

R E S U L T S

Personal data:

Age: $\frac{2}{12}$ - 11 years

Sex: Male 18

Female 12

Ratio 1.5 : 1

Consanguinity: 12

Sibs. with congenital heart disease: 2

Symptoms:

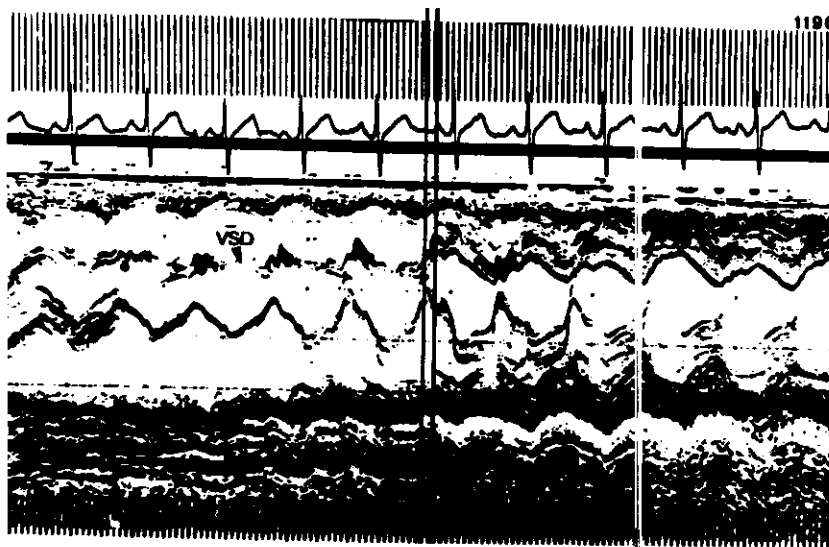
- S.O.B. 14
- Sweating 16
- Failure to thrive 19
- Chest infection 18
- Previous H.F. 12
- Cyanosis 4

Signs:

- Weight 18 below average centile for their age
- Thrill 24
- Heart sounds: 8 showed high S_2
- Murmur : 30 pansystolic m. over LSB.
10 middiastolic m. over apex.

E.C.G.: BVH 12
RVH 15
RBBB 6
LA 5
Normal 6

CXR:	- Increase CTR	18
	- BVE	12
	- RVE	15
	- LVE	-
	- LAE	-
	- BAE	4



M-mode Echocardiography showing VSD in the immediate subaortic area.

Table (1): Echo findings in cases under one year.

Case No.	Age	Sex	Dimensions	Septal motion	Comment
1	2 months	Male	L.A. 2 cm L.V.D. 2.8 cm L.V.S. 2 cm R.V. 1.5 cm	Normal	No apparent Septal defect
2	3 months	Male	L.A. 1.5 cm L.V.D. 3.5 cm L.V.S. 2.5 cm R.V. 2 cm	Normal	Hyperdynamic L.V. uggestive of VSD.
3	4 months	Female	L.A. 2.3 cm L.V.D. 3.5 cm L.V.S. 3.1 cm R.V. 2.1 cm	Normal	Normal echo
4	6 months	Female	L.A. 1.75 cm L.V.D. 1.5 cm L.V.S. 1.2 cm R.V. 2.6 cm	Paradoxical Septal motion.	Dilated RV Suggestive of VSD.
5	6 months	Female	L.A. 2 cm L.V.D. 2.7 cm L.V.S. 2.1 cm R.V. 1.6 cm	Normal	The septum looks interrupted. Indicative of VSD.
6	6 months	Female	L.A. 2.2 cm L.V.D. 2.5 cm L.V.S. 1.5 cm R.V. 3.1 cm	Exaggerated paradoxical	Suggestive of VSD.
7	6 months	Female	L.A. 1.5 cm L.V.D. 2.9 cm L.V.S. 2 cm R.V. 1.9 cm	Normal	No evidence of VSD.
8	6 months	Female	L.A. 4 cm L.V.D. 5.9 cm L.V.S. 4 cm R.V. 3.1 cm	Exaggerated	Suggestive of VSD.

