Persistent sciatic artery (PSA) is a rare congenital malformation. In the early embryonic stage, the sciatic artery is the major blood supply for the lower limb bulb and is later replaced by the iliofemoral artery as the limb develops. Its failure to regress, sometimes associated with femoral arterial hypoplasia, and therefore becoming the dominant inflow to the lower extremity is called PSA. This anomaly is often associated with a higher rate of aneurysm formation or thromboembolic complications causing lower extremity ischemia. Here, we describe a 79-year-old male patient who presented with acute left lower extremity ischemia. He was treated initially with conventional embolectomy through inguinal and popliteal incisions. The bilateral PSA with thrombosed aneurysms was not identified at first on computed tomographic angiography. It was later diagnosed intraoperatively due to the discontinuity of the superficial femoral artery and popliteal artery found with embolectomy catheter, and was managed successfully with ePTFE graft bypass. Careful interpretation of the imaging study may be helpful in preoperative diagnosis. [J Formos Med Assoc 2007; 106(12):1038–1042]

Key Words: angiography, ischemia, sciatic artery

Case Report

A 79-year-old man was admitted to our emergency department because of sudden onset of left lower leg weakness. The initial physical examination showed that the patient had normal sinus rhythm, and his left foot was cold with severe tenderness and poor capillary refilling. The pulsations of the left dorsalis pedis artery and posterior tibialis artery were not palpable. Duplex survey also revealed poor distal flow in both vessels. Acute arterial occlusion was suspected. Subsequently, computed tomographic angiography (CTA) was arranged and...
the image suggested that the obstruction was located in the distal portion of the left superficial femoral artery (Figure 1A). Under the impression of bilateral chronic arterial occlusion with left superficial femoral artery acute thrombosis, emergent embolectomy was performed.

The operation was performed under general anesthesia. We first made a vertical incision over the left groin area to expose the left common femoral artery and the bifurcation where the superficial and deep femoral arteries arise. The sizes of the left common artery (8 mm in diameter) and deep femoral artery (6 mm in diameter) were normal, but the left superficial femoral artery was hypoplastic (about 2–3 mm in diameter only). By making a transverse cut over the left common femoral artery, we tried to insert the embolectomy catheter downward into the left superficial femoral artery. However, it could not pass down more than 10 cm and no blood clot was removed. We then made a second skin incision on the medial side at the level just above the knee and explored the area for the popliteal artery. Its size was normal (6 mm in diameter) and its wall was elastic without any atherosclerotic change. It was then opened, the embolectomy catheter was inserted upward, and many blood clots were removed. Although the whole length of the catheter (about 40 cm) was inserted, it did not come out through the femoral arteriotomy site. This implicated that the superficial femoral artery was not in continuity with the popliteal artery.

The CTA was then reviewed, and we found that bilateral superficial femoral arteries both ended at the mid-thigh level. A strange mass over each side of the buttock, connecting upward to the internal iliac artery and downward to the popliteal artery, was identified (Figures 1B–E). Part of the left

Figure 1. Post-contrast computed tomographic angiography (CTA) images. (A) Initial three-dimensional reconstruction of the computed tomographic angiogram suggested that the acute obstructive lesion was located in the lower portion of the left superficial femoral artery. (B) At the level of the ischiatic foramen major, the thrombosed right persistent sciatic artery (PSA) (arrowhead) and left PSA (arrow) exited the pelvis through the ischiatic foramen major. (C) At the level of the greater trochanter, the PSA projected midway between the greater trochanter and the ischial tuberosity with thrombosed aneurysm formation (arrows). (D) At the upper thigh, bilateral PSAs with thrombosed aneurysms travel along the back of the thigh behind the adductor magnus muscle (arrows; left side aneurysm 33 mm, right side aneurysm 30 mm). CTA reconstruction demonstrates: (D) the course of bilateral superficial and deep femoral arteries; (E) the course of bilateral sciatic arteries and their thrombosed lesions. Note the calcified mural plaques inside the PSAs.
buttock mass was enhanced by contrast. Bilateral persistent complete-form sciatic artery with thrombosed aneurysmal formation was then diagnosed. In order to provide adequate low extremity blood flow, a common femoral–popliteal bypass using an 8-mm ePTFE graft was performed (Figures 2C and D).

When a more detailed history was taken postoperatively, it was found that right leg chronic arterial insufficiency with claudication symptom had been noted for a long time, which had been wrongly blamed on a right lower leg fracture caused by a traffic accident many years ago. One week later, he received right femoral–popliteal bypass with an 8-mm ePTFE graft again for the right thrombosed sciatic artery. The patient’s postoperative course was uneventful and he was discharged smoothly.

