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# BILATERAL PERSISTENT SCIATIC ARTERIES (PSA) AND VARICOSE VEINS: MRI DEMONSTRATION OF AN UNUSUAL ASSOCIATION

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**ABSTRACT** Persistent sciatic artery (PSA) is an extremely rare anatomical variant of lower limb arterial supply with an incidence of 0.025-0.6 % as estimated on angiographic studies. This vessel is prone for atherosclerosis, aneurysm formation and rupture, sciatic neuropathy, and ischemia of the lower extremities. It is important to diagnose this condition pre operatively especially in renal transplant surgery and in surgeries around the hip joint as trauma to this anomalous vessel can have disastrous consequences. It is associated with other congenital anomalies including Mullerian and left renal agenesis, A-V fistula formation, hypertrophy or hypotrophy, multiple hemangiomata, neurofibromatosis, or anomalies of leg arteries. Association of this anatomical variant with varicose veins is very rare and rarely discussed in literature. We report the youngest patient till date with this unusual association demonstrated on MRI.

**KEYWORDS** : Persistent sciatic artery, varicose veins , MRI

## Introduction

Persistent sciatic artery (PSA) is an extremely rare anatomical variant of lower limb arterial supply with an incidence of 0.025-0.6 % as estimated on angiographic studies. [1] The exact frequency of PSA remains to be elucidated as it is very rare to identify this condition without the need for surgical intervention or anatomical dissection and radiological demonstration remains uncommon unless it is symptomatic. [2] Although this condition remains asymptomatic, it may present with aneurysmal dilatation, atherosclerotic disease with claudication, limb ischemia or sciatic neuropathy. It is important to recognise this anatomical variant as it may pose difficulty during hip surgeries and renal transplant surgery. Association of this anatomical variant with varicose veins of lower limb is extremely rare. An exhaustive search of English language literature revealed only 4 published cases describing this rare association.[3-6] We describe a 12 year old female patient who presented to us for evaluation of varicose veins of the lower extremity and was diagnosed to have bilateral PSA along with varicose veins. Ours is the youngest patient reported with this unusual association till date.

## Case report

A 12 year old female patient presented with complaints of unsightly veins over the lower extremity which had gradually increased in size and tortuosity over the past one year. She had a dragging type of pain in bilateral lower limbs. On examination dilated tortuous veins were visible over the lower leg. There was no lower limb edema or erythema. The patient was referred to the Radiology department for Doppler study of varicose veins to evaluate valvular competency and perforators. Doppler evaluation revealed varicose veins over the lower extremity and hypoplastic bilateral superficial femoral vessels which terminated in the region of upper thigh.The popliteal vessels were visualised in the popliteal fossa which continued cranially along the posterior aspect of the thigh and deep to the gluteal musculature beyond which they were untraceable. A MR angiography was suggested to assess the complete course of this anomalous vessel. MR angiography showed an anomalous artery [Figure 1A, 1B, short arrows]in continuity with the internal iliac artery [Figure 1A, 1B, long arrows] which followed an anomalous course in the deep gluteal region [Figure 2, small arrow] and the posterior aspect of the thigh[Figure 2, long arrow]. Distally it continued as the popliteal artery which later trifurcated to form the normal anterior and posterior tibial arteries and the peroneal artery. This anomalous vessel was consistent with embryological persistence of the sciatic artery. A delayed phase MR angiography also revealed dilated tortuous veins over the lower extremity. [Figure 3]

## Discussion

Embryogenesis of the lower extremity vasculature is well documented. The umbilical arteries are paired fourth set of ventral branches of dorsal aorta. By the fourth week of gestation corresponding to 5mm embryo stage, a dorsal axial artery supplying the developing lower extremity bud arises from dorsal branch of the umbilical artery and is termed as the sciatic artery [7, 8]. The sciatic artery constitutes the main blood supply to the lower extremity in the 9 mm embryo [9] until it is replaced by the development of common and superficial femoral arteries. The external iliac artery arises from the lateral aspect of the umbilical artery dividing it into two parts, proximally the internal iliac artery and distally the internal iliac artery and its branches.[10] By the 12mm stage the external iliac artery develops further into the common and superficial femoral arteries [11]. As the embryo continues to grow, the sciatic arterial system coalesces with the femoral system via the external iliac artery. By the 22mm stage, the femoral system appropriates the distal sciatic system and the more proximal sciatic artery involutes leaving only the inferior gluteal artery and the artery of the sciatic nerve [1]. Failure of the sciatic artery to involute or femoral system to develop results in persistence of sciatic artery.The cause of this occurrence is however not known.

