

Optimal Timing of Alveolar Bone Grafting: A Comparative Analysis Across Pediatric Age Groups

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Background

- Cleft lip and palate is among the most common congenital craniofacial anomalies, often requiring staged surgical reconstruction.
- Alveolar bone grafting (ABG) restores maxillary continuity, supports tooth eruption, and stabilizes the dental arch.
- Optimal timing remains debated; emerging evidence suggests earlier intervention may improve outcomes.

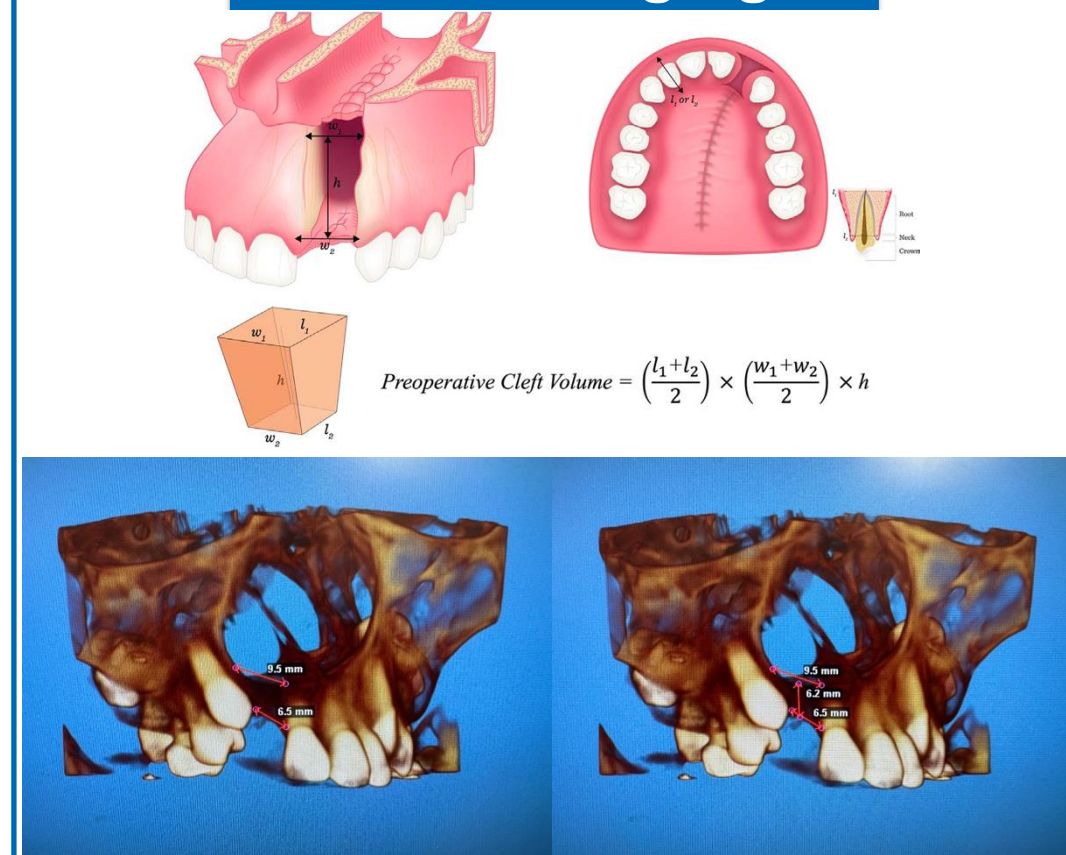
Purpose of Study:

- To evaluate outcomes of ABG across pediatric age groups and determine whether surgical timing influences complications, graft outcomes, and need for secondary procedures.

Methods

- Retrospective review at a single tertiary children's hospital of pediatric patients undergoing alveolar bone grafting with unilateral alveolar clefts.
- Stratification:** Stratified by age at surgery (<6 y, 6–12 y, >12 y). Outcomes: SSI, dehiscence, regrafting, graft volume/take (CBCT). Stats: chi-square, ANOVA.
- Bilateral alveolar clefts excluded.

