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Experience with Surgical Management of Cardiovascular Diseases in Children

CH ANYANWU*, EO OKOROMA**, HNC IHENACHO† AND BU UMEH*†

Summary

Anyanwu CH, Okoroma EO, Ihenacho HNC and Umeh BU. Experience with Surgical Management of Cardiovascular Diseases in Children. *Nigerian Journal of Paediatrics* **1980; 8: 94.** During a 4-year period, surgery was undertaken in 25 children with congenital malformations of the heart and in 21 others with different acquired cardiovascular disorders. The most common of the malformations were persistent ductus arteriosus and Fallot's tetralogy. Closed surgical procedure was used in 24 cases. Of 21 children with acquired diseases, 19 had closed surgical procedures while 2 patients had open-heart surgery. Eight (17.4%) of the 46 children died.

Introduction

IT is now generally accepted that congenital cardiovascular diseases are as common in the developing countries of the world as in the technologically developed ones.[1,2] Acquired heart diseases, notably rheumatic heart disease and endomyocardial fibrosis, are also common among Nigerian children.[3,4] For most of these children, definitive surgical treatment has been, until recently, offered only to a very small proportion of those with congenital[5] and acquired heart diseases.[6] This situation had existed because of the paucity of experienced personnel in addition to inadequate clinical facilities. This paper is based on our experience with the surgical management of cardiovascular diseases in Nigerian children. It also discusses the scope of cardiac surgery in Nigeria.

University of Nigeria Teaching Hospital, Enugu

Department of Surgery
* Consultant Cardiothoracic Surgeon
Department of Paediatrics
** Consultant Cardiologist
Department of Medicine
† Consultant Cardiologist
Department of Anaesthesia
*† Consultant Anaesthetist

Materials and Results

During a 4-year period (November 1975 to October 1979), 46 children (24 males and 22 females) aged between 24 hours and 16 years, were treated surgically for cardiovascular diseases at the University of Nigeria Teaching Hospital (UNTH), Enugu. Twenty-five of the children had congenital malformations and 21 had acquired disorders.

Congenital Defects

All the patients but one, were under 10 years of age; 19 (76%) were aged 5 years and under (Table 1). Diagnosis was made from the physical

TABLE I

Age Distribution in 46 Children with Heart Diseases Treated Surgically

Age	*No. of cases*	
	Congenital Lesions	*Acquired Lesions*
0–6 months	3	1
7–11 months	3	0
1–2 years	5	0
2–5 years	8	3
5–10 years	5	1
10–16 years	1	16
Total	25	21

TABLE II

Operative Procedures for 25 Children with Congenital Lesions

Procedure	*No. of Cases*	*No. of Deaths*
Division and suture of PDA	10	1
Blalock-Taussig shunt	7	2
Waterston-Cooley shunt	3	2
Closure of atrial septal defect	1	Nil
Repair of ectopia cordis	1	1
Exploratory thoracotomy	3	Nil
Total	25	6

signs, electrocardiography, chest radiography and angiocardiography in all cases except in one case of ectopia cordis. The congenital lesions included Fallot's tetralogy (9 cases), persistent ductus arteriosus (9 cases), and one each of Fallot's tetralogy combined with dextrocardia, atrial septal defect, atrial septal defect plus persistent ductus arteriosus; tricuspid atresia plus persistent ductus arteriosus, Fallot's tetralogy plus atrial septal defect, single ventricle, ectopia cordis. Associated diseases included congenital cataract, bilateral otitis media, septic knee effusion and skin sepsis. The indications for surgical treatment were: intractable heart failure in 13 patients, severe cyanotic attacks in 12 patients, exertional dyspnoea in 11 patients, recurrent respiratory infections in 7 patients, retarded growth in 4 children and severe external defect in one patient.

Preoperative treatment included the control of heart failure, plasmapheresis for polycythaemia (haematocrit of 70–85%) in 5 patients, treatment of concomitant infections in 4 patients and control of tachyarrythmia in one patient. Table II shows the surgical procedures used and the operative mortality. The causes of death were anaesthetic difficulty in 2 patients, haemorrhage in one patient, postoperative heart failure in 2 patients and postoperative respiratory failure in one patient.

Acquired Diseases

There were 21 patients with acquired heart diseases diagnosed from physical signs as well as from electrocardiography, chest radiography, echocardiography and cardiac catheterisation. The disorders included 12 cases of pericarditis (7 pyogenic, 3 endomyocardial fibrosis, and 2 chronic constrictive), 7 cases of mitral valve disease and one each, of aortic valve disease and arterial injury. Twelve patients were in Class IV, seven in Class III and one in Class II (New York Heart Association Classification). The patient with arterial injury was operated for severe bleeding. The surgical procedures performed are shown in Table III. The patient with aortic incompetence was operated in London where a successful homograft valve replacement was performed. There were 2 deaths; one, a 15-year old boy who died 24 hours after open mitral commissurotomy, and another, a $4\frac{1}{2}$-year old girl with purulent pericarditis who had cardiac arrests pre- and post-operatively.

