Popliteal Artery Entrapment Syndrome: An Uncommon Cause of Lower Limb Ischemia in a Young Man Successfully Treated with Myomectomy and Vascular Bypass

Popliteal Arter Tuzak Sendromu: Miyomektomi ve Vasküler Bypass ile Başarıyla Tedavi Edilen Genç Bir Erkekte Alt Ekstremite İskemisinin Nadir Bir Nedeni

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ABSTRACT

Popliteal artery entrapment syndrome (PAES) is a rare vascular disease that affects young adults and athletes. Patient usually presented with intermittent claudication and infrequently with acute limb ischemia. The incidence is low and largely undiagnosed due to unawareness of the entity in general practice. This article highlighted a case of Type II PAES in a 32 years old soldier, in whom the symptoms of claudication were disregarded for two years. The diagnosis was made via ultrasound and his symptoms completely resolved after right myomectomy and popliteal bypass with interposition of vein graft. We highlight this uncommon cause of claudication and revisited management of current case with previous literature.

Keyword: Arterial Occlusive Diseases, Entrapment syndrome, Intermittent claudication, Lower Extremity, Popliteal Artery

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ÖZET

Popliteal arter tuzak sendromu (PAES), genç yetişkinleri ve sporcuları etkileyen nadir bir vasküler hastalıktır. Hasta genellikle aralıklı topallama ve seyrek olarak akut ekstremite iskemisi ile başvurdu. Genel uygulamada varlığın farkında olmamasından dolayı görülme sıklığı düşüktür ve büyük ölçüde teşhis edilememiştir. Bu makale, 32 yaşındaki bir askerde topallama semptomlarının iki yıl boyunca göz ardı edildiği bir Tip II PAES vakasını vurguladı. Teşhis ultrason ile konuldu ve sağ miyomektomi ve popliteal baypastan sonra ven greftinin interpozisyonu ile semptomları tamamen düzeldi. Bu nadir görülen topallama nedenini ve mevcut olgunun önceki literatürle yeniden gözden geçirilmiş yönetimini vurguladık.

Anahtar Sözcükler: Arteriyel Oklüzif Hastalıklar, Tuzak sendromu, Aralıklı topallama, Alt Ekstremite, Popliteal Arter

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INTRODUCTION

Popliteal Artery Entrapment Syndrome (PAES) is a rare vascular condition that affects young adults. This entity is mostly reported as a single case report or low number case series due to its rarity (1,2), The underlying pathology was due to abnormal positioning of the popliteal artery in relation to its surrounding muscles during the embryologic developmental period (3). It was classified to 6 types based on the anatomical relationship(4).Often, patient presented with claudication and in severe cases, they may present with acute vascular insufficiency. The diagnosis can be confirmed with angiogram, computed tomography and magnetic resonance imaging. Surgical intervention is usually offered to those who are symptomatic. The surgical options include myotomy and vascular bypass if there is presence of arterial luminal occlusion. Herein, we report a young man who was diagnosed with type 2 PAES and treated with myomectomy of the gastrocnemius plus popliteal to popliteal artery bypass. The clinical course and management strategy are discussed, and available literatures are revisited.

CASE REPORT

A 32 years old army officer presented with right lower calf cramping pain for 2 years. The pain was precipitated by running for 500 meters and it progressed to 100 meter in the following year. There was no rest pain, limb discoloration or ulceration. He smokes one pack of cigarettes per day. On examination, the right leg was cold and pulseless at popliteal artery and distal to it. The sensation and muscle power were intact. The ankle brachial systolic index was 0.7. The contralateral leg pulses were normal.

Digital subtraction angiography (DSA) showed short segment occlusion of distal right superficial femoral artery, with reconstitution of the popliteal artery, anterior tibial artery and posterior tibial artery(Figure 1). Ultrasonography revealed the medical head of gastrocnemius lying lateral to popliteal artery causing impingement to artery. The diagnosis of Type II PAES was made and intraoperative findings confirmed the diagnosis. The procedure was started with saphenous vein graft harvested from right thigh as the contralateral long saphenous vein had long segment thrombosis. Patient was repositioned to prone position and popliteal fossa was explored. Myomectomy of the right medial head of gastrocnemius and popliteal artery P1 to P3 jump graft with the reversed saphenous vein was performed. The dorsalis pedis and popliteal artery pulses was reestablished following bypass graft surgery. He remained symptoms free up to 2 years of follow up. He suffers no muscle weakness over right calf.

