

Original Articles

Characteristics of Congenital Heart Disease and their Surgical Outcome in a Private Hospital: Importance of Team Concept in Paediatric Cardiac Surgery

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Abstract

Background: Congenital heart disease poses much morbidity and mortality to children. During the past one-decade there have been encouraging improvements in the care of patients with congenital heart disease (CHD) seen in Bangladesh. The aim of the study was to determine the demography, characteristics, surgical result and complications of the entire operated patient with CHD during last four year and five months in United Hospital and to find out the importance of well-coordinated paediatric cardiac team in reducing case fatality rate.

Method: This is a retrospective study based on patient's record. The records of 457 patients were reviewed. Data of all patients with CHD who were operated from November 2006 to March 2011 at United Hospital, Dhaka were analyzed in this study.

Result: Proportion of cyanotic congenital heart disease was 25%, among them tetralogy of Fallot (TOF) constitutes maximum number. Acyanotic heart diseases were mostly shunt lesion where 60% were associated with different degrees of pulmonary hypertension. Varied types of surgical procedures were done for correction of different types of CHD. Post operative complications were found in 125 (27%) patients. Since 2008 after implementation of well-coordinated paediatric cardiac team outcome of surgical procedure were improved. Case fatality rate which was 16% in 2007 came down to 8.3 % in 2010.

Conclusion: Spectrum of CHD in our set-up was varied in nature. Though we have an acceptable mortality rate further improvement will be achieved from multidisciplinary progresses through developing a good, well-coordinated pediatric cardiac team.

Key word: paediatric cardiac surgery, congenital heart disease(CHD), cardiac team

Introduction

Congenital heart disease (CHD), in a definition proposed by Mitchell is "a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance¹". The incidence of CHD in different studies varies from about

4/1000 to 50/1000 live birth¹⁻⁵. During the last decade, therapy of congenital heart disease underwent several transformations related to the improvement of medical technology in developed world. Advances resulted from multidisciplinary progresses, among which one may distinguish several categories: Better knowledge of pathology, improvement in pre and post operative assessment, improvement in pre and post operative management and progress in operative management⁶. In developing countries building up of a paediatric cardiac team is a new concept. A team comprises a group of people linked in a common purpose with members with complementary skills which allows each member to maximize his or her strengths and minimize weaknesses. A Paediatric cardiac team

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comprises of paediatric cardiac surgeon, cardiologist, anesthetist, neonatologist, perfusionist, physiotherapist, nutritionist and nurses. A supportive workplace for all staff by fostering an environment of teamwork and mutual respect between all members of the interdisciplinary team should be established for good team function. It is a very difficult task in a developing nation to develop a well coordinated team because of lack of well trained medical personals, dedication, patience, and willingness of the centre and high cost of treatment. A team concept is very much required to improve the quality of care thus improving surgical outcome and reducing mortality of children with CHD.

The aim of the study was to determine the demography, characteristics, surgical outcome and complications of the entire operated patient with CHD during last four year and five months in United Hospital and to find out the importance of a well-coordinated paediatric cardiac team which has developed in this centre from 2008 to March 2011.

Material and Methods

This study was a retrospective study based on the patient’s records. The sample size consisted of 457 cases, which has undergone surgical management for congenital heart disease in United Hospital’s cardiovascular center during four years -November 2006 to March 2011. All the consecutive patients of congenital heart diseases from newborn to adult were included in this study. A questionnaire was developed to record all the parameters of interest and data was collected from the patient’s records. Findings from history, physical examination, chest x-ray, ECG, echocardiography were recorded. In some cases where cardiac catheterization, angiography and other diagnostic procedures were done also noted. From the record operative procedure, complications and outcome were recorded then analyzed.

A Paediatric cardiac team comprised of paediatric cardiac surgeon, cardiologist, anesthetist, neonatologist, perfusionist, physiotherapist, nutritionist and nurses was formed in 2008 and worked in coordinated way wherever their service was required. Since the development of team some changes in postoperative management protocol was done like calcium infusion from day of surgery as an ionotrope, commencing early enteral feeding of breast milk and early introduction of direct breast feeding, initiation of PD as soon as renal impairment was detected,

introduction of effective chest physiotherapy, Phenoxybenzamine for infants or children with severe pulmonary hypertension and hypertensive crisis through PA catheter and strict maintenance of hand washing protocol. Regular training of nurses and taking feedback form them were also confirmed. Data were analyzed to compare the case fatality rate before and after formation of paediatric cardiac team.

