

CASE REPORT

Leriche-Like Syndrome as a Delayed Complication Following Posterior Instrumentation of a Traumatic L1 Fracture

A Case Report and Literature Review

Martina Blocher, MD, Michael Mayer, MD, Herbert Resch, MD, and Reinhold Ortmaier, MD

Study Design. Case report and review of literature.

Objective. Case report of an acute Leriche-like syndrome as an unusual complication after posterior transpedicular instrumentation of an L1 fracture.

Summary of Background Data. Injuries to the aorta after pedicle screw placement are rare. Reports exist about acute hemorrhage, erosions, and pseudoaneurysm formation.

Methods. A 47-year-old female developed an acute occlusion of the infrarenal aorta after posterior transpedicular instrumentation of an L1 burst-fracture. The patient presented with increasing sensation of hypothermia in both lower extremities and cyanosis of the toes, as well as claudication-like symptoms 15 days after the initial surgery. CT angiography showed bicortical placement of the left pedicle screw at L2 with perforation of the anterior cortex of 2.5 mm and complete obliteration of the infrarenal aorta up to the bifurcation.

Results. The patient was treated with resection of the aorta and implantation of a silver graft prosthesis. Preoperative symptoms resolved immediately after surgery without reoccurrence.

Conclusion. Although rare, the risk of iatrogenic injuries to the aorta during spine surgery exists, several complications have previously been described. However, this is the first report of an acute Leriche-like syndrome after posterior instrumentation of the spine. Whereas bicortical pedicle screw placement in selected cases of posterior spinal instrumentation is intended, one has to be aware of the possible risks, as in our case where an acute aortic obliteration was observed. Preoperative CT-based

planning of surgery and profound knowledge of the neurovascular anatomy is mandatory.

Key words: iatrogenic aortic injury, interposition grafting, Leriche syndrome, pedicle screw fixation, posterior instrumentation.

Level of Evidence: 5

Spine 2015;40:E1195–E1197

Iatrogenic injury of the aorta is a rare but serious complication of spinal posterior pedicle-screw fixation (PSF).¹ Reports range from perforation causing rapid bleeding, hematoma and hemodynamic instability to delayed complications, such as formation of a pseudoaneurysm or aortic erosion.¹ Here, we describe the case of a patient who developed a Leriche-like syndrome with complete thrombus-associated occlusion of the infrarenal aorta after PSF at the thoracolumbar junction, representing the first report on this entity in the literature.

CASE REPORT

A 46-year-old female patient presented to the hospital 15 days after PSF T12-L2 performed externally after experiencing an L1 burst fracture (AO A3.1). She reported about increasing cold sensations in both lower extremities, cyanosis of the toes and increasing pain while walking. Symptoms first occurred during mobilization immediately after PSF and were getting progressively worse. The patient was in good health but showed elevated blood pressure (150/95 mmHg), a heart rate of 80 beats/min and a respiratory rate of 22 breaths/min, whereas laboratory tests were inconspicuous. She had no individual risk factors and negative family history for cardiovascular diseases and no further relevant comorbidities. Clinically femoral and distal arterial pulses were not palpable bilaterally. Oscillography showed clear decrease of amplitude in both lower legs. The ankle-brachial index at rest was 0.42 on the right side and 0.47 left. CT-angiography showed complete chronic occlusion of the infrarenal abdominal aorta down to the bifurcation (Figure 1). CT scan showed bicortical placement of the left

Müllner Hauptstrasse 48, Salzburg, Austria.

Acknowledgment date: March 26, 2015. First revision date: June 24, 2015. Acceptance date: July 10, 2015.

The manuscript submitted does not contain information about medical device(s)/drug(s).

No funds were received in support of this work.

No relevant financial activities outside the submitted work.

Address correspondence and reprint requests to Martina Blocher, MD, Müllner Hauptstrasse 48, A-5020 Salzburg, Austria; E-mail: m.blocher@salk.at

