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Case Report

Endovascular management of posttraumatic and iatrogenic large pelvic pseudoaneurysms following biopsy: case report

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ABSTRACT

Pelvic traumatic and iatrogenic pseudoaneurysms supplied by the internal iliac artery are very rare but can present with pain, nerve compression, and rupture. Particularly with more chronic pseudoaneurysms, their imaging appearance can be confusing and they can be mistaken for tumors. We present two cases of pelvic pseudoaneurysms supplied by the superior gluteal artery that were initially mistaken for masses and subsequently biopsied. We report the subsequent successful endovascular embolization technique subsequently utilized for both of these cases. A high index of suspicion should be maintained to avoid biopsy of these lesions. In the appropriately selected patient, an endovascular approach may be safely used to perform embolization.

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Introduction

Pseudoaneurysms manifest as painful and pulsatile masses, often the result of blunt or penetrating arterial trauma. Of the sites in which pseudoaneurysms can be found, those supplied by the internal iliac artery, specifically the superior gluteal branch, are particularly rare. Because pseudoaneurysms can be fatal, it is important to maintain the diagnostic possibility of a pseudoaneurysm in patients who have had prior history of trauma to the area along with complaints of

pain, nerve compression, and loss of mobility in the corresponding limb. We present two cases of patients with large pseudoaneurysms arising from the superior gluteal artery, initially incorrectly diagnosed as masses, prompting subsequent biopsies. One of these masses was likely secondary to prior trauma, while the other was likely due to prior bone marrow biopsy. Both cases were treated successfully with coil embolization. To our knowledge, there are only 11 reports of posttraumatic superior gluteal artery pseudoaneurysm in the literature since 1983.

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Case report

Patient 1

Clinical presentation

A 47-year-old gentleman was transferred to our center from an outside hospital with a right gluteal mass. Unbeknownst to us, the patient underwent nondiagnostic biopsy a prior to arrival at our institution complicated by 2 liters of intraoperative blood loss and continued intermittent bleeding from the open biopsy site, requiring multiple blood transfusions. The patient's past medical history was notable for hepatitis C virus and a remote history of right leg trauma at age 30 years, as well as right buttock gunshot wound at age 33 years. Vital signs were stable. Physical examination demonstrated a roughly 12 × 10 cm nonmobile, nontender right buttock soft tissue mass. Coagulation panel and platelet count were within normal limits.

Imaging

Contrast-enhanced computed tomography (CT) of the abdomen and pelvis demonstrated partial visualization of a 15-cm soft tissue density mass with central enhancement in the right gluteal region, which extended medially to the pelvic sidewall and involved the right piriformis muscle (Fig. 1). The possibility of sarcoma was raised at the outside hospital. To further evaluate the vascular supply to this mass, MR angiogram of the pelvis and lower extremities was performed at our center upon admission. The study revealed contrast enhancement of the mass with contrast pooling in the medial aspect of the mass, with enlargement of a branch of the right internal iliac artery with drainage into the contrast collection within the mass, suggesting a partially thrombosed pseudoaneurysm (Fig. 2).

Intervention

An angiogram was next performed to further evaluate the pseudoaneurysm with intention to treat. After attaining left common femoral artery access, a diagnostic angiogram was

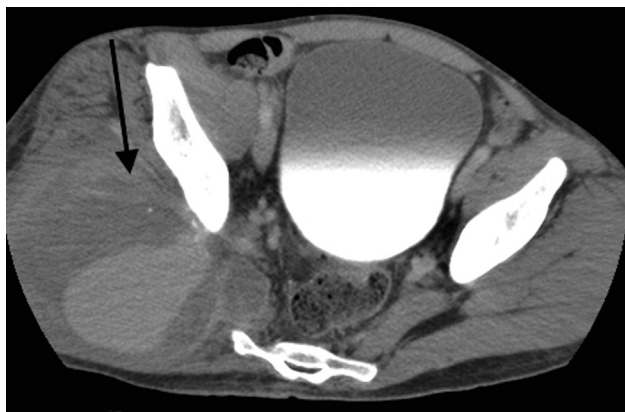


Fig. 1 – Contrast-enhanced CT of the abdomen and pelvis demonstrating large right gluteal soft tissue density with central enhancement (arrow), with extension medially to the pelvic sidewall and involvement of the right piriformis muscle.

