

## X-ray quiz: an old gentleman with back pain

### X 光照片猜謎：一名老翁的腰痛

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#### Case

A 75-year-old gentleman was seen at a general outpatient clinic for hypertension and back pain around the lumbar region. A chest radiograph was taken and interpreted by the physician as normal (Figure 1). He was then treated with oral analgesic and anti-hypertensive drugs.

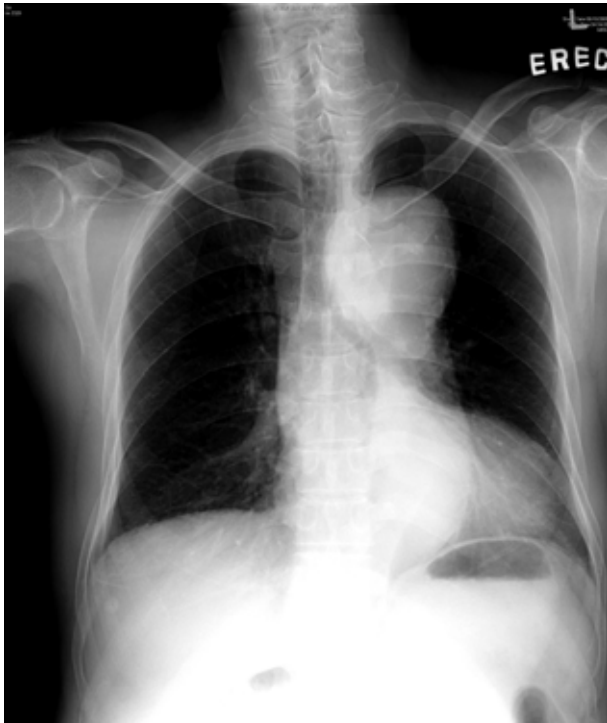


Figure 1.

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His low back pain improved with the analgesic. On follow-up, another radiograph of the chest was taken which showed changes from the first radiograph (Figure 2a).

#### Questions

1. What are the abnormalities and diagnosis?
2. What is the upper limit of normal mediastinal width?
3. What are the other possible radiological features?
4. What is the percentage of normal chest radiograph in such condition?
5. What are the other investigations for confirming the preliminary diagnosis?

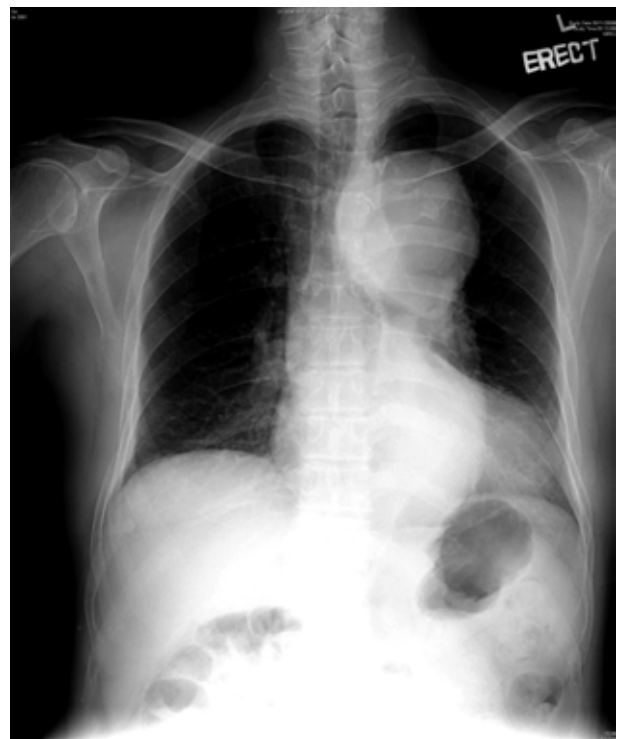


Figure 2a.

## Answers

1. The mediastinum is widened (~11 cm). Figure 2b shows the "calcification sign" (arrows) which is the inward displacement of the calcified atherosclerotic plaque by >5 mm from the outer aortic contour and this sign applies only to the contour of the descending aorta secondary to projection. The features are suggestive of aortic dissection.
2. Normal superior mediastinal width is 8 cm or less as measured at the level of the bifurcation of the trachea. Widened superior mediastinum can be due to haemorrhage or the large false channel of an aortic dissection.<sup>1</sup>
3. Disparity in size between the ascending and descending aorta; irregular wavy contour or indistinct outline of the aorta; cardiac enlargement due to left ventricular hypertrophy or haemopericardium; left apical cap; left pleural effusion; rightward displacement of the trachea or endotracheal tube; depression of left main stem bronchus; and oesophageal deviation.

