RESEARCH PAPER

The Cardiac Masquerade: Clinical Insights from a Case Series of Straight Back Syndrome

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ABSTRACT

Straight back syndrome (SBS), also known as flat chest syndrome, is characterized by the disappearance of the normal kyphotic curvature of the thoracic spine, which results in decrease in the anterior-posterior diameter of the chest which can compress the heart and great vessels between the sternum and thoracic vertebrae.

Here we report a case series of straight back syndrome. It consists of three cases with three different presentations of straight back syndrome and a brief review of the literature on its clinical presentation, diagnosis, and therapeutic approach.

Keywords: Straight back syndrome, flat chest syndrome, kyphotic curvature, thoracic spine.

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INTRODUCTION

The hallmark of straight back syndrome (SBS), also called flat chest syndrome, is the loss of the thoracic spine's typical kyphotic curvature, particularly in the upper part. This causes the anterior-posterior diameter of the chest to decrease, which can compress the heart and major vessels between the sternum and thoracic vertebrae (1). SBS usually affects young, slender people who do not have normal thoracic kyphosis, which results in a smaller thoracic sagittal diameter. The most crucial diagnostic technique is X-ray examination, particularly the left lateral picture where the sagittal diameter is narrowed and the spinal thoracic segments seem straight (2). Heart anomalies like mitral valve prolapse may be linked to SBS. Scoliosis, pectus excavatum, or Marfanoid habitus may occur with SBS, indicating a component of skeletal dysplasia or connective tissue (3).

CASE PRESENTATION

CASE1:

A 20 year old female presented with complaints of central type of chest pain, non-cardiac, on and off for 1 month. Examination revealed low BMI (15.2), Marfanoid habitus with increased arm span-168cm (while height was 158cm) (Figure 1a) and long slender fingers (Figure 1b). On auscultation, a short systolic murmur was heard in pulmonary area.

Chest X-ray showed Pancake heart, decreased anteroposterior (AP) diameter of the thoracic cage, measured from the posterior surface of the sternum to the anterior surface of the thoracic spine, is less than 11 cm (8.40cm) (Figure 2).

Distance from the midpoint of the T8 vertebral body to the vertical line connecting the anterior borders of T4 and T12 is less than 1.2cm (1.02cm) – DAVIES CRITERIA. (Figure 3)

Ratio of anterior-posterior to transverse thoracic diameter less than 1/3 measured at the T8 level (3.78/25.05= 0.15) - DE LEON CRITERIA. (Figure 4)

ECG showed incomplete RBBB. (Figure 5)

2DECHO revealed mild prolapse of the body of anterior mitral leaflet (Figure 6).

Figure 1a: Marfanoid habitus: Arm span (168cm) more than height (158cm)

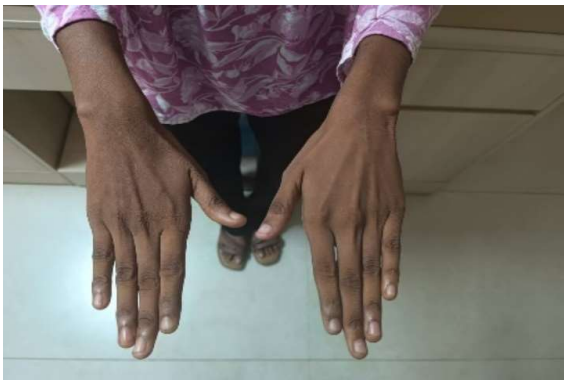

Figure 1b: Marfanoid habitus: Long slender fingers

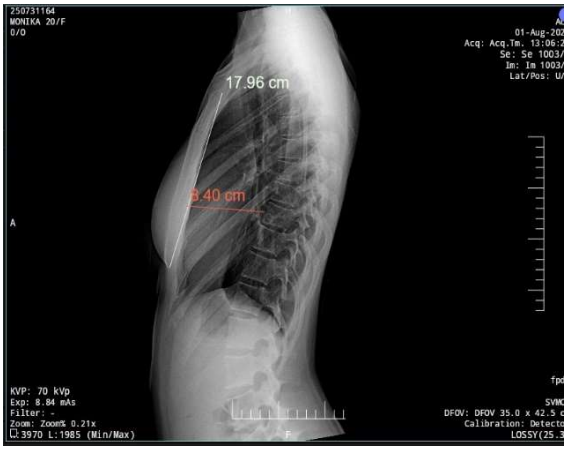

Figure 2: Chest Xray lateral view showing AP diameter of the thorax, measured from the posterior surface of the sternum to the anterior surface of the thoracic spine is 8.40 cm.

