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- **PARTNER TBS INSTRUMENTS, UNIVERSAL SHAPERS**
- **NEW PRODUCT CONSULTANT FOR MEGAGEN AMERICA, IDS-BIOTECH, 3DISC, HENRY SCHIEN, BENCO, MEGAGEN KOREA, MEDIT, QUICKSCAN, CARESTREAM, RAYSCAN**



10th Ave toward Irving St

STAY ON TARGET

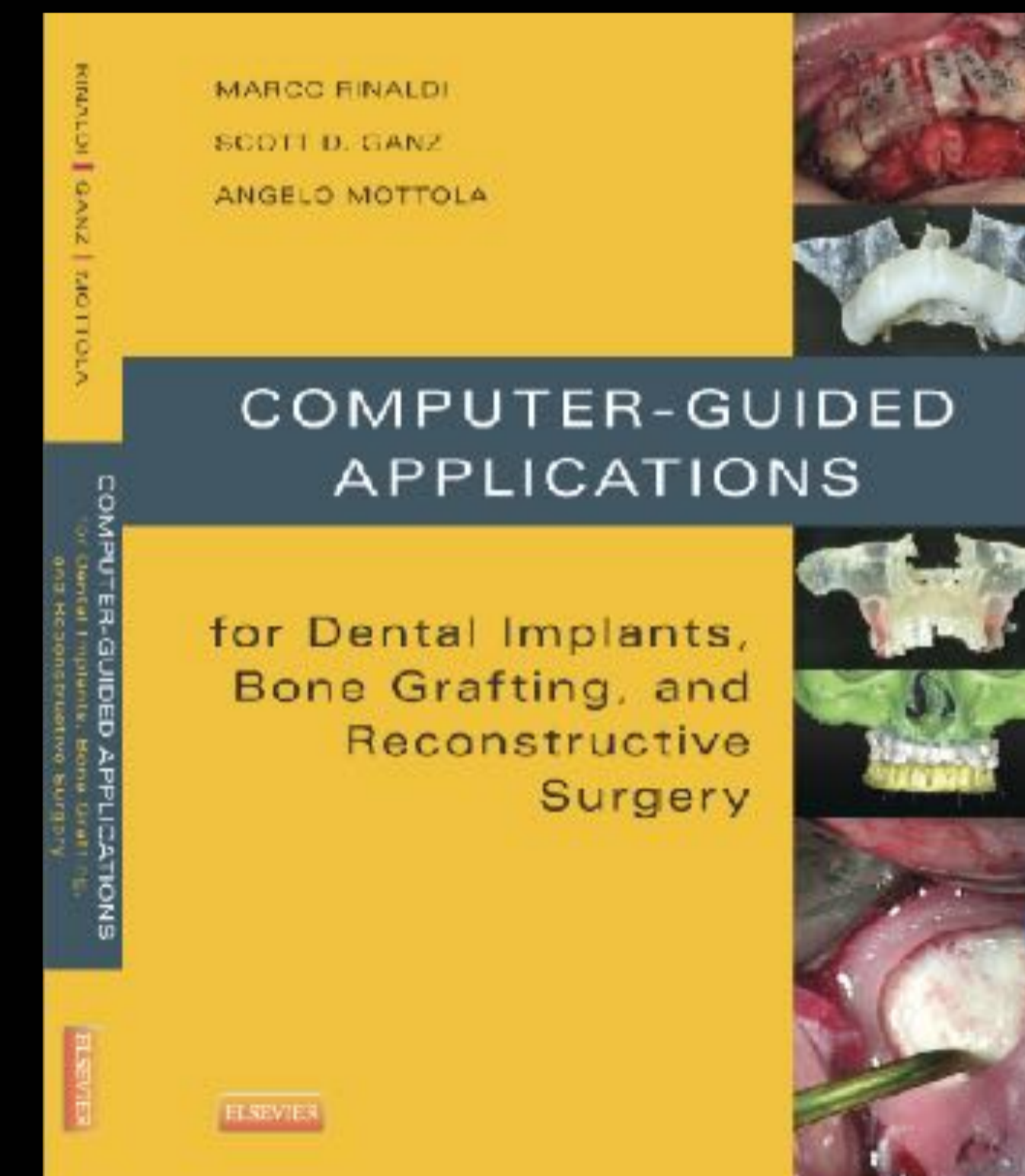
Ortega St

- DIPLOMAT INTERNATIONAL ACADEMY DENTAL IMPLANTOLOGY
- DIPLOMAT INTERNATIONAL ACADEMY FOR DENTAL FACIAL ESTHETICS
- FELLOW INTERNATIONAL CONGRESS OF ORAL IMPLANTOLOGY
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- PRIVATE PRACTICE, BROOKLYN, NEW YORK
- FOUNDER AND CO-DIRECTOR AND OF ADVANCED IMPLANT EDUCATION

