**Name of Journal:** *World Journal of Clinical Cases*

**Manuscript NO:** 59629

**Manuscript Type:** CASE REPORT

**Salvage of vascular graft infections *via* vacuum sealing drainage and rectus femoris muscle flap transposition: A case report**

Zhang P *et al*. Salvage of vascular graft infections

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**Author contributions:** Zhang P, Zhou DS and Tao FL were the patient’s respiratory physicians; Li QH and Liu FX performed the radiological diagnosis and contributed to manuscript drafting; Li QH and Liu FX performed the pathological diagnosis and contributed to manuscript drafting; Zhang P, Tao FL, Li QH, Zhou DS and Liu FX reviewed the literature and contributed to manuscript drafting; Zhang P and Liu FX were responsible for the revision of the manuscript for important intellectual content; all authors issued final approval for the version to be submitted.

**Supported by** Shandong Provincial Natural Science Foundation, No. ZR2013HM069; Shandong Key R&D Program, No. 2017GSF218089; and China Scholarship Council, No. 201808080126.

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**Received:** October 11, 2020

**Revised:** December 23, 2020

**Accepted:** January 12, 2021

**Published online:**

**Abstract**

BACKGROUND

The management of vascular graft infections continues to be a significant challenge in a clinical situation. The aim of this report is to illustrate the novel vacuum sealing drainage (VSD) technique and rectus femoris muscle flap transposition, and to evaluate the prospective of future testing of this surgical procedure.

CASE SUMMARY

We report the case of a 32-year-old male patient, who presented a severe infected groin wound with acinetobacter baumannii biological vascular graft infection resulting in graft exposure extensively. Using the VSD and muscle flap transposition, the groin wound and vascular graft infection were finally treated successfully.

CONCLUSION

Our case report highlights that VSD technique and rectus femoris muscle flap transposition could be considered in patients presenting with a severe infected groin wound with acinetobacter baumannii biological vascular graft infection resulting in graft exposure extensively, especially in consideration of treatable conditions.

**Key Words:** Vascular graft; Infection; Muscle flap transposition; Rectus femoris muscle flap; Vacuum sealing drainage; Case report; Trauma

Zhang P, Tao FL, Li QH, Zhou DS, Liu FX. Salvage of vascular graft infections *via* vacuum sealing drainage and rectus femoris muscle flap transposition: A case report. *World J Clin Cases* 2021; In press

**Core Tip:** Artificial vascular graft infected with acinetobacter baumannii is extremely rare in the clinic and continue to be a significant challenge for clinicians. Vacuum sealing drainage technique and rectus femoris muscle flap transposition are of great value in patients presenting with a severe infected groin wound with acinetobacter baumannii biological vascular graft infection resulting in graft exposure extensively.

**INTRODUCTION**

The vascular graft infection suffer from injury is a rare involving in the femoral region. It remains one of the most challenging complications in vascular trauma surgery. The gradual and irreversible deterioration of the vessel wall is the most serious issue on the conservative treatment of major vascular graft infections, significantly increasing bleeding risk[1-3].

Active wound treatment with vacuum sealing drainage (VSD) therapy is considered to be a very important strategy to accelerate wound healing and improve its prognosis[4,5]. Several studies demonstrated the excellent performance in the use of muscle flaps for treating chronically wound beds infected with various pathogenic organisms[6-8].

In the presented study, a case was reported who suffered with a severe acinetobacter baumannii vascular graft infection and cured successfully by using VSD covering the infected wound and the rectus femoris muscle flap transposition. The purpose of our study was to report our experience about vascular graft salvage in the treatment of peripheral vascular graft infections involving the groin as well as detect adverse prognostic risk factors.

**CASE PRESENTATION**

***Chief complaints***

Vascular graft infections for 2 wk.