Table (1): (Cont.):

Case No.	Age	Sex	Dimensions	Septal motion	Comment
9	8 months	Female	L.A. 1.70 cm L.V.D. 1.5 cm L.V.S. 1.1 cm R.V. 1.6 cm	Normal	Discontinuity of the anterior aortic wall with septum. Indicative of VSD.

N.B.:

Normal dimensions

Left atrium	1.9-4.0 cm
Left ventricle diastole	3.5-5.6 cm
Left ventricle systole	1.2-2.1 cm
Right ventricle	0.7-2.3 cm

[Lundstrom, 1974]

Table (2): Echo findings in cases from 1-3 years.

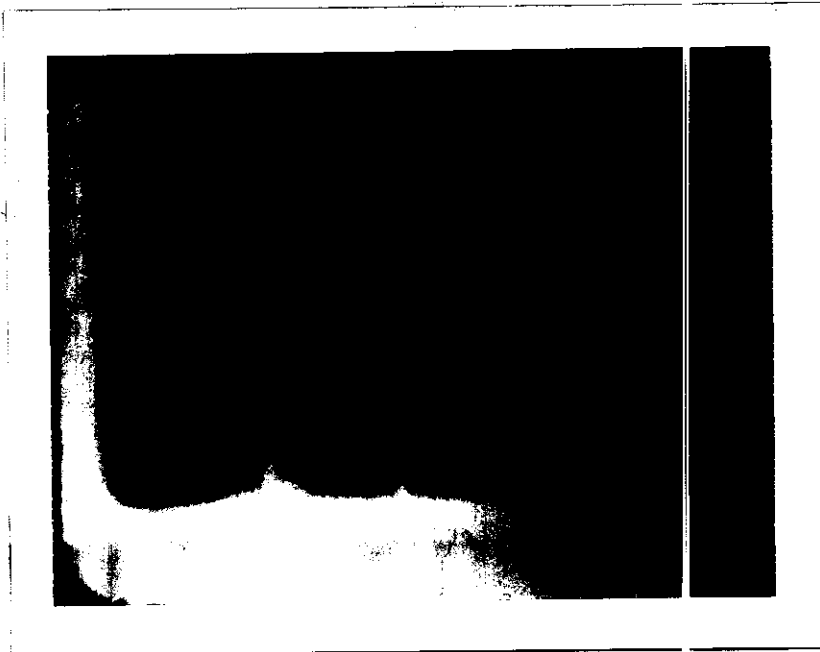
Case No.	Age	Sex	Dimensions	Septal motion	Comment
10	13 months	Male	L.A. 3.1 cm L.V.D. 3.5 cm L.V.S. 2.5 cm R.V. 2 cm	Normal	Suggestive of VSD.
11	14 months	Male	L.A. 3 cm L.V.D. 4 cm L.V.S. 2.8 cm R.V. 2.1 cm	Normal	Normal echo-cardiogram.
12	1½ years	Male	L.A. 1.2 cm L.V.D. 1.8 cm L.V.S. 1.5 cm R.V. 1.6 cm	Paradoxical	Indicative of VSD (septum is interrupted).
13	1½ years	Male	L.A. 1.9 cm L.V.D. 3.2 cm L.V.S. 2 cm R.V. 2 cm	Normal	Normal echo-cardiogram.
14	2 years	Female	L.A. 3 cm L.V.D. 4.8 cm L.V.S. 2.9 cm R.V. 1.6 cm	Exaggerated	Normal tracing.
15	2 years	Male	L.A. 4 cm L.V.D. 6.6 cm L.V.S. 4.1 cm R.V. 3.3 cm	Paradoxical	Picture coap- red with VSD.
16	3 years	Male	L.A. 2.3 cm L.V.D. 5 cm L.V.S. 3.9 cm R.V. 3.5 cm	Normal	Suggestive of VSD.
17	3 years	Male	L.A. 3 cm L.V.D. 2.6 cm L.V.S. 1.8 cm R.V. 1.5 cm	Exaggerated	Normal echo-cardiogram.

Table (3): Echo. findings in cases from 3-5 years.

