

Key Insights into Vertebral Erosion in a Case of Thoracic Aortic Aneurysm

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Abstract

We presented a rare case with the images of a large thoracic aortic aneurysm causing vertebral erosion and intrusion into the spinal canal, yet the patient was asymptomatic for many months. We discussed the possible mechanism of this complication of a large aortic aneurysm.

1. Introduction

The erosion of the vertebrae is an uncommon finding and is due to metastasis, myeloma or chronic infection like tuberculosis. Thoracic aortic aneurysm causing erosion of vertebrae is a rare phenomenon. We reported an unusual case of thoracic aortic aneurysm that presented with extensive and multiple vertebral body erosion with extension into spinal canal and discussed its genesis and reviewed the relevant literature.

2. Case Report

A 54-year male non-smoker, hypertensive and diabetic presented with progressive upper backache and neck pain since 7 months. The physical examination was unremarkable with no neurological

deficits. On trans-thoracic echogram, mitral valve was thick and myxomatous. There was no mitral stenosis or regurgitation. Aortic valve was bicuspid but not thickened or stenotic. Tricuspid and pulmonary valves were normal. All the chambers are normal in size, but the left atrium was externally compressed by a large mass. Left ventricular ejection fraction was 58%. Aortic diameter was 3.4cm at proximal aorta and the extrinsic mass was a saccular aortic aneurysm of size 7.2x 6.3 cms. Chest radiograph, done later showed the same aneurysmal dilatation of descending aorta with wall calcification which was abutting onto left atrium and compressing and superiorly displacing the left bronchus (Figure 1).

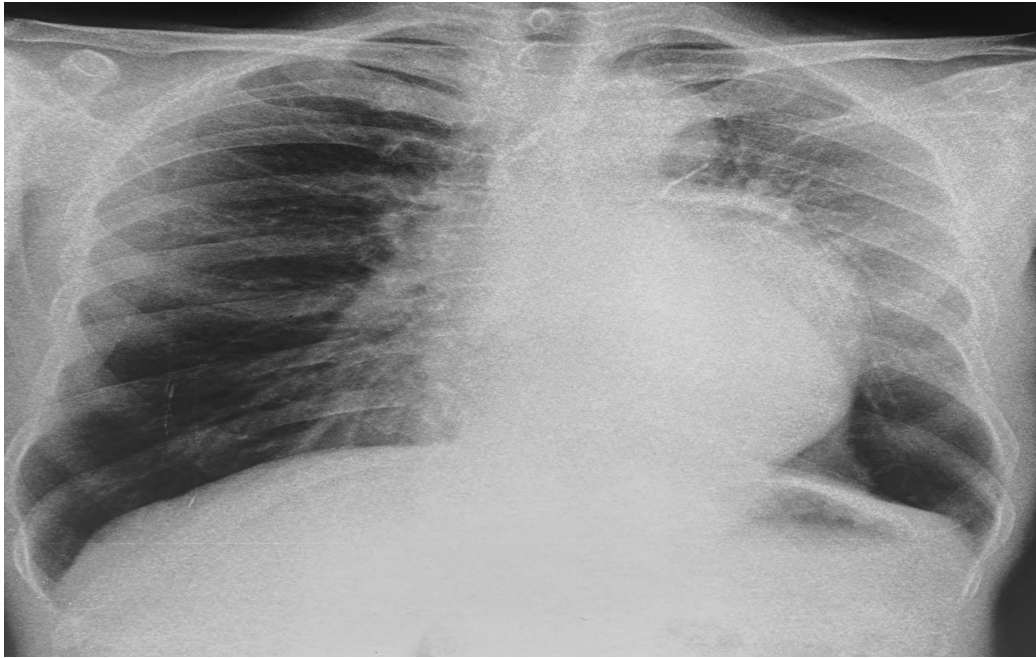


Figure 1: Chest radiograph revealing aortic aneurysm with atheromatous calcification. The left bronchus is compressed by the aortic aneurysm.

CT aortogram revealed a large saccular aneurysm of descending thoracic aorta with large crescentic thrombus. Aneurysm measured 18 x 9.7 cms extending from D7 to L1 level. The thrombus measured 4.7 cm in thickness. Thrombus appeared layered with evidence of calcification. Left atrium was compressed by the aneurysm adjacent to it. The left main bronchus was compressed and displaced superiorly. The adjacent vertebrae were eroded with involvement of pedicle, transverse process, costovertebral junction and the rib on left lateral aspect of D7 to D11. There was extension

of the mass into spinal canal compressing and displacing thecal sac to right with maximum compression at D9 (Figure-2). There is 'drape aortic sign' that refers to aorta following the contour of the spine with no fat plane between aorta and vertebra. The scan done 6month before had the same findings except an increase in the size of erosion with extension of aneurysm further into spinal canal (Figure 3). Dorsal spine radiograph clearly depicted the bone erosions.

