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ASCA-1 UPDATE ON PAEDIATRIC CARDIAC ANAESTHESIA

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Pediatric cardiac anesthesia is rapidly changing because of technologic advances in monitoring equipment, innovations in surgical techniques, new pharmacology therapies, improvement in cardiopulmonary bypass and myocardial preservation. "Fast track" care plans in which patients progress rapidly from preoperative preparation through surgery to early discharge have become commonplace for uncomplicated congenital lesions. Key factors in the success of the "Fast Track" are admission on day of surgery, fentanyl-vecuronium-midazolam infusion anesthesia, adequate myocardial protection, systemic steroids, transesophageal echocardiographic evaluation of repair, and good postoperative pain control. Interventional cardiac catheterization continues to be perfected for ablation of accessory pathways in the heart, valvuloplasty, and closure of patent ductus/septal defects.

Many techniques applied in adult patients are utilized in children such as preoperative autologous blood donation and use of physiologic and pharmacologic adjuncts to minimize blood transfusions. Miller and coworkers demonstrated that the only predictors of post bypass bleeding in pediatric patients were duration of bypass and patient weight.

Conventional or modified ultrafiltration are used in most pediatric procedures to control fluid balance, remove inflammatory mediators, improve organ function (particularly heart and lung) post bypass, and reduce transfusion requirements. Current recommendations for management of profound hypothermia and circulatory arrest are 20 - 30 minutes of cooling prior to arrest, cool using pH-stat strategy, maintain with (-stat, maintain hematocrit of $\approx 30\%$, reperfuse for 10 - 15 minutes with cold, then rewarm to only $34 - 35^{\circ}\text{C}$, use of ultrafiltration. Low flow of 7ml/kg/min is preferable to circulatory arrest if possible.

Adverse events complicating postoperative care are associated with duration of bypass > 150 minutes, arterial hypotension, and increased blood lactate concentrations.

ASCA-2 INTRAOPERATIVE ASSESSMENT OF CONGENITAL HEART

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In many medical centers, TEE is now the standard of care for intraoperative assessment of most congenital heart repairs. Intraoperative echocardiography clearly has significant perioperative impact in the care of infants and children undergoing surgical repair of congenital heart disease. Diagnoses can be confirmed preoperatively, or altered and the surgical plan can be revised. Residual defects can be immediately detected after bypass and corrected before the patient leaves the operating room. The overall incidence of change in surgical management due to intraoperative TEE is 7% in our series and others. In all cases, TEE can be used to assess global left ventricular function indirectly by measurement of cardiac output, stroke volume, or ejection fraction. In particular, TEE has been shown to be a reliable monitor of cardiac filling changes in pediatric patients. Serious complications from TEE are very rare but hemodynamics and respiration must be closely monitored during TEE. Blood pressure generally remains stable but can drop precipitously if anteflexion or retroflexion compresses the aorta. Respiratory compromise, right mainstream intubation and extubation of the trachea can occur. For all the above reasons, we recommend frequent monitoring of the peak inspiratory pressures and arterial pressure throughout the TEE examination. TEE has become a valuable adjunct to intraoperative anesthetic and surgical management in this area of cardiac surgery.

ASCA-3 ANAESTHETIC MANAGEMENT OF ARTERIAL SWITCH OPERATION

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Until now, open heart surgery for the repair of congenital heart disease is associated with high morbidity and mortality. The major problems associated with these procedures include technical difficulty, pump failure, respiratory failure, volume overload, coagulopathy, hypothermia and renal failure. It behooves, therefore, that the team taking care of these critically ill children are aware of the pathophysiological effects of congenital cardiac malformations on the overall cardiopulmonary functions.

Newborns with transposition of the great arteries who need to undergo arterial switch operation during the first few days or weeks of life offer the greatest challenge to the cardiovascular anesthesiologist. The urgency of the procedure means that life may be incompatible unless there is an intercommunication that exists between the two parallel circuits and that early surgery is done to avoid further increase in pulmonary resistance as the newborn grows older.

Anaesthetic Management

Anesthetic plan for the infant with complex congenital anomaly is focused on the following factors:

1. Safe anesthesia
2. Maximum cardiac protection
3. Maintenance of stable hemodynamics
4. Adequate monitoring
5. Postoperative care

Atropine sulphate may be all that is needed before induction of anesthesia. Anesthetic technique is primarily narcotic based. Fentanyl pancuronium bromide with or without isoflurane are the anesthetic agents of choice.

Continuous monitoring of the following parameters are mandatory

- Electrocardiography
- Capillary pulse oximetry
- Capnography
- Intra-arterial blood pressure
- Central venous pressure
- Temperature
- Urine output

Postoperative Management

One goal of anesthetic management is focused on an adequate cardiorespiratory support. Since patients are treated with a moderate dose of opioids delayed extubation is the rule of thumb. Sedation and pain relief is achieved with a continuous infusion of morphine sulphate.

ASCA-4 ASSESSMENT OF COAGULATION DURING CARDIOPULMONARY BYPASS

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Understanding normal coagulation, its regulation, and the genesis of pathophysiologic processes is necessary in order to make clinical decisions and institute appropriate therapy in the operating room. Assessment of coagulation function during cardiopulmonary bypass is dependant upon a knowledge of the patients' pre-existing hemostatic reserve, the current and future hemostatic challenges this patient will encounter, the use of anticoagulant and antifibrinolytic agents, the objective assessment of the surgical field and associated blood loss, and the appropriate interpretation of various laboratory tests of coagulation, platelet and fibrinolytic activity. The implementation of user-friendly laboratory-guided transfusion algorithms will continue to improve patient care and reduce unnecessary transfusion of blood products.

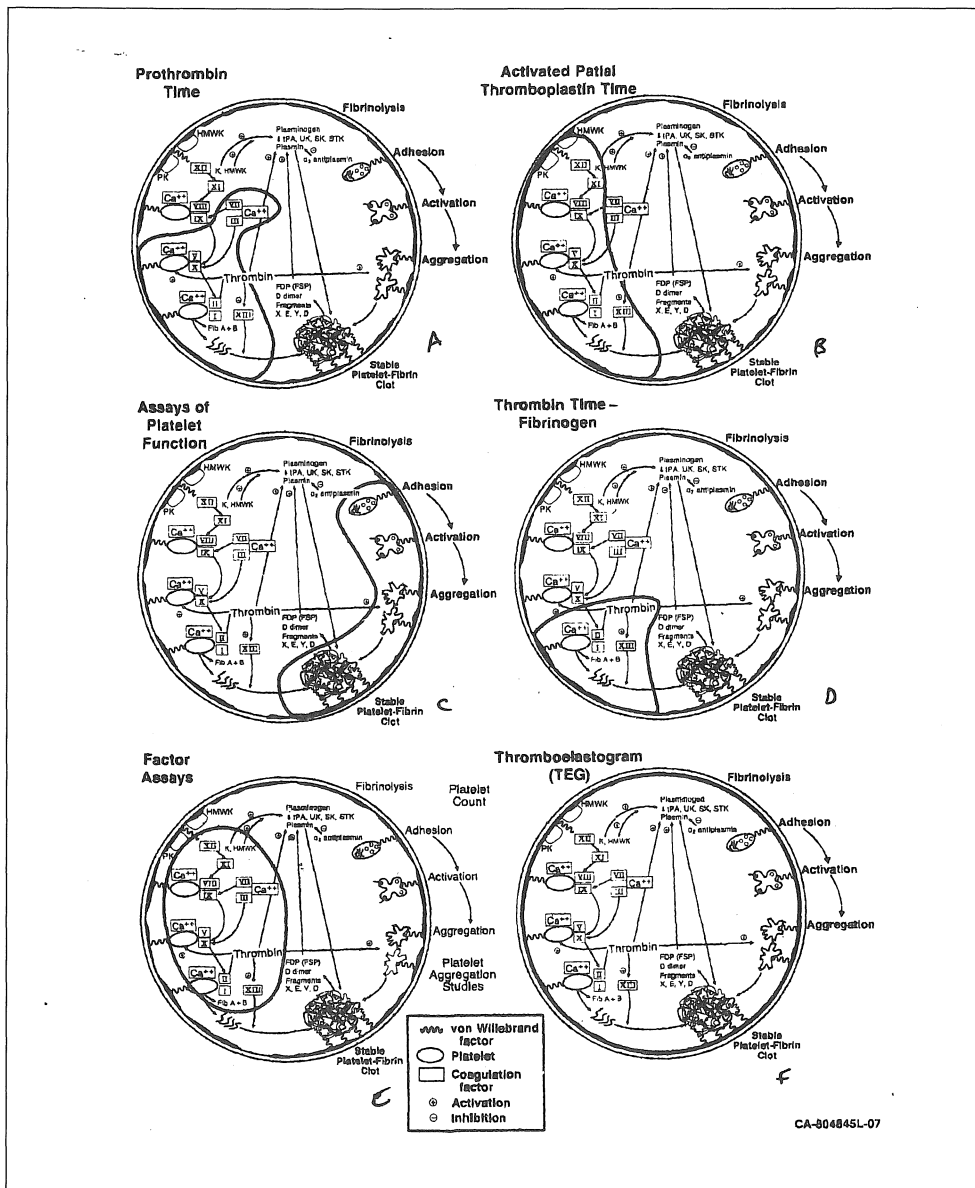


Figure: Coagulation and Platelet Function Assays

ASCA-5 BIOCOMPATIBILITY OF CARDIOPULMONARY BYPASS

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The lack of adverse biological response from the biomaterial and the absence of harmful effects in actual clinical applications (biocompatibility) are required all medical devices. Especially in the devices, which contact arterial or venous blood flow, the blood-material interactions such as activation of coagulation system, platelet, complement, or leukocytes and destruction of blood cells, should be minimal (hemocompatibility).

CPB induces a whole-body inflammatory response that leads to postoperative lung and heart dysfunction. Suggested causes of this CPB-induced inflammatory response include blood-material interactions, development of ischemia and reperfusion, and endotoxemia. Complement activation through the alternate pathway may play a central role in the inflammatory response, leading to subsequent activation of both humoral and cellular mediators of inflammation. Although warm heart surgery is frequently performed because of the excellent myocardial protection, peripheral vasodilation during normothermic CPB could be mediated by temperature-dependent cytokine production.

To attenuate the systemic inflammatory response, a variety of therapeutic interventions including medications, leukocyte filtration, and development of biocompatible CPB circuits have been investigated.

ASCA-6 CARDIAC ASSIST DEVICES

R G Walsh, Royal Prince Alfred Hospital, Sydney, Australia

In the broadest sense, cardiac assist devices range from the simple pacemaker to prolonged cardiopulmonary bypass perfusion (CPBP). This presentation considers the many practical (and some impractical!) technologies between these extremes.

Indications for use of cardiac assist devices in gross heart failure include unsuccessful maximal medical treatment not associated with planned surgery, "prophylaxis" prior to and during major surgery, failure to wean from CPBP in the surgical patient, failure of maximal pharmacological therapy in the post-operative period, and a "bridge to transplantation". Indications for use of such devices have become clearer with the widespread use of trans-oesophageal echocardiography (TOE).

Most commonly employed devices are the intra-aortic balloon pump (IABP) and partial ventricular bypass devices - the latter being the right or left ventricular assist device (RVAD or LVAD) and the bi-ventricular assist device (BiVAD). Despite its long history of use, the IABP maintains its prime place, particularly as technological refinements make application safer and more effective.

Over the past three decades, many devices and techniques have been proposed, applied and usually abandoned. Some linger on with limited use and questionable benefit, and often at great expense. This group includes "artificial hearts", aortic root propulsion devices, myocardial wrap procedures with skeletal muscle, and many others.

Ethical considerations are relevant, particularly for anaesthetists who should be regarded as a third party in decisions. The future will continue to see development of newer techniques and devices as much money continues to be poured into seeking cures for the desperately failing heart.

ASCA-7 POST BYPASS ORGAN DYSFUNCTION

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(Abstract not available at the time of printing)

ASCA-8 ANAESTHESIA FOR MINIMALLY INVASIVE SURGERY

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Minimally invasive cardiac surgery minimizes overall trauma, pain and blood loss, thus promoting more rapid recovery. However, the length of hospital stay is usually 5 - 6 days. Techniques include video-assisted surgery using cardiopulmonary bypass, minimal-assess coronary grafting on a beating heart without cardiopulmonary bypass, and endovascular bypass, Port-Access techniques. The technical demands placed upon both the anesthesiologist and surgeon by these techniques are substantial with preparation times of up to two hours.

The anesthesiologist must insert catheters into the pulmonary artery (PA) and the coronary sinus. Monitoring systemic arterial and venous flow through femoral artery and vein to ensure adequacy of perfusion is critical. Transesophageal echocardiographic monitoring is absolutely critical to ensure optimal ventricular function, indicating absence of myocardial ischaemia after coronary grafting, and normal valvular function after valve repair/replacement. For endovascular bypass a system of three catheters and two cannulas which drain venous blood from the right atrium, return oxygenated blood to the peripheral arterial circulation, provide aortic occlusion, vent the pulmonary artery and aortic root, and deliver cardioplegia solution to the coronary circulation is used. The venous cannula is placed via the femoral vein while the arterial cannula is placed into the femoral artery. The femoral artery is also the site for introduction of an endoaortic clamp catheter to occlude the aorta like an aortic clamp. It also allows administration of cardioplegia into the aortic root and measurements of the aortic root pressure. The PA vent and coronary sinus catheters are placed via the internal jugular vein. A minithoracotomy usually at the fourth left intercostal space provides access to the heart for coronary grafting while a limited right thoracotomy is performed for mitral valve surgery. Despite their success, technical, time-consuming details and questions about coronary graft quality have tempered widespread acceptance.

ASCA-9 POSTOPERATIVE MANAGEMENT AFTER THE FONTAN PROCEDURE

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(Abstract not available at the time of printing)

ASCA FP-1 PROGRAMMED CELL DEATH (APOPTOSIS) AFTER CARDIOPULMONARY BYPASS

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Introduction

Apoptosis is a physiological, genetic driven cell death, released by many external or internal factors¹. There is no information yet about the presence of apoptosis following a cardiopulmonary bypass (CPB). The purpose of the study has been the detection of apoptosis in cells of the heart and pulmonary tissue and leucocytes of the blood and their young forms from bone marrow in an animal model of CPB. Secondly, we tried to find a difference in activation of apoptosis between two types of CPB.

Methods

38 minipigs were used. 10 controls had a standard 3hr CPB at 28°C; 10 had prebypass plasma+platelet+leucocyte apheresis to decrease proinflammatory agents. 18 animals were excluded from this study due to surgical bleeding, incomplete data and postop complications (anemia, hypothermia, mechanical ventilation related hypoxia). Heparin 3mg/kg was given, a bubble oxygenator was used and the aorta was clamped for 2hr using St. Thomas cardioplegia. Tissue samples were taken after opening the thorax, after CPB and after stopping the experiment (5th postop day). DNA fragmentation was used for the detection of tissue apoptosis and TUNEL test for a blood elements apoptosis².

Results

There was more DNA fragmentation after CPB in myocardium (table) but none in pulmonary tissue. Apoptosis in leukocytes was found in all samples with maximum after the end of CPB. Postoperatively there was a peak of difference in apoptosis between the control and apheretic group.

Discussion

Genetically programmed cell death is activated during CPB in myocardium, leukocytes and their young forms from bone marrow. Myocardial apoptosis is likely due to temporary ischemia and reperfusion because there was no apoptosis in the pulmonary tissue. Leukocyte apoptosis was caused by its enhanced inflammatory turnover, correlated with its amount and activation (superoxide radical production and protease activity). The importance of myocardial apoptosis after CPB remains to be clarified.

| Percentage of Animals with Myocardial Apoptosis | | |
|---|---------|-----------|
| | Control | Apheretic |
| Prior CPB | 0 | 10% |
| Post CPB | 80% | 70% |
| 5th Postop Day | 10% | 0 |

ASCA FP-2 STUNNED MYOCARDIUM AFTER NONCARDIAC SURGERY AFFECTS FEMALES PREDOMINANTLY?

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Objective

The aim of this study was to determine the incidence and risk factors of stunned myocardium after noncardiac surgery.

Methods

At our institution, 5,289 patients greater than 30 years of age admitted to the intensive care unit (ICU) following noncardiac surgery from January 1993 to December 1998. On arrival in the ICU a blood pressure cuff or a radial artery catheter, ECG leads, and a pulse oximeter were placed and monitored. Stunned myocardium was defined as ischemic changes on ECG including new ST-T alterations, ST segment depression or elevation >0.1 mV, minimal elevation of creatine kinase-MB (CK-MB) concentrations (CK-MB $<4\%$ of total CK) and reversible wall motion abnormalities such as hypokinesis, akinesis or dyskinesis by transthoracic echocardiography (TTE).

Results

Twelve patients (0.2%) developed stunned myocardium. The onset was intraoperative in 3 patients, and postoperative in 9 patients including 6 within 6 hours, 1 at 6 to 12 hours and 2 at 12 to 18 hours after admission to the ICU, respectively. All were female with no known coronary artery disease and mean age was 67.4 years. Stunned myocardium was asymptomatic in all patients. The mean peak levels of CK-MB after surgery was 18.9 IU while wall motion abnormalities were observed on the area corresponding to ECG changes. The mean duration to restore normal contractile function of hypokinetic or akinetic ventricular wall segment was 10.5 days. Coronary artery disease has not manifested up to the present. All patients were given general anesthesia with inhalation anesthetic (sevoflurane in 11, isoflurane in 1), fentanyl and vecuronium. Changes in mean arterial pressure in the postoperative period was within 25% of the preoperative value. The maximum increase in heart rate was 41.9% intraoperatively and 27.9% postoperatively, as compared with the preoperative value. The maximum increase in postoperative body temperature from the preoperative value was 1.2°C.

Conclusions

It was remarkable that stunned myocardium occurred in female gender alone. Intraoperative hemodynamic instability and shivering at emergence from anesthesia might have led to myocardial stunning.

ASCA FP-3 EFFECTS OF MILRINONE ON THE SYSTEMIC AND PULMONARY HAEMODYNAMICS IN PATIENTS WITH PULMONARY HYPERTENSION UNDERGOING OPEN HEART OPERATIONS

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Objective

The hemodynamic properties of milrinone seem suitable for improving pulmonary hemodynamic indices and right ventricular dysfunction in patients with pulmonary hypertension. Effects of milrinone on systemic and pulmonary hemodynamic indices were evaluated in patients with pulmonary hypertension.

Methods

With IRB approval, 15 patients with pulmonary hypertension (PH) whose mean pulmonary arterial pressure (mPAP) was greater than 25mmHg consented to participate in this study. Under the steady state of anesthesia with fentanyl, hemodynamic variables including heart rates, systemic arterial pressure, PAP, cardiac output were measured as control values. Patients were received milrinone by bolus loading dose (50µg/kg) over 10 minutes and followed by a continuous infusion of 0.5µg/kg/min for 30 minutes. Hemodynamic variables were measured at 10 minutes and 30 minutes after the start of the continuous infusion.

Results

There were decreases in PAP, pulmonary vascular resistance indices (PVRI) and improvement of cardiac index after administration of milrinone.

Hemodynamic Responses to Milrinone (mean ± SD)

| Variables | Control | 10 min ^a | 30 min ^b |
|-----------|-------------|---------------------|---------------------|
| CI | 2.4 ± 1.3 | 2.9 ± 1.6 | 3.1 ± 1.7 |
| MAP | 80.9 ± 1.3 | 69.1 ± 9.0 | 71.9 ± 11.3 |
| PAP | 35.6 ± 11.2 | 30.9 ± 10.9 | 32.6 ± 13.2 |

CI: cardiac index (l/min/m²); MAP: mean systemic arterial pressure (mmHg); PAP: mean pulmonary arterial pressure (mmHg); ^ap<0.01 compared with control; ^bp<0.05 compared with control.

Conclusions

Persistence of an PH may cause right ventricular (RV) failure and low output syndrome postoperatively. Milrinone was found very beneficial for RV failure with PH because it reduced PAP without systemic hypotension and also increased cardiac index (CI) slightly.

ASCA FP-4 MODIFIED ULTRAFILTRATION IN NEONATAL OPEN HEART SURGERY

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Introduction

CPB (Cardiopulmonary Bypass) has been reported to provoke inflammatory responses. Neonates are vulnerable to the released inflammatory mediators and might result in multiple organ dysfunction.

Methods

Objectives were 20 consecutive neonates (1 - 23 days) with either TGV (Transposition of the Great Vessels) or TAPVD (Total Anomalous Pulmonary Venous Drainage). The latest 10 {9DUF (Dilutional Ultrafiltration) + MUF, 1 CUF (Conventional Ultrafiltration) + MUF} underwent MUF and 10 in non-MUF (8 DUF, 2 CUF) did not. In the MUF group, various parameters were compared at pre, just after and 30min after CPB. The comparison between groups was also conducted.

Results

Although MUF raised mean arterial pressure (from 36.5 to 47.4 mmHg) and Ht (Hematocrit) value (from 28.6 to 44%) at just after CPB, it reduced esophageal temperature significantly. Oxygenation could not be improved significantly.

MUF group required postoperative peritoneal dialysis less frequently than non-MUF group (30% vs 80%)

Discussion

It was confirmed MUF improved cardiac performance in neonates. The increase in mean arterial pressure may be due to the elevation of Ht and the elimination of cardiodepressive cytokines. It was noted that MUF in neonates would have a protective effect on renal function against SIRS (systemic inflammatory response syndrome).

ASCA FP-5 SURVEY ON THE USE OF INTRAOPERATIVE TRANSESOPHAGEAL ECHOCARDIOGRAPHY AT THE NATIONAL HEART INSTITUTE, KUALA LUMPUR

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Introduction

Transesophageal echocardiography (TEE) was introduced in our Institute in 1997 and its usage has had a major influence in our practice of cardiac surgery.

Objective

This survey was conducted to evaluate patient characteristics and clinical conditions in which TEE usage was deemed most relevant.

Methods

Retrospective chart review and review of our database were conducted to gather information on all intraoperative TEE examinations conducted between 1/3/97 and 28/2/99. A single echocardiography machine (Hewlett Packard Sonos 1000) was used for the examinations and the omniplane probe used was only suitable for patients weighing 20kg or more.

Results

A total of 201 intraoperative TEE examinations were performed which represented 8.4% of the total number of adult 'open-heart' surgeries performed. Their ages ranged from 8 years to 76 years. The racial and sexual distribution was according to the norm seen in our Institute. TEE was utilized in the following: (a) mitral/aortic valve replacement 75 patients (37.3%); (b) mitral/aortic valve repair 56 patients (27.9%); (c) coronary artery surgery 33 patients (16.4%); (d) aortic root/aneurysm surgery 13 patients (6.5%); (e) miscellaneous 57 patients (11.9%). The examinations were conducted by staff anesthesiologists. However, a cardiology consultation was made in the presence of any difficult interpretations. No significant complications were reported.

Conclusions

Intraoperative TEE examinations played a pivotal role in ensuring good outcomes in certain types of surgery. We feel that its role will increase as both anesthesiologists and surgeons become more familiar with this tool.

ASCA FP-6 THE EFFECTS OF RETROGRADE CARDIOPLEGIA ON RIGHT VENTRICULAR FUNCTION IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFT SURGERY

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Objective

For myocardial protection, the retrograde cardioplegia perfusion applied in coronary artery bypass graft (CABG) or aortic valvular surgery has been known to protect the right ventricle (RV) inadequately. We evaluated the effects of retrograde cardioplegia on postbypass RV function in CABG patients.

Methods

With approval of IRB, 44 patients undergoing CABG were prospectively studied. Among 44 patients 30 patients with significant stenosis of the right coronary artery (RCA) had a graft of RCA. The RV function was assessed with a right ventricular ejection fraction / volumetric catheter before induction, before and after CPB, and after sternum closure.

Results

Right ventricular ejection fraction (RVEF) and RV stroke work index (RVSWI) decreased after CPB without significance in both groups.

| Group | Hemodynamics | pre-induction | pre-CPB | post-CPB |
|-------------------|--------------|---------------|---------------|--------------|
| Control (n=14) | HR | 66.3 ± 10.8 | 66.8 ± 14.6 | 85.4 ± 9.2*# |
| | RVEF | 46.8 ± 10.8 | 45.2 ± 11.8 | 43.9 ± 9.7 |
| | RVSWI | 9.1 ± 3.8 | 5.9 ± 2.7* | 4.3 ± 1.6* |
| | PVRI | 144.3 ± 48.1 | 202.1 ± 157.1 | 161.7 ± 88.7 |
| G (n=30) | HR | 66.4 ± 16.0 | 66.5 ± 12.9 | 85.4 ± 11.3# |
| | RVEF | 43.7 ± 11.8 | 42.8 ± 11.3 | 42.8 ± 10.4 |
| | RVSWI | 8.4 ± 5.0 | 6.3 ± 4.2 | 5.2 ± 2.1 |
| | PVRI | 162.2 ± 107.5 | 180.1 ± 85.5 | 172.2 ± 60 |

G: right coronary graft group; *p<0.05 compared with pre-induction; #p<0.05 compared with pre-graft CPB

P-1 (ASCA) THE COMPARATIVE EFFECT OF FENTANYL VERSUS ISOFLURANE ON SPLANCHNIC HYPOPERFUSION INDUCED BY HYPOTHERMIC CARDIOPULMONARY BYPASS

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Derangement of splanchnic perfusion commonly occurs during cardiac surgery and intestinal mucosal ischemia is postulated as a factor of increasing morbidity. Intramucosal pH (pHi) has been known as a reliable monitor of splanchnic perfusion. Isoflurane has been considered the choice of anesthetics where preservation of blood flow is required. This study is aimed to compare the effect of two anesthetics for cardiac surgery (isoflurane vs. fentanyl) on the splanchnic perfusion during hypothermic cardiopulmonary bypass (CPB). Twenty-four patients undergoing cardiac surgery were randomized divided into two groups and anesthetized with fentanyl (n=12) or isoflurane (n=12). Intramucosal CO₂ tension (PrCO₂), arterial blood gas and hemodynamic variables were measured. The patient's temperature was maintained about 28°C during CPB and arterial pH was managed by alpha-stat mode. Measurement was made at: (1) baseline, after induction of anesthesia, (2) 30 minutes of CPB, (3) 60 minutes of CPB, (4) the end of CPB, (5) 1 hour after CPB, and (6) 24 hours after CPB. The pHi decreased significantly during CPB and maintained the decreased state for postoperative 24 hours in both groups. The pHi in isoflurane group decreased more significantly than in fentanyl group. The PrCO₂ increased significantly during CPB and maintained the increased state for postoperative 24 hours in both groups. The PRCO₂ increased earlier in isoflurane group. The difference between arterial and intramucosal CO₂ tension (CO₂ gap) increased significantly at the end of CPB and maintained the increased state for postoperative 24 hours. The hemodynamic and demographic data were similar in both groups. We conclude that the reduction of splanchnic perfusion induced by hypothermic CPB is greater in isoflurane group and isoflurane has less effect on the preservation of splanchnic perfusion during cardiac surgery comparing to fentanyl.

P-2 (ASCA) DEVELOPMENT OF COLLOIDS FOR USE IN TRAUMA

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Trauma is considered the leading cause of mortality in adults up to the age of 45 years. Clinical prognosis of multiple trauma shows 50% immediate death within minutes (A), 30% of deaths due to irreversible shock within 4 hours (B) and 20% primary survivors (C) (ZANDER 1993). Traumatic shock decreases blood volume, cardiac output (CI), oxygen delivery (DO₂) and oxygen consumption (VO₂) and induces organ failure and death. Early treatment with artificial colloidal solutions (HAES) in the ambulance, emergency room, during operation and in the ICU is most effective in preventing accumulation of oxygen debts in trauma patients. Colloidal solutions useful for trauma patients in preclinical and clinical settings are HAES-Steril 6%/10% (H) volume efficacy 100%/145% initial volume effect and 4 - 8 hours duration and Plasmasteril 6% (HAES 450/0.5) (P) volume efficacy 100% and 8 - 12 hours duration. Hemodynamic and O₂ transport effects have been tested in trauma patients in prospective clinical trials with HAES-Steril (H) and Plasmasteril (P):

| Investigator | Year Indic | Dosage | CI | DO₂ | VO₂ |
|---------------------|-------------------|---------------|-----------|-----------------------|-----------------------|
| H HANKELN | 1989 Trauma | 800ml | 4.3/5.3 | 634/224 | 158/203 |
| H WAXMAN | 1989 Burns | 500ml | 5.0/6.8 | 837/1024 | 209/264 |
| H BOLDT | 1996 Trauma | 1230ml | 3.7/4.7 | 522/650 | 137/158 |
| P BISHOP | 1995 Trauma | 1915ml | 4.5/5.2 | 655/779 | 163/158 |
| P SCHILLER | 1992 Burns | 720ml | 3.2/5.7 | - | - |
| P PURI | 1983 Trauma | 2577ml | 2.7/3.9 | 422/601 | 273/299 |

HAES-steril and Plasmasteril raised CI, DO₂ and VO₂ to supranormal values in these clinical trials. Morbidity and mortality of trauma patients was significantly reduced by early titration with HAES: BISHOP (1995) observed significant reduction of organ failures per patient (from 1.62 to 0.74) and of mortality (from 37% to 18%) in trauma patients in the protocol group (n=50) which were treated to supranormal values of CI, DO₂, VO₂ within 24 hours as compared with patients of the control group (n=65). The protocol group patients received sign. larger volumes of fresh frozen plasma, HAES and albumin 5% than the control group patients. SCHILLER (1996) found a significant reduction of mortality from 48% to 10% in patients suffering from severe burn trauma (BSA 40 - 42%) which were treated early to supranormal values of CI, DO₂, VO₂. Conclusion: HAES-steril and Plasmasteril are effective colloidal plasma substitutes for use in trauma, which improve haemodynamics, oxygen transport, organ function and outcome.

P-3 (ASCA) PLUGGING CAPILLARY LEAK

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Escape of plasma volume through capillary leak (CL) or increased permeability to plasma proteins is responsible for failure of fluid therapy to maintain blood volume in severe shock states. CL leads to hypovolaemia, peripheral and pulmonary edema including ARDS to arterial hypoxaemia and haemorrhagic shock. Measurements of CL are not available but must be inferred clinically. Many clinicians withhold fluid therapy, especially colloids in order to avoid CL. An alternate view is that CL is not an all or none phenomenon but rather starts only in the middle (3 - 5 days postop.) or late stage in critically ill patients and gradually increases to the terminal stage where it leads to lethal hypovolaemia unresponsive to fluid therapy. Low flow in the intraoperative was identified as the cause of oxygen debt, tissue hypoxia, organ failure, CL and death. (SHOEMAKER 92, 93). Hypovolaemia is the most common cause of low flow but is also the most easily correctable. For the critically ill high risk postoperative patients early and vigorous volume therapy without exceeding PAOP-values of 20mmHg is the first and most important therapy to achieve optimal goals of cardiac index (CI), oxygen delivery (DO₂) and oxygen consumption (VO₂). It is easier to reach these goals with colloids than with crystalloids which overexpand the interstitial space. Hydroxyethylstarch (HAES) solutions increase CI, DO₂ and VO₂ most effectively in hypovolaemia patients with severe surgery trauma, sepsis or burns. Oxygen debt, capillary leak, organ failure and mortality was reduced significantly when HAES and albumin were used to titrate CI, DO₂, VO₂ values early (< 8hrs postop.) to supranormal values (SHOEMAKER 88; BISHOP 95, TUCHSCHMIDT 92, SCHILLER 95, HANKELN 89, 90, LONDON 89, RACKNOW 89, WAXMAN 89). Hydroxyethylstarch may also plug capillary leaks due to a specific pharmacologic sealing effect: Recent studies by ZIKRIA 89 in a burn induced model of endothelial injury in rats revealed that HAES 200/0/5 (pentafraction) plugged the leaks more effectively, than did albumin. Significant sealing effects were also registered in experimental models with coronary occlusion (TANAKA 93) and sepsis (TRABER 92). Early and vigorous volume therapy with HAES 200/0.5 to optimal values of CI, DO₂ and VO₂ may therefore prevent capillary leaks in high risk patient with severe surgery, trauma, sepsis or burns and should plug capillary leaks, once they occur in critically ill patients in the middle or late stages of their disease.

P-4 (ASCA) HIGH THORACIC EPIDURAL ANAESTHESIA (TEA) FOR CARDIAC VALVULAR SURGERY

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Introduction

High thoracic epidural anaesthesia has been shown to provide excellent hemodynamic stability and perioperative analgesia after coronary artery bypass grafting (CABG) and it has been suggested that regional anaesthesia may beneficially affect the outcome of patients undergoing CABG surgery through cardiac sympathectomy and cardiopulmonary bypass-related stress response attenuation. In addition, earlier reports suggested that the technique would improve early postoperative lung function and that earlier extubation was possible due to the clearer sensorium and excellent analgesia associated with this method. High thoracic epidural anaesthesia has never before been used in patients undergoing valve replacement. We have used the method routinely for all kinds of adult cardiac surgery. A prospective study was carried out to evaluate hemodynamic stability, time to extubation and short term outcome in 43 consecutive patients undergoing valvular replacement.

Methods

An epidural catheter was inserted at the T2-T3 interspace on the day before surgery. Epidural analgesia was induced with bupivacaine 0.5% plus sufentanil 1:200.000 and was maintained with bupivacaine 0.25% plus sufentanil 1:1000.000. The catheter was removed on the 4 - 5th day.

Results

Heart rate, mean arterial blood pressure, stroke volume index and cardiac index did not vary significantly during the perioperative period (8hrs). Median extubation time was 6hrs. Mortality (30 days) 2.3% (one patient). No serious adverse events related to TEA were noted.

Conclusions

These results suggest that TEA for cardiac valvular replacement surgery is a safe method and provides hemodynamic stability in the perioperative period. Early extubation and mobilisation may improve outcome in patients undergoing cardiac valve replacement.

P-5 (ASCA) AN INCREASE IN MACROPHAGE MIGRATION INHIBITORY FACTOR (MIF) RELEASE IN PATIENTS WITH CARDIOPULMONARY BYPASS SURGERY

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Objective

To determine the macrophage migration inhibitory factor (MIF) responses to cardiopulmonary bypass (CPB) surgery as well as to investigate their roles to predict patient outcome.

Design

Prospective, observational, cohort study.

Setting

Intensive care unit (ICU) in a university hospital.

Patients

Thirty patients undergoing cardiovascular surgery with CPB received 10mg/kg betamethasone immediately before the CPB.

Interventions

None.

Results

Blood samples were obtained serially for 24 hours and assayed for MIF, cortisol, and tumour necrosis factor- α (TNF- α). TNF- α release could not be detected during the study period. The MIF and cortisol levels were elevated before CPB and peaked at the end of CPB (57.5 ± 4.8 ng/ml), and at the end of surgery (507.7 ± 44.1 nmol/l), respectively. Peak MIF levels correlated with aortic cross clamp time ($r^2=0.183$, $p=0.0182$, $n=30$), but did not show any significant correlation with peak cortisol levels. All patients were discharged from hospital. Massive MIF production during CPB had no influences on both the length of ICU stay and organ dysfunctions after surgery.

Conclusions

Our findings demonstrate that MIF production occurs in patients with CPB surgery. Under the condition where high dose steroids are administered, high MIF levels minimally affect for patients morbidity and outcome after CPB surgery.

P-6 (ASCA) Central venous catheterisation performed with an insertion needle with a built-in ultrasound probe

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Introduction

Central venous catheterization was performed with an insertion needle with a built-in ultrasound probe (PD access). The results will be reported.

Methods

Forty patients necessitating central venous catheterization were studied. A new insertion needle was used in group A (n=20), and a used insertion needle in group B (n=20). A 22-G metal needle containing an ultrasound probe was used, and the time from the beginning of insertion to the completion of guide wire insertion was determined. A needle is attached to a 5-ml glass syringe containing heparin-added physiological saline, and the needle filled with saline (by pressing the syringe plunger). A needle is inserted subcutaneously at the site of the apex of a triangle formed by the clavicle, and the heads of the sternum and clavicle of the sternocleidomastoid muscle. The tip of the needle inserted subcutaneously is moved to the right and left in a fan formation, and the sound of the vein and the artery then identified. As the needle is advanced toward the point where the most intensive sound of vein is heard, the presence or absence of backflow, and loss of the venous sound are detected. At this site, after the syringe plunger is pulled out and backflow confirmed, a guide wire is inserted.

Results

Catheterization was successful in both groups A and B. The time needed for insertion ranged from 25sec to 145sec. The sound of artery and vein was able to be differentiated in all patients except one. No error of arterial puncture or hematoma was observed. Although venous sound was audible, the backflow of venous blood was not observed in 5 patients in group B in which a used needle was used.

Discussion

Various trials, including ultrasound-guided procedures, and the use of a modified insertion needle, for attaining safe and successful central venous catheterization have been reported. The present method is safe because the needle is inserted with the guidance of venous sound heard continuously. However, the needles are reused because of the high cost. A used needle with its blunt tip can press the vascular wall easily to cause vascular puncture, leading to complications of hematoma and pneumothorax. The needles should be replaced each time in order that catheterization can be performed safely. We are in the process of developing a new type of needle.

P-7 (ASCA) CONVENIENT CANNULAS FOR INTRAVENOUS CATHETERISATION EVALUATED BY THE PATTERN OF CHANGES IN PENETRATION FORCE (COMPARISON BY PENETRATION SPEED)

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Introduction

Using a self-invented experimental unit, changes in the penetration force of six types of cannulae containing an 18-gauge needle used for indwelling intravenous catheterization at different penetration speeds were measured, and the results were compared.

Methods

The cannula for indwelling intravenous catheterization is composed of a needle and catheter, and classified into two groups, lancet type (Group A) and back-cut type (Group B) according to the techniques of grinding the needle point.

A cannula (a needle and a catheter) affixed to a push-pull gauge was moved at the speed of 13.3mm/sec and 3.3mm/sec with a motor, and changes in the penetration force while the needle was being inserted at an angle of 45° into a 0.04mm thick polypropylene film and while the needle and the catheter were passing through said film.

Results and Discussion

With four kinds of lancet-type cannulae, the penetration force was decreased when the penetration speed was increased. With two kinds of back-cut type cannulae, penetration force needed was smaller than that with any of the lancet-type cannulae, and showed no changes depending on alterations to the penetration speed. Therefore, we consider that back-cut cannulae are superior to the lancet type in clinical use.

PL-1 ANAESTHESIOLOGY IN THE NEXT MILLENNIUM: PERSPECTIVES FROM A JOURNAL EDITOR

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To attempt a prediction as to the structure and function of our specialty in the next millennium is a daunting task. The future of medical publications in the next 10 to 20 years seems obvious and very predictable. All major journals will have full text on-line availability within the next two years, which has the advantages of lower cost, rapid and nearly universal access, multimedia possibilities, and hypertext linking to references. The impact on the standard written journal is difficult to ascertain but will be discussed. Major changes in our specialty will include increased reliance on technology with regard to the anesthesia workstation, and the practice of anesthesia. There will be national and international databanks on our individual practices and the anesthesia workstation will be voice-activated and integrated with all other in-patient and outpatient functions of a given patient. Our competency as an individual anesthesiologist will be continually evaluated, namely with the use of computer generated programs and simulators. There will be continued receptor and ion channel research, which will be at the bedside in the next few years. We will have a genetic mapping of every patient, which will define prospectively what their response variability will be to the various anesthetic drugs. The need to have specific skills with regard to regional anesthesia will be attenuated with the development of receptor specific drugs, which can be transmitted to the site of action via dermal application. Molecular biology and the neurosciences will be responsible for defining new therapeutic approaches and provide intracellular continuous non-invasive monitoring of the well being of a particular patient. Lastly, we need to know how well we are delivering anesthesia care (outcomes). More sophisticated computer models will require fewer data and less reliance on large multi-institutional studies. From a political and conceptual point of view, our specialty needs to assume responsibilities in medicine other than just the operating room anesthesia. We currently do not have a mechanism by which our specialty can plan its fate for the next 20 to 40 years. It will be discussed whether such a plan is possible and/or necessary.

S1-1 CHALLENGES IN ANAESTHESIA FOR AMBULATORY SURGERY

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Ambulatory surgical procedures represent a large and increasing fraction of surgery being performed throughout the world. Data from the USA show that the percentage of outpatient surgery was 69% in 1996. We are seeing the continuing shift of more complex operations and procedures from the inpatient hospital to hospital-based ambulatory surgery units, freestanding ambulatory surgery centers, and surgeons' offices.

Anesthesia which is specifically tailored for ambulatory surgery involves a multi-component integrated approach. Good perioperative education facilitates patients' cooperation and satisfaction. The patient has become the focus of the ambulatory surgical experience, and should be invited to participate in all decisions which are not truly medical judgment issues.

Anesthesia which is tailored for ambulatory surgery also requires a new approach to the drugs used, with a focus on the minimizing the postoperative side effects of anesthetic drugs. Specialized ambulatory anesthesia also includes an increased awareness of the cost of the entire patient care visit.

Most importantly, the growth of ambulatory surgery anesthesia is tied to anesthesiologists' desire to improve the quality of anesthesia care. Such an anesthetic must have a smooth onset and good intraoperative conditions. All phases of recovery must be rapid, starting with early wake-up, through the intermediate recovery phases which lead to discharge from the facility, and continuing with late recovery which culminates in the patient's return to normal function. Side effects or discomforts must be few and have limited duration. The prompt return to normal function is important from the patients' perspective, for ambulatory and all other surgery.

S1-2 LOCAL AND REGIONAL ANAESTHESIA IN AMBULATORY SURGERY

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In the ambulatory surgery setting, the ideal anaesthetic would be one which is efficacious, allows rapid turnover and has a low complication rate. A skilfully administered, well-timed block in a carefully selected patient definitely fits the bill. The benefits of locoregional anaesthesia are well-documented - lower risks of emesis and aspiration, prolonged analgesia, simplicity, economy and decreased nursing requirements. It allows better communication between patient and staff, and often results in shortened time to dismissal and lower morbidity.

A wide range of procedures can be done under local or regional anaesthesia, and some common techniques are briefly described. The choice of drugs and common complications are presented. The pre-requisites for the successful practice of locoregional anaesthesia in the ambulatory setting include good co-operation with surgeon and patient, minimal turnover time, low failure rate and a good routine for failure detection and alternatives, and the judicious use of sedation.

S1-3 UNDERSTANDING THE PHARMACOLOGY OF SEDATION

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(Abstract not available at the time of printing)

S1-4 ANAESTHESIA FOR THE MEDICALLY COMPLICATED PATIENT UNDERGOING AMBULATORY SURGERY

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As the quality of surgery and the safety of anesthesia improves, many ambulatory surgery centers find out that patient with multiple medical problems can undergo surgery under general anesthesia in their units.

Guidelines for patients selection formerly where only ASA class 1 or class 2 for ambulatory surgery currently ASA class 3 patients who are found medically stable are allowed in many centers, even ASA class 4 patient may be eligible if the procedure is quite limited in nature.

This presents a special challenge for the anesthesiologist.

Although the surgical procedure may be suitable for ambulatory anesthesia, the systemic effects of the medical complications may result in a less suitable ambulatory candidate. Many of these complications do not produce specific contraindications to anesthesia.

However the systemic effect of the disease/complications will certainly influence the management of anesthesia.

Each patient requires specific preoperative evaluation.

Anticipation of systemic dysfunction and appropriate monitoring in one phrase "*Safety of Anesthesia*", allow us in most cases to administer ambulatory anesthesia.

S2-1 ASSESSMENT AND MANAGEMENT OF THE DIFFICULT AIRWAY IN THE PARTURIENT

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Overall Mortality

In 1954, Beecher and Todd reviewing 599,428 anaesthetics concluded that the death rate from anaesthesia and surgery was about 3 in 10,000. Since then, we have come a long way such that, nowadays, an anaesthetic mortality rate of 0.054 per 10,000 would be more more realistic.

Failed Intubation

The incidence of failed intubation in obstetrics is eight times higher (at 1 in 300) than in the general surgical population (at 1 in 2,230). In the American Society of Anesthetists' Closed Claim Study, oesophageal and difficult intubation accounted for 23% of damaging events associated with obstetric general anaesthesia. Also, of the 522 respiratory related claims examined, 35 (7%) were related to events surrounding tracheal extubation.

Airway Assessment

There are a number of ways to determine whether the obstetric airway has the potential for being difficult. These can be grouped into:

- * History: Congenital abnormality; faciomaxillary trauma; dental, cervical spine or faciomaxillary surgery (eg, wisdom tooth extraction); snoring.
- * Physical Features: Receding mandible; short/thick neck; mammary; buck teeth; protruding maxilla; large tongue; intraoral mass.
- * Tests: Mallampati grade; mandibular space; thyromental distance; atlanto-occipital extension; interincisor distance; Wilson risk sum.
- * Radiological: Simulation laryngoscopy, X-Ray laryngoscopy.

Management

There are a large number of techniques used to manage the difficult airway. They can be divided into:

- * Prophylaxis: Test ventilation, awake intubation, inhalational induction, modified induction sequence, endotracheal tube introducers, 'positioning' of the patient, operator and airway.
- * Difficult "intubation" aids: Belscope, blind intubation, fiberoptic intubation, intubating stylet, light wand, retrograde intubation, tracheostomy, tracheotomy, cricothyroid puncture
- * Difficult "ventilation" aids: Benjet tube & other intratracheal and transtracheal jet ventilation, Combitube, laryngeal mask airway, Guedel's & other oral airways, nasopharyngeal airways, two-person mask ventilation, tracheotomy, tracheostomy and cricothyroid puncture.

Conclusions

The difficult airway in the obstetric patient can be avoided by increased use of regional techniques; efficient airway assessment and a high level of preparedness for the difficult intubation; and training in a failed intubation 'protocol'. These simple precautions can reduce the impact of and the morbidity associated with difficult intubation.

S2-2 AIRWAY ADJUNCTS AND ALTERNATIVE TECHNIQUES FOR TRACHEAL INTUBATION

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Aids and techniques to facilitate tracheal intubation are evolving all the time and hence are numerous. These may be classified under visual and blind or guided blind techniques. In the first category, rigid laryngoscopic intubation has been enhanced with various blades, adapters to change angle of the blade, stylets, and introducers. Special laryngoscopes for both direct and indirect laryngoscopy have been introduced. Flexible fiberoptic scope has become an invaluable tool where equipment and expertise are available. Recently a visualised endotracheal tube system (VETT) with fiberoptics built into the tube has been reported.

List of blind and guided blind techniques are long. These are blind nasal, blind tactile oral, airway intubator, lightwands, Laryngeal Mask Airway (LMA) and LMA fastrach, endotrol tube, combitube, retrograde intubation and magnetic fluoroscopy guided intubation. Some techniques are used in combinations at times.

Some of the practical useful and frequently performed techniques will be discussed briefly during the presentation. It is neither possible nor necessary for a clinician to have access and training to all the adjuncts and techniques but one should be proficient in at least one visual and one blind supraglottic and one infraglottic approach to tracheal intubation.

S2-3 THE LARYNGEAL MASK AIRWAY: AN EXPANDING CONCEPT IN AIRWAY SAFETY

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The laryngeal mask was designed in an attempt to find a less invasive airway than the endotracheal tube which would offer more security than the face-mask. For more than a decade, it has been a subject of study and debate in the scientific literature. Initial rapid acceptance in the UK has been followed by slower but steadily increasing usage around the world. But even today, in spite of an estimated 100 million uses, there is still wide disparity in perceptions of its appropriate role, mirrored by equal disparities in the scope of its use between clinicians, disciplines and countries. Unquestionably, its primary role is in anaesthesia, particularly for ambulatory surgery, itself an expanding concept; but it is finding increasing popularity with emergency services too.

