

Staged 3D Bone Regeneration for Severe Atrophic Alveolar Cleft: A Case Report

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Introduction:

Alveolar cleft defects often show extremely thin residual bone and complex three-dimensional morphology, making implant rehabilitation highly demanding. Such cases usually require extensive bone augmentation, often with nonresorbable membranes or titanium meshes, which increase the risk of dehiscence, infection, or exposure. This case report describes a stepwise regenerative protocol combining autogenous bone and mineralized allograft under fully resorbable conditions, achieving predictable reconstruction of an untreated alveolar cleft with severe atrophy in an elderly patient.

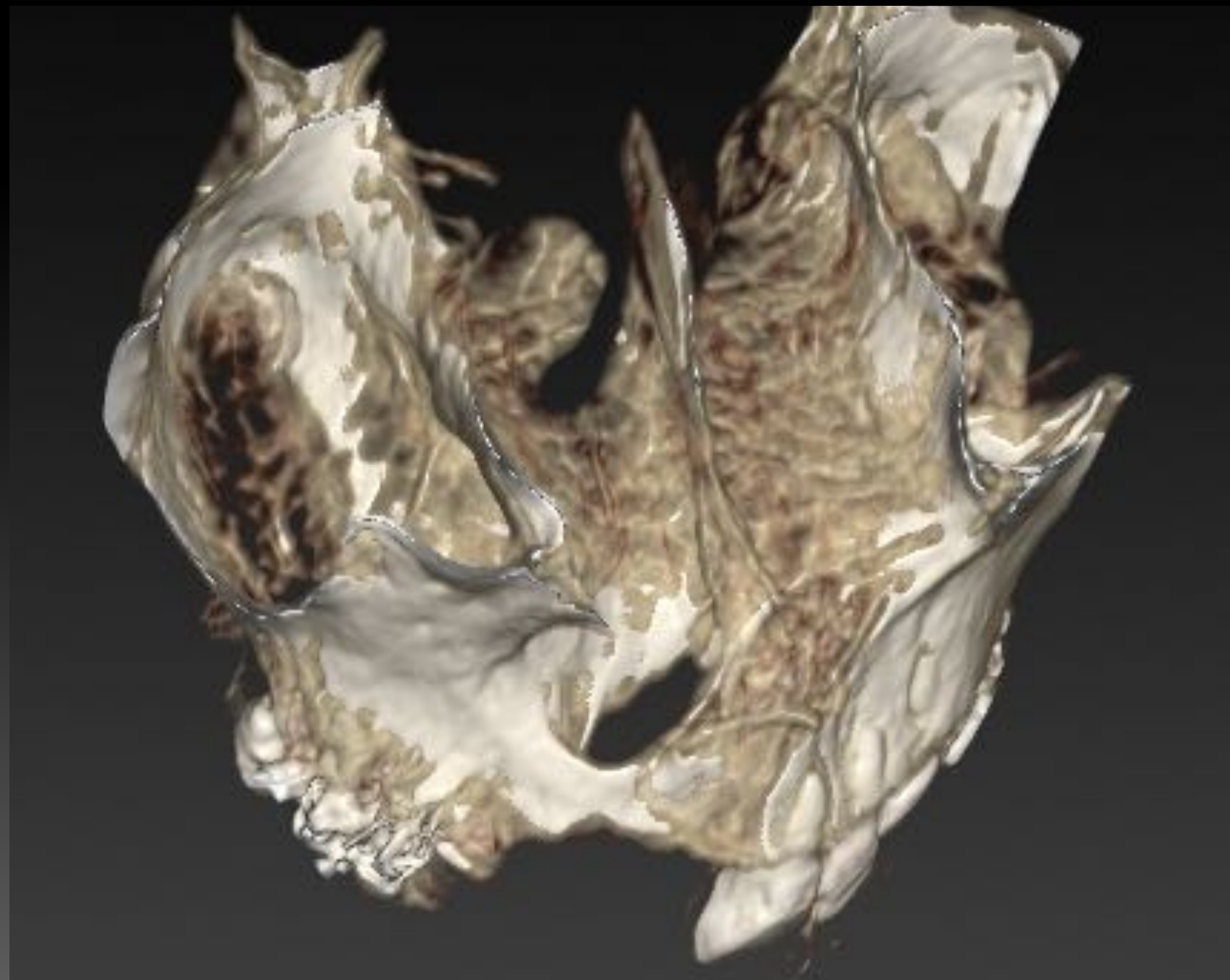
Patient:

A 70-year-old female with a history of cleft lip and alveolus—lip previously repaired but alveolar cleft untreated—presented for implant rehabilitation. Clinical examination revealed the absence of teeth #6–#8 and marked soft tissue depression. CBCT showed a cleft extending from the labial to palatal side, communicating with the nasal cavity, and leaving a thin bony plate. Because of low osseogenic potential and the need for complex 3D reconstruction, a staged regenerative approach using resorbable materials was planned.