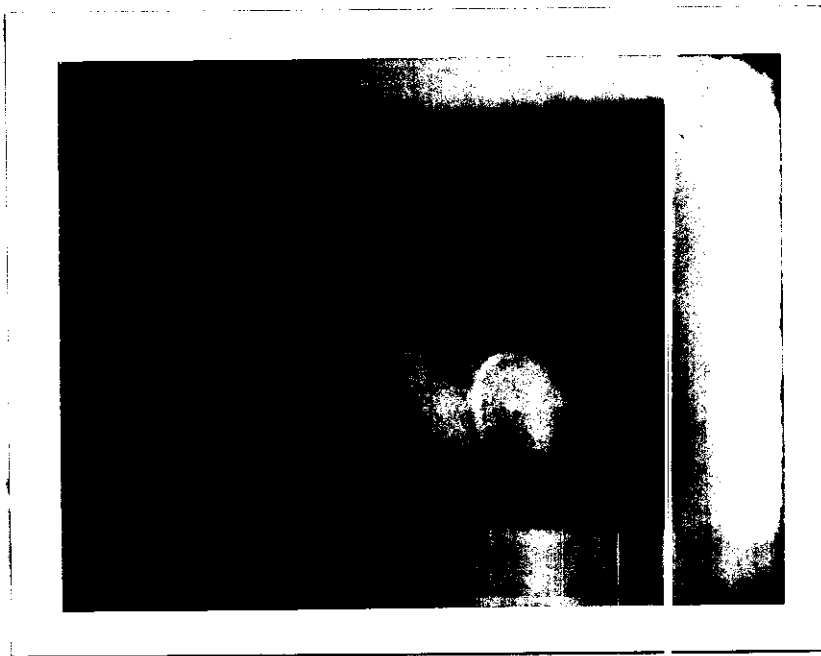
Case No.	Age	Sex	Dimensions	Septal motion	Comment
18	3½ years	Female	L.A. 2.8 cm L.V.D. 3.2 cm L.V.S. 2.1 cm R.V. 1.9 cm	Normal	Suggestive of VSD
19	4 years	Male	L.A. 3 cm L.V.D. 5.2 cm L.V.S. 4.8 cm R.V. 2 cm	Normal	Normal echocardiogram.
20	4½ years	Male	L.A. 2.1 cm L.V.D. 5 cm L.V.S. 3 cm R.V. 3.2 cm	Exaggerated	Suggestive of VSD
21	5 years	Male	L.A. 3 cm L.V.D. 3.3 cm L.V.S. 2 cm R.V. 1.6 cm	Normal	Normal echocardiogram.
22	5 years	Male	L.A. 2.3 cm L.V.D. 3.4 cm L.V.S. 2.1 cm R.V. 1.8 cm	Normal	Interruption of septum is at its continuation with the anterior aortic root. Δ membranous VSD. Sure VSD.
23	3½ years	Male	L.A. 2.4 cm L.V.D. 3.4 cm L.V.S. 2 cm R.V. 1.6 cm	Normal	Suggestive of VSD.

Table (4): Echo. findings in cases 5-11 years.

Case No.	Age	Sex	Dimensions	Septal motion	Comment
24	5½ years	Male	L.A. 2.3 cm L.V.D. 4.5 cm L.V.S. 3 cm R.V. 1.8 cm	Exaggerated	Suggestive of VSD
25	6 years	Male	L.A. 3.2 cm L.V.D. 5.2 cm L.V.S. 4.5 cm R.V. 1.8 cm	Normal	Normal echocardiogram.
26	6 years	Male	L.A. 3 cm L.V.D. 6 cm L.V.S. 4.2 cm R.V. 1.5 cm	Normal	Suggestive of VSD.
27	7½ years	Male	L.A. 2.5 cm L.V.D. 5 cm L.V.S. 4.3 cm R.V. 1.6 cm	Normal	Normal echocardiogram.
28	7½ years	Female	L.A. 2.5 cm L.V.D. 3.5 cm L.V.S. 2.7 cm R.V. 1.5 cm	Normal	Normal echocardiogram.
29	8 years	Female	L.A. 3.1 cm L.V.D. 5 cm L.V.S. 4.3 cm R.V. 1.6 cm	Normal	Normal echocardiogram.
30	11 years	Female	L.A. 2.5 cm L.V.D. 3.7 cm L.V.S. 4.2 cm R.V. 1.7 cm	Normal	Interrupted vent. septum. ▲V.S.D. Indicative of VSD.