New forms of LMA have evolved, and will continue to evolve, in response to demands for alternative versions, including more user-friendly designs, disposability, and modifications favouring particular applications, such as otolaryngology, difficult intubation and positive pressure ventilation. Debate, meanwhile, has continued to centre mainly around the question of aspiration. In this area, both scientific findings and clinical practice show a notable lack of consensus, suggesting that technique may be an important but elusive variable in the balance of risk. There appears to be an inverse relation between fear of aspiration and actual clinical experience. Formal education has been unable to keep pace with expansion in use, although two text-books on the LMA have recently been published and one training centre has been established in the USA. Much remains to be done, both to temper the uninformed enthusiast and to encourage the well-read but fearful novice. For all its current popularity and apparent simplicity, the LMA is still a poorly understood piece of equipment whose full potential remains largely unrecognised. It remains to be seen whether the more sophisticated forms of the device about to enter the marketplace will facilitate the task of the educator. But however well the LMA is designed, it is unlikely that the need for skill acquisition can ever be eliminated. Practical training must become more widely available and the need for it more widely recognised, if the LMA is to achieve its potential to make a lasting impact on the quality of airway management.

S2-4 ACHIEVING EFFECTIVE VENTILATION IN THE DIFFICULT AIRWAY

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Common causes of anesthetic morbidity and mortality are adverse outcomes involving the respiratory system, e.g., inadequate ventilation, esophageal intubation, and difficult intubation¹. The difficult airway is defined as the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with mask ventilation, tracheal intubation, or both². Difficulties in ventilation of patients may occur by physiological and/or pathological processes. As consciousness is lost, both anatomical and physiological changes occur that lead to difficulty in the ventilation³. Disease processes, e.g., congenital, trauma, tumour of the head and neck regions especially associated with airway obstruction will lead to the difficulty in achieving effective ventilation. The action plan for difficult intubation should be developed and be practiced as the time required for proper action is limited^{2,3,4}. The goal is to maintain the oxygenation first, then effective ventilation to control CO₂ level. Appropriate history taking and physical examination will help identify the patient at risk and plan for the proper management. The management of the airway in an awake state should always be considered especially if the patient has symptoms and signs of airway obstruction. Preparing the equipment for difficult intubation, having experience assistant, preoxygenation, positioning and proper monitoring of the patient are the crucial steps in managing this particular group of patients.

To achieve adequate ventilation in the difficult airway situation, the anesthesiologist must first be able to establish and secure the airway. To establish the airway, various types and sizes of airway may be tried and intubation may be necessary. If that is impossible the use of less invasive airway equipment, such as the LMA and esophageal tracheal Combitube, may be useful. However, if it is still impossible to achieve effective ventilation, then more invasive alternatives, e.g., cricothyroid puncture, cricothyrotomy, minitracheostomy, tracheostomy, should be employed. If the patient cannot breathe adequately by himself, the anesthesiologist must immediately act by: conventional low pressure ventilation via mask or other airway devices. In the extreme situation, when cricothyroid puncture by a small diameter intravenous catheter is needed, ventilating by normal self inflation bag may be inadequate and may require the use of jet ventilation³.

The problem of difficult intubation and failure to ventilate is not common (1), (4), however, it will lead to very undesirable outcomes if the effective management does not intervene in a very short period of time. To avoid miserable outcome, the anesthesiologist should always prepare to identify the patient at risk, plan the appropriate and alternative action, have necessary equipment and assistance, even postpone the operation if necessary. In addition, the new generation anesthesiologists should receive optimal teaching and training on this subject.

S3-1 ANAESTHETIC STRATEGIES FOR THE PATIENT WITH HEART DISEASE

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This is an exciting time in medicine in general and anesthesia in particular.

Anesthesiologists are cardiovascular specialists by the very nature of their work. In previous times, many patients with severe heart disease were simply given a "cardiac anesthetic" (i.e. high-dose opioid anesthetic). Today, this approach is no longer practical for three principal reasons. First, recent changes in surgical procedures are focused on reducing costs wherever possible. To decrease costs, surgical teams desire "fast track" (rapid awakening) pathways following most types of surgery. Second, ambulatory surgery centers accept patients with very significant heart disease. Third, anesthesiologists anesthetize extremely ill patients in remote locations where access to comprehensive recovery facilities may be unavailable. Moreover, the magnitude of these problems is increasing. The most rapidly growing segment of our population is the elderly in whom serious heart disease is very common. As the elderly population increases rapidly in the next decade, it is obvious that many more patients with heart disease will require cardiac and non-cardiac surgery. In addition, the United States population includes a growing number of young adults with congenital heart disease (500,000 currently). Although most of these individuals lead active and productive lives, many have only partial repairs or complex palliations of their heart disease. The rapid advances in understanding the cardiovascular pathophysiology and the pharmacology of drugs have made possible a multidisciplinary approach to the perioperative management of these patients.

Therefore, anesthesiologists must be prepared to care for an increasing number of patients with severe heart disease. This lecture will describe the modern anesthetic management strategy for such patients. By necessity, this will be focused on achieving appropriate hemodynamic goals and overall surgical requirements not on specific anesthetic agents or techniques, because no cookbook approach could possibly deal with various cardiovascular pathologies and changing practice demands anesthesiologists face today.

This strategy allows appropriate flexibility and prioritization of clinical demands.

S3-2 ASSESSMENT OF OPERATIVE RISK IN PATIENTS WITH ADVANCED LUNG DISEASE

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In recent years, advances in medical care have allowed patients with severe lung disease to present for surgery. Perioperative risk is significantly increased in these patients. Preoperative clinical evaluation is the most useful in the risk assessment. The functional status of the patient such as exercise tolerance and degree of dyspnoea is a useful guide as to severity of the illness. Patients with chronic obstructive airway disease have higher risks of developing postoperative pulmonary complications as opposed to those with restrictive lung disease. Preoperative spirometry has been widely used to assess pulmonary risk although its predictive value has been unproved. No preoperative test has been able to identify the individual patient who will have a complication or who will die from the procedure.

Compared to cardiac risk, pulmonary operative risk has been less extensively studied. In addition to the lung disease, other risk factors are advanced age, history of heavy smoking, upper abdominal or thoracic surgery, emergency surgery and high ASA physical status. A high ASA physical status probably indicates likelihood of postoperative complications better because it takes into account both pulmonary and non-pulmonary factors.

In the final analysis, the risk-benefit ratio is the major determinant of whether surgery should or should not be performed. Interventions to alter risks or plans for different operative strategy may need to be made.

S3-3 NULL PER Os (NPO) STATUS AND RISK OF ASPIRATION

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Since 1946, Null Per Os (NPO) has become a strict rule for the safety of patients after Mendelson's review and his rabbit experiments. Although the incidence is low (1:10,000) but high severity of aspiration convinced numerous anaesthetists. There are anatomical and physiological mechanisms to prevent aspiration and gastroesophageal reflux. General anesthesia depresses laryngeal reflexes and intubation can cause excessive anterior angulation of larynx, which may facilitate reflux. Silent esophageal regurgitation occurs in 4 - 26% of all general anesthesia. Gastric critical contents is pH less than 2.5 and volume more than 25ml. Pharmacoprophylaxis (antacids, H₂ antagonists and gastroprokinetic drugs) was not cost-effective and mechanoprophylaxis (Sellick's maneuver) was also questionable in efficacy and safety. Emptying stomach seems to be the direct problem in solving in prevention of aspiration. Solid contents are the cause of death by complete respiratory obstruction, therefore they are undoubtedly forbidden in preanesthetized patients for at least 6hr. Aspiration of large volume of acid gastric contents produce a severe pulmonary pathology. Physiologically, the ingested clear liquid is absorbable and easily emptied within 2hr. Furthermore, intake of fluids may actually dilute gastric secretions and stimulate gastric emptying, resulting in lower residual gastric volumes. Allowing clear liquids until 2 hours before surgery was proved by many studies especially gastroscopy study of Ingebo, et al; that there is no increase risk of aspiration and does not significantly change gastric volume or pH. Canada, USA, Norway and Denmark already published recommendations for shortening preoperative fasting. NPO after midnight should be withdrawn in the new millenium. This new trend of fasting should be avoided in the patients at risk of aspiration such as trauma, obesity, pregnancy, depressed level of consciousness or airway obstruction and one of the risk factor of aspiration is inexperienced anesthetist.

S3-4 WHAT PREOPERATIVE INVESTIGATIONS ARE NECESSARY?

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Preoperative evaluation is needed to assess individual patient risks of perioperative morbidity and mortality. An adequate history and physical examination is essential to evaluate the patient's clinical situation. Routine preoperative laboratory testing for all patients undergoing surgery is unjustified. It has resulted in excessive expenditure with limited benefit. In addition, iatrogenic injury has resulted in further evaluation and treatment of false-positive results. In an otherwise healthy patient, all that is required in the preoperative evaluation is history taking and physical examination; minimal additional laboratory tests is necessary only in certain cases. The decision to order preoperative tests should be based on positive clinical findings, the need to obtain baseline values before major interventions, the type of operation to be performed and the existence of risk factors for certain diseases. Recommendations for some laboratory tests are made depending on the age of the patient because of altered physiology in combination with the increased number of disease processes in the older patients. In conclusion, preoperative investigations should be undertaken selectively. With this approach to preoperative evaluation, the quality of patient care is maintained, yet there is potential for cost containment.

S4-1 CARDIOPULMONARY INTERACTIONS OF MECHANICAL VENTILATION

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(Abstract not available at the time of printing)

S4-2 POLYNEUROPATHY IN CRITICALLY ILL PATIENTS

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Infection, injury, burn, trauma, surgery can cause systemic inflammatory response (SIR) and multi-organ dysfunction (MOD). Peripheral nerves can be interfered from hypoperfusion and from many toxic substances that might be formed or potentiated by many drugs (muscle relaxants, aminoglycoside, steroid) that might have been given during critical period. Malnutrition, fluid and electrolytes disturbance are also potentiated these effect. One form of peripheral nerves involvement in critically ill is polyneuropathy which is generalized widespread, symmetrical effects that mostly involve lower limbs more than upper, distal than proximal, look like stocking-glove pattern. Motor, sensory and autonomic nerves are involved.

Incidences of polyneuropathy are about 70% in the septic encephalopathy patients. Polyneuropathy was also related with duration in ICU that the incidences were higher if the patients were in ICU longer than 2 weeks. Limb weakness and difficult to wean (from intercostal muscles and diaphragm involvement) are the common signs and symptom. Differential diagnosis from Guillain-Barre's syndrome, neuropathy or weakness from other causes. Confirm diagnosis should be made by EMG, muscle biopsy, CSF analysis, blood for electrolytes and muscle enzymes that showed axonal degeneration and muscle atrophy from denervation, no signs of inflammation. CSF protein, muscle enzyme in blood are normal or slightly elevated.

Critical polyneuropathy is able to spontaneous recover when primary disease is already improved. So supportive treatments, correction of fluid electrolytes disturbance and also nutritional status are needed.

S4-3 PHARMA NUTRITION FOR THE CRITICALLY ILL

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(Abstract not available at the time of printing)

S4-4 APPLICATION OF ULTRASONOGRAPHY IN THE CRITICALLY ILL PATIENT

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Diagnostic ultrasonography have revolutionised the practice of medicine over the past century and continue to provide a reliable and expedient information to the intensivist or emergency physician. It is the imaging modality of choice in many situations encountered in the Intensive Care or Emergency Unit. This is because the technique is simple, safe, non-invasive and readily available at the bed-side.

It is particularly useful in the differentiation of fluid and masses for example in the investigation of abscesses, fluid collections and tumors.

In the ICU, HUSM we have utilised this modality in the investigation of septicaemia, MOF, trauma, post-operative cases and also neonates. Ultrasound has been used in our setting to assess hydration, cardiac function and assisting central venous cannulation in difficult and high risk patients.

It is highly useful in the management of critical situations in the ICU or Emergency Departments. We have used this modality to guide decompression of pericardial cavity in cardiac tamponade or acalculus cholecystitis. It provide reliable information in the investigation of deep vein thrombosis.

Detailed discussions of these aspects will be presented.

S5-1 ANAESTHESIA FOR PAEDIATRIC AMBULATORY SURGERY

S M Walker, Department of Anaesthesia, New Children's Hospital and Royal North Shore Hospital, Sydney, Australia

Ambulatory surgery is common in paediatric practice. Several issues will be discussed, including modifications required for the type of surgery and for the environment in which cases are performed.

1. fasting guidelines. Clear fluids can be allowed until two hours prior to surgery.
2. the use of premedication. Oral agents may be utilised if required, following assessment of the child.
3. parental presence at induction. In many centres in Australia, parental presence at induction is now common, and has tended to further reduce the use of premedication.
4. inhalational or intravenous induction. The choice of induction technique depends on the preference of the anaesthetist and the child. Data regarding the rapidity of inhalational induction with sevoflurane vary in different studies, but less cardiovascular change during induction and more rapid emergence is seen when compared with halothane.
5. analgesia. Provision of adequate perioperative analgesia is essential. Many cases are suited to supplemental local anaesthetic infiltration, nerve blocks or caudal anaesthesia. Routine use of nonopioid spinal analgesics should await adequate neurotoxicity data. Paracetamol is an effective analgesic if administered in an appropriate dose and by an appropriate route. Parents need adequate instruction on the appropriate type, dose, and frequency of administration of analgesics following discharge.
6. postoperative vomiting. Reducing nausea and vomiting is important, particularly following certain types of surgery, to minimise distress for the child and the need for overnight hospital admission.

S5-2 MORBIDITY FOLLOWING AMBULATORY SURGERY

T J Gan, Peri-Anaesthesia Care Unit, Department of Anaesthesiology, Duke University Medical Centre, North Carolina, USA

About 28 million anesthetics are delivered per year in the United States. Over 60% of this are performed in an ambulatory setting. Over the years, advances in anesthetic and surgical techniques have allowed increasingly complex operations to be performed on an ambulatory basis. Similar trends exist in most parts of the world.

Postoperative morbidity may be classified as major, i.e. those requiring hospital admission or the potential of serious outcome; or minor, i.e. those that are troublesome or unpleasant, but without any serious threat to life. While life-threatening morbidity following ambulatory anesthesia is rare, nevertheless, complications such as nausea and vomiting, pain, drowsiness, lethargy and headache are not uncommon. There is evidence to suggest that patients undergoing ambulatory procedures may take up to a week to recover to preoperative activity level.

Postoperative morbidity not only results in patient's discomfort; they often cause delay in discharge from hospital and the potential of unexpected admission. These events are associated with increase in cost and decrease in efficiency. We need to be aware of the factors that contribute to the various postoperative complications and take appropriate steps to prevent them. For example, the administration of prophylactic antiemetic in patients prone to developing postoperative emetic symptoms may result in greater patient satisfaction and more cost-effective; the use of adjunctive pain medication and local anesthetic will improve patient comfort.

This presentation will address the major as well as the more common non-life threatening morbidity. The incidence, treatment and various strategies to reduce these postoperative adverse events will be discussed.

S5-3 PATIENT RECOVERY AND DISCHARGE FOLLOWING AMBULATORY SURGERY

C Y Wang, Department of Anaesthesiology, University Malaya, Kuala Lumpur, Malaysia

Ambulatory surgery continues to grow at a rapid pace throughout the world. In the USA approximately 65% of all surgical procedures are performed as ambulatory surgery. The reason for this expansion is due to the associated cost saving and for patient benefits.

Unique to outpatients is the need to achieve a state of "home-readiness" soon after surgery. Home-ready: they should be clinically stable and able to rest at home under the care of a responsible adult. This can be achieved by adopting a standardized discharge criteria for patients. There should be a written discharge policy involving 'signing out' the patient. Kortilla has compiled a set of ambulatory surgery discharge criteria and several variations on these have been developed. One recent modification is the new discharge criteria called Chung's modified PADSS (mPADSS) which eliminated toleration of oral intake/voiding as criteria for discharge. It is also prudent that the use of the scoring system be combined with medical judgment and common sense.

The development of short-acting anaesthetic, analgesics, devices (e.g., EEG-Bispectral Array) and techniques ("balanced" local/general anaesthesia) and the use of minimally invasive surgical approaches ("key-hole") has facilitated faster early recovery in ambulatory surgery. This may enable patients to bypass Phase 1 recovery (i.e., PACU) and be transferred directly from the operating room (OR), to the less labour intensive Phase 2 (step-down area) recovery area. By passing Phase 1 recovery (i.e., PACU) has been termed "fast tracking" in ambulatory surgery. This can result in potential cost savings to the institution.

Other psychological tests have been devised to investigate such features as memory and psycho-motor coordination, but they are sometimes used in routine patient care, they are more applicable to research studies.

S5-4 BALANCING COST AND QUALITY IN AMBULATORY ANAESTHESIA

B K Philip, Harvard Medical School, Brigham & Women's Hospital, Boston USA

In order to deliver cost effective care we must determine the value obtained for the cost. Costs include more than the price of acquisition. Specific benefits include faster recovery and decreased postanesthetic side effects.

Thiopental, methohexital and propofol can be compared as induction agents for ambulatory general anesthesia. Thiopental has significant recovery disadvantages, although it costs much less. Recovery differences after methohexital or propofol occur briefly, but propofol may provide a larger benefit by reducing emesis. The cost of propofol is 4 - 5 fold higher.

Maintenance agents for ambulatory procedures can also be compared. Use of alfentanil produces faster recovery and fewer side effects than fentanyl, but at increased cost. For total intravenous anesthesia, propofol is significantly better than midazolam comparing recovery outcome, at similar cost. The use of flumazenil after TIVA with midazolam results in significantly faster recovery, which potentially reduces recovery costs. Compared with isoflurane, desflurane, sevoflurane and propofol infusion all provide faster early recovery parameters and, for the latter two, better quality of recovery regarding nausea and somnolence. Indicators of intermediate recovery, such as ambulatory second-stage discharge, are rarely different. Return to normal activities is a long-term recovery benefit which should be assessed. However, estimated reductions in personnel workload remain potential gains only; real savings occur only if the facility can increase caseload or actually decrease staffing.

Prices of the anesthetic drugs used can then also be compared. Use of lower fresh gas flows will reduce the cost of inhalants. Generic drugs remain least expensive. Determining prices is simple and instructive, but determining value is the real issue.

S6-1 EARLY MANAGEMENT OF ACUTE PAIN: ITS ROLE IN THE PREVENTION OF CHRONIC PAIN

M S Cardosa, Department of Anaesthesiology & Intensive Care, Ipoh Hospital, Perak, Malaysia

It has been recognised for some time that pre-amputation epidural blockade reduces the incidence of phantom limb pain. However there have also been a number of studies that did not show any difference in postoperative pain or analgesic consumption between groups of patients who received "pre-emptive analgesia" compared to those who did not. More recently, Katz (1996) showed that early postoperative pain predicts chronic post-thoracotomy pain and Nikolajsen (1997) reported that severe pre-amputation pain could predict stump and phantom pain.

Pre-emptive analgesia is based on the concept that the nervous system is not "hard-wired" but demonstrates both peripheral and central plasticity. The continuing volley of nerve impulses in unmyelinated C-fibres sets off a prolonged widespread increase in spinal cord excitability - the phenomenon of "central sensitization". These changes may be reversible, but probably only in the early phase. In the longer term, synaptic morphology and neuronal phenotype may be altered. The mechanisms for this involve either loss of inhibitory control, or enhanced excitation in spinal cord structures and there may be agents other than local anaesthetics and opioids which may be useful in preventing the development of longer term changes, e.g. ketamine, an NMDA receptor antagonist.

Based on current experimental evidence, it would seem that in order to prevent the development of chronic pain states, we should aim to minimise the afferent input caused by continuing acute pain. This should be done using a multi-modal approach, and should look at the whole perioperative period. More clinical studies are needed, looking at the long term outcome rather than immediate postoperative morbidity alone.

S6-2 ACHIEVING OPTIMAL PAIN RELIEF IN INFANTS AND CHILDREN

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Effective pain control improves morbidity and mortality. Recent advances in pain relief in infants are based on better understanding of pain mechanisms, late effects of early experienced pain, development of clinical pain services and more sophisticated delivery devices for analgesics and monitoring protocols.

An individual approach to each child, with a plan for analgesia starting preoperatively is crucial - even small children can manage PCA if shown how. Techniques are based on the knowledge of how much pain (often late pain) certain surgical procedures entail, regional anaesthesia where possible with epidural catheters, opioid infusions and generous use of NSAIDS and paracetamol. Treatment of side-effects (pruritus, PONC) is very important.

Close monitoring is essential, based on a simple pain scoring mechanism taken at the same time as the usual postoperative observations of pulse, BP and respiratory rate.

It is recognised that children are different - most blocks are put in after induction of anaesthesia, except spinals or caudals in the ex-premature baby. Newborns, sensitive to opioids, have a lower toxic threshold to local anaesthetic agents and do not metabolise them so readily. Where patients are nursed postoperatively is controversial.

Details of our Pain Service are discussed and results presented.

S6-3 CLINICIAN'S EXPECTATIONS VERSUS PATIENT'S EXPERIENCE

F R Nuevo, Santo Tomas University Hospital, Manila, Philippines

Perceptions of pain relief after surgery is varied. Both the surgeons and the anesthesiologists, would have differing opinions as to the modalities and scope of pain relief a patient must be given. The nursing staff taking care of the postoperative patients also have their own concept of how this should be done.

On one end, the surgical patient would almost always desire for a pain-free recovery period. Most often, they are told that pain is the natural thing to expect after an operation.

Literature review discloses that until the present time, much has to be desired with regards postoperative analgesia. Several misconceptions have been uncovered. Pain control after surgery seems not to be of prime importance as evidenced by the lack of a specific unit to address this problem in most hospitals. Despite evidence that there is human variability in terms of drug effects, we observed that analgesics are not titrated according to patient's needs to ease down pain. Acute Pain Service has been organized in leading institutions to specifically address the problem of postoperative pain. Yet, there are identified pitfalls and these challenges must be met. APS makes the cost of postoperative pain relief seem to be expensive, hindering others to follow through.

This short lecture aims to discuss the current scenario of postoperative pain management globally, and present the several reasons why satisfactory pain relief after surgery cannot be successfully attained despite the advancement in drug research and technology.

S6-4 ACUPUNCTURE AND PAIN MANAGEMENT

T L Lee, Department of Anaesthesia, National University of Singapore, Singapore

Acupuncture is a component of the health care system of China that can be traced back for at least 2,500 years. The general theory of acupuncture is based on the premise that there are patterns of energy flow (Qi) through the body that are essential for health. Disruptions of this flow are believed to be responsible for disease. The acupuncturist can correct imbalance of flow at identifiable points close to the skin.

Acupuncture is widely offered as a treatment option in pain management clinic in UK and USA^{1,2}. The theories used to explain the pain relief that results from acupuncture fall into three broad categories: neurological, neurohumoral and psychological³.

Many studies in animals and humans have demonstrated that acupuncture can cause multiple biological responses. These responses can occur locally, i.e. at or close to the site of application (segmental acupuncture), or at a distance (heterosegmental acupuncture), mediated mainly by sensory neurons to many structures within the central nervous system. This can lead to activation of pathways affecting various physiological systems in the brain as well as in the periphery. Considerable evidence supports the claim that opioid peptides are released during acupuncture and that the analgesic effects of acupuncture are at least partially explained by their actions^{4,5}. In addition, physiological research has shown that two inhibitory descending neuronal mechanisms, the first of which is serotonergic and the second adrenergic are excited by acupuncture stimulation^{6,7}.

The initial progress in explaining its analgesic action in western scientific terms provided a measure of credibility for acupuncture within the biomedical community. But it also had the inappropriate effect of keeping clinical testing of acupuncture largely within the framework of the drug model. Slow in coming were the realization that in many of the clinical trials for pain, what were designed as 'placebo acupuncture' treatments were causing significant non-placebo effects, and that needling of supposed non-points ("irrelevant acupuncture") as a sham control were often producing effects (50%) intermediate between placebo responses (30%) and effects of true needling (70%)⁸.

Attention to the design of clinical trials of acupuncture has only recently began to receive the necessary attention to ensure that it is tested by methods that on the one hand are rigorous enough to satisfy scientific standards, while on the other do not distort the diagnostic and treatment principles that are unique to this therapeutic tradition.

The cumulative evidence suggests that acupuncture represents a therapeutically beneficial, cost effective treatment option for a broad spectrum of chronic pain conditions⁹. Specifically, there was good evidence for the short-term effectiveness of acupuncture for low back pain, mixed results for headache, and some encouraging preliminary results for cervical pain and arthritis. The proportion of patients helped varied from study to study but commonly fall in the region 50 - 80%. Patients unwilling to accept, unable to tolerate or non-responsive to, standard therapies for pain management should be offered the opportunity to receive an adequate course of acupuncture treatment for their condition.

S7-1 LESSONS LEARNT FROM CARDIOVASCULAR RESEARCH

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There is growing interest in the impact acute care medicine has on the long-term outcomes of patients. Governments, private payers, and patients demand to know whether proposed medical care will make a difference in eventual outcomes. CAD an important factor in early death and disability and is difficult and expensive to treat. In those patients with CAD, their risk of cardiac complications during the perioperative period is very high. Discovery of clinical strategies that will have a positive impact on these high-risk patients are an important goal of cardiovascular research.

Mangano and colleagues reported the results of treating 200 patients with known or suspected CAD with either the β -blocker atenolol or placebo who underwent significant noncardiac surgery. Patients received 5 to 10mg of atenolol or placebo prior to surgery and continued on this regime for seven days postoperatively. There were no differences in in-hospital complications between groups. Patients in the atenolol group had more bradycardia, HR<50bpm, less tachycardia, HR>100bpm, and less myocardial ischemia during the study period. 100% of atenolol treated patients were alive at six months as compared to only 92% in the placebo group, p<0.001. When in-hospital myocardial ischemia is examined in light of these long-term outcome data the investigators showed that any incidence of myocardial ischemia, whether in the atenolol or placebo group, was associated with adverse cardiac events.

Weightman and colleagues examined the association between the use of common preoperative cardiovascular medications and in-hospital mortality in 1600 patients undergoing coronary bypass surgery. Multivariate analysis of the data and patient risk factors found that the relative risk of in-hospital mortality in patients taking preoperative nitrates was 3.8 with a 95% confidence intervals of 1.5 - 9.6. In contrast, those patient on daily β -blocker treatment had only 0.4 times the relative risk of in-hospital mortality with a 95% confidence interval of 0.2 - 0.8.

These studies illustrate several vital lessons from the scientific literature. Changes in pathophysiologic status that appears to have a relatively minor impact on patients during the perioperative period can lead to dramatic differences in eventual outcomes. For example, any in-hospital ischemia, whether during the immediate perioperative period or seven days post-operatively, even when successfully treated, leads to a significant increase in mortality rate.

Clinicians should ponder whether these results should lead to a change practice. It is reasonable to ask, based on these results, why would one would not attempt to decrease the rate of myocardial ischemia after surgery by treating patients with know or suspected CAD with a β -blocker? Particularly, when the treatment is easy to administer, inexpensive, and has few apparent side-effects. The same is true of the use of daily nitrates, why would one continue to use this class of medications chronically when this and other studies suggest adverse patient outcomes?

S7-2 LUNG FUNCTION DURING ANAESTHESIA: SOLVED AND UNSOLVED ISSUES

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Recent advances in our understanding of lung function have centred on protection of the functions of the normal and injured lung during mechanical ventilation and enhancement of the processes of cellular recovery. The use of muscle relaxants, while important as part of general anesthesia, removes diaphragmatic tone, alters regional ventilation and promotes cyclical alveolar distension and collapse.

One of the most serious potential complications of mechanical ventilation is ventilation-induced lung injury (VILI) resulting, in healthy animal models, in alterations in lung fluid balance, increases in endothelial and epithelial permeability, tissue damage, and lesions histologically indistinguishable from diffuse alveolar damage (DAD) observed in human acute respiratory distress syndrome (ARDS). In the 1990s the prevention of VILI has received a greater priority in clinical practice and research with emphasis on using modes of mechanical ventilation to ease the stress on acutely injured lungs.

The evidence from Amato, *et al.* suggests that a strategy *to open up the lung and keep it open* which includes (1) the abandonment of targeting ideal blood gases and the acceptance that hypercapnia and acidosis are less damaging than DAD, (2) the use of smaller tidal volumes and lower peak inspiratory pressures to limit cyclical alveolar distension, (3) the use of sufficient PEEP to recruit atelectatic alveoli and maintain end-expiratory lung volume is associated with improved survival in ARDS. Optimal PEEP results in the best static compliance, lowest shunt fraction and lowest dead space, yet the time-dependency of this process is often overlooked in its application.

Refinements in the application of PEEP have led to the use of PEEP combined with a sustained inflation, permitting significant recruitment at lung deflation even at plateau pressures below the lower inflexion point (P_{flex}). This is possible if PEEP maintains alveolar recruitment above the closing pressure of the deflation static pressure-volume curve. In neonates with hyaline membrane disease sustained inflation has been combined with the use of high frequency oscillation to permit ventilation with very low tidal volumes and airway pressures. Partial liquid ventilation with perfluorocarbon has recently emerged as another method of improving arterial oxygenation in animal models but its mechanism of action remains to be defined and clinical efficacy and safety remain to be proved.

It was believed that regional pulmonary blood flows can be predicted by the effects of gravity. Positioning the patient prone during ventilation reverses the gravitational distribution of pleural pressure and improves dorsal lung ventilation. However, Glenn, *et al.* have demonstrated that blood flow to the dorsal regions (zone 3) is independent of gravity and posture. This may be due to increased regional vascular conductance in dorsocaudal zones (Beck, *et al.*) and may offer insight into the beneficial effects of prone ventilation on oxygenation in ARDS.

S7-3 CEREBRAL CIRCULATORY PHYSIOLOGY: AN UPDATE

A M Lam, University of Washington, Seattle, Washington, USA

Normal Regulation of Cerebral Blood Flow

Cerebral blood flow averages $50\text{ml } 100\text{g}^{-1} \text{min}^{-1}$ in the adult, with average oxygen consumption of $3.3\text{ml } 100\text{g}^{-1} \text{min}^{-1}$. Thus in the average patient of 70kg the brain receives about 14% of the cardiac output but consumes about 20% of the oxygen.

Flow-metabolism coupling: Flow to the brain is tightly coupled to the regional metabolism; increase in activity is matched by increase in flow.

CO₂ reactivity: CBF increases by about 3% per mmHg increase in PaCO₂.

Autoregulation: This complex mechanism (metabolic, myogenic and their interaction) maintains CBF constant between MAP 60 - 160mmHg. These limits however, may vary considerably among individuals.

Hypoxaemic response: Decrease in PaO₂ to <50mmHg leads to increase in CBF.

Anaesthetic Influences

Flow-metabolism coupling: Most intravenous agents (except ketamine) preserve flow-metabolism coupling. Inhalational anaesthetics may increase CBF in a dose-related manner while metabolic rate is variably decreased. However, flow-metabolism coupling is not abolished.

CO₂ reactivity: Anaesthetic agents have little influence on CO₂ reactivity. Although intravenous agents may decrease the absolute slope, the relative slopes is similar between intravenous and inhalational anaesthesia.

Autoregulation: Cerebral autoregulation is relatively unaffected by intravenous agents. All inhalational agents except sevoflurane appear to impair autoregulation in a dose-related manner.

Hypoxaemic response: The influence of anaesthesia on this has not been well studied. Clinically it is relatively unimportant as it is a poor defense.

The Interactive Effect Between BP and CO on Cerebral Blood Flow:

During moderate hypercapnia (PaCO₂>60mmHg) cerebral autoregulation is abolished. Conversely, severe systemic hypotension resulting in maximal cerebral vasodilation decreases cerebrovascular response to CO₂.

S7-4 MALIGNANT HYPERTHERMIA: ASEAN PERSPECTIVE

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Malignant Hyperthermia (MH) is a rare pharmacogenetic trait often manifested when a susceptible individual is given general anaesthesia using triggering agents such as potent volatile anaesthetics and depolarising muscle relaxants. Recent data from Denmark revealed an incidence of 1:260,000 with general anaesthesia and 1:60,000 when succinylcholine was used. Similar data from Asean countries have not been available and only sporadic isolated reports can be reviewed from literature. Questionnaires were sent to major hospitals in 9 Asean countries. The years from 1990 till present were reviewed for any MH episode. (*only almost definite or very likely MH cases were considered, using the MH grading scale proposed by MG Larach et al 1994*). There was no reply from Vietnam. Analysis revealed the following conclusions:

1. Brunei, Indonesia, Myanmar and Cambodia had no case over the years reviewed (or any case remembered before that).
2. Philippines (Philippines General Hospital) reported one case in 1990. Incidence quoted for the hospital is 1:40,000.
3. In Malaysia, all the States' major government hospitals replied except Sabah. There were no MH cases seen except from Penang Hospital with 2 reports. University Hospital Kuala Lumpur had 1 referral for ICU admission from Kelang Specialist Hospital in 1988. The incidence estimated for Malaysia ranges from 1:50,000 to 500,000.
4. Thailand (Siriraj Hospital, Bangkok) had 2 cases in 1997. Incidence in Thailand estimated as very rare. Four cases of MH were reported in Thai medical journals (1990, 1996).
5. In Singapore a total of 5 cases detected. Estimated incidence ranges from 1:30,000 to more than 1:100,000. Two cases were reported in *Annals Academy of Medicine 1990*.

Clinical incidence is very low in Asean region probably because responsible genes are rare in this area. Other contributing factors may be due to failure to report an MH episode or a death that is attributable to MH being missed.

S8-1 ACADEMIC ANAESTHETISTS: AN ENDANGERED SPECIES

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The past five years has seen considerable shrinkage in the number of University Chairs in Anaesthesia in the United Kingdom and the reasons for this deserve analysis because they may affect other countries also. The combined effect of two factors has been crucial. The funding for support costs of research (secretarial, technical, equipment and consumable materials) has been progressively removed from the funding of Universities and given to Research Councils: at the same time, the funding for Universities has been biased according to criteria of 'research excellence', an important element of which has been the amount of Research Council funding obtained. Notions involving teaching, examining, editing or writing books have not been accorded any status. As a consequence, when a Chair has fallen vacant, the University's main consideration has been whether any likely replacement will be able to obtain Research Council funding. As this is mostly given for basic research, particularly genetic manipulation, AIDS research and molecular biology, there have been few, if any, applicants for Chairs in Anaesthesia who were regarded as 'suitable'. There has been natural resistance to appointing highly specialized research workers as heads of clinical academic anaesthesia departments, not least because the very factors which are excluded by the research assessment exercise are just those activities which the specialty needs. The remedy has been the successful persuasion of the National Health Service authorities in the immediate

vicinity to fund a sizable proportion of the regional academic department in return for the provision of a mix of clinical services, co-ordinating and organizing teaching of postgraduates and supervising clinical research projects. These are the very reasons for which many UK Chairs were originally set up 20 - 30 years ago.

What should be the response of the specialty? Some have suggested greater concentration on research training in basic sciences for young academics. I believe that this is wrong: we need to broaden the training of future academics to include the skills of teaching how to teach, how to manage complex services, and how to organize collaborative research projects and multi-centred clinical studies. These are the skills we now need of our future academics, at least in the UK.

S8-2 HOW TO MANAGE A HAPPY DEPARTMENT

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The definition of a "happy" department is discussed in relation to the expected output. Essentially, a "happy" anaesthetic department provides quality patient care, is client oriented and gives a high level of job satisfaction. Managing an anaesthetic department is no different from other organisation taking into consideration the environment of providing anaesthesia and the stress factors associated with it. An effective management involves all categories of staff working as a team. Central to this is the effective leadership. Positive attributes of an effective leadership include the ability to manage conflicts of interdependent units in the hospitals, interpersonal skills, technical expertise and decision making skills. Effective leaders are principled centered leaders who are continually learning and who believe in other people. Understanding staff needs, motivating them to achieve their aspirations results in a 'win-win' situation and highly satisfied staff.

A review of literature on job satisfaction and work stress in the medical profession is presented. In a recent survey on anaesthetic doctors in local government hospitals, teamwork, supportive superior and an active teaching/training programme were identified as important factors for job satisfaction. Salary and promotion opportunities were considered less important.

Managing an anaesthetic department remains a challenge to the senior anaesthetists. Self-realisation and management skill improvement are keys to success.

S8-3 MANAGEMENT OF PERSONAL AND PROFESSIONAL STRESSES IN ANAESTHESIA PRACTICE

Y W Chan, Department of Anaesthesia and Surgical Intensive Care, Singapore General Hospital, Singapore

Work-related stress is well accepted and recognized in the training and practice of anaesthesia. Alcoholism and drug-abuse among residents and consultants have been reported in a number of anaesthesia publications. How well we manage stress depends very much on our individual emotional and psychological make-up; and the working environment we are in.

A departmental survey on the desirability of anaesthesia as a career among 28 young medical officers was conducted last year. 71.4% of them felt that the specialty was stressful at the start of the posting, and this increased to 82.1% at the end of the six months training rotation. The major sources of stress were highlighted to be the surgeon; the lack of control over working hours; the increased patient expectations and the pace of new developments. Despite these responses, over a third of them decided to take up anaesthesia as a career and over 75% of the respondents felt that the anaesthetists as a group were not prone to suicide or substance abuse.

Techniques for examining job satisfaction, stress and emotional problems associated with doctors' work are well established. Young doctors and doctors in training have very long hours of work with high degree of responsibility taken at an early stage of their career, and these have been shown to have adverse effects on their mental health.

The department tries to improve its working environment and minimise stress by ensuring adequate manpower resources; encouraging teamwork; supporting subspecialty and leadership development; providing good training programmes in an effective mentorship system; adopting an "open-door" management practice with regards to resolution of conflicts, direction of feedback and work improvement; and striving for good and fair remuneration packages for each level of staff.

S8-4 HELP! AVENUES TO ASSIST THE ANAESTHETIST IN DISTRESS

K P Ng, Department of Anaesthesiology, Faculty of Medicine, University Malaya, Kuala Lumpur, Malaysia

Anaesthesiology is without a doubt a highly skilled and highly stressful specialty. It has been described as being "95% boredom and 5% absolute panic with instant disaster an ever present threat in the operating room". Knowing this, it then comes as no surprise that the average anaesthetist is more exposed to and in danger of succumbing to the many stressors associated with this specialty.

Chemical dependency was recognised as a problem within the medical profession, more specifically within the ranks of anaesthesiologists in the United States more than 20 years ago. In 1993, incidence of substance abuse was reported at between 1 and 2 % of those entering anaesthetic training in the USA as well as in Australia. Anaesthetists spend years training to avoid disasters but are rarely taught how to handle these disasters and their aftermath. Malpractice litigation, already commonplace in the US, UK and Australia will eventually rear its ugly head on our shores and add to our stress and distress.

So, how can we help our colleges in distress? Realisation of the existence of a problem is the first step. Then comes identification of the problem, intervention, treatment and if possible prevention. Protocols for guidance following major anaesthetic mishaps, regular sessions on welfare issues in the department, development of impaired physicians committees and more educational sessions on the anaesthetist in distress are some measures which will allow us to intervene and treat earlier and more effectively this problem lurking among us.

S9-1 COMPLEX REGIONAL PAIN SYNDROMES: DIAGNOSIS AND MANAGEMENT

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“Reflex sympathetic dystrophy” and “causalgia” are now classified as Complex Regional Pain Syndromes (CRPS) I and II, with the aim of gaining consensus regarding terminology and diagnostic criteria. CRPS can lead to severe ongoing pain and disability after relatively minor trauma, is often misdiagnosed, and may require management within a multidisciplinary pain centre.

CRPS consists of a constellation of symptoms and signs including: pain, autonomic dysfunction, trophic changes, and motor impairment. There is no evidence from current series that a particular psychological profile predisposes to CRPS, and comparison with other chronic pain patients has found similar behavioural and psychological changes.

The pathophysiology of CRPS is not fully elucidated, but current research findings relating to interactions between the somatosensory and sympathetic nervous systems will be outlined.

The diagnosis of CRPS is based predominantly on history and clinical examination, with further information from carefully performed and interpreted diagnostic tests. Early recognition and treatment are associated with the best chance of a successful outcome. Treatment must include adequate management of the precipitating injury and an active physiotherapy program to preserve and recover limb function, and minimise secondary effects due to disuse. The role of sympathetic blocks as diagnostic and therapeutic procedures will be discussed. In patients with persistent symptoms, invasive techniques (eg. spinal drug delivery, spinal cord stimulation) and/or cognitive behavioural pain management programs may be required.

S9-2 MECHANISMS OF PAIN IN SPINAL CORD INJURY

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The pain of spinal cord injury is referred to as ‘Central Pain’ and is defined as pain caused by a lesion or dysfunction in the central nervous system (CNS). It starts shortly after the injury, can be long lasting and is a major reason for a poor quality of life in these patients. Although our understanding of the pathophysiology of central pain is incomplete, several hypotheses have been proposed.

Irritable focus

Pain is a result of an irritable focus at the site of injury - the spinothalamic tracts, which affect pain and temperature sensibility. There may be disinhibition by a concurrent lesion of the dorsal columns, but this is not essential. The crucial lesion appears to be in the neospinothalamic projection i.e. the ventroposterior thalamic nuclei. Recordings from the thalamus in patients with spinal cord injuries have demonstrated increased spontaneous activity characterized by bursts of action potentials in the portions of the ventroposterior nuclei representing the anaesthetic and painful area of the body.

Cellular Disorganization

The cellular processes underlying central pain are largely unknown, but processes involving excitatory amino acids, in particular glutaminergic NMDA (N-methyl-D-aspartate) -receptors have been implicated. Recent reports suggest that GABA (gamma amino butyric acid) agonists such as baclofen (GABA-B) and midazolam (GABA-A) can abolish or reduce the spontaneous pain and hyperalgesia of central pain, when administered intrathecally. Thus antagonizing excitatory transmission or strengthening GABAergic inhibition in the CNS can partially or totally control the components of central pain. It thus leads to the proposal that central pain of spinal cord origin may involve an unbalanced glutamate / GABA neurotransmission in the CNS, with relative hypofunction of GABAergic inhibition. This represents a breakthrough in our understanding of central pain.

S9-3 MANAGEMENT OF CHRONIC PAIN: THE ROLE OF INVASIVE PROCEDURES

P Chaudasekshetrin

Introduction

Chronic pain is a complex entity to both patients and therapists, yet it is often multidimensional in nature. Thus rational for blocking the pain pathway or giving drug parentally alone, focus on single dimension is not relevant to its nature. Yet these procedural techniques have been proved as an effective measure in treating certain chronic pain states such as, sympathetic maintained pain (SMP), herpetic neuralgia, ischaemic pain, and radiculopathy associated with chronic spinal pain. The aim is to identify the role of invasive procedure retrospectively.

Methods

The record of chronic pain patients treated in Pain Clinic Siriraj Hospital during 1990 -1 998 were reviewed retrospectively. Only the records of patients with follow up were used for this study.

Results

1058 out of 3668 cases had chronic pain, and 317 cases had received invasive procedure for diagnosis and treatment. 223 cases were male, 94 cases were female. Average 2.7 invasive procedures were provided per case. 70 cases dropped out from clinic. About 31.9% of invasive procedure are diagnostic measure, 60.7% are therapeutic and 7.4% are both. The techniques that have been used involve injection of local anaesthetic, steroid, opioid, guanethidine, ketanserin, phentolamine and neurolytic solution. Cryolesioning is the only physical mean used. In reviewing the data, invasive procedures employed include stellate ganglion block (SGB), T1 & T2 sympathetic block, lumbar sympathetic block, intravenous regional guanethidine (IVG), ketanserin, intravenous lidocaine intravenous phentolamine test, paravertebral block, celiac plexus block, epidural steroid, facet joint injection, sacroiliac (SI) joint injection and cervical epidural block. These techniques had been used to diagnose and treat 276 neuropathic pain, 48 nociceptive pain and 7 visceral pain. The common chronic pain problems treated in this Pain Clinic are brachial plexus injury, chronic spinal pain, and herpetic neuralgia. Other problems seen are ischaemic pain from vascular disease, central post-stroke pain, causalgia post-gun shot wound (GSW), post-amputation pain and spinal cord injury pain. Most frequent diagnostic measures employed are the SGB and IV phentolamine test. The common procedures employed for brachial plexus injury are SGB, IVG, IV phentolamine and T1 & T2 neurolysis. The common procedures employed for chronic spinal pain are epidural steroid, facet joint injection and SI joint injection. It is apparent that most of the patients (46.6%) reported about 50% pain relief with temporary effect. Only one fourth of cases (24.7%) experienced good and satisfactory pain relief and about 2.4% had reported excellent pain relief. Among this 26.3% of cases did not get any pain relief from the procedure.

Discussion

This study demonstrates temporary roles of invasive procedures in the management of certain chronic pain states mainly SMP, causalgia post GSW, ischaemic pain, radiculopathy associated with chronic spinal pain and herpetic neuralgia. This can be correlated with the complexity in nature of these chronic pain problems, which had not been identified. Small percentage of successful rates possibly due to the nature of the pain and variability in patient configure and their psychological states. A failure rate shows unsuccessful rates of neural blockade and the psychological impact against invasive techniques.

Conclusions

Invasive procedures are one of the useful adjuncts in the management of pain. Thus it can offer specific roles in the management of certain chronic pain states; selection is subjected to its critical appraisal.

S9-4 MANAGING THE CHILD WITH CHRONIC PAIN

S M Walker, University of Sydney Pain Management and Research Centre, Royal North Shore Hospital, and New Children's Hospital, Sydney, Australia

In children and adolescents, chronic pain may influence self-esteem, result in school avoidance, and either reflect or lead to family disruptions. Chronic pain requires multidisciplinary assessment and management, which includes both pharmacological and non-pharmacological treatments.

Recurrent pain syndromes with periodic pain and symptom free intervals are common in children. Recurrent abdominal pain, headache, chest pain or limb pain occur in 5 to 10 per cent of school-aged children. A thorough history and examination is required to exclude organic conditions, but often pain may be precipitated by stress and anxiety and investigation of social and family factors is required.

Chronic persistent pain may be associated with neuropathic pain syndromes (eg. phantom limb pain) or chronic illness (eg. cystic fibrosis, juvenile rheumatoid arthritis). Drugs effective for neuropathic pain in adults are utilised, but controlled trials in children are lacking.

The nature of pain related to cancer differs markedly in paediatric and adult populations. Pain may be directly tumour related but usually remits with primary treatments such as chemotherapy and radiotherapy. Children often find diagnostic and therapeutic procedures to be the most difficult part of having cancer. The cancer treatment itself may also be associated with painful complications (eg. mucositis). As patients often have a long disease free survival, neuropathic pain resulting from radiation, chemotherapeutic agents or surgery may require ongoing management. Tumour recurrence, which is unresponsive to therapy, tends to progress rapidly, and associated pain may require aggressive management.

S10-1 PERIOPERATIVE ALTERATIONS IN COAGULATION AND HAEMOSTASIS

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Coagulation is a complex, interrelated, and dynamic physiologic process involving enzymatic and cellular mechanisms, many of which interact with other vascular and inflammatory process. Understanding normal coagulation, its regulation, and the genesis of pathophysiologic processes is necessary in order to make clinical decisions and institutes appropriate therapy in the operating room and intensive care unit (ICU). We will review normal coagulation (enzymatic and cellular) processes, the assessment of coagulation, related issues, and the rational treatment of coagulopathy.

