

# Necrotizing Fasciitis Causing Complete Femoral Vessels Necrosis and Thrombosis in an Intravenous Drug Abuser: A Case Report

Majdi El Husseiny<sup>1</sup>, Sirage Edriss<sup>2</sup>, Talal Kassar<sup>2</sup>, Houssam Khodor Abtar<sup>3</sup>, Jad J. Terro<sup>4</sup>

<sup>1</sup>Department of Surgery, Vascular Surgery Division, LAUMC-RH and Makassed General Hospital, Beirut, Lebanon

<sup>2</sup>Department of Surgery, Vascular Surgery Division, Makassed General Hospital, Beirut, Lebanon

<sup>3</sup>Department of Surgery, Makassed General Hospital, Beirut, Lebanon

<sup>4</sup>Department of General Surgery, Faculty of Medical Sciences of the Lebanese University, Beirut, Lebanon

Corresponding Author: Jad J Terro, Beirut, Lebanon, [j.terro@hotmail.com](mailto:j.terro@hotmail.com)

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## Abstract

**Background:** Intravenous drug abuse is an anciently known health and social problem worldwide. The nonsterile application of addicting drugs leads to severe life-threatening vascular complications. The femoral triangle is an easy target for this purpose. Groin necrotic fasciitis (NF) with vessel necrosis is a challenging diagnosis that requires prompt treatment.

**Case Report:** A 44-year-old male intravenous drug user presented for a left groin pain. He was diagnosed by computed tomography scan to have necrotizing fasciitis. Urgent debridement was performed and identified infected and necrotic ruptured femoral vessels without active bleeding. Debridement with vessel ligation was performed, and delayed revascularization was planned. The patient was admitted six weeks later with a left fifth toe necrosis and delayed arterial revascularization was performed via extra-anatomic trans-obturator ilio-femoral anastomosis. The patient had a favorable follow-up.

**Conclusion:** NF in intravenous drug abusers should always be taken into consideration when a patient presents with groin pain and swelling. Urgent surgical control should be established. Extra-anatomical trans-obturator ilio-femoral anastomosis is a good option for revascularization.

**Keywords:** *Necrotizing Fasciitis, intravenous drug abusers, rare case, case report, vascular surgery, ilio-femoral anastomosis*

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## Introduction

Intravenous drug abuse (IVDA) is an anciently known societal and health crisis. With the increasing availability of intravenous (IV) drugs, such as heroin, this problem is becoming more notable especially due to its possible complications on the vascular system [1]. The femoral triangle is an accessible and simple site for IVDA. Complications at this area can vary from simple needle site infection to more serious events such as cellulitis, thrombophlebitis, bacterial endocarditis, arterial pseudoaneurysm rupture or infection, necrotizing soft tissue infection, hepatitis, pulmonary septic emboli, ulcerations, and gangrene [1]. Necrotizing fasciitis (NF), also known as necrotizing soft tissue infection, is the rapid spread of infection from subcutaneous tissue reaching the deep fascial layer and muscles causing myonecrosis. It is a life-threatening condition associated with systematic inflammatory response syndrome, septic shock, and multi-organ failure. It usually presents with crepitus, subcutaneous emphysema on imaging, skin necrosis, and possible hemodynamic instability [2]. Femoral artery pseudo-aneurysm, an aneurysmal sac with a single layer of fibrous tissue, is a result of accidental injection into the femoral artery during IVDA. It usually presents with groin pain, scarring, and the presence of a pulsatile mass. A thorough history, precise physical exam and imaging by computed tomography (CT) scan with contrast and Doppler ultrasound are all crucial for diagnosis [3]. NF is challenging for vascular surgeons in terms of diagnosis and management (debridement alone +/- revascularization). Here we present a rare case of left groin NF in an IVDA patient with findings of infected, thrombosed, and necrotic femoral vessels that was treated by debridement followed by delayed arterial revascularization via extra-anatomic trans-obturator ilio-femoral anastomosis [4]. To the best of our knowledge, this is the first report of such a case in English literature.



Figure 1: Subcutaneous hematoma with necrotic tissue of the femoral region.

## Case Presentation

A 44-year-old male known to be an intravenous heroin user was admitted with severe left groin pain of ten days duration. His pain was initially cramping in nature, and was followed by skin discoloration and purulent discharge. The pain reached its peak two days prior to presentation where it developed into a continuous “tearing and burning” pain. The patient noted some episodes of chills, and also mentioned left lower extremity swelling for 2 weeks and a long history of claudication. He was previously healthy, with no significant surgical history, and uses his upper and lower extremity veins for IV drug abuse. Vital signs were stable. Physical exam showed a left tender necrotic groin (Figure 1), with foul smell and subcutaneous crepitation. He had a warm left lower extremity with no signs of ischemia. Distal pulses were weak but the patient had positive popliteal and distal Doppler signals. Laboratory serum tests showed leukocytosis of 19000/mm<sup>3</sup> (WBC) and a C - reactive protein (CRP) of 200 mg/L in serum.

