INTRODUCTION

The Cardiothoracic Department, General Hospital, Kuala Lumpur which was set up in April 1982, deals with a wide range of cardiac disease, general thoracic and also vascular cases. A total of 2,450 operations were performed from April 1982 to February 1987, and 79.3% of these were for cardiac cases (open and closed heart). This paper reports a review of the 1,110 consecutive open heart operations performed by the Department during the stated period.

PATIENTS AND METHODS

The patients undergoing open heart surgery varied in age from 1 month to 69 years. 765 patients were below 30 years of age (Table I) and 223 were from East Malaysia (Table II).

<table>
<thead>
<tr>
<th>Age (vrs.)</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15</td>
<td>346</td>
</tr>
<tr>
<td>16 - 30</td>
<td>419</td>
</tr>
<tr>
<td>31 - 60</td>
<td>336</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Origin</th>
<th>Patients (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Malaysia</td>
<td>875</td>
</tr>
<tr>
<td>East Malaysia</td>
<td>233</td>
</tr>
<tr>
<td>Others</td>
<td>2 (from Indonesia and Burma)</td>
</tr>
</tbody>
</table>

When the Cardiac Intensive Care Unit (CICU) began, all patients with congenital heart disease, rheumatic valvular disease and coronary artery disease had invasive, cardiac catheterisation prior to surgery. However since early 1986, those with atrial septal defects and those with valvular lesions...
were accepted for surgery without undergoing this procedure if their diagnosis were clear on clinical and non-invasive studies alone.

Conventional hypothermic cardiopulmonary bypass using bubble oxygenator was used routinely. Fifteen patients weighing less than 7 kg underwent correction of congenital defect under profound hypothermia with circulatory arrest. Throughout the series, an average of about 3 units of blood per person was used for both adults and children.

Post-operatively, all patients were nursed in the CICU. Their progress were routinely monitored by right and sometimes left atrial pressure measurements, arterial pressure, urine output, blood drainage and ECG. Serial blood gases, serum electrolyte estimations and portable chest X-ray also formed an essential part of the postoperative management. The average stay in CICU was 48 hours. The average stay in hospital after surgery was 14 days.

RESULTS
Table III shows the breakdown of the number of open heart surgery performed on a yearly basis. 536 operations were for acquired and 574 for congenital heart disease (Table IV).

Acquired Heart Disease

Valve Replacement. Valve surgery formed the largest single group. A total of 303 patients underwent valve replacement and the total hospital mortality for this group was 3.0% (Table V). 19 patients in addition had simultaneous procedures performed and three died (Table VI).

Five patients underwent emergency valve replacement of which three had bacterial endocarditis (two native aortic valve and one prosthetic endocarditis in the mitral position). One patient had a perivalvular leak in the aortic position six months after valve replacement and the other patient had a failure (cusp rupture) of a bioprosthesis in the mitral position. The single death in the aortic group was a patient who had a simultaneous ascending aortic replacement for acute dissection. She had features of Marfan's Syndrome.

Mitral Valvotomy. One hundred patients underwent mitral valvotomy. Open valvotomy is routinely performed for mitral stenosis with mobile leaflets in our department. Three of the patients were in the second trimester of pregnancy and following surgery all completed the pregnancy
uneventfully and had normal deliveries. The one
death in this group was due to cerebral infarction
secondary to embolism. She was in atrial fibrillation
and had large amounts of clot in the left atrium.

Coronary Artery Surgery. This bypass was per­
formed in 118 patients and there were no deaths
in this group (Table VII).

<table>
<thead>
<tr>
<th>Operations</th>
<th>Patients (no.)</th>
<th>Deaths (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure of ASD (includes</td>
<td>329</td>
<td>2</td>
</tr>
<tr>
<td>Sinus venous and ostium primum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure of ASD</td>
<td>158</td>
<td>7</td>
</tr>
<tr>
<td>Total correction of</td>
<td>55</td>
<td>7</td>
</tr>
<tr>
<td>Tetralogy of Fallot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Pulmonary Valvotomy</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Infundibular Resection</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

The age range was between 30–67 years. The
youngest patient was a 30-year-old Chinese female
who had hyperlipidaemia. Interestingly, 53
patients had previous myocardial infarction.
Seventy had hyperlipidaemia and 76 were chronic
smokers prior to surgery. Thirty patients had left
main stem disease and 68 patients had triple
vessel disease.

Miscellaneous. The 15 miscellaneous operations
in the acquired group included the removal of
six atrial myxomas and one ventricular sarcoma.
There were three cases of ruptured sinus of
valvulae presenting in the space of four months.
One patient had a resection of a left ventricular
aneurysm. The single mortality in this group was
an elderly lady who had a left atrial myxoma with
severe pulmonary hypertension. She died of right
ventricular failure on the night of surgery.

