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# Segmental Artery Pseudoaneurysm Associated With Thoracic Spinal Fracture

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**ABSTRACT:**

Segmental artery pseudoaneurysm is a rare complication of spinal trauma. We present an unusual case of thoracic 11-12 segmental artery pseudoaneurysm caused by thoracal spine fracture. A 72-year-old man was admitted to our emergency department because of a car accident. Neurological examination revealed complete motor and sensorial deficiency below the level of T10. Direct x-ray of the thoracic and lumbar spine was performed together with Computerized Tomography (CT) at the level of T9-10-11. Magnetic resonance imaging (MRI) and digital subtraction angiography (DSA) were also performed. X-ray revealed anterior displacement of thoracic 10 with the burst fracture of thoracic 11 vertebral bodies. The computerized tomography (CT) of this region showed a pseudo-aneurysm formation located in the left aortic region. Surgical decompression and stabilization of the involved thoracic vertebras was performed. After surgery, the patient was referred to cardiovascular surgery and endovascular radiology department for further treatment of the pseudo-aneurysm.

**KEY WORDS:** Pseudoaneurysm, Segmental arteries, Spinal trauma, Spine fractures.

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## INTRODUCTION

Traumatic spinal column and medulla spinalis injuries are relatively common pathologies encountered in neurosurgical practice (1, 4). Both operative and nonoperative treatment modalities have been used successfully in spinal fractures. Clinical and neuroradiological criteria are important in the selection of operative versus nonoperative treatment in fracture of the spine.

The term pseudoaneurysm is used to describe a localized focus of arterial dilatation lined by granulation or scar tissue, overlying the media (2, 5, 6). Lumbar artery pseudoaneurysm is used for a pseudoaneurysm originating from the lumbar artery (2, 5, 6). Some authors have used the term false aneurysm to describe this pathology (5). In a lumbar artery pseudoaneurysm, there is no actual aneurismal wall (2, 5, 6). They can reach a large size (2, 5, 6). They sometimes rupture into the fascial compartment containing the psoas muscle (3, 4, 5).

In this report, we present a case of thoracolumbar trauma associated with lumbar artery pseudoaneurysm. This case enabled us, with the assistance of a literature review, to outline the clinical presentation, the diagnostic difficulties and the value of diagnostic tools.

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## CASE REPORT

This 72-year-old man was admitted to our emergency unit complaining of lower extremity plegia, urinary retention, and severe back pain after a car accident. Neurological examination revealed total paraplegia and anesthesia below the level of T10 dermatome (Frankel A in the Frankel classification). Thoracic lateral plain X-ray showed T10 anterolistesis with T11 vertebral burst fracture (Figure 1). The computerized tomography (CT) scan of this region showed a pseudoaneurysm formation located in the left aortic region (Figure 2). T1-weighted magnetic resonance imaging (MRI) in the sagittal plane showed pseudoaneurysm at the level of T12 (Figure 3). T2-weighted MRI in the sagittal plane showed total spinal cord transection at the level between T10-T11 (Figure 4). The patient was operated (T10-T11 partial hemilaminectomy) on and dural repair and stabilization (T10-T12 posterior transpedicular screw fixation) were performed. The patient was taken to the digital subtraction angiography (DSA) unit on the first day after the

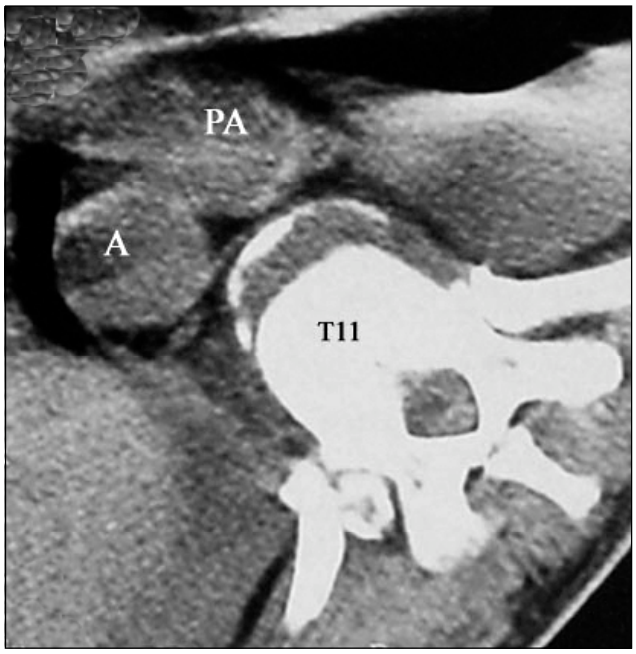


**Figure 2:** The computerized tomography (CT) scan of this region showing a pseudoaneurysm located in the left aortic region (T11: thoracal 11, A: Aorta, PA: pseudoaneurysm).

