The unusual presentation of a vascular injury after lumbar microdiscectomy: case report

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Vascular injury during lumbar spine surgery is a relatively rare complication but can have devastating outcomes. The injury may not be apparent during surgery and can present acutely or late in various manners, and some injuries can be asymptomatic. This report discusses the unusual case of a 35-year-old woman who underwent a right L4–5 microdiscectomy for disc herniation and 4 days postoperatively presented with a pulmonary embolus. A subsequent CT scan revealed a pseudoaneurysm and arteriovenous fistula of the right common iliac vein and artery, which gave rise to the embolus. The patient received a right iliac artery stent, and at 4 months after surgery she continues to be symptom free. This report describes the atypical presentation of vascular injury after lumbar microdiscectomy and stresses the importance of cautiously using the pituitary rongeur when removing deeper disc fragments.

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KEY WORDS lumbar microdiscectomy; arteriovenous fistula; vascular injury; lumbar disc herniation; pulmonary embolus; technique

THE posterior approach to the lumbar spine is the most commonly used approach for treating lumbar spine pathology. Depending on the pathology, the incidence of complications following lumbar spine surgery is between 2% and 30%,^{1,9,23} and vascular injuries represent an infrequent number of complications. Although vascular injuries occur at a low frequency during lumbar spine surgery, they are among the most feared complications due to their potentially life-threatening consequences.^{4,6–8,10,13,14,19,21,24,27}

Vascular injuries during lumbar spine surgery may involve injury to the arterial blood supply, venous blood supply, or both. Acute lacerations to the arterial blood supply can present in various ways, from massive hemorrhage to small changes in blood pressure, heart rate, and end-tidal CO₂. Many arterial injuries are identified intraoperatively or shortly thereafter.^{2,3,7,8,10–13,18,19,21,24,26,27,30,33} Venous injuries do not always manifest as acutely and can be missed for years postoperatively.^{2,4,5,9,13,15,17,31} Late presentations range from asymptomatic to high-output cardiac failure that causes death from an undiagnosed arteriovenous fistula (AVF). In this report, we present the case of a patient with AVF and pseudoaneurysm formation after lumbar micro-

discectomy. Although these are usually diagnosed late, our patient presented acutely with a pulmonary embolism due to a thrombus that formed at the vascular injury site.

Case Report

This 35-year-old woman had a body mass index of 28.3 kg/m² and no medical history. She experienced intractable right leg pain and weakness that lasted for several months. MRI revealed a right-sided L4–5 disc herniation with nerve root compression (Fig. 1). The anterior longitudinal ligament was noted to be intact on the MR image (Fig. 1), and she did not have any evidence of instability at L4–5. After nonsurgical treatment failed, the patient elected to undergo right L4–5 microdiscectomy in the prone position. During the procedure, hemilaminotomy with removal of the medial portion of the facet was performed to visualize the intervertebral disc. The epidural veins were coagulated with bipolar cautery. The L-5 nerve root was exposed and retracted medially, and a 1 × 3.5-cm annular fragment was removed using a pituitary rongeur. The pituitary rongeur was again inserted deeper to grab any loose intradiscal fragments. The disc was irrigated with

ABBREVIATIONS AVF = arteriovenous fistula.

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FIG. 1. Preoperative sagittal (left) and axial (right) T2-weighted MR images showing a right-sided L4–5 disc herniation.

an angiocatheter to remove any loose leftover fragments. Adequate hemostasis was noted after Gelfoam sponges (Pfizer) were applied. During the entire procedure, no excess bleeding was noted. The wound was closed in a standard fashion. The estimated blood loss was less than 30 ml, and the operative time was 51 minutes. The patient was admitted overnight. On postoperative Day 1, her preoperative right leg pain had significantly improved and she was discharged home.

The patient returned to the emergency department on postoperative Day 4 and complained of shortness of breath. The patient's preoperative right leg pain had nearly resolved, and her right ankle dorsiflexion strength was improving. On presentation, she was tachycardic at 130 bpm with normal oxygen saturation. She underwent CT angiography, which revealed a pulmonary embolism in the left lower lobe, pulmonary edema, and pleural effusion. The bilateral lower-extremity Doppler ultrasound examination was negative for deep venous thrombosis. She was admitted to the hospital and was placed on therapeutic enoxaparin with a bridge to warfarin to treat the pulmonary embolism.