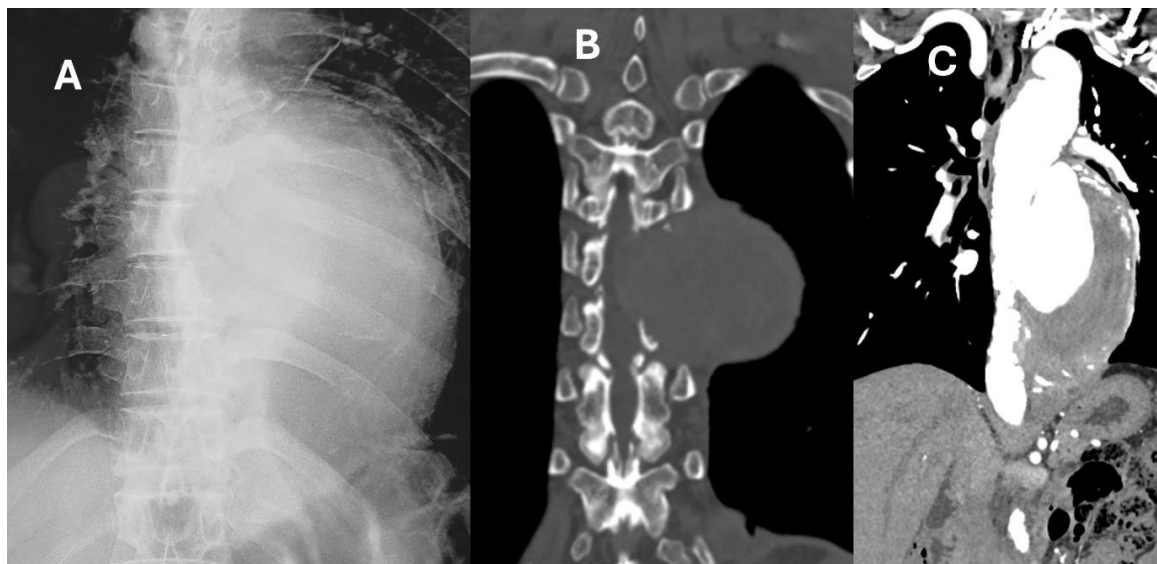


Figure 2: A) Erosion of vertebral bodies and posterior elements on left of dorsal spine by aneurysm in AP radiograph; B) Coronal reconstruction of chest CT in bone window depicting the bony erosion; C) Contrast enhanced aortogram in coronal reconstruction -saccular aneurysm of aorta with large thrombus.

