

# Treatment of A Persistent Sciatic Artery Aneurysm By Endovascular Exclusion of The Internal Iliac Artery

## Persistan Siyatik Arterin Endovasküler Yöntem ile Internal Iliac Arter Kapatılarak Tedavisi

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**ABSTRACT** A persistent sciatic artery (PSA) is an extremely rare congenital vascular malformation. Here we present the case of a 64-year-old woman with recurrent distal embolism of the right lower leg with symptoms of ischemic vascular complications. Computerized tomography and angiography revealed an entirely occluded distal PSA and an accompanying aneurysm. The PSA aneurysm was successfully treated using two self-expanding stent grafts to occlude the origin of the internal iliac artery. After arterial reconstruction, the patient's ischemic symptoms showed complete recovery.

**Key Words:** Aneurysm/surgery; arteries/abnormalities; femoral artery/ anatomy & histology; endovascular procedures; endovascular techniques

**ÖZET** Persistan siyatik arter (PSA) çok nadir görülen bir konjenital vasküler malformasyondur. Bu olgu sunumunda sağ alt ekstremiteye tekrarlayıcı distal emboliler sonucu iskemik vasküler komplikasyonlarla başvuran 64 yaşında bir kadın hasta sunulmuştur. Bilgisayarlı tomografi ve anjiyografide tamamen oklude distal PSA ve ilişkili anevrizma gösterilmiştir. PSA anevrizması internal iliak arter girişine yerleştirilen iki adet self-expanding stent ile başarılı bir şekilde kapatılmıştır. Arteriyal onarım sonrasında hastanın iskemik semptomları iyileşmiştir.

**Anahtar Kelimeler:** Anevrizma/ cerrahi; arter/ anomaly; femoral arter/ anatomi ve histoloji; endovasküler işlem; endovasküler teknik

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A persistent sciatic artery (PSA) is a rare congenital vascular malformation.<sup>1,2</sup> The embryonal axial or sciatic artery in the fetus persists in the adulthood, and connects the internal iliac arteries (IIA) to the popliteotibial arteries.<sup>3</sup> Hypoplasia of the femoral artery (FA) results in the PSA, providing the dominant inflow to the lower extremity. A PSA is prone to development of atherosclerotic stenosis as well as aneurysm degeneration, and is often associated with a higher rate of thromboembolic complications to the lower extremity.<sup>4,5</sup>

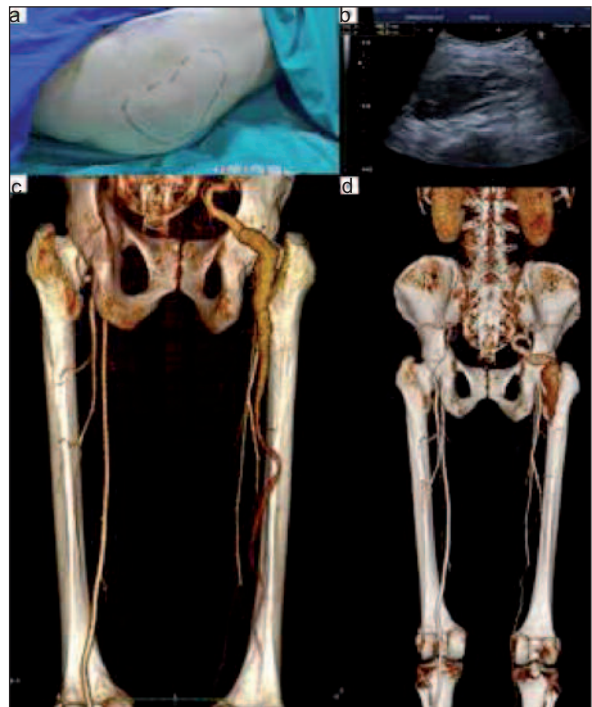
We present a patient with complaints of right leg pain, cyanosis and numbness. Based on this history and physical examination, an acute ischemic event of the lower leg was considered; an entirely occluded distal PSA and accompanying aneurysm were detected. Using two self-expanding

stent grafts, the aneurism was successfully closed, and endovascular occlusion of the internal iliac artery was carried out with overlapped stent deployments.

