

Assessing the Efficacy of Autologous Iliac Crest Bone Graft with Recombinant Human Bone Morphogenetic Protein for Alveolar Crest Reconstruction

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Background

- Cleft lip ± palate (CLP) is one of the most common congenital anomalies worldwide
- Iliac crest bone graft (ICBG) is the standard of care for **alveolar bone grafting**
- Recombinant human bone morphogenetic protein with demineralized bone matrix (**rhBMP-2/DBM**) has been proposed as an alternative
 - Avoids donor site morbidity** associated with harvesting bone
- Despite significant advancements in ABG, the reported graft success rates vary widely for both ICBG and rhBMP-2/DBM.
- This study compares graft success rates among rhBMP-2/DBM versus ICBG versus ICBG+rhBMP-2 for ABG

Methods

- Retrospective review of patients who underwent ABG from 2017-2023
- Graft success** defined as bony bridge formation based on *postoperative imaging*
- Bridge thickness** was calculated based on the height of the graft site from the cemento-enamel junction to the cleft-adjacent tooth root apex
- Statistical analyses:** Chi-squared analysis and independent t-test

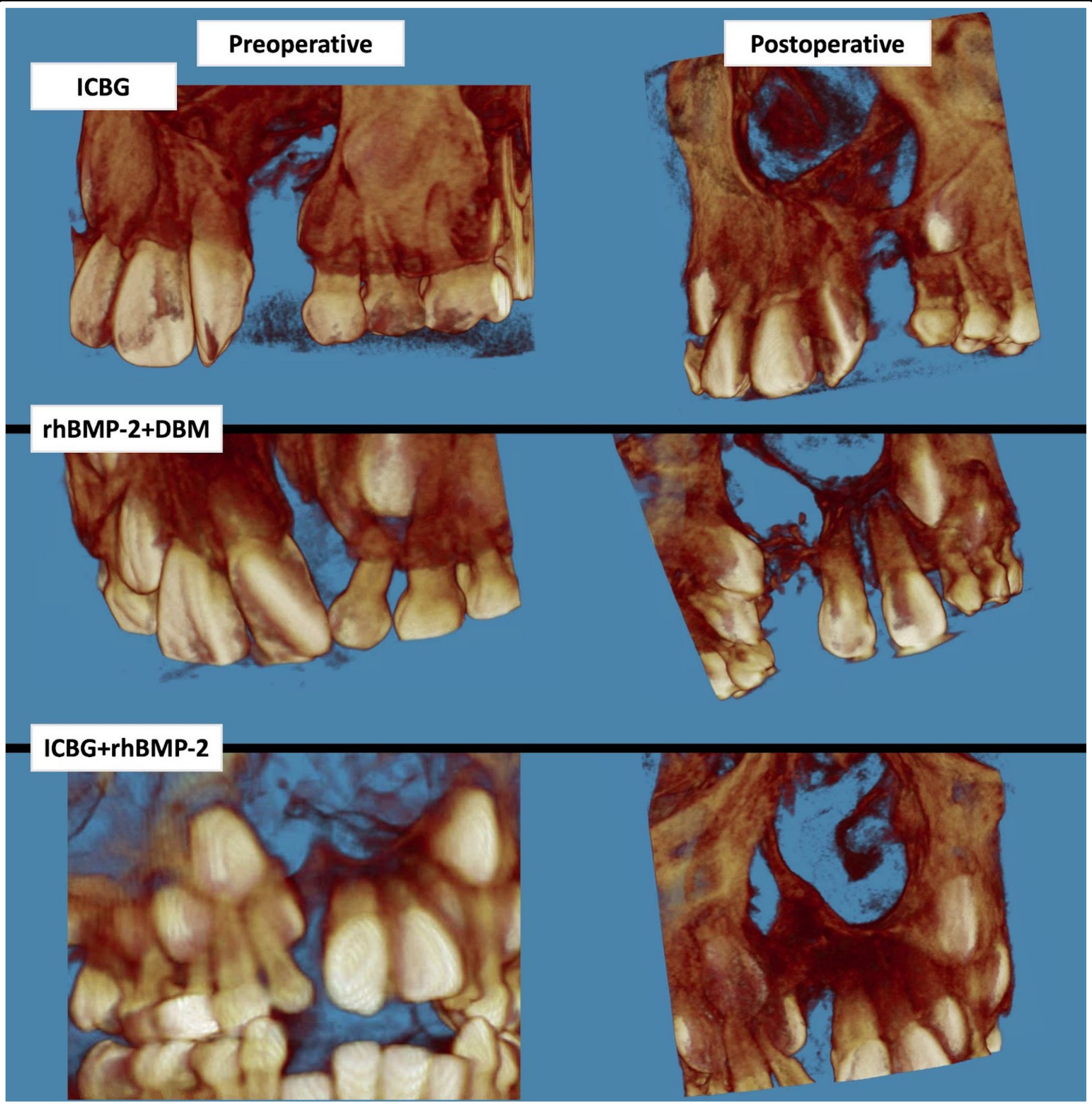


Figure 1. Preoperative and Postoperative Cone-Beam Computed Tomography Scans for Patients who Underwent Alveolar Bone Grafting with ICBG (top row), rhBMP-2/DBM (middle row), and ICBG+rhBMP-2 (bottom row)

Results

- 432 patients included: 196 **ICBG**, 284 **rhBMP-2/DBM**, 46 **ICBG+rhBMP-2**
- Mean age at bone grafting
 - ICBG**: 10.2±3.2 years
 - rhBMP-2/DBM**: 9.3±2.9 years
 - ICBG+rhBMP-2**: 10.7±3.6 years
- The **clinical graft success rates** were *comparable* across all three cohorts (rhBMP-2/DBM: **95.1%** vs. ICBG: **95.4%** vs. ICBG+rhBMP-2: **97.9%**; p=0.694)
- Based on CBCT imaging, **88.9%** of the **ICBG+rhBMP-2** cohort had demonstrated **successful bony bridge formation**, which was *significantly higher* compared to **ICBG** (89.4% vs. 65.3%; p=0.031) and **rhBMP-2/DBM** (88.9% vs. 61.5%; p=0.023).
- Mean bridge thickness was *significantly higher* in the **ICBG+rhBMP-2** cohort compared to **ICBG** (7.4±2.6 mm vs. 4.7±1.9 mm; p<0.001) and **rhBMP-2/DBM** (7.4±2.6 mm vs. 4.4±1.2 mm; p<0.001).

Conclusion

- The use of ICBG with rhBMP-2 appears to result in **more bony bridge formation** and **greater bridge thickness**.
- With a higher rate of bony bridge formation and bridge thickness, dental rehabilitation of the repaired alveolar cleft space with **implants or orthodontic movement** of existing teeth may be **more feasible**.

Table 1. Baseline Characteristics and Outcomes

	ICBG+rhBMP-2 n=47	ICBG n=196	p-value	rhBMP-2/DBM n=284	p-value
Age at Bone Grafting (years)	10.7±3.6	10.2±3.2	0.399	9.3±2.9	0.014*
Clinical Graft Success	46 (97.9%)	187 (95.4%)	0.692	270 (95.1%)	0.705
Reoperation	1 (2.1%)	9 (4.6%)	0.692	14 (4.9%)	0.705
Bony Bridge Formation	42 (89.4%)	128 (65.3%)	0.001*	175 (61.6%)	<0.001*
Bridge Thickness (mm)	7.4±2.6	4.7±1.9	<0.001*	4.4±1.2	<0.001*