Aorto biiliac bypass with superficial femoral vein: an option in aortic grafts and endografts infection – a case report

Enxerto aorto bi-iliaco com veia femoral superficial: uma opção nas infecções de próteses e endopróteses aórticas – relato de caso

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Abstract

One of the most feared complications in vascular surgery is synthetic graft infection. It happens in 2% of conventional surgical procedures and about 0.3 to 6% of endovascular procedures. We report the case of a patient treated for abdominal aortic aneurysm with both methods. Six years later, the prosthesis had to be removed due to infection. Bilateral superficial femoral vein was successfully used to replace the graft.

Keywords: Infection; prostheses and implants; aneurysm.

Introduction

One of the most feared complications in vascular surgery is synthetic graft infection. It happens in 2% of the cases and may cause dehiscence of the vascular anastomosis with life-threatening hemorrhage, and aortoenteric fistulas (AEF), conditions that, if not treated adequately, are invariably fatal.

The incidence of infection in endovascular procedures with aortic endografts vary from 0.3 to 6%. In a literature review, 62 cases of aortoiliac endovascular graft infection were identified, accounting for an incidence of 0.4%.

The treatment of graft infection consists of removal of the infected graft and reconstruction of the vessels with extra-anatomical bypass or in situ graft. Total excision with extra-anatomical bypass has been the most used technique since the 1980’s, with a re-infection rate of 5 to 8%. Recently, substitution of the infected graft by an in situ venous graft has been successfully performed, with the advantages of being autogenous, reducing the chances of bleeding from the remaining aortic stump, and presenting high rates of limb salvage.

The superficial femoral vein as arterial graft was first described by Schulman in the femoropopliteal re-

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Conflict of interest: nothing to declare.

Submitted on: 23.08.2010 Accepted on: 12.04.2011.

J Vasc Bras. 2011;10(2):1-5
Aortic grafts and endografts infection - Metzger PB et al.

J Vasc Bras 2011, Vol. 10, Nº 2

161

Since 1997, small series of case in other arterial territories have been published with good results.

Despite the advances in the peri- and postoperative care and in antimicrobial therapy, mortality and morbidity rates related to aortic graft and endograft infection remain high.

Case report

A 64-year-old female patient had a history of infrarenal abdominal aortic aneurysm repair with a 23-mm Dacron aortic graft, without complications. Nine years later, she presented dilatation of the infrarenal aortic proximal neck to a maximum of 43 mm in diameter. She was subjected to endovascular repair with an aorto-biiliac endograft (Apolo-Nano, 28 x 14 x 150 mm). The operation was performed by bilateral common femoral artery open access. The procedure was successful, without complications or endoleaks at control arteriography.

Six years later, she was admitted to our Service with a complaint of low back pain radiating to the left iliac fossa, associated with fever, anorexia and poor general condition. At physical examination, the abdomen was painful at palpation, but there were no signs of peritoneal irritation. Laboratory exams were normal. Computed tomography (CT) showed a collection of fluid and gas around the aortic graft (Figures 1 and 2), which confirmed aortic graft and endograft infection. Antibiotic therapy was started on tazobactam and vancomycin. Hemocultures and uroculture at admission were negative for fungi and bacteria.

Antibiotics were administered for 28 days without improvement. The patient still had daily fever and sporadic episodes of chills.

She was subjected to surgical removal of the aortic graft and the endograft and to in situ reconstruction with both superficial femoral veins. Common aorto-iliac graft was performed on the right and aorto-external iliac was performed on the left (Figures 3 to 4).

Extensive debridement of the retroperitoneal space and irrigation with saline solution were performed. During the procedure, adhesions between the aorta and the bowel were observed and taken down (Figure 5).

The postoperative course was satisfactory; she had no fever during the period, normal pulses in the lower limbs, absence of edema and of leucocytosis. Vancomycin and tazobactam were maintained for five days. She was discharged on the seventh postoperative day with a prescription for statin and acetylsalicylic acid. She has been followed up is doing well. CT angiography showed a patent graft without signs of infection.

Blood and MacConkey agar culture of the purulent material collected at surgery was negative for bacteria and fungi after 48 hours.
Culture of the aortic graft and endograft was also negative for bacteria and fungi after seven days.

Anatomopathological examination of the surgical specimen showed extensive inflammatory and suppurative reaction, with the presence of multiple gram-positive cocci (Figures 6 to 7).

