Endovascular Therapy of Superior Gluteal Artery Aneurysms: Case Report and Review of Literature

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ABSTRACT

We report two cases of superior gluteal artery aneurysms successfully treated with coil embolization and review treatment options for these lesions. Our experience in the treatment of three total aneurysms, two likely post-traumatic in etiology and one mycotic, suggests that endovascular therapy is an effective alternative to open surgery when treating superior gluteal artery aneurysms.

KEYWORDS: Gluteal aneurysm, coil embolization, endovascular

Objectives: Upon completion of this article, the reader should understand the indications for and advantages of using endovascular therapy to treat superior gluteal artery aneurysms.

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Superior gluteal artery aneurysms are a rare clinical finding. These lesions are often unilateral and most commonly due to pelvic trauma.¹ We describe two cases of superior gluteal artery aneurysms: one patient with bilateral post-traumatic aneurysms and one patient with a unilateral mycotic aneurysm. Both cases were successfully treated with endovascular therapy. Subsequently, we discuss the incidence, etiology, and treatment of superior gluteal artery aneurysms.

CASE 1

A 75-year-old man was transferred emergently to our institution with a large actively bleeding hematoma in

his right buttock. The patient had fallen earlier while in the bathroom and developed a red, warm, fluctuant mass palpable around his right buttock. He was initially seen at an outside facility, and the mass was believed to represent an abscess. Incision and drainage of the mass was attempted in the emergency room. After a liter of blood had been drained, the procedure was aborted and the site was surgically packed. The patient was resuscitated with 8 units of packed red blood cells and 4 units of fresh-frozen plasma, and he was transferred to our institution.

Further information obtained from the patient's family revealed that the patient had a history of bilateral internal iliac artery aneurysms for which he declined

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Figure 1 Right superior gluteal aneurysm (arrow).

surgical treatment due to predicted high surgical morbidity and mortality. With this history in mind, it was determined that his earlier fall most likely resulted in the rupture of his right internal iliac artery aneurysm. On arrival at our institution, the patient was immediately brought to the angiography suite for anatomic mapping and possible endovascular repair of his aneurysms.

The left femoral artery was accessed and a 6F Pinnacle sheath (Boston Scientific, Natick, MA) was placed into the proximal aorta. A C2 catheter was used to access the right common iliac artery, and diagnostic right iliac arteriogram was performed. The C2 catheter was subsequently exchanged for a SOS OMNI Selective Catheter (AngioDynamics, Queensbury, NY) and Glidewire (Terumo Medical, Somerset, NJ), and the right internal iliac artery was then selected. Angiography revealed a large aneurysm off the posterior division of the internal iliac originating from the superior gluteal artery (Fig. 1). A 5F Kumpe catheter (Cook, Bloomington, IN) was then used to reach the posterior division of the right internal iliac artery. From this position, multiple 10-mm and 8-mm Nester coils (Cook, Bloomington, IN) were deployed until stasis was achieved. Postembolization angiography of the right internal iliac artery revealed complete thrombosis of the aneurysm (Fig. 2).

Angiography was then performed from the left common iliac artery, which revealed a similarly large aneurysm coming off the posterior division of the left internal iliac artery, likely originating from the superior gluteal artery. A SOS OMNI Selective Catheter was then used to selectively catheterize the posterior division of the internal iliac artery. Multiple 10-mm and 8-mm Nester coils were deployed until stasis of blood flow through the superior gluteal artery and thrombosis of the aneurysm sac was documented. With both aneurysms

Figure 2 Postembolization right superior gluteal artery angiogram shows no filling of aneurysm sac.

embolized with coils, pelvic angiography was performed and revealed no filling of either aneurysm (Fig. 3).

CASE 2

A 79-year-old man was admitted with an 8-month history of recurrent *Pseudomonas aeruginosa* bacteremia from an unknown source. During his course of hospitalization, the patient developed right-sided buttock and back pain. An indium white blood cell scan was obtained and interpreted as showing uptake in the right sacroiliac joint. A noncontrast computed tomography (CT) scan

Figure 3 Aortogram reveals successful coil embolization of bilateral superior gluteal artery aneurysms.

