Obturator Bypass for Recurrent Infected Femoral Artery Pseudoaneurysm

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A seventy-three-year-old female presented with acute left-lower limb ischemia associated with groin swelling, one year following the resolution of an infected left-Common Femoral Artery (CFA) Pseudoaneurysm. Ultrasound Scan of the left-groin revealed Common Femoral Artery Pseudoaneurysm. CT angiography confirmed the presence of the pseudoaneurysm with surrounding cystic swelling associated with multiple air pockets and inflammatory changes suggestive of infected pseudoaneurysm. The patient was started on broad-spectrum antibiotics and underwent a left ilio-popliteal (obturator) bypass in addition to debridement of left-groin infected pseudoaneurysm.

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Infected femoral artery pseudoaneurysms (IFAPA) have increased in recent years, which may be related to the increasing prevalence of illicit drug abuse, invasive hemodynamic monitoring, percutaneous peripheral arterial, coronary interventions and immune-compromised hosts[1]. Furthermore, the increased use of percutaneous femoral artery closure devices may be associated with an increased risk of infected pseudoaneurysms[2].

Despite its increasing incidence, it remains a rare complication with a low overall prevalence.

It is a complication associated with high morbidity and mortality. Moreover, the treatment options are difficult and controversial with no consensus on the optimal management[3].

The aim of this presentation is to report the management of a recurrent infected common femoral artery pseudoaneurysm.

THE CASE

A seventy-three-year-old female is known) diabetic, hypertensive, hyperlipidemic and suffering from ischemic heart disease (ejection fraction 25%). The patient presented with a history of fever for three days, left-groin swelling and left-lower limb pain for one week, which was associated with foot discoloration, weakness and foot drop.

On examination, the patient had a pulsatile left-groin swelling with absent distal lower extremity pulses. In addition, she had a cold left-limb with decreased motor function and decreased sensation. The patient had a normal vascular examination of the right-lower limb. The rest of the examination was unremarkable, including cardiac and respiratory examinations.

An ultrasound scan of the left-groin was performed revealing a left-CFA pseudoaneurysm measuring 5.8 x 3.9 cm.

CT angiography confirmed the presence of left-CFA pseudoaneurysm with surrounding cystic swelling associated with multiple air pockets and inflammatory changes, suggestive of infected pseudoaneurysm. The scan revealed a thrombus confined to the left-superficial femoral artery, with a patent popliteal artery. The common, external and internal iliac arteries were patent, see figure 1.

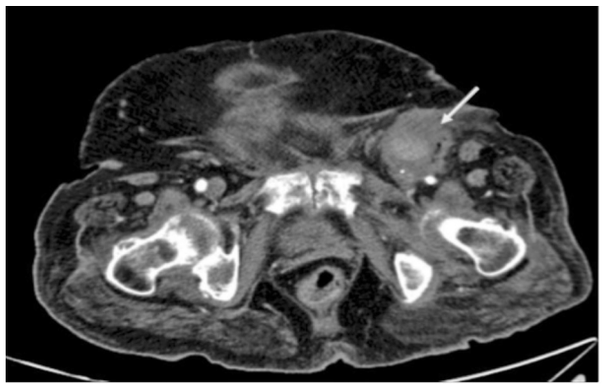

Figure 1: CTA Revealing Left-CFA Infected Pseudoaneurysm (Arrow)

The patient had an elevated CRP (353 mg/L), WBC (25,000) and low Hb (8.6).

One year ago, the patient had developed acute limb ischemia post coronary angioplasty, which followed CFA closure with Angioseal™ device at another medical facility. Intraoperatively,

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she was found to have an intimal dissection causing complete occlusion of arterial inflow into the left-lower limb. Surgical thrombectomy, repair of the intimal flap, and bovine patch angioplasty of the left-CFA were performed at the same center. One month later, the patient presented with bleeding from the groin and the patch was reinforced with Prolene sutures only. The patient had another episode of bleeding from the left-groin and was transferred to our center for further management.

Re-exploration revealed an infected femoral patch. The patch was completely removed and a new femoral patch angioplasty was performed with a native vein harvested from the ipsilateral great saphenous vein. Local area debridement was performed and the femoral artery was covered with a rotated sartorius muscle flap.

The patient had multiple debridements for infected discharge and was kept on vacuum dressing until complete healing of the wound was achieved three months later.

During this presentation, the patient had a poor general condition due to the recurrence of infection and the presence of acute limb ischemia. Available management options were local control of the infective process via surgical debridement and IV antibiotics only compared to the first option in addition to lower extremity revascularization. Although the first option is reasonable given the general patient status, it would seriously place the patient at risk of major lower extremity amputation. Therefore, the second option was preferred to save the patient's life as well as a limb.

The patient first underwent left ilio-popliteal bypass with a PTFE graft tunneled through the obturator foramen in a different plane and away from the site of the infection. Following skin closure and dressing of the surgical incisions, the patient underwent excision of the pseudoaneurysm along with major debridement of all infected and devitalized tissues including ligation of the involved segments of the CFA and its branches, see figure 2. The CFA was covered with a single layer of fascia and vacuum dressing.

Figure 2: Left CFA Infected Pseudoaneurysm Intraoperative Image

Postoperatively, the patient had a palpable dorsalis pedis artery pulse with significant improvement of all ischemic features. She was started empirically on intravenous broad spectrum antibiotics (Meropenem).

Culture was done and initially revealed Proteus Mirabilis and Extended Spectrum Beta Lactamase Positive E coli. Repeat culture revealed growing Enterococci, no specific species was identified (Enterococcus faecalis, Enterococcus faecium, Enterococcus solitarius). The patient was given Vancomycin for 21 days in addition to Meropenem which for 14 days.

