

ORIGINAL ARTICLE

PRESENTATION OF CONGESTIVE CARDIAC FAILURE IN CHILDREN WITH VENTRICULAR SEPTAL DEFECT

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Background: While there is much data on cardiac problems of adults, there is a limited statistical data available to evaluate the magnitude of the cardiac problems in children in Pakistan. Many of these children present with recurrent chest infections and congestive cardiac failure (CCF), and are managed by general practitioners. A careful search for underlying cardiac problems and awareness about the presentation of CCF and its magnitude will definitely decrease the morbidity and mortality of these children. The objective of this study was to see the frequency and clinical presentation of CCF in children with Ventricular Septal Defect (VSD). **Methods:** Forty-nine patients met the preset criteria during the study period of 6 months. A detailed history and physical examination with special emphasis on symptoms and signs was sought and the findings were noted in a questionnaire. Data was analysed using SPSS-11. Frequencies and percentages were calculated for all categorical variables. **Results:** CCF in VSD was found more in males, with a male to female ratio of 1.45:1. Majority (63.1%) of the patients presented in infancy. The common symptoms at presentation were dyspnoea (98%), cough (83.7%), and feeding difficulty (9.6%). Other important symptoms were fever, fatigue, failure to thrive, sweating and wheezing. The common physical signs in order of frequency were murmur 98%, tachypnoea 91.8%, tachycardia 89.8%, hepatomegally 89.9% and crackles in chest 85.7%. Other presenting signs were displaced apex beat 57%, oedema 28.6% and chest deformity 20.4%. Regarding the type of VSD, perimembranous was the commonest 61.2% as confirmed by echocardiography. **Conclusion:** This study was done on a smaller scale in hospitalised children. The exact studies regarding CCF in paediatric patients are scarce. There is a need to design more studies in children with CCF. Early recognition of signs and symptoms of CCF on paediatric patients with VSD and awareness at primary health care level can prevent the delay in the diagnosis and early referrals by GPs to hospital setup will definitely reduce the morbidity and mortality.

Keywords: Children, Congestive cardiac failure, Ventricular septal defect

INTRODUCTION

Congenital Heart Diseases (CHD) with incidence of 6–8/1000 live births is mainly responsible for occurrence of congestive cardiac failure (CCF) in infancy and childhood.^{1–5} Ventricular septal defects (VSD) with incidence of 1.7–4/1,000 live births is the most common congenital heart defect accounting 25–30% of all congenital cardiac lesions.^{2,3,6} It is one of the major causes of CCF.⁷ Congestive cardiac failure and VSD carries a high morbidity and mortality.^{2,8,9} Early diagnosis of CCF and effective treatment reduces morbidity and mortality.⁹

Presentation of VSD depends upon size of septal defect and to a lesser extent, the type of VSD and presence of other shunts.^{7,8} On the basis of size, VSD is divided into small, moderate and large defect.¹⁰

Clinically CCF is a syndrome of breathlessness and fatigue which commonly is associated with cardiac disease. It is often accompanied by congestion as indicated by increase jugular venous pressure (JVP) and oedema. CCF is inability of heart or circulatory system to delivery blood to metabolizing tissues at rest or during light exercise. This state may arise because of excessive work load on cardiac muscle, usually by congenital heart defect (CHD).^{4,9,10} Signs and

symptoms of patient presenting with CCF are tachypnoea, tachycardia, fatigue, orthopnoea, exertional dyspnoea, oedema, wheeze, growth failure, pallor, feeding difficulty, sweating, irritability, raised JVP, pulmonary crackles, hepatomegally, repeated chest infections and failure to thrive in children.^{8–10} Diagnosis is made clinically and with the help of chest, x-ray, ECG and echocardiography.^{9–12}

There is a limited scientific data available on the evaluation of the magnitude of cardiac problems in children in our country. This is primarily due to lack of optimum paediatric cardiac facilities in the country, though now there are few newly established centres in the major cities.

The most common type of VSD is infracristal (80%) lying in outflow tract of left ventricles. Supra-orbital or sub-pulmonary constitute 5–7%. Muscular septal defect account for 5–20%. The relationship of atrioventricular pathways with defects is important specifically in post operative periods.^{7,8,10,13} Early recognition of these lesions and proper evaluation by cardiologist is important both for patients and families to prevent severe morbidity and mortality.¹⁴ Younger age at diagnosis improves the chances of successful surgery while pulmonary hypertension is reversible. The

outcome may be improved by proper follow-up of children with congenital heart defects in general, better organization of paediatric cardiology services and improved surgical results.

Very few studies are available in children in the local and national level on this topic.¹⁵ We expect a wide presentation of CCF in VSD in children being admitted to hospital and therefore, it is imperative that the paediatricians always make a careful search for underlying heart pathology. Early recognition and adequate management can reduce complications and overall mortality and improve outcome.¹⁴

MATERIAL AND METHODS

This was a descriptive study of 49 patients with CCF and VSD, conducted in the Children Hospital, PIMS, Islamabad in a period of 6 months. Patients presenting with signs and symptoms of CCF coming to OPD and A and E Departments were admitted in wards.