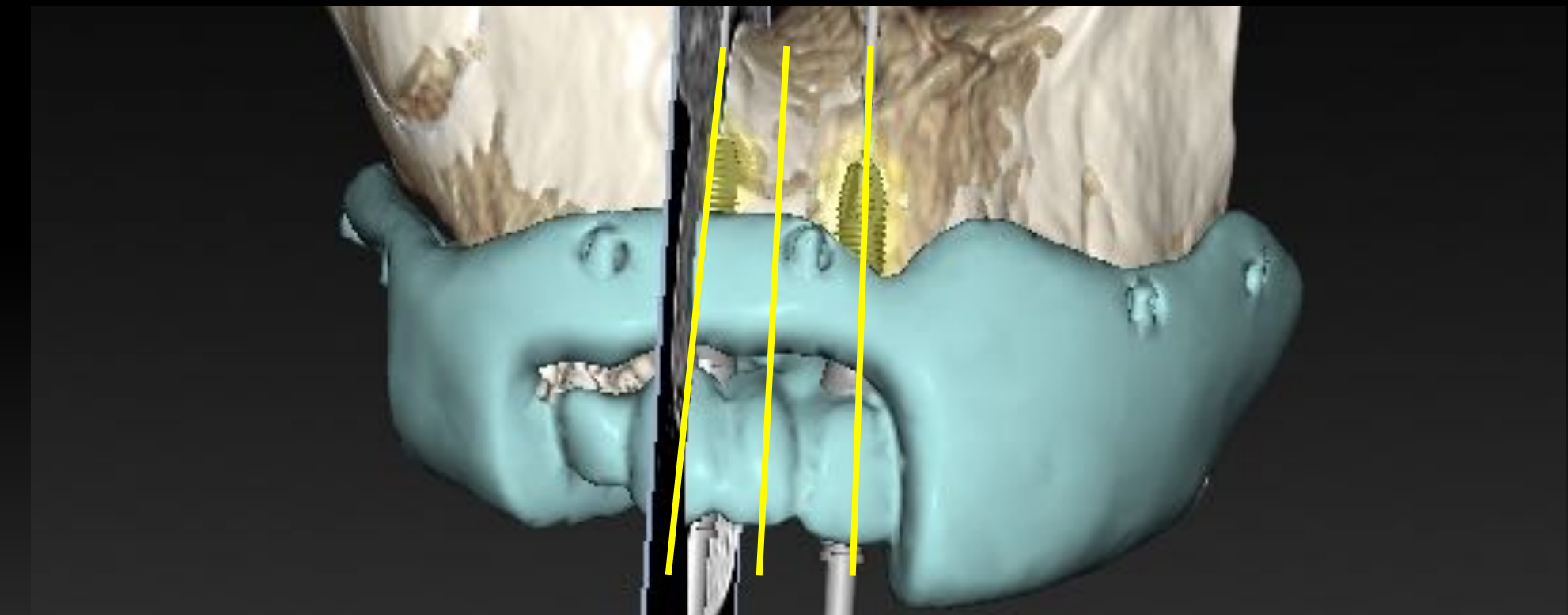
Intra-oral:



