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EC CARDIOLOGY
Case Report

A Squeezed Heart: ECG Changes with Pectus Excavatum

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Abstract

Pectus excavatum (PEx) is the most common congenital anomaly of the chest wall and is seen in association with many chromosomal syndromes and connective tissue disorders. It causes distortion of the physical and electrical orientation of the heart. We present a case with classic ECG changes along with a selected echocardiographic and a CT image.

Keywords: *Pectus Excavatum; Electrocardiocardiographic Abnormalities*

Introduction

Electrocardiographic changes can be seen due to various reasons- ischemic, metabolic, drug induced, ventricular hypertrophy, accessory pathways etc. Skeletal abnormalities of the rib cage can cause physical distortion which in turn can cause electrocardiographic abnormalities.

Case Presentation

A 52 year old male with history of pectus excavatum for which he had a corrective surgery at age two, presented with month of dyspnea and chest pain on exertion and progressively decreasing exercise tolerance. He denied any episodes of dizziness or syncope. A nuclear stress test was negative for ischemia. His 12 lead electrocardiogram (ECG) (Figure 1) demonstrated a rightward axis with incomplete right bundle branch block and biatrial enlargement. A transthoracic echocardiogram (Figure 2) showed decreased left atrial size. A CT scan of the chest (Figure 3) showed compression of the left atrium by the vertebrae. His symptoms and ECG findings were attributed to anatomical cardiac compression from pectus excavatum.

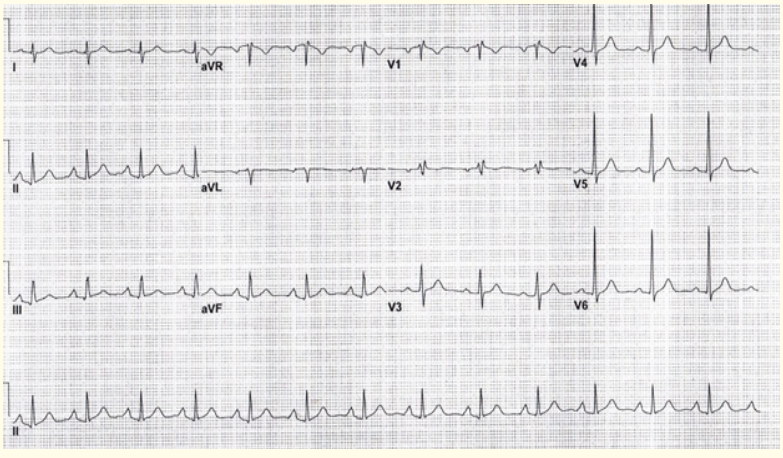

Figure 1: *ECG showing rightward axis with incomplete right bundle branch block and biatrial enlargement.*