An urgent CT scan of the abdomen, pelvis and thighs with IV contrast was done and showed subcutaneous emphysema in the left groin, multiple small abscesses

between the muscles of the anterior upper thigh, and the presence of thrombotic material in the left iliac and femoral veins (Figure 2). A diagnosis of NF was made and the patient was started on tazobactam/piperacillin 4.5 g IV every 8 hours (h) and clindamycin 600 mg IV every 12h and was taken to the operation room for urgent debridement.

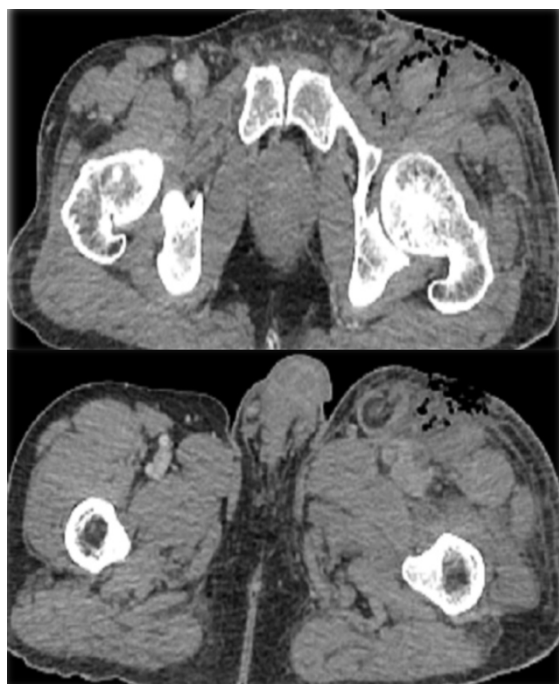


Figure 2: Computed tomography scan of the femoral area showing subcutaneous gas suggestive of necrotizing fasciitis.

Debridement and exploration of the wound down to the mid-thigh showed a thrombosed and ruptured left common femoral artery at its bifurcation level. There was no active bleeding due to the severe necrosis and thrombosis at the vessel

edges. Arterial embolectomy of the femoral arteries was performed to try to preserve the collateral circulation and good backflow was obtained distally. Stumps of the femoral vessels were ligated after necrosectomy with a total operative time of 2 hours 35 minutes.

Post-operatively the patient did not show any signs of lower limb ischemia. Daily dressing changes were performed and negative pressure wound therapy (NPWT) was applied on day 3 post-op with improvement of granulation tissue noted, as well as decrease in the wound size. He was discharged on day 8 on aspirin, anticoagulation, and antibiotics. He was also planned for a delayed revascularization.

The patient was readmitted six weeks later with necrosis of the left fifth toe and lower limb pain at rest. His Ankle-Brachial Index (ABI) was 0.45. Lower limb arteriography was performed and showed a developed collateral circulation from the left internal iliac artery towards the branches of the deep femoral artery, with reentry in the distal superficial femoral artery, along with patent popliteal and three leg vessels (Figure 3). Revascularization of the left lower limb was done by ilio-femoral extra-anatomical bypass graft. The graft was a reversed saphenous vein harvested from the contralateral right lower limb and tunneled in trans-obturator from the retroperitoneal space (external iliac artery) to the distal thigh (adductor tunnel) to avoid contamination from the open wound

