

Surgical treatment of femoral artery pseudoaneurysm after cardiac catheterization

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PA: pseudoaneurysm

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ABSTRACT

Today, femoral artery pseudoaneurysm is one of the most common iatrogenic complications. There are many treatment variants, where non-invasive procedures are the most used; however, surgery remains an effective alternative. A patient with a diagnosis of femoral artery pseudoaneurysm following a cardiac catheterization by electrophysiological study is presented, who two months after procedure began with a volume increase in the right inguinal region, functional impotence and auscultation of a murmur. Excision of the pseudoaneurysm and repair of the femoral artery with vascular prosthesis was performed. Eight months later, the patient underwent an evolutionary ultrasound, demonstrating the favorable evolution (normal flow and fully endothelialized prosthesis).

Key words: Pseudoaneurysm, Femoral artery, Surgery, Blood vessel prosthesis

Tratamiento quirúrgico de un pseudoaneurisma de la arteria femoral derecha posterior a cateterismo cardíaco

RESUMEN

El pseudoaneurisma de la arteria femoral es una de las complicaciones iatrogénicas más comunes en la actualidad. Existen muchas variantes de tratamiento, donde los procedimientos incruentados (no invasivos) resultan los más empleados; sin embargo, la cirugía continúa siendo una alternativa eficaz. Se presenta un paciente con diagnóstico de pseudoaneurisma femoral derecho posterior a un cateterismo cardíaco por estudio electrofisiológico, que dos meses después del procedimiento comenzó con aumento de volumen en la región inguinal derecha, impotencia funcional y auscultación de un soplo. Se le realizó excéresis del pseudoaneurisma y reparación de la arteria femoral con prótesis vascular. Ocho meses después se le realizó ecografía evolutiva donde se demostró la favorable evolución (flujo normal y prótesis completamente endotelizada).

Palabras clave: Pseudoaneurisma, Arteria femoral, Cirugía, Prótesis vascular

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INTRODUCTION

Pseudoaneurysm (PA) is a false pulsatile sac which develops after rupture

of the three layers of a vessel and is contained by the surrounding tissues. The femoral artery is the most commonly used vessel in interventional procedures, where the artery disruption with the incomplete sealing of the middle layer causes the false aneurysm formation. PA walls are formed by perivascular tissues and clot elements that progressively grow and maintain a systolic and diastolic flow with the arterial lumen through its neck. PA can also be associated with trauma and infections^{1,2}.

CASE REPORT

A 60-year-old man with a history of high blood pressure treated with losartan 100 milligrams (mg) and chlortalidone 25 mg, that in order to perform electrophysiological study and radiofrequency ablation for an intranodal reentrant tachycardia underwent cardiac catheterization with right femoral artery puncture. Two months after intervention, the patient began to notice increased volume at the level of the right thigh root. He was evaluated by his cardiologist, who diagnosed a femoral artery PA and indicated conservative treatment. It continued to grow three months later and was associated with regional neurological alterations and impotence of the homonymous limb. The patient was referred to our

center, where the ultrasound diagnosis was corroborated and surgical treatment was decided.

Physical examination showed a non-painful volume increase in the right inguocrural region, approximately 6 centimeters (cm) in diameter, with beating on palpation and murmur on auscultation.

The electrocardiogram was normal, with sinus rhythm, and on the ultrasound, a 5.5 cm diameter PA was found in the right common femoral artery, with a flow filling the aneurysmal sac (**Figure 1**).

In the surgical procedure, an incision of about 10 cm was made at the level of the thigh root, 3 cm above and 7 cm below the right inguinal fold, it was deepened by planes to locate the PA, which was dissected from the surrounding structures and excision was performed. The common femoral artery was repaired with polytetrafluorethylene graft (PETF) 0.7 cm in diameter and 2 in length (**Figure 2**); it was closed by planes with no surgical or anesthetic accidents. The patient was extubated from the operating room and after favorable postoperative evolution was withdrawn in the first 24 hours postoperatively with ticagrelor for one month and analgesia for five days.

Two weeks later a surgical wound hematoma was detected and was resolved with conservative measures. An ultrasound was indicated eight months after surgery where a common patent femoral artery was

