Ruptured Profunda Femoris Artery Aneurysm Successfully Treated Using Coil Embolization and Surgical Ligation: A Case Report

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Abstract

A 78-year-old man developed pain and swelling in his right groin. Computed tomography revealed a ruptured aneurysm of the right profunda femoris artery. Reconstruction of the profunda femoris artery was not required because the patient did not have any evidence of peripheral artery occlusive disease and the ipsilateral internal iliac artery was patent. Thus, transcatheter coil embolization was performed, followed by ligation of the proximal portion of the aneurysm. The patient’s postoperative course was uneventful. The patient had no neurological complications. On postoperative day 19, the patient was discharged.

Key words: Profunda femoris artery aneurysm, Rupture, Transcatheter embolization

Introduction

Profunda femoris artery aneurysms are a relatively rare condition, reportedly accounting for 0.5% of peripheral artery aneurysms and for 1-2.6% of femoral area aneurysms. They are often discovered as an aneurysmal rupture [1]. The standard treatment of profunda femoris artery aneurysm has been open surgery with or without reconstruction. A consensus has not been reached regarding the optimal surgical treatment of profunda femoris artery aneurysms, and the diameter of the aneurysm and its shape and the presence of an embolism must be considered to comprehensively determine the appropriate approach [2, 3]. Here we report a case of a ruptured profunda femoris artery aneurysm that was successfully treated using both endovascular and surgical management.

Case Report

A 78-year-old man had a past history of hypertension, stroke, smoking, and surgery for a left femoral bone fracture. Owing to the left femoral bone fracture surgery, his activities of daily living (ADL) were performed at the level of walking with support. At presentation, he reported pain in his right groin and swelling of his right thigh. His blood pressure was 120/60 mm Hg and heart rate was 70 bpm. Laboratory evaluation revealed a hemoglobin level of 10.3 g/dL. Contrast-enhanced computed tomography (CT) revealed a 47-mm aneurysm of the right profunda femoris artery and a femoral hematoma (Figure 1). An emergency operation was scheduled. Reconstruction of the profunda femoris artery was considered unnecessary. There was no apparent stenosis in the superficial femoral artery (SFA) or the popliteal artery (pop A). Ligation of the aneurysm was planned, but it was spindle-shaped and the outflow vessels of profunda femoris artery were deeply situated. Therefore, we decided to perform transcatheter coil embolization of the aneurysm on its distal portion, followed by ligation of the proximal portion of the aneurysm.

The left femoral artery was punctured under local anesthesia. A cobra-shaped 5-French guiding catheter (Elway,
Terumo Clinical Supply, Gifu, Japan) was advanced antegradely into the right profunda femoris artery. Angiography of the right profunda femoris artery revealed the point of aneurysm rupture. A microcatheter (Sniper, Terumo Clinical Supply, Gifu, Japan) was advanced into the distal part of the aneurysm; a Nester microcoil (MWCE-18S-7-4-NESTER, Nester® Embolization Microcoils™; Cook Medical Inc., Bloomington, IN) was implanted to create a frame, and a Nester microcoil and Tornado coils (MWCE-18S-5/2-TORNADO, MWCE-18S-6/2-TORNADO, Tornado® Embolization Microcoils™; Cook Medical Inc.) were placed (Figure 2). Since residual flow was present, spong...
ments (Spongel, Astellas Pharma Inc., Tokyo, Japan) were injected into the aneurysm. After confirming the reduced flow, the procedure was completed, and the patient was transferred to the operating room.

Under general anesthesia, a 7-cm vertical incision was made to the right groin. The common, superficial, and profunda femoris arteries were exposed. The profunda femoris artery was ligated directly on the proximal neck of the aneurysm. The ligated portion was located below the branch extending from the proximal neck of the aneurysm; therefore, blood flow of the branch was preserved. In order to verify whether the inflow remained, we incised the aneurysm wall to check the lumen (Figure 3). The back flow was confirmed at the sidewall of the aneurysm, and the branch of profunda femoris artery was closed by suturing. After ruling out blood filling of the aneurysm, the aneurysm wall was sutured. Operative bleeding was minimal.

Extubation was performed in the operating room. After confirming the absence of blood flow within the aneurysm by ultrasound on the next day, rehabilitation commenced. No decrease in the patient’s ADL below the preoperative level was observed. No clinical signs of neurological complications associated with embolization of the profunda femoris artery were observed. On postoperative day 8, contrast CT was performed, and complete thrombosis within the deep femoral artery aneurysm was confirmed (Figure 4). On postoperative day 19, the patient was discharged. No recurrence of the aneurysm was observed over the 2-year postoperative period.

