Early Experience with Stenting for Iliac Occlusive Disease


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Objectives: To review our experience of iliac artery stenting for occlusive disease.

Design: Prospective study of 50 consecutive patients with iliac occlusive disease, November 1993–November 1996. The indications for stenting were complete iliac occlusion (37), restenosis (four), donor site inflow for bypass grafting (four) and difficult stenoses (>90% and/or >5 cm) (five). The majority of patients (41) presented with intermittent claudication.

Results: All 13 stenoses were successfully stented. One occluded but the rest remain patent. There were no other complications. By contrast, it was not possible to place a stent across 10 of the 37 complete iliac occlusions. In this group there were nine major complications, including five patients who required early embolectomy (four femoral, one brachial) and one patient who developed a false aneurysm at the site of the stent. The “intention to treat” primary cumulative patency for iliac occlusions was 65% at 2 years but after excluding technical failures was 88%.

Conclusions: There is a sharp learning curve and significant complication rate associated with stenting complete occlusions. However, following successful stenting patency rates are around 90% for both iliac stenoses and occlusions.

Key Words: Iliac occlusive disease; Stents.

Introduction

Aortoiliac occlusive disease has been successfully treated with percutaneous transluminal angioplasty (PTA) since the early 1980s. Increased acceptance of this technique reflects its simplicity, cost effectiveness and low incidence of significant complications.1 Failures and recurrences of iliac artery angioplasty do not increase the difficulty of subsequent procedures.2 However, restenoses, long and tight stenoses, dissections and occlusions have a major impact on results of iliac angioplasty.3,4

The two main limitations of percutaneous transluminal balloon angioplasty appear to be intimal dissection and elastic recoil.1 Intravascular stents provide a mechanical means of overcoming these problems. With clearly defined indications for stent placement we report our early experience of iliac stenting and early complications encountered.

Materials and Methods

Data were collected prospectively on patients undergoing iliac artery stenting for occlusive disease between November 1993 and November 1996. Re-analisation of the iliac artery was achieved by passing a guide-wire across the lesion using an ipsilateral Seldinger approach. The procedure took place under local anaesthetic in the Radiology department. Angioplasty was performed using an undersized balloon (4 mm) before insertion of a self expanding Wallstent (Schneider Europe, Zurich, Switzerland). Technical success was defined as restored patency and confirmed by a post-stenting digital subtraction angiogram (DSA). Whilst in hospital all patients received 5000 units bd subcutaneous heparin. Following treatment, patients were prescribed a daily dose of 75 mg aspirin. Patients were reviewed in outpatients at 6 weeks. Intravenous DSA was carried out at 6 and 12 months.

During the 3-year period angioplasty with stenting was attempted in 50 patients (median age 61 years, range 45–89). There were 37 men. Forty-one patients presented with short distance intermittent claudication, four with rest pain and five with ischaemic ulcers. Five patients were diabetic.

The indications for stenting were clearly defined: (i) complete occlusion, (n = 37), (ii) recurrent stenosis, (n = 4), (iii) stenosis when iliac artery to be used as donor site for bypass grafting, (n = 4), (iv) difficult stenosis (longer than 5 cm and/or tighter than 90%), (n = 5). In 43 patients the common iliac artery was involved.
of the 34 occlusions involved the whole length of the artery. In the other seven, lesions were confined to the external iliac artery (complete occlusion in three). The majority (34/50) of the disease was on the left side. Fifty-six Wallstents were used. In four patients more than one stent was required. The diameter of the stents ranged from 6 mm–12 mm (median 8 mm).

Results

It was not possible to stent 10 of the 37 complete iliac occlusions. In nine cases this was due to failure to pass a guide-wire across the lesion. In one, after successful positioning of the guide-wire an inadequate angioplasty was performed. Nine of these technical failures occurred in the first 21 cases, including the first four attempted. Four of the 10 patients having a technical failure required subsequent operation. These included femorofemoral crossover grafts, one combined with a femoropopliteal bypass, and one combined aorto-femoral bifurcation and femoropopliteal bypass graft.

Of those patients having attempted stenting of occlusions there were nine major complications. Eight occurred within 24 h of successful stent placement. Five patients required embolectomy (four femoral, one brachial). Two of the four femoral embolectomies and the brachial artery embolectomy were ipsilateral to the side of the stent. The patient with the brachial artery embolus developed a mild Volkman’s contracture but is able to use her arm and hand in a normal manner.

Two stents occluded. One occlusion was thrombolysed with tPA which was only temporarily successful. The patient underwent aortofemoral bifurcation 3 weeks later following reocclusion of the stent. The other patient with an occluded stent underwent a femorofemoral cross over graft the next day. Lysis was contraindicated due to a history of peptic ulcer disease. In one patient the iliac artery temporarily went into spasm.

We have previously shown a decline in the use of aortofemoral bifurcation grafts for aorto iliac occlusive disease. This was associated with an increase in the number of extra anatomic bypasses. The impact of iliac stenting, which has resulted in a reduction in extra anatomic bypasses performed since 1994, is shown in Fig. 1.

One patient developed a false aneurysm adjacent to the proximal end of the stent 6 months after placement. This patient underwent an aortofemoral bifurcation graft. At operation the aneurysm was found to be saccular originating from the common iliac artery at the upper limit of the stent. The stent was patent. None of the patients in our series have suffered limb loss including the nine patients who presented with critical ischaemia.

The “intention to treat” primary cumulative patency rate for the 37 occluded iliac arteries was 65% at 2 years. The median follow up was 17 months, (range 2–36). However, if technical failures are excluded this patency rate increases to 88%, (Fig. 2). All patients with patient stents have improved symptoms and anklebrachial pressure indices, (pre-procedure
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Fig. 2. Kaplan-Meier life table analysis of iliac artery occlusions with technically successful (---) and “intention to treat” (---) recanalisation. The lines indicate cumulative patency rate and numbers of patients at risk. 95% confidence limits at 24 months: 67%, 96% (---) and 48%, 80% (---).

median 0.5, range 0.4–0.8; post-procedure median 0.95, range 0.7–1.1.