Results

Total cardiac surgery done at United Hospital in last four years five months was 4013. Among them 457 (11.38%) was congenital heart surgery. Among 457operated patients with congenital heart disease, proportion of adult (19years and above) with CHD was 29 % (133) shown in figure-1. Mean age excluding adult with CHD was 7 year. 202 (45%) patients of CHD were found in 1-10 years age group. Minimum age was 7days and maximum age was 63 years (Fig: 1). Among 457 cases, 246 (54%) were male and 211 (46%) were female.

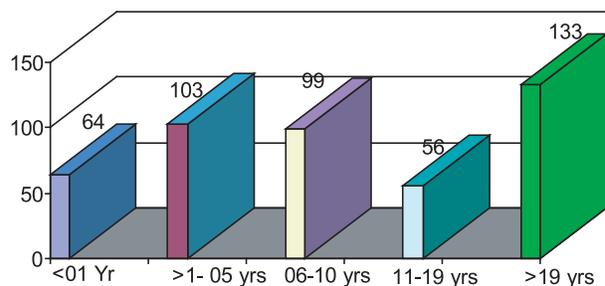


Fig.-1: Distribution of patient by age

Atrial septal defect (25%) was the commonest among the all cardiac defects in this study followed by VSD (15%) and then by TOF (12%) shown in figure-2.

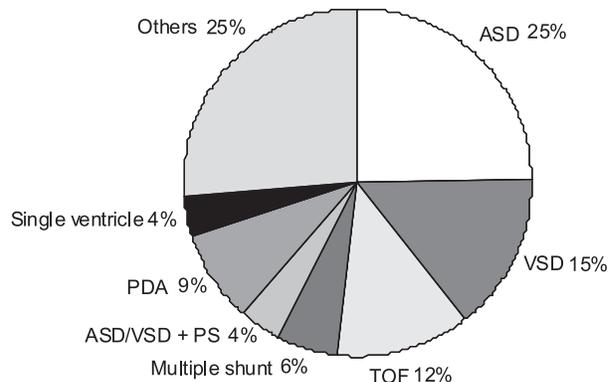


Fig.-2: Showing distribution of patient with CHD by diagnosis.

Proportion of Cyanotic congenital heart disease was 24% (110) and Acyanotic CHD was 76 % (347). Among the acyanotic group ASD was 37%, VSD 23%, isolated PDA 13%, Multiple Shunt (VSD+ASD+PDA) 9% and AV canal defect 2%. It was found that maximum frequency of cyanotic congenital heart disease was TOF (58%) followed by Single ventricle physiology (17%), TGA (11%), TAPVC (4.5%).

Total shunt lesion was 284 and out of them 189 (66%) developed pulmonary hypertension. Among these 189 patient 90 (31%) had mild, 61 (21%) moderate and 38 (13%) severe pulmonary hypertension.

Twelve patients were syndromic; six of them had Down’s syndrome two was suspected to have Noonan’s syndrome and one with William’s syndrome, three with congenital rubella syndrome.

In 86.5% cases echocardiography was the only diagnostic tool. Another 13% cases cardiac cath aided the diagnosis.

Most commonly used surgical approach was median sternotomy, though three ASD cases were closed by right anterolateral thoracotomy on request. PDA ligation was done usually by left posterolateral thoracotomy. Mean CPB and aortic cross clamp time was recorded as 70 minutes and 37 minutes respectively.

As operative procedure, one hundred thirty ASD (33%) cases were closed by pericardial patch, seventy nine VSD (20%) cases were closed by Dacron patch. Double ligation of PDA was done in 45 (11%) cases, total intra-cardiac repair was done in sixty four TOF (16%) cases and in thirty (7%) cases closer of VSD, ASD and PDA was done at a time (Table-I).

Thirty two percent patients were extubated on the same day of operation and most by 1st POD. 125 (27%) patients develop major postoperative complications. Among them, pleural effusions was found in 25 (20%) cases, Arrhythmia in 22 (18%), septicaemia in 20 (16%), right heart failure in 15 (12%), collapse-consolidation of lungs in 15 (12%), excessive bleeding in 11 (9%) and pulmonary hypertensive crisis in 10 (8%) cases shown in Table-II. Most of them improved with treatment.

