



Allogenic/Xenogenic Bone Substitute for Lateral (Horizontal) Guided Bone Regeneration: A Case Report

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BACKGROUND

- Guided bone regeneration (GBR) is a standard procedure to increase bone volume for future implant placement in an atrophic ridge.
- Biomaterials act as a scaffold to stabilize the surgical wound and encourage new bone formation.
- The outcome may vary depending on the stability of biomaterials, tissue perfusion, sufficient soft tissue release, and minimal soft tissue trauma.

AIM

Report outcomes of patients receiving xenogenic and allogenic bone substitutes covered by an absorbable collagen membrane.

OUTCOMES OF INTEREST

1. Dimensional horizontal bone changes.
2. Volume stability.
3. Tissue volumetric (surface) differences between baseline and follow-up.



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CASE 1 MODERATE HORIZONTAL BONE DEFECT IN THE POSTERIOR MANDIBLE

A 54-year-old healthy female patient presents to clinic with a mild horizontal bone defect in the left posterior mandible.

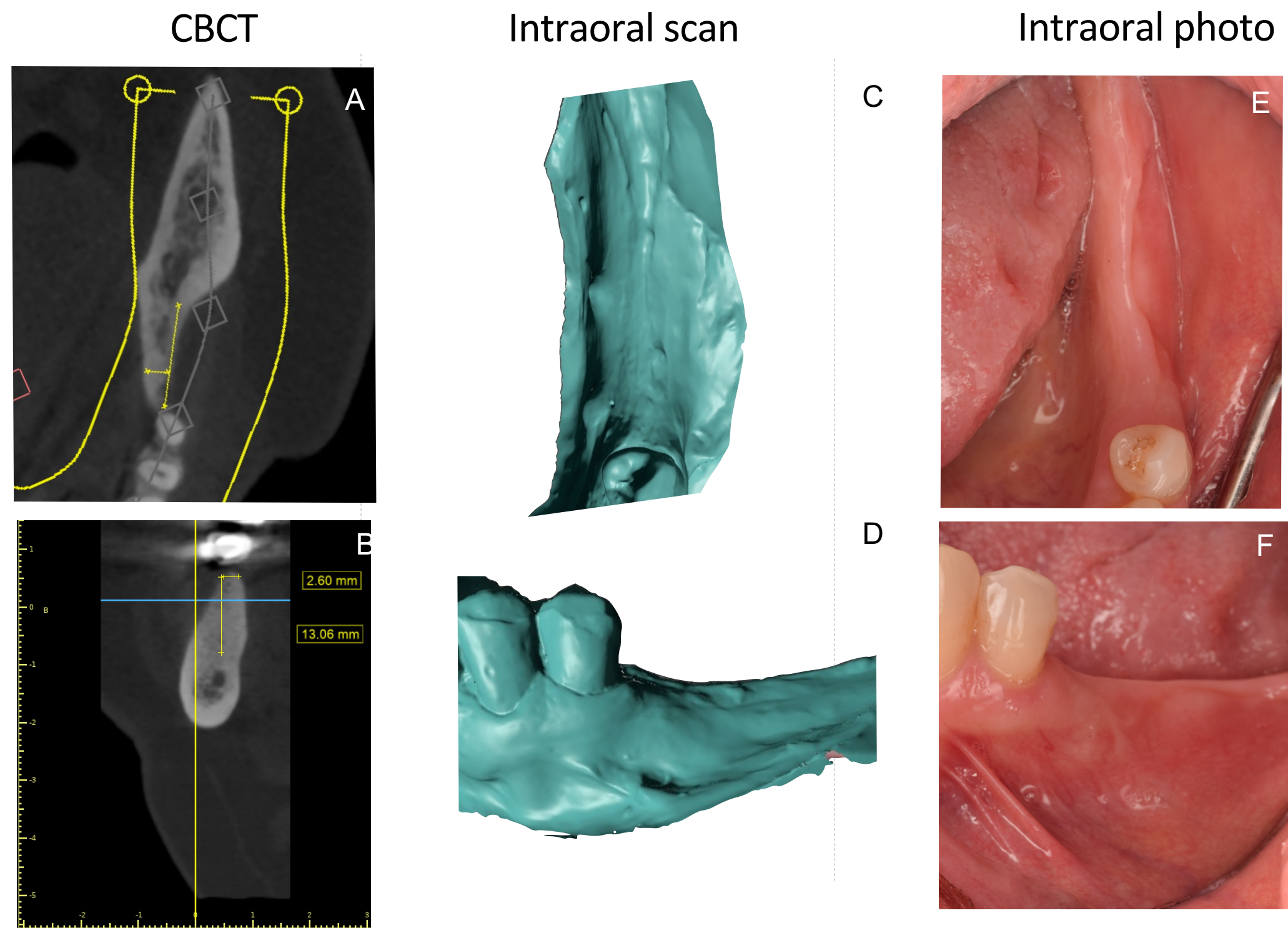


Figure 1. Pre-operative Diagnosis and Planning
(A and B. CBCT bone dimensions: 3 mm (mean width), 6 mm (mean height), 15 mm (length). C and D. Pre-operative intraoral scan and intraoral photos (E and F).

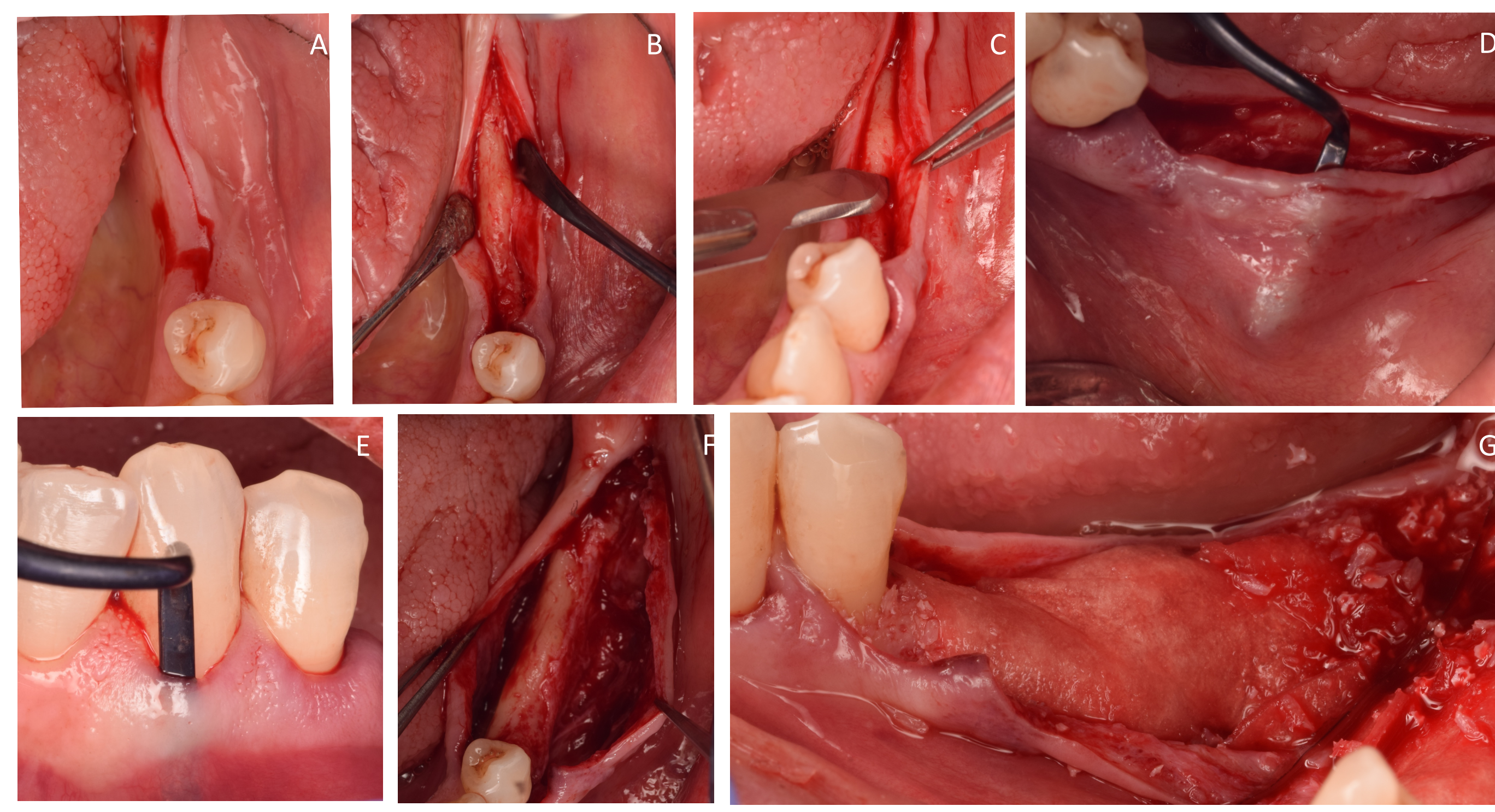


Figure 2. Horizontal Bone Augmentation Surgery Workflow
A. Crestal incision. B. Full-thickness flap release. C and D. Periosteal pocket flap release. E. Tunneling. F. Corticotomy. G. Bone graft placement (1 cc allogenic fiber substitute + 0.25 cc xenogenic bone particles)