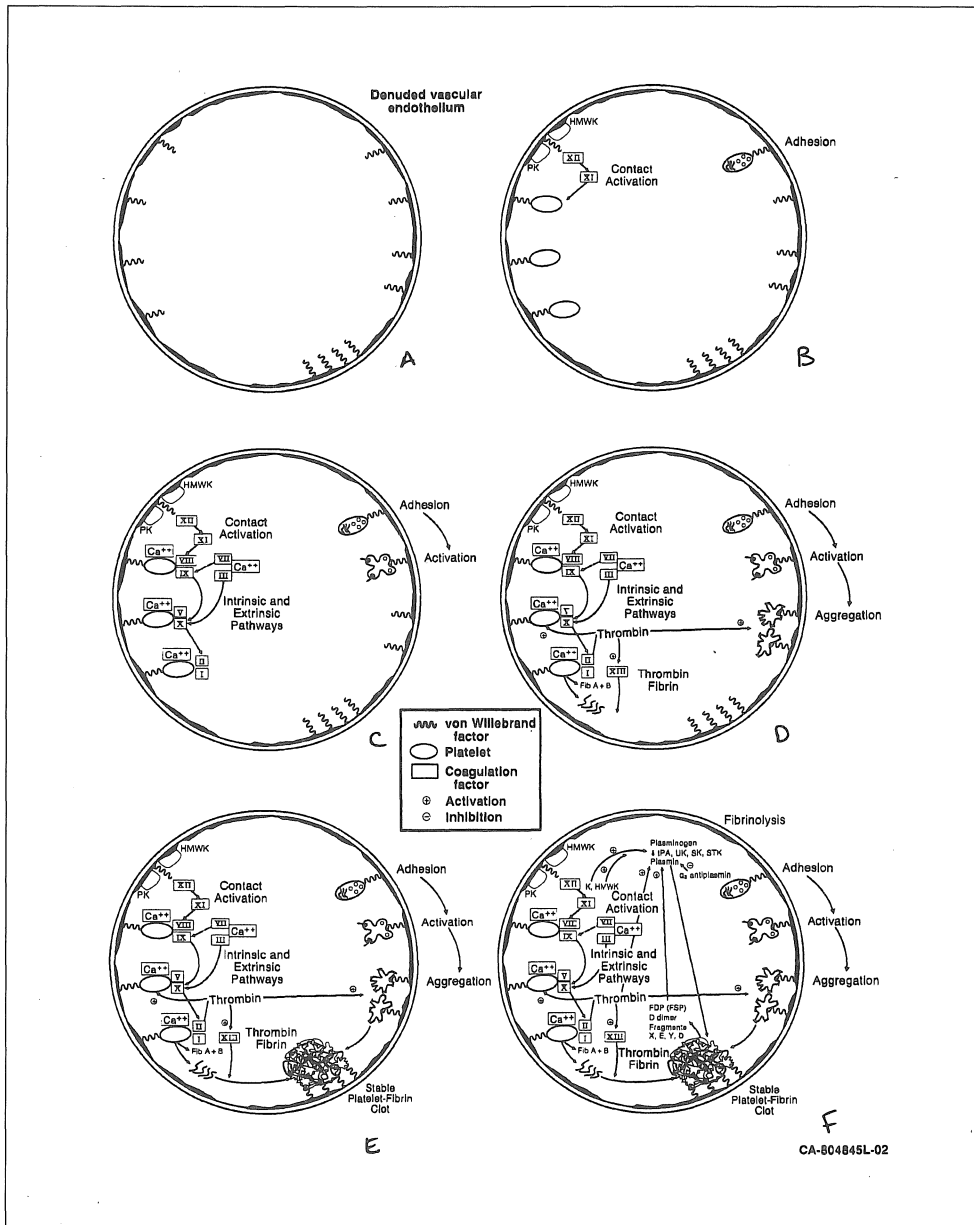


Figure: Thrombosis and Fibrinolysis

S10-2 MONITORING IN CARDIAC ANAESTHESIA

A Okamura, O Kemmotsu, Department of Anaesthesiology, Hokkaido University School of Medicine, Sapporo, Japan

Vigilance best describes the task of the anaesthesiologist. The aim of monitoring the anaesthetized patient is to increase vigilance by obtaining information using various devices. We must use the information in a logical way, treat the patient and make therapeutic decisions. Many vital organs are influenced with cardiopulmonary bypass and comprehensive monitoring of these organs becomes mandatory in cardiac anaesthesia. It is particularly vital to monitor electrocardiography, arterial blood pressure, cardiac filling pressure and cardiac output during cardiac anaesthesia. Transoesophageal echocardiography enables us to measure global and regional cardiac function, assess cardiac anatomy and visualise intracardiac air emboli during cardiac surgery. Although it is controversial the noninvasive measurement of regional cerebral oxygen saturation of haemoglobin by near-infrared spectroscopy is useful in some clinical settings. Advances in computer technology enabled us to develop the more sophisticated method of data collection in cardiac anaesthesia. We developed the electronic anaesthesia record keeping system linked to the Hokkaido University Hospital Operating Room Patient Management System. Although the basic principle of monitoring remains unchanged, the system increases vigilance and promotes safety of surgical patients. We routinely use the system in patients' management during cardiac anaesthesia.

S10-3 DRUGS AND TECHNIQUES FOR FAST-TRACKING IN CARDIAC ANAESTHESIA

G N C Kenny, Royal Infirmary, Glasgow, United Kingdom

Fast tracking after cardiac surgery requires selection of patients with satisfactory cardiovascular and respiratory systems. It is important to have precise control of hypnosis, analgesia, temperature and blood loss. Intravenous anaesthesia using target controlled infusions of propofol and alfentanil can assist greatly with the control of hypnosis and analgesia. Our technique is to begin with the alfentanil infusion while baseline recordings are made. Thereafter, the target concentration of propofol is started. The targets of the two agents are increased gradually until induction is accomplished and altered as dictated by clinical requirements.

We used this technique to provide anaesthesia for 120 adult patients. After bypass, patients were randomised to receive a patient demand, target controlled alfentanil infusion or a traditional morphine PCA system for postoperative analgesia. When pain relief was requested by patients who received alfentanil, the target concentration of alfentanil was increased by 5ng/ml. If analgesia was not requested during a 15-minute period, the target concentration was reduced automatically by 5ng/ml. If the button was not pressed the target concentration was further reduced in steps of 5ng/ml every 15 minutes for the first four hours of use, every 30 minutes for the next four hours and every 60 minutes thereafter.

The overall mean visual analogue pain score in patients using the alfentanil system was significantly lower than in those using morphine PCA. Patients in the alfentanil group were also extubated sooner at a mean of 288 minutes compared with 411 minutes for the morphine PCA group.

S10-4 NITRIC OXIDE AND THE TREATMENT OF PULMONARY HYPERTENSION

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Patients with pulmonary hypertension have had no effective treatment available because of the lack of a selective pulmonary vasodilator. In 1980, a labile humoral factor produced by endothelial cells (endothelium-derived relaxant factor, EDRF) was shown to mediate vascular dilatation. Nitric Oxide (NO) has been shown to be biologically identical to this factor, EDRF. Once released, NO diffuses into vascular smooth muscle cells, activates soluble guanylate cyclase which increases the concentration of cGMP and initiates a cascade of events that results in smooth muscle relaxation. In vitro and in vivo evidence indicate that NO may be an important mediator of pulmonary vascular tone. Therefore, numbers of reports have appeared evaluating the effect of NO as a selective pulmonary vasodilator in the treatment of pulmonary hypertension (PHTN). Inhaled NO also has provided effective treatment for patients with PHTN recovering from mitral valve replacement. In these patients, NO decreased pulmonary vascular resistance (PVR) without affecting systemic blood pressure or inducing other adverse effects. NO has proven therapeutic in some infants with PHTN after cardiac surgery. Our work and other data has shown that inhaled NO decreases mean pulmonary artery pressures after cardiopulmonary bypass in some patients with PHTN. There are no prospective blinded studies with large numbers of patients or whether NO will reliably prevent the pulmonary hypertensive crisis that can occur after cardiopulmonary bypass.

PL-2 NEW TECHNOLOGIES, CRITICAL CARE AND ECONOMIC REALITIES

M R Pinsky, Department of Anaesthesiology and Critical Care Medicine, University of Pittsburgh, Pittsburgh, PA

Critical care medicine is feeling the stress of trying to incorporate an unprecedented explosion of medical knowledge, new diagnostic and therapeutic technologies of unclear benefit and tightening budget restraints aimed at limiting escalating health care cost. In the face of lack of evidence to the contrary, health care administration services wish to limit or deny the use of expensive diagnostic procedures and therapies to patients. However, lack of proof of efficacy is not proof of lack of efficacy. However, the actual issue is the efficient application of all technologies, and the assessment of their impact on the process of care in the ICU. This enters the realm of outcomes research. Critical care is a challenge to the outcomes researcher precisely because the key variables of disease, patient population, therapy, and provider are difficult to define. Defining critical care as that patient care done in the ICU focuses on a region but not on the process of critical care services. Reasonable outcome measures to quantify are those that are important to patients, their families, and to society. Mortality is also not a clean statistic. "Health-related quality of life" (HRQL) refers to the subjective experience of the effect of health and treatment on one's satisfaction with life. It reflects a societal valued measure of health care effectiveness. While "functional status" describes an individual's ability to perform tasks in everyday life. "Health status" encompasses both functional status and HRQL. Patient values or "utility" can be used to calculate quality-adjusted life years (QALYs) that incorporate the quality and the quantity of life into a single measure for use in economic analyses. Prior to the addition of novel therapies, it is useful to address strategies to optimize present management. Since the intensive care unit is a triage center for resource utilization, this triage can be aided by initial and ongoing risk prediction using established tools, such as APACHE and acute physiological scoring systems. Similarly, treatment of many disease processes can be protocolized. A cardinal characteristic of intensive care is the frequent and detailed assessment of physiological processes through the use of invasive and non-invasive monitoring. This process of hemodynamic monitoring rapidly develops into the application of potent and potentially dangerous therapies. Unfortunately, the underlying assumptions to the use of monitoring devices or therapies directed by their surveillance are not well validated for most of the process for which acute care is given. ICU management needs to be demystified. The overall objectives of acute care medicine and the ICU can be simply stated as: To admit and treat those patients who will benefit from intensive care, not admit or treat those who will not benefit, to discharge those patients who are not ill enough to benefit from intensive care, and to do so in a cost-effective manner. In order to accomplish these goals one must formulate admission and triage policies with the understanding that the principle of equity must not be softened in favor of cost-effectiveness. This process can not be effectively imposed from outside because peculiarities of each hospital administrative and physical structure, patient mix and economic forces will be different. Thus, the intensivist needs to learn how to identify patients within their local environment who have a reasonable chance of improving. This should be done while also performing appropriateness audits. By not admitting those patients who will not benefit from intensive care, the number of inappropriate admissions will decrease. Importantly, the goal of reducing inappropriate and ineffective care is worthwhile for both the hospital, the patient and society.

S11-1 PERIOPERATIVE FLUID MANAGEMENT IN CHILDREN

R Leelanukrom, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

The goal of intraoperative fluid management is to sustain homeostasis by providing the appropriate amount of parenteral fluid to maintain adequate intravascular volume, cardiac output, and ultimately oxygen delivery to tissues at a time when normal physiologic functions are altered by surgical stress and anesthetic agents. Calculation of maintenance fluids based on the well known formulae devised by Holliday and Segar in 1957. The hourly fluid requirement is 4ml/kg for children up to 10kg, an additional 2ml/kg for each kilogram above 10kg up to 20kg, and an additional 1ml/kg for each kilogram above 20kg. Half the deficit caused by fasting is replaced during the first hour and one quarter each over the next 2 hours. Third-space and blood losses are replenished with balanced-salt solution, albumin, synthetic colloids, and blood where appropriate.

Glucose infusion during surgery has undergone extensive reevaluation including children. Withdrawal of glucose administration can prevent hyperglycemia during surgery. However, hypoglycemia can occur in children with low incidence due starvation. Solutions containing 2.5% glucose or less, or glucose infusion at a rate of no more than 300mg/kg/hr seem appropriate for preventing perioperative hypoglycemia as well as marked hyperglycemia. Certain variables, such as duration of starvation, timing of starvation, neonates, nutritional status, effects of anesthesia, concurrent drug administration, blood transfusion, and other specific conditions, should be considered prior to perioperative glucose administration.

S11-2 NEONATAL EMERGENCIES

E Sumner, Hospital for Sick Children, Great Ormond Street, London WC1N 3JH, United Kingdom

I have chosen oesophageal atresia and tracheo-oesophageal fistula as my subject because it illustrates many problems of the neonatal emergency - low birthweight, possible cardiac, airway and renal involvement and hyaline membrane disease. The original 1962 classification of Waterston in which the mortality of Group C (between 1.8kg or over 1.8kg with severe pneumonia or a cardiac anomaly) was 94% has been superceded. Spitz (1994) group 3 (below 1.5kg and major cardiac defect) has a mortality approximately 25 - 50%.

50% of patients have other congenital anomalies, 30% are cardiac (often Fallot's tetralogy), 14% anorectal, 14% renal, 10% limb or vertebral. Echo and renal ultrasound are routine preoperative. Low birth weight (30%) and cardiac anomalies (30%) have the greatest impact on morbidity and mortality.

Awake tracheal intubation is no longer used. Inhalation or IV with relaxant, careful manual ventilation and insertion of a caudal epidural catheter is routine and no patient is allowed to breathe spontaneously until the fistula is ligated. In the case of ventilation problems - hyaline membrane disease or a large fistula - several manoeuvres are discussed but ultimately we believe in emergency ligation of the fistula.

Indications for postoperative ventilation include, a tight oesophageal anastomosis, low birthweight, cardiac problems, apnoeas, pulmonary disease. In our unit, 50% breathe spontaneously with either an epidural or morphine infusion IV. The mortality from this condition now approaches zero and steps to improve morbidity are current.

S11-3 PRACTICAL OVERVIEW OF REGIONAL BLOCKS IN CHILDREN

F Taib, Department of Anaesthesia and Intensive Care, Kuala Lumpur Hospital, Malaysia

The use of regional anaesthetic techniques in children is gaining more acceptance in recent years as a consequence of a better understanding of the basic knowledge, technical improvement in equipment designed specifically for children and a broader acceptance that regional procedures are considered complimentary to general anaesthesia in children. Spinal anaesthesia was reintroduced as a safe alternative to general anaesthesia for high risk premature infants undergoing inguinal hernia repair to reduce the incidence of post-anaesthetic complications especially apnoea. Caudal block is a very useful adjunct for providing intraoperative anaesthesia and postoperative analgesia. It is also the most popular regional block in children because of its simplicity, safety and effectiveness especially for 'sacral segment surgery' and other operations below the umbilicus. Lumbar and thoracic epidural block have been used extensively in paediatric patients as part of a 'balanced anaesthetic' plan. This technique reduces general anaesthetic requirements for surgery, minimises usage of intraoperative systemic narcotics, reduces stress response to surgery, contracts gut intraoperatively and hence maximises surgical field for retroperitoneal operations. The common peripheral nerve blocks performed are the ilioinguinal/iliohypogastric block, penile nerve block, femoral nerve block, 3-in-1 block and axillary block. Regional techniques in children are very safe but not without risk. For the safety of the patients, the risks and benefits of these neural blocks should be thoughtfully considered when planning an anaesthetic.

S11-4 COMPLICATIONS IN PAEDIATRIC ANAESTHESIA

A Ng, KK Women's and Childrens' Hospital, Singapore

Paediatric anaesthesia involves the management of distinct group of patients: neonates, children with syndromes, healthy children and children who require recurrent operations. There is a wide range of complications. However, complications common to all groups are mainly respiratory involving the airway i.e. laryngospasm and bronchospasm, leading to hypoxia. Bradycardia is often hypoxia-related though it may be drug induced. A less serious complication but still distressing is post-operative vomiting. Equipment considerations are often related with unfamiliarity. Uncommon complications of latex allergy and malignant hyperthermia can be seen in at risk groups of children.

S12-1 CHALLENGES AND OUTCOME IN LABOUR ANALGESIA

S P Gatt, Prince of Wales & Prince Henry Hospitals, Sydney, Australia

(Abstract not available at the time of printing)

S12-2 TOWARDS A SAFE GENERAL ANAESTHETIC FOR CAESAREAN SECTION

C Y Lee, Department of Anaesthesiology & Intensive Care, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia

Although maternal mortality rates have declined, anaesthetic-related deaths continue to account for 2 - 3% of maternal mortality. These problems are largely related to the difficult obstetric airway - difficult, failed, or unrecognised oesophageal intubation resulting in hypoxia and/or acid aspiration. Despite an increased utilisation of regional anaesthesia for Caesarean sections, there is still a place for general anaesthesia in parturients who are unwilling to undergo regional anaesthesia, or in cases which are unsuitable for regional anaesthesia. Other than airway related problems, extreme haemodynamic changes during induction and reversal of anaesthesia may be detrimental particularly in hypertensive or preeclamptic patients. Although awareness under general anaesthesia in itself does not contribute to maternal mortality, it is still a complication which needs to be addressed by virtue of its medico-legal implications. In order to improve safety for general anaesthesia, the anaesthetist should be aware of the problems associated with general anaesthesia and take steps to prevent them. There should be adequate training and supervision of the anaesthetist and the anaesthetic assistant. Protocol development and simulation studies are useful in crisis situations such as failed intubation. There should also be back-up facilities such as blood bank, high dependency units and intensive care units for problem cases and patients with peri-partum haemorrhage. The anaesthesiologist, obstetrician and neonatologist should work closely together in order to provide adequate professional care for the mother and her baby.

S12-3 THE ROLE OF OPIOIDS IN OBSTETRIC ANAESTHESIA

W D Ngan Kee, The Chinese University of Hong Kong, Hong Kong, China

Because they cross the placenta and can cause neonatal respiratory, opioids have historically been used with caution in obstetric patients. However, with the evolution of obstetric anaesthesia and improvement in neonatal resuscitation, the applications for opioids in obstetrics are expanding and they are now used routinely in most methods of obstetric anaesthesia. This lecture will discuss the evolving role of opioids in obstetric anaesthesia, with a focus on some of the newer and more novel techniques and applications. The main areas that will be covered will include: parenteral opioids for labour analgesia, epidural and intrathecal opioids for labour analgesia, and opioids in Caesarean section.

S12-4 ANAESTHESIA FOR PREPARTUM AND POSTPARTUM SURGERY

J L Chong, Department of Anaesthesia, KK Women's and Children's Hospital, Singapore

Prepartum surgery is uncommon in comparison to postpartum surgery. Whereas most prepartum surgery are attempts at preserving a good outcome to pregnancy, postpartum surgery are mainly for sexual sterilisation, i.e., bilateral tubal ligations. Prepartum surgery may be urgent events and postpartum sterilisation are considered medically non-urgent. Reports of anaesthetic mortality are relatively rare in both prepartum and postpartum surgery. A common prepartum surgery related to obstetrics is cervical cerclage to prevent premature delivery. Both general anaesthesia and regional anaesthesia have been safely used in this group of patients. Use of tocolytics afterwards have been used can prevent premature labour.

However, both prepartum and postpartum surgery carries with it the effects of physiological changes in pregnancy. Physiological changes during this postpartum period will be discussed. The issue of risk of pulmonary aspiration, timing of operation and type of anaesthesia will be discussed.

S13-1 INHALATIONAL ANAESTHETIC AGENTS

B K Philip, Harvard Medical Schl, Brigham & Women's Hosp, Boston USA

In recent years, desflurane and sevoflurane have joined isoflurane for clinical practice. This presentation will explore the clinical implications of the agents' different solubility and physical properties.

Several studies have compared the two new agents with isoflurane as a maintenance agent for ambulatory anaesthesia. They find that either desflurane or sevoflurane provide faster early recovery than isoflurane. The two new agents have also been compared with propofol for maintenance, and recovery times are similar when all groups receive N₂O.

Direct comparisons of desflurane with sevoflurane in the setting of clinical ambulatory anaesthesia appear to show no significant recovery time differences.

The agents have different undesirable properties. Sevoflurane undergoes metabolism to inorganic fluoride and degradation to a vinyl ether, Compound A. However, clinical renal dysfunction due to sevoflurane has not been observed. Desflurane produces sympathetic nervous system activation, paralleled by cardiovascular stimulation. Airway tolerability is also problematic. However, the clinical implications of desflurane's adverse properties are less certain, since they can be controlled with other drugs.

Since the newer agents are more expensive, anaesthesiologists have tried to use isoflurane for maintenance and finish the anesthetic with a less soluble agent. The isoflurane-desflurane combination has been researched; however, recovery times were not improved and costs were not reduced.

The choice of inhaled anaesthetic agent for clinical use depends on a balance of patient-specific advantages and disadvantages.

S13-2 NEW NARCOTICS FOR ANAESTHETIC PRACTICE

G N C Kenny, Royal Infirmary, Glasgow, United Kingdom

One profile of the 'perfect' agent for anaesthesia is rapid onset with short duration. Remifentanyl is metabolised by tissue cholinesterases and the context-sensitive half-time is less than any other analgesic. Onset time of remifentanyl is similar to alfentanil but esterase metabolism allows the plasma remifentanyl concentration to decrease by half within 3 - 4 minutes of stopping administration no matter the duration of infusion.

Few drugs are free from adverse effects and the same is true for remifentanyl which has the same benefits and drawbacks as other opioids. However, muscle rigidity has not been noted at the doses required to produce profound levels of analgesia. Provision must be made for longer term analgesia to ensure that adequate postoperative analgesia is provided.

S13-3 ARE THE NEW MUSCLE RELAXANTS COST EFFECTIVE AND OF BENEFIT TO PATIENTS?

R D Miller, Department of Anaesthesiology & Perioperative Care, University of California, San Francisco, USA

Since 1982, there have been many new muscle relaxants approved for clinical use. Based on numerous sources of outcome data, the three most important problems involving muscle relaxants in which these drugs are directly responsible for morbidity and/or mortality are:

- * adequate control of the airway;
- * residual muscular blockade;
- * long term use in the intensive care unit

Clearly, the use of intermediate acting muscle relaxants have markedly decreased the incidence of residual neuromuscular blockade in the post-anesthetic recovery room. It, therefore, seems reasonable that if it is an expectation to extubate the trachea and have spontaneous respiration at the end of surgery, either intermediate or short acting muscle relaxants should be used. With regard to inadequate control of the airway, there are no outcome data to prove that the new muscle relaxants have improved our ability to control the airway. Nevertheless, if one believes that the rapid onset of neuromuscular blockade is important, then rocuronium and succinylcholine have to be the most important drugs for rapid sequence in anaesthesia. Hopefully, a new drug rapacuronium will be an improvement. Lastly, the guidelines for use of muscle relaxants in the intensive care unit to avoid prolonged paralysis are now established and will be discussed.

The conclusion is that the new muscle relaxants have been of considerable benefit to patients and allow more flexibility with regard to anaesthesia care.

S13-4 DRUG INTERACTIONS IN ANAESTHESIA

M Wood, Department of Anaesthesiology, Columbia-Presbyterian Hospital, New York, USA

(Abstract not available at the time of printing)

S14-1 GOALS OF RESUSCITATION

M R Pinsky, Department of Anaesthesiology and Critical Care Medicine, University of Pittsburgh, Pittsburgh, PA

Resuscitation from circulatory and respiratory failure represent mainstays of emergency and critical care management. However, laboratory studies have demonstrated that restoration of total blood flow, arterial oxygenation and even arterial pressure to otherwise normal levels by the use of vasoactive agents is not universally good for either organ function and host outcome. Exogenous vasopressor therapy impairs normal autoregulation of blood flow among organs and may induce occult tissue ischemia in vital but silent vascular beds, such as the gut mucosa and renal subcortex. Furthermore, microcirculatory oxygen utilization is more a function of local metabolic demands and capillary flow than global blood flow or arterial O₂ content. Regrettably, significant regional ischemia or rescue can occur without perceptible changes in global O₂ uptake (VO₂). Although fluid and vasopressor therapies may normalize organ perfusion pressure they may not induce normal organ perfusion nor prevent organ dysfunction. Still, it is clear from numerous clinical studies that tissue hypoperfusion is bad and that avoidance of ischemia improves outcome from stress states. Thus, the rapid restoration of normal hemodynamics by conventional means, including fluid resuscitation and surgical repair, results in a superior outcome than inadequate or delayed resuscitative efforts. Since critically ill patients often have abnormal blood flow regulation, increasing oxygen delivery (DO₂) to supranormal levels theoretically may treat the lethal occult tissue hypoxia that is a hallmark of many forms of circulatory shock. Accordingly, recent interest has centered on "hyper-resuscitation" such that DO₂ is exogenously increased to supranormal levels, levels often seen in subjects who spontaneously survive acute circulatory insults, the so-called "survivor levels of DO₂." Most studies which have aimed at augmenting DO₂ or VO₂ to "survivor levels" have documented that if DO₂ can increase, subjects do better. However, this improvement in survival appears to be independent of whether the subject was part of the group with intentional augmented DO₂. Furthermore, aggressive therapies aimed at augmenting DO₂ may actually increase mortality in experimental groups! Thus, a low DO₂ in a critically subject is probably a marker of critical illness, rather than a parameter of effective resuscitative therapy. Interestingly, the most impressive beneficial outcomes from clinical trials have all included prevention of hypoperfusion rather than resuscitation from shock. Aggressive hemodynamic therapies in patients at risk for development of multiple organ dysfunction and death improves survival in this group even if no differences in DO₂ or VO₂ are seen during therapy. Thus, the cumulative data to date suggests that a major benefit of aggressive resuscitation therapy would be realized if efforts were directed at more rapid identification of subjects at risk from the general hospital population and the more rapid emergency resuscitation, transport and definitive therapy of subjects in the field. However, once circulatory shock and/or organ dysfunction has occurred there appears to be little additional benefit and real risk of harm from aggressive resuscitation therapies which increase DO₂ or VO₂ to levels above which would otherwise be considered normal.

S14-2 IMMUNOMODULATION IN SEPSIS

K S Ng, Dept of Anaesthesia, New Changi General Hospital, Singapore

In the early part of this century, clinicians focused on the microbe as the point of dealing with the problem of sepsis. Antibiotic was discovered and continues to be developed to deal with microbes. The affected organism mounts a myriad of reaction to a microbial invasion; collectively this is termed the immune response. It became apparent that attacking the offending microbe alone may not be enough in securing a good outcome in sepsis. Over the past 3 decades, investigators have done much to increase our understanding of the immune response. Several trials of immunomodulation have been and continue to be conducted since the early '80s.

The immune response has been best worked out with regards to infection by Gram-ve organisms. However, it must be noted that though lipopolysaccharide is a very potent initiator of the immune response, there are other potent stimulators such as Gram+ve organisms, viruses, protozoa, etc. The entire sequence of immune response may be divided into 3 phases - Induction Phase, Phase of Cytokine Synthesis and Secretion, and the Cascade Phase. Each Phase presents opportunities for modulation as part of the process of treating sepsis.

Lipid A appears to be the key portion of the lipopolysaccharide molecule involved in interacting with the body's immune system to produce the septic state. Following the success of polyclonal human antisera against J5 E. coli in patients with Gram-ve infection, monoclonal antibodies against Lipid A were developed. One of these, HA-1A was extensively investigated as an immunomodulatory substance. Despite initial promising results, the CHES trial to assess 14-day mortality in patients with Gram-ve bacteremia and shock had to be suspended. This was a result of the first interim analysis on 1500 patients which showed excessive mortality among treated patients who did not have Gram-ve bacteremia.

The process by which an activated monocyte synthesises and secretes cytokines involves several regulated steps. Among others, pentoxifylline and corticosteroids are substances that have been found to influence this phase of the immune response. Staubach et al reported that continuous intravenous infusion of pentoxifylline positively influenced cardiopulmonary dysfunction in patients with sepsis. No adverse effects were reported.

Once TNF is secreted, an entire cascade of inflammatory reactions erupts. Hyperinflammatory response to microbial infection is believed to play a major role in multi-organ system dysfunction and ultimately death related to sepsis. Many therapies directed at the Cascade Phase have been and continue to be investigated as means of immunomodulation in sepsis.

While much attention has been directed at taming the hyperinflammatory response to sepsis, Volk et al remind us of the existence of a hypoinflammatory phase in sepsis. They reported that persistence of a state of "immunoparalysis" beyond 5 days in abdominal sepsis carries a very high mortality rate of 81%. Plasmapheresis has been suggested as a means of reversing monocyte deactivation in the "immunoparalysed" state. Therapies directed at reversing the state of "immunoparalysis" constitute another important aspect of immunomodulation in sepsis.

We will briefly review what is known of the pathogenesis of the septic process and some of the main immunomodulatory therapies that have been reported to date.

S14-3 SYSTEMIC CONSEQUENCES OF HYPERCAPNIA

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(Abstract not available at the time of printing)

S14-4 RESULTS OF THE FIRST ASIA-PACIFIC CONSENSUS CONFERENCE IN CRITICAL CARE MEDICINE: "RESUSCITATION OF PATIENTS IN SEPTIC SHOCK"

I Mustafa, Intensive Care Unit, Harapan Kita National Cardiac Centre, Jakarta

We organized the 1st Asia-Pacific Consensus Conference in Critical Care Medicine on Resuscitation of Patients in Septic Shock held in conjunction with the 4th Indonesian-International Symposium on Shock and Critical Care in Jakarta, Indonesia on August 25 - 28, 1997. The organizers aim to develop an annual consensus conference process targeted at the Asia-Pacific area, open to all participants from Asia, to function in parallel with similar consensus conferences in Europe and North America. Physicians from Europe and North America met with the representatives of the Western Pacific Association of Critical Care Medicine and its member national critical care societies, and agreed to collaborate on this process. The organizers hope exchanges of this type will increase in quality and number and lead to advances on academic and clinical critical care.

The topic chosen was resuscitation of patients in septic shock, with participants requested to focus on clinical management that could be applied during the first 24 hours in countries with developing critical care systems. The focus was on **central and regional circulation, end-organ function, metabolic and inflammatory response**. Due to time constraints, the crucial issues surrounding the use of antibiotics in patients with septic shock, while recognized, was not directly reviewed during this conference. The Consensus Conference did not aim to produce formal guidelines, but rather to increase participation of regional societies of critical care medicine in Asia in development of a practical state-of-the-art approach in collaboration with European and North American colleagues. The process may be helpful to individual national societies in all parts of the world in developing detailed guidelines applicable to the local healthcare system.

The methods used to conduct this conference borrowed components from several existing consensus methods. As in the National Institute of Health (United States) and French national processes, we organized the conference around a small set of key questions. The Conference chairmen, facilitator and members of the panel developed a set of four key topics, each with two questions for the panel to answer. The panelists were divided into four groups, each of which took the primary responsibility for developing the answers to the assigned questions.

Before the consensus conference, panelists distributed to their allocated group references, literature reviews, draft responses, and other materials relevant to answering their questions. This interchange was to encourage panelists to begin thinking about their questions, and to allow each group to gain an understanding of its members for answering the questions. In addition, the organizers distributed materials on the levels of evidence-based medicine method for grading cited literature. Levels of evidence of individual clinical trials were labelled I to V, and responses to questions were graded A through E. Panelists were encouraged to use the levels of evidence methods to classify references.

All panelists from Europe and North America were faculty members of the associated 4th Indonesian-International Symposium of Shock and Critical Care. The full panel met on first day of this symposium to review the Conference agenda, the consensus process, and the wording of the eight questions. The purposes of the session were to allow the panelists to develop a common understanding of each question, agree on the

wording for each question, and to review what was expected from them. Since there is great diversity in medical facilities, the panel next develop minimum standards and characteristics of a medical system to which the recommendations could apply.

Groups met during the three day Symposium and drafted answers to their questions. The evening before the Conference the panel met and all groups presented their responses. The panel critically reviewed each group's responses.

During the morning of the Conference groups modified their statements in response to the previous input. Once this was completed, groups presented their recommendations in detail for feedback and panel discussion. In the weeks immediately after the Conference the groups agreed on a preliminary draft of their recommendations. The answers to all questions were then distributed to panelists for final comments.

FP1-1 ESMOLOL IMPROVES THE RECOVERY OF ISCHEMIC MYOCARDIUM AFTER CARDIO-PULMONARY BYPASS

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Introduction

Beta blockers protect against myocardial damage during acute myocardial ischemia and infarction. We hypothesized that acute beta-blockade with esmolol would enhance recovery of post-ischemic myocardium after hypothermic cardiopulmonary bypass (CPB).

Methods

20 canines were anesthetized with midazolam and fentanyl constant infusions. One group underwent left anterior descending coronary artery constriction to diminish epicardial blood flow to a point where regional myocardial ischemia induced >50% but <100% reduction in anterior wall systolic shortening. The second group did not undergo regional ischemia and served as a non-ischemic control. Regional myocardial ischemia was maintained for 45 minutes. Subsequently complete right atrial to aortic CPB was instituted. At CPB initiation, esmolol (500µg/kg bolus and 100µg/kg/min) was administered. Ten minutes after the release of cross-clamp, the esmolol infusion was discontinued. Data were obtained at baseline (B), after 45 minutes of LAD constriction (I), 1 and 30 minutes after termination of CPB.

Results

Regional systolic function in the apical wall was significantly different between the two groups at I stage but otherwise the group showed no difference. The posterior wall systolic function was not different between the two groups at any time during the experiment.

Discussion

our study shows that in esmolol treated dogs, regional myocardial function after CPB is preserved in the ischemic group as well as in control. The use of esmolol did not alter regional function in the non-ischemic territories of either group. Esmolol improves the recovery of systolic function in pre-existing ischemic myocardium after CPB.

FP1-2 HIGH CONCENTRATION INHALATION ANAESTHESIA COMBINED WITH POST-OPERATIVE EPIDURAL ANALGESIA IN CARDIAC SURGERY

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Introduction

Inhalation anesthetics were well known for myocardial depression. Modern anesthesiologists conduct cardiac anesthesia mainly via intravenous high dose narcotic technique to achieve relative stable hemodynamic discharge and improve peripheral circulation. This study was conducted to assess clinical effects of high concentration inhalation anesthetic technique combined with post-operative epidural analgesia in cardiac surgery.

Methods

46 patients undergoing various cardiovascular surgical procedures were studied. General anesthesia was induced with thiopental 1.5mg/kg and followed by progressive increase inhalation anesthetic (halothane) vapor dial concentration through 0.5 to 5.0% with 2L/min of O₂ and air mixture to achieve calculated blood concentration of 1.5 - 2.0% during 30 to 50 minutes period via mask ventilation. Intubation was achieved with supplemental pavulon 0.15mg/Kg. Anesthesia was maintained with low flow (100% O₂ 400cc/min) and halothane (calculated blood concentration 1.0 - 2.0%). During emergence of anesthesia after surgery, epidural catheterization was established for postoperative pain control.

Results

All patients except two could be extubated immediately after surgery. ICU and total hospital stay were 2.1±0.5 and 8.8±0.7 days respectively. Only four cases needed inotropics to support hemodynamic status postoperatively. All patients could achieve satisfactory post-operative pain control and earlier respiratory training.

Conclusions

High concentration inhalation anesthetic technique is safe and effective method to achieve adequate depth of anesthesia in cardiac surgical operation. Even in severely compromised hemodynamic situations like congestive heart failure this kind of anesthesia can preserve and maintain steady hemodynamic and adequate depth of anesthesia. Epidural analgesia can be safely used in cardiac surgical patients for effective postoperative pain control and may promote earlier mobilization and respiratory training.

FP1-3 ROLE OF COLLOIDS IN MANAGEMENT OF CRITICALLY ILL PATIENTS

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Albumins are costly and the use in intensive therapy should be limited to patients with burns, renal failure, hepatic failure, neonates and to patients with albumin serum levels less than 2.5g%. Gelatines are characterized by a low molecular weight of 35000 Daltons and low concentration (3 - 3.5%) they have a weak volume effect of 70% and a short duration of 1 - 2 hours. Dextrans have more potent hemodynamic actions, yet the specific interference with plasmatic coagulation limits daily dosages to 15ml/kgbw./day. HAES-solutions are available as medium or long lasting colloids: 6% / 10% HAES 200/0.5 (HAES-steril) (H), 6% HAES 450/0.7 (Plasmasteril) (P). HAES-steril 6%/10% have initial volume effect of 100%/145% with a duration of 4 - 8 hours, Plasmasteril has 100% initial volume effect and a longer duration of 8 - 12 hours. The hemodynamic effectivity in intensive care and surgery has been clinically documented in numerous studies. Cardiac index (CI), oxygen delivery (DO₂) and oxygen consumption (VO₂) increased significantly to reach normal or even supranormal values in high risk patients:

| HAES | Investigators | Year | Indication | Dosage | CI | DO ₂ | VO ₂ |
|------|---------------|------|------------|--------|---------|-----------------|-----------------|
| H | HANKELN | 1985 | Trauma | 800ml | 4.3/5.3 | 634/224 | 158/203 |
| H | RACKOW | 1989 | Sepsis | 900ml | 2.7/3.2 | — | — |
| H | FRIEDMANN | 1994 | Sepsis | 400ml | 3.4/4.1 | — | — |
| H | WAXMAN | 1989 | Burns | 500ml | 5.0/6.8 | 837/1024 | 209/265 |
| H | BOLDT | 1996 | Trauma | 1230ml | 3.7/4.7 | 522/650 | 137/158 |
| H | BOLDT | 1996 | Sepsis | 1450ml | 4.1/5.6 | 626/845 | 154/201 |
| P | LAZROVE | 1983 | Sev.surg. | 500ml | 3.5/4.3 | 472/544 | 125/160 |
| P | RACKOW | 1983 | Sepsis | 4865ml | 2.4/3.5 | — | — |
| P | McCARTNEY | 1986 | Sev.surg. | 500ml | 3.5/4.4 | 489/587 | 111/130 |
| P | PURI | 1983 | Trauma | 2709ml | 2.7/3.9 | 422/582 | 273/293 |

H= HAES-steril, P= Plasmasteril

Recent outcome studies have revealed significant reduction of morbidity, mortality and cost of treatment when CI, DO₂ and VO₂ values were titrated early with HAES to supranormal values in patients with severe surgery, sepsis, trauma or burns:

| Investigators | Year | Indication | Patients C/P (no.) | Org. failure C/P (no.) | (%) | Mortality(%) C/P |
|---------------|------|------------|-----------------------|---------------------------|---------|---------------------|
| SHOEMAKER | 1988 | Surgery | 30/28 | 39/1 | 103/3.6 | 33/ 4 |
| TUCHSCHMIDT | 1992 | Sepsis | 26/25 | ---- | ---- | 72/50 |
| YU | 1998 | Sepsis | 23/43 | 30/34 | 130/79 | 52/21 |
| BISHOP | 1995 | Trauma | 65/50 | 105/37 | 161/74 | 37/18 |
| SCHILLER | 1996 | Burns | 30/33 | 5/2 | 17/6 | 48/10 |

C = Control group: normal / P = Protocol group: supranormal CI, DO₂, VO₂ values

Larger volumes (2000ml vs. 700ml HAES) were required to reach supranormal values of CI, DO₂, VO₂ in the protocol group (P) patients.

Conclusions

HAES-solutions improve hemodynamics, oxygen transport organ functions and outcome in intensive care and reduce cost of treatment. Comparable data are not available with other colloidal plasma substitutes.

FP1-4 ATTENUATION OF HAEMODYNAMIC RESPONSES FOLLOWING EXTUBATION WITH VARYING DOSES OF ESMOLOL

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This study was done to compare the effectiveness of two doses of esmolol in attenuating the haemodynamic responses to extubation. Ninety patients scheduled for elective surgery were included and randomly divided into three groups. Group 1 (n=30), the control group, received normal saline, Group 2 (n=30) received esmolol 0.5mg/kg and Group 3 (n=30) received esmolol 1 mg/kg one minute prior to extubation. Systolic blood pressure (SBP), mean arterial pressure (MAP) and heart rate were recorded at induction (baseline) and every minute from the time of extubation up to 10 minutes post-extubation. There was a significant reduction in MAP and heart rate ($p < 0.05$) between the control group (Group 1) and esmolol groups. There was no significant reduction in MAP between Group 2 and Group 3. There was a significant reduction in SBP between Group 1 and Group 3 but not with Group 2. Therefore while the esmolol dose of 0.5mg/kg is just as effective as the 1mg/kg dose in attenuating the MAP and heart rate responses to extubation, the 1mg/kg dose is needed to reduce the SBP effectively following extubation.

FP1-5 ATTENUATION OF HAEMODYNAMIC RESPONSES TO LARYNGOSCOPY AND TRACHEAL INTUBATION IN HEALTHY PATIENTS WITH DIFFERENT DOSES OF ESMOLOL

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This prospective study was designed to compare the effectiveness of esmolol, either 0.5mg/kg or 1.0mg/kg with a placebo in attenuating the haemodynamic responses to laryngoscopy and tracheal intubation. Ninety patients of ASA I or II scheduled for elective surgery were included in this study. Patients were randomly allocated to receive either placebo, 0.5mg/kg or 1.0mg/kg bolus of esmolol as part of an anaesthetic induction technique. Systolic, diastolic, mean arterial pressure and heart rate were recorded at baseline, prior to intubation and every minute for 10 minutes following laryngoscopy and tracheal intubation. Though there was an increase in systolic blood pressure and heart rate above the baseline in the placebo group, both esmolol 0.5mg/kg and 1.0mg/kg groups maintained systolic blood pressure and heart rate at levels comparable to baseline values throughout the study. We found there were no statistically significant differences in all haemodynamic parameters amongst the three groups.

FP1-6 CHANGES OF FINGER BLOOD FLOW AFTER CARDIOPULMONARY BYPASS

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Objective

The aim of this study was to examine the change of skin blood flow (SBF) on hand by laser Doppler flowmetry after CPB.

Methods

16 patients (male/female: 9/7) undergoing CABG surgery received fentanyl-sevoflurane anesthesia. 1st and 5th finger skin blood flow of left hand (RBF: SBF at radial site, UBF: SBF at ulnar site) were measured simultaneously by laser Doppler flowmetry during surgery. Data analysis was done with unpaired t-test, ANOVA and Fisher exact test where appropriate. A p value <0.05 was considered significant.

Results

There were no significant change of RBF during and after CPB. On the other hand, UBF increased in 7 patients and demonstrated little change in the remaining patients after CPB. Hence, we divided those patients into 2 groups according to the degree of the change on UBF after CPB: high flow group (7 patients); more than 200% increase of UBF, low flow group (9 patients); less than 199% increase of UBF. In high flow group, UBF increased 4 fold after CPB than before CPB (p<0.05). There were no significant differences in demographic variables (age, weight, sex), duration of CPB and aortic cross clamp and temperature management during CPB (normothermia/hypothermia: 9/7).

Conclusions

Those changes of finger blood flow may lead to the pressure gradients between peripheral and central arteries after CPB.

FP1-7 ADVERSE HAEMODYNAMIC EFFECTS OF APROTININ IN CARDIAC SURGICAL PATIENTS

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In open heart surgery the administration of aprotinin, a proteinase inhibitor extracted from bovine lung, may achieve a 30% - 40% reduction in perioperative blood loss and transfusion requirements. We are now reporting 2 cases of anaphylactic shock following a single exposure of aprotinin in a young patient undergoing aortic valve replacement and an elderly lady undergoing coronary artery bypass grafting where resuscitation was successful.

1st Case History

A 31 year old man, a known case of chronic rheumatic heart disease with severe aortic regurgitation, was admitted for aortic valve replacement. Following induction of anaesthesia, a standard regime of aprotinin was administered. Adverse haemodynamic reactions were observed within 5 minutes by severe tachycardia, marked hypotension, bronchospasm and generalised flushing. Resuscitation was commenced immediately and cardiopulmonary bypass (CPB) was established. The patient was successfully resuscitated and proceeded for surgery successfully.

2nd Case History

A 60 year old Indian lady with DM, diagnosed as having triple vessel coronary artery disease, was scheduled for CABG. Following induction of anaesthesia and sternotomy, a test dose of 2 ml of aprotinin was given. Five minutes later there was severe tachycardia, marked hypotension, bronchospasm and flushing. Resuscitation was instituted immediately and after 30 minutes CPB was instituted. Patient was successfully operated on and discharged well.

Discussion

For the last 10 years, aprotinin indications were centred on its haemostatic effects. Between 1964 and 1993 anaphylactoid reactions to aprotinin have been reported in 20 patients with 3 fatalities. The manufacturers of aprotinin estimate a 0.5% (i.e., 1:200) overall risk of anaphylactoid reactions. Our experiences above reveal a clinically relevant risk of serious anaphylactic response with the use of aprotinin, calling for a thorough re-evaluation of the risk-benefit relationship. Immediate consequence from our incidences prompts us to alter our protocol for the administration of aprotinin.

FP2-1 A COMPARISON OF THE INDUCTION AND EMERGENCE CHARACTERISTICS OF SEVOFLURANE AND HALOTHANE IN CHILDREN

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Introduction

Sevoflurane is an inhalational anesthetic with characteristics suited for use in children. This open-labelled, randoized, controlled study was designed to determine whether the induction and recovery characteristics of sevoflurane differ from those of halothane.

Methods

40 children, aged 1 to 10 years, weighing less than 25kg, ASA physical status 1 or 2, undergoing simple urological surgery were selected for the study. Informed consent was taken from the parents. Children were randomly allocated to receive either sevoflurane or halothane, both in 66% N₂O and 33% O₂. Standard premedication with trimeprazine 2mg/kg was given orally two hours prior to surgery. Anaesthesia was induced using a mask with an Ayre's T-piece. During induction the inspired concentration was increased every 5 breaths in the following order: 1%, 2%, 3%, 3.5% in the halothane group and 2%, 4%, 6%, 7% in the sevoflurane group. Anaesthesia was maintained by spontaneous ventilation via the face mask. End tidal concentrations of both inhalational anesthetics were adjusted to about 1.5 MAC for at least 10 minutes before the end of surgery. Ilioinguinal or caudal block was given after induction as appropriate to the type of surgery. Paracetamol suppositories were also given prior to the start of surgery. Induction and recovery characteristics and side effects were recorded.

Results

During induction of anesthesia, the time to loss of the eyelash reflex with sevoflurane was faster than halothane [mean time of induction (SD)=46(9)s vs. 69 (19)s, $p<0.05$]. The incidence of airway reflex responses was infrequent with both anesthetics. Early recovery, as evidence by the time to response to command was more rapid with sevoflurane than with halothane [mean time of emergence (SD)=9(4) min vs. 21(14)min, $p<0.01$]. The incidence of postoperative complications was similar between the two groups.

Conclusions

Sevoflurane compared favorably with halothane. Induction was significantly faster and early recovery was predictably more rapid than after halothane. We conclude that sevoflurane is a suitable alternative to halothane for use in children undergoing minor surgery.

FP2-2 COMPARISON OF MAINTENANCE AND RECOVERY CHARACTERISTICS OF SEVOFLURANE AND DESFLURANE IN PAEDIATRIC AMBULATORY PATIENTS

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Objective

This study aims to compare the hemodynamic stability, airway properties, emergence and recovery characteristics of MAC equivalent concentration of desflurane or sevoflurane in paediatric patients undergoing ambulatory surgery.

Methods

43 healthy children, aged from 1 to 9 years, undergoing elective surgery for circumcision were randomised to receive either sevoflurane (Group 1) or desflurane (Group 2) for maintenance. No premedication was given and all patients were induced with sevoflurane. After loss of consciousness and eyelash reflex, patients in Group 1 continued to breathe spontaneously in 60% nitrous oxide and oxygen with sevoflurane maintained at end-tidal 1 MAC and patients in Group 2, desflurane 1 MAC. A one-shot caudal (0.125% plain bupivacaine 0.5ml/kg) was performed in both groups before surgery. Blood pressure every 2 minutes, heart rate and oxygen saturation were monitored and all anaesthetics were terminated at end of surgery. Record was made of total anaesthetic time; first eye-opening and discharge from recovery (preset criteria). Signs and symptoms of airway irritability and quality of emergence were also assessed.

Results

There were no significant differences between the 2 groups with respect to airway complications and first eye-opening times. Desflurane group resulted in a slightly shorter recovery stay and the sevoflurane group had a higher incidence of delirium on emergence ($p < 0.05$). Heart rate decreased significantly from the awake state in the desflurane group but both groups demonstrated hemodynamic stability during surgery.

Conclusions

It is concluded that sevoflurane and desflurane have quite similar maintenance and recovery characteristics in this patient population except for a greater incidence of post operative agitation in the sevoflurane group.

FP2-3 EFFECTS OF SPINAL ANAESTHESIA WITH PETHIDINE AS SOLE AGENT IN CHILDREN

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Pethidine as sole agent for spinal anaesthesia was used with good results in adults submitted to perineal, urologic and obstetric surgery. There are no data concerning the effectiveness of spinal anaesthesia with pethidine in children. We investigated the quality of anaesthesia and the haemodynamic and respiratory responses to surgery when spinal anaesthesia was performed with pethidine in comparison with bupivacaine. In order to evaluate the stress response to surgery, the glucose and cortisol blood levels were also measured.

