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Primary Stenting of the Superficial Femoral Artery in Intermittent Claudication Improves Health Related Quality of Life, ABI and Walking Distance: 12 Month Results of a Controlled Randomised Multicentre Trial

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WHAT THIS PAPER ADDS

This prospective randomised trial, for the first time evaluates the impact of primary stenting of lesions in the SFA in addition to BMT in patients with IC on HRQoL. Stenting improves HRQoL, ABI, and walking distance at 12 months. It may guide clinicians in their difficult decision on how to treat the patient with infrainguinal IC by BMT alone, or BMT with additional invasive treatment.

Background: Invasive treatment of intermittent claudication (IC) because of severe atherosclerotic stenosis or occlusion in the superficial femoral artery (SFA) is controversial. This prospective randomised trial was performed to assess the impact on health related quality of life (HRQoL) of primary stenting with nitinol self expanding stents compared with best medical treatment alone in patients suffering from stable IC due to SFA disease.

Methods: One hundred patients with stable IC caused by SFA disease from seven Swedish hospitals treated with best medical treatment (BMT) were randomised to either the stent ($n = 48$) or the control ($n = 52$) group. Change in HRQoL assessed by the Short Form 36 Health Survey (SF-36) and EuroQoL 5 dimensions (EQ5D) 12 months after treatment was the primary outcome measure. Improvement in the Walking Impairment Questionnaire (WIQ), ankle brachial index (ABI), and walking distance were secondary outcomes.

Results: HRQoL improved significantly. In the stent group the following SF-36 domains improved: Physical Function, 19 points ($p < .001$); Bodily Pain, 14 points ($p = .001$); General Health, 6 points ($p = .019$); Vitality, 10 points ($p = .004$); Physical Component Summary, 6.5 points ($p < .001$); EQ5D, 0.14 points ($p = .008$); and WIQ 22 points ($p < .001$). They were unchanged in the control group. Both ABI (from 0.58 ± 0.11 to 0.86 ± 0.19, $p < .001$, in the stent group and from 0.63 ± 0.17 to 0.70 ± 0.20, $p = .005$, in the control group) and walking distance (WD) (from 171 ± 90 meters to 613 ± 381 meters, $p < .001$, in the stent group and from 209 ± 106 m to 335 ± 321 meters, $p = .012$, in the control group) improved, and at 12 months both the ABI ($p < .001$) and the WD ($p = .001$) were higher in the stent group.

Conclusions: In patients with IC caused by lesions in the SFA, the addition of primary stenting to BMT was associated with significant improvement in HRQoL, ABI, and walking distance after 12 months follow-up compared with BMT alone.

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INTRODUCTION

Intermittent claudication (IC) is a common manifestation of peripheral arterial disease, with a prevalence of 6.5% in women and 7.2% in men aged 60–90 years in Sweden.[1] Management of IC traditionally consists of risk factor

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modification and best medical treatment (BMT) with or without supervised exercise training.[2] Whereas the long-term results of invasive treatment of IC patients with suprainguinal disease are excellent,[3] invasive treatment of infrainguinal IC is more controversial and international guidelines[2] recommend that infrainguinal lesions in most cases should not be revascularised. In spite of this 8.9 per 100,000 inhabitants in Sweden underwent invasive treatment of infrainguinal IC in 2009.[4] As the restriction of patient's health related quality of life (HRQoL) in IC is not considered big enough to justify the risks of open surgery the majority of these patients were treated endovascularly.[4]

The results of endovascular treatment of the superficial femoral artery (SFA) are suboptimal with restenosis rates of 60–70% after percutaneous transluminal angioplasty (PTA) alone in long lesions.[5] Several studies have reported superior results of primary stenting with nitinol stents in the SFA compared with PTA with bailout stenting, with respect to restenosis rate, ankle brachial index (ABI), and walking distance.[6,7] Divergent results have also been published,[8] however. Restenosis is the main problem in endovascular infrainguinal treatment and is correlated with the length of the stented segment, the number of stents, and the stent brand used.[9] A strategy of using as few stents as possible is presumed to be preferable in long lesions.[10]

