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Surgical Treatment of Endarteritis in the Iliofemoral Region with the Use of Selective Left Lower Limb Perfusion During a Prolonged Vascular Reconstruction – A Case Report

ABSTRACT

KEY WORDS: septic endarteritis, selective distal perfusion, *Staphylococcus aureus*, homograft

Surgical treatment of septic endarteritis of the iliofemoral region can result in prolonged ischemia of the lower extremities. Distal perfusion of the limb can improve early postoperative outcomes. We present a case of a 35-year-old woman who was diagnosed with septic endarteritis of the right iliofemoral region as a consequence of residual wire fragments from a prior endovascular procedure. During the intervention, the entire right iliofemoral arterial segment was replaced with a homograft due to the destruction of native arterial walls. Because of the extent of the replacement and predicted duration of the procedure, we used selective distal perfusion of her right leg to minimize the possibility of ischemia and reperfusion injury to the tissues, which is usually followed by compartment syndrome. The patient recovered fully. This case highlights the importance of a multidisciplinary approach when it comes to the treatment of rare and complex cases.

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INTRODUCTION

Septic endarteritis following endovascular procedures is a rare complication, reported in less than 1% of patients. Presentation within one to two weeks after the procedure is most common. Sites of infection usually include the groin region with inflamed skin, endarteritis, and/or pseudoaneurysm formation. Intravenous antibiotic treatment is considered the first line of treatment, but most patients require some sort of surgical intervention *(1)*. In case of extensive arterial wall destruction, it is necessary to surgically replace the entire vessel segment. A reperfusion injury after such a procedure is a very common complication. Using selective perfusion of the affected limb could minimize the reperfusion injury to the limb and kidneys following the procedure.

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

CASE REPORT

A 35-year-old female with a history of endovascular procedures presented with a fever, headache, vomiting, pain in her right leg, and Osler's nodes (onset of symptoms two days prior to hospitalization). Inflammatory markers were elevated. An empirical intravenous antibiotic treatment was started (flucloxacillin, ceftriaxone). Haemocultures and the fluid from arthrocentesis of the right knee were later positive for *Staphylococcus aureus*, so antibiotic treatment was readjusted (flucloxacillin only). An echocardiography displayed no evidence of endocarditis. An X-ray and a CT scan showed foreign material (residual wire) present in the right iliac and femoral arteries with thrombosis in the right common femoral artery from prior endovascular procedures (from 2006 and 2012). A positron emission tomography combined with a CT (PET-CT) scan showed significantly elevated metabolic activity along the iliac arteries, common femoral artery (CFA), and superficial femoral artery (SFA) indicating possible inflammation in this region.

After two weeks of conservative medical treatment, the patient underwent an endovascular procedure to extract the residual material. The attempt was unsuccessful due to wire adhesion to the arterial wall. Five days later, the patient was operated on again, this time with an open surgical technique to remove foreign material and replace the extensive vessel segment, severely affected by endarteritis. Following proximal and distal exposure of the vessels, common iliac artery was clamped proximally and SFA distally. We perfused the distal part of the right leg via arterial cannulas (size 8 Fr) inserted in the distal SFA and femoral vein with a venous cannula (size 10 Fr) (figure 1). We used a roller pump and a children's oxygenator (Dideco Kids D101). The priming fluid was Ringer's lactate with a 50 mg dose of heparin. The limb was supported with a flow of 50–130 mL/min (average: 86.00 ± 0.35 mL/min). Arterial line pressure was 59–70 mmHg (average: 60.60 ± 6.58 mmHg). Hematocrit values during selective perfusion from the oxygenator were between 23.6–26.8% (average: 25.12 ± 1.44%) and activated clotting time (ACT) was 361–564 s (average: 446.33 ± 105.29 s). Then the rest of the vessels were exposed, the wire and the affected arteries were removed, and the segment was replaced with two homografts. Selective perfusion of the leg was discontinued after 73 minutes by removing the clamps. Before closing, the wound was thoroughly rinsed.

After the surgery, the patient was prescribed lifelong acetylsalicylic acid and antibiotics for four weeks. Creatinine and myoglobin were only slightly elevated immediately after the procedure (probably due to ischemia of the thigh and buttock) and returned to normal values the same day. The patient gained full function of her lower limb during hospitalization.

The patient was discharged from hospital after seven weeks. On the six-month follow-up appointment, the patient denied any problems concerning the functionality of her right leg or any signs of inflammation.

DISCUSSION

To our knowledge, this is the first case of peripheral vascular reconstructive surgery to treat septic endarteritis, where selective perfusion of a limb during the procedure was used to minimize ischemia and reperfusion injury due to predicted longer duration of intraoperative limb ischemia.