3 D-CBCT view

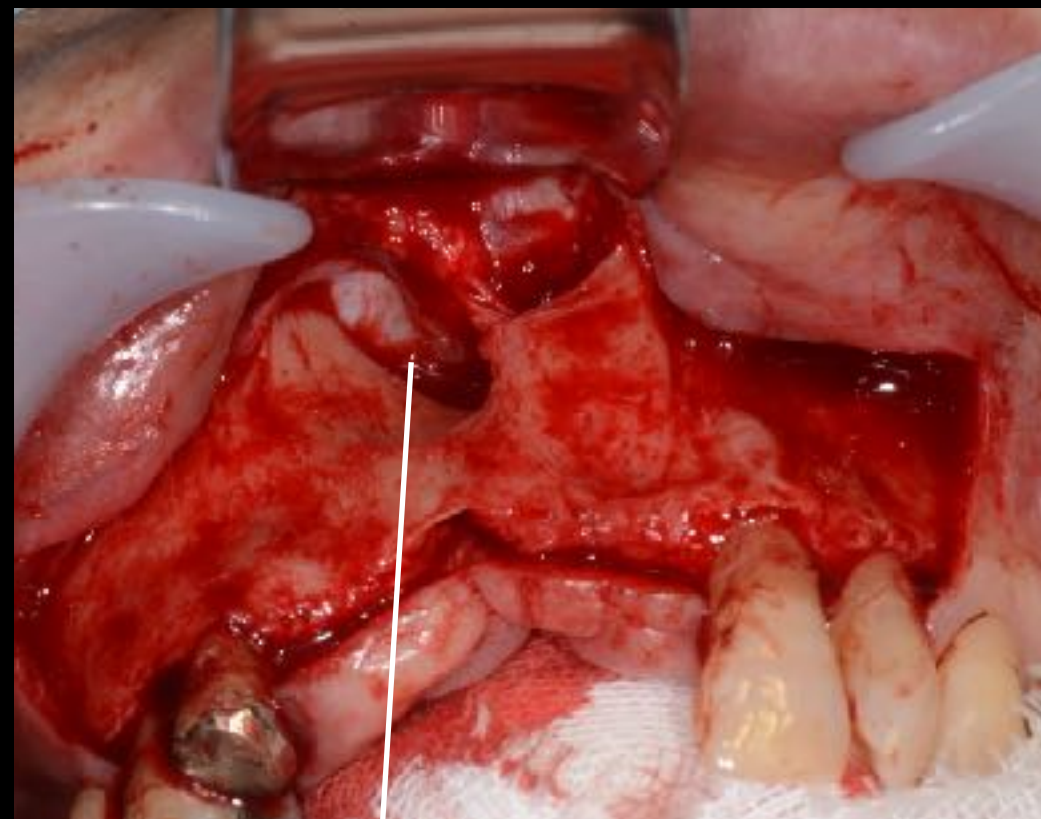


CBCT sagittal view

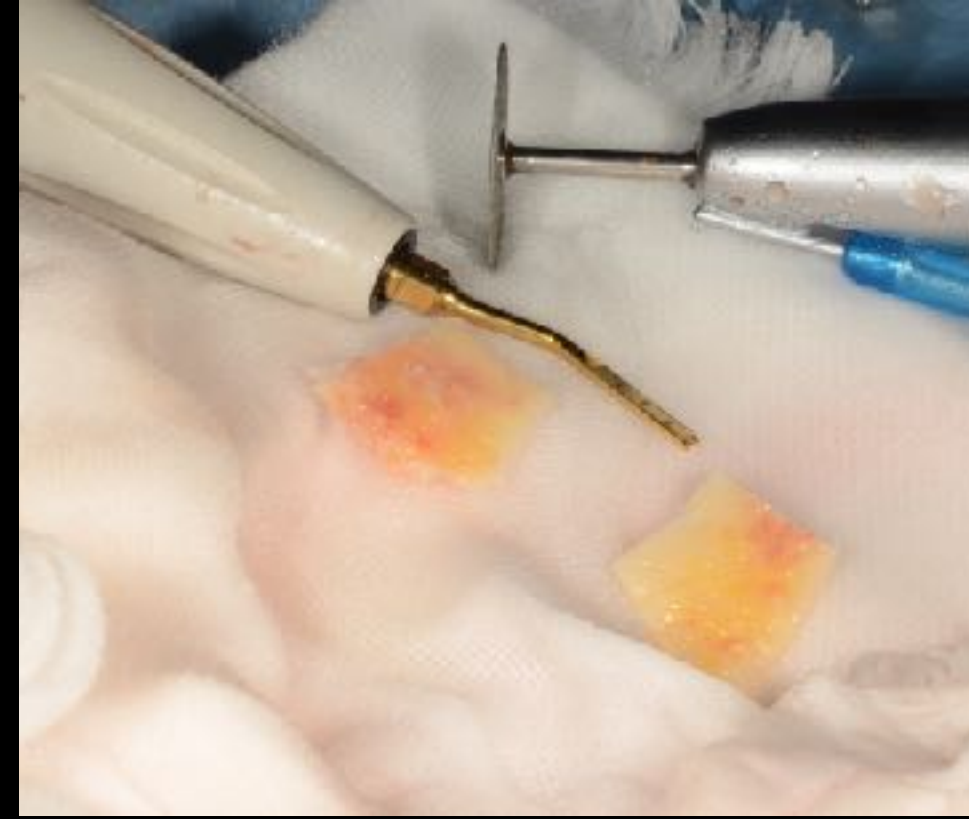


Staged bone augmentation Procedure:

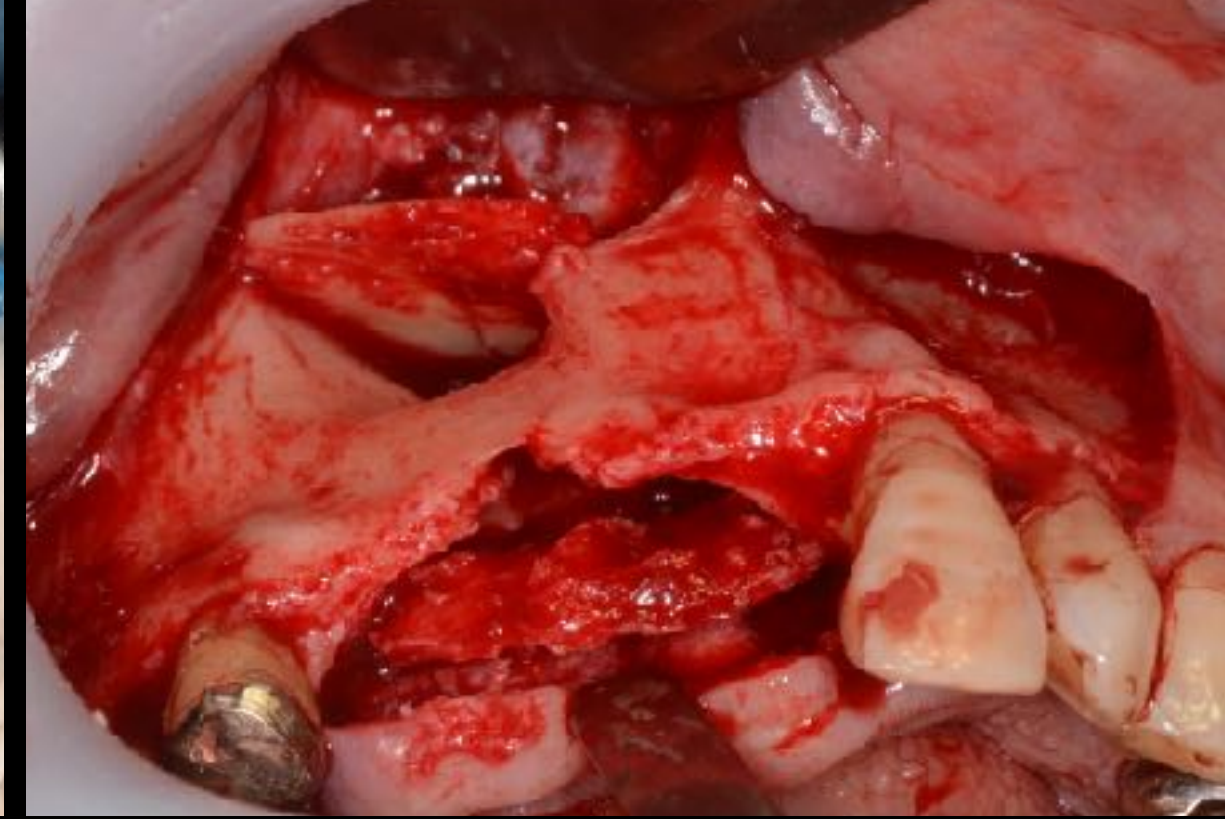
First stage, A thin autogenous cortical bone block was fixed to the palatal and nasal walls for space maintenance, and the defect was filled with mineralized allograft. Second stage After sufficient horizontal augmentation, an interpositional osteotomy was performed for a 4–5 mm vertical lift. Third stage, Residual horizontal deficiency was corrected simultaneously with implant placement using GBR with a resorbable membrane and titanium pins. Sequential augmentation provided adequate bone in both dimensions without complications.