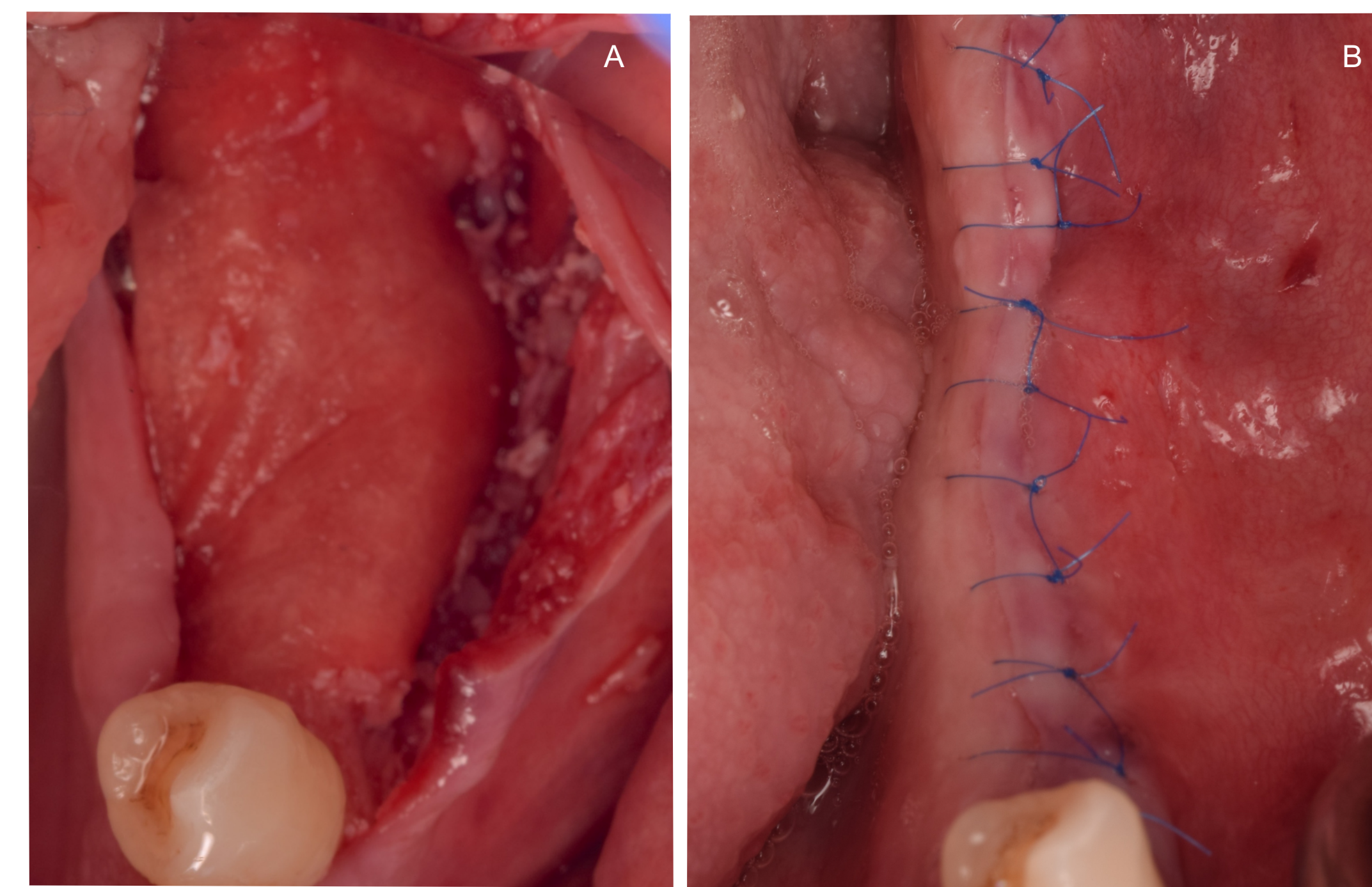


Figure 3. Membrane Fixation and Immediate Post-surgical
A. A collagen resorbable membrane (30 x 40 mm) was fixed with 3 mm screws B. Flaps sutured with 7-0 polypropylene single suture.

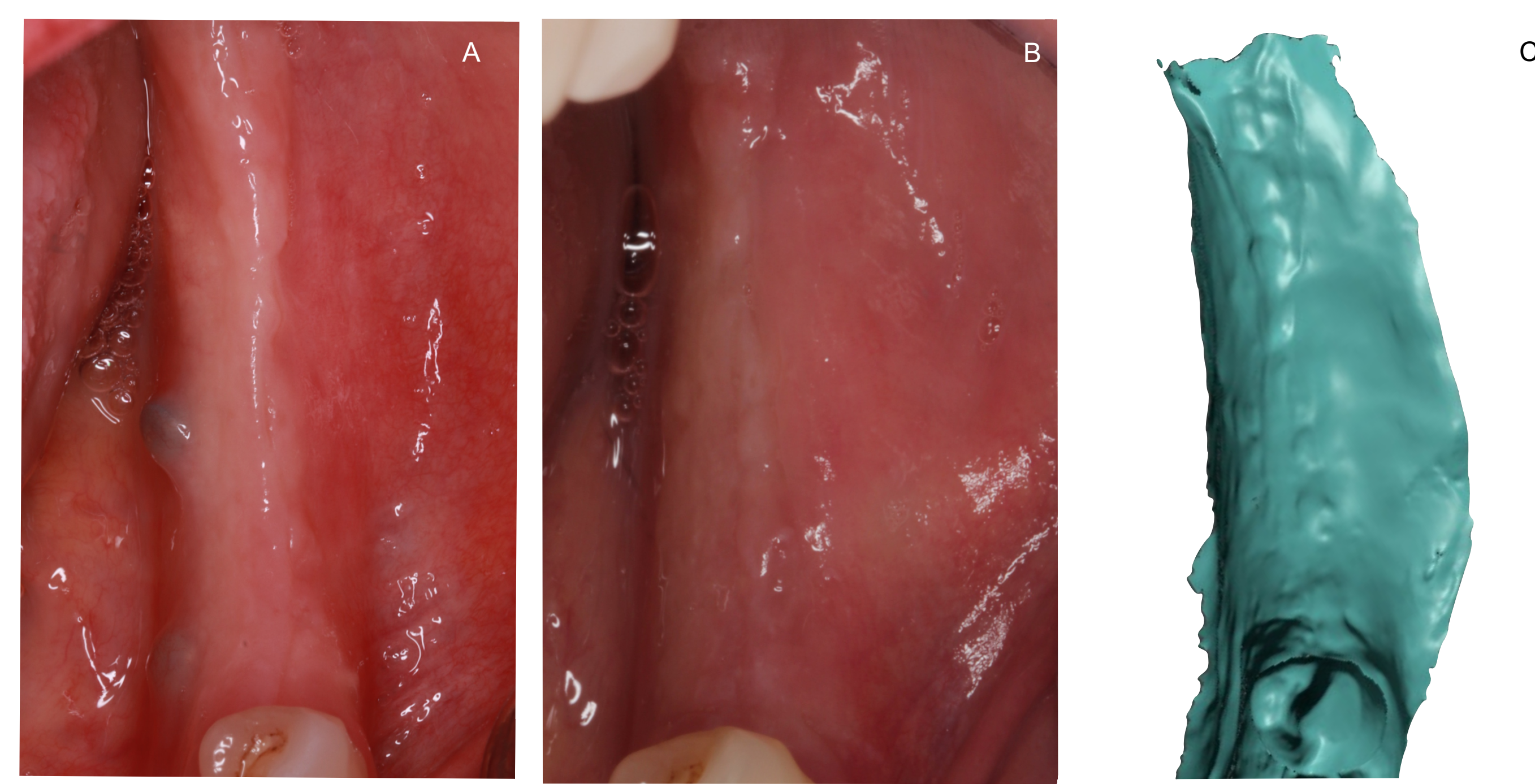


Figure 4. Post-surgical Follow Up
1 month (A) and 6 months photos (B), and 6 months (C) post-surgical intraoral scan occlusal view.

CASE 2 MODERATE HORIZONTAL BONE DEFECT IN THE POSTERIOR MANDIBLE

A 54-year-old healthy female patient presents to clinic with a mild horizontal bone defect in the left posterior mandible.

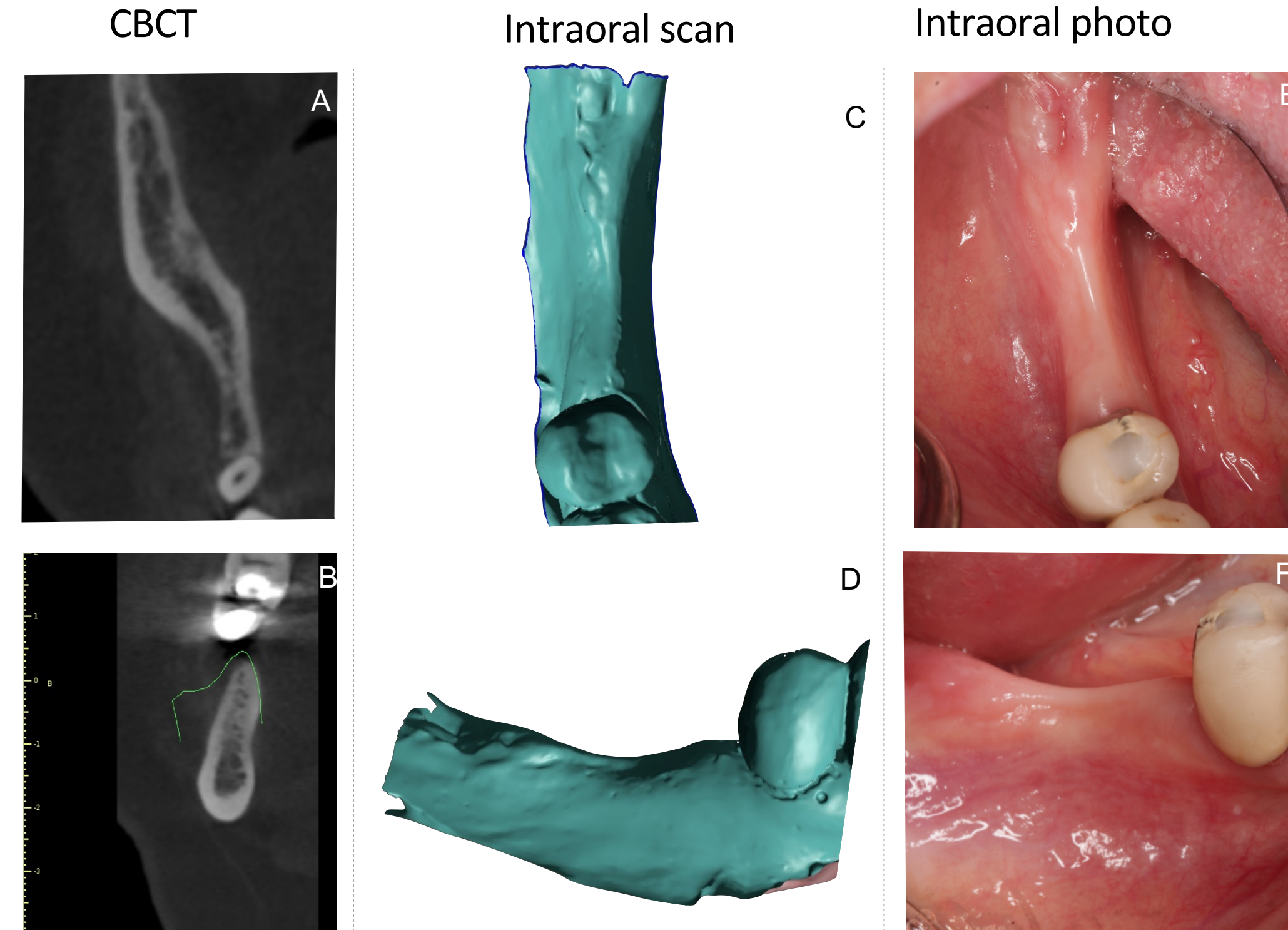


Figure 1. Pre-operative Diagnosis and Planning
A and B. CBCT bone dimensions: 2.5 mm (mean width), 7 mm (mean height), 18 mm (length). C and D. Preoperative intraoral scan and photos (E -F).

