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Secundum Atrial Septal Defect

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Abstract: ***Septal defects (ASD, VSD, Atrioventricular defects) account for 35-40% of the congenital heart defects. Atrial septal defect (ASD) is the most common congenital heart anomaly. The incidence of ASD is 1 per 1500 live births or 6-11% of congenital cardiopathies. It is more common in the females with a female-to-male ratio 2/1. (1) The atrial septal defect is a communication in the interatrial septum that allows blood to flow between the upper chambers of the heart. The many types of atrial septal defect are differentiated from each other by location of the defect in the septum: ostium secundum, ostium primum, foramen ovale, common (single) atrium and the sinus venosus defect of the right atrium.(2) The aim of the study is to compare datas such as right heart enlargement, pulmonary hyperflow persistence, rhythm disturbances and FS values in pre and post operatory patients diagnosed with DIA OS. This is a prospective study performed in the General Pediatric Service, the Department of Cardiology for the period 2010-2014. only 12% of cases had an enlargement of right cavities one month after correcting the defect . Results: All cases had no pulmonary hyperflow after correction, and only 16% of cases had systolic murmur one month after the defect correction. Conclusion: By comparing all the variables, we conclude that all the estimated parameters (enlargement of right cavities, pulmonary hyperflow, FS contractility) are significantly improved after the intervention.***

Keywords: Atrial septal defect, ostium primum, ostium secundum, cardiac arythmia, congestive heart failure, asymptomatic, catheter procedure.

1. Introduction

Clinical presantation

A child with DIA OS is often asymptomatic and pathology can be detected randomly in a routine examination. A very large DIA or total lack of the interatrial septum often causes right-sided heart failure and repeated pulmonary infections. Some cases tend to have inadequate growth. Clinical signs depend on the size of the defect and the degree of shunt. Untreated cases may occur with right atrium enlargement, cardiac arrhythmia, and in some cases congestive heart failure. The auscultative findings include: a normal or increased first heart sound, a fixed splitting of second heart sound in all phases of the respiration and a systolic ejection murmur in the pulmonic valve area . At the lower left-sided sternal border, it is often possible to find a mesodiastolic murmur as a consequence of a greater volume of blood passing through the tricuspid valve.

Diagnosis

Anamnesis and physical examination of any case that occurs with complaints such as fatigue, weight loss or signs of heart failure with systolic murmur, gives a suspection of septal defect of the heart. The diagnosis is made by echocardiography which determines the defect size and position, but also left-to-right shunt. Other diagnostic examinations are: chest X-ray, electrocardiogram, cardiac catheterization and in some cases CT scan or MRI. (4)

Management

Closure of DIA OS is advisable for all symptomatic patients, for asymptomatic patients with a Qp / Qs ratio of at least 2/1 (Qp / Qs ratio is pulmonary and systemic hematic inflow ratio) as well as for patients who have enlarged right ventricle. So far there is a general consensus on the non-closure of a DIA OS with small size and minimal left-to-right shunt. It is recommended correction after age 1 and before school age, as surgical mortality and morbidity are significantly higher in adults as well as arrhythmia as a long-term complication occurs more often in correcting the defect during the school age. There are two main ways to correct the defect:

a) Surgical closure which can be done either with median sternotomy or by submammar right ministernotomy. It is preferred in cases where the defect is large and its position is difficult. Post-surgical results are very good. The symptoms and size of the heart normalize quickly. Mortality is lower than 1%.
b) Catheter procedure. Placing devices (umbrellas) by heart catheterization is another way that is being used more and more recently. In these cases there should be parts of the septum on both sides of the defect where devices will be supported.

Specific postoperator complications

- Sino-atrial node dysfunction
- Post-pericardiotomy syndrome (pericardial versament, fever)
- Residual defect
- Venous obstruction (mainly in the sinus venous or superior caval defects)
- Atrio-ventricular block (5)

2. Material and Methods

This is a prospective study performed in the General Pediatric Service, the Department of Cardiology for the period 2010-2014.

A total of 50 cases were diagnosed with ASD from 2010 to 2014. This study includes only cases with ostium secundum ASD. The number of cases distributed by gender in ASD cases is almost the same, with a slight predominance in females, but without a statistical difference (p = 0.135).