Figure 4 Initial noncontrast pelvic computed tomography demonstrates sacroiliitis (arrow) and slight gluteal mass abnormality on right, evidenced by asymmetrical enlargement of right gluteal muscles (arrowheads).

showed no signs of osteomyelitis or fluid collection, but it did demonstrate severe degenerative sacroiliitis (Fig. 4). Because the patient's pain persisted, a follow-up noncontrast CT was obtained 2 weeks later. Asymmetric soft tissue density was noted in the right buttock musculature, which was a significant change from the previous CT. Duplex ultrasound revealed an $11.1 \times 6.4 \times 7.0$ cm lesion containing anechoic and hypoechoic material, with evidence of pulsatile and to-and-fro arterial flow. CT angiogram of the pelvis confirmed the presence of a 12×8 cm pseudoaneurysm originating from the right superior gluteal artery (Fig. 5). No abnormalities of the left internal iliac artery were noted, and the remainder of the visualized vasculature was normal. Due to the patient's persistent fever, leukocytosis, coagulopathy, renal failure, mental status changes, and the pseudoaneurysm's marked increase in the size over a 2-week interval, the aneurysm was presumed to be mycotic in origin. The patient underwent emergent angiography and endovascular repair of his mycotic aneurysm.

A 5F sheath was placed into the left common femoral artery, and a Glidewire was used to access the right internal iliac artery. A C2 catheter was then advanced over the Glidewire to this position.

Figure 5 Computed tomography angiogram reveals large pseudoaneurysm of right superior gluteal artery (arrow).

Figure 6 Pseudoaneurysm of right superior gluteal artery (arrow).

Angiography of the right internal iliac and right superior gluteal artery was performed, revealing a pseudoaneurysm of the superior gluteal artery (Fig. 6). The Glidewire and catheter were advanced into the superior gluteal artery distal to the aneurysm sac. Distal embolization was performed with Nester coils to prevent possible collateral filling after proximal embolization. The C2 catheter was then withdrawn and the pseudoaneurysm selectively catheterized. Fifteen hundred units of opacified thrombin were injected directly into the aneurysm sac under fluoroscopic guidance. Post-thrombin angiography revealed thrombosis of $\sim 90\%$ of the aneurysm sac (Fig. 7). The main trunk of the superior gluteal artery was then embolized with multiple 10-, 8-, 6-, and 4-mm Nester coils. Angiography was performed at the end of

Figure 7 Postembolization angiogram shows near complete thrombosis of aneurysm sac.

Figure 8 Angiogram shows successful embolization of right superior gluteal artery.

the procedure and demonstrated no continued flow into the superior gluteal artery or aneurysm sac (Fig. 8).

Immediately following endovascular treatment, surgical drainage and debridement were performed via a right buttock approach to remove the infected nidus. No intraoperative bleeding occurred. Pelvic CT 5 days later revealed no signs of aneurysm sac enlargement or extravasation of blood. Although surgery was successful, the patient's postoperative course remained complicated: He continued to have unexplained bacteremia refractory to treatment.

DISCUSSION

The true incidence of superior gluteal artery aneurysms is not known, but they represent a very small fraction of all reported aneurysms.² They are almost always due to blunt or perforating trauma to the pelvis but can rarely be due to sepsis,^{3,4} atherosclerosis,⁵ or connective tissue disorders.^{6,7}

Our first patient presented with bilateral superior gluteal artery aneurysms, a very rare finding. Apart from the fall that brought him into the hospital, the patient reported no history of trauma to his pelvis. The patient, however, was a very thin farmer and had spent decades operating and sitting on a tractor, most likely causing chronic trauma to his pelvis in the gluteal region. This bilateral repetitive trauma is likely to have caused this patient's bilateral superior gluteal artery aneurysms. He had no atriomegaly or other identifiable aneurysms. Our second case demonstrated a unilateral mycotic aneurysm due to *Pseudomonas aeruginosa* bacteremia. The patient was also HLA-B27 positive and may have had some underlying connective tissue disorder contributing to aneurysm formation.

