Vascular Applications: Arteries

Stent Placement in Iliac Arterial Lesions: Three Years of Clinical Experience with the Wallstent

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Abstract. Within a 3-year period, 125 patients with 63 iliac occlusions and 62 complex iliac stenoses underwent stent placement using self-expandable vascular endoprostheses. Early technical success rate was 98%, with a total complication rate of 4%. Major complications were seen in 1.6%. Early reobstruction occurred in 4 patients with previous occlusions. Late reobstruction due to a clinically relevant restenosis or reocclusion occurred in 10 patients and required 12 repeat interventional procedures. Cumulative patency, excluding early technical failure, was 100% at 6 months and 89.4% at 24 months. Stenting of iliac arteries using self-expandable endoprostheses is a safe and effective treatment of complex iliac lesions.

Key words: Endoprosthesis, vascular—Iliac artery, occlusion, stenosis

Balloon angioplasty of iliac artery stenoses is the most common form of percutaneous transluminal angioplasty (PTA) performed by radiologists [1], yielding results that are comparable to surgical treatment [1, 2]. On the other hand, percutaneous endoprostheses, which were introduced to percutaneous intervention a few years ago, were applied in most cases to iliac lesions [3-5]. This apparent contradiction may be explained by the expansion of percutaneous recanalization to a subset of iliac lesions. These included iliac occlusions or complex stenoses which are less amenable to balloon angioplasty and were so far subject to surgical treatment. We want to report on our results using the self-expandable Wallstent limited to this subset of iliac artery disease.

Materials and Methods

Indications for stent placement were lesions meeting the criteria of a complex lesion [1] or an acute complication such as an occluding dissection occurring during balloon dilatation. Iliac occlusions, long-segment stenoses with an irregular surface, aneurysm formation, or markedly ulcerated plaques were included in this group of complex lesions [1] as well as eccentric stenoses (Fig. 1) and ostial lesions with extension to the aortic bifurcation. All are known not to respond well to balloon angioplasty. Collapsing stenoses after deflation of the balloon [1, 6] and flow-obstructing dissections [7] complicating PTA were considered to be acute indications for stent placement in order to maintain the vascular lumen (Fig. 2). Iliac restenosis after previous PTA was a relative indication for stent placement in case the postangioplasty result was compromised. An inadequate result after state-of-the-art balloon dilatation of the iliac stenoses was a prerequisite for stent placement. Chronic iliac occlusions of at least 3 months clinical history, however, were considered a primary indication for stent placement [8].

The Wallstent prosthesis, used in all cases, is described in detail elsewhere in this issue. In iliac stenoses, the stent opening started proximal to the lesion and, after DSA angiography via the inner lumen of the delivery catheter, the prosthesis was pulled back until it reached the desired position ready for complete deployment. Balloon dilatation of a stenotic lesion always preceded stent implantation, and the stent was redilated only in case it had not opened completely. In lesions that included the aortic bifurcation, slight protrusion of the proximal end of the stent into the aortic lumen was intended in order to cover the stenosis properly and to keep the iliac orifice open, thus avoiding a low flow situation at the implantation site. In chronic iliac occlusions, the endoprosthesis was always implanted prior to full dilatation [8] after the occluded segment was traversed by retrograde approach using a 5F catheter and a straight guidewire. The contralateral approach was used in selected cases. Subsequently, a "working channel" was created by dilatation with undersized balloons of 5-7 mm. The stent was then placed on the occluding material. If the stent did not open to its full diameter it was dilated with 8-10 mm balloons. Overdilatation of the artery was avoided even with the stent in place.

A total of 125 patients with a mean age of 56.7 years (40-73 years) were treated. All patients displayed clinical symptoms
of arterial occlusive disease. Eight patients had claudication Fontaine's stage IIa (walking distance 200 m and more) and 108 patients had stage IIb (walking distance less than 200 m). Six patients presented with pain at rest (stage III) and three with cutaneous necrosis (stage IV). The lesions were located in the common iliac artery (n = 78), the external iliac artery (n = 23), or both the common and the external iliac artery (n = 14). The mean length of the lesions was 4.4 cm (range 0.5–22 cm). Sixty-two iliac stenoses and 63 iliac occlusions were stented (Table 1).

A total of 162 vascular endoprostheses were used. The implanted length of the individual stents ranged from 20 to 75 mm. Where a lesion exceeded the length of a single stent, more than one device was implanted with an overlap. Eighty-nine patients received one and 36 patients received two or more stents. The expanded diameter of the endoprostheses varied between 6 and 14 mm. Diameters of 8–10 mm for the external iliac artery and 10–12 mm for the common iliac artery were preferred.

### Adjunctive Medical Treatment

Preoperative medication with 500 mg acetylsalicylic acid (ASA) was given 24 h before the procedure and 100–500 mg ASA on the day of the procedure. An intraoperative dose of 5,000 IU heparin was administered and supplemented by an additional 2,000 U if the procedure took longer than 1 h. The protocol included postoperative heparinization for 24 h at a rate of 1,000 U/h for

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**Fig. 1.** Stenting of a complex iliac lesion. A An eccentric stenosis due to a large medially located plaque was seen in the left external iliac artery (arrowheads). B Balloon dilatation with 8 mm only established a lumen of about 4 mm (open arrow) compared with the normal diameter of the distal common iliac artery of 10 mm, measured by intravascular ultrasound. C Following stent implantation, a fully restored lumen is seen (open arrows).

**Fig. 2.** Arterial dissection. A Left external iliac artery after balloon dilatation. A small dissection is seen proximally (curved arrow). The morphological and functional result was satisfying and no further intervention was considered. B After exchange of the angiographic catheter by an unexperienced angiographer, the external iliac artery was completely blocked by a severe dissection (arrow). C After recrossing the occluded segment by a hydrophilic guidewire, stent placement enabled complete restoration of the vascular lumen. Small residual dissection is seen medially (curved arrow).