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ABSTRACT

Background: Venous anomalies of the lower extremity are a challenge when found as rare variations. Physicians should be aware of morphological variations in this region for correct diagnosis and management of diseases such as deep vein thrombosis.

Materials and methods: During the routine dissection of the lower extremities of a Caucasian male cadaver, a case of persistent sciatic vein was found.

Results: A persistent sciatic vein originating from the saphenopopliteal junction coursed proximally and laterally to enter into the adductor magnus muscle, at the right side. Running through the fibers of the adductor magnus anteriorly, the variant vein drained into the deep femoral vein just medial to the vastus medialis muscle.

Conclusions: As being a rare congenital vascular anomaly, the persistent sciatic vein should be correctly diagnosed and defined during the radiologic assessments, surgical interventions and blockades for better outcomes and lesser complications.

Key words: sciatic vein, popliteal vein, variation, cadaver, deep femoral vein, Klippel-Trénaunay-Weber syndrome

INTRODUCTION

During the 9th to 15th weeks of embryonic development of foetus, the large primitive axial vein drains the lower extremity. When the femoral vein grows into the main trunk of the thigh, the greater axial vein turns into a lesser arcade along the sciatic nerve. In case of persistence of this axial vein which normally should regress is defined as the persistent sciatic vein (PSV) (1).

PSV, first described by Servelle in 1978, is a rare congenital vascular anomaly characterized by varicose veins, cutaneous hemangiomas, and soft/hard tissue hypertrophy and it is often related with Klippel-Trenaunay Syndrome (KTS). The main venous outflow may be provided by a PSV when the femoral vein is occluded (2).

Classical textbooks define the popliteal vein to be formed by the junction of the anterior and posterior tibial veins at the lower border of the popliteus muscle. Crossing the popliteal fossa vertically, at its superior border the vein passes through the adductor hiatus to become the femoral vein. Within the popliteal fossa, from superficial to deep, first the tibial nerve then the popliteal vein is encountered. The popliteal artery is located deep to the popliteal vein and it is in contact with the femur and the joint capsule. The popliteal vein and artery are in the same fibrous sheath. At the distal border of the popliteus the popliteal vein is posteromedial to the popliteal artery and superiorly it lies posterior to the artery (3, 4).

Both the anatomy and surgery books lack adequate descriptions of popliteal vein formation and its possible variational patterns and also the multiple variational tributaries. Therefore, any case or research study might add to the comprehensive understanding of the nature of these vessels.

CASE REPORT

During the routine dissection of the lower extremities of a Caucasian male cadaver, a case of PSV was encountered at the right popliteal fossa: The variant vein was originated from the saphenopopliteal junction (SPJ). While the popliteal vein was ascending anteriorly and medially to enter into the adductor canal, the variant vein was ascending laterally and penetrated the fibres of the adductor magnus muscle. The length of the variant vein, from the SPJ until its penetration into the adductor magnus muscle was 15.17 cm. The diameter of the vein at the emerging site was 8.58 mm and 8.61 mm. The popliteal vein (PV) was 9.28 mm at the SPJ and 9.60 mm at the inferior hiatus of the adductor canal. A vein considerable in diameter (3.85 mm) draining the AM muscle opening into the PSV was observed. When the dissection was progressed at the anterior surface of the thigh, the PSV was seen draining into the deep femoral vein just medial to the vastus medialis muscle. Small saphenous vein opened into the SPJ at its posterior aspect and the gastrocnemius vein at its medial aspect.

DISCUSSION

Persistent sciatic vein may act as the main venous outflow tract incase femoral vein is occluded, though it may persist in the presence of patent superficial and deep femoral veins (2, 5). The PSV in the present case with a diameter of 8 mm was observed together with a considerable sized popliteal vein which is 9 mm in diameter, that means the drainage of the leg was shared by these two veins.

Klippel-Trénaunay-Weber syndrome (KTWS) displays hypoplasia or aplasia of the femoral vein as a major finding together with the persistent sciatic vein since the PSV serves as a compensatory venous pathway (6). Peirce and Funaki reported the greater saphenous vein, deep femoral veins, and distal superficial femoral vein to be absent in a case of PSV in a patient with KTWS (7). All of these veins were morphologically normal in our case. According to Servelle the pathophysiology of KTWS is declared with the malformation of the popliteal vein. In this condition the venous drainage is maintained around the knee by the development of collaterals. One of these collaterals is PSV. However, the PV was evaluated and there was not a sign of occlusion or contraction in the present case. PSV is not unique to KTS; Cherry et al found only 20 patients with PSV in 279 patients with KTWS (2, 8).

Several reports are found implicating the popliteal venous ligation as a contributing factor to the lower extremity amputations due to the fractures, gun wounds, blunt and/or penetrating trauma of the lower extremity (9). Though the existence of variational veins such as PSV can be considered as an advantage in such conditions, because ligation of PV or PSV can be compensated by other vein, consequently it is important for the surgeons to consider the variational anatomy of the region very well before surgery.