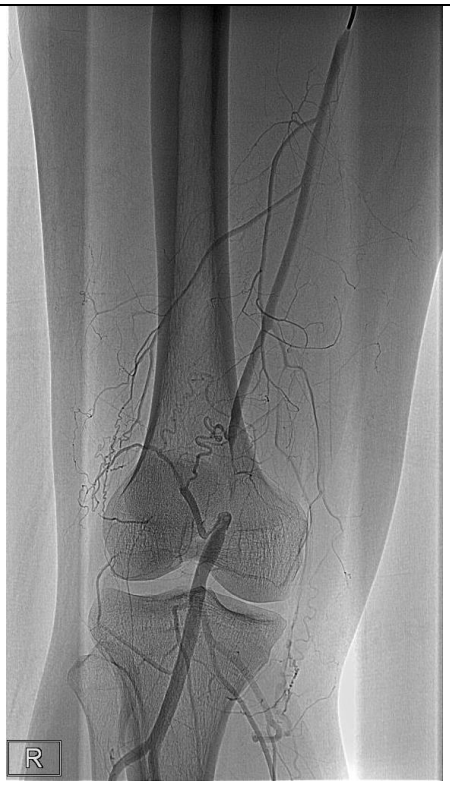

Figure 1: Digital subtraction angiogram of right lower limb showing contrast non-opacification at right proximal popliteal artery with distal reconstitution at distal popliteal artery and downwards.

DISCUSSION

PAES was first described by in 1879 by T. P. Anderson Stuart. This condition has a 15:1 male predilection and 60% of affected patients are below 30 years old. Bilateral diseases are found in 25% of cases(1). The true incidence of remain unknown but it may be more common than previously recognized. Previous literature reported a prevalence of PAES at 0.165% in young males from military service(5), and post mortem study revealed a prevalence of this entity at 3.5%f(6).

PAES is characterized by external compression of the popliteal artery by the adjacent muscle and tendons. It can be divided into anatomical or functional. The patients with “anatomical” PAES have anatomical anomalies that lead to the symptoms, patients with “functional” PAES have evidence of artery occlusion but no defined lesion can be found that directly causes the occlusion. “Anatomical” PAES can be classified based on anatomic types or Heidelburg classification system. There are five anatomic types of entrapment. In type I, the artery has an aberrant medial course around medial head of gastrocnemius; type II the artery is not displaced but the medial head of gastrocnemius inserts more lateral than usual hence artery passes medial and beneath the muscle, type III an accessory slip of medial head of gastrocnemius slings around the artery; type IV the artery lies deep in popliteal fossa entrapped by popliteus or fibrous band and type V there is entrapment of both popliteal artery and vein. Heidelberg classification is slightly different. In type I the artery has an atypical course, type II the muscular insertion is atypical and type III both conditions are present.

PAES is an important but under recognized cause of exercise induced leg pain as it shares many features with other conditions including chronic exertional compartment syndrome, medial tibia stress syndrome, tibial and fibular stress fractures, nerve entrapment syndrome, vascular claudication from atherosclerosis and spondylolisthesis. Furthermore, diagnosis was made difficult as this condition can exist concurrently. Hence, a good understanding these diseases and their presentations are essential to identify patients with PAES and to carry out the necessary investigations.

Duplex ultrasound, computed tomography angiography (CTA), magnetic resonance angiography (MRA) and DSA are useful in the diagnosis of PAES. Superficial location of the popliteal artery makes it ideal for ultrasound examination. Provocation test can be performed during doppler examination to accentuate the findings. The main limitation of ultrasound is lack of image clarity which made it difficult to accurately access musculo-tendinous structures. CTA and MRA are both excellent for assessing the anatomical relationship between popliteal artery and musculotendinous structures of the affected limb as well as contralateral limb to rule out bilateral disease. DSA is good for evaluating the arterial tree and can be obtained during provocative maneuvers to increase sensitivity.

Until recently, the definitive intervention was in the form of vascular surgery with variable myotomies and releases. Early diagnosis and surgical intervention are imperative for good outcome and prevention of limb loss. The aim is to establish normal anatomy within popliteal fossa and restoration of arterial flow. The best approach is a posterior S-shaped incision at the popliteal fossa which enables complete exposure of the artery and its adjacent structures. At early disease when the popliteal artery is patent, the treatment of choice is releasing the artery by dividing the anomalous musculotendinous tissue. Untreated PAES will invariable become stenotic, occluded or aneurysmal due to micro trauma to the vessels and associated fibrosis.

Vascular reconstruction in addition to division of anomalous musculotendinous structure will be required to bypass or replaced the diseased vessel. The role of endovascular treatment for PAES is limited. It is mainly used for patient who presented with occlusion prior to definitive surgical correction. There is, however, case report that good clinical outcome following angioplasty and thrombolysis alone, without subsequent surgery(7).

For patients with symptomatic functional PAES, myomectomy of the medial head of gastrocnemius can relief the symptoms but is only recommended for patients with “typical symptoms”. The surgical outcome for functional PAES is less satisfactory as compared to that for anatomical PAES. Therefore, new treatment modality such as intramuscular periarterial botulinum therapy has been proposed. Initial study reported promising results but further evidences are required before it can be the main stay treatment(8).

In conclusion, PAES is an uncommon condition with potential to cause significant morbidity. The purpose of this case is to emphasize PAES as an important differential diagnosis for lower limb claudication. Early recognition, diagnosis and intervention will promote better patient outcome.

Conflict of interest
No conflict of interest was declared by the authors.

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