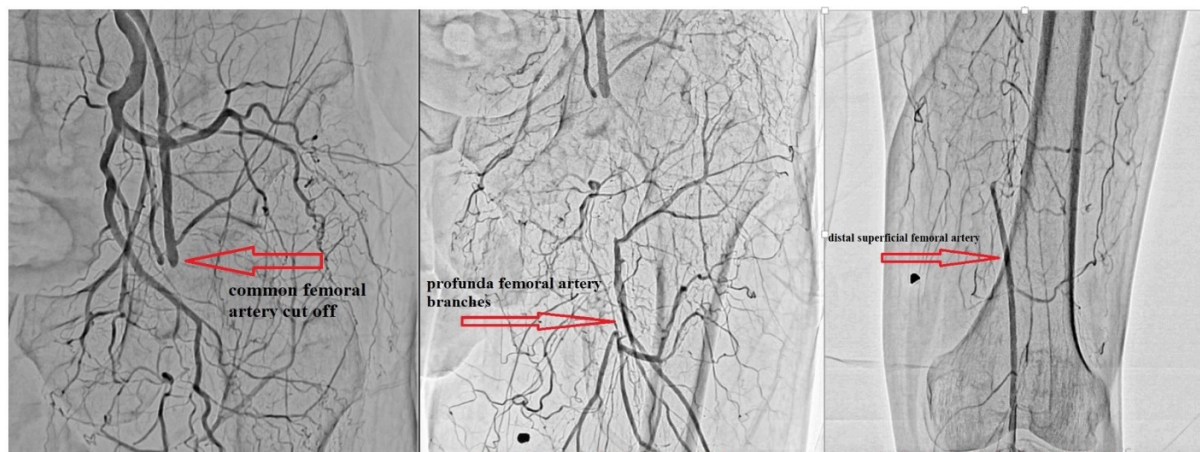


Figure 3: Arteriography of the lower extremity indicates the common femoral artery rupture as well as collaterals (red arrows).

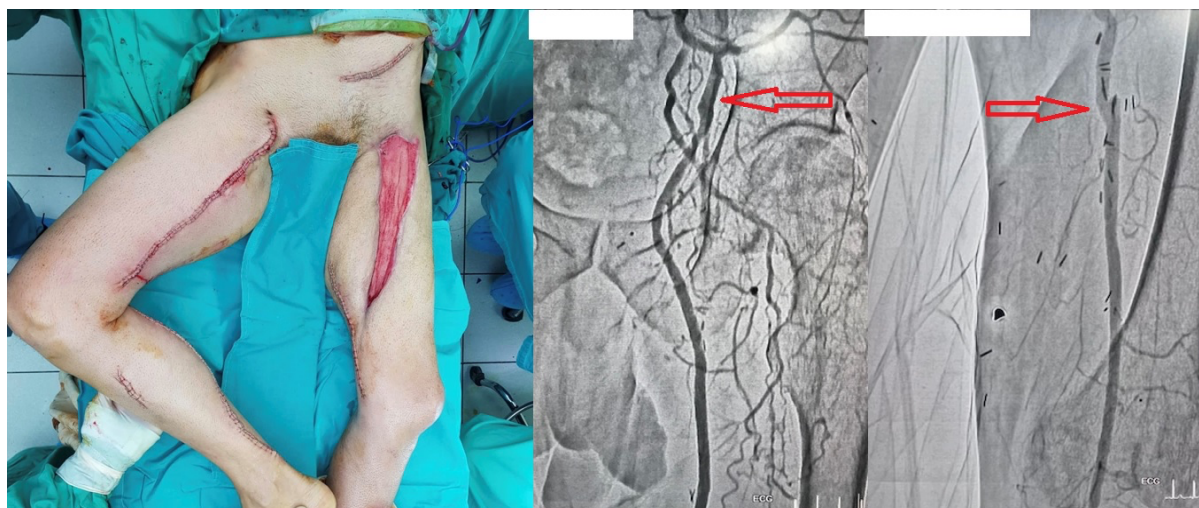


Figure 4: Intraoperative images and postoperative arteriography showing both proximal and distal bypass anastomosis (red arrows).

bed. Amputation of the fifth toe was done during the same operation because of the presence of necrosis. Perioperative arteriography showed the patency of the bypass and good flow distally (Figure 4). He had a smooth post-operative course and was discharged on day five. During his follow-up visit, the patient had complete secondary wound healing without complications (Figure 5).

## Discussion

The femoral vein has been described as a frequent access site for IVDA. 14 million IVDA cases are reported worldwide with a male predominance [5]. The most common complications resulting from such behavior include cellulitis, abscess formation, soft tissue necrotizing infection, deep vein thrombosis, infected thrombi, arteriovenous fistulae and pseudoaneurysm formation [5]. When aseptic techniques are not applied, infection can lead to necrotizing fasciitis in the groin [3]. Repeated needle pricks can lead to periarterial extravasation and formation of a hematoma, which in turn can become infected and erode the vessel wall leading to a pseudoaneurysm formation [3]. Infected pseudoaneurysms in IVDA most commonly involve the femoral artery [3]. A wide differential exists when having an IVDA patient with groin pain and fever [3]. Groin pain, a pulsatile mass, femoral erythematous scarring, or fever in an IVDA patient should raise

suspicion for a femoral artery aneurysmal infection. If neglected, this may progress to sepsis, hemorrhage, amputation (toes or whole limb) and even death [3]. Patients often try to give an erroneous case scenario to mask their actual usage of IV drugs, so a judicious and thorough history taking is crucial [1].

