

CONGESTIVE CARDIAC FAILURE IN CHILDREN WITH VENTRICULAR SEPTAL DEFECT

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ABSTRACT

Objective: To find the frequency of children with ventricular septal defect presenting with congestive cardiac failure

Material and method: This is a cross sectional descriptive study; carried out in a pediatric unit of a tertiary care hospital of Khyber Pakhtunkhwa, Peshawar from June 2018 till December 2019.

Results: 209 infants and children with ventricular septal defect were enrolled. 146 (69.9%) were males and 63 (30.1%) females. Minimum age of the patient was 0.9 years and maximum age was 8.5 years. Feeding difficulty was found in 90% of patients, dyspnea in 59.8% of patients, repeated chest infection was seen in 49.8%, failure to thrive in 69.9%, tachycardia in 83.3%, displaced apex beat in 59.8%, cardiomegaly in 90%, hepatomegaly in 43.1%, VSD murmur in all 100% of patients and edema was observed in 56.5% and tachypnea in 40.7% of patients with majority of patients presenting with combination of more than three clinical features.

Conclusion: Ventricular septal defect is not uncommon in our population. This study proves that the clinical picture of VSD has a big variety and care must be taken while these clinical features are observed in younger age groups or its combination to get the correct diagnosis in time.

Keywords: Ventricular septal defect (VSD), Congestive Cardiac Failure (CCF), Children.

This article may be cited as: Amir S, Rehman Y, Shah SIA, Munir A, Rehman k, Bahar S. Congestive Cardiac failure in children with Ventricular Septal defect. *J Med Sci* 2020 April;28(2):125-128

INTRODUCTION

Congestive cardiac failure (CCF) in infancy and childhood is a common presentation of many Congenital Heart Defects (CHD). The incidence of congenital heart disease is 6-8/ 1000 life birth and amongst them Ventricular septal defects (VSD) comprises of 25–30% of all congenital cardiac lesions i.e. 1.8–4/1,000 live births¹. Thus CCF is very common in VSD².

Ventricular septal defect (VSD) though a common congenital heart defect, is usually picked up late. The reason being variable symptoms of VSD presenting from being quiet and silent with spontaneously closure, to irreparable complications and mortality when not treated timely and appropriately^{3,4,5}.

Several key components determine the mode of presentation of this defect. The amount of blood, inter-ventricular shunting direction and the cardiac chambers'

degree of volume loading are the primary factors, thus secondarily leading to aortic valve prolapse and pulmonary or systemic out flow tract obstruction. The size of the defect and pulmonary and systemic vascular resistance determines the quantity of interventricular flow^{6,5}.

The asymptomatic children who are picked during routine physical examination actually have a small VSD with less shunting and normal pulmonary arterial pressure while children with large VSDs and pulmonary hypertension and increased flow have tachypnoea, poor feeding and growth, excessive sweating, recurrent pulmonary infections and heart failure^{4,6}.

Children with VSD usually presents under one year of age (63.1%). The common symptoms are dyspnea (98%), cough (83.7%), problems with breast feeding (9.6%), and inability to gain weight (65.3%), recurrent pneumonias (59.2%) and excessive perspiration (44.9%)².

Cardiac murmur (98%), labored breathing (91.8%), cardiomegaly on X-ray chest (89.8%), tachycardia (89.8%), hepatomegaly (89.8%), displaced apex beat (57.1%) and edema (28.6%) are the common signs to look for².

The disorder with inability of the heart to pump blood adequately through the body is termed as congestive heart failure. Insufficient oxygenation and collection

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Date received: 05-04-2020

Date revised: 08-05-2020

Date accepted: 20-06-2020

of fluid in tissues and organs lead to breathlessness and easy fatigability of children. The severity of these symptoms is variable as is VSD itself. whatever the cause may be children with heart failure presents with failure to thrive, tachypnoea, tachycardia, feeding difficulty, sweating, irritability, pallor, fatigue, exertional dyspnea, orthopnea, edema raised JVP, pulmonary crackles, hepatomegaly, repeated chest infections and wheeze⁷.

About 24.6% patients with moderate or large VSD present with congestive cardiac failure⁸. Morbidity and mortality of congestive heart failure and VSD is high². In developing countries the late presentation of ventricular septal defect (VSD) leads to development of severe pulmonary arterial hypertension (PAH) (16.5%) leading to rise in morbidity and mortality^{3,9}.

The current study was designed to determine the variable presentation of children with VSD and congestive heart failure. This study will prove helpful to the physician in prompt recognition of CCF in pediatric patients with VSD thus early diagnosis and reduction of morbidity and mortality will be possible.

MATERIAL AND METHODS

This Cross sectional descriptive study was conducted at department of pediatrics, Khyber teaching hospital, Peshawar from June 2018 till December 2019.