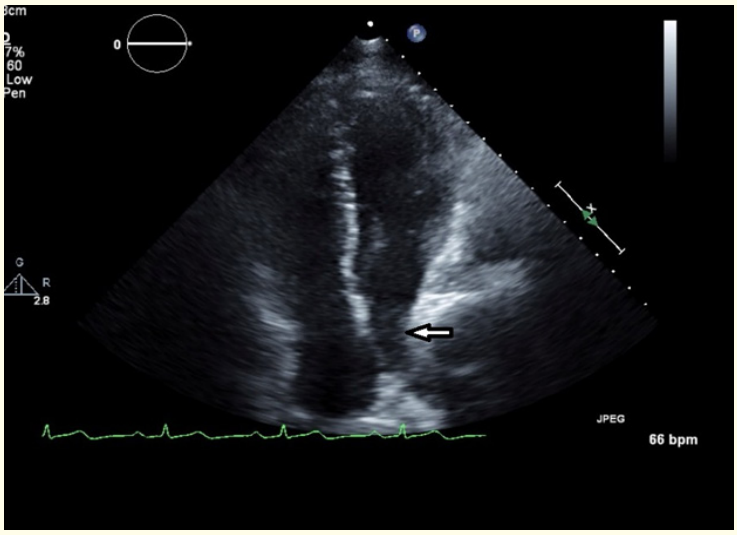

Figure 2: *Transthoracic echocardiogram showing decreasing left atrial size.*

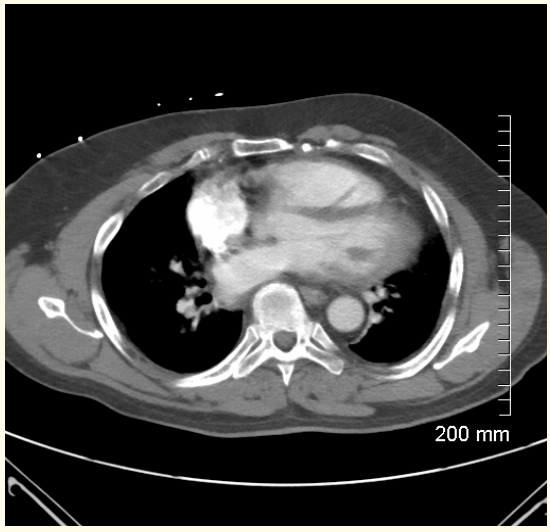

Figure 3: *CT scan of chest showing compression of left atrium by the thoracic vertebra.*

Discussion

Pectus excavatum (PEx) is the most common congenital anomaly of the chest wall and accounts for 90% of anterior chest wall disorders [1]. It is characterized by posterior displacement of the inferior part of the sternum and prominence of the costochondral junction. The incidence of PEx is 1 in every 400 - 1000 live births [1,2] and is 3 times more prevalent in males than females and has a higher incidence in patients with Noonan syndrome, Turner syndrome, multiple endocrine neoplasia type 2b, and connective tissue disorders (Marfan syndrome, Ehler-Danlos syndrome and osteogenesis imperfecta) [3]. 40% of the patients have relatives with PEx but no causative gene has yet been identified [4].

A study conducted mainly in a pediatric age population reported symptoms of exertional intolerance, chest pain and poor endurance associated with PEx [5]. The symptoms are believed to be caused by anatomic cardiac dysfunction and limited lung expansion. The chest wall deformity leads to cardiac displacement or rotation and in most cases causes dysfunction of the right ventricle. This leads to decreased cardiac output especially with exertion and hence the symptoms. Our case was unusual as the compression was primarily of the left atrium.

The electrocardiogram (ECG) in PEx patients, owing to alteration in the position of heart, (even in absence of any other cardiac condition) is expected to show some changes. De Oliveira et al in 1957, described frequent (though not pathognomonic) ECG findings in patients with PEx and attributed them to cardiac rotation [6]. These findings were a) S1S3 or S1Q3, b) negative P waves in V1 and c) RSR' pattern in V1. All of these findings are present in the ECG of our patient. Landtman reported that all of these findings typically disappeared after surgical correction further supporting cardiac rotation as cause [7]. In our patient, these ECG findings were present despite the fact that he had undergone surgical correction, likely because there was residual cardiac compression and rotation. More recently, electrocardiographic patterns of Brugada syndrome was reported in 2 patients with pectus excavatum [8].

The severity of PEx can be calculated by the Haller index which is derived by dividing the transverse diameter of the chest by the anteroposterior diameter as measured by CT scan. The treatment for the deformity is surgical.

Conflicts of Interests

There are no conflicts of interests and no funding was required.

Bibliography

1. Fokin AA., *et al*. "Anatomical, histologic, and genetic characteristics of congenital chest wall deformities". *Seminars in Thoracic and Cardiovascular Surgery* 21.1 (2009): 44-57.

2. Fonkalsrud EW. "912 open pectus excavatum repairs: changing trends, lessons learned: one surgeon's experience". *World Journal of Surgery* 33.2 (2009): 180-190.

3. Williams AM and Crabbe DC. "Pectus deformities of the anterior chest wall". *Paediatric Respiratory Reviews* 4.3 (2003): 237-242.

4. Kotzot D and Schwabegger AH. "Etiology of chest wall deformities--a genetic review for the treating physician". *Journal of Pediatric Surgery* 44.10 (2009): 2004-2011.

5. Nuss D and Kelly RE Jr. "Minimally invasive surgical correction of chest wall deformities in children (Nuss procedure)". *Advances in Pediatrics* 55 (2008): 395-410.

6. Martins de Oliveira., *et al*. "The electrocardiogram in pectus excavatum". *British Heart Journal* 20.4 (1958): 495-501.

7. Landtman B. "The heart in funnel chest pre- and postoperative studies of seventy cases". *Annales Paediatriae Fenniae* 4.3 (1958): 181-190.

8. Kataoka H. "Electrocardiographic patterns of the Brugada syndrome in 2 young patients with pectus excavatum". *Journal of Electrocardiology* 35.2 (2002): 169-171.

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