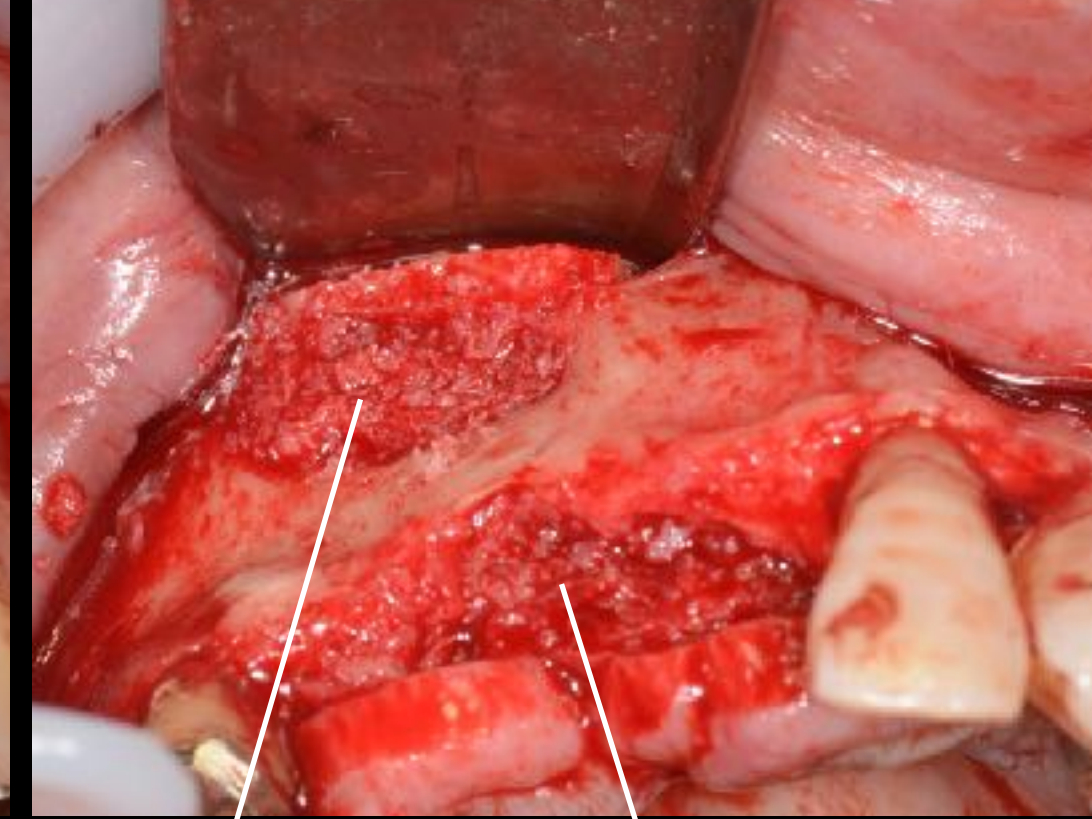
Nasal Cavity



Splited Ramus Cortical plate

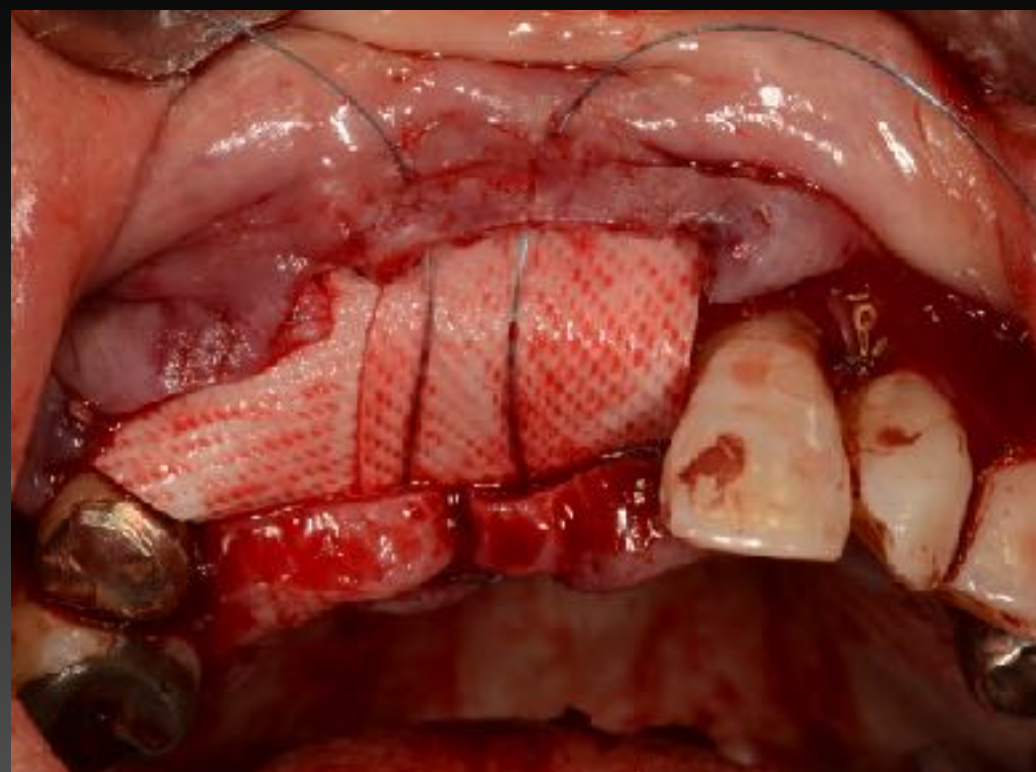


Space maintenance with cortical plate

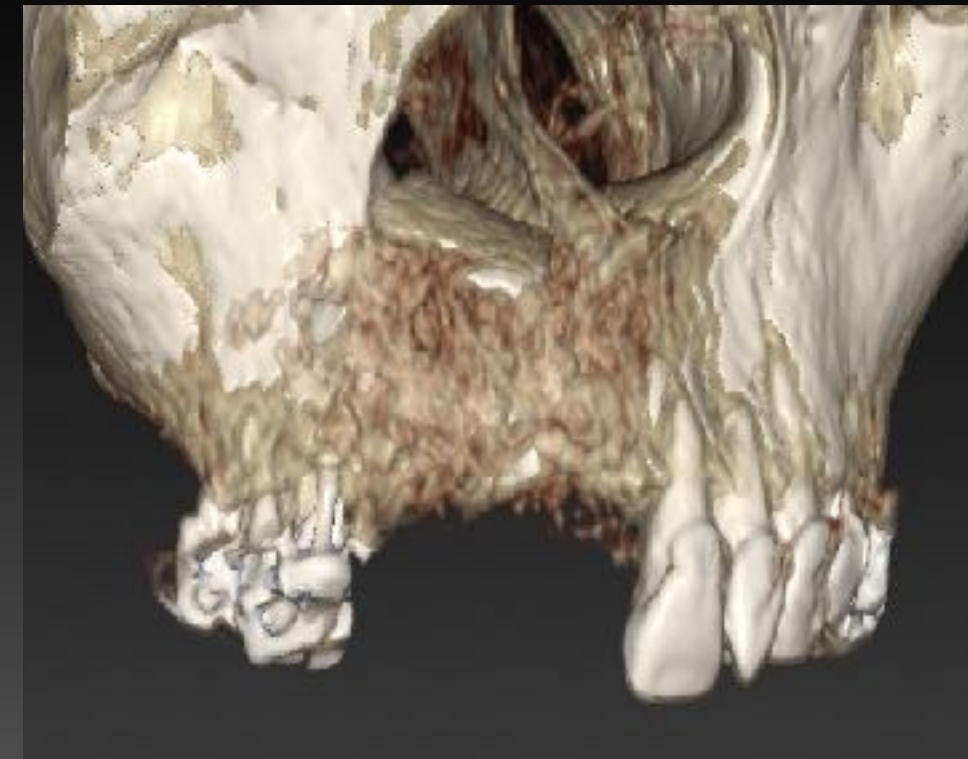


Mineralized allograft

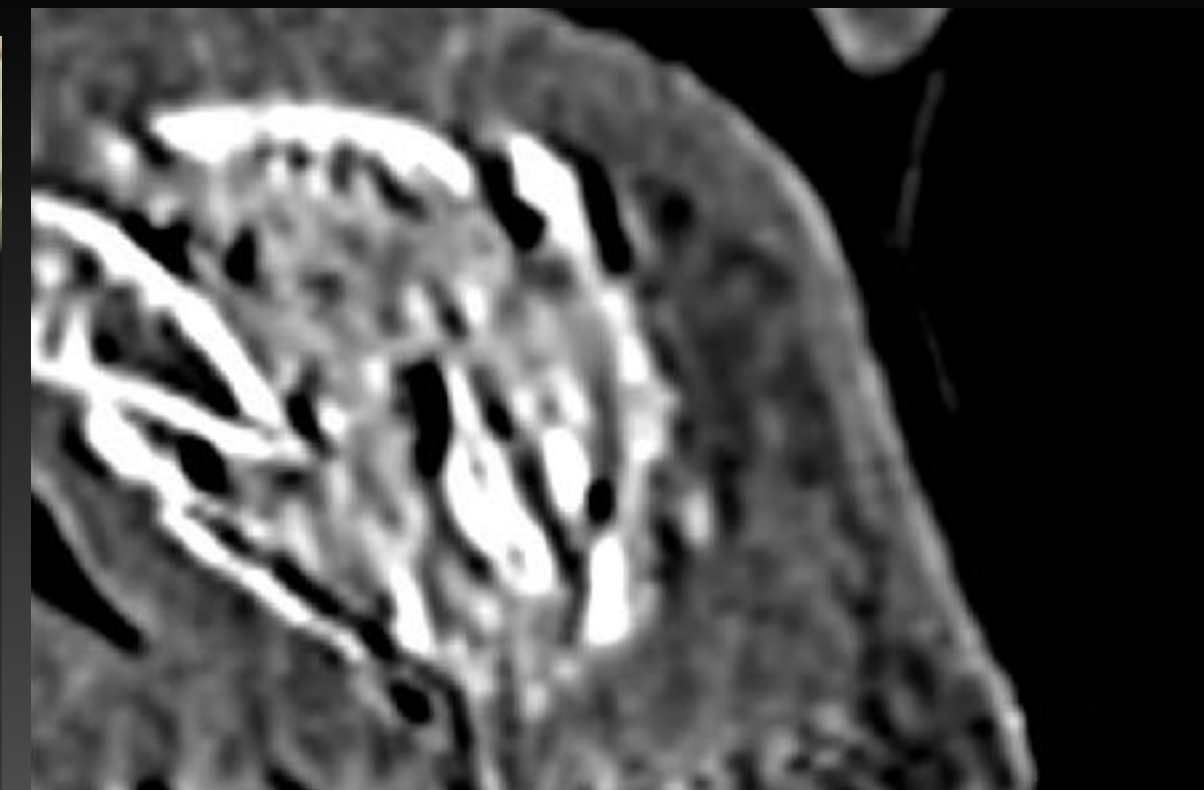