DOI: 10.1097/BRS.0000000000001057

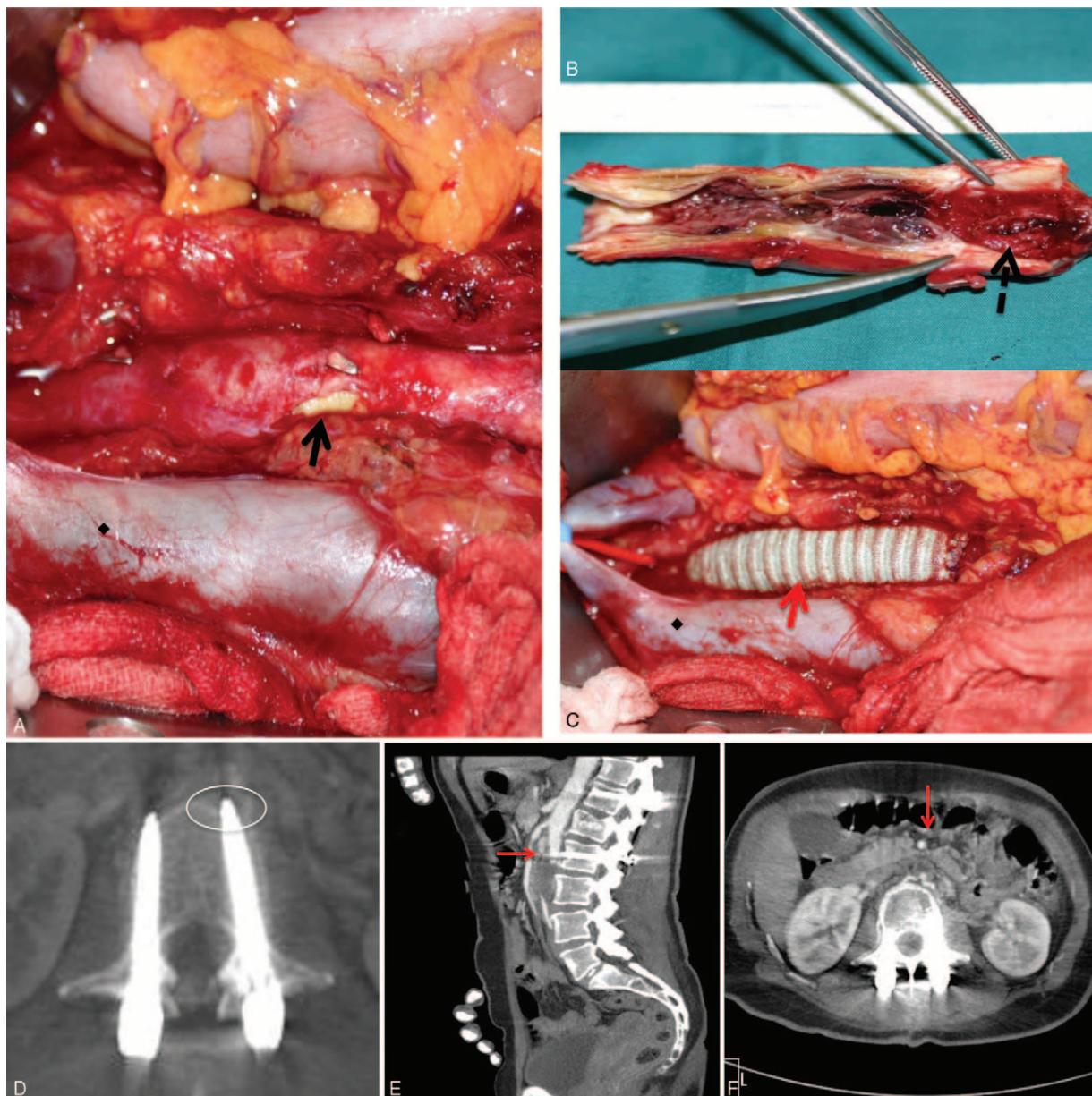


Figure 1. (A) Intraoperative situs of the abdominal aorta. Black arrow indicates location of the thrombus. (◆) Indicates the vena cava. (B) Shows the opened resected aorta. Dotted arrow indicates the thrombus. (C) Red arrow indicates the implanted graft. (◆) Indicates vena cava. (D) Postoperative radiographs after bisegmental posterior instrumentation T12–L2 for an unstable L1 burst fracture (AO 3.1) with obvious pedicle screw malpositioning in CT-scan. (E,F) CT-angiography shows complete obliteration of the abdominal aorta indicated with red arrow without contrast enhancement of the abdominal aorta below the renal artery.

pedicle screw at L2 protruding the anterior wall for 2.5 mm (Figure 1D–F). The patient underwent an open, infrarenal aortic replacement (Silver graft prosthesis/Braun, Melsungen, Germany) after resection of the chronically occluded aorta caused by pedicle screw induced irritation of the aortic wall (Figure 1A–C). Intra-abdominally there were no further specific findings such as a retroperitoneal hematoma. The screw-tip L2 left were palpable, covered by the anterior longitudinal ligament. There was no macroscopic sign of aortic wall damage but external compression of the aorta. As it did not interfere with the implanted aortic prosthesis, the bicortical pedicle screw was left in place to maintain primary

stability. Histological findings showed a red clot with a regular texture of the aortic wall but partial intima fibrosis with a blood cell conglomeration crossed by fibrin precipitates. The postoperative course remained without adverse events and symptoms immediately regressed completely. At the 5-year follow-up, the patient remained asymptomatic.

