

# Omental Free Flap Coverage for Extracavitary Vascular Bypass Graft Salvage

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**Background:** Prosthetic vascular graft infection is a serious complication associated with significant morbidity and mortality often requiring graft excision and numerous additional operations. Pedicled flaps are often used for the coverage of exposed deep tissue or hardware for graft salvage. In the absence of pedicled options, the properties of omentum make it an excellent choice for free flap tissue coverage, particularly in cases involving implanted prostheses.

**Methods:** A 63-year-old woman developed a mycotic right subclavian arterial aneurysm requiring ligation and extra-anatomic bypass grafting to restore right-sided intracranial and right upper extremity arterial perfusion. Subsequent wound breakdown and poor healing left the grafts exposed, resulting in contamination. Given the profound risks associated with graft excision in this patient, salvage was attempted with IV antibiotics, serial wound/graft washouts, and graft coverage with an omental free flap.

**Results:** The patient tolerated the procedure well. The remainder of her hospital course was uneventful, and she was discharged home in good clinical condition. She will remain on long-term suppressive antibiotics per Infectious Disease recommendations.

**Conclusions:** Contemporary literature reporting novel and effective applications of omental free flap coverage is rare. This report demonstrates that omental free flap coverage is safe and can provide healthy tissue to protect implanted grafts and even aid in the salvage of infected extra-anatomic bypass grafts. (*Plast Reconstr Surg Glob Open* 2021;9:e3646; doi: [10.1097/GOX.0000000000003646](https://doi.org/10.1097/GOX.0000000000003646); Published online 29 June 2021.)

## INTRODUCTION

Prosthetic vascular graft infection (PVG) is a serious complication of vascular intervention occurring in 0.5%–6% of cases.<sup>1</sup> It is a significant source of morbidity and mortality frequently requiring additional surgical intervention, graft removal, and revascularization.<sup>1</sup> Graft protection from contamination is therefore paramount and typically achieved via vascularized flaps, or negative pressure wound therapy. Omental free flap coverage is an excellent option for high-risk defects due to its highly vascular, angiogenic, and lymphatic nature.<sup>2</sup> Herein, we present the first case report of extra-anatomic bypass graft salvage through omental free tissue transfer.

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## CASE REPORT

A 63-year-old woman presented with complaints of headache and right-sided neck pain 2 weeks after diagnostic cerebral angiography. CT angiography of her neck and brain revealed a 2-cm pseudoaneurysm of the right subclavian artery and a paratracheal mediastinal hematoma. She underwent emergent vascular intervention, including a right brachial cutdown, stenting, and dilation of the right subclavian artery with a favorable result. Several days postoperatively, hemodynamic lability prompted repeat CT angiography, which revealed enlargement of the right subclavian pseudoaneurysm, hemomediastinum, and a new right hemothorax, consistent with rupture of a proximal right mycotic subclavian artery aneurysm. She returned to the operating room emergently, where she underwent innominate artery ligation and extra-anatomic bypass, using left-to-right carotid-carotid arterial bypass and right carotid-to-right axillary arterial bypass (Fig. 1). This was done with Rifampin-soaked ePTFE. Surgical cultures were positive for methicillin-sensitive *Staphylococcus aureus*.

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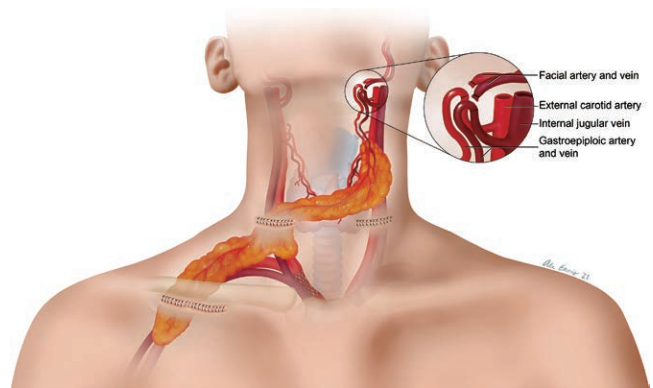
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Plastic surgery was consulted for flap coverage and salvage of her otherwise exposed bypass graft. She had three wounds near her graft sites, including 6 × 2 × 3 cm right infraclavicular; 4 × 3 × 3 cm right neck; and 5 × 2 × 3 cm left supraclavicular wounds. (See figure, Supplemental Digital Content 1, which displays preoperative wound beds with exposed grafts. Right infraclavicular wound measures 6 × 2 × 3 cm; right neck wound measures 4 × 3 × 3 cm; and left supraclavicular wound measures 5 × 2 × 3 cm. <http://links.lww.com/PRSGO/B692>.) She was initiated on appropriate antibiotics and underwent serial washouts until deemed to be free from purulence and suitable for flap coverage.

**Operative Technique**

A two-surgeon approach was used facilitating simultaneous graft exposure and omental harvest. A left submandibular incision was taken down to the level of the facial artery and vein. The marginal mandibular nerve was identified and retracted to avoid injury. Subcutaneous dissection along the open wounds was performed to ensure proper wound and graft coverage. Omental harvest was achieved through a midline supraumbilical “mini-laparotomy” incision due to concerns regarding the patient’s ability to tolerate pneumoperitoneum. The omentum was identified, freed from peritoneal attachments, and eviscerated before ligation of the right gastroepiploic vessels. A 1-inch Penrose drain facilitated safe delivery of the pedicle to the facial vasculature. The omentum was subsequently tunneled across all three wounds in a tension-free manner using an atraumatic clamp.

