Surgical Outcome of Congenital Heart Disease Cases: A single Unit Analysis in an Upcoming Centre in Eastern Uttar Pradesh, India

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ABSTRACT

Introduction: These days with the advancement in science and technology and also increasing expertise, the surgical outcome of congenital heart disease (CHD) is very promising. On an average around 2 Lakhs (0.2 million) children are born in India every year with CHD, whereas approximately 25000 surgeries are done every year for CHD in India. With this background and considering the tremendous need of congenital heart surgery but with limited infrastructure and manpower we started our congenital heart surgery programme. This study was conducted to audit our congenital heart surgery programme in very limited infrastructure and also to help decrease the burden of this increasing disease load.

Material and Methods: This study was done over a period of four and half years and 109 cases of CHD were operated. We observed the age, sex, type of surgery, morbidity, mortality and hospital stay etc.

Results: In our study, 64 % of patients were between the age of 10 to 40 years. Male and female distribution was almost equal. Most common surgery performed was atrial septal defect closure, followed by patent ductus arteriosus ligation. There was one mortality 0.9% and morbidity requiring major intervention was seen in 3.66 % cases. Average hospital stay was 12 days.

Conclusions: In spite of our shortcomings, surgical outcome in our series is comparable to other centres.

Key words: Congenital Heart Disease, outcome, surgery, paediatric cardiac surgery, upcoming

INTRODUCTION

Congenital heart disease (CHD) refers to the presence of a structural abnormality of the heart and / or great vessels that is present at birth and is of actual or potential functional significance.[1] With advancement in technology and surgical expertise the management of congenital malformations of the heart has improved tremendously in the developed world such that even very complicated lesions are now being treated with high success rates.[2] The situation in many of the developing countries is very different as only very few children born with congenital heart disease are properly diagnosed at correct time and then receive timely treatment. Most of them suffer high morbidity and mortality. This is due to several factors that may be considered obstacles or challenges for congenital heart disease management in these regions. Thus, thousands of children die, many undiagnosed, each year from congenital heart disease, while millions more remain in desperate need of treatment in the these regions, even after diagnosis. Alleviating the sufferings of such children and their families is a major challenge to our health system.

Birth incidence of structural congenital heart disease is between 10-15/1000 live births.[3-5] With this estimate on an average around 2 Lakhs (0.2 million) children are born in India every year with CHD, whereas approximately 25000 surgeries are done every year for CHD in India. Thus every year a large number of children suffering from CHD are added in already existing massive disease pool. Ventricular septal defect is the commonest CHD, followed by Atrial septal defect. In cyanotic group, Tetralogy of Fallot is the commonest subgroup.[6] CHD is the most common congenital problem in children accounting for nearly 25% of all congenital malformations.[7]

With this background and considering the tremendous need of congenital heart surgery but with limited infrastructure and manpower we started our congenital heart surgery programme in June 2011 at our unit along with an active adult cardiac surgery and thoracic surgery programme. We retrospectively analysed our surgical outcome in terms of morbidity and mortality.

Eastern Uttar Pradesh has no cardiac surgery centre where congenital hearts are operated on a routine basis. Adjoining state of Bihar, which drains to our hospital also has no such programme. This area in spite of having the maximum population density in India, is totally devoid of congenital heart surgery facility. With this in mind, we started our congenital heart surgery programme to demonstrate that such complex procedures which may involve high morbidity and mortality can also be done with acceptable low mortality and morbidity in hospitals with limited infrastructure with special attention in selection of cases. Our aim was to demonstrate that such programmes can be successfully started in all government medical colleges with basic infrastructure for cardiac surgery.

MATERIAL AND METHODS

This study was conducted in the Department of Cardiothoracic and Vascular Surgery, Institute of Medical Sciences and SS Hospital, BHU Varanasi. Total 109 cases of congenital heart disease were operated over a period of four and half years (June 2011 to Dec 2015) in our unit as per the operation theatre records. All the patients who underwent such procedures for congenital heart disease were included. In this series we have not accepted

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babies below 15 kg of weight, except for PDA ligation. The most complex of cases we did were Tetralogy of Fallot (TOF) with good pulmonary artery anatomy, more complex cases were referred to higher centre for further management. Necessary ethical approval and informed consent were taken.

The following points were noted about patients.

1. Age of patient
2. Sex
3. Type of congenital heart defect
4. Type of surgery
5. Morbidity and mortality
6. Follow up

Age group	No of patient with CHD	Percentage
0 To 5 years	18	16.5
5 To 10 years	19	17.4
10 To 18	34	31.1
18 To 40	36	33.02
>40	2	.01
Total	109	

Table-1: Age of patient

	Numbers	
Male	58	53.21 %
Female	51	46.78 %
Total	109	

Table-2: Sex of patient

STATISTICAL ANALYSIS

All data were fed in Microsoft Excel for analysis. Descriptive statistics including mean and percentage were used to infer results.

RESULT

Most of our congenital heart surgery patients were between 10 to 40 years of age, with around one third of them in adult age group, thus showing the failure of early detection and lack of surgical facilities. (Table-1). Male and female patients were almost in equal distribution. (Table 2).

We operated a variety of CHD (Table-3). ASD, PDA and TOF dominated the series with they accounting for about 60% of all cases.

We had one mortality (Table-4) in our congenital heart surgery series. She was a girl child, aged eight years suffering from double chambered right ventricle with VSD and PDA. We lost the child on third post-operative day due to right ventricular failure.

We had two post-operative mediastinal bleeding requiring re exploration. Both patients recovered normally. Two cases of patch dehiscence were also encountered. Both patients came with symptoms one month after discharge. The cause was infection in both cases. They underwent redo surgery to stabilize the problem (Table-4).

