



## Management of major vascular injury during pedicle screw instrumentation of thoracolumbar spine



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### ABSTRACT

**Objectives:** Vascular injury is a rare complication of spinal instrumentation. Presentation can vary from immediate hemorrhage to pseudoaneurysm formation. In the literature, surgical approach to repair has varied based on anatomy, acuity of diagnosis, infection, and available technology. In this manuscript, we aim to describe our institutional experience with vascular injuries in thoraco-lumbar spine surgery.

**Patients and methods:** We report our institutional experience of three cases of vascular injury secondary to pedicle screw misplacement and their management, as well as a review of the literature.

**Results:** The first case had a history of previous instrumentation and presented with back pain and fever. The patient was taken for instrumentation exploration via a posterior approach. Aortic violation was discovered at T6 intraoperatively during instrumentation removal and the patient underwent emergent endovascular repair. The second case presented with chronic back pain after multiple prior posterior fusions and CT angiogram showing screw perforation on the aorta at T10. The patient underwent elective endovascular repair with synchronous removal of the instrumentation. The third case presented with radicular leg pain 6 months after L4-S1 posterior lumbar interbody fusion, with CT scan demonstrating the left S1 screw abutting the L5 nerve root and common iliac vein. The patient underwent elective instrumentation revision with intraoperative venography.

**Conclusion:** Major vascular injury is a known complication of spinal surgery, especially if it involves instrumentation with pedicle screws. Treatment approach has evolved with the advancement of endovascular technology; however, open surgery remains an option when anatomy or infection is prohibitive. In the elective setting, preoperative planning with attention to surgical approach, positioning, and contingencies, should occur in a multidisciplinary fashion. Repair with an aortic stent-graft cuff may minimize unnecessary coverage of the descending thoracic aorta and intercostal arteries.

### 1. Introduction

Pedicle screw fixation is a well-established technique to treat degenerative spine disease, trauma, neoplasms, deformity, and other pathological conditions of the thoracolumbar spine [1,2]. Various vascular structures are at risk during pedicle screw insertion including the azygos vein, intercostal artery, inferior vena cava, and aorta for thoracic spine procedures and the aorta and common iliac vessels for the lumbar spine surgeries.

Vascular injury is a rare but significant complication of spinal

instrumentation [4]. Presentation can vary from immediate hemorrhage to pseudoaneurysm formation. There have been several reports published describing such cases and the various approaches treatment. However, the presentation and complications can be varied. Additionally, as vascular traumatic treatment has evolved to less invasive therapies, multiple methods for repair exist.

### 2. Patients and methods

We report our institutional experience of three cases of pedicle

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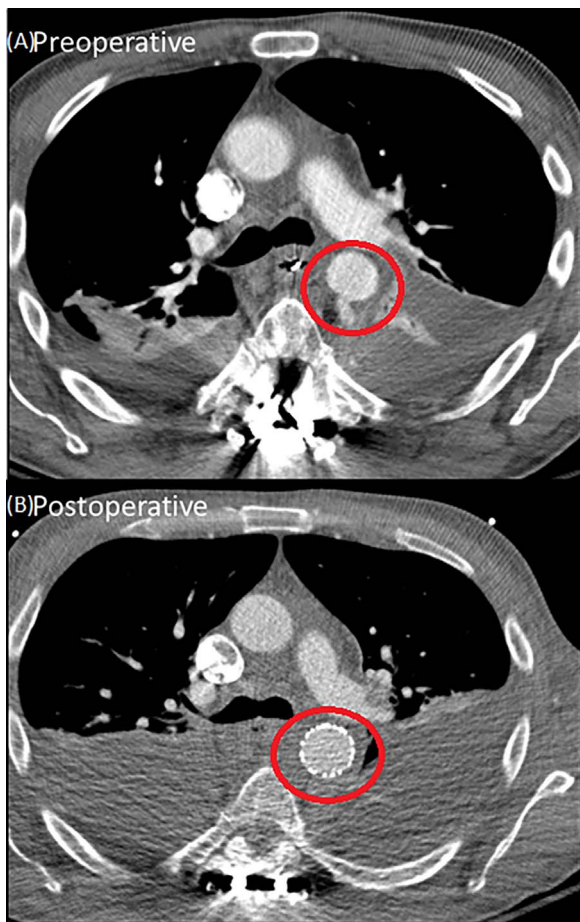


Fig 1. Pre/postoperative CT angiograms demonstrating thoracic aortic pseudoaneurysm and repair.

