ORIGINAL RESEARCH PAPER

Plastic Surgery

RUPTURED POPLITEAL PSEUDOANEURYSM SECONDARY TO INTRAVENOUS HEROIN ABUSE: DACRON GRAFT AND WOUND COVERAGE WITH TRANSPOSITION FLAP — A CASE REPORT

KEY WORDS: popliteal pseudoaneurysm; intravenous drug abuse; heroin; Dacron graft; transposition flap; wound coverage; limb salvage; plastic surgery

Dr Divya Bharathy Kannan* Department of Plastic and Reconstructive Surgery, DY Patil School of Medicine and Hospital, Navi Mumbai, India*Corresponding Author

Dr Vinita Nair Department of Plastic and Reconstructive Surgery, DY Patil School of Medicine and Hospital, Navi Mumbai, India

Dr Sanket V Ekhande Department of Plastic and Reconstructive Surgery, DY Patil School of Medicine and Hospital, Navi Mumbai, India

Dr Manpreet Kaur Juneja Department of Plastic and Reconstructive Surgery, DY Patil School of Medicine and Hospital, Navi Mumbai, India

Dr Suhas V Abhyankar Department of Plastic and Reconstructive Surgery, DY Patil School of Medicine and Hospital, Navi Mumbai, India

ABSTRACT

Background: Peripheral pseudoaneurysms arising from intravenous drug abuse represent a distinct and increasingly encountered vascular emergency. Popliteal artery involvement, though rare, carries a high risk of limb ischaemia, haemorrhage, and septic complications. Wound breakdown following endovascular repair poses an additional reconstructive challenge that is best addressed with plastic surgical input.**Case Presentation:** We report a 22-year-old male with a history of heavy intravenous heroin abuse who presented to the casualty department with an expanding, pulsatile popliteal swelling and haemodynamic instability. Exhaustion of peripheral venous access had led him to inject directly into the popliteal fossa, resulting in a pseudoaneurysm that subsequently ruptured. Emergency Dacron graft placement was performed by the cardiothoracic and vascular surgery (CTVS) team, achieving initial haemostasis. The wound became infected and the Dacron graft was exposed, precipitating referral to the plastic surgery department. A transposition flap was designed and executed to provide well-vascularised soft tissue coverage over the exposed Dacron graft, with complete wound closure achieved.**Conclusion:** This case illustrates a rare but life-threatening complication of intravenous drug abuse involving the popliteal vasculature. Multidisciplinary collaboration between vascular surgery and plastic surgery, with timely flap coverage of exposed vascular hardware, is essential to achieving limb salvage and wound healing in this challenging patient population

INTRODUCTION

Intravenous drug abuse (IVDA) is a well-recognised cause of peripheral vascular injury, most commonly manifesting as false aneurysms (pseudoaneurysms) at sites of repeated or traumatic injection [1]. The femoral triangle is the most frequently affected region, as it becomes a site of last resort once superficial veins are sclerosed and inaccessible from chronic abuse [2]. However, popliteal pseudoaneurysms arising from IVDA are distinctly uncommon, reported only in isolated cases in the surgical literature [3,4].

The popliteal fossa, bounded by the hamstring muscles superiorly and the heads of the gastrocnemius inferiorly, houses the popliteal artery and vein in proximity to the tibial and common peroneal nerves. Haematoma expansion or frank rupture in this confined space carries significant risk of compartment syndrome, neurovascular compromise, and life-threatening haemorrhage [5]. The management of ruptured popliteal pseudoaneurysms is challenging; open surgical repair is the traditional approach, but endovascular stent placement has emerged as a viable alternative in haemodynamically unstable patients [6].

A further complication unique to this patient population is wound infection, driven by the heavy bacterial colonisation associated with illicit injection practice, poor nutritional status, and immunosuppression. Exposure of vascular hardware through infected, necrotic wounds demands plastic surgical intervention to prevent graft loss, re-bleeding, and sepsis [7]. Soft tissue coverage with a well-vascularised flap is the reconstructive cornerstone in such situations.

We present a case of ruptured popliteal pseudoaneurysm in a young man with severe heroin addiction, managed by emergency open vascular repair with Dacron interposition graft followed by plastic surgical wound coverage using a transposition flap, with a successful outcome. To the best of our knowledge, the combination of these two interventions in this clinical context has not been previously described.

