

Split Pedicled Gastrocnemius Flap for 3D Knee Defect: A Spare-Part Concept

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Objective

To present a case demonstrating the use of a split muscle pedicled gastrocnemius flap for three-dimensional soft tissue defect reconstruction around the knee, utilizing the “spare part” concept to optimize functional and aesthetic outcomes while preserving donor site integrity.

Introduction

Chronic soft tissue defects around the knee present a reconstructive challenge, particularly in patients with a history of multiple prior surgeries and impaired wound healing. We report a case of a patient with a three-dimensional, fibrin-covered defect infrapatellar on the right knee, persisting after previous local flap reconstruction for skin necrosis following genicular nerve radiofrequency ablation. Despite repeated debridements and wound care, the defect remained non-healing and painful. In this context, we employed a split muscle pedicled gastrocnemius flap with the “spare part” concept to achieve durable coverage and promote healing, while minimizing donor site morbidity.

Methodology

The patient was placed in the supine position with the right lower leg angled medially. Following sterile draping and tourniquet application (260 mmHg), extensive ulcer excision and debridement of a 4 × 4 × 3 cm defect was performed. Tissue and bone samples were sent for histological and microbiological analysis. After irrigation and disinfection, a proximally pedicled medial gastrocnemius split muscle flap was planned. Through an S-shaped incision, the medial head of the gastrocnemius muscle was dissected from medial to lateral and separated from the soleus. A longitudinal muscle-split was performed, allowing tension-free mobilization into the defect. The gastrocnemius muscle having a Type 1 muscle perfusion, it is recommended to do an angiography prior to the procedure. An ICG could also be performed to confirm perfusion.

In this case perfusion was confirmed with Doppler following tourniquet release. The flap was tunneled subcutaneously and inset into the defect, fixed with absorbable sutures. A split-thickness skin graft (0.2 mm) harvested from the anterolateral right thigh (4 × 4 cm, meshed 1:1.5) was applied over the flap. Hemostasis, layered closure, drain placement, and appropriate dressings were completed. Fibrin glue was applied to secure the graft. The procedure was completed without complications.

Result

The split-pedicled medial gastrocnemius muscle flap was successfully transposed to the anterior infrapatellar region of the right knee to fill a deep three-dimensional soft tissue defect. The flap demonstrated excellent integration, and a split-thickness skin graft provided durable coverage. Postoperative recovery was uneventful. At the 1-year follow-up, the flap remained stable, with complete wound closure, good functional outcome, and minimal scarring. The patient regained satisfactory range of motion in the knee, without major contractures or discomfort.

Fig. 1: Preoperative image of the chronic, fibrin-covered wound over the right knee with central necrosis, measuring approximately 4 × 4 × 3 cm.



Fig. 2 & 3: Intraoperative views of the donor site (gastrocnemius flap harvest) and the recipient site after flap inset, prior to skin grafting.

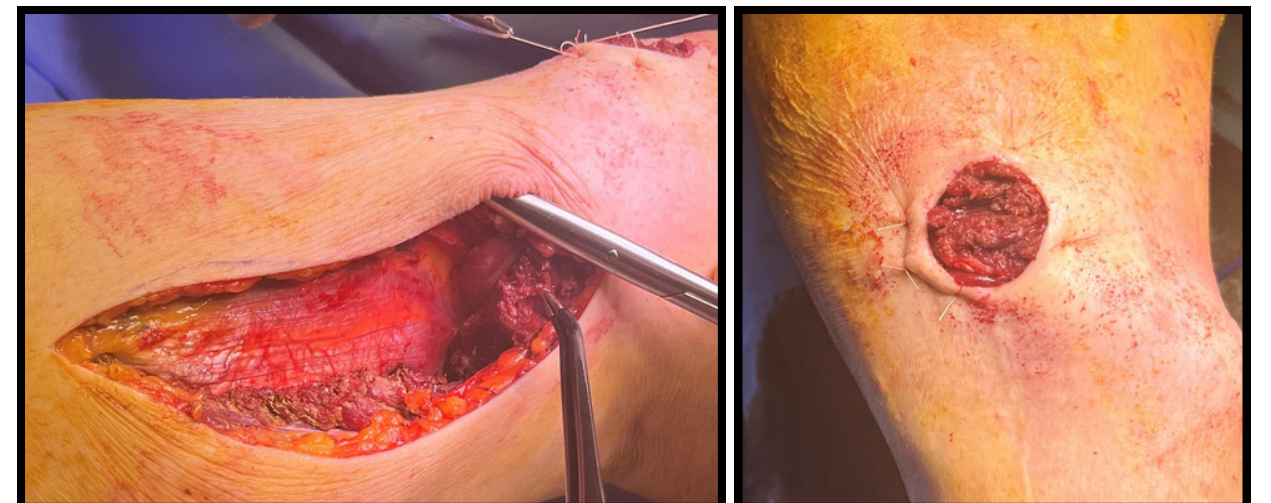
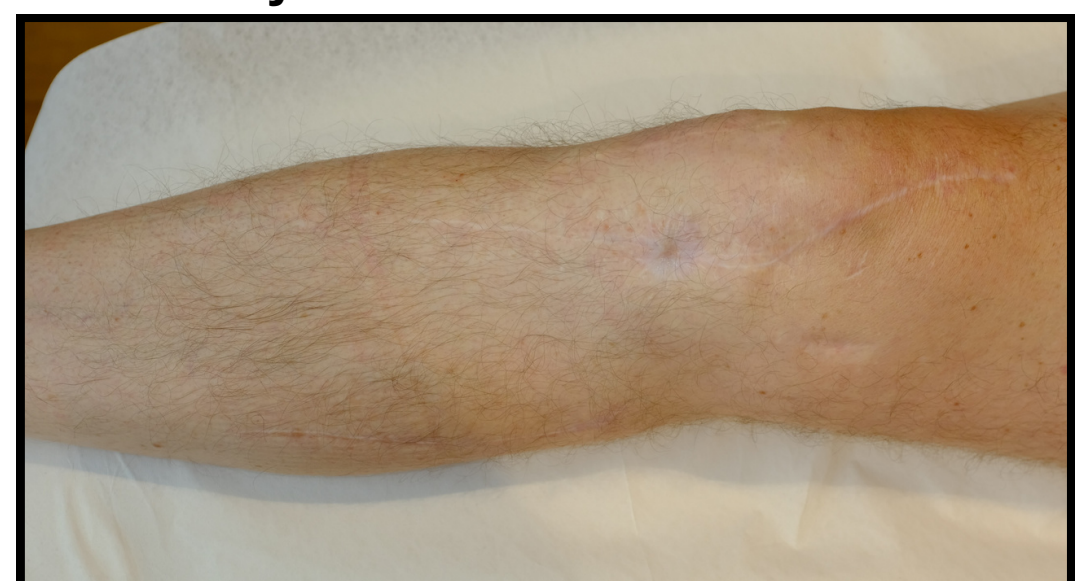


Fig. 4. 1 year post-OP follow-up showing a well-healed soft tissue reconstruction with good functional outcome and minimal scarring.



Conclusion

The split-pedicled medial gastrocnemius muscle flap is a reliable and effective reconstructive option for complex anterior knee defects, particularly when deep cavities require durable soft tissue filling. This technique provides robust vascularized coverage, facilitates early healing, and can result in excellent long-term functional and aesthetic outcomes with minimal donor site morbidity.