Right heart catheterization.
Angiocardiography showing VSD.



Right heart catheterization.
Angiocardiography showing VSD.



Left heart catheterization.
Angiocardiography showing VSD.

Table (5): c.c. and Angio. findings in cases under one year.

Case No.	Age	Sex	% O ₂ saturation	Angio diagnosis
1	2 months	Male	R.V.I. 77 R.V.B. 82 R.V.O. 83	Membranous VSD.
2	3 months	Male	R.V.I. 77 R.V.B. 86 R.V.O. 85	Membranous VSD.
3	4 months	Female	R.V.I. 70 R.V.B. 81 R.V.O. 81	Membranous VSD.
4	6 months	Female	R.V.I. 74 R.V.B. 89 R.V.O. 89	Membranous VSD.
5	6 months	Female	R.V.I. 73 R.V.B. 88 R.V.O. 89	Membranous VSD.
6	6 months	Female	R.V.I. 72 R.V.B. 80 R.V.O. 83	Muscular VSD.
7	6 months	Female	R.V.I. 74 R.V.B. 82 R.V.O. 82	Membranous VSD.
8	6 months	Female	R.V.I. 73 R.V.B. 81 R.V.O. 81	Membranous VSD.
9	8 months	Female	R.V.I. 72 R.V.B. 84 R.V.O. 84	Membranous VSD.

Table (6): c.c. and Angio. findings in cases 1-3 years.

Case No.	Age	Sex	% O ₂ saturation	Angio. diagnosis
10	13 months	Male	R.V.I. 71 R.V.B. 82 R.V.O. 81	Membr. VSD.
11	14 months	Male	R.V.I. 68 R.V.B. 77 R.V.O. 76	Very small muscular VSD.
12	1½ years	Male	R.V.I. 71 R.V.B. 79 R.V.O. 78	Membr. large VSD.
13	1½ years	Male	R.V.I. 70 R.V.B. 78 R.V.O. 79	Very small Membr. VSD.
14	2 years	Female	R.V.I. 70 R.V.B. 78 R.V.O. 77	Muscular VSD.
15	2 years	Male	R.V.I. 70 R.V.B. 76 R.V.O. 76	Membr. VSD.
16	3 years	Male	R.V.I. 71 R.V.B. 78 R.V.O. 80	Membr. VSD
17	3 years	Male	R.V.I. 71 R.V.B. 79 R.V.O. 78	Very small muscular VSD.

Table (7): c.c. and Angio. findings in cases 3-5 years.

Case No.	Age	Sex	% O ₂ saturation	Angio. diagnosis
18	5½ years	Female	R.V.I. 70 R.V.B. 84 R.V.O. 83	Membranous VSD.
19	4 years	Male	R.V.I. 75 R.V.B. 84 R.V.O. 85	Membranous VSD
20	4½ years	Male	R.V.O. 73 R.V.B. 80 R.V.O. 80	" "
21	5 years	Male	R.V.I. 77 R.V.B. 84 R.V.O. 84	VSD (muscular)
22	5 years	Male	R.V.I. 74 R.V.B. 82 R.V.O. 82	Membranous VSD
23	3½ years	Male	R.V.I. 78 R.V.B. 84 R.V.O. 84	Muscular VSD

Table (8): c.c. and Angio. findings in cases 5-11 years.

