www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v6i12.75

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Superficial femoral artery as a graft material by performing an iliacofemoral in situ bypass for leg stump salvage: Case report

Author
Mestric A. M.D.
Department of cardiovascular surgery, Heart Center Bad Segeberg, Germany

Introduction

Once infection occurs after vascular operations with grafts, it might result in a serious disaster. According to statistics, both early (within 4 months after operation) and late (more than 4 months after operation), one forth to one half, is caused by Staphylococcus aureus.[1]

Blood- borne bacteria from intravenous lines or systemic infections may also cause graft inoculation and sepsis.[2]

Prosthetic graft infection can present at any time from days to years after surgery with pyrexia, systemic sepsis, local abscesses and sinuses, graft exposure, thrombosis or anastomotic haemorrhage.[2]

In contradistinction to infected aortic grafts, infected peripheral bypass grafts pose greater risk to loss of limb as opposed to loss of life, although sepsis and bleeding complications can occur and have devastating outcomes.[3]

The mainstay of vascular graft infection management is as follows. First, excision of the graft, as this as a foreign body may potentiate the infection. Second, wide and complete debridement of devitalised and infected tissue to provide a clean wound in which healing can occur. Third, establishing a vascular flow to the distal bed. Fourth, intesive and prolonged treatment with antibiotics, to reduce the risk for sepsis and secondary graft infection. [2]

Reconstruction options for the in situ approach include in-line placement of a prosthetic graft or tissue graft, with the latter encompassing arterial allografts, venous allografts, and venous autografts.[3]

We aim to report a case of 58-year-old female who presented with active bleeding as a result of artery wall erosion through infection, 3 months after performing of plastic repair on profound femoral artery (PFA) with bovine pericardial patch.

Case Presentation

A 58- years old female patient, with hypertension, dyslipidaemia, obesity, diabetes typ 2 and coronary heart disease was admitted to the clinic of cardiovascular surgery with suspect of bleeding after plastic repair of the left common femoral artery (CFA) and profound femoral artery (PFA) with a bovine pericardial patch, 3 months ago.

Her left leg had already been amputated above the knee due to severe arterial occlusive disease in June 2018. Computed tomography angiography revealed active bleeding from the left PFA (Figure 1, 2, 3).

Skin incision revealed necrosis and abscess of soft tissue as well as muscle resulting from infection. The cause of bleeding was infections erosion of femoral patch as a result of severe sepsis. The infection source was probably decubital ulceration of leg stump.

Left external iliac artery (EIA) was clamped and occluded with sutures to stop the bleeding. The wall of CFA and PFA was enhanced with single interrupted suture, after the patch was removed. Under conditions of tissue necrosis, infection and possible collateral circulation from the internal iliac artery (IIA), we decided to finish the operation without performing of any type of revascularization.

Vacuum assisted closure (VAC) was applied to increase local vascularity and oxygenation of the wound bed and reduce edema by removing exudate and bacteria. The patient was after surgery in critical condition and was placed at the intensive care unit (ICU).

Leg stump was by the time livid colored and painful. There were only two options to treat the patient´s condition, one was performing of another amputation, this time with hip disarticulation. Instead amputation, an iliacofemoral artery bypass using the superficial femoral artery (SFA) as graft material was performed, due to stump salvage and maintaining the quality of life.

The microbiological examinations of wound and blood revealed the infection with methicillin-resistant Staphylococcus aureus (MRSA). The broad spectrum antibiotics (Meropenem, Linezolid) were administrated.

Surgical Procedure

Concerning the postoperativ stump condition another surgical procedure was necessary for a treatment of stump ischaemia. After removing the VAC from the wound, the left EIA was exposed. From arteriel lumen was previous stent successfuly extracted and artery has been blocked with Fogarty catheter. We decided to use the occluded SFA as graft material. Prior was adventitia narrow desobliteration performed with dissector and ring strip cutter. Finally, artery has been washed with heparin solution.

