

Case Report

Typical signs of secundum atrial septal defect in a young female
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Abstract:

We report the case of a 25-year-female presented with dyspnea & chest pain on exertion. The ECG showed signs of right ventricular overload. The chest X-ray showed an enlargement of central pulmonary arteries, pulmonary plethora and a small aortic knuckle. Atrial septal defect (ASD) was suspected and transthoracic echocardiography (TTE) subsequently confirmed the presence of a large ostium secundum ASD. A surgical closure with an equine pericardium patch was performed. Two months after the surgical repair, the ECG and TTE showed the regression of signs of right ventricular overload.

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Introduction

Atrial septal defect (ASD) is one of the more commonly recognized congenital cardiac anomalies presenting in adulthood. Atrial septal defect is characterized by a defect in the interatrial septum allowing pulmonary venous return from the left atrium to pass directly to the right atrium. Depending on the size of the defect, size of the shunt, and associated anomalies, this can result

in a spectrum of disease from no significant cardiac sequelae to right-sided volume overload, pulmonary arterial hypertension, and even atrial arrhythmias. With the routine use of echocardiography, the incidence of atrial septal defect is increased compared to earlier incidence studies using catheterization, surgery, or autopsy for diagnosis. The subtle physical examination findings and often minimal symptoms

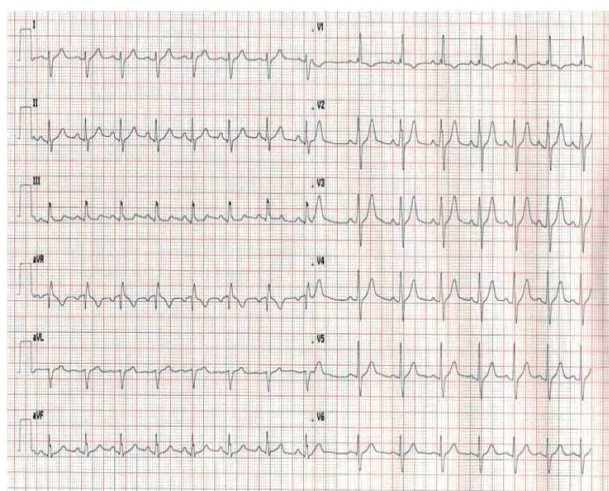


Figure 1: ECG: sinus rhythm with peaked P-waves in lead II, right deviation of QRS axis; “crochetage” on R-wave in inferior limb leads, rsR’ pattern in precordial lead V1 and R/S = 1 in lead V5–V6.

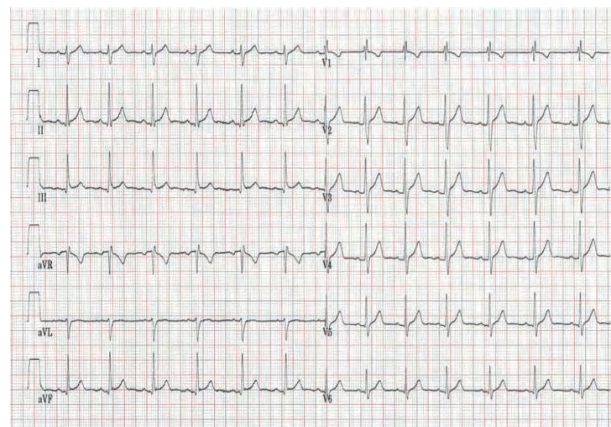


Figure 2 : ECG after surgical closure: sinus rhythm, reduction of P-waves amplitude in lead II, mild right QRS axis deviation, reduction of rsR’ ratio pattern in pre-cordial lead V1, disappearance of crochetage on R-wave in inferior limb leads and normalisation of R/S ratio in lead V5–V6.

