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Endurance Athletes with Intermittent Claudication Caused by Iliac Artery Stenosis Treated by Endarterectomy with Vein Patch – Short- and Mid-term Results

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WHAT THIS PAPER ADDS

- Diagnosis and treatment of endurance athletes with intermittent claudication are challenging. Conventional vascular testing is not discriminative in endurance athletes and general treatment strategies do not apply to this patient group.
- Our study describes in detail diagnostic workup, treatment and follow-up of 36 endurance athletes with intermittent claudication due to iliac artery stenosis treated with endarterectomy with vein patch and is the first study in literature describing this treatment with a complete middle-term follow-up.

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ABSTRACT

Introduction: Endurance athletes may suffer from intermittent claudication. A subgroup of 16% has severe iliac artery stenosis due to endofibrosis. In this study we report the short- and mid-term results of endarterectomy with venous patching.

Patients/methods: Athletes with claudication-like complaints were analysed using a protocol including cycling test and provocative echo-Doppler. Thirty-six athletes were diagnosed with serious iliac flow limitation (one bilateral), confirmed by additional magnetic resonance (MR) angiography. Endarterectomy with venous patching was performed for 32 iliac artery stenosis and five occlusions. Postoperative (mean 15.6 months) 33 legs were evaluated using the same diagnostic protocol. A complete follow-up after mean 29 months was obtained by questionnaire.

Results: Twenty-eight athletes were symptom free or could perform on a desired level with minor remaining complaints. Two athletes were satisfied though minor complaints prohibited high competition performance. Two athletes developed a re-stenosis and became symptom free after an additional operation. Three athletes had objective improvement but limited decrease in symptoms. One was unsatisfied but refused postoperative tests. The only major surgical complication was a postoperative bleeding necessitating re-operation. Postoperative tests showed significant increase in maximal workload and post-exercise ankle–brachial index. No aneurysm formation was detected.

Conclusions: Precise diagnosis and meticulously performed endarterectomy with vein patching have satisfactory results in mid-term follow-up with acceptable risk in endurance athletes complaining of intermittent claudication due to iliac artery stenosis.

Several publications have identified iliac artery flow limitation as a cause of performance hampering in endurance athletes, specifically cyclists and speed skaters. These athletes typically report intermittent claudication including loss of power, cramp or pain in a leg prior to attaining maximal cardiopulmonary exercise capacity. Complaints may also include sensations of a swollen thigh or a too tight-fitting cycling short.[1–3] Symptoms predictably occur during maximal exercise and rapidly disappear at relative rest.

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All endurance athletes presenting themselves with complaints of intermittent leg claudication were evaluated with our specific adapted test protocol.[4,5] In 65% of these patients an iliac flow limitation could be diagnosed. Iliac kinking without stenosis or elongation could be demonstrated in half of these patients; kinking with elongation and a short stenotic segment is present in an additional 25%, whereas the remaining quarter demonstrates severe external iliac artery stenosis or occlusion.

Conservative treatment was advised consisting of counselling, adjustment of the cycling position or switch of sport. However, especially professional cyclists and other athletes performing at high level did consider their complaints highly disabling and were not satisfied with conservative treatment. Operative options were explored by additional contrast enhanced magnetic resonance angiography (CE-MRA).

Athletes with severe external iliac stenosis or occlusion were treated with endarterectomy and a venous patch. In this follow-up study, we evaluate the results of this treatment with special attention to reduction of complaints and risk of dilatation and restenosis.

Patients and Methods

Subjects

During the study period 1996–2007, 36 of the athletes with severe disabling complaints of typical intermittent claudication with loss of power, cramp or pain were diagnosed to have significant vascular narrowing, dissection or occlusion of the external iliac artery. These patients were operated with endarterectomy and vein patching of the external iliac artery. Of these 36 patients, one was operated on both legs in two separate sessions.

Baseline characteristics of the patients are shown in Table 1. Patients were mostly cyclists (87%) and the majority was male (27 out of 36 patients). They cycled an average of 73,000 km with complaints, indicating a considerable patient and doctor delay. Symptoms were mostly left sided (23 out of 36 patients). About 50% of these patients were active at the national/professional level.

