Outcome after Ligation of Infected False Femoral Aneurysms in Intravenous Drug Abusers

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Objectives: to determine the outcome of a policy of ligation with observation of infected false femoral aneurysms (IFFA) in intravenous drug abusers (IVDA), particularly with respect to the issue of limb preservation.

Design: a retrospective study.

Materials and methods: thirty-seven consecutive cases of IFFA in 34 patients accrued over nine years were studied by case note review and by clinical or telephone interview.

Results: in 34 cases of ligation of primary IFFA there were no amputations, with patients describing claudication only in follow-up. In three cases of second IFFA in the same limb, repeat ligation resulted in two viable limbs with claudication only, and one above-knee amputation. At the nine year follow-up, all patients were still drug-dependent and considered unsuitable for late revascularisation. There were three deaths and all were drug-related.

Conclusions: in our experience, ligation of IFFA is effective, safe and simple, and is the most appropriate method of dealing with these challenging cases.

Key Words: Femoral artery; False aneurysm; Substance abuse.

Introduction

When cases of infected false femoral aneurysm (IFFA) following groin injection in intravenous drug abuse (IVDA) first appeared at our hospital and around the world in the 1980s, treatment by ligation with revascularisation was felt to be necessary to avoid severe limb ischaemia. Not surprisingly, high rates of graft infection were found using this method and outcomes were poor.1–5 As a consequence of these findings we turned to ligation with observation as the initial treatment of IFFA. There is, however, some controversy regarding the best management of IFFA, with advocates of routine revascularisation, selective revascularisation and of ligation alone.4–10 We therefore felt it important to present our experience with a policy of ligation with observation which has been used in our hospital since 1990.

Methods

We reviewed the records of patients with IFFA complicating IVDA treated by the Peripheral Vascular Unit at the Glasgow Royal Infirmary in Scotland from 1990 to 1998. Demographic data, presentation, investigation, operation, microbiology and complications were noted. Follow-up data were obtained by clinical interview or telephone interview with the patients or patient’s general practitioner or family members as necessary.

Results

Patients

Thirty-seven cases of IFFA were studied in 34 patients. There were 34 primary IFFA and 3 secondary IFFA (second IFFA in the same groin at a separate presentation). The series was comprised of 28 males and 6 females with ages ranging from 18 to 41 years (median 28 years). All patients were long-term drug abusers with their experience of injecting drug abuse ranging from one to 16 years (median 6 years). Many patients had previously suffered groin injection complications, including 16 cases of deep-vein thrombosis (DVT), 11 cases of groin abscess, and 10 cases of intra-articular injection with distal ischaemia.
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Presentation

All patients gave a history of groin injection with the development of pain and swelling in the groin over a period of 1–30 days. In 32 of 37 cases the distal circulation was clinically intact as assessed by distal perfusion and the presence of pedal pulses. In three cases of second IFFA in the same limb, distal circulation was adequate on presentation despite the absence of pedal pulses. Two cases presented with clinical evidence of moderate acute distal ischaemia. Fourteen of 37 cases presented with bleeding, seven with signs of haemorrhagic shock. These 14 cases required no diagnostic investigation prior to operation.

Investigation

Twenty-three of 37 cases presented with a painful groin swelling only, and, of these, 19 had duplex ultrasound scans, which confirmed the diagnosis of IFFA. Notably, three cases with clinical findings very suggestive of IFFA but initially negative duplex scans were subsequently found to have IFFA on repeat duplex scans after a period of observation. Four cases were incorrectly diagnosed as having a groin abscess by duplex ultrasound despite repeated scanning. These IFFA were found later when attempted incision and drainage resulted in profuse arterial bleeding.

Bacteriology

*Staphylococcus* was cultured from 20 cases and *Streptococcus* from eight cases. There were five cases of Gram-negative infections, and in six there was no growth from wound culture.

Operations

Procedures were performed as emergencies or on the next available list. Initially, proximal control of the external iliac artery was gained via a suprapubic incision. Longitudinal groin incisions were used to expose the false aneurysms and, on incision, back-bleeding was controlled with balloon catheters. Aneurysms were excised and local debridement of necrotic tissue performed. Definitive control was often gained with a simple ligation of the vessel just proximal and distal to the infected aneurysmal segment, but, if inflammation and fibrosis did not allow easy dissection of the vessels, suture ligation or oversewing of the ends of the damaged vessel was performed. The groin wound was always left open to heal by secondary intention.

Thirty-four ligations of primary IFFA were performed. In 24 cases a single vessel only required ligation; the common femoral artery (CFA) in 17 cases, the superficial femoral artery (SFA) in six cases and the profunda femoris artery (PFA) in one case. In 10 cases the three vessels at the common femoral bifurcation (CFA, SFA and PFA) required ligation. Two cases with preoperative distal ischaemia had calf fasciotomies in addition to ligation of IFFA. One ligation of secondary IFFA involved conversion of single vessel ligation to triple ligation of the common femoral bifurcation. Two cases of ligation of secondary IFFA involved conversion of previous triple ligation to ligation of profunda branches and external iliac arteries. In the postoperative period three cases bled on the ward, requiring return to theatre for control.

Early outcome

The result of ligation with observation for all primary IFFA was a viable limb with claudication only, even if the common femoral bifurcation had been ligated. In cases of primary IFFA with preoperative distal ischaemia, primary ligation with calf fasciotomies also resulted in a viable limb, although in these patients walking was limited by a degree of foot drop. Three secondary ligations resulted in two viable limbs with claudication only and one above-knee amputation. The patient who required above-knee amputation had not only suffered two IFFAs in the limb, but had previously had an episode of distal ischaemia from intra-arterial injection in that limb and had required extensive fasciotomies. Length of stay ranged from 3 days to 5 months (median 10 days). Almost one quarter of the patients (nine of 37 cases) discharged themselves against medical advice. There were no deaths in hospital in this series.

