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Aortic Graft Complicated by a Corynebacterium Striatum Infection Due to Previous Type IV Thoraco Abdominal Aortic Aneurysm Repair

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Abstract

We report successful management of aortic graft infection without graft explanation or extra-anatomic bypass. A 61 year-old male who had undergone surgical repair of a type IV thoraco-abdominal aortic aneurysm presented with left flank pain and raised inflammatory markers following graft implantation. CT scanning revealed a left psoas fluid collection. Graft infection was diagnosed. A radio-guided drainage and conservative management, with irrigation drain placement was undertaken with preservation of the aortic graft. There was no evidence of recurrent infection after follow-up at 34 months. Aortic endograft infection may be managed by surgical or radio-guided drainage, antibiotic irrigation of the graft and systemic antibiotic therapy without graft removal.

Keywords: Aortic Graft Infection, Corynebacterium Striatum, Antibiotic Irrigation

1. Introduction

Aortic stent graft infection is a rare but disastrous complication associated with high mortality. Infection rates for graft repair of aortic aneurysm are unclear although a ranging from less than 1% to 6% has been reported [1-5].

Corynebacterium striatum is a gram-positive, aerobic, nonsporulating bacillus that is part of the normal flora of the skin and respiratory tract and has a low virulence thus, when seen in blood cultures it is usually considered a contaminant [6]. Although it has rarely been implicated as a cause of disease, native valve endocarditis has occasionally been described [7,8].

We report successful surgical management of aortic graft infection, without graft removal or extra-anatomic bypass.

2. Report

A 66-year-old man presented with increasing left flank pain seven days later the type IV thoraco-abdominal aortic aneurysm repair by a Dacron bifurcated graft: a left thoracoabdominal incision and extraperitoneal retronephric exposure of the thoracoabdominal aorta, celiac, superior mesenteric, and left renal arteries is used according to the Crawford technique without cardio-pulmonary bypass. The diaphragm was radially divided to facilitate thoracoabdominal aortic exposure. TAA repair is achieved with aortic Carrel patch containing the visceral arteries. His blood pressure was 150/90 mm Hg and pulse rate was 102 beats/min on admission. Peripheral pulses were present and there were no sign of ischemia. Laboratory tests showed a sedimentation rate of 51 mm/h, haemoglobin level of 9.3 g/dl, white blood cell (WBC) was 12.7 × 10^9/l, creatinine and potassium level were normal.

The patient continued to experience increasing left flank pain, associated with elevated C-reactive protein (CRP) levels. CT scanning 4 days later confirmed successful treatment of the type IV thoraco-abdominal aortic aneurysm, and found no obvious source of intra-abdominal sepsis. A small gas bubble within the aneurysm sac was felt to be secondary to recent surgical intervention. On the 7th hospital day his temperature increased to 38 8˚C. Blood pressure was 110/70 mmHg, the pulse was 110 beats per minute. The spleen was not palpable and

no peripheral manifestations of endocarditis were found. Hemoglobin level was 8.9 g/dl, WBC was 18.2 - 10^9/l with 88% neutrophils. A chest X-ray revealed a mild pleural effusion.

A CT scan at 21 days revealed a left psoas abscess (**Figure 1**) and this was drained under ultrasound guidance. Intravenous broad-spectrum antibiotics were commenced, then changed to vancomycin and metronidazole

Figure 1. CT scan at 21 postoperative days revealed a left psoas abscess.

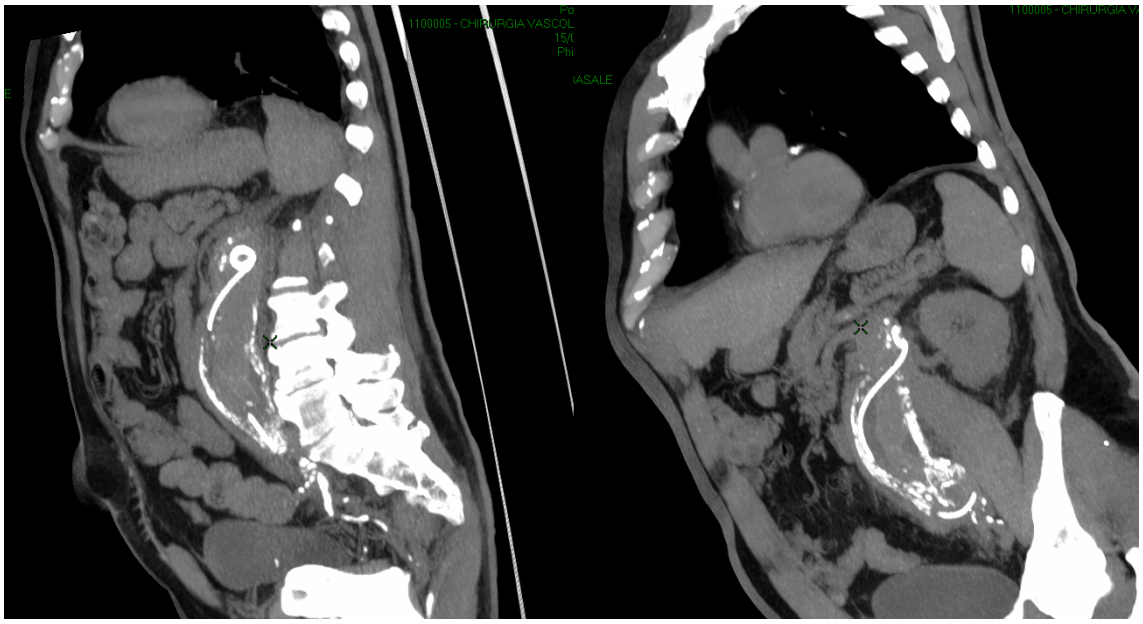

Figure 2. CT scan at 30 postoperative days showed a RX-guided drainage in the aneurysm sac.

