

# Persistent Sciatic Artery Aneurysm: Cases Series and Review of Literatures

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**Introduction:** Persistent sciatic artery (PSA) is a rare anomaly of high clinical significance. Embryological, part of the sciatic artery involutes and other parts develop into the popliteal and peroneal arteries. Most cases present silent with aneurysm formation. Treatment is aneurysm exclusion with maintaining limb vasculature.

**Aim:** Was to outline presentations and management PSA patients.

**Patients:** First was female with bilateral pulsating gluteal masses. A bypass was done between the internal iliac and popliteal arteries because the femoral arteries were hypoplastic bilaterally. Second was 59y female presented with critical left lower limb ischemia. Femoropopliteal bypass with exclusion of the aneurysm was done. Third patient was 52y male with right painful pulsating gluteal mass with hypoplastic femorals.

**Conclusions:** PSA is a rare vascular anomaly. Treatment depends on clinical and angiography presentation. Usually surgery is preferred. PSA awareness is in favor to appropriate management.

**Key words:** Persistent sciatic artery, congenital vascular anomaly, gluteal aneurysm.

## Introduction

The persistent sciatic artery (PSA) is a rare but of a high clinical significance congenital anomaly occurring in 0.03 – 0.06% of the population. Such an anomaly was published as early as in 1832 in the Lancet by Green. The first description of PSA aneurysm was reported in 1864, rupture of which resulted in the death of the patient.<sup>1</sup>

During the early embryonic phase, the umbilical artery develops into the internal iliac artery. The internal iliac artery continues forming the sciatic artery. The sciatic artery runs along the sciatic nerve and forms the major blood supply to the lower limb. When the femoral arteries develop, a part of the sciatic artery involutes and other parts develop into permanent arteries; as the proximal part gives rise to the superior and inferior gluteal arteries, while the distal part forms the popliteal and peroneal arteries.<sup>2,3</sup>

For unknown reasons, when the femoral artery develops incompletely, the sciatic artery may persist. The PSA is a tortuous and large vessel. In such condition, the internal iliac artery has a larger diameter than the external iliac artery, supplying blood to the lower leg through the PSA.<sup>2</sup> Four types of PSA were described by Pillet et al: type 1 represents a complete PSA with a normal femoral artery; in type 2 a complete PSA is present with an incomplete femoral artery; type 3 represent an incomplete PSA (persistent upper part) with normal femoral artery and the type 4 is an incomplete PSA (persistent lower part) with normal femoral artery.<sup>4</sup>

Most cases of PSA are clinically silent and detected only after complications. Unlike the developed femoral artery, PSA is prone to early atheromatous degeneration and aneurysm formation. The thrombosis of the aneurysm and the primitive arterial wall together with minor traumas and sitting, result in micro emboli and aneurysm complications. Clinical manifestations were seen following thrombosis, embolism and rupture of the artery resulting in ischemia and pain of the lower limb.<sup>5,6</sup>

Ultrasound duplex and Computed Tomography (CT) are the preferred diagnostic tools for identifying a suspected PSA. In addition, CT is useful to detect the proximal and distal anatomy of the vessel and helping in pre-operative planning. Usual protocols do not take in consideration the possible anatomical anomalies, especially rare ones, and it is wise to look for subtle indirect sign of likely developmental anomaly when performing lower limb vascular examinations.<sup>3,6,7</sup>

The choice of treatment mainly depends on the clinical manifestations and is usually including the surgical exclusion or excision of the aneurysm together with providing fair vascular supply of the lower limb by endovascular stenting or graft bypass.<sup>6,8,9</sup>

## Aim of the work

The aim of the work was to present the work up management of patients presented with PSA in Vascular Surgery Department of Alexandria University.

## Patients

The study was carried out on three patients documented in less than two years admitted in vascular surgery department of Alexandria University.

**First patient:** A 52-year-old woman presented to our department in May 2015, with sciatic-like pain in both lower limbs nine months earlier. Her history was irrelevant for diabetes or hypertension and she had no more complaints. On physical examination, two pulsatile swellings were present one on each buttock. The swelling of the left side is larger than that of the right side. Bilateral popliteal and pedal pulses were intact with absent femoral pulses of both right and left lower limbs.