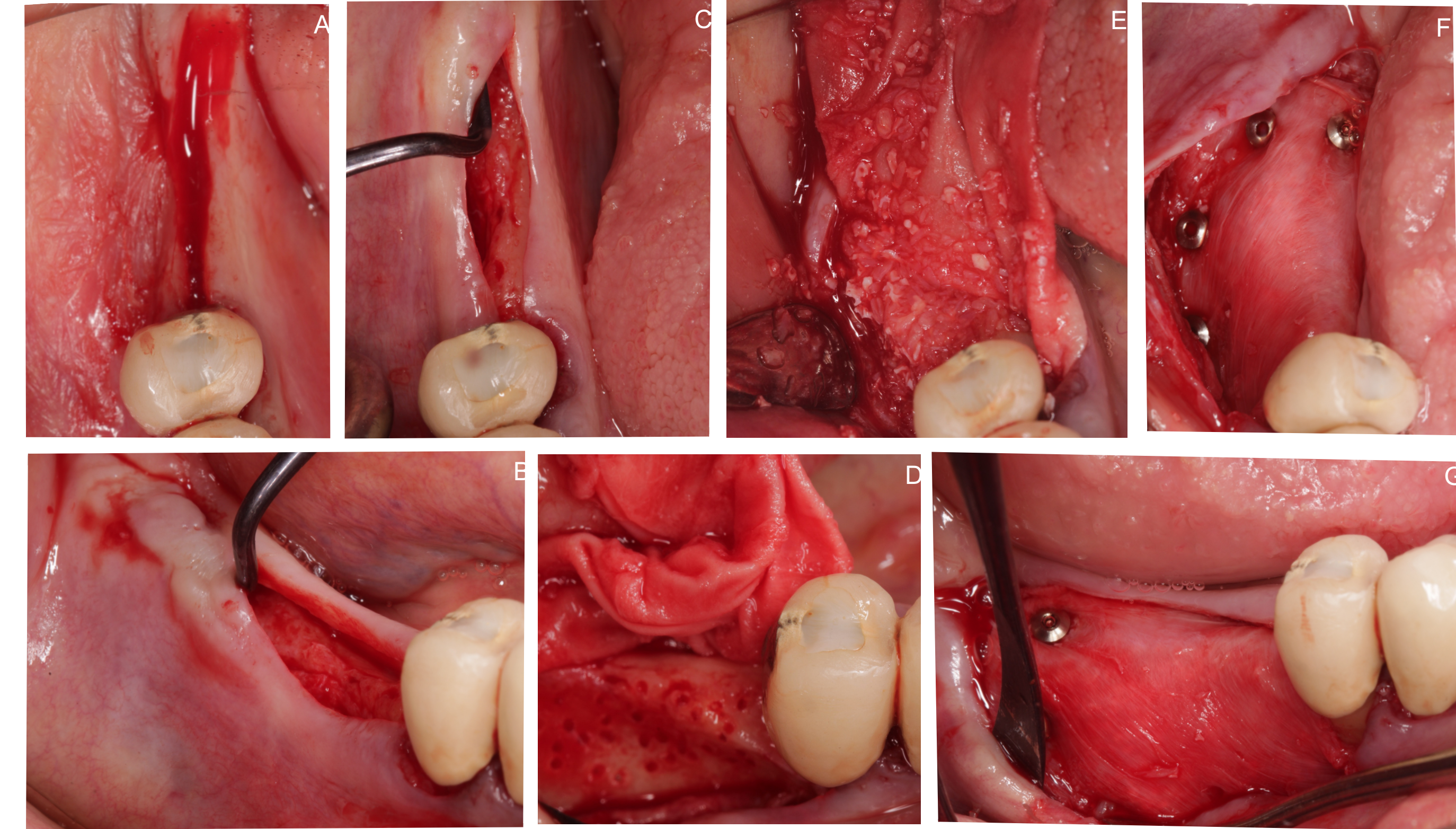


Figure 2. Horizontal Bone Augmentation Surgery Workflow
A. Crestal incision. B-C. Envelope flap design and periosteal pocket flap release. D. Corticotomy and lingual membrane placement F. Bone graft placement (1 cc allogenic particles + 0.25 cc xenogenic bone particles).

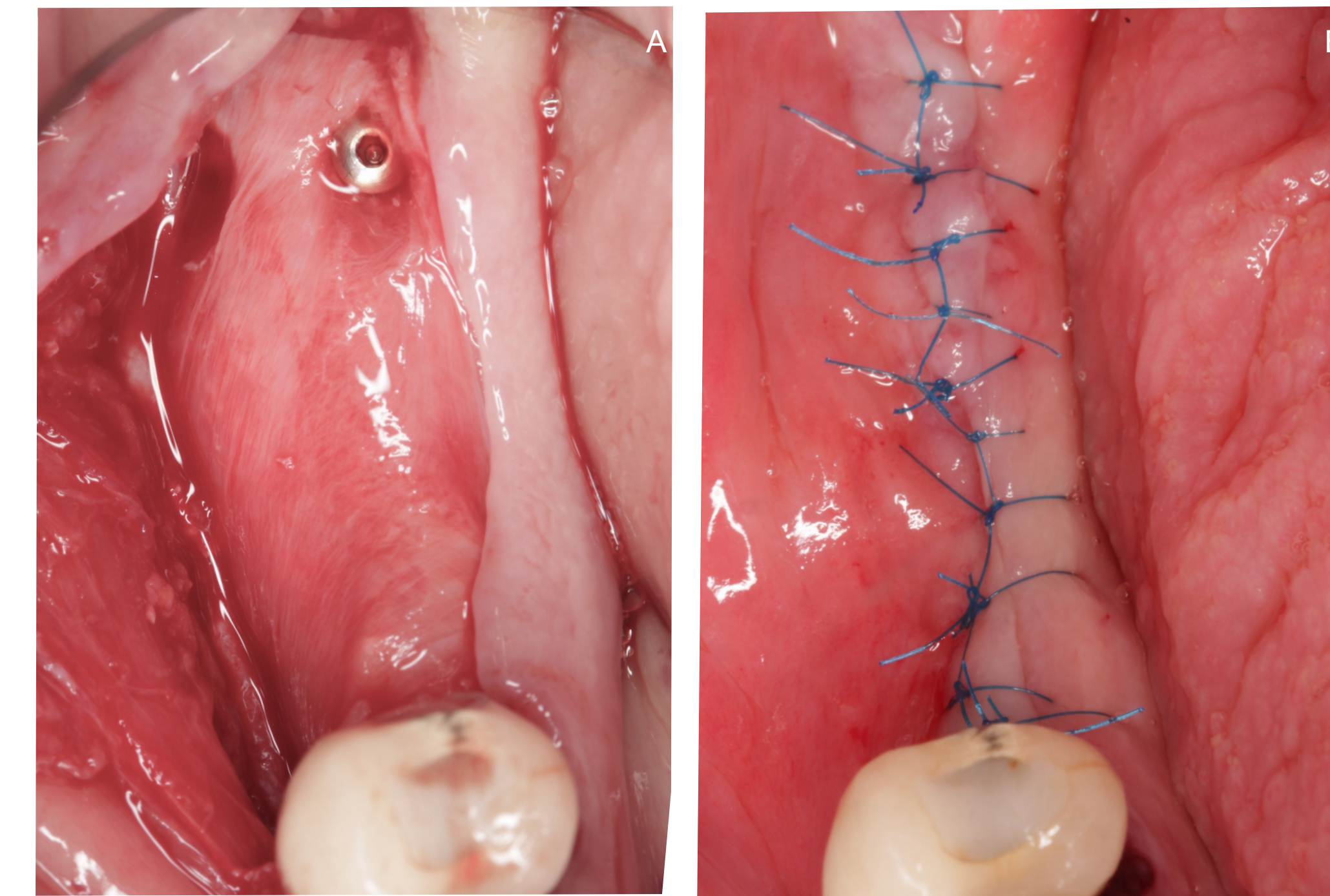


Figure 3. Membrane Fixation and Immediate Post-surgical
A. A collagen resorbable membrane (30 x 40 mm) was fixed with 3 mm screws B. Flaps sutured with 6-0 polypropylene single