performed through a 4-French Omni Flush pigtail catheter (AngioDynamics, Latham, NY). The angiogram showed an enlarged superior gluteal artery arising from the right internal iliac artery providing supply to a large pseudoaneurysm in the right posterior pelvis (Fig. 3). The decision was made to proceed with coil embolization of this pseudoaneurysm due to ongoing blood loss and repeated transfusion requirements. Over an 0.035 Bentson guidewire (Cook Medical, Bloomington, IN), the pigtail catheter was exchanged for a 5-French Levin-1 catheter (AngioDynamics). Through the Levin-1 catheter, a Tracker microcatheter (Stryker, Kalamazoo, MI) was introduced to select the superior gluteal branch artery for coil embolization. The neck and segments proximal and distal to the pseudoaneurysm were then embolized with fifteen 6-7 mm Complex Helical-18 coils (Boston Scientific, Natick, MA). Postembolization arteriogram demonstrated cessation of antegrade flow and nonopacification of the pseudoaneurysm. The patient tolerated the procedure well without complications.

Outcome

Following embolization, the patient reported cessation of bleeding and his hemoglobin normalized. Patient initially described mild decrease in sensation over the right dorsal foot, which later resolved during hospitalization, with intact motor examination and distal pulses. Thrombosed pseudoaneurysm was later evacuated surgically without complication 3 weeks following embolization.

Patient 2

Clinical presentation

A 51-year-old gentleman presented with a 10-month history of lumbar spondylosis, low back pain, right buttock pain radiating down the leg, as well as right foot drop and numbness in the right medial lower leg. Of note, 1 month prior to symptoms onset, he had undergone bone marrow biopsy via right posterior iliac approach. The patient had tried oral analgesics, epidural spinal injections, and physical therapy with minimal improvement in his symptoms. Past medical history was notable for hepatitis C virus, lumbar radiculopathy, sciatica since a work-related lumbar spine injury 3 years prior, as well as persistent leukopenia (which had prompted his bone marrow biopsy). Laboratory results were notable for INR of 1.3. Platelet count and hepatic function tests were within normal limits. Recent electromyography demonstrated denervation changes in the right lateral gastrocnemius muscle, which were thought to be related to recent direct muscular trauma with associated bruising.

Imaging

Nonenhanced magnetic resonance imaging (MRI) of the lumbar spine was obtained to evaluate the patient's low back pain and neurologic deficit. The study showed an 11 × 8.6 × 7.7 cm mass in the presacral space lateral to the rectum with extension into the right gluteus medius and maximus muscles, with heterogeneous solid components and surrounding cystic/fluid components (Fig. 3). The mass resulted in anterior displacement of the right sacral neurovascular bundle, mild remodeling of the right posterior acetabulum, and edema and

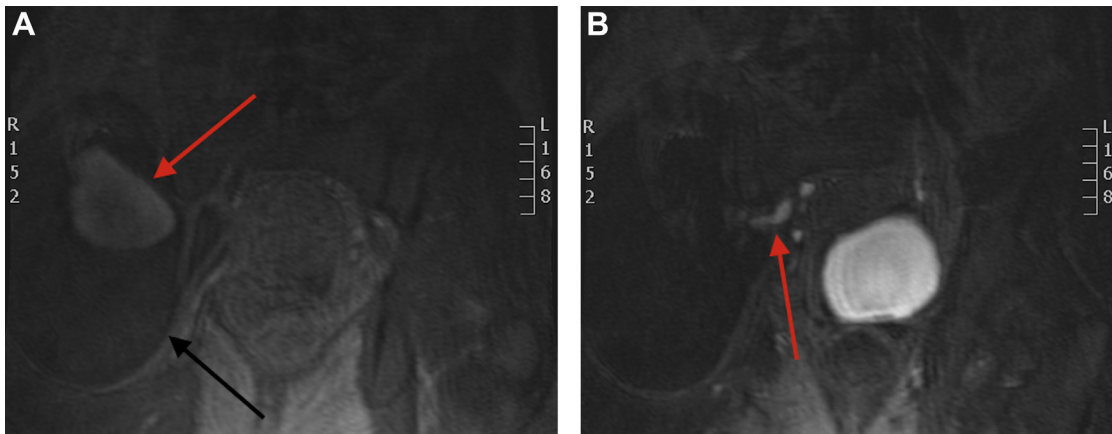


Fig. 2 – (A) Contrast-enhanced coronal MR angiography of the pelvis demonstrates large mass-like right gluteal lesion with contrast pooling medially (red arrow) and partial thrombosis (black arrow). (B) Coronal MR angiography in a different slice demonstrates enlargement of a branch of the right internal iliac artery with drainage into the gluteal lesion, suggesting a partially thrombosed pseudoaneurysm (arrow).

mild atrophy of the right gluteal muscle. These findings were nonspecific but raised the possibility of a large hematoma versus complicated neurogenic tumor. As a result, a repeat postcontrast MRI was initially recommended.