Case No.	Age	Sex	% O ₂ saturation	Angio. diagnosis
24	5½ years	Male	R.V.I. 74 R.V.B. 81 R.V.O. 83	1. Muscular VSD. 2. Membranous VSD
25	6 years	Male	R.V.I. 75 R.V.B. 80 R.V.O. 81	Small muscular VSD
26	6 years	Male	R.V.I. 71 R.V.B. 79 R.V.O. 78	Muscular VSD
27	7½ years	Male	R.V.I. 74 R.V.B. 82 R.V.O. 83	Membranous VSD
28	7½ years	Female	R.V.I. 70 R.V.B. 82 R.V.O. 84	Muscular VSD
29	8 years	Female	R.V.I. 70 R.V.B. 78 R.V.O. 80	Membranous VSD
30	11 years	Female	R.V.I. 70 R.V.B. 80 R.V.O. 80	Membranous VSD

Table (9): Cases of VSD not shown by echocardiography in cases less than one year.

Case No.	Age	Sex	Echo. findings	Angio. & Cather. diagnosis
1	2 months	Male	No apparent septal defect.	Membranous VSD
2	4 months	Female	Normal echocardiogram.	Membranous VSD
7	6 months	Female	Normal Echo.	Membranous VSD

Table (10): Cases of VSD not shown by echocardiography in cases 1-3 years.

Case No.	Age	Sex	Echo. findings	Angio. & Cather. diagnosis
11	14 months	Male	Normal Echo.	Very small muscular VSD
13	1½ years	Male	Normal Echo.	Very small membranous VSD
14	2 years	Female	Normal Echo.	Muscular VSD
17	3 years	Male		Very small muscular VSD

Table (11): Cases of VSD not shown by echocardiography in cases 3-5 years.

Case No.	Age	Sex	Echo. findings	Angio. & catheter. diagnosis
19	4 years	Male	Normal Echo.	Membranous VSD
21	5 years	Male	Normal echo.	Muscular VSD

Table (12): Cases of VSD not shown by echocardiography in cases 5-11 years.

Case No.	Age	Sex	Echo. findings	Angio. & Catheter. diagnosis
25	6 years	Male	Normal Echo.	Very small muscular VSD
27	7½ years	Male	Normal Echo.	Membranous VSD
28	7½ years	Female	Normal Echo.	Muscular VSD
29	8 years	Female	Normal Echo.	Membranous VSD

Analysis of the Results

The ages of our 30 cases of VSD ranged between 2 months - 11 years. There were 10 males and 12 females, with female to male ratio 2:3 (66%), consanguinity between parents was present in 12 cases. There were 2 sisters with C.H.D., V.S.D.

The manifestations in our cases varied from a murmur discovered during routine examination and this was the main presentation in 12 cases. Failure to thrive was the main complaint in 8 cases, recurrent chest infection was present in about 18 cases, shortness of breath was the main presentation in about 14 cases. History suggestive of heart failure was present in 40% of cases.

Physical examination of all patients showed that the majority were undersized.

Their weight was below the 50 centile of ages. Bulging of the left side of the chest all over the preordium was present in 30% of cases.

Systolic thrill over the preordium was felt in the majority of cases about 80% of cases.

On auscultation the classical pansystolic murmur over the left sternal edge was present in all patients.

In 30% of cases a mitral flow murmur was heard in the form of diastolic murmur and this was proved to be heard in cases of large VSD.

E.C.G. showed biventricular hypertrophy in 40% of cases, right ventricular hypertrophy in 50% and normal tracing in 20% of cases. Partial RBBB (right bundle branch block) was present in 30% of cases.

Chest X-ray showed in 60% of cases increase in cardiothoracic ratio with biventricular hypertrophy in 40% of cases and right ventricular hypertrophy in 50% of cases.

Lung plethora was present in all cases.

M-mode echocardiography was done in all cases. It showed:

- Sure diagnosis of VSD in 5 cases in the form of interruption of the septum.
- In 12 cases the Echo. showed suggestive signs of VSD in the form of:
 - . Hyperdynamic left ventricle.
 - . Exaggerated septal motion (9 cases).

- In 13 cases the Echo. showed normal findings and in spite of that all the cases were proved to be VSD by cardiac catheter and angiocardiography.

Right and left heart catheter was done in all cases.

In our results membranous VSD was found in 20 cases and in 9 cases muscular VSD was found. In 1 case, combined muscular and membranous VSD was found.

Pulmonary hypertension was found in 6 cases.