For every patient a proper record was maintained. Children of age less than 1 month and more than 12 years were excluded from this study because most of the patients with CCF present after neonatal period and as a policy of the hospital only patients with age less than 12 years were admitted after ECG, X-RAY and Echocardiography. All those patients with symptoms and signs of CCF but without VSD were excluded from the study. Similarly, children with VSD and other shunts were also excluded from this study. For patient who were included in the study a detailed history was noted with special emphasis on symptoms such as age at presentation of 1st Symptom, breathing difficulty, feeding difficulty, fever, fatigue, sweating, suspected chest infection, failure to thrive, cough and wheeze. Similarly a detailed examination with a special emphasis on signs such as tachycardia, tachypnea, chest deformity, apex beat, oedema, hepatomegally, chest crackles and murmur was noted.

Feeding difficulty was defined as disinterest, excessive fatigue, diaphoresis, a change in the pattern of respiration, tachypnea and dyspnoea during or after feed.¹⁶

Breathing difficulty or dyspnoea were considered if the child was breathing rapidly and had flaring of *alae nasi*, chest retraction. Dyspnoea is among the earliest signs of CCF and is both a sign and a symptom.

Repeated chest infection was considered if the patient had more than two episodes of pneumonia in six months period or more than 5 episodes in one year.

Failure to thrive was defined as weight or height at least two standard deviations below the mean for age of the child.¹⁷

Apex beat was defined as the normal if it was felt at the 4th intercostal space in the midclavicular line

before the age of 7 years and at the 5th inter-costal space in the midclavicular line after the age of 7 years.¹⁸

Murmur for VSD was defined as the presence of pansystolic murmur at left lower sterna edge. Hepatomegally was described if the live edge was felt more than 2 cm below the right costal margin.¹⁹

Congestive Cardiac Failure was suspected if child was having two or more of the following clinical features²⁰, plus the evidence of cardiomegally on CXR:

Tachycardia, tachypnea, dyspnoea, feeding difficulty, exercise sweat on forehead, failure to thrive, wheezing and crepitation in chest, hepatomegally and cardiomegally. Cardiomegally on CXR was considered if there was cardiothoracic ratio of more than 0.5 which was calculated by the measurement of widest transverse diameter of the heart shadow divided by the widest transverse diameter of thoracic cavity above the diaphragm.²¹

CXR were obtained in a PA view in the department of radiology. Standard 12 lead ECG was performed and interpreted for heart rate, rhythm, axis, ventricular hypertrophy and abnormalities of PQRS and T-waves.

Echocardiography was performed by paediatric cardiologist with 2-D Doppler and colour Doppler machine with transducer frequency appropriate for patient size.

Patients were grouped into different classes, based on size of defect on echo as small sized VSD (<0.5 Cm), medium (0.5–1 Cm), and large (>1 Cm). Similarly patients were also grouped into different classes according to the site and nature of the defect as peri-membranous, muscular, supracostal and inlet VSD.

Data was analysed by using SPSS-10. Simple frequencies and percentages were calculated to present the study findings. This was a descriptive study so no inferential statistics was used.

RESULTS

A total of 49 patients were included in the study during a period of six months. Twenty-nine (59.2%) were males. The male to female ratio was 1.45:1.

Out of total, 42 patients (85.7%) had their first symptom before the first birthday while only 1 (2.0%) patient had first symptom after the age of 5 years. Similarly, 31 (63%) patients were under one year of age at presentation (Table-1).

Table-1: Age of the patients (n=49)

Age	At 1 st Symptom	At presentation
<1 year	42 (85.7%)	31 (63.3%)
1–5 years	6 (12.2%)	14 (28.6%)
>5 years	1 (2.0%)	4 (8.2%)

Symptoms in order of frequencies in patients with CCF and VSD were dyspnoea in 48 (98.0%) cough (83.7%), feeding difficulty 39 (79.6%), fever 35

(71.4%), failure to thrive 32 (65.3%), repeated chest infection in 29 (59.2%), sweating 22 (44.9%), and wheeze 9 (18.4%). Signs in order of frequency were murmur in 48 (98%), tachypnea 45 (91.8%), tachycardia 44 (89.8%), hepatomegally 44 (88.8%) crackles in chest 42 (85.7%), displaced apex beat 28 (57.1%), oedema 14 (28.5%) and chest deformity in 10 (20.4%) patients. Amongst the investigations the notable CXR findings included cardiomegally in 44 (89.8%) and in 5 patients (10.2%) the CXR was found normal (Table-2).

