Cardiovascular Surgery between Makkah And Madinah

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Summary: The Saudi Heart Center at the King Fahd Hospital in Jeddah, Saudi Arabia, is located between Makkah (50 km) and Madinah (450 km), receiving patients from all parts of the Kingdom of Saudi Arabia and the middle eastern countries such as Syria, Yemen, Sudan, Egypt and others. It was opened in June 1982 and has performed up to this date 2481 cardiovascular surgeries covering neonatal, paediatric and adult surgeries for congenital and acquired cardiopathies. Eight hundred and sixty-eight patients underwent repair for simple and complex congenital anomalies with a mortality rate of 8.6%. Some 1613 patients underwent surgery for acquired valvular and coronary heart diseases with a mortality rate of 4.0%. The average mortality rate for 2481 cardiovascular surgeries in both groups (141 deaths) was 5.6%.

Material and Methods

A total of 2481 patients underwent cardiovascular surgery. The youngest patient was three years old, the oldest was 72 years of age. The male/female ratio was 1.5 male:2 female. All the patients who underwent repair for congenital cardiac defects or coronary surgery had a pre-operative detailed cardiac catheterisation with complete hemodynamic data, oximetry and contrast angiography. About 40% of the patients below the age of 40 years with clear mitral or aortic valve disease, without advanced pulmonary hypertension or reduced ventricular function are judged by echocardiography (percentage of shortening and ejection fraction) and without associated coronary artery diseases (history and EKG), have undergone open heart surgery without prior cardiac catheterisation.

The Saudi Heart Center reaches a large volume of patients and covers two and a half million of the population in the area, in addition to patients flying to the Center from Yemen, Sudan, Syria and Egypt.

The largest number of patients appearing with congenital or acquired cardiopathies are children or young adults in a rather late advanced and reduced general condition. Advanced pulmonary hypertension (above 60 mmHg),[1] and congestive cardiac failure are frequent. Malnutritional state and hypovitaminosis is also seen in the children group. The majority of the patients are in N.Y.H.A. functional Class III (80%) and 20% in Class IV.

Rheumatic heart disease with its cardiac sequellae makes about 60% of the patient's volume, while congenital heart diseases make 35%. Rheumatic fever is still common in the western parts of the Kingdom (Al Baha, Gizan, Zahran, Ghamed, Taif and even in Makkah). This remains a problem in developing countries.[2]

Type	No.	Deaths
Atrial Septal Defect (ASD I & II)	232	12
Ventricular Septal Defect (VSD)	142	14
Tetralogy of Fallot (TOF)	119	24
Pulmonary Stenosis (PS)	62	2
Discrete Subaortic Stenosis (DSS)	23	2
Congenital Aortic Stenosis	11	–
Double Outlet Right Ventricle (DORV)	5	1
Ebstein Anomaly	4	–
Aorto Pulmonary Window	4	1
Total Atrioventricular Canal	6	2
Total anomalous pulmonary venous return (TAPVR)	2	–
COR Triatriatum	2	–
Truncus Arteriosus	1	1
Dissecting Aneurysm of Ascending Aorta	2	–
Very advanced complex anomalies	9	6
Total No:	624	65

Average Death Rate : 10.4%

Table II:
Open Heart Surgery for Congenital Cardiopathies.

Sinus venosus Atrial Septal Defects are rather frequent and always associated with 1 to 2 abnormally draining pulmonary veins. 6 secundum defects were found to be associated with clefts in the anterior, or more frequently, the posterior leaflet of the mitral valve.

Discrete subaortic stenosis (DSS) is mostly of a fibromuscular type 2–4 mm below the aortic valve. In only two cases,the aortic valve had to be replaced in addition to the excision of the diaphragmatic shelf. Aorta septal approach,[5] or aorta ventriculoplasty for radical excision and myectomy are not used yet. The reported recurrence rate of subvalvular stenosis is still high.[6] However, better results are achieved with aorta ventriculoplasty than simple excision. Since discrete subvalvular aortic stenosis is rather common in Saudi Arabia (24 cases in a 3–year period), we are planning to use this new proposed technique.

Advanced pulmonary hypertension more than 60 mmHg is a common finding in Saudi adults with Atrial Septal Defect (ASD), and Ventricular Septal Defect (VSD) due to the long duration of the disease. Few patients appear with incomplete spontaneous Ventricular Septal Defect (VSD) closure with aneurysmal transformation of the septal leaflet of the tricuspid valve.[7] Many of these patients do appear with multiple cautery scars on their trunks with gross cardiomegaly and intractable heart failure making intensive pre-operative management and preparation, including correction of iron deficiency anaemia, necessary. Rheumatic fever is common and rather endemic in Saudi Arabia, especially in the southern parts of the Kingdom where the climate is rather cold and many children

Many children and adults appear with multiple cautery burn scars on their bodies reflecting long trials of unsuccessful folklore treatment by local healers, which allows the disease to progress to a very advanced neglected state with severe myocardial damage. Some 11 children have appeared with congenital cardiac anomalies, where Eisenmenger Syndrome has developed.