A total of 209 patients newly diagnosed VSD or known cases who presented with signs and symptoms were included in the study. Non-randomized convenient sampling was used to select children. The attendants of the enrolled children gave informed consent. Standardized proforma was used for all patients included in study.

Record of every patient was maintained. A detailed history was taken from attendant of patient included in study. Attention was paid to presenting complaints such as poor feeding, fever, lethargy, perspiration, repeated chest problems, poor weight gain, cough and noisy chest. During examination of these children, special attention was paid to clinical features such as tachycardia, tachypnea, chest abnormality, apex beat, edema, hepatomegaly, crepitations and murmur. X-Rays chest antero-posterior were obtained in the radiology department of KTH. ECG was performed and interpreted for tachycardia, arrhythmias, left axis deviation, ventricular hypertrophy and abnormalities of PQRS and T-waves which helped in initiation of treatment. Echocardiography was performed by pediatric cardiologist with 2-D Doppler and color Doppler machine with transducer frequency appropriate for patient size for diagnosis of new cases and in those known VSD cases where reevaluation was needed. The data was recorded in pre designed questionnaire.

The patients presenting to OPD and Emergency Pediatric Services or ward with signs and symptoms of

CCF, known to have VSD or found to have VSD on workup, known patients with VSD developing CCF during hospital stay and age 1 month to 16 years were included. While all those patients with complaints and clinical features of heart failure but without ventricular septal defect or with signs of heart failure and other or a complex congenital cardiac anomalies with VSD were excluded. All these factors are confounders and will make the study results biased if included.

RESULTS

209 patients with ventricular septal defect were enrolled. Males were 146 (69.9%) and female 63 (30.1%). (Figure No. 1). Minimum age of the patient was 0.9 years and maximum age was 8.5 years. The mean age was 4.05± 2.07. Most of the patients 98 (46.9%) were in the age group up to 3.50 years followed by 70 patients (33.5%) in the age group of 3.51-6.00 years and 41 patients (19.6%) were above 6.01 years of age. (Table No.1). Since our objective was to see the different types of presentation in children with VSD, we took about 11 set of different signs and symptoms in our study. Feeding difficulty was found in 90% of patients, dyspnea in 59.8% of patients, repeated chest infection was seen in 49.8%, failure to thrive in 69.9%, tachycardia in 83.3%, displaced apex beat in 59.8%, cardiomegaly in 90%, hepatomegaly in 43.1%, VSD murmur in all 100% of patients and edema was observed in 56.5% and tachypnea in 40.7% of patients with majority of patients presenting with combination of more than three clinical features (Table 2).

As our inclusion criteria consisted of consecutive patients with VSD; which were confirmed by ECHO. The subtypes of VSD in our study, were peri-membranous (86.6%), muscular VSD (10%) and sub-atrial infundibular VSD (3.3%)(Table 3).

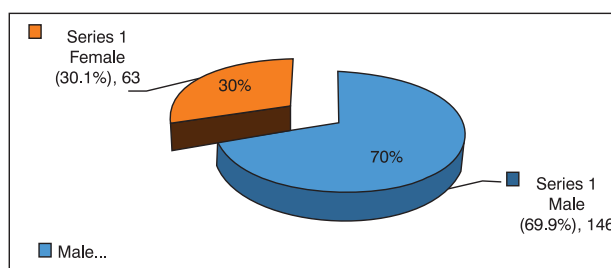


Figure 1: Gender wise distribution of sample (N=292).

Table 1: Age wise distribution of the sample (N=209)

Age Groups in years	Frequency	Percent
up to 3.50	98	46.9
3.51 - 6.00	70	33.5
6.01 and above	41	19.6
Total	209	100.0

Table 2: Clinical presentations among patient of Ventricular Septal defect.

Clinical presentation among patient	Yes (%age)	No (%age)
Feeding difficulty	188(90)	21(10%)
Dyspnea	125(59.8)	84(40.2%)
Repeated chest infections	104(49.8)	105(50.2)
Failure to thrive	146(69.9)	63(30.1)
Tachycardia	174(83.3)	35(16.7)
Displacement of apex beat	84(40.2)	125(59.8)
Cardiomegaly on CXR	188(90)	21(10)
Hepatomegaly	90(43.1)	119(56.9)
Edema	118(56.5)	91(43.5)
Tachypnea	85(40.7)	124(59.3)
VSD murmur	209(100)	

Table 3: Echocardiographic finding of VSD.