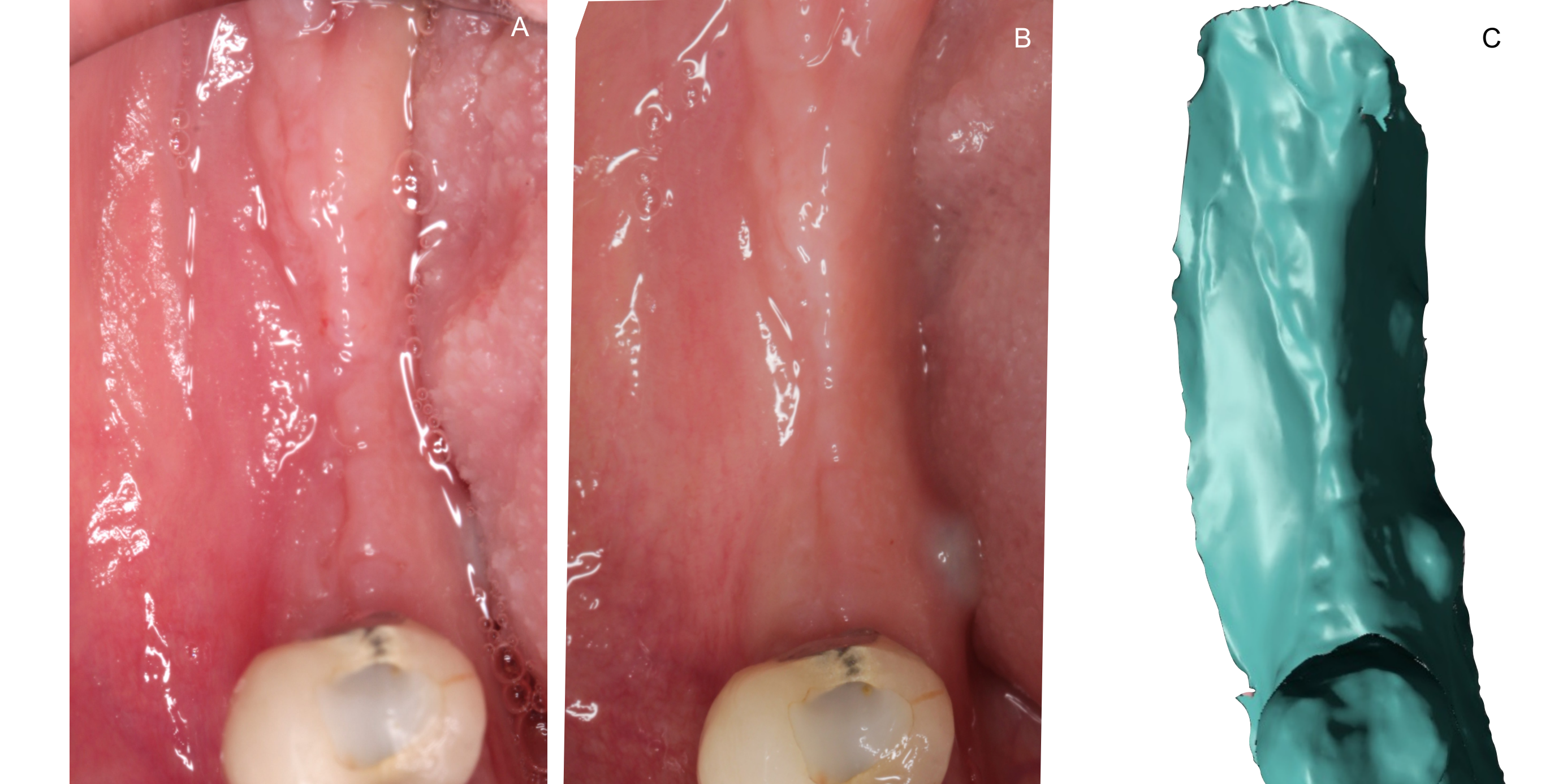


Figure 4. Post-surgical Follow Up
1 month (A) and 6 months photos (B), and 4 months (C) post-surgical intraoral scan occlusal view.

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CASE 3 SEVERE HORIZONTAL BONE LOSS IN THE ANTERIOR MAXILLA

A 56-year-old healthy female patient presents to clinic with a moderate horizontal bone defect in the upper anterior maxilla.

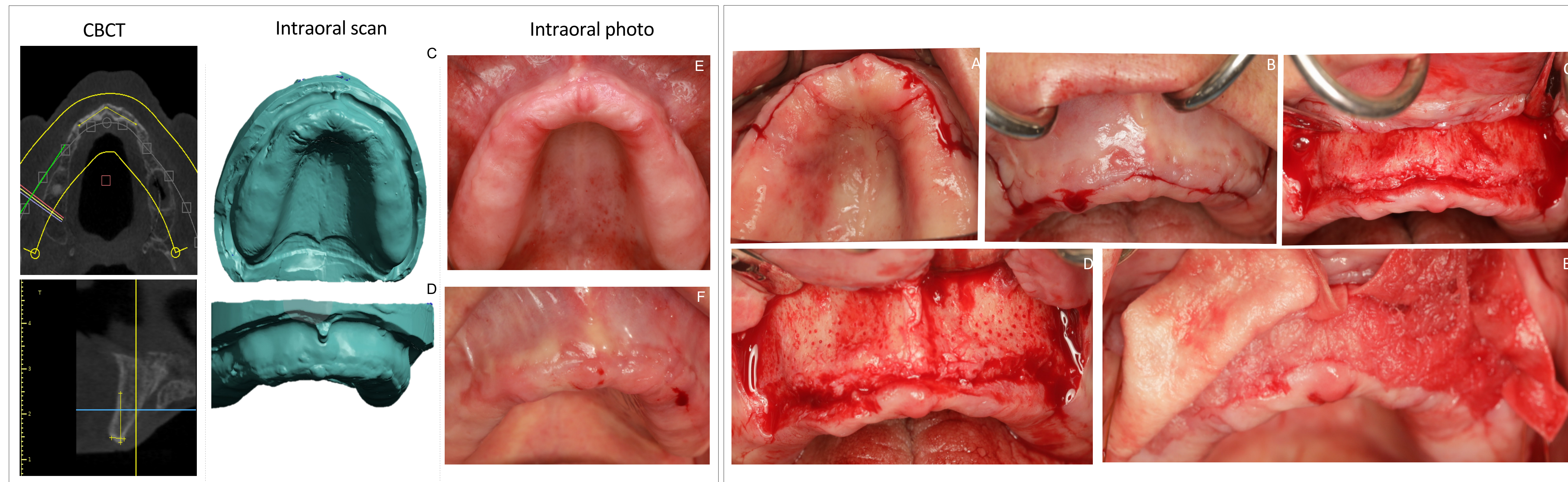


Figure 1. Pre-operative Diagnosis and Planning

A and B. CBCT bone dimensions: 3 mm (mean width), 10 mm (mean height), 25 mm (length). C-D. Preoperative intraoral scan. photos show (E-F).

Figure 2. Horizontal Bone Augmentation Surgery Workflow

A-B. Trapezoidal flap C. Full-thickness flap elevation. D. Corticotomy. D. Bone graft placement (1 cc allogenic fibers + 0.25 cc xenogenic bone particles, and placement of collagen resorbable membranes.

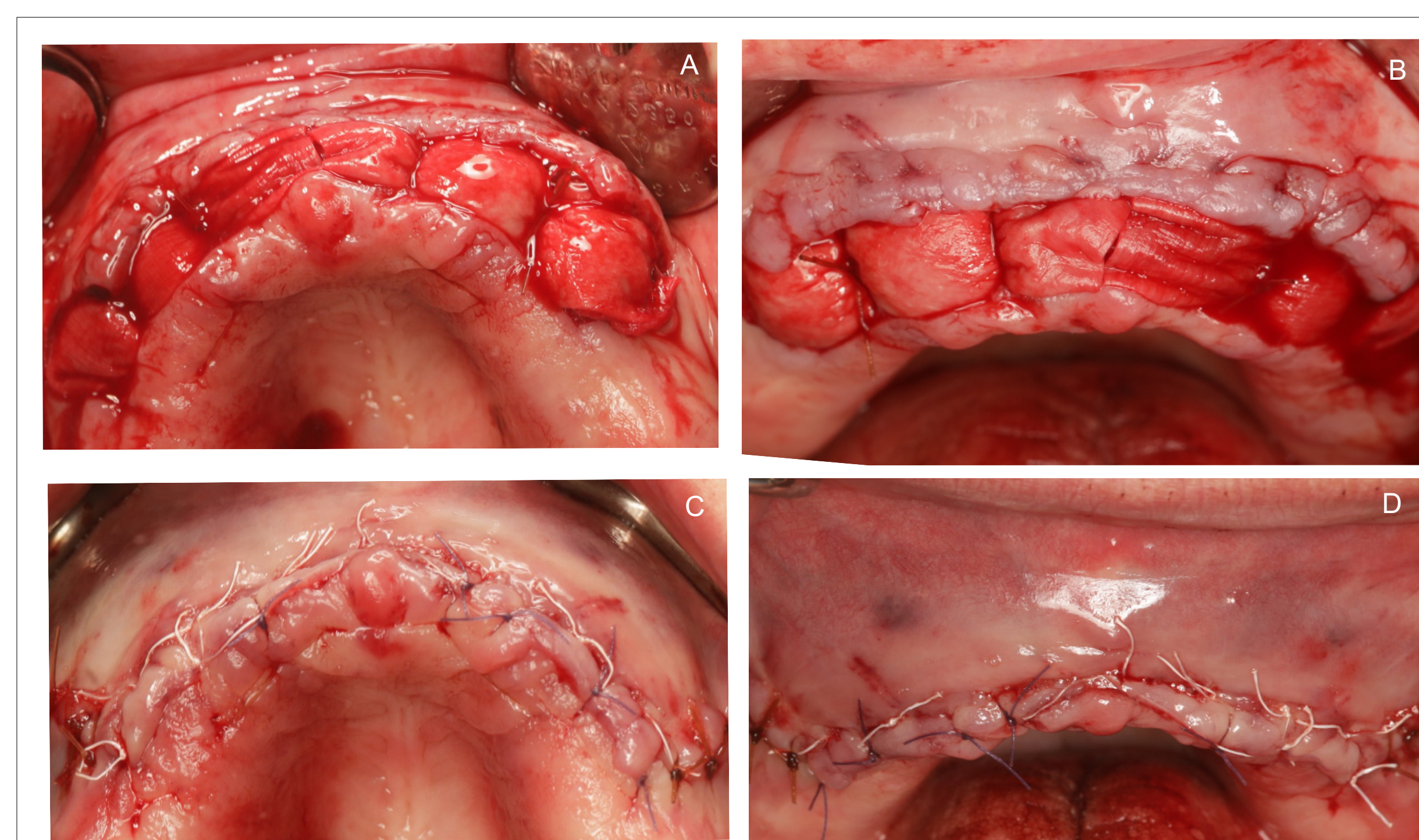


Figure 3. Membrane fixation and Immediate post-surgical

A. Collagen resorbable membranes (30 x 40 mm) fixed with periosteal vertical mattress 6-0 GPA sutures. B. 5-0 PTFE horizontal mattress



Figure 4. Post-surgical Follow up

15 days intraoral photos occlusal (A) and facial view (B). 6 months FU intraoral photos (C) and intraoral scan (D).

CASE 4 SEVERE HORIZONTAL BONE LOSS IN THE POSTERIOR MANDIBLE

A 80-year-old female patient with controlled HTA presents to clinic with a moderate horizontal bone defect in the posterior mandible.

