

# AN INCIDENTAL FINDING OF A PERSISTENT SCIATIC ARTERY – CASE REPORT AND LITERATURE REVIEW

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## Abstract

*Persistent sciatic artery is a rare anatomic variation due to the lack of regression during fetal development, associated sometimes with abnormalities of the iliofemoral arterial axis and predisposing the patients to aneurysm formation and thromboembolism, which can compromise the limb. In our department, we assisted a 59-year-old male with an acute limb ischemia as result of an incidental finding of a thrombosed persistent sciatic artery aneurysm.*

**Keywords:** *Persistent sciatic artery; sciatic artery aneurysm; vascular embryological development; acute ischemia.*

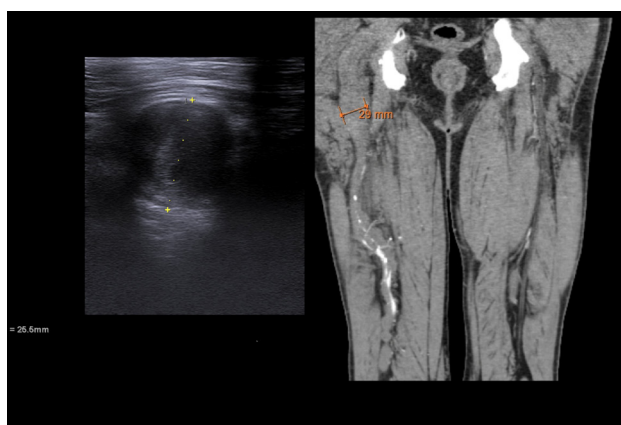
## INTRODUCTION

The presence of a persistent sciatic artery (PSA) was first described in a post-mortem case by Green<sup>1</sup>, in 1832. This artery is the main inflow artery of the lower limb in the early embryological development<sup>2</sup>. After the 8th week, the sciatic artery starts to regress while the superficial femoral artery starts to develop towards knee level progressively becoming the main arterial supply. In the 3<sup>rd</sup> month, in a normal development, the sciatic artery supply is completely interrupted, and some residuals persist as part of the peroneal and popliteal arteries<sup>3</sup>.

The lack of regression of the sciatic artery gives rise to a rare congenital variant of the lower limb vasculature, with a reported incidence of 0.025% to 0.04% in the population<sup>4</sup>, with a mean age of diagnosis of 57 years and an almost equal gender distribution<sup>5</sup>. It can be bilateral in 30% of cases<sup>6</sup>. Starting at the internal iliac artery, the PSA runs through the greater sciatic foramen, in close relationship to the sciatic nerve, and even sometimes, inside the sciatic nerve sheath<sup>7</sup>.

Distally it courses laterally, along adductor magnus muscle, reaching the popliteal fossa afterwards. Due to this anatomical course, PSA is predisposed to early atherosclerotic changes, aneurysm formation and consequently distal embolic events. Also, the proximity with the nerve makes sciatic neuralgia a possible clinical presentation.

PSA is frequently associated with a range of abnormalities of the iliofemoral arterial axis, which created a need to classify these variations. In 1980, Pillet et al.<sup>8</sup> have described four different types of PSA, depending on the presence of a complete/incomplete PSA and on the status of the superficial femoral artery. Latter in 1994 a fifth type of classification was added by Gauffre et al.<sup>9</sup> when PSA was found originating from the median sacral artery. Recently a new and simpler classification was proposed by Ahn et al.<sup>10</sup> based on the anatomic status of both PSA and SFA, and the presence of aneurysm degeneration (Table 1). Unclassifiable by the Pillet-Gauffre’s system, this new approach made the classification of patients with both incomplete PSA and SFA possible.