Table-2: Signs and symptoms of CCF (n=49)

	No. of patients	%
Dyspnoea	48	98.0
Cough	41	83.7
Feeding difficulty	39	79.6
Fever	35	71.4
Failure to thrive	32	65.3
Repeated chest infection	29	59.2
Sweating	22	44.9
Wheeze	9	18.4
Murmur	48	98.0
Tachypnea	45	91.8
Tachycardia	44	89.8
Hepatomegally	44	89.8
Crackles in chest	42	85.7
Displaced apex beat	28	57.1
Oedema	14	28.5
Chest deformity	10	20.4

ECG was helpful in 32 patients (65.3%) with LAD, it was normal in 14 (28.1%) patients, and 3 (6.1%) patients had RAD on ECG (Table-3).

Table-3: Investigations in patients (n=49)

Parameters	No. of patients	%	
CXR	Normal	5	10.2
	Abnormal	44	89.8
ECG	LAD	32	65.3
	RAD	3	6.1
	Normal	14	28.0

Echocardiography showed that in 22 (44.9%) patients the defect size was large VSD, 15 (30.6%) patients were having moderate sized VSD while 12 (24.5%) patients were with small defect size (Figure-1).

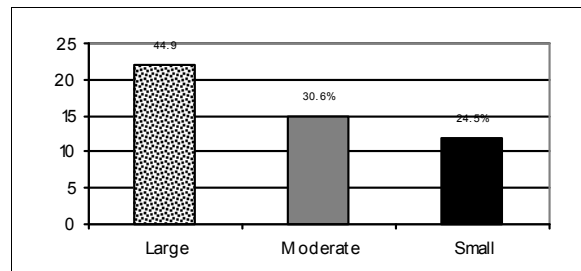


Figure-1: Size of VSD (n=49)

The type of VSD, peri-membranous was the commonest. Thirty (61.2%) patients were with this type followed by muscular (15, 30.6%), supracristal (3, 6.1%), and inlet type (1, 2.1%) (Figure-2).

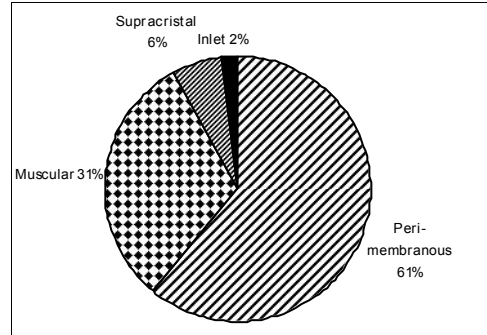


Figure-2: Distribution of patients according to type of VSD (n=49)

DISCUSSION

There are very fewer studies available in Pakistan reflecting the presentation of CHD but data with clinical features of CCF in children with VSD is scarce.¹⁵

Aziz³ and Masood *et al*⁶ reported congenital heart disease in children with a predominance in males. Our study also showed male predominance and male to female ratio of 1.46:1.

Presentation of CHD is more common during infancy. In our study most of the patients with VSD presented before one year of age. Dyspnoea, cough, feeding difficulty, fever, failure to thrive, repeated chest infections and sweating were the common symptoms in our study. These findings are in consistence with the findings observed by Ejaz *et al*² except that cough was present in 25% of patients compared to 83.7% of patients in our study. It is probably because we included only patients with CCF and Ejaz *et al* included patients with congenital as well as acquired heart diseases. In another study by Ramarchandran *et al* recurrent chest infections were observed in 58.2% of patients which is almost similar to our study. Dyspnoea was observed in 16.4% of patients.¹⁴ In our study this was observed in 98% of the patients. It is because we included only patients with CCF and VSD while Ramachandran *et al* included patients with all cardiac problems, and some of these conditions do not cause CCF and dyspnoea.

The most frequently observed clinical signs were murmur (98%), tachypnea (91.8%), tachycardia (89.8%), hepatomegally (89.8%), crackles in chest (85.7%), displaced apex beat (57.1%) and oedema 28.6% whereas in the study done by Ejaz *et al* the percentage of murmur was 58.5%, hepatomegally 58.5% and crackles in chest in 44% patients.² The reason for this difference is that our study is done on patients with CCF and VSD only but they included some patients with cyanotic congenital heart disease, cardiomyopathy and myocarditis. Some of these conditions do not present with CCF and some do not have murmurs.

We found CXR helpful in 89.8% with evidence of cardiomegally, and ECG was significant in 71% of patients. In a study by Saton *et al*⁹ ECG and

CXR helped to confirm the diagnosis of heart disease in 33% of patients. The probable reason of this difference is that in our study most of the children were referrals cases in advanced stages, initially treated by general practitioners. In these children because of CCF and advanced disease there were more chances of cardiomegally and hypertrophy of left ventricles.

Analysis of our study showed that large sized VSD (44.9%) with peri-membranous type (61%) respectively were most common lesions in patients with CCF. Aziz³ reported 25.7% large VSD from 750 patients. Peri-membranous defect was noted in 92%. This was a relatively big study of 750 patients while our study was done only on 49 patients. Moreover, all types of patients with or without CCF in VSD were included in that study.

CONCLUSION

Early recognition of sign and symptoms of CCF in paediatric patients with VSD and awareness at primary health care level can prevent the delay in diagnosis and will definitely reduce the morbidity and mortality in these children. There is a need to design more studies in children with CCF.

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