- **Diagnostic - Freehand**

- **Template-Assisted**

- **Full template-Guidance**



- **Diagnostic - Freehand**

- **Template-Assisted**

- **Full template-Guidance**



All roads lead to Rome

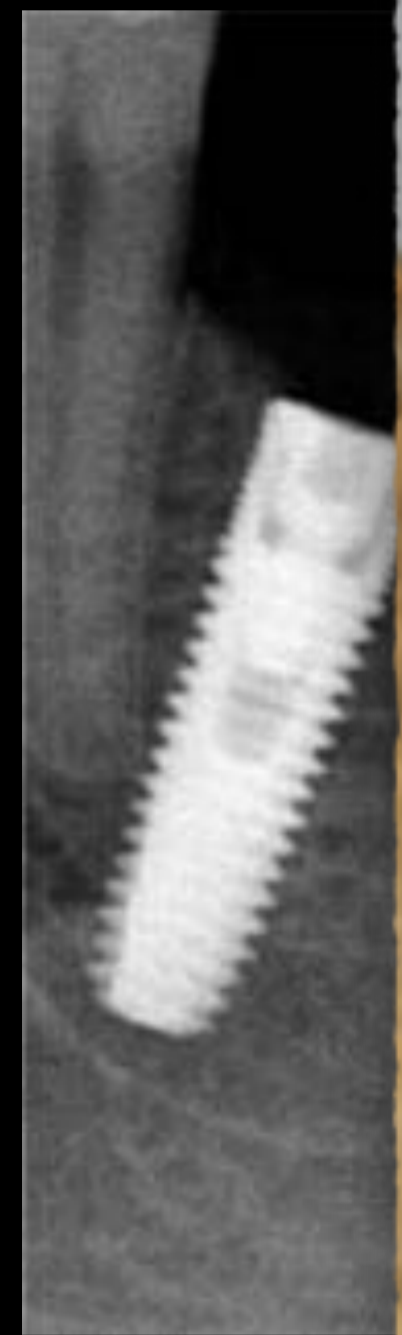
Some may be bumpier than others



Some may be bumpier than others

• **Diagnostic - Freehand ?**

