

# Cardiovascular Surgery Between Makkah and Medina

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## Abstract:

*The Saudi Heart Center at the King Fahd Hospital in Jeddah, Saudi Arabia, located between Makkah (50 km) and Madinah (450 km), receiving patients from all the parts of the Kingdom of Saudi Arabia and middle eastern countries such as Syria, Yemen, Sudan, Egypt, and others was opened in June 1981 and has performed up to this date 2481 Cardiovascular surgeries covering neonatal, pediatric and adults surgeries for congenital and acquired cardiopathies. 868 patients underwent repair for simple and complex congenital anomalies with a mortality rate of 8.6%. 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%.*

**Key Words:** Cardiovascular Surgery, Congenital Defects, Acquired Defects, Saudi Arabia, Mortality rate.

## Materials & Methods:

2481 consecutive patients underwent cardiovascular surgery during a 4 years period. The youngest patient was 3 days 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 preoperative detailed cardiac catheterization with complete hemodynamic data, oximetry and contrast angiography. 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 as judged by echocardiography (percentage of shortening and ejection fraction and without associated coronary artery disease (history and EKG), have undergone open heart surgery without prior cardiac catheterization.

The Saudi Heart Center drains an area of a large patients volume reaching two and half million population, in addition of patients flying to it 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 mm Hg) (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 NYHA functional class III (80%), and 20% in class IV.

Rheumatic heart disease with its cardiac sequelae makes about 60% of the patients volume while congenital makes 35%, 5% is coronary artery disease! Rheumatic fever is still common in the western parts of the Kingdom (Al Baha, Gizan, Zahran, Ghamed, Taif and even in Makkah, and remains a worldwide problem in developing countries (2). Overcrowding and socioeconomic factors do play certain role in the frequent occurrence of rheumatic fever in Saudi Arabia. Many of the children and adults appear with multiple diathermy 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. 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 adult 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 (12mEq/500cc) used, systemic hypothermia to 28 degree C, aortic crossclamping and always left ventricular venting through an apical stab, topical cooling using slushed ice around the heart was a routine. Hemodilution was used on all adult patients. Every patient undergoing open heart surgery donated 2 litres of regular blood by his relatives and 2 donors for fresh blood were kept for the day of surgery. Cyanotic infants are not seen frequently (4), it seems that most

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of them die at home. Tetralogy of fallot and transposition of the great arteries are the commonest. Most of the coarctation seen are periductal in type and well localized and with well developed aortae and no hypoplasia, so that an anterior cusset angioplasty of the aorta is sufficient. All the ductus arteriosus were ligated in double fashion with a transfixion except in 6 cases, which were divided and sutured there was only one simple case of PDA recanalization due to faulty application at the first surgery.

### Closed Heart Surgeries for Correction of Congenitales Anomalies

Type	Patients No.	Death
Patent ductus arteriosus	177	2
Systemic Pulm. artery shunts	34	6
Coarctation of aorta	24	1
Vascular rings	3	-
Pulmonary artery banding	3	-
Atrial septectomy for T.G.A.	3	1
<b>Total No.</b>	<b>244</b>	<b>10</b>
<b>Average death rate</b>		<b>4,0%</b>

Congenital Cardiac anomalies are rather common in the Saudi society. Almost 40% of the cardiac patients needing surgical help are in the pediatric age group. 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 hypochromic anemia. Strong preoperative preparation is mandatory. An intensive care unit with 15 beds is available for open and closed heart patients.

### Pediatric Open And Closed Heart Surgery

657 Surgeries for congenital Diseases  
291 Surgeries for acquired diseases

948 Total patients number (under 14 years)  
75 Death mortality rate 7.9%

Sinus venosus Atrial Septal Defect are rather frequent and rare 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 frequent the posterior leaflet of the mitral valve.

Discrete subaortic stenosis (DSS) is mostly of a fibromuscular type 1-2 mm below the aortic valve. In only 2 cases the aortic valve had to be replaced in addition to the excision of the diaphragmatic shelf. Aorto septal approach (5) or aorto ventriculoplasty for radical excision and myectomy was not used yet. The reported recurrence rate of subvalvular stenosis

### Open Heart Surgery for Congenital Anomalies

Type	Patients No.	Death
Atrial Septal Defect (ASD)	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	1
COR Triatriatum	1	-
Truncus Arteriosus	1	1
Dissecting Aneurysm of Ascending Aorta with AR (Marfan)	2	-
Very Advanced Complex Anomalies	9	6
<b>Total No.</b>	<b>624</b>	<b>65</b>
<b>Average Death Rate</b>		<b>10,4%</b>

is still high (6), however better results are achieved with aortoventriculoplasty than simple excision. Since discrete subvalvular aortic stenosis is rather common in Saudi Arabia (24 cases in 3 years period) we are planning to use this new proposed technique.

