



## Endovascular Repair of an Ilio-Iliac Arteriovenous Fistula with Pseudoaneurysm after Lumbar Disc Surgery: A Case Report

Choshin Kim<sup>1</sup>, Deokbi Hwang<sup>2</sup>, and Woo-Sung Yun<sup>2</sup>

<sup>1</sup>Department of Surgery, Yeungnam University Medical Center, Yeungnam University College of Medicine, Daegu, <sup>2</sup>Division of Transplantation and Vascular Surgery, Department of Surgery, Kyungpook National University Hospital, School of Medicine, Kyungpook National University, Daegu, Korea

Aortoiliac vascular injury during lumbar disc surgery is potentially life-threatening, but occasionally presents with delayed-onset symptoms. This is a case report of a fistulized pseudoaneurysm presenting with claudication. A 73-year-old female presented with swelling of the left leg and short-distance claudication. Two months prior, she had undergone discectomy for the management of right foot drop caused by an L4-L5 herniated lumbar disc. The left ankle-brachial index was 0.71. Computed tomography angiography revealed a 31 mm×20 mm pseudoaneurysm of the left common iliac artery fistulized to the left common iliac vein. The patient was successfully treated with stent graft placement.

**Key Words:** Lumbar disc surgery, Vascular injury, Endovascular treatment

Received June 21, 2021  
Revised August 22, 2021  
Accepted August 30, 2021  
Published on September 28, 2021

**Corresponding author:** Woo-Sung Yun  
Division of Transplantation and Vascular Surgery, Department of Surgery, Kyungpook National University Hospital, School of Medicine, Kyungpook National University, 130 Dongdeok-ro, Jung-gu, Daegu 41944, Korea  
Tel: 82-53-420-5605  
Fax: 82-53-421-0510  
E-mail: wsyun@me.com  
<https://orcid.org/0000-0001-8956-8310>

Copyright © 2021 The Korean Society for Vascular Surgery

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article; Vasc Specialist Int 2021. <https://doi.org/10.5758/vsi.210043>

### INTRODUCTION

Vascular injury during lumbar disc surgery is rare, with a reported prevalence of 3.5-17.3 per 10,000 cases [1]. Not all injuries are detected intraoperatively. In a systematic review [2], clinical presentation depended on the type of injury. Lacerations causing hypotension, tachycardia, shock, or abdominal distension, were mostly detected intraoperatively or in the immediate postoperative period. However, arteriovenous fistulas (AVFs) or pseudoaneurysms often remained unrecognized for several weeks or even years. Patients with chronic AVF usually present with symptoms of heart failure with abdominal bruit or leg swelling. Herein, we report the endovascular treatment of a pseudoaneurysm with a fistula between the left common iliac artery (CIA) and vein presenting with unilateral leg swelling and claudication. The

report was approved by the Institutional Review Board of the Yeungnam University Medical Center (IRB no. 2021-06-018).

### CASE

A 73-year-old female presented with swelling of the left leg and short distance claudication. Two months prior, she had undergone discectomy for the management of right foot drop caused by an L4-L5 herniated disc. She had no relevant medical history.

Duplex ultrasonography (DUS) revealed no deep vein thrombosis (DVT) in both lower extremities, but the spectral Doppler waveform of the left common femoral vein showed a pulsatile pattern with a reverse flow component rather than a phasic pattern (Fig. 1). The left ankle-brachial

index (ABI) was 0.71. Computed tomography (CT) revealed a 31 mm×20 mm pseudoaneurysm of the left CIA fistulized to the left common iliac vein (Fig. 2).

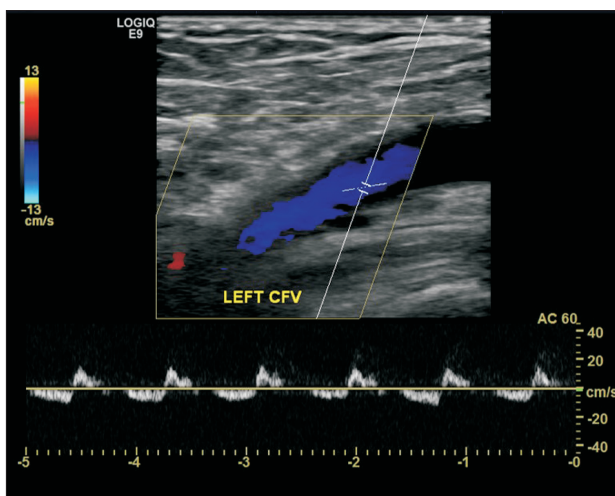
We planned to treat the pseudoaneurysm endovascularly with the placement of a stent graft in the left CIA. The diameter and length of the CIA were 11 mm and 45 mm, respectively. We decided to use a 13 mm×50 mm self-expanding stent graft. Because the length of the CIA proximal to the pseudoaneurysm neck was only 7.6 mm, a bifurcated stent graft was also prepared for proximal extension up to the aorta in case of an endoleak through the proximal attachment site.