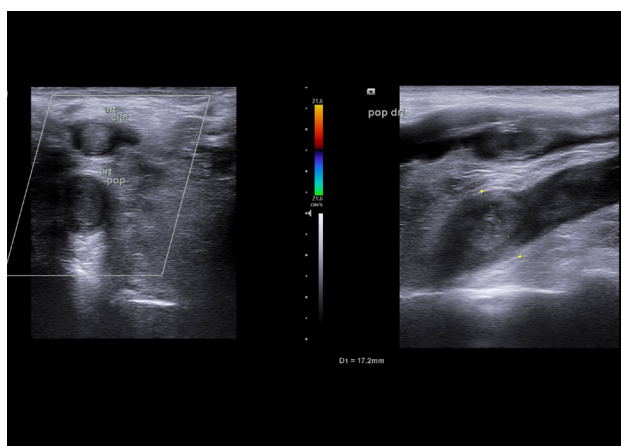
**Figure 1**

*Ultrasound and CT angiography reconstruction revealing a PSA running in the posterior thigh compartment.*

We report a PSA-Class Ia case (Ahn-Min's Classification) and resume the available information on the literature about clinical features, diagnostic tools and treatment on this matter.

### CASE REPORT

A 59-year-old male presented to our department with an acute onset of pain and paresthesia in the right foot with four days of evolution. He had no previous symptoms of either buttock or leg claudication. He had a past medical history of biological aortic valve replacement, and was not under antiplatelet or anticoagulant medication. He had hypertension controlled with oral medications and no other atherosclerotic risk factors were identified. Normal femoral pulse in the symptomatic limb was present when he arrived at our emergency department. In the asymptomatic leg distal pulses were present and a broad popliteal pulse was noted. Computed tomography angiography revealed not only a thrombosed popliteal aneurysm but also a persistent sciatic artery in continuation of the right internal iliac artery, coursing caudally through the major sciatic foramen and



**Figure 2**

*Thrombosed sciatic and popliteal artery and their relationship in the popliteal fossa.*

adopting a pathway within the posterior thigh compartment, where it became aneurysmatic (29mm) and, also thrombosed (Figure 1). Since there was no motor impairment, the patient was admitted to our ward under therapeutic anticoagulation. Lower limb ultrasound unveiled clear signs of thrombus chronicity in the sciatic artery (Figure 2). Besides, it also revealed poor run off vessels in the leg. The patient was discharged after the symptoms completely disappeared, under anticoagulation. After 6 months on medical treatment the patients remains free of limb amputation, complaining of limb claudication after 200 meters.

### DISCUSSION

#### Clinical Features

Frequently, PSA is discovered by accident during evaluation for lower limb claudication, rest pain, acute limb ischemia or foot ulcers in about 70-80% of the patients<sup>11,12</sup>. Many of the patients will have a subacute/chronic presentation, while 20% will be completely asymptomatic<sup>12</sup>.

Others will present with a painful pulsatile buttock mass or sciatic neuropathy whereas aneurysmal dilation is the most frequent complication, occurring in up to 40%-60% of patients<sup>12,13</sup>. More commonly, the aneurysm will develop in the segment more prone to chronic traumatism as result of human sitting position, between the piriformis muscle and posterior aspect of the greater trochanter<sup>14</sup>. Stenosis and occlusions are reported to have an incidence of 7% and 9%, respectively<sup>5</sup>. This will be clinical important in class III and IV (Ahn-Min's Classification) or in class I and II if there is a concomitant stenosis or occlusion of the iliofemoral segment.

In certain cases, PSA can also be associated with other vascular anomalies and malformations. These may include Mullerian agenesis, arteriovenous fistulae, varicose veins with atypical distribution, and hypertrophy of the lower limb<sup>25,26</sup>. The coexistence of PSA with a hypertrophic limb may be attributed to the shared origin of the vascular and musculoskeletal systems from the mesoderm. Additionally, PSA can be found in combination with a suprafacial brachial artery and a right retroesophageal subclavian artery<sup>26,27</sup>.

#### Diagnostic Tools

On the physical examination, the Cowie's sign, described as diminished or abolished femoral pulse with concomitant palpable popliteal or distal pulses, is considered to be pathognomic for PSA<sup>15</sup>. This is true when the femoral artery is hypoplastic. However, some cases present with both PSA and femoral axis fully developed, which precludes a good sensitivity of this sign.

Vascular imaging modalities like computed tomography angiography (CTA) and magnetic resonance angiography (MRA) allow not only an early diagnosis but also the assessment of the aneurysmal component and its anatomic relationships. Moreover, they enable the vascular surgeon to plan the most suitable surgical treatment according to patients' anatomy features.

