VENTRICULAR SEPTAL DEFECTS, CLINICAL PRESENTATION AND ASSOCIATED COMPLICATIONS

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ABSTRACT

Introduction: Ventricular septal defect (VSD) is a developmental defect of the intervene tricul ser septum resulting from a deficiency of growth or a failure of alignment or fusion of component parts of ventricular septum. Ventricular Septal Defect (VSD) is the most common cardiac malformation of the heart accounting for 25% of Congenital Heart Disease (CHD).

Patients and Methods: This was a cross-sectional descriptive echocardiography based study, conducted in department of Pediatric Cardiology, Study was conducted from January 2018 to April 2019. Only cases of isolated VSD (Absence of other cardiac anomaly) were included in the study. VSD were classified as perimembranous, muscular, Doubly Committed Subarterial (DCSA), and inlet VSD according to Soto’s classification. were included in the study. Size and location of the defect were identified by two dimensional transthoracicecho cardiography in the Department of Cardiology. Patients were grouped into three different classes: small, moderate and large based on size of aortic root. Lesions that approximate the size of the aorta are considered large; lesion one-third to two-thirds of the diameter of aorta are moderate; and lesions less VSD were classified as perimembranous, muscular, Doubly Committed Subarterial (DCSA), and inlet VSD according to Soto’s classification.

Only cases of isolated VSD (Absence of other cardiac anomaly) were included in the study. Size and location of the defect were identified by two dimensional transthoracic, colour Dopplerecho cardiography in the Department of Cardiology. Patients were grouped into three different classes: small, moderate and large based on size of aortic root. Lesions that approximate the size of the aorta are considered large; lesion one-third to two-thirds of the diameter of aorta are moderate; and lesions less VSD were classified as perimembranous, muscular, Doubly Committed Subarterial (DCSA), and inlet VSD according to Soto’s classification.

A thorough history, anthropometric measurement and along with chest X-ray and ECG were done in all the cases.

Results: A total of 77 patients were included during the period of 14months. Out of the total patients, 40 (51.9%) were female and 37 (48%) were male. Mean age was3.1±3.64 years (range: 1 day to 15 years). Patients below 1year were 57%, when they came to seek medical evaluation. Echocardiography done in the study subjects found 27 cases (35%) had small VSD, 27 cases (35%) had moderate VSD, while 23 cases (29.8%) had large VSD regarding complications, the most common complication was pulmonary hypertension 20, followed by aortic valve prolapse 10 and least complication was RVOTO 5(6.4%). Patients were classified according to Soto’s classification as Perimembranous, Muscular,
Doublycommitted subarterial type and Inlet VSD. Perimembranous type were 56(71%), Muscular type, were 11(16%) ,inlet VSD were 6(7%), and Doubly committed subarterial type were 4(5.3%).

**Conclusion:** Perimembranous ventricular septal defect is the commonest type of ventricular septal defect, followed by muscular VSD and least one was the least one

**INTRODUCTION:**
Ventricular septal defect (VSD) is a developmental defect of the interventricular septum resulting from a deficiency of growth or a failure of alignment or fusion of component parts of ventricular septum.1 Isolated ventricular septal defect occurs in approximately 2-6 of every 1000 live births and accounts for more than 15-20% of all congenital heart diseases.2 Ventricular Septal Defect (VSD) is the most common cardiac malformation of the heart accounting for 25% of Congenital Heart Disease (CHD).3 Isolated VSD affects approximately 2–6/1000 live births.4 Ventricular Septal Defect (VSD) is a developmental defect of the interventricular septum resulting from a deficiency of growth or a failure of alignment or fusion of component parts of ventricular septum.5 Soto et al classified VSD into 3 types: perimembranous, muscular and Doubly Committed Subarterial (DCSA) types depending upon the location. Perimembranous defect is the commonest accounting for about 70–80% of cases.6, 7 The natural course of VSD depends to a large degree on the size of the defect. Small VSD with trivial left to right shunt and normal pulmonary arterial pressure are asymptomatic and is usually found during routine physical examination. Large VSD with excessive pulmonary blood flow and pulmonary hypertension are responsible for dyspnoea, feeding difficulties, poor growth, profuse perspiration cardiac failure in early infancy.8

**Patients and Methods**
This was a cross-sectional descriptive echocardiography based study, conducted in department of Pediatric Cardiology, Study was conducted from January 2018 to april 2019. Only cases of isolated VSD (Absence of other cardiac anomaly) were included in the study.

VSD were classified as perimembranous, muscular, Doubly Committed Subarterial (DCSA), and inlet VSD according to Soto’s classification. Only cases of isolated VSD (Absence of other cardiac anomaly) were included in the study. Size and location of the defect were identified by two dimensional transthoracic, colour Doppler echocardiography in the Department of Cardiology. Patients were grouped into three different classes: small, moderate and large based on size of aortic root. Lesions that approximate the size of the aorta are considered large; lesion one-third to two-thirds of the diameter of aorta are moderate; and lesions less.

