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Original Research Paper

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MEDIAL GASTROCNEMIUS FLAP WITH PARTIAL-THICKNESS SKIN GRAFT FOR COVERAGE OF TIBIAL BONE EXPOSURE: A CLINICAL CASE PRESENTATION

Alexander Antonio Jara Chavez*	MD. Fellow of Aesthetic and Reconstructive Plastic Surgery "Pontificia Universidad Católica del Ecuador" / Quito - Ecuador. *Corresponding Author
Carolina Vanessa Saldaña Rodríguez	Resident doctor at the Hospital de las Fuerzas Armadas N1 / Quito - Ecuador.
Patricio Andres Miranda Cevallos	Resident at the Hospital de Especialidades Carlos Andrade Marin / Quito - Ecuador.
Ana Paula Leon Rodriguez	MD. General practitioner / Quito - Ecuador.
Emily Raphaela Salcedo Torres	Resident doctor at the Hospital de las Fuerzas Armadas N1 / Quito – Ecuador.
Olga Maricela Estrada Escobar	Resident doctor at the Hospital de las Fuerzas Armadas N1 / Quito - Ecuador.

ABSTRACT **Objective:** To describe the use of the medial gastrocnemius muscle flap combined with split-thickness skin graft for coverage of tibial bone exposure after post-traumatic soft tissue necrosis. **Method:** We present the case of a male patient with a tibial fracture managed with osteosynthesis, who developed soft tissue necrosis with exposure to the tibial bone. After serial debridements and two negative cultures, a medial gastrocnemius muscle flap was performed for bone coverage, simultaneously covered with partial-thickness skin graft. **Results:** The postoperative evolution was satisfactory, with complete viability of the flap and graft integration. Clinical follow-up at 15 days, 1 month, and 2 months showed progressive healing and adequate recovery of limb function. **Bottom Line:** The medial gastrocnemius flap remains a reliable and versatile option for coverage of proximal tibial bone exposures, especially when combined with skin grafts for optimal coverage.

KEYWORDS : Tibial fracture, soft tissue necrosis, gastrocnemius flap, partial-thickness skin graft, lower limb reconstruction.

INTRODUCTION

Tibial fractures, especially open fractures classified as Gustilo-Anderson IIIB and IIIC, are often associated with severe soft tissue injuries and bone exposure. These complications increase the risk of infection, delayed healing, and poor functional recovery. Reconstruction of soft tissue defects in the lower extremities requires a multidisciplinary approach, combining orthopedic stabilization, infection control, and timely soft tissue coverage.

Among the reconstructive options, the medial gastrocnemius flap has been widely described as a reliable option for coverage of exposures of the proximal tibial bone. Its vascular reliability, proximity to the defect, and ability to provide well-vascularized tissue make it a preferred choice, especially in traumatic cases. The following case illustrates its use in combination with a split-thickness skin graft for definitive coverage.

METHODOLOGY / CASE PRESENTATION

A male patient who presented with a traumatic fracture of the tibia treated by orthopedic surgery with the placement of a fixation plate. As a postoperative complication, he developed necrosis of the overlying soft tissue flap, which subsequently detached, exposing the tibial bone.

The patient underwent multiple surgical debridements and was kept under close surveillance. After two consecutive negative tissue cultures (thioglycolate) confirmed the absence of infection, a reconstructive procedure was planned with prior CT angiography that allowed us to verify vascular preservation of the leg necessary for surgery. A medial gastrocnemius muscle flap was designed and elevated to cover the tibial bone exposure. In the same surgical act, the muscle flap was covered with a partial-thickness skin graft extracted from the ipsilateral thigh.

Intraoperative findings confirmed adequate vascularization of the flap and the donor site was mainly closed.

