Bone Morphogenetic Protein Utilization in Long Bone Nonunions: Is It as Popular as We Think?

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Purpose: Bone morphogenetic protein (BMP) has gained popularity for managing long bone nonunions in spite of controversy/concern for complications. This study aims to evaluate BMP efficacy and impact on patient outcomes/complications, and describe BMP utilization for managing long bone nonunions in trauma centers among orthopaedic traumatologists.

Methods: We performed a multicenter retrospective review of adults with long bone (humerii, femurs, tibias) nonunions treated with autograft (iliac crest, RIA, local graft) or allograft, with/without BMP. Inclusion criteria included patients >18 years old requiring long bone nonunion surgical intervention. Exclusion criteria was follow-up <180 days. We collected demographics, injury characteristics, surgical details, facility, surgeon, surgery date, complications, and outcomes.

Results: There were 970 nonunions, 157 BMP cases (33 humerii [21%], 61 femurs [38.9%], and 59 tibias [38%]) and 813 cases without BMP (222 humerii [28%], 247 femurs [29.7%], 344 tibias [42.3%]). Over 50% of injuries were closed in both groups (57% BMP, 51% non-BMP) and there was a significant association between segmental gap defect presence and BMP utilization as a biologic augment (P = 0.016). BMP cohort patients tended to be female (54% vs 40%, P = 0.029), older (54 vs 48 years, P = 0.0036), and had higher body mass index (31.12 vs 28.44, P = 0.0019). No difference in union rate (85% vs 79%, P = 0.1266), time to union (197 vs 205 days, P = 0.8415), or complication rates (43% vs 40%, P = 0.3708). Median length of stay was 2 days. BMP cohort had greater variability than non-BMP cohort (interquartile range 1,4 vs 2,4; P = 0.0127). BMP utilization significantly increased after 2010 (4% vs 41%), with 3 centers driving 78% of utilization and 4 surgeons driving 42% of cases. When the top 2 BMP utilizers were excluded, there was no significant clinical outcome improvement and statistically significant increase in length of stay (1-4 days in BMP group vs 1-3 days in no BMP group, P = 0.0004).

Conclusion: BMP patients tended to be older and female. There were no significant differences in union rate, time to union, or complications between the cohorts. Although it has been increasing since 2010, a limited number of centers and fewer surgeons utilize BMP.