Methods

With Ethical Committee and parental approval, 40 children 3 - 12 years old were divided into two equal groups in a randomised, prospective study. According to the body weight $< 15\text{kg}$ or $> 15\text{kg}$, the patients received 1.1mg/kg and 1mg/kg pethidine 5% (group P) or 0.4mg/kg and 0.3mg/kg bupivacaine (group B). A superficial halothane anaesthesia by facial mask in spontaneous ventilation was used for the maintenance of

hypnosis. The onset time and duration of sensory block, the blood pressure, heart rate and respiration rate were recorded during the operation. Glucose and cortisol blood levels were measured 1 min. before skin incision and at 4h and 24h after incision. Results were analysed using two way ANOVA. Data were expressed as mean+SD. $P < 0.05$ was considered significant.

Results and Discussion

No differences were identified between the two groups in terms of demographic variables and haemodynamics. The sensory block was satisfactory in both groups, with the onset faster in group P ($p < 0.001$). In comparison with preoperative values the cortisol levels were significantly increased 4h postoperatively in both groups ($p < 0.0011$). Glucose levels decreased in both groups but significantly only in group B. No significant differences were found between the two groups concerning cortisol and glucose blood levels.

FP2-4 PREMEDICATION FOR PAEDIATRIC PATIENTS: IS KETAMINE THE RIGHT CHOICE?

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Introduction

It is usually difficult to separate children from the parents in the reception area of the operation theatre. Children are usually crying, anxious and very agitated. Most of the premedications used are not very effective to facilitate this separation and allow the placement of mask. We embarked upon this study to see if ketamine could provide this answer and compared it with midazolam.

Methods

Healthy ASA I children 2 to 10 years old were divided randomly into four groups of 15 each. Group I received ketamine 3mg/kg, Group II received ketamine 6 mg/kg, Group III received midazolam 0.3mg/kg and Group IV a mixture of midazolam 0.1mg/kg + ketamine 4.5mg/kg. Each dose was mixed with atropine 0.02mg/kg plus an equal volume of syrup and was given orally 45 minutes prior to surgery. A grade of 1 (asleep, difficult to arouse), 2 (asleep, easily aroused), 3 (awake, calm), 4 (awake, anxious, occasional cry), or 5 (crying, agitated) was assigned at the time of parental separation and again when mask induction began. A grade of 1 - 3 was considered successful. Children were also assessed postoperatively using the same scale for sedation. Other adverse effects like hallucinations and vomiting were also noted.

Results

For parental separation Group IV was 100% successful, Group II 90%, Group I 85% and Group III 75%. Successful mask induction for Group IV was 90%, Group III 70%, Group II 63% and Group I 52%. Two children (13%) in Group I and 3 children (20%) in Group II vomited. Two children (13%) in Group I and 4 children (27%) in Group II hallucinated.

Conclusions

Results show that mixture of midazolam + ketamine is a better choice for premedication compared to either drug alone.

FP2-5 MONOCYTE HLA-DR EXPRESSION IN CRITICALLY ILL CHILDREN WITH SYSTEMIC INFLAMMATORY RESPONSE SYNDROME

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In critically ill adult patients with sepsis, a decrease in monocyte HLA-DR expression has been shown to be a prognostic marker for increased mortality. This study aimed at determining the significance of monocyte HLA-DR expression in critically ill children with systemic inflammatory response syndrome (SIRS). Eighteen consecutive children admitted to the paediatric intensive care unit (PICU), fulfilling at least 3 criteria of SIRS, were studied. Their ages ranged from 3 months to 18 years. Patients who were on immunosuppressive drugs were excluded. Fresh whole blood obtained on admission to the PICU were analyzed for HLA-DR expression on CD14+ monocytes by 2-colour flow cytometry. The percentage of monocytes expressing HLA-DR was correlated with the following parameters: presence of multi-organ dysfunction (MODS), defined as ≥ 3 or more organ involvement, septic shock and mortality. There was no significant difference in monocyte HLA-DR expression between critically ill patients with and without MODS or septic shock. However, the mean monocyte HLA-DR expression was significantly lower in those patients who died ($55 \pm 30\%$) as compared to those who survived ($83 \pm 18\%$) ($p < 0.031$). However, the positive predictive value of a low HLA-DR expression for mortality was only 60%. In conclusion, although the mean HLA-DR expression on monocytes was decreased in critically ill children with SIRS who died, however, the low predictive value did not allow this to be a useful parameter for identifying those children at high risk of mortality.

FP3-1 METARAMINOL DOSAGE DURING SPINAL ANAESTHESIA

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Objective

To determine an optimal dosage of metaraminol for elevating blood pressure by 25% during subarachnoid anaesthesia (SA).

Methods

In twenty patients, aged 53 - 84 years, undergoing SA 1-minute non-invasive blood pressures (BP) were recorded. A series of four iv metaraminol boluses (0.25, 0.25, 1.0 and 0.5mg per 50kg adult) were administered during SA. From individual patient time plots of BP predicted dosages for a 25% elevation in BP were estimated.

Results

Dose related elevations in systolic BP (mean (SD)) occurred following dosages of 0.5mg (25(11%)) and 1.0mg (50(23%)). Overall estimated dosage to produce a 25% elevation in systolic BP was 0.5g (per 50kg adult). However, individual patient responses varied (10 - 90th centiles = 0.23 - 0.8mg).

Conclusions

We recommend a starting dose of 0.25mg, increasing to 0.5mg if necessary, to treat hypotension (25% decrease in systolic BP) during SA.

FP3-2 SATISFACTION OF PATIENTS WITH SPINAL ANAESTHESIA

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Objective

To verify the degree of our patients's satisfaction towards this technique and to formulate remedial measures.

Methods

Two prospective, randomized studies were done on 58 patients (1st study n Feb 1997) and 50 patients (2nd study in May 1998) who underwent various elective or emergency surgeries from Hospital Melaka. The population was from various races, ages, sexes and educational levels. They were interviewed by an independent medical assistant via questionnaire in the first post-op day. Patients below 18 years old, the senile and psychiatric patients were excluded.

Results

87.9% (1st study) and 96% (2nd study) of patients were told preoperatively that spinal anaesthesia was the choice of anaesthesia. 96.5% (1st) and 100% (2nd) of patients were told preoperatively the sequence of events expected during the procedure. 93.1% (1st) and 100% (2nd) of patients were explained regarding the effects of spinal anaesthesia. 87.9% (1st) and 98% (2nd) of patients were told of the recovery of the effects. The "Effectiveness in communication" (average of the above 4 responses) was achieved at 91.35% (1st) and 98.5% (2nd). During the surgery, 98.3% (1st) and 86% (2nd) of patients were pain free, 51.7% (1st) and 52% (2nd) of patients were anxious-free. 65.5% (1st) and 82% (2nd) of patients would opt for spinal anaesthesia in the future if required. 98.3% (1st) and 94% (2nd) of patients were verbally "satisfied with spinal anaesthesia". The "overall satisfaction" (average of the above 4 responses) was 78.45% (1st) and 78.5% (2nd).

Conclusions

In both the studies, the standard for "Effectiveness in communication" and "Overall satisfaction" was set at above 90%. This was achieved in the former study but not the latter. Remedial measures were formulated and to be taken to improve our standard.

FP3-3 INTRATHECAL ROPIVACAINE FOR CAESAREAN SECTION

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Objective

To investigate the dose response relationship of intrathecal ropivacaine for elective Caesarean section.

Methods

With Ethics Committee approval and informed consent, ASA I-II Asian women undergoing elective Caesarean section were studied. In this randomized double-blinded study, patients received 10mg, 15mg, 20mg or 25mg of ropivacaine intrathecally. Combined spinal epidural was performed with the patient in the right lateral position. The procedure and assessments were performed by the same investigator, blinded to the dosage. Sensory changes to ice, pinprick and the degree of motor block were recorded at 2.5 minute intervals. Haemodynamic changes were recorded every minute, and hypotension was treated according to a standard protocol. For patients with inadequate blocks, the epidural catheter was used for top up. Results were analysed using ANOVA and Fisher's exact test.

Results

This is a preliminary report from an interim analysis (n=40). Patient characteristics in each group were similar. The block characteristics are summarised below. Great variability was observed and for Caesarean section, up to 20mg produced blocks with inadequate density for surgery.

Conclusions

Using intrathecal ropivacaine for Caesarean section, a minimum dose of 25mg is required.

| | 10mg n=13 | 15mg n=6 | 20mg n=8 | 25mg n=13 | |
|--------------------------------------|----------------------|---------------------|---------------------|----------------------|--------|
| Hypotensive episodes | 1.7 (1.5) | 2.3 (1.2) | 2.0 (1.1) | 2.5 (1.9) | ns |
| Pin max | T3 | T3 | T3 | T3 | |
| Median (range) | (T2-T12) | (T3-L5) | (C1-T11) | (C1-T8) | |
| Ice max | T3 | T3 | T2 | T3 | |
| Median (range) | (C3-T9) | (T2-L1) | (C1-T8) | (C1-T9) | |
| Inadequate Block % | 87 | 67 | 38 | 15 | |
| Onset time; mean (SD) mins | | | | | |
| Bromage 1 | 4.0 (3.7) | 1.9 (1.6) | 3.5 (2.4) | 1.6 (1.2) | P<0.05 |
| Bromage 2 | 6.8 (5.9) | 5.2 (4.3) | 5.3 (3.1) | 3.7 (2.1) | P<0.05 |
| Bromage 3 | 12.5 (10.6) | 15.5 (6.0) | 10.1 (6.7) | 12.1 (8.3) | P<0.05 |
| Pin T10 | 5.5 (3.5) | 10.6 (13) | 7.5 (4.4) | 5.2 (4.4) | ns |
| Ice T10 | 4.3 (5.6) | 3.4 (2.8) | 6.9 (4.7) | 3.3 (2.0) | ns |
| Recovery time; mean (SD) mins | | | | | |
| Bromage 2 | 45 | 67 (31) | 92 (50) | 150 (37) | P<0.05 |
| Bromage 1 | 75 | 90 | 109 (51) | 169 (41) | P<0.01 |
| Bromage 0 | 98 (332) | 120 | 138 (58) | 184 (45) | P<0.05 |
| Pin T10 | 142 (32) | 180 (64) | 138 (33) | 170 (48) | P<0.05 |
| Ice T10 | 105 (21) | 135 (64) | 116 (33) | 162 (44) | ns |

FP3-4 COMPARISON BETWEEN SPINAL, EPIDURAL AND COMBINED SPINAL EPIDURAL ANAESTHESIA FOR CAESAREAN SECTION

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Aims

To compare the efficacy, advantages and disadvantages of spinal (S), epidural (E) and combined spinal epidural (CSE) techniques for Caesarean section.

Methods

120 ASA 1 and 2 patients presenting for elective caesarean section were randomised into 3 groups receiving either S, E or CSE with 27G Whitacre spinal needles and 18G Weiss epidural needles. The time taken to perform procedure, time for onset of T4 level block, dose of ephedrine used, patient assessment of pain and incidence of side effects were determined.

Results

There were 5 D (12.5%), 4 E (10%) and 6 CSE (15%) failed blocks (no sig. difference). Difference in time taken to perform S (7.4min), E (9.1min) and CSE (12.6min) was significant. Times to onset of T4 level was significantly slower in E (21.8min) followed by CSE (7.2min) and S (5.4min). Use of ephedrine was significantly greater in the S and CSE groups compared to E group. There was no difference in patients' pain scores or incidence of nausea and vomiting. There was no post dural puncture headache reported.

Conclusions

The rather high failure rate in the S and CSE groups probably reflect lack of familiarity with the needles and technique. Hypotension in the S and CSE groups are likely to be due to the rapid speed of onset of the T4 block despite smaller dose used in the CSE. The smaller bupivacaine dose in CSE (7.5mg) also could explain the slower onset of block compared to S (11mg). Analgesic efficacy of the 3 techniques is comparable as are the incidence of side effects.

FP3-5 COMPARISON OF 0.125% WITH 0.2% ROPIVACAINE FOR PARTURIENT-CONTROLLED LABOUR ANALGESIA

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Objective

Parturient-controlled epidural analgesia (PCEA) for labour pain relief has been shown to be a reliable method as it allows for the vast inter-parturient variation of drug requirement. Our initial experience with PCEA using 0.2% ropivacaine showed a 30% incidence of lower limb motor block. In our current study, we aimed to reduce this incidence with the use of a lower concentration of ropivacaine, i.e., 0.125%.

Methods

This double-blind and controlled cohort study was approved by the Hospital Ethics Committee. Only nulliparous parturients of ASA physical status I in established, early labour were recruited. Written consent was obtained from each parturient. After the induction of epidural analgesia with 10ml 0.2% ropivacaine, all the parturients were randomly assigned to receive either 0.2% ropivacaine (n=15) or 0.125% ropivacaine (n=15).

Results

Pain relief was indistinguishable between the two groups. PCEA using 0.125% ropivacaine produced a lower incidence of lower limb motor block as assessed by the modified Bromage score (2 vs. 7, $p < 0.05$). The total volume used per hour was higher in the PCEA 0.125% ropivacaine group (median 9.07ml vs. 7.61ml, $p < 0.05$). Although the ratio of successful/total PCEA demands was higher in the 0.2% ropivacaine group (0.76 vs. 0.52, $p < 0.05$), this did not culminate in a significantly higher overall satisfaction score in the 0.2% ropivacaine group. No difference in the maternal or fetal outcome was detected.

Conclusions

PCEA 0.125% ropivacaine produced a lower incidence of motor block although the proportion of good PCEA demands was less favourable in comparison with 0.2% ropivacaine. Further studies on other concentrations between 0.125% and 0.2% ropivacaine (with or without adjuvants) may provide the optimal solution for this regimen of PCEA in labour pain relief.

FP3-6 THE EFFECT OF ADDING FENTANYL ON PARTURIENT-CONTROLLED EPIDURAL ANALGESIA WITH ROPIVACAINE 0.125% FOR LABOUR PAIN RELIEF

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Objective

The use of parturient-controlled epidural analgesia (PCEA) with a baseline infusion of 0.125% ropivacaine for labour analgesia has been described before. Here we studied the effect of adding fentanyl on demand-only PCEA using 0.125% ropivacaine for labour analgesia.

Methods

With the approval of the Hospital Ethics Committee, this controlled, randomized trial was conducted on 26 nulliparous ASA I parturients in established early labour. Upon written consent, epidural analgesia was started with 10ml 0.2% ropivacaine. All parturients subsequently received either 0.125% ropivacaine (n=12) or 0.125% ropivacaine plus fentanyl 2µg per ml (n=14) by using demand-only PCEA mode (bolus 5ml, lockout time 10 minutes, maximum volume per hour 20ml).

Results

The degree of pain relief was similar in both the groups. The total volume used per hour was lower in the group that received fentanyl (mean 8.5ml vs. 10.4, $p < 0.05$). The fentanyl group also had a higher dermatomal sensory block to cold (median T6 vs. T8, $p < 0.05$). However, no difference in motor block was detected. The ratio of good/total PCEA demand, satisfaction score and the maternal-fetal outcome were similar in both groups.

Conclusions

This PCEA regimen produced a low incidence of motor block, i.e.: 8 - 14%. The addition of fentanyl produced a higher level of sensory block and had a dose sparing effect on the requirement of ropivacaine.

FP3-7 COMBINED SPINAL-EPIDURAL ANAESTHESIA WITH BUPIVACAINE AND DIFFERENT MORPHINICS

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Objective

To evaluate the effectiveness of combined spinal-epidural (CSE) with bupivacaine and one of the available morphinic for the preoperative anesthesia and for the postoperative analgesia.

Methods

A prospective, randomised and controlled study was conducted in the patients of ASA I, II, age above 16, undergoing the surgical interventions in the lower abdomen or in the lower extremities. A standard CSE technique was performed with ESPOCAN pack (B.BRAUN). The combination was spinal bupivacaine (Marcaine heavy(ASTRA) and epidural injection of either a physiologic saline solution or one of the available morphinic (fentanyl, pethidine, morphine). Patients were unintentionally divided into 4 groups following each combination: Group I (control) (GI) S.Bupivacaine 0.2mg.kg⁻¹ b.w + Epi. 10ml of NaCl 9%. Group II (GII): S.Bupivacaine 0.2mg.kg⁻¹ b.w + Epi. Morphine 50mcg.kg⁻¹ b.w + 10ml of NaCl 9%. Group III: S.Bupivacaine 0.2mg.kg⁻¹ b.w + Epi. Pethidine 1mg.kg⁻¹ b.w + 10ml of NaCl 9%. GIV: S.Bupivacaine 0.2mg.kg⁻¹ b.w + Epi. Fentanyl 1mcg.kg⁻¹ b.w + Epi. 10ml of NaCl 9%.

The following data were obtained by the time scale of the operations: anesthetic time (Tanes), surgical time (Tsug) motor block (Bromage's scale Br), post-op analgesia (Tpost), (Visual Analogue Score VAS >5), hemodynamic functions (HR, BP), respiratory functions (RR, SpO₂), side effects and overall results by a surgeon blinded to the anesthetic technique (as good, moderate, poor). Statistic applied for the calculations.

Results

120 patients were included, 30 for each group, comparable identification of the patients and surgical indications for all groups.

No significant changes in hemodynamic states and no early or late respiratory depression, low rate of side effects were found.

| | G I | G II | G III | G IV |
|---------------------|--------------|----------------|---------------|---------------|
| Tini (min) | 8.25±0.75 | 8.05±0.82* | 5.67±1.05* | 6.27±0.95* |
| Tanes (min) | 130.7±15.78 | 130.45±18.24* | 140.75±16.78* | 138.74±15.86* |
| Tsur (min) | 108.75±20.80 | 95.48±20.45* | 115.86±18.76* | 108.70±20.63* |
| Brl (min) | 6.75±1.05 | 5.05±1.25* | 3.25±1.05* | 4.07±1.21* |
| Br (min) | 118.74±22.05 | 131.17±20.75* | 125.78±18.76* | 125.07±20.05* |
| Tpost (min) | 168.75±20.40 | 1350.56±92.50* | 366.70±30.50* | 250.70±22.40* |
| Urinary retention | 6.60% | 26.40% | 13.20% | 9.90% |
| Overall results (%) | G 93.5 P6.5 | G100 | G100 | G96.7 P3.3 |

*Significant difference to control
+No significant changes

Conclusion

CSE is a good anesthetic technique for the surgical interventions in the lower parts of the body of patients. The combination of spinal bupivacaine and epidural morphine gives the best post-op analgesia with very low rate of side effects.

FP3-8 REGIONAL ANALGESIA FOR LABOUR IN KK HOSPITAL: 2 YEAR AUDIT OF 3954 PATIENTS

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Objective

To analyse the patient profile, techniques of labour regional analgesia, complications and delivery outcome for all patients who received regional analgesia for labour between 1 Feb 1997 and 31 Jan 1999 in order to identify the change in trends in the practice of labour epidural and whether this has any impact on the delivery outcome.

Methods

In 1997, an epidural audit form was designed to capture demographic data, epidural techniques, complications and delivery outcome of all patients who received labour epidural. This was keyed into a database in Microsoft Access.

Results

Labour epidural rate was 9.7% (1478/15262) in 1997 and increased to 11.7% (2476/14547) in 1998. In 1997, 26.8% of the epidurals were combined spinal epidurals (CSE). In 1998, this increased to 39.4%. There was a change in drug use: in the first year, 182 patients received epidural infusion of a new drug ropivacaine. This increased to 1307 in 1998. The most common complication at insertion of epidural was venous tap (5.3%). Inadvertent dural puncture rate was 0.4%. The rates for normal vaginal delivery was 57%, Caesarean section 17.2%, forceps 20% and vacuum delivery 5.6%, without significant change in the modes of delivery between the 2 years. The assisted delivery rate was significantly greater compared with that of the total hospital population (25.6% vs. 9%).

Conclusions

The labour epidural rate has been increasing. Despite this, caesarean section rate has not risen. This should be reassuring that current techniques of epidural analgesia does not contribute to caesarean delivery. However, the assisted delivery rate in patients with epidural analgesia is high. Complications are minor without long-term morbidity.

FP4-1 OPTIMAL DOSE OF LIGNOCAINE FOR PREVENTING PAIN ON INJECTION OF PROPOFOL

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Introduction

A prospective, controlled, randomised, double-blind trial on 124 patients undergoing general anaesthesia was undertaken to determine the optimal amount of lignocaine required to be mixed with the induction dose of propofol to reduce its pain on injection.

Methods

Patients were randomised into 4 groups : group A received 1ml of normal saline as control, group B had 5 mg, group C had 10mg and group D had 20mg of lignocaine added to the propofol.

Results

Incidence of pain on injection of propofol was 77.14% in the control group.

Conclusions

Addition of lignocaine significantly reduces pain on injection of propofol and 5mg of lignocaine was found to be sufficient to reduce the pain.

FP4-2 THE EFFECTIVENESS OF PATIENT-CONTROLLED ANALGESIA VERSUS ON-DEMAND INTRAMUSCULAR INJECTIONS: A META ANALYSIS

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Objective

This systematic review aims to assess the efficacy and side-effects of PCA morphine versus on-demand intramuscular (IM) morphine.

Methods

Searches on Medline (1996 - 98), EMBASE (1972 - 98) and Cochrane Controlled Trials Registry found 52 randomised controlled trials, thirteen trials (N=721) were suitable for systematic review. Two authors independently extracted the data and assessed trial characteristics. Outcomes collected included morphine consumption, mean pain scores, respiratory depression, mean level of sedation, patient satisfaction and length of hospital stay. The summary effect size and 95% confidence interval (CI) were calculated using a random-effects model.

Results

Of the 13 trials, 12 were of poor quality (no blinding). The PCA group used 6mg (95%CI: 3 to 9) less morphine and had lower pain scores (7.4, 95%CI: 4.4 to 10.2). There was no difference in the risk of respiratory depression (RR=0.78, 95%CI: 0.32 to 1.89). Results for sedation, patient satisfaction and length of hospital stay were not combinable.

Conclusions

We found marginal benefit in using PCA over on-demand IM analgesia for postoperative pain management. Further well-designed trials are needed to show clinically important differences.

FP 4-3 COMPARISON OF PIROXICAM, NAPROXEN AND MELOXICAM FOR PRE-EMPTIVE ANALGESIA: IMPLICATIONS OF COX-1/COX-2 RATIO

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Two isoforms of cyclooxygenase presently exist, COX-1 is the constitutive enzyme responsible for the normal cell activity while COX-2, which is normally absent to minimal in the normal resting cells is induced during inflammation thereby attributing the therapeutic effects to this latter isoform. Three non-steroidal anti-inflammatory drugs (NSAIDs) of different isoform selectivity were studied to determine if selective inhibition of COX-1 or COX-2 will influence the pre-emptive analgesic property of the NSAID. Meloxicam preferentially inhibits COX-2; naproxen is equipotent against COX-1 and COX-2; and piroxicam mainly inhibits COX-1. Sixty subjects were randomly assigned to receive either meloxicam 15mg/tablet or naproxen 500mg/tablet or piroxicam 20mg/tablet two hours prior to operation to achieve a peak therapeutic effect during surgery. The time of administration of the NSAID to the onset of pain (latency period) was determined. Intraoperative hemodynamic parameters were measured and recorded. Untoward side effects were noted. Selectivity of an NSAID to COX-1 or COX-2 did not have any relevance to their efficacy to reduce postoperative pain. Pre-emptive analgesia was evident in all drugs. Meloxicam, a selective COX-2 inhibitor provided longer pain relief than naproxen or piroxicam due to its higher potency. All study drugs did not cause any significant hemodynamic changes and untoward effects.

FP4-4 CONTINUOUS SUBCUTANEOUS ADMINISTRATION MORPHINE VERSUS INTRAVENOUS PATIENT-CONTROLLED ANALGESIA MORPHINE FOR POSTOPERATIVE PAIN MANAGEMENT IN SPINAL SURGERY

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Introduction

The purpose of this study was to investigate the efficacy and safety of continuous subcutaneous morphine (CSM) for postoperative pain management in spinal surgery compared with intravenous patient controlled morphine (IV-PCA).

Methods

Forty-eight (ASA 1 or 2) patients scheduled for vertebral fusion were randomly divided into two groups: CSM (n=24) and IV-PCA (n=24). They were premedicated with midazolam 0.2mg/kg orally. General anaesthesia was induced with IV propofol. Tracheal intubation was facilitated by vecuronium and ventilation was controlled. Anaesthesia was maintained with sevoflurane in a mixture of 60% N₂O in oxygen. No supplementary analgesics were used. After induction, morphine 2mg was administered as initial doses subcutaneously in both groups followed by continuous administration of morphine subcutaneously (CSM) or intravenously (IV-PCA) through a disposable infusion pump (Coopdech syrinjector™) at the rate of 0.8mg/hour. The incidence of side effects were recorded and compared between both groups. Postoperative pain was evaluated immediately after operation and at 8, 24, 48, and 72 hours after operation using a 5-rated verbal response score (VRS).

Results

Post operative pain scores in VRS are shown below.

| | Immediate | 8h | 24h | 48h | 72h |
|--------|-----------|-----|-----|-----|-----|
| IV-PCA | 1.9 | 2.2 | 2.1 | 1.2 | 1.1 |
| CSM | 1.7 | 2.7 | 2.2 | 1.4 | 1.3 |

Somnolence (5 in CSM and 12 in IV-PCA), nausea (9 in CSM and 10 in IV-PCA) and pruritis (6 in CSM and 7 in IV-PCA) were frequently seen 24 hours after operation.

Discussion

Our results suggest that CSM is a satisfactory alternative to IV-PCA for postoperative pain relief in patients who had a spinal fusion operation during the first 72 hours of postoperative period. This technique has fewer adverse effects.

FP4-5 PRE-EMPTIVE EFFECT OF BUTORPHANOL ON POSTOPERATIVE PAIN IN HYSTERECTOMY

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Introduction

Well-localized and brief noxious stimuli are found to produce long-lasting neuronal sensitization. The aim of this study was to investigate the pre-emptive and analgesic sparing effect of intravenous butorphanol in female adults aged 30 - 53 years after hysterectomy.

Methods

We have compared in 28 female adults the effect of preoperative in a double-blind, randomized study, which was approved by the local Ethics Committee. Informed consent was obtained from all patients. After induction of anesthesia, patients were allocated randomly to receive a butorphanol intravenously, either before (n=14) or immediately after (n=14) surgery. Patients were instructed to ask analgesic whenever they required pain relief and all demands were recorded. Postoperative pain was rated on a visual analog pain scale (0=no pain, 10=worst pain imaginable) for 24 hours, assessed every hour for the first 6 hours after operation. If pain occurred, patients received demerol 25mg on demand. The visual analog scales at the time of postoperative ambulation, and total frequency of requirement of demerol for 24 hours were checked. Using the t-test or Mann-Whitney rank sum test (significance <0.05) were used.

Results

VAS scores were low over the entire study in each group and there was no significant difference between groups. VAS scores at ambulation were similar between groups. The total frequencies of demerol requirement for 24 hours were 1.7 (SD 1.2) in preoperative, 3.79 (SD 3.2) ($p<0.05$) in postoperative group. No serious adverse reactions occurred.

Conclusions

Preoperative butorphanol in the hysterectomy was effective on the reducing the frequency of the analgesic requirements postoperatively. We conclude that preoperative butorphanol 2mg offers advantage of cost-effectiveness of postoperative analgesics.

FP4-6 COMPARISON OF PATIENT-CONTROLLED EPIDURAL ANALGESIA WITH AND WITHOUT A BACKGROUND INFUSION AFTER LOWER ABDOMINAL GYNAECOLOGICAL SURGERY

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The addition of a background infusion to patient-controlled epidural analgesia (PCEA) for post-operative pain control is still controversial. To assess the analgesic efficacy and incidence of side effects of PCEA with and without a background infusion, 42 patients presenting for elective lower abdominal gynaecological surgery were randomized into 2 groups. A lumbar epidural catheter was inserted for all patients and they received PCEA post-operatively using a mixture of 0.2% ropivacaine and 2ug/ml of fentanyl. One group received incremental demand boluses of 5mls with a lock-out interval of 15 minutes while the other group received in addition a background infusion of 5mls/hr of the same solution. Our results show that those with a background infusion had no difference in pain scores or patient satisfaction scores as compared to the group without background infusion. In addition, the group with a background infusion consumed a higher total volume of drug in the first 24 hours and had a higher incidence of side effects and motor blockade at 12 and 18 hours post-operatively. There was no incidence of serious side effects like hypotension or respiratory depression. We conclude that a background infusion in patients receiving PCEA following lower abdominal gynaecological surgery confers no benefit and thus should not be used.

| | PCEA alone | PCEA + Background infusion |
|-----------------------------------|-------------------------------------|---------------------------------------|
| Total Volume used (mls) mean | 89.6 | 156.8 |
| SD | 41.0 | 34.8 |
| | p<0.01 | |
| Side effects (No. of patients) | 6/21 (29%) likelihood ratio<0.01 | 14/20 (70%) |
| Motor Block at 12 hours | 3/21 (14%) | 9/20 (45%) |
| 18 hours | 4/21 (19%) | 10/20 (50%) |
| (No. of patients) | | likelihood ration <0.05 |

FP4-7 EFFECTIVENESS OF EMLA CREAM AND 2% LIGNOCAINE FOR INTRAVENOUS CANNULATION

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The aim of this study is to compare the effectiveness of EMLA cream (Group A) and 2% lignocaine (Group B) prior to intravenous cannulation in adult patients. EMLA cream was applied in the ward, while local infiltration of 2% lignocaine was administered in operation theatre. Following the cannulation, the patient completed a visual analogue scale (VAS). An independent observer also scored, by using a simple 4 category Verbal Rating Score (VRS). Patients who received 2% lignocaine infiltration scored statistically significance ($p < 0.01$) VAS and VRS scores when compared to EMLA cream ($p < 0.05$). this study showed that Group B (2% lignocaine) infiltration was more effective compared to Group A (EMLA cream) prior to intravenous cannulation in adult patients.

FP5-1 ANAESTHESIOLOGY IN THE UNDERGRADUATE MEDICAL CURRICULUM

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Much has been said in various anesthetic journals about the need to teach medical undergraduates in areas such as basic life support skills and resuscitation. Anesthesiology as a specialty can contribute significantly in this aspect of teaching. The question is how should it be incorporated into the medical curriculum given the fact that it constitutes a minor role in many existing undergraduate medical curricula?

This paper attempts to describe the possible integration of anesthesiology specialty into the undergraduate medical curriculum as far as the Kulliyah of Medicine, IIUM is concerned. Its objective and implementation in both the pre-clinical and clinical phase will be discussed.

FP5-2 OBSTETRIC ADMISSIONS TO THE INTENSIVE CARE UNIT

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Objective

To determine the incidence, causes and outcome of the obstetric admissions to the General Intensive Care Unit (ICU).

Methods

Retrospective study of the obstetric patients admitted to the ICU was done from Jan 1991 to Dec 1998. The database of the ICU and the hospital obstetric records were reviewed to determine the number of deliveries, reasons for admission to the ICU, and the number and causes of the obstetric deaths.

Results

1. Only 257 patients out of 81,684 deliveries (0.32%) were admitted to the ICU.
2. The obstetric patients formed 10.6% of the total admissions to the ICU (2,420).
3. Bleeding, post-partum haemorrhage, pregnancy-induced hypertension and eclampsia were the major reasons for admission to the ICU.
4. 26 out of 449 deaths in the ICU were obstetric patients (5.79%). The figure also represented 30.58% of the total maternal deaths in the hospital (85).
5. Pregnancy-induced hypertension was the single most common cause of the obstetric deaths in the ICU, followed by post-partum haemorrhage, and bronchopneumonia with septicaemia.
6. There was no death attributed to anaesthetic complications.

Conclusions

Only a small proportion of the obstetric patients developed complications requiring ICU admission. Our study has shown a good outcome if these patients were admitted to the ICU.

FP5-3 EVALUATION OF THE PART I (BASIC MEDICAL SCIENCES) INTENSIVE COURSE

M Marzida, C Y Wang, C L Chiu, A K H Wong

The part I intensive course has been traditionally conducted on a yearly basis, about two months before the exam by either UMMC or UKM. The tutor has always been an invited tutor from abroad. During the recent course organised by UMMC from 20 - 31 October 1998, a survey was conducted to determine the effectiveness of the programme, identify areas of weaknesses and to explore the possibility of conducting our own course. Thirty-five evaluation forms were given out and thirty received, a 86% response rate. The results are tabled.

| Physiology | Excellent | Good | Fair | Poor |
|---------------------|-----------|----------|---------|------|
| Physiology tutor | 12 (40%) | 16 (53%) | 2 (7%) | 0 |
| Viva (by 1 person) | 3 (10%) | 22 (73%) | 5 (17%) | 0 |
| Pharmacology | | | | |
| Pharmacology tutor | 11 (37%) | 19 (63%) | 0 | 0 |
| Viva (by 4 persons) | 7 (23%) | 21 (70%) | 2 (7%) | 0 |
| Statistics tutor | 7 (23%) | 15 (50%) | 8 (27%) | 0 |

| Pharmacology Examination Results | | |
|---|-------------------------|---------------------------|
| | Mock Examination | Part I Examination |
| Number passed | 17 | 21 |
| Number failed | 21 | 17 |

Conclusions

An intensive course alone is not effective in improving the performance of the candidates hence the need for a regular teaching programmes. However borderline candidates can be identified and maximum effort could be made for them to succeed in the real exam. The slightly lower rating for statistics is probably due to the fact that it is difficult to teach over a short period of time and as for the candidates, a poor basic understanding of the subject. It is also noted that viva sessions conducted by more than one person are preferred. The performances of the local tutors were satisfactory. Suggestions put forward by the candidates will be discussed.

FP5-4 NURSING CARE OF CENTRAL VENOUS CATHETERS - A QUALITY ASSURANCE STUDY

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Catheter related problems such as local infection, systemic sepsis and thrombophlebitis are not uncommon with the use of central venous catheters. However, they can be minimised with good nursing care and strict adherence with accepted clinical practice guidelines on management of IV lines.

The main purpose of this study was to audit the nursing care of central venous catheters in Kuala Lumpur Hospital. During a two-month period (1st October - 30th November 1998), a total of 166 central venous catheters that were inserted in adult patients were followed up by an independent QA nurse from the time of insertion until their removal.

It was noted that the practice of nursing management of CVC varied from ward to ward within the same institution. The most common sites of CVC insertion were the internal jugular vein, ante-cubital route and subclavian vein. Labelling of date of CVC insertion was only done in 41.6% of the time and the most common reason for CVC insertion was for central venous pressure monitoring (85.5%). Sterile transparent semi-permeable dressing was used in 58.4% of cases where daily inspection of catheter site was accessible. The rest were dressed with occlusive dressing and flavine gauze. Of those patients whose catheters were kept for more than 10 days, 58.4% of them had temperature of undetermined cause. 22% of catheter sites had blood-stained dressings that were not changed after 72 hours and 10% of cases did not have dressing change even after 10 days.

It is felt that an institution-wide uniform clinical practice guidelines on the care of CVC is necessary in ensuring consistency in the quality of care of the CVC.

FP5-5 SETTING UP AN OBSTETRIC EPIDURAL SERVICE - THE HOSPITAL UNIVERSITI KEBANGSAAN MALAYSIA EXPERIENCE

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Hospital Universiti Kebangsaan Malaysia (HUKM) is a new teaching hospital which started its operations in September 1997. The obstetric services in HUKM were started in December 1997. There was no organised obstetric epidural service in our former hospital in Maternity Hospital Kuala Lumpur. Setting up of an obstetric epidural service involved drawing up practice guidelines for the anaesthetic registrars and labour room nurses, organising necessary anaesthetic and resuscitation equipment, and conducting sessions with the obstetricians, anaesthetists and labour room nurses. The anaesthetic registrars were under close supervision by specialists and any problems or complications during the course of epidural analgesia were managed accordingly. Continuing medical education sessions were held from time to time for the anaesthetic and obstetric registrars. Between April 1998 and March 1999, 150 parturients received epidural analgesia during labour, of which 74.0% were epidural analgesia maintained by continuous infusion and 18.7% were combined spinal-epidural analgesia. The instrumental delivery rate was 9.3% and caesarean section rate was 24.7%, compared to 2.9% and 16.7% respectively during the four months before commencement of epidural service. Feedback from mothers who had undergone epidural analgesia was generally favourable, 74.0% expressing that they would request for epidural analgesia for the next delivery. Antenatal education classes are due to commence in April 1999 in order to heighten awareness among expectant mothers regarding options of analgesia during labour.

FP5-6 DAY CASE SURGERY: 24-HOUR POST-OPERATIVE FOLLOW-UP

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205 patients undergoing procedures during a three month period in a free-standing day surgery centre were followed up via a phone call 24 hours after discharge. They were asked a standard set of questions regarding possible anaesthetic and surgical complications, adequacy of pain relief, satisfaction with day surgery and type of community support they received at home.

The procedures were carried out either under general anaesthesia GA (n=117) or local anaesthesia LA (n=51) or monitored anaesthesia care MAC (n=37). General anaesthesia consisted either of sevoflurane only, propofol/sevoflurane for cases in which laryngeal mask airway was inserted, or intubation following sevoflurane/non-depolarising muscle relaxant. Analgesia was achieved with IV tramadol or NSAID suppositories or both, with or without infiltration of local anaesthetic. Patients were discharged with NSAID's with or without oral opioids.

Forty-three patients were uncontactable (GA=24, LA/MAC=19). Of those contactable, the most common post-anaesthetic complications were dizziness (GA=4, LA-1, MAC=1), nausea and vomiting (GA=2, LA=1) and sore throat (n=2). Surgical complications consisted of slight blood staining (n=13), mild swelling of the operative site (n=8) and difficulty in micturation (n=3). Analgesia was adequate in 141 patients, and was either slight or bearable in 19 patients. One patient had severe jaw pain which was relieved with oral analgesics; and one complained of jaw ache, probably due to the anaesthetist holding her jaw. Only 85 patients were asked about satisfaction with day surgery: all but three were satisfied: the three patients' response was "don't know". 68 patients were asked about community support - all were cared for by parents, relatives or friends. There were no hospital admissions due to complications during the period of study.

The complication rate in day surgery patients are usually minor and are within acceptable limits.

FP5-7 IMPLEMENTING CLINICAL INFORMATION SYSTEM INTO THE INTENSIVE CARE UNIT

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Clinical Information System (CIS) utilizes information technology to manage clinical information from patients in data intensive critical care areas of a hospital. In addition to automatic charting of patients' clinical signs' the CIS also manages and organizes information from various medical devices and equipment to facilitate optimum patient care. Integration of the CIS into a Hospital Information System (HIS) will allow for additional management of information from and to support services, eg. Pharmacy, radiology, electronic medical records.

Selayang Hospital is the first paperless and filmless fully integrated I.T. hospital in the world. CIS is implemented for the intensive care unit (ICU), high dependency ward (HDW), coronary care unit (CCU), neonatal intensive care (NICU), burns unit and the operating theatres (OT). With the core team of five nurses, one medical assistant and specialist clinicians from the respective units, design and development of the CIS commenced in January 1998.

Components of the CIS included formation of the database for the creation of flowsheets, templates and clinical notes. Various existing forms had to be reappraised and customised to meet the unit's requirements. Electronic instruction manuals and guidelines were also developed. Among the challenges encountered were adapting and customising a foreign system to our local environment, instability of software and frequent software changes/upgrades, as well as a change in work culture. Currently, the CIS is being integrated and tested with other systems, i.e., RIS, PACS, PathNet, PharmNet, Registration and Billing/Revenue, which together with Office Automation will make up the Total Hospital Information System.

FP5-8 CLINICAL FEATURES AND INTENSIVE CARE MANAGEMENT OF NIPAH ENCEPHALITIS AMONG PIG FARMERS

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Objective

To describe the clinical features and management of 45 patients admitted to intensive care unit out of 96 hospital admissions with Nipah virus encephalitis during February - April 1999.

Design

Retrospective analysis of ICU database.

Setting

University hospital.

Interventions

Indications for admission to ICU: Increasing drowsiness, coma, progressive abnormal neurological signs, seizures requiring IPPV and cerebral protection. Diagnosis: CT scan. CSF analysis and culture. Blood culture, Japanese encephalitis and Hendra virus serology. Antiviral therapy: oral/iv ribavarin. Volume controlled ventilation/SIMV + pressure support + PEEP. Monitoring: ECG, arterial blood pressure, central venous pressure, temperature, urine output, prothrombin time, platelet count, neurological examination. Cerebral protection: midazolam and muscle relaxant intravenous infusion for 48h followed by cessation of muscle relaxant. Hypertension: isosorbide dinitrate infusion. Antithrombotic therapy: aspirin 150mg.day-1, pentoxifylline. Routine intensive and nursing care.

Statistical Analysis

Mean±SD, T-test, univariate analysis for parametric data. Kruskal-Wallis for non-parametric data. Level of significance p<0.05.

Results

| | Survivors | Non-survivors | |
|--------------------------|-------------------|-------------------|--------|
| Number | 17 (38%) | 28 (62%) | |
| Age (years) | 37 ± 10 | 40.4 ± 10 | |
| Age range (years) | 14 - 58 | 22 - 58 | |
| Sex | 6 female, 11 male | 2 female, 26 male | |
| Days illness before hosp | 3.62 ± 1.99 | 3.73 ± 2.37 | |
| Myoclonus | 5 (29%) | 21 (75%) | p<0.01 |
| Highest heart rate | 134 ± 23.2 | 150 ± 18.2 | p<0.05 |
| Highest mean BP | 180.5 ± 40 | 194.6 ± 30.1 | |
| Highest temp (mean±SD) | 39.3 ± 0.81 | 40.5 ± 0.86 | |
| Brain stem death | 0 | 21 | |
| Duration of IPPV (days) | 12.4 ± 13.1 | 4.85 ± 4.5 | p<0.05 |
| Days ribavarin therapy | 8.88 ± 3.91 | 4.32 ± 3.26 | p<0.05 |

Conclusions

Non-survivors showed a greater degree of hypertension and tachycardia ($p < 0.01$). Evidence of brain stem failure occurred in 21/28 non-survivors. Persistent abdominal or extremity myoclonus correlated significantly with risk of mortality.

BFP-1 THE ROLE OF THE NMDA RECEPTOR IN STRESS-INDUCED ANALGESIA (SIA)

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Objective

Endogenous opiates modulate pain and induce analgesia. N-methyl-D-aspartate (NMDA) receptors have been implicated in analgesia and this study examines the role of NMDA receptors in modulating stress-induced analgesia (SIA) and their relationship to the opiate system.

Methods

Previously non-stressed [A] and chronically-stressed rats [C] were pretreated with ketamine, ketamine+naloxone, morphine, morphine+naloxone, 5min prior to experimentation. The rats were then acutely stressed by swimming for 3min at 21°C. There were two groups of placebo rats: [PA] were unstressed while [PC] were chronically stressed and both groups were given normal saline. [PA] and [PC] were then acutely stressed by swimming for 3min at 21°C. Analgesia was assessed by the tail-flick test immediately before and 2min after cessation of swimming and every 10min until values returned to baseline.

Results

Previously non-stressed animals [A] develop analgesia while previously chronically-stressed animals [C] develop tolerance to analgesia when exposed to acute stress. Chronically-stressed animals pre-treated with morphine did not develop SIA and this was unaffected by naloxone. Pretreatment with ketamine, blocks NMDA receptors, antagonises tolerance to analgesia and causes SIA which is enhanced by naloxone.

Conclusions

It is known that ketamine causes analgesia in non-stressed animals. Our studies show that during acute and chronic stress, ketamine behaves differently and suggests that NMDA receptors are involved in the modulation of analgesia with a mechanism that is closely related to the opiate system.

BFP-2 CHANGES IN CREATININE CLEARANCE AND FREE-WATER CLEARANCE DURING CARDIOPULMONARY BYPASS

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Objective

(1) To evaluate the glomerular filtration and the concentrating ability of renal tubules by measuring creatinine clearance (CCR) and free-water clearance (CH₂O) respectively; (2) to investigate the diagnostic and predictive value of CH₂O for renal dysfunction (RD) and acute renal failure (ARF) during cardiopulmonary bypass.

Methods

A prospective, nonrandomised, noncontrolled study was conducted in 82 consecutive patients (pts) with preoperative plasma creatinine <110 (mol/l) undergoing routing open heart surgery under CPB. At the completion of CPB, the urine from the per-CPB collection and the blood were sampled simultaneously to determine urine and plasma creatinine as well as urine and blood osmolality. CCR and CH₂O were calculated from the standard formulae. The CCR-based renal dysfunction was classified according to Morgan GE and Mikhail MS. The (2 (significant if $p < 0.05$) and the CH₂O test performance characteristics were analysed.

Results

During CPB, out of 82 pts, we met transiently 16pts (19.5%) with mild; 8pts (9.76%) with moderate RD, 14pts (17%) with ARF. The abnormal CH₂O (>-20 ml/h) was seen in 32pts (29%), among whom 28 cases associated with RD (CCR<60ml/min). These changes are significantly correlate to CPB duration. The sensitivity of CH₂O test is 0.65, specificity 0.86, predictive value positive 0.81, predictive value negative 0.76, false negative rate 0.32, false positive rate 0.14.

Conclusions

In our study, the glomerular filtration and/or the concentrating ability of renal tubules are impaired progressively and dependently on CPB duration. The CH₂O seems to be an important test at bed-side for diagnosing and predicting renal dysfunction and acute renal failure in cardiac surgery under CPB.

BFP-3 DETERMINATION OF DOSE-RESPONSE OF EPIDURAL ROPIVACAINE FOR LABOUR ANALGESIA

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Introduction

Ropivacaine is a popular local anaesthetic agent in labour epidural analgesia due to its differential sensorimotor blockade and relative cardiovascular safety. A formal dose-response study to determine the ED₅₀ and ED₉₅ for effective labour analgesia has not been previously published.

Objective

To determine the dose-response of ropivacaine as the initial epidural dose to establish effective analgesia in early labour.

Methods

We aimed to recruit 75 ASA I and II parturients in active early labour who requested epidural analgesia into our prospective randomised, double-blind study. Patients were randomised into one of 5 groups (n=15 per group) to receive the following doses of epidural ropivacaine in a 10-ml volume with saline: 10, 20, 30, 40, 50mg (Gps A - E). The analgesic response to the randomised dose was assessed using the VAS pain score at 5 and 10-minute intervals until the patient requested further analgesia. Sensory and motor block, maternal pulse rate and arterial blood pressure, and side effects such as nausea/vomiting, sedation and pruritis were also documented. Effective analgesia was defined as a reduction in VAS pain score by at least 50% within 30mins. Parametric data were compared by ANOVA. Non-parametric data were analysed using Kruskal-Wallis test. Longitudinal data were analysed using BMDP statistical software (LA, CA, USA).

Results

Patient demographics and initial VAS pain scores were comparable across the 5 groups. Gp A (10mg) was dropped after only 6 patients after interim analysis showed it to be ineffective. A dose-response curve was constructed: the ED50 and ED95 were 10.4 and 88.0mg, respectively. The duration of analgesia, upper sensory level, haemodynamic changes and patient and midwife satisfaction scores were significantly different across the 5 groups. However, motor block and other side effects were similar.

Conclusions

The ED50 and ED95 of epidural ropivacaine for labour analgesia were 10.4mg and 88.0mg, respectively. We recommend an initial epidural dose of 90mg (ED95) ropivacaine to establish effective epidural analgesia in early labour.

BFP-4 A NON-OCCLUDING BAG DESIGN TO ENHANCE CLOSED SCAVENGING FOR THE T-PIECE BREATHING CIRCUIT

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Objective

1) prevent the bag of the Ayre's T-piece from rotating around its longitudinal axis causing obstruction, 2) provide a conduit for effective closed scavenging.

Methods

The inner tubing of a disposable Bain's circuit was exposed by removing the corrugated outer tubing from the connector at the patient's end. A 500ml double ended rubber bag was threaded over the tubing till the collar of the bag was mounted on the connector. The floppy tail of the bag made an airtight seal over the tubing. The distal end of the tubing was then connected to the Active Gas Scavenging System (AGSS) via a Paediatric Airway Pressure Limiting (APL) valve with appropriate connectors.

Three sets of bags were made: One had an intact tubing (N), while the others had openings in the tubing at the level of the upper (P) and lower ends (D) of the bag respectively. Resistance to gas flow through the bags and the APL valve with the (N) bag were measured. CO₂ tension was determined from the lower end of the bag and from the tubing before the APL valve during actual use in patients.

