Eur J Vasc Endovasc Surg (2008) **36**, 424–431

Kissingstents in the Aortic Bifurcation – a Valid Reconstruction for Aorto-iliac Occlusive Disease

K. Björses [a,*], K. Ivancev [a], L. Riva [b], J. Manjer [c], P. Uher [a], T. Resch [a]

[a] *Vascular Center, Malmö, Sweden*
[b] *Department of Surgery, Kristianstad, Sweden*
[c] *Department Surgery, Malmö, Sweden*

Submitted 16 March 2008; accepted 21 June 2008
Available online 8 August 2008

KEYWORDS
Arterial occlusive disease;
Iliac artery;
Stent;
Vascular patency

Abstract *Objective:* To evaluate outcome and patency predicting factors of kissingstent treatment for aorto iliac occlusive disease (AIOD).
Methods: Patients treated with kissingstents for AOID between 1995 and 2004 at a tertiary referral center were identified through local databases. Chart review and preoperative images were used for TASC and Fontaine classification. Follow-up consisted of clinical exams, ABI and/or duplex. Patency rates were estimated by Kaplan-Meier analysis, and Cox multivariate regression was used to determine factors associated with patency.
Results: 173 consecutive patients (46% male, mean 64 years) were identified. TASC distribution was: A 15%, B 34%, C 10%, D 41%. Mean follow-up was 36 months (range: 1–144). 30-day mortality was 1% (2 patients), and 1-year survival was 91% (157 patients). 2 patients underwent late, open conversion and 13 patients suffered minor puncture site complications. Primary, assisted primary and secondary patency was: 97%, 99% and 100%, and 83%, 90% and 95% at twelve and 36 months respectively. There was no significant difference in patency between the TASC groups. Patency was significantly worse for patients in Fontaine class III.
Conclusions: Aortoiliac kissing stents is a valid alternative to open repair for TASC A-D lesions. The procedure has low mortality and morbidity and good patency at 3 years.

Introduction

AIOD has traditionally been treated with open surgery, commonly with aorto-bifemoral bypass. Surgical treatment of AIOD is burdened with a peri-operative mortality of 3–5% and morbidity of 8–13%.[1] Endovascular treatment reduces mortality and both rate and severity of complications[2–4] and has rapidly replaced open surgery in mild to moderate lesions, defined as TASC class A and B.[5] There are, however, still controversies whether endovascular treatment is optimal for more advanced lesions such as severely calcified long segments or extensive occlusions of the iliac arteries and/or the entire aortic bifurcation, defined as

* Corresponding author. K. Björses, MD, Vascular Center, Malmö University Hospital, Lund University, Ing 59 UMAS, 205 02 Malmö, Sweden. Tel.: +4640338079; fax: +4640338097.
E-mail address: katarina.bjorses@med.lu.se (K. Björses).

1078-5884/$34
doi:10.1016/j.ejvs.2008.06.027

TASC class C and D. In recently revised recommendations the TASC committee still advocate surgical treatment for class C and D lesions.[5]

There are several published single center series of kissingstents in the aortic bifurcation, none of which give a clear-cut answer to whether TASC classification predicts outcome.[6–16]

At our tertiary vascular referral center, endovascular treatment has been the primary treatment option for AOID since 1995, during this period of time only 16 patients underwent primary treatment with OR (aortobifemoral bypass) on this indication. The aim of this study was to analyze outcome after kissingstent placement and to determine if TASC classification or other factors, such as stent type, affects outcome for our patients.

