Pseudoaneurysm of the external iliac artery is a rare late complication after total hip arthroplasty

Shinji Fukuhara, MD, Sachiko Kanki, MD, Masahiro Daimon, MD, Ryo Shimada, MD, Hideki Ozawa, MD, and Takahiro Katsumata, MD, Osaka, Japan

ABSTRACT
Vascular injury as a delayed complication of total hip arthroplasty (THA) is rare. We present a case of pseudoaneurysm of the external iliac artery due to chronic irritation from a prominent bone spicule occurring 2 years after revision THA. We successfully managed the patient with open repair, and there has been no sign of recurrence in the 2 years since the previous surgery. This report suggests that patients who have undergone THA should be followed up carefully and assessed for vascular injuries even after a substantial time. (J Vasc Surg Cases and Innovative Techniques 2017;3:149-51.)

CASE REPORT
A 72-year-old woman presented to our hospital with a cold, painful left lower limb. She had a good femoral pulse, but none was palpable in the left leg distal to the femoral artery. Contrast-enhanced computed tomography (CT) demonstrated an acute occlusion of the left common femoral artery of >4 cm, and no embolic source was found, such as aortic atheroma, intracardiac thrombus, arterial stenosis, or dissections. She had no medical history of arrhythmia or other thrombogenic diseases. She had undergone THA for her left leg because of osteoarthritis at the age of 41 years and an additional surgery for a loosening component of her THA at the age of 70 years. Emergent thrombectomy was successfully performed through left femoral artery exposure. A dark red thrombus was removed, resulting in good backbleeding and restoration of the arterial pulse of the left leg. Oral anticoagulant therapy was initiated with an antiplatelet agent and warfarin to achieve a prothrombin time-international normalized ratio of 2 to 2.5 to prevent recurrent thrombosis because the cause of the thrombosis was unknown.

Five months after the first surgery, she returned to our hospital with pain in the left lower limb. Pertinent laboratory data included a platelet count of \(64 \times 10^{11}/\mu L\), a fibrinogen level of 19 mg/dL, prothrombin timeinternational normalized ratio of >10, and activated partial thromboplastin time of 82.4 seconds. CT found no sign of arterial occlusion or other abnormal findings that could cause the pain. Fresh frozen plasma was used to correct coagulopathy, and the patient’s leg pain resolved. The patient’s peripheral arterial pulsations in the left lower limb were palpable throughout this episode. However, even with therapeutic anticoagulation, a recurrent thrombosis developed in her left lower limb during 2 weeks in our hospital, and an emergency redo left transfemoral thrombectomy was successfully performed. She experienced discomfort again in her left inguinal area 1 week after the second surgery. CT showed a pseudoaneurysm in the left external iliac artery, close to an iliac bone spur that was suspected to be due to revision arthroplasty (Fig 1). A closer review of CT images taken at the first thrombosis event revealed an 8-mm pseudoaneurysm that was obscured by the halation artifact from the prosthetic femoral head and missed on the initial review (Fig 2). This pseudoaneurysm had significantly enlarged to the size of 52 mm during the interval. The patient underwent vascular repair through a left retroperitoneal approach. The posterior aspect of the left external iliac artery was contiguous with the bone spicule derived from the acetabulum, and all layers of the artery were absent at a distance of >5 mm from the site of the aneurysm (Fig 3). After removal of the prominent bone spicule, the damaged artery was replaced with interposition of an expanded polytetrafluoroethylene graft. This revascularization technique was chosen because of the long lesion and inadequate autogenous vein conduit. The patient was discharged 12 days postoperatively, and no recurrence or...
further complications were noted throughout the 2 years of the follow-up period.

**DISCUSSION**

Vascular injuries after THA are extremely rare events, with a reported incidence of approximately 0.2% to 0.3%\(^3\); however, the possible sequelae of these complications cannot be easily overlooked. Shoenfeld et al\(^4\) disturbingly reported 7% mortality and 15% amputation rate in the group requiring vascular surgery due to complications after hip arthroplasty. Nachbur et al\(^1\) described five mechanisms of vascular injuries in hip surgery: perforation of a major artery by the tip of a retractor; overextension of atherosclerotic arteries with subsequent thrombus formation; laceration of a major artery during replacement of a total hip prosthesis; thrombotic occlusion of a major artery due to extensive heat of polymerization from methyl methacrylate; and repeated trauma by osteophytes, screws, or cement that entered the pelvis. Besides these, prosthesis joint infection can also cause infectious pseudoaneurysm of contiguous vessels.\(^5\)

Vascular injuries after hip surgery commonly develop subclinically, and they can occur not only in the acute phase of surgery but also after a substantial time. From a literature review, it was seen that these injuries can occur up to 16 years after hip surgery.\(^6\) These factors make early diagnosis difficult, despite the possible development of severe complications.