Advanced pulmonary hypertension more than 60mm Hg 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 diathermy scars on their trunks with gross cardiomegaly and intractable heart failure, making intensive preoperative management and preparation, including correction of iron deficiency anemia, 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 live together 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, y). (8)

50% of the valves are repaired using a modified Kay-Wooler method at uni or bicommissural level with pledgeted 2 x 0 ticon 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

## Open Heart Surgery for Acquired Cardiovascular Diseases

Type	Patients No.	Death
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	-
<b>Total No.</b>	<b>1177</b>	<b>54</b>
<b>Average Death Rate</b>		<b>4,5%</b>

St. Jude and Duromedic bi-leaflets valves are used (11) and patients are kept under prophylaxis with antiplatelet 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 now only in young women in childbearing age (13). Due to the known morbidity and mortality associated with mitral valve replacement, the Saudi Heart Center has taken a new policy as to try 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 bileaflets 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 by 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.

## Closed Heart Surgery For Acquired Heart Diseases

Type	Patients No.	Death
Pericardiectomy	15	2
Closed Mitral Valvotomy	2	-
Peripheral Vascular Disease	233	4
Thoracic Surgery	105	6
Permanant Pacemaker Implantation	18	-
<b>Total No.</b>	<b>436</b>	<b>12 = 2,7%</b>

At the begin of our cardiac surgery programme in 1982 only bovine pericardial xenograft valves and no

porcine valves at all were implanted (for ethical and religious factors) both in the aortic and mitral position. It is also documented that calcification in glutaraldehyde preserved porcine valve in children is rather rapid (17). (Children make 20% of our valvular patients volume). Bio-prosthesis were used widely due to the high morbidity potentially associated with anticoagulation in Saudi Arabia. Many patients are bedwines who live in rural areas where no prothrombine facilities are available. Many are yet illiterate and non-complaint to the drug treatment. Since 1983 we implant only mechanical valves in children and adults for aortic position without anticoagulation but only antiplatelet drugs. For mitral valve replacement full with anticoagulation. Only women in childbearing age, who wish to have children undergo mitral valve replacement with a bioprosthesis (Ionescu 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 also mitral valve replacement with a bioprosthesis.

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

## Summary:

2481 consecutive pediatric and adult patients underwent cardiovascular surgery at the Saudi Heart Center during the period 1981 - 1985; in the western region of Saudi Arabia. Pediatric and adult open and closed heart surgery was performed with an average mortality rate of 5,6%, mitral valve repair is performed increasingly with excellent results. Mitral valve replacement is avoided whenever possible as most of our valve patients are children and young adults, who should be protected from the high morbidity and mortality related to valve prosthesis.

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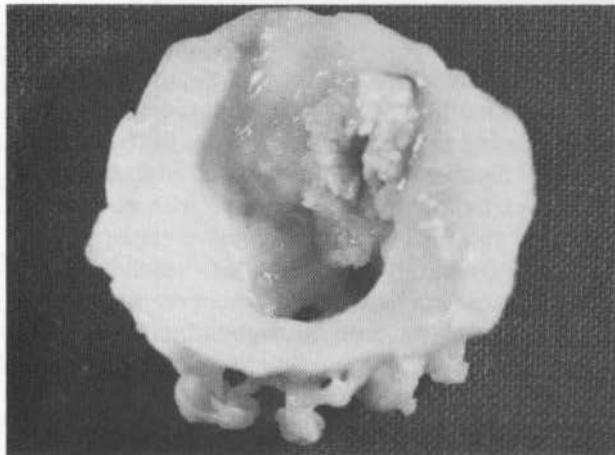
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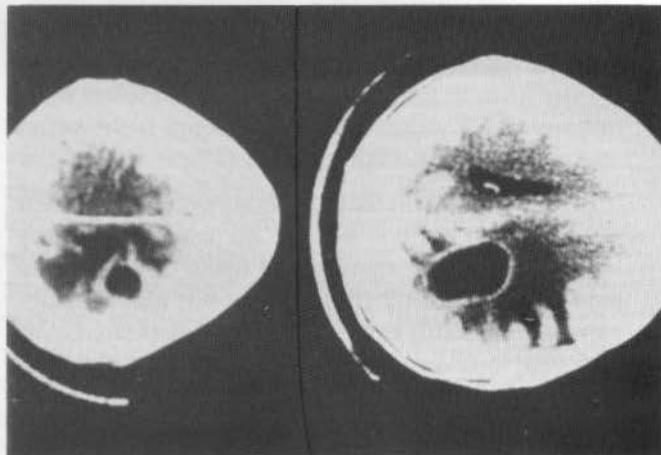
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#### Illustrations



Calcified mitral Valve excised from the heart of a 9 year old Saudi boy.



CT scan showing cerebral abscess in the brain by a young adult Saudi with Tetralogy of Fallot.