The venous anastomosis was then completed with a 4-mm coupler between the right gastroepiploic vein to the antegrade facial vein. A right gastroepiploic artery to the anterograde facial artery anastomosis was performed with interrupted 9-0 nylon (Fig. 2). Satisfactory Doppler signals were obtained and ICG angiography confirmed adequate perfusion. The omentum was wrapped entirely around each of the grafts and secured. Excess omentum was excised. A 15 French Blake drain was placed through the subcutaneous tunnels before closure. Total operative time was 163 minutes.



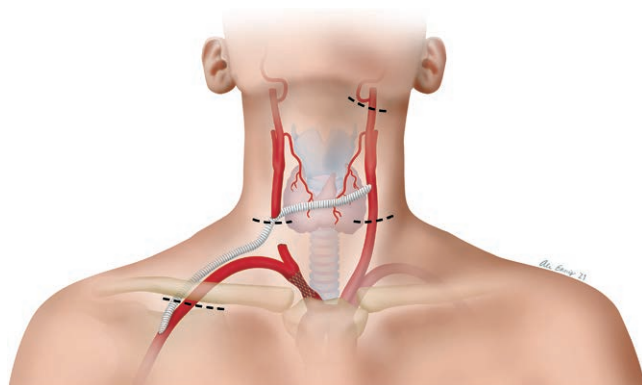
**Fig. 2.** Illustration depicting the course of the tunneled omentum over the vascular graft and its anastomosis to the left facial artery and vein.

Perfusion of her omental flap was monitored through an implantable Cook Doppler for 1 week postoperatively. The remainder of her hospital stay was uneventful. She was ultimately discharged to acute rehab 2 weeks postoperatively and remains on oral antibiotics for long-term methicillin-sensitive *Staphylococcus aureus* suppression, as recommended by Infectious Disease. Through 3 months of postoperative follow-up she remains clinically well without pain, limited motion of her arm or neck, or signs of infection (Fig. 3).

**DISCUSSION**

PVGI is a major complication appropriately feared by surgeons. It is associated with rates of amputation and mortality cited as high as 70% and 75%, respectively.<sup>3,4</sup> Optimal treatment includes graft excision, debridement of surrounding tissue, and a prolonged antibiotic course.<sup>5</sup> Graft preservation is reserved for patients in whom explantation poses significant risk of morbidity.<sup>4</sup> As the frequency of endovascular intervention increases, early identification and intervention for PVGI will remain vital to reduce patient morbidity and healthcare costs.

Risk factors for PVGI are varied, but primarily result from exposure to contamination.<sup>6</sup> The Samson classification of vascular graft infections can guide the management



**Fig. 1.** Illustration depicting the course of the patient’s right-to-left carotid-carotid bypass and right carotid-to-right axillary arterial bypass graft. The ligated innominate artery, and her operative incisions and (collapsed) endovascular stent are also depicted.



**Fig. 3.** Wound appearance at clinical follow-up: well-healed and without sensorimotor deficit.

of PVTI.<sup>7</sup> Successful salvage is associated with serial irrigation and debridement to remove all sources of infection and best performed with a vacuum-assisted device before myocutaneous coverage.<sup>8</sup> Attributes of the tissue used for coverage are another essential consideration.

The omentum, informally referred to as “the policeman of the abdomen,” is a large, highly vascularized tissue barrier that overlies and protects the peritoneal organs. McLean et al, recognizing its advantageous characteristics for autologous tissue transfer, performed the first omental free flap transfer in 1972 for coverage of a cranial defect. Omentum has been a reliable tool for the reconstructive surgeon ever since and its applications are well documented.<sup>3</sup> As a flap, the omentum provides voluminous and pliable soft tissue with robust blood supply and excellent lymphatic function. These characteristics facilitate the delivery of antibiotics to sites of infection, increase absorption of wound secretions, and obliterate dead space to prevent bacterial growth and optimize wound healing.<sup>9</sup> Additionally, omentum avoids the bulky effects of muscular flaps and is readily available anatomically once abdominal access has been obtained.<sup>2</sup>

The efficacy of pedicled omental flaps is well documented for abdominal and thoracic aortic grafts and for protection of femoral anastomosis.<sup>9,10</sup> However, its use has not been described for peripheral extra-anatomic prosthetic vascular graft salvage. Herein, we provide the first description of this application in the coverage of an otherwise exposed vascular graft in a life-threatening situation. This flap was delivered through subcutaneous tunnels to cover three separate wounds with a single anastomosis. The importance of effective coverage when attempting vascular graft salvage cannot be overstated. The physiologic characteristics of omentum allow for excellent coverage with potential immunologic benefit, acceptable donor site morbidity, and most importantly, successful graft salvage.

### CONCLUSIONS

Contemporary descriptions of omental free flap coverage are relatively rare; however, the properties of

omentum make it an excellent substrate for tissue coverage and graft salvage. This report demonstrates the safe and effective implementation of omental free flap coverage in the salvage of infected extra-anatomic bypass grafts with an excellent functional outcome.

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