Extra-Anatomic Obturator Bypass
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ABSTRACT
Aim: To evaluate the technique of Trans Obturator bypass as regards indications, patency rate, and complications in the management of cases with hostile groin pathology.

Patients and Method: Prospective study of 24 patients with hostile groin pathology underwent obturator bypass graft, for infected aortic or femoral grafts, Pseudoaneurysms, crush injuries, drug abuse, or iatrogenic interventions.

Results: The primary patency rate was 87.5% at one year and 79% at 2.5 years (end of follow up period). There was one post operative mortality (4.2%). There was no late graft infection in all cases, but 2 patients (8.3%) required reoperation due to graft thrombosis, one of them required a major amputation. Healing of the groin wounds occurred in all patients.

Conclusion: Obturator bypass technique is a safe, efficient, with favorable outcome, and few complications, so it is recommended to be incorporated in the management of hostile groin pathology.

Key words: Groin sepsis, Graft occlusion, Extra-anatomic bypass.

INTRODUCTION
Extra-anatomic bypass is the passage of graft through a significantly different anatomic pathway than the natural blood vessel it replaces. The use of this bypass may be to avoid the natural location of the vascular supply, either because of hostile pathology or because entering the area adds to the risk of the operation as in the abdomen.

Obturator bypass was introduced primarily to restore blood flow to the limb when direct vascularization is prohibited by groin sepsis.1) The innovative use of obturator bypass was in crushing injuries in the groin,2,3 in bypassing malignancies involving the inguinal nodes, or after irradiation of the groin with the resultance occlusive arteritis3). It was also used in dealing with infected femoral aneurysms caused by practicing non-sterile techniques, by drug addiction. This could occur as iatrogenic lesion by physicians or interventionists performing diagnostic procedures4,5).

In case of infected proximal anastomosis of a femorodistal bypasses due to any hostile groin pathology, the graft could pass through the obturator foramen. The obturator bypass differs from other extra-anatomic bypasses in that it does not use the inflow of another limb depending only on the ipsilateral side.6)

PATIENTS & METHODS
In this study, 24 patients with hostile groin pathology underwent obturator bypass graft. The aetiology of hostile groin is shown in table 1.

Table (1): The aetiology of hostile groin

<table>
<thead>
<tr>
<th>Cause of hostile groin</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected grafts:</td>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>Aorto-femoral</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Femoro-popliteal</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Pseudoaneurysm</td>
<td>4</td>
<td>16.7%</td>
</tr>
<tr>
<td>Crush injury</td>
<td>4</td>
<td>16.7%</td>
</tr>
<tr>
<td>Drug abuse</td>
<td>2</td>
<td>8.3%</td>
</tr>
<tr>
<td>Interventions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catheter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dialysis</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The mean age of patients was (60.2±3.5) years, 8 patients (33.3%) were diabetics, and 6 patients (25%) had ischaemic heart disease. The presenting symptoms were summarized in table 2,
Table (2): The presenting symptoms

<table>
<thead>
<tr>
<th>Presenting symptoms</th>
<th>Severe infection</th>
<th>Bleeding</th>
<th>Aneurysm</th>
<th>Septic shock</th>
<th>Ischaemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>24 (100%)</td>
<td>8 (33.3%)</td>
<td>4 (16.7%)</td>
<td>1 (4.2%)</td>
<td>14 (58.3%)</td>
</tr>
</tbody>
</table>

Treatment of infection consisted of irrigation, radical debridement, control of bleeding, removal of foreign materials and graft excision with extra-anatomic obturator bypass.

**Technique of Obturator Bypass:**

The patient is placed in supine position with the leg abducted and laterally rotated, so the hip can be flexed to relax the thigh muscles. Groin wound should be covered properly with adherent drape to be excluded from the operative field.

A transverse retroperitoneal approach is preferred if angiography has confirmed a suitable donor iliac vessels.

Abdominal exposure is through a right paramedian incision. Then transperitoneal approach to the aorta and iliac vessels or to the limb of an aorto-femoral graft could be performed. (Figures 1, 2, 3, 4)

The site of proximal anastomosis is selected according to the extent of the disease.

The safe avascular area for making the tunnel through the obturator foramen should be located anteriorly and medially (to avoid the fleshy obturator internus muscle), just below the superior pubic ramus and medial to the vessels and nerve that pass laterally.

The obturator membrane is tough to be passed with blunt finger dissection and should be incised sharply.

