Straight back syndrome with pathological Q wave misdiagnosed as established myocardial infarction

Introduction

Patients with straight back syndrome are characterized by the absence of anterior concavity in the upper thoracic spine which may lead to cardiac murmurs and chest pain. A 35-year-old man was admitted with a complaint of severe unremitting chest pain and his electrocardiograph suggested a preliminary diagnosis of established myocardial infarction. However, the serum cardiac biomarkers were normal and the electrocardiograph did not change accordingly. Chest X-ray suggested a diagnosis of straight back syndrome.

Discussion

Malformation of the thoracic spine is an unusual cause of functional disturbances of the cardiovascular system (Datey et al, 1964). These malformations are usually benign but may produce unwanted complications such as cardiac murmurs, chest pain and tracheal compression (Grillo et al, 2005).

Straight back syndrome is one complication, characterized by the absence of anterior concavity in the upper thoracic spine. The misdiagnosis of straight back syndrome as congenital absence of the pericardium has been reported (Ostovan and Mollazadeh, 2007). This article reports a patient with straight back syndrome presenting with persistent squeezing chest pain and abnormal Q wave on electrocardiograph which could be easily misdiagnosed as myocardial infarction. However, his cardiac biomarkers were normal and the ST-T segment did not change accordingly on the electrocardiograph. Coronary computed tomography angiography allowed the authors to eliminate the possibility of myocardial infarction. The diagnosis of straight back syndrome was later confirmed by lateral chest X-ray and thorax measurement.

Straight back syndrome, first reported as pseudo heart disease in 1960 (Rawlings, 1960), is usually an asymptomatic skeletal defect. The deformity of the thoracic spine can be easily identified at the bedside. Owing to the straight spine and narrowing of the anteroposterior diameter of the bony thorax, some clinical signs mimicking heart disease may present as the result of a forward and leftward displacement of the heart and great vessels. Electrocardiography may show pseudo-left axis deviation in chest leads which bears a strong resemblance to left anterior fascicular block. However, it is unusual for the electrocardiograph of a patient with straight back syndrome to indicate established myocardial infarction, as seen in this patient. Pseudo-infarction pattern electrocardiograph may also be caused by aortic coarctation (Motwani et al, 2011), hyperkalaemia (Vereckei, 2003), amyotrophic lateral sclerosis (Li et al, 2000) and Wolff–Parkinson–White syndrome (Khan and Shaw, 2000). Q waves in leads V1 to V3 also can be a normal variant caused by clockwise rotation of the heart.

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CASE REPORT

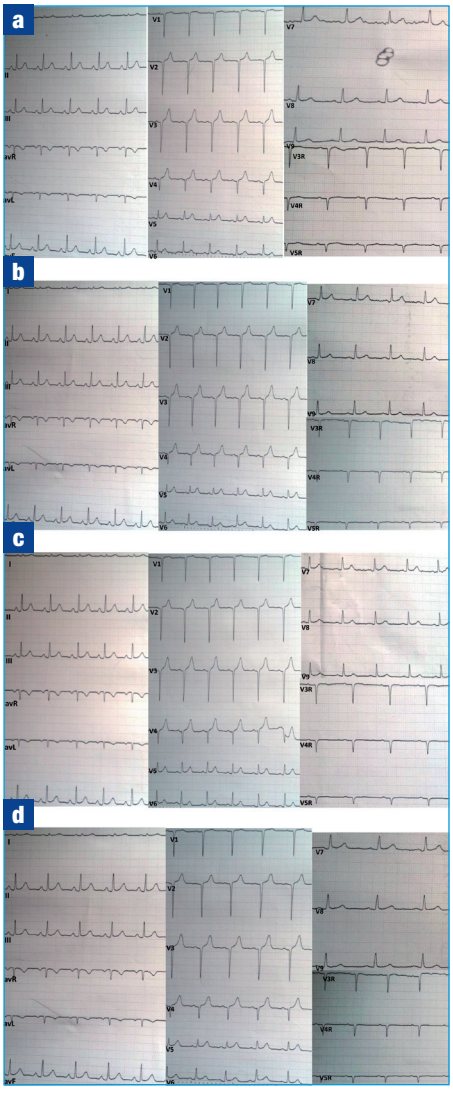
A 35-year-old Chinese man was admitted to the authors' hospital with a complaint of severe unremitting chest pain that began 1 hour after physical labour. The pain was of acute onset and a squeezing character. The electrocardiograph was abnormal (*Figure 1a*) and revealed QS pattern in leads V1–V3 and tall T in leads V2–V4 which suggested a preliminary diagnosis of established myocardial infarction. Physical examination showed blood pressure 138/100 mmHg, pulse 74 bpm, body temperature 36.6°C, respiratory rate 15 breaths/min and oxygen saturation level 99%. Cardiac auscultation revealed normal first and second heart sounds, with no additional sounds, murmurs or rubs. The rest of the physical examination was insignificant.