CASE REPORT

A 22-year-old male, a known intravenous heroin abuser for approximately four years, was brought to the casualty department by his family with a two-day history of progressively increasing, painful swelling over the right popliteal fossa. He reported no prior surgical history. On direct questioning, he admitted to having injected heroin into the popliteal region after the veins of his upper and lower limbs had become entirely fibrosed and inaccessible.

On examination, the patient was agitated and diaphoretic. His pulse rate was 118 beats per minute with weak volume, blood pressure was 90/60 mmHg, respiratory rate was 22 breaths per minute, and oxygen saturation was 94% on room air. There was a tense, tender, pulsatile swelling measuring approximately 8 x 6 cm over the right popliteal fossa, with overlying skin showing early signs of ecchymosis. Distal pulses in the right foot were feeble. Examination of both upper and lower limbs revealed extensive venous scarring and thrombosis consistent with chronic intravenous drug abuse.

Relevant investigations on admission included haemoglobin 9.4 g/dL, total leucocyte count 14,200 cells/ L with neutrophilic predominance, and C-reactive protein 68 mg/L. Serology was reactive for Hepatitis C. A bedside Doppler

study confirmed a pulsatile haematoma communicating with the popliteal artery, consistent with a pseudoaneurysm with contained rupture. CT angiography was deferred given haemodynamic instability; the patient was resuscitated with intravenous fluids, packed red cell transfusion, and empirical broad-spectrum antibiotics.

The patient was taken to the operating theatre by the cardiothoracic and vascular surgery (CTVS) team on an emergency basis. Intraoperative digital subtraction angiography confirmed a large pseudoaneurysm of the right popliteal artery. The pseudoaneurysm sac was opened, the proximal and distal popliteal artery were controlled, and a Dacron interposition graft was anastomosed end-to-end to restore popliteal artery continuity and achieve definitive haemostasis. The wound was packed and the patient was transferred to the surgical intensive care unit for monitoring.

Post-operatively, the patient remained haemodynamically stable and distal perfusion was preserved. However, over the subsequent ten days, the popliteal wound became progressively erythematous, oedematous, and malodorous, with purulent discharge. Wound swab cultures grew methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa. Serial debridements were performed, and antibiotic therapy was adjusted based on sensitivity results. Despite these measures, the wound broke down, resulting in frank exposure of the dacron graft over an area of approximately 5 x 3 cm. At this point, the CTVS team referred the patient to the department of plastic and reconstructive surgery for wound management and soft tissue coverage.

Plastic surgical assessment confirmed a clean, well-debrided wound base with exposed graft, healthy surrounding skin, and adequate distal vascularity confirmed on Doppler examination. The exposed stent was examined; its structural integrity was intact, with no evidence of haemorrhage or infection tracking along the stent. Following a period of negative pressure wound therapy (NPWT) to optimise the wound bed and reduce bacterial load, the patient was taken to the operating theatre for definitive wound closure.

Figure 1: Pre Operative Defect with exposed Graft [original]

A random pattern transposition flap was designed adjacent to the popliteal wound, incorporating skin and subcutaneous tissue from the medial aspect of the proximal leg. The flap was planned with a length-to-width ratio not exceeding 1.5:1 to ensure adequate perfusion through the subdermal plexus without dependence on a named axial vessel. The flap was raised in a subfascial plane, transposed over the exposed stent, and inset with interrupted absorbable sutures in the deep layer and non-absorbable monofilament sutures for skin closure. The donor site was grafted. Intraoperative vascularity was confirmed by clinical assessment of flap colour, capillary refill, and bleeding at the wound margins.

Figure 2: Intraoperative marking for Transposition flap [original]

The post-operative period was uneventful. The flap demonstrated complete viability at day five with no signs of venous congestion or tip ischaemia. Wound inspection at two weeks showed satisfactory healing with no evidence of infection. The patient was maintained on targeted antibiotics for a total of four weeks and underwent structured addiction counselling during the hospital stay. At six-week follow-up, the wound was fully healed, the dacron graft was non-palpable, and the patient had retained intact motor and sensory function of the right lower limb.