CBCT Imaging



Results

Older age at SABG (>12y) is linked to higher rates of **surgical site infection** and **need for regrafting**, but **lower rates of dehiscence**

Older patients showed **no significant improvement** in graft volume or graft take compared to younger cohorts

Performed prior to eruption of permanent central/lateral incisors (**6-9 years old**) may be preferred

Discussion

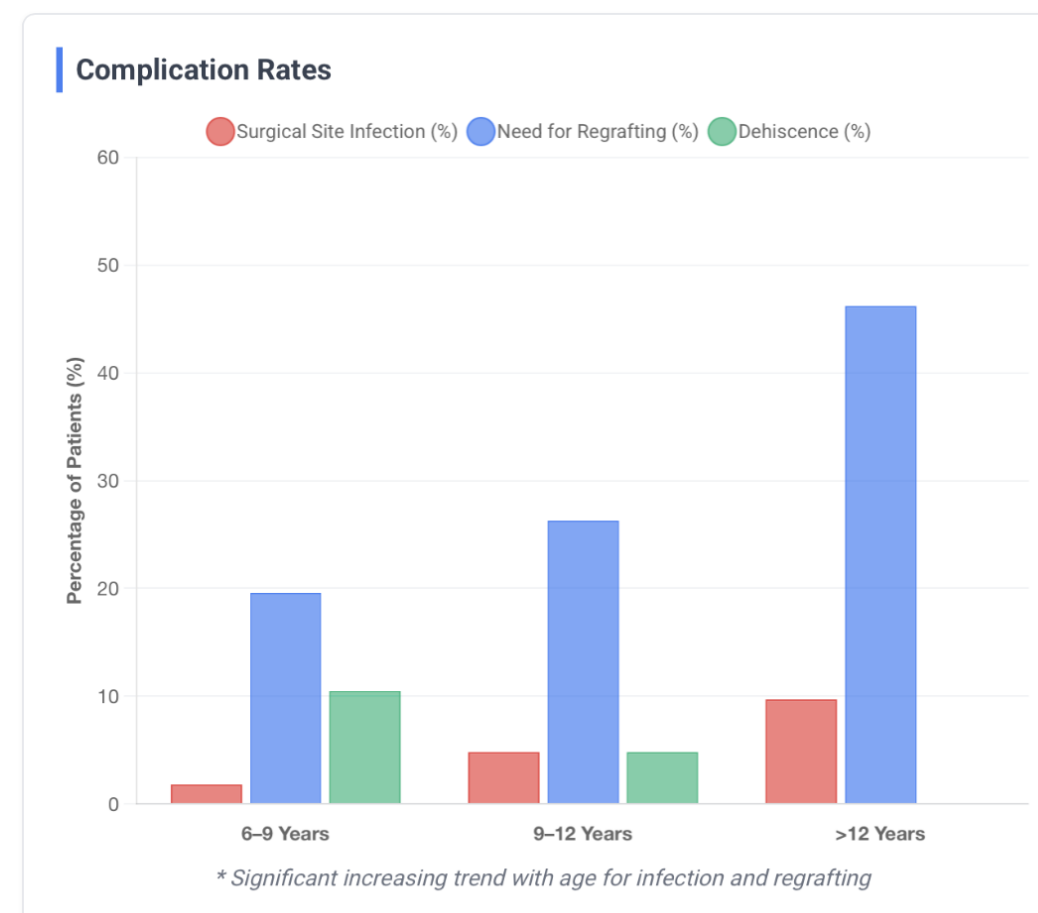
Complications by Age Group

- Wound dehiscence: highest <6y
- Surgical site infection: highest >12y
- Need for regrafting: highest >12y

