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CLINICAL CASE

Popliteal artery acute thromboembolic ischemia from a persistent sciatic artery

Isquemia tromboembólica aguda de la arteria poplítea por una arteria ciática persistente

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Abstract

A persistent sciatic artery (PSA) is a rare anomaly and it is an embryologic remanent of the internal iliac artery, occurring in five different forms, depending on its relationship with the superficial femoral artery (SFA). Physicians must acknowledge the existence of this anomaly, and it should be included in the differential diagnosis of lower limb ischemia. We present the case of a 56-year-old female who presented with a popliteal artery acute ischemic event. Angiography showed a hypoplastic right SFA with a patent PSA vascularizing the lower extremity. A conventional embolectomy through a P1 popliteal incision was auspiciously performed. A magnetic resonance angiography confirmed a PSA of the right lower extremity during the post-operative period. At 12-month follow-up, the patient is well and asymptomatic.

Keywords: *Persistent sciatic artery. Acute limb ischemia. Persistent sciatic artery. Anomaly.*

Resumen

Una arteria ciática persistente es una anomalía rara y un remanente embriológico de la arteria ilíaca interna. Se presenta en cinco formas diferentes, dependiendo de su relación con la arteria femoral superficial. Los médicos deben reconocer la existencia de esta anomalía y debe incluirse en el diagnóstico diferencial de isquemia de miembros inferiores. Presentamos el caso de una mujer de 56 años que consultó por un evento isquémico agudo de la arteria poplítea. La angiografía mostró una arteria femoral superficial derecha hipoplásica con una arteria ciática permeable persistente que vascularizaba la extremidad inferior. Se realizó auspiciosamente una embolectomía convencional a través de una incisión poplítea P1. Una angiografía por resonancia magnética confirmó una arteria ciática persistente de la extremidad inferior derecha durante el postoperatorio. A los 12 meses de seguimiento, la paciente se encuentra bien y asintomático.

Palabras clave: *Arteria ciática persistente. Isquemia arterial aguda. ACP. Anomalía.*

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Introduction

A persistent sciatic artery (PSA) is an embryologic remanent of the internal iliac artery, being present in 0.03-0.06% of the population[1]. The sciatic artery is a branch of the umbilical artery and the main arterial supply of the lower limbs during the embryonic phase until the 3rd month of development which is supply by the superficial femoral artery (SFA), and then, the umbilical artery develops into the internal iliac artery. The PSA may persist when the SFA develops incompletely, and when this happens, the internal iliac artery supplies blood to the lower leg through the PSA[2]. PSA can occur on the right leg, the left leg, or bilaterally, in 50%, 20%, and 30% of the cases, respectively. The PSA can be completed or incompleted, depending on whether the SFA is normal, hypoplastic, or absent[3].

Physicians must acknowledge the existence of PSA since up to 50% of the patients with this anomaly will eventually develop aneurysmal formation, leading to an increased risk of acute lower ischemia and potential limb loss[4].

The present study's objective is to describe a 56-year-old female patient with PSA who presented with acute limb ischemia. A review of the literature is also presented.

Case report

A 56-year-old female patient with a previous history of ovarian cancer was electively admitted for a ventral hernia repair. Laboratories were within normal parameters. During completion of the herniorrhaphy, under general anesthesia, the patient presented sudden hemodynamic instability, with tachycardia and hypotension, without an explained cause. She was transferred to the coronary unit, and cardiac studies were within normal parameters. On the 2nd post-operative day, she was extubated, and on the 3rd post-operative day, when she tried to walk, she referred acute right leg pain on a scale of 9/10. Physical examination showed absent right popliteal and tibial pulses, with a regular femoral right pulse. An arterial Doppler ultrasound was ordered, where thrombotic occlusion of the right popliteal and tibial arteries was seen. She was taken to the angiography suit, where an angiogram was performed with us-guided puncture to the left common femoral artery, after crossover, an angiogram showed adequate patency of the common and profound femoral arteries, with a hypoplastic SFA and a right occluded popliteal artery (Fig. 1A-C). The decision to perform the right popliteal conventional thrombectomy was made. A right popliteal incision was made at P1 level, popliteal arteriotomy was performed, and embolectomy was achieved with a 3-fr Fogarty catheter. The final angiogram showed adequate patency through the popliteal and tibial arteries, with adequate flow to the foot. The incision was closed, without incidents. After the procedure, a magnetic resonance angiogram was done where a right permeable sciatic artery was confirmed, with good outflow toward the infrapopliteal vessels (Fig. 2A-C). The patient recovered uneventfully and was discharged on POD 3 with aspirin 100 daily. On a 12-month follow-up, the patient is doing well, with adequate infrainguinal pulses, and without claudication or rest pain.

