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 lumbar disc. The left ankle-brachial index was 0.71. Computed tomography angiography revealed a 31 mm x 20 mm pseudoaneurysm of the left common iliac artery fistulated to the left common iliac vein. The patient was successfully treated with stent graft placement.

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

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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: wyun@me.com
https://orcid.org/0000-0001-8956-8310

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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 (Vibahn; 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...
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 surgery 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.