The patient underwent diagnostic angiography which revealed a persistent sciatic artery on both sides with the presence of aneurysm. The PSA was the continuation of a dilated internal iliac artery, however the external iliac and femoral arteries were hypoplastic on both sides (**Figure 1**).



**Fig 1: A diagnostic angiography revealed bilateral persistent sciatic artery with gluteal aneurysm.**

A surgical bypass was done for this woman joining the internal iliac artery to the supra-genicular part of the popliteal artery using 8mm ringed synthetic PTFE graft. Exclusion of the aneurysm by ligation of the internal iliac artery just below the anastomosis, and a second ligature was put to the popliteal artery just above the distal anastomosis. The bypass was first performed to the left side in January 2015, however the right side was done one month later (**Figure 2**).



**Fig 2: Intra-operative demonstrating the enlarged internal iliac artery and attenuated external iliac artery.**

On post-operative follow up by repeated visits for 12 months, the sciatic pain was rapidly decreased and only sense of numbness near the ankle was experienced in the first three months, and otherwise there was no more symptoms. Bilateral pedal pulses were confirmed to be present in every visit, and repeated arterial duplex scanning demonstrated a patent bypass with decreasing in the size of the thrombosed gluteal aneurysms. (**Figure 3**).



**Fig 3: Post-operative angiography revealed bilateral patent grafts with resolved aneurysms.**

**Second patient:** A 59-year-old female presented in our department in December 2016 with critical left lower limb ischemia and foot rest pain. She was suffered from sciatic pain in the form of thigh and leg numbness few month earlier. The patient was diabetic and overweight. On vascular examination, the right lower limb was irrelevant with fair distal pulses, however the left side had cold foot with absent popliteal and tibial pulses (**Figure 4**).



**Fig 4: PSA presented with critical left lower limb ischemia in a 59-year-old woman.**

Computed tomography angiography was requested and showed the presence of PSA on both sides. The left lower limb arterial tree revealed that the PSA was emanating from the left internal iliac artery at the level of the sciatic notch, then forming a sizable fusiform aneurysmal dilatation averaging 7.5x4.5mm with adherent mural thrombus. The PSA continued with multiple focal stenosis till the formation of the popliteal artery via the reconstituted sciatic artery. The common and profunda femoral arteries showed normal course with no evidence

of stenosis or occlusion. However the superficial femoral artery was hypoplastic and terminated by muscular branches at the adductor canal level. The right lower limb arterial tree revealed the presence of PSA with a course similar to that on the left side but with no aneurysmal dilatation and no evidence of stenotic or occluded segment (**Figure 5**).



**Fig 5: A diagnostic angiography revealed bilateral persistent sciatic artery with left sciatic artery aneurysm (1) Enlarged internaliliac artery. (2) Hypoplastic superficial femoral artery. (3) Reconstituted left popliteal artery from the PSA.**

The patient was prepared for left lower limb revascularization. Retro-peritoneal exposure of the iliac arteries showed a fair caliber and pulses of both the external iliac and external iliac arteries. Groin femoral incision revealed fair common and profunda femoral arteries while attenuated pulseless superficial femoral artery. A third supra-genicular incision was done to dissect the popliteal artery. Thus a bypass from the common femoral artery distally to the supra-genicular part of the popliteal artery was done using a PTFE graft. The aneurysm was excluded by two ligatures; the first was by ligation of the internal iliac artery at its origin, and the second ligature was on the popliteal artery just above the distal bypass anastomosis (**Figures 6,7**).



**Fig 6: Intra-operative demonstrating surgical approaches in a case of PSA; the arrow shows the distal popliteal anastomosis with the PTFE graft.**



**Fig 7: Intra-operative demonstrating fair size of both internal and external iliac arteries and ligated internal iliac artery to exclude the aneurysm.**

On post-operative, the rest pain disappeared soon, and the popliteal and tibial pulses were detected with fair capillary filling and temperature of the foot. Follow up over one year via repeated imaging, the aneurysm decreased gradually in size and totally resolved.