after culture of Corynebacterium striatum from the aspirate. CT scan 9 days after drainage confirmed abscess resolution, accompanied by reduction in aneurysm sac diameter, suggesting communication between sac and abscess, and graft infection. Symptoms returned one week later. Three out of four blood cultures, obtained on the day of admission, were positive for C. striatum sensitive to Vancomycin and gentamicyn. CRP levels remained elevated. RX-guided drainage was placed within the aneurysm sac as shown in **Figure 2**. Intravenous antibiotic therapy was continued. Post-operatively the patient was commenced on intravenous Vancomycin and Metronidazole. Continuous Gentamicin irrigation via the abdominal drains was performed as described by Morris *et al.* [9]. Corynebacterium striatum was cultured from the aneurysm sac contents, and therapy was confirmed. No bacterial growth was observed from any drain fluid. Rapid improvement in analgesic requirement was noted, together with falling inflammatory markers. Repeat CT scans 7 and 13 days post-operatively showed no further collections. Drains were removed sequentially, when no further drainage was observed.

The patient was discharged 16 days after procedure, with three further week's intravenous antibiotics. This was followed by oral Minociclin for two months. Clinical, inflammatory marker, and CT follow-up to thirty-one months after sac irrigation shows no evidence of recurrent infection (**Figure 3**).

3. Discussion

Aortic graft infection due to non-diphtheriae corynebacteria is very infrequent, no report of thoraco-abdominal graft infection by Corynebacterium striatum was previously reported; while Endocarditis due to non-diphtheriae corynebacteria has been described [10]. In our patient during the first admission the C. striatum bacteraemia was probably a catheter related nosocomial bacteraemia. While this may be true in the common case of endocarditis, the literature concerning the risk benefit approach to corynebacterial infections, especially on prosthetic valves, is scarce. We could not find any report on graft infection cause by C. striatum. We found only two cases of early endocarditis due to C. striatum on a prosthetic aortic valve, one case was unsuccessfully treated by antibiotics alone and a single case on a prosthetic aortic valve was successfully treated medically.

The C. striatum in our patient was resistant to all antibiotics except vancomycin and gentamicyn. The susceptibility of corynebacteria to antibiotics is variable. Prolonged (median duration 6 weeks) parenteral administration of a bactericidal agent or combined antibiotic treatment is recommended [8]. The optimal duration of antibiotic treatment is not known. Based on the few reports of C. striatum in the literature and according to the recommended therapy of graft infection caused by more common pathogens we discontinued vancomycin after 5 weeks.

Controversy exists about the best operative option for infected aortic aneurysms. The conventional approach is removal of graft with aortic stump ligation and extra-anatomic bypass in the form of either an axillo-bifemoral or two axillo-unifemoral grafts. The risks of this treatment is aortic rupture or thrombosis of the extra-

Figure 3. CT follow-up showed no evidence of recurrent infection.

anatomical bypass graft. Alternatively, some authors suggested the using of inline or in situ graft placement following thorough debridement of the infected area [10].

Dacron grafts, arterial homografts, or superficial femoral venous could be used for aortic replacement. selective approach could be proposed in low-grade infection patients by in situ reconstruction, but this approach could be avoid the aortic stump pseudoaneurysm or aortic rupture. However the incidence of infection recurrence is not known.

Some authors have taken a selective approach whereby in situ reconstruction was performed in cases of low-grade infection as indicated by a well circumscribed inflammatory process in the absence of pus. Conversely, if severe purulent infection is seen traditional teaching dictates removal of the infected graft, oversewing of the aortic stump and insertion of an extra-anatomic bypass [11,12]. This management is technically complex and carries a reported early mortality rate of 24% to 45% [13-17]. We usually perform an extra-anatomical bypass if possible, but in our cases this approach is not available because the anostomosis included the major abdominal branches.

In recent years there has been a renewed interest in the use of cryopreserved arterial homografts although the risk of aneurismal dilatation remains [18,19]. Favourable results with arterial homografts has been reported by Szilagyi and Kieffer [20-22].

Some authors had documented the use the superficial femoral vein (SFV) as an arterial substitute in the repair of both non-leaking and leaking mycotic aortic aneurysms as well as for infected aorto-iliac grafts. The advantage of this conduit over the rest is that it is resistant to infection and is not prone to aneurismal dilatation. However, the operative time is invariably longer and there are morbidity issues relating to the leg incisions.

Our experience of this technique is mainly limited to early infections, but we suggest it has a place in the treatment of both early and late panprosthetic graft infections with anastomotic involvement, providing suture line integrity is preserved.

We suggest that the more conservative surgical approach described here, with endograft preservation, could reduce operative mortality. Placement and securing of drains is clearly crucial to this approach and positions should be checked by contrast studies if in doubt. sequential culture of drain effluent should be performed for institution of appropriate antimicrobial therapy. In selectively cases our approach permit a superior outcome in terms of infection-free survival and limb loss, while requiring a single, less hazardous surgical procedure for a critically ill patient. Morris's technique could be represent a significant improvement in the management of this major complication of vascular surgery.

Our conservative proposed approach should be applied with caution and needs close follow-up on a long-term basis. To our knowledge few case series in conservative graft infection treatment have been reported. We suggest this approach in carefully considered single cases.

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