Results

At fresh gas flow rates of 10Lmin⁻¹, resistance was not increased by the presence of a tube within the bag. The APL valve minimally increased the resistance. There was no evidence of preferential gas flow. The modified circuit was used successfully for both spontaneously breathing and ventilated paediatric patients.

Conclusions

The enhanced T-piece circuit offers effective closed scavenging and prevents obstruction of the circuit due to twisting of the bag.

BFP- 5 TRANSIENT RADICULAR IRRITATION AFTER SPINAL BLOCK WITH LIDOCAINE

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Despite its potential risk of transient radicular irritation (TRI) after spinal block, 5% hyperbaric lidocaine has been used for several years with few reports of this syndrome in Thailand. The objective of this study is to determine and compare the incidences of TRI in patients receiving 5% hyperbaric lidocaine and those receiving 0.5% bupivacaine for spinal anesthesia.

The studied subjects consisted of 200 patients randomly allocated to receive either 5% hyperbaric lidocaine or 0.5% hyperbaric bupivacaine for spinal block at Chiang Mai University Hospital. Each of the studied patients was evaluated on the following postoperative days by one anesthesiologist unaware of the study group to determine the symptoms of TRI by using the modified Hampi criteria.

Seventeen out of ninety-nine patients (17.17%) receiving 5% lidocaine developed TRI symptoms while two out of the one-hundred and one patients (2.92%) receiving 0.5% bupivacaine developed TRI-like symptoms. The risk of TRI increases in the lidocaine group compared to the bupivacaine group with adjusted odd ratio (95%CI) of 9.81 (2.15, 44.5) after controlling for lithotomy position by the multiple logistic regression analysis.

The result may alert anesthesiologists in this zone to the risk of TRI after spinal block with 5% hyperbaric lidocaine. The clinical significance of TRI after spinal block has been discussed. Dilution of the anesthetic concentration before administration has been recommended. However, the effect of this diluted solution on reducing the risk and providing adequate analgesia should be determined.

BFP-6 CONCENTRATION DEPENDENT PROPOFOL PHARMACOKINETICS

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This study was designed to utilize non parametric methods to investigate possible departures of pharmacokinetics from linearity due to physiological changes produced by propofol and to utilize physiological simulation to identify the cause of any change. As part of a separate pharmacodynamic study, with insitutional approval and informed consent, twenty healthy male volunteers aged 21 - 30yrs were anaesthetised with an intravenous infusion of propofol designed to achieve a series of increasing steps in measured arterial blood concentration (Cm). Propofol was delivered via an Ohmeda 9000 Syringe Pump controlled by laptop computer running software designed to administer a series of bolus doses and a variable rate continuous infusion according to a preset table and the calculated lean body mass of each subject. The desired target concentration (Ct) was stepped to 1.0 or 1.5 (gml⁻¹ and was increased in 0.5 (gml⁻¹ steps each 15 minutes until the patient failed to respond to verbal command. Whereupon, Ct was doubled for a further 15 minutes and then the infusion terminated. Arterial blood samples were taken at 5, 10 and 15 minutes after each step in Ct. Samples were analyzed using a HPLC assay.

A simulation of the study was then conducted using BODY Simulation (Advanced Simulation Corporation - <http://www.bodysim.com/>). This simulation incorporates a model of cardiovascular and respiratory physiology, as well as the distribution, effects and elimination of many drugs including propofol. Output was to a conventional spreadsheet.

Volunteer subject data showed a significant positive departure from the line of identity when described by the regression equation $C_m (95\% \text{conf}) = 1.23(1.16 - 1.30) \times C_t - 0.24(0.06 - 0.42)$. The simulation resulted in a similar positive departure in Cm however all the values of Cm were some 40% above the values obtained in the volunteer subjects.

We conclude that the positive departure of Cm from the prediction of Ct is due to changes in the circulation produced by propofol. While the simulation models this non-linearity, the higher than expected values of Cm may be explained by a failure of the model to account for the high level of binding of propofol in blood. The consequence of the non-linearity of the pharmacokinetics indicates that conventional compartmental models might be inaccurate at higher concentrations and that the effects of propofol on the circulation might affect the pharmacokinetics of other drugs.

S15-1 DEVELOPMENTS IN PHARMACOLOGY FOR THE PAEDIATRIC PATIENT

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(Abstract not available at the time of printing)

S15-2 SEDATION AND ANALGESIA FOR THE CHILD IN AND OUTSIDE THE OPERATING ROOM

I T Camagay, Quezon City, Philippines

(Abstract not available at the time of printing)

S15-3 ANAESTHESIA FOR CHILDREN WITH CONGENITAL HEART DISEASE FOR NON-CARDIAC SURGERY

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8 per 1000 live births have congenital heart disease. Most conditions now have an operative mortality approaching zero. As many surgical problems coexist with heart disease, non cardiac surgery is common and may take place in district hospitals. Patients may have uncorrected, corrected or palliated lesions or have residual lesions. Crucial preoperative assessment includes exercise tolerance and the ability to feed and an echocardiograph where possible. Specific lesions, Fallots tetralogy, transposition of the great vessels, single ventricle repairs are discussed with reference to survival and risk factors for anaesthesia. All patients require antibiotic prophylaxis.

Basic anaesthetic principles include full preoperative assessment, anxiolytic premedication, full and careful (?invasive) monitoring, maintenance of cardiac output and blood volume. Ketamine, etomidate and sevoflurane are suitable for induction, light general anaesthesia with controlled ventilation with regional anaesthesia where possible and postoperative nursing in a High Dependency Unit with increase of FiO₂. If the procedure is deemed to carry a greatly increased risk, then specific informed parental consent is taken.

S15-4 ANAESTHESIA FOR THE CHILD WITH LUNG DISEASE

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General anesthesia has a major effect on motion and shape of the chest wall (diaphragm, thoracic and abdominal wall). The altered motion and shape of the chest wall changes function of the lungs. The lungs will be stiff, the elastic recoil pressure of the lungs will increase, and the intrapulmonary distribution of the inspired gas will be changed. As a consequence of these alterations in the lung function, pulmonary gas will be impaired. Characteristic of the respiratory function in child, and small baby are; higher in the air way resistance, mechanics breathing depend on the motion of the chest and abdominal wall and also diaphragm, and increasing of the alveolar minute will be only by increasing the respiratory rate. Airway resistance of child with lung diseases will be increased (asthma, chronic bronchitis, emphysema). Increasing of the pulmonary secretion may result in obstruction of the bronchioles (infectious lungs) and also reduced function residual capacity (FRC) which the patients will have hypoxic pulmonary vasoconstriction (chronic hypoxaemia). Problems in anesthesia are; to prevent hypoxia and to maintain adequate tissue oxygenation during anesthesia and post operatively.

S16-1 ANAESTHESIA FOR EMERGENCY CAESAREAN SECTION

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The emergency caesarean section refers to the section of the parturient who is possibly unplanned from the anaesthetic point of view. She is less than optimal for anaesthesia and may not be fasted, has uncontrolled hypertension as in a severe pre-eclamptic or eclamptic or has severe hypotension and hypovolemia from an antepartum haemorrhage.

The choice of the anaesthetic depends on consideration about speed required for induction of anaesthesia, the condition of the parturient, the usual course of the complicating disease process and the state of fasting and airway of the parturient.

General anaesthesia provides rapid onset of anaesthesia but in the non-fasted, eclamptic patient, securing the airway in a rapid sequence intubation is fraught with danger. Hypoxia as a result of failure to intubate and pulmonary aspiration remain the 2 chief causes of death under general anaesthesia especially in the emergency situation.

Intrathecal anaesthesia does provide an alternative method of anaesthesia with rapid onset especially in the non-fasted parturient. This however provides anaesthesia for a limited duration and in complicated sections the surgery may outlast the anaesthetic. It is contraindicated in patients with coagulopathy.

Topping up an existing epidural is a good alternative as it obviates the necessity to proceed with a general anaesthesia in less than ideal conditions. De novo epidural or combined spinal epidural (CSE) may be less than ideal if speed is required but CSE does provide for a more rapid onset compared to an epidural.

Effective management and correct choice of anaesthesia requires a full understanding of the parturient's condition, the precise urgency of the caesarean section and the expected course of events during the procedure.

S16-2 PLACENTA PRAEVIA AND REGIONAL ANALGESIA

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Placenta previa is a leading cause of third trimester bleeding and results in the considerable maternal and fetal morbidity. With the incidence of 1 in 200 deliveries, a meta-analysis showed the risk of placenta previa on the number of prior cesarean deliveries. Relative risk were 4.5 for one, 7.4 for two, 6.5 for three and 44.9 for four or more prior cesarean sections. Bonner et al used the questionnaire survey and found the wide variety of anaesthetic practice regarding the use of regional anaesthesia in patients with placenta previa presenting for cesarean section. The majority were willing to use regional anaesthesia for minor degree of placenta previa, (posterior location without covering os) and for elective cesarean section. The two minority groups were those who were unwilling to use regional anaesthesia for any cases of placenta previa and those who would use regional anaesthesia regardless of placenta location and bleeding status. More experienced anaesthetists were more willing to use regional anaesthesia for cesarean section in the presence of placenta previa in both elective and emergency situations associated with haemorrhage. From our study, with incidence of 1 in 125 deliveries and 1 emergency hysterectomy in 31 placenta previa, we found more bleeding in patients with complete covering of the os than in none or partial covering of the os by the placenta, regardless of anterior or posterior location. Patients in the group using regional anaesthesia had less intraoperative bleeding than in group using general anaesthesia. Regional anaesthesia was used for patients with placenta previa mostly for none and minimal preoperative bleeding, but not all patients with moderate to severe preoperative bleeding including those with previous history of cesarean section who had higher risk of placenta accreta had general anaesthesia. Although guidelines for trainees might be helpful for management of this potentially hazardous condition, individualised management for each patient by experience anaesthetist might more appropriate.

S16-3 ANAESTHESIA AND INTENSIVE CARE MANAGEMENT OF THE PATIENT WITH PRE-ECLAMPSIA AND ECLAMPSIA

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(Abstract not available at the time of printing)

S16-4 ANAESTHESIA FOR THE PARTURIENT WITH CARDIAC DISEASE

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Cardiac disease during pregnancy presents a strong challenge to the cardiologist, the obstetrician, and the anesthesiologist. It still ranks as one of the leading causes of maternal morbidity and mortality. Controversy exists as to the advantage of general anesthesia over regional anesthetic techniques in gravidocardiac patients. Prompt recognition and treatment of various hemodynamic alterations during labor and delivery are determining factors for a successful outcome.

A clear understanding of the pathophysiology of cardiac disease in pregnancy will help greatly in the formulation and conduct of anesthetic plan of action. It, therefore becomes imperative for the anesthesiologist to correlate the cardiovascular adaptations occurring during pregnancy, such as, the effect of maternal posture, maternal hemodynamics changes during labor and delivery and specific problems in parturients with valvular heart disorders, congenital heart anomalies, arrhythmias, and cardio-myopathy. Each cardiac disease involves basic guidelines and recommendations to observe.

The importance of essential monitoring requirements, fluid management and specific pharmacologic therapy must be realized to prevent any catastrophe during the perioperative management of pregnant cardiacs. Judicious choice of anesthetic drugs and techniques, and the use of cardiac support drugs will help in maintaining the optimum hemodynamic parameters.

The management of parturients with cardiac disease requires the thoughtful integration of all these information to achieve the best outcome for both mother and fetus.

S17-1 EVIDENCE-BASED MEDICINE: WHAT IT IS WHAT IT ISN'T?

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Essentially, Evidence-Based Medicine (EBM), as defined by Sackett is "The use of epidemiological and biostatistical principles to improve the care of a given patient." In its highest terms it is the meeting place between the art and science of medicine. It has gained popularity because of the increased need to validate value of services involved in patient care. Efficiency and quality improvement of patient care are thought to bond through EBM. In reality there are too many publications to allow an individual to up to date with the literature on several items. So, EBM is the process of finding relevant information in the medical literature to address a specific clinical question. To do so it applies rules of science (epidemiology and biostatistics) to a body of literature on a given topic with the goal to distinguish evidence from opinion. In this regard it is a "Critical Appraisal of the Literature". The specific questions used to address this broad issue, when related to studies of a therapy, for example, include are the results of the study valid and clinically useful? Validity is assess by experimental design and data analysis by asking such questions as: Are the results of study valid? Were patients correctly randomized? Were all the patients accounted for and was follow-up complete? Were patients analyzed according to how they were randomized (i.e. intention to treat)? Was the study blinded? Were groups similar the start and treated equally apart from the experimental intervention? Relevance is assessed by asking such real life questions as:

How large was the treatment effect and how precise was the estimate of the treatment effect? Were the patients studied similar to the "norm"? and were all clinically important outcomes considered? Finally, was a cost benefit analysis performed? Based on the answer to these questions, studies (evidence) are stratified into levels

of evidence, with Level I reflecting randomized trials with low false positive (?? and low false negative (?) error (i.e. high power), Level II similar randomized trials but with high ? error or low power, Level III all non-randomized concurrent cohort studies, Level IV as non-randomized historic cohort studies, and Level V as case series. All evidence is valid but just with differing levels of power. The primary barriers to the effective use of EBM are physicians who resist programmed approaches to patient care, poor discrimination around clinically relevant outcomes from literature review and low power to make definitive recommendations. These can also be misapplication of evidence: lack of evidence of effect does not equate to evidence of lack of effect. EBM is a tool for the clinician to understand and apply the literature to patient care. It is not a substitute for medical experience, knowledge of the personal response of a given patient, nor does it supplant experience. However, clinicians are required to effectively interpret the evidence in their fields and with clinician leadership, efforts to improve the practice of medicine can succeed and not just from the financial aspect.

S17-2 CRITICAL APPRAISAL OF JOURNAL ARTICLES AND IMPLEMENTING EVIDENCE BASED CHANGE

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Evidence based medicine (EBM) is a paradigm of using the best scientific evidence to make decisions about the care of individual patients. The growth of this methodology has been furthered by: (1) The exponential increase in data acquisition and scientific publication, (2) The need to have interpretation of validity, (3) The need to apply this interpretation to individual practice, (4) The economic and managerial pressures to benchmark clinical practice and to justify changes in practice, (5) The influence of the media in disseminating the latest medical news to an interested but unprimed public.

The simplest outline of this approach begins, first, with the formulation of a specific question or problem arising from clinical practice. E.g. "What is the best regional anaesthetic technique for an elective Caesarean section for my 26 year old primigravid patient?" Second, the literature can be accessed through various methods but the on-line or CD-ROM electronic search of MEDLINE or NIH-National Library of Medicine-equivalent is becoming the basic standard required for practising EBM. Third, the evidence and its validity must be weighed by the clinician. The rules of assessing validity have been described by Sackett, et al. Fourth, the evidence has to be applicable to a particular patient and this judgement should incorporate the clinician's own experience and expertise. Fifth, the use of this learning tool must be evaluated by the clinician's own self assessment at the point of care. In this way, the practice of EBM is integrated into the continuum of patient care and continuing professional development (CME).

The barriers to successful implementation of evidence-based change stem from (1) the time needed to practice EBM, (2) the effort to master an EBM learning curve, (3) taking the path of lesser resistance in 'falling back' on personal experience and expertise, (4) the negative messages to junior colleagues from senior clinicians, (5) the lack of funding to provide access to EBM technology. Last, but not least, the quest for an ideal anaesthetic technique for our patient may yield an answer supported by weaker levels of evidence or by no evidence and this may be demoralising. However, such a gap could well become the stimulus to further research.

S17-3 UNDERSTANDING METHODOLOGY AND STATISTICS

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(Abstract not available at the time of printing)

S18-1 WRITE IT RIGHT! PUBLICATION IN A PEER-REVIEWED JOURNAL

R D Miller, Department of Anesthesiology & Perioperative Care, University of California, San Francisco, USA

In addition to evaluating the necessary components of the abstract, (e.g. introduction, methods, results, and discussion), the ingredients for good writing will be discussed. They are: (1) Ask a good question; (2) Read extensively (leads to a good question); (3) Write extensively to a critical audience; (4) Follow the "Guide to Authors"; (5) Understand the process.

Also, information will be provided as to what Editors-in-Chiefs think. For example, they will ask: (1) Was "the Guide to Authors" followed? (2) What was the question being asked? (3) What was the conclusion? (4) Is the research important or relevant?

Lastly, the criteria by which an author selects one journal versus another will be discussed. Hopefully, this presentation will allow a better understanding of the thinking processes that peer review journals have. This knowledge should improve the ultimate success or acceptance of articles by authors.

S18-2 TRUTH AND LIES OF STATISTICS

P S Myles, Department of Anaesthesia & Pain Management, Alfred Hospital, Melbourne, Australia

Conclusions based on poor research can be harmful to patient care. The commonest errors are often quite basic and relate more to research design: lack of a control group, no randomization to treatment groups and inadequate blinding of group allocation.

Analysis of Baseline Characteristics

It is not uncommon for patient baseline characteristics to be compared with hypotheses testing. This is wrong for two major reasons: significance tests only test the success of randomization, and there may be a clinically significant difference between groups which is not detected by significance testing, yet such an imbalance may have an important effect on the outcome of interest (ie. confounding).

Inadequate Sample Size

A common reason for failing to find a significant difference between groups is that the trial was not large enough (ie. type II error).

Multiple Testing, Subgroup Analyses & Interim Analysis

Multiple comparisons between groups will increase the chance of finding a spurious significant difference (ie. type I error). This is because each comparison has a probability of roughly 1 in 20 of being significant purely by chance.

Misuse of Parametric Tests

Parametric tests (Student's t-test & ANOVA) assume a normal distribution of numerical data.

Standard Error vs Standard Deviation

Standard deviation (SD) is a measure of variability and should be quoted when describing the distribution of sample data. Standard error is a derived value used to calculate 95% confidence intervals, and so is a measure of precision.

Misuse of Correlation

Variables with a mathematical relationship between them will be spuriously highly correlated because of mathematical coupling. Both correlation and regression should not be used to measure agreement between two measurement techniques (use Bland & Altman plot).

Adapted from a text book in preparation, "Statistics for Anaesthesia and Intensive Care", edited by Paul Myles & Tony Gin (Butterworth Heinemann, Oxford, UK).

S18-3 PRESENTATION SKILLS

W D Ngan Kee, The Chinese University of Hong Kong, Hong Kong, China

Although designing a research study, correctly applying statistical analysis, and writing the manuscript well are all difficult and demanding tasks, probably the biggest, or certainly the most stressful hurdle that a young researcher can face is the presentation of his or her findings at an international scientific meeting. This talk will focus on "survival skills" for new researchers presenting for the first time. Three phases of the presentation process will be discussed:

1. Written Abstract

The objective of the research should be clearly stated. Methodology should be brief and succinct. Only relevant results should be included, but these should be in detail. The conclusion should be clear and include implications. Carefully follow word and space limits. Table and graphs should remain clear after reduction.

2. Oral Delivery

Important considerations for good delivery include: Good knowledge of the subject, self-confidence, enthusiasm, preparation and planning, appropriate dress, and appropriate language.

3. Audiovisuals

Projected slides remain the clearest form of visual aid. Ideally, a good slide has the following features: it is uncluttered and discusses only one major concept; it has large and clear lettering that is easily read at a distance, with mixtures of upper and lower case; it is simple and contains no more than five key points. Contrast between text and background should be maximised - light text on dark background has greatest clarity but dark text on light background is more natural to read. Use a sans-serif typeface for body text. Use spellchecker of your computer. Avoid "cliché clipart". Computer projection is now frequently available at conferences. Beware that although versatile, computer projection is not as clear and can be less reliable than slides. Avoid overuse of animation and other special effects.

S19-1 THE PATIENT FOR CAROTID ENDARTERECTOMY: CHALLENGES AND SOLUTIONS

A M Lam, University of Washington, Seattle, Washington, USA

Introduction

Increasing numbers of symptomatic and asymptomatic (marginal benefits) patients are undergoing carotid endarterectomy (CE) for prevention of stroke. To realize the benefits, the preoperative morbidity/mortality must be <5 - 6% for symptomatic patients and <3% for asymptomatic patients. The majority causes of mortality and morbidity from CE are myocardial infarction and stroke.

Preoperative Considerations

The Mayo Clinic classification system is a well accepted method of grading preoperative risk. Preoperative assessment must include a thorough evaluation of (1) the cardiovascular system, (2) the neurologic system, (3) angiographic/Duplex ultrasound assessment, and (4) other medical illnesses.

Anaesthetic Management: Regional or Local Anaesthesia vs General Anaesthesia: No technique-related outcome differences have been demonstrated. Regional allows easy CNS monitoring whereas general anaesthesia may reduce metabolic demand and offer some degree of cerebral protection. No ideal anaesthetic has ever been identified. Blood Pressure and PaCO₂ Management: As autoregulation may be lost, an adequate

BP is critical. Vasopressor may be necessary during cross-clamp. Normocapnia is preferred. CNS Monitoring: When general anaesthesia is employed, CNS monitoring available include EEG, SSEP, stump pressure, CBF, transcranial Doppler (TCD), and near infra-red spectroscopy. TCD appears to be a promising tool. Intraoperative Cerebral Protection: Surgical protection: selective shunting decreases the risk of ischaemic stroke although the literature remains inconclusive. Pharmacologic protection: Where the shunt is never used, it is not unreasonable to administer a bolus of thiopental 5mg/kg prior to cross-clamping of the carotid artery. No conclusive data exist to attest its efficacy.

Postoperative Complications

These include BP lability, myocardial ischemia, wound hematoma/airway obstruction, and neurologic deficits from embolization/thrombosis, or intracerebral haemorrhage.

S19-2 ANAESTHESIA FOR THORACIC ANEURYSM SURGERY

R G Walsh, Royal Prince Alfred Hospital, Sydney, Australia

Thoracic aneurysm surgery has a high perioperative morbidity and mortality rate, and as such is a great challenge for the anaesthetist. Management depends on the site of surgery.

1. Ascending Aortic Aneurysm

Requiring cardiopulmonary bypass perfusion (CPBP), replacement of the ascending aorta often also involves aortic valve replacement and reimplantation of the coronary arteries. Anaesthesia and perfusion management is not dissimilar to that of major cardiac surgery, with added expectations of major blood loss and special techniques for blood component conservation.

2. Aortic Arch Aneurysm

Management is similar to that for ascending aortic aneurysm; in fact both are commonly combined. Surgery and CPBP is usually very prolonged and techniques for cerebral perfusion and myocardial protection are required, as are considerations of potential complications of very prolonged CPBP.

3. Descending Thoracic and Thoraco-abdominal Aortic Aneurysm

Surgical and anaesthetic management for this condition vary greatly according to the pathology. One lung ventilation, sometimes with difficulty, is usually required for a left thoracotomy; partial left heart CPBP is often utilised; special techniques for spinal cord monitoring and protection may be considered; and, again, employment of blood conservation techniques are necessary. Recently introduced minimally invasive endoluminal surgical techniques present the anaesthetist with new and interesting challenges.

Options for anaesthetic management of these conditions will be presented, along with personal experiences and views on newer techniques. The anaesthetist and surgeon have important roles and options in ensuring myocardial, brain, spinal and renal protection, as well as blood conservation, during thoracic aortic aneurysm surgery.

S19-3 LEFT HEART BYPASS WITH AND WITHOUT MEMBRANE OXYGENATOR DURING THORACIC AORTIC SURGERY

M Nomura, K Kodaka, T Nagasawa, H Suzuki, Department of Anaesthesiology, Tokyo Women's Medical University, Tokyo 162, Japan

Left heart bypass (LHB) during surgery of thoracic aneurysms is a very simple and useful method, but sometimes it has a few clinical problems; hypoxia due to differential lung ventilation (DLV), hypothermia and hypotension. Recently we use a new support system, which contains centrifugal pump, membranous oxygenator (MENOX AL4000) and thin wall cannula (anthon tubes) and report its usefulness during thoracic aneurysms. Anesthesia was induced with fentanyl with diazepam and pancuronium, the trachea was intubated with a univent tube with a movable blocker (FUJI system corpo), which was directed into the left bronchus. The patients were ventilated with 100% oxygen and DLV was performed with bronchial cuff inflation. The LHB started and bypass flow was adjusted to maintain right femoral artery pressure about 60mmHg. Blood gas analysis of radial artery, pulmonary artery (PA), and superior and inferior vena cava (SVC and IVC) was performed during DLV and LHB with oxygen. In our study LHB with membrane oxygenator significantly increased arterial oxygen pressure compared with during DLV. We were able to maintain DLV by collapsing the non-dependent lung and to prevent bleeding from left lung to the healthy right lung. The increase of arterial oxygen pressure is partly explained by shunt flow through descending aorta flow by bypass flow, but unknown mechanism is existed. Our new method, LHB with membranous oxygenator, is very useful during surgery of thoracic aneurysms.

S20-1 PERIOPERATIVE INADVERTENT HYPOTHERMIA

G A B Herbosa, Department of Anaesthesiology, Philippine General Hospital, Manila, Philippines

Introduction

A non-intentional decrease in core temperature is by far the most common perioperative thermal disturbance, resulting from a combination of impaired thermoregulation and exposure to a cold microclimate. The human body is precisely controlled to maintain a core body temperature of 37°C to achieve optimum metabolic performance. Hypothermia is defined as a core temperature of 36°C or below. During anesthesia and surgery, there is an initial rapid decrease in core temperature (0.8 - 1.0°C) followed by a slow linear decrease.

To be briefly presented are the basic principles of normal thermoregulation (afferent input, central control, efferent responses), and how it is altered by general and regional anesthesia. The consequences, treatment and prevention of intraoperative hypothermia are likewise presented.

Methods

A literature review using several research strategies were utilized-optimal MEDLINE search, manual library searches and appropriate topic journal searches.

Results

General anesthesia removes a patient's ability to regulate body temperature through behavior so that autonomic defenses alone are available to respond to changes in temperature. It inhibits thermoregulation in a dose dependent manner and inhibits vasoconstriction and shivering about three times as much as they restrict sweating. General anesthetics raise warmth-response thresholds in linear proportion to increased dosage. Opioids and propofol similarly lower the thresholds for vasoconstriction and shivering. Volatile anesthetics (isoflurane, desflurane) however, decreased the threshold temperatures for cold responses in a nonlinear fashion.

Nonshivering thermogenesis does not occur during general anesthesia in either adults or infants.

Anesthetics thus widen the interthreshold range (the range of values not triggering thermoregulatory defenses) to a value approximately 20 times the normal range of 0.2°C. Thus, the anesthetized patients are poikilothermic.

All thermoregulatory responses are neurally mediated (circulating factors normally contribute little to thermoregulation, except during fever). Consequently, nerve blocks prevent the normal activation of regional thermoregulatory defenses such as sweating, vasoconstriction, and shivering. Nerve conduction is disrupted by both spinal and epidural anesthesia. Central control of thermoregulation is likewise inhibited by regional anesthesia. It appears that the regulatory system incorrectly judges the skin temperature in blocked areas to be abnormally high. This apparent elevation of skin temperature in the blocked region fools the regulatory system into tolerating core temperatures that are genuinely lower than normal without triggering a response. The thresholds for vasoconstriction and shivering are reduced by 0.5°C and the threshold for sweating is raised by 0.3°C resulting in an interthreshold range three to four times the normal value.

Patients often feel warmer after the induction of anesthesia. This results from the thermoregulatory system's incorrect evaluation of skin temperature in the blocked area. Because core temperature is rarely monitored and because patients usually do not feel the cold, undetected hypothermia is common during regional anesthesia.

Several studies have shown the immediate and delayed consequence of intraoperative hypothermia in organ function: excessive sympathetic stimulation, interference with drug metabolism, modified platelet activity, altered immune system with impaired wound healing and increased postoperative breakdown of muscle protein.

Residual hypothermia at the end of surgery leads the shivering, increased circulating concentration of plasma catecholamines, increased oxygen consumption and exaggerated hemodynamic responses.

A logical approach to unintentional hypothermia is prevention. This can be achieved by prewarming the patient's skin surface before induction of anesthesia, use of warmed I.V. fluids, forced air warming, among others.

Most preventive methods aim to reduce the temperature gradient between patients and their immediate environment, thus minimizing heat loss via all routes (radiation convection, conduction, and evaporation). If these preventive measures fail in maintaining normothermia, the anesthesiologist may use the alternative strategy of vigorously treating the residual heat debt by either pharmacological (opioids, vasodilators) or physiological (cutaneous warming) measures. A novel approach using a mixture of amino acid I.V. infusion was proposed by Branstrom and Brundin with the aim of stimulating heat generation and whole body oxidative metabolism that otherwise would be depressed as a result of anesthesia.

The question remains as to whether or not the stress of hypothermia, as part of the overall injury response, should be prevented by further increasing resting energy expenditure (REE) or, in contrast, should measures be implemented to abolish or at least attenuate the sympathetic response associated with thermal and surgical stress.

Conclusions

Our homeothermic physiology permits maintenance of function in hostile environments. However, compensatory mechanisms can be overwhelmed with the sudden, rapid heat production of malignant hyperthermia or with chronic exposure to cold. Furthermore, these mechanisms may be obtunded by general anesthesia and the patient may be left later to pay the hypothermic consequences of inattentiveness. Regional anesthesia impairs both central and peripheral thermoregulation. As a result, hypothermia is common in patients given spinal or epidural anesthesia. Patients who become sufficiently hypothermic may start to shiver, a development often disturbing to both patients and medical staff. The hypothermia initially results from a redistribution of body heat from the core to the periphery and then from an excess of heat loss over heat production. The core temperature of patients who become sufficiently hypothermic during general anesthesia

eventually reaches a plateau when arteriovenous shunt is reestablished. It is without doubt that good anesthetic care requires prevention of the causes and treatment of the consequences of altered body temperature. Even mild perioperative hypothermia which is easily prevented, is associated with adverse outcomes. The body temperature should therefore be measured in most surgical patients. Unless hypothermia is specifically indicated (e.g., from protection against ischemia), the intraoperative core temperature should be maintained above 36°C.

The contention is not anymore whether hypothermia should be prevented, but whether the stress associated with this disturbance is seen in the context of the injury response. Therefore a rational approach would be aimed globally at modulating the production and loss of body heat and its consequences.

S20-2 POSTOPERATIVE CNS DYSFUNCTION

A Dan, Department of Anaesthesiology & Intensive Care, Faculty of Medicine, Universiti Kebangsaan Malaysia, Malaysia

Postoperative CNS dysfunction is well documented following cardiopulmonary bypass. It may be subtle with memory and concentration impairment, to severe such as stroke, seizure and coma. Delirium and cognitive impairment are not uncommon following non-cardiac surgery. It is associated with increased morbidity and economic implications such as longer hospital stay and extra nursing care. It was reported as early as 1955 when 18 or 7% of 250 elderly patients that are supposedly to be "mentally normal" had dementia following general anaesthesia. The incidence of delirium had been reported to occur between 0 - 77%, and long term, or late cognitive dysfunction between 5 - 10% following anaesthesia. We will review the incidence, associated factors and pathophysiology of postoperative delirium and cognitive dysfunctions.

S20-3 EXTUBATION AND AIRWAY PROBLEMS IN THE IMMEDIATE RECOVERY PERIOD

N D Santos, MD, DPBA, Santo Tomas University Hospital, Manila, Philippines

The anesthetic literature is replete with studies that deal on problems during tracheal intubation, particularly on the management of the difficult airway. Tracheal extubation and the problems associated with it, however, have received little emphasis. Anesthesiologists recognize the immediate post-extubation period as one where patients are vulnerable. Recognition of immediate or delayed airway obstruction and institution of immediate adequate measures are essential in preventing or treating post-extubation hypoxemia. Objective assessment of simple clinical predictors of return of adequate ventilatory patterns merit attention. Differential diagnosis of post-extubation problems include: (1) laryngospasm; (2) airway muscle relaxation, due to either residual anesthetics or muscle relaxants; (3) soft tissue edema of the uvula and the pharyngolaryngeal structures, due to either an allergic reaction or mechanical trauma; (4) cervical hematoma; (5) vocal cord paralysis/dysfunction; (6) foreign body aspiration. Post-extubation hypoxemia is preventable. Should hypoxemia occur, however, it can be corrected in minutes. Prevention of post-extubation include: (1) breathing 100% oxygen for at least 3 minutes prior to extubation; (2) careful clinical assessment of breathing patterns for adequacy of spontaneous ventilation and respiratory muscle strength, i.e., ability to sustain a 5sec head lift, TOF=0.7 - 0.8, MIP=-20 to -25cmH₂O; positive pressure breaths and suctioning before removal of ETT. Management of post-extubation problems include: (1) correct airway positioning with jaw thrust, concomitant neck extension and placement of an artificial airway; (2) administration of 100% O₂ by mask; and (3) if caused by laryngospasm, give IV lidocaine and administer 100% O₂ by CPAP. Extubation of the difficult airway is as equally challenging as its intubation. The extubation strategy as proposed by the ASA Task Force on Difficult Airway Management will be discussed.

PL-3 PARADIGM SHIFTS IN CHRONIC PAIN

S M Walker, University of Sydney Pain Management and Research Centre, Royal North Shore Hospital, St Leonards, Australia

Significant advances have been made in our understanding of chronic pain due to increased knowledge from basic science and clinical research, and awareness of the complex interaction between biological, psychological and social factors in all individuals experiencing both acute and chronic pain. Pain is recognised as a disease process rather than merely a symptom, that requires active and early intervention to improve analgesic and functional outcomes. Anaesthetists have an important and expanding role in pain management which is best achieved within an interdisciplinary team.

Examples from various aspects of management will be utilised to illustrate recent paradigm shifts in our understanding and management of patients with chronic pain.

'What?' will include discussion of the definition of pain.

'How?' will outline the utilisation of various pharmacological therapies based on our increased understanding of modulation of pain transmission in the spinal cord, mechanisms of neuropathic pain, and potential alterations in response to opioid analgesics.

'When?' emphasises the shift to management of pain as a continuum from acute to chronic.

'Why?' will outline recent changes in the rationale for management of pain in neonates, and the need to reduce the personal and economic cost associated with chronic pain and disability.

'Who' discusses the role of anaesthetists as pain medicine specialists and also the shift from a medical or Cartesian model to a biopsychosocial model of pain.

'What do we need for the future' outlines the role of evidence based medicine, the need for ongoing education and training, and the emergence of Pain Medicine as a specialty.

S21-1 STRESS-FREE SURGERY WITH COMBINED GENERAL AND REGIONAL ANAESTHESIA

K Mori, H Segawa, Kyoto University Hospital, Kyoto, Japan

By definition, stress is a physical, chemical or psychological factor or combination of factors that poses a threat to the homeostasis or well-being of an organism, and that produces a defensive response, as, for example, physical or emotional trauma or infection. Surgical noxious stimulation is a typical stress and the patients' response consists of (1) an activation of the sympathetic nervous system, and (2) an activation of the hypothalamo-pituitary-adrenal axis. In addition, the major surgeries are usually associated with an immune response that releases various cytokines which facilitate the noxious stimulation-induced response. Sympathetic nerve activation and catecholamines induce an activation of the cardiovascular system and increase cardiac output. Cortisol and epinephrine induces gluconeogenesis and hyperglycemia. Cortisol facilitates the gene-expression of the adrenergic receptors and facilitates the actions of catecholamines. All these responses are associated with an increased energy expenditure by generalized catabolism, i.e., persistent gluconeogenesis and protein degradation, hyperglycemia and negative nitrogen balance. The increased catabolism leads to a loss of body mass and simply makes the patient exhausted. The primary purpose of surgical anesthesia is to protect patients from such adverse responses to surgery. We have shown that the potent anesthetics, such as isoflurane and sevoflurane, do not attenuate the stress response, and that an epidural anesthesia with local anesthetics blocked the stress response as measured by the plasma levels of pituitary stress hormones. The issue of stress response is of paramount importance not only in the case of cardiac as well as non-cardiac surgery for cardiac patients, since it is strongly related to outcome. The significance of combined regional and general anesthesia will be discussed.

S21-2 PEARLS AND PITFALLS IN THE MANAGEMENT OF EPIDURAL ANAESTHESIA

L G de Guzman, Department of Anaesthesia, Cardinal Santos Memorial Medical Center, Manila, Philippines

Over the last decade, advances in the knowledge of the nature and dynamic peculiarities of the epidural space has provided a roadmap on the anatomy of the epidural space, the lack of which has been one of the major pitfalls in the management of epidural anesthesia. The epidural space is a potential space that is only established if solid, liquid or air is introduced. Insights into the anatomy of the epidural space lead to the better understanding of the technical aspects of epidural anesthesia and the possible development of complications.

Factors such as considerations with technique, site of injection, addition of opioid or non-opioid adjuncts to local anesthetics, use of varying concentrations of anesthetics have variously affected outcomes. These have been measured in terms of success in making the epidural work, the preservation and enhancement of postoperative physiologic well-being, and the preservation of the occurrence of complications.

S21-3 THE ROLE OF CONTINUOUS SPINAL ANAESTHESIA

J A W Wildsmith, Ninewells Hospital & Medical School, Dundee, UK

Placement of a catheter in the subarachnoid space allows the benefits of spinal anaesthesia (minimal drug requirements and profound blockade) to be extended by repeated injection. However, the technique was not widely used until developments in plastic technology allowed the production of fine gauge catheters that can be passed through needles sufficiently small so as not to cause a significant risk of postdural puncture headache. Unfortunately, such small gauge catheters are somewhat difficult to control and misplacement can result in mal-distribution of the injected solution. Such mal-distribution can, by allowing accumulation of very high concentrations of drug around the caudal nerve roots, cause neurological sequelae. Developments in technique may overcome this catheter control problem and allow the full benefits of the technique to be developed. Clearly, it has a role in prolonged surgery in the lower half of the body in patients whose anaesthetic risk is significant. In the longer term entirely new modalities of analgesic drug may be developed that may require to be deposited directly in to the subarachnoid space. Continuous spinal techniques would allow such developments to be utilised.

S21-4 THE FUNCTIONS OF OPIOID RECEPTORS IN SPINAL CORD

H E Soerasdi, Department of Anaesthesiology, General Hospital Dr. Hasan Sadikin, Bandung, Indonesia

The function of opioid receptors in spinal cord has been introduced.

The mechanism drugs on many tissues could biologic respons selectivities and specifically. Drug interaction against the tissues depend on the physical and chemical properties and the biological effects depend on 3 dimensionals there are; sire of action, size of molecule and configuration of chemical drugs. Reaction of drugs to the receptors must be maintained in long time and their effects will be started. According to the identified in 1973 by Pert and Snyder, that receptors has been demonstrated in several central nervous system location and distributed in sub cellular fraction of synaptic membrane and most of them will be binding in the microsomal fraction. Opioid binding to the receptor are influenced by pH, bivalent and monovalent ionic binding of cation and sensitivity of ionic binding and temperature.

High affinity are related to the paleo spinothalamicus tract and the medial portion of thalamus. Receptors also exist in the limbic system i.e. the amigdala, the corpus striatum, and the hypothalamus. The receptors in the medial thalamus subserves dull, chronic and poorly localized pain, later in the limbic system, etc., response to the opioid related to emotional component of the pain and euphoric condition.

The receptors in spinal cord are located in the substantia gelatinosa and especially concentrated found in the lamina I and lamina V.

Studies by Yaksh, show two distinct sub populations of opioid receptors i.e. mu and delta which mediate analgesia. Beta-endorphine preferentially bind to the mu receptor and other as all analogues of enkephalin especially two penta peptides: leu-enkephalin and met-enkephalin interact with the delta receptors.

Enkephalineric terminals are numerous in the part of the spinal cord and the small interneuron may serve to regulate the activity of primary sensory afferents. Enkephalin perhaps as a neurotransmitter, affecting the motility of the gastrointestinal tract.

Distributions and functions of the opioid receptors shown and connectioned between three systems; sensoric system, limbic system and endocrine system.

The functions of mu receptor according to the result of investigation by Lord, et al., that morphine is a selective antagonist mu receptor and peptides with high selectivity for mu receptor eg. Morphiseptin. Opiate antagonist as naloxone and nalprexone have shown high grade selectivity for mu receptor. The functions of delta receptor have possed greater capacity result to the enkephalin and beta endorphine also have a high grade affinity and as a endogen ligan.

Other receptors in the spinal cord that are kappa receptor which administration kappa agonist e.g. ketazocin and brimazocin can be effective for analgesia related to the sedation in the level of the spinal cord.

Sigma receptor inactive in the spinal cord and actively as antinociception.

Epsilon receptor shownpotentially against thermal stimuli and antinociceptic is not yet known.

S22-1 NEUROMONITORING: STATE OF THE ART

A M Lam, University of Washington, Seattle, Washington, USA

Cerebral Blood Flow Velocity

Transcranial Doppler ultrasonography (TCD) measures CBF velocity in the major vessels of the Circle of Willis non-invasively. Although the absolute CBF cannot be derived, relative change in CBF is measured quantitatively. It has been used to determine cerebral autoregulation, CO₂ reactivity, and to detect air/particulate emboli. Anesthetic agents appear to have negligible influence on vessel diameter. Vasospasm of the major vessels will increase flow velocity and TCD has been used to manage patients in vasospasm following subarachnoid hemorrhage. Intraoperatively, it has been used during carotid endarterectomy and cardiopulmonary bypass, for diagnosis of circulatory arrest, and for management of patients with moderate head injury.

Cerebral Oxygenation/Metabolism

Jugular bulb venous oximetry (SjvO₂): SjvO₂ monitoring allows estimate of the global balance between cerebral oxygen demand and supply. Clinically, hyperventilation-induced cerebral ischemia can be avoided. It is often used in head-injured patients. However, it can only detect global ischemia.

Near-infrared spectroscopy: This measures cerebral regional O₂ saturation by measuring light reflected off the chromophores in the brain, i.e., oxyhemoglobin, deoxyhemoglobin, and cytochrome AA3. It has been used during carotid endarterectomy and hypothermic circulatory arrest. Its limitations include the inter-subject variability, lack of a definable threshold value, the variable optical path length, as well as potential contamination from extracranial blood from the scalp. Brain tissue PO₂: Using a miniature Clark-type polarographic electrode, it is possible to measure brain tissue PO₂, PCO₂, and pH. It is, however, invasive and measures only regional PO₂. For now it remains an investigative tool.

S22-2 CEREBRAL PROTECTION: THE HOLY GRAIL

P Ophasanond, Department of Anaesthesiology, Siriraj Hospital, Mahidol University, Bangkok, Thailand

A measure to prevent or amelioration of neural damage occurring after hypoxia or ischemic event, and this measure should start prior and sustain throughout the insult. This presentation will review the cerebral physiology included flow and metabolism, factors regulating of CBF, electrophysiologic changes caused by reduction of cerebral blood flow. The pathophysiology of ischemic injury begin with the lose of ability to maintain energy-requiring for Na⁺ and K⁺ pump activity and thus undergo membrane depolarization that lead to increase intracellular Ca²⁺ and the release of neuroexcitatory amines, especially glutamate which cannot be removed from the extracellular because of absence of oxygen and ATP. Glutamate will stimulate NMDA and kinate receptors causes the opening of Ca²⁺ channels and Na⁺ channels thus elevate intracellular Ca²⁺. The increase intracellular Ca²⁺ will activate several enzymes included phospholipase, protease, which hydrolyze phospholipid and produce free fatty acid. Free fatty acid can be metabolize to free radical, prostaglandin and leukotrien, all of these can damage cell and mitochondrial membrane. The free radical formation in cerebral capillary endothelium can cause procoagulant surface which later will be adhered by leukocyte and platelet result in no reflow.

The management for cerebral protection can be (1) Physiological method (hypothermia, glucose regulation, blood pressure manipulation, and hemodilution) (2)Pharmacological method (Barbiturate, Ca²⁺ blocking agent, and Na⁺ channel blocking agent) (3) Genetic control.

S22-3 MANAGING THE PATIENT WITH AN ELEVATED INTRACRANIAL PRESSURE: A CONTEMPORARY VIEW

S Das, Pantai Medical Centre, Kuala Lumpur, Malaysia

(Abstract not available at the time of printing)

S22-4 HAEMODYNAMIC CONSIDERATIONS IN SUBARACHNOID HAEMORRHAGE

W L Lim, Department of Anaesthesia and Intensive Care, Kuala Lumpur Hospital

Subarachnoid haemorrhage (SAH) is a dramatic and life-threatening event eliciting a chain-reaction resulting in raised intracranial pressure, cerebral vasospasm and systemic haemodynamic changes. Despite great advances in understanding the patho-physiology of SAH as well as therapeutic interventions available today, this disease still carries a high degree of morbidity.

The lecture will present an overview of pathophysiological effects of SAH and examine current literature on managing the systemic effects of SAH.

S24-1 VENTILATOR-INDUCED ACUTE LUNG INJURY

M R Pinsky, Department of Anesthesiology and Critical Care Medicine, University of Pittsburgh, Pittsburgh, PA

Positive-pressure ventilation provides the force necessary to expand the lungs above resting lung volume either in a tidal fashion to augment CO₂ elimination or in a constant fashion to improve arterial oxygenation. Although maintaining a normal internal milieu for acid-base balance by normalizing PCO₂ near 4mmHg in patients with acute lung injury by increasing minute ventilation by either increasing tidal volume, frequency or both is often associated with increased patient comfort it may also require using higher levels of airway pressure than can be tolerated by the damaged lungs. Normal lung too will become damaged, leak protein-rich fluid into their air spaces and promote local and generalized inflammation if repetitively over distended to high trans-pulmonary pressures. Importantly, in subjects with lung disease the threshold above which lung injury will develop is not known but is probably lower than for subjects with normal lungs. In support of this concept two recent studies documented improvement in survival and reduced lung injury when patients with acute lung injury were ventilated with tidal volumes less than 5ml/kg. The logic of this approach is that small tidal volume ventilation limits lung over distention and promotes recovery from acute lung injury. Data from both experimental animal studies and humans will be presented to validate these points. Based on this approach, physicians can support ventilator-dependent patients with acute lung injury from a different perspective in which lung protection rather than patient comfort is the primary goal of ventilatory therapy.

S24-2 RECRUITMENT STRATEGIES DURING ACUTE LUNG INJURY

M B P Amato, Respiratory Intensive Care Unit, Pulmonary Division, Hospital das Clinicas, University of Sao Paulo, Sao Paulo, Brasil

(Abstract not available at the time of printing)

S24-3 CONVENTIONAL RESPIRATORY CARE IN PAEDIATRIC PATIENTS

K Miyasaka, Department of Anaesthesia & ICU, National Children's Hospital, Tokyo, Japan

Pediatric respiratory care is characterized by the use of intermittent mandatory ventilation (IMV) plus PEEP which is the standard method of mechanical ventilation in pediatric patients in Japan. Pressure limited or pressure controlled ventilation is used for mandatory breaths. A continuous flow with or without a reservoir bag is used for spontaneous breaths. Use of synchronization functions is of very limited value in pediatric patients. A simple and inexpensive ventilator which is equipped with fundamental IMV functions utilizing continuous flow and a reservoir bag, such as Newport E100 (Newport Medical, CA) can effectively be used with a majority of pediatric patients of all ages and is of great value in our region.

In this paper, fundamental issues of pediatric respiratory care in Japan, especially use of ventilators and airway management, will be discussed.