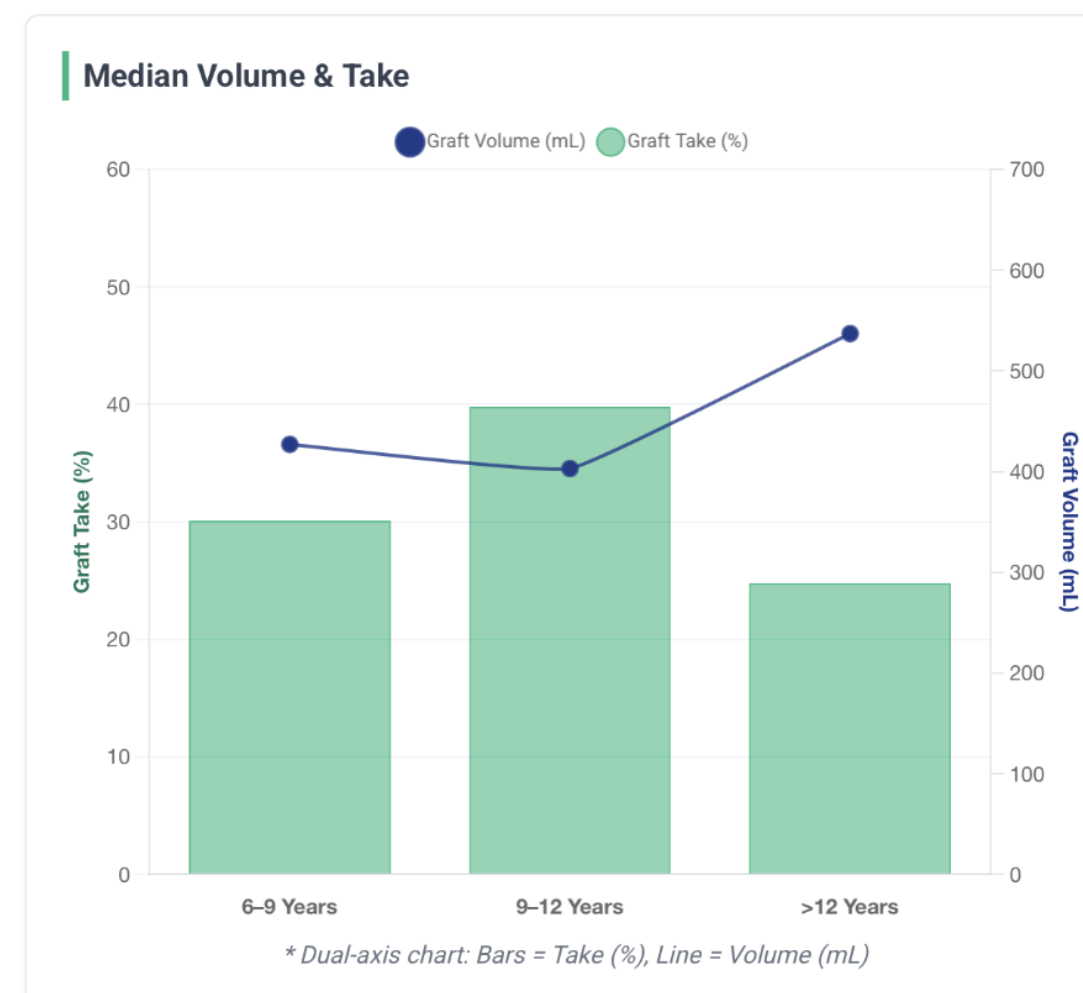
3D CBCT Subset Analysis

- Graft volume: no differences by age
- Graft take: no differences by age
- Key Finding: Older age = more risk without radiographic benefit. Early mixed dentition (6–9 y) is favored.

Surgical Decision Algorithm



Recommended window: 6–9 years
(early mixed dentition, prior to eruption of permanent incisors)



CBCT segmentation of the alveolar cleft used to quantify pre- and post-operative graft volume and graft take. Volumetric methodology adapted from Roohani et al. (2024).

Conclusion

- Older SABG (>12 y) increases SSI and regrafting risk.
- ABG at 6–9 years (early mixed dentition) optimizes surgical outcomes.

References

- Roohani I, et al. Volumetric assessment of alveolar bone grafts using cone-beam CT. *Cleft Palate Craniofac J.* 2024;61(3):412–420.