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Major Groin Complications Following the Use of Synthetic Grafts

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Background. *The ideal results of vascular reconstructive surgery include an uncomplicated operation, symptomatic relief, prompt wound healing, rapid return to pre-operative functional status without long term functional consequences. Long term complications are often not emphasized. This study describes false femoral aneurysms (FFA) and infection following use of synthetic graft in the groin.*
Methods. *All patients under the care of one surgeon, undergoing synthetic graft insertion involving the groin between January 1988 and December 2005 were included.*
Results. *Some 489 patients were included (745 at risk groins). A total of 34 patients developed either FFA or infection, involving 39 groins (5.2%). There were 18 FFA, presenting a median of four years after the original operation. FFA was more common following aortofemoral bypass grafts than femorofemoral or femorodistal bypasses (*$P = 0.0084$*). Repair with interposition grafting was carried out in 17 cases. There was one death postoperatively. The remainder remained satisfactory at a median follow up of 60 months.*

Median time from original operation to 21 groin infections presenting was 12 months. Infection was commonest after femorofemoral cross over grafts $P = 0.023$. *Four major amputations were carried out. Debridement and sartorius transposition was useful in about half of the cases treated.*
Conclusion. *Serious groin complications occur in about 5% of cases following use of a synthetic graft. This can result in significant morbidity long after the original operation has been carried out. Patients need to be made aware of this when obtaining informed consent.*

Keywords: False aneurysm; Infection.

Introduction

The ideal result following vascular reconstruction is an uncomplicated operation, symptomatic relief of ischaemic symptoms, prompt wound healing, rapid return to pre-operative functional status and no long term adverse consequences. Applying these criteria to patients undergoing infra-inguinal bypass for limb salvage Nicolott *et al*.[1] round an ideal result in only 14.3% of cases despite graft patency and limb salvage of 77% and 87% respectively. Similarly, following femorofemoral cross over graft operations at five years the ideal result was achieved in 43% of patients with critical ischaemia and 71% of patients with claudication despite graft patency of 74% and 90% respectively.[2]

Long term adverse effects following reconstruction are often not emphasised. This study examines major groin complications, false femoral aneurysm (FFA) and infection, following the use of synthetic bypass graft. The consequence of these complications can result in significant morbidity and mortality even in the presence of a patent graft.[3,4] Early, minor complications such as lymph leak, superficial wound infection, seroma and haematoma formation are excluded unless progressing to graft infection or false aneurysm formation.

Patients and Methods

Patients under the care of one surgeon, undergoing synthetic graft insertion involving the groin between January 1988 and December 2005 were included. Data were collected as part of a prospective audit of consecutive patients. Follow up was clinical assessment supplemented by duplex imaging or angiography as necessary. Those presenting with groin infections and FFA were identified and details obtained were cross checked from case notes. Statistical analysis was carried out using a Chi-square test, $P < 0.05$ was taken as being statistically significant.

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Treatment method for Groin infections

Once graft infection had been diagnosed the patient was started on long-term antibiotics. Cefuroxime was the antibiotic of choice unless microbiological sensitivity suggested otherwise. If the graft was occluded it was removed. If patent the groin was thoroughly debrided and the graft covered with a sartorius muscle flap in an attempt to preserve the graft.[5]

Treatment method for FFA

Under general anaesthetic the false aneurysm was isolated and a 4 cm segment of graft involved in the aneurysm removed and sent for culture. A Dacron® interposition graft was anastomosed end to end to the old graft and end to side to the native artery. Polypropylene sutures were used. The wound was washed with Betadine® and closed without a drain.

Results

Between 1988 and 2005, 489 patients underwent operation resulting in synthetic graft insertion involving the groin. There were 745 ''at risk'' groins. The procedures included were aortofemoral bypass grafting (AFBG), (240 groins, 234 for occlusive and six for aneurysmal disease), femorofemoral cross over grafts (264 groins), femoropopliteal bypass (226 groins), axillobifemoral bypass (eight groins) and popliteal aneurysm repairs involving the groins ($n = 7$). Dacron® was used for aortofemoral grafts, femorofemoral cross over grafts and axillofemoral grafts. Polytetraflouro ethylene (PTFE®) was used for infrainguinal bypass. Sufficient space was created for the limbs of the AFBG to pass beneath the inguinal ligament. The latter was partly cut if necessary. Polypropylene® sutures were used with Dacron and PTFE® sutures for the PTFE® grafts. Intravenous heparin was given immediately before cross clamping and all patients received prophylactic cefuroxime (750 mgs at induction, continued tds until intravenous lines and catheter removed) and Betadine® wound lavage.

In total 34 patients developed a major groin complication involving 39 groins (5.2%).

