Minimally Invasive Therapy. 2013;22:56–60

informa
healthcare

CASE REPORT

Endovascular treatment of iatrogenic aortic injury after spinal surgery

MARTIN RABELLINO[1], RICARDO GARCIA-MONACO[1], VICENTE CESAREO[2], ROMAN ROSTAGNO[1], CARLOS SOLA[3]

[1]*Department of Angiography and Endovascular Therapy, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina,* [2]*Department of Cardiovascular Surgery, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina, and* [3]*Department of Orthopedic Surgery, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina*

Abstract

A 59-year-old female presented to our institution with paraparesis caused by medullar compression secondary to multiple myeloma. Spinal cord decompression and transpedicular spine fixation were performed. A month later, the patient complained of sudden pain in her middle back. A CT scan revealed screw impingement on the aortic wall at T8 level. A thoracic stent-graft was deployed before removing the fixation. The patient had an uneventful postoperative course, without complications during the four-year follow-up. In this case report, stent-graft placement proved to be safe and effective in avoiding bleeding during screw removal.

Key words: *Spine, transpedicular fixation, aortic injuries, stent-graft, complication*

Introduction

An aortic injury is a recognized but uncommon complication of spinal surgery. However, it may be associated with high morbidity and mortality (1–3). Endovascular repair of vascular injuries using stent-graft is the standard of care in different pathological entities in the thoracic aorta (4–6).

In this report we describe the endovascular treatment of an iatrogenic aortic injury after transpedicular screw fixation in the thoracic spine. This procedure was carried out to prevent a potentially life-threatening hemorrhage during the removal of the screw causing the aortic injury.

Case report

A 59-year-old woman with previous diagnosis of multiple myeloma affecting the thoracic spine was referred with sudden paraparesis. The patient underwent complete diagnostic workup including X-ray, computed tomography (CT) and magnetic resonance imaging (MRI) of the thoracic and lumbar spine. Images showed a T7 osteolitic lesion and spinal cord compression at the same level (Figure 1). Therefore, early decompression surgery with posterior spinal fusion was scheduled.

Under general anesthesia, posterior lateral spine decompression with complete removal of T7 posterior arch by posterior approach was performed. Fluoroscopic guidance was previously used to localize the involved vertebra. Hybrid instrumentation from T2 to T10 was performed by pedicle screws T5, T8, T9, T10 and double proximal claws at T2-T3. Double rod 5.5 mm in diameter and two cross connectors were placed. Paraparesis resolved after surgery, the postoperative course was uneventful and the patient was discharged.

One month after surgery the patient felt a sudden pain in her middle back. No neurological changes were observed at physical examination. Spine CT revealed a misplaced pedicle screw at T8 impinging on the descending thoracic aortic wall (Figure 2). These findings led to the removal of the screw, which was replaced

Correspondence: R. Garcia-Monaco, Department of Angiography and Endovascular Therapy,Hospital Italiano de Buenos Aires, University of Buenos Aires, J. D. Perón 4190, Ciudad de Buenos Aires (C1181ACH), Argentina. Fax: +54-11-4959-0471. E-mail: ricardo.garciamonaco@hospitalitaliano.org.ar

ISSN 1364-5706 print/ISSN 1365-2931 online
DOI: 10.3109/13645706.2012.692332

Figure 1. Sagittal T2 MRI of the dorsal spine shows myeloma with intradural extension.

with a new one properly positioned. To prevent a hemorrhagic complication during screw removal, previous placement of an endovascular stent-graft was considered.

An angiography performed at the operating room confirmed the CT findings (Figure 3A). Under direct fluoroscopic guidance, a single Talent thoracic endovascular graft (Talent Medtronic, Minneapolis, MN, USA) 32 mm in diameter and 45 mm in length was introduced through the right common femoral artery into the descending thoracic aorta in the region of the aortic screw impinging. Control angiography showed correct stent-graft placement without related complications (Figure 3B). The patient was changed to ventral position, and the misplaced screw was replaced by a new one. No bleeding was observed during surgery. The postoperative course was uneventful, and the patient was discharged within 24 hours without symptoms. One week after the intervention we started antiplatelet therapy with aspirin 100 mg daily. At four-year follow-up the patient continued asymptomatic, and CT showed stent-graft patency without aortic wall lesions (Figure 4A–D).

Discussion

Aortic injuries secondary to pedicle screw fixation, though uncommon at the level of the thoracic spine, may be life-threatening (1–3). Pedicle screw fixation is considered biomechanically superior to other spine stabilization devices, and is considered a standard procedure in thoraco-lumbar spine surgery (1).

Thoracic vertebral screws can be safely placed using anatomic landmarks to achieve appropriate positioning (7). However, image-assisted techniques have been suggested to ensure appropriate deployment of

Figure 2. Axial CT of the dorsal spine shows transpedicular fixation and impingement on the dorsal aortic wall.

the screws (8). In spite of these precautions, screw malpositioning has been reported in up to 20% of the cases (9).

