



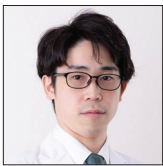
## Case Report

# Retroperitoneal hematoma: A rare complication of percutaneous pedicle screw in an osteoporotic patient

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## ABSTRACT

**Background:** Percutaneous pedicle screw (PPS) placement is an established technique for minimally invasive surgery. However, life-threatening hematomas may occur in osteoporotic patients undergoing percutaneous screw placement.

**Case Description:** An 80-year-old female with an osteoporotic T10 chance fracture developed a life-threatening hematoma following a T8–L3 posterior fusion performed with PPS. Prompt angiography diagnosed a life-threatening hematoma attributed to laceration of the left third lumbar artery occurring following pedicle screw (PS) placement into an osteoporotically fractured left L3 transverse process. This was immediately and successfully embolized.

**Conclusion:** An 80-year-old female with multiple lumbar osteoporotic fractures developed a life-threatening hematoma during a T8–L3 PS fusion. When the lumbar computed tomography angiography diagnosed a laceration of the left L3 lumbar artery, immediate transarterial embolization proved life-saving.

**Keywords:** Lumbar artery injury, Percutaneous pedicle screw, Transarterial embolization, Transverse process fracture, Retroperitoneal hematoma

## INTRODUCTION

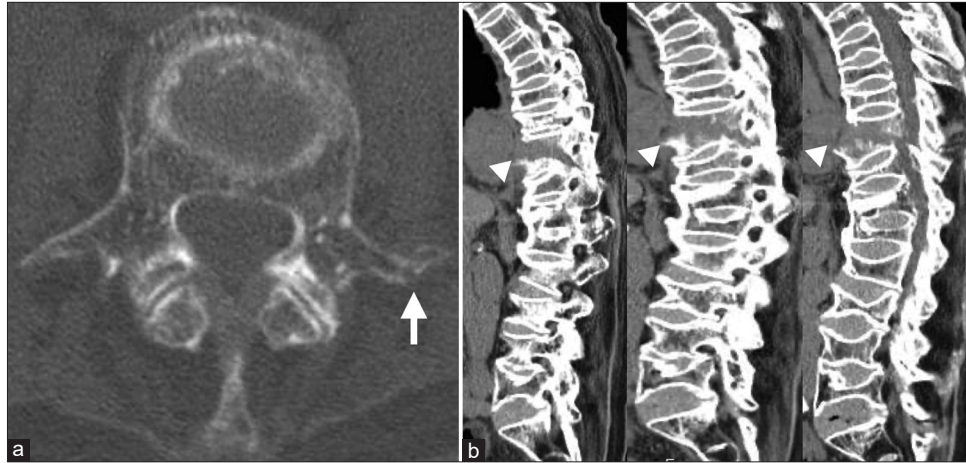
Lumbar artery injuries are rare following percutaneous pedicle screw (PPS) placement. Here, an 80-year-old female with multiple lumbar osteoporotic vertebral fractures developed a life-threatening retroperitoneal hematoma following pedicle screw (PS) laceration of the left L3 lumbar artery at the site of a left L3 osteoporotic transverse process (TP) fracture. Once the computed tomography (CT) angiogram diagnosed the site of the vascular injury, the patient successfully underwent life-saving transarterial embolization (TAE).

## CASE DESCRIPTION

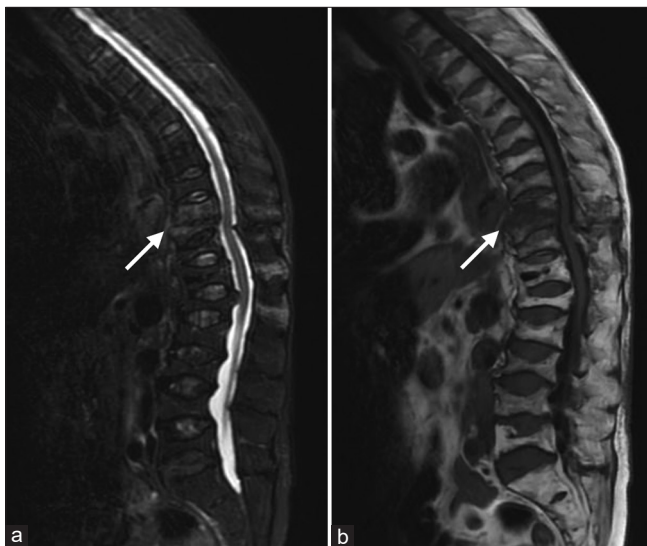
An 80-year-old osteoporotic female with a prior history of a T12 balloon kyphoplasty had fallen 10 days earlier. The thoracolumbar CT showed the left TP fractures from L1 to 3, a T10 chance fracture, and multiple osteoporotic fractures involving the T11, T12, L2, L3, and L4 vertebrae [Figures 1a and b]. The magnetic resonance image also showed that the T10 vertebra

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**Figure 1:** (a) Plain computed tomography (CT) shows the left transverse process fracture of the L3 vertebra. (arrow: fracture point). (b) CT revealed T10 burst fracture (arrowhead) and multiple osteoporotic fractures.

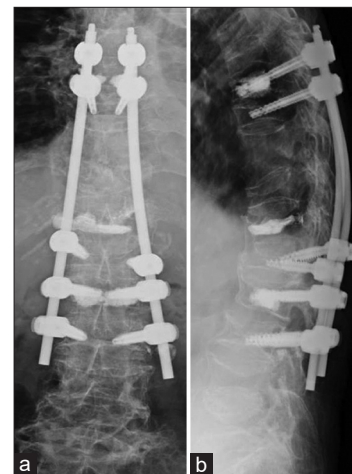


**Figure 2:** (a) Short-tau inversion recovery (STIR) of the thoracolumbar spine reveals the fresh fracture of the T10 vertebra (arrow: T10 vertebra). (b) T1-weighting images (T1WI) of the thoracolumbar spine reveal the fresh fracture of the T10 vertebra (arrow: T10 vertebra).

was hyperintense on the short-tau inversion recovery study, and low-intensity on T1-weighting images, confirming the diagnosis of an acute T10 fracture [Figures 2a and b].