All patients who underwent open heart surgery had standard techniques of extracorporeal circulation employing a membrane oxygenator for major and long cases in adults and bubble oxygenator in children, as it is simple to prepare, efficient and cost-effective.[3] In all surgeries, total bypass was applied, cold potassium cardioplegia (12 mecq/500 cc) used, systemic hypothermia to 28°C and left ventricular venting through an apical stab are routine, as well as topical cooling using slushed ice around the heart. Hemodilution was used on all adult patients. Every patient undergoing open heart surgery donated two liters of regular blood by his relatives and two donors were at standby for fresh blood on the day of surgery. Cyanotic infants are not seen frequently[4] as most of them die at home. Tetralogy of fallot and transposition of the great arteries are most common. Most of the coarctations seen are periductal in type and are well localised with well developed aortae and no hypoplasia so that an anterior gusset angioplasty of the aorta is sufficient. All the patient ductus arteriosus we ligated in double fashion with a transfixion, except in six cases which were divided and sutured. Only one case of P.D.A. recanalisation due to faulty application at the first surgery occured.

Congenital cardiopathies are rather common in the Saudi society. Almost 40% of the cardiac patients requiring surgical help are in the paediatric age group (948 patients under the age of 14 years). Most of these patients appear in an advanced and neglected state with gross cardiomegaly, advanced pulmonary hypertension, congestive cardiac failure and a wasted malnutritional state with iron deficiency anaemia as they are referred late. Intensive pre-operative preparation is usually mandatory.

Type	No.	Deaths
Patent Ductus Arteriosus	177	2
Systemic Pulmonary Artery Shunts	34	6
Coarctation of Aorta	24	1
Vascular Rings	3	–
Pulomanry Artery Banding	3	–
Atrial Septectomy for T.G.A.	3	1
Total No:	244	10

Average Death Rate : 4.0%

Table 1:
Closed Heart Surgery for correction of congenital cardiopathies.

Type	No.	Deaths
Aortic Valve Replacement (AVR)	244	8
Mitral Valve Replacement (MVR)	291	14
Multiple Valve Replacement	104	12
Mitral Valve Repair	480	15
Aortic Valve Repair	18	1
Coronary Artery Bypass	35	4
LA Myxoma	2	–
Thoracic Aneurysms	2	–
Heart Hydatidosis	1	–
Total No:	1177	54

Average Death Rate : 4.5%

Table III:
Open Heart Surgery for Acquired Cardiopathies.

live in overcrowded homes. Rheumatic fever in Saudi Arabia leads to severe damage, destruction and even calcification at an early age, making valve replacements frequently necessary at an early age of childhood (8–14 years).[8]

About 50% of the valves are repaired using a modified Kay-Wooler method at uni or bicommissural level with pledgeted 2 x 0 ticron sutures. The competence of the valve is assured by injecting saline under pressure from the L.V. apex,[9] calcified valves are debrided and repaired with a pericardial patch. Only severely calcified or ulcerated and perforated valves are replaced.[10] For aortic valve replacement, only St. Jude and Duromedic Bi-Leaflets mechanical valves are used,[11] and patients are kept under prophylaxis with anti-platelet agents (Persantin 75 mg tds).[12]

All patients who underwent mitral valve replacement and received mechanical valves (St. Jude or Duromedic) are fully anticoagulated. Biologic tissue valves are implanted only in young women of childbearing age.[13] Due to the known morbidity and mortality associated with mitral valve replacement. the Saudi Heart Center has taken a new policy to repair every mitral valve, whenever possible.[14]

Aortic valve replacement has a low mortality of 3.3% and embolic rate of less than 1% with bi-leaflets central flow valves. Mitral valve replacement has a mortality rate of 4.8%. However, mitral valve repair has a lower mortality of 3.1%. Open mitral valvotomy is the safest with a very low mortality of 1%.[15]

Closed mitral valvotomy is done only in pregnant women who cannot be put on cardiopulmonary bypass. All mitral stenosis are being done in open method as not only commissures but also the subvalvular apparatus can be mobilised, associated clots removed, calcium debrided, residual regurgitation repaired, competence checked and lesser rapid chance of restenosis[16] is possible with open method.

Type	No.	Deaths
Pericardiectomy	15	2
Closed Mitral Valvotomy	2	–
Peripheral Vascular Disease	233	4
Thoracic Surgery	105	6
Permanent Pacemaker Implantation	81	–
Total No :	436	12

Average Death Rate : 2.7%

Table IV:
Closed Heart Surgery for Acquired Cardiopathies.

At the beginning of our cardiac surgery programme in 1982, only bovine pericardial xenograft valves and no porcine valves at all were implanted for ethical and religious reasons, both in the aortic and mitral position. It is also documented that calcification in gluteraldehyde preserved porcine valves in children is rather rapid.[17] (Children make 20% of our valvular patients volume). Bio- prosthesis was used widely due to the high morbidity and mortality potentially associated with anticoagulation in Saudi Arabia. Many patients are Bedowins who live in rural areas where no prothrombine facilities are available. Some are yet illiterate and non-compliant to the drug treatment. Since 1983 we implanted only mechanical aortic valves in children and adults without anticoagulation but only antiplatelet drugs. Patients with mitral valve replacement were fully anticoagulated. Only women of childbearing age, who wish to have children, undergo mitral valve replacement with a bio-prosthesis (lonescu Shiley bovine pericardial xenograft). Elderly patients who have had a history of thromboembolism, gastric or duodenal ulcer, systemic hypertension, chronic atrial fibrillation or very large left atria, undergo mitral valve replacement with a bio- prosthesis.

Constructive pericarditis in Saudi Arabia manifests itself by massive ascites and severe congestive heart failure. The ertiology was tuberculous in only half of the cases, with significant calcification, while in the other half of the cases, the pathology specimen showed unspecific inflammatory changes.

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