CorSalud. 2021 Jan-Mar;13(1):104-108

CorSalud

Cuban Society of Cardiology

Case Report

Cardiocentro Ernesto Che Guevara Santa Clara Cuba

Giant para-anastomotic pseudoaneurysm after revascularization though aorto-bifemoral bypass grafting: Case report

Abey Medina Rodríguez[1], MD; Cecilio González Benavides[2], MD, MSc; Mileidys Hernández Pérez[2], MD, MSc; Conrado Perulena Llamuza[2], MD; Liubka M. Pérez Mederos[3], MD, MSc; Mery K. Satorre Ley[4], MD; Ariel García Alemán[1], MD; and Niurka González Morales[1], MD

[1] Faculty of Medicine, *Universidad de Ciencias Médicas de Villa Clara*. Santa Clara, Villa Clara, Cuba.
[2] Department of Angiology and Vascular Surgery, *Hospital Provincial Universitario Arnaldo Milián Castro*. Santa Clara, Villa Clara, Cuba.
[3] Department of Neurology, *Hospital Pediátrico Universitario José Luis Miranda*. Santa Clara, Villa Clara, Cuba.
[4] Faculty of Stomatology, *Universidad de Ciencias Médicas de Villa Clara*. Santa Clara, Villa Clara, Cuba.

Este artículo también está disponible en español

ARTICLE INFORMATION

Received: December 16, 2019
Accepted: January 14, 2020
Online first: February 13, 2021

Competing interests
The authors declare no competing interests.

Figures
Pictures of the complication and surgical procedure are shown with the patient's consent.

ABSTRACT

Pseudoaneurysm is that pulsatile and encapsulated hematoma produced after the rupture of all vessel layers and contained by surrounding neighboring tissues. It is considered a late complication in aorto-iliac prosthetic surgery. We present a 72-year-old patient who underwent an aorto-bifemoral bypass grafting 13 years ago, and who was subsequently diagnosed with a para-anastomotic pseudoaneurysm that was allowed to evolve due to presenting several associated comorbidities. After two years, it was necessary to perform a surgical intervention due to the excessive growth of the swelling, and ischemic complication with skin necrosis. The appearance of a pseudoaneurysm is related to sex, prosthetic material as well as the time that elapses since the surgery. Ultrasound follow-up during the postoperative period is essential for an early identification of this complication.

Keywords: Pseudoaneurysm, False aneurysm, Femoral artery, Surgery, Vascular grafting, Blood vessel prosthesis

Pseudoaneurisma para-anastomótico gigante tras revascularización por baipás aorto-bifemoral: Informe de un caso

RESUMEN

El pseudoaneurisma es aquel hematoma pulsátil y encapsulado producido tras la rotura de todas las túnicas del vaso y contenido por tejidos vecinos circundantes. Es considerado una complicación tardía en la cirugía protésica aorto-ilíaca. Se presenta un paciente de 72 años al que se le realizó un baipás aorto-bifemoral 13 años atrás, y que posteriormente se le diagnosticó un pseudoaneurisma para-anastomótico que se dejó evolucionar por presentar varias comorbilidades asociadas. Transcurridos 2 años fue necesario realizarle una intervención quirúrgica por presentar crecimiento excesivo de la tumefacción y complicación isquémica con necrosis cutánea. La aparición de un pseudoaneurisma está relacionada con el sexo, el material protésico y con el tiempo que transcurre desde la cirugía. El seguimiento ultrasonográfico durante el postoperatorio es primordial para identificar tempranamente esta complicación.

Palabras clave: *Pseudoaneurisma, Aneurisma falso, Arteria femoral, Cirugía, Injerto vascular, Prótesis vascular*

✉ *A Medina Rodríguez*
Universidad de Ciencias Médicas de Villa Clara. Carretera Acueducto y Circunvalación. Santa Clara 50200. Villa Clara, Cuba.
E-mail address: abeymr@nauta.cu

RNPS 2235-145 © 2009-2021 Cardiocentro Ernesto Che Guevara, Villa Clara, Cuba.
Article licensed under a Creative Commons Attribution – CC BY-NC-ND 4.0

INTRODUCTION

Pseudoaneurysm is that pulsatile and encapsulated hematoma produced after the rupture of all vessel layers and contained by surrounding neighboring tissues. In other words, it is a contained rupture, formed by the disruption of the three layers of the arterial wall and bounded by perivascular structures that make it look like a sac with a communicating neck to the affected vessel[1].