Laboratory evaluation was negative for serum cardiac biomarkers. Complete blood count and a comprehensive metabolic panel were also performed upon admission but showed no abnormalities. The patient denied a history of smoking, alcohol consumption or substance abuse, nor did he have a history of dyslipidaemia, diabetes or hypertension. The patient's family history is positive for coronary artery disease. With a combined therapy of aspirin, clopidogrel, low molecular weight heparin, atorvastatin and glyceryl trinitrate, the patient felt less pain.

On the second day of hospitalization, the patient was noted to have an absence of normal thoracic curvature (*Figure 2a*). Measuring the patient's thoracic anteroposterior diameter showed a 26% anteroposterior ratio. Chest roentgenogram showed a narrow anteroposterior diameter and suggested the diagnosis of straight back syndrome, characterized by the absence of anterior concavity in the upper thoracic spine (*Figure 2b*). Coronary computed tomography angiography showed no significant occlusions in either the left or right main coronary arteries.

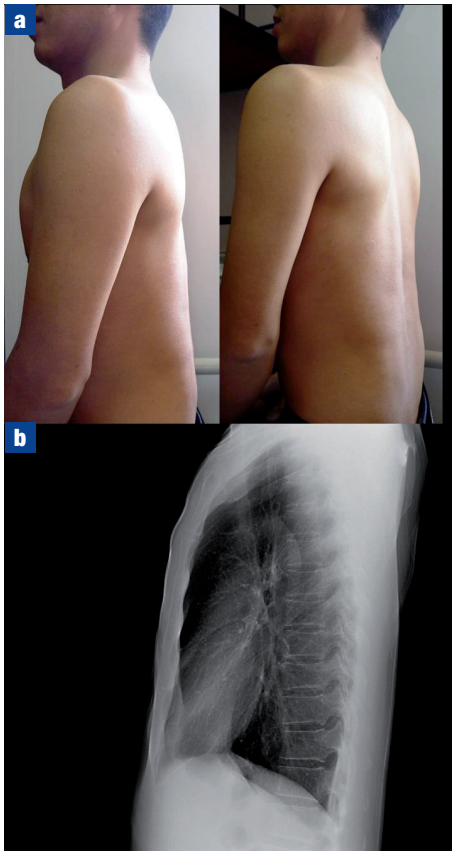
Echocardiograms found no structural or functional cardiac abnormality during his hospitalization and 3 months after discharge. Electrocardiographs did not have significant change during the second, the third day of his hospitalization (*Figures 1b* and *1c*) or 3 months after discharge (*Figure 1d*).

Figure 1. Electrocardiogram shows no change in days 1, 2 and 3 of hospitalization and 3-month follow-up. **a.** Day 1 of hospitalization. **b.** Day 2 of hospitalization. **c.** Day 3 of hospitalization. **d.** 3-month follow-up.



The authors did not find palpable systolic impulses from the pericardial region in this patient which is common in patients with straight back syndrome because of the proximity of the heart to the anterior chest wall (Shimizu et al, 2010). Systolic crescendo-decrescendo murmurs are also a common sign which is bound up both with displacement of the main pulmonary artery and with an exaggeration of the normal ejection vibrations. However, no murmurs were found in this patient, which may be because there were insignificant abnormalities of the pulmonary artery position or transvalvular pressure gradient according to this patient's echocardiography. The onset of chest pain in this patient might be caused by compression of the heart caused by the reduced volume of the chest cavity from the thoracic deformity.

Figure 2. **a.** Lateral view and posterior view shows the narrowness of the patient's chest, and a spine lacking normal curvatures. Normal dorsal kyphosis of the vertebral column is absent. **b.** Chest lateral X-ray emphasizes the straight vertebral column.



Conclusions

This case should remind physicians of the importance of differential diagnosis in patients with analogous myocardial infarction syndrome and patients with any unexplained cardiac symptom or atypical presentation. BJHM

LEARNING POINTS

- Straight back syndrome should be considered as a differential diagnosis in patients with chest pain.
- Patients with straight back syndrome may present with a pathological Q wave on electrocardiography which may be misdiagnosed as established myocardial infarction.

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