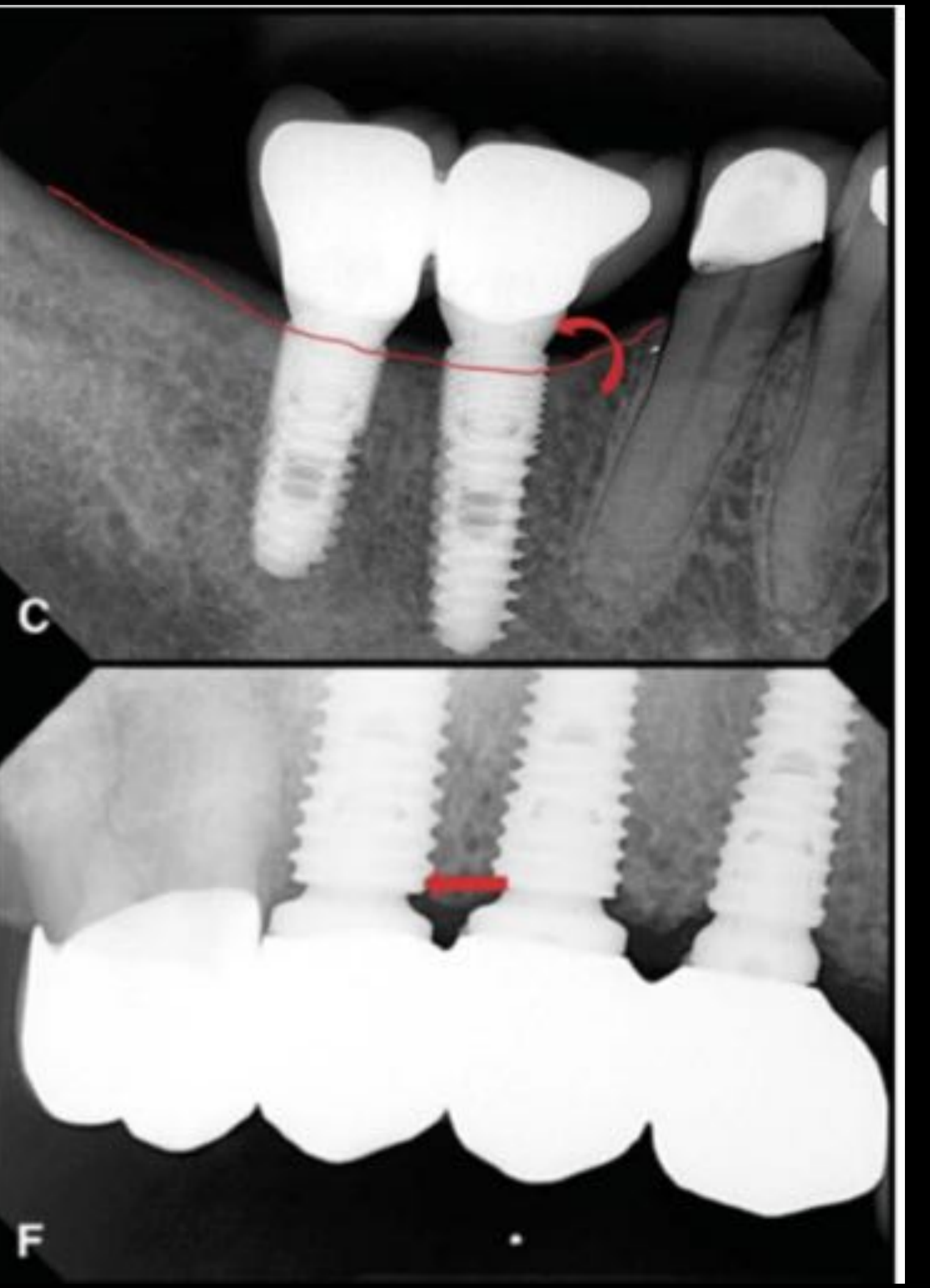
Complication



Angulation



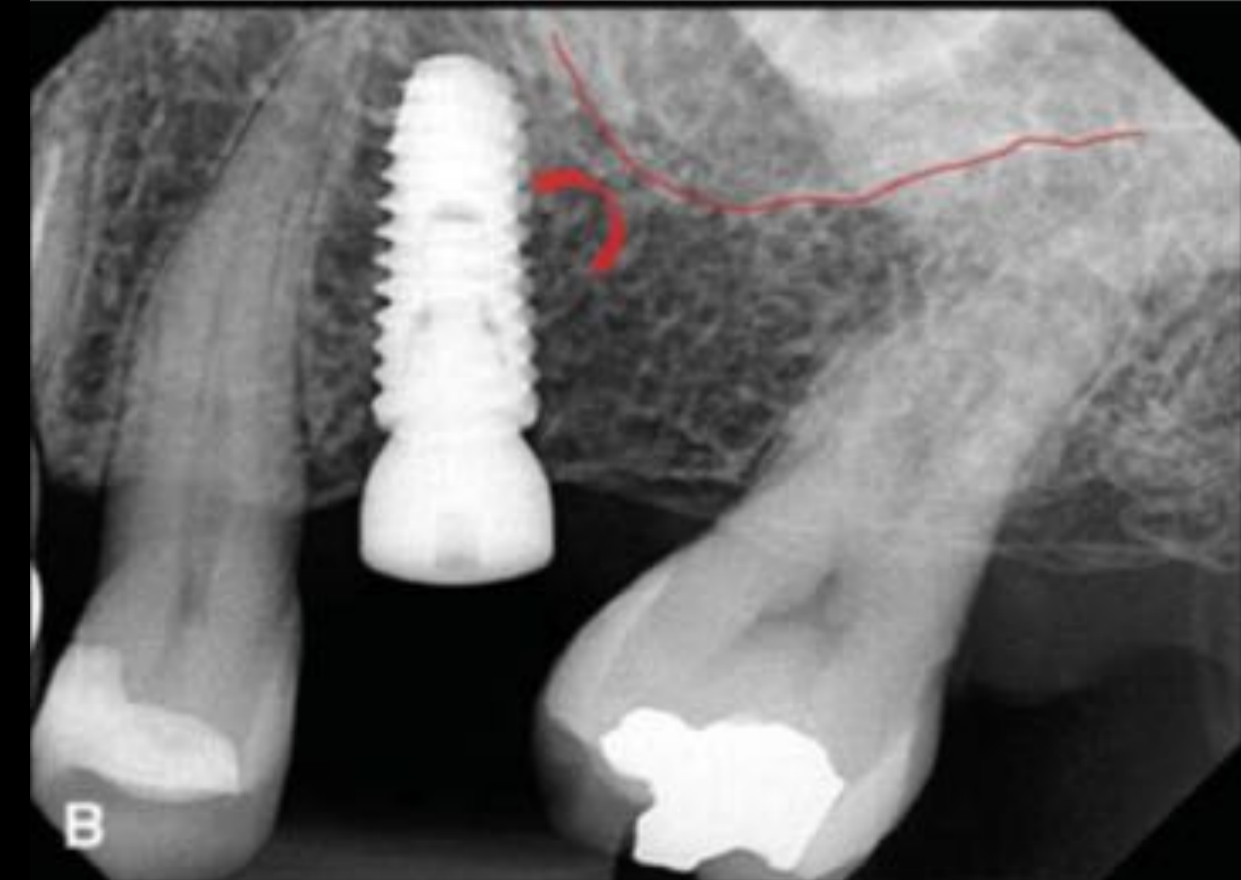
Spacing



• Diagnostic - Freehand ?