Figure 3: Intraoperative image of the transposed flap [original]

Figure 4: Intraoperative Image of the transposed flap sutured and STSG with the CRD [original]

DISCUSSION

Pseudoaneurysm formation following intravenous drug abuse occurs as a consequence of direct arterial puncture, perivascular injection leading to haematoma organisation, or

septic arteritis with resultant vessel wall weakening [1,2]. While femoral pseudoaneurysms account for the majority of IVDA-related vascular injuries, the popliteal fossa is occasionally used as an injection site when more conventional venous access is exhausted, and pseudoaneurysms at this location carry a unique set of anatomical and clinical challenges [3,5].

The natural history of popliteal pseudoaneurysms is unpredictable; expansion and rupture can occur rapidly, and the space-constraining anatomy of the popliteal fossa accelerates the development of compartment syndrome and distal ischaemia [5]. In the present case, rupture had already occurred before arrival, contributing to haemodynamic instability. This dictated an expeditious approach, and the decision to proceed with open surgical repair using a Dacron interposition graft was appropriate and consistent with established vascular surgical practice. Dacron grafts offer excellent long-term patency, are readily available in theatre emergencies, and provide a durable conduit for popliteal artery reconstruction when the native vessel cannot be primarily repaired [6].

Wound infection and hardware exposure represent well-described complications following endovascular repair in IVDA patients. The factors contributing to this include heavy polymicrobial wound contamination at the time of injection, malnutrition and immune dysfunction associated with chronic substance abuse, and the poor tissue healing environment created by repeated injection trauma [7,8]. In the present case, the combination of MRSA and Pseudomonas aeruginosa is particularly virulent and difficult to eradicate without surgical debridement and well-vascularised tissue coverage. Exposed dacron and stents, if left uncovered, carry the risk of secondary haemorrhage, graft thrombosis, and systemic sepsis. Plastic surgical input with flap coverage is therefore not merely cosmetic but is integral to limb and life salvage [9]. Several flap options are available for popliteal fossa defects, including the medial gastrocnemius muscle flap, the sural artery perforator flap, local fasciocutaneous transposition flaps, and free tissue transfer [10]. In this case, a random pattern transposition flap was chosen for its simplicity, reliability, and the avoidance of perforator dissection in an infected field where perforator mapping and dissection would have been both technically demanding and potentially hazardous. The flap was designed with a conservative length-to-width ratio, relying on the rich subdermal plexus of the proximal leg for its vascularity. Its proximity to the defect allowed tension-free transposition, and primary donor site closure was achievable — both important considerations in a medically compromised patient in whom minimising operative time and complexity was a priority.

Figure 5: Post Operative Image of a well-settled Transposition flap and STSG [original]

The use of NPWT as a bridge before definitive flap coverage is well supported in the literature and was employed in this case to optimise wound bed conditions, reduce bacterial bioburden, and promote granulation tissue formation [11]. This stepwise approach — debridement, NPWT, then flap coverage — is our recommended algorithm for infected exposed vascular hardware in this anatomical region.

This case highlights the importance of a coordinated multidisciplinary approach involving emergency medicine, vascular surgery, and plastic surgery. Early plastic surgical involvement, rather than a late referral after wound deterioration, may reduce the complexity of the required reconstruction. It is also noteworthy that this young patient had effectively destroyed his entire peripheral venous access by the age of 22, serving as a sobering reminder of the devastating systemic consequences of long-term intravenous drug abuse. Comprehensive addiction management, including pharmacological and behavioural support, must accompany surgical treatment to address the root cause of these injuries.

CONCLUSION

Ruptured popliteal pseudoaneurysm secondary to intravenous heroin abuse is a rare but limb-threatening emergency. Emergency open repair with Dacron interposition graft restores vascular continuity in the unstable patient, and subsequent wound complications including graft exposure can be successfully managed with transposition flap coverage. A multidisciplinary approach, integrating vascular and plastic surgery expertise alongside addiction medicine, is essential for optimal outcomes in this challenging patient population. This case adds to the limited literature on popliteal vascular injuries from IVDA and underscores the reconstructive role of plastic surgery in preserving the integrity of endovascular repairs.

DECLARATIONS

Patient Consent: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Ethical Approval:
Institutional ethical clearance was obtained in accordance with institutional policy for the publication of anonymised case reports.

Conflict of Interest:
The authors declare no conflict of interest.

Funding:
This research received no external funding.

Author Contributions:
[Author 1]: primary surgeon, manuscript drafting and conceptualisation. [Author 2]: vascular surgical management, critical revision. [Author 3]: literature review and manuscript preparation. All authors approved the final manuscript.

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