First stage: Thickening alveolar bone



Cross-linked membrane



CBCT view

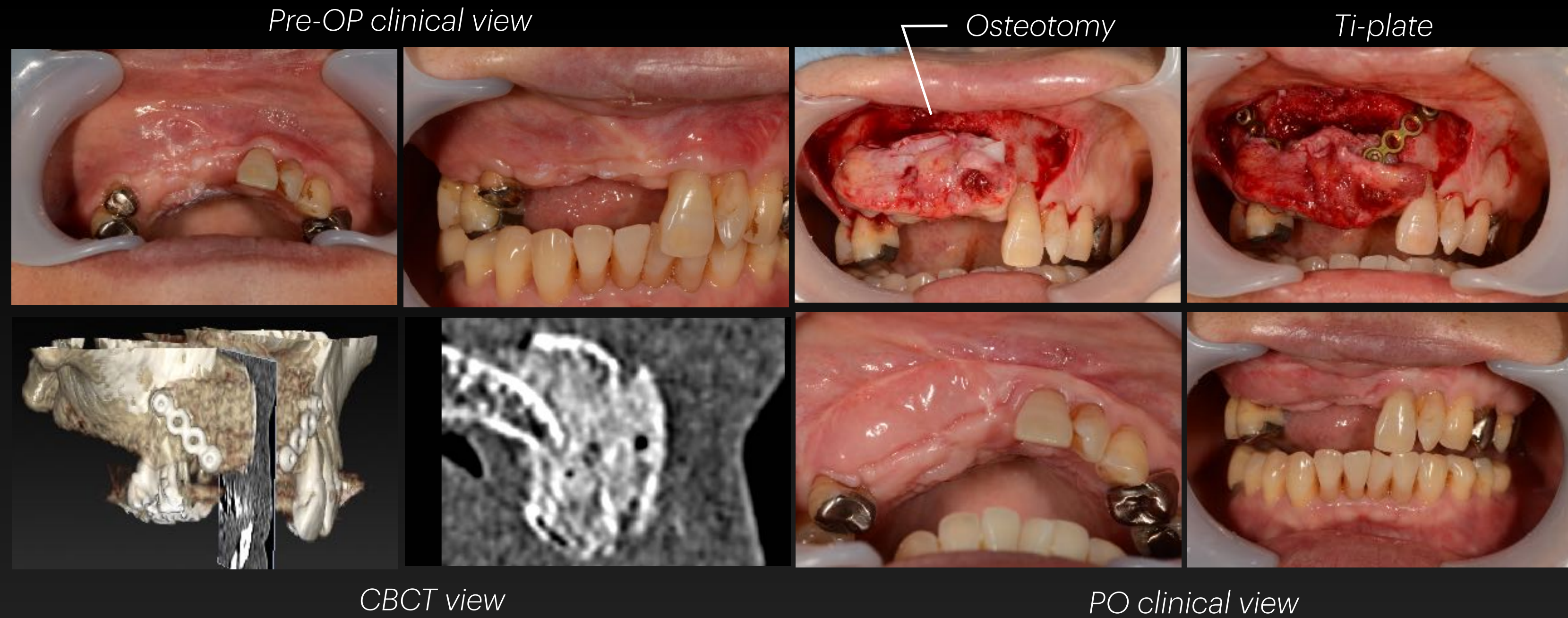


CBCT view

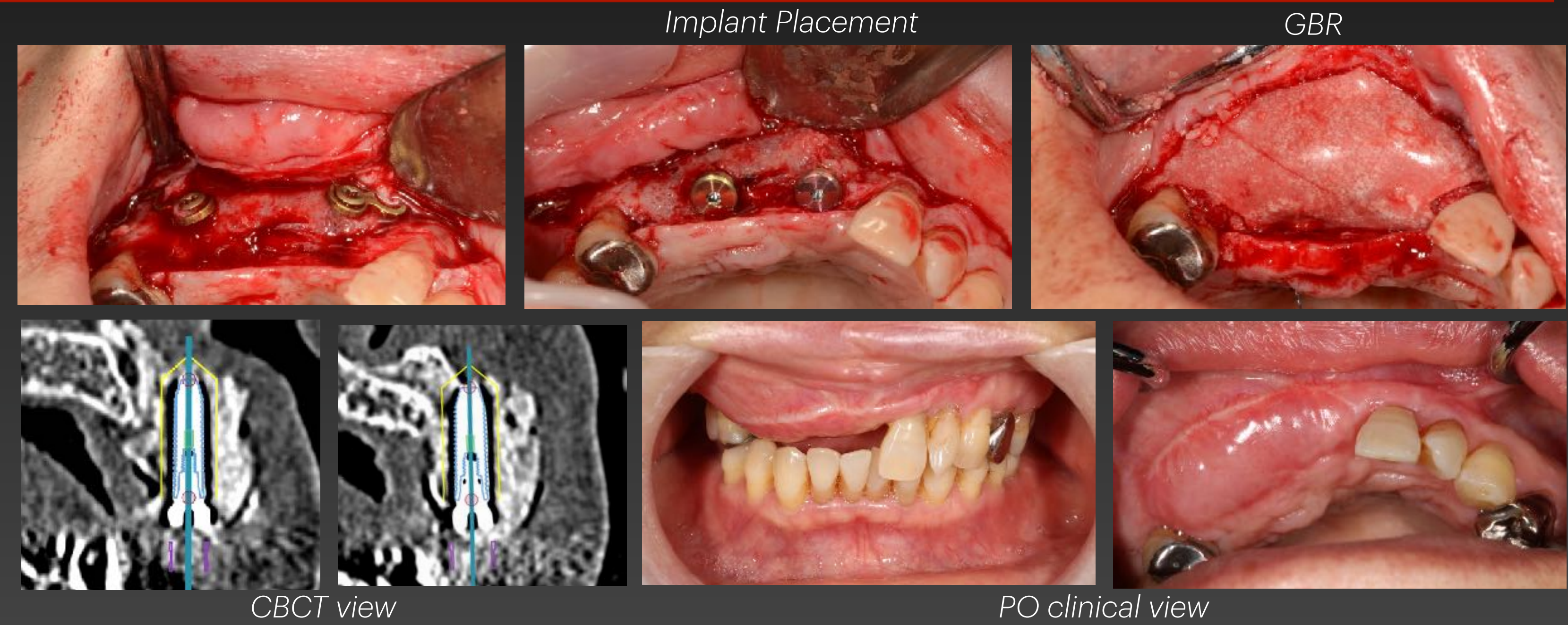


PO clinical view

**Second stage:
Vertical augmentation**



**Third stage:
Implant placement