During admission, she complained of worsening abdominal pain and increasing lower-extremity swelling. An abdominopelvic CT scan was obtained, which revealed a right common iliac artery and vein AVF with pseudoaneurysm and thrombus formation (Fig. 2). After consulting with the vascular surgery service, she underwent placement of a right common iliac artery stent on hospital Day 3 by interventional radiology. Following stent placement, she was monitored in the intensive care unit and received a heparin drip for 24 hours. After transfer from the intensive care unit, she was restarted on a regimen of enoxaparin and warfarin therapy. Repeat CT angiography showed appropriate stent placement with resolution of the AVF and pseudoaneurysm (Fig. 3). The patient was discharged home on enoxaparin while transitioning to warfarin for pulmonary embolism treatment. At her last follow-up at 4 months after surgery, she was symptom free without any lumbar reherniation or stent graft occlusion.

FIG. 2. Sagittal (left) and axial (localized to the L5–S1 disc) (right) postcontrast abdominopelvic CT showing the AVF and pseudoaneurysm of the right common iliac artery and vein, just inferior to the aortic bifurcation.

Discussion

The posterior approach is commonly used for lumbar spinal surgery and demonstrates a low complication rate between 2% and 20%.^{1,9,23} Although vascular injuries account for less than 1% of complications during these surgeries,^{4,5,15,16,29} they are one of the most feared complications and can have devastating consequences, including mortality.^{6–8,10,13,19}

In 1945, Linton and White reported the first case of a vascular injury after lumbar discectomy resulting in AVF formation.²² Since then, many more cases of vascular injury during lumbar spinal surgery have been documented. The most common injury is a vascular tear,³ and its presentation varies from heavy bleeding to signs of shock including tachycardia and hypotension in the early postoperative period.^{4–7,9–13,15,18,19,28} Other vascular injuries, such as AVFs and pseudoaneurysms, are commonly diagnosed

FIG. 3. Axial CT angiogram with reconstruction (left) and 3D reconstruction of the CT angiogram (right) after right common iliac artery stent placement, showing resolution of the AVF and pseudoaneurysm. Figure is available in color online only.

in the late postoperative period.² AVF is the second most common type of vascular injury after lumbar spine surgery³ and can have various presentations. While an AVF may be diagnosed in the early postoperative period, many are diagnosed late, sometimes up to a decade after surgery,³ with many different signs and symptoms leading to the diagnosis. The early diagnosis of an AVF is often due to high-output cardiac failure.^{11,18,26} Late diagnoses vary in presentation from leg edema, back pain, abdominal bruits, and pulsating masses to high-output cardiac failure.^{4,5,9,10,13–17,25,26} While these symptoms may help lead to a diagnosis, up to 50% of patients with an AVF may be completely asymptomatic.¹⁹ A vascular injury presenting as a pulmonary embolism is also an infrequently reported complication after lumbar surgery^{4,13} and may manifest up to a year after surgery.⁴

While there are reports of massive hemorrhage into the operative field during surgery, vascular injuries are not always apparent during surgery.^{5,6,9,10,13} Vascular injuries to most of the blood vessels in the abdomen and pelvis have been documented³² and linked to aggressive use of the pituitary rongeur.^{12,20} As the rongeur tip passes the anterior longitudinal ligament and enters the abdominal space, it has the potential to injure the vessels within its vicinity. In our patient, the perforation of the anterior annulus was not felt during surgery. On further reflection, the performing surgeon thought that the pituitary rongeur was inserted deeper than usual. In the future, anterior annulus violation can be prevented by carefully noting any change in resistance when using the pituitary rongeur and how deep it is inserted. During this case, we were meticulous in maintaining hemostasis, but it is still possible that we may have missed light bleeding from the disc space. This case report stresses the importance of checking for any excess bleeding at the end of a microdiscectomy.

Conclusions

In this case report, we present the diagnosis and management of acute pulmonary embolism due to an undocumented vascular injury during lumbar microdiscectomy. Vascular injury during lumbar spine surgery is a relatively rare complication, but one that can have devastating outcomes. Although a vascular injury during lumbar spine surgery can present acutely as hemorrhage and shock, this case describes AVF and pseudoaneurysm formation—which is commonly diagnosed years after the injury—that acutely presented as a pulmonary embolism. This case outlines the importance of a multidisciplinary approach when dealing with an uncommon presentation and cautiously using the pituitary rongeur when removing deeper disc fragments.

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Disclosures

Dr. O'Brien owns stock in Spinicity; works as a consultant for Globus, Stryker, and Relivant; and received clinical or research support for this study from Globus.

Author Contributions

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