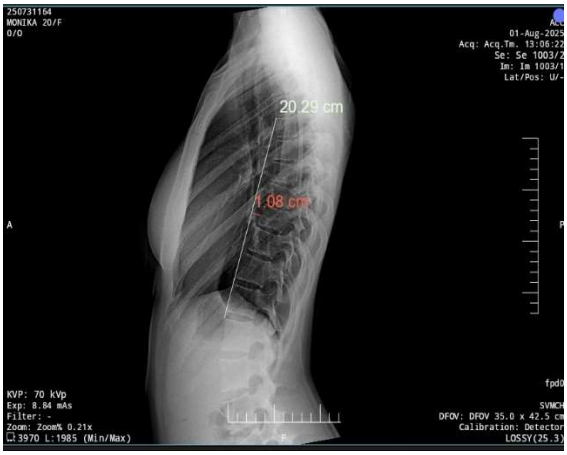

Figure 3: Chest Xray lateral view showing distance from the midpoint of the T8 vertebral body to the vertical line connecting the anterior borders of T4 and T12 is 1.02cm

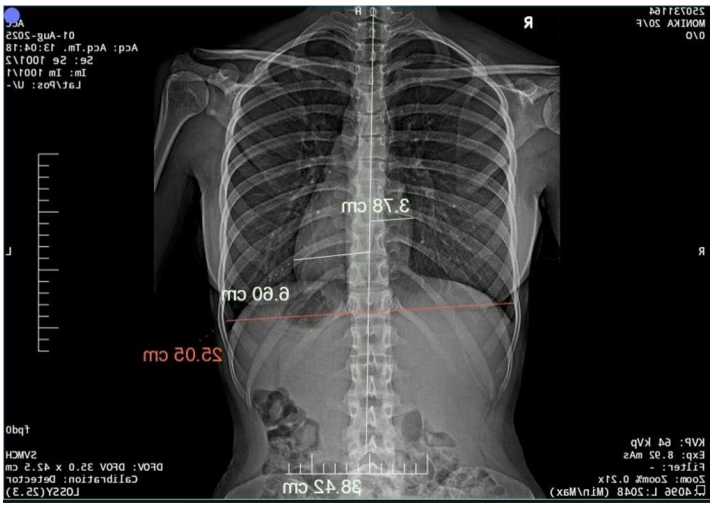

Figure 4: Chest Xray AP view showing the Ratio of anterior-posterior to transverse thoracic diameter less than 1/3 measured at the T8 level (7.8/25.05= 0.27)

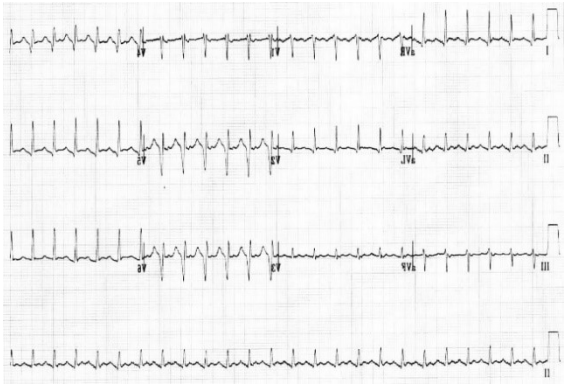

Figure 5: ECG showing Incomplete RBBB.

