



Pseudoaneurysm of a segmental lumbar artery following a full-endoscopic transforaminal lumbar discectomy: a rare approach-related complication

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Abstract

Full-endoscopic transforaminal lumbar discectomy is based on a puncture technique using a guide needle to reach the target area of the foramen via a percutaneous posterolateral/lateral approach. It may correlate with specific approach-related complications, as exiting nerve root injury. We report the first case of pseudoaneurysm of the lumbar segmental artery secondary to a transforaminal full-endoscopic surgery in the treatment of a lumbar herniated disc. A 39-year-old man underwent left L4-L5 full-endoscopic transforaminal lumbar discectomy for a herniated disc. Three hours after surgery, he experienced acute progressive abdominal pain. An abdomen CT scan showed contrast extravasation in the left paraspinal compartment at L4 vertebral body level. The selective left lumbar angiogram revealed a pseudoaneurysm of a side branch of the left lumbar segmental artery, which was treated by endovascular coiling. The patient made a rapid postoperative recovery without further complications and was discharged 4 days later. This report identifies a rare complication of transforaminal full-endoscopic surgery in the treatment of a herniated lumbar disc. To our knowledge this is the first case of pseudoaneurysm formation of the lumbar artery following a full-endoscopic transforaminal lumbar discectomy.

Keywords Full-endoscopic lumbar discectomy · Percutaneous · Transforaminal approach · Vascular injury · Lumbar pseudoaneurysm

Introduction

In recent years, the full-endoscopic transforaminal lumbar discectomy (FETD) has been considered as a safe and effective alternative to standard microsurgical procedures for the treatment of lumbar herniated discs and other disorders [3, 11, 14, 20]. FETD differs significantly from traditional microdiscectomy as it is a pure percutaneous posterior-lateral or lateral approach to the foraminal area and it is related

to a steep learning curve [9, 16]. The latter mainly correlates with the blind puncture technique which distinguishes the initial phase of the procedure and thus with the specific approach-related complications including exiting nerve root injury or visceral injury [1, 5, 10–12].

We report the occurrence of a pseudoaneurysm of a segmental lumbar artery secondary to a full-endoscopic transforaminal L4-L5 discectomy procedure, and we discuss the mechanism of such a rare approach-related complication.

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Case report

A 39-year-old man presented with 3-month history of left leg pain, refractory to conservative treatment. Lumbar spine magnetic resonance imaging (MRI) demonstrated a left paramedian extruded herniated disc at L4-L5 level. A left L4-L5 FETD was performed, according to the technique described by Ruetten et al. [15].

The patient was placed in prone position under general anesthesia. The skin incision was placed approximately 10 cm from the midline, on a transverse line bisecting the disc in anterior-posterior fluoroscopic view. A spine needle was inserted posteriorly-laterally and advanced under fluoroscopic guidance until the level of the dorsal annulus, pointing to the left L4-L5 foramen. A guidewire and a cannulated dilator were inserted, entering the foraminal area. Next, a surgical sheath was placed, and through this, the endoscope was inserted and an uneventful full-endoscopic herniectomy was performed under direct visualization.

Immediately after surgery, the patient's radicular symptoms improved, but about 3 h later, he complained of acute progressive left flank abdominal pain. Emergency laboratory examinations and blood pressure were normal, but an abdominal emergency CT scan showed an active circumscribed contrast extravasation in the left paraspinal compartment at L4 vertebral body level (Fig. 1). Thus, an emergency selective left lumbar angiogram was performed revealing a pseudoaneurysm of a side branch of the left lumbar segmental artery (Fig. 2), which was completely embolized by endovascular coiling (Fig. 3). The patient was discharged 4 days later free of complaints.

