

Computed Tomography and Magnetic Resonance Imaging Findings of Chronic Contained Rupture of an Abdominal Aortic Aneurysm Leading to Vertebral Destruction and Total Thrombosis: A Case Report

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Abstract

Rupture is an extremely fatal complication of abdominal aortic aneurysms (AAAs), which may result in severe retroperitoneal bleeding. In certain cases, particularly in those with smaller ruptures, bleeding may be contained by surrounding tissues, such as vertebral bodies or psoas muscle. These chronic hematomas can cause vertebral destruction, leading to radicular pain and back pain. Total thrombosis of the abdominal aorta secondary to aneurysm rupture is a relatively uncommon complication, leading to numbness and vascular pain in the lower extremities, rather than back pain. Herein, we present a case of a chronic contained rupture of an AAA, leading to vertebral destruction and total thrombosis, as evidenced by contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI).

Keywords: Computed tomography; Magnetic resonance imaging; Aneurysm; Destruction; Thrombosis

Introduction

A chronic contained rupture of an abdominal aortic aneurysm (AAA) is a well-documented subtype of AAA ruptures [1]. Compressive resistance to extravasation may cause a chronic retroperitoneal hematoma. Strong retroperitoneal structures, such as vertebral bodies and the psoas muscle can tamponade the hematoma [1,2].

The majority of the patients with a ruptured AAA present with abdominal or back pain and the clinical findings of shock [1,2]. In addition, there may be no accompanying severe clinical manifestations, and this type of aneurysmal ruptures is termed as a chronic contained rupture [3].

We present a case of a chronic contained rupture of an AAA, leading to vertebral destruction and total thrombosis, as evidenced by contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI).

Case Report

A 47-year-old male patient was presented with a 10-month history of low back pain and one-month history of bilateral intermittent claudication and numbness in both lower extremities. His medical history revealed mild untreated hypertension for two years. Physical examination also revealed diminished peripheral pulses in both lower extremities. Arterial Doppler ultrasound (US) demonstrated low peak systolic velocity and flow volume in bilateral femoral, tibialis posterior and dorsalis pedis arteries. The difference in Doppler US measurements between the right and left lower extremities was non-significant. A contrast-enhanced thoracoabdominal CT angiography and MRI showed a focal (3.2 cm in size) aneurysmal dilatation of the infrarenal abdominal aorta. In addition, there was a 84 × 65 × 53 mm non-enhancing heterogeneous lesion which was compatible with a chronic contained rupture associated with the aneurysm, extending posterolaterally. The lesion caused severe erosion of the anterior parts of L2 and L3 vertebral bodies and compressed the left psoas muscle. A total thrombosis in the abdominal aorta was detected starting below the origin of the inferior mesenteric artery and the origin of aneurysm extending toward the bifurcation of the aorta and the

common iliac arteries. Furthermore, bilateral internal thoracic artery-inferior epigastric artery collaterals which provided lower extremity perfusion were detected (Figures 1-9). The patient presented with clinical manifestations of arterial insufficiency rather than neurological symptoms, as the lesion did not reach the posterior parts of vertebrae and did not cause a nerve root compression. A surgical repair of the

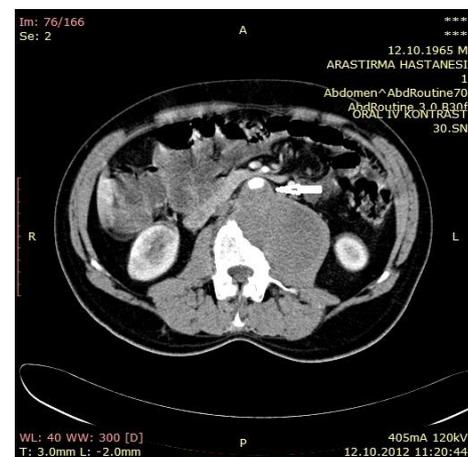


Figure 1: An axial contrast-enhanced CT image showing a partially thrombosed aneurysm (arrow), extending posterolaterally and compressing the left psoas muscle.

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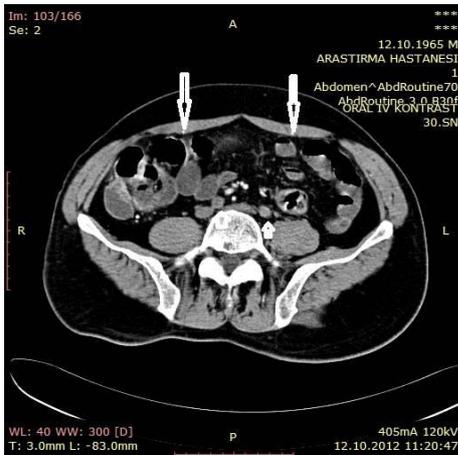


Figure 2: An axial image showing bilateral internal thoracic artery-inferior epigastric collaterals (long arrows) and bilateral total thrombosed common iliac arteries (short arrows).