Animal models have shown that major impingement by a fixation screw can lead to aortic wall thinning and the potential for vessel wall erosion (10). Although aortic injuries typically occur during surgery or in the immediate postoperative period, symptoms may occasionally present later, even years after surgery (11–13).

In this case report, both acute pain and CT findings showing a misplaced screw impinging the aortic wall determined the need for screw replacement, given the risk of aortic rupture or pseudoaneurysm formation. To prevent a hemorrhagic complication during screw removal, a stent-graft was previously placed, as suggested by some authors (14,15).

From multiple therapeutic options, we chose the placement of an aortic extender, since this is the shortest device, to avoid neurological complications. This could be achieved because it was a small single lesion.

Almost 20 years ago, an endovascular device was first used for the treatment of abdominal aortic

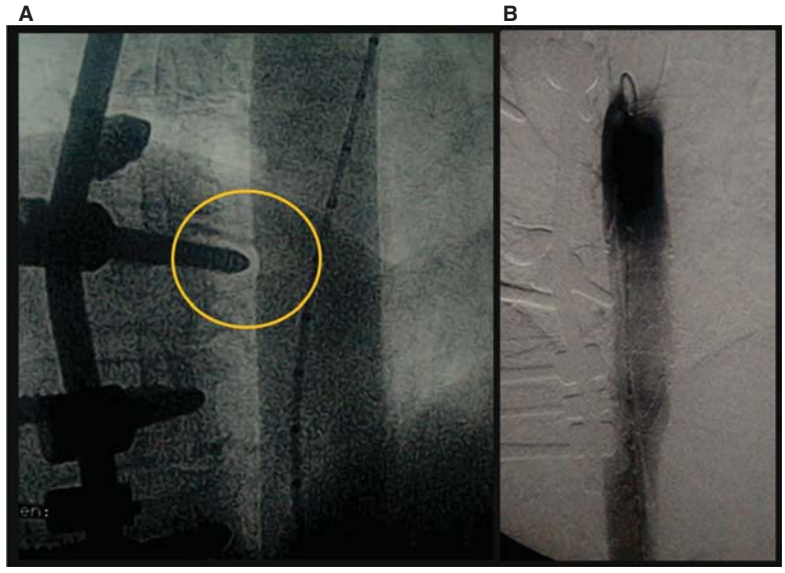

Figure 3. (A) Angiography shows impingement of the screw tip on the aortic wall (circle). (B) Angiography performed after the endovascular procedure.

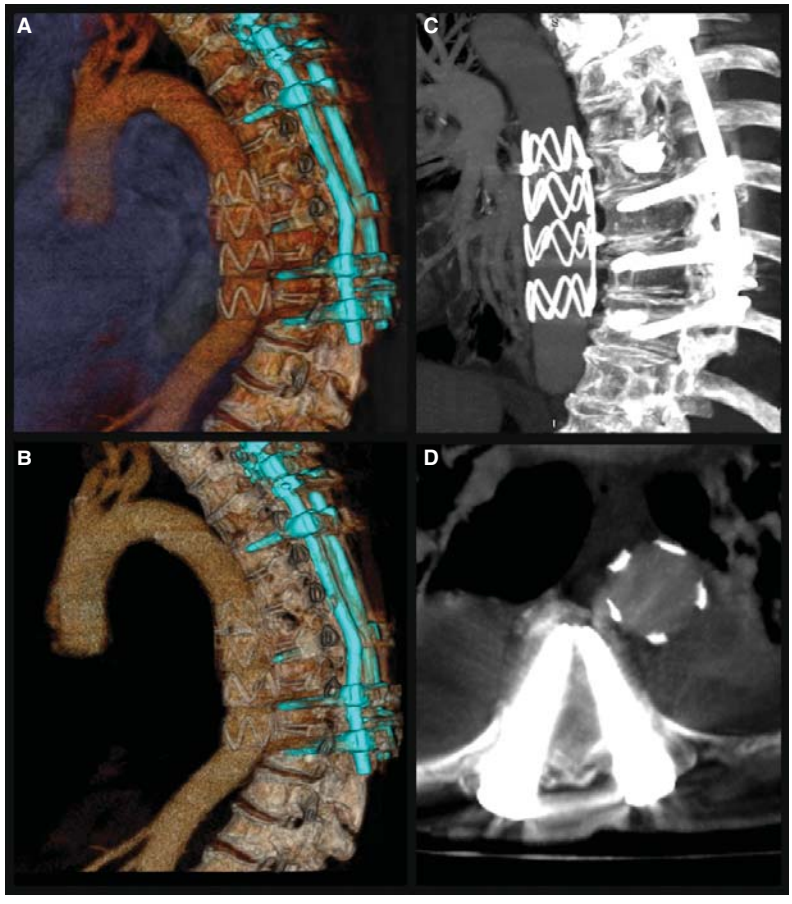

Figure 4. (A-B) Angiography computed tomography three-dimensional reconstructions showing patency of the stent-graft and the thoracic aorta. (C-B) CT Multiplanar reconstruction in lateral (C) and axial (B) view showing the relationship of the aorta and stent-graft with osteosynthesis screws and indemnity aortic wall without associated injuries.

aneurysm (6). Considerable experience has been gained since then, and endovascular approaches to the aorta have become a standard of care in aortic diseases. The major advantages of this technique over open surgery include minimal invasiveness, shorter operative times, early recovery and lower morbidity and mortality rates (16–19).

