

Review of ventricular septal defect in South Western Saudi Arabia

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Ventricular septal defect (VSD) is defined as a structural abnormality of the heart; defect in any portion of the ventricular septum with blood flow at the level of ventricles through this defect. It accounts 25% of congenital heart disease;¹ and remains one of the major causes of morbidity.² Ventricular septal defect is the most common lesion of congenital heart disease worldwide,³ with a prevalence rate of 24% in Oman and 57.4% in Australia. Few studies in Saudi Arabia have been reported. Previous reports were as follows: 29.6% in south western Saudi Arabia, Al-Baha,⁴ 32.5% in Asir, 33.1% in Riyadh, 34.5% in Madina, 38.4% in Buraida, and 39.5% in Al-Hassa.³

The aim of this study is to demonstrate the magnitude of VSD, the most common type and size, correlation with gender, spontaneous versus surgical closure in muscular and membranous type, and the role of close follow up in morbidity and mortality.

This is a hospital based, prospective cross-sectional study. The study included all patients aged one day until 12 years with cardiac findings referred to the Pediatric Cardiology Unit, King Fahad Hospital at Al-Baha, Kingdom of Saudi Arabia from April 2005 to December 2011. The study was approved by the ethical committee of the hospital and the patient consent was not obtained due to no interventions or procedures were carried out.

A computer based software program was established to register all cases. All patients were examined clinically, underwent chest x-ray, and electrocardiogram. The diagnosis of all patients was confirmed by echocardiography (Philips IE33 echocardiography machine, Philips, Bothel, WA, USA). For sedation, oral chloral hydrate 50mg/kg body weight or IV medazolam 0.15 mg/kg was used. The echocardiography examination was conducted using M-mode, 2-dimensional, pulse, and continuous wave Doppler, and colored Doppler echocardiogram. Regular follow up was carried out every 6 months for stable patient, and every 3 months for symptomatic patients in all types. Two-dimensional echocardiographic pictures were recorded in the standard parasternal long axis, short axis, apical 4 and 5 chamber, subcostal and suprasternal views. The type, size, the severity of the shunt, and biventricular function were

analyzed according to the guideline of American Society of Echocardiography. Isolated VSD was considered in this study, but the defect associated with other congenital heart disease were excluded. Ventricular septal defect constitutes an important group of congenital heart disease that leads to great morbidity and low mortality in children. We found that early diagnosis using echocardiography with close observation and regular follow up decrease the morbidity significantly and make the mortality decrease.

A total of 3370 child with cardiac murmur have been seen in the study period and congenital heart disease diagnosed in 866 cases (26%). The most frequent type was found to be VSD (n=260 [30%]) in the same range of all international studies.¹ Approximately 30 new cases diagnosed per year. Occurrence is higher in female (57%), than in male cases (43%). Significantly, small size is more common in 73% than large size in 27%, in all types of VSD. Clinically, 73% of patients were stable without significant clinical signs and 25% symptomatic, only 2% have evidences of pulmonary hypertension. There is no significant difference in the occurrence of muscular type (46.5%) and membranous type (44%), with only 6.5% inlet type and 3% outlet type. The odds of small to large type is 4.4:1 in female and 4:1 in male. Small VSD is slightly more common in female than in male (OR; 1.1), [95% CI (0.6-2.5)]. The odds ratio of muscular to membranous was 1.4:1 in female and 0.7:1 in male, and the muscular type is more common in female than in male [OR; 1.9, 95% CI (1.4-13.8)]. Spontaneous closure seen in 140 (60%) cases of muscular and membranous type mainly 81.4% of them closed in the first to second year of age as in other international studies.¹ But, there is no significant difference in early spontaneous closure in the first 2 years of age between muscular and membranous type (OR: 1), and odds of early closure (<2nd year) in muscular and membranous is 4.4:1. The odds ratio (OR) of spontaneous to surgical closure was 10:1 in small size and 0.7:1 in larger size and the spontaneous closure in small type was higher than the larger size [OR; 13.9; 95% CI (2.3-79.4)]. Also, spontaneous closure is more common in muscular type than membranous type [OR: 1.8; 95% CI (0.7-21.3)]. The OR of spontaneous to surgical closure was 5.4:1 in muscular and 3:1 in membranous type. Approximately 23% of cases are still under regular follow up in our unit. Approximately 23% of patients needed transfer to one of the higher cardiac centers in Riyadh or Jeddah by air ambulance service, medical evacuation (MEDEVAC) for unstable patients, and normal flights for stable patients for further evaluation or surgical intervention.

Table 1 - Distribution of all cases of ventricular septal defect (VSD) regarding to type, gender, size, symptoms, and type of closure (N=260).

Type of VSD	n (%)	Gender		Size		Symptomatic		Spontaneous closure		Surgical (n=60)	Follow up (n=60)
		Female (n=148)	Male (n=112)	Small (n=190)	Large (n=70)	Yes (n=190)	No (n=70)	<2 nd year (n=114)	>2 nd year (n=26)		
Muscular	121 (46.5)	Female	78	Small	66	4	62	30	6	3	27
			Large	12	7	5	4	2	4	2	
		Male	43	Small	40	4	36	23	5	2	10
			Large	3	3	-	-	-	3	-	
Membranous	114 (44.0)	Female	56	Small	43	5	38	25	4	2	12
			Large	13	7	6	4	-	8	1	
		Male	58	Small	41	8	33	23	7	5	6
			Large	17	7	10	5	2	8	2	
Inlet	17 (6.5)	Female	11	Small	-	-	-	-	-	-	-
			Large	11	11	-	-	-	11	-	
		Male	6	Small	-	-	-	-	-	-	-
			Large	6	6	-	-	-	6	-	
Outlet	8 (3.0)	Female	3	Small	-	-	-	-	-	-	-
			Large	3	3	-	-	-	3	-	
		Male	5	Small	-	-	-	-	-	-	-
			Large	5	5	-	-	-	5	-	

Some problems we encountered are the shortage of beds in the cardiac centers especially in the pediatric intensive care unit.

In conclusion, VSD constitutes the most common type of congenital heart disease in Al-Baha. It is more common in female. Small asymptomatic type is the most common. Spontaneous closure of muscular and membranous type is the common course and the high percentage of early spontaneous closure is occurred in the first 2 year of life. Early diagnosis with regular close follow up and observation by echocardiography, electrocardiography, and clinical examination is recommended to decrease morbidity significantly and make the mortality very low. In inlet and outlet type, surgery is the treatment of choice (all cases in this study need surgical intervention). Health education for parents and patients is in great value to decrease the morbidity.

Study limitations. This study tried to cover all the cases of ventricular septal defect and to give real idea about the distribution, types, occurrence, and prognosis of this type of congenital heart disease, but we have to follow up these cases for long time. This type of this study as cross sectional study needs to continue and follow with another type of control studies which is more significant to know exactly the situation of this health problem.

Cardiac center with full facilities is now under construction in King Fahad Hospital at Al-Baha.

This center will resolve all obstacles and difficulties in transferring our patients to cardiac center in other cities.

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References

- Hoffman JI, Kaplan S. The incidence of congenital heart disease. *J Am Coll Cardiol* 2002; 39: 1890-1900.
- Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation* 2007; 116: 1736-1754
- Alnajjar AA, Morsy MF, Almuzaini IS, Sheikh AA. Pediatric heart diseases in Medina, Saudi Arabia. Current status and future expectations. *Saudi Med J* 2009; 30: 1186-1191.
- Almawazini AM, Al-Ghamdi AS. Congenital heart disease in south-west Saudi Arabia. *Saudi Med J* 2011; 32: 195-196.