In the case described here, the symptoms appeared 2 years after the last hip operation. In addition, insufficient attention was paid to the possibility of this...
condition because the initial symptoms were those of embolism, leading to delayed diagnosis. CT was thought to be insufficient to diagnose the aneurysm because of halation artifact from metal implants. Molfetta et al suggested that the diagnosis should be based on examination by ultrasound and digital subtraction angiography.

An osteophyte was considered to have occurred during revision hip arthroplasty. Although it was close to the arterial vessel, no adverse effect had occurred initially. However, we speculate that chronic mechanical irritation from the bone spur over the years damaged the arterial wall, leading to intimal injury, pseudoaneurysm formation, and subsequent thrombus and causing a decrease in the number of coagulation factors and platelets.

Several therapeutic strategies for pseudoaneurysms have been reported, such as open repair, stent grafting, thrombin injections, and glue embolization or coiling. Although intravascular therapy may be adequate as a temporary treatment, the durability of these treatments remains unknown in the setting of external compression from a bone spur. For this reason, the removal of the abnormal osteal spur was necessary to prevent recurrence. We performed open surgery successfully, and no signs of recurrence or further complications have been seen. It is important to choose flexible strategies and to prepare adequately because the pathologic mechanism of vascular injuries varies in each case.

REFERENCES
1. Nachbur B, Meyer RP, Verkkala K, Zürcher R. The mechanism of severe arterial injury in surgery of the hip joint. Clin Orthop 1979;141:122-33.
2. Bach CM, Steingruber I, Wimmer C, Ogon M, Frischhut B. False aneurysm 14 years after total hip arthroplasty. J Arthroplasty 2000;15:535-8.
3. Nozawa M, Irimoto M, Maezawa K, Hirose T, Shitoto K, Kurosawa H. False aneurysm of the profunda femoris artery after total hip arthroplasty. J Arthroplasty 2000;15:671-4.
4. Shoenfeld NA, Stuchin SA, Pearl R, Haveson S. The management of vascular injuries associated with total hip arthroplasty. J Vasc Surg 1990;11:549-55.
5. Mody BS. Pseudoaneurysm of external iliac artery and compression of external iliac vein after total hip arthroplasty. J Arthroplasty 1994;9:95-8.
6. Smith GH, Nutton RW, Franser SC. Iliac artery pseudoaneurysm rupture following excision of an infected hip prosthesis. J Arthroplasty 2011;26:e13-5.
7. Molfetta L, Chiapale D, Caldo D, Leonardi F. False aneurysm of the superficial femoral artery after total hip arthroplasty: a case report. Hip Int 2007;17:234-6.
8. Drake TA, Morrissey JH, Edgington TS. Selective cellular expression of tissue factor in human tissues. Am J Pathol 1989;134:1087-97.
9. Sethuraman V, Hozack WJ, Sharkey PF, Rothman RH. Pseudoaneurysm of femoral artery after revision total hip arthroplasty with constrained cup. J Arthroplasty 2000;15:531-4.
10. Saha S, Trompetas V, Al-Robaie B, Anderson H. Endovascular stent graft management of a ruptured profunda femoris artery aneurysm. EJVES Extra 2010;19:e38-40.
11. Shah Y, Naganmanavar S, Syed T, Zafar F, Wetherill M. Pseudoaneurysm of the profunda femoris artery: a rare complication of femoral intertrochanteric fracture fixation. Eur J Orthop Surg Traumatol 2008;18:591-3.
12. Li X, Luckeroth P, Curry E, Esram M, Leclair W. Pseudoaneurysm of the profunda femoris artery following a long antegrade intramedullary nail for an unstable intertrochanteric hip fracture: a case report and review of the literature. Eur J Orthop Surg Traumatol 2011;21:293-9.
13. Unay K, Poyanli O, Akan K, Poyanli A. Profunda femoris artery pseudoaneurysm after surgery and trauma. Strategies Trauma Limb Reconstruct 2008;3:127-9.

Submitted Jul 13, 2015; accepted Apr 23, 2017.