RESULTS

The postoperative evolution was favorable. The muscle flap remained viable and the skin graft demonstrated progressive integration. At 15 days after surgery, a fully vital muscle flap was observed with a small non-integrated area of graft on the caudal border which was maintained under advanced healing. At one month, the graft was fully integrated, caudal border not integrated with adequate granulation tissue and the flap remained viable with no evidence of necrosis. By 2 months, the surgical site had completely healed, allowing the patient to regain functional mobility with no signs of infection or graft loss.

Image 1 – 2: Bone exposure, with a medial skin flap forming a bridge in the pretibial region.

The photographic documentation was obtained at the following times: preoperative, intraoperative, 15 days postoperative, 1 month postoperative, and 2 months postoperative.

Image 3: Transsurgical with medial gastrocnemius flap covering defect with bone exposure.

Image 4: Muscle flap covered with partial-thickness skin graft

Image 5: 15 post-surgical days **Image 6:** 30 post-surgical days

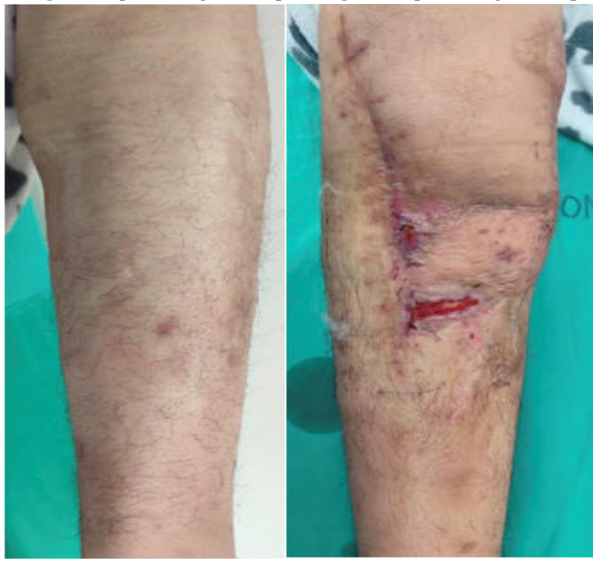

Image 7 – 8: 2 post-surgical months

DISCUSSION

Covering exposed bone after traumatic tibial fractures is a major challenge in reconstructive surgery. The medial gastrocnemius flap has consistently proven to be one of the most reliable local flaps for proximal tibial defects due to its robust vascular supply and ease of collection. Recent studies have confirmed its high success rates in limb rescue, infection reduction, and functional recovery (Karamanos, 2021; Shokrollahi, 2020).

The combination of muscle flap with a split-thickness skin graft provides a quick and effective solution for coverage, ensuring both structural protection and skin closure. The literature indicates that when the infection is controlled and the surgical site is well prepared, long-term outcomes are favorable with low complication rates (Wei & Mardini, 2019; Brown & Gregory, 2015).

Our case supports these findings, demonstrating the viability of the gastrocnemius flap even in post-traumatic contexts, with satisfactory functional and aesthetic results.

CONCLUSION

The medial gastrocnemius flap remains the gold standard for coverage of proximal tibial bone exposures. Its anatomical reliability, vascular consistency, and relative technical simplicity make it a safe and effective option for reconstruction. When combined with partial-thickness skin grafts, it provides definitive coverage, promoting healing and restoring limb function.

REFERENCES

1. Brown, D. L., & Gregory, H. (2015). Michigan Manual of Plastic Surgery (2nd ed.). Lippincott Williams & Wilkins.
2. Wei, F. C., & Mardini, S. (2019). Flaps in Reconstructive Surgery. Elsevier Saunders.
3. Shokrollahi, K. (2020). Practical Reconstructive Surgery Flaps: Reconstructive Flaps from A to Z. Springer.
4. Karamanos, E. (2021). Comprehensive Atlas of Upper and Lower Extremity Reconstruction. CRC Press.
5. Systematic Review: Gastrocnemius flap in post-traumatic reconstruction of the knee. European Journal of Orthopaedic Surgery & Traumatology, 2024.