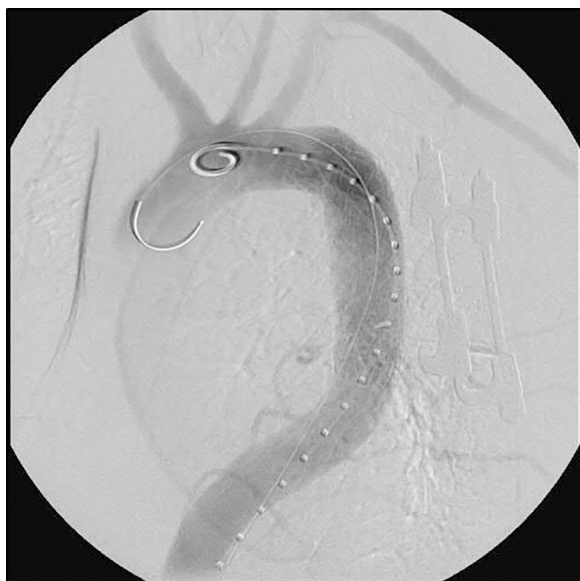


Fig. 2. Completion aortogram with no extravasation or endoleak.

screw involvement with major arterial and venous structures and their management. We also reviewed the literature for current practices of management of such injuries.

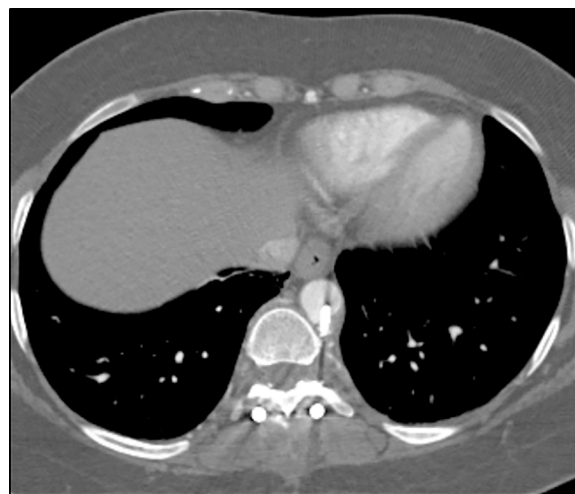


Fig. 3. CT angiogram showing transpedicular screw perforation of the aorta.

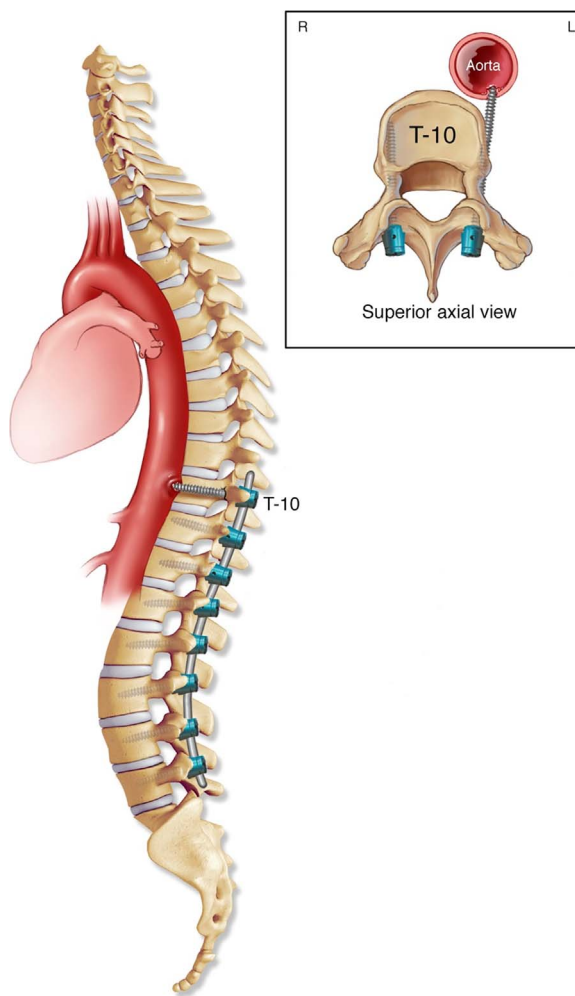


Fig. 4. Illustration of T10 pedicle screw projecting into the lumen of the aorta.

### 3. Results

#### 3.1. Case 1

##### 3.1.1. Presentation

A 56-year-old male presented with back pain and chills in the setting of paraplegia due to a remote history of spinal cord injury at T6-T7

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