This embryonic vascular remnant may be found in three morphological forms. The PSV is considered to be “complete” if courses along the thigh and buttock. A complete PSV arises from the popliteal vein, ascends to traverse the sciatic notch, and terminates draining into the internal iliac vein. An “upper” PSV arises from the minor tributaries of the upper thigh and passes through the sciatic notch ending in the pelvis. A “lower” PSV is limited to the distal and middle thigh opening into the deep femoral veins. Lower PSVs may also drain into an embryonic subcutaneous venous plexus (2). Considering these patterns, the PSV in our case was a typical “lower” one draining into the deep femoral vein.

Cross et al investigated the vessels in the popliteal fossa of 52 lower extremities and 63 venograms he categorised the PVs in 9 groups, but they did not mention PVS in any way. They described the origin of the PV occurring as the joints of medial and lateral veins. Out of 9 groups one group fit our case which they stated the prevalence as %1,9. According to the drawings of them; medial vein was the continuation of the posterior tibial vein and lateral vein was the continuation of the fibular vein, but the terminations of these two branches were not detailed (9).

Koç et al reported a bilateral PSV case in which the popliteal veins both were hypoplastic contrary to our case. They reported the diameter of PV at the right side to be 5.21 mm, while we measured the diameter of PV as 9.3 mm in our case. In their case, the origin of the PSV was anterior tibial vein at the right side and junction of the anterior and posterior veins at the left side. In our case PSV originated from the saphenopopliteal junction. Koç et al reported the diameters of the PSVs at the origin and termination to be 7.08 mm and 8.53 mm respectively at the right side while 7.78 mm and 7.43 mm at the left side. Ours were 8.6 and 9.6 mm, respectively. The PSVs in both case reports drained into

the deep femoral vein (10). In our case, there was not an accompanying artery at the back of the thigh and the variant vein had no communication with the inferior gluteal vein or perforating veins along its course.

A solid knowledge of the variational venous anatomy of the lower extremities is crucial for the accurately assesment of the CT scans and ultrasound examinations. Being aware of the diverse femoral and popliteal vein variations may be helpful to comprehensively interpret the suspected deep vein thrombosis and plan the interventional management (11). Trigaux et al determined the presence of the sciatic venous axis and the possible incompetency of the deep venous system stressing the clinical consequences such as the rejection of the saphenectomy the sciatic venous pathway draining posterior varicose veins of the leg has (12). It was regarded such variant veins as a risk of complication during popliteal sciatic nerve blockade (10). To avoid this kind of complications ultrasound visualization of the region can help or more classically an aspiration may prevent an intravascular injection.

During the sciatic nerve decompression, the transgluteal approach is the conventional route through which the piriformis is reached and transected. Tubbs et al defined a new method for this procedure reaching the piriformis via the obturator canal in prone position. A potential presence of the PSV is very important, as in our case, since this new procedure is performed through adductor muscles. On the other hand, a complete PSV might be an obstacle during the transgluteal aproach (13).

When a literature search on the PSV is performed, a few research or case reports conducted by ultrasound and venography, poorly defining the origin, course, and termination of this congenital angiodyplasia, is found. An incidence of 0.7 to 9% appears as a result of overall review (11, 12). Cardoso, after analysing 32 lower limbs of cadavers reported the incidence of PSV as 6.25% (14) . Park et al detected 3 cases of PSV out of 445 patients in a retrospective CT venography research. In their research conducted on 41 cadavers and 169 phlebographies, Pompeo reports the incidence as 3.33%. Trigaux et al reported 7 patients with sciatic drainage pathway in more than 1200 ascending phlebographies in which no incidence is implicated (11, 15).

On the other hand, there stands a question if the incidences claimed in the aforementioned studies are reliable since MR angiography is the most suitable imaging

technique to make a certain diagnosis (5) and solely the cadaveric dissections could reveal the exact emergence, course and termination of the variant vessels.

Conflict of interest: None declared

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Figure 1. a: Posterior aspect of the right thigh: After removal of skin and superficial fascia biceps femoris retracted (with hand and scissor) to display the PSV and adductor magnus. SN: Sciatic nerve, AM: Adductor magnus, ST: Semitendinosus, BF: Biceps femoris, PSV: Popliteal sciatic vein, SM: Semimembranosus, PV: Popliteal vein, SPJ: Saphenopopliteal junction. **b:** Posterior aspect of the right thigh with PSV retracted: The photograph reveals the neurovascular structures of the right popliteal fossa and the penetration of the PV through the adductor hiatus. The retractor indicates the medial aspect of the thigh. AM: Adductor magnus, BF: Biceps femoris, SN: Sciatic nerve, ST: Semitendinosus, PSV: Popliteal sciatic vein, AH: Adductor hiatus, PV: Popliteal vein, SM: Semimembranosus, SPJ: Saphenopopliteal junction. **c:** Anterior aspect of the right thigh: The photograph displays the drainage of the PSV into the DFV on the anterior aspect of the right thigh. DFV is located lateral to FV. The top scissor indicates the lateral aspect of the thigh. FV: Femoral vein, FA: Femoral artery, DFV: Deep femoral vein, PSV: Popliteal sciatic vein

