

Lateral geniculate artery pseudoaneurysm after arthroscopic medial meniscectomy

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ABSTRACT

Vascular complications after arthroscopy are rare and generally present as transient paresthesia most likely due to nervous injury or vasospasm. Rare cases of genicular artery injuries can occur and generally involve the medial genicular artery due to proximity to the right arthroscopic knee hook. This case, however, represents a rare lateral inferior genicular artery injury resulting in a symptomatic pseudoaneurysm. In addition, during the workup, the best visualization of the pseudoaneurysm was possible using duplex ultrasound. The diagnostic information seen on ultrasound was paramount and superseded the findings from conventional angiography and computed tomography angiography, both of which were nonspecific. In brief, this case not only highlights a rare surgical complication but also emphasizes the importance of duplex ultrasound compared with angiography and computed tomography in the workup of pseudoaneurysms. (J Vasc Surg Cases Innov Tech 2024;10:101397.)

Keywords: Angiography; Coil embolization; Duplex ultrasound; Pseudoaneurysm

Vascular complications after arthroscopic knee surgery are rare, although most commonly involve the popliteal and medial genicular arteries. These are generally caused during trocar insertion.¹⁻³ The medial genicular arteries, both superior and inferior, are more frequently injured because the medial meniscus is a much more commonly injured structure requiring repair.^{4,5} However, a paucity of literature reporting on lateral geniculate arterial injuries occurring after medial arthroscopic surgery is available. In the setting of arterial injuries, one of the most insidious complications is a pseudoaneurysm (PSA). PSAs are false aneurysms commonly occurring at the site of arterial injuries. PSAs are not considered true aneurysms because they do not contain all layers of the artery but rather evolve as outpouchings of the native vasculature.³ We present a case of a lateral geniculate PSA after arthroscopic medial meniscectomy. This presentation is unique due to the differing laterality of the operation and the PSA. However, the workup findings additionally demonstrate that dedicated color flow, gray scale, and spectral Doppler ultrasound are the preferred

diagnostic modalities for PSAs compared with conventional angiography. The present case highlights the need for access to high-quality ultrasound at the bedside and intraoperatively. The patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

A 32-year-old man without any prior medical or surgical history presented to the emergency department with a pulsatile mass at the lateral left knee 3 weeks after an uncomplicated arthroscopic medial meniscectomy. The patient was hemodynamically stable with no abnormal laboratory test results. The patient did state that he could appreciate a pulsatile mass that was becoming more painful and subjectively increasing in size. Point-of-care computed tomography (CT) angiography (CTA) showed a nonspecific blush of contrast in the area of the lateral left knee with postoperative findings in the same region. The CTA was of poor quality due to motion artifact. Because of the persistence of symptoms and concern for an arterial injury, dedicated anterolateral color Doppler ultrasound (CDU) was performed. CDU showed an echogenic collection measuring 2.9 cm × 2.3 cm × 1.5 cm with a small vessel present deep to the collection. Spectral Doppler ultrasound additionally showed pulsatile flow with to-and-fro flow consistent with a PSA of the left lateral inferior genicular artery (LIGA). These findings are shown in Fig 1. The patient was taken on hospital day 1 for angiography and intervention of the PSA. Intraoperatively, left lower extremity arteriography with runoff was performed, which did not show any obvious signs of a PSA. The only abnormal finding was heavy contrast filling at the takeoff of the left LIGA. Cone beam CT was then performed with a steep left angle oblique (LAO) until a small area of narrowing was identified at the distal end of the left LIGA. These findings are shown in Fig 2 and include a robust LIGA, distal narrowing, and coil embolization. However, still, no obvious PSA filling was found. Due to the duplex

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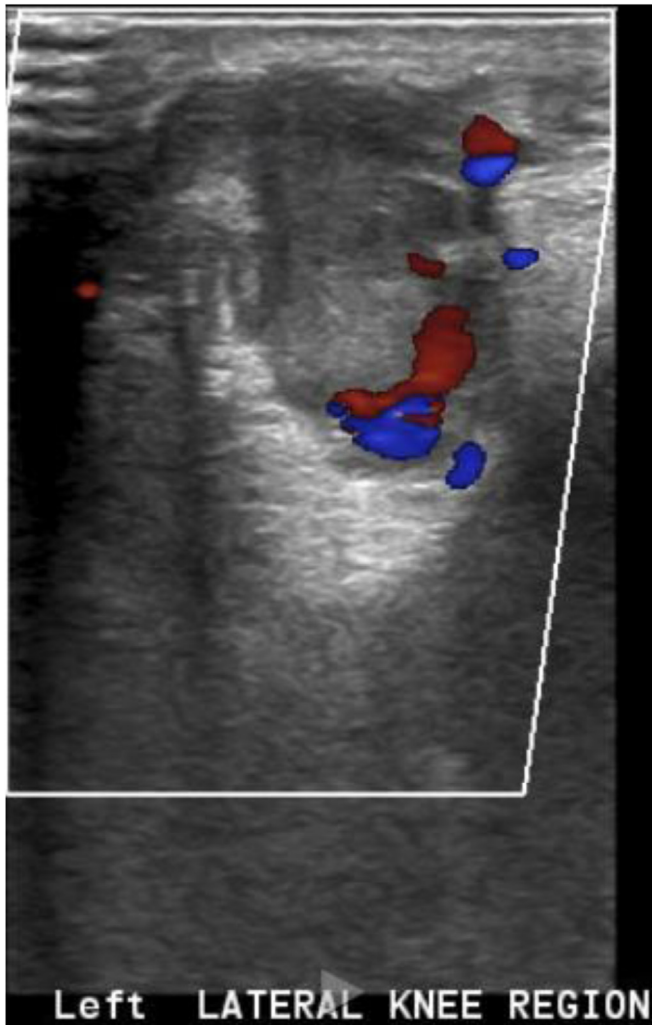