All 13 iliac artery stenoses were successfully stented. One stent occluded at 7 days and was cleared with tPA. It re-occluded at 21 months. The patient then underwent a femorofemoral cross over graft. The remaining stents (12/13) are patent at a median follow up of 17 months, (range 2–36). All but two patients are asymptomatic. These two still have calf pain because of distal disease but refuse operation.

All uncomplicated and successfully stented patients stayed in hospital for 1 night, as did those who had a technical failure. The median stay of patients with early complications was 5 nights (range 2–22).

There are two aspects to successful endoluminal treatment of any diseased artery. Firstly, mechanical crossing of the lesion, and secondly maintenance of patency. Passage of a guide-wire across the lesion is the critical step with complete occlusions, whether for angioplasty alone or combined with stent insertion. Our data show that there is learning curve in performing this procedure, as nine of the technical failures occurred in the first 21 patients with complete occlusions. Therefore, there has been successful primary recanalisation in 16 of the last 17 performed (88%). Others have experienced this learning curve. In a series of 103 iliac artery occlusions, Vorwerk et al. achieved a primary recanalisation of 71% with the first 50 patients and 93% with the later 53 patients. It is thought that occlusions are due to severe atherosclerotic disease and proximal thrombus. Some centres have used thrombolysis before attempting recanalisation with a guide-wire with encouraging results (Table 1).

The second area of discussion is long-term patency. Cumulative patency is usually calculated after rejecting the technical failures which can give a misleading impression of success rate of stenting for iliac occlusions. Vorwerk et al. described a primary cumulative patency rate of 87% at 1 year and 54% at 5 years. Long et al. reported primary cumulative patency rates of 90% and 41% at 1 and 4 years, respectively, but their data included iliac stenoses as well as occlusions. Secondary cumulative patency rate refers to patency after additional or assisted patency procedures, such as angioplasty, thrombolysis or further stent insertion.

Discussion

Table 1. Summary of percutaneous angioplasty and/or stenting of iliac occlusive disease.

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of lesions</th>
<th>Lysis</th>
<th>PTA</th>
<th>Stent placement</th>
<th>Primary recanalisation rate, %</th>
<th>Primary cumulative patency rate, % (years)</th>
<th>Secondary cumulative patency rate, % (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring</td>
<td>10</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>50</td>
<td>80 (4)</td>
<td>NG</td>
</tr>
<tr>
<td>Colapinto</td>
<td>64</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>78</td>
<td>78 (4)</td>
<td>NG</td>
</tr>
<tr>
<td>Johnston</td>
<td>82</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>82</td>
<td>58 (3)</td>
<td>NG</td>
</tr>
<tr>
<td>Kichikawa</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>58</td>
<td>100</td>
<td>100 (1.5)</td>
<td>100 (1.5)</td>
</tr>
<tr>
<td>Long</td>
<td>64</td>
<td>0</td>
<td>0</td>
<td>63</td>
<td>98</td>
<td>41 (4)</td>
<td>81 (4)</td>
</tr>
<tr>
<td>Blum</td>
<td>47</td>
<td>47</td>
<td>43</td>
<td>189</td>
<td>98</td>
<td>NG</td>
<td>87 (3)</td>
</tr>
<tr>
<td>Vorwerk</td>
<td>127</td>
<td>0</td>
<td>0</td>
<td>103*</td>
<td>81</td>
<td>54 (5)</td>
<td>75 (5)</td>
</tr>
<tr>
<td>This series</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>27*</td>
<td>73</td>
<td>88 (2)</td>
<td>88 (2)</td>
</tr>
</tbody>
</table>

* Wallstent.
† Palmaz stent.
§ Gianturco stent.
‖ Includes 28 iliac occlusions and 31 dissections.
NG, not given.
In our series of occlusions only one stent underwent thrombolysis. This was unsuccessful. Therefore, our primary and secondary cumulative patency rates are the same. However, others have shown improvements in secondary cumulative patency rate \(^6-10\) (Table 1). Despite regular angiography surveillance no restenosis has so far been detected in our series of occlusions or stenoses.

We have previously shown that diabetic patients undergoing PTA are more likely to have disease below than above inguinal ligament \(^11\). Diabetes has been shown to adversely affect results of angioplasty alone. Only five patients in this series were diabetic providing insufficient information regarding the influence of diabetes on results of stenting.

The most significant complication in our series has been peripheral emboli. It has been suggested that thrombolysis treatment prior to passing a guide-wire, angioplasty and stent insertion may reduce the rate of embolisation. However, embolisation rates vary between 0\% to 40\% with both stent insertions and angioplasty alone \(^6-10,12,13,15\). The embolisation rate in our study is high (5/27) but it is important to note that all of these patients have patent stents and only one experienced any long-term morbidity. It is likely that the brachial artery embolus was caused by the pigtail catheter being inserted too high. Complication rates for stented or angioplastied iliac stenoses tend to be lower than for occlusions \(^15\).

Patency rates for stenting occlusions are at least as good as angioplasty alone, particularly secondary patency rates (Table 1). No prospective trials have been performed comparing stenting verses angioplasty alone for iliac occlusions. In a randomised trial for stenoses, Richter et al. improved technical success and better patency with stenting \(^14\).

In our study, clear indications for stenting were defined. Others have used stents in the presence of vessel dissection. However, indications for stenting have yet to be completely identified. Its place in routine interventional radiology needs to be established with prospective studies.

**References**


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