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POPLITEAL ARTERY ENTRAPMENT SYNDROME- A CASE REPORT

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Abstract : Popliteal artery entrapment syndrome (PAES) is a rare limb threatening clinical disorder seen in young adults. This is characterised by the compression of the popliteal artery by adjacent muscular and tendinous structures (1). We report a case of popliteal artery entrapment syndrome and discuss the mechanism, classification and management of this clinical entity.

Keyword : Popliteal artery entrapment syndrome, Acute limb ischaemia CASE HISTORY: A 44 year old male presented with complaints of a cold clammy left lower limb and claudication pain for a distance of less than 100m for a duration of 5 days. He was evaluated at a local hospital for the above mentioned complaints and an arterial Duplex study was done which showed no flow in the left popliteal, anterior and posterior tibial arteries. Based on this, a diagnosis of acute limb ischemia was made and a femoral embolectomy was done elsewhere. Postoperatively, he was started on oral anticoagulation with Tab. Acitrom. He had no medical co-morbidities and was a smoker. Despite the above measures, he continued to have pain and absence of warmth of the left lower limb below the knee. So he was referred to our centre for further evaluation. On examination, his pulse rate was 80/min and regular. The left sided posterior tibial and left dorsalis pedis pulses were not palpable. The rest of the peripheral pulses were palpable. There was no carotid bruit on auscultation. The examination of the cardiovascular and respiratory system was within normal limits. Abdominal examination was within normal limits. Initial investigations revealed Haemoglobin of 14gm%, with normal renal and liver function tests. He was normoglycaemic and his lipid profile showed hypercholesterolemia. His electrocardiogram showed normal sinus rhythm and chest X-ray was within normal limits. A Computed tomographic Angiogram (CT- angiogram) of the abdominal aorta and both lower limbs showed a short segment (12mm) occluding thrombus in the left poplitealartery (Fig 1) with abnormal origin of the left medial head of the gastrocnemius. This was noted to arise lateral to the left popliteal artery and was compressing the left popliteal artery resulting in abnormal vessel contour.

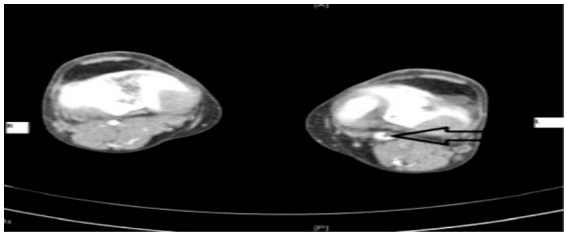


Figure 1: Partially occluding thrombus (marked with arrow) in the left popliteal artery with abnormal origin of medial head of gastrocnemius.

Based on these findings on angiography, a diagnosis of Popliteal Artery Entrapment Syndrome (PAES) was made. He was planned for release of the medial head of the gastrocnemius and patch plasty of the popliteal artery. Intra operatively, the popliteal artery was noted to be pushed medially by the medial head of the left gastrocnemius (Fig 2) and the popliteal artery had a short segment of thrombus within. The patient underwent open release of the medial head of the left gastrocnemius with a vein patch plasty of the left popliteal artery (Fig 3).

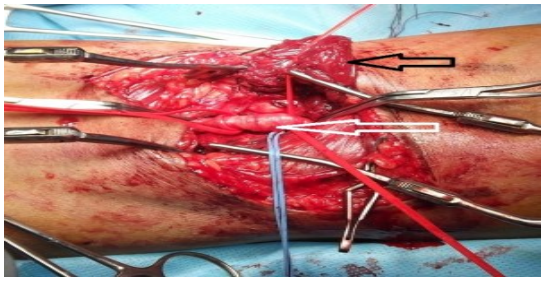
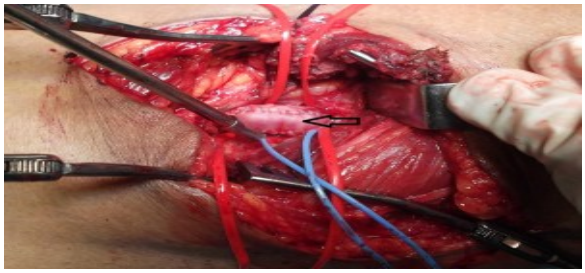


Figure 2: Intra operative photograph showing medial head (marked with black arrow) of left gastrocnemius (divided and retracted) and left popliteal artery after proximal and distal control was obtained (marked with white arrow). Figure 3: Shows vein patch (marked with arrow) sutured onto the left popliteal artery