The optimal site for distal anastomosis depends on the extent of the disease, the lower popliteal is usually free of disease, but the upper popliteal has the advantage of a shorter graft with better expected patency.

The deep fascia is then opened, retraction of the sartorius muscle or dividing the tendinous margin of the adductor magnus to expose the proximal popliteal artery.

The tunneler is then passed through the canal on to the anterior surface of the adductor magnus in the thigh to reach the adductor hiatus.

The graft is then passed or drawn through the tunnel using the tunneling device. After application of the popliteal clamps and reapplication of the iliac artery clamp, the distal suture line is then performed.

The popliteal artery is then usually ligated proximal to the graft in order to minimize back bleeding from the superficial femoral artery during groin dissection.

After closing the abdominal and thigh incisions, dealing with the groin problem is then started and may include removal of the distal graft limb, debridement or controlling bleeding by suture ligature of the profunda femoris artery.

**Follow up:**

This was done using Duplex scanning at (1, 3, 6, 12 months) and then every year after the operation.

In cases with suspected thrombosis diagnostic angiography was also performed.

The follow up period for patients with obturator bypass was 2.5 years.

**RESULTS**

There was one post operative mortality (4.2%) in the series due to multisystem organ failure at the 10th postoperative day in a patient with infected Aorto-femoral graft.

The primary patency rate was 87.5% at one year and 79% at the end of follow up period (chart 1).

As regards the recorded complications: there was no late graft infection in all cases. But 2 patients (8.3%) required reoperation due to graft thrombosis, one of them required a major amputation (chart 2).

Healing of the groin wounds occurred in all patients.
Chart 1: Patency rates

Chart 2: Graft thrombosis and mortality
Figure 1, 2: Obturator canal from inside and outside the pelvis.

Figure 3, 4: The pathway of the graft
DISCUSSION

Since the introduction of extra-anatomic grafts in the early 1960s for management of difficult and often desperate technical problems usually related to infection or failure of previous grafts, the use of a variety of extra-anatomic bypasses has increased to include wider application in patients with high risk for conventional surgery or patients with more limited disease not otherwise suitable for endovascular procedures.

In these circumstances the goal is to achieve revascularization by means of grafts that utilize remote, frequently alternative pathways and can be performed with potentially lower morbidity and mortality.(7)

As emphasized by Rutherford and coworkers, the results of extra-anatomic grafts are quite different in patients with good versus poor runoff, or when used as primary procedure versus reoperative reconstruction for failure of prior grafts. Thus a more detailed consideration of specific clinical indications and anatomic patterns of disease are necessary to more accurately predict likely outcome and attain a perspective on the application of such conditions.(8)

The procedure of obturator bypass differs from other extra-anatomic bypasses in the that it is not using the inflow from the same limb.

The runoff status of the limb below the point of re entry is responsible for the expectation of the patency rate and prognosis of the graft. If good runoff is present, better longer term patencies may be achieved than other extra-anatomic bypasses.

The extra-anatomic bypasses could be associated with all the complications of arterial reconstruction as perigraft hemorrhage, thrombosis, and infection. The specific nature of extra-anatomic bypasses with extensive tunneling, and their application in septic
condition, accounts for a higher than average incidence of complications.\(^{(9)}\)

The incidence of general or systemic complications, although higher than that reported for ordinary bypasses, yet it usually matches with the complications reported on the same group of patients.\(^{(6)}\)

Patency rates for obturator bypass ranges from 66\% to 89\%\(^{(10)},(11),(12)}\)

In our series the patency rate was 87.5\% at one year.

Although the prosthetic materials were used in all patients, the obturator bypass graft was not subjected to acute flexion, and in comparison with the femoropopliteal graft it has the advantage of receiving better proximal inflow.

The 5 year patency rates were approximately 70\%, except for the expected higher risk Patients.\(^{(4)},(13)}\)

In our study the patency rate at the end of follow up period (2.5 years) was 79\%.

However, extra-anatomic bypasses are usually longer grafts, and in some types of extra-anatomic grafts the position is more subjected to compression, so lower patency rates are to be expected in comparison with the direct arterial reconstruction.\(^{(6),(14)}\)

Obturator bypass is used when there is little other choice, so it is accepted even if it is not technically easier, or does not reduce the operating time. In contrast to the other extra-anatomic bypasses which compete with other procedures.

The correct choice depends on a number of factors in addition to the patient risk and hostile groin or abdominal pathology, as the morphology of the occlusive disease and the state of distal runoff.

REFERENCES