In addition to the perivascular tissues, the walls of the pseudoaneurysm are made up of elements of the clot that progressively grow and maintain a systolic and diastolic flow related to the arterial lumen through the neck[2]. The most frequent causes are: trauma, angiographic procedures (it is one of the most important complications after arterial catheterization), infections and aneurysms in the Kawasaki disease[1]. Another frequent cause is that associated with previous surgical interventions and especially those of vascular structures, where the risk appears to be significantly increased. The vascular prosthetic graft surgery represents the most important surgical antecedent regarding the occurrence of this disorder and, even, the emergence of a pseudoaneurysm is considered by many authors as a late complication of the aorto-iliac prosthetic surgery, which is present in up to a 6% of patients[3].

The most obvious clinical finding is a pulsatile mass, where there are frequently associated systolic sounds on the mass, which is sometimes confused with an abscess or hematoma because it is soft and warm[4]. Depending on the size of the sac, there are symptoms of compression of neighboring structures, such as nerves, veins and other arteries[1].

The clinical picture is very varied, some may remain asymptomatic and resolve spontaneously; others present pain, paraesthesia, and functional impotence. The main complications associated with pseudoaneurysm are: progressive growth and rupture, skin necrosis, distal embolism and neurological symptoms secondary to local compression. On physical examination, a pulsatile mass is palpable, usually painful, which on auscultation presents a murmur. The most widely used imaging study to corroborate the diagnosis is the Doppler ultrasound —initial technique, which is even used to guide most therapeutic procedures[2]—, with a sensitivity of 94% and specificity of 97%; in addition to an angiography with 97% and 98.7%, respectively. However, the most reliable test is the arteriography[4].

When the pseudoaneurysm is less than 3 cm in diameter, it is usually solved with conservative treatment in the first month, although this technique shows unpredictable results and requires patient follow-up. Manual compression or assisted with compression devices, guided by Doppler ultrasound, has become the first line of treatment for pseudoaneurysms in some centers, reducing hospital stay and the need for surgical repairs; however, it presents a high incidence of relapses and complications[2]. The basic principle of vascular repair is to achieve proximal and distal control prior to approaching the damaged site[5].

CASE REPORT

A 76-year-old man with a history of smoking, high blood pressure (for 30 years), chronic peripheral arterial failure, stage IIb (for 20 years), chronic renal failure (for 7 years), currently stage V needing hemodialysis, and previous surgery: aorto-bifemoral bypass grafting due to an aorto-iliac occlusion, which was performed at the *Instituto Nacional de Angiología y Cirugía Vascular* 13 years ago; who had come for consultation about two years ago with an increase in volume in the left inguinal region, for which an echo-Doppler was performed and a pulsatile tumor was found, with flow and turbulence, in relation to the anastomosis site of the prosthesis with the femoral artery. A para-anastomotic pseudoaneurysm (PAPA) was diagnosed, which, due to the age and comorbidities of the patient, was allowed to evolve with medical treatment and follow-up.

The patient abandoned the follow-up and on this occasion came to the consultation because the tumor had grown (**Figure 1**) and presented an ischemic lesion in relation to the pseudoaneurysm complicated with cutaneous ischemia. The risks of rupturing the pseudoaneurysmal sac were explained to the patient and his relatives, for which he was admitted for a medical-surgical treatment, with prior informed consent.

The complementary tests yielded the following results: hemoglobin 9.2 g/dL, blood glucose 6.2 mmol/L, creatinine 600 µmol/L, cholesterol 6.3 mmol/L, triglycerides 1.2 mmol/L, platelets 150 × 109/L, bleeding and clotting time 2 and 6 minutes, respectively, and leukogram 15,000 (81.4% polymorphonuclear).

Figure 1. Views of the tumor in the left inguinal region, in relation to the pseudoaneurysm.

Treatment with renal dose vancomycin was started before, during and after the surgical procedure. The technique used was the following: after applying aseptic and antiseptic measures, an incision was made at the level of the left ili-ac fossa (**Figure 2A**) to control the prosthetic proximal end and, at the level of the inguinal fold with distal extension of the entire upper third of the thigh, to control the distal ending in the superficial and deep femoral arteries. A resection of the aneurysmal sac (**Figure 2B**) and end-to-side anastomosis of the prosthetic segment were performed at the bifurcation of the superficial and deep femoral artery. In addition, a necrectomy of the damaged skin was performed. The patient left the operating room without complications, with a viable limb and was discharged, without postoperative complications, 15 days after the procedure.

