

## Case Report

# Erosion of Lumbar Vertebral Body caused by Aortic Pseudoaneurysm. CT Findings with 3D Volume Rendering Reconstructions

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Rupture of the posterior wall of abdominal aortic aneurysm (AAA) may be followed by the formation of a pseudoaneurysmatic sac in which the blood is contained by the surrounding tissues, causing pressure erosion and destruction of adjacent lumbar vertebra. This presentation is unusual and the diagnosis of aortic wall rupture may be delayed; therefore, extensive remodelling of anterior aspect of the lumbar spine should be considered with suspicion in patients affected by AAA. In patients with AAA and unexplained low back pain, Computed Tomography (CT) may suggest correct differential diagnosis allowing urgent surgical repair indicated to prevent lethal, uncontrolled hemorrhage.

### CASE REPORT

A 76-year-old man presented at our Institution with a 6-month history of episodic low back pain; for two days before admission, the patient experienced continuous pain, much worse than in the past. The pain was limited to lumbar region and did not radiate into either leg. On physical examination, the patient was afebrile but tachycardic. The abdomen was distended. Initial investigations showed severe anemia with reduced haemoglobin value of 8.0 g/dl (haematocrit 23.6%). No other blood test abnormalities were observed. Conventional radiography of the lumbar column showed a large round-shape bone defect of the anterior aspect of the fourth lumbar vertebra. In order to better evaluate this non specific finding lumbar spine CT examination was performed with a GE HiSpeed Advantage CT system (General Electric, Milwaukee, WI, U.S.A.). Pre-contrast 3-mm collimation axial images at the level of vertebral lesion showed unexpected abdominal aortic aneurysm with a large retroperitoneal hypodense hematoma; subsequently, a contrast-enhanced set of images was acquired with spiral acquisition (Fig. 1). The acquisition parameters were 3-mm collimation, 3 mm reconstruction, with a pitch of 1.3. One hundred twenty ml of Omnipaque 300 (Nycomed Inc./Nycomed A.S., Oslo, Norway) were delivered by an automatic injector (Medrad, Indianola, PA, U.S.A.) at a rate of 3 ml/s. The delay time in arterial phase was 25 s. Contrast enhanced CT revealed a posterior rupture of the AAA with a large pseudoaneurysm contained in retroperitoneum, involving the left iliopsoas muscle; extensive erosion of vertebral body

was observed. Subsequently, three-dimensional CT angiography (3D-CTA) reconstruction was performed to allow detailed interpretation of the extent of disease. Images were processed at a dedicated workstation (Advantage Workstation 4.0; GE Medical System, U.S.A.) for Volume Rendering (VR). The abdominal aortic aneurysm, the site of vessel rupture and the extent of pseudoaneurysm and of the vertebral erosion were easily visualized (Fig. 2). Volume rendered images provided enhanced understanding of 3D anatomic relationship among the AAA and surrounding structures, allowing a useful "road map" for surgical planning. At operation, complete tube-graft replacement of aortic aneurysm was carried out; the patient had a slow but uneventful recovery and was discharged after 15 days.

### DISCUSSION

Clinical manifestations of an AAA, depending on its site, morphology and direction of expansion, may imitate numerous other intraabdominal diseases, but also lesions of peripheral vessels, vertebral column and spine [1]. Whatever the site, aortic aneurysm rupture is a life-threatening event that usually lead to uncontrolled hemorrhage and urgent surgical repair is mandatory. Chronic, contained rupture of aortic aneurysms is an important subset of ruptured aneurysms with presenting features that may be very variable; diagnosis tends to be delayed unless a high degree of suspicion is present. Development of a retroperitoneal hematoma may cause pressure erosion and destruction of lumbar vertebrae that may contribute to the difficulty in diagnosis [2–4]. A pathogenic mechanism involving the intermittent pulsation of the aneurysm and ischaemia of the vertebral bone has been proposed [5]; perianeurysmal inflammation may also contribute to the development of destructive vertebral and discal lesions [6]. In these cases, patients may present with unusual clinical and imaging findings: aspecific low back pain may be thought to be orthopaedic or neurologic in origin [7] and correct diagnosis of AAA rupture may be delayed. Common causes of anterior erosion of a lumbar vertebral body include abscess, adenopathy from neoplasm or infection and metastasis; in cases of spondylodiskitis intervertebral disk inflammation and involvement of two vertebral bodies allow correct diagnosis. Radiologists should be

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(a)



(b)

Fig. 1 – Unenhanced axial CT (a) shows infrarenal aortic aneurysm in close relationship with a large retroperitoneal hypodense mass suggesting contained rupture. Erosion of adjacent lumbar vertebral body may be observed. Spiral CT obtained during the dynamic administration of i.v. contrast medium (b) shows the early enhancement of pseudoaneurysmatic lumen that causes vertebral erosion.

aware that in patients affected by AAA the radiographic finding of vertebral erosion may suggest contained rupture; computed tomograms performed for possible lumbar disease should also be screened for paraspinal disease and the applied field of view should be large enough to include at least the paraspinal psoas regions [8]. Plain radiography

and ultrasound are unreliable at identifying retroperitoneal collections with vertebral involvement. Magnetic Resonance Imaging (MRI) is a valuable diagnostic tool to identify the AAA rupture with retroperitoneal pseudoaneurysm causing vertebral erosion [9]; nevertheless, MRI may be more time-consuming than CT and its use in emergency