However, prior to obtaining further postcontrast imaging, a CT-guided biopsy of this pelvic mass was requested by the primary service 1 month later, as they suspected neoplastic etiology. After advancement of a 17-gauge coaxial needle into the mass and removal of the central stylet, there was immediate return of pulsatile red blood flow, raising concern for pseudoaneurysm. At this point, the biopsy cannula was removed and manual compression was applied without complication. Immediate CT revealed a large pseudoaneurysm projecting into the right buttock. Subsequently, contrast-enhanced MR angiogram was obtained the same day, demonstrating an 8.7 cm partially thrombosed pseudoaneurysm projecting into the right buttock (Fig. 3). The patient was discharged following observation without complications or other immediate adverse sequelae.

Intervention

Two months later, pelvic angiogram and embolization of the right pelvic pseudoaneurysm were carried out under general anesthesia since the patient had not been able to previously tolerate the procedure under moderate sedation. Left common femoral artery access was achieved, followed by catheterization of the contralateral internal iliac artery utilizing a 5-French Omniflush catheter (AngioDynamics, Latham, NY). The catheter was exchanged over 035 Bentson wire (Cook Medical, Bloomington, IN) for a 6-French, 45-cm Pinnacle sheath (Terumo, Tokyo, Japan), and the tip was positioned in the proximal internal iliac artery. Angiography was performed, demonstrating a large right gluteal artery pseudoaneurysm originating from the proximal segment of the right superior gluteal artery. Microcatheterization of the superior gluteal artery was then performed with an Echelon 14 microcatheter (Covidien, Dublin, Republic of Ireland), which

was found to be the origin of the pseudoaneurysm (Fig. 4). Coil embolization of the superior gluteal artery was subsequently performed across the neck of the aneurysm with 8 Axium detachable coils (Covidien, Dublin, Republic of Ireland) of varying diameters and lengths. Subsequent angiograms demonstrated no residual filling of the pseudoaneurysm (Fig. 4). Catheter and sheath were removed, and hemostasis was achieved with manual compression.

Outcome

Follow-up CT angiogram of the pelvis obtained a month later demonstrated a completely thrombosed right gluteal pseudoaneurysm with no evidence of residual filling of the aneurysm lumen, thus indicating successful embolization (Fig. 5). At 2-week follow-up visit, the patient described slight improvement in sensory and motor deficit as well as improved pain control on gabapentin and tramadol. Four months later, the patient underwent surgical evacuation of the thrombosed pseudoaneurysm without complication.

Discussion

Pseudoaneurysms form at sites of arterial injury where hemorrhage was contained by the adjacent nonvascular tissues. They are more likely to occur when only one side of the arterial wall is injured, whereas complete transection of an artery usually does not result in pseudoaneurysm formation [1]. Any penetrating arterial injury can result in pseudoaneurysm formation, including vascular reconstructive surgery, inadvertent puncture by IV drug users, blunt trauma, orthopedic internal fixation, as well as percutaneous or vascular interventions [2]. The incidence of iatrogenic pseudoaneurysm has increased due to the rising prevalence of peripheral interventional procedures, transarterial cardiac catheterization, and image-guided biopsies. They occur in 0.1%-0.2% of diagnostic angiograms and 3.5%-5.5% of interventional procedures [3]. In the case of image-guided biopsy,