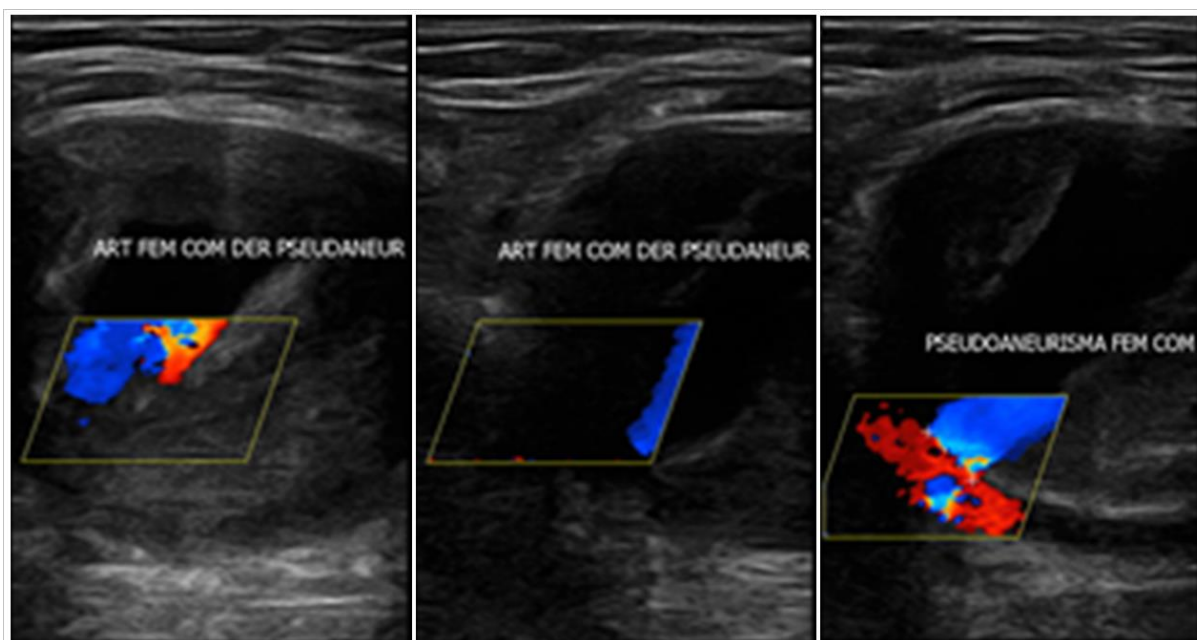


Figure 1. Doppler ultrasound images showing the femoral artery pseudoaneurysm.

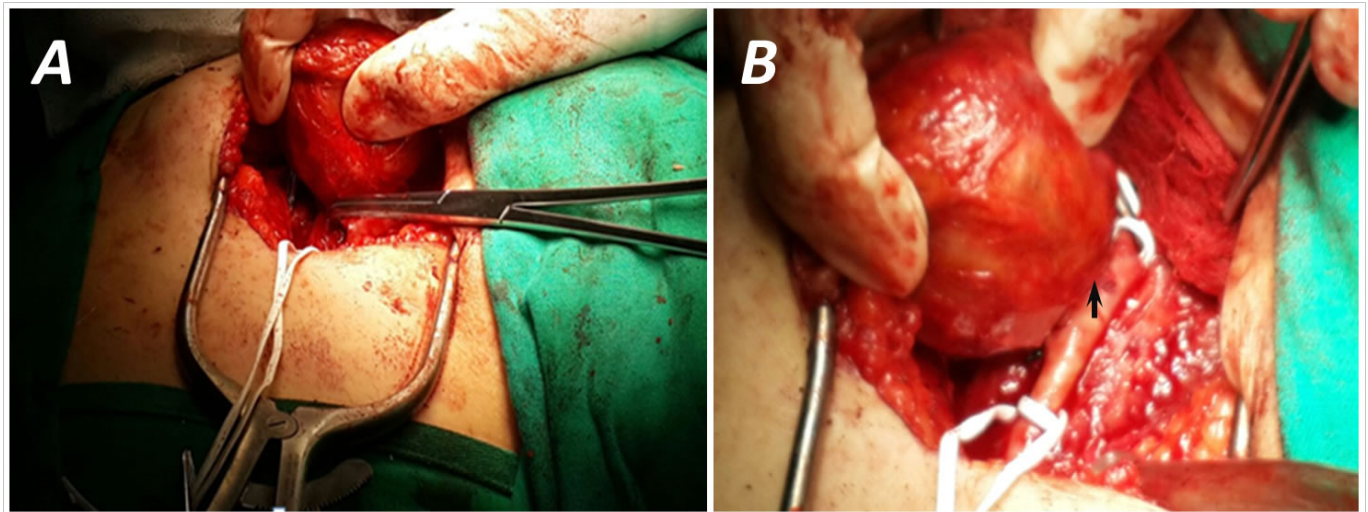


Figure 2. Pseudoaneurysm *in situ*. **A.** Released from adhesions near the right common femoral artery. **B.** Fully exposed, ready to be resected. The arrow on the femoral artery points to the neck of the pseudoaneurysm.

found, with complete vascular graft endothelialization (**Figure 3**).

COMMENT

PA of the femoral artery is one of the most common iatrogenic complications at present. Its origin is re-

lated to a series of risk factors depending on the procedure performed, the technique used, and the patient's conditions.

