Case Report

Persistent Sciatic artery

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ABSTRACT

Arteria comitans nervi ischiadici or Persistent sciatic artery (PSA) is a rare congenital vascular anomaly with an incidence varying 0.025-0.04% . During routine dissection in department of anatomy an incomplete type of Persistent sciatic artery was found which is being reported here. Its oncogeny and phylogeny is also discussed in detail. Such a PSA is prone to atheromatous degeneration, thrombosis, distal thromboembolism, aneurysm formation and rupture. Although rare, the possibility of such an anomaly must be borne in mind with certain clinical presentations , during orthopedic procedures on the hip and during angiographic studies of the leg. Successful surgical correction of problems necessitates excluding the anomalous artery from the circulation while revascularizing the lower exterimity.

Key words: *Sciatic artery, persistent, lower limb*

Introduction

Arteria comitans nervi ischiadici is a latin term for persistent sciatic artery and is rare vascular anomaly.It branches off the inferior gluteal artery as a long slender artery and accompanies the sciatic nerve for a short distance. [1] Then it penetrates the nerve and runs in its substance to lower part of thigh. It has been differently named as Arteria comitans nervi ischiadici, artery to sciatic nerve, accompany artery to ischiadic nerve, ischiopopliteal artery [2] or persistant axis artery. It is an uncommon congenital malformation with its incidence ranging from 0.025% to 0.04 % in worldwide population. [3,4] If it is accompanied by femoral hypoplasia, its presence is essential for perfusion of lower limb as then this malformed primitive vascular trunk persists as main blood supply to lower limb. [5] It may pose a threat to the viability of the lower extremity, for pathologic character of persistent sciatic artery is such that it is especially prone to artheromathous degeneration, thrombosis, distal thromboembolism and rupture. Although rare, the possibility of such an anomaly must be borne in mind with certain clinical presentation, during orthopedic procedures on the hip and during angiographic studies of the leg. Successful surgical correction of the problems necessitates excluding the anomalous artery from the circulation while revascularizing the lower extremity. [3]

Case Report

During the routine undergraduate dissection of right lower limb of a 60 years old male cadaver, in Anatomy department of Govt medical college, Amritsar, an incomplete persistent sciatic

artery was found. It emerged from the greater sciatic foramen below the piriformis muscle and ran on the surface of the sciatic nerve for a distance of 8 cm. Then it dipped within the substance of the sciatic nerve. The nerve fibers were separated around the artery and it was traced distally upto the superior angle of popliteal fossa where the nerve bifurcated into tibial and common peroneal nerves and the artery decreased in caliber and ultimately disappeared, there being no communication with popliteal or tibial arteries. (Fig. 1)

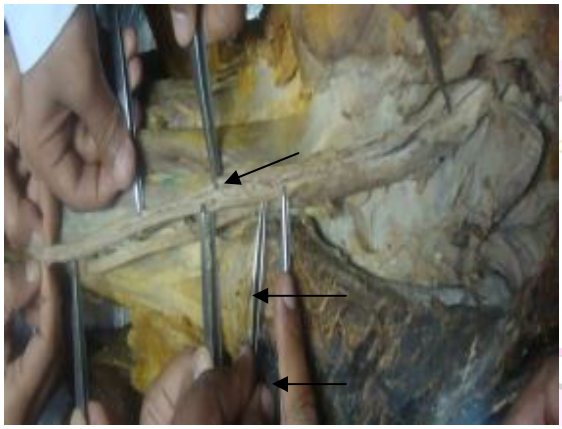

Fig 1 Persistent Sciatic **Artery**

The inferior gluteal and femoral arteries were normal in caliber with the later continuing as popliteal artery. The other variations which are usually associated with persistent sciatic artery i.e. rectus sternalis muscle, high devision of sciatic nerve, bilateral origin of sural nerve from common peroneal nerve and superficial brachial artery were absent in this cadaver.

Discussion

Persistent sciatic artery (PSA) is a rare congenital vascular anomaly with its incidence varying from 0.025 - 0.04%. [3] Most of the times it is seen unilaterally but a bilateral presentation has been reported in 12% cases by Julia et al [6] and in one third of cases by Mayschak and Flye [3] and Hasson [7] While Aziz et al [8] found a male predominance, Julia et al [6] Mayschak and Flye [3] and Hassan [7] could not find any difference in its prevalence depending upon the sex. The mean age of the clinical presentation is found to be around 51 years by Mayschak and Flye [3] through sporadic cases of more or less ages have also been reported . [2, 5, 9, 10]

Morphologically a PSA has been devided by Szejnfeld et al [10] into two types, viz

1. Complete type (63- 79%) : In it, the PSA is the major blood supply to lower limb and the superficial femoral system is hypoplastic, but rarely absent.
2. Incomplete type (about 20% of cases): In it , the PSA is hypoplastic and communicates with femoral system via several branches. The femoral system has no abnormality as such.

The present case fits in incomplete type of the above classification whereby the PSA is hypoplastic and femoral system is normal in development. However, the communications between the PSA and femoral system could not be traced. Recently Paraskevas et al [11] have provided more elaborate classification for PSA. According to this, the PSA may be of following types :

Type I – A Complete axial artery and a normal femoral artery.

