

Case Report

Profunda Femoris Artery Dissection: An Unusual Presentation of Iliac Endofibrosis in an Elite Cyclist

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- Iliac Endofibrosis
- Arterial dissection
- Duplex Ultrasound
- Ankle brachial index

Abstract

Case: A 19 year old elite male cyclist presented with exercise induced thigh pain. He had been cycling competitively for 5 years with an average of 23 hours of training per week with a history of thigh pain over the past year. The patient was healthy and fit with no significant medical history. General vascular examination was normal with no femoral bruits on extension or flexion of the hips. A Colour Doppler ultrasound (CDU) of the iliac and femoral arteries at rest and after cycle ergometer test was performed. A pre and post exercise ankle brachial pressure index (ABPI) was measured and resulted within the normal range. At rest, a 50% stenosis of the profunda femoris artery (PFA) caused by a subtle dissection with intimal flap was diagnosed with CDU. A diagnostic digital subtraction angiogram confirmed the ultrasound findings. The patient underwent successful endarterectomy of the PFA with a great saphenous vein patch.

Discussion: Profunda femoris artery dissection is an unusual complication of endofibrosis in young cyclists, however the diagnosis should be considered in those with exertional related pain confined to the thigh. This case report shows the importance of using CDU in addition to ABPI in the assessment of athletes with exertion related thigh pain.

ABBREVIATIONS

ABPI: Ankle Brachial Pressure Index; CFA: Common Femoral Artery; EF: Endofibrosis; EIA: External Iliac Artery; PFA: Profunda Femoris Artery; PFAE: Profunda Femoris Artery Endofibrosis; SFA: Superficial Femoral Artery

INTRODUCTION

Endofibrosis (EF) of the iliac arteries is a non-atherosclerotic flow-limiting condition typically seen in highly trained endurance athletes, including cyclists and long distance runners [1]. The aetiology of this condition is unclear, but may be related to a combination of hemodynamic injury and mechanical stress [2]. Recurrent exposure to these factors can trigger an arterial remodelling process resulting in an intravascular lesion that resembles an "adaptive intimal thickening". In 90% of cases the endofibrosis affects the external iliac artery [2]. Profunda femoris artery endofibrosis (PFAE) is an extremely rare entity. There are few reports of PFAE and in those cases EF presented with an occlusion of the profunda femoris artery (PFA) [3]. We herein report a case of PFAE, which was complicated by arterial

dissection with an intimal flap. The diagnosis was primarily performed using Colour Doppler Ultrasound (CDU).

CASE PRESENTATION

A 19 year old male elite cyclist presented with a 1-year history of right thigh pain whilst cycling. The patient had been cycling competitively for 5 years with an average of 23 hours of training per week. The patient reported pain on exertion confined to the right thigh. There was no pain in the lumbar spine, calf or foot. He also described a subjective sensation of a lack of power in the right lower limb when cycling. This sensation appeared to commence very rapidly on cycling and stopped within several seconds of exercise cessation. He did not describe any paraesthesia in his lower limb and symptoms only occurred during exercise. The patient was healthy, with a normal habitus and with no significant medical history. He was on no regular medication and there was no family history for cardiovascular disease. He was a non-smoker.

A variety of investigations had already been performed prior to referral to the vascular service. This included a magnetic resonance imaging (MRI) of the pelvis and upper legs and a

computed tomography (CT) scan to look for leg discrepancy. These investigations were all reported to be normal with no evidence of atherosclerotic disease and muscular compression on the limb arteries. There after the patient attended our vascular unit were a general vascular examination, CDU and diagnostic angiogram were performed. The vascular examination was normal with no femoral bruits on extension or flexion of the hips. A CDU of the iliac and femoral arteries was performed. The CDU demonstrated a 50% stenosis of the PFA caused by a subtle dissection with an intimal flap located approximately 1.5 cm after the PFA origin. There was also a diffuse increase in the intima media thickness (0.8 mm-average of 10 measurements 1 cm proximally to the femoral bifurcation) of the right common femoral artery (CFA) compared to the left CFA (0.4 mm-average of 10 measurements 1cm proximally to the femoral bifurcation). There was no kinking or tortuosity of either the left or the right iliac systems on flexion and extension of the hips. A normal ABPI was measured at rest with no difference between limbs (ankle pressures 135mmHg bilaterally, brachial pressures 128/67 mmHg, ABPI 1.05 bilaterally)

The patient underwent a cycle ergometer test with his own bicycle. Following 10 minutes warm up stage, he exercised at maximum intensity until exhaustion. The right thigh pain occurred during the exercise test. Within one minute of cessation of exercise he underwent repeated pressures measurements and CDU. There were significantly raised velocities throughout the right PFA (Peak systolic and end diastolic velocities, 680/218 cm/sec) with damped Doppler wave form flow noted at this level (Figure 1A). The right PFA had a prolonged recovery time (time to revert to normal multiphasic flow, >10 minutes) and associated calibre reduction due to an intimal flap. Damped flow with raised velocities was observed at right CFA level also. Hyperaemic flow was noted in the left ilio-femoral system with a normal recovery time <2 minutes (Figure 1B). There was no drop in the posterior tibial pressures bilaterally (150 mmHg).

