

## Case Report

# Bleeding Femoral Pseudoaneurysm in HIV-Positive Intravenous Drug Abusers: A “Headache” for Vascular Surgeon

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## Introduction

Intravenous drug abuse (IVDA) and Human Immunodeficiency Virus (HIV) infection are frequently related. The first condition contributes to the development of infected arterial pseudoaneurysms (PSAs), particularly in where arteries are more superficial (e.g.: common femoral artery), while the second one may have a role in the enhancement of this process. Rupture of this kind of PSAs is rare but dramatic and its correction is difficult and controversial because of active bleeding which could lead to shock and death, unless a bailout procedure is performed in order to save the patient and his/her limb [1]. Moreover, acute illness related to infective co-morbidities worsen make both the clinical picture and the whole operative management [2].

## Etiopathogenesis

The etiology of these infected femoral PSAs is mainly related to the chronic trauma of the arterial wall, which runs beside the homologous vein, the first choice for drug injection when the forearm venous access are compromised. Direct inoculation of bacteria or fungi, by means of used and dirty needles, maintains local chronic infection with spread of superficial tissues necrosis, subcutaneous groin phlegmon formation and destruction of these vessels [3-5]. We also postulate two further worsening factors contributing to vessel wall weakening. In fact, even if large arteries' involvement is infrequent in absence of overt mycotic or bacterial infection, in HIV patients a virus-mediated leucocytoclastic vasculitis of the vasa vasora and periadventitial vessels seems to be able to cause true aneurysm formation or occlusive disease, and some aspects of this process could be considered valid even for PSA development. We highlight that HIV-related aneurysms are observed in young African patients with sexual infection, who are

not IVDAs [6-8]. Moreover, PI therapy is demonstrated to promote, particularly in older patients, atherosclerosis and cell death through necrosis pathways including endothelial mitochondrial DNA damage [9-11].

Besides the clinical point of view, social issue should be also considered: illicit opioids consumption is still the main cause of drug related deaths and morbidity in Europe. Behaviours associated with drug abuse are among the main factors implicated in the spread of HIV infection in the Western world. Among all European HIV-positive people, with known vehicle transmission, 8% are drug abuse related infections. Conversely, HIV-related mortality is one of the main indirect causes of death in drug abusers [12]. Lifestyle, poor living conditions, lack of prevention and age-related immune system deterioration expose these people to chronic health care issues, increasing this way health costs and worsening decision making [13-14].

## Case-Series

We faced two emergency cases of middle-aged HIV-positive IVDAs, with HCV-related cirrhosis, smoke-related pathologies and inconstant PI-therapy, presenting bleeding femoral PSAs. We had to quickly decide, in those circumstances, if and how to treat these patients in order to save their lives and limbs. We evaluated their features and compliance, the operative risk, the social costs of our decision, and ultimately the safety of the health-care workers. Open surgery is considered the first choice treatment. Arterial ligation is the simpler option available but it is burdened by high rates of limb ischemia and amputation. Revascularization, by means of bypass graft to exclude the PSA, gives better results. Nevertheless, potential pitfalls are around the corner: when using alloplastic materials, graft infection rates are not negligible, this way frustrating

the goal of the intervention, while autologous grafts (e.g. deep or superficial veins), usually less prone to infection, frequently collapse because of the development of chronic superficial and/or deep venous thrombosis after chronic intravenous drug injection [3]. Few authors have reported endovascular treatment for infected PSAs, which consists of a preliminary angiography to identify PSA site and a subsequent stent-graft deployment. This approach allows an effective control of the bleeding site, but theoretically does not ensure infection resolution, which could be accomplished by means of a long term antibiotic therapy and a careful drainage of the overlying phlegmon. Furthermore, endovascular treatment is time sparing compared to open surgery, avoiding ill and weak vessels' exposure and so, consequently, blood losses and tissue traumatism.