After deployment of a 13 mm×50 mm stent graft (Via-bahn; W.L. Gore and Associates, Flagstaff, AZ, USA), the pseudoaneurysm was no longer enhanced on the final angiography (Fig. 3). Postoperatively, the left ABI increased to 1.23, and the swelling of the left leg resolved. Aspirin was administered postoperatively. Follow-up CT after 1 month

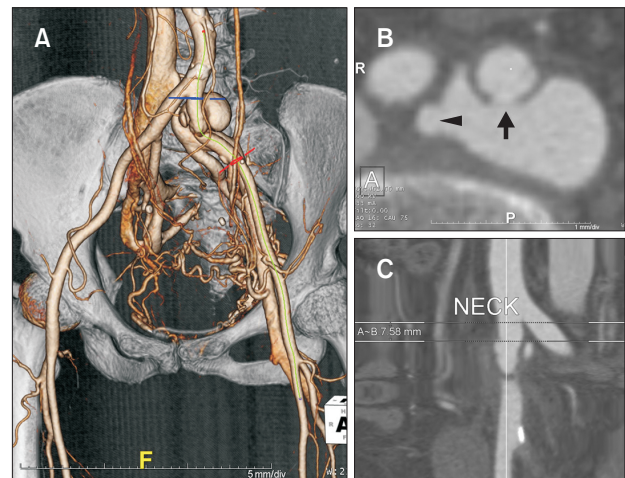
revealed an occluded pseudoaneurysm and fistula (Fig. 4). The patency of the stent graft was maintained during a 45-month follow-up period.

## DISCUSSION

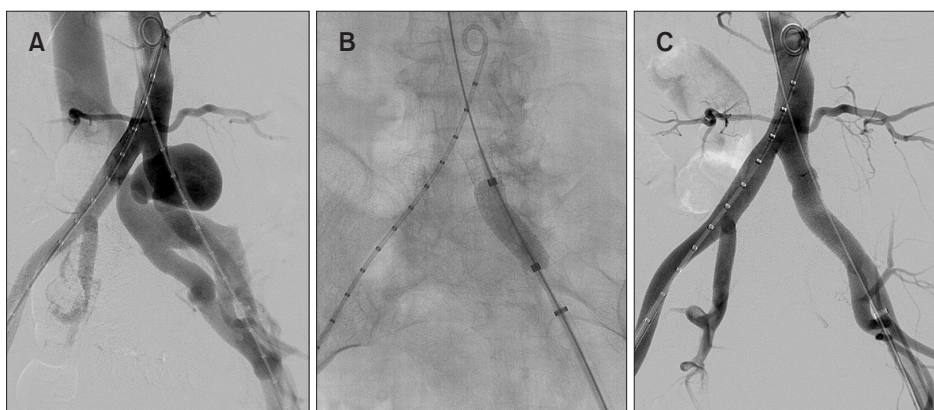
Iatrogenic great vessel laceration during lumbar disc surgery typically causes massive bleeding. It is mostly noticed intraoperatively or within a few hours postoperatively, and its mortality rate is as high as 19% [3]. However, the clinical manifestations of AVFs or pseudoaneurysms vary, including bruit, cardiopulmonary symptoms, leg swelling, abdominal pain, hypotension, disc space hemorrhage, abdominal distension, and varicose veins [2,4,5]. Some patients are asymptomatic, and the diagnosis is incidental [6]. Dyspnea on exertion is the most common symptom in patients with



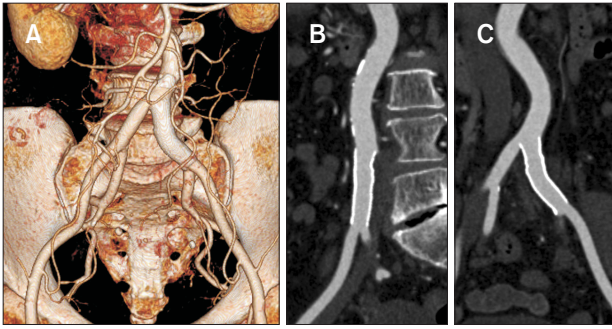
**Fig. 1.** Preprocedural duplex ultrasonography. Spectral waveform of the left common femoral vein shows a pulsatile pattern with reversed flow.



**Fig. 2.** Preprocedural computed tomography. (A) Volume rendering image. (B) The fistulae between the left common iliac artery and pseudoaneurysm (arrow) and between the pseudoaneurysm and left common iliac vein (arrowhead). (C) The length of the proximal landing zone is 7.6 mm.



**Fig. 3.** Endovascular treatment. (A) Aortography shows a pseudoaneurysm of the left common iliac artery (CIA) which is fistulized with the left common iliac vein. (B) A Viabahn stent graft (13 mm×50 mm) has been placed in the left CIA. (C) The pseudoaneurysm is completely excluded on the final angiography.



**Fig. 4.** Postprocedural computed tomography. (A) Volume rendering image. (B, C) Maximum intensity projection images.

chronic AVF [7]. In a literature review, claudication with decreased ABI was reported to be rare, and only one article has reported this symptom [8].