Discussion

Recent advances in the diagnosis, medical management, surgical techniques and nursing care have increased the scope of definitive surgical

TABLE III

Surgical Procedures for 21 Children with Acquired Lesions.

Procedure	*No. of Cases*	*No. of Deaths*
Pericardiotomy	10*	1
Pericardiectomy	4*	0
Mitral commissurotomy	7	1
Aortic valve replacement	1	0
Repair of arterial injury	1	0
Total	23	2

*2 patients had both procedures

treatment of patients with cardiovascular diseases. In most developed countries, only very few cardiovascular lesions in children are surgically untreatable. But in Nigeria, and despite some encouraging starts in few centres, inadequate surgical facilities have limited the number of children being offered the necessary surgical treatment. At Enugu, probably only about 10% of the patients with congenital cardiovascular lesions requiring surgery have been offered such treatment. Though ventricular septal defect is the commonest congenital cardiovascular abnormality in children, none has been totally corrected in Nigeria. This is due to the non-routine use of the 'open-heart' technique which was first introduced in Nigeria, at Enugu, in 1974. Only 3 of the 46 children were treated with the open-heart procedure. But, at least 50% of our paediatric patients with such diseases should be treated by this technique.

Persistent ductus arteriosus and coarctation of the aorta are the common congenital defects that can be totally corrected without the use of cardio-pulmonary by-pass. Because of the known complications of persistent ductus arteriosus, it is usually advisable to repair it in childhood as soon as the diagnosis is made. Unfortunately, not all our cases of persistent ductus arteriosus have been operated on because of the reluctance of the parents of some children to permit operation on apparently healthy-looking children with the defect. We prefer division and suture of the ductus as the procedure of choice to prevent recanalisation which occurs in 0–7.8% of cases after ligation[7] and aneurysmal dilatation of the aortic end of the ductus. Haemorrhage may be associated with division and suture, but it was not a significant problem in our patients, 3 of whom received no intra or postoperative blood transfusion.

Although early total correction of Fallot's tetralogy, ventricular septal defect, transposition of the great arteries and other severe abnormalities are now feasible,[8, 9] only palliative correction is safely practicable at our present state of evolution in cardiac surgery. Systemic-pulmonary anastomosis is a useful palliative procedure for most cyanotic children but total correction should be offered to them before such complications as pulmonary hypertension develop some years after the shunt.[10] Our successful closure of an atrial septal defect under cardio-pulmonary by-pass in March 1979 (our sixth open-heart procedure) and the recent introduction of the procedure at the University College Hospital, Ibadan, (Adebonojo, personal communication) encourage us to expect a wider use of this essential procedure in the management of cardiovascular diseases.

Ectopia cordis is a severe abnormality with a very high mortality. Our case, reported in full elsewhere,[11] survived the repositioning of the heart but died later from respiratory obstruction due to blood clot in the larynx.

Our operative mortality of 24% in this group of children is a modest but expected improvement on an earlier report from Ibadan.[12] Further improvement in the number of operated cases and the post-operative results will certainly be achieved in the near future both at Enugu and at Ibadan.

Valvular and pericardial diseases are common and surgically treatable acquired cardiac diseases in children. Our experience, and reports from other centres in tropical countries confirm that

rheumatic mitral valve disease occur in young children.[4 12 13] Because of its early and rapid progression to mitral stenosis, and the early onset of subsequent heart failure, early surgical treatment should be advised. Though open commissurotomy has some advantages,[14] we have adopted the closed technique for most of our cases of mitral stenosis, and obtained good results. There was no death in the 6 children who had closed mitral commissurotomy and all have reversed to Class I or II from their previous Class III or IV (NYHA).

Pericardiocentesis is the first line of treatment for purulent pericarditis, but pericardiotomy and tube drainage may be necessary to ensure complete drainage. Pericardiectomy may, however, be performed if there is reaccumulation of fluid or incomplete tube drainage as occurred in 2 of our patients. Only 2 of our patients yielded bacterial organisms (*Staphylococcus aureus* and *Streptococcus pneumoniae*) from the pericardial fluid. This finding contrasts with that of Weir and Joffer in Cape Town[15] who reported the isolation of *Staphylococcus aureus* in 22 of their 28 cases, and is probably due to the indiscriminate use of antibiotics by Nigerians.

The association of pericardial effusion with endomyocardial fibrosis (EMF) has long been recognised.[16] Our 3 patients with this association improved for several months after pericardiotomy before they were lost to follow-up. A definitive surgical treatment such as endocardiectomy with or without valve replacement[17] may give hope to some patients with EMF.

Some progress has been made in the surgical management of cardiovascular diseases in Nigerian children. There is still a large scope for further progress which should result not only in the improvement of our overall operative mortality of 17.4%, but also in a greater number of children offered surgical treatment in Nigeria.

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