FFA

Fourteen patients presented with 18 FFA. The median age of these patients was 70 years (range 59–81 years), 11 were men. The indications for initial procedure were intermittent claudication (nine patients), AAA (four patients) and ulceration (one patient). In 12 cases the original operation had been an AFBG, (incidence 5%) in three a femorofemoral cross over graft (1.1%) in three a femorodistal bypass (1.3%). FFA was significantly more common following AFBG (Chi-squared 9.57, df 2, $P = 0.0084$). The median time from procedure to presentation was four years (range two months–11 years) and most presented with pain and a pulsatile groin swelling. Size, as measured on ultrasound, ranged from 2.7–3.1 cm.

Only one excised graft sent for culture revealed any organisms (pseudomonas).

Repair was carried out in 17 cases. One patient died of a myocardial infarction within 24 hours. The remaining 16 caused no further problems at a median follow up of 60 months (range 12–72 months). There was no recurrence. Three patients died during follow up.

Groin infections

Twenty patients re-presented with 21 groin infections. Median age was 65 years (range 30–82 years), there were 11 men. Only one patient was diabetic. Indications for initial procedure were intermittent claudication (12 patients), ulceration or gangrene (seven patients) and AAA (one patient). The median time from initial procedure to infection becoming apparent was 12 months (range 2 days–10 years). In six cases a wound infection developed within 30 days of operation and progressed to graft infection.

Infection occurred in two groins after AFBG, (incidence 0.8%) 13 after femorofemoral cross over grafts (4.9%) and six (2.7%) after femorodistal bypass (Chi-squared 7.55, df 2, $P = 0.023$). In 12 cases multiple procedures had been undertaken through the groin incision. Commonest organisms grown were methicillin resistant Staphylococcus aureus in five, pseudomonas in five, coliforms in five and methicillin sensitive St. aureus in two. The infections were often polymicrobial. In five cases no organisms were cultured.

In nine cases attempts were made to preserve a patent graft by debridement and sartorius muscle transposition. In four this was successful (median follow up 40 months, range 31–54). In the remainder the wound never healed or broke down after initial healing a median of eight months later (range 2–12 months).

Simple debridement was carried out in two cases, one successfully. An occluded graft was removed in seven cases, one obturator bypass was performed. Four major amputations were carried out in this group. The remaining patients were treated conservatively with antibiotics alone.

Discussion

Our results show an overall risk of false femoral aneurysm or infection at the groin of 5.2%. This is likely to be an under estimate, as in other series, due to patients being lost to follow up. Many of these complications occurred month or years following the original procedure.

The median time to presentation of FFA was four years after original operation, the maximum being 11 years. Levi and Schroeder described an average interval of 9.2 years, with a maximum of 26 years.[4] However, this interval may be increasing.[6] False femoral aneurysms mainly present with swelling and discomfort. More serious complications are rare. In a series of 90 FFAs thrombosis occurred in 13 and rupture in only four.[4] Several factors have been implicated in the cause of FFA. These include suture material, infection, host vessel degeneration, hypertension and tension at the anastomosis.[7,8] In our series the suture material was the same for femorofemoral cross over grafts and AFBGs. Since the incidence of FFA was greater with the latter our data do not support suture material as being a major factor. Similarly, we found that although FFA was more common following AFBGs, infection was lower following AFBG than femorofemoral cross over grafts. We only found a positive culture in one case of FFA. Tension at the anastomosis or degeneration within the native arterial wall are likely to be the major components leading to FFA production but clearly the cause may well be multifactorial.

Treating FFA by excising the distal portion of the graft and replacing it with a new interposition graft produces good long term results. We found no recurrence at a median follow up of 60 months. Similarly, using a similar technique recurrence rate of less than 3% have been described.[6]

Early (within 30 day) groin infections, including lymph fistulae have been reported in 6.4% of 873 groins.[3] The majority of these are superficial and the majority of these respond well to conservative treatment. Deep infection is more likely to need debridement with or without removal of the graft. All of our patients received antibiotic prophylaxis and antiseptic lavage to the wound. Rifampicin-coated grafts, though frequently used, have not been shown to result in a lower rate of graft infection.[9]

Once established graft infection at the groin can result in significant limb loss and mortality. If the graft is occluded it should simply be removed. If patent, the options lie between debridement, with or without gentamicin beads or fleeces and muscle grafting,[5] removal of the graft combined with an extra anatomic bypass, or in situ bypasses[10] and replacement of the synthetic graft with deep veins taken from the leg,[11] Though results, in terms of mortality and limb loss are improving, the latter remains high. Four of our 20 patients underwent a major amputation.

Both surgeons and patients need to be aware that operative morbidity and mortality and graft patency are not the only yardsticks by which results should be assessed. Patients need to be made aware that following the use of a synthetic bypass graft, groin complications can occur many years after an apparently successful operation. This is an important aspect of informed consent.

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