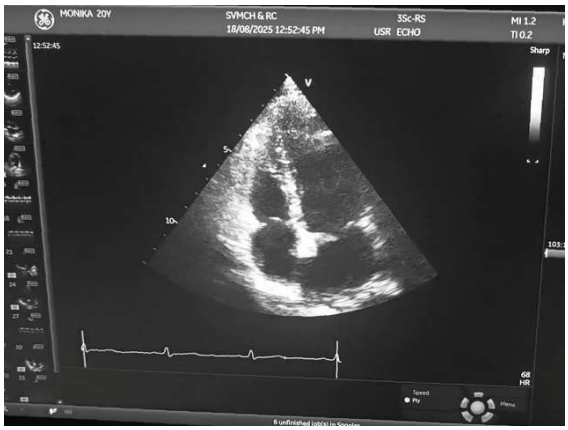

Figure 6: 2DECHO showing mild prolapse of the body of anterior mitral leaflet

CASE 2:

A 21 year old male presented with complaints of fever, headache and vomiting for 2 days. Examination revealed low BMI (15.26), Marfanoid habitus with increased arm span-198cm (while height was 195cm) and long slender fingers. On auscultation, a short systolic murmur was heard in pulmonary area. Chest Xray showed reduced anteroposterior length (Figure 7a). ECHO showed mild Mitral valve prolapse with Trivial MR. It was a case of Dengue fever with incidental diagnosis of straight back syndrome.

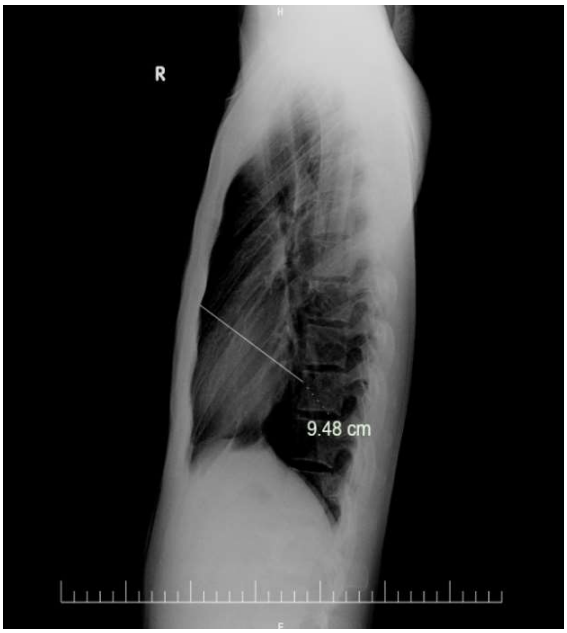

Figure 7a: Chest Xray showed reduced anteroposterior length

CASE 3:

A 19 year old female who is a known case of bilateral ovarian chocolate cyst S/P aspiration presented with complaints of dyspnea on and off for 1 year. Examination revealed low BMI (16), Pectus excavatum, Marfanoid habitus with increased arm span-165cm (while height was 160cm) and long slender fingers. On auscultation, a-mid systolic murmur was heard in pulmonary area. Chest Xray showed reduced anteroposterior length (Figure 7b). ECHO showed Mitral valve prolapse with MR. It was a case of bilateral ovarian chocolate cyst with incidental diagnosis of straight back syndrome.