COMMENT

The onset of a pseudoaneurysm is considered a late complication of the aorto-iliac prosthetic surgery, which takes place in 6% of patients[2]. According to Bretón Gutiérrez *et al.*[6], this condition is recognized in the studies by Galeno, Pare, Hunter and Hallowell; this latter was the initiator of its treatment, in 1761. Lesions to the iliac artery are infrequent (0.03%); in the femoral artery they are around 25%, and they predominate in men in a 7:1 ratio, compared to women.

It is indisputable that the ultrasound is the initial technique of choice for its diagnosis and even to guide its percutaneous treatment if necessary. An echolucent image is identified, whose periphery is occupied by echogenic material, which corresponds to thrombus. The flow, on Doppler color, shows the "yin-yang" sign, and on pulsed, a bidirectional pattern of the "to and fro" type (forward and backward). The imaging study is complemented with the angiography, which makes it possible to better assess the arterial tree. The sensitivity of Doppler col-

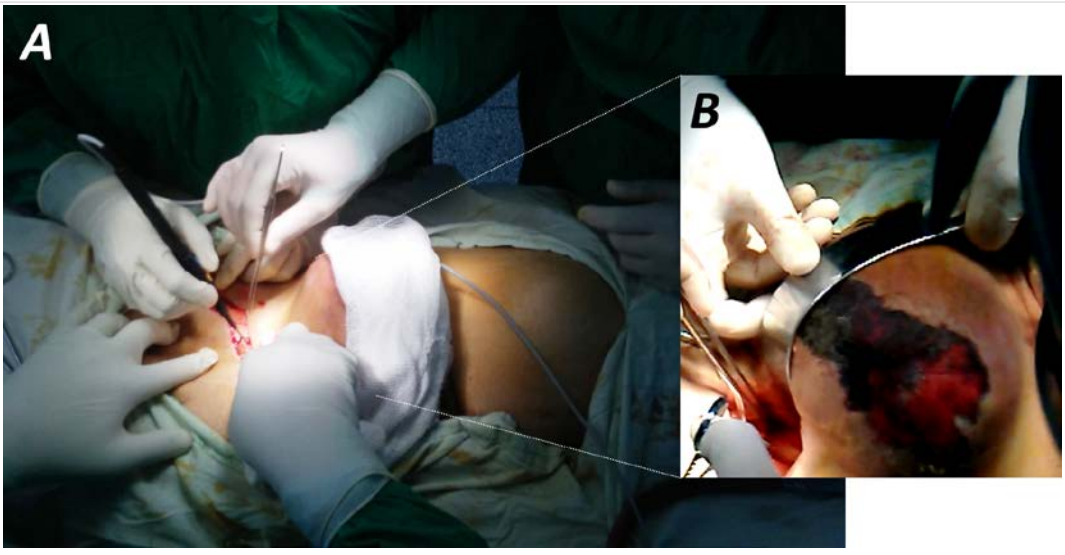

Figure 2. A. Control of the distal prosthetic ending. **B.** Initiation of the aneurysmal sac resection.

or to identify a pseudoaneurysm is 94%, with a specificity of 97.6%; while a tomography has a sensitivity and specificity of 95% and 98.7%, respectively. The latter is faster, assesses deep structures, as well as morphology, the size of the neck and the feeding vessel, and diagnoses complications such as active bleeding; furthermore, it is not a dependent operator. It also has some disadvantages: it uses ionizing radiation and intravenous iodinated contrast[1].

Para-anastomotic pseudoaneurysm takes place with the same frequency after aneurysmal repair interventions or occlusive disease. Its causes also include fatigue of the arterial wall, the suture material, and the arterial prosthesis used. Older reports include both: suture material and prosthetic material, although these problems are less common with modern materials[7]. According to Ricotta[7], in a study carried out by Shah *et al.*, it was found that of a total of 1000 patients with polytetrafluoroethylene (PTFE) prostheses, 94% did not develop a pseudoaneurysm, which implies a greater benefit of this material; an aspect highlighted by Berman *et al.* (also cited by Ricotta[7]), who found a significant increase in the percentage of dilation in Dacron prostheses (49%) compared to PTFE (20%).

