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AORTIC GRAFT INFECTION: A HYBRID AND STAGED SOLUTION

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RESUMO

A infeção de prótese aórtica é uma condição clínica potencialmente fatal e um desafio terapêutico para qualquer cirurgião vascular. Os autores relatam o caso de uma infeção de prótese aórtica complexa abordada com uma estratégia híbrida e faseada. Um paciente do sexo masculino, de 51 anos de idade, foi admitido no nosso serviço com o diagnóstico de falso-aneurisma da anastomose femoral esquerda e sinais inflamatórios na região femoral contralateral. Trata-se de um doente submetido há 5 anos a uma interposição aorto-bifemoral com um *bypass* para a artéria mesentérica superior (AMS) por doença oclusiva aorto-ilíaca, e recentemente tratado por cirurgia aberta a um falso-aneurisma na anastomose femoral direita. A investigação diagnóstica iniciada neste internamento (angio-CT e PET-Scan) confirmou a infeção do enxerto aorto-bifemoral. Uma abordagem híbrida com três tempos operatórios foi então planeada. Na primeira etapa, foi construído um *bypass* axilofemoral esquerdo, a contornar a área infetada, com laqueação do ramo esquerdo do enxerto aorto-bifemoral. Duas semanas depois, o paciente foi submetido à recanalização endovascular da AMS com implantação de um *stent* autoexpansível e à construção de um *bypass* axilofemoral direito com a respetiva laqueação do ramo protésico infetado. Uma semana depois, é feita a exclusão da anastomose proximal do *bypass* visceral com implantação de um *stent* coberto na AMS. No mesmo tempo operatório, o doente é submetido a laparotomia para excisão completa do material protésico infetado, com subsequente laqueação aórtica. O paciente recebeu alta nas três semanas seguintes com antibioterapia oral. A tomografia computadorizada pós-operatória confirmou a permeabilidade da AMS, de ambas as artérias renais, bem como dos bypasses extra-anatómicos, com aparente resolução da infeção intra-abdominal.
O caso relatado é bastante incomum e representa um desafio devido à presença de um *bypass* da AMS associado a uma infeção protésica. A recanalização endovascular da AMS possibilitou a excisão total dos enxertos abdominais infetados.

Palavras-chave
infeção protésica; *bypass* aorto-bifemoral; doença arterial periférica; *bypass* visceral; cirurgia bíbrida

ABSTRACT

Introduction: *Aortic graft infection (AGI) is a life-threatening condition and a therapeutic challenge for vascular surgeons. We report a case of a complex AGI managed by a hybrid and staged strategy.*

Methods: *Data related to the present case report were collected from hospital medical records.*

Results: *A 51-year-old male patient, submitted 5 years ago to prosthetic aorto-bifemoral and superior mesenteric artery (SMA) bypass to treat aorto-iliac and visceral occlusive disease and a recent history of a right femoral anastomotic pseudoaneurysm managed by open surgery, was admitted to our emergency room with a left femoral anastomotic pseudoaneurysm and inflammatory signs on the right groin. The diagnostic workup (angio-CT and PET-Scan) strongly suggested infection of the aorto-bifemoral graft.*

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A three-stage hybrid approach was then planned. In the first step, a left axillofemoral PTFE bypass was performed avoiding the infected area with ligation of the infected limb graft of the aorto-bifemoral bypass. Two weeks later, the patient was submitted to a successful endovascular recanalization of the SMA with implantation of a self-expandable bare metal stent, followed by a right axillofemoral PTFE bypass and ligation of the infected limb graft. One week later, the final stage included the exclusion of the proximal anastomosis of the visceral bypass with a covered stent in the SMA and a laparotomy for complete excision of the intrabdominal infected grafts with subsequent aortic ligation. The patient was discharged on the next three weeks on oral antimicrobial therapy. The post-op CT scan confirmed the patency of the SMA recanalization, both renal arteries, as well as the extra-anatomic bypasses to the lower limbs, with apparent resolution of the abdominal infection.

Conclusion: *The reported case is very unusual and represents a challenge due to the presence of a SMA bypass associated to the AGI. Endovascular recanalization of the SMA occlusion made possible the total excision of the infected abdominal grafts.*

Keywords

aortic graft infection; aorto-bifemoral bypass; peripheral arterial disease; visceral bypass; hybrid surgery

INTRODUCTION

Aortic graft infection (AGI) is a life-threatening condition with sparse incidence estimates. A recent study reports a cumulative 2-year incidence of 4.5% on AGI, with a 1-year mortality rate of 45%.