***History of present illness***

A 32-year-old male patient was transferred to our hospital because of hip and lower limbs injuries caused by heavy objects. The initial diagnosis was left femoral artery defect injury and lower limbs injuries. The left femoral artery defect injury was performed for anastomosis with artificial vascular graft (approximately 10 cm in length) and lower limbs injuries were conducted using femoral external fixation. After 14 days, a recurrent deep right wound was opened with an exposure of the artificial vascular graft, which underlying tissue necrosis and exposure at the distal anastomosis level. His family history and past history had nothing notable.

***History of past illness***

He had no major trauma or damage to the blood vessels before.

***Personal and family history***

There is nothing special about his personal and family history.

***Physical examination***

In the physical examination, the external fixator is firmly fixed. An obvious severe inguinal infection and the artificial vascular graft exposure extensively (approximately 3.5 cm in length) not embedded in the surrounding tissues. A recurrent deep right wound dehiscence with exposure of the tract of the artificial vascular graft, which underlying tissue necrosis and exposure at the distal anastomosis level. The peripheral sensation of the left lower limb is normal, the peripheral blood supply of left lower limb is good, and left dorsalis pedis artery and posterior tibial artery pulsation were touched.

***Laboratory examinations***

Repeated bacteriological cultures were positive for acinetobacter baumannii.

***Imaging examinations***

The first computed tomography angiography was performed in the outer hospital, revealed that the left femoral artery defect injury was performed for anastomosis with artificial vascular graft (Figure 1).

**FINAL DIAGNOSIS**

Synthesizing imaging and Pathogenic microorganism, we finally diagnosed the patient as an obvious severe inguinal infection caused by acinetobacter baumannii and the artificial vascular graft exposure extensively (approximately 3.5 cm in length) not embedded in the surrounding tissues.

**TREATMENT**

The artificial vascular graft was completely excised and hemodynamic unimpeded flow fortunately (Video). After initial debridement of the perivascular necrotic tissue, a continuous VSD device of 125 mmHg (17 kPa) was applied in the inguinal wound. A silicon-based dressing was used for coverage of visible graft material and native artery in the wound; regular changes of the dressings were usually done in the ward (Figure 2).

**OUTCOME AND FOLLOW-UP**

Two weeks later, the wound was closed to protect both the anastomosis and the artificial vascular graft using rectus femoris muscle flap transposition. The large infected surgical wound was filled with muscle flap adjacent to the biological graft and no bleeding was detected from both the anastomosis and the arterial wall. We did not add any antibiotic for acinetobacter baumannii because of the antibiotic resistance. The muscle flap survived and the wound of the patient at risk healed successfully after 3 wk.

**DISCUSSION**

The vascular graft infection suffer from injury is a rare involving in the femoral region. It remains one of the most challenging complications in vascular trauma surgery. Local muscle flap transposition demonstrated the promising performance in the treatment of low-grade infections in the early stage but carried an unreasonable failure in the high-grade infections sustained by high-virulence bacteria[1-3,5,9-11].

In our opinion, the careful analysis of patient’s medical history is particularly important. The infection occurring after the left femoral artery surgical revascularization, culture-positive acinetobacter baumannii and methicillin-resistant species, and the exposure of the arterial-graft anastomosis were poor prognostic indicators of graft preservation. Furthermore, the wound infection in the groin had exposed vital the anastomosis and failed prior debridement and antibiotic treatment. Moreover, due to the poor general condition of wound infected by acinetobacter baumannii, these surgeries were not conducted simultaneously. Therefore, several studies revealed a significant increased risk for graft infection in the groin when multiple repeated surgeries were conducted[12-14].