VSD were classified as perimembranous, muscular, Doubly Committed Subarterial (DCSA), and inlet VSD according to Soto’s classification. A thorough history, anthropometric measurement and along with chest X-ray and ECG were done in all the cases. Anthropometric procedures were performed according to standard WHO procedure. Data was entered and analysed by using SPSS-1.6. A total of 56 patients were included by consecutive sampling. All new children below fifteen years of age with suspected ayanotic congenital heart disease attended to outpatient clinic at Tikrit teaching hospital. The diagnosis was primarily made on echocardiography. Size, number and exact location of the defect as well as magnitude of shunt were identified by two dimensional and Doppler echocardiography. Pulmonary artery pressure was estimated by using modified Bernoulli equation. Aortic valve prolapse and aortic regurgitation was also noted. Severity of aortic regurgitation was assessed by using parameters like left ventricular end - diastolic and systolic dimensions, Doppler flow
velocity measurement and assessment of length, width and area of regurgitant jet. All echocardiograms were performed by two trained paediatric cardiologists using latest HD echomachine. Patients with VSD as a part of other congenital cardiac anomalies were excluded from the study. Patients having isolated Ventricular Septal Defect (absence of any other major cardiac anomaly) only were included in the study. Patients having minor associated anomaly, like a small patent ductus arteriosus, and secundum atrial septal defect were also included. VSD were classified as Perimembranous, Doubly committed subarterial, Muscular and Inlet VSD using Soto’s classification.3 Functionally VSD was divided into small, moderate and large groups. Small VSD was defined as a doppler CW gradient across VSD > 60mmHg, no LV dilation and absence of severe pulmonary hypertension. Moderate VSD was defined as doppler CW gradient across VSD 30-60 mmHg and LV dilation was the absence of severe pulmonary hypertension. Large VSD was a doppler CW gradient across VSD < 30mmHg LV dilation may or may not be present. Presence of severe pulmonary hypertension.

**RESULTS**

In our study, a total of 77 patients were included during the period of 14 months. Out of the total patients, 40 (51.9%) were female and 37 (48%) were male. Mean age was 3.1±3.64 years (range: 1 day to 15 years). Patients below 1 year were 57%, when they came to seek medical evaluation Echocardiography done in the study subjects found 27 cases (35%) had small VSD, 27 cases (35%) had moderate VSD, while 23 cases (29.8%) had large VSD (Fig. 1), regarding complications, the most common complication was pulmonary hypertension 20, followed by aortic valve prolapse 10 and least complication was RVOTO 5 (6.4%). Patients were classified according to Soto’s classification Perimembranous, Muscular, Doubly committed subarterial type and Inlet VSD. Perimembranous type were 56 (72%), Muscular type were 11 (16%), Inlet VSD were 6 (7%), and Doubly committed subarterial type were 4 (5.3%) as shown in table 1.

Regarding the clinical presentation and complication, The major signs in order of frequency were systolic murmur (100%), 77 (100%), 55 (71%) patients presented with repeated chest infection, 20 (25.9%) had heart failure, 21 (27.2%) had failure to thrive, as shown in table 3.

**Discussion**

VSD is the commonest congenital heart disease in children. In our study the commonest type of VSD was perimembranous 56 (72%) followed by muscular 11 (14.2%), the least frequent were subarterial 4 (5.1%), approximately the same study done at Chaudhry Pervaiz Elahi Institute of Cardiology, Multan. While study at NICVD, Karachi, Aziz et al. found that perimembranous VSD were 92% of total VSD, doubly committed subarterial were 7% and the least common were muscular i.e. 1.7%20. Among the study subjects, 77% had their 1st symptom below the age of 1 year. This is comparable with the studies done in Pakistan 7. Muscular VSD was found mostly in younger patients may be that small muscular VSD tend to close earlier than perimembranous. 7 Similar results were shown in local studies by Uzma Kazmi et al and Masood Sadiq et al conducted in Lahore. 9, 10 Aortic valve prolapse was present in 12.9% of total patients, and aortic regurgitation occur in 10.3% of patients. This consistent with other Study done by Lue et al. 11 found aortic cusp prolapse and aortic regurgitation in 11.9% of their patients with VSD. Brauner et al. found aortic cusp prolapse in over 5% of children with VSD 12.

RVOT obstruction present in 6.4% similar to study by Glenn et al. 13 found that 5.8% patients of VSD developed in fundibular stenosis, while study done by Tauseef Asma Chaudhry 14, show 1.6% of cases presented with RVOT stenosis.
Regarding pulmonary hypertension 20 patients 25.9% had pulmonary hypertension, one of major indication for surgery, approximately same study done by Tauseef Asma Chaudhry 14.

Conclusion
Perimembranous ventricular septal defect is the commonest type of ventricular septal defect, followed by muscular VSD and least one was the least one. Pulmonary hypertension was the commonest complication seen with ventricular septal defects, followed by aortic cusp prolapse and aortic regurgitation. Cardiac murmur is the commonest clinical sign.

Table 1: Types of VSD

<table>
<thead>
<tr>
<th>Type</th>
<th>NO.</th>
<th>%</th>
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<tbody>
<tr>
<td>Perimembranous</td>
<td>56</td>
<td>72</td>
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<tr>
<td>Muscular</td>
<td>11</td>
<td>14.2</td>
</tr>
<tr>
<td>Inlet</td>
<td>6</td>
<td>7.7</td>
</tr>
<tr>
<td>Subarterial</td>
<td>4</td>
<td>5.1</td>
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</table>

Table 2: complications associated with VSD

<table>
<thead>
<tr>
<th>Complications</th>
<th>NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary hypertension</td>
<td>20</td>
<td>25.9</td>
</tr>
<tr>
<td>Aortic valve prolapsed</td>
<td>10</td>
<td>12.9</td>
</tr>
<tr>
<td>TR</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Aortic regurgitation</td>
<td>8</td>
<td>10.3</td>
</tr>
<tr>
<td>RVOT obstruction</td>
<td>5</td>
<td>6.4</td>
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</table>

Table 3: clinical presentations

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest infection</td>
<td>55</td>
<td>71</td>
</tr>
<tr>
<td>Murmur</td>
<td>77</td>
<td>100</td>
</tr>
<tr>
<td>Heart failure</td>
<td>20</td>
<td>25.9</td>
</tr>
<tr>
<td>Failure to thrive</td>
<td>21</td>
<td>27.2</td>
</tr>
</tbody>
</table>

References: