

## CASE REPORT

# Delayed Penetration of the Thoracic Aorta by Pedicle Screws

A Case Report of Screws Left As-Is

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**Study Design.** A case report.

**Objective.** Presentation of a patient diagnosed with perforation of the aorta by pedicle screws at levels T6 and T9 2 years after spinal fusion, who was advised no intervention. Review of other reported cases that did not undergo excision of the penetrating screws.

**Summary of Background Data.** More than 30 cases of aortic penetration by pedicle screws were described. Gradual penetration of the screws into the aorta rarely causes symptoms other than backache. However, only two cases were treated conservatively.

**Methods.** A 65-year-old female patient underwent spinal decompression and T5-T10 posterior fusion following a spinal abscess. Two years and 8 months postoperatively, she underwent a computed tomography scan for suspicion of spinal hardware infection, which showed T6 and T10 screws penetrating the thoracic aorta.

**Results.** Due to high morbidity, the patient was not offered an operation for screw excision.

**Conclusion.** This case report adds to the only two previous reports of patients who did not undergo revision of pedicle screws penetrating thoracic aorta.

**Key words:** aorta perforation, pedicle screw, posterior stabilization, thoracic spine.

**Level of Evidence:** 5

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vascular complications following spinal surgery is very low. Acute or subacute bleeding due to hardware penetration of major vessels appears to be an extremely rare complication.<sup>3</sup> However, when this occurs, immediate intervention and repair clearly is life-saving. Chronic penetration of the aorta, however, presents differently, mostly as a backache.<sup>4–6</sup> Patients remain stable and screw removal is often performed electively. No intervention, however, may be considered by some patients. More than 30 studies have reported on one or more patients who underwent revision of a pedicle screw penetrating the aorta.<sup>5–14</sup> Of these, only two patients were treated nonoperatively.<sup>4</sup> We report a case of nonoperative follow-up of a patient with two pedicle screws penetrating the thoracic aorta.

## CASE PRESENTATION

A 65-year-old woman with hypertension and morbid obesity underwent decompression of vertebral osteomyelitis complicated by an abscess at spinal levels T7-T8, with posterior spinal fusion at levels T5-T10. Screws were placed in the pedicles of T5-T6 and T9-T10. She suffered from residual paraplegia, remained confined to a wheelchair, and required a permanent urethral catheter. She soon underwent left above knee amputation for infected left knee arthroplasty. About 3 years after spinal decompression surgery, the patient was hospitalized for right above knee amputation. Despite a normal postoperative course and absence of any signs of wound infection, levels of C-reactive protein remained elevated. As part of the workup, we examined the patient's chest x-ray and noticed lateral displacement of tips of the left T6 and T9 pedicle screws (Figure 1). Computerized tomography scan was performed to rule out hardware infection or failure, but neither was present. There, was, however new kyphosis of T7, and the left T6 and T9 pedicle screws were seen penetrating the thoracic aorta (Figure 2).

Because of high operative morbidity, the vascular surgery unit in our medical center advised against operative intervention. The patient remained well and asymptomatic on a 3-year follow-up.

## DISCUSSION

The currently reported incidence of vascular injuries in spinal surgery, about 0.01%, is likely under-reported.<sup>2</sup>

**D**espite a high appreciable fraction of mispositioned pedicle screws (15%–20%)<sup>1,2</sup> and proximity of the aorta to the thoracic spine, the reported rate of

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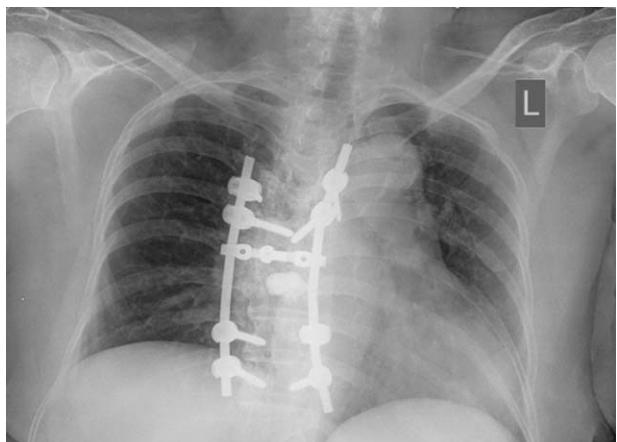
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**Figure 1.** Chest X-ray of the patient 3 years after posterior fusion at levels T5-T10. Notice lateral deviation of the left T5 and T9 screws.

Up to 15% to 20% of screws are mispositioned<sup>1,15</sup> and some degree of contact or encroachment of the aorta by a screw is present in 0.29% of cases.<sup>2</sup> Local pressure imposed by a screw tip on the pulsating vessel wall causes ulceration and gradual penetration of the screw into the lumen. In the majority of the reviewed cases, diagnosis of aortic injury was made 6 months to 6 years postoperatively.<sup>6,16</sup> Local inflammation and scar formation processes probably prevented blood leak and dissection. Chronicity of the above process may explain the universally benign presentation of this complication. Two screws demonstrated in our case represent two consecutive stages of the process: one has

entered the aorta, but has only partially penetrated the vessel wall, while the second one was completely intraluminal.

Contradictory to other reports of removal of pedicle screws penetration of the aorta,<sup>5-14</sup> our patient was recommended conservative follow-up. Soultanis *et al*<sup>4</sup> presented a similar scenario of two patients who were diagnosed with this complication. One of them was an 82-year-old female with progressive kyphosis 5 years after T7-L4 fusion, who declined both endovascular screw removal and correction of kyphosis. She continued follow-up for 2 years, without any adverse outcomes reported.<sup>4</sup> Another 26-year-old patient with T10-L4 fusion for idiopathic scoliosis presented 5 years postoperatively. She declined to undergo revision for this "silent" complication. Unfortunately, no information regarding her long-term follow-up is available. The authors acknowledge that presence of an intraluminal screw may be unsettling for both the surgeon and the patient. Nevertheless, they recommend heavy consideration of risks *versus* benefits of revision, especially in elderly patients.

Endovascular screw removal and stenting may result in long-term graft migration, whereas open thoracotomy with cross-clamping may lead to paraplegia and pulmonary failure.<sup>4,16</sup> However, generally good results were reported, with a few complications including seroma formation,<sup>14</sup> intraoperative bleeding,<sup>16</sup> transient multiple organ dysfunction,<sup>17</sup> and graft displacement on follow-up.<sup>18</sup> In case of conservative treatment, chronic anticoagulation or antiaggregation treatment may be necessary. No specific guidance is available because most intravascular foreign bodies are treated by surgical removal.<sup>19</sup>

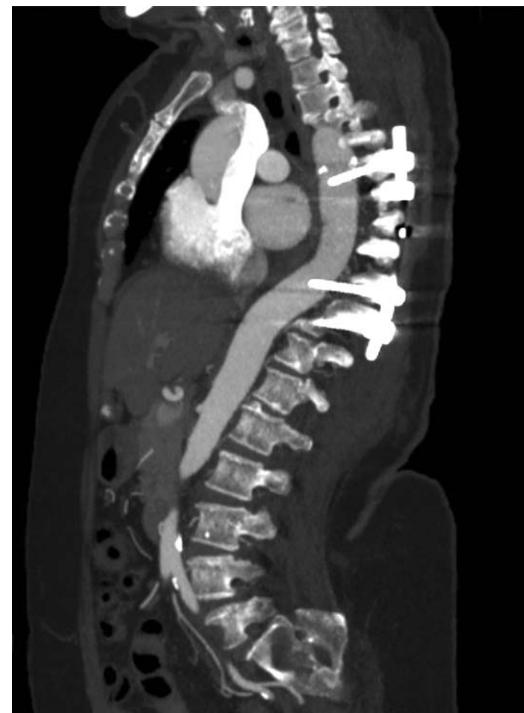
In our situation, multiple comorbidity status precluded surgery, and the patient had already received double anti-aggregation therapy. Influenced by the above cited report<sup>4</sup> and understanding the chronicity of this complication, we decided that the intraoperative risk would be unacceptably high.

## ➤ Key Points

- This report presents a patient whose thoracic aorta was penetrated by two pedicle screws.
- As a postoperative complication, pedicle screws penetration into the aorta may be under-reported.
- Nonintervention may be a viable treatment modality, given patient preferences and perioperative risk.

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**Figure 2.** Sagittal CT image demonstrating penetration of the thoracic aorta by T5 and T9 pedicle screws. CT indicates computed tomography.

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