**Third patient:** A 52- year- old male patient admitted in April 2017 and was complaining of a right painful pulsating gluteal mass two months earlier. Severe sciatic pain of the right lower limb was experienced for long time by the patient. The patient was hypertensive and mild hyperlipidemia. Arterial pulses were intact along the right lower limb.

Angiography revealed the presence of a right PSA with aneurysmal dilatation. The right internal iliac artery was large in caliber, attenuated size with the absent pulses of both external iliac and femoral arteries. Again the right superficial femoral artery was hypoplastic and terminated by muscular branches in the thigh. The left arterial tree was intact (**Figure 8**).



**Fig 8: A diagnostic angiography revealed right persistent sciatic artery with gluteal aneurysm, enlarged internal iliac and attenuated external iliac and femoral arteries.**

The patient was prepared for surgical intervention. A surgical bypass was done for this patient joining the right internal iliac artery to the supra-genicular part of the right popliteal artery using 8mm ringed synthetic PTFE graft. Exclusion of the aneurysm by ligation of the internal iliac artery just below the anastomosis, and a second ligature was put to the popliteal artery just above the distal anastomosis. No post-operative complication was encountered to this patient, and again the aneurysm decreased gradually in size through the follow-up period.

## Discussion

The PSA is the embryonic remnant from the stage before the external iliac and femoral arteries development. The sciatic artery arises from the umbilical artery and passes to reach the sole of the foot. Normally, only segments of the sciatic artery persist as popliteal and peroneal arteries. PSA runs within the buttock and thus it is exposed to repeated trauma and stretching, and in addition to the primitive vessel wall structure is in favor for aneurysmal degeneration of the proximal sciatic artery.<sup>3,10</sup>

Many studies discussed the demographic aspect of PSA. Some earlier studies reported that 80% of PSA are complete type, however other recent reviews suggest that most of PSA are incomplete. Prevalence of PSA was reported as 1 in 1700 to 3300. In 40 – 60% of cases were complicated by aneurysms, 7% by stenosis and or occlusions. Symptomatic patients were reported in 50% of the cases. The average age is 57 years with no sex predilection. Bilaterality has been shown in 25 – 50% of the cases.<sup>10,11,12</sup>

Aziz et al stated that patients with PSA become symptomatic at a mean age of 40 – 50 year old with equal sex predominance. The most common presenting manifestation is leg ischemia secondary to atherosclerosis or thromboembolism, with up to 25% of them were critical limb ischemia.<sup>13</sup> Other manifestations were shown by Kritsch D et al 2006, which may include a pulsating mass in one or both buttock. 44 to 61% of cases were complicated by aneurysm rupture, distal embolization, aneurysm thrombosis and / or local compression of the sciatic nerve. On examination, a palpable popliteal and distal pulses with no femoral pulse should increase the suspicion of PSA, and angiography is needed to confirm the diagnosis. The PSA is sometimes found in combination with other anomalies as lower limb hypertrophy, varicose veins, arteriovenous fistulae, right retro-esophageal subclavian artery, and Mullerian agenesis.<sup>14</sup> Only one of our patients complained of manifestations of lower limb ischemia, and this may be due to the little number of cases.

Many authors stated that surgical intervention is not indicated in asymptomatic patients, thus treatment of PSA is mainly dependent on the presenting

symptoms. The PSA may be ligated when the femoral artery provides fair blood to the distal limb, however, an additional ilio-popliteal bypass is needed when the femoral artery is hypoplastic. Again exclusion of a sciatic aneurysm may be complicated by sciatic nerve damage.<sup>15,16</sup>

## Conclusions

PSA is a rare vascular anomaly presented by many complications as aneurysm and ischemia that may be ended by amputation.

Treatment of PSA varies according to clinical presentation and angiography.

For most patients with symptomatic PSA, open surgical treatment is the gold standard.

Physicians should widen their differential diagnosis and be aware of the rare PSA vascular anomaly in order to appropriate treatment.

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## Conflicts of interest

There are no conflicts of interest.

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