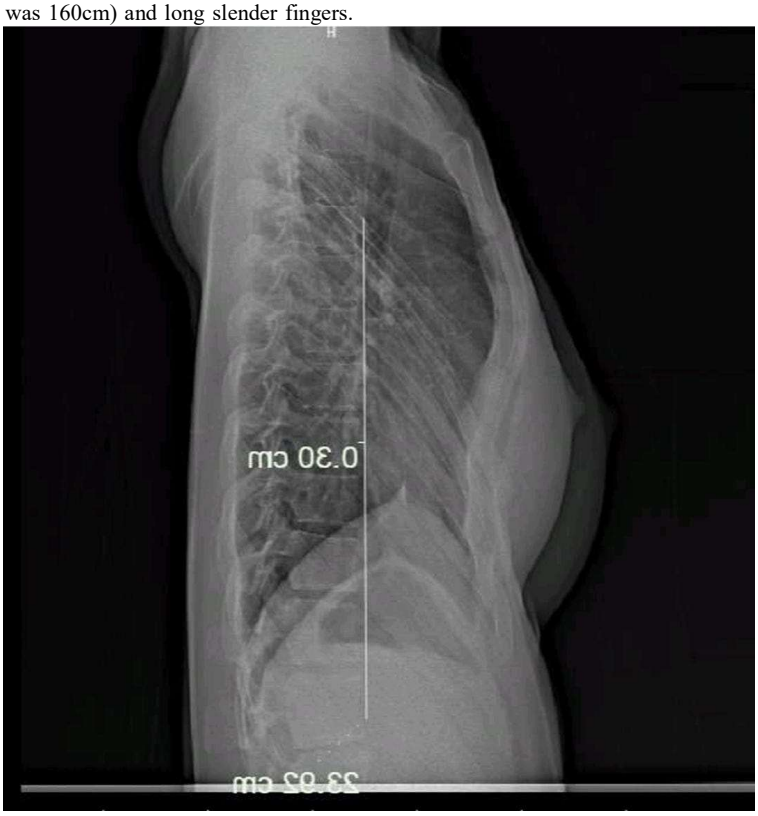

Figure 7b: Chest X ray shows reduced anteroposterior length

DISCUSSION:

The first description about SBS was by Rawlings in 1960 (2). According to studies citing the original 1960 work, Rawlings reported on a series of 50 patients, 36 were male and 14 were female.

The radiological criteria described by Davies and De Leon et al in 1980s (4). This gave objectivity to the diagnosis.

In early 2000s, the cause of the murmur was identified to be due to compression of right ventricular outflow tract and pulmonary artery by 2D doppler and colour doppler by Steffan M Essar (5).

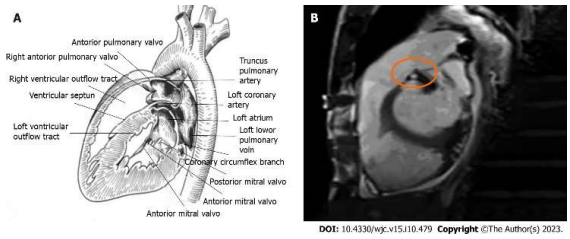

Figure 8a: Right ventricular outflow tract between normal patients and patients with SBS

Comparison of right ventricular outflow tract between normal patients and patients with straight back syndrome. A: Right ventricular outflow tract patency in a normal individual; B: Right ventricular hypertrophy and narrowing of the right ventricular outflow tract in a patient with straight back syndrome. Turbulent flow (A, parasternal short-axis view). (B. Continuous wave Doppler along the RVOT with simultaneous respirogram revealed a paradoxical decrease both in signal density and systolic flow velocity at end inspiration (Figure 8a & Figure 8b).

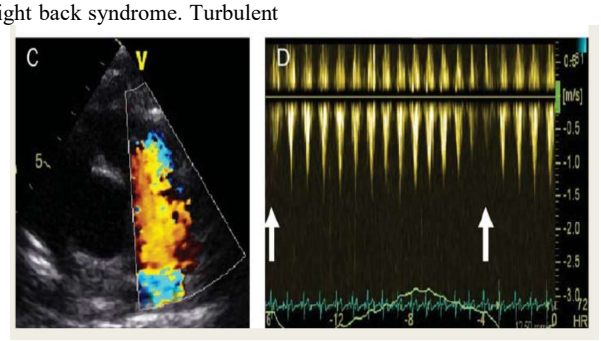

Figure 8b: Colour Doppler mosaic pattern in the right ventricular outflow

Marfanoid habitus and mitral valve prolapse have been found as an association and described in many case reports (6,7).

In our case series, only one patient had symptoms referable to cardiac system, while others were incidental.

Management is usually conservative which includes postural training & physiotherapy, breathing exercises to improve chest expansion, cardiac evaluation if symptoms suggest valve involvement, surgical correction is rarely indicated.

CONCLUSION:

SBS is a diagnosis of clinical suspicion. It should be kept in mind in young individuals with clinical examination suggestive of cardiac etiology but normal on evaluation.

Accurate recognition and diagnosis of Straight Back Syndrome (SBS) hold significant clinical importance, primarily to avoid anxiety in patients and to prevent misdiagnosis. Early diagnosis helps to improve the quality of life of SBS patients and to reduce serious complications caused by the disease.

CONSENT

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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