Preoperative diagnostic testing

All patients were tested using our specially devised test protocol.[4,5] A thorough patient history and physical examination were performed with attention to bruits over the external iliac artery (EIA) and common femoral artery (CFA) with extended and flexed hips. A cycling test was performed measuring maximum working capacity, ankle–brachial index (ABI) and the difference in ankle pressure between the healthy and the affected leg. Echo-Doppler examination visualised vascular stenosis and excessive length and allowed measurement of the peak systolic velocity (PSV).[6] Measurements were performed with the hip extended and again with the hip flexed aimed at eliciting kinking of the artery. A CE-MRA (Philips Gyroscan NT 1.0T) was performed with flexed hips facilitating the visualisation of possible kinking of common iliac arteries (CIAs). CE-MRA with extended hips assessed the degree of vascular narrowing and the length of the iliac vessels.[7]

Table 1
Baseline characteristics of the patients.

			Study group ($n = 36$)	
Gender			27 male 9 female	
Type of Sport			26 cycling 7 cycling and speed skating 1 triathlon 2 runners	
Competition level			9 international (professional) 8 national 6 regional 13 recreational	
Side of operation			23 left 12 right 1 both sides	
	Mean	SD	Median	Range
Age	34.6	10.3	31.0	22.1–56.4
Years active in sports	14.6	7.6	13	3–31
Weekly training hours	12.6	4.6	12	5–20
Cycled in total (km)	210,000	105,000	200,000	50,000–450,000
Cycled with complaints (km)	73,000	84,000	37,500	1250–350,000

Operation

Following informed consent to the specifics of surgery, patients were operated under general anaesthesia by one vascular surgeon in Máxima Medical Centre, the Netherlands. Through an inguinal incision the oblique and transverse abdominal muscles were split in their fibre direction. The lateral portion of rectus abdominis fascia was incised and the iliac artery was approached by extra-peritoneal route. The iliac artery was dissected from the aortic bifurcation down to the inguinal ligament. Small side branches to the psoas muscle were transected. The internal iliac artery was dissected over about 4 cm. Damage to the adjacent veins, nerves, ureter and the lymphatic vessels was avoided.

Through a second small groin incision the CFA was dissected cranially up to the EIA. Superficial external pudendal, deep circumflex ileac and inferior epigastric arteries were saved. The EIA was cut in an oblique plane from the iliac bifurcation and exteriorised through the groin incision (Fig. 1a–c). The EIA was opened by a longitudinal incision at its ventral portion followed by an endarterectomy of the stenosed segment. A portion of the saphenous vein was harvested through two separate small incisions on the medial side of the thigh. Integrity of the EIA was restored using a long saphenous vein patch and prolene 5/0 sutures (Fig. 2a,b). The reconstructed EIA was repositioned and re-anastomosed to the iliac bifurcation, with the patch extending over the iliac bifurcation to prevent stenosis at the anastomosis (Fig. 1d,e).

Intimal thickenings were removed and examined by a pathologist, most often revealing endofibrosis.[8,9] As the athletes did not suffer from atherosclerosis they used aspirin for 3 months only and no statin was prescribed.

Postoperative diagnostic regimen

Postoperative control was performed after 2 and 8 weeks, usually by telephone. Patients followed a recovery schedule with increasing exercises. After 2 months training was resumed. Postoperative testing was performed with the same specific test

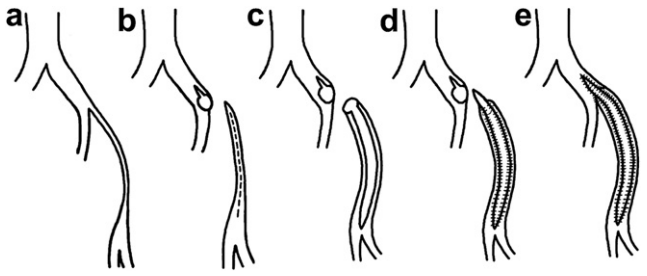

Figure 1. External iliac artery stenosis (EIA) corrected by endarterectomy and vein patch (a) EIA stenosis, (b) dissection and trans-section of the EIA at the iliac bifurcation, (c) longitudinal incision after exteriorisation with endarterectomy, (d) reconstruction of the EIA by vein patch, (e) re-anastomosis of the EIA to the iliac bifurcation.