After intravenous administration of heparin solution (5000 IE) the proximal part of PFA and distal part of EIA were clamped.

Primarily was created end to end anastomosis between EIA and SFA. Distal anastomosis was created side to end between SFA and PFA. Both were made with simple continuous suture by using a 6-0 polypropylene. After releasing the clamps came to exposion of inflammatory mediators in blood stream which led to worsening of patient´s hemodynamic state.

The patient was at the time hypotensive with mean arterial blood pressure by < 70 mmHg, and tachycardic with heart rate by 112 bpm. She needed support with catecholamine therapy (norepinephrine continuous perfusion) to maintain the blood pressure.

Despite activated clotting time of > 220 seconds, the arterial bypass graft showed to be thrombosed. There were, however, no clinical signs of heparin induced thrombocytopenia. After one more intravenous administration of heparin solution, we performed the thrombectomy wit Fogarty catheter, through the branch of the SFA after removing a clip.

The sartorius muscle flap has been used as an adjunct for soft tissue coverage due to prevent further wound complications. Finally, VAC device was mounted on the thigh wound.

Patient developed in short time after surgery diffuse bleeding from surgery area with severe blood loss. She had undergone a revision surgery. After protamine administration was the bleeding managed.

Over time came to recovery of thigh muscles and soft tissue, the blood supply of the sartorius muscle flap had also been maintained.

Figure 1.

Figure 2.

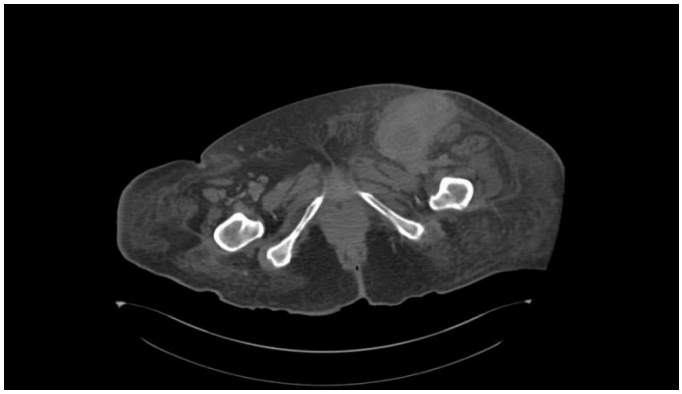

Figure 3.

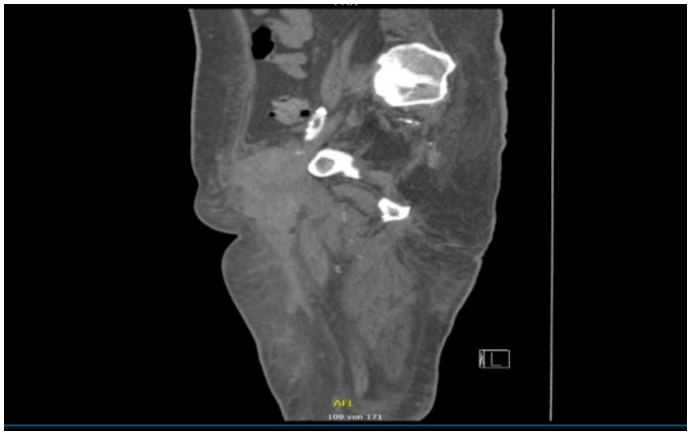

Figure 1,2,3.: computed tomography angiography in coronal (1), transverse (2) and sagittal plane(3)

Discussion

Most vascular surgical operations are clean, but the chance of infection is usually increased, due to the application of artificial graft, vascular surgery patients are often elderly, and may be combined with a variety of internal medicine diseases such as diabetes, hypertension and heart disease, immune disease, weak body resistance.