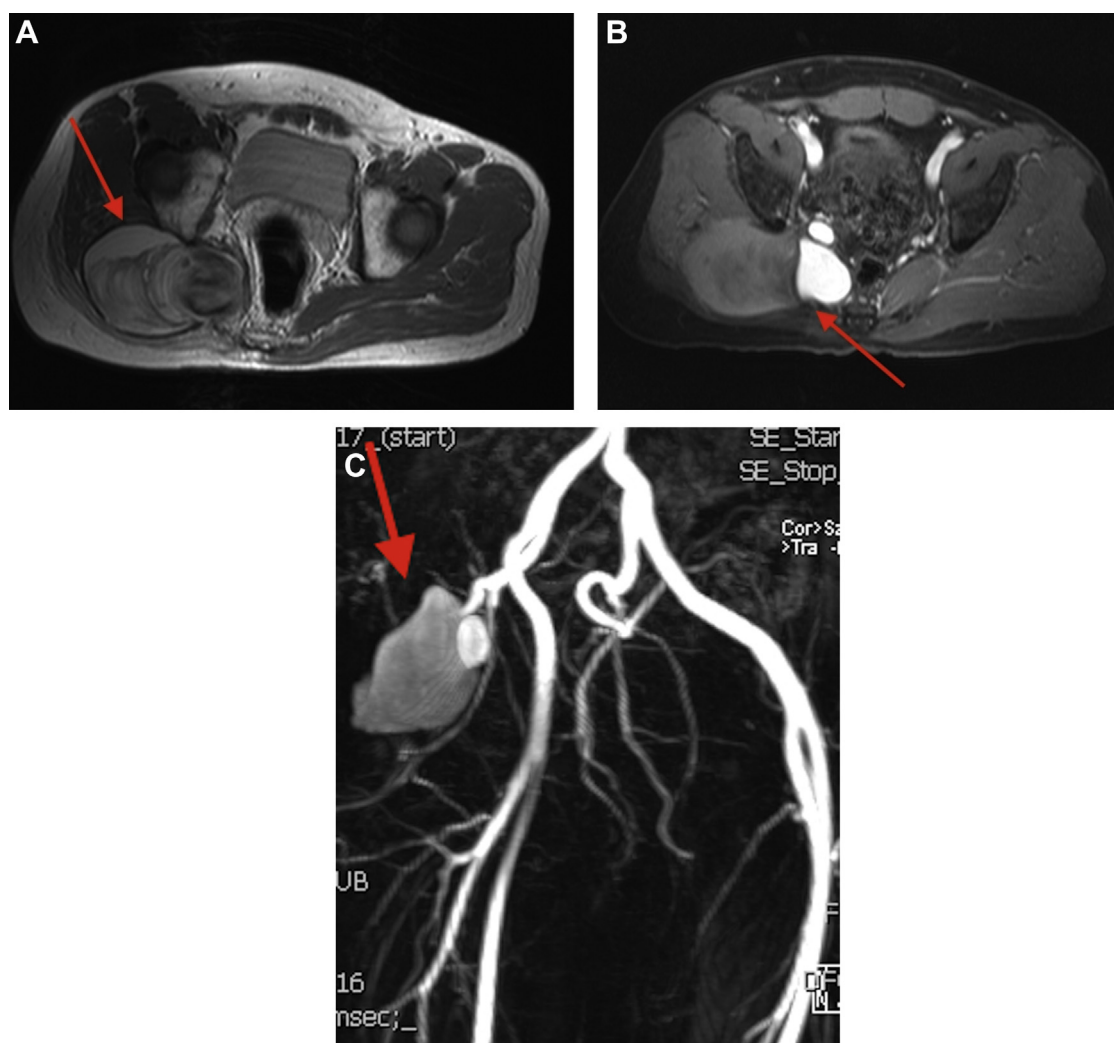


Fig. 3 – (A) Proton density axial MRI through the pelvis demonstrates mass in the presacral space lateral to the rectum with extension into the right gluteus medius and maximus muscles, with heterogeneous solid and cystic components (arrow). Due to the complex appearance, hematoma and neurogenic tumor were both raised as diagnostic possibilities. (B) Subsequent contrast-enhanced MR angiography of the pelvis demonstrates the previously identified lesion to be a partially thrombosed pseudoaneurysm projecting into the right buttock (arrow). (C) Maximum intensity projection of pelvic MR angiogram demonstrates origin from a branch of the internal iliac artery (arrow).

the biopsy needle size was found to be proportional to the complication rate [4]. The incidence of pseudoaneurysm was reported to be higher with the use of thrombolytics, antiplatelet medications, anticoagulants [5], as well as in patients with low platelet counts and/or platelet dysfunction [6]. Mlekusch [7] reported platelet counts of less than $200 \times 10^9/L$ were strongly associated with puncture-related pseudoaneurysm formation.

