

## Effect of Recombinant Human Bone Morphogenetic Protein-2 (rhBMP-2) with Hydroxyapatite (HA) Carrier in Induced Membrane Technique (IMT): A Retrospective Propensity Score–Matched Study

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**Purpose:** We sought to determine the effect of rhBMP-2 with HA carrier augmentation in managing critical-sized bone defect with IMT.

**Methods:** This was a retrospective comparative study conducted at an academic Level I trauma center. The study included 14 patients who underwent rhBMP-2 with HA carrier (rhBMP-2/HA) augmentation in IMT for managing critical-sized bone defect (BMP group). Moreover, 14 patients who underwent IMT without rhBMP-2 augmentation were matched by propensity score analysis (non-BMP group). The volumetric measurements of the grafted bone were performed using immediate postoperative CT, and the volumetric measurements of regenerated bone were performed 1 year after CT. The changes within them were calculated as a percentage. Changes in density of the regenerated bone from grafted bone were measured by mean Hounsfield unit (HU). Moreover, we also measured changes in dense bone percentage relative to the total grafted bone and regenerated bone volumes (Fig. 1). Corticalization of the grafted bone under the plate was assessed. The ratio between total axial cuts of grafted bone under the plate and axial cuts that present corticalization under the plate within them was obtained, and the percentage was calculated (Fig. 2).

**Results:** In the BMP and non-BMP groups, the changes in densities from grafted bone to regenerated bone were +379.63 HU and +248.55 HU ( $P = 0.034$ ), changes in dense bone percentage were +37.52% and +23.31% ( $P = 0.027$ ), corticalization rates under the plate were 79.70% and 39.30% ( $P = 0.007$ ), changes in volume were -20.77% and -23.35% ( $P = 0.812$ ), union rates were 85.71% and 78.57% ( $P = 0.622$ ), numbers of patients requiring additional procedures were 4 and 3 ( $P = 0.663$ ), and times to union were 291.66 and 466.63 days ( $P = 0.059$ ), respectively.

**Conclusion:** rhBMP-2/HA augmentation in IMT increases the density of regenerated bone and enhances corticalization under the plate. rhBMP-2/HA augmentation can be a useful tool for overcoming incomplete consolidation issue in IMT.

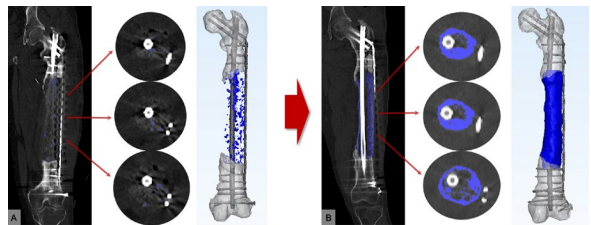


Fig. 1 A 24-year-old male patient underwent staged IMT and rhBMP-2 with HA carrier augmentation for managing critical-sized bone defect after osteomyelitis. A Dense bone percentage that is >370 HU in grafted bone was measured. B Dense bone percentage in regenerated bone was measured. The change of dense bone percentage was 62.75% in this patient.

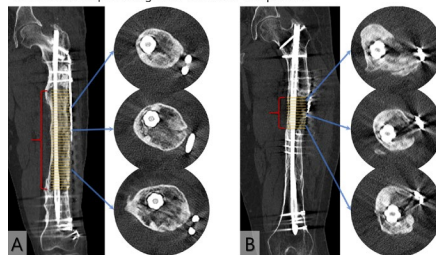


Fig. 2 A The same patient in Fig. 1 who was classified in the BMP group. The corticalization rate under the plate was 81.37% (83/102). B A 36-year-old male patient in the non-BMP group underwent staged IMT for osteomyelitis management. The corticalization rate under the plate was 6.43% (2/31).

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.