The classical treatment of AGI is a surgical approach with prosthetic explantation and arterial revascularization. There are essentially three surgical options to manage AGI: prosthetic explantation followed by extra-anatomic revascularization, extra-anatomic revascularization followed by graft explantation, or in situ revascularization.

Aorto-bifemoral graft infection is by itself a therapeutic challenge for any vascular surgeon. However, infection of an aorto-bifemoral graft associated to a visceral prosthetic bypass infection substantially increase the complexity of the treatment. We report a complex case of an infection of an aorto-bifemoral graft combined with superior mesenteric artery (SMA) bypass managed by a hybrid and staged strategy.

CASE REPORT

A 51-year-old male patient with a history of aorto-bifemoral and superior mesenteric artery (SMA) bypass was admitted to our emergency room with a left femoral anastomotic pseudoaneurysm and inflammatory signs on the right groin.

The patient had a previous medical history of an aorto-visceral occlusive disease (occlusion of the celiac trunk and SMA) submitted 5 years ago to an aorto-bifemoral Dacron interposition and SMA bypass with inflow from the left limb of the bifurcated graft. This procedure was complicated by extrinsic duodenal compression caused by the SMA bypass, which was treated with a digestive derivation – a Roux-en-Y gastrojejunostomy – after unsuccessful repositioning of the bypass. Three years later, the patient was admitted with an anastomotic pseudoaneurysm of the right common femoral artery. After surgical treatment with aneurysm excision and graft interposition to the common femoral artery, he was discharged without laboratory or microbial evidence of graft infection.

Two years later, the patient developed a left femoral anastomotic pseudoaneurysm and inflammatory signs on the right femoral region. He was admitted to our department on broad range antimicrobial therapy and the diagnostic workup (angio-CT scan and PET-SCAN) strongly suggested infection of the aorto-bifemoral graft (Fig. 1 and 2).

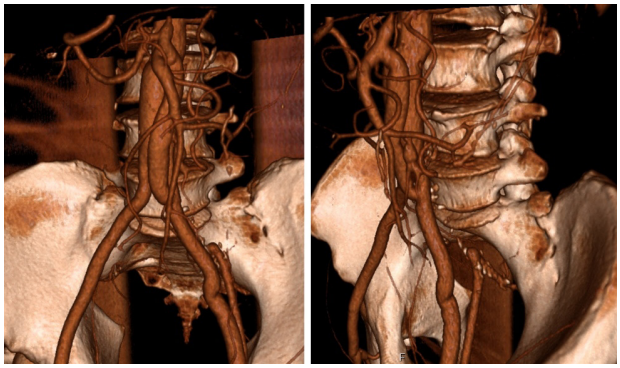

Figure 1 – *Angio-CT scan showing patency of the aorto-bifemoral interposition and SMA bypass.*

Figure 2 – *PET-SCAN with high fluorodeoxyglucose uptake that strongly suggest infection of the aorto-bifemoral graft. It is also visible a false-positive regarding the axillofemoral graft recently performed.*

Taking into account that a prosthetic-SMA bypass graft was present, a three-stage hybrid approach was then planned. In the first step, regarding the risk of rupture of the left femoral anastomotic pseudoaneurysm (Fig. 3), a left axillofemoral PTFE bypass was performed avoiding the infected area with ligation of the limb graft of the aorto-bifemoral bypass. Two weeks later, the patient was submitted to a successful endovascular recanalization of the SMA with implantation of a self-expandable bare metal stent in order to maintain the patency of the visceral graft (Fig. 4), followed by a right axillofemoral PTFE bypass and ligation of the infected limb graft.

Figure 3 – *Left femoral anastomotic pseudoaneurysm progressively growing with eminent rupture.*

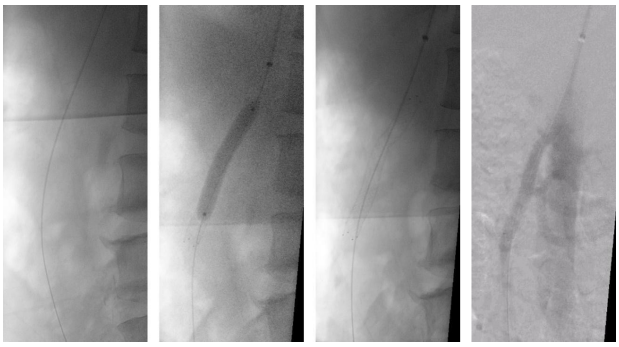

Figure 4 – *Intraoperative arteriography of the endovascular recanalization of the SMA with implantation of a self-expandable bare metal stent.*

One week later, the final stage included the exclusion of the visceral bypass with a covered stent in the SMA (Fig. 5) and a laparotomy for complete excision of the intrabdominal infected grafts with subsequent aortic stump ligation.