Our patient presented with swelling of the leg and claudication. Because spine surgery is a risk factor for venous thromboembolism, DUS was the initial diagnostic modality of choice for detecting DVT; however, no DVT was observed. Although no iliac fistula was identified on DUS, it was suspected because of the common femoral venous flow pattern. Subsequently, CT revealed a fistula between the left CIA and left common iliac vein with a pseudoaneurysm. The decreased ABI normalized after treatment.

Traditionally, vascular injury after lumbar disc surgery is treated via open surgical repair (e.g., primary repair, patch angioplasty, interposition with autogenous or prosthetic graft, resection with ligation, or bypass surgery) [2], but the current trend is leaning more towards endovascular repair (e.g., stent graft placement, embolization, or balloon inflation) [9].

Although no clinical trials have been conducted due to the rarity of vascular injury after lumbar disc surgery, open surgical repair is the treatment of choice in cases of laceration causing massive bleeding and shock [10]. However, endovascular treatment can be used in such cases depending on the imaging equipment and device inventory. In a hybrid operating theater, intraoperative angiography can be performed without delay and provides crucial anatomic information. Treatment (open vs. endovascular) can be decided based on angiographic findings. Even if open sur-

gery is adopted, active bleeding can be controlled using an endovascular technique, such as a temporary occlusion balloon.

In contrast, endovascular treatment can be the first-line therapy for most patients with AVFs or pseudoaneurysms with delayed-onset symptoms, because these can be treated electively, and there is enough time for precise planning and preparation of devices. In an elective setting, the technical success rate of endovascular treatment was >95%, and procedure-related morbidity was minimal [11]. Therefore, we attempted to treat the AVF using endovascular techniques. Despite the short proximal landing zone, we were fortunately able to achieve technical success. A bifurcated aortic stent graft was available to manage a potential type I endoleak. As new endovascular devices and techniques emerge, the indications for endovascular treatment should also be expanded.

Iatrogenic vascular injuries during lumbar disc surgery can be acute, subacute, or chronic. In these cases, endovascular treatment is a safe and effective alternative to open surgery, and precise preoperative planning is key to its success.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

## ORCID

Choshin Kim

<https://orcid.org/0000-0002-7726-3912>

Deokbi Hwang

<https://orcid.org/0000-0003-0050-6434>

Woo-Sung Yun

<https://orcid.org/0000-0001-8956-8310>

## AUTHOR CONTRIBUTIONS

Concept and design: WSY. Analysis and interpretation: all authors. Data collection: CK, DH. Writing the article: all authors. Critical revision of the article: all authors. Final approval of the article: all authors. Statistical analysis: none. Obtained funding: none. Overall responsibility: WSY.

## REFERENCES

- 1) Postacchini R, Cinotti G, Postacchini F. Injury to major abdominal vessels during posterior lumbar interbody fusion. A case report and review of the literature. *Spine J* 2013;13:e7-e11.
- 2) Papadoulas S, Konstantinou D, Kourea

- HP, Kritikos N, Haftouras N, Tsolakis JA. Vascular injury complicating lumbar disc surgery. A systematic review. *Eur J Vasc Endovasc Surg* 2002;24:189-195.
- 3) Akhaddar A, Alaoui M, Turgut M, Hall W. Iatrogenic vascular laceration during posterior lumbar disc surgery: a literature review. *Neurosurg Rev* 2021;44:821-842.
- 4) Kim DH, Lee YC, Huh KH, Lee DY, Kim YS, Lee JH. Traumatic arteriovenous fistula treated by PTFE stent graft: a case report. *J Korean Soc Vasc Surg* 2004;20:138-141.
- 5) Choi HH, Kwon SH, Huh S. Iliac arterio-venous fistula after lumbar discectomy. *J Korean Soc Vasc Surg* 2005;21:156-160.
- 6) Bingol H, Cingoz F, Yilmaz AT, Yasar M, Tatar H. Vascular complications related to lumbar disc surgery. *J Neurosurg* 2004;100(3 Suppl Spine):249-253.
- 7) May AR, Brewster DC, Darling RC, Browse NL. Arteriovenous fistula following lumbar disc surgery. *Br J Surg* 1981;68:41-43.
- 8) Serrano Hernando FJ, Paredero VM, Solis JV, Del Rio A, Lopez Parra JJ, Orgaz A, et al. Iliac arteriovenous fistula as a complication of lumbar disc surgery. Report of two cases and review of literature. *J Cardiovasc Surg (Torino)* 1986;27:180-184.
- 9) van Zitteren M, Fan B, Lohle PN, de Nie JC, de Waal Malefijt J, Vriens PW, et al. A shift toward endovascular repair for vascular complications in lumbar disc surgery during the last decade. *Ann Vasc Surg* 2013;27:810-819.
- 10) Jung HS, Kim DJ, Kim HS, Lee HK, Choi SJN, Chung SY. Vascular complications related to posterior lumbar disc surgery. *Vasc Specialist Int* 2017;33:160-165.
- 11) Canaud L, Hireche K, Joyeux F, D'Annoville T, Berthet JP, Marty-Ané C, et al. Endovascular repair of aortoiliac artery injuries after lumbar-spine surgery. *Eur J Vasc Endovasc Surg* 2011;42:167-171.