

Volumetric Stability of Biphasic HAp/ β -TCP/Collagen Implants in Malar Augmentation

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ABSTRACT

Objective: Evaluate volumetric stability and symmetry of Biphasic Hydroxyapatite(HAp)/ β -Tricalcium phosphate(β -TCP)/collagen (BCP-collagen) implants in malar augmentation post-orthognathic surgery over one year using Cone-Beam-CT(CBCT) and explore influencing factors.

Methods: Retrospective case-series analysis of 45 patients (38 females) who underwent bimaxillary orthognathic surgery with malar augmentation using BCP-collagen implants. CBCT scans were taken at 1 week, 4 months, and 12 months post-surgery. Regression analysis explored potential factors influencing volume loss, including age and sex ($p < 0.05$).

Results: Median patient-age was 26 years (IQR: 22–32). One week postoperatively, median implant-volume was 1356.70 mm³ (SD=5888.53). By four-months, it decreased to 985.46 mm³ (SD=4352.47), a 25.4% reduction ($p < 0.001$). Afterwards, a 1.3% volume decrease ($p = 0.42$). Volume loss varied between 35.1~14.7%. Asymmetry $> 7\%$ was observed in 17.7% of patients. No significant differences in volume loss were found between sexes ($p = 0.6$) or age groups ($p > 0.9$). Regression showed no significant associations with age ($\beta = 0.02$, 95%CI: -0.48, 0.53, $p > 0.9$) or sex ($\beta = 11$, 95%CI: -30, 52, $p = 0.6$).

Conclusion: BCP-collagen implants exhibit early volume loss but stabilise long-term. High variability and asymmetry in volumetric changes challenge standard overcorrection strategies, emphasising the need for early monitoring. CBCT enables precise volumetric assessment and may improve surgical decision-making.