Treatment of Recalcitrant Femoral Nonunion With Medial Femoral Condyle Pedicled Osteoperiosteal Autograft

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Purpose: Femoral shaft atrophic nonunion results in significant disability and can present a difficult treatment challenge. For the small subset of patients that prove recalcitrant to front-line treatment, the medial femoral condyle (MFC) provides a local source of vascularized autograft bone with minimal donor site morbidity. Although the MFC has gained recent adoption as a free vascularized transfer, its role as a pedicled graft is less understood. We present a novel surgical technique and retrospective analysis of patients treated with MFC autograft using a pedicled technique.

Methods: Between November 2017 and September 2019, at a large tertiary-care institution, 3 atrophic nonunions of the distal femur were identified in 3 patients who had failed multiple revision surgeries. All patients were treated with an MFC pedicled osteoperiosteal flap. Radiographic assessment of bridging callous was performed to determine bony union as the primary outcome. Time to union, Patient-Reported Outcomes Measurement Information System (PROMIS) scores, and complications including infection, persistent nonunion, and need for reoperation were recorded in all cases. Technique: A medial approach to the distal femur is utilized and the vastus medialis retracted anteriorly. The descending genicular artery (DGA) and the medial superior genicular artery (MSGA) are identified supplying the MFC of the distal femur. The dominant blood supply to the MFC is then carefully dissected proximally to allow excursion. The nonunion site on the medial surface of the femur is thoroughly debrided and a recipient site is created. A matching vascularized graft is elevated at the MFC and is rotated proximally on a pedicle to the recipient site. The autograft is secured in place with suturing of attached periosteum.

Results: Three patients met inclusion criteria and underwent MFC pedicle for treatment of recalcitrant femoral nonunion during the study period. On average, patients had undergone 2 revision nonunion surgeries with nonvascularized autograft prior to the MFC procedure. All patients demonstrated radiographic union at the 6-month time period. PROMIS Physical Function (PF) scores increased from an average 33 preoperatively to an average 39 at 6 months postoperatively. There were no complications of persistent nonunion, infection, or donor site fracture in this cohort.

Conclusion: A vascularized, osteoperiosteal autograft from the MFC pedicle is a reliable and safe technique to achieve healing in cases of recalcitrant femoral nonunion. The proximity of the graft site to the donor site allows a single incision approach and a pedicled graft with no requirement for vascular anastomosis and very little donor site morbidity. This serves as a utilitarian solution to recalcitrant nonunion of the femoral shaft and distal femur, which may be particularly helpful in settings where microsurgery is not available, or for patients who may not be candidates for microsurgery.