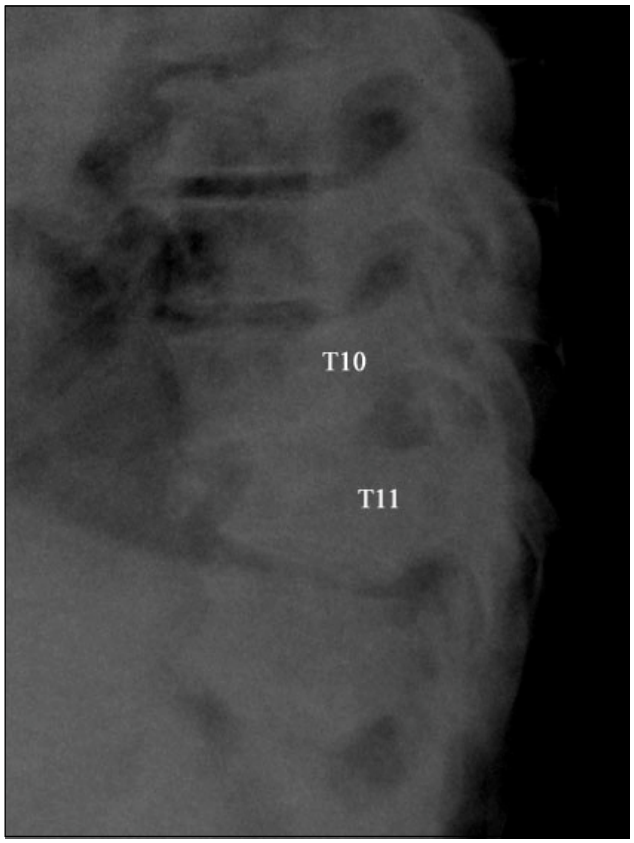


**Figure 1:** Thoracic lateral plain X-ray showing T10 anterolisthesis with T11 vertebral burst fracture (T10: thoracal 10, T11: thoracal 11).


**Figure 3:** T1-weighted magnetic resonance imaging (MRI) in the sagittal plane showing pseudoaneurysm at the level of T12 (T11: thoracal 11, A: Aorta, PA: pseudoaneurysm).


**Figure 4:** T2-weighted MRI in the sagittal plane showing total spinal cord transection at a level between T10-T11 (T10: thoracal 10, T11: thoracal 11).

surgery for visualization of the aorta and segmental arteries. Angiography showed left segmental artery pseudoaneurysm and aortic displacement from the left to the right (Figure 5). The patient was referred to cardiovascular surgery department and radiology unit for further treatment patient on the second postoperative day.

## DISCUSSION

Traumatic spinal column injuries associated with medulla spinalis injury or without medulla spinalis injury are relatively common neurosurgical pathologies especially in our country with high frequency of traffic and industrial injuries. Spinal column injuries may sometimes be associated with other system injuries such as lung, head and abdomen. Paravertebral soft tissue injuries are common with spinal trauma while paravertebral vascular injuries are relatively uncommon. This may be because of the elasticity and tolerability of vascular structures.