Figure 3: A sagittal image showing an aneurysmal dilated segment (short arrow), a distal total thrombosed abdominal aorta segment (long arrow), and the extension of a contained rupture.



Figure 4: A coronal image demonstrates an aneurysmal dilated segment, a distal total thrombosed abdominal aorta segment and iliac bifurcation (long arrow), and the well opacified bilateral common femoral arteries.

aneurysm was performed following anticoagulant therapy, and the patient was discharged two weeks after surgery.

Discussion

An AAA can be considered a dilatation of the infrarenal aorta,

giving rise to a permanent vessel diameter >30 mm, while typical abdominal aortic diameter ranges from 15 to 25 mm) [4]. A chronic contained rupture of an AAA is relatively rare, including only 2.7% of



Figure 5: A T2-weighted MRI image showing vertebral erosion caused by the aneurysm.

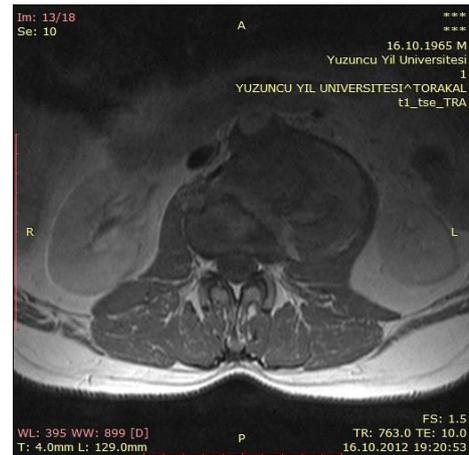


Figure 6: A contrast-enhanced T1-weighted MRI image showing a partial thrombosed lumen of the abdominal aorta and heterogeneous hematoma.



Figure 7: A T1-weighted sagittal image showing bone destruction.



Figure 8: A contrast-enhanced sagittal T1-weighted image showing no contrast enhancement of the lesion.



Figure 9: A three-dimensional volume-rendering image showing vertebral destruction (arrows).

operated infrarenal AAAs, and occurs when the surrounding tissues contain an aortic leak [3]. The underlying mechanism of a chronic contained rupture of an AAA still remains unclear. However, it has been proposed that the aortic wall is strong and the tear is limited in case of small aneurysms [1]. For large aneurysms, as the size of the sac increases, it induces a strong perianeurysmal reaction, which provides a high level of resistance to extravasations of the blood, when the aneurysm becomes ruptured [1]. This finding suggests that the vertebrae can tamponade the rupture thanks to their inherent strength [1].

Small case series with a chronic contained rupture of an AAA have been described in the literature. Kapoor et al. [5] reported a case with a chronic contained rupture of an AAA at the site of prior graft repair of the aneurysm. Similarly, Roeyen et al. [6] reported a case with vertebral erosion related to a chronic contained rupture of AAA in a patient with Behçet's disease. Although a chronic contained rupture of an AAA most commonly occurs after infrarenal AAA operations, our case had no prior surgery, and he did not suffer from a connective tissue disease.

Although acute ruptures have a mortality rate of about 60%, symptoms of a chronic contained rupture can be more subtle including back pain for several months [1]. In addition, several symptoms including obturator neuropathy, obstructive jaundice, and groin hernia have been reported [7]. Symptoms which can be attributable to tissue compression or erosion and are most commonly detected in the work-up of back pain or an abdominal pathology. A thorough clinical and radiological work-up is, therefore, required and imaging studies should include a careful examination at all structures surrounding the vertebral body. Computed tomography is the most reliable

diagnostic tool, although an organized hematoma can be confirmed by pathological examination [8].

Several authors previously described vertebral erosion associated with a chronic contained rupture of an AAA. It has been suggested that a continuously pulsating aneurysm, which is compressing the vertebral body leads to extensive bone destruction [5-7]. It is also of utmost importance to differentiate the vertebral erosion caused by a chronic contained rupture of an AAA from the infectious processes. Chronic contained ruptures of an AAA-related erosions are usually smooth, compared to those caused by a vertebral pyogenic infection, in which the bony destruction is irregular and poorly delineated [5,9].

Conclusion

To the best of our knowledge, our case, who presented with clinical manifestations of arterial insufficiency and back pain, is the first case of a chronic contained rupture of an AAA, leading to both vertebral erosion and total thrombosis, which was attributed to chronic compression of the distal segment of the abdominal aorta by a widened chronic contained rupture sac.

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