Figure 4 – *Intraoperative arteriography of the proximal anastomosis' exclusion of the SMA bypass with a covered stent in the SMA.*

The patient was discharged on the next three weeks on oral antimicrobial therapy. The 9-month post-op CT scan confirmed the patency of the SMA recanalization and both renal arteries, as well as the extra-anatomic bypasses to the lower limbs, with apparent resolution of the abdominal infection (Fig. 6). At one year of follow-up, the patient is under oral antibiotics, fully recovered from the surgery.

Figure 6 – *Nine-month post-operative CT scan confirming the patency of the SMA recanalization, both renal arteries, as well as the extra-anatomic bypasses to the lower limbs.*

DISCUSSION

Aortic graft infection is an uncommon yet devastating complication with significant morbidity and mortality rates. The incidence of AGI is not well established with older series rates ranging between 0.5 to 6%.[1] *Recently, Shiraev et al reported an overall incidence of 1.1% for an 18-year period of follow-up and Berger et al a 2-year incidence rate of 4.5%, with a 1-year mortality rate of 45%.*[1,2]

The gold standard to manage AGI is a complete explantation of the infected aortic graft assuring lower limb arterial revascularization.[1–4] *There are several surgical options for arterial reconstruction. Extra-anatomic repair allows to perform a bypass in a non-infected field followed by complete removal of the infected aortic graft, obtaining reinfection rates between 0% to 15%.*[5] *An additional advantage is the possibility to stage the procedure to decrease the operative time. However, this technique has some disadvantages, such as, reduced graft patency rates with higher long-term amputation rates (3.7%–11%)*[6,7] *and a rare but significant risk of stump blowout (0–2.8%).*[6–8]

In situ revascularization could be the response for some of the limitations described above. However, there are no consensus on the most appropriate conduit to use. Neo-aortoiliac system (NAIS) procedure, developed by Claggett et al, utilizes femoropopliteal veins for vascular reconstruction. This technique is associated with longer operative time, a 5% graft-related haemorrhage, 5–10% major amputation rates and fasciotomy rates in 20% of the patients.[9] *Cryopreserved arterial grafts are an expensive and not readily available solution, with a risk of aneurysmal degeneration and blowout between 3 to 9%.*[9] *Silver-coated or rifampicin bonded prosthetic grafts are another option but with important concerns related to reinfection rates, ranging between 5 to 20%.*[5,9]

Conservative management of AGI is also a valid alternative for some patients given their frailty, comorbidities or even an hostile abdomen.[2,10] *Several authors reported satisfactory outcomes with antimicrobial therapy combined with less invasive approaches, such as, percutaneous drainage, graft irrigation, surgical debridement, omentoplasty, and endograft implantation, when it is necessary to exclude an aorto-bronchial or aorto-enteric fistulae.*[11–14]

In the last decade there has been a paradigm shift from extra-anatomic revascularization to in situ replacement to manage AGI.[3,15]

In our case, the fragile but still young patient, with a complex aortic graft infection involving not only an aorto-bifemoral graft but also a patent SMA bypass and a symptomatic and infected left pseudoaneurysm with a high rupture risk, led us to opt for a hybrid and staged approach. This patient had the particularity of proximal occlusion of the celiac trunk and SMA, with a patent SMA bypass with inflow from the left limb of the bifurcated graft. The original solution was the recanalization and stenting (non-covered) of the SMA in an initial stage and in the final intervention the re-stenting (covered) of the SMA followed by complete graft explantation (without the need of any additional visceral revascularization).

CONCLUSION

Despite the recent paradigm shift from extra-anatomic graft to in situ reconstruction, there is still some questions regarding patient selection and the best conduit to use. The reported case is very unusual and represents a challenge due to the presence of a patent SMA bypass associated to the AGI. The endovascular recanalization of the SMA occlusion with extra-anatomic solution made possible the total removal of the infected abdominal grafts. and was an original approach.

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