## CASE REPORT

A 64-year-old woman was admitted to our emergency room with a 12-hour history of a sudden, severe pain in her right leg, along with pallor and hypothermia. Physical examination revealed a non-palpable and diminished right femoral, popliteal, pedal and posterior tibial arterial pulses. All of the left leg pulses were palpable and normal. Doppler ultrasonography revealed complete occlusion of the superficial femoral and popliteal arteries (PA). The patient was brought to the operating room emergently, and femoral thromboemblectomy was performed with extraction of well-formed thrombi from femoral (superficial and deep) and PA. A satisfactory blood flow was achieved, and hand-held Doppler (Doppler Ultrasonic, Maquet, Cardiopulmonary Medikal Teknik San.Tic.Ltd.Sti., Antalya, Turkey) examination revealed biphasic pedal pulses after the thromboemblectomy procedure. The superficial FA was narrower than expected for a 64 year-old woman. In the postoperative period, anticoagulation therapy with low molecular weight heparin (2 x100 U/kg, twice a day) was maintained.

The following day, the patient complained of renewed right leg pain, and developed cyanosis of the extremity. A full embolic work-up was performed including electrocardiogram, transthoracic echocardiography and computerized tomography (CT) angiography. Cardiac and other systemic examinations were within the normal ranges. Upon further questioning, the patient described a history of right hip trauma in her childhood, and a swelling on her right hip since she was 7 years old. On physical examination, a pulsatile mass was detected on her right hip (Figure 1-A). Duplex ultrasonography revealed a large mass of 100.7 x 43.8 mm originating from a vascular structure (Figure 1-B). 3D reconstruction of the CT images that were obtained 3 years agodemonstrated a complete PSA with incompletely developed femoral arteries, and an



**FIGURE 1:** Physical examination, superficial and Doppler ultrasonography (USG) and computed tomography (CT) show a persistent sciatic artery (PSA). **a:** The pulsatile mass on the patient's right hip (dotted line); **b:** Doppler USG revealed a large mass of 100.7 x 43.8 mm originating from a vascular structure; **c:** 3D reconstruction of the CT images obtained 3 years ago demonstrated a complete PSA with incompletely developed femoral arteries, and an aneurysm 66 mm in diameter at the posterior aspect of the major trochanter of the femur (posterior view); **d:** 3D reconstruction of the CT images demonstrated a complete occlusion of the distal segment of the PSA.

aneurysm sized 66 mm in diameter at the level of the posterior aspect of the major trochanter of the femur (Figure 1-C). The CT demonstrated a right-sided complete PSA with a narrower superficial femoral artery (SFA), thromboembolic total occlusion of the 1/3 distal SFA, and a 66-mm aneurysm at the posterior aspect of the major trochanter of the femur, with normal contra-lateral iliac and femoral arteries (Figure 1-D). In addition, complete occlusion of the distal segment of the PSA was detected (Figure 1-D). Angiography demonstrated presence of the PSA and related aneurysm (Figure 2-A-B-C). Endovascular occlusion of the IIA was performed successfully with two overlapping self-expanding graft stents (27 x 10 mm and 27 x 9 mm stents; Bentley Innomed GmbH, Hechingen, Germany), as shown in Figures 2 D-E. Completion arteriogram demonstrated complete occlusion of the

IIA and aneurysm, without any endoleak (Figure 2-E). The second thromboembolectomy procedure was performed after the stent implantation with a hybrid procedure. A hand-held Doppler examination revealed biphasic Doppler pedal pulses. The ischemic complaints of the foot disappeared. The pulsating mass disappeared, the distal limb pulses returned to normal after 24 h, and the ankle-brachial index was measured as 0.9. The patient's postoperative recovery period was uneventful, and she discharged from hospital 5 days after the procedure. She remained asymptomatic during a 6-month follow-up period.

## DISCUSSION

During embryogenesis, the sciatic artery, a branch of the umbilical artery, provides the blood supply to the lower extremity buds. In the third month of the embryonic development, the sciatic artery regresses completely, and SFA continues to provide all blood supply to the lower extremity. While the majority of the sciatic artery is regressed, some parts are involved in the formation of other arteries such as the inferior and superior gluteal, per-

oneal and PA. If there is a failure in the development of the femoral vascular system, the axial artery may persist as the sciatic artery.<sup>6</sup> Based on the main blood flow of the lower extremity and development of FA and PSA, Pillet et al. classified PSA into four categories while Gauffre et al. added a fifth type.<sup>7,8</sup>

Accordingly, PSA can be classified as follows;

Type 1: Complete PSA and normal FA,

Type 2: Complete PSA and incomplete FA (2a: SFA are available but cannot reach the PA, 2b: All parts of the SFA are rudimentary)