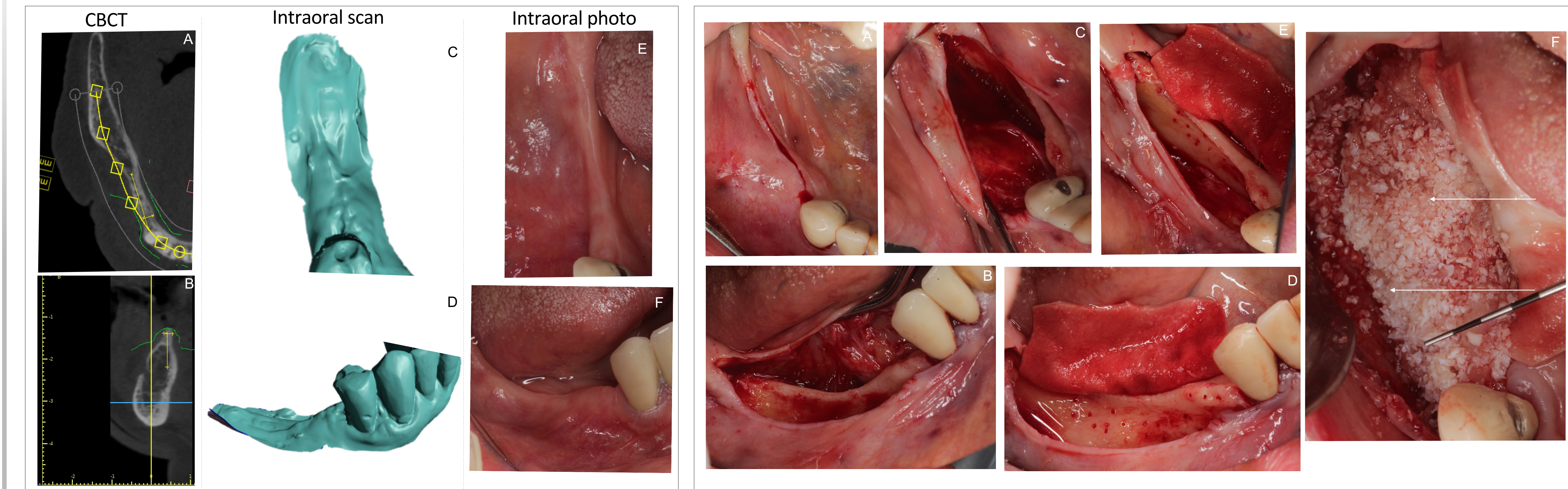


Figure 1. Pre-operative Diagnosis and Planning

A and B. CBCT bone dimensions: 2.5 mm (mean width), 7 mm (mean height), 18 mm (length). C-D. Intraoral scan and photos (E-F).

Figure 2. Horizontal Bone Augmentation Surgery Workflow

A-C. Envelope flap design and periosteal pocket flap release. D-E. Corticotomy and lingual membrane placement F. 1 cc of allogenic bone particles (inner layer) + 0.25 cc xenogenic bone particles (outer layer).

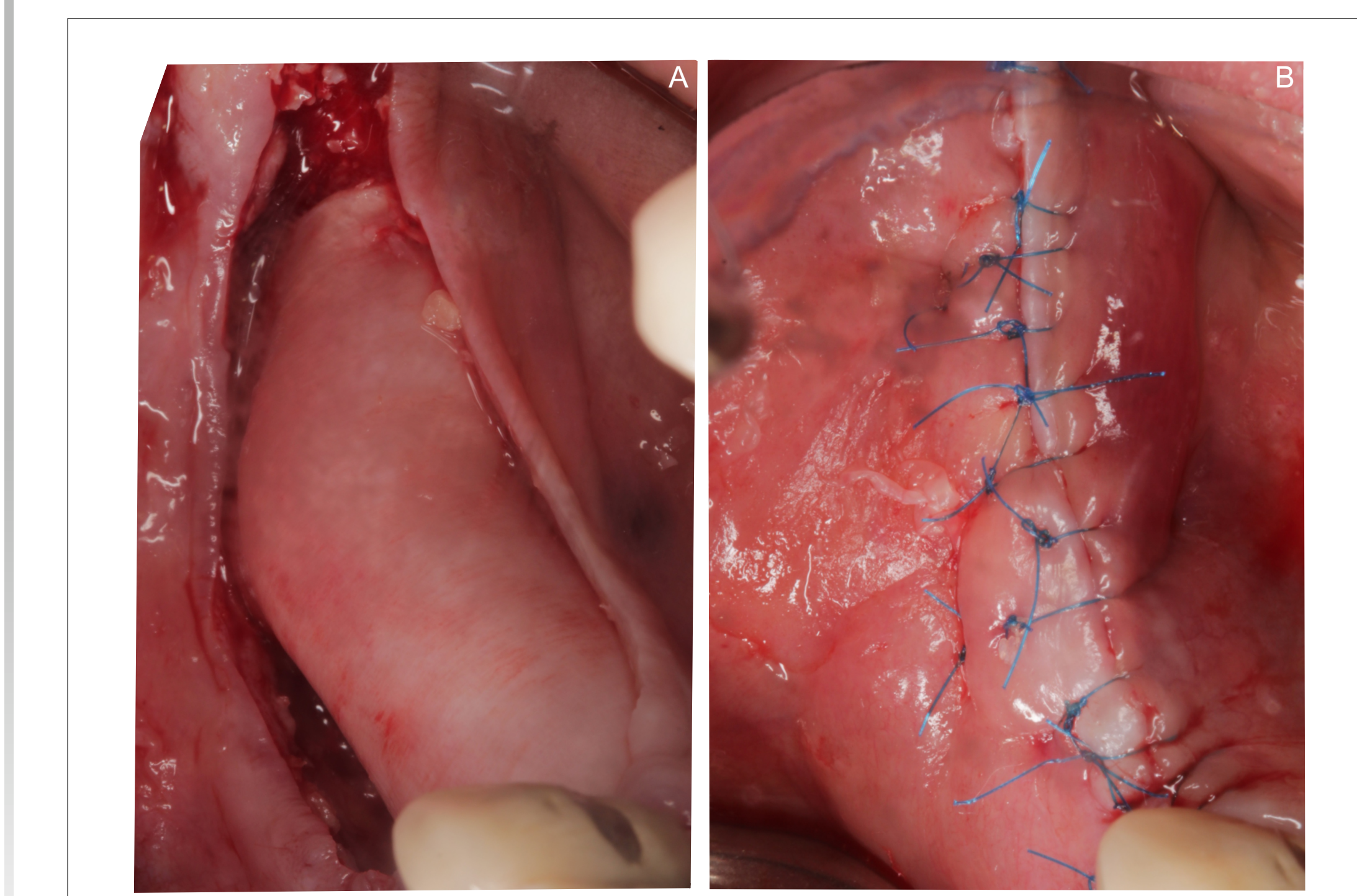
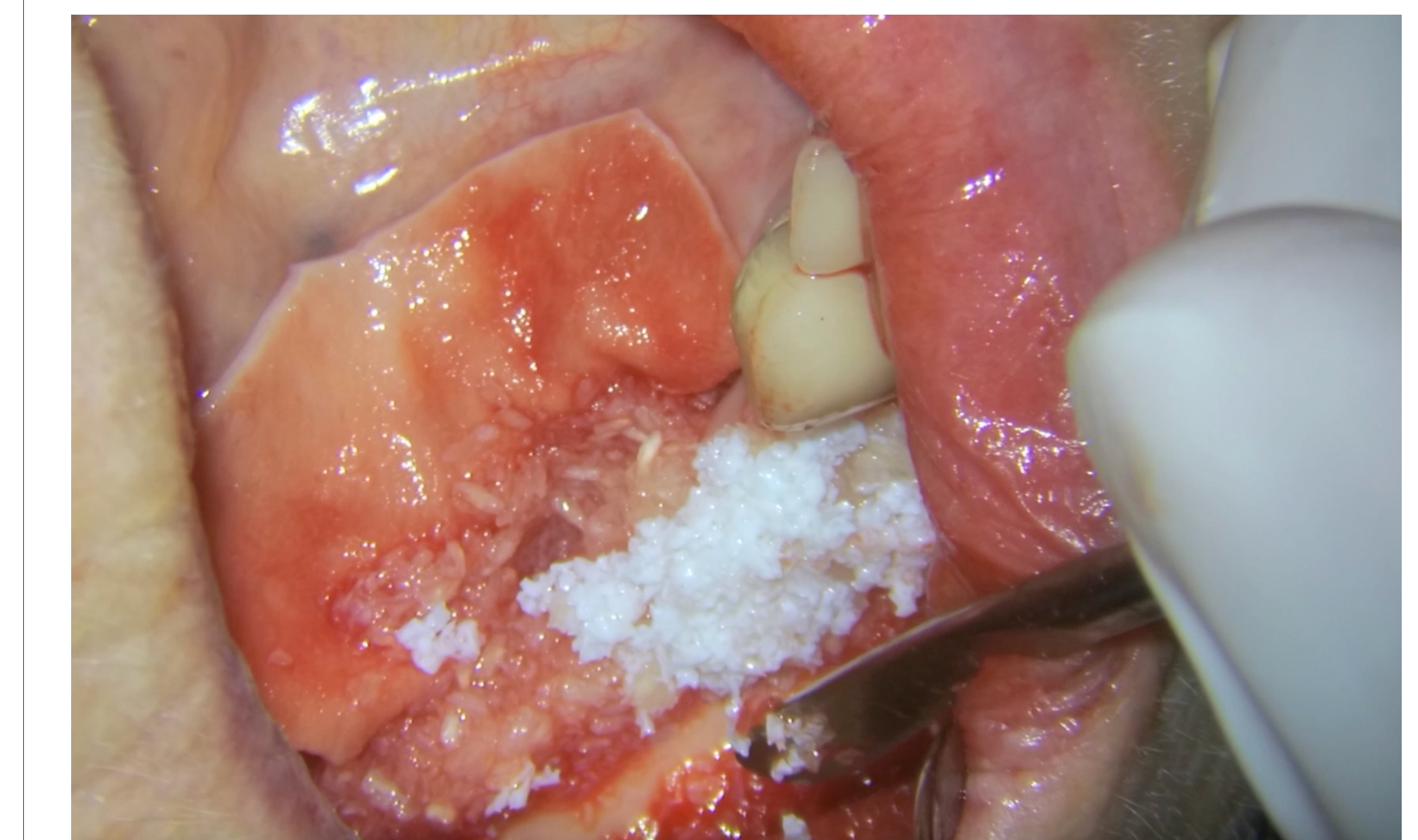


Figure 3. Membrane fixation and Immediate post-surgical

A. A collagen resorbable membrane (30 x 40 mm) fixed with 3mm screws. B. 7-0 polypropylene horizontal mattress and single