#### PPS T8–L3 fusion resulting in left L3 lumbar artery laceration (site of left L3 TP osteoporotic/traumatic fracture)

With an unstable vertebral fracture of T10, the patient underwent a minimally invasive thoracolumbar T8–L3 PPS fusion under C-arm fluoroscopy [Figures 3a and b]. Postoperatively, when the patient was turned back to the supine position, she suddenly went into shock. Her acute



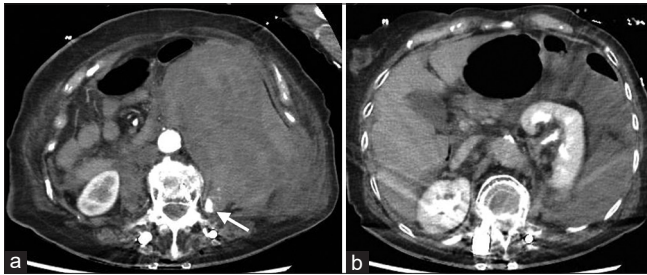
**Figure 3:** (a) Postoperative X-ray shows an anterior view of T8–L3 posterior fixation. (b) Postoperative X-ray shows a lateral view of T8–L3 posterior fixation.

anemia (hemoglobin [Hb] 6.0g/dL and preoperative Hb 12.0g/dL) warranted urgent transfusions of 6 units of red blood cells. The CT angiogram documented the leakage of contrast ventral to the left L3 TP where there was also a large retroperitoneal hematoma [Figure 4]; notably, the left L3 PS was accurately placed within the pedicle [Figure 5]. When urgent angiography documented a pseudoaneurysm involving the left third lumbar artery, TAE was performed (i.e., using 0.3 mL of 33% n-butyl-2-cyanoacrylate injected from the proximal portion of the lumbar artery) [Figure 6]. The retroperitoneal hematoma was spontaneously absorbed over time, and the patient was transferred to a rehabilitation hospital 3 weeks later, following up with outpatient visits within 3 postoperative months.

**Table 1:** Lumbar artery injuries due to PS placement.

Authors	Age/sex	Open PS/PPS	Processes causing bleeding	Additional treatment
Sugimoto <i>et al.</i> case 1	65 y/man	Open PS	L2 pedicle tapping	TAE
Sugimoto <i>et al.</i> case 2	82 y/man	Open PS	L4 screw malposition	TAE
Alvarez Postigo <i>et al.</i>	-	Open PS	L5 screw malposition	TAE
Makino <i>et al.</i>	76 y/woman	Open PS	L4 pedicle tapping	TAE/intraperitoneal drainage
Omi <i>et al.</i>	75 y/woman	PPS	Slipped tapping at L4 TP	TAE
Our case	80 y/woman	PPS	Needle insertion to L5 pedicle	TAE

TAE: Trans-arterial embolization, TP: Transverse process, PPS: Percutaneous pedicle screw, PS: Pedicle screw, y: Years old



**Figure 4:** (a) Contrast-enhanced computed tomography (CT) shows leakage of contrast medium ventral to the left lateral process of the third lumbar vertebra (arrow: Leak point of contrast agent into retroperitoneal space). (b) Contrast-enhanced CT shows a large retroperitoneal hematoma.



**Figure 5:** Postoperative computed tomography shows that the implanted screw resides within the pedicle of the left third lumbar vertebra.

## DISCUSSION

### TP fractures can lead to lumbar artery injuries

TP fractures can lead to lumbar artery injuries, including pseudoaneurysm formation, following spinal trauma and/or spine surgery.<sup>[2,4,6]</sup> Here, a left L3 lumbar artery pseudoaneurysm developed following PPS placement in a left L3 TP osteoporotic/trauma-related fracture. The vascular injury was confirmed with a CTA and subsequently successfully embolized.



**Figure 6:** Selective angiography for the left third lumbar artery shows pseudoaneurysm.

### History of iatrogenic lumbar artery injury with lumbar PS insertion

Although iatrogenic lumbar artery injuries due to PS insertion are rare, we found 6 such life-threatening complications in the literature [Table 1].<sup>[1,3,5,7]</sup> Sugimoto *et al.* had two such cases; one L2 lumbar artery injury occurred while tapping an L2 screw, while the second case occurred after L4 screw misplacement.<sup>[7]</sup> Alvarez Postigo *et al.*'s vascular injury involved L5 PS malpositioning resulting in a hematoma.<sup>[1]</sup> In Makino *et al.*, the L4 lumbar artery was injured when openly tapping in an L4 PS.<sup>[3]</sup> Omi *et al.* caused massive bleeding from the left L4 TP fracture site when the tapping device slipped from its entry point.<sup>[5]</sup> We experienced a case that needle insertion to the L3 pedicle with a fractured left TP led to the left L3 lumbar artery injury. In all six cases, patients sustained potentially life-threatening injuries that were successfully treated endovascularly.

## CONCLUSION

An 80-year-old female developed a life-threatening retroperitoneal hematoma following a PPS/fusion (T8–L3)

that included placing a PS into an osteoporotic left L3 TP; immediate resuscitation and TAE proved lifesaving.

#### Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

#### Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author(s) confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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