The clinical presentation of pseudoaneurysm includes a new thrill or bruit, pulsatile hematoma, or marked pain [8]. Potential complications of pseudoaneurysms are rupture, distal embolization, local pain, neuropathy, and local skin ischemia [9]. Early diagnosis and intervention reduce the risk of rupture, thrombosis, mass effect, and other complications [2]. A superficially located pseudoaneurysm can be diagnosed using ultrasound with color Doppler flow mapping, whereas diagnosis of pseudoaneurysm in less accessible locations

requires contrast-enhanced CT angiogram, MR angiogram, or catheter-directed angiogram. At our institution, MR angiography and CT angiography are both performed with relatively equal frequency for the evaluation of vascular pathology.

To our knowledge, there are only a few case reports on biopsy-related iatrogenic pseudoaneurysms. As with our second case, pseudoaneurysm is a rare but potential complication of iliac bone marrow biopsy. Lowenthal et al. [6] reported gluteal artery pseudoaneurysm as a complication of posterior iliac crest bone marrow biopsy to monitor treatment response in a patient with combined chronic lymphocytic leukemia and chronic myelocytic leukemia. Percutaneous coil embolization was performed successfully, as in our cases, resulting in improvement in pain and mobility [6]. Close correlation should be performed with any possible clinical history of prior biopsy or trauma in patient's with these types