Congenital Heart Disease

Table VIII shows the breakdown of the opera­
tions for congenital heart disease. The four most
common diagnoses were atrial septal defect, ven­
tricular septal defect, Fallot's Tetralogy and
pulmonary stenosis. The overall hospital mortali­
ity for this group was 3.0%. The two patients that
died in the ASD group had severe systemic pul­
monary hypertension with minimal left to right
shunt; one died of right heart failure and the other
of respiratory failure in the early post-operative period. Similarly, the seven deaths in
the VSD group had severe pulmonary vascular
disease: three of them were less than 7 kg and
had undergone surgery under profound hypo­
themia and circulatory arrest.

In the miscellaneous group, three patients
underwent transpulmonary closure of persistent
ductus arteriosus for persistent shunt following
PDA ligation (Table IX). The single death was
a month-old infant who underwent surgery
for pulmonary atresia.

<table>
<thead>
<tr>
<th>Operations</th>
<th>Patients (no.)</th>
<th>Deaths in hospital (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure of PDA under Cardiopulmonary Bypass</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Mustard’s Operation for Transposition of Great Arteries</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Repair of Hemitruncus</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Complete A. V. Canal</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Corrallatrium</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Pulmonary Atresia</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

DISCUSSION

In this review, we have recorded the per­
formance of a new department in its initial five years
of service. The paper also gives an insight into the
spectrum of surgically-treatable heart disease
that is found in our population. The total overall hospital mortality of 2.5% compares favourably with other centres.

**Valvular Heart Disease**

Rheumatic heart disease is a major problem in our population. It accounts for almost all the valvular heart lesions in our series. Most of our patients (more than 80%) were below the age of 30 years and more than 75% were in functional class III to IV with cardiomegaly and impaired ventricular function. Our early evaluation of the results of valve replacement in terms of symptomatic relief has been most encouraging and we await to see the long-term results.

For acute infective endocarditis, our initial results have shown the obvious benefits of emergency valve replacement. Unremitting fever and/or cardiac failure are rapidly controlled following surgery. It is our policy now to treat this serious condition aggressively with early surgery when medical therapy fails.¹⁻³

For mitral stenosis with mobile leaflets, we regard valvotomy by the open method under cardiopulmonary bypass as the surgical treatment of choice. It permits direct visualization of the mitral valve and precise incision of the fused commissures and, if necessary, the subvalvular structures. Left atrial and leaflet thrombi can also be safely removed. In addition, the functional result may be assessed at the time of surgery. The long-term results by this method have been shown to be better than closed valvotomy.⁴

**Coronary Artery Surgery**

In our population, coronary artery disease is a major cause of morbidity and mortality, and surgery can contribute to the reduction of both. In our series, angina pectoris significantly interfering with the patient's lifestyle has been the most common indication for surgery. Other indications for surgery in our series are unstable angina and prophylactically for patients for left main or triple vessel coronary artery disease.

With increasing awareness of the availability of the operation locally, we believe we have to be prepared for a steady and substantial increase in the volume of surgery for coronary artery disease and our results have shown that this can be achieved with low operative risk.

**Congenital Heart Disease**

In this review, 52% of the operations were for congenital heart disease and the hospital mortality for this group was 3.0%. The results of surgery depends on the age of the patient and timing of the surgery. In our experience, most of our cases with acyanotic heart disease present late with evidence of pulmonary vascular disease. However, surgery is usually not contraindicated unless there is clear evidence of shunt reversal. For the cyanotic heart disease, it is our policy to undertake total correction if the anatomy is suitable. For the more complex heart disease and in infants with Fallot's Tetralogy, we usually palliate them with the modified Blalock-Taussig systemic-pulmonary shunt.

**CONCLUSION**

This paper reviews the overall experience of a Department dealing with a wide range of cardiac diseases. This study was not designed to show long-term results but we hope the obvious early benefits in terms of symptomatic relief and return to useful and productive life would be sustained in most patients as time goes on.

**ACKNOWLEDGEMENTS**

The authors wish to thank Tan Sri Datuk Dr. Abdul Khalid bin Sahan, Director-General of Health Malaysia, for permission to publish the paper. We thank Datuk Dr. C. A. Fonseka, Director, General Hospital, Kuala Lumpur, Datuk Dr. Robayah Zambahari and her colleagues in the Cardiology Department, Dato’ Dr S. Radha Krishnan and members of his staff in the Anaesthetic Department; Staff of Blood Bank, rotating Medical Officers, nursing staff, perfusionists, technicians and many others who have contributed so much to the running of the Department.
REFERENCE