**Discussion**

To determine the appropriate treatment for profunda femoris artery aneurysms, it is important to confirm patency from the SFA to the pop A. The profunda femoris artery is an important component of collateral circulation for the SFA. Based on an evaluation of the SFA at the time of surgery, it is necessary to consider whether only to ligate the aneurysm or to perform vascular reconstruction of the profunda femoris artery. Furthermore, if the patient is young and there is the possibility of eventual stenosis in the SFA, it is also necessary to consider vascular reconstruction to preserve the collateral circulation through the branches of the profunda femoris artery. In our case, the SFA and pop A were patent, and the patient was elderly with no particularly high-level ADL. Therefore, only ligation of the aneurysm was performed.

In our case, we anticipated that reaching the distal portion of the aneurysm would be problematic. Given that the aneurysm was spindle-shaped and elongated, that the outflow vessel of the periphery was situated deep in the muscle, and that the aneurysm was ruptured, a longer skin incision and more extensive dissection would have been necessary to achieve a satisfactory view for a reliable procedure. Thus, we performed coil embolization first to reliably control the bleeding from the periphery of the aneurysm. The preceding coil embolization enabled us to complete the surgery safely with minimal bleeding and decreased risk of injury. Minimization of the extent of the muscle dissection enabled the pa-
tient to commence rehabilitation quickly and to recover without any decline in ADL. Shintani et al. [4] reported three cases of profunda femoris artery aneurysms that were treated by proximal ligation without control of the distal branches. This approach could be an alternative option in complicated conditions.

Reports on catheter intervention as a minimally invasive treatment for peripheral artery aneurysms have been increasing [5], and the use of coil embolization has been reported even in cases of ruptured aneurysm [6]. The endovascular treatment approach undoubtedly contributes to decreased invasiveness overall, but in published reports to date, the aneurysm diameters have been smaller than that reported herein. In our case, the potential success of coil embolization was unclear due to its structural characteristic, namely a wide neck; hence, we combined coil embolization with surgery. In some cases, coil embolization has been considered the first-line treatment. Various embolic materials have been used for endovascular embolization. In our case, sponge fragments were used to eliminate the residual flow while the embolic effect was transient. NBCA-Lipiodol is another embolic agent, which has the advantage of a good long-term occlusion rate [7]. Application of NBCA-Lipiodol may be another suitable option in this condition. However, successful treatment using stent grafts for ruptured aneurysms has also been reported [8, 9]. As a way to preserve the blood flow toward the periphery of the aneurysm, stent grafts may become another viable treatment option.

Herein, we described a case in which catheter intervention was used in conjunction with surgery, which was a safer and less invasive treatment strategy than surgery alone.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of interest: The authors declare that they have no conflicts of interest to report.

References

1. Idetsu A, Sugimoto M, Matsushita M, Ikezawa T. Solitary profunda femoris artery aneurysm. Ann Vasc Surg 2011; 25(4): 558.e13-15.
2. Dawson J, Fitridge R. Update on aneurysm disease: current insights and controversies: peripheral aneurysms: when to intervene - is rupture really a danger? Prog Cardiovasc Dis 2013; 56(1): 26-35.
3. Lawrence PF, Harlander-Locke MP, Oderich GS, Humphries MD, Landry GJ, Ballard JL, et al. Vascular Low-Frequency Disease Consortium. The current management of isolated degenerative femoral artery aneurysms is too aggressive for their natural history. J Vasc Surg 2014; 59(2): 343-349.
4. Shintani T, Norimatsu T, Atsuta K, Saitou T, Higashi S, Mitsuoka H. Initial experience with proximal ligation for profunda femoris artery aneurysms: report of three cases. Surg Today 2014; 44(4): 748-752.
5. Mohan IV, Stephen MS. Peripheral arterial aneurysms: open or endovascular surgery? Prog Cardiovasc Dis 2013; 56(1): 36-56.
6. Dominguez-Escrig JL, Lees TA, Dunlop P, Seymour K. Management of ruptured true profunda femoris artery aneurysms. EJVES Extra. 2002; 4: 45: e55-57.
7. Hamaguchi S, Ogawa Y, Arai Y, Hashimoto K, Nakajima Y. A case of pseudoaneurysm of the deep femoral artery successfully treated by NBCA embolization under occlusion. Jpn J Radiol 2013; 31 (8): 538-541.
8. Saha S, Trompetas V, B. Al-Robaie B, Anderson H. Endovascular stent graft management of a ruptured profunda femoris artery aneurysm. EJVES Extra 2010; 19: e38-40.
9. Peynircioglu B, Ergun O, Hazarlan T, Serter T, Uçar I, Çil B, et al. Stent-graft applications in peripheral non-atherosclerotic arterial lesions. Diagn Interv Radiol 2008; 14(1): 40-50.