S24-4 OPTIMIZING PATIENT-VENTILATOR SYNCHRONY

M B P Amato, Respiratory Intensive Care Unit, Pulmonary Division, Hospital das Clinicas, University of Sao Paulo, Sao Paulo, Brasil

(Abstract not available at the time of printing)

FP6-1 A COMPARISON OF INTUBATING CONDITIONS AND DURATION OF ACTIVITY OF CIS-ATRACURIUM AND ATRACURIUM IN FILIPINOS FOR SURGERY AT THE PHILIPPINE GENERAL HOSPITAL. A RANDOMIZED DOUBLE-BLIND CLINICAL TRIAL

M F de La Cruz-Odi, T C Odi, E P Evangelista, G B Jose, Department of Anaesthesiology, University of the Philippines-Philippine General Hospital, Manila, Philippines

Cis-atracurium, an isomer of atracurium, is a new nondepolarising muscle relaxant. Its clinical advantages and disadvantages over atracurium were weighed in this study. We compared the onset of action, intubating conditions, duration of neuromuscular blockade, and determined which of the muscle relaxants caused cutaneous and systemic evidence of histamine release. A prospective, randomized, double-blind study was performed in eighty-one (81) patients of ASA physical status 1 and 2 undergoing elective surgical procedures treated with intubating dose of either 0.5mg/kg atracurium (3 X ED95) n=42 administered by bolus intravenously over 5 seconds under adequate anesthesia, before surgical stimulation. Induction of general anesthesia commenced with the use of propofol-fentanyl in oxygen. Neuromuscular transmission was assessed by recording the mechanical twitch response to single twitch and train-of-four nerve stimulations. Cutaneous manifestations, blood pressure and heart rate were recorded every 5 minutes. Good to excellent conditions for tracheal intubation were observed in both cis-atracurium and atracurium groups. The time to spontaneous recovery (T4:T1 ratio >80%) were noted to be approximately 83.48+/-20.0 minutes for cis-atracurium whereas those treated with atracurium recovered in approximately 83.70+/-8.94 minutes and none necessitated reversal from the muscle relaxants. When given in equipotent intubating doses, the cis-atracurium group does not significantly differ clinically from the atracurium group with regards to onset, duration, intubating conditions and recovery. Hemodynamic stability was no different at intubating doses of 3 X ED95 for cis-atracurium and 3 X ED95 for atracurium.

FP6-2 MIVACURIUM FOR RAPID TRACHEAL INTUBATION "THE TIMING PRINCIPLE"

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Tracheal intubating conditions following the three different mivacurium regimens, using the "timing principle" were compared. The timing principle entails administration of a single bolus of non-depolarising muscle relaxant, followed by an induction agent at the onset of neuromuscular blockade. Sixty consenting ASA physical status I and II patients, 20 - 65 years old, scheduled for surgery requiring general inhalational anesthesia with orotracheal intubation were randomly allocated into three groups. Group I received 0.20mg/kg, Group II 0.25mg/kg, and Group III 0.30mg/kg mivacurium over twenty seconds through a rapidly flowing intravenous fluid. At the onset of change in TOF, anesthesia was induced with thiopental sodium at 5mg/kg. Upon loss of eyelash reflex, cricoid pressure was applied with the patient breathing spontaneously without assisted ventilation by mask. Intubation was accomplished at 95% neuromuscular blockade after 120 seconds, 70 seconds and 45 seconds in Groups I, II and III respectively. Intubating conditions were assessed according to the "CCC" rating scale and were either good or excellent in all patients. Patients were interviewed postoperatively and all were satisfied with the manner in which anesthesia was induced. In conclusion, Mivacurium at a dose of 0.30mg/kg using the "timing principle" consistently provides good to excellent intubating conditions 35 - 45 seconds after induction of anesthesia and is an effective and safe alternative to succinylcholine for rapid tracheal intubation.

FP6-3 COMPARISON OF TRACHEAL INTUBATION CONDITIONS AFTER 45 SECONDS, 60 SECONDS ROCURONIUM AND SUCCINYLCOLINE TREATMENTS IN ELECTIVE SURGERY

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Objective

A comparison of tracheal intubation conditions after 45 seconds, 60 seconds Rocuronium and Succinylcholine treatments in elective surgery.

Methods

The tracheal intubating conditions of rocuronium and succinylcholine under balanced anesthesia with midazolam, fentanyl, penthotal, nitrous oxide, oxygen and halothane were studied in 38 patients undergoing elective surgery. Patients were given either 0.6-mg/kg-body weight rocuronium, or 1mg/kg body weight succinylcholine intravenously. Forty-five seconds after the administration of rocuronium, or 60 seconds after the administration of succinylcholine, the trachea was intubated and the intubating conditions were scored by blinded assessor.

Results

Intubating conditions were same between rocuronium and succinylcholine group. ($p=0.18$). The hemodynamic effect was same among the three groups.

Conclusions

The result showed that all the patients with 0.6mg/kg body weight rocuronium could be intubated within 45 seconds as well as 60 seconds; however, those intubated within 60 seconds were similar to those with 1mg/kg body weight succinylcholine.

FP6-4 USE OF COLLOIDS IN AUTOTRANSFUSION DURING ELECTIVE SURGERY

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Homologous blood transfusions are associated with significant disadvantages and risks like infections (Hepatitis, AIDS, Dengue Fever, Lues), transfusion reactions, limited availability, immune suppression and raising costs. There are basically three methods of autotransfusion: (1) Preop. Autologous blood donation (ABD) 2 weeks before elective surgery, (2) Acute preop. normovolemic hemodilution (ANH) and (3) Intraop. mechanical autotransfusion (MAT). ANH is the most simple autologous transfusion technique. ANH requires colloid plasma substitutes which after replacement of withdrawn autologous blood (1:1) maintain normovolemic conditions intra - and post-operatively over at least 4 - 8 hours. HAES-steril6% (15ml/kg bw) in 94 patients (Group I) undergoing cardiac surgery in combination with MAT vs. a control group of 90 patients (group II) receiving homologous blood transfusion. Hemoglobin dropped during ANH to 9g% and during extracorporeal circulation to 6.5g%. ANH increased cardiac output and oxygen delivery. Homologous blood consumption during the intra-op. and post-op. periods was significantly reduced in the ANH group patients (2.72 units) as compared with the control group patients (9.00 units). The consumption of homologous blood derivatives (PRC, FFP, Fresh blood) in the ANH group was significantly reduced by 71%. The net saving of costs per ANH patient amounted to 298 US Dollars. Wang et. Al. Performed another clinical trial in cardiac surgery with HAES-steril 6% and HAES-steril 10% vs a control group which was treated with homologous blood transfusions. 500ml autologous blood was replaced during anaesthesia by

500ml HAES-steril 6% or HAES-steril 10% in group I and group II patients just before sternotomy. A second 500ml unit of HAES-steril 6% or HAES-steril 10% was infused into the heart lung machine as priming solution. Immediately after the operation the autologous blood was retransfused. A third 500ml unit of HAES-steril 6% or 10% was infused in the ICU as a plasmaexpander. Significant improvement in cardiac output with decrease in hemotocrit, plasmaviscosity and systemic vascular resistance was noted after these colloid infusions due to their haemodilution effects. HAES-steril 6% increased cardiac index (CI) from 2.48 to 3.69 (L/min, m²) (49%) and HAES-steril 10% from 2.24 to 3.19 (L/min, m²) (42%). Systemic vascular resistance dropped by 21% in both ANH groups. Patients of both groups treated with HAES-steril 6% and 10% did not require any transfusions of homologous blood components and did not show abnormal coagulation parameters or increased postop. Bleeding. Patients of the control group III required significant amounts of homologous blood derivatives (3 units RBC, 5 units FFP, 5 units platelets). Further prospective randomized clinical trials with HAES-steril have been performed in patients undergoing ANH in cardiac surgery (Boldt 1990) in abdominal aortic surgery (Baron 1991), in orthopaedic surgery (Von Bormann 1990), (Van der Linden 1994), (Mielke 1997), Fassmann 1994), in liver surgery (Von Bormann 1986), in plastic surgery (Steege 1990) and in gynecology (Oberhauser 1996). HAES-steril 6% and HAES-steril 10% thus represent colloidal plasmasubstitutes useful to perform ANH in elective surgery effectively and safely. HAES-steril allows to stabilize normovolemic conditions, hemodynamics and oxygen transport reduce the risks, the amount and the costs of homologous blood transfusions significantly.

FP6-5 ISOVOLAEMIC HAEMODILUTION

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Introduction

Delivering oxygen to the tissues is the primary physiological duty of the anaesthesiologist. The estimation of intraoperative blood loss is notoriously inaccurate. During surgery, blood loss are continuously replaced with non-hematological fluids. The haemoglobin loss gradually declines. The oxygenation of blood and its delivery are the central goal. Allogenic blood is expensive and not always available. Red blood cell dilution is a viable option.

Objective

To minimize perioperative blood loss and avoid allogenic blood transfusion.

Methods

The volume of the blood lost during surgery is not altered but the number of red blood cells lost is reduced. Blood is collected from the patients just prior to surgery as to decrease the haematocrit to 25%. This blood is later retransfused as autologous blood. Normovolaemia is restored with crystalloid and colloid solutions. Acute normovolaemic haemodilution is safer than predonation and if the blood is returned within six hours, platelets retain their function.

Results

Isovolaemic haemodilution shows significant improvement of haemoglobin and haematocrit concentration in the immediate postoperative period compared to the usual situation with the same volume of blood loss.

Conclusions

Allogenic blood transfusion remains lifesaving when used appropriately in combination with proper monitoring of the patient status.

FP7-1 FRESH GAS FLOW AND SEVOTEC 5 VAPORISER

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Introduction

Currently, cost saving is a big issue. To reduce the consumption of sevoflurane, we reduced the fresh gas flow from 6 to 3 l/min. However, it was felt that with the lower fresh gas flow, induction by mask was somewhat delayed.

Objective

To investigate the effect of fresh gas flow on output of sevoflurane from the vaporiser.

Methods

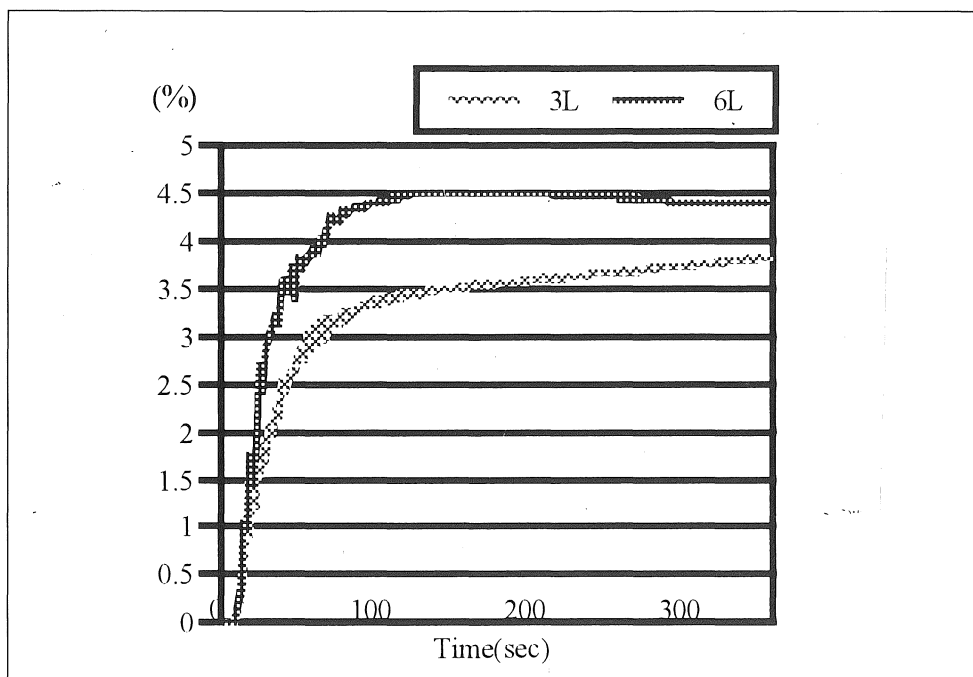
Paediatric disposable circuit, with a test lung, was connected to Ohmeda Excel 210 anaesthesia machine on which Sevotec 5 (Ohmeda) was mounted. An agent monitor (HP M1026A) measured the concentration of sevoflurane and data were stored in the computer via Mac Monitor (Phyio-Tech, Tokyo, Japan). Ventilator was set for pressure-cycle mode (f, 15cpm, peak inspiratory pressure, 20cm H₂O). With fresh gas flow (N₂O:O₂=2:1) of 3 or 6 l/min, vaporiser was switched on 5% and concentration of sevoflurane was recorded every 2 seconds for 3 minutes. Measurements were repeated alternatively for 8 times for each fresh gas flow.

Results

The mean concentrations of sevoflurane are shown in the figure. The concentration was higher in the gas flow of 6 l/min at 60, 130, 360sec (Student's t test, $p < 0.0001$). With the fresh gas flow of 6 l/min the concentration reached over 4.0% in 70sec but with 3 l/min the concentration never reached to 4.0% in the study period.

Conclusions

Sevotec 5 vaporises sevoflurane more effectively with fresh gas flow of 6 l/min than with gas flow of 3 l/min.



FP7-2 THE INTUBATING LARYNGEAL MASK AIRWAY (ILMA): BLIND TRACHEAL INTUBATION IN CARDIOSURGICAL PATIENTS WITH DIFFICULT AIRWAYS

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Introduction

The intubating laryngeal mask airway is a new airway device designed to have better intubation characteristics than the laryngeal mask airway. The principal new features are a short, anatomically curved, rigid airway tube with an integral guiding handle, an epiglottic elevator bar replacing the mask aperture bars and a guiding ramp built into the floor of the mask aperture. Blind intubation via the ILMA was 92 - 98% of normal patients. Cardiosurgical patients especially require a haemodynamically stable patients, also under complex laryngoscopy as in difficult airway.

Methods

Use of ILMA for ventilation and blind tracheal intubation in 4 cardiosurgical patients with suspected or unanticipated difficult intubation. Anaesthesia was induced with intravenous midazolam, sufentanil and suxamethonium or pancuronium. A size 4 ILMA was inserted in a single attempt in all patients within 10s with the head in a neutral position. When ventilation was adequate, blind tracheal intubation was performed with a straight silicon reinforced endotracheal tube (Euromedical Malaysia) size 8.0 internal diameter, easily with no manipulation of the ETT or ILMA required.

Results

| Patient | ASA | NHYA class | Airway Assessment | | | |
|---------|-----|------------|-------------------|---------------------------|-----------------------|----------------------|
| | | | Mallampati class | Thyromental distance (cm) | Interincisor gap (cm) | Lehane Cormack grade |
| 1 | IV | II | IV | <6 | >4 | 3 |
| 2* | III | II | III | <6 | >4 | 3 |
| 3* | III | III | III | <6 | >4 | 3 |
| 4 | IV | III | III | <6 | >4 | 4 |

unanticipated difficult intubation

The time for tracheal intubation, from disconnection of the ILMA from the breathing system to confirmation of tracheal intubation by capnogram and chest movement was less than 30s. Peripheral oxygen saturation was continuously monitored with a pulse oximeter and stayed above 97%. The directly measured arterial blood pressure changed by 15%, the heart rate did not. After successful tracheal intubation, the ILMA was removed and the tracheal tube left in place.

Conclusions

The ILMA has a potential role for establishing an airway for blind intracheal intubation in adult cardiosurgical patients with difficult airways.

FP7-3 A CLINICAL TRIAL ON ACCURACY OF CENTRAL VENOUS CATHETER PLACEMENT

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Objective

To test the accuracy of placement of central venous catheters using Electro Cardiographic Monitoring via a guide wire.

Methods

In a sample of 82 patients undergoing open heart surgery, triple lumen central venous catheters were placed in 40 patients with ECG guide wire monitoring technique while the balance 42 patients had the catheters placed without guide wire ECG monitoring. In the group using the ECG guide wire method, the right thoracic lead was connected to a universal adapter with a switching function prior to cannulation. A marking on the guide wire enables the tip of the catheter to exactly line up with a crocodile clamp and lead, and the universal adapter switched on to the 'monitoring via wire' mode. A decrease, in the exaggerated amplitude p wave was taken as the extra atrial position. The catheter was then withdrawn 2 - 3cm and secured. All patients had post operative chest x-rays and the catheter tip position was recorded.

Results

Of the 40 patients with guide wire monitoring, 100% had the catheter placed correctly. Of the 42 patients without guide wire monitoring, 5 patients (12%) had the catheter incorrectly positioned.

Conclusions

Central venous catheter placement using ECG guide wire monitoring is extremely accurate and does not require subsequent adjustments.

FP7-4 MINIMAL FLOW ANAESTHESIA USING A FRESH GAS FLOW OF 300 ML PER MINUTE

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The purpose of this study was to investigate the safety of minimal flow anaesthesia using a semi-closed circle system on MIE anaesthesia Machines (Falcon). 15 adults, body weight of less than 80 kg, with no cardiorespiratory abnormalities who requires general anaesthesia for at least 1 hour were included in the study. After initial 15 minutes of denitrogenation with a fresh gas flow (FGF) of 6l/min (O₂ 2l/min and N₂O 4l/min), the FGF was reduced to O₂ 300ml/min. The changes in the composition of the inspired gas were recorded every 15 minutes and the unmeasured gas fraction was calculated. The anaesthetic circuit was flushed for 1 minute with a FGF of 6l/min (O₂ 2l/min and N₂O 4l/min) at the end of every hour to prevent accumulation of unmeasured gases. No hypoxic gas mixture or carbon dioxide (CO₂) accumulation was observed. The inspiratory O₂ fraction was noted to increase with the reduction of N₂O fraction as anaesthesia progressed. There was also a progressive increase in the unmeasured gas fraction. Increment of isoflurane fraction was needed to maintain the anaesthetic depth. In conclusion, minimal flow anaesthesia using O₂ 300ml/min can be safely performed with a semi-closed circle system on MIE anaesthesia machine. Intermittent purging of anaesthetic circuit at regular intervals is important in preventing accumulation of unmeasured gases and restoring initial inspired O₂, N₂O ratio.

FP7-5 THE EFFECT OF LARYNGEAL MASK CUFF PRESSURE ON POSTOPERATIVE SORE THROAT

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The effect of laryngeal mask cuff pressure on postoperative sore throat incidence was prospectively studied on 63 patients with ASA I and II undergoing elective surgery requiring a spontaneous ventilation anaesthesia technique. A cuff pressure measurement device was used to measure the cuff pressure at 2, 10, 20, 30, 45, 60 and 90 minutes after insertion of laryngeal mask. Patients were divided into two groups. In Group 1 (n=32) the cuff pressure was not adjusted during anaesthesia. In Group 2 (n=31), the cuff pressure was adjusted and maintained at 2cm H₂O. The cuff pressure significantly increase with time in Group (1) The differences in the cuff pressure between Group 1 and Group 2 were statistically significance at all times. Five out of thirty two patients (15.6%) complained of sore throat in Group 1 and one out of thirty one patients (3.2%) in Group (2) All patients complained of mild sore throat which resolved spontaneously within 24 hours. However there was no statistical significance in the incidence of post-operative sore throat in both groups.

FP7-6 ENDOTRACHEAL TUBE CUFF IS RESPONSIBLE FOR TRACHEAL LESIONS IN ANAESTHETIZED PATIENTS

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Introduction

The pressure in air filled cuffs increases steadily throughout general anesthesia mainly because nitrous oxide diffuses from anesthetic gas-mixture into the cuff. Cuff hyperpressure is responsible of local ischaemia, that may induce tracheal mucosal injury. The purpose of this study was to assess post-anesthesia tracheal lesions by fiberoptic while varying the cuff pressure.

Methods

Sixty-five patients undergoing general anesthesia with tracheal intubation (Mallinckrodt standard tube) exceeding 1h of duration were randomized in 2 groups. Endotracheal tube cuff was inflated to 30 - 40cm H₂O to have an effective seal with air in group 1 (n=33) and with gas-mixture (N₂O 50% in oxygen) in group 2 (n=32). Intracuff pressure was monitored continuously. At the time of extubation, a fiberoptic on the endotracheal tube was performed by an independent observer. Aspects of trachea at the level of cuff contact area were scored 0:normal; (1) mucosal erythema or edema; (2) mucosal erosion or hemorrhage; (3) mucosal erosion or hemorrhage on both anterior and posterior tracheal wall. Statistical analysis was performed using ANOVA, Chi-square and Spearman's rho test.

Results

Cuff pressure increased throughout the procedure ($p < 0.01$) in group 1, while it remained relatively stable in group 2. In group 1 the tracheal lesions in the area of cuff were more frequent than in group 2 (79% versus 37%, $p < 0.001$). Tracheal injury was correlated to cuff pressure ($r = 0.62$, $p < 0.001$). No post-operative respiratory complication was observed in any patients.

Conclusions

Mucosal tracheal injury was seen very often by fiberoptic in anesthetized patients, whose the intracuff pressure was not controlled. Inflation of cuff with gas mixture (N₂O 50% in oxygen) pressure could prevent intracuff hyperpressure during the anesthesia and minimize significantly the tracheal injury.

FP7-7 COMPARISON BETWEEN ULTRASOUND-GUIDED CANNULATION OF THE INTERNAL JUGULAR VEIN VERSUS CONVENTIONAL TECHNIQUE

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Introduction

It is already recognised that ultrasound-guided cannulation of the internal jugular vein (IJV) offers a greater success rate and a lower complication rate. With the availability of the 3.5MHz transthoracic probe (Vingmed CFM 800) in our operating room, we decided to look at the number of punctures requires to successfully double-cannulate the right IJV.

Methods

108 patients undergoing open heart surgeries were chosen. In the ultrasound group, the probe is placed perpendicularly to the skin and moved medially/laterally until the view on the monitor gives a centrally placed IJV before the overlying skin is carefully marked. At a different level of the neck a similar approach is done, allowing a line joining the marked spots to be drawn. After cleaning and draping, the seeking or cannulating needle is then directed along this line. In the conventional group, the apex of the triangle between the two heads of the sternomastoid muscle is used with the needle directed towards the ipsilateral nipple. Occasionally, the carotid artery pulsation is felt and the needle inserted just lateral to it. In both groups, the patients are places about 150 head-down and looking to the left. A seeking puncture is performed first with a 23G needle. The total number of punctures required to successfully double-cannulate the right IJV is recorded. The frequency of carotid artery (CA) puncture is similarly recorded.

Results

No significant difference between the 2 groups in terms of age, weight and height were noted.

| Group | Ultrasound | Conventional |
|------------------|------------|--------------|
| n | 30 | 78 |
| Age (years) | 56 ± 9 | 55 ± 10 |
| Total punctures* | | |
| 3 | 22 (73.3%) | 47 (60.3%) |
| 4 | 5 (16.7%) | 10 (12.8%) |
| 5 | 2 (6.7%) | 4 (5.1%) |
| 6 | 0 | 9 (11.5%) |
| 7 | 1 (3.3%) | 8 (10.3%) |
| CA puncture | 0 | 5 (6.4%) |

Values are mean ± SD or n. (P < 0.05 bet. The 2 grps (Mann-Whitney)

It can be seen that the use of the ultrasound helped to reduce the number of punctures required to successfully double-cannulate the right IJV. The rate of CA puncture is similarly lowered. By aligning the direction of the needle puncture along and above the direction of the IJV, and not towards the ipsilateral nipple, this helps to increase the success rate of the procedure.

FP8-1 HEAMODYNAMIC AND ENDOCRINE RESPONSES TO CGRP DURING SEVOFLURANE ANAESTHESIA

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Objective

Calcitonin gene-related peptide (CGRP) produces vasodilation, hypotension and tachycardia. Tachycardia induced by CGRP may be due to sympathetic activation. Volatile anesthetics attenuate activation of arterial baroreflexes. We examined the hemodynamic and endocrine effects of CGRP during sevoflurane anesthesia.

Methods

Seven dogs were anesthetized with sevoflurane in oxygen (1.0 minimum alveolar concentration) and ventilated to maintain normocapnia. CGRP was infused at constant rate of 4 ($\mu\text{g kg}^{-1}$) to each animal. They were instrumented to measure and calculate the hemodynamic and endocrine variables. Measurements of hemodynamic variables and assay for plasma catecholamines were made before, during and after CGRP infusion. Data were analysed by ANOVA followed by Dunnett's test. $P < 0.05$ considered significant.

Results

The decrease ($p < 0.01$) in mean arterial pressure induced by CGRP infusion was due to a reduction ($p < 0.01$) in cardiac index, but was not accompanied by a change in heart rate. No changes in right atrial and mean pulmonary artery pressures were observed. Plasma norepinephrine, but epinephrine, increased ($p < 0.01$) during CGRP infusion.

Conclusions

These results suggest that CGRP may be a useful vasodilator agent during sevoflurane anesthesia and the alteration in heart rate may be partially due to the roles of catecholamine responses from the anesthetic-induced sympathetic suppression.

FP8-2 EFFECTS OF DIFFERENT INTENSITIES OF FORMALIN ON BEHAVIOURAL RESPONSE AND PAW EDEMA IN RAT MODEL

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Introduction

The formalin test is increasingly used as a model of injury-produced inflammatory pain response. There were some reports of formalin test with various volumes and concentrations of formalin. They used formalin of different concentration with same volume. If the total amount of formalin is fixed, the concentration and volume will be adjusted. We would like to evaluate the effect of three solutions of formalin (2.5% 100ul, 5% 50ul 10% 25ul) on the behavioural response and paw edema.

Methods

Male Sprague-Dawley rats (weighing 225 - 250g) were used. Formalin (2.5% 100ul, 5% 50ul 10% 25ul) was made with commercially available formalin further diluted in isotonic saline. Formalin was injected in the right plantar surface subcutaneously with a 26G needle. Following injection, a nociceptive score was determined for each 5 minutes time block by measuring the sum of nociceptive behaviour. Nociceptive behaviour was quantified by counting the number of flinch or duration of lick. One observer who did not know the type of the group assessed formalin-induced nociceptive behaviour. The data was recorded for the phase 1 (0 - 5 minutes after formalin injection) and the phase 2 (20 - 60 minutes after formalin injection). Formalin induced edema of the injected paw and non-injected paw were assessed. Volumes of both paws were measured at 4 hours after injection.

Results

The phase 1 response of 10% was lower than others. The phase 2 response was started around 20 minutes (10%), 15 minutes (2.5%), 10 minutes (5%). The paw edema 4 hours after injection were similar in three groups.

Conclusions

Our findings indicate that formalin paw test would be carried out using concentration between 2.5 - 5%. In same condition, 2.5% 100ul would produce better response than 10% 25ul. Not only the sum of flinches but also the duration of lick was important phase 2 response.

FP8-3 OBSTRUCTIVE SLEEP APNEA PATIENTS UNDERGOING UVULOPALATOPHARYNGOPLASTY - AN AUDIT

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Introduction

Uvulopalatopharyngoplasty for treatment of Obstructive Sleep Apnea (OSA) syndrome is associated with significant preoperative risk. With the aim of reducing perioperative morbidity, our Department implemented an anaesthetic protocol and conducted an audit to evaluate its efficacy.

Methods

Preoperative assessment includes a detailed cardiorespiratory and airway assessment. We avoid sedative premedication. Severity of OSA is graded using the Apnea Hypopnea Index (AHI). If difficult intubation is suspected, we either perform awake direct laryngoscopy for further assessment or proceed to awake fiberoptic intubation. Otherwise, patients are intubated using propofol and suxamethonium. Anaesthesia is maintained with N₂O, desflurane, atracurium or vecuronium and fentanyl. In the recovery, pain and sedation scores, desaturation and other complications are documented. Patients with AHI >20 are admitted to high dependency ward.

Results

Over a 7-month period, we anaesthetised 30 OSA patients using this protocol.

| AHI | No. of patients | Age (years) | Body Mass Index | Fiberoptic Intubation | Extubation Time (min) |
|----------|-----------------|-------------|-----------------|-----------------------|-----------------------|
| 5 - <20 | 3 | 43 ± 4 | 24 ± 2 | 0 | 11.7 ± 7.6 |
| 20 - <50 | 12 | 40 ± 8 | 28 ± 6 | 1 | 6.1 ± 4.8 |
| >50 | 15 | 38 ± 8 | 30 ± 8 | 4 | 8.0 ± 5.1 |

Values are mean ± SD, (no significant difference between the 3 AHI groups)

By following protocol guidelines for intubation, all patients were successfully intubated using the initial method of choice (direct laryngoscopy or fiberoptic). The mean time from reversal to extubation was 7.6 ± 5.3 min. One patient desaturated transiently during induction (laryngoscopy) and 1 in the recovery (resolved with deep breathing). Postoperatively, 77% of patients had no or mild pain and 83% minimal or no drowsiness. Two patients required surgical haemostasis for re-bleeding and 1 had transient arrhythmias. None desaturated during overnight pulse oximetry monitoring.

Conclusions

By following a standard management protocol, we were able to intubate all OSA patients successfully, extubate them promptly with minimal perioperative complications.

FP8-4 THE STUDY OF THE FACTORS AFFECTING LENGTHS OF STAY IN ICU AND WARD IN LIVER TRANSPLANT RECIPIENTS

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Introduction

A large-scale database for liver transplantation (LTx) will reveal the many important facts. We hypothesized that even a small-scale database in one institute might give us some information and the lengths of stay in ICU or ward might represent the recipient's overall condition.

Methods

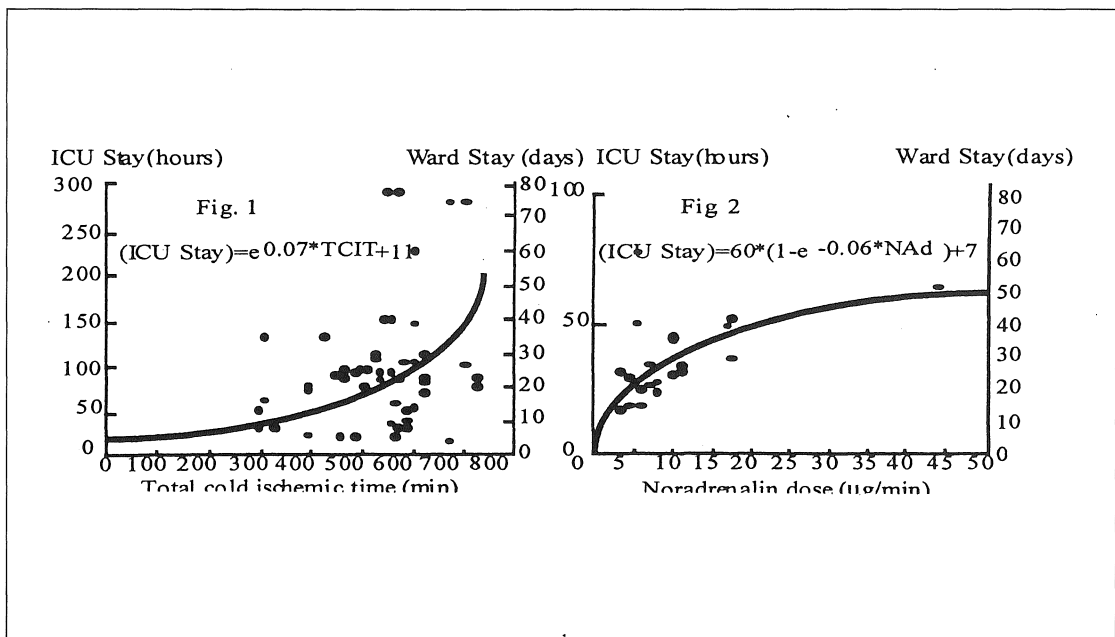
Twenty-nine case of 28 recipients who had received the LTx in Austin Hospital between 1st January 1997 and 31st December 1997 were subjected to this study. One case received LTx twice for the liver infarction of the graft and three cases were excluded due to the death. The factors that might affect the length of stay in ICU or ward were studied by using correlation coefficient and linear regression.

Results

The total cold ischaemia time (TCIT) was significantly correlated with the duration of the ward staying period ($r=0.42$, $p<0.03$). And the logarithm of the ICU staying period was correlated with the TCIT ($r=0.31$, $p<0.03$) (Fig.1) The dose of noradrenaline to the donor and the duration of ICU stay were expressed in an exponential equation (Fig.2) The effect of noradrenaline was assessed from 7 to 67 hours during the ICU stay.

Conclusions

A small-scale database of liver transplantation will give us a new prospective study design and a new clinical protocol, if the recipient's condition to discharge will be established in one institute.



FP8-5 THE EFFECTS OF THE MODERATE DOSE OF FENTANYL TO THE BISPECTRAL INDEX (BIS) DURING INDUCTION

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Introduction

EEG analysis proved to be useful in monitoring depth of opioid anesthesia in various kinds of work. The aim of this study is to investigate the sedative effects of fentanyl on BIS and also spectral edge frequency (SEF).

Methods

Thirty patients were studied. The BIS and SEF were measured during experiments. The bolus injection of fentanyl 15(g/kg over short periods of time (<30sec) were performed. To prevent rigidity caused by fentanyl the intubating dose of vecuronium (0.1mg/kg) infused concomitantly with fentanyl. The patients were ventilated by mask for 10 minutes. All patients were interviewed on the post-operative 24 - 48hr and asked whether they could recall anything about the induction.

Results

Anesthesia was uneventful for 30 patients. No patient had recall of induction phase. Following administration of the fentanyl, BIS and SEF decreased rapidly and the decrease was statistically significant at 2 minutes (BIS) and 3 minutes (SEF) after induction. The lowest value of the BIS after induction was 26 ± 6.5 . The duration to hit the bottom is 3.4 ± 0.9 minutes.

Conclusions

From this study it is suggested that BIS could be the hypnotic monitor of the fentanyl anesthesia.

FP8-6 EFFECT OF SEVOFLURANE AND ISOFLURANE ON NORADRENALINE RELEASE FROM RAT PREOPTIC AREA

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Introduction

Preoptic area (POA) of the anterior hypothalamus has been thought to be a site of various physiological responses such as sleep, reproduction, thermoregulation and stress response. This study is aimed to investigate the effect of sevoflurane and isoflurane on noradrenaline release from the POA in rats according to microdialysis method.

Methods

The effect of isoflurane and sevoflurane on noradrenaline (NA) release in the POA was studied in male Wister rats by a microdialysis method coupled to HPLC. Sixteen rats were used for a microdialysis. Dialysates were collected at 10min intervals. After obtaining five control samples for 50min, 3% sevoflurane or 1.8% isoflurane in air was given for 30min. After the end of inhalation five more samples were taken for 50min of the recovery period.

Results

We demonstrated that sevoflurane and isoflurane anesthesia cause a marked increase in noradrenaline release from rat POA (sevoflurane 233% at 20min, isoflurane 357% at 10 min after induction). The noted NA release was also observed during the emergence from sevoflurane and isoflurane anesthesia (sevoflurane 269% at 20 min, isoflurane 368% at 10min in emergence period).

Conclusions

These elevations of NA would be a stress response to sevoflurane and isoflurane anesthesia and also related to the emergence from these anesthetics.

FP8-7 PREDICTED EFFECT COMPARTMENT CONCENTRATION OF THIOPENTONE AT LOSS OF THE EYELASH REFLEX

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Introduction

The aim of this study is to determine the effect compartment concentration of thiopentone at induction of anaesthesia.

Methods

22 patients, ASA I - II, participated in the study. Patients in Group I did not receive any premedication or fentanyl pre-induction. Patients in Group II, who have known CVS disorders, received midazolam 3.75mg as premedication and fentanyl 100 (g pre-induction. Patients were given either a bolus dose of 3 - 4mgkg⁻¹, or 50mg boluses of thiopentone every 15sec until loss of eyelash reflex was noted. The effect compartment concentration was simulated using the pharmacokinetic model reported by Stanski and Maitre.

Results

In Group I, mean concentration at loss of eyelash reflex was not significantly different between patients given a single dose (10.34 (gml⁻¹) and patients given multiple boluses (12.01 (gml⁻¹). In Group II, the corresponding values were 6.97 and 6.52 (gml⁻¹.

Conclusions

Predicted effect compartment concentration of thiopentone at induction is the same regardless of whether it is given in a single bolus or multiple boluses.

FP9-1 ANAESTHESIA FOR AWAKE CRANIOTOMY - A METHOD OF CHOICE FOR BOTH GOOD CONTROL OF THE TIMING AND QUALITY OF AROUSAL

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Introduction

Propofol anaesthesia is one of the novel methods for awake craniotomy. We used the combination of premedicated oral midazolam and continuous infusion of propofol that may act synergistically and may cause reduction in propofol consumption leading to quick recovery from anaesthesia for awake craniotomy.

Methods

Nine patients (2 females, 7 males) underwent removal of malignant glioma of the frontal operculum were premedicated with midazolam 0.2mg/kg orally one hour prior to the operation. The arterial blood pressure (AP), ECG, SpO₂ and ETCO₂ were monitored. Anaesthesia was induced with fentanyl 3 (g/kg and propofol 2 - 3mg/kg followed by reinforced laryngeal mask airway (RLMA) was inserted. Anaesthesia was maintained with propofol, nitrous oxide in oxygen and intermittent fentanyl. The patients were allowed to breathe spontaneously. After the infiltration of bupivacaine to the scalp and appropriate positioning of the patient, operation was started. Propofol and nitrous oxide were discontinued just after the craniotomy was completed. RLMA was removed after confirmation that the patient is fully awake. Flumazenil 0.25 - 0.5mg was administered as needed. After the tumour was resected, anaesthesia was again induced and continued as required until the end of operation.

Results

Anaesthesia was well maintained with the use of propofol 6.6+1.5mg/kg/h before arousal. The time from cessation of propofol until the patient responded to command was 5.2+1.2min. Flumazenil was used in 4 patients. The duration of arousal was 52.5+15.6min. No patient awoke violently and could recall anything unpleasant. Recovery from anaesthesia took 7.4+1.2min.

Discussion

We conclude that the combination of premedicated oral midazolam and continuous infusion of propofol is a novel method for awake craniotomy as it provides good control of both the timing and quality of arousal.

FP9-2 A CASE OF INCARCERATION OF A GIANT LARYNGOPOLYP INTO GLOTTIS DURING INDUCTION OF ANAESTHESIA

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We experienced a case of incarceration of a giant laryngopolyp into glottis during induction of anesthesia.

Case Report

A 51 yr old female was scheduled for resection of a giant laryngopolyp. Difficult airway was predicted, so we intended to intubate with keeping spontaneous respiration. When intubating Laryngeal Mask Airway (ILMA) was inserted using fentanyl and propofol, sudden airway obstruction occurred because of incarceration of the polyp. A 16G intravenous catheter was inserted into cricothyroid membrane, and High Frequency Jet Ventilation (HFJV) was instituted through the catheter. After oxygenation, a fibroscope was used to observe the polyp and glottis through the ILMA. The rima glottidis was covered with the polyp entirely, but the fibroscope could be placed into the trachea over the polyp. Then a small size endotracheal tube (5.5mm) was intubated into the trachea over the fibroscope. Anesthesia was maintained with total intravenous anesthesia (TIVA) using propofol, fentanyl and ketaral.

Conclusions

A giant laryngopolyp was incarcerated into glottis during induction of anesthesia. Combination of HFJV and TIVA was successful to deal with this case. ILMA was useful to observe the incarcerated polyp and helpful to intubate over the polyp.

FP9-3 ANAESTHESIA FOR PHAEOCHROMOCYTOMA FOR OPEN ADRENALECTOMY

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A retrospective study was carried out on patients undergoing open adrenalectomies from 1988 to 1999. Out of 95 patients, 35 patients were operated for phaeochromocytoma. The others were operated for Cushing's disease³¹, Conn's syndrome²⁶ and bilateral adrenal hyperplasia³. Phaeochromocytoma patients had symptoms and signs such as headache, palpitations, and excessive sweating and persistent hypertension. All patients were treated with anti-hypertensive drugs pre-operatively, which included labetalol. Prazosin and/or phenoxybenzamine to stabilize the blood pressure. Pethidine, promethazine and/or midazolam were used as premedication drugs. In this type of surgery, general anaesthesia combined with epidural anaesthesia for post-operative pain relief was the technique of choice for the majority of patients. Sodium nitroprusside (SNP) or nitroglycerin (GTM) and isoflurane were used during surgery to control the blood pressure. Standard monitoring equipment used were ECG, SpO₂, CVP, ET-CO₂, anaesthetic agent monitor and invasive blood pressure device. In this study, one patient had severe hypotension due to acute massive blood loss. During this episode, transient ST segment depression was observed in lead CM₅. A twelve lead ECG postoperatively showed ST segment elevation in leads V₂ and V₃ with deep Q waves in V₁, V₂ and V₃. Two other patients had profound hypotension following induction of anaesthesia and required adrenaline infusions during intra- and post-operative period.

FP9-4 COMPARISON OF SPONTANEOUS WITH CONTROLLED MODE OF VENTILATION IN PATIENTS UNDERGOING TONSILLECTOMY

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This study compares spontaneous versus controlled ventilation in 60 ASA I and II patients undergoing tonsillectomy as regards haemodynamic stability, recovery characteristics, intra and immediate postoperative complications and surgical impressions. The spontaneous ventilation group (S) received thiopentone/suxamethonium/nitrous oxide/oxygen and isoflurane 1% anaesthesia. Pethidine 0.8mg/kg was used for narcosis in both groups. The patients in the B group showed lesser haemodynamic variability compared to baseline after endotracheal intubation, mouth gag application and removal and incision. 2 patients had dysrhythmias in the B group compared to 6 in the S group. 6 patients in S group had a rise in end-tidal carbon dioxide concentration above 60mmHg. Recovery scores were higher in the B group at 10 and 20 minutes into recovery.

The surgical impression of bleeding and jaw relaxation was similar with both groups. The incidence of postoperative nausea and vomiting and agitation was higher in S group but did not achieve statistical significance.

In conclusion, use of balanced anaesthesia with the above technique offered more haemodynamic stability and a rapid recovery.

FP9-5 COST MINIMISATION OF HALOTHANE WITH LOW-FLOW CLOSED SYSTEM

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Objective

To minimization the cost of halothane when used in low-flow closed system compared to high-flow semiclosed system.

Design

Randomized open-trial; cost minimization analysis.

Setting

Inpatient underwent elective surgery at Dr Sardjito General Hospital.

Participant

20 adults male and female patients, age between 18 - 60 year, with body mass index less than 30, and physical status ASA I - II.

Intervention

All patients anaesthetized in the same procedure, but differ in the anesthesia technique in which one group for low-flow closed system, while the other group for high-flow semi-closed system.

Main Outcome Measure

The amount of halothane used during anesthesia per-unit of time (hour) and then calculated the cost.

Results

The low-flow closed system group consumed 8.784 (0.91 (SD) ml halothane in an hour, while high-flow semiclosed system 18.517 (2.24 (SD) ml. The difference of halothane consumed is statistically significant ($p=0.004$) and 52.652% reduced in low-flow closed system. The cost of halothane in low-flow closed system is Rp 9.400 per-hour, while high-flow system is Rp. 21.500 per-hour according local prize value. When research was done exchange rate of US\$1=Rp2.560.

Conclusions

There is statistically reduction ($p=0.004$), clinically reduction (52.562%) and cost minimization (Rp. 12.100/per-hour) when halothane used in low-flow technique compared to high-flow technique.

FP9-6 ANAESTHESIA FOR ENDOSCOPIC THIRD VENTRICULOSTOMY: A HAEMODYNAMIC STUDY

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Endoscopic third ventriculostomy is one of the recent neurosurgical advances for treatment of hydrocephalus. The indications for third ventriculostomy are relatively clear: non-communicating hydrocephalus with dilated third ventricle and potentially patent subarachnoid space with sufficient arachnoid reabsorption¹. The autonomic changes under anaesthesia are of great concern to the anesthetists. However, in the literature the anaesthetic considerations of endoscopic third ventriculostomy are not documented. We are presenting our clinical experience with this fairly new surgical procedure. Forty-nine pediatric patients of both sexes (34 males) who underwent third ventriculostomy under general anaesthesia were studied. Their age range between 1 month to 12 years. Their body weight range between 2.4 to 22kg. Regarding ASA classification, 25 patients were II, 20 patients III and 4 patients were IV. The indication for surgery for all patients was obstructive hydrocephalus. Thirty six patients were operated electively and the rest were emergency. Premedication consisted of vallergran⁷, phenobarbitone², atropine (4), valium (2) and 34 patients received no premedication. The range of their preoperative heart rate was 86 - 214b/m. Induction of anaesthesia was inhalational in 22 and I.V in 27 patients. During the procedure the range of the lowest heart rate reading was between 35 - 150b/m. In 14 patients the third ventricle pressure was measured. The duration of surgery ranged between 15 -50min. Six patients were kept ventilated in the PICU postoperatively and the rest were extubated. Three patients had intraventricular hemorrhage during surgery and were resuscitated. One patient developed convulsions during in the recovery room where he was intubated and resuscitated and later extubated. Two patients expired one month after surgery due to chest infection. The details of the anaesthetic management and discussion will be given during the presentation.

YIA-1 EFFECT OF ROCURONIUM AS COMPARED TO SUCCINYLCHOLINE ON INTRAOCULAR PRESSURE DURING RAPID SEQUENCE INDUCTION OF ANAESTHESIA

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Suxamethonium remains unsurpassed in providing ideal intubation. However raised intraocular pressure following suxamethonium remains one of its undesirable effects especially in open eye injury. Rocuronium is a non-depolarising neuromuscular blocking drug which provides a rapid onset of action with an intermediate duration. In this prospective double blind, randomized study we compared the intraocular effect of rocuronium with that of succinylcholine during rapid sequence induction of anesthesia using propofol and fentanyl. We studied 30 ASA 1 patients, aged 18 - 50 years who required tracheal intubation as part of the anesthetic technique for elective non ophthalmic surgery. They were allocated to two groups. S group patients received 1.5mg/kg suxamethonium and R group patients received rocuronium 0.9mg/kg. All were premedicated with midazolam 0.15mg/kg orally 2 hours prior to induction. After preoxygenation for three minutes, anesthesia was induced with fentanyl 2mcg/kg and a sleep dose of propofol injected at a rate of 200mg/min until the loss of verbal response. This was followed immediately by either succinylcholine or rocuronium diluted in 10ml 0.9% sodium chloride. Laryngoscopy and intubation was performed 1 minute after suxamethonium. Intraocular pressure (IOP), mean arterial pressure and heart rate were measured at the following intervals:

before induction, 1 minute after succinylcholine or rocuronium and every minutes after intubation for 5 minutes. Intubation condition was graded with a simple scoring system. In the suxamethonium group, intraocular pressure rose significantly after induction. Tracheal intubation caused a further increase. In the rocuronium group there was an initial decrease in IOP. Although intubation caused an increase in IOP as compared to the postinduction value, it remained below baseline value throughout the induction sequence. The difference in the changes in IOP between succinylcholine and rocuronium was highly significant. Intubation conditions were equally good in both groups. In conclusion, the results of this study confirmed that rocuronium did not cause a rise in IOP and that it provided good to excellent intubating conditions at 60s after its administration.

YIA-2 CLINICAL EVALUATION OF RSD921 AS A LOCAL ANAESTHETIC IN PATIENTS UNDERGOING VENOUS CANNULATION FOR ELECTIVE TREATMENT

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RSD921, a sodium channel blocker, developed jointly by Nortran Pharmaceuticals and CCM Pharma, is undergoing development as a novel local anaesthetic agent. We have conducted a randomised, double blind, controlled Phase II clinical trial to compare the effects of injecting saline, RSD921 (0.15% and 0.25%) and lidocaine (0.6% and 1.0%) in 60 male patients undergoing elective treatments. After informed consent, a skin wheal was raised on the dorsum of the hand of each patient by injecting 0.1ml of the test solution intradermally followed by 0.1ml subcutaneously with a 27-gauge hypodermic needle. The patient's pain experience was rated using a visual analogue scale. Skin colour changes were also visually evaluated at timed intervals and recorded as nil, pink (local redness) or pale (local blanching). When compared with saline; 0.15% RSD921, 0.25% RSD921 and 0.6% lidocaine reduced the pain associated with cannulation ($P < 0.05$). The reduction of pain between saline and 1% lidocaine was statistically not different. No statistical differences were evident between RSD921 and lidocaine at all concentrations in terms of pain reduction. There were no differences between drug and saline treatments in terms of ecchymoses, erythema, blanching, inflammation, swelling, necrosis or neuritis either early after injection or at the follow-up visit. In conclusion RSD921 is as effective at a concentration four times lower than that of lidocaine in alleviating pain associated with venous cannulation of the dorsum of the hand.