Discussion

Removal of the infected graft with reconstruction of the arterial flow by axilo-bifemoral graft is the traditional method for the treatment of infected aortic graft, even though the morbidity and mortality rates are high. Currently, there is a tendency to perform in situ reconstruction with autogenous material. The superficial femoral vein is preferred due to its larger diameter, high resistance to infection and non-thrombogenic characteristics, thus being appropriate to arterial revascularization.

The use of the greater saphenous vein in the aortofemoral territory has presented unsatisfactory results, probably due to the intimal hyperplasia and small caliber, which results in a patency rate of 40% according to some studies. The superficial femoral vein and the popliteal vein present low incidence of stenosis and aneurysmal degeneration.
Ali et al. conducted a study with 187 patients subjected to aortic reconstruction with autogenous graft of femoropopliteal segments and showed a primary assisted and secondary patency rates of 81% and 91% respectively, in a 7-year follow-up. Mortality rate in 30 days was 10%, and survival rate in 1 year was 7%, with a limb salvage rate of 92.6%\(^6\). They observed that age and gastrointestinal complications, notably AEF, were independent mortality predictors\(^6,21,22\).

Synthetic grafts embedded in rifampicin have shown good results for the treatment of low-virulence infections caused by \textit{S. epidermidis} in the literature, despite the short follow-up of these patients\(^1\).

A recent study suggested that silver-coated grafts may be as effective and safe as arterial allografts, and they are associated with lower costs. This should be an option for patients without homologous grafts available\(^23\).

In the described case, the aortoenteric adhesions were released and primarily sutured. No gastrointestinal complications were observed in the postoperative period. Some authors have reported that gastrointestinal reconstruction determines the outcome of this operation, so they recommend isolation and repair of AEF by omental interposition in order to better isolate the bowel loops from the new graft\(^6\).

Therapeutic failure of these reconstructions is directly related to variables such as: blood loss of more than 3 L during the procedure, presence of renal failure, high clinical risk (American Society of Anesthesiologists – ASA score > 4) and sepsis\(^5,6\).

Our patient lost 1,300 mL of blood during the procedure, without intra- and postoperative hemodynamic instability. She presented good urine outputs and normal serum creatinine.

An important surgical maneuver in such cases is the extensive debridement of the aortic and periaortic infected tissues, as well as a careful cleaning of the new graft bed with saline solution. The estimated time of this type of reconstruction is 6 to 11 hours according to literature; our procedure was performed in 6 hours\(^21\).

\textit{Staphylococcus aureus} is the leading etiological factor in cases of aortic graft infection, especially those with early onset. On the other hand, \textit{Staphylococcus epidermidis} has been increasingly involved in late infections, with onset after months or years. Being less aggressive, they are frequently associated with negative culture of grafts, tissues and periaortic fluids\(^5\). Infection by anaerobic bacteria is much more severe and usually associated with severe sepsis and systemic toxicity\(^6\).

Fungal infection by \textit{Candida glabrata} is associated with long-term use of antibiotics and present as chronic infection, causing signs of malnutrition and general debility. It is often associated with AEF and unfavorable outcomes. Infection by \textit{Pseudomonas aeruginosa} and methicillin-resistant \textit{Staphylococcus aureus} are very severe and may be correlated with acute rupture or dehiscence of the anastomosis of autologous graft\(^24\).

In our case, culture of perigraft secretions, of the Dacron prosthesis and of the aortic endograft were negative, despite the finding of multiple gram-positive \textit{coci} by anatomopathological examination. This fact can be accounted for by a low-virulence microorganism and to prolonged use of antibiotics in the preoperative period. Data from the literature show that 15% of the cultures of infected aortic grafts and endografts are negative for microorganism growth\(^6\).

Worsening of chronic venous insufficiency (CVI) symptoms after superficial femoral vein removal has shown to be uncommon in clinical trials, for the patency of the common femoral vein, deep femoral vein and infra-articular popliteal vein maintains the flow into the affected limb, thus preventing significant edema and increase of venous stasis\(^25\).

Superficial femoral veins are good options for aorto-iliac reconstruction, but they should not be used in patients with history of deep vein thrombosis. Despite that, up to 80% of the patients with aortic graft and endograft infection are eligible for this type of reconstruction\(^19\).

**Conclusion**

Aorto-iliac reconstruction with autogenous superficial femoral vein may be a good option in aortic graft and endograft infection, because the superficial femoral vein is a good conduit and it is resistant to infection. It also presents good patency at long term and morbid-mortality rates comparable to extra-anatomical grafts.

**References**