Postoperatively, the left posterior tibial and left dorsalis pedis pulsations were well palpable. His immediate post operative period was uneventful. He was counselled to quit smoking and initiated on oral antiplatelet therapy (Aspirin) and lipid lowering agents (Atorvastatin). An arterial Doppler done one month post operatively showed normal flows in the left popliteal, anterior tibial, posterior tibial and dorsalis pedis arteries

DISCUSSION:

The anatomical basis of popliteal artery entrapment syndrome was first described in 1879 (2). The popliteal fossa is a diamond space that is located posterior to the knee joint. It is bounded by biceps femoris tendon superolaterally, semimembranosus muscle superomedially, and medial and lateral heads of the gastrocnemius muscle inferiorly. The popliteal artery which normally courses between the two heads of the gastrocnemius, may get trapped between the various tendons and muscles, owing to anatomical variations occurring during embryological development (3). However, the term "Popliteal artery entrapment syndrome" was coined by Whelan in 1965(4).

Classification of popliteal artery entrapment syndrome:

The Rich's modification of Whelan's classification (1) is accepted by most vascular surgeons worldwide. able 1- Classification of popliteal artery entrapment syndrome (1).

Type I	MHG is normal, PA is devisted medially and has an aberrant course
Type II	MHG is located laterally, no deviation of PA
Type III	Abnormal muscle bundle from MHG surrounding the PA
Type IV	PA is located deeply and entrapped by the popliteus muscle or a fibrous band
Type V	Popliteal vein is also entrapped with any type of PA

MHG: medial head of gastrocnemius muscle, PA: popliteal artery

Pathogenesis:

The central contributing mechanism for the changes seen in the vessel wall is continuous mechanical stress and these changes are seen in three stages (5). In the earliest stage, there is neovascularisation of the adventitia; involving up to the outer half of the tunica media. In stage 2, the neovascularisation involves the entire thickness of the tunica media with increasing fibrosis of the vessel wall. Stage 3 is characterised by extensive fibrous replacement of the media, marked fragmentation of the internal elastic lamina and extensive fibro-intimal proliferation with overlying thrombi.

Clinical presentation:

Popliteal artery entrapment syndrome is more commonly seen in males; who are young and lack the common risk factors for atherosclerosis. The classical presentation of PAES is that of claudication pain or acute limb ischaemia in a young male (6). The disappearance of the foot pulses on active plantar flexion or passive dorsiflexion is said to be diagnostic in the appropriate clinical setting; though this might be a normal variant (6,7). Chronic extrinsic arterial compression leads to trauma to the endothelium, early arteriolosclerosis and subsequent thrombosis of the vessel (7). In individuals who do not have adequate collateral circulation, this leads to popliteal artery thrombosis and acute limb ischaemia; which is a vascular surgical emergency (8).

A subset of patients are diagnosed years after the onset of symptoms and complications; having developed post-stenotic aneurysms or distal emboli.

Diagnosis and evaluation:

Magnetic resonance angiography is the gold standard of diagnosis. This helps demonstrate the abnormalities of the popliteal artery as well as the abnormal muscular anatomy of the popliteal fossa (7). Also, this does not require iodinated contrast and does not subject the patient to radiation exposure. Typical angiographic findings are medial deviation and well-defined focal narrowing of the popliteal artery (7). Other characteristic findings include: occlusion of the proximal popliteal artery with post -stenotic dilatation of the distal portion of the popliteal artery and features of distal embolisation. Duplex ultrasonography shows narrowing with changing posture, variations of colour mode, and increase in peak systolic velocity. Also, this can be used to monitor post operative patients.

Treatment:

Irrespective of the intensity of symptoms, all patients with PAES require definitive treatment with surgical interventions. The basic principles of surgical management for this condition include: releasing the vessel by dividing the muscle that causes entrapment, and reconstructing the narrowed lumen by either patch plasty or by-pass grafting.

Various authors have described endarterectomies and thromboembolecomies with patch plasties using vein grafts and some have even performed bypass grafting to replace the disease segment of the popliteal artery (9). However, the crucial step and mainstay of treatment remains division of the medial head of the gastrocnemius and release of the entrapped vessel.

Though PAES is a rare disease, it is still an important reversible cause of claudication pain. Also, often this diagnosis is missed at an early stage owing to the lack of conventional atherosclerotic risk factors. However, the advances in diagnostic radiology have helped circumvent this and are instrumental in making a correct and early diagnosis. PAES needs to be considered in young men presenting with limb ischaemia and do not have other atherosclerotic risk factors.

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