Horizontal augmentation**





1st Provisional Restration



Vertebral plasty



2nd Provisional Restration

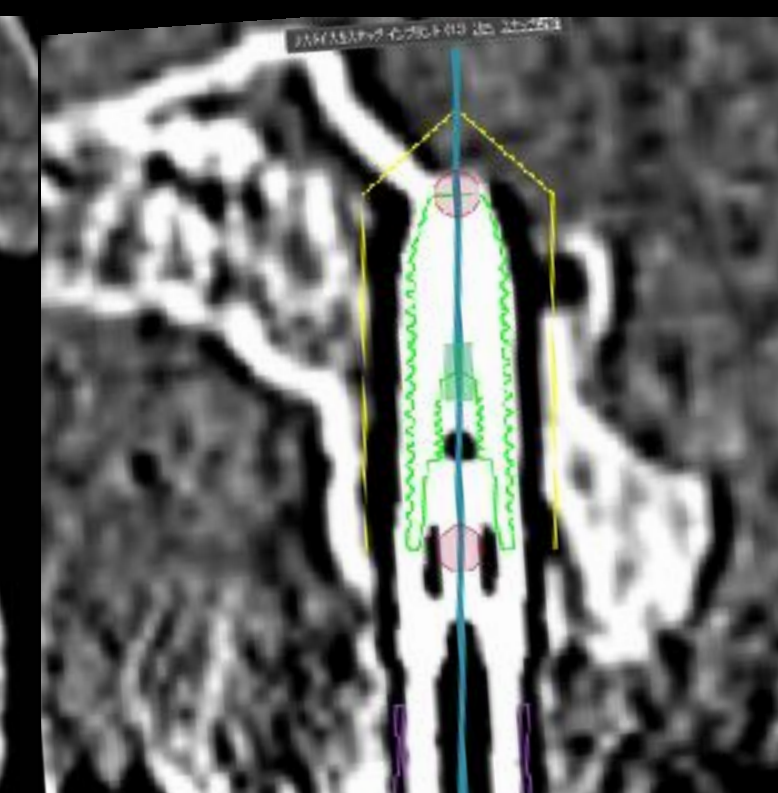
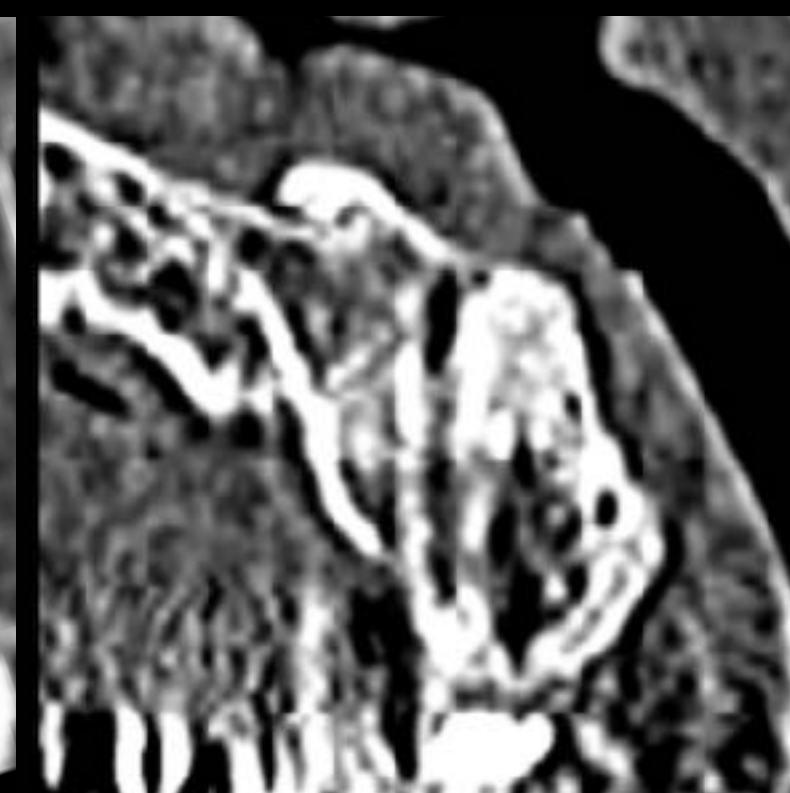
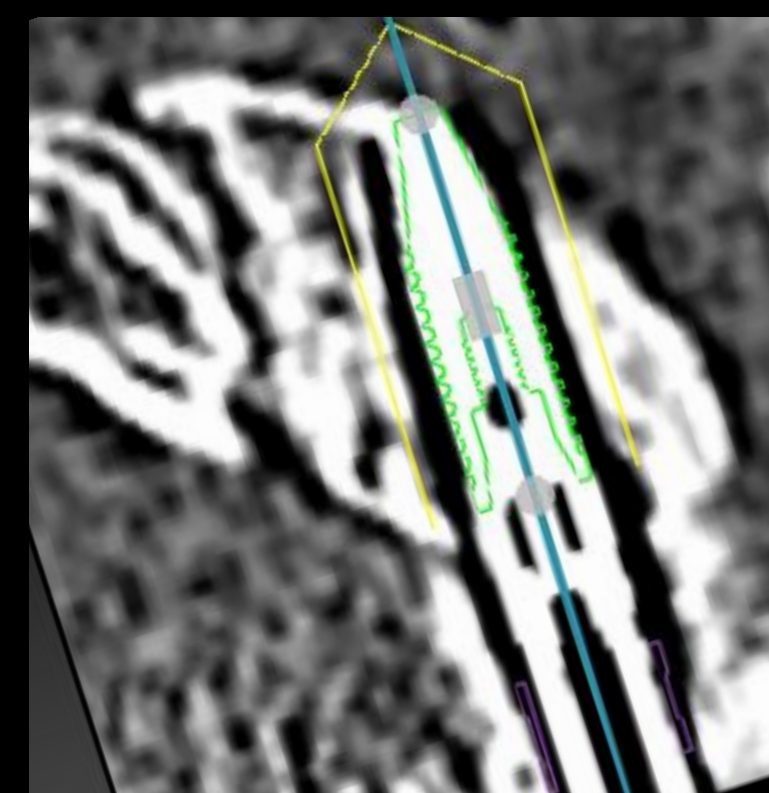
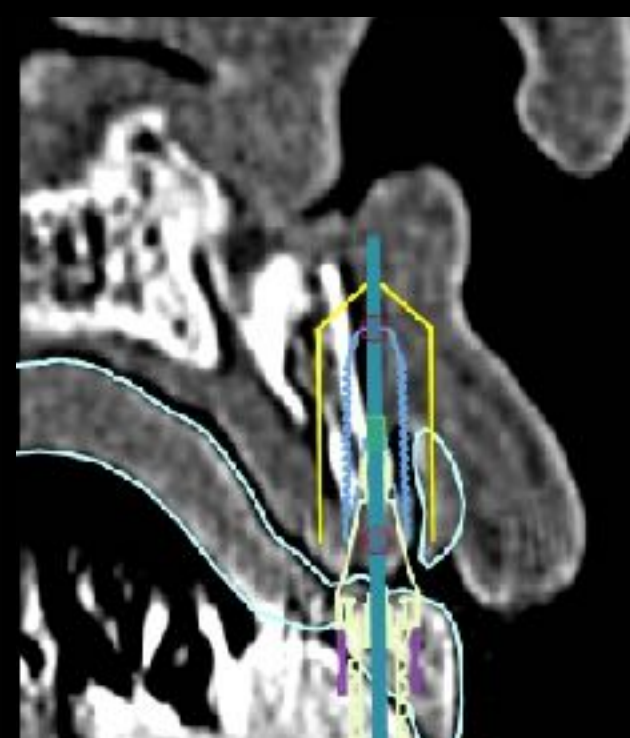