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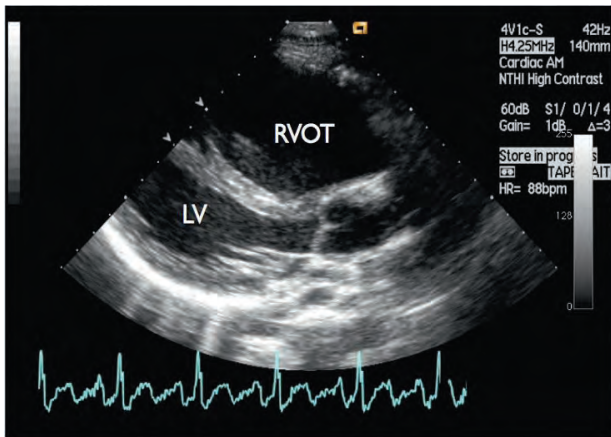


Figure 3 : TTE, parasternal long-axis view: left ventricular diastolic D-shape. LV = left ventricle; RVOT = right ventricle outflow tract.

during the first 2-3 decades contribute to a delay in diagnosis until adulthood, the majority (more than 70%) of which is detected by the fifth decade. However, earlier intervention of most types of atrial septal defect is recommended. Smaller atrial septal defects may close on their own during infancy or early childhood.

Case report

A 25-year-old female was evaluated in our department because of chest pain associated with dyspnea on exertion. Cardiac auscultation revealed a normal S1 heart sound, a systolic ejection murmur at the upper left sternal border and fixed splitting of the 2nd heart sound. The ECG showed sinus rhythm with peaked P waves in lead II, right axis deviation of QRS, an rsR' pattern in lead V1 with R' of 8 mm in amplitude, an R/S = 1 in lead V5–V6 and a “crochetage” on R-wave in inferior limb leads (fig. 1). The chest X-ray showed enlargement of central pulmonary arteries, pulmonary plethora and a small aortic knuckle (fig. 5). Atrial septal defect (ASD) was suspected and transthoracic

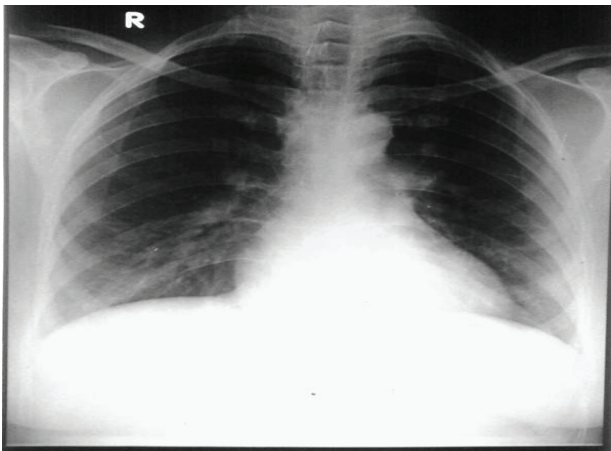
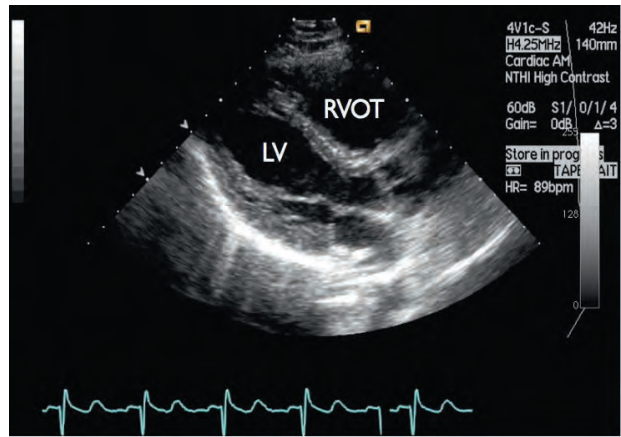


Figure 5 : Chest X-ray: enlargement of central pulmonary arteries, pulmonary plethora and a small aortic knuckle.



echocardiography (TTE) subsequently confirmed the presence of a large ostium secundum ASD with a left ventricular diastolic D-shape suggestive of right ventricular overload (fig. 3) and severe left-to-right shunt with a calculated Qp/Qs (pulmonary artery blood flow relative to systemic blood flow) of 3.2. Estimated systolic arterial pulmonary pressure was 32 mm Hg. Transoesophageal- echocardiography confirmed a large secundum ASD with maximal superio-inferior diameter of 30 mm and allowed the exclusion of the presence of anomalous pulmonary venous drainage. The anatomy of the defect was unsuitable for percutaneous closure, thus surgical closure with an equine pericardium patch was performed. Two months after the surgical repair, the ECG showed sinus rhythm with reduction of P-waves amplitude in lead II, mild right QRS axis deviation, reduction of rsR' ratio pattern in precordial lead V1, disappearance of crochetage on R-wave in inferior limb leads and normalisation of R/S ratio in lead V5–V6 (fig. 2). The TTE showed no evidence of right ventricular overload (fig. 4).