One-month postoperatively, the patient underwent a CT angiogram, which showed patent in-flow and ilio-popliteal graft with no evidence of collections or hematomas, see figure 3.

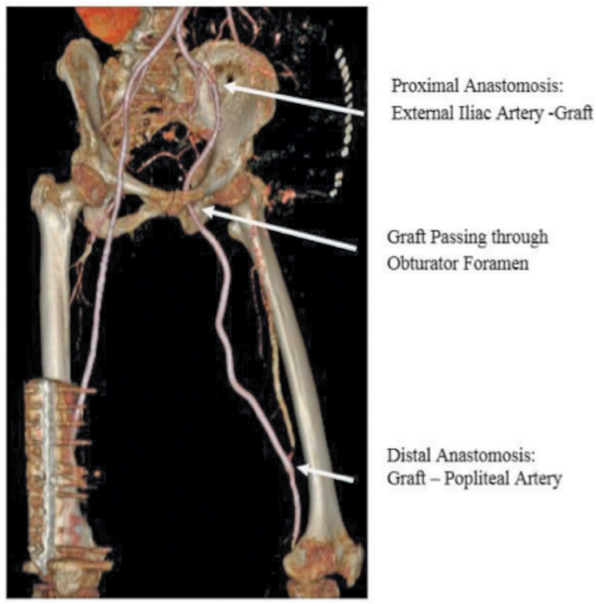

Figure 3: Postoperative 3D Reconstruction Showing Patent Left Ilio-Popliteal Bypass

The patient was followed up regularly in the clinic with serial vacuum dressing application until wound healing was obtained 3-months postoperatively, see figure 4.

Figure 4: Healed Left Groin Wound Three Months Postoperative

DISCUSSION

Infected femoral pseudoaneurysm is a rare complication of percutaneous access for coronary and peripheral arterial intervention. As a result, the management of this complication has been mainly studied in the IV drug abused population, which differs in personal characteristic and baseline clinical status from the majority of patients undergoing percutaneous vascular interventions[3].

Furthermore, to date, no Level I evidence exists to support or refute any particular management approach; data has been mainly published in the form of limited case series and single case reports. As such, there is currently no consensus on the ideal surgical management for this complication.

The management approaches could be as follows: excision of infected pseudoaneurysm, debridement of infected tissue and ligation of the infected artery; excision of infected pseudoaneurysm, debridement of infected tissue and selective/routine revascularization.

Revascularization procedures may be undertaken in-situ or via extra-anatomical bypasses using autogenous venous or arterial grafts versus synthetic grafts and patches[3].

An obturator bypass is the preferred surgical option. In addition to employment in patients with groin sepsis, it may also be used in patients with groin neoplasm or local tissue damage from prior irradiation[4,5].

In such procedure, the proximal anastomosis could be performed at the common or external iliac artery, or an uninvolved limb of an aorto-bifemoral bypass. The distal anastomosis could be performed at the distal superficial femoral artery or the popliteal artery. The obturator foramen is incised surgically in its anteromedial portion to avoid injury to the obturator nerve and artery, which pass posterolaterally in the foramen, and a tunnel is created in this location for the bypass conduit[4,5].

Variable results regarding patency and limb salvage reported 57% 5-year patency and 77% 5-year limb salvage rates, while others revealed high re-infection and low patency rates[4,5].

Favorable outcomes were seen in recent case reports, 74% 3-year and 54% 5-year patency rates respectively[6,7]. Only one patient required major amputation due to ascending infection[8].

Multiple factors contribute to procedure selection based on patient and lesion criteria; these include the patient's general comorbidities status, hemodynamic instability and the presence of sepsis. Lesion factors include the degree of contamination and the size of the arterial wall defect[9,10].

Most recent reports support sole ligation of CFA without revascularization[11,12]. However, these recommendations stemmed from IV drug abusers, but there is no Level I Evidence to support this practice[11,12].

Two recent series of 33 and 17 patients respectively demonstrated a high risk of limb loss, intermittent claudication and non-healing ulcers with sole CFA ligation[11,13].

In a study by Reddy et al, patients were divided into two groups based on the Infected Femoral Artery Pseudoaneurysm (FAP) location at (group-A) Isolated Superficial Femoral Artery/Profunda Femoral Artery or Common Femoral Artery, compared to (group-B) Common Femoral Artery Bifurcation. Patients in group-A were treated with sole ligation and excision with no reported resultant amputations. Patients in group-B were treated either with triple vessel ligation or with revascularization, the result was 33% amputation rate in the triple vessel ligation group[14].

A review of five cases revealed a 44.3% rate of intermittent claudication with sole ligation and an amputation rate ranging from 6.25% to 25% and high risk of late infection (32.5%)[15].

Klonaris et al found that the internal iliac artery as a conduit for revascularization in IFAPs and a good size match for CFA pseudoaneurysms; all the nine patients who underwent revascularization had no re-infection, claudication or amputation[3].

Advantages of this approach include resistance to infection (autologous and harvested from an uninfected field), less susceptibility to a late aneurysm and pseudoaneurysm formation versus venous conduits and is applicable in cases with absent/un-usable Great Saphenous Vein.

Bell et al reported routine revascularization was with Superficial Femoral Vein grafts. This was done either in-situ or via extra-anatomic obturator bypasses. During the follow-up periods no amputations, claudication or re-infection were reported[16].

CONCLUSION

This report demonstrates the possibility of re-development of Infected Femoral Artery Pseudoaneurysm even following treatment with an autogenous (vein) patch, and complete wound closure, which indicates the importance of long-term follow-up for these patients.

Current evidence shows superior outcome for revascularization compared to sole ligation, with no difference in outcome between routine and selective revascularization.

The decision for in-situ versus extra-anatomical bypass is multi-factorial and should be individualized based on patient and lesion characteristics.

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