Bone Marrow Aspirate with Allograft Cancellous Chips Versus Autologous ICBG or RIA in the Treatment of Long Bone Nonunions

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Purpose: Long bone nonunion represents a significant source of pain and functional disability. Despite numerous grafting options available to stimulate osteogenic augmentation, limited comparative data exist between these various biological adjuncts. The purpose of this study was to assess union rates between bone marrow aspirate with allograft cancellous chips (BMA-ACC) compared to autologous iliac crest bone grafting (ICBG) and the reamer-irrigator-aspirator (RIA) system in the treatment of long bone nonunion. We hypothesized that the combination of BMA-ACC would have higher union rates with less complications.

Methods: After IRB approval, a retrospective review of patients undergoing operative repair of nonunion from 2015 to 2021 was conducted. Inclusion criteria consisted of a primary bone grafting technique using BMA-ACC, autologous ICBG, or RIA. Exclusion criteria included skeletally immature patients, less than 6-month follow-up, and presence of hypertrophic nonunion. The primary outcome of interest was union. Secondary outcomes of interest were donor site morbidity, operative time, length of stay, rate of transfusion, and unplanned reoperations.

Results: A total of 112 patients were included in the study, with 27 patients in the BMA-ACC group, 43 patients in the autologous ICBG group, and 42 patients in the RIA group. BMA-ACC, autologous ICBG group, and RIA groups did not differ significantly between rates of union (88.9% vs 72.1% vs 83.3%, P = 0.18). The autologous ICBG group was most associated with acute donor site complications (19.0%) compared to the BMA-ACC and RIA groups (0.0% vs 4.8%, P = 0.01). Average operative time was shorter in the BMA-ACC group compared to the autologous ICBG and RIA groups (146.1 ± 54.8 vs 173.1 ± 88.6 and 178.9 ± 88.6 min), but this difference was not significant (P = 0.23). Overall, there were no significant differences in operative time, length of stay, rate of transfusion, or unplanned reoperations among all 3 comparison groups.

Conclusion: In the present study, primary treatment of long bone nonunion with BMA-ACC had comparable union and complication rates to bone grafting performed with autologous ICBG or RIA. Given the well-established complications associated with traditional autograft harvest, BMA-ACC may offer a less morbid alternative.