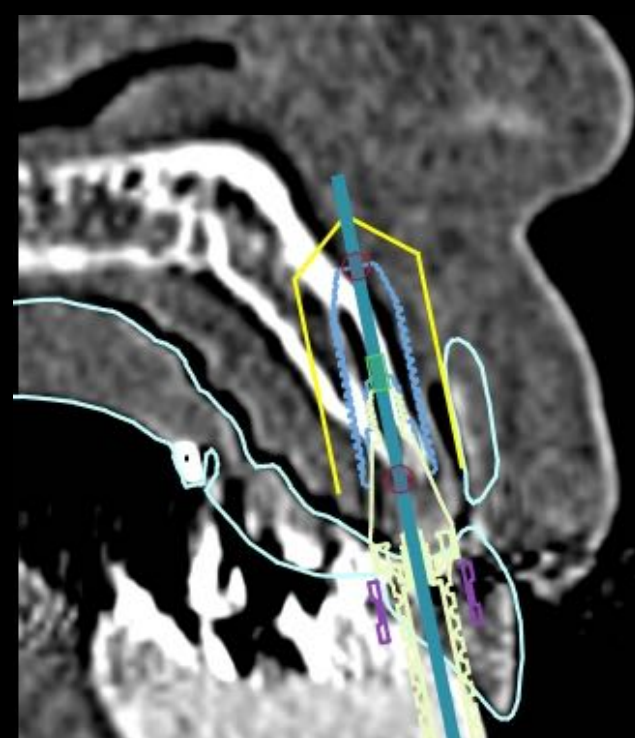


Final Restration

Initial Clinical View



Final Clinical View



Conclusion:

Even in severe atrophic alveolar cleft, staged bone regeneration combining autogenous bone and allograft under resorbable conditions may achieve reliable 3D reconstruction while minimizing the risks of nonresorbable membranes. Although multiple short procedures are needed, this protocol may ensure stable long-term function and esthetics. Continuous follow-up is necessary to confirm long-term predictability.