Since first described in 1898,⁸ open surgery has been the mainstay of therapy for symptomatic superior

gluteal artery aneurysms and ruptures. Although modifications to the original technique have been made, open surgery involves an extraperitoneal approach to control the proximal artery as well as the aneurysm sac. This procedure is often effective but can be technically challenging.

Patients are usually placed on their side with the aneurysm side up. Two approaches can then be taken. For larger aneurysms, the gluteus maximus is divided and the gluteus medius is carefully retracted. This allows for exposure of the superior gluteal artery and subsequent ligation of the artery and endoaneurysmorrhaphy.⁹ Smaller aneurysms can be approached with a transverse gluteal incision with longitudinal splitting of the gluteus maximus, resulting in visualization of the aneurysm.¹ Ligation and endoaneurysmorrhaphy can then be performed.

These two approaches, however, are not without complications. The sciatic nerve often runs along the superior gluteal artery and can sometimes adhere to the aneurysm wall. Identification of the nerve is critical to prevent injury during surgery. Some have recommended the use of an electrostimulator to map out the course of the nerve before any excision of the aneurysm or surrounding tissue.^{1,9} Additionally, in unstable, actively bleeding patients, open surgery can be especially challenging because bleeding sites are often difficult to identify. Some have advocated the use of endovascular therapy in hemodynamically unstable patients to minimize hemorrhagic complications associated with open surgery.¹⁰ Other documented risks associated with surgery include muscular necrosis and infection.¹¹

With these complications associated with open repair, less invasive techniques have been attempted with good technical and clinical success. Since 1977, there have been seven reports of successful endovascular embolization of gluteal artery aneurysms.^{4,10-14} No major morbidity or mortality have been reported when endovascular techniques have been attempted. Coil embolization was used in the majority of the cases, with a few using Gelfoam embolization of the aneurysm sac. Reported complications involved dislodgement and migration of coils during attempted embolization due to high arterial blood flow and difficulty packing coils into a large arterial lumen.⁴ In these previous cases, shorter 3- to 7-cm Gianturco coils (Cook, Bloomington, IN) were primarily used. Since that time, longer (14 cm), more pliable Nester coils have been developed, making it easier to pack the coils tightly inside the arterial lumen. In both our cases, Nester coils were used with good success, with no dislodgement. If dislodgement and migration was a concern, stiffer Gianturco coils could have been used to serve as a backstop for the more pliable Nester coils. Although coil embolization was effective, opacified

thrombin was also used in the second case. This was done to slow bleeding from the ruptured aneurysm sac prior to coil embolization of the proximal superior gluteal artery. Opacified thrombin can be used judiciously to control bleeding, but care must be used when injecting into the aneurysm sac.

In our cases, endovascular therapy was effective for both patients. Neither experienced major postoperative complications associated with therapy. Our results, coupled with the results of others, suggest that endovascular therapy may be as effective in treating superior gluteal artery aneurysms as open surgery. One possible drawback of endovascular therapy is that it may not diminish the compressive effects of the aneurysm in a symptomatic patient. If this is the case, open surgery would be warranted, especially if the patient was experiencing bowel or bladder dysfunction, severe nerve pain, or vascular insufficiency. It is our belief, however, that angiography and endovascular therapy should be attempted first for all patients who have a suspected gluteal artery aneurysm. Angiography allows for anatomic mapping and would be useful in any future surgical procedure. In addition, treating the aneurysm sac with endovascular thrombosis is potentially curative and will decrease hemorrhagic complications if future surgical debulking is needed. If endovascular repair is not possible or if the patient continues to experience symptoms due to compression postoperatively, open surgery can then be attempted.

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