All our patients are under routine follow up. After discharge they are advised to attend OPD after one week, one month,

S no	Type of disease	Operative procedure	Number	Percentage
1	Ostium secondum ASD	pericardial patch closure of defect	33	30.27
2	sinus venosus atrial septal defect	pericardial patch re-routing	06	5.5
3	Ventricular Septal defect	synthetic patch closure	08	7.3
4	Patent Ductus Arteriosus	triple ligation	20	18.34
5	Tetarology of Fallot	intra cardiac repair	11	10.09
6	Pentalogy of Fallot	intracardiac repair	2	1.83
7	Partial AV canal	intracardiac repair	3	2.75
8	ASD with moderate to severe mitral regurgitation	ASD closure with mitral repair (ring annuloplasty)	5	4.58
9	ASD with severe mitral stenosis	ASD closure with mv replacement	2	1.83
10	VSD with valvular pulmonary stenosis	VSD closure with pulmonary valvotomy	3	2.75
11	Double chambered right ventricle	intracardiac repair (ICR)	3	2.75
12	Total anomalous pulmonary venous connection with ASD	intracardiac repair	1	.09
13	Sub aortic membrane	Resection	1	.09
14	Abnormal right coronary artery from pulmonary artery	Right coronary artery translocation to aorta	1	.09
15	Combination of septal defects with or without PDA/PS	intracardiac repair	10	9.17

Table-3: Type of congenital heart disease and surgery

Morbidity				
S. No	**Type of morbidity**	**No of cases**	**Management**	**Percentage**
1	Postoperative mediastinal bleeding	2	Re exploration done	1.8%
2	patch dehiscence in			
	ASD with chronic constrictive pericarditis	1	conservative	1.8%
	partial AV canal	1	re do surgery	
Mortality				
1	Intra Cardiac repair for DCRV with VSD with PDA	1	Right ventricular dysfunction leading to low cardiac output	0.9%

Table-4: Morbidity and Mortality

three month, six month and then on yearly basis. All patients are followed with Echo Cardiogram before discharge and after one month of discharge. Two patients with VSD closure had less than 2 mm size residual VSD with hemodynamically insignificant shunt. All mitral repairs had mild residual mitral regurgitation. In intra cardiac repairs for TOF, three patients needed trans annular patch thus having moderate to severe pulmonary regurgitation. Rest all ICR for TOF achieved good hemodynamic correction. Average hospital stay for our patients were 12 days.

DISCUSSION

Our is a new unit which is trying to establish open heart surgery programme in a tertiary care centre of northern India. We are the only government centre between Lucknow and Kolkata, a distance of 1000 kms, doing open heart surgery and congenital heart surgeries on a regular basis. This results in huge OPD load of pre-operative patients. But due to severe shortage of trained manpower, operative days and other infrastructure, our unit still struggles to take up all the cases that come to us. Also our unit is not exclusive CHD surgical unit. For about 3200 CHD cases that came to our unit OPD in this period, we were able to operate only 109 cases. Our desire is to achieve a congenital heart surgery programme with low morbidity and mortality so public develops faith in this programme and the perception that cardiac surgery cannot be done in children is changed and this programme becomes more acceptable. The goal was to utilize our limited manpower and resources to save maximum lives, thus we referred cases with high per and postoperative risk to higher centres.

We plan to accept more complex of congenital heart surgery cases as our manpower, infrastructure and experience grows. Some of the limiting factors our unit faces are:

1. Average 5 operating days in a month.
2. Only one dedicated cardiac surgery OT, with facility to do only one major case per OT day.
3. Burden of other cases including adult cardiac surgery, thoracic and vascular surgery plus other emergencies.
4. Limited number of ICU beds (two per unit)
5. No Senior Residents. We have junior residents from general surgery who come on a rotation basis for two months to assist us.
6. Shortage of nursing staff (One staff per six beds in ICU).

In this series we have not accepted babies below 15 kg of weight, except for PDA ligation. The most complex of cases we did were Tetralogy of Fallot (TOF) with good pulmonary artery anatomy. We performed CT pulmonary angiography in all TOF patients and calculated McGoon ratio. Cases with McGoon ratio above 1.5 were taken up for intra cardiac repair. Also TOF patients with large major aorto pulmonary collateral arteries were not taken up. Case selection is very important for any upcoming cardiac surgical unit in a government set up, with limited resources. The aim should be to lay a solid foundation on which one can build a castle in future.

Congenital heart surgery data from around the globe shows that mortality rates are now less than 5% in most of the well-established centres, which are doing the most complex of congenital heart surgery procedures.[8-10]

Stark J et al[8] in their article found that overall mortality rate for all operations was 4.0% (95% CI 3.0-5.2). No deaths occurred for 67 arterial-switch operations. Mortality rates for coarctation, ventricular septal defect, atrioventricular septal defect, Fallot, and truncus arteriosus operations were 1.1%, 0.6%, 3.6%, 2.3%, and 28.6%, respectively. Although overall mortality rates between surgeons varied (1.6-6.9%), no surgeon's were higher than the 95% CI.

Edward L. Hannan[11] in their article concluded that both hospital volume and surgeon volume are significantly associated with in-hospital mortality, and these differences persist for both high-complexity and low-complexity paediatric cardiac procedures. In their publication they reported a mortality rate of 8.77% for surgeons with annual congenital heart operations less than 75.

CONCLUSION

In India we need urgently to establish such congenital heart surgery centres in every district, so that ever increasing CHD case load is decreased. The day will not be far when after control of infectious disease mortality, CHD will become as number one cause of mortality in children. Ours is small effort in this direction.

In spite of our shortcomings, surgical outcome in our series is comparable to other centres.

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