Video 1. Microscope-assisted Horizontal Bone Augmentation



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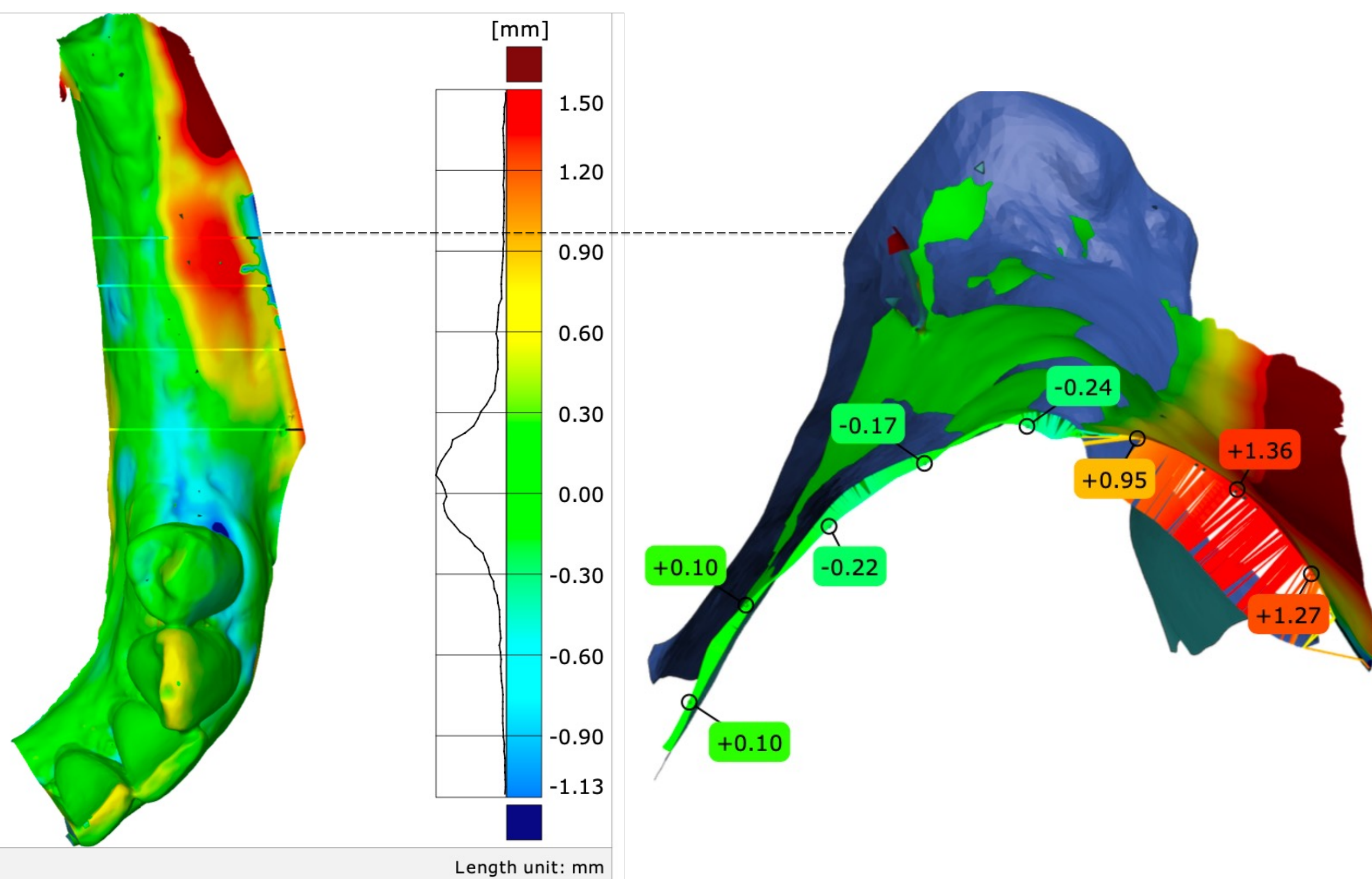