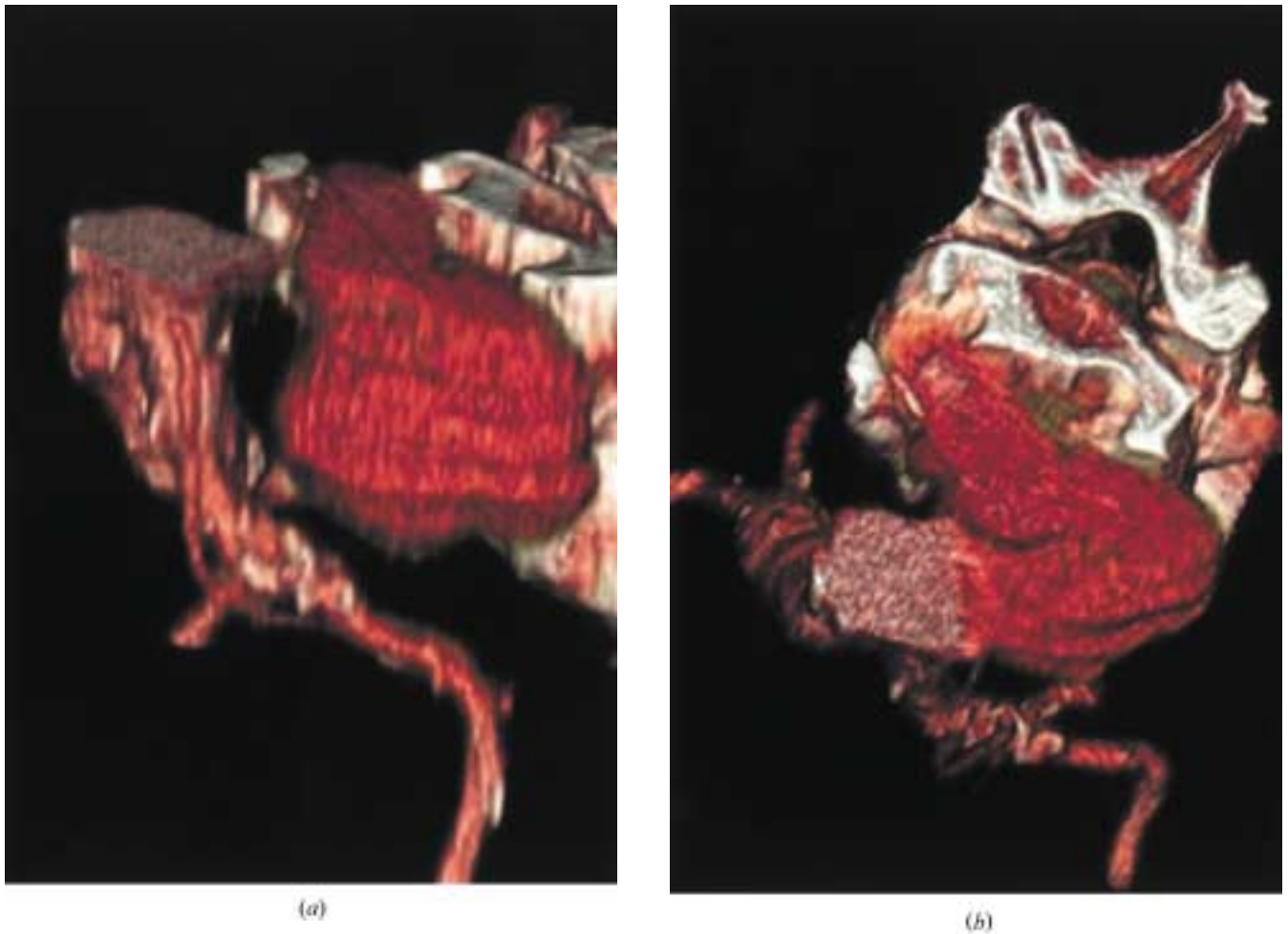


Fig. 2 – 3D Volume Rendering (VR) reconstruction of the volumetric spiral CT data set. Parameters of VR reconstruction have been chosen to show only contrast enhanced patent lumen of the pseudoaneurysm, excluding its hypodense thrombosed portion. Lateral view (a) of 3D VR reconstruction allows precise anatomical localizing of the site of AAA rupture and shows the relationship to the spine. Left antero-lateral cranial view (b) of the VR reconstruction at the level of the fourth vertebral body better defines the bony erosion and its relationship to the pseudoaneurysm and may be helpful in surgical planning.

setting may be difficult. According to previously reported cases [10], our experience confirms the role of CT in correct diagnosis of this unusual presentation of AAA rupture. Moreover, although patient management and surgical approach are not actually modified by computer reconstructions compared to axial CT images, we have found that CT angiography and 3D VR images may substantially contribute to surgical planning providing excellent information about anatomic details and extent of disease (mainly on z-axis); moreover, we believe that 3D reconstructions may enhance understanding of CT findings by non radiologists. On the basis of our experience, we believe that 3D images may be created also in emergency setting, due to the brief time required for good quality reconstructions with modern available software. To our knowledge, this is the first report of vertebral erosion due to contained rupture of AAA in which 3D-CTA with Volume Rendering images are presented. The case we present here demonstrates the great variety of clinical presentation of AAA

contained rupture; in this particular case, the entity of pain referred by the patient led the emergency staff to better investigate the radiographic finding of vertebral erosion, avoiding any delay in diagnosis. In older patients with unexplained back pain, a high degree of clinical suspicion is essential, together with early resort to cross sectional imaging with CT or MRI.

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