In the thoracic aorta the endovascular technique has been used to rule out a large number of conditions, such as aneurysms, dissections and traumatic ruptures (5). Reports on endovascular repair of aortic injury after spinal surgery are scarce, but have shown to be safe and effective in selected patients (12–15).

In this case, the indication for treatment was to reduce the risk of bleeding at the time of screw removal. Endovascular treatment and replacement of the screw were performed at the same time, thus reducing morbidity and mortality associated with open aortic surgery. The patient had a favorable outcome, with no evidence of complications at four-year follow-up.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

1. Faciszewski T, Winter R, Lonstein J, Denis F, Johnson L. The surgical and medical perioperative complication of anterior spinal fusion surgery in the thoracic and lumbar spine in adults: a review of 1223 procedures. Spine. 1995;20:1592–9.
2. Inamasu J, Guiot BH. Vascular injury and complication in neurosurgical spine surgery. Acta Neurochir (Wien). 2006; 148:375–87.
3. Kuklo TR, Lehman RA Jr, Lenke LG. Structures at risk following anterior instrumented spinal fusion for thoracic adolescent idiopathic scoliosis. J Spinal Disord Tech. 2005; 18(Suppl):58–64.
4. Pratesi C, Dorigo W, Troisi N, Pratesi G, Santoro G, Stefano P, et al. Acute traumatic rupture of the descending thoracic aorta: endovascular treatment. Am J Surg. 2006;192: 291–5.
5. Amabile P, Rollet G, Vidal V, Collart F, Bartoli JM, Piquet P. Emergency treatment of acute rupture of the descending thoracic aorta using endovascular stent-grafts. Ann Vasc Surg. 2006;20:723–30.
6. Parodi JC, Palmaz JC, Barone HD. Transfemoral intraluminal graft implantation for abdominal aortic aneurysms. Ann Vasc Surg. 1991;5:491–9.
7. Amoit LP, Lang K, Putzier M, Zippel H, Labelle H. Comparative results between conventional and computer-assisted pedicle screw installation in the thoracic, lumbar and sacral spine. Spine. 2000;25:604–14.
8. Kim YJ, Lenke LG, Bridwell KH, Cho YS, Riew KD. Free Hand Pedicle Screw Placement in Thoracic Spine: Is it Safe? Spine. 2004;29:333–42.
9. Riesenman PJ, Farber MA, Rich PB, Sheridan BC, Mendes RR, Marston WA, et al. Outcomes of surgical and endovascular treatment of acute traumatic thoracic aortic injury. J Vasc Surg. 2007;46:934–40.
10. Ohnishi T, Neo M, Matsushita M, Komeda M, Koyama T, Nakamura T. Delayed aortic rupture caused by an implanted anterior spinal device. Case report. J Neurosurg. 2001;95: 253–6.
11. Laine T, Lund T, Ylikoski M, Lohikoski J, Schlenzka D. Accuracy of pedicle screw insertion with and without computer assistance: a randomised controlled clinical study in 100 consecutive patients. Eur Spine J. 2000;9:235–40.
12. Faro FD, Farnsworth CL, Shapiro GS, Mohamad F, White KK, Breisch E, et al. Thoracic vertebral screw impingement on the aorta in an in vivo bovine model. Spine. 2005;30: 2406–13.
13. Minor ME, Morrissey NJ, Peress R, Carroccio A, Ellozy S, Agarwal G, et al. Endovascular treatment of an iatrogenic thoracic aortic injury after spinal instrumentation: case report. J Vasc Surg. 2004;39:893–6.
14. Matsuzaki H, Tokuhashi Y, Wakabayashi K, Kitamura S. Penetration of a screw into the thoracic aorta in anterior spinal instrumentation. A case report. Spine. 1993;18: 2327–34.
15. Stone DH, Brewster DC, Kwolek CJ, Lamuraglia GM, Conrad MF, Chung TK, et al. Stent-graft versus open-surgical repair of the thoracic aorta: mid-term results. J Vasc Surg. 2006;44:1188–97.
16. Vanichkachorn JS, Vaccaro AR, Cohen MJ, Cotler JM. Potential large vessel injury during thoracolumbar pedicle screw removal. A case report. Spine. 1997;22:110–13.
17. Kakkos SK, Shepard AD. Delayed presentation of aortic injury by pedicle screws: report of two cases and review of the literature. J Vasc Surg. 2008;47:1074–82.
18. El Sakka K, Halawa M, Kotze C, Francis I, Doyle T, Yusuf W. Complications of open abdominal aortic surgery: the endovascular solution. Interact Cardiovasc Thorac Surg. 2008;7:121–4.
19. Rousseau H, Dambrin C, Marcheix B, Richeux L, Mazerolles M, Cron C, et al. Acute traumatic aortic rupture: a comparison of surgical and stent-graft repair. J Thorac Cardiovasc Surg. 2005;129:1050–5.