REPORTED VOLUMETRIC OUTCOMES

Case 01

STL files superimposition

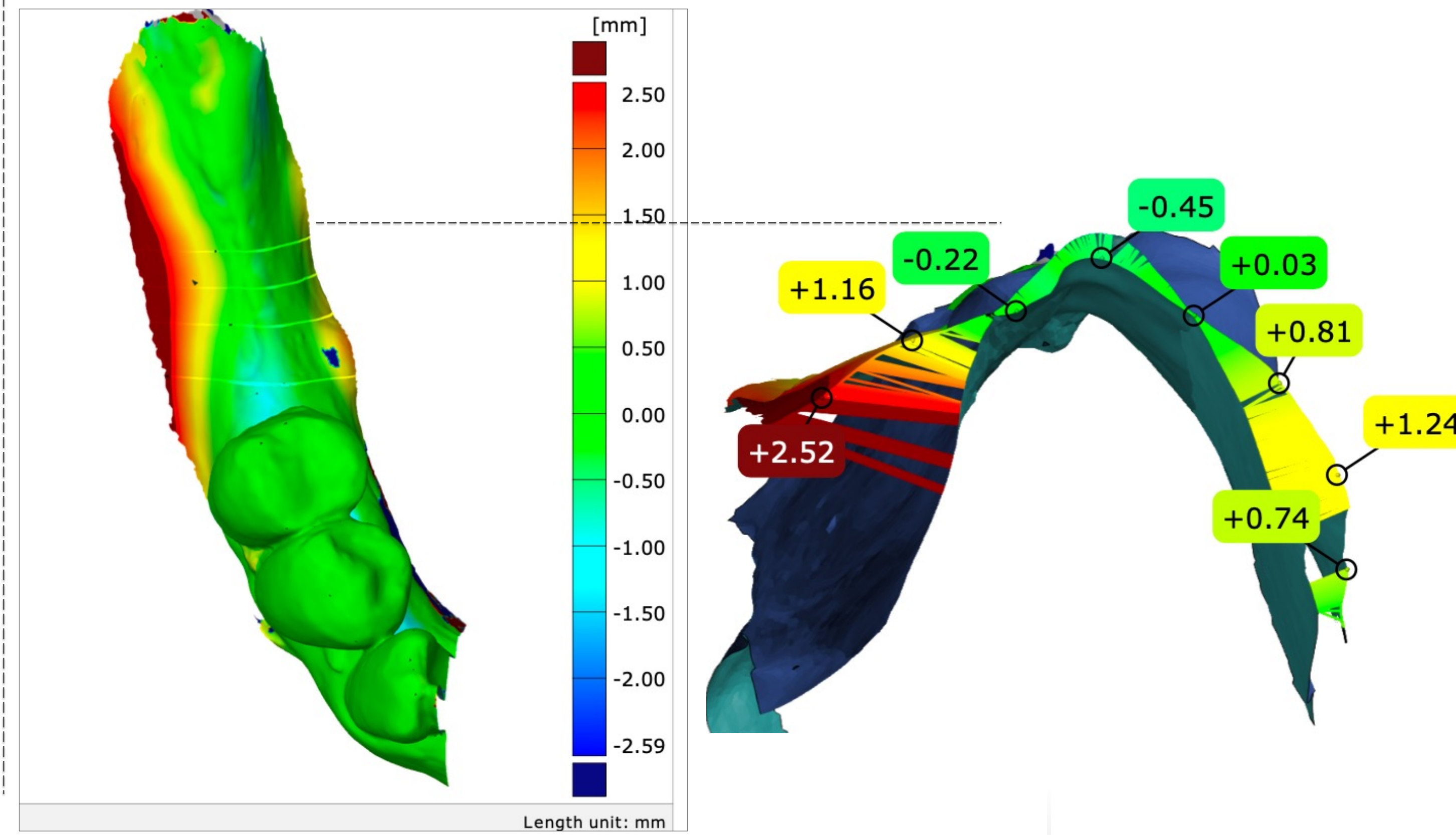
Dimensional changes



Case 02

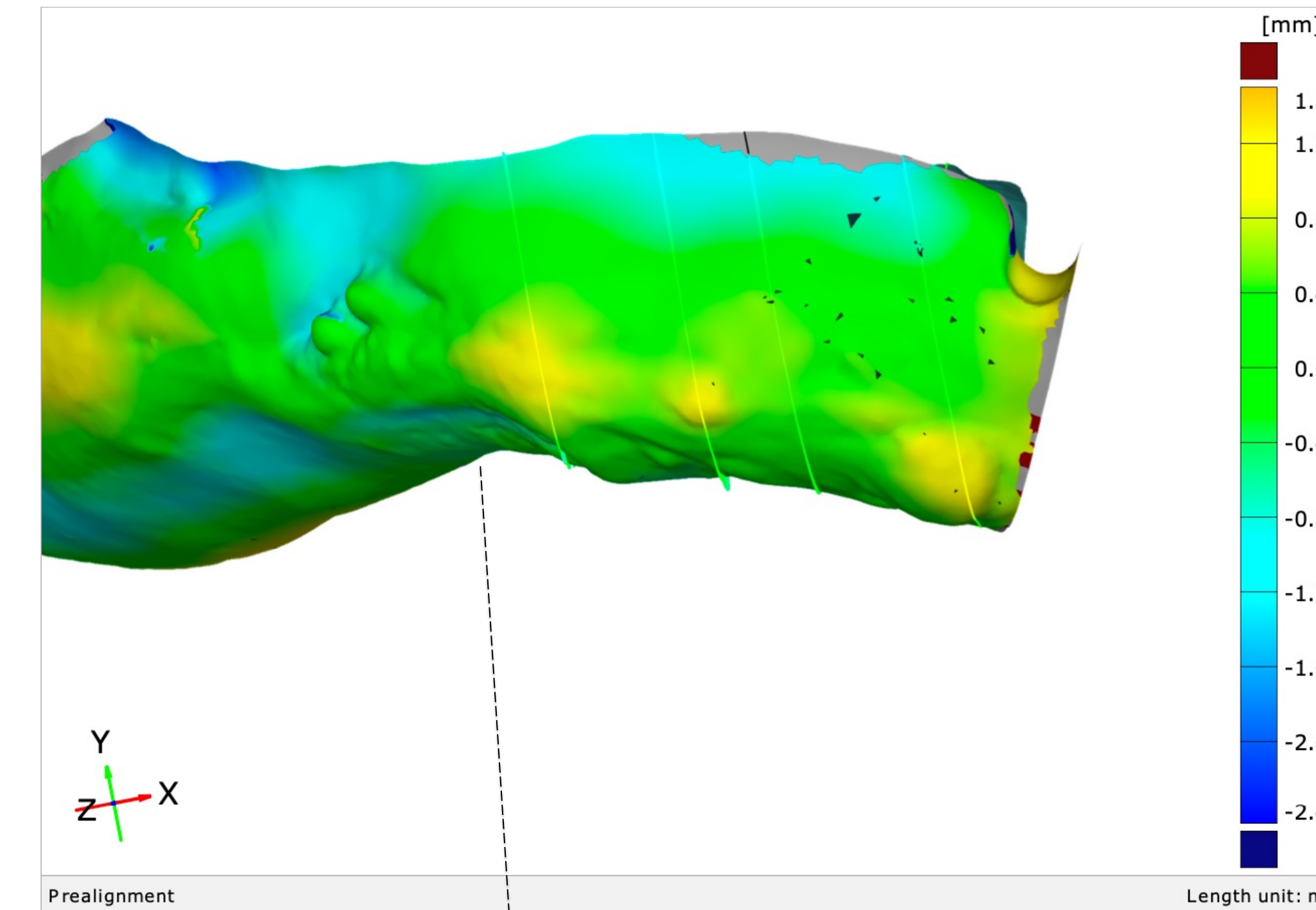
STL files superimposition

Dimensional changes

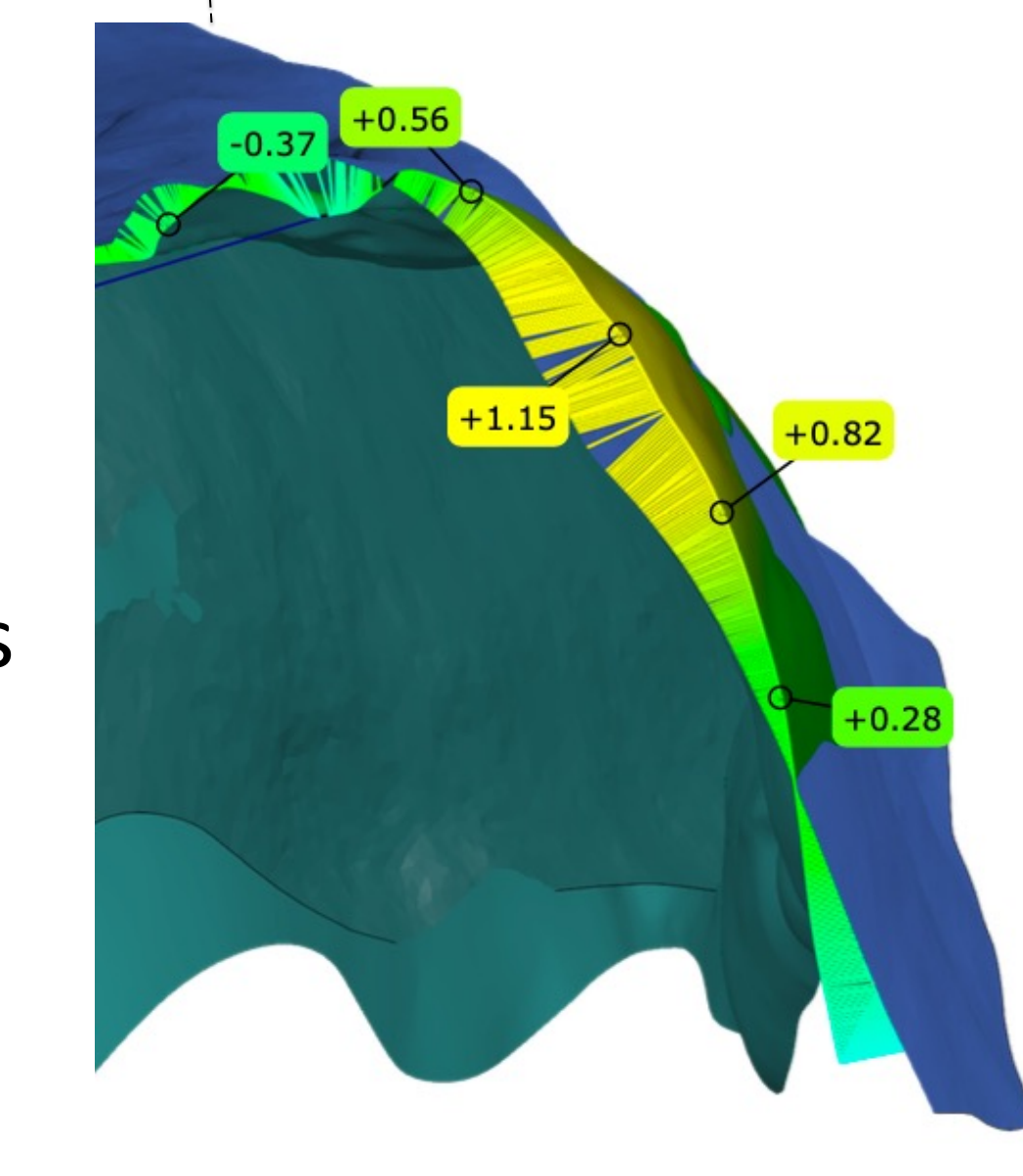


Case 03

STL files superimposition

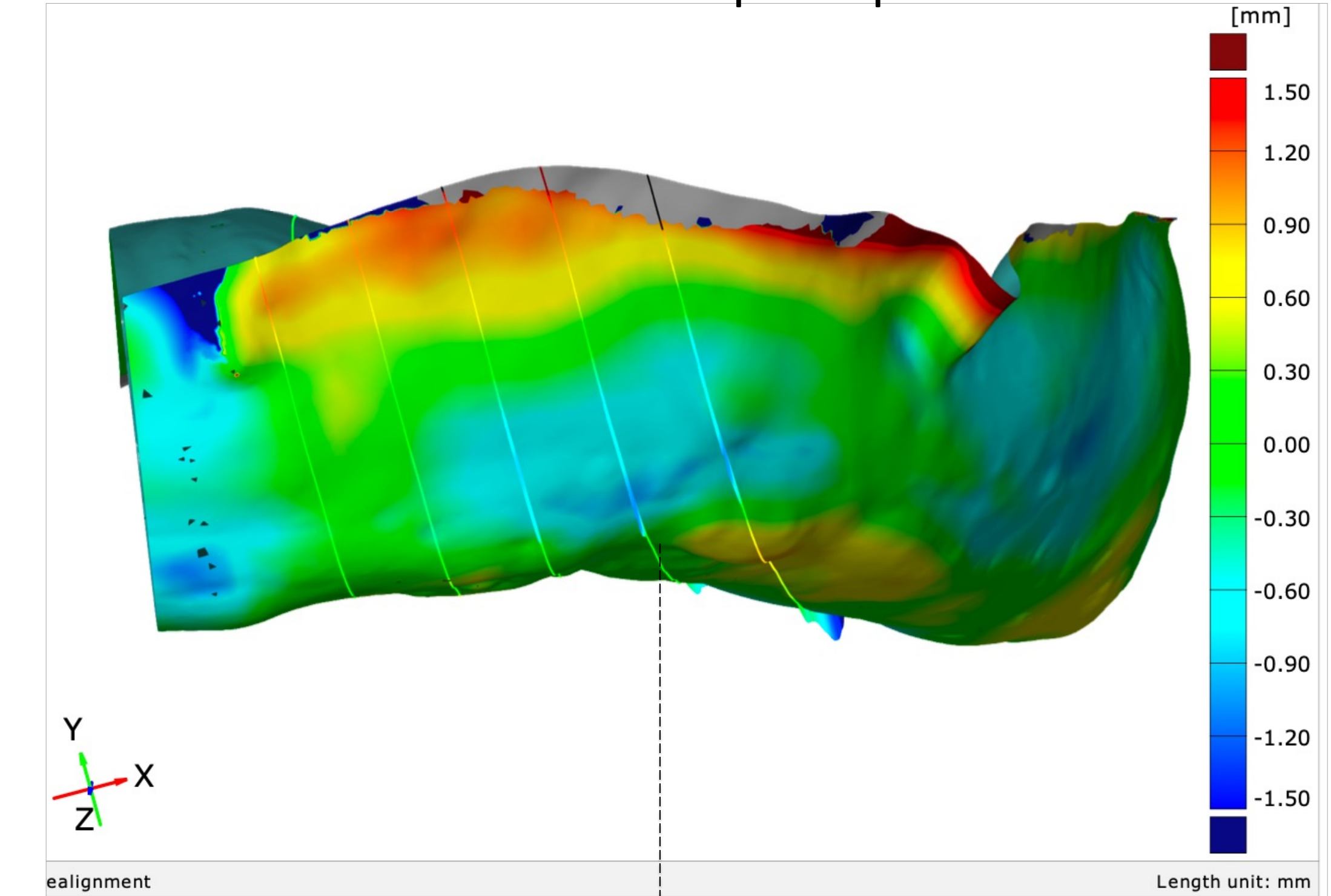


Dimensional changes

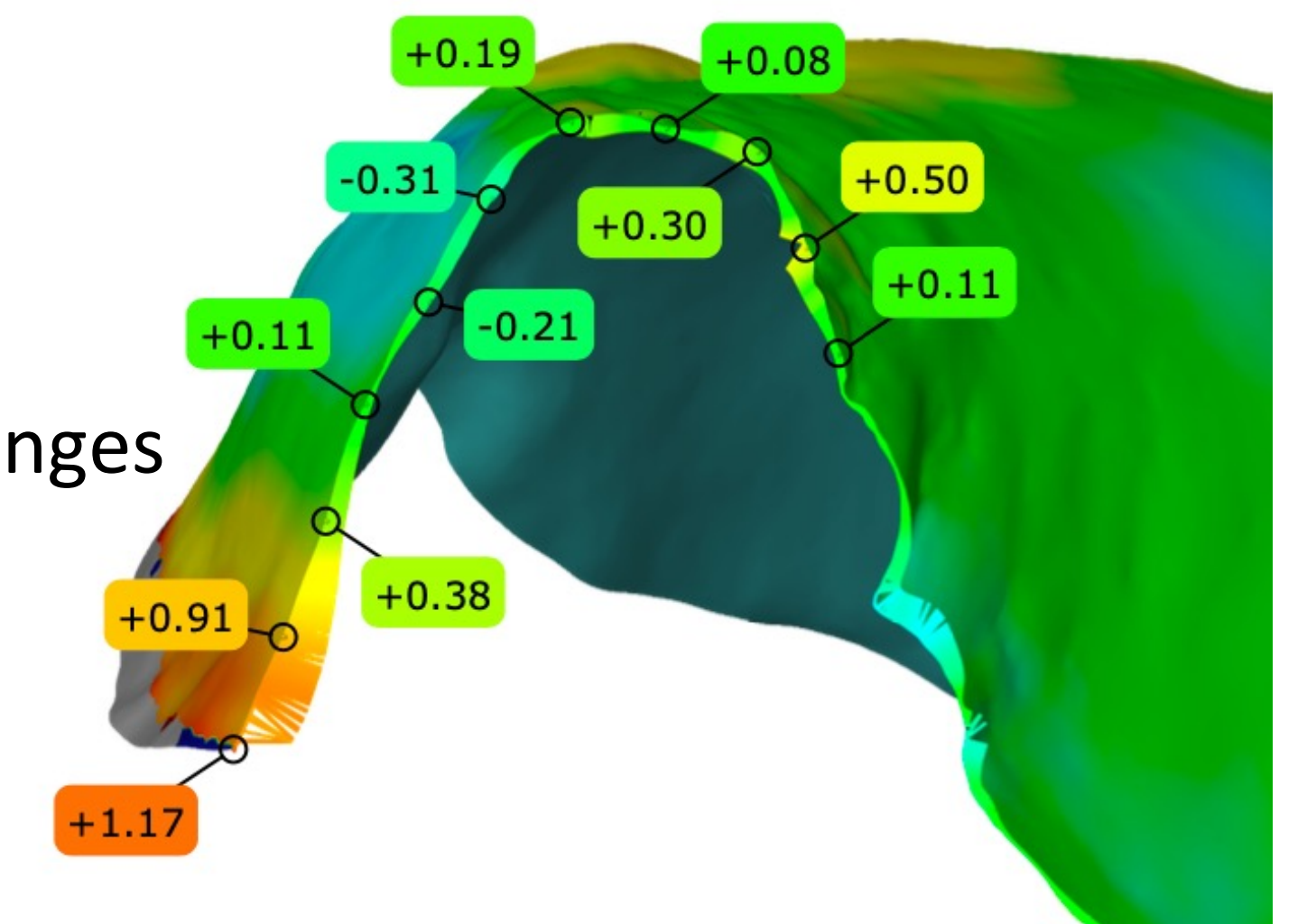


Case 04

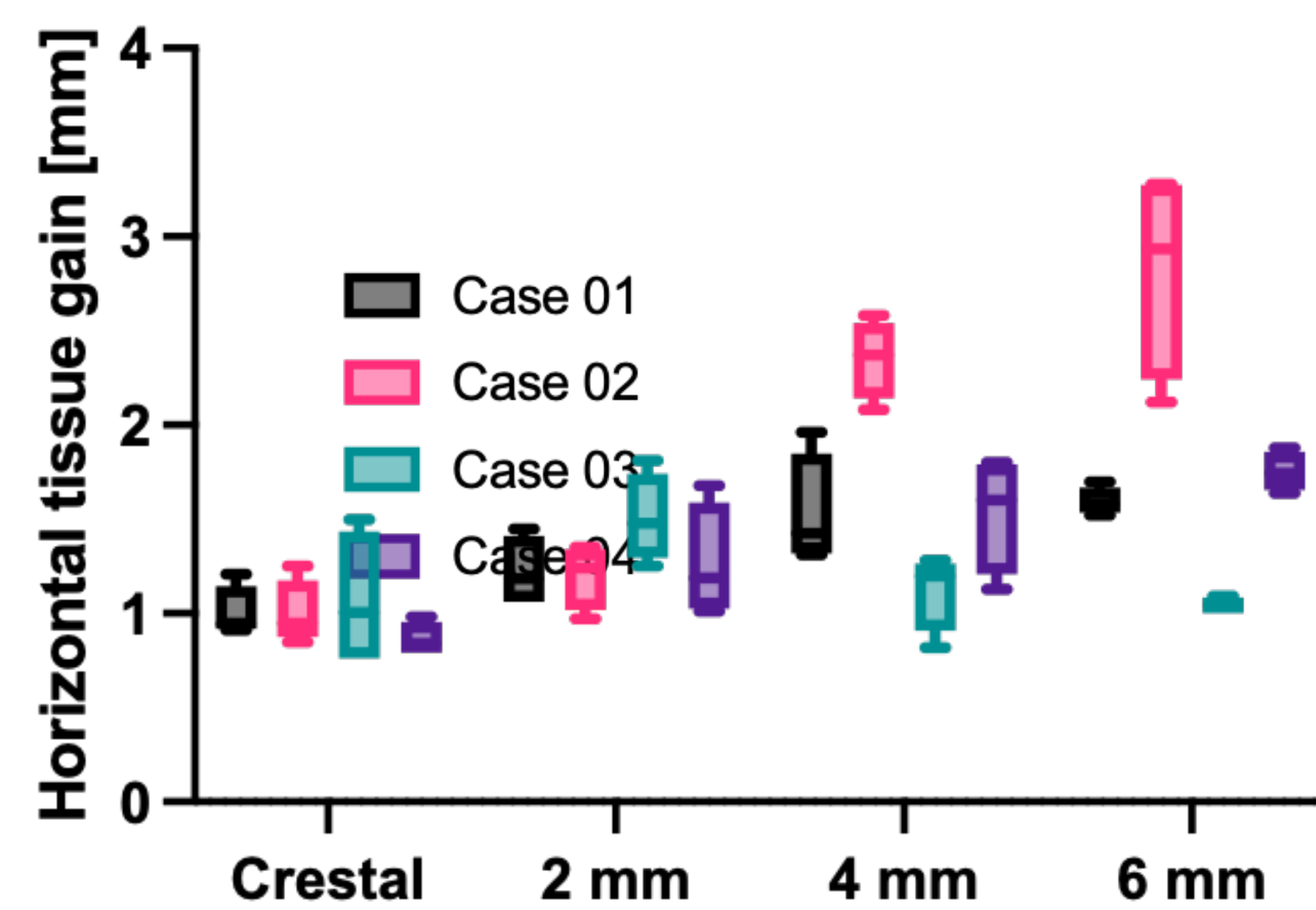
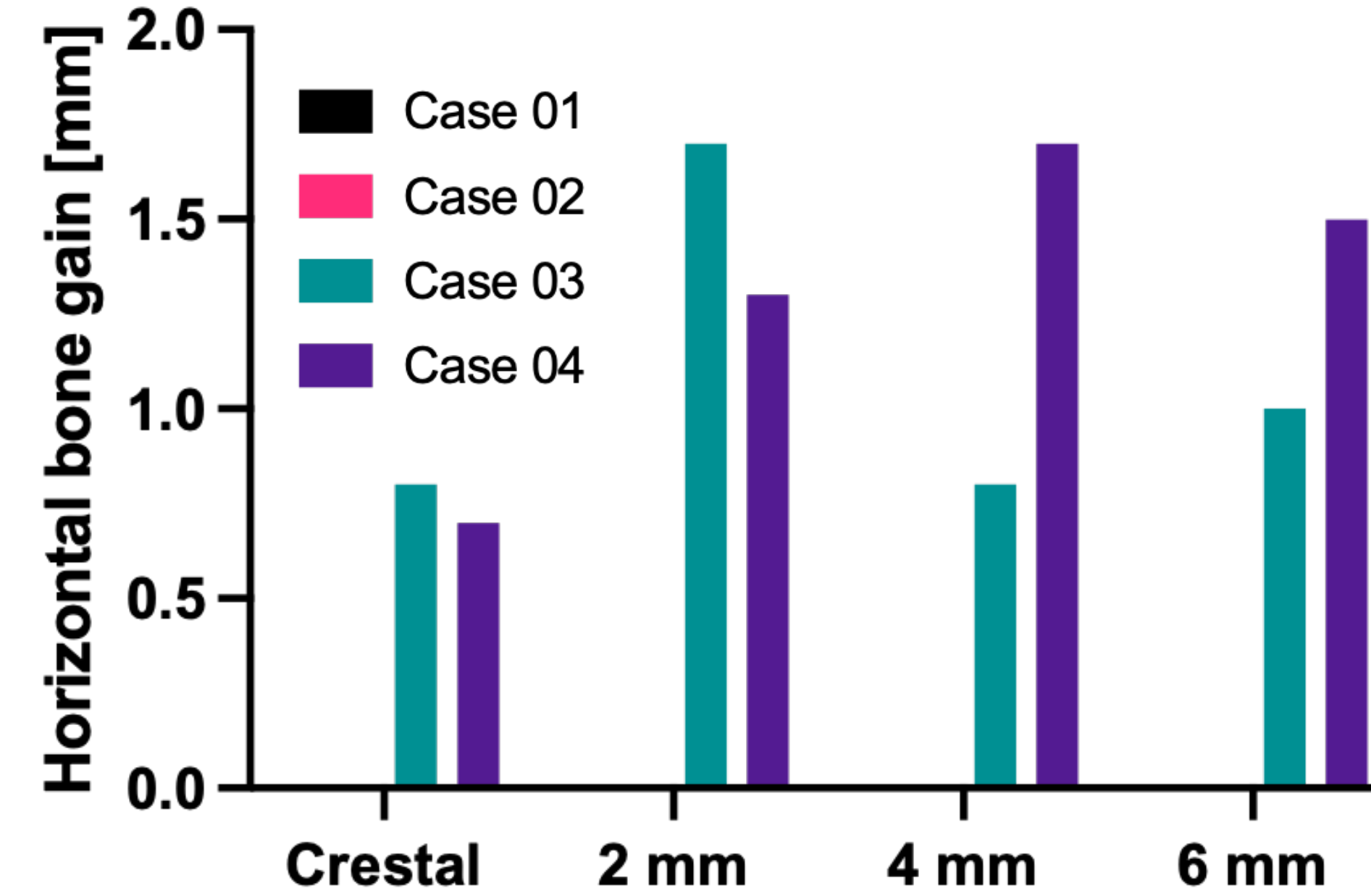
STL files superimposition



Dimensional changes



RESULTS



CONCLUSION

- The results of this study could significantly improve our understanding of GBR wound healing.
- Using a combined bone alternative benefits from the osteoinduction properties of the allogenic component with rapid cell turnover and the stable scaffold for new bone formation from the xenogenic component.
- Long-term follow-ups with bone quality as well as quantity comparisons in a controlled study design are needed.

Significant horizontal gain of tissue and bone dimensions at 2, 4, and 6 mm apical to the crest when compared to crestal bone (p-value <0.05).



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CONFLICT OF INTEREST STATEMENT

This poster is partially supported by Geistlich Pharma N.A. We declare financial support for regenerative biomaterials and meeting registration.

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