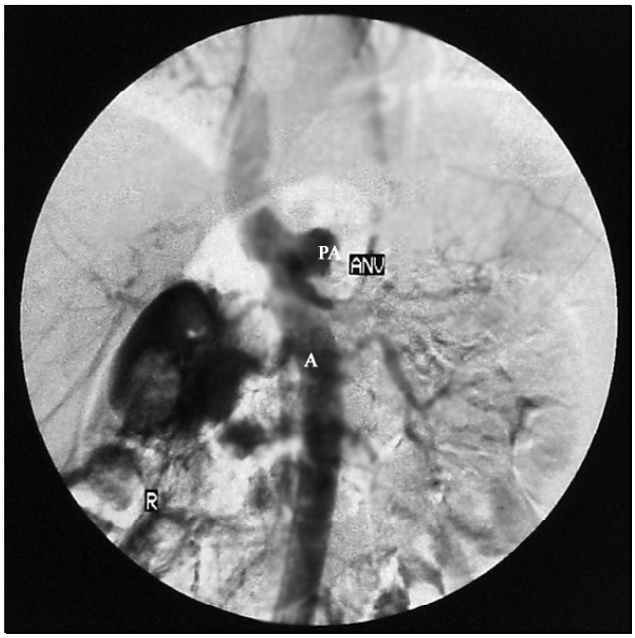


**Figure 5:** Angiography showing the left segmental artery pseudoaneurysm and aortic displacements from the left to the right (A: Aorta, PA: pseudoaneurysm).

The segmental arteries include the posterior intercostal, subcostal, and lumbar arteries. These arteries arise from the thoracic and lumbar aorta bilaterally and run toward their appropriate spinal foramina to supply radicular arteries. One of the largest radicular arteries is the Artery of Adamkiewicz. Segmental anterior and posterior radicular feeder arteries passing from the intervertebral foramina and entering into the subarachnoid space give off the terminal branches to one anterior spinal artery and two posterior spinal arteries.

The abdominal aorta gives off several branches. The visceral branches of the abdominal aorta are the celiac, the superior mesenteric, the middle suprarenal, renal, testicular or ovarian, and inferior mesenteric arteries. The parietal branches of the abdominal aorta are the inferior phrenic arteries, four paired segmental lumbar arteries and the median sacral artery.

The type of the fracture in this case is compression-dislocation as described by Hanley and Eskay (1). These rare fractures are caused by a combination of axial compression and posteroanterior translation, leading to a superior vertebral anterolisthesis associated with an inferior vertebral compression fracture (1). These are three-

column injuries and extremely unstable (1). The type of the injury and the position of aorta in relation to the vertebral column fracture are shown in a schematic figure (Figure 6).

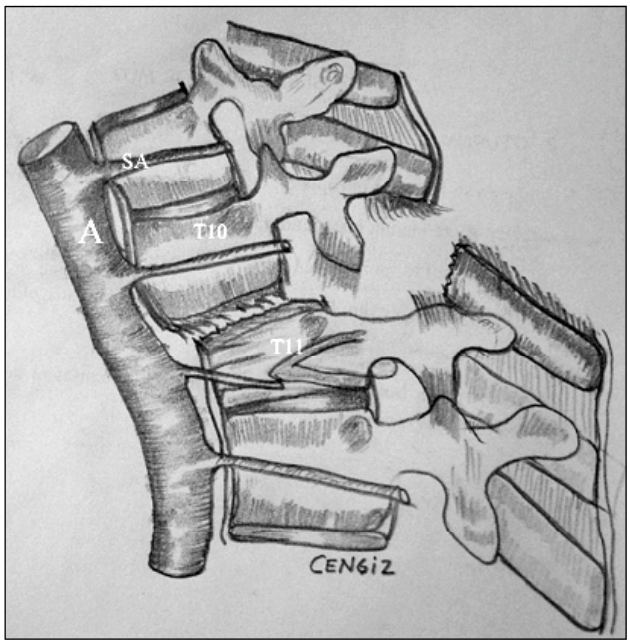


**Figure 6:** Schematic figure showing the vertebral fracture and aorta (T10: thoracal 10, T11: thoracal 11, A: Aorta, PA: pseudoaneurysm, SA: Segmental artery).

The pathogenesis of aneurysm formation in the segmental artery of this patient is partial or totally rupture of the arterial branch due to overstretching after severe lower thoracic trauma (Figure 7). The fractured vertebral bone fragment was also the cause of the segmental artery rupture. In published reports, blunt abdominal trauma or surgical intervention are described as causes of pseudoaneurysm. The level of the dislocated vertebrate was thoracic 10 in our case. The compressed vertebra was thoracic 11 but the level of the pseudoaneurysm was thoracic 12. The appropriate level of the segmental artery seemed to be thoracic 11-12 according to the MRI of the spinal column. In this case, the effect of the vertebral bone fragments or compression seems inappropriate for this injury. Hyperflexion may cause mainly stretching of the aorta. If the segmental artery is injured it should be another cause for injury. The most appropriate cause may be torsion or rotation of the vertebral column. Hyperextension associated with lateral rotation may be the most likely cause for