Patients and Methods

Patients treated with kissingstents in the aortic bifurcation between 1995 and 2004 in Malmö were identified through local databases. All intraoperative angiographies were reviewed for TASC classification (the original TASC classification from 2000 was used, Table 1). Operative notes were analyzed for number, make and size of stents inserted in the distal aorta, common and external iliac arteries. Patients' charts were analysed for demographic data, complications and follow-up. Their pre-interventional symptoms were graded according to the Fontaine classification.[5,17]

Technique

All procedures were performed in a dedicated angiosuite with a fixed c-arm system (Siemens, www.medical.siemens.com). All patients were treated percutaneously through bilateral common femoral arterial (CFA) punctures, in most cases with six or seven French introducers. The CFA punctures were performed under fluoroscopic guidance, frequently with micro-puncture technique and contrast injections to confirm a correct location of the puncture. If necessary (patients with bilateral occlusions of common iliac arteries and/or occlusion of distal aorta), brachial access was used to facilitate the procedure. Patients with disease extending into the CFA requiring simultaneous surgical treatment were excluded from this study. All patients were taking anti-platelet medication (75 mg acetylsalicylate or clopidogrel daily) and during intervention 50–100 IU/kg bodyweight of heparin (Heparin Leo, Leo Pharma AB, www.leo.se) was administered intra arterially. Stenoses were passed intraluminally and occlusions recanalized subintimally with a 0.0035'' hydrophilic guidewire (Terumo, www.terumomedical.com). All kissingstents were deployed with the proximal end in the aorta one – two cm above the native aortic bifurcation. Choice of stent was at the interventionist's discretion. Self-expanding nitinol stents were the primary choice in long tortuous lesions if not heavily calcified, in which case balloon expandable stents or occasionally covered stents were used. All self-expanding stents were post dilated to the nominal vessel diameter, measured on the pre-treatment angiogram. Technical success was defined as less than 30% residual stenosis and/or mean pressure gradient of five mmHg or less across the treated segments. After intervention all patients remained in hospital overnight, and received low molecular weight heparin subcutaneously (40 mg enoxaparin sodium, Sanofi-Aventis, www.sanofi-aventis.com). The patients continued with their ordinary anti-platelet medication with addition of statins after discharge from hospital.

Table 1 TASC 2000 classification of aorto-iliac lesions

Type A lesions:	• Unilateral or bilateral stenoses of CIA • Unilateral or bilateral short (≤ 3 cm) stenosis of EIA
Type B lesions:	•Short (≤ 3 cm) stenosis of infrarenal aorta •Unilateral CIA occlusion •Single or multiple stenosis totaling 3–10 cm involving EIA, not extending to the CFA •Unilateral EIA occlusion, not invoving the the origins of internal iliac or CFA
Type C lesions:	•Bilateral CIA occlusions •Bilateral EIA stenoses 3–10 cm long, not extending into the CFA •Unilateral EIA stenosis extending into the CFA •Unilateral EIA occlusion that involves the origins of internal iliac and/or CFA •Heavily calcified unilateral EIA occlusion with or without involvement of origins of internal iliac and/or CFA
Type D lesions:	•Infrarenal aorto-iliac occlusion •Diffuse disease involving the aorta and both iliac arteries requiring treatment •Diffuse multiple stenoses involving the unilateral CIA. EIA and CFA •Unilateral occlusions of both CIA and EIA •Bilateral occlusions of EIA •Iliac stenoses in patients with AAA requiring treatment and not amendable to endograft placement or other lesions requiring open aortic or iliac surgery

CIA: common iliac artery, EIA: external iliac artery, CFA: common femoral artery, AAA: abdominal aortic aneurysm.

Follow-up

The standardized follow-up (FU) at the clinic consisted of clinical examination including ankle-brachial index (ABI) measurement one month and one year after intervention. After this patients were informed to return if symptoms recurred. An additional FU was performed between Oct 2005 and Feb 2007, when all patients alive and traceable were offered a clinical examination, ABI measurement and an ultrasound duplex scan. The majority of patients accepted. (Fig. 1) Since the distal aorta and common iliac arteries were often difficult to visualize with ultrasound duplex, the evaluation of the suprainguinal arteries was made by flow measurements and Doppler Pulse Wave recordings in the common femoral artery bilaterally.[18–20] If the examinations indicated a restenosis or occlusion suprainguinally, the patient was offered a CT scan. If the