Although arterial duplex ultrasound is a noninvasive

**Table 1**

Class	Superficial Femoral Status	Sciatic artery status	Preferred Treatment	Other treatment options
<b>I</b>			BMT	
<b>Ia</b>	Complete	Complete	WW; Embolization if risk of thromboembolism	Aneurysm resection
<b>II</b>			BMT	
<b>Ila</b>	Complete	Incomplete	WW; Embolization if risk of thromboembolism	Aneurysm resection
<b>III</b>			Bypass + Ligation	
<b>IIla</b>	Incomplete	Complete	Bypass + Ligation + Aneurysm embolization	Covered stent Graft; Interposition Graft; Bypass + Aneurysm resection
<b>IV</b>			Bypass	
<b>IVa</b>	Incomplete	Incomplete	Bypass + embolization	BMT Aneurysm Resection

Ahn Min's Classification and algorithm treatment according to each class. "a" stands for aneurysm presence in the sciatic artery.  
BMT – Best Medical Treatment; WW – Watch and Wait

modality and readily available in vascular departments, it can be misleading when performed with no prediagnostic clues, leading to assumption of acute occlusion of lower extremity inflow<sup>16</sup>. Nevertheless, when complaints of painful buttock mass are present it can provide the right diagnosis, and even add information of the run-off leg vessels, especially important, if a surgical/endovascular treatment is considered.

Angiography plays a crucial role in leading to the correct diagnosis especially in the presence of an internal iliac artery aneurysm along with an undeveloped common femoral artery. Additionally, preoperative angiography proves valuable for surgical planning, since it provides detailed visualization of the run-off leg vessels, particularly in cases of distal embolization, ensuring optimal bypass vessel selection. Nevertheless, due to its invasive nature, careful consideration of angiography's benefits versus associated risks is essential for each patient.

### Treatment

The choice of treatment mainly depends on the presence of symptoms, classification of PSA and presence of aneurysmatic degeneration of the PSA artery. Ahn et al<sup>10</sup> also proposed an algorithm treatment along with the new classification (Table I). In class I and II, when asymptomatic incidentally diagnosed non aneurysmatic PSA are present, no intervention is required and a close follow-up observation combined with antiplatelet or anticoagulation therapy is sufficient<sup>18,19</sup>. If aneurysmatic degeneration is present and there is risk of distal embolism, aneurysm coil embolization

needs to be considered. Open ligation or aneurysm excision are also an option, but the risk of nerve damage needs to be considered with this approach. To maintain limb perfusion, in class III, bypass plus proximal popliteal artery ligation is required to prevent the risk of leg vessels embolization. Endovascular treatment with a covered stent graft is also another feasible, simpler and minimally invasive option with a recent increase in the number of reported cases<sup>18, 20-24</sup>. Nevertheless, the risk of stent fracture and thrombosis needs yet to be assessed, since long-term follow-up studies are not available. As for the class IV, since both axis are incomplete, the risk of distal embolization does not exist, therefore, bypass can be carried out without PSA ligation, if ischemic symptoms such as rest pain or necrotic lesions are present. Claudication can be best managed with medical therapy only. On the other hand, if PSA aneurysm exists it can be managed in the same way as for the other classes. Up to now, there is no size threshold for the treatment of PSA aneurysms. The treatment should be guided combining the risk of aneurysmal rupture and thromboembolism, considering thromboembolic events lead to amputation in around 8-10% of patients even after surgical treatment<sup>24</sup>. The main goal is to not compromise blood flow to the foot, assuring limb viability.

### CONCLUSION

This case illustrates a common thrombosed popliteal aneurysm presentation, in which, this anatomic variation might have played a role in the poor run off leg vessels,

leading to less therapeutic options. An early recognition could have possibly prevented the life long claudication and future ischemic complications the patient may experience with reduced life quality. High volume studies are yet needed to compare endovascular and conventional surgical approaches in terms of long-term complications and amputation-free survival.

The PSA is rare but it should be promptly recognized, classified and managed accordingly, given the high incidence of complications and risk of limb amputation.

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