Symptoms are varied, some may remain asymptomatic and resolve spontaneously. Others present with pain, paraesthesia and functional impotence. The main PA-associated complications are: progressive growth and rupture, cutaneous necrosis, distal

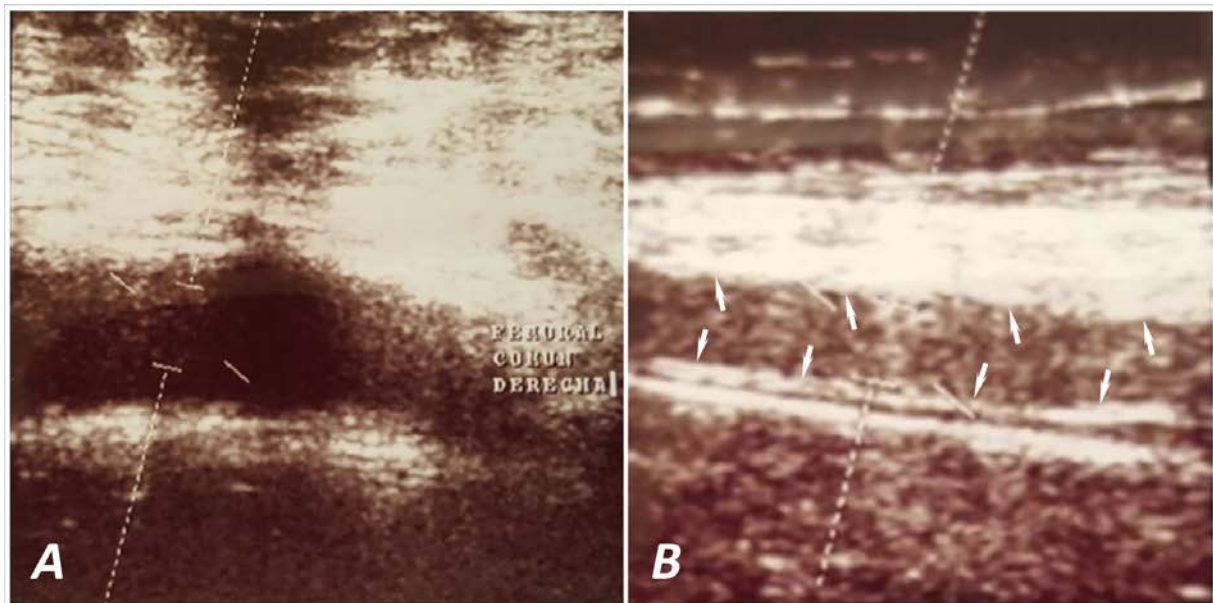


Figure 3. Sonographic images, eight months after surgery. **A.** Anatomical integrity of the right common femoral artery at the surgical site. **B.** Adequate endothelialization of the vascular prosthesis (arrows).

embolism and neurological symptoms secondary to local compression. On physical examination, a pulsatile mass, usually painful, is palpated, which presents a murmur on auscultation. Ultrasound with a sensitivity of 94% and a specificity of 97%, in addition to angiotomography with 97 and 98.7%, respectively³, are the most used imaging studies to corroborate diagnosis. Ultrasound is the initial technique, can be performed in the patient's bed and is even used to guide most of the PA therapeutic procedures.

When PA has a diameter less than 3 cm, it usually resolves with conservative treatment in the first month, although this technique shows unpredictable results and needs patient follow-up. Manual or assisted Doppler ultrasound-guided compression has become the first line of PA treatment in some centers, which decreases hospital stay and need for surgical repairs. However it presents a high incidence of relapses and complications^{4,5}.

Another method used in many medical institutions is the thrombin injection, the coagulation factor (II), which converts fibrinogen into active fibrin and favors thrombus formation. It is injected using echocardiographic monitoring in the interior of the PA until its blood flow ceases^{6,7}.

Purified bovine collagen injection, which is easily accepted by patients and does not require systemic analgesic medication during the procedure, has also been used. With this technique, PA obliteration is achieved in approximately 10 seconds. When collagen comes into contact with blood, the platelets are added therein and release coagulation factors that together with plasma factors, form a fibrin matrix. This collagen is eventually degraded and progressively reabsorbed by granulocytes and macrophages⁸.

Percutaneous coronary intervention, by placing a covered stent at the level of the PA neck or coil embolization, constitutes another treatment variant⁹.

For a long time surgery was the only treatment available for PA. After the 90s, with the incorporation of less aggressive procedures, surgical treatment has lost the leading role although keeping its precise indications. In the case of ruptured or progressive growth PA, easy available surgery prevails over other methods. Likewise, surgery is preferred in the infected femoral PA, distal limb ischemia and the neurological deficit of the affected limb.

In the San Norberto *et al.*¹⁰ series, which included 79 patients, 71% of the sample, presented some type of complication in the first 30 days, requiring transfusion in 53%. The infection rate and suture dehiscence

were 19 and 12.7% respectively. Surgery-related mortality was 3.8%. The use of antiplatelet or anticoagulant therapy after cardiac catheterization was an independent risk factor to increase postoperative morbidity.

This patient presented only surgical wound hematoma, which surely was related to the anticoagulant treatment during and after procedure. In our center conservative treatment prevails over surgical behavior which is reserved only for selected patients with specific indications.

CONCLUSIONS

Although non-invasive procedures play a leading role in femoral PA treatment, surgery continues to be part of the therapeutic variants; and, in some cases, it is the only possibility for treatment. When the team is experienced and follow surgical principles, the incidence of complications, need for blood products and mortality decrease significantly.

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