Surgical management of popliteal artery pseudoaneurysm. A case report

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Background

Popliteal pseudoaneurysms are a rare vascular pathology, usually caused by trauma or iatrogenic interventions. The reported incidence in the literature about vascular injury after orthopedic procedures varies between 0.005 and 0.5% depending on the procedure. The popliteal artery the most common major vessel involved in iatrogenic orthopedic injuries. The case of a 12 years old patient with popliteal artery pseudoaneurysm after resection of right proximal end femur osteochondroma is presented, diagnostic evaluation proceeded with Doppler Ultrasonography and computed tomography angiography, which showed a vascular defect of saccular morphology at the level of the distal epiphysis of the right femur. The open-surgical repair was planned, pseudoaneurysm resection and anastomosis of the distal and proximal popliteal artery with saphenous vein graft were performed without complications. The patient was discharged after three days and currently 5 months after surgery with favorable clinical evolution. This case report aims to describe the diagnosis and successful surgical treatment of this vascular pathology.

Keywords: Popliteal artery, Pseudoaneurysm, Saphenous vein graft, Bypass.

seudoaneurysm (PSA) also known as false aneurysm or pulsating hematoma is a saclike structure surrounded by periarterial tissue and blood clot that communicates with the arterial lumen and results from disruption of all layers of the arterial wall giving rise to an extravascular hematoma[1]. While the common femoral artery is the predilection site for pseudoaneurysms due to its frequent use in invasive procedures, pseudoaneurysms of the popliteal artery (PPAs) are rare and can have various causes such as penetrating trauma, fractures, previous surgery, infections, and osteochondromas[3]. Usually can cause a range of symptoms and usually present as a painful, localized swelling, pain, pulsatile or non-pulsatile mass[10]. Clinical suspicion must be confirmed with an imaging study, the computed tomography angiography it helps in identifying associated lesions and for planning surgical approach. These lesions should be repaired shortly because their complications (rupture, thromboembolic episodes) carry a high risk for limb dysfunction and amputation. There is no evidence that demonstrates the superiority of the endovascular procedure and most are treated with open surgery.

Case report

A 12-year-old girl was referred to our unit for edema and pulsatile mass in the right popliteal fossa of 2 months of evolution, at physical examination, all limb pulses were normal, the mass was located in the popliteal fossa, on palpation, with firm characteristics, tender, and a pulsatile movement of the skin. The patient's medical-surgical history revealed а Osteochondroma resection of the distal right femur 6 months ago. A Doppler ultrasound was requested and revealed in popliteal fossa a round hypoechoic image with dimensions of 42x38 mm, anterior and lateral wall shows thickened and Color-Doppler ultrasound (Fig. 1) confirmed arterial and venous flows giving "vin-vang" effect. characteristic а of а pseudoaneurysm. Computed tomography angiography (Fig. 2) confirmed the ultrasound diagnosis, which showed a vascular defect of saccular morphology at the level of the distal epiphysis of the right femur, 51 x 37 x 43 mm dimension, it presents an adventitia layer with increased dimensions of a heterogeneous aspect associated with an intramural hematoma. Given the above findings, an open surgery was planned, a pneumatic tourniquet applied at the proximal thigh was used as an adjunct for providing vascular control, using a posterior approach through the popliteal fossa with an "S" incision, and the area was explored. Pseudoaneurysm had 60x50 mm dimension, it adhered to spongy bone and partially thrombosed (Fig.3), the surgical intervention involving Pseudoaneurysm's resection, and was decided to do a popliteal artery bypass using autologous saphenous vein, a nonabsorbable suture material (Polypropylene Suture 6-0) was used to perform an end-to-end anastomosis (Fig. 4), blood flow and no leakage were verified, the surgical procedure was performed successfully

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Figure 1. Doppler US showing the yin-yang sign of Pseudoaneurysm.

without complications. Post-operatively was uneventful, the peripheral pulse was maintained. This specimen (Fig. 5) was sent to pathology service, histopathologic impression was papillary endothelial hyperplasia. For post-surgical management, we indicated a low molecular weight heparin (LMWH) of antiplatelet with subsequent use agent (acetylsalicylic acid) after hospital discharge. At 1mont follow-up, distal peripheral pulses were palpable and capillary refill time of 2 seconds, no edema. Three months post-operatively, she was asymptomatic and physical seprehabilitation have begun.

Discussion

А pseudoaneurysm pulsating, is а encapsulated remains hematoma that in communication with the lumen of a ruptured or injured vessel. The arterial wall itself is torn or ruptured, and the external wall of the aneurysmal sac consists of outer arterial layers, perivascular tissue, blood clot, or a layer of reactive fibrosis[13]. PPAs are uncommon and mostly associated with prior medical interventions or trauma, In particular orthopedic and vascular procedures[3].

Injury to the popliteal artery most commonly occurs during resection of the femoral condyles or proximal tibia and during release of the posterior capsule. The leading symptom of PPAs is a large pulsating mass in the popliteal fossa, frequent accompanying symptoms such as localized swelling, pain, limited leg extension movement, may also be manifested with claudication, acute limb ischemia, and rupture [10] [11]. Symptoms may occur in the



Figure 2. Right Popliteal Artery Pseudoaneurysm on CT angiography.

immediate postoperative period or up to 5 months after surgery, clinical suspicion should be confirmed with an imaging study, Duplex sonography provides excellent visualization of the disrupted vessel wall in a pseudoaneurysm and CT angiography, which helps to identify associated lesions and surgical planning[6]. arteriography by arterial puncture is considered the gold standard in the diagnosis of pseudoaneurysm of the arteries[3]. It is very important to perform a prompt diagnosis and treatment to avoid serious complications like limb loss[4].

There are 2 main treatment approaches for PPAs according to the characteristics of each patient: open surgery by vein interposition and endovascular



Figure 3. Intraoperative findings, Popliteal Artery pseudoaneurysm. Posterior view

intervention with the exclusion of the pseudoaneurysm with covered stents, in both cases, the goal was to effectively treat the pseudoaneurysm and prevent potential complications such as rupture or thrombosis [3]. The arterial reconstruction is performed using a graft interposition, typically of the autologous saphenous vein. When feasible, pseudoaneurysm resection and arterial reconstruction with end-to-end anastomosis was also a treatment option, the choice of the greater saphenous vein (GSV) as a bypass conduit for lower extremity revascularizations has improved long-term durability and complication-free outcomes '



Figure 4. Anastomosis of the distal and proximal popliteal artery with saphenous vein graft.

compared with the use of various synthetic materials[14]. Endovascular techniques with coil embolization is another option[5], it can be used when all the equipment is available, and the patient's hemodynamic status is optimal. There is no evidence to demonstrate the superiority of the endovascular approach. Post-surgical use of anticoagulant or antiplatelet therapy is indicated to reduce the risk of thrombosis.



Figure 5. Popliteal pseudoaneurysm piece.

Conclusion

During the review of previous studies on popliteal pseudoaneurysm and its management, we can conclude that a high percentage of pseudoaneurysms are associated with previous surgical procedures, as in the case presented. As well as open surgical management using autologous saphenous vein grafting is a favorable alternative to the minimally invasive endovascular approach, which can be a reproducible technique with a good prognosis.

Conflicts of interests

The authors declare no conflict of interest.

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