Type of ventricular septal defect	Frequency	Percent
Peri membranous VSD	181	86.6
Muscular VSD	21	10
Sub atrial Infundibular VSD	7	3.3
Total	209	100

DISCUSSION

Congenital cardiac malformations constitute a major portion of pediatric cardiovascular disease thus constituting a greater percentage of congenital malformations; 4 to 50 per 1000 live birth being its estimated prevalence. Amongst the 4 to 10 live born infants per 1000 having a cardiac defect, 40% are diagnosed less than one year of age and 50 per 1000 live births.

Incidence of CHD is deficient growth or failure of the septum between the ventricles to align or non-fusion of parts of interventricular septum leads to Ventricular septal defect (VSD)¹². Ventricular septal defect alone with none of the other cardiac defects presents in 2-6 of every 1000 live births and constitute more than 15-20% of all congenital heart diseases¹³. Lopez L divided VSD into peri membranous, Muscular and juxta arterial types and 80% of VSDs are peri membranous thus being the most frequently diagnosed type^{14,15}. About 5-20% are Muscular VSD and have a good prognosis as they close on their own earlier than peri membranous VSD¹⁶. Doubly committed sub arterial VSD's (DCSA) are found in 5-7% children with VSD on autopsies and surgically. They are more common in Asia, particularly Far East constituting about 29% of VSDs¹⁷. Classically VSD association with aortic valve prolapse and aortic regurgitation developing progressively is being reported in Chinese and Far Eastern population frequently¹⁸. Peri-membranous VSD was the most common type in this study (86.6%). Muscular VSD (10% of total VSD) was the second frequent subtype while Sub arterial infundibular (SI VSD) type was least frequent (3.3%). These results

were similar to western literature, where peri membranous VSD was the most frequently reported while muscular and DCSA followed in descending order of frequency^{19,20}.

There is a lack of local studies on this topic. In a study at Children Hospital Lahore by Hyder SN, peri membranous, muscular, sub-aortic supra-cristal inlet and outlet were reported in 65.8%, 12.6%, 8.3%, 6.0%, 5% and 1.7% of patients respectively¹⁹. In a study at NICVD, Karachi, Aziz K found that PM VSD were 92% of total VSD, 7% were SI VSD and muscular were 1.7% being the least common. The same study diagnosis was made in children older than one year (68% of patients) more frequently²⁰. In the present study, however, the ages of patients were between 0.9 and 8.5 years with mean age of 4.05 years. The reason being that tiny muscular VSD closes earlier and spontaneously than PM. In another study by Sadiq PM et al²⁰, the incidence of VSD was 32% of all Congenital Heart Diseases (CHD) in patients presenting to a tertiary care pediatric cardiology unit²¹.

In our study, we reported a set of clinical features in patients with VSD. We studied and found feeding difficulty in 90% of patients, dyspnea in 59.8% of patients, repeated chest infection was seen in 49.8%, failure to thrive in 69.9%, tachycardia in 83.3%, displaced apex beat in 59.8%, cardiomegaly in 90%, hepatomegaly in 43.1%, VSD murmur in all 100% of patients and edema was observed in 56.5% and tachypnea in 40.7% of patients with majority of patients presenting with combination of more than three clinical features. In a study by Ejaz MS, the most commonly diagnosed congenital cardiac defect was Ventricular septal defect (20%) and 17.14% of acquired cardiac diseases were Rheumatic fever and viral myocarditis. The signs of heart diseases were difficulty in breathing (94.28%), fever (90%), poor feeding (57.14%) and malnutrition (34.28%). Rheumatic fever presented with movement disorder (chore)(8.57%), joint pain in 11.42%(arthritis) and S/C nodules (2.85%)²². In another study by Hussain M, children with VSD presented under one year (63.1%). The presentation of these children were with breathing difficulty (98%), cough (83.7%), failure to breast feed (9.6%), not gaining weight (65.3%), frequent chest problems (59.2%) and sweating (44.9%). Cardiac murmurs (98%), tachypnea (91.8%), cardiomegaly on X-ray chest (89.8%), tachycardia (89.8%), hepatomegaly (89.8%), apex beat being displaced (57.1%) and edema 28.6% were found in descending order³.

LIMITATIONS

It was carried out in only one hospital Ventricular septal defect is fairly common in our population and features of congestive cardiac failure are apparently nonspecific. A good knowledge of common features of congestive cardiac failure is important for clinician while dealing with a child having ventricular septal defect.

CONCLUSION

Ventricular septal defect is not uncommon in our population. This study proves that the clinical picture of VSD has a big variety and care must be taken while these clinical features are observed in younger age groups or its combination to get the correct diagnosis in time.

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CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Amir S: Principal author and article writing.

Rehman Y: Statistical analysis and review.

Shah SIA: Data Collection.

Munir A: Literature searching & Writing References.

Rehman K: Literature searching & Writing References.

Bahar S: Data Collection.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.