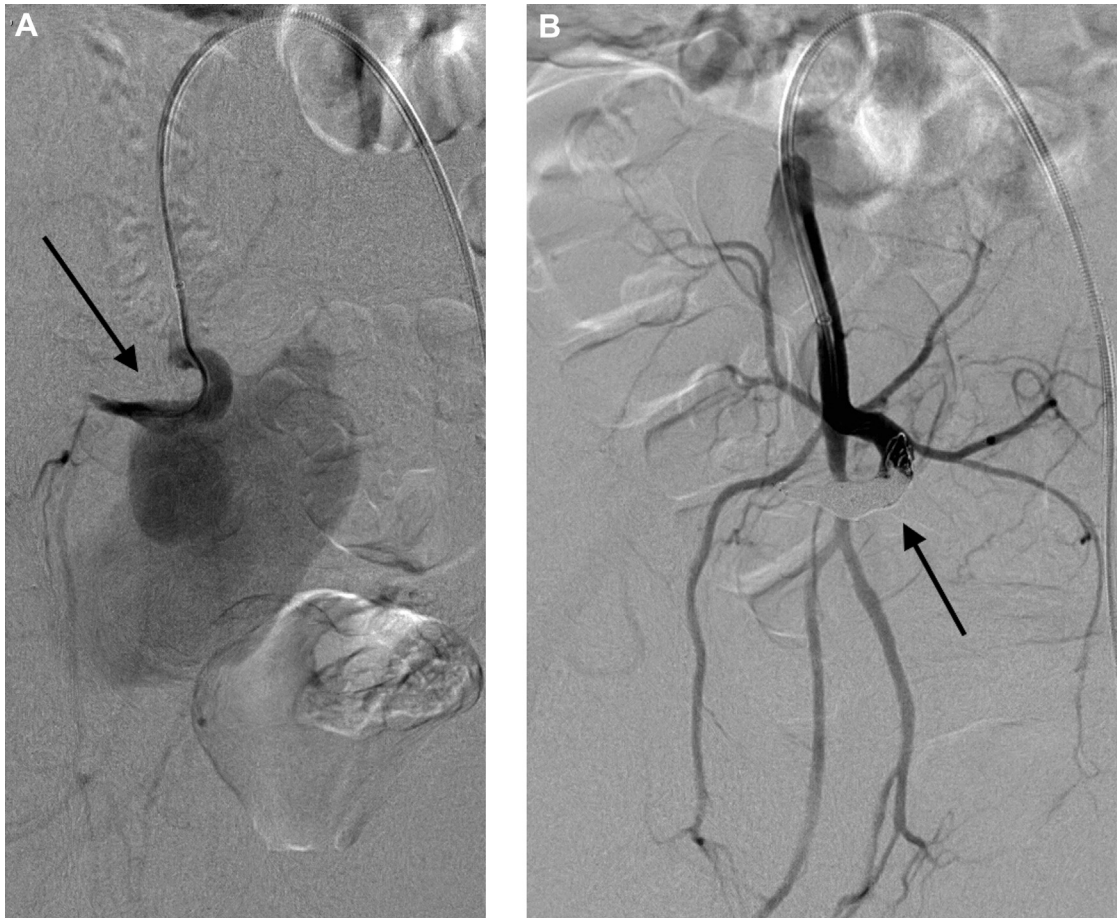


Fig. 4 – (A) Pre-embolization angiogram performed from the proximal right superior gluteal artery (arrow) demonstrates large pseudoaneurysm. (B) Internal iliac angiogram following coil embolization (arrow) of the right superior gluteal artery demonstrates no further opacification of the pseudoaneurysm. There is no evidence of nontarget embolization of other internal iliac artery branches.

of vascular lesions. Furthermore, due to the potential to confuse these lesions with tumors (particularly on non-contrast MRI with partially thrombosed masses), a high index

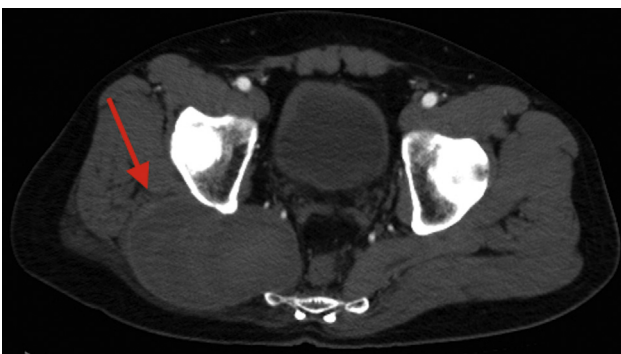


Fig. 5 – One month postembolization, CT angiogram of the pelvis demonstrates completely thrombosed right gluteal pseudoaneurysm (arrow) with no further evidence of luminal opacification, thus indicating successful embolization.

of suspicion must be maintained to avoid biopsy. Prompt referral for embolization should be performed if biopsy is inadvertently performed, as in our cases.

The management options for pseudoaneurysm include ultrasound-guided compression repair, minimally invasive percutaneous treatments (thrombin injection, coil embolization, and insertion of covered stents), or surgical repair [5]. Ultrasound-guided compression repair is a cost-effective but time-consuming treatment option for superficially located pseudoaneurysms. Drawbacks of this technique include patient discomfort and high recurrence rate in patients on anticoagulation and an increased failure rate in pseudoaneurysms with diameters over 3 cm [8,9]. In our case study, the large size and deep locations of the pseudoaneurysms excluded utilization of this technique.

Ultrasound-guided thrombin injection is another treatment option and mainly used to treat common femoral artery iatrogenic pseudoaneurysms with neck sizes less than 5 mm [8,10]. It involves injection of the thrombin into the pseudoaneurysm body (average dose of 1100 IU, with ranges of 100-5000 IU) [8]. Injection of thrombin in liquid form may lead to distal migration of thrombin through the neck (especially in short

and wide necks), resulting in nontarget embolization [11]. Furthermore, development of immunologic cross-reaction to host coagulation factors has been reported [2,8,12]. The large size of the pseudoaneurysms in our case precluded this technique as well.

In our case study, we highlight the potentially adverse effects from biopsy of large pelvic pseudoaneurysms. These pseudoaneurysms can have a confusing clinical and radiologic presentation, particularly when chronic, and as a result can sometimes be confused for masses. Postcontrast studies, multimodality imaging with CT, MRI, and/or ultrasonography, and a high index of suspicion are critical to diagnosis and avoidance of potentially catastrophic biopsy. We report the successful subsequent endovascular embolization of two large iatrogenic pseudoaneurysms, followed by surgical evacuation of the thrombosed hematoma without complication and progressive improvement in clinical symptoms. We believe that an endovascular approach can be safely and successfully utilized in internal iliac branch pseudoaneurysms and should serve as the preferred initial approach when possible.

Conclusion

While extremely uncommon, gluteal artery pseudoaneurysms should be considered in patients presenting with gluteal masses and sciatic pain and/or foot drop, particularly when presenting with histories of trauma or local biopsies. Dedicated thorough imaging should be performed, and extreme caution should be taken prior to attempting image-guided percutaneous biopsy. Endovascular coil embolization is a proven and effective technique to manage these types of pseudoaneurysms.

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