Several therapeutic strategies have been developed to treat this complication, the most important of them include: ultrasound-guided compression repair, surgical repair and, in recent decades, minimally invasive percutaneous treatments[8]. Surgery was, for a long time, the only available treatment for pseudoaneurysm, but after the 90s, with the incorporation of interventional procedures, surgical treatment has lost its prominence; however, it keeps its very specific indications. In the case of pseudoaneurysms with progressive growth and in those complicated with rupture, the rapid availability of surgery prevails over the other methods. Likewise, surgery is preferred for infected femoral pseudoaneurysm, distal ischemia, and neurological deficit of the affected limb.

According to Valdés Dupeyrón *et al.*[2], in the series by San Norberto *et al.*, which included 79 patients, 71% presented some type of complication in the first 30 days, requiring a transfusion in the 53% of them. The infection and dehiscence rate of the suture was 19 % and 12.7%, respectively, and the mortality related to surgery was 3.8%.

Another method used in many medical institutions is the injection of thrombin, coagulation factor II, which converts fibrinogen into active fibrin and promotes the formation of a thrombus. It is injected under echocardiographic monitoring into the pseudoaneurysm until its blood flow ceases[2]. Purified bovine collagen injection has also been employed, which is readily accepted by patients and does not require systemic analgesic medication during the procedure. With this technique, an obliteration of the pseudoaneurysm is achieved in approximately 10 seconds. When the collagen comes into contact with the blood, platelets aggregate in it and release clotting factors, which, together with plasma factors, form a fibrin matrix. This collagen is finally degraded and is progressively reabsorbed by granulocytes and macrophages[2].

CONCLUSIONS

The onset of a pseudoaneurysm is related to sex, prosthetic material, the time that elapses since the surgery and the postoperative ultrasound follow-up. The choice of surgical treatment depends on the complications, the risks for the patient and the associated comorbidities.

REFERENCES

1. Castillo Yujra BJ, Herbas Bernal RI, Panozo Borda SV, Caero Herbas L, Zegarra Santiesteban W, Ricaldez Muñoz R. Pseudoaneurisma crónico de la arteria femoral izquierda secundaria a trauma. Presentación de un caso. Gac Med Bol. 2012;35(2): 84-6.
2. Valdés Dupeyrón O, Mejides Díaz R, Cruz Martínez A, Suárez Rivero A, Zambrano Vásquez KB, Zambrano Parrales AL. Tratamiento quirúrgico de un pseudoaneurisma de la arteria femoral derecha posterior a cateterismo cardíaco. CorSalud [Internet]. 2016 [cited Dec 13, 2019];8(3):189-93. Available at: http://www.revcorsalud.sld.cu/index.php/cors/article/view/141/333
3. Marisio G, Schalper K, Quintana J, Urrea R. Falso aneurisma de la aorta abdominal. Rev Chil Cir. 2004;56(5):481-5.
4. López García D, González González ME, Tagarro Villalba S, González Arranz MA, García Gimeno M, Rodríguez Camarero S. Pseudoaneurismas arteriales secundarios a fractura de fémur: opciones terapéuticas. Angiología. 2015;67(5):415-7.
5. Cobas Díaz O, Roselló Pérez L, Gonzáles Expósito A. Pseudoaneurisma de la arteria humeral. CCM

[Internet]. 2013 [cited Dic 14, 2019];17(1). Available at: http://www.revcocmed.sld.cu/index.php/cocmed/article/view/788/257

6. Bretón Gutiérrez MA, Zaldívar Reyna O, Parra Soto I, Pérez García R, Uribe Pineda J. Falso aneurisma gigante de arteria iliaca externa izquierda. Reporte de un caso. Rev Hosp Jua Mex. 2000; 67(1):3-10.
7. Ricotta JJ. Para-anastomotic aortic aneurysms: General considerations and techniques. En: Ascher E, Veith FJ, Gloviczki P, eds. Haimovici's Vascular Surgery. 6ª ed. Oxford: Wiley-Blackwell; 2012. p. 612-24.
8. Lenartova M, Tak T. Iatrogenic pseudoaneurysm of femoral artery: case report and literature review. Clin Med Res. 2003;1(3):243-7.