Discussion

PSA is an uncommon anomaly that develops when the SFA is involuted during gestation. Making the diagnosis is a challenge, and most people presenting this anomaly live asymptomatic. The most common symptoms are limb ischemia (claudication, rest pain, or necrosis) and mass formation, being less frequently encountered neurological disorders, such as radicular pain or foot drop[4]. In a systematic review of PSA by Van Hooft et al.[4], 146 PSAs in the literature were studied. They found that 80% of the patients presented symptoms, with 26.3% having acute onset. The most common symptom was rest pain (29.6%), followed by claudication (27.4%).

In most cases, the diagnosis is made incidentally during physical examination for lower extremity symptoms such as claudication, rest pain, or acute thromboembolism[5]. Our patient presented with sudden acute leg pain due to acute embolism. A positive Cowie's sign might be seen when distal pulses are present in the absence of femoral pulses. This sign is pathognomonic for PSA[6]. In our patient, this sign was absent, and on the contrary, a femoral pulse was present, and popliteal and tibial pulses were absent.

Diagnostic tests might vary, and the most frequently used include computed tomography angiography (CTA), magnetic resonance imaging (MRI), and angiography. CTA and MRI are useful for showing possible aneurysmal formation of the artery and its relationship with adjacent structures such as the sciatic nerve. Furthermore, they can show a totally occluded PSA that might not be seen with angiography. Our patient's diagnosis as first was made with angiogram, and postoperatively confirmed with MRA, where the PSA was seen without aneurysmal degeneration. Arterial Doppler ultrasound can also help with diagnosis; nevertheless, a meticulous examination should be made as the absence of the SFA might lead to the assumption of a complete thrombosis of the vessel, confusing it with a hypoplastic vessel.

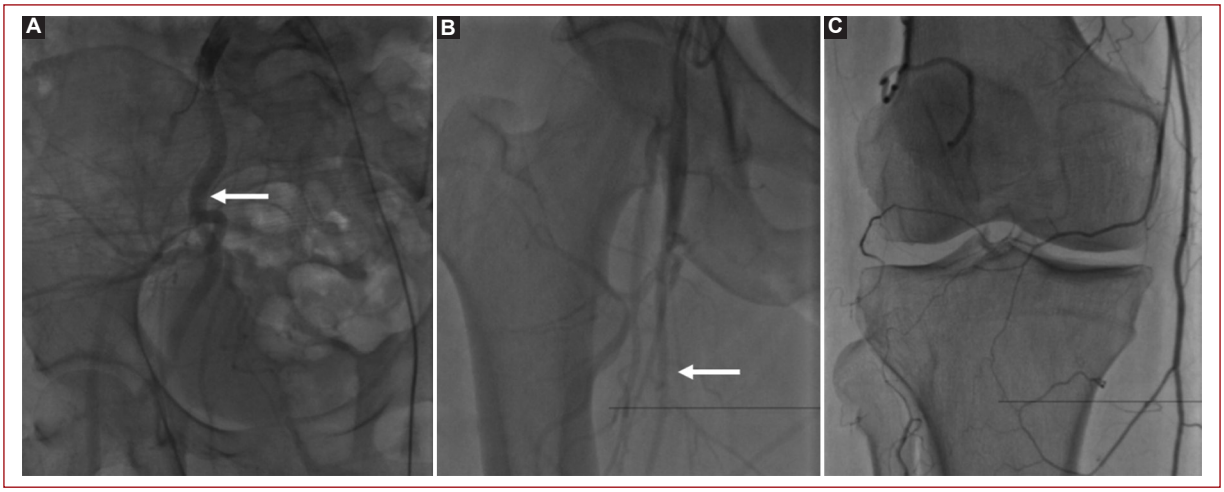

Figure 1. Angiogram. **A:** persistent sciatic artery (white arrow). **B:** hypoplastic superficial femoral artery (white arrow). **C:** popliteal artery occluded due to embolism.