YIA-3 THE MORPHINE SPARING EFFECT OF KETOPROFEN AFTER ABDOMINAL SURGERY

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In a double-blind, placebo-controlled clinical trial (power of 80% to detect a 30% reduction in morphine consumption, $p < 0.05$), we have determined that the administration of two doses of intravenous ketoprofen 100mg, one at the end of surgery and the second 12 hours postoperatively, was associated with a significant reduction in morphine consumption at 4, 8, 12 and 24 hours postoperatively, as compared to placebo, when assessed by patient-controlled analgesia. There was no difference between the groups in pain scores or in the incidence of nausea and vomiting. One patient in the placebo group suffered from excessive sedation while one patient from the ketoprofen group suffered from transient oliguric renal failure. There were no other adverse effects. In conclusion, the results of this study show that ketoprofen does provide a morphine sparing effect in the management of postoperative pain after abdominal surgery.

YIA-4 THE EFFICACY OF NICARDIPINE IN COMPARISON WITH ALFENTANIL AND ESMOLOL IN OBTUNDING THE HAEMODYNAMIC RESPONSE TO RAPID TRACHEAL INTUBATION

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Objective

The efficacy of i.v. nicardipine to obtund the haemodynamic response to rapid tracheal intubation was compared with alfentanil and esmolol in a randomised double-blind controlled trial.

Methods

One hundred and twenty patients ASA physical Status I and aged between 18 and 55 years, who underwent elective surgery, were prospectively studied. The patients were randomly allocated to receive either i.v. alfentanil 20 µg/kg, i.v. esmolol 1 µg/kg, i.v. nicardipine 20 µg/kg, or saline as control. One minute after the test drug, anaesthesia was induced with i.v. thiopentone titrated to loss of eyelash reflex while rapid tracheal intubation was facilitated with i.v. suxamethonium 1.5mg/kg. Blood pressure and heart rate were recorded non-invasively at baseline, one minute after test drug, after induction of anaesthesia, immediately after intubation, and every minute for four minutes after intubation. Anaesthesia was maintained with 66.7% nitrous oxide in oxygen and no volatile or intravenous anaesthetic agents were administered until the full series of haemodynamic variables were recorded.

Results

The groups were similar in age and weight distribution but there were more men than women in the nicardipine group ($p=0.032$). Baseline blood pressure and heart rate were similar for all groups. Statistically significant reduction in diastolic blood pressure ($p<0.019$) and an increase in heart rate ($p<0.03$) were seen one minute after administration of nicardipine when compared to the other 3 groups. Throughout the study period, heart rates remained significantly higher after nicardipine compared to the other 3 groups ($p<0.05$). Blood pressures after intubation were also significantly higher than baseline but were similar between nicardipine, esmolol and saline groups. Blood pressures returned to baseline levels only after 2 minutes following intubation for the nicardipine, esmolol and saline groups. Only alfentanil effectively obtunded the haemodynamic response to intubation at all phases of the study.

Conclusions

Nicardipine 20mg/kg was not as effective as alfentanil 20mg/kg in obtunding the haemodynamic response to rapid tracheal intubation. Nicardipine caused an undesirable increase in heart rate after administration which persisted throughout the study.

YIA-5 CAN ROCURONIUM REPLACE SUXAMETHONIUM DURING RAPID SEQUENCE INDUCTION OF ANAESTHESIA?

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Introduction

Since the introduction of rocuronium there has been no replacement. We embarked upon this study to see if high dose rocuronium (Roc) could replace suxamethonium (Sux) to produce satisfactory intubating conditions during rapid sequence induction (RSI).

Methods

Thirty ASA I-II patients between two to ten years old scheduled for emergency or elective procedures that required RSI were randomized to receive either Sux 1.5mg/kg or Roc 1.2mg/kg. All the investigators except the one dispensing the relaxant were blinded. The person performing intubation was blinded by standing with his/her back to the patient so as not to detect fasciculations. After placement of routine monitors and establishment of intravenous access, all the patients were preoxygenated. All the patients then received 10mg/kg atropine and thiopental 5mg/kg. Subsequently, IV was flushed, relaxant rapidly administered and cricoid pressure applied. TOG, onset of apnoea and return of twitch were monitored with TOF-Guard™ monitor. Intubation was attempted exactly 30sec following relaxant administration. Intubating conditions were scored (jaw relaxation, vocal cord relaxation, cough) using a standard scale. "Excellent" or "Good" were considered adequate and "Fair" or "Poor" inadequate.

Results

A total of 30 patients were studied, 15 in each group. There were no differences in demographic parameters between the two groups. All patients had Class I airways. There was no significant difference in the intubation scores between the two groups ($p > 0.05$). There was no significant difference in the clinical onset of apnoea ($p > 0.05$). There was a significant difference in the time of return of the twitch ($p < 0.001$). All patients were easily reversed at the end of the procedure.

Conclusions

We conclude that Roc, at a dose of 1.2mg/kg when combined with 5mg/kg of thiopental for RSI provided good to excellent intubating conditions within 30sec. As expected, the recovery time for Roc is significantly longer than Sux, which may be a disadvantage for short surgical procedures.

S25-1 NEUROLOGIC COMPLICATIONS AFTER REGIONAL ANAESTHESIA

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Neurological complications of regional anaesthesia are rare, but the user must be constantly aware of the possibility that they may occur. The nervous system is particularly sensitive to damage by adverse factors and has little capacity for regeneration. Thus an approach that aims to prevent them is essential. There is a good argument that all trainees should be taught the complications of regional techniques before any other aspect because awareness of the possibilities will engender an approach that avoids them. Direct physical or chemical trauma, the introduction of infection, ischaemia caused by local (thrombosis, vasoconstrictors or compression by haematoma or abscess) or systemic (severe hypotension or respiratory problems) factors, and prolonged leakage of CSF through dural puncture holes can all lead to nerve damage. Careful pre-operative assessment, a gentle injection technique, an obsessive approach to asepsis and the avoidance of injection errors, plus careful intra-operative management are all essential if these problems are to be avoided. Only if major sequelae are avoided can the potential benefits of regional methods be translated into risk/benefit advantage.

S25-2 HEMOSTATIC ABNORMALITIES, ANTI-COAGULATION AND REGIONAL ANAESTHESIA

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The use of regional anaesthesia in patients with coagulation abnormalities has been an issue of great debate. Out of the multitude of bleeding disorders, the most commonly encountered in clinical practice is the use of anticoagulants. The present review deals with the mechanism of action of various anticoagulants (unfractionated heparin, low molecular weight heparin, oral anticoagulants and anti-platelet drugs) and implications of their use along with central neural blockade. The factors responsible for the most dreaded, though rare, complication of central neural blockade, i.e., spinal haematoma, along with the precautions necessary to prevent it, have been discussed. The specific problems to be considered in the use of regional anaesthesia in an obstetric patient and patient on cardiopulmonary bypass have also been reviewed. Finally, we discuss recommendations to proceed with a safe regional anaesthetic technique in a patient with coagulation abnormality.

S25-3 IMPACT OF EPIDURAL ANALGESIA ON OUTCOME: THE MASTER TRIAL

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The Multicentre Australian Study of Epidural Anaesthesia ("MASTER Trial") is now the largest ever prospective randomised controlled trial investigating the influence of perioperative epidural analgesia on clinical outcomes after major surgery. The MASTER Trial selects a high risk patient population designed to detect >20% difference in major morbidity and mortality between groups, and so requires 850pts. Patients are randomised to receive either perioperative epidural with local anaesthetic and opioid, or intravenous opioid infusion. After initial financial support from ANZCA the study has been funded by the Australian NHMRC over 3 years. Currently 20 hospitals throughout Australasia and SE Asia (inc. Hong Kong & Kuala Lumpur) are participating with further recruitment of hospitals, continuing. Over 450pts had been randomised to Feb. 1999.

Interim Results

Preliminary comparison of data from 200 randomised and 117 non-randomised but eligible patients showed no significant difference in demographic characteristics or perioperative outcomes. This provides reassurance that there is no selection bias in patient recruitment and suggests the results of the trial will have high external validity and will be generalisable outside the participating institutions. Analysis of data from randomised patients has confirmed a high (58%) overall rate of at least one major endpoint among the two groups combined. This suggests that initial estimates of sample size were correct.

Interim analysis of data by an independent biostatistician at n=260 randomised pts demonstrated no significant difference in any major end points between the two groups ($p>0.01$). Recruitment continues with a further interim analysis due at n=460.

In an era of increasing emphasis on the need for an evidence base for clinical practice, the importance of the MASTER Trial is stressed both as a means of defining the place of epidural analgesia in perioperative management, and as a benchmark for the future conduct of large randomised controlled trials in anaesthesia.

S25-4 REGIONAL ANAESTHESIA/ANALGESIA IN THE CRITICALLY ILL PATIENT

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Shortly after the introduction of local anaesthetics into clinical medicine, proponents claimed that the use of regional anaesthesia improved operative outcome. However, a reduction in rare complications may not be detected in samples of healthy patients undergoing minor procedures.

In recent years, regional anaesthesia, in particular, epidural anaesthesia and post-op analgesia, has been shown to exert a favourable effect on several aspects of operative outcome—reduction of myocardial ischaemia; decreased frequency of respiratory failure, pneumonia and atelectasis; decreased incidence of deep vein thrombosis and clotting of vascular graft; increased bowel motility and less post-op ileus; shorter ICU and hospital stay in critically ill patients.

Modes of delivery and choice of epidural drugs:

1. Bolus morphine injection: simplest, but associated with a higher frequency of side effects.
2. Continuous infusions: lower frequency of nausea and pruritis was seen in large series of patients receiving continuous infusions of fentanyl and bupivacaine.
3. Patient controlled epidural analgesia: ease of administration, reduction of drug requirement and motor blockade.
4. Choice of opioids: water soluble opioids have been associated with a higher incidence of side effects, eg pruritis and nausea. There is a recent trend to employ more lipid-soluble opioids.
5. Addition of local anaesthetics: The synergistic potentiation between local anaesthetics (LA) and opioids has been demonstrated in surgical patients. LA are also critical in providing a rapid return of normal bowel function, and are associated with earlier discharge time following abdominal surgery.
6. Ropivacaine: Motor blockade is less dense and resolves faster than bupivacaine. Bupivacaine produces more cardiovascular depressant effects at lower doses and plasma concentrations than ropivacaine.
7. Clonidine: Continuous infusion of 20 - 30 (g /hr enhances the action of both LA and opioids.

Limitations of regional anaesthesia/analgesia in the critically ill:

Regional blocks are time-consuming, difficult to perform, and contra-indicated in patients with a coagulopathy or receiving anti-coagulants. Epidural catheter may become infected. Local anaesthetic with low therapeutic/toxic ratio may accumulate easily, particularly in patients with renal or hepatic failure. Critically ill patients with sepsis and hypovolaemia may not tolerate regional anaesthesia well.

The advantages in improved outcome in the area of cardiovascular physiology, pulmonary physiology, coagulation, return of bowel function, and hospital discharge all seem to favour the utilisation of aggressive pain management, particularly in the form of epidural opioid/opioid and LA infusions for thoracotomy and upper abdominal procedures in the critically ill.

S26-1 CURRENT CONCEPTS AND CONTROVERSIES IN THE MANAGEMENT OF HEAD TRAUMA

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Pathophysiology of Head Injury

The cause of secondary injury is cerebral ischaemia. Contributing factors include hypotension, elevated ICP, vasospasm and excessive hyperventilation.

Intracranial Contents and ICP

The components are brain bulk (80%), blood volume (5%) and CSF (15%). A small increase in volume can be compensated by translocation of CSF, but this mechanism is limited.

Measurement of ICP

Methods include ventriculostomy catheter, epidural catheter, hollow subarachnoid bolt, and the Camino catheter.

Control of ICP

Brain bulk: Mannitol (20%) 0.25 - 1.0gm/kg and furosemide+hypertonic saline. Blood volume: Hyperventilation is effective, but it may cause cerebral ischaemia. Vasoconstrictive agents include the intravenous anesthetic agents and lidocaine. CSF volume: Halothane and enflurane may increase the CSF compartment. Hypertonic saline and mannitol may reduce the production of CSF. Mass lesions: Evacuation of epidural or subdural hematoma.

Anesthetic Management

The basic principles are (1) Optimize cerebral perfusion, (2) Avoid cerebral ischaemia and (3) Avoid increase in ICP.

Intravenous Fluid Therapy

It is important to maintain intravascular volume to prevent hypotension and to maintain CPP. Inotropes and vasopressors may be needed. Colloid vs crystalloid: Maintaining osmotic pressure is generally more important than maintaining oncotic pressure. Although colloid has been shown to be beneficial experimentally, a recent meta-analysis suggests its use in critically ill patients is associated with increased mortality. Hetastarch may aggravate coagulopathy. Pentastrach, with a lower molecular weight than hetastarch, may have less effect.

Coagulation

Incidence of coagulopathy is reported to be 19 - 24%. Hypothermia, may have cerebroprotective value, but also leads to clotting abnormalities. Aggressive replacement of clotting factors is indicated.

The Lund Therapy

Advocates the use of mild hypotension, colloid therapy and specific venoconstrictors and has reported good results.

S26-2 THE CHILD WITH A BRAIN TUMOUR: FROM THE MRI TO OR

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Anaesthetic management of a child with a brain tumour for MRI poses a multitude of problems. The anaesthetic challenges are, (1) problems pertaining to paediatric anaesthesia, (2) hazards of the intense magnetic field for the use of physiologic monitors, anaesthesia machine and ventilator (3) problems of RF energy and cryogen release. (4) Brain tumour may be associated with intracranial hypertension and neurologic deficit, (5) other associated illnesses. (6) Transportation from MFI to OR.

Anaesthetic goals are, (1) to provide an immobile patient for MRI, (2) care of the intracranial hypertension, (3) maintenance of the cerebral perfusion pressure, (4) care of cardio-respiratory parameters during transportation from MRI to OR.

Anaesthetic technique for such procedure is controversial. Though intravenous sedation is preferred for MRI, balanced anaesthesia is the technique of choice in this particular patient.

Monitoring

ECG, HR, core temperature, SaO₂, NIBP can be monitored with a MR compatible cardiac monitor. ETCO₂ monitoring is desirable.

I.V. fluids

Crystalloid solution / half strength normal saline can be used.

Transfer from MRI to OR

Patient to be transferred to OR with cardio-respiratory monitoring and IPPV with O₂.

Conclusions

Anaesthetic management of a child with brain tumour for MRI poses unique problems. Better understanding and management of these helps in providing safe anaesthesia.

S26-3 ANAESTHESIA FOR STEREOTACTIC AND MINIMALLY INVASIVE NEUROSURGERY

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The frequency and scope of stereotactic neurosurgery and minimally invasive neurosurgery in many centres are enjoying a revival, on the back of current advances in biomedical technologies, including:

- * development of powerful, new brain atlases
- * application of computer aided design (CAD) processes in medicine,
- * endoscopic techniques extended to neurosurgery
- * functional neurosurgery for seizures and movement disorders
- * increased utility of magnetic resonance imaging (MRI) for functional analysis
- * improved outcome and techniques in interventional neuroradiology
- * replacing many conventional open neurosurgical procedures.

Concurrently they pose new challenges and revisit old paradigms in techniques of anaesthesia for unusual procedures or locations:

- * **Planning & Organization:** Conventional stereotactic-guided surgery requires sequence planning, with emphasis on safety, immobilization and airway control. Infrastructure provisions for GA outside the OT, such as the MRI Suite is necessary to overcome their unique problems.
- * **GA for Interventional Neuroradiology:** Knowledge of specific requirements and expected patient responses during carotid artery stenting, aneurysm coiling, embolization of giant arteriovenous malformations is necessary to ensure good peri-operative outcome.
- * **Awake Craniotomy/Functional Neurosurgery:** Awake craniotomy surgery requires good analgesia and sedation during opening and closure of the cranial vault, interposed by a period of relatively pain-free wakefulness and co-operation from the patient.

These issues are briefly described in this paper.

S26-4 MANAGEMENT OF ACUTE SPINAL CORD INJURIES

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(Abstract not available at the time of printing)

S27-1 UTILISATION AND LIMITATION OF NON-INVASIVE MONITORING

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In the last 20 years, there have been considerable advances in non-invasive monitoring equipment in anaesthesia and intensive care. The introduction of minimal monitoring standards and widespread use of non-invasive monitoring equipment has improved the quality and safety of anaesthesia. The uses and limitations of several modalities of non-invasive monitoring will be discussed. Some newer monitors, e.g. the oesophageal cardiac output doppler, will be mentioned.

With increasing numbers of monitoring equipment, we may be reaching a plateau with regards to cost versus benefit of each additional new monitor. In these days of economic uncertainty, the addition of new monitors to our list of minimal monitoring standards should be carefully weighed against the additional cost.

S27-2 LOW FLOW ANAESTHESIA MADE SIMPLE AND PRACTICAL

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Low flow and closed circuit anesthesia were initiated more than forty years ago. But this technique sometime created problems due to the lack of appropriate equipment, monitor and knowledge in the past. High fresh gas flow about 4 - 6l/min was more popular, even though less than one-tenth of that flow was utilized by the patient. Now we have new anesthetic machine with good flow meter control, powerful vaporizer, circuit with minimal air leakage, and breath to breath gas concentration monitor. So we can decrease the gas delivery rate to match with the uptake rate of the patient such as oxygen 200 - 250ml/min and nitrous oxide 100 - 300ml/min. This is a closed circuit anesthesia, which is a difficult technique because gas uptake varies from time to time and patient to patients. Minimal flow about 500ml/min to match with the uptake and leakage with minimal waste is more practical. The definition of low flow anesthesia is using a fresh gas flow rate less than half of patient's minute ventilation so that most of the inspired gas comes from reuse of exhaled gas. We can simply and safely use flow rate as low as 2l/min with nitrous oxide 1l/min and oxygen 1l/min. The lower the flow we use, the more advantage and disadvantage we get.

From economic point of view, anesthetic cost will be less. The patients will have high airway humidity and good body temperature preservation. Most of all, the pollution to personnel and environment can be certainly decreased by using the low flow technique.

However some disadvantages can happen. Sodalime consumption is higher and reaction of anesthetic agent with carbon dioxide absorbent should be kept in mind, especially for sevoflurane. Another problem is the slow adjustment of anesthetic concentration. This can be solved by using the intermittent high flow or supplement with short acting opioids. Significant concentration of acetone, methane, ethanol, carbon monoxide, anesthetic metabolite, and nitrogen have been found, so caution is made to use low flow in the obese, starving or alcoholic patients. These problems require the knowledge about the principle of low flow anesthesia and careful patient monitoring. Low flow anesthesia is simple, practical and safe. Please save our earth.

S27-3 THE SAFETY AND COMPLICATIONS OF ANAESTHESIA DELIVERY SYSTEMS

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In the essential elements, the safe administration of general anaesthesia is about three things: oxygenation, ventilation, and anaesthesia. Each aspect has to be managed and monitored. Ideally the anaesthesia delivery system is designed with complete safety and no hazards. Unfortunately, this is not easily achieved. It is an important responsibility of every anaesthetist to understand the strengths and weaknesses of the equipment he or she uses and use this understanding to care for the patient during anaesthesia.

Oxygenation

A gas mixture without oxygen will result in death in less than a few minutes. This critical point has been well understood by the major manufacturers and each has attempted to ensure that his anaesthetic machine is unable to deliver an hypoxic mixture. Ohmeda have installed the Link 25 system on their recent machines such as the Excel. Ulco have a lever system within the flowmeter controls as an antihypoxia system. Drager have a pneumatic oxygen ratio controller (ORC). Unfortunately each of these systems can fail to protect totally the patient from an hypoxic gas mixture. None will prevent hypoxia if nitrogen is substituted for oxygen in the medical gas pipeline. In the Link 25 and the Ulco systems mechanical failure within the anaesthesia machine has also resulted in delivery of an hypoxic mixture even when the pipeline is functioning correctly. Hypoxia has also occurred with the selective leak of oxygen from the rotameter bank. Most designs within the rotameter banks reduce this risk but do not totally prevent it. Sometimes the very devices meant to protect are themselves the cause of the hazard. The Howison alarm warns of oxygen failure but itself may allow an oxygen-depriving leak into the circuit. The failure to understand the function of some vaporizers has allowed a total leak of fresh gas after anaesthesia has begun. Only the continuous monitoring of the inspired or expired oxygen can ensure that an hypoxic mixture is not delivered.

Ventilation

In the large majority of general anaesthetics, patients are paralysed and ventilated. This is a great responsibility and requires constant vigilance. A few minutes can bring disaster. Even today some of the ventilators in use are easily able to be "fooled" into believing that all is satisfactory. The most common reason for this is that disconnect alarms do not work because they are not set correctly or are not turned ON. This allows ventilators such as the Manley and the Campbell to function without any patient connection. The best alarms are integrated with the ventilator and turn ON with the ventilator. There is no reason why a ventilator cannot have a robust disconnect alarm which activates when the ventilator is turned ON, and can reliably detect a disconnect without operator intervention. Even the more reliable systems have difficulty in detecting a remote dis-connection such as at the common gas outlet, and this can be a very subtle failure of ventilation which may take some time to be recognised

Some circuits are prone to hidden failure and loss of effective ventilation. The widely used coaxial "Bain" circuit is well recognised as an example of this type of problem. The only totally secure system is the continuous monitoring of the expired respiratory gas which ensures that CO₂ is being eliminated.

Anaesthesia

Although anaesthesia is the reason for the intervention by an anaesthetist, it has not always been administered successfully. Gas confusion between nitrous oxide and air had resulted in administration of subanaesthetic doses of the drugs. The failure of vaporizers to properly connect has resulted in patients recalling their operation. Similar problems are occurring with TIVA, where the disconnection of the propofol infusion may go unrecognised as few circuits have any disconnect alarm provisions. The declaration by the ANZ College of anaesthetists for volatile agent monitoring is a realistic appraisal that only the ultimate downstream monitoring of all the gases intended for the patient can ensure the correct mixture is given to the patient. At present however, there is no reliable technique for monitoring TIVA.

Conclusions

Only a high level of awareness and at-patient monitoring can ensure that our obligations of oxygenation, ventilation and anaesthesia are consistently achieved for our patients. Arguably the highest priority for patient care should be placed on monitoring rather than the anaesthetic machine.

S27-4 MEASUREMENT AND CLOSED-LOOP CONTROL OF DEPTH OF ANAESTHESIA

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There is no agreed standard against which any technique to measure depth of anaesthesia can be judged. However, any monitor of anaesthetic depth must provide sufficient information to enable satisfactory general anaesthesia to be produced during surgery. The closest control of anaesthesia is required when the patient is breathing spontaneously during surgery since excessively light anaesthesia leads to the patient moving while excessively deep anaesthesia results in depression of respiration. Therefore, any monitor of anaesthetic depth should provide information to allow the anaesthetist to deliver satisfactory anaesthesia in a patient breathing spontaneously while undergoing a surgical procedure. Satisfactory anaesthesia requires:

- * Adequate cardiovascular and respiratory stability
- * Ideally no, or at least only minimal, patient movement
- * No awareness or recall of events during the procedure

These conditions are one part of a standard against which any monitor of the depth of anaesthesia can be judged. Other features which should be present are:

- * Similar values for different types of anaesthetic agents
- * Values at recovery similar to those before induction of anaesthesia
- * Appropriate change during surgical stimulation
- * Unaffected by changes in the cardiovascular system or by cardioactive drugs
- * Marked signal difference between consciousness and unconsciousness

The ultimate proof for a measurement of anaesthetic depth is that the signal should be able to control automatically the delivery of an anaesthetic agent to produce satisfactory anaesthesia in a patient breathing spontaneously during surgery. Such a closed-loop control system must be reliable, robust and rapid in response.

S28-1 BLEEDING IN OPEN HEART SURGERY

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A prerequisite for open heart surgery has always been to utilise cardiopulmonary bypass (CPB). It has the potential to sustain circulatory and respiratory function, unfortunately the blood touches the foreign surfaces of the circuits and heart lung machine. This stimulates a host of inflammatory responses leading to total body inflammation causing a temporary dysfunction of nearly every organ and deranging body homeostasis. CPB activates at least 5 plasma protein systems that lead to deranged hemostasis and mediate much of the morbidity associated with CPB. The activation of these systems - contact, intrinsic, extrinsic pathways, complement and fibrinolytic systems - cause haemostatic failure. With advancements in oxygenators and surgical techniques bleeding for first timer open heart surgery requires little blood. With sicker patients (SBE, other organ failures, redos, thrombolytic therapy post AMI) bypass becomes longer and the risk of post operative haemostatic failure is higher.

Various techniques are utilised to reduce post op bleeding and utilisation of bank blood and blood products. Surgical hemostasis is the first step in this process. Complementing this are physical techniques (cell savers, plasma and platelet pheresis) and pharmacological techniques (erythropoietin, E-amino caproic acid, tranaxemic acid, DDAVP, Prostaglandins and aprotinin). Lately less invasive techniques are utilised so as to avoid CPB and its consequences (mid CABG, OP CABG).

We present some data concerning blood usage and techniques of usage reduction employed at the IJN.

S28-2 COMPLICATIONS OF BLOOD TRANSFUSIONS AND THE FUTURE OF SYNTHETIC BLOOD

R D Miller, Department of Anesthesiology & Perioperative Care, University of California, San Francisco, USA

The complications of blood transfusions are well documented. In the last 15 years, major concerns have been related to the infectivity of blood transfusions, namely hepatitis and HIV. However, the incidents of hepatitis and HIV from blood transfusions have markedly decreased. In fact, new PCR testing being introduced in many blood banks in the world will reduce the incidents of hepatitis and HIV to one per million of blood transfusions given. This PCR technology will virtually eliminate this source of traditional infectivity. Nevertheless, many other issues (e.g. type and cross matching, febrile reactions) dictate the need for synthetic blood. A variety of hemoglobin-based oxygen carriers and perfluorocarbon emulsions are under clinical investigation. The absence of infectivity, type and cross matching issues, reactions, and prolonged storage life should make these artificial oxygen carriers very useful in clinical medicine. Their application will not be restricted to the treatment of severe hemorrhage but will be used in many other medical conditions in which enhanced oxygen delivery is needed (e.g. cardiopulmonary bypass).

S28 3 BLOOD SALVAGE: WHEN, WHAT AND HOW

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Blood transfusion is often times a life saving measure in the management of both medical and surgical conditions. Blood transfusion is decided based on a good clinical judgement and based on the following factors:

- * Specific condition requiring treatment (co-morbid state)
- * Benefit against possible risk to the patient
- * Are there known alternatives to blood transfusions

The strategy to lessen the use of homologous blood transfusion is often times called blood salvage. The target population for blood salvage are patients subjected to autologous blood, whereby autologous transfusion is the collection and reinfusion of patients' own blood.

The discussion will deal on the following principles or techniques:

1. Periop Blood Salvage (PABD) - collection and preparation of the blood of a patient, which they donate prior to the elective surgery.
2. Intraoperative Blood Salvage (IBS) refers to the collection and reinfusion of blood shed into the body cavities or released from bleeding surfaces during surgery.
3. Intraoperative Isovolumetric Hemodilution (INH) - the technique of reduction of the hematocrit by the withdrawal of blood and the simultaneous volume replacement with cell free substitutes.

Each of the aforementioned techniques (goals and targets) will be discussed and presented during the lecture. Possible problems inherent to autologous blood donation will be presented (based on a masteral thesis) on the feasibility of autologous blood donation done in a tertiary hospital. Use of cell savers and Intentional Normovolemic Hemodilution (INH) will also be discussed, with emphasis on the indications and contraindications and the advantages of the methods.

S28-4 DEEP VEIN THROMBOSIS: ASEAN EXPERIENCE

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Deep vein thrombosis (DVT) is a common postoperative complication, causes fatal pulmonary embolism in Western people. The incidence of DVT is 30 - 50%. In ASEAN countries, the incidence of DVT is very low. The reports from Thailand, Japan, Malaysia and Taiwan are 10 - 15%. The detection of DVT in those patients were done by radio-isotope scanning on postoperative follow up programme, without any symptoms and signs of DVT in the patients. There were some occurrences of pulmonary embolism but nonfatal. Age and type of operation colonorectal, pelvic and orthopedics are cofactors of increasing incidences. The cause of low incidence of postoperative DVT in ASEAN people is a matter of speculation. It is likely that several factors are responsible for the low incidence, including diet and race. Low fat diet, pepper chilli and garlic are reported to increase fibrinolytic activity. The incidence of inherited thrombophilia is low in ASEAN people. The lack of antithrombin III, protein C and protein S causes inhibition of fibrinolysis, thus aggravates venous thrombosis.

S29-1 ANAESTHESIA AND MANAGED HEALTH CARE

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Spiraling health care cost throughout the world in the last 2 decades as a result of advancement of science and technology has caused the governments, private sector employers, health insurance companies to see methods of containing the expenditure and obtain better deals for their employees and the insured.

Managed care is one of the methods that has seen tremendous growth in USA in the last ten years and is now being exported to the rest of the world including the ASEAN countries. Managed care has many definitions and in principle it is a way to achieve quality care using the most cost-effective treatments and encourages preventive health strategies. It is also a strategic concept that is used to control and manage future increases in health care costs.

Managed care is not a single entity and is complex in nature and uses variety of methods of financing and organising the delivery of comprehensive health services to contain costs by controlling the provision of the services.

It is inevitable that anaesthesiologists will have to work in the managed care environment in the near future as more managed care organisations (MCO) make their presence in this region. As a result of contracting with MCOs the way of providing anaesthesia services will undergo fundamental changes. These will include provision of ambulatory care anaesthesia, adhering to treatment protocols with fixed drug formulary and clinical practice guidelines and subjecting ones practice to utilisation review, medical audit and quality assurance programmes. It is also inevitable that managed care will cause dents in the income of some practitioners as the reimbursements will be fixed at discounted rates.

S29-2 QUALITY VERSUS COST IN ANAESTHESIA

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Over the last few decades and in the next millenium the costs of health care have continued and will continue to rise. New technologies and new drugs have no doubt improved quality of our services in terms of safety and efficacy but at increased cost. Cost containment has now become a major issue in health care provision. Perioperative care, including anaesthetic costs, constitutes a major component of hospital costs and the challenge in the next millenium is to control costs but at the same time provide an excellent quality of care. Calculation of costs in medicine is a rather complex economic exercise as it involves multiple and often confounding variables. Thus, there are direct and indirect costs as well as fixed, variable and marginal costs such that cutting costs in one sector often results in shifting of costs to another. The relationship between actual costs and charges is not always direct. In addition, cost containment strategies such as cost minimisation, cost benefit and cost effectiveness assessments do not always benefit the individual patient. The concept of value based anaesthesia has been promoted as a balance between achieving the best outcome in anaesthesia, in terms of safety, efficacy and comfort, and maintaining reasonable costs. While anaesthesia itself accounts for only 5 to 6% of operative costs, the anaesthesiologist is in a unique position to control costs not only in the intraoperative period but throughout the perioperative period. In the preoperative period, costs can be controlled by ordering only appropriate laboratory tests and reducing unnecessary medical consultations. In the intraoperative period, the possibilities are immense, ranging from using low flow techniques to save on expensive volatile anaesthetic agents and using cheaper alternatives for neuromuscular blocking agents (NMBA), narcotics and intravenous anaesthetics. Cheaper alternatives may result in cost shifting (e.g. dealing

with complications) and one has to match very judiciously the use of expensive drugs to the individual patient and procedure. In the postoperative period, techniques to reduce minor complications and treat pain aggressively will pay dividends if patients recover faster and are discharged faster. Thus costs are reduced while quality is maintained. In the overall scheme of things, one has to look even at all aspects of perioperative costs and manage the operating room in the most efficient way possible. There are numerous possibilities. Other strategies to maintain cost and quality is to use clinical practice guidelines in our daily practice, based on the best medical evidence. Several have been prepared for perioperative use, for example, monitoring guidelines, preoperative laboratory testing and perioperative blood transfusion and these have been integrated into clinical practice. These have, in a way, controlled costs and maintained good or even enhanced quality in anaesthesia. The anaesthesiologist must play a very active role, both clinical as well as political, within the hospital administration to ensure that the right decisions are taken with regard to cost control in the perioperative setting.

S29-3 LATEST DEVELOPMENT OF ANAESTHESIA PRACTICE IN CHINA

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Introduction

China is a large developing country with a huge population. There are more than 6500 above county level hospitals across the country. More than 50,000 anesthesiologists are contributing their efforts to the development of anesthesiology in China. The status of clinical anesthesia as well as basic research has improved a lot with the rapid economic development in recent years.

Clinical Anesthesia and Analgesia

Traditionally, regional anesthesia such as epidural blockade is still the main anesthesia method in the majority of Chinese hospitals. On the other hand, general anesthesia with propofol and/or inhalational agents is becoming more popular in large hospitals equipped with sophisticated anesthesia machines and monitors. The anesthesia techniques in teaching hospitals are similar to that of Western countries. However, variation in working conditions exists based on economic situations in different regions of the country. Acupuncture is mainly used for pain relief rather than clinical anesthesia any more. More attention has been paid to postoperative pain relief as well as palliative care of cancer patients. Besides traditional acupuncture some Western analgesia techniques such as patient-controlled analgesia and transdermal fentanyl patch are gradually introduced into the clinical practice.

Research

More than 1000 research papers have been published each year including clinical trial as well as clinical relevant basic study. Multiple clinical study on new drugs is popular based on good clinical practice (GCP). About 10% of research papers was finished and published overseas each year.

Education

Professional education is most important to the further development of anesthesiology. Three education programmes are available as follows: (1) medical school for specialist training programme for five years; (2) postgraduate training programme for three years; and (3) doctoral training programme for three years. The resident training programme has been set up and residents from medical school have better postgraduate education and clinical training programme. More and more young doctors are going abroad for further study in different countries.

Journals

There are more than four anesthesia journals available such as *The Chinese Journal of Anesthesiology*, *The China Journal of Anesthesia and Analgesia*, *The Journal of Clinical Anesthesia* and Foreign Medicine Section of Anesthesia and Resuscitation. The full paper is published in Chinese with English abstract and overseas editors are initialized, in which international communication can be enhanced.

Society and Academic Activities

Chinese Society of Anesthesiology (CSA) has four subgroups i.e. clinical anesthesia, pain management, intensive care and education with 54 committee members from different parts of the country. Annual meeting of CSA will be held in different city in spring. Sino-Japanese Symposium on clinical anesthesia is held every two years either in China or in Japan. Anesthesiologists from different countries are always welcome to involve in out national academic activities.

S29-4 INTENSIVE CARE IN THE DEVELOPING WORLD

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The aim of intensive care unit (ICU) is to treat an acute life threatening severely ill patient who is expected to recover by intensive treatment. Ultimate goals of intensive care is to enable patient reintegration to her/his community and reemployment. Intensive treatments done include:

- a. Sustaining life or life support through poly pharmacy and multiple diagnostic and life support equipment.
- b. Eradicate underlying disease to reverse process toward death.

Problems of Intensive Care service face in the developing country:

- a. ICU available mostly in referral hospital level I and level II, located in capital of province.
- b. High cost is paid by patient mostly "out of pocket", because health insurance only covers limited population.
- c. Transfer to ICU almost in the late phase of disease.
- d. Lack of intensivists and trained nurse in intensive care

Effort to disseminate ICU service throughout country:

1. Developed Society of Intensivists as "think tank" in critical care dissemination.
2. Trained nurse in basic intensive care for 3 months.
3. Choose appropriate technology in district hospital by consider cost effective analysis.

Concerning economy aspects, strictly selected indication of entry to ICU must be done and discharge patient from ICU as soon as possible. Within 3 days care in ICU, decision should be made whether to continue treatments or withdraw it.

S30-1 CONTROVERSIES IN PRE-HOSPITAL INTERVENTION OF TRAUMA PATIENTS

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Many controversies exist in the pre-hospital care of the trauma patient. These are the results of services being set up or based on the premise that what works for "cardiac arrest" should also work for trauma. Compounding this, data on the efficacy of pre-hospital care in the management of the traumatised patient remain scanty, difficult to interpret, controversial and inconclusive.

The controversies include the following:

1. The scoop-and-run versus the advance-on-scene stabilisation; within this controversy has another debate of the role of emergency medical technician vs an emergency physician in the advance on-scene stabilisation.
2. Although the importance of early definitive treatment on war wounds are well established since the American Civil War, the attenuation of the endocrine metabolic response to trauma with analgesia and anaesthetics administered in the field to improve outcome is still controversial.
3. Tracheal intubation is the gold standard of airway management but is notoriously difficult in the field. In addition, the debate on the use and choice of the appropriate neuromuscular blocking agent in the field continues.
4. Is our current advanced trauma life support adequate? The third peak in trauma related mortalities occur in patients who survived on-scene resuscitation and in-hospital preoperative interventions. Out of this group of patients is another subset whose care during the initial phase was good but not good enough.

S30-2 ANAESTHETIC MANAGEMENT OF THE PATIENT WITH FACIO-MAXILLARY AND AIRWAY TRAUMA

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The facio-maxillary trauma victim presents with a unique challenge to the anaesthetist and management requires a multidisciplinary team approach. Severe facial injury is rarely fatal per se, but its complications and associated injuries demand immediate care. Problems include (1) airway obstruction and injuries (2) haemorrhage, and (3) other injuries other than facio-maxillary ie associated cervical or CNS injuries.

Immediate management starts with recognition of the traumatised airway and knowing the patterns of disruption, as well as different techniques of securing the airway. It must be emphasised that airway injuries are dynamic and not static, and hence close observation is essential. A common mistake is failure to appreciate the need for early airway control because of deceptive initial presentation. Subsequent expansion of haematoma or swelling may result in rapid airway obstruction.

Airway obstruction is common in patients with maxillofacial injuries due to haemorrhage, with fresh and clotted blood in the oropharynx, teeth, dentures, bone fragments or vomitus. These must be manually removed before adequate ventilation can be established. Bi-mandibular fracture, with posterior displacement of the tongue may cause severe respiratory obstruction and asphyxiation. Nasotracheal intubation is contraindicated in unstable mid-face fractures or cerebrospinal fluid (CSF) rhinorrhea. Severe mid-face injuries and bi-mandibular fractures may necessitate immediate cricothyroidotomy or transtracheal jet ventilation or tracheostomy.

It is also important to restore blood volume as quickly as possible to minimise the possibility of hypovolaemic shock. Facio-maxillary trauma may well be associated with cervical spine fracture and/or subluxations and special precautions should be taken during intubation with manual in-line stabilisation of the head and neck.

Management of the facio-maxillary trauma victim involves a multidisciplinary team approach.

The anaesthetist should be involved in the management of the patient from the earliest possible stage.

S30-3 IMPORTANT CONSIDERATIONS IN THE MANAGEMENT OF CHEST TRAUMA

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Patients with chest trauma present a challenge to the anesthesiologist because injuries may involve the airway, lungs, chest wall, heart and major vessels. The anesthesiologist should play an active role in all phases of trauma management, including emergency resuscitation, provision of intensive care and pain relief.

Management of any trauma patient begins with the airway control with cervical spine precaution. Circulatory collapse due to exsanguination and respiratory problems such as pneumothorax, hemothorax, pulmonary contusion and flail chest are common.

Patients with severe thoracic injuries often present to the operating room in an urgent manner. Only minimum or no information on the patient is available. There is generally little time for full examination.

Resuscitation in the emergency room continues into the operating room and intensive care unit, so do the important considerations in the initial patient management.

The causes of perioperative morbidity and mortality in these patients are airway, respiratory problems and hemorrhage. The anesthesiologist familiar with the nature of the injuries is best suited to manage these difficult problems.

S30-4 HYPERTONIC SALINE FOR SEVERE HEAMORRHAGE

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Introduction

For patients with hemorrhage there are usually two options. First, to give Lactated Ringer rapidly, 2 - 4 times lost volume. Secondly, to give hydroxy-ethyl starch or dextran which will restore blood pressure quicker and offer better hemodynamic stability. Hypertonic saline, once infused into the vein will draw interstitial and intracellular water, to become intravascular as part of the equalization process to reach isotonicity. In our institution, we use 5% NaCl mixed with 6% or 10% Dextran-70 in 250ml flexible plastic bottle. Theoretically, this 250ml solution will expand to become approx.1500ml.

Results

The results have been published in the Annual Meetings of International Trauma Anesthesia & Critical Care Society in 1996 (London) and 1997 (Baltimore).

From 59 consented patients underwent autologous blood donation just before surgery we achieved these data. Median blood volume taken from C1, C2, RL groups as % of Estimated Blood Volume (70ml/kg) were 23% EBV. This amount was collected rapidly to simulate arterial bleeding of 50 ml per minute. Completion of the infusion took median of 6, 11 and 35 minutes respectively. The Mean Arterial Pressure measured at 5, 10, 20 and 40 minutes after the infusion showed significant difference in favor of C1 and C2 at 5 minutes ($p=0.0002$) and 10 minutes ($p=0.026$). Pulse pressure measured at 10, 20 and 30 minutes after the infusion showed significant difference due to type of solution at 10 minutes ($p=0.042$), 20 minutes ($p=0.008$) and 30 minutes ($p=0.047$). This prompt overshoot of baseline values may benefit flushing sluggish microcirculation in shock patients. But, this overshoot might re-open the thrombosed vessels and induce re-bleeding. In 47% patients at anesthetic induction 2 - 6 hours after infusion systolic pressure ranged from one-day-pre-operative values (10%). The problem with hypernatremia did not exist. Highest values at 5 minutes were 158 for C1 and 157 for C2. Suggested maximal dose of Dextran-70 is 1.2gm/kg bodyweight. 250ml of C2 contained only 25gm Dextran-70. We compared 9 patients with C1, 6 patients with C2 and 9 patients with RL. We arrived at no statistical significant difference. We noted no difference in surgical oozing in all patients. Further clinical experience with acute hemorrhage patients were as follows. Fifteen severely bleeding patients lost 4000 (1974ml (median 3500ml or more than 50% Estimated Blood Volume of 70ml/kg BW) in this study.

Estimated and collected shed blood ranged from 1500 - 9000ml. The amount of Lactated Ringer were median 5000, range 2000 - 12,500ml. Hemoglobin values during massive hemodilution were median 4.0, range 0.7 - 7.3. Then C2 were given to increase the low blood pressure. Eleven patients (73.3%) showed blood pressure increase and clinical improvement of peripheral perfusion. Four patients showed poor responses (blood loss 3300, 3500, 4500, 4500ml) from which one died.

Recently we have finished a randomized controlled trial of C2 and RL in the resuscitation at arrival setting. Measured outcomes were arterial pressure, normalization of blood gases and lactic acidosis. The result will be presented at the meeting.

PL-4 ORGAN TRANSPLANTATION: THE ASIA-PACIFIC PERSPECTIVE

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The advent of immune-suppression drugs transformed organ transplantation from experimental procedure to standard clinical practice. Countries in the Asia-Pacific in rapid succession have adopted this technology. The first kidney transplant in Asia was performed in Japan in 1964 from a living donor, followed by the Philippines (1968), Korea (1969), Hong Kong (1970), Singapore (1970), Thailand (1972), Malaysia (1975) and Indonesia (1977). Liver transplantation was first performed in the Peoples' republic of China in 1977, Taiwan (1984), Australia (1985), Thailand (1987), Korea (1988), Philippines (1988), Japan (1989), Singapore (1990) and Malaysia (1995). The first Asian heart transplant was in Japan in 1968. In ASEAN, this was pioneered in Thailand (1987), followed by Singapore (1990), Philippines (1994) and Malaysia (1997). Waiting lists far exceed available organs, >600 patients in Singapore and >1,100 patients in Hong Kong await kidney, liver, heart and lung transplants. The donor rate per million was 8 in Singapore, 4 in Hong Kong (1998).

Factors which may affect the decision to donate include religious and cultural views, understanding of brain death, legislative and economic aspects, and the media. Surveys of public attitudes indicate that belief in keeping an intact body plays an important role. All major religions in the region permit organ donation and transplantation, and many consider donation an act of love. Respect for the body of the deceased is universal and consent is viewed with great importance. Cultural factors and ethics is examined, particularly issues pertaining to commerce in organs and the use of non-conventional donors.

Legislation has been enacted in different countries to address particular issues - presumed consent in Singapore (1987), brain death in Japan (1997) and living donors in Hong Kong (1998). Individuals' religious and cultural beliefs result in a paucity of cadaveric donors which is more acute in Asia than elsewhere in the world. As a result, living donor transplants form a significant pool in most Asian transplant programs. The cadaveric donor pool has been increased by expanded criteria for brain-dead donors, non-beating heart donors, and splitting of cadaveric livers.

Anaesthetists and intensivists are an integral part of a transplant team. An important role can be played in identifying potential organ donors, maintenance of brain-dead donors, support and counseling of families, and anesthetic care for organ harvest and transplantation. Many anaesthetists are also involved in transplant coordination and representation to legislative authorities.

S31-1 EXAMINATIONS AND ASSESSMENT IN ANAESTHESIA

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(Abstract not available at the time of printing)

S31-2 USING COMPUTERS IN EDUCATION

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Students at undergraduate or postgraduate level must learn large numbers of facts about different subjects and also understand how these facts relate to each other. The aim of using computer assisted learning (CAL) has been to emulate the function of a tutor by allowing students to assess their understanding of a subject. Many studies have demonstrated the benefit of CAL for medical education and the development of inexpensive microcomputers increased the availability of this form of education. Different formats are used ranging from simple multiple choice questions to complex simulations of physiological, pharmacological and pathological systems.

A survey of 100 medical students showed their enthusiasm for this form of teaching. They expressed a preference for using CAL in a group rather than singly and group teaching with CAL was found to produce a high degree of interaction and discussion between the students. To a certain extent, it was viewed as a game but it was a game in which they learn real clinical lessons. Studies examining the use of CAL for postgraduate education and self-assessment have also been encouraging since it provides an interactive, non-threatening method of learning and self-evaluation.

New developments in hardware such as faster processors and less expensive memory have encouraged the more widespread use of multimedia and computer simulations for education. Benefits of multimedia include high quality graphic displays and sounds which can provide more realism for clinical teaching. For example, x-ray pictures can be shown to the student instead of merely being described in text form. Desk top and whole body simulators are available more widely with the ability to interact with a high degree of realism. However, there are still major difficulties in developing a sufficiently comprehensive bank of teaching material and it is essential that there is a critical mass for others to invest in this form of education.

S31-3 ROLE OF PROTOCOLS AND ALGORITHMS IN CRISIS MANAGEMENT

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An acute emergency or high-risk patient may not be managed promptly and properly in the Accident & Emergency Department (A&E) or Intensive Care Unit (ICU). It may cause confusion among the medical and paramedical staff in the A&E or ICU. Time in this situation is very critical. The patient requires immediate initial clinical diagnosis, Physiologic monitoring and resuscitation. Further clinical examination and investigation to confirm the diagnosis must be carried out within a specific time frame. Important steps i.e. diagnosis, monitoring, treatment and the movement of the patient from A&E to the operating theatre or to the ICU for example will ultimately determine the outcome of this patient. In this scenario where a crucial decision and immediate actions need to be done, we must have a well-organized system which will allow all doctors and paramedical staff in the A&E or ICU to function more efficiently. What would be the best method or protocol to define this system? A few clinical approaches have been described. These include traditional approach, clinical pathways, clinical algorithms or branch chain decision trees.

Traditional approach to acute emergency and trauma cases emphasizes on the basic principles of management obtained from the senior doctor with vast experience. Although history, clinical findings and results of investigations are important aspects of assessment to make correct diagnosis, the bedside doctor himself or herself has to modulate or manage the case on his or her own judgement. Traditional approach to clinical decision-making is usually stated in narrative form, lists of laboratory investigations and treatments supplemented by anecdotal clinical observations and reviews of the results of specific types of problems. Lists of investigations for example may be appropriate to some patients but inappropriate to other patients. The problem while awaiting these clinical and laboratory results is that the doctor may not come to the diagnosis, make initial decision or start initial treatment.

Clinical algorithms were initially designed for resuscitation of trauma patients in the A&E for medical assistants and nurses performing triage. Clinical algorithms or decision trees were then designed for doctors to treat trauma and acutely ill patients. Clinical algorithms focus on the detailed application of concepts in a systematic and well-organized manner. They adopt the diagnostic and physiological monitoring processes into the actual therapeutic management. Hence, decision-making is a dynamic process within the clinical pathways. Each decision made will be based on the ongoing physiological changes on the patients. Problems are listed or prioritized according to the urgency of treatments where time is of great importance. Technically, clinical algorithms mimic protocols or post-operative standing orders. They are just guidelines for the doctors to be more systematic in managing ill patients. However, decisions are still in the hands of the doctors. The arts of medicine are still intact.