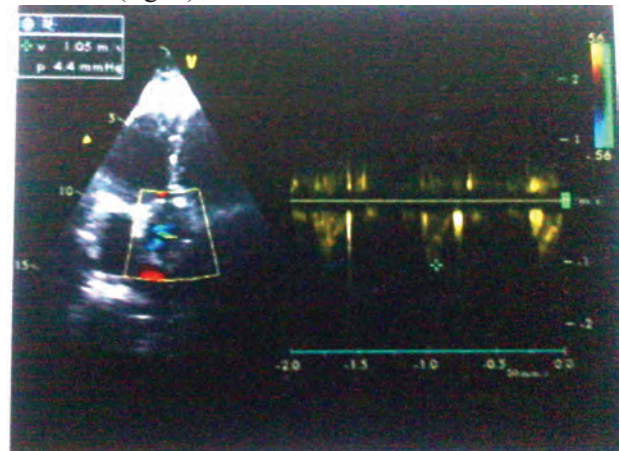


Figure 6 : Parasternal long-axis view showing a color flow map across an atrial septal defect.

Discussion

Besides the patent foramen ovale, there are four major types of interatrial communications: ostium primum ASDs (partial atrioventricular septal defect), ostium secundum ASDs, sinus venosus defects and coronary sinus ASDs. The ostium secundum ASDs are common and can present at any age. Females constitute about two-thirds. Many patients with ASDs are free of overt symptoms, although most will become symptomatic at some point in their lives. The age at which symptoms appear is highly variable and is not exclusively related to the size of the shunt. Exercise intolerance in the form of exertional dyspnoea or fatigue is the most common initial presenting symptom¹. Effort intolerance due to the ASD in this case study was only revealed during exertion. Physical examination is in most instances informative and assists in diagnosis and management. A wide and fixed splitting of the 2nd heart sound at the upper left sternal border is the auscultatory hallmark of an ASD but is not always present. The ECG may be an important clue to diagnosis. Patients with a secundum ASD may have peaked P-waves in lead II suggesting right atrial enlargement, but in the majority of patients P-wave amplitude and duration are normal². When the left-to-right shunt is significant, there is almost always right ventricular conduction delay and right ventricular overload with an rsR' pattern in lead V1³. The QRS axis is typically rightward⁴. Another sign that could be found and which correlates with shunt severity is the "crochetage" (notch) on R-wave in inferior limb leads⁵. In the current case, all ECG criteria mentioned above were

present (fig. 1). Surgical closure of secundum ASD resulted in normalisation of ECG signs in our patient (e.g., signs of right atrial dilatation and right ventricle volume overload). These changes are consistent with the data of previous studies⁶. The diagnosis is made on the basis of history, symptoms, clinical findings and TTE. The ECG can provide clues to differentiate the various types of ASDs. The distinctive feature of an ostium primum ASD is left axis deviation of the QRS. Right ventricular conduction delay and hypertrophy are frequently seen in the presence of significant mitral valve insufficiency associated with cleft mitral valve². The less common sinus venosus defect of SVC type, the P-wave axis in frontal plane in patients with sinus rhythm, is either left and superior or normal⁷. The chest X-ray film is often, but not always, abnormal in patients with significant ASD. Right heart dilation is better appreciated in lateral films. The central pulmonary arteries are characteristically enlarged, with pulmonary plethora indicating increased pulmonary flow. A small aortic knuckle is characteristic, which reflects a chronically low systemic cardiac output state, because increased pulmonary flow in these patients occurs at the expense of reduced systemic flow⁸. TTE documents the type and size of the ASD, the direction of the shunt, and, in experienced hands, the presence of anomalous pulmonary venous drainage. Patients with a significant ASD should usually be offered elective closure. Surgical closure is required for patients with secundum ASDs which are anatomically unsuitable for percutaneous closure⁹.

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