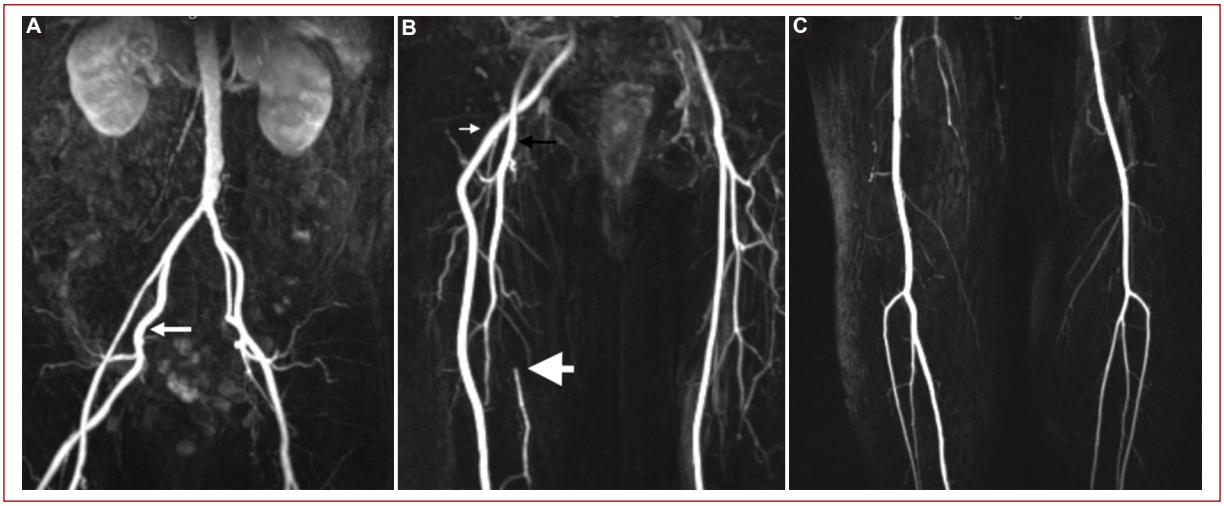

Figure 2. Magnetic resonance angiogram. **A:** aortic bifurcation. A hypoplastic external iliac right artery with a persistent sciatic artery (white arrow). **B:** right persistent sciatic artery ending in the popliteal artery (thin white arrow). Profunda femoris of good caliber (black arrow). Hypoplastic superficial femoral artery occluded in its middle third (thick white arrow). **C:** post-embolectomy right popliteal artery runoff with good outflow.

Ultrasound scanning through a posterior approach can help to identify a PSA and its collateralization of the above-knee popliteal artery[7].

Angiography is the most used study for detecting PSA since it gives information about the classification and outflow of the PSA. Pillet et al.[8] in 1980 described four different types of PSA. Types I and II involve a complete PSA in combination with a complete femoral artery and an incomplete femoral artery, respectively. In subtype IIa, the SFA is present without reaching the popliteal artery; in subtype IIb, the SFA is absent. Type III has an incomplete proximal PSA with normal femoral arteries. Type IV has an incomplete distal PSA with normal femoral arteries. A V type was added 12 years later by Gauffre et al.[9] where the PSA originated from the sacral artery, with developed and undeveloped SFA corresponding to types Va and Vb, respectively. Our patient presented with type IIa because he had a complete PSA with a hypoplastic SFA. Table 1 summarizes the types of PSA.

Patients can present with stenosis or aneurysm with and without distal thrombosis of the PSA[4]. The precise

Table 1. Types of persistent sciatic artery

Type	Persistent sciatic artery	Superficial femoral artery
Type I	Complete	Complete
Type II a	Complete	Incomplete (does not reach the popliteal artery)
Type II b	Complete	Absent
Type III	Incomplete (lower part is absent)	Complete
Type IV	Incomplete (upper part is absent)	Complete
Type V a	Originate from sacral artery	Complete
Type V b	Originate from sacral artery	Absent

cause of why an aneurysm is recurrently seen in a PSA is undetermined. One theory is that the vessel is affected by recurrent trauma from compression against the sacrospinous ligament, piriformis muscle, and hip during flexion of the hip articulation, causing destruction of the adventitia and media, resulting in aneurysmal dilatation[10].

Treatment depends on the type of PSA encountered and on the symptoms of the patients. If the PSA or the SFA is hypoplastic or incomplete, maintaining circulation to the lower extremities should be the primary objective. A femoral-popliteal bypass, ilio-popliteal-transobturator bypass, or interposition bypass can achieve revascularization[4]. If an aneurysm is encountered and the PSA is patent, ligation of the PSA can be safely performed. If the PSA is not patent, then end-to-end reconstruction after aneurysmectomy can be done using a venous or prosthetic graft[7]. Endovascular treatment with stent placement has also been reported with reasonable patency rates[1]. If the patient is asymptomatic, conservative treatment is recommended, with active image surveillance, due to the high incidence of aneurysmal formation, or thromboembolic events[7,11]. Our patient presented with a patent PSA, so the embolism acute event was resolved by embolectomy, and the PSA was left intact. Furthermore, the patient will be kept under active surveillance due to the known risk for PSA aneurysm formation in up to 50% of the cases[11].

Conclusion

PSA is a rare arterial embryological anomaly with a high incidence of complications. A prompt diagnosis should be made and treated according to the PSA type encountered. PSA should be included in the differential diagnosis of lower limb ischemia.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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