Discussion

FETD shares several complications with the microdiscectomy procedure, including nerve root injury, incidental durotomy, surgical site infection, cauda equine syndrome, and hematoma [17]. Yet, specific features render FETD a completely different surgical procedure from the standard microdiscectomy. FETD requires a guide needle to reach the target area of the foramen via a percutaneous posterior-lateral or lateral approach [15,

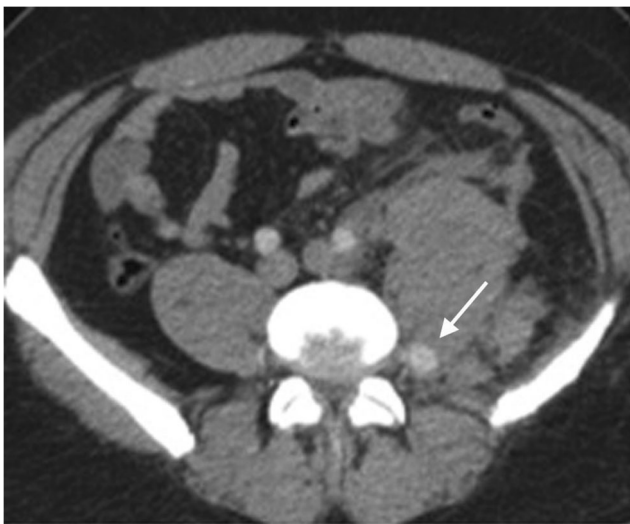


Fig. 1 CT scan showing an active circumscribed contrast extravasation at the left paraspinal compartment at L4 vertebral body level

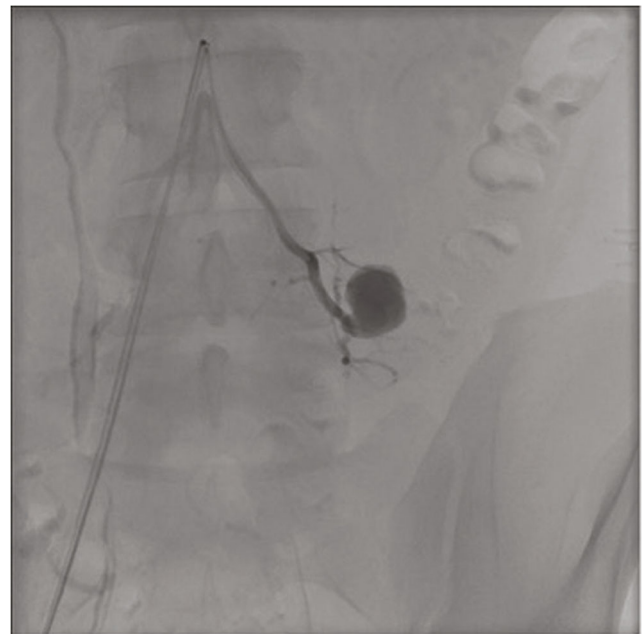


Fig. 2 Selective lumbar artery arteriography disclosing a pseudoaneurysm of the segmental lumbar artery

21]. The blind puncture technique needed in this step remains essential for a straight-through procedure and is carried out on a repeated trial-and-error manner under continuous fluoroscopy [1, 8]. As long as puncture targeting remains inaccurate, additional puncture attempts are necessary, increasing the risk of injuring normal tissues [7]. Specific surgery-related complications may occur, including exiting nerve root injury by puncturing, heat transmission by bipolar or mechanical compression from the cannula or surgical tools, and visceral injury [1, 5, 10, 17].

The occurrence of serious vascular injuries in FETD is very rare [17]. Ahn et al. [2] first reported four cases of retroperitoneal hematoma following FETD in a series of 412 patients. As in our patient, in all cases, an initial symptom was a flank/inguinal pain right after a few hours of pain-free interval following surgery. The mechanism of this complication suggested by the authors focused to the initial blind puncture technique toward the foraminal area and its anatomy. In this anatomical area, the segmental lumbar artery and its branches run toward their corresponding foramen. These vessels may be injured during puncturing if the tip of the needle is placed too anteriorly. Among the four cases of retroperitoneal hematomas, two patients presented a diffuse type of hematoma and required open hematoma evacuation. The remaining two patients presented localized type of retroperitoneal hematomas and were managed conservatively. An additional case of a paravertebral hematoma treated conservatively was reported by Chae et al. [4] in a published series of 153 patients treated with FETD, but no further details were given.