Fig 1. Ultrasound images of the left lateral knee showing heterogeneous echogenicity with antegrade and retrograde flow, more commonly referred to as the “to-and-fro” sign consistent with a pseudoaneurysm (PSA). Antegrade flow is arterial blood entering the PSA sac, and retrograde flow is diastolic regurgitation of the arterial blood.

ultrasound findings previously and high clinical suspicion, the decision was made to coil embolize the left LIGA. A microcatheter was selected in the LIGA and advanced toward the area of narrowing seen most prominently on the LAO arteriogram. Coil embolization was performed. The completion angiogram showed successful coil embolization. Postoperatively, the patient reported resolution of his symptoms, and he was discharged on postoperative day 1 after follow-up duplex ultrasound.

DISCUSSION

This case highlights several important factors. From an orthopedic view, contralateral vessel injury during

arthroscopic medial meniscectomy is rare, especially in an individual without any previous surgeries and otherwise healthy. Comprehensive literature reviews have reported the incidence of major complications, including neurovascular compromise, as $<0.4\%$.⁶ The incidence, specifically, off genicular PSAs is even less. Previous case reports outlining medial genicular PSAs also highlight coil embolization as the gold standard of treatment. However, more importantly, the present case highlights the specialized role of ultrasound in the management of vascular disease compared with other modalities. Performance of the point-of-care CTA was an appropriate usage of resources in the emergency department. However, it was unhelpful in describing any type of vascular injury, with the initial differential diagnosis ranging from a hematoma to an abscess. Likewise, angiography was also limited in the evaluation of the PSA. A standard lower extremity runoff imaging study did not show filling opacification of the PSA. Thus, only from the preoperative ultrasound did the clinicians know where specifically to focus their attention. Finally, steep LAO cone-beam CT was performed, which did show focal narrowing at the suspected PSA with a concurrent robust genicular artery. Together, these findings clinically corroborate what was shown on the CDU without direct visualization of the PSA. The addition of intraoperative CDU in the present case would have confirmed the findings without the need to rely solely on clinical judgment. Additionally, after coil embolization, the robust genicular artery was not visualized, and the patient had resolution of his symptoms. The importance of CDU cannot be overemphasized, especially in the management of PSAs. It offers a unique ability to assess real-time dynamic hemodynamics, similar to angiography, without invasive access. Although our patient is young and healthy, older patients with intrinsic kidney disease have a higher risk of contrast-induced nephropathy,⁷ which would make repeated angiograms dangerous. Likewise, CTA and magnetic resonance angiography are not dynamic test modalities and do not offer the same assessment of vascular characteristics. Finally, CDU is an inexpensive diagnostic test that can be performed in almost any setting ranging from the bedside to the hybrid room. Duplex ultrasound does have limitations, mostly centered around the technologist's skill level. However, this is a user-dependent weakness that will dissipate as more emphasis is placed on ultrasound. There is an evolving paradigm on the use of intraoperative CDU, intravascular ultrasound, and trained OR sonographers to help better manage PSAs and other vascular disorders. This case highlights this persistent need.

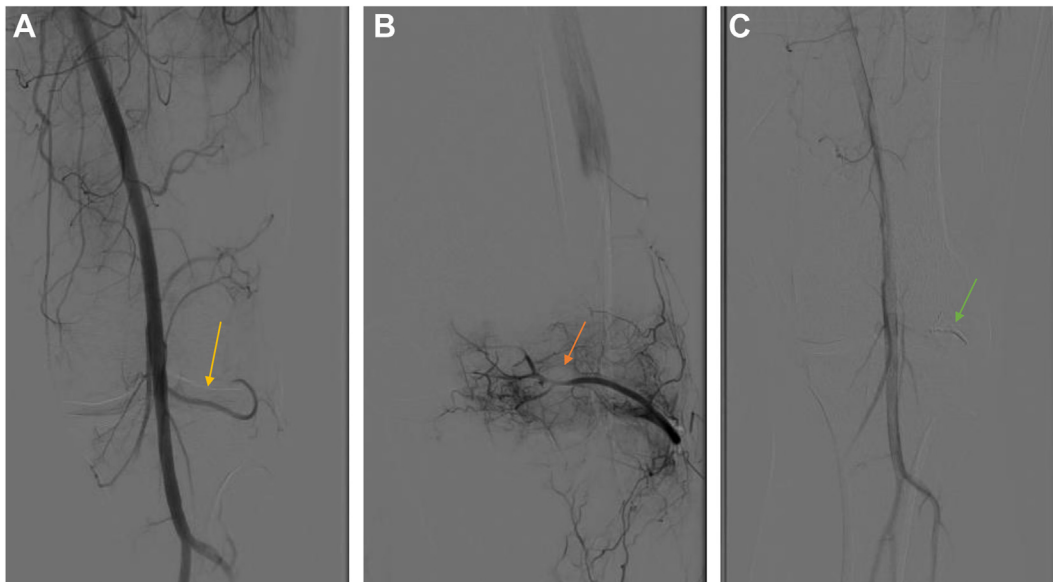


Fig 2. Angiographic images of the left lower extremity. **A**, Patent vasculature throughout the lower extremity arterial system with a robust lateral inferior geniculate artery (LIGA; *yellow arrow*). **B**, Steep left angle oblique (LAO) view showing focal narrowing (*orange arrow*) at the distal geniculate artery. **C**, Lower extremity angiogram after coil embolization (*green arrow*) with no flow in the geniculate system.

DISCLOSURES

None.

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