

Transarterial Embolization of an Inferior Genicular Artery Pseudoaneurysm with Arteriovenous Fistula after Arthroscopy

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Arthroscopic meniscectomy of the knee is generally a safe and effective procedure with a low rate of vascular complications. We report here on a unique case of a 55-year-old man with a lateral inferior genicular artery pseudoaneurysm and a concomitant arteriovenous fistula that developed after arthroscopic meniscectomy; this was successfully treated with selective angiographic embolization. This case illustrates the effectiveness of an endovascular approach as a minimally invasive treatment for this uncommon complication that occurs after an arthroscopic procedure.

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Arthroscopy meniscectomy of the knee has become a routine therapeutic procedure. The worldwide clinical experience has proven this technique to be safe, effective and well tolerated by patients, with low rates of morbidity and mortality (1, 2). The overall complication rate for knee arthroscopy ranges from 0.56% to 8.2%. Vascular injuries are quite rare and they represent less than 1% of all the complications (1–3), and most have involved the popliteal artery or vein, or both. There are only a few reports about injuries to the genicular artery during arthroscopic procedures. In this report, we describe a unique case of iatrogenic lateral inferior genicular artery pseudoaneurysm and concomitant arteriovenous fistula that were detected one week after arthroscopic meniscectomy; these lesions were successfully treated with superselective percutaneous transarterial embolization.

CASE REPORT

A 55-year-old man in good general health had pain and intermittent locking of the left knee of two months duration. Clinical examination revealed tenderness at the lateral joint line and moderate effusion. Magnetic resonance imaging (MRI) showed a displaced bucket-handle tear of the lateral meniscus and so arthroscopic lateral meniscectomy was performed. Increasing pain and swelling in the left popliteal fossa developed postoperatively over the following five days. A 65-mL hematoma was aspirated and repeat arthroscopy of the knee detected only remnants of blood. The limb showed no signs of ischemia. The same symptomatology was displayed four days later and so the patient was referred for endovascular management. Selective arteriography was performed via the right femoral artery, and a 4-Fr catheter was placed into the left proximal popliteal artery. After contrast injection (30 mL at 8 mL/sec; Iopromida, Shering, Madrid, Spain), a pseudoaneurysm measuring 2.5 × 1.6 × 0.9 mm and arising from the lateral inferior genicular artery was detected; there was early venous drainage via the hypertrophied genicular veins, forming an arteriovenous (AV) fistula (Fig. 1). A hydrophilic 3-Fr catheter (Terumo, Leuven, Belgium) was selectively

advanced over a guide wire into the injured genicular artery. The pseudoaneurysm was embolized with two small (2 mm in diameter, 20 mm in length) fibered platinum coils (Cook Europe, Bjaeverskov, Denmark). Follow-up angiography demonstrated complete occlusion of the AV fistula, with no filling of the pseudoaneurysm (Fig. 2). Clinically, the patient became free of symptoms a few days after the embolization and further clinical follow-up at six months was uneventful.

DISCUSSION

Vascular injuries arising from arthroscopy of the knee are very rare, and several large series have reported an incidence of less than 1% (1, 2). Most vascular injuries involve the popliteal artery or vein, or both (2).

Pseudoaneurysms of the popliteal and lateral genicular arteries after knee surgery are rare and only a few, isolated case reports have been published (3–6). Pseudoaneurysms are more likely to form when a vessel is incompletely divided and blood dissects into the surrounding soft tissues. The susceptibility of the popliteal artery and its branches to injury during arthroscopic meniscectomy is due to several factors, including the employed surgical technique, and the operator's experience and knowledge of their anatomic location (3, 4). The popliteal artery is close to the posterior capsule of the joint and it is moved forward during knee flexion. However, visualization of this region during knee arthroscopy is limited and any injury is often not immediately recognized (4).

Nevertheless, the formation of combined pseudoaneurysm and AV fistula after knee arthroscopy is

extremely rare. Only two such cases have been previously reported on, and both of these occurred in the popliteal artery (5, 6). Karkos et al. reported a case of AV fistula of the lateral superior and inferior geniculate arteries, and the etiology of this was unclear (7). In our case, the mechanism to injury was probably direct trauma by cutting all three layers of both the artery and vein with scissors, which resulted in an AV fistula. Alternatively, hematoma formation around the artery and vein with degradation of the enclosed vessels may have also resulted in a combined pseudoaneurysm with AV fistula.

When a patient has popliteal swelling, mass, bruit, thrill, recurrent hemarthrosis, pain, calf edema, and/or a neurologic deficit after a knee arthroscopy, the possibility of a vascular injury should be considered early on in the diagnostic process (2, 4). The diagnosis can be confirmed by conventional arteriography, as in our case, by Color Doppler sonography, or with using three-dimensional CT or MRI arteriography techniques (4–8).

Surgical exploration with vessel ligation is the "gold standard" of treatment because it preserves distal flow if collateral circulation has formed (3, 5–8). Other treatment options include correction of the vascular tear by vascular patch or direct suture (8). Sonographically guided compression to occlude the postcatherterization pseudoaneurysm of the femoral and brachial arteries has been reported on (9). However, with the advances in selective endovascular techniques, percutaneous embolization has been successfully performed for the management of popliteal pseudoaneurysms and also for the delayed combined pseudoaneurysm and AV fistula of the anterior tibial artery after an open tibial fracture (10). In our case, we embolized the



Fig. 1. A. Digital subtraction intraarterial angiography reveals a pseudoaneurysm originating from the inferior genicular artery (arrow) with shunting of contrast into the venous system (arrowheads). **B.** Postembolization digital subtraction intraarterial angiography demonstrating the embolized pseudoaneurysm; note the coils that were used and complete occlusion of the aneurismatic fistula (arrow).

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lesion with using microcoils to definitely occlude the pseudoaneurysm and AV fistula.

This case demonstrates that superselective percutaneous angiographic embolization with coils offers the advantages of a minimally invasive approach (no surgical incision, a reduced risk of infection and a shortened hospital stay); therefore, this technique may represent an effective and safe therapeutic alternative for this uncommon complication of knee arthroscopy.

In summary, we report here on a unique case of a lateral inferior genicular artery pseudoaneurysm with concomitant arteriovenous fistula as a complication of knee arthroscopy. This was successfully treated with superselective percutaneous transarterial embolization.

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