Table-I
Distribution of patient by operative procedure (n=394)

Operative procedure	Number	Percentage
Pericardial patch closure of ASD	130	32.99
Dacron patch closure of VSD	79	20
Double ligation of PDA	45	11.42
Closure of VSD+ASD+PDA	30	7.6
ICR for TOF physiology	64	16.2
BT shunt	8	2
Staged Single ventricle repair(BDG)	12	3
Arterial switch operation	12	3
Completion Fontan	6	1.5
Correction of TAPVC	5	1.2
Ebstein repair	2	0.50
Single patch repair of Complete AV canal	1	0.25

BDG- Bidirectional Glenn shunt.

Table-III showed the distribution of patients by outcome according to time of admission. 157 patients underwent cardiac surgery in the year 2007; 132 patient improved while 25 patient died; case fatality rate was 15.9%. In 2008 case fatality rate was come down to 8.3%, in 2009 that was 12% & came down to 8.75% in 2010. In the 2011 until March, 21 patients underwent cardiac surgery with no case fatality.

Table-II
Distribution of patient by postoperative complications (n =125)

Complications	N	%
Pleural effusion	25	20
Arrhythmia	22	18
Septicaemias	20	16
Collapse consolidation of lung	15	12
Right Heart failure	15	12
Excessive bleeding	11	9
Pulmonary hypertensive crises	10	8
Neurological Complication	5	4
Complete heart block	2	2

Table-III
Distribution of patient by surgical outcome according to time of admission (N=457)

Time period	No. of patient	Improved No.	No. of death	Case fatality rate
November 2006-December 2006	13	13	0	0
January 2007-December 2007	157	132	25	15.9
January 2008-December 2008	96	88	08	8.3
January 2009-December 2009	90	79	11	12
January 2010-December 2010	80	73	7	8.75
January 2011-March 2011	21	21	0	0

Discussion

The reported incidence of CHD varies between 4 and 50 per 1000 live births¹⁻⁵. The incidence of CHD has been studied in developed countries for many years, but rarely in developing countries. Knowledge of the epidemiology of CHD is important in allocating appropriate resources and planning effective prevention.

The trend for early primary repair of CHD is increasing in developed countries due to improvement in the comprehensive surgical approach, technology and PICU care⁷. Spectrum of CHD in our set-up was varied in nature.

The distribution of specific lesions was different between the live births and stillbirths. In China among the live births, the top three lesions were ventricular septal defect (VSD), patent ductus arteriosus, and atrial septal defect, which accounted for 34.0%, 23.7%, and 10.8%, respectively⁸. In our series among 457 patients we found that maximum frequency of CHD was ASD (25%). Next we found VSD (15%) and TOF. Among cyanotic group TOF was most frequently observed. Right aortic arch has been found 22% of our TOF patient. One hundred eighty nine of our shunt lesion patient had some degree of PAH mostly mild to moderate.

With the evolution of noninvasive technology such as echocardiography, the indications for diagnostic cardiac catheterization have diminished substantially⁷. In 86% cases echocardiography was the only diagnostic tool in this study. Because diagnostic catheterization is invasive and time-consuming, we recommend, that the patients may undergo surgery without invasive diagnostic procedures in most of cases.

Patients born with severe forms of CHD are at approximately 12 times higher risk of mortality in the

first year of life, particularly if they are missed in the neonatal period. One study showed mortality in the first year of life was 18% for all CHD that are diagnosed in infancy⁹. Cardiac surgery with poor setup could have a higher mortality than leaving them alone.

An Italian multi-center study on midterm results of surgical intervention for congenital heart disease in adults showed major complications were reported in 28.8% patients and postoperative arrhythmias were the most frequent¹⁰. In our centre 27% patient develops immediate major postoperative complications.

A study has been undertaken by members of the European Congenital Heart Surgeons Association with the aim of evaluating the impact of cardiac surgery in adult age group found hospital mortality (within 30 days) was 2.4% (range, 0% to 15.3% in different centres)¹¹.

Congenital heart disease in Sudanese patients seen at Sudan Heart Centre showed that surgery was done for 125 patients. Seventy three operations were done by the local team and 52 by the visiting team. The 30-day operative mortality was 8.3%¹². In our centre post surgical overall mortality rate was 16% in first year (2007) which came down to 8.75% in fourth year (2010). The reduction in case fatality was probably achieved by the cardiac team who tried to work coordinated way over the time.

Conclusion

Among the CHD cases 76% patients were acyanotic and 24% were cyanotic on presentation. ASD was commonest in acyanotic CHD and TOF in cyanotic CHD. Well coordinated paediatric cardiac team may play important role to reduce case fatality rate in surgical outcome.

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