

## Does Flap Type Affect Membrane Osteogenic Potential in Masquelet Procedures?

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**Purpose:** 20% of Masquelet procedures require flap coverage. A recent case series by Morwood et al. on Masquelet procedures found no difference in outcomes for patients that required muscle versus fasciocutaneous free flaps. The purpose of this study was to determine if flap type alters the osteogenic potential of the membrane that forms during the Masquelet procedure.

**Methods:** Six 10-week-old Sprague Dawley rats were randomized into 1 of 2 tissue coverage groups: myocutaneous rectus abdominis free flap or fasciocutaneous epigastric free flap. A 1-cm hemispherical critical-size bone defect was created in the femoral shaft, a polymethylmethacrylate spacer was implanted, and the fracture was stabilized using an intramedullary device. Membranes were harvested after 2 and 4 weeks for gene expression analysis of vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF- $\beta$ ), and bone morphogenetic protein (BMP)2, 3 markers of membrane osteogenicity. Statistical analysis was performed with a t test.  $P < 0.05$  was considered significant.

**Results:** There was significantly more VEGF expression in the fasciocutaneous membranes relative to the muscle membranes at 4 weeks ( $P = 0.0033$ ). There was a trend toward increased expression of TGF- $\beta$  in the fasciocutaneous membranes relative to the muscle membranes ( $P = 0.071$ ) and no difference in BMP2 expression by flap type at 4 weeks. No difference in membrane gene expression by flap type was seen at 2 weeks (Fig. 1).

**Conclusion:** Fasciocutaneous flaps demonstrate increased expression of VEGF and equivalent expression of TGF- $\beta$  and BMP2 compared to muscle flaps. Surgeons should not be wary of using fasciocutaneous flaps over muscle flaps when performing the Masquelet technique as they may be more osteogenic, less time-consuming, and less morbid for the patient.

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