Late outcome: limb function and drug dependence

Long-term follow-up in this group of patients proved difficult to obtain. However, our endpoints were simple, and basic information was obtained on all patients. Median follow-up was 36 months (range 1–96 months). Sixteen of 34 patients were followed up at recall clinics. Four patients were followed up by direct...
telephone interview and, in 14, details of current condition were obtained by telephone interview with family members or the patient’s general practitioner.

Thirty-three of the 34 patients were claudicants only at the time of follow-up or death. One patient was mobile with an above-knee amputation. In the 16 patients seen in clinics the ankle–brachial pressure index (ABPI) in the affected leg ranged from 0.60 to 0.92 (median 0.66). During the period of follow-up there were three deaths, two from drug overdoses and one from hepatitis B. All 31 survivors were drug-dependent. Twenty-six of the 31 were still injecting drugs. Five were taking prescribed medication only.

Discussion

The complications of groin injection in intravenous drug abuse are serious and include deep-venous thrombosis, chronic venous insufficiency, soft-tissue infection, abscess, intra-arterial injection and IFFA. Whilst IFFA is an uncommon complication, it presents difficult and unique vascular management problems.

Contaminated injection into the arterial wall or periarterial area results in infection of the arterial wall, which then leads to necrosis and rupture, causing an IFFA. Many organisms have been reported to cause IFFA, but the most common is *Staphylococcus aureus* and, indeed, in our series it proved to be the most frequent infecting organism, being present in 20 of 37 cases.

The diagnosis is often obvious with a history of groin injection, followed in one to 30 days by pain and swelling which may clearly demonstrate expansile pulsation. If these symptoms are neglected, the IFFA may erode the skin and result in massive arterial bleeding. In fact, one-third of the cases reported here presented with bleeding, reflecting the reluctance of many IVDA patients to seek medical help.

In cases presenting as a painful groin swelling alone, it is helpful to try to distinguish a localised abscess, cellulitis or venous thrombosis from an IFFA. Although angiography will show an IFFA and can be useful also in delineating vascular anatomy, the favoured investigation at present is duplex ultrasound. This has previously been recommended for the diagnosis of IFFA. In this series 23 cases were studied with duplex ultrasound and, of these, 19 cases were correctly diagnosed as IFFA. Four cases were misdiagnosed by duplex ultrasound as abscesses. Notably, three cases had changing duplex findings after a period of observation. This would suggest that evolution of the lesion from a stage of phlegmonous inflammation to either abscess or IFFA occurs, and that, in cases where clinical suspicion is high, a period of observation and serial duplex scanning may improve preoperative diagnosis rates.

In the management of IFFA a number of issues must be addressed. Treatment of local or disseminated infection is essential and requires both surgical and pharmacological methods. The control or prevention of bleeding by ligation of feeding vessels to the IFFA must be weighed against the risk of limb ischaemia or limb loss. The high probability of continued drug dependence and of injecting drug abuse should be borne in mind when considering the most appropriate surgical treatment.

Conservative treatment of IFFAs is not an option: they do not heal and there are serious complications, including rupture, which may be fatal. Whilst antibiotic therapy should be instituted to cover Gram-positive organisms, particularly *S. aureus*, ligation of the groin vessels to control or prevent bleeding from the aneurysm is essential. Ligation of the groin vessels prevents or controls haemorrhage, but at the risk of ischaemia which may be profound.

It seems axiomatic that acute ligation of the femoral vessels should result in critical ischaemia and limb loss, and we and others have in the past considered emergency revascularisation essential for the management of IFFA. However, the results of revascularisation procedures for IFFA have been poor. In particular, limb preservation rates have been found to be no better after attempted revascularisation than when ligation alone was used. In some cases attempted revascularisation ultimately resulted in limb loss.

In our series, there were no amputations following ligation of primary IFFA, even when this involved ligation of all three vessels at the femoral bifurcation. This suggests that distal limb perfusion is maintained by the development of an adequate collateral circulation in these relatively young patients with no underlying atheromatous peripheral vascular disease. It has been suggested that chronic vessel injury related to IVDA results in stenosis or occlusion of the femoral vessels and may promote collateral development. However, the majority of our patients did not have significant distal ischaemia preoperatively or evidence of stenosis or occlusion of the femoral vessels. In fact, we would contend that as long as the distal vessels are clinically assessed to be patent, acute ligation of the femoral vessels is safe.

It is well recognised that the use of vascular grafts in infected fields will be associated with high-complication rates. In series of IFFA where revascularisation has been attempted, graft sepsis...
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requiring the removal of grafts is common, with rates ranging from 7% to 100%, and this has been associated with limb loss.\textsuperscript{1-5} This suggests that attempted revascularisation risks unnecessary morbidity whilst not improving the limb preservation rate.

Furthermore, if a non-infected, functioning graft is achieved, continued injecting drug abuse may contribute to the development of late graft infection. In this series, at long-term follow-up all patients were still drug-dependent, with the majority still injecting drugs, so none were considered for late revascularisation.

Our experience shows that IFFA is a serious complication of IVDA. We have found that accurate assessment requires an awareness of the spectrum of groin complications of IVDA and, if imaging is required, the use of duplex ultrasound. We have shown that ligation of IFFA with observation is effective in the control of bleeding, results in a viable limb, and is associated with less morbidity than ligation with reconstruction. We consider late revascularisation unwise in patients who continue to abuse drugs. We conclude that ligation with observation provides the most appropriate treatment of IFFA due to groin injection in intravenous drug abuse.

References


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