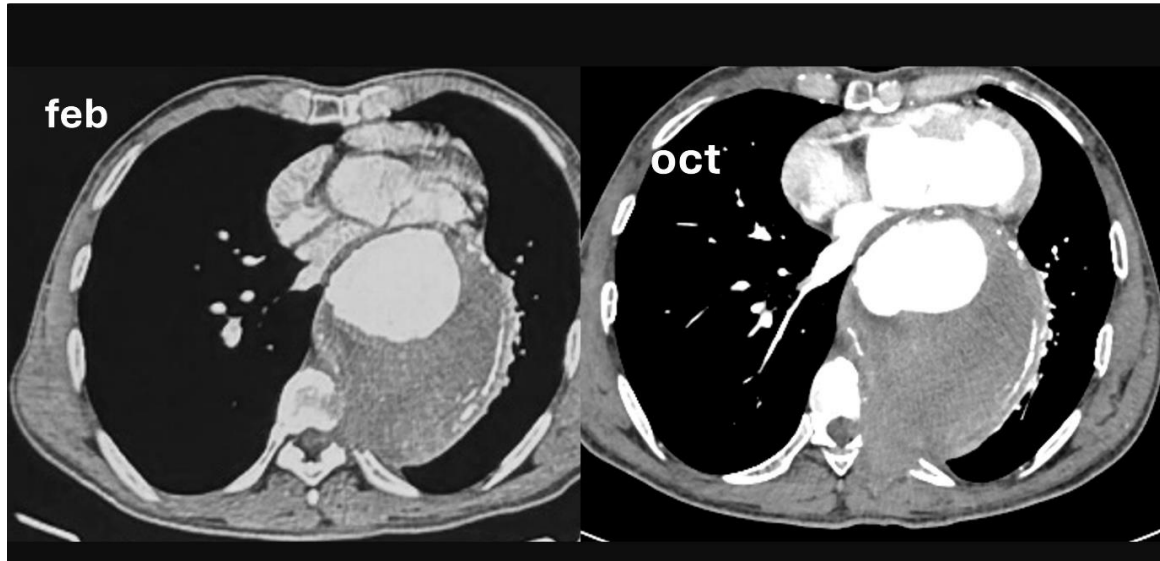


Figure 3: Axial contrast enhanced CT aortogram done 9 months apart shows increase in bone erosion and intraspinal extension and compression over thecal sac. *Drape aorta sign* is also positive

3. Discussion

Aortic aneurysms have high mortality and are 15th cause of death in USA. Incidence is 1.3% [1]. Prevalence of aortic aneurysm of >8 cm is 0.03% [2]. When aneurysm is more than 10cm, it is generally labelled as a giant aneurysm; however, the joint council of American Association for vascular surgery defined an aortic aneurysm as giant if the diameter crosses 11 cm [3,4].

The saccular aneurysm in our patient was of size 10cm diameter, hence qualifies to be called giant aortic aneurysm. Smooth corticated vertebral erosion with sclerotic border is usually caused by aneurysm secondary to chronic repetitive arterial pulsations. Mechanical pressure causing relative bone ischemia leads to lysis and bone destruction. The association with osteoporosis increases the risk of erosion. Contained rupture also causes vertebral erosion. Contained rupture occurs when extravasated blood is contained by surrounding tissue. It may be present without any symptoms for a long period. Posterior extension of rupture can erode the spine. When posterior wall of aneurysm is not clearly visible as a distinct line and aorta follows the contour of spine as in our case, it is called positive drape aorta sign, and it indicates contained leak or impending rupture. The discontinuity of parietal calcification and positive drape aorta sign are seen in aneurysmal rupture. The erosion of vertebrae is seen predominantly on left anterior vertebral bodies at D7 to D11 with erosion of left posterior elements and extension into spinal canal compressing thecal sac (mostly at D9). The close differential for vertebral erosion at this stage is neurogenic tumors. The later predominantly involves the posterior elements in contrast to vertebral bodies. The tumor component can be differentiated from hematoma in ruptured aneurysm. Contrast enhanced scans are diagnostic. Infective conditions are other differential diagnosis for vertebral erosion. Disk involvement and gibbus formation are characteristics for spinal tuberculosis etiology which is not seen in

aneurysm (Figure 2).

Presence of layered thrombus can affect the hemodynamics within aorta. Whether intraluminal thrombus increases risk of rupture is controversial. Some studies indicated that intraluminal thrombus reduces aortic wall shear stress, thus acting as mechanical cushion. However, intraluminal thrombus may create inflammatory response in which neutrophils, cytokines, reactive oxygen species are sequestered which may reduce the strength of the aortic wall. Some reports suggested that there is an increased chance of aortic rupture. High density thrombus shows increased risk of rupture. It is observed in many studies that the attenuation value and volume of thrombus is more in the ruptured aortic aneurysms as compared to intact aortic aneurysm [5].

Type and the extent of thrombus also influences the wall integrity. Some aneurysms have fibrous walls of such character that little upgrowth of granulation tissue intramural thrombus appear, and the lower layer becomes quite compact [6]. Such cases the wall of sac may contain considerable amount of calcium. Our case revealed layered thrombus with evidence of calcification. The aortic aneurysms >4cms are followed up. When the size is larger than 5.5cms, surgical repair is advised. Annual rupture rate is 30% for aneurysms >8cms [7]. Giant aortic aneurysms need to be fixed either by surgical or endovascular repairs to prevent the rupture. Due to some medical comorbidities and a positive HbsAg test with high titers surgical repair is not yet taken up in our patient.

4. Key Points

Giant aortic aneurysm is an aneurysm which is more than 10cm in diameter. Vertebral erosion though rare can occur in the adjacent vertebral bodies due to mechanical pressure or maybe due to contained rupture of aortic aneurysm. The vertebral erosion due to

a large aortic aneurysm must be differentiated from bone erosion due to neurogenic tumor.

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