Invasive treatment for IC should provide the best HRQoL for the patient with minimal complications. PTA with selective stent implantation or primary stent implantation has shown significantly better results than PTA alone with respect to this.[11]

Since IC is often caused by infrainguinal lesions with symptoms most commonly localised to the calf,[2,12] and as previous studies have often included patients with both supra- and infrainguinal lesions,[13,14] there is a need for studies focusing on the more controversial topic of infrainguinal IC, commonly caused by lesions limited to the SFA[12]; however, a previous attempt to study this issue in a randomised setting[15] failed because of difficulties in patient recruitment.

The main objective of this study was to assess the impact of primary SFA stenting with nitinol self expanding bare metal stents (BMS) in addition to BMT in patients with stable IC caused by SFA disease compared with BMT alone on HRQoL during 12 months of follow-up.

Secondary objectives were to study the impact of primary SFA stenting on WIQ, ABI, and walking distance.

MATERIAL AND METHODS

In this open label multicentre, prospective, randomised, two armed study conducted at vascular clinics in seven Swedish hospitals (Eskilstuna, Helsingborg University Hospital, Kalmar, Kristianstad, Örebro University Hospital, Skåne University Hospital Malmö, and Växjö), patients already on BMT were randomised on a 1:1 basis to primary stenting versus BMT alone. Data were reported to research units at Helsingborg and Spenshult Hospitals. Subjects were stratified with regard to lesion length shorter (short lesions) or longer (long lesions) than 90 mm calculated as the sum of all stenotic or occluded segments measured on pre-inclusion magnetic resonance tomography angiography (MRA) or computed tomography angiography (CTA). Results were prepared and reported according to the CONSORT 2010 Statement.[16] Source data verification regarding informed consent, inclusion and exclusion criteria and site visits during the study and at study closure were conducted by project monitors at Helsingborg Hospital research unit.

The treatment protocol remained unchanged throughout the study.

Inclusion criteria

Patients aged $>$ 18 years suffering from stable (i.e., $>$ 6 months) IC (Fontaine IIb)[17] with absolute walking capacity $<$ 500 meters measured by a standardised constant treadmill test (speed 3 km/h, without incline), caused by de novo or restenotic SFA lesion (stenosis or occlusion) were included. The target treatment segment was the full length of the SFA to the proximal limit of the popliteal artery not extending beyond 3 cm above the patella on MRA or CTA, TASC IIa–c.[2] A patent popliteal and at least one patent non-stenotic tibial runoff artery on the index side were required for inclusion in the study. Patients with a target artery diameter (i.e., diameter of vessel above or below the lesion) $<$ 4.0 mm measured on MRA or CTA were excluded.

Exclusion criteria

Patients with haemorrhagic stroke within the past 3 months, aneurysm of the SFA or popliteal artery, previously implanted stent(s) at the same site, or poor aorto-iliac or common femoral inflow were excluded from the study. However, patients having invasive correction of reduced inflow 3 months prior to evaluation of eligibility were considered eligible for randomisation.

Other exclusion criteria were critical limb ischaemia (CLI, Fontaine III and IV)[17] in the index leg, life expectancy of less than 24 months, and previous enrollment of the index or contralateral leg in this or any other clinical trial.

Patient screening

Between 2010 and 2015, 310 patients were screened at the seven different vascular surgical outpatient clinics, from which 100 patients were randomised. Enrolment and flow of patients in the trial are shown in Fig. 1.

Randomisation

One hundred and twenty envelopes, of which 60 contained allocations to each of the two study groups, were sealed and distributed to the research unit at Spenshult Hospital. During a telephone call from the treating physician, patients were randomised to the stent or the control group on a 1:1 basis by an administrative officer at the research unit by opening one of the previously sealed envelopes.

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