S31-4 SIMULATION FOR TRAINING, LEARNING, AND TESTING IN ANAESTHESIA

J S Gravenstein, J F Hardcastle, University of Florida

Over 80 sophisticated patient simulators have now been installed throughout the world. The simulators are mannequins with anatomically realistic airway features. They can breathe spontaneously or be ventilated and they respond to many anesthetic interventions and over 50 drugs with appropriate changes in circulatory and respiratory functions. Simulators are used in the training of anesthesia personnel as well as medical students and nurses. In several international meetings a simulator was programmed to represent a patient developing one or the other acute complication requiring urgent medical intervention. Anesthesiologists who care for such a simulated patient observe the changes in vital signs and physical findings, make a diagnosis and institute the appropriate treatment. In order to assure that the simulator exercises are educational and not embarrassing, all simulator exercises are designed so that a successful outcome of the exercise is assured. A simulator exercise will be available at the 11th ASEAN Congress of Anaesthesiologists.

S32-1 CARE OF THE MULTI-ORGAN DONOR

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Following the recognition and subsequent confirmation of a potential donor, the appropriate management involves certification of brain death, fulfilment of the legal requirements, obtaining consent from the grieving relatives by the transplant coordinator, organization of organ procurement by various surgical teams, whilst throughout supporting the potential donor by a team of motivated on-duty intensivists. Although time consuming, complex and challenging, it is more than justified if it results in satisfactory multi-organ donation and transplantation.

Time limitation is a critical aspect of brain death management. There is a progressive deterioration in organ function, and cardiac standstill will occur in many potential donors within 24 hours despite intensive care. Brain death pathophysiology must be known in order to pre-empt these derangements. The majority of donors die from head trauma or massive intra-cranial haemorrhage, and their initial condition may be very poor. Furthermore, efforts to lower ICP by intravascular volume contraction are detrimental to terminal organs. There must be a shift of emphasis from cerebral resuscitation to the preservation of function of all organs until donation.

It requires meticulous monitoring and aggressive interventions to reverse hypotension, control DI, prevent hyperglycaemia, correct various electrolyte abnormalities, prevent and correct hypothermia, prevent arrhythmia, optimize ventilator management, correct coagulopathy, sepsis, hypoxia, acidosis and anaemia, and to decide whether or not to replace the hormones of the failing endocrine system. Factors that preclude the certification of brain death must be avoided and corrected. Certain measures beneficial to a particular organ may be detrimental to another, and a balance must be sought.

These efforts must continue, not only preoperatively, but also throughout the often long and complex surgery required for the retrieval of multiple organs.

S32-2 ANAESTHESIA FOR LIVER TRANSPLANTATION

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Patients presenting for liver transplantation vary from relatively fit individuals with metabolic disease to those with severe decompensated chronic liver disease or fulminant hepatic failure. These patients are faced with an ultra-major surgical procedure with large haemodynamic shifts, and present a major challenge.

Preoperative assessment is performed by a team, consisting of hepatologist, transplant surgeon, anaesthetist, radiologist, respiratory physician, cardiologist, dentist and clinical psychologist. Anaesthetic assessment focuses on the effects of liver disease on various organ systems. Hypoxaemia may be present, due to V/Q mismatch, shunts and restrictive defects from ascites and pleural effusions. Most patients have a high cardiac output, low SVR state, with increased resistance to vasoconstrictors. An echocardiogram is useful to exclude myocardial disease and pericardial effusions. Hepato-renal syndrome may sometimes require peri-operative dialysis. Coagulopathy is invariable, a major task is maintaining an acceptable clotting profile. Thromboelastography may be used to detect increased fibrinolysis.

The surgical procedure itself has physiological implications, and the transplant anaesthetist must be prepared to deal with these. In difficult cases, transfusion requirements due to massive bleeding may reach 500ml/min. A cell-saver and rapid infusion system are used routinely. Full blood bank support is essential. Venovenous bypass reduces abdominal venous pressure and decreases bleeding and gut ischaemia, but is not without complications. Particular attention is paid to warming measures, as hypothermia may result from the extracorporeal circuit, reduced metabolic rate and the cold cadaveric donor liver with ice-slush in the abdominal cavity. Reperfusion of the grafted liver is associated with marked vasodilatation and may require inotropes. Laboratory support with rapid availability of results is a pre-requisite. Point-of-care testing will allow real-time titration of treatment. Infectious risk must not be ignored, and the transplant anaesthetist must be vaccinated against hepatitis B and practice universal precautions scrupulously.

Logistic problems are encountered in providing anaesthetic care for several concurrent operations when a cadaveric donor is from the same institution. This includes donor harvest, liver transplant, and one or even two renal transplants. In living donor liver transplants, two major operations are supported simultaneously. Liver transplantation can be a viable therapeutic option for patients who previously had no hope. Care is optimized with a multi-disciplinary team approach.

S32-3 POST-OPERATIVE CARE OF THE RECIPIENT

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(Abstract not available at the time of printing)

S32-4 CONTINUOUS LUMBAR EPIDURAL ANAESTHESIA IN HIGH RISK PATIENTS FOR RENAL TRANSPLANTATION

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At the National Kidney and Transplant Institute, continuous lumbar anesthesia is the anesthesia choice of management for renal transplantation. It has been used for more than 91% of the cases.

Renal failure per se puts the patient in Risk IV in accordance with the American Society of Anesthesiologists Physical Status Classification.

With the high incidence of co-existing diseases and medical disorders in these patients, the anesthesia management becomes even more difficult and precarious. Perioperative morbidity and mortality are also increased.

In this presentation, the advantages and disadvantages of continuous lumbar epidural anesthesia are discussed, particularly in the high risk patients, citing different studies by known workers in anesthesiology and allied specialties.

Basically, "proper application of regional anesthesia requires appropriate patient selection, skilled performance of the block, knowledge of the physiologic effects and complications, and clinical judgement whenever knowledge is inadequate".

S33-1 PREPARATION OF THE PATIENT FOR THORACIC SURGERY

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Accurate prediction of postoperative morbidity would improve patient selection for thoracotomy as well as assist in counselling patients about operative risks. However, several studies have shown that a high prevalence of unsuspected impairment of lung function in surgical patients suggesting that the preoperative preparation of patients is far from adequate and that preoperative pulmonary function testing is underutilised.

The preoperative evaluation would entail developing a system of identifying patients at risk of developing complications perioperatively, assessing the degree of pulmonary dysfunction preoperatively and estimating post operative lung function.

In assessing pulmonary function, several tests have been described but especially for lung resection surgery, the only independent predictor of complication was the predicted postoperative FEV1 as a percentage of the predicted normal (ppo FEV1).

(ppoFEV1 = preop FEV1 x (100 - % functional lung tissue removed))

Of note were several preoperative factors that did not correlate with complication including elevated PaCO₂ or FEV₁ <1L.

Patients with ppoFEV₁ >50% had no or minor respiratory complications. Major complications were seen with ppoFEV₁ <40%.

Ventilation/perfusion (V/Q) scanning are used to determine regional ventilation and perfusion of the lungs and results have been used to estimate postoperative pulmonary function. It is especially useful for patients with marginal lung function.

DLCO₂ is usually reserved for patients with restrictive disorders to evaluate the severity of gas exchange abnormality.

Exercise capacity has correlated well with postoperative cardiac and respiratory complications, the simplest test being how many flights of stairs a patient can climb. However, formal cardiopulmonary exercise studies are more valid. A maximal oxygen uptake of more than 20ml/kg/min is a predictor of good outcome. VO₂ max of <15ml/kg/min is associated with high rates of complication. With chronic obstructive pulmonary disease (COPD) being the most prevalent medical condition in the thoracic surgical population, several considerations are important, eg., right ventricular dysfunction, preoperative bronchodilators, chest physiotherapy and cessation of smoking. CO₂ retention is no longer seen as a contraindication for lung resection.

The use of double lumen tubes (DLT) and one lung ventilation are the hallmarks of thoracic anaesthesia. The risks of difficult endobronchial intubation must be carefully assessed and can usually be anticipated from recent chest x-ray and CT scan. The usefulness of the fiberoptic bronchoscope in guiding and confirming DLT placement cannot be overemphasized.

Risk of hypoxaemia in one lung ventilation (DLV) must be assessed. There is risk of desaturation in patients with low preoperative PaO₂, right thoracotomy and increased perfusions of the operative lung on V/Q scan. Lastly with neuroaxial analgesia offering superior post thoracotomy analgesia and pulmonary function, potential contraindication to epidural analgesia should be sought.

In conclusion, in preparing patients for a thoracic surgical procedure it is possible to formulate a reasonable anaesthetic management plan that will minimise risks and unexpected morbidity. Easily obtainable information such as age, smoking, level of dyspnoea, FEV₁, supplemented by exercise testing variables and extent of proposed surgery help identify patients at risk of postoperative complications.

S33-2 SEPARATING THE LUNGS - CHOOSING AND INSERTING A DOUBLE LUMEN TUBE

W J Russell, Royal Adelaide Hospital, Adelaide, South Australia

The insertion of a double lumen tube (DLT) should be planned in a logical manner.

Selection

Unless surgery involves the left main bronchus, the bronchial cuff is placed on the left. The tube size is selected from the diameter of the left main bronchus on a standard PA chest Xray. Unfortunately the size of the bronchial tube differs between manufacturers. The length to be inserted can be estimated by the distance between the sternal angle and the anterior border of the ear lobe.

Insertion

The tube is inserted only until the bronchial cuff is in the trachea. The breathing circuit is connected directly to the left tube and the bronchial cuff is inflated to seal the trachea. The DLT now ventilates both lungs. With each breath, the tube is advanced in the trachea until the tip of the bronchial tube enters the left main bronchus. This is recognised by one lung ventilation, resistance to further advancement and reduce compliance. The bronchial cuff is deflated. The tube is advanced the width of the cuff plus one centimeter.

Securing

The bronchial cuff now seals with about 1 - 2ml air. The connections are reversed and the tracheal cuff inflated until a seal is achieved.

Conclusions

This method of inserting the double lumen tube is quick and accurate in most patients. It can also be used for insertion of a right sided tube if that is necessary.

S33-3 OPTIMIZING GAS EXCHANGE DURING ONE LUNG VENTILATION

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In considering gas exchange, oxygenation rather than carbon dioxide elimination is of prime importance and is most threatened during one lung ventilation (OLV). This presentation approaches optimization of oxygenation by firstly establishing the basic principles of successful OLV through pre-operative investigation, planning and preparation, successful isolation of the lung, and consideration of pathophysiology of OLV. Only then is one able to understand and apply techniques which may most effectively and practically improve gas exchange.

Carbon dioxide retention is normally not significant during OLV and even if it does occur, the consequences are not regarded as significant. The most important determinants of arterial oxygenation and oxygen delivery (in terms of the pathophysiology of OLV) are inspired oxygen concentration, gas exchange efficiency of the ventilated lung, blood flow through the unventilated lung, residual gas and gas flow through the unventilated lung, and cardiac output. Each of these factors will be discussed in detail.

In practical terms, adequate arterial oxygenation can be ensured in most patients by following a simple plan of management. This should include the maintenance of tidal volume during OLV as for two lungs, inspired oxygen of 50% or more, maintain cardiac output at normal levels, add no PEEP or CPAP to either lung, and monitor arterial oxygenation, haemodynamics and the surgery closely. If oxygenation becomes insufficient, various options may be considered, the first of which will be to increase inspired oxygen, and the second will be to inflate or partially inflate the unventilated lung. Other proposed manipulations will be considered.

S33-4 ANAESTHESIA FOR LUNG VOLUME REDUCTION SURGERY IN COPD PATIENTS

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(Abstract not available at the time of printing)

S34-1 TUBERCULOSIS: OLD DISEASE, NEW PROBLEMS

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Tuberculosis is an old disease caused by tubercle bacillus which discovered more than 100 years ago, become a serious public health threat world wide, responsible for more than 3 million deaths per year.

Unappropriateness of tuberculosis therapy lead to resurgence of Multi Drug Resistant (MDR) strain. MDR tuberculosis is the only HIV infection related opportunistic infection that present a threat to the general population. 95% of tuberculosis cases occur in developing countries, arise problems to the control of the disease, like, poor patients adherence to therapy, deficiencies in resources and medical management and lack of governmental support.

From WHO report 1998, revealed that Indonesia is the 3rd rank of highest incidence rate of tuberculosis among the countries in the world, after China and India. Early diagnosis of tuberculosis is difficult. One surgical patient with undiagnosed tuberculosis can expose many hospital personnel to the disease. Health care workers have a greater risk of tuberculosis infection than the general population.

Eddie SS and Sutanto reported (data from 1995 - 1997) in Hasan Sadikin Hospital, from 2973 pulmonary patients, 1206 patients (40.56%) were pulmonary tuberculosis with 206 (26.3%) patient smear positive and culture positive in 29 patients (29.6%). Among the tuberculosis patients 610 (50.58%) took the medications regularly while 140 (11.6%) patients are not regularly took the drugs and 416 (34.49%) patients dropped out. The pattern of resistancy test are: 64.07% resistant to Rifampicin, 32.61% resistant to isoniazide, 23.17% resistant to ethambutol and 15.87% resistant to pyrazinamide. Multiple drug resistant performance are: 27.03% resistant to single drug, 27.46% resistant to 2 drug combination, 17.39% resistant to 3 drug combination.

Early diagnosis and case finding of tuberculosis and appropriateness of therapy still our main problem in the tuberculosis program in Indonesia.

S34-2 THE RECENT VIRAL ENCEPHALITIS OUTBREAK: SEREMBAN ICU EXPERIENCE

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(Abstract not available at the time of printing)

S34-3 **MAGNESIUM SULPHATE THERAPY FOR SEVERE TETANUS - AN EXPERIENCE WITH 30 CASES**

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Tetanus has been aptly described as a third world disease which requires first world technology to treat. There is therefore a search for drugs which can avoid artificial ventilation and sedation. Magnesium sulphate (Mg) has been reported to be effective in the suppression of sympathetic over activity in tetanus. Following a pilot study on 8 patients we now report our experiences with 30 patients suffering from severe (26) or moderate tetanus (4) who were treated with magnesium sulphate as the sole therapy for the control of spasms and sympathetic over activity.

A loading dose of 5g was given intravenously over 30 minutes followed by an infusion of 1 - 2g/hour which was titrated to the control of spasms. If the tidal volume fell below 5ml/kg ventilatory support was provided. Spasms were controlled at doses ranging from 1 - 4.5g/hour. Serum magnesium concentrations ranged from 2 - 4.2mmol/l.

Ventilatory support was required in 29% of patients (<60yr). 3 of them had lung pathology and one patient with very severe spasms required high doses of Mg. In the older age group (60yr and over) 79% required ventilatory support for varying periods. The need for ventilatory support should therefore be anticipated in the elderly and those who develop lung pathology.

Once the spasms were controlled there was no evidence of sympathetic over activity. 4 patients had episodes of hypotension and 2 had bradycardia.

Patients were conscious and rational throughout therapy and this simplified nursing care.

In the younger age group the duration of Mg therapy and ICU stay were 17.3 + 6.3) and 21(+ 7) days respectively. Mortality was nil. In the older age group the duration of Mg therapy and ICU stay were (20 + 4.6) and 26.6(+6.1) respectively. Mortality was 28%. Mortality with Mg compares favourably with reported mortality with traditional treatment. There were no deaths due to autonomic dysfunction.

We conclude that the outcome of severe tetanus with Mg therapy compares well with that of traditional treatment both in severe cases and in the elderly. It is possible to control muscle spasms and sympathetic over activity without supplementary therapy but ventilatory facilities must be available especially to the elderly and the very severe cases.

| Incubation Periods and Onset Times | | | |
|---|-----------------------|-------------------------|-----------------------|
| Incubation period (days) | No of Patients | Onset time (hrs) | No of Patients |
| 1-7 | 11 | 12-24 | 11 |
| 8-14 | 9 | 24-48 | 6 |
| 15-21 | 3 | 48-72 | 1 |
| >21 | 1 | >72 | 8 |
| not known | 6 | none | 4 (moderate) |

S34-4 CRITICAL CARE MANAGEMENT OF DENGUE SHOCK SYNDROME (DSS)

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General Considerations

The major pathophysiologic changes that determine disease severity in DHF/DSS is an acute increase in vascular permeability that leads to leakage of plasma with resultant hypovolaemia/shock and abnormal haemostasis that may cause bleeding. These changes occur between the 3rd and 5th day of fever. The duration of leakage is 24 to 48 hours in most cases. Supporting evidence of plasma leakage includes haemoconcentration, pleural effusion, hypoproteinaemia and ascites.

The prognosis of dengue haemorrhagic fever (DHF) or DSS depends on early diagnosis and recognition of plasma leakage. This can be detected by frequent monitoring of the patient's haematocrit level and platelet count, which may change around or after the third day of fever. Therapy in DHF/DSS is directed at replacement of lost plasma and maintenance of adequate circulatory volume for the 24 to 48 hour period of increased vascular permeability. The intravenous fluids should be isotonic, i.e., 0.9% sodium chloride solution or Ringer's lactate. Since the rate of plasma leakage is not constant throughout the 24 - 48 hour period, the volume and rate of intravenous infusion should be carefully balanced by monitoring the haematocrit level. A delay in recognition of hypovolaemic shock or inadequate restoration of blood volume is associated with clinically significant haemorrhage which carries a high mortality.

Management of Dengue Shock Syndrome

DSS is a medical emergency. The most important aspect of managing DHF/DSS cases is the recognition of shock and adequate and judicious volume replacement. Treatment of shock consists of immediate fluid resuscitation with 20 - 30ml per kg of 0.9% sodium chloride, Ringer's Lactate, or Haemaccel until the peripheral pulse volume return to normal. Ideally patients with shock should be managed in an intensive care setting with close clinical monitoring of vital signs and serial haematocrit. Invasive forms of monitoring such as central venous pressure monitoring is definitely not advisable because of the risk of bleeding. Further intravenous fluids are regulated to the degree of plasma leakage, which is reflected in the haematocrit levels. Thus, serial and frequent (2 to 6 hourly) monitoring of the haematocrit is an essential guide to further fluid replacement. The urine output and close observation of the pulse volume and peripheral perfusion provide further clinical guides. Further fluids may be infused at 1 to 1.5 times the maintenance rate as Dextrose 5% - 0.45% sodium chloride solution. The volume of fluid replacement should be just sufficient to maintain effective circulation during the period of leakage of 24 to 48 hours. Excessive volume replacement and continuation for a longer period after the cessation of leakage will cause massive pleural effusion and ascites, pulmonary congestion and oedema during the convalescent stage when extravasated plasma is reabsorbed.

Fluid therapy should be discontinued when haematocrit decreases to around 40% and vital signs are stable. A good urine flow indicates sufficient circulating plasma volume. A return of appetite and diuresis are signs of recovery. In general there is no need for intravenous fluid therapy for more than 48 hours after the onset of leakage or shock. Reabsorption of extravasated plasma takes place 2 to 3 days thereafter, manifested by a further drop in haematocrit after IV therapy has been stopped and mobilisation of pleural effusion and ascites has occurred. If more IV fluids are given at this stage, hypervolaemia, heart failure and pulmonary oedema will occur. If respiratory embarrassment occurs at this stage small doses of frusemide may be useful to aid diuresis.

Important reminders are:

1. A drop in platelet count precedes the rise in haematocrit in DHF.
2. A drop in haematocrit in a haemodynamically stable patient is a sign of adequate intravascular volume.
3. A drop in haematocrit without clinical improvement may be a sign of internal haemorrhage, usually gastrointestinal haemorrhage, and blood transfusion may be indicated before clinical improvement can be obtained.

4. Transfusion of platelets and fresh frozen plasma in a stable patient to correct laboratory findings of thrombocytopenia and coagulopathy are NOT advocated, and carry the risks of blood borne infections; in other words treat the patient and not the laboratory results.
5. The period of plasma leakage lasts about 24 to 48 hours. After this period, intravenous fluids must be reduced or stopped, especially if there has been a lot of pleural effusion and ascites. If intravenous fluids are not discontinued, the pleural effusion and ascites will be slow to resolve and the patient may even develop pulmonary oedema. If respiratory embarrassment occurs at this stage, small doses of frusemide will be helpful to avert the need for positive pressure ventilation.

In severe bleeding cases, blood transfusion will be required, "safe O" blood may be necessary. Whole blood, platelets, fresh frozen plasma and cryoprecipitate may be required for about 24 to 48 hours until the pathophysiology of DHF stops. The most serious pitfall in the management of shock is failure/delay to recognise concealed internal haemorrhage with resultant prolonged shock. Furthermore transfusion with crystalloid or colloid instead of blood in these cases leads to volume overload and respiratory failure which are the major contributing factors to the high mortality.

The use of corticosteroids or inotropes in the treatment of shock has failed to show any benefits. The efficacy of anticoagulants such as heparin to treat patients with disseminated intravascular coagulation has not been well documented.

In summary, DSS is a pure form of hypovolaemic shock which is reversed by prompt restoration of circulating volume. Massive gastrointestinal haemorrhage follows prolonged shock and remains the most important cause of mortality.

P-8 COMPARISON OF EFFECTIVENESS ACCORDING TO THE DIFFERENT DOSES OF DOXAPRAM IN THE TREATMENT OF POST-ANAESTHETIC SHIVERING

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Introduction

Doxapram injection is a relatively new treatment for post-anesthetic shivering. But according to previous studies, suggested dosage for post-anesthetic shivering differs widely. The purpose of this study was to compare the effectiveness of different doses of doxapram for the treatment of post-anesthetic shivering and hopefully find the minimal effective dose.

Methods

Sixty patients who developed post-anesthetic shivering were divided into six groups of ten patients each. The groups were divided into a control group which received normal saline and the doxapram groups which received five different doses of doxapram (0.15-1.5mg/kg). The antishivering effect, blood pressure and body temperature were compared among the groups.

Results

Compared to the control group, patients in the doxapram groups showed a significant decrease in post-anesthetic shivering. However, there was no significant difference within the doxapram groups.

Conclusions

We conclude that the dose of doxapram required to achieve an antishivering effect would be much less than that currently in use.

P-9 SURVEY OF PATIENT SATISFACTION ON ANAESTHESIA

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Introduction

A survey of patient satisfaction towards anaesthesia was conducted in Hospital Universiti Kebangsaan Malaysia (HUKM) as part of the continuous quality improvement activities.

Methods

Over a 12-days operating period in March 1998, all patients (120) who underwent elective operative procedures from various disciplines were interviewed regarding satisfaction on anaesthesia and data were collected using a questionnaire.

Results

Ninety-six out of 104 (92.3%) patients seen preoperatively by the anaesthetists were given proper explanation regarding the procedure at the preoperative visit. Premedication was ordered for 53 out of 120 (44.2%) patients and out of these only 26 (49.1%) had their medications served. A high incidence of anxiety was noted amongst patients who were not visited by the anaesthetist prior to the procedure. Sixty-four patients out of 120 (53.3%) underwent local anaesthesia while the remaining had general anaesthesia. Only one out of 120 (0.83%) felt mild pain while the rest did not have any complication. Headache was the main morbidity noted (38 out of 120 [26.7%] patients). 102/120 (85%) patients regarded the anaesthesia given as satisfactory. One hundred and sixteen patients out of 120 96.7% were willing to return to HUKM for future anaesthesia and surgery.

P-10 THE EFFECTS OF ORAL CLONIDINE PREMEDICATION ON SEVOFLURANE REQUIREMENTS FOR ANAESTHESIA, HAEMODYNAMIC RESPONSES AND PLASMA CATECHOLAMINE LEVELS

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Introduction

Oral clonidine has been recommended as an agent of premedication because of its analgesic and sedative properties. Furthermore some studies have suggested that clonidine influence plasma glucose homeostasis by modulating endocrinologic responses to surgical stress. We have investigated the effects of oral clonidine premedication in adult who anesthetized with sevoflurane.

Methods

Twenty ASA grade 1 or 2 patients were allocated to receive either placebo or clonidine 5 μ g/kg per Os 90 mins prior to the induction of anesthesia. Heart rate and blood pressure were measured non-invasively. Preoperative anxiety and postoperative pain were assessed using visual analogue scales (VAS). The plasma concentrations of glucose, epinephrine, norepinephrine, dopamine were determined just before induction and at the end of surgery.

Results

The plasma epinephrine levels in patients receiving placebo increased significantly but the others did not. Plasma glucose concentration slightly decreased in both groups. Values of systolic blood pressure were stable in patients receiving clonidine significantly. Assessment of preoperative anxiety and postoperative pain using VAS did not reveal the advantage of clonidine. Clonidine has reduced the requirement for sevoflurane.

Conclusions

Oral clonidine premedication reduced the requirement for sevoflurane and provided stable blood pressure controls by suppressing the norepinephrine release.

P-11 VENOUS BLOOD FLOW MEASUREMENT BY DETERMINATION OF CHANGE IN VENOUS HAEMOGLOBIN SATURATION

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Objective

To evaluate a method of measuring blood flow in vitro by utilizing changes in hemoglobin saturation and to apply the method to measurement of hepatic blood flow clinically.

Methods

Hemoglobin saturation of human blood deoxygenated by bubbling of nitrogen was changed by the injection of 0.2ml oxygenated blood in the in-vitro study. A fiberoptic sensor was attached to the circuit for continuous monitoring of hemoglobin saturation. Signals from the optical fiber were A/D converted and recorded in a computer. In clinical study, 8 critically ill patients were studied. A pulmonary artery catheter was inserted into the inferior vena cava (IVC) via the femoral vein. Ten ml arterial blood was drawn from the radial artery, and injected into the IVC. Hemoglobin saturation was recorded by the same way as for the in-vitro study. Blood flow was calculated using Fick's principle, assuming that all the injected blood passes through the sensor.

Results

In-vitro estimation of blood flow was well correlated with the actual flow ($r_2 = 0.87$). The blood flows in IVC above and below the point of merging with the hepatic vein were 2.96 (0.72 and 1.90 (0.59 (SD) L/min. Average estimated hepatic blood flows was 1.06L/min (range 0.67 to 1.89L/min).

Conclusions

We examined the accuracy and reliability of this new method in the basic study. This method might be clinically useful for measuring hepatic blood flow.

P-12 THE EFFECTS OF CATECHOLAMINE AND PROSTAGLANDIN E1 ON PHARMACOKINETICS OF LIDOCAINE IN ISOLATED PERFUSED RAT LIVER

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Introduction

We previously reported that the metabolism of lidocaine was changed by high dose dopamine and norepinephrine due to possible increased shunt in the liver. Prostaglandin E1 has been reported to decrease intrahepatic shunt. We investigated the effects of catecholamine and prostaglandin E1 on pharmacokinetics of lidocaine in isolated perfused rat liver.

Methods

We used isolated perfused rat liver (IPRL) because we could regulate experimental conditions in IPRL. We selected lidocaine as an indicator drug because the metabolism was limited mainly by hepatic blood flow. The liver was perfused in recirculating system at a constant flow of 20ml/min. Twenty one rats were allocated into three groups, control (n=7), norepinephrine (n=7) and PGE1 (n=7) groups. Norepinephrine and PGE1 were administered at rate of 1.6×10^{-3} mg/ml and 1×10^{-1} ?g/min, respectively. Lidocaine 2mg was administered in every group after perfusion pressure in the recirculating system became stable. The lidocaine concentration in samples was measured by immunoassay (TDX/Dinabot) after 5, 10, 15, 30, 45, 60, 90 minutes. We applied two compartment model to the time-concentration data of lidocaine using SAAM(program.

Results

The perfusion pressure in norepinephrine group was significantly higher than that in control group. There was no significant difference between norepinephrine and PGE1 groups. There were significant difference in the elimination constant (K_e), the area under the time-concentration curve (AUC) and clearance (CL) between norepinephrine and PGE1 group.

Conclusions

Norepinephrine increased K_e and AUC, and it decreased CL. PGE1 increased K_e , AUC, and CL. These data suggest that PGE1 might improve the lidocaine metabolism that has been suppressed by norepinephrine.

P-13 EVALUATION OF LEFT VENTRICULAR DIASTOLIC FUNCTION DURING CORONARY ARTERY BYPASS GRAFTING USING COLOR M-MODE DOPPLER ECHOCARDIOGRAPHY

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Objective

To evaluate the effects of coronary artery bypass graft surgery with cardiopulmonary bypass on left ventricular diastolic function.

Methods

Ten patients scheduled coronary artery bypass graft surgery were studied using transesophageal Doppler echocardiography. Doppler measurements included peak velocity during early filling (peak E velocity), peak velocity during atrial contraction (peak A velocity), and the ratio of peak E velocity to peak A velocity (E/A). Rate of propagation of peak early filling flow velocity (FPV) was also measured using color M-mode Doppler echocardiography. Hemodynamic and Doppler-derived variables were measured before and after sternotomy, after the end of cardiopulmonary bypass (CPB) and after closure of the sternum. Dopamine and dobutamine were administered after CPB in all patients.

Results

E/A showed a significant decrease after sternotomy and did not return to pre-CPB level. FPV increased after CPB. FPV was correlated with E/A (pre-CPB: $r=0.54$, $p=0.013$; post-CPB: $r=0.54$, $p=0.014$). E/A had a significant correlation with heart rate. After the influence of heart rate was eliminated by the analysis of covariance, corrected E/A value in post-CPB was significantly higher than that in pre-CPB (0.68 (0.29 to 1.10 (0.29), $p<0.05$).

Conclusions

FPV and heart rate-corrected E/A increased after CPB, which suggested improvement of diastolic function during coronary artery bypass graft surgery with cardiopulmonary bypass.

P-14 QUICK-OFFSET PROPOFOL SEDATION IMPROVES THE RELIABILITY OF INTRAVENOUS LIDOCAINE TEST DOSE

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Regional anesthesia generally involves the administration of large amounts of a local anesthetic. Sedation is often performed before and during administration of regional and general anesthesia with epidural anesthesia. However, these sedatives may act on the CNS and mask symptoms that distinguish a positive local anesthetic test dose. To overcome this problem, we propose the use of quick-offset sedation (eg. propofol). This study examines whether premedication with propofol prevents reliable detection of an iv lidocaine test dose. Twenty patients were randomly divided and administered either routine premedication (cercine, hydroxicidine, etc: $n=10$) or continuous propofol iv (1mg/kg/hr: $n=10$) until 10min before iv administration of lidocaine. Two hours later, iv administration of iv lidocaine 1mg/kg was initiated. At 1.5min before (baseline) and every minute after lidocaine administration, each subject was questioned regarding the presence of four symptoms (tinnitus, perioral numbness, metallic taste, or light-headedness) indicative of systemic lidocaine toxicity. At the baseline period, a blind observer graded the patient's level of consciousness using a sedation scale (Ramsey Score). In the PF group, all 10 patients (100% sensitivity) had a positive response to iv lidocaine test dose within 5min, but only 4 of the 10 patients in the routine sedation group had a positive response (40% sensitivity: $p=0.007$). These results suggest that quick-offset propofol sedation enables the return of patient sensorium before injection of the local anesthetic.

P-15 PROPOFOL ANAESTHESIA IN COLONOSCOPY

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Introduction

Colonoscopy is an ambulatory procedure: short but painful, troublesome for both the patient and physician. The anesthetic technique must satisfy requirements on patient: calmness, pain relief, less side-effects, safe and early discharge.

Objective

Evaluation of effects and side-effects in using propofol as main drug in giving anesthesia.

Methods

Patient having colonoscopy indication for diagnosis, treatment, and following the evolution of disease, ASA I, II, age above 15 years. Premedication as usual with midazolam 0.04mg/kg and atropine 0.01mg/kg. Induction: propofol iv bolus 2 - 2.5mg/kg with E.S. Maintenance: propofol 5 - 7mg/kg perfusion. Followed signs per and post anesthesia. Hemodynamic: pulse, blood pressure. Respiratory: rate, SpO₂. Conscious and side-effects if any. Overall evaluation: excellent, good, bad.

Results

102 patients underwent anesthesia for colonoscopy. Mean age: 44 (15 years, BW: 49 (6kg. Endoscope tip reach the caecum: 91. Duration of anesthesia 22 (5mins. Endoscopy 12 (6mins. Propofol dosage/patient: 145 (53mg. Evaluation: excellent 94 (92%), good 8 (8%). Hemodynamic, respiratory parameters: no big changes in comparison with that before anesthesia. Consciousness during recovery time: open eye after 10 (3mins; accurate answer after 15 (5mins; oriented walking: 54 (14; discharge: 68 (12mins. Post-anesthesia side-effects: nausea 2, secretion 2; pain on injection site 24.

Conclusions

Propofol anesthesia satisfies colonoscopy procedure. Early recovery but slower than usual perhaps due to midazolam combination. Well being feeling after anesthesia. No need morphinomimetic but with small dose of midazolam for premedication the propofol dose is not as high as that in using alone.

P-16 PERCEPTION OF ANAESTHESIA AS A PROFESSION - EFFECT OF A SIX-MONTH POSTING IN THE SPECIALTY

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Introduction

Recent surveys have revealed decreased work satisfaction amongst doctors. Coupled with the image of anaesthesia as a stressful specialty, we sought to assess the view of non-trainee, recently qualifies, doctors who were posted to the department for a six-month rotation on the desirability of anaesthesia as a career and their perception of anaesthetists in general.

Methods

A multiple choice questionnaire survey was conducted prior to, and at the end of posting.

Results

28 doctors (majority age: 26 - 30yrs) participated in the survey. 32.1% were undecided on their choice of career initially, but after six months, this fell to 17.9%. More specifically, the percentage of those who definitely would not consider taking up anaesthesia as a career increased from 14.3% to 35.7%. On the other hand, 7.1% considered anaesthesia as a "strong possibility" as a career and this was increased to 25% after six months. 57.1% were attracted by the good job prospects in the specialty and this perception increased to 71.4% after six months.

Regarding the image of the anaesthetists' within the medical profession, 60.7% considered this to be acceptable, but after six months, this had fallen to 46.4%. Before starting, most felt that anaesthetists would be generally happy in their work (85.7%) but after a six-month exposure in the unit, this fell to 64.3%.

On the issue of stress, 71.4% felt that anaesthesia was a stressful specialty and this increased to 82.1% at the end of the rotation. Most (60.7%) felt that lack of control over their time was a significant source of stress to the anaesthetist and this perception was increased after six months (67.9%).

Discussion

This survey has shown that a six-month rotation helps young doctors who are uncertain about career choices, making the decision to take up anaesthesia. The main attraction remains the job prospects but the negative aspects of the specialty pertain to the lack of control over time. The perceived decreased job satisfaction and poor image amongst established anaesthetists are of concern. Further research is needed to identify the dissatisfied in our practice and to whether the profession needs to institute formal support mechanisms.

P-17 MULTIPLE REGRESSION ANALYSIS OF LACTIC ACIDOSIS IN HEPATIC SURGERY

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We investigated the predictors of lactic acidosis during hepatic surgery with multiple regression analysis. The data of 134 adult patients who had hepatic surgery in last 18 months were retrieved from Hokkaido University Hospital Operation Room Data Management System (HODMS), which contained the perioperative data of 20,000 surgical patients at present time. As explanation variants, we chose lability index¹, mean blood pressure (MAP) during surgery, operation time, blood loss, total fluid volume, dose of bicarbonate, age, gender, height, body weight, body mass index, as well as the data of arterial blood gas analysis measured with ABL 625 System. Lactate values over 5mmol/l were observed in 29 cases (21.6%), and pH values under 7.30 were observed in 24 cases (17.9%). Maximal lactate value (mmol/l) in blood was significantly correlated with minimal base excess (BE), minimal pH, total fluid volume, and dose of bicarbonate (regression coefficients = -0.489, -0.227, 0.223, 0.209, respectively). Also minimal pH was significantly correlated only with minimal BE. There was no correlation between lactate or pH values and lability index, MAP, age, obesity, or blood loss. Our data suggest that the increase of blood lactate is well related with the decrease of pH or BE, and there is little relation between lability of MAP, or MAP itself and lactic acidosis.

P-18 THE DIRECT CARDIAC EFFECTS OF VECURONIUM AND PANCURONIUM IN ISOLATED RAT HEARTS

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Vecuronium is commonly used in clinical anesthetic practice because it causes minimal hemodynamic complications. However, the development of bradycardia and asystole after administration of vecuronium has been reported, although the reason for these hemodynamic changes has not been explained. The purpose of this study is to evaluate the direct cardiac effects of vecuronium compared with those of pancuronium. Forty-two rates were divided in two groups: the electrically pacing heart rate group and the spontaneous heart rate group. According to the method of Langendorff, the isolated heart was perfused with a solution containing vecuronium or pancuronium at a concentration of 1, 10 or 100 μ M, respectively. Heart rate, systolic left ventricular pressure, left ventricular maximum rate of pressure development, coronary flow and myocardial oxygen consumption were measured. In the pacing heart rate groupm there were no significant changes in hemodynamic states. In the spontaneous heart rate group, vecuronium reduced HR at the 100 μ M. Pancuronium increased HR at the concentrations of 10 and 100 μ M. Vecuronium or pancuronium exerted no effects on another hemodynamic states.

We concluded that vecuronium has effect on the cardiac conduction system in the denervated heart only at the high concentration (greater than 20 times those of ED 90 for skeletal muscle relaxation).

P-19 CUFFED OROPHARYNGEAL AIRWAY IN ANAESTHETISED PATIENTS AT MAHARAJ CHIANG MAJ HOSPITAL

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The cuffed oropharyngeal airway (COPA[®]) was first described by Greenberg and Toung in 1992 as a potential airway during anesthesia in spontaneous breathing patients. To determine the ease and the problems of its use in the anesthetized Thai patients. The study was conducted in forty patients undergoing minor surgery under general anesthesia with cuffed oropharyngeal airway for spontaneous breathing at Maharaj Nakorn Chiang Mai Hospital.

After induction, the first and second attempts in successful insertion of the cuffed oropharyngeal airway were noted in 33 (82.5%) and 5 (12.5%) patients respectively. The conditions for airway insertion were good to excellent and satisfactory in 29 (72.5%) and 10 (25.0%) respectively. Brief airway manipulations during the maintenance of anesthesia; ie chin lift, head tilt and jaw thrust were recorded in 14 (35%), 10 (25%) and 3 (7.5%) patients respectively. The frequencies of airway obstruction and cardiac arrhythmia were observed in 4 and 1 respectively. However, these incidents were successfully managed by airway manipulations and deepening the anesthesia. The frequencies of postoperative sore throat, jaw-ache, sore tongue and vomiting were reported in 3, 2, 1 and 2 patients respectively.

The result from this report has supported the use of cuffed oropharyngeal airway as alternative in airway management during anesthesia in spontaneous breathing patients. However, further studies are still required to determine the optimal head and neck position and other unexpected undesirable effects in a large scale study.

P-20 SPONTANEOUS CHYLOTHORAX: A CASE REPORT

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A 19-year old male patient complained of shortness of breath. Aspiration of the pleural fluid revealed chylothorax. Right chest tube was inserted. His ABG showed hypoxaemia with relative hypercarbia. He underwent right thoracotomy and thoracic duct ligation under general anaesthesia and double lumen endobroncheal intubation. During surgery he lost 1.5L blood and 4L chyle. He was transferred to the SICU intubated and ventilated. On the subsequent days chyle leak was reduced to a minimum of 10ml/hr. On the 9th postoperative day the trachea was extubated. He was receiving TPNN 2600kcal/day. He was transferred to the normal floor on the 15th day. After 7 days he was readmitted, his chest showed severe lung fibrosis and consolidation. His ABG showed severe Hypercarbia 126mmHg. The trachea was reintubated. His condition deteriorated and he was considered for lung transplantation. No donor was available. Later he arrested and died. Anaesthesia and surgical management of spontaneous chylothorax is challenging. The mortality rate is high.

P-21 PREOPERATIVE HAEMOGLOBIN TESTING IN HEALTHY CHILDREN UNDERGOING ELECTIVE SURGERY, IS IT NECESSARY?

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Introduction

Routine preoperative haemoglobin testing in healthy paediatric patients scheduled for surgery is still being practiced. This study was undertaken to determine the value of routine preoperative haemoglobin testing in healthy children and to establish how these results influence the decision of accepting patients for anaesthesia.

Methods

130 paediatric patients scheduled for minor surgery in which a routine preoperative haemoglobin level was done were included. The arbitrary level of 10g/dl was selected as the minimum requirement for anaesthesia and surgery.

Results

The mean haemoglobin values for the 130 patients was 11.5+1.0g/dl and ranged from 9.2 to 14.5g/dl. Two patients (1.5%) aged 3.5 months and 5 months respectively had a haemoglobin level below 10g/dl (9.2g/dl) and underwent anaesthesia without any complications.

Discussion

We observed that significant anemia is rare in otherwise healthy children. Routine preoperative hemoglobin testing may create unnecessary discomfort for young children. The results rarely influence the conduct of anaesthetic in most cases. We conclude that healthy children scheduled for minor surgery do not require routine haemoglobin testing.

P-22 STRICT TEMPERATURE CONTROL HAS NO EFFECT ON INJECTION PAIN WITH PROPOFOL

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Introduction

Ozturk et al., demonstrated no difference in the incidence of pain felt by patients during the injection of cold, room temperature and body temperature propofol. We were, however, concerned that spontaneous warming of the cold propofol, during the interval between removal from the refrigerator and injection might have been sufficient to "mask" any beneficial effects. Ozturk et al., did not describe how they controlled the temperatures of their injectates. Given these concerns, we repeated the study of Ozturk et al, but with close monitoring of the injectate temperature.

Methods

The study was approved by our local Institutional Medical Ethics Committee and Informed consent was obtained from 75 female surgical patients. 2.5mg/kg of propofol was injected via a 3-way stopcock attached directly to a cannula in the cephalic vein at the rate of 10ml in 30secs. Patients were randomly assigned to receive propofol at 25°C, 4°C or 37°C. Cold propofol syringes were kept on ice, warm syringes in a 40°C water bath ("Toray' Blood Warmer (TM 90, Toray, Toray, Tokyo) and room temperature syringes in a beaker. In each

patient, Three pairs of propofol syringes were prepared, one for injection, the other for each temperature, using a measurement probe (Terumo Finer model CTN-303, Terumo, Tokyo) inserted through the cut-off nozzle and fixed to the syringe by adhesive tapes. When the temperature reached near the target degree, The monitoring person removed both syringes from the "temperature controlled box". One syringe was handed to the attending anaesthesiologist who held the piston rod in the hand and then performed the injection. The other syringe was left in the monitor's hand in a similar fashion, while the contained drug temperature was monitored beneath the table. The injector started to administer propofol at a sign from the monitor. Pain scores during injection were determined as described by Ozturk et al.

Results

There were no intergroup differences in age or weight. There were no differences in the reported pain scores of the groups ($P=0.31$, Kruskal-Wallis test). There were also no differences in the distribution of pain scores ($P=0.33$, chi-square analysis).

Conclusions

The results, like those of Ozturk et al. suggest that the temperature of the propofol during injections is not an important determinant of pain.

P-23 PLASMA CHOLINESTERASE ACTIVITY IN MALAYSIAN CHILDREN

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Introduction

Reference values for plasma cholinesterase activity for Malaysian adults are available but data for Malaysian children are not available at all.

Methods

Plasma cholinesterase activity, dibucaine and fluoride numbers were measured in 75 healthy Malaysian children aged between 5 months and 14 years. These values were compared with 25 healthy adults.

Results

The mean plasma cholinesterase activity was 3785.0U/l (range 966.3 - 6921 U/l). The mean dibucaine and fluoride numbers were 96.6+5.1 (range 86.9 - 98.9) and 95.8+3.9 (range 85.4 - 98.9). There was no significant difference in the plasma cholinesterase level between children and adults. One child was found to have a low cholinesterase activity and presumed to have an atypical variant of the enzyme.

P24 PREVENTION OF HYPOTENSION DURING SPINAL ANAESTHESIA: A COMPARISON BETWEEN INTRAVENOUS ADMINISTRATION OF HAES-STERIL® 6% AND RINGER'S LACTATE SOLUTION

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Objective

To compare the efficacy of HAES-steril®6% to that of Ringer's lactate solution in reducing the incidence and severity of hypotension during spinal anaesthesia in non-obstetric patients.

Methods

60 ASA physical status I and II patients, aged between 17 and 70 years, scheduled for surgery under spinal anaesthesia, were randomized into two groups of 30 patients each. Group 1 received 500ml of HAES-steril®6% solution and Group 2 received 1,000ml of Ringer's lactate solution over 10 to 15 minutes prior to spinal anaesthesia. Hypotension was defined as a drop of 20% or more systolic blood pressure from the baseline.

Results

Four patients (13/3%) in the HAES-steril®6% group and nine patients (30%) in the Ringer's lactate group developed hypotension. However, this was not statistically significant ($p < 0.05$). The episodes of hypotension were short-lived, reversed rapidly by intravenous boluses of ephedrine or/and intravenous fluids. The mean time to hypotension (12.5 vs 7.5min), amount of ephedrine (15 vs 12mg) and the intraoperative fluid administration (571.7 vs 573.3ml) were not statistically significant between the two groups.

Conclusions

Administration of 500ml of HAES-steril®6% solution prior to spinal anaesthesia is as effective as 1,000ml of Ringer's lactate solution in attenuating spinal anaesthesia-induced hypotension in non-obstetric patients.

P-25 THE EFFECTS OF BLOOD TRANSFUSION ON BLOOD IONISED CALCIUM CONCENTRATIONS DURING SURGERY

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It is well documented that ionized calcium concentrations in blood (Ca^{2+}) decreased during blood transfusion. However, there is few quantitative studies between Ca^{2+} and transfusion volume. This retrospective study was designed to evaluate the effect of transfusion on Ca^{2+} during surgery.

The data of 1,817 patients in recent seven years were retrieved from Hokkaido University Hospital Operation Room Data Management System (HODMS), which contained the perioperative data of 20,000 surgical patients. Arterial minimal and maximal ionized calcium concentrations were measured with ABL 625 System. Blood transfusion volume was 1,402.4 (1,854.7ml. (mean SD, $n=1817$). The minimal Ca^{2+} value (mmol/l) was significantly correlated with the transfusion volume (ml) in patients who did not receive any calcium agents such as calcium gluconate or calcium chloride ($r=0.533$, $y=3.8 \times 10^{-5} + 1.021$).

Our data suggest that more blood transfusion makes lower value of Ca^{2+} during surgery.

P-26 ANAESTHETIC IMPLICATIONS OF MINIMALLY INVASIVE CARDIAC SURGERY

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Recent interest in minimally invasive cardiac surgery (MICS) has been attributed to the high cost of conventional coronary artery bypass graft, competition from percutaneous transluminal coronary angioplasty, drawbacks of cardiopulmonary bypass (CPB) and patient's demands. Evolutionary, two aspects of MICS are, (1) MICS without CPB (MIDCAB and OPCAB); and (2) MICS with CPB (partial sternotomy and Port access surgery). Avoidance of CPB reduces morbidities involving perioperative myocardial infarction, neurological sequelae, coagulopathies and other systemic dysfunctions (whole body inflammatory response).

Minimally Invasive Direct Coronary Artery Grafts (MIDCAB) and Off Pump Coronary Artery Grafts (OPCAB) with the innovative use of Tissue stabilizer has further enhanced the appeal of these techniques. Moreover, cumulative favourable reports have established the safety and both early and intermediate term patency rate of coronary artery grafts performed with these newer techniques. Specific anesthetic considerations include meticulous ischemic and hemodynamic management intraoperatively during surgical handling of the heart. Minutalization of incision offers both cosmesis, expedites recovery from musculoskeletal trauma and certain specific pathological conditions (chestwall deformity and previous sternotomy with intact IMA).

Taking this minimally invasiveness further, Stanford group develops a technique that provides full CPB without need for sternotomy and a system to perform cardiac surgery thoracoscopically. Participation of anesthetist involved acquiring of new skills: Transthoracic Echocardiography aided insertion of coronary sinus catheter (Retrograde cardioplegia) and Endopulmonary vent.

Conclusions

With a greater understanding of anesthetic implications toward these MICS will ensure a successful outcome and earlier return to productive lives.