The PSA is anatomically a continuation of internal iliac artery. It courses through greater sciatic foramen below the piriformis muscle to enter thigh after giving rise to superior gluteal and internal pudendal arteries. PSA enters the popliteal fossa posterior to the adductor magnus and inferiorly to gluteus maximus, where it continues as popliteal artery. [12]

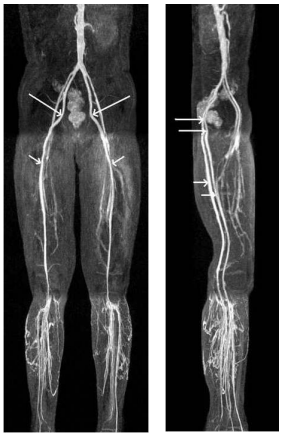
The first case of a PSA was reported by Green in the journal Lancet in 1832[13] and scattered reports have appeared in literature since then. PSA is more common in men and slightly more common on the right than left side. [14] Bilateral PSA is seen in about 12-29% of all cases. [15] PSA can be subdivided into mainly two types as described by Mada in 1955. [16] In the complete type the PSA is a

direct continuation of the internal iliac artery and continues further as the popliteal artery which later trifurcates into the ATA, PTA and the peroneal artery and forms the main vessel supplying the knee and distal lower limb. In the incomplete type the PSA originates from the internal iliac artery but terminates in a small calibre vessel in the region of popliteal fossa. The superficial femoral artery is of normal calibre and continues as the popliteal artery and supplies the distal lower limb.

Clinically, the patients with PSA are usually asymptomatic. However some patients may present with symptoms related to complications like atherosclerosis, rupture, painful buttock mass, sciatic neuropathy, and ischemia of the lower extremities. Forty-six per cent of PSA are known to form an aneurysm, the pathogenesis of which is unclear. [17] A proposed mechanism of aneurysm formation states that the PSA emerging from the infrapiriform foramen turns abruptly at the exit which exerts an outward force on the posterior wall of this artery. The topographical and hydrodynamic conditions of the adjacent soft tissues predispose to aneurysm formation about 20 mm from its exit. [2]

Awareness of the presence of a PSA is very important in two special circumstances. Firstly, in hip surgery there is a possibility of trauma to this vessel when the gluteal muscle mass is reflected [18]. Secondly, in renal transplant surgery, potentially disastrous limb ischemia could occur if an anomalous internal iliac artery continuing into the SA were divided and anastomosed to a transplant renal artery [19]. The presence of this vessel should be clinically suspected in a patient with an absent femoral pulse and detectable distal pulses.

A persistent sciatic artery may be associated with other congenital anomalies including Mullerian and left renal agenesis, A-V fistula formation, hypertrophy or hypotrophy, multiple hemangiomata, neurofibromatosis, or anomalies of leg arteries. An exhaustive search of the English language literature revealed only 4 previously published case reports [3-6] in which patients presented with gross varicose veins and were found to have persistent sciatic arteries. However, in addition these patients also had a limb length discrepancy which along with a persistent sciatic artery and varicose veins formed a distinct clinical entity. It is postulated that a single, appropriately timed, genetic or environmental insult may have synchronously affected the development of both the arterial and venous systems of the lower extremity and the same developmental insult (occurring during femoral embryogenesis) caused these patient's unilateral limb length discrepancy. [3] It would be interesting to note that all the four previously mentioned patients with this triad of findings had a unilateral PSA of the complete variety whereas our patient had bilateral complete PSA but no limb length discrepancy. The association of venous incompetency, limb discrepancies, and persistence of the sciatic artery may be an incidental finding or may represent a related embryologic event. This relationship merits consideration in a young patient presenting with severe venous varicosities.



1A 1B

**Figure 1A, 1B: Coronal and sagittal MR angiography image showing the anomalous persistent sciatic artery [short arrows] arising in continuation with the internal iliac artery [long arrows].**

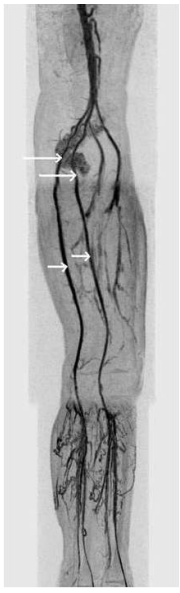


**Figure 2: Sagittal MR angiography image showing the course of the PSA along the gluteal region [long arrows] and the posterior aspect of the thigh [short arrows].**

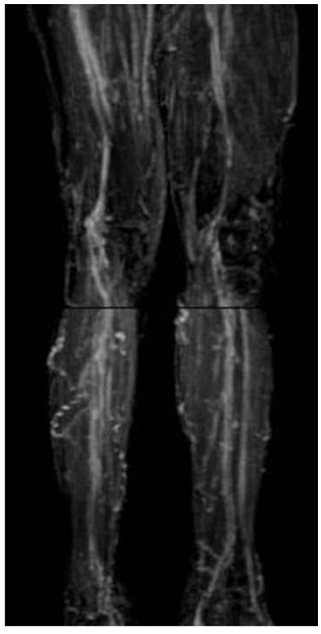


**Figure 3: Coronal delayed phase MR angiography image showing dilated and tortuous veins over the lower leg.**

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