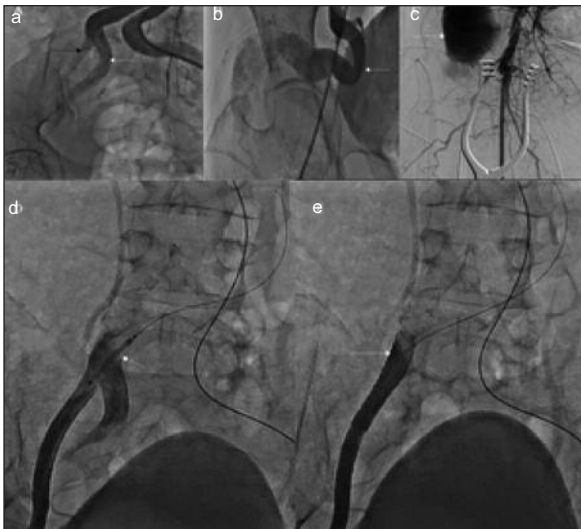
Type 3: Incomplete PSA (it is developed only in the proximal region of lower extremities and FA is normally developed).

Type 4: Incomplete PSA is only developed in the distal region of lower extremities and FA is normally developed

Type 5: The PSA originates from the median sacral artery (5a: SFA is normally developed, 5b: SFA is rudimentary.)

The classification is particularly important in guiding medical or surgical therapies. The present case corresponds to a PSA Type 2a, and only treatment of the PSA and related aneurysm may be sufficient to regain a distal blood flow, and SFA may not necessitate any further surgical treatment such as a bypass.

The PSA originates from IIA, passes through the greater sciatic foramen, and stays adjacent to the sciatic nerve (often coursing within the sciatic nerve sheath in some patients).<sup>3</sup> PSA is located inferior to the gluteus maximus muscle, travels along the edge of the adductor magnus muscle, and reaches the popliteal fossa where it joins the PA.<sup>3</sup> The vascular structure of a PSA is hypoplastic, and destined to degenerate during development. The anatomical location and inherent properties of the vascular tissue in a PSA make it highly susceptible to tortuous and ectatic vascular development. Furthermore, the PSA is subject to repetitive trauma often resulting in aneurysmal degeneration due to its location.<sup>3,6</sup> Indeed, a PSA associated with aneurysms has been reported in 15-40 % of the



**FIGURE 2:** Angiographic studies of occlusion of the internal iliac artery (IIA) resulting from aneurysmatic persistent sciatic artery (PSA). **a:** Angiogram shows an enlarged IIA (white arrows) and the external iliac artery (black arrow); **b-c:** Figure shows PSA with a tortuous and aneurysmatic pattern, extending from the origin of the IIA; **d-e:** Endovascular stenting of the IIA, and completion angiograms show good patency of the metal stent after the procedure.

cases in the literature.<sup>3,4</sup> The patient in the current report described a right hip trauma that resulted in pulsatile swelling in a large bruised area when she was 7 years old. Thus, an acute injury may also have contributed to the aneurysm formation in our patient.

Aneurysmal degeneration of a PSA has been shown to be a potential source of recurrent thromboembolism in the lower extremity.<sup>2,4</sup> As in the current case, despite a completely occluded PSA, clots formed in the aneurysmal segment resulted in embolism to FA branches. We believe the most likely mechanism for thromboembolism spilling retrograde into the femoral artery is a mechanical compression of the superficially located large PSA aneurysm by surrounding muscles or direct external pressure. The aneurysm, laden with a large thrombus burden, may have functioned as a pipette blub, milking the thrombus into the femoral artery when externally compressed.

Steps need to be taken to prevent recurrent FA embolism in these patients. In patients with adequate blood flow to the distal lower extremity, aneurysmal segment can be treated with surgical or endovascular techniques, as in our case<sup>2</sup>. If the blood flow to the lower extremity is impaired, treatment is usually completed with a femoral-distal bypass.<sup>6</sup> Especially in patients with unilateral

PSA, the IIA may be occluded by a stent graft placement at the origin at the common iliac separation, if necessary.<sup>5</sup> In the current case, the patient's lower extremity ischemic symptoms showed improvement after the procedure, and no additional complications were encountered.

In conclusion, decision regarding the treatment of PSA depends on symptoms, anatomy, occlusive vascular disease, concomitant aneurysm and type of PSA. The treatment of choice can be determined based on the status of each patient. The common goals of all the therapies are to subvert the problem of the lower extremity ischemia, prevent embolic events, and rupture of aneurysm.

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#### **Conflict of Interest**

*Authors declared no conflict of interest or financial support.*

## KAYNAKLAR

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