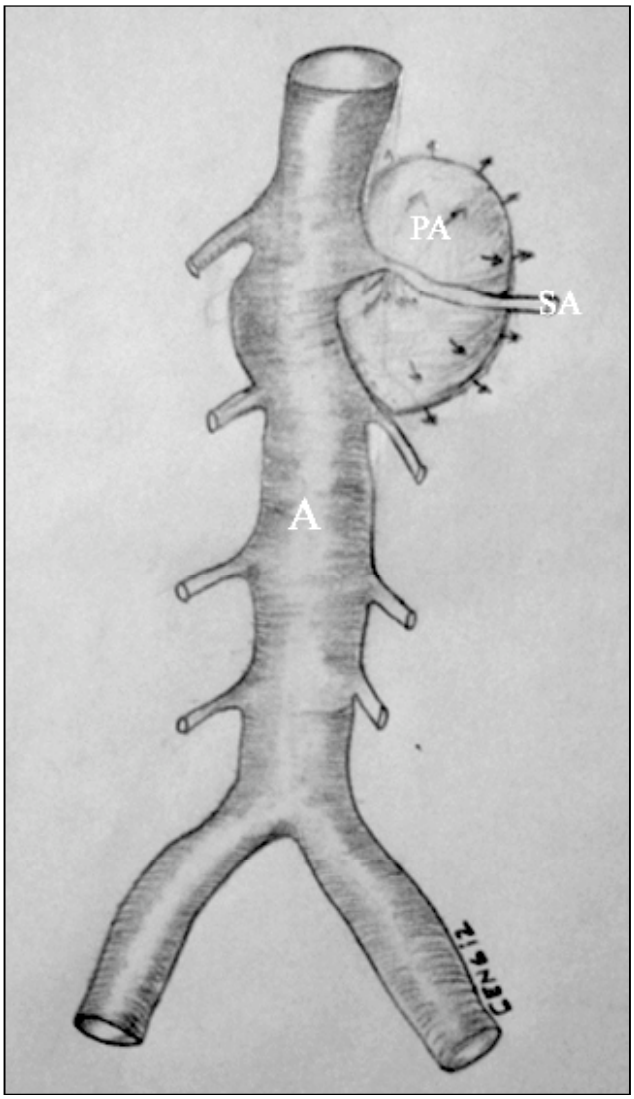


**Figure 7:** Pseudoaneurysm formation (A: Aorta, PA: pseudoaneurysm).

the overstretching of segmental arteries resulting in injury of the artery.

The CT scan can show vertebral bone fractures better than MRI, but MRI is superior to CT in demonstrating the spinal cord, the prevertebral paraaortic region and the retroperitoneum from the upper thoracic to the lower lumbar region. Hematoma can be seen with MRI. The demonstration of pseudoaneurysm on T1- and T2-weighted MRI is difficult because of the presence of hematoma. Magnetic resonance angiography may be performed in suspected cases or in cases associated with retroperitoneal hematoma demonstrated by MRI and abdominal ultrasonography. The advantages of the CT scan and MRI over DSA are

that they are less expensive and noninvasive (3) but DSA must be performed when arterial injury is suspected. The CT scan and MRI should be done immediately in the patient with thoracolumbar spinal trauma before surgery to demonstrate associated retroperitoneal pathologies (such as pseudoaneurysm of the segmental and lumbar artery) and the spinal cord.

## REFERENCES

1. Hanley EN, Eskay ML: Thoracic spine fractures. Orthopaedics 12: 689-696, 1989
2. Hulnick DH, Naidich DP, Balthazar EJ, Megibow AJ, Bosniak MA. Lumbar artery pseudoaneurysm: CT demonstration. J Comput Assist Tomogr 8: 570-572, 1984
3. McAninch JW, Federle MP: Evaluation of renal injuries with computerized tomography. J Urology 128: 456-460, 1982.
4. Smythe WR, Carpenter JP. Upper abdominal aortic injury during spinal surgery. J Vasc Surg 25: 774-777, 1997
5. Stevens KJ, Gregson RH, Kerslake RW. False aneurysm of a lumbar artery following vertebral biopsy. Eur Spine J 6: 205-207, 1997
6. Steward JR, Barth KH, Williams GM. Ruptured lumbar artery pseudoaneurysm: an unusual cause of retroperitoneal hemorrhage. Surgery 93: 592-594, 1983