Type II – A Complete axial artery and an incomplete femoral artery. It may be further of 2 subtypes.

Type II a - A superficial femoral artery which does not however reach the popliteal artery.

Type IIb - No superficial femoral artery.

Type III - An incomplete axial artery whereby only the upper half of the artery can be found with a normal femoral network .

Type IV - An incomplete axial artery whereby only lower half of the artery can be found with a normal femoral network .

Type V – A sciatic artery branching from the medial sacral artery with an existing superficial femoral artery.

According to this classification, PSA in our case falls in type III.

Ontogeny

During ontogeny, when the human embryo reaches 9mm at about 6th week, the sciatic artery or axial artery arises from the dorsal root of umbilical artery and become major source of blood supply to primitive foot. At 10mm stage , the femoral system starts to develop as a continuation of the external iliac artery which expands and branch out to irrigate the thigh. When embryo reaches 14mm at about 8 weeks the lower limb has dual blood supply, the sciatic and femoral ones. At about 12 weeks, sciatic artery involutes and superficial femoral artery develop. In adult, remnants of the sciatic artery participate in formation of gluteal artery, popliteal artery and origin of anterior tibial and fibular artery and contribute to the terminal anastmosis of the foot. In embryo the inferior gluteal artery supplies the main axial artery of the limb, which is represented in adult by the Arteria comitans nervi ischiadici.[10]

Phylogeny

In phylogenic study of sciatic artery, it was noted that birds and reptiles always carry a long and thick artery accompanying the sciatic nerve (i.e. sciatic artery) whereas mammals do not. In midterm human fetuses (15 - 18 weeks) thin feeding arteries in sciatic nerve are consistently present inspite of the long, inferiorly curved course of the nerve around the ischium. The tissue around the human sciatic nerve is not so tight because of medial and inferior shift of nerve away from the hip joint. The fetal hip joint position differs among the species being highly flexed in human and almost at right angle flexion in mice and chicks. Because of deep adduction of hip joint in the mouse, the knee is located near the midline of body. The mouse sciatic nerve runs through the tight tissue along head of the femur, whereas chick nerve runs through the loose space even in gluteal region. In birds, evaluation of pelvis including the hip joint without adduction seems to make the arterial development possible. In mammals , highly flexed or adducted hip joint seems to be one of the disturbing factors against development of long and thick artery. A slight change in posture may cause significant arterial variation. [12]

Clinical Implications

The PSA follows the trajectory of the sciatic nerve to the distal thigh. It may be associated with other malformations like neurofiberomatosis, bone hypertrophy, single kidney, rectus sternalis muscles, high devision of sciatic nerve and superficial brachial artery. [6] It is usually symptomatic and associated with aneurysm formation in 25-58% of cases.

Such a high incidence of aneurysm is assigned to reported microtrauma in the gluteal area and to hypoplasia of elastic fibers in the arterial wall. [13, 14] The aneurysm may present as a pulsating mass in the buttock which may or may not be associated with compressive symptoms of muscle and nerves in that region i.e. Inferior gluteal nerve, posterior cutaneous nerve of thigh or sciatic nerve or with local pain especially when sitting. It may also be associated with hypertension which actually acts as a causative factor for aneurysm rather than its result. [5]

Another possible symptom is acute or chronic ischaemia of the limb due to accelerated atherosclerotic disease and consequent thromboembolism. [15] This diagnosis may be suspected if a patient presents with reduced or absent femoral pulse but palpable popliteal and distal pulses associated or not with a pulsatile gluteal mass. [16] A failure to recognize a PSA as the major blood supply to the lower limb may lead to an incorrect diagnosis of femoral artery occlusive disease and inappropriate surgical revascularization. [17] Some patients may experience sciatica manifested by pain , numbness or motor impairment as a result of compression of the sciatic nerve by the aneurysm at the level of sciatic notch. [18]

PSA can be diagnosed by using Doppler studies, angiography, computed tomography , or magnetic resonance imaging of the pelvis and lower limbs. However magnetic resonance imaging may be considered as the first line imaging modality due to its non invasiveness and ability to generate three dimensional vascular images without using an iodinated contrast. [18] Moreover, it also allows determining actual size of vessel and aneurysm and the adjoining structures. USG allows tracking the course of vessels and locating any turbulence which may represent presence of aneurysm. [3]

By using the above said techniques, the PSA can be differentiated from the other conditions like lumbosciatalgia, arteriovenous fistula, gluteal abscess and gluteal artery aneurysm. [10]

There is no consensus in the literature about the best therapy for this entity and treatment should be selected for each specific case. [10]Some reports advocate the use of grafts, synthetic prosthesis and autologous veins [16, 19] while others have achieved good results with thrombolysis, embolization, covered stents and angioplasty. [14, 19, 20] The surgical treatment definitely generates risk due to difficulty of exposure and proximity with the sciatic nerve. However, the aneurysm if present may be excluded or excised by distal and proximal ligations in case of incomplete PSA but in case of complete PSA lower limb vascularization is also recommended. [21, 22]

PSA is a rare vascular anomaly which should be included in the differential diagnosis of lumbosciatalgia, ateriovenous fistula and gluteal abscess.It is of importance not only for anatomists but also for radiologists, clinicians and surgeons operating in this field.

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