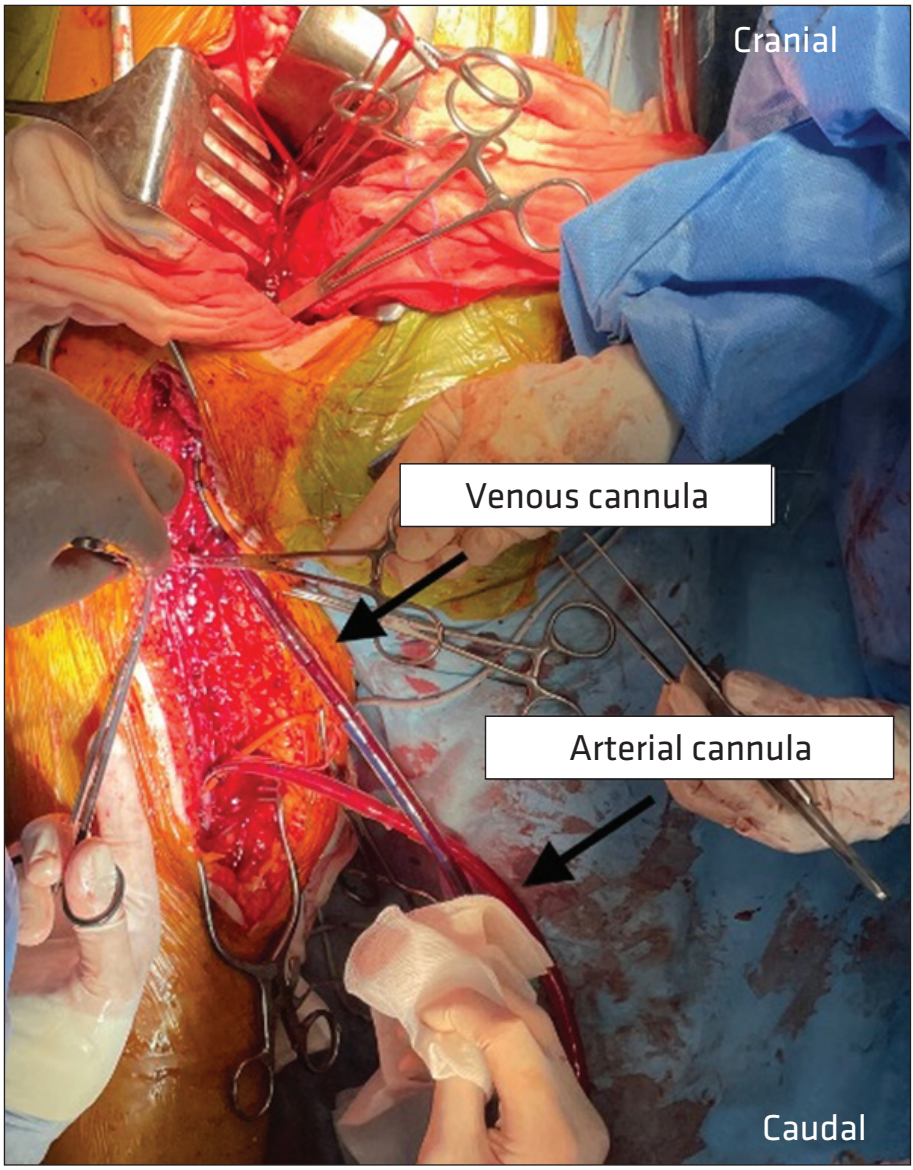

Figure 1. Cannulation of the superficial femoral artery and femoral vein, and selective perfusion.

Ischemic injury is responsible for cellular death and also for cellular edema, which can further compromise tissue perfusion *(2)*. The reperfusion of ischemic tissues leads to the release of bioproducts of muscle ischemia and cell necrosis into circulation (potassium, phosphate, organic acids, myoglobin, creatine kinase, and thromboplastin), and can cause systemic complications such as cardiac depression, acute lung injury, renal failure and poorer limb-related functional outcomes *(3)*. A study by Perkins and colleagues on the impact of ischemia duration on lower limb salvage in combat casualties showed that the threshold to restitution of blood flow should be much less than the ubiquitous six hours – the probability of limb salvage was still only around 60% when ischemia was < 3 hours *(4)*. Current therapies aimed at mitigating ischemia-reperfusion injury are mostly just supportive, by providing adequate hydration, electrolyte correction, vasopressor support, and acid-base management only after reperfusion has occurred.

A controlled reperfusion of the lower extremity was shown to improve outcome after acute severe lower-limb ischemia by using a crystalloid reperfusion solution with glucose, tromethamine glutamate, aspartate, allopurinol, and sodium citrate *(5)*. During elective major vascular operations, ischemic postconditioning proved to be capable of conferring protection against different organ injuries caused by longer circulatory occlusions *(6)*. Several studies suggest that selective renal and visceral perfusion during thoracoabdominal aortic aneurysm repair improves outcomes *(7)*.

In our case, selective distal perfusion in a peripheral vascular surgery offers a solution through which malperfusion of a limb can be completely avoided during an operation, thereby, avoiding the possibility of reperfusion injury. It is particularly suitable for major reconstructive vascular surgery, where the procedure itself is the cause of temporary acute ischemia.

CONCLUSIONS

The use of distal perfusion of the limb during a reconstructive vascular procedure highlights the importance of interdisciplinary involvement in the improvement of patient outcomes, especially in those with anticipated prolonged limb ischemia due to a surgical procedure.

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