Staphylococcus aureus and coagulase-negative staphylococci are the most common pathogens of vascular surgery infections.[1]

Methicillin-resistant Staphylococcus aureus, or MRSA, is causing an increasing percentage of vascular graft infections. MRSA graft infections usually occur in hospitalized patients, with some reports demonstrating higher morbidity and mortality as compared to other pathogens due to antibiotic resistance and multiple virulence factors.[3]

Infections of both native and prosthetic vessels are most frequently seen in the region of the groin. The main predisposing factors for vascular groin infection are infected lymph glands or surgical division of lymphatic channels, the proximity of the groin to the perineum, the relatively superficial location of vascular grafts in the groin, and the development of wound infection adjacent to a vascular graft.[4]

In general, early aggressive surgical treatment is the gold standard. In other words, in cases where the diagnosis is clear, antibiotic therapy alone is infrequently successful and early aggressive surgical debridement with or without revascular-ization is necessary for any chance of cure.[3]

Homografts present the lowest rate of reinfection with acceptable rates of degradation and aneurysm formation. Silvergrafts and synthetic grafts coated with antimicrobials show similar early and late mortality rates, but higher reinfection rates.[5]

Although the use of vein material (greater saphenous vein GSV) is preferable it may be inadequate because of venous disease or unavailable due to previous harvest for coronary or peripheral artery bypass. Arterial reconstruction with vein in an infected field has been on the other side variously associated with vein graft autolysis, disruption, and bleeding.[6]

Other choices of conduit include prosthetic material, cephalic or basilic vein, cryopreserved saphenous vein allografts, umbilical vein graft, superficial femoral vein, or an endarterectomized segment of occluded superficial femoral artery.[6]

The superior long-term results with arterial conduits are well documented.[7]

The SFA has been shown to be a material of choice for renal arteries and supra-aortic vessels reconstruction, especially in young patients with complex reconstruction or Takayasu disease and in patients presenting with infection or previous radiation.[8]

SFA can be easily harvested, has an adequate wall thickness, and is easy to handle even in deep regions; anastomosis is thus relatively easy to perform. [9] SFA autografts (SFAA) have also becomem choice for popliteal reconstruction when the ipsilateral GSV is not suitable.[8]

On the other side, an arterial bypass graft may develop a hemodynamically significant stenosis at either anastomosis (proximal or distal), within the body of the graft, or in the native arterial inflow/outflow separate from the reconstruction. [10]

Standard teaching for treatment of infected vascular grafts is extra anatomical bypass grafting whilst commencing appropriate antibiotics.[11]

Otherwise extrinsic causes of early graft failure including extrinsic compression because of tunneling errors or hematomas may compromise graft flow.[12]

The outcome extra-anatomic bypass surgery seems to be improved in actual series compared with historical results but their disadvantages (limited patency, higher rate of amputations as well as high rates of reintervention combined with higher early mortality) are obvious.[5]

In situ reconstruction facilitates the use of limited skin incisions, reduced manipulation of the graft with the potential benefit of less traumatic injury, subcutaneous position assists in operative graft revision.[13]

With their rich vascularity, muscle flaps enhance wound healing and assist in the elimination of residual infection. In contrast to fasciocutaneous flaps, muscle flaps easily fill dead space. [14]

Covering vascular structures found in infected tissue with a muscle flap positively influence healing, due to locally increased blood flow and dead space elimination. Among the many possible muscle flaps, sartorius muscle is most commonly used because it is readily available at the reconstruction site, requires minimal dissection and and is large enough to cover the defect. [15]

Conclusion

The key concept of graft infection treatment is a multidisciplinary and individualized approach to disease. Surgery and antibiotics are the cornerstones of treatment. In the case of complications such as bleeding, surgery is still the first choice. The reconstruction of blood stream can be made with venous, arterial or PTFE graft. To avoid additional wounds from harvesting the vein and infection progression through using the strange material, arterial in situ reconstruction with SFA graft should be considered as an optimal solution for the vascular groin reconstruction.