Moreover, endovascular approach protects health-care workers reducing from the risk of contamination, because punctures with needles or cuts with scalpels, together with blood splatter, are the main routes of exposure during bail out surgery for haemorrhage.

For all these reasons we opted for the minimally invasive approach. Our original idea was to perform a “hybrid” intervention. First, we exposed the ipsilateral distal superficial femoral artery in order to work in a sterile surgical field and to have an easy way to cannulate the artery, avoiding the inguinal scar and infected tissues. The second step was endovascular, covering the bleeding PSA through the retrograde deployment of the stent-graft, which were more direct and faster thanks to the nearby site of cannulation. At last, we completed the intervention with the groin phlegmondebridment.

Hospitalization was not less than two weeks, with the inguinal wound healed per secundam. Patients were discharged with long-term antibiotic therapy without clinical or laboratory signs of infection. Patients have been lost at regular follow up because of their erratic lifestyle. Nevertheless, we had the chance to control when they showed up to the emergency room for other issues. We could assess that stent-grafts were patent without signs of infection recurrences. In one of those circumstances we found out that the first patient had undergone to emergency open surgical treatment (iliac-femoral bypass graft with arterial homograft) for contralateral bleeding PSA in another hospital, complicated by severe blood losses, delay of healing of the surgical wound and iatrogenic neurologic complications. No stent graft infections or recurrences have been detected for respectively 4 years and 1 year.

## Discussion

When discussing particular and complicated cases as those reported above, we believe that is important to follow an unwritten flow chart: first, to do or to give up? Second, what to do? Third, how to do

it? Every question is difficult because of lack of specific guidelines.

The first question is probably the biggest issue. In our cases, the unstable hemodynamic conditions were life-threatening and the need for emergency surgery paradoxically helped us in the decision making process, we opted for intervention without any hesitation [14]. On the other side, if PSAs were asymptomatic or stable, we would be more pragmatic postponing elective surgery; in case of extremely compromised patients (advanced stage disease or unfeasible redo cases), we would avoid overtreatment or “dangerous heroism”. We cynically have to evaluate also the economic impact of these high-risk surgical procedures. Considering both the direct costs of the personnel and materials and the social price of advanced therapies, length of stay, treatment of complications, and readmissions.

The second question is: what to do in such patients? Mortality, morbidity, procedure time, blood loss, intensive care, and hospitalization are lower for minimally invasive procedures, obtaining the same result of open surgery. In our experience, we strongly recommend this method, which could be considered “definitive”, and not only a bridge to open surgery in not compliant patients.

The third crucial issue is how to perform the intervention. Some authors perform just a percutaneous approach, in order to lower the invasiveness for the patient and the risks for the surgeons. Nevertheless, the access from the contralateral femoral artery is often compromised as much as the bleeding site whereas access from the ipsilateral popliteal artery is rather challenging and not easy to perform in life-threatening emergencies.

Our preferred technique is hybrid. Open surgery is firstly used to expose the superficial femoral artery at Hunter’s canal and, in a second time, to perform phlegmondebridment, which is mandatory in these cases.

The surgical exposure of the distal superficial artery at the Hunter canal is frequently the most rapid and available access, and it is preparatory to a manageable and easy arterial cannulation. Anyway, the endovascular phase remains the keystone of our treatment because it is easier, faster, safer, less traumatic and in our experience as effective as surgery, avoiding unnecessary risks for both patients and health-care personnel, particularly in emergency conditions.

Our strategy contemplates also security by means of the adoption of barrier protections, protective eyewears, gloves and water-impermeable gowns together with a careful surgical planning, in order to maximally reduce any risk of contamination for health-care workers [15-17].

When facing PSAs in HIV-positive IVDAs, our recommendations are to assess, on a case by case basis, the feasibility of

endovascular correction, avoiding any hasty decisions and to carry out the less invasive possible treatment, always keeping in mind the respect for human dignity and the Hippocratic concept of “*primum non nocere*”.

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