With regard to the age of diagnosis, the average age is 3.3 years, the youngest child is 1 month and the oldest is 14 years

old. The average age of surgical intervention is 5 years, the youngest child is 8 months old and the oldest 14 years old. In these cases, we do not have ASD associated with other anomalies. Clinically, these patients were shown: 58% with inaqequate growth, 68% with recurrent pulmonary infections, 8% with rhythm disorders, all cases had cardiac murmure, and 40% were asymptomatic.

Echocardiographically 88% of cases had pulmonary hyperflow and 70% had enlargement of right cavities. The average size of the ASD resulted 14 mm and FS resulted 33%. Correction of the defect in this study was done surgically by two methods: 74% with direct suture and 26% with autologous pericardial patch. Only 6% of cases had postoperative complications such as: cardiac rhythm disturbances.

Statistical analysis

All the collected data was downloaded to the computer in Microsoft Excel, where they were then expounded in Statistical Package for Social Sciences (SPSS) 20.0, a program in which all statistical analysis was performed.

The statistical procedures and techniques applied in the analysis of the data of this study are described in detail below:

- For all categorical variables (nominal including binary / dichotomous and ordinal), the absolute numbers and percentages were calculated.
- For all numeric variables, when the data subject to normal distribution was calculated the arithmetic averages ± respective standard deviations.
- Differences between groups for discrete variables, non-parametric data, were performed by Hi-square test.

The presentation of the data was realized through tables and graphs of different types.

Significant values were $p \leq 0.05$.

3. Results and discussion

After surgical correction of interatrial defect os secundum, datas such as right heart enlargement, pulmonary hyperflow persistence, rhythm disturbances and FS values were compared as pre and post operator variables.

The results are: only 12% of cases had an enlargement of right cavities one month after correcting the defect .All cases had no pulmonary hyperflow after correction, and only 16% of cases had systolic murmur one month after the defect correction. The comparison of the pre and post interventions in ASD cases (right heart enlargement) is shown in Table 1:

Table 1: Right heart enlargement

Right heart enlargement	*pre-op*	*post-op*	*P values*
yes	35 (70.0)	6 (12.0)	P <0.001
no	15 (30.0)	44 (88.0)	
Total	50 (100.0)	50 (100.0)	

Wilcoxon Test = 5.2

Wilcoxon test shows that there is a statistically significant difference in right heart enlargement before and after surgical intervention (p = <0.001). After surgery, the number of patients with the enlargement of right cavities (70.0% vs 12.0%) decreased significantly.

Comparison of echocardiographic data pre and post interventions in ASD cases (pulmonary hyperflow) is presented in Table 2:

Table 2: Pulmonary hyperflow

Pulmonary hyperflow	*pre-op*	*post-op*	*P values*
yes	44 (88.0)	0 (0.0)	P < 0.001
no	6 (12.0)	50 (100.0)	
Total	50 (100.0)	50 (100.0)	

Wilcoxon test = 6.6

The Wilcoxon test shows that there is a statistically significant difference in pulmonary hyperflow before and after surgical intervention (p <0.001). After the intervention there is no patient with pulmonary hyperflow (88.0% vs. 0.0%).

The comparison of the number of cases with ASD with pre and postoperative rhythm disorder is presented in Table 3:

Table 3: Rhythm disturbances

Rhythm disturbances	*pre-op*	*post-op*	*P values*
yes	4 (8.0)	2 (4.0)	
no	46 (92.0)	48 (90.0)	P =0.739
Total	50 (100.0)	50 (100.0)	

Wilcoxon test = 0.33

The Wilcoxon test shows that there is no statistically significant difference in the rhythm disturbances before and after surgery (p= 0.739). Comparison of pre and post operator FS values is shown in Table 4:

Table 4: Fractional shortening (FS)

FS (%)	*pre-op*	*post-op*	*P value*
	32.94±1.63	33.66±1.23	<0.001

T-Test = 5.6

Through the student's test for two paired samples it is seen that there is a statistically significant difference in FS contract before and after surgical intervention (p <0.001). After the intervention there is a tendency to increase the average value of the FS contract, compared to the pre-intervention value (indirectly, 33.66 ± 1.23 vs. 32.94 ± 1.63).

4. Conclusion

By comparing all the variables, we conclude that all the estimated parameters (enlargement of right cavities, pulmonary hyperflow, FS contractility) are significantly improved after the intervention.

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