References

1. Yong-Gan Zhang, Xue-Li Guo, Yan Song, et all.: Diagnosis and Treatment of Vascular Surgery Related Infection, Open Biomed Eng J. 2015; 9: 250–255. Published online 2015 Sep 17. doi: 10.2174/1874120701509010250
2. Loftus Ian, Hinchliffe Robert J., Revision vascular surgery; Graft infection. In: Vascular and Endovascular Surgery, sixth edition, Elsevier; 2018. p. 106-111.
3. Arman Kilic, Dean J Arnaoutakis, Thomas Reifsnyder et all.: Management of infected vascular grafts, November 19, 2015 Review Article, Vascular Medicine, journals.sagepub.com/doi/full/10.1177/1358863X15612574
4. Cagatay Engin, Hakan Posacioglu, Fatih Ayik, et all.:Management of Vascular Infection in the Groin, Tex Heart Inst J. 2005; 32(4): 529–534.
5. Diener H, Hellwinklel O, Carpenter S et all.: Homografts and extra-anatomical reconstructions for infected vascular grafts. J. Cardiovasc Surg (Torino). 2014 Apr;55(2 Suppl 1):217-23.

6. Jeffrey B.Thomas, Lisa A.Smith, Ian N.Hamilton et all. Vascular reconstruction utilizing artery from an amputated extremity: A case report, Journal of Vascular Surgery, Volume 29, Issue 6, June 1999, Pages 1159-1161
7. Marek Bednarkiewicz, Dominique Vala, Gregory Khatchourian et all. Obtaining a superficial femoral artery graft in adolescents and children with the deep femoral artery transposition, Journal of Vascular Surgery, Volume 33, Issue 2, February 2001, Pages 429-430.
8. Nikolaos Paraskevas, Yves Castier, Sumio Fukui, et all. Superficial femoral artery autograft reconstruction in the treatment of popliteal artery aneurysm: Long-term outcome, JOURNAL OF VASCULAR SURGERY, August 2008, Volume 48, Number 2, Page 311.
9. Shota Yasuda, Kiyotaka Imoto, Keiji Uchida, et all. A Case of LMT Reconstruction Using Superficial Femoral Artery Graft in the Patient with Type A Acute Aortic Dissection, Annals of Vascular Diseases Vol.4, No.4; 2011; pp 328-331
10. Sean P. Roddy: Hemodynamic conditions in a failing peripheral artery bypass graft**,** Journal of vascular surgery, August 2012, Volume 56, Issue 2, Page 572
11. I.M.Williams, M.A.P.Milling, A.A.Shandall Vascularised muscular flaps and arterial graft infection in the groin, European Journal of Vascular and Endovascular SurgeryVolume 25, Issue 5, May 2003, Pages 390-395
12. Joseph L. Mills: Etiology of Vein Graft Failure, in Rutherford´s Vascular Surgery, Section 13, Grafts and Devices, Volume 2, 7th edition Saunders Elsevier Philadelphia, 2010, Pages 1328-1329,
13. Joseph L. Mills: Autogenous Vein Graft Configurations, in Rutherford´s Vascular Surgery, Vein Graft Configurations Preoperative Planning, Table 87-1 Section 13, Grafts and Devices, Volume 2, 7th edition Saunders Elsevier Philadelphia, 2010, Pages 1322-1323,
14. Simone N. Zoepke, Louis de Weerd. : The Marriage of Sartorius and Tensor Fasciae Latae in Treating Vascular Prosthetic Graft Infections**.** Plast Reconstr Surg Glob Open. 2017 Apr; 5(4): e1274.
15. George V. Patrut, Claudiu Neamtu, Mihai Ionac.: Leg for life? The use of sartorius muscle flap for the treatment of an infected vascular reconstructions after VA-ECMO use. A case report. Int J Surg Case Rep. 2015; 16: 25–28.