Previously studies had reported many risk factors for vascular graft infections, such as groin incisions, wound infections, and comorbidities. A retrospective study[15] involving 39 of 438 patients with a vascular graft infection demonstrated that renal insufficiency, hemorrhage, incisional surgical site infections and longer procedure time could increase the risk factor for vascular graft infections. Aretrospective and descriptive study[16] including 223 patients receiving abdominal or lower extremity revascularization surgery identified risk factors of vascular graft infections revealed that diabetes mellitus, hemoglobin A1c more than 7.0, blood glucose more than 180 mg/dL, and lack of mobility were preoperative risk factors; perioperative hypoxemia and hemostatic agents were intraoperative factors; the hospital to skilled nursing facility or acute rehabilitation facility and unscheduled clinic visits were postoperative factors. A warm, wet places in the groin area combined with innumerable skin folds lead to a high burden of bacteria, which makes deep perivascular infected groin wounds particularly challenging to heal[17,18]. VSD strategy and graft preservation had been warned for in case of acinetobacter baumannii infection and sepsis; however, the wound of the patient at risk cured successfully. In our case, the initial operation was conducted to reduce infection of the groin wound and vascular graft. Our surgical team had long-standing experience in the treatment of various wounds by using VSD method, which can be useful in the prevention of peripheral arterial injury in certain challenging cases and in the development of a hybrid approach.

To our knowledge, active wound treatment with VSD therapy is considered to be a vital important modality to accelerate wound healing and improve prognosis. Selective adjunctive strategies including muscle flap coverage probably contributed to the cover of dead space, and a decreased time of wound healing and risk of recurrent infections[4]. The muscle flap combined use of VSD therapy can be useful for speeding up wound healing[5].

Several studies demonstrated the excellent performance in the use of muscle flaps for treating chronically wound beds infected with various pathogenic organisms[6-8]. These flaps have been shown to reduce healing time, lower wound bed bacterial count, improve antibiotic delivery, and obliterate dead space, thus decreasing the possibility of recurrent infection. In this presented case, the muscle flap coverage was used for stable wound coverage regardless of the fate of the graft.

In addition to aggressive serial debridement and VSD, rectus femoris muscle flap provides the best solution to promote healing of the infected field in this case. While the underlying mechanisms and biological effects of the muscle flap on the injured vessel wall remain to be proven, the possibility of experimenting with this technique to significantly improve limb salvage rates and avoid the related requirement to resort to extra-anatomic bypass, which carried high morbidity and mortality. In our opinion, with multidisciplinary treatment of malnutrition, infection, and local wound coverage along with the creative use of muscle flap closures, we achieved improved graft salvage rates and markedly increased limb salvage rates.

**CONCLUSION**

This case report highlights that VSD technique and rectus femoris muscle flap transposition could be considered in patients presenting with a severe infected groin wound with acinetobacter baumannii biological vascular graft infection resulting in graft exposure extensively, especially in consideration of treatable conditions.

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**Footnotes**

**Informed consent statement:** The patient and the legal guardian provided informed written consent during the treatment. Written consent was obtained from the patient for the purpose of publication of case details and images.

**Conflict-of-interest statement:** The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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**Manuscript source:** Unsolicited manuscript

**Peer-review started:** October 11, 2020

**First decision:** December 13, 2020

**Article in press:**

**Specialty type:** Medicine, research and experimental

**Country/Territory of origin:** China

**Peer-review report’s scientific quality classification**

Grade A (Excellent): 0

Grade B (Very good): 0

Grade C (Good): C

Grade D (Fair): 0

Grade E (Poor): 0

**P-Reviewer:** Gupta SK **S-Editor:** Gao CC **L-Editor: P-Editor:**

**Figure Legends**



**Figure 1 Computed tomography angiography.** The left femoral artery defect injury was performed for anastomosis with artificial vascular graft.



**Figure 2 A severe inguinal wound infected with acinetobacter baumannii at two weeks after surgery.** The graft infection was treated with the vacuum sealing drainage (VSD) procedure (negative pressure wound therapy with 125 mmHg was commenced. A: Preoperative appearance; B: The graft was uncovered for a distance of 3.5 cm after the VSD procedure; C: The artificial graft was exposed in the right groin region and the wound revised with application of the rectus femoris muscle flap transposition; D: The muscle flap survived and the wound of the patient at risk healed successfully after 3 wk.