DISCUSSION

Injuries of the thoracic and abdominal aorta after spine surgery are rare but may result in severe complications.^{1–3} Reports are scarce and describe acute and chronic vascular injuries such as perforations leading to major bleeding or

hematoma formation, erosions or pseudoaneurysmatic formation.^{1–3} However, most injuries are delayed due to chronic irritation of the aortic wall.¹ Interference of pedicle screws with the aorta does not imperatively lead to acute complications but might cause erosions and pseudoaneurysm formation due to mechanical irritation of the pulsating aorta. Therefore, the clinical presentation ranges from acute bleeding with hemodynamic instability to asymptomatic perforation.¹ Although rare, aortic injuries may also occur directly related to trauma with extensive distraction forces, usually combined with spinal fractures.¹⁴ This was precluded in this case by the specific patients history and manifestation of symptoms as also by the micro- and macroscopic intraoperative findings. However, traumatic aortic injuries have to be ruled out as a differential diagnosis in cases with an adequate trauma. Treatment strategies depend on the type of injury and range from open procedures such as primary closure, patch interposition, graft interposition, or stenting to endovascular repair.^{12–14} Despite the biomechanically advantages, bicortical screw placement at the thoracic and lumbar spine is usually avoided as they impose a risk to vascular structures.^{5–8}

The Leriche syndrome was first described by Leriche in 1948⁹ and refers to a thrombotic obliteration of the aortic bifurcation. The cause is emboli in 70% of which 80% originate from the left heart and lead in up to 8% to obliteration of the aortic bifurcation.¹⁰ Moreover, Leriche syndrome has been described in patients undergoing coronary artery bypass surgery (CABP) and percutaneous coronary intervention.^{10,11} Cumulative appearance has been described for patients who underwent surgeries requiring heart-lung machines.^{10,12} Risk factors are severe aortoiliac atherosclerosis, diabetes mellitus, smoking, hypertension and hyperlipidemia with predominance in males.^{9,13}

Typically, the Leriche syndrome is a disease with a long course, presenting for a long period of time. Symptoms in male patients are described as a triad: claudication of the buttocks and thighs, absent or decreased femoral pulses and impotence.⁹ The diagnosis of Leriche syndrome is based on clinical examination and CT-angiography.

CONCLUSION

This case is the first to illustrate a Leriche-like syndrome after PSF. In patients with neurological symptoms and reduced or absent pulses or pain after spine surgery, aortic injuries such as the Leriche syndrome must be considered if other causes are ruled out. Clinical and radiological diagnostics confirm the diagnosis, implying an

interdisciplinary approach for the further treatment. In our case, open vascular surgery with removal of the thrombus and interposition of an aortic prosthesis was indicated and led to full recovery.

➤ Key Points

- Leriche syndrome after posterior instrumentation and bicortical pedicle screw fixation is a rare but serious complication.
- Leriche syndrome after pedicle screw fixation can be caused by pedicle screw malpositioning.
- Leriche syndrome can be treated with interposition grafting.

References

1. Kakkos SK, Shepard AD. Delayed presentation of aortic injury by pedicle screws: report of two cases and review of the literature. *J Vasc Surgery* 2008;47:1074–82.
2. Baker JK, Reardon PR, Reardon MJ, et al. Vascular injury in anterior lumbar surgery. *Spine* 1993;18:2227–30.
3. Brau SA, Delamarter RB, Schiffman ML, et al. Vascular injury during anterior lumbar surgery. *Spine* 2004;4:409–12.
4. Liljenqvist UR, Halm HF, Link TM. Pedicle screw instrumentation of the thoracic spine in idiopathic scoliosis. *Spine* 1997;22:2239–45.
5. White KK, Oka R, Mahar AT, et al. Pullout strength of thoracic pedicle screw instrumentation: comparison of the transpedicular and extrapedicular techniques. *Spine* 2006;31:E355–8.
6. Lehman RA, Polly DW, Kuklo TR, et al. Straight-forward versus anatomic trajectory technique of thoracic pedicle screw fixation: a biomechanical analysis. *Spine* 2003;28:2058–65.
7. Zindrick MR, Wiltse LL, Widell EH, et al. A biomechanical study of intrapedicular screw fixation in the lumbosacral spine. *Clin Orthop Relat Res* 1986;203:99–112.
8. Cardoso MJ, Helgeson MD, Paik H, et al. Structures at risk from pedicle screws in the proximal thoracic spine: computed tomography evaluation. *Spine* 2010;10 (10):905–9.
9. Leriche R, Morel A. The syndrome of thrombotic obliteration of the aortic bifurcation. *Ann Surg* 1948;127:193–206.
10. Kappert A. Pathogenesis and clinical aspects of the acute occlusion syndrome. *Verh Dtsch Ges Inn Med* 1972;78:544–50.
11. Busch T, Lotfi S, Sirbu H, et al. Intraoperative acute occlusion of aortic bifurcation during extracorporeal circulation. *Ann Thorac Cardiovasc Surg* 2000;6:51–3.
12. Wiesenack C, Kerschbaum G, Keyser A, et al. Acute Leriche's syndrome in a patient undergoing coronary artery bypass grafting with extracorporeal circulation. *Anaesthetist* 2001;50:32–6.
13. Venugopal V, Ramachandran M. Do not blame the arterial catheter: a case report of intraoperative acute Leriche syndrome. *J Cardiothorac Vasc Anesth* 2012;26:462–4.
14. Inaba K, Kirkpatrick AW, Finkelstein J, et al. Blunt abdominal aortic trauma in association with thoracolumbar spine fractures. *Injury* 2001;32:201–7.