Diagnosis may be sometimes challenging. It is dependent on history, physical examination, laboratory findings, and may require more than one imaging modality. On physical exam, the classic triad consists of tenderness, necrosis, and crepitus. Usual laboratory tests describe elevated WBC, CRP, and Creatine Phosphokinase (CPK). Creatinine can be altered in the setting of sepsis and multi-organ failure [2]. Duplex Ultrasonography has an advantage in visualizing the proximal and distal blood flow and can simultaneously screen for venous thrombosis [3]. On the other hand, CT angiography scan has a higher sensitivity and specificity, and can better define the groin mass as well as the anatomy of the surrounding tissues [3]. Magnetic resonance arterial imaging, Doppler signal detection and ABI can also assist in the diagnosis [4].

Risk factors for NF are numerous and include diabetes (21%), use of immunosuppressive drugs, kidney failure, age>60 years, IVDA (30%), peripheral arterial disease, malnutrition, obesity



Figure 5: Progression of secondary wound healing.

(18%) and underlying malignancy [6]. NF is divided into 3 types according to microbial cultures: Type 1 is polymicrobial, Type 2 is *Staphylococcus aureus* alone, and Type 3 involves vibrio marinus [6]. *S. aureus* is the most commonly encountered germ. Urgent broad spectrum antibiotic treatment must be initiated. Possible regimens include 1) Anti-staphylococcal agent plus aminoglycoside and clindamycin, 2) Broad spectrum  $\beta$ -lactam /  $\beta$ -lactamase inhibitor plus clindamycin or 3) Fluoroquinolone plus clindamycin [2].

Management of these cases is challenging given the absence of a consensus regarding optimum surgical intervention. Patients are often hemodynamically unstable upon presentation which further complicates management. Options include: 1) Necrosectomy with stumps ligation, 2) Necrosectomy with primary revascularization, and 3) Necrosectomy with arterial ligation then delayed revascularization [3]. Necrosectomy with stumps ligation seemed to be the best and first line treatment, even if it carries a risk of subsequent claudication or limb ischemia, as it serves the main aim, which is to save the patient's life. Delayed arterial reconstruction can be held in patients having bothersome claudication or signs of ischemia after receiving adequate rehabilitation [3]. Qui et al. described claudication in 37% of cases at 5-year follow-up while no cases were encountered after the 5-year follow-up [5]. The infected operative field makes a

prosthetic graft unsuitable and most IVDA patients have no suitable vein grafts given the associated thrombosis [1]. In our case, the patient presented very late with infected necrotic femoral vessels and thrombosis of the stumps but with no active bleeding. Nonetheless, we opted to ligate the vessels for two reasons: the absence of limb ischemia and the presence of necrotic tissue and inflammation in the field, as these may impose a risk of subsequent bleeding. The consequences of such a procedure are varied in the literature, as some reported only claudication in 35% of cases, while others reported major amputation in up to 25% [7]. Anticoagulation and antiplatelet therapy have been recommended and utilized post-necrosectomy along with adequate bleeding control in the hospital setting, but are precluded in certain situations due to lack of outpatient follow-up with some patients [8].

In necrotizing fasciitis, vacuum-assisted closure is associated with a reduction in healing time, and time to discharge, but with up to a seven-fold increase in cost compared with the conventional wet-to-dry dressing [9]. The options for revascularization include either using a prosthetic or autologous graft. Finding a suitable vessel is difficult and was reported in only 25% of patients as most will have a co-existing deep vein thromboses (DVTs). When the graft is implanted within the infected tissue planes, reinfection occurs in more than 50% of cases [3, 8]. With the

use of extra-anatomical bypass, this rate goes down to 7%. Lateral femoral bypass technique is simpler and faster, but the trans-obturator method is associated with lower graft infection rates [4]. Obturator canal bypass has been described as a good alternative in revascularization. This method was shown to have high patency rates, although the risk of bleeding was reported to be elevated [10]. In our case, the trans-obturator approach was used to decrease the risk of graft infection and to avoid the re-use of this site for injection.

This case presentation of NF in an IVDA patient carries unique findings that differ from the more common scenarios of infected femoral artery pseudo-aneurysm stated in the literature. The patient did not present with acute bleed. Stump ligation was carried out due to the absence of acute limb suffering and the chronicity of the patient's ischemia that had established a good collateral circulation. A non-thrombotic contralateral saphenous vein was found to be an adequate autologous graft in distant revascularization. Delayed ilio-femoral bypass was performed extra-anatomically to decrease the risk of graft infection and the re-use of this site for IV drug injections.

## Conclusion

Complications of IVDA at the femoral triangle are challenging cases. NF is a life-threatening condition that needs wise decision making and intervention. Due to the lack of adequate data in literature, there is still no consensus on the optimal management nor on the type of graft to use. Tissue debridement plus ligation of the vessels followed by a delayed extra-anatomical revascularization is an acceptable approach with negative pressure wound therapy helping to assist in shortening the time of healing.

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