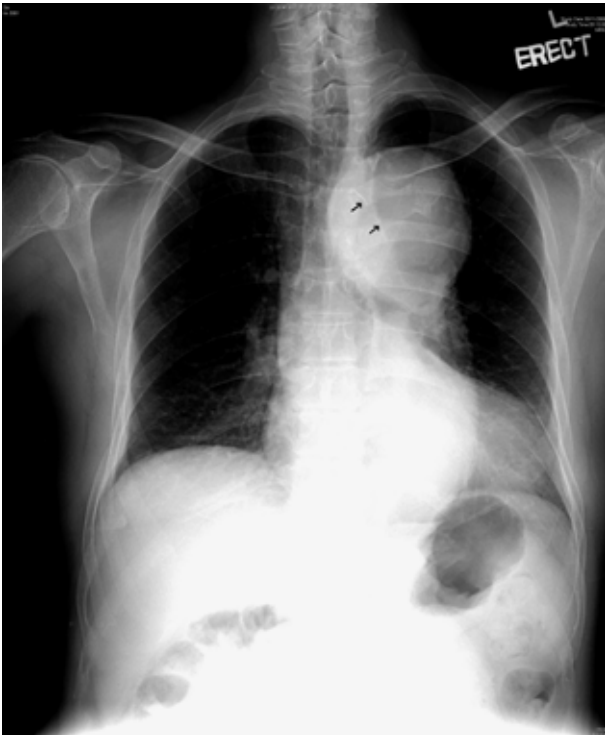


Figure 2b. The "calcification sign" of aortic dissection (arrows).

4. Chest radiographs may be normal in up to 25% of cases.<sup>1</sup>
5. Computed tomography (CT), echocardiography, angiography and magnetic resonance imaging. CT thorax was subsequently performed in this patient (Figures 3 & 4).

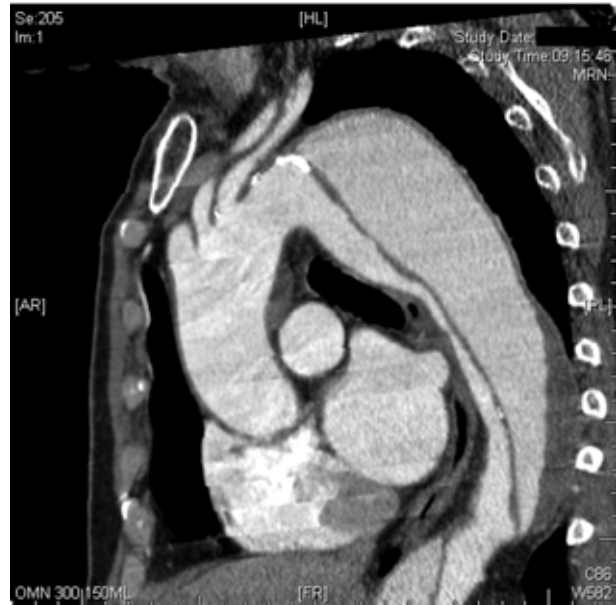


Figure 3. CT showing dissection of the descending thoracic aorta.



Figure 4. CT with 3D reconstruction showing dissection of the descending thoracic aorta.

## Discussion

Hypertensive patients with low back pain were common presentations to emergency departments and general outpatient clinics. Among the causes, acute aortic dissection is a dreaded one because of its protean manifestations and potential lethality.

Chest radiographs are the most common initial investigation. In general, the most prominent feature is widening of the superior mediastinum. However, this sign can be easily missed and is also present in only 40-80% of cases.<sup>1</sup> It is a good practice to obtain an erect chest radiograph with good positioning and compare it with old images for assessing mediastinal width change.

A retrospective review of initial chest radiographs of patients with the confirmed diagnosis of acute aortic dissection was done for a period of 5 years by Welch et al from 1998 to 2003. During this period, chest radiographs were obtained in the emergency department and 67% of the radiographs were read as normal.<sup>2</sup> Moreover, aortic anomalies (such as an aberrant right subclavian artery arising directly from the aorta) may cause confusion on a chest radiograph.<sup>3</sup>

CT scanning is quickly replacing angiography as the diagnostic test of choice in many institutions. CT in the diagnosis of acute aortic dissection has reported accuracy ranging from 88-100%.<sup>3-5</sup> It is a relatively less invasive investigation as compared with the gold standard investigation of conventional angiography. Multi-slice CT with 3-dimensional reconstruction also

gives good images (Figures 3 & 4) for differentiating between proximal aortic dissection (Stanford type A) and distal aortic dissection (Stanford type B),<sup>6</sup> which is important since surgical repair is necessary in type A cases and endovascular stent-graft placement may be considered in type B cases.

Other imaging studies include transthoracic echocardiography, transoesophageal echocardiography, angiography and magnetic resonance imaging. Each has its advantages and limitations. The preferred method depends on the stability of the patient, the availability of the radiographic modality and the preference of the surgeon.

## References

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