Discussion

PSA is a very rare anatomical variant. The sciatic artery is a branch of the internal iliac artery, the

Figure 2. (A, B) Sagittal and coronal posterior view of three-dimensional reconstruction of computed tomographic angiogram with volume rendering technique shows the course of the thrombosed persistent sciatic artery (arrows). (C, D) Coronal lateral and posterior view of three-dimensional reconstruction of computed tomographic angiogram shows the reconstructed bypass graft with persistent sciatic artery (arrowheads). Note the atrophied superficial femoral arteries branching in the thigh (arrow).
principal blood supply to the lower extremity in the human embryo prior to the development of the femoral artery. The sciatic artery leaves the pelvis in close proximity with the sciatic nerve and is continuous with the popliteal artery. Its involution starts once the femoral artery develops and replaces its function completely by the third month of gestation. However, its failure to regress means that the embryonic arterial pattern is retained, with the existence of both femoral and sciatic main trunks. The PSA enters the buttock through the greater sciatic foramen situated in the gluteal region lateral to the sciatic nerve and in the mid thigh medially to the same nerve, becoming in the popliteal fossa the popliteal artery. According to the degree of involution of the sciatic artery and hypoplastic changes of the femoral arterial system, PSA can be divided into complete and incomplete forms. Our patient had the complete form in which the popliteal artery was supplied completely by the PSA, with hypoplastic or absent superficial femoral artery. The bilateral occurrence as in our case is even more rarely encountered. The incidence of PSA is about 0.05% in the normal population. Clinically, PSA has no particular symptoms in early life. The mean age at presentation is in the mid-40s to mid-50s, with equal sex incidence. The presentation of symptoms depends on which anatomic configuration of the PSA anomaly is present and whether it has an associated aneurysm. Owing to congenital hypoplasia of the artery's connective tissue due to programmed degeneration of the artery during development, the PSA shows considerably more frequently accelerated atherosclerosis changes and infection leading to aneurysms and thromboembolic events. Pulsatile gluteal mass with possible pain, especially in the sitting position, occurs in as many as 46% of cases. The high incidence of aneurysm formation might be the result of repeated external trauma. If the femoral artery is severely hypoplastic or absent, the patient will have palpable popliteal and pedal pulses despite an absent or severely diminished femoral pulse. This presentation is called Cowie's sign and is strongly suggestive of the complete form of PSA. If the aneurysm is thrombosed or distal embolization occurs, symptoms of limb ischemia or claudication would be present, as occurred in our patient. Radicular pain along the distribution of the L5 and S1 nerve roots secondary to intrapelvic or extrapelvic compression of the sciatic nerve fibers from existing arterial aneurysm has also been reported. In our case, Cowie's sign was negative for his strong pulsation over bilateral femoral arteries. The only manifestation was acute limb ischemia due to the thrombosed aneurysm with distal embolism.

The diagnosis of PSA relies heavily on patient presentation and physical examination, but some of the cases were found incidentally by radiologic or autopsy findings. Traditionally, contrast angiography is essential for determining the pattern of the existing vasculature and providing appropriate treatment. However, angiographic findings can be misleading if they are not properly reviewed by an experienced radiologist. CTA and magnetic resonance imaging angiography have been demonstrated to be useful in determining the presence and size of an aneurysm, the relationship of the local vascular structures to the bony landmarks, the course of the PSA, and progression after treatment. In our case, emergent CTA showed the bilateral thrombosed aneurysms over the gluteal regions with most areas non-enhanced by contrast, so it was therefore neglected initially. The normal size of bilateral common femoral arteries and the tapering change of the superficial femoral arteries further misled us to have an initial impression of acute obstruction at the lower level of the left superficial femoral artery with chronic atherosclerotic change.

Management of PSA depends on the symptoms, the vascular anatomy of the sciatic artery and the iliofemoral system, the presence of concurrent vascular occlusive disease, and the presence of aneurysm. Treatment is either by surgical procedures or by endovascular interventions. PSA aneurysm can be obliterated via ligation, resection, embolization, or endovascular stent graft. Vascular reconstruction can be performed by femoral–popliteal bypass, iliopopliteal transobturator bypass or interposition bypass. End-to-end
graft reconstruction after aneurysmectomy using autologous venous graft and/or prosthetic graft is another option. PSA without aneurysmal formation in an asymptomatic patient does not require any intervention; however, continued surveillance, usually with duplex ultrasonography, is required because of the high incidence of aneurysmal formation or thromboembolic event.

PSA is a rare developmental anomaly with a high rate of aneurysm formation and frequently complicated by lower extremity ischemia due to aneurysm thrombosis and/or distal thromboembolism. We presented a case of bilateral PSA with left lower extremity ischemia that was treated with femoral to popliteal bypass with ePTFE graft. Careful interpretation of CTA findings is mandatory for proper preoperative diagnosis of an anomaly.

References