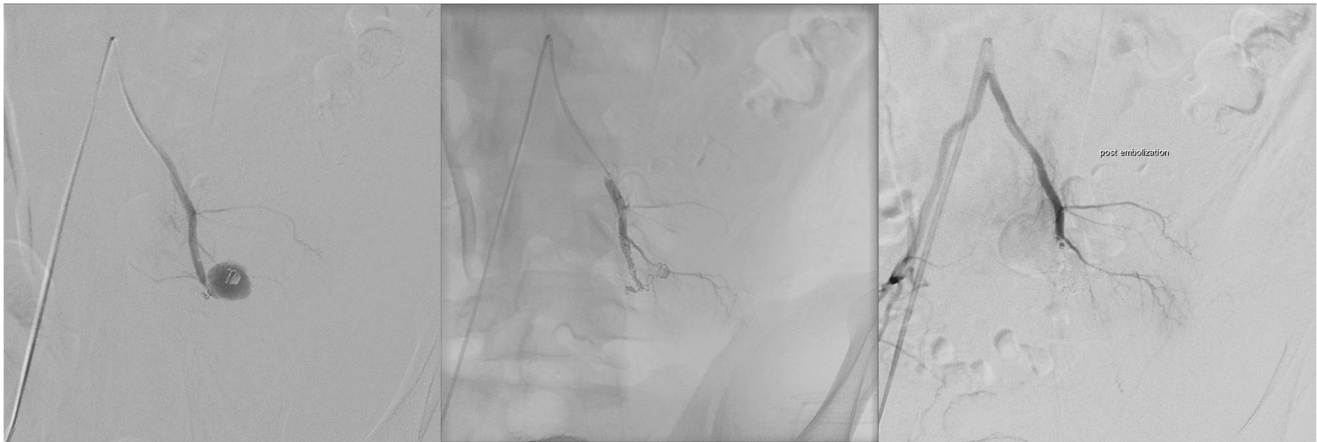


Fig. 3 Angiogram showing coiling of the pseudoaneurysm and its complete occlusion

We report the first case of pseudoaneurysm of the lumbar segmental artery secondary to a transforaminal full-endoscopic surgery in the treatment of a lumbar herniated disc. In our case, the vascular injury, likely originated by a combination of a needle penetration and direct trauma of the vessel toward the lateral wall of the vertebra, resulted in a lumbar arterial branch pseudoaneurysm, which was treated with endovascular coiling [13]. The clinical manifestations of lumbar artery injury may vary considerably, oscillating from asymptomatic to hemorrhagic shock requiring surgical or endovascular repair [2, 6, 15, 18]. Delayed rupture is also reported with initial formation of pseudoaneurysm complicated by secondary bleeding [19]. Endovascular embolization of lumbar artery pseudoaneurysm may be effective in controlling hemorrhage, and it can be performed in an emergency setting if needed [18].

Adequate technical skill acquisition is mandatory to minimize approach-related complications performing full-endoscopic surgery. Live surgery attendance, hands-on cadaver labs, and strict adherence to well-described step-by-step technical tips outline the ways to handle with the demanding learning curve [12, 16].

Conclusion

We present a unique case of pseudoaneurysm of a segmental lumbar artery secondary to a full-endoscopic transforaminal L4-L5 discectomy procedure. FETD has a steep learning curve that requires caution and experience, especially for those unfamiliar with percutaneous techniques. It may be associated with specific complications related to the blind puncture technique with the guide needle, including exiting nerve root injury and visceral and segmental lumbar artery injury. The latter is extremely rare but potentially risky and spinal endoscopic surgeons should be aware of that.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (San Giovanni Addolorata Ethical Committee) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Patient consent The patient has consented to the submission of the case report for submission to the journal.

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Comments

Full-endoscopic procedures are advocated for their minimal invasive nature and most proponents claim complication rates close to zero. While potential advantages like less scaring have not yet been properly evaluated, others have attributed problems like approach-related neuropathic pain to the transforaminal endoscopic route. This interesting case report adds to the discussion of the pros and cons of full-endoscopic disc surgery in comparison with microscopic procedures reminding us of the difference in possible severe complications of lateral endoscopic procedures with blind access to the site of action.

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