A subtraction diagnostic angiogram showed a possible dissection of the PFA. After intra-arterial administration of 30mg of papaverine delivered in to the right external iliac artery the patient reported the onset of right thigh pain (the same as he experienced during exercise). There was no pressure gradient across the right iliac system. The patient underwent endarterectomy of the CFA and PFA with a great saphenous vein patch. Intra-operative findings were in accordance with the findings on CDU. There was endofibrotic thickening at the CFA bifurcation and a dissection of the proximal profunda that was significantly compromising flow (Figure 2A). The patch was extended to the first few centimetres of SFA to ensure complete removal of all the endofibrotic plaque at the CFA bifurcation and to retain a substantial lumen into the proximal SFA (Figure 2B). The arterial excision, sent for histological examination in formalin, confirmed the endofibrotic nature of the arterial lesion. A pre-discharge CDU ultrasound demonstrated integrity of the patch, multiphasic flow throughout the femoral arteries and no evidence of stenosis/dissection. The patient was therefore discharged with 75 mg of aspirin for three months and with the indication to refrain from cycling over 6 weeks. After 6 weeks a follow-up CDU showed integrity of the patch and persistence of multiphasic flow throughout the femoral arteries. Patient was symptoms free at this stage.

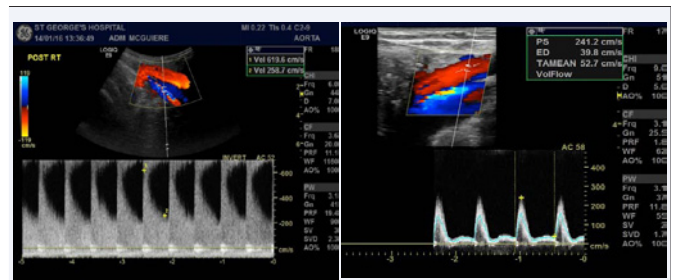


Figure 1 1A: Post exercise CDU of the PFA. High peak systolic and diastolic velocities damped flow (619.6 and 258.7 cm/sec) was detected at the level of the proximal PFA, site of dissection. Despite a high Pulse Repetition Frequency (119) aliasing was still observed in the proximal PFA suggesting a severe stenosis. Velocities recorded at this level suggested a >75% stenosis. 1B: Post exercise CDU of the asymptomatic CFA. Evidence of hyperemic flow noted throughout the ilio-femoral arteries with no evidence of focal region of stenosis seen.

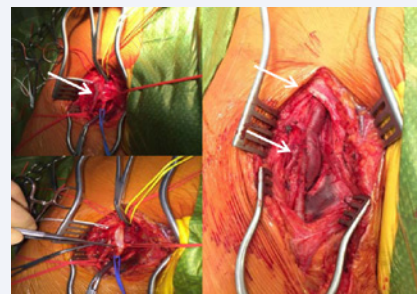


Figure 2 2A (top image): Groin dissection with exposure and slinging of the CFA, SFA and PFA. The white arrow demonstrates the blue discoloration of the proximal PFA indicating a dissection. Figure 2A (bottom image): Arteriotomy from CFA in to PAF. Note the dissection of the proximal PFA (white arrow). 2B: Completed repair of the artery (following endarterectomy) with a GSV patch angioplasty of the CFA in to the PFA and SFA.

DISCUSSION

Symptoms of exercise induced pain at the lower limbs in young athletes are commonly attributed to musculoskeletal causes; however, increasing numbers of patients (especially cyclists) are being diagnosed with iliac EF. The diagnosis of EF is often delayed because musculoskeletal diagnostic tests and standard physiotherapy regimens are suggested before a vascular origin of these symptoms is considered. Nonetheless recent studies suggested a 20% prevalence of EF amongstelite cyclists, using hemodynamic criteria [2]. The natural history of EF is poorly understood; however it is hypothesized to be progressive and related to the amount of exercise undertaken by individuals [2]. An early identification of this condition is therefore desirable in order to improve quality of life of the affected athletes.

Endofibrosis commonly affects the external iliac arteries; however other arterial segments can be involved with the CFA, PFA and internal iliac artery being the least common. There are few reports of PFA EF in the literature. PFA should be considered when a young athlete has exercise induced pain limited to the thigh.

The peculiar nature of EF has led to discrepancies in diagnostic criteria and difficulties in establishing a reliable, reproducible imaging modality [2]. However ABPI, after a cycle ergometer or treadmill test recorded within 5 min of ceasing maximal exercise, has been suggested to have a sensitivity and specificity of up to 100% [4-6]. Lesions at the level of PFA and internal iliac artery may however not necessarily cause a drop in the tibial pressure after exercise. Exercise testing with pressure measurements alone in these circumstances may yield a false negative test. The role of CDU in the diagnosis and assessment of patients with EF has previously been questioned [2]. However in our experience, ultrasound, when used in combination with ABPI and after a dynamic test, can be more discriminatory than ABPI alone. This case report reinforces the utility of CDU in identifying location, type and extension of endofibrotic lesions. Nonetheless CDU should be performed only by professionals with experience in the assessment of patients with EF as even in experienced hands may reveal to be unhelpful.

CONCLUSION

The PFA is an unusual site for the development of EF but should always be considered in young athletes (especially cyclists) with exercise induced pain limited to the thigh. ABPI after exercise test should always be performed in combination

with CDU especially in patients presenting with symptoms limited to the thigh. The assessment of patients with suspected iliac EF should be reserved to professionals with experience in the identification and management of this condition.

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