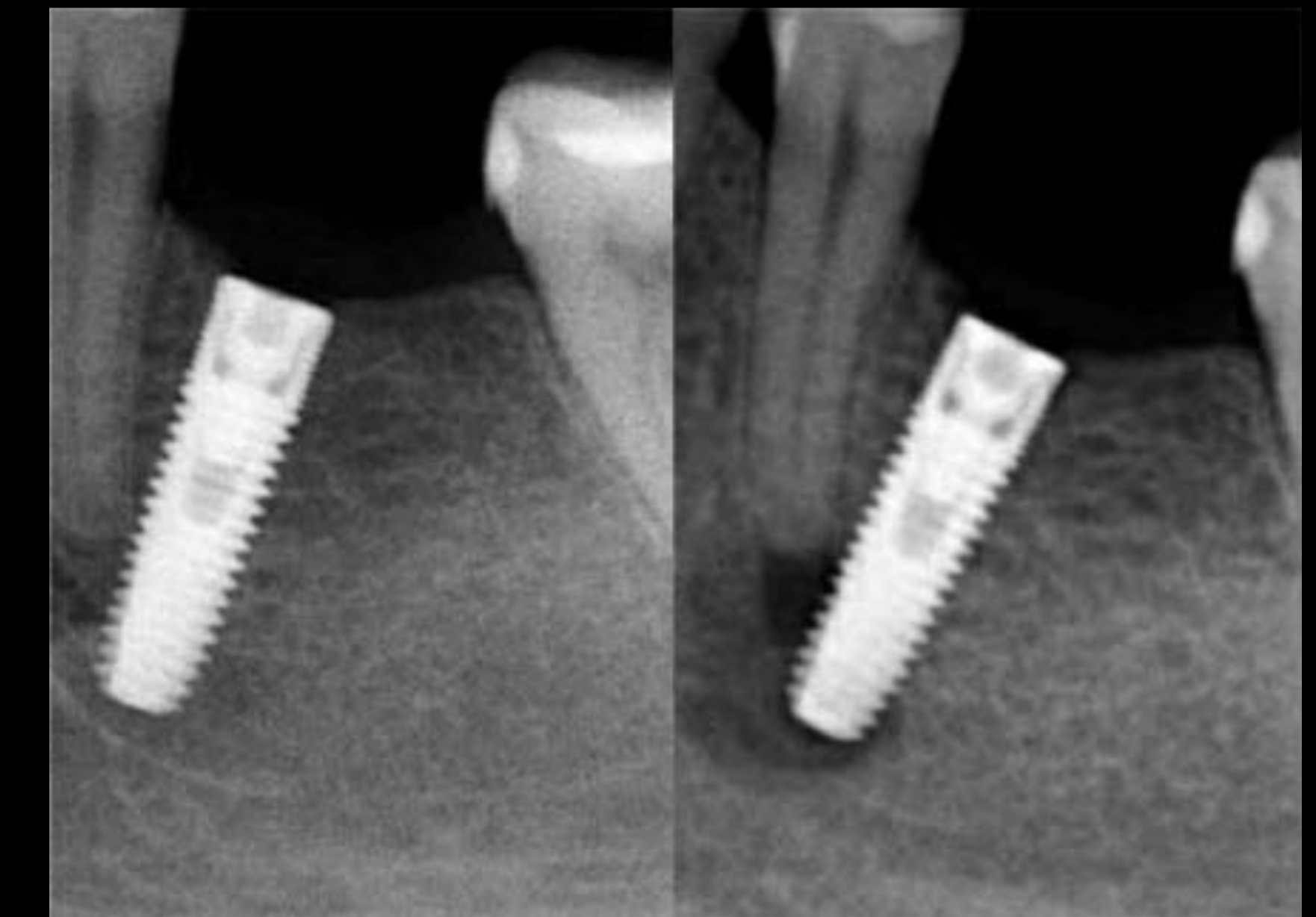
Complication



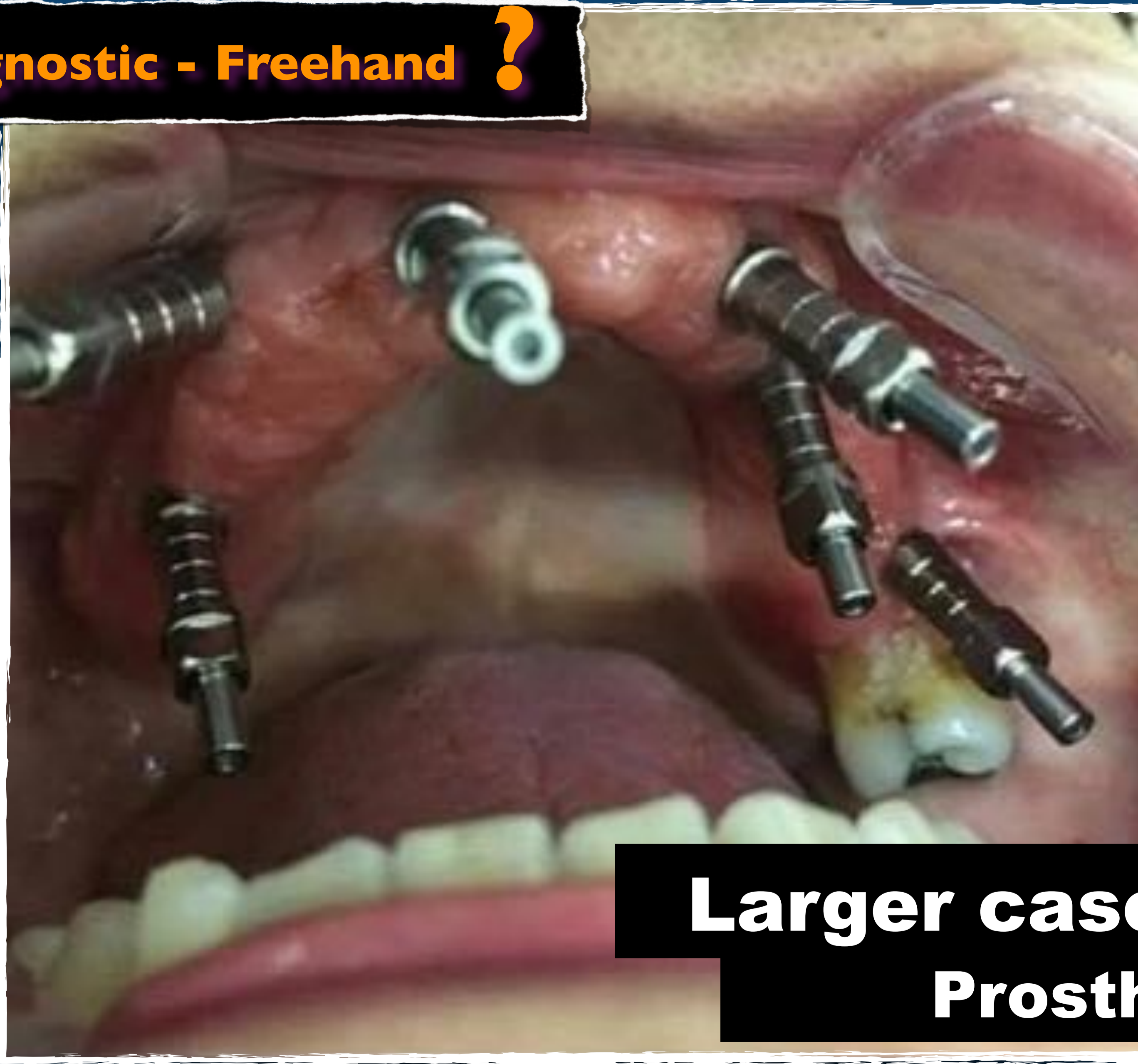
Angulation



Spacing

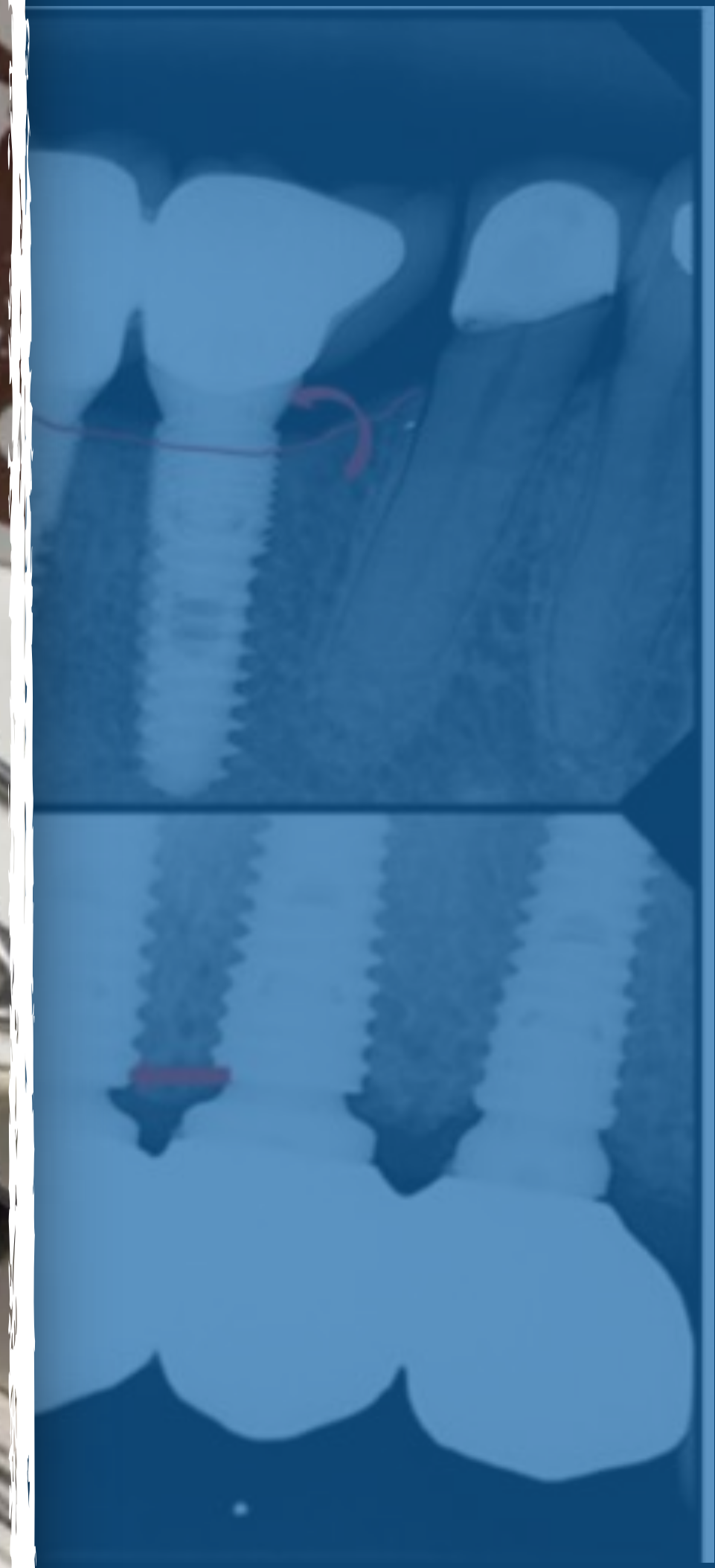


• Diagnostic - Freehand ?



**Larger cases can loose orientation
Prosthetic Gymnastics**

Spacing





Keep your perspective

Dont miss the forest for the trees



• Full-G

88% positional

Freehand Versus Guided Surgery: Factors Influencing Accuracy of Dental Implant Placement.

Choi, William DMD; Nguyen, Bao-Chau DDS; Doan, Andrew DMD; Girod, Sabine MD, DDS, PhD; Gaudilliere, Brice MD, PhD; Gaudilliere, Dyani DMD, MPH

Implant Dentistry: Post Author Corrections: July 20, 2017

doi: 10.1097/ID.0000000000000620

Basic and Clinical Research: PDF Only

Int J Oral Maxillofac Implants. 2013 Jan-Feb;28(1):190-204. doi: 10.11607/jomi.2691.

Implant positioning errors in freehand and computer-aided placement methods: a single-blind clinical comparative study.

Arisan V¹, Karabuda CZ, Mumcu E, Özdemir T.

J Clin Periodontol. 2018 Apr 2. doi: 10.1111/jcpe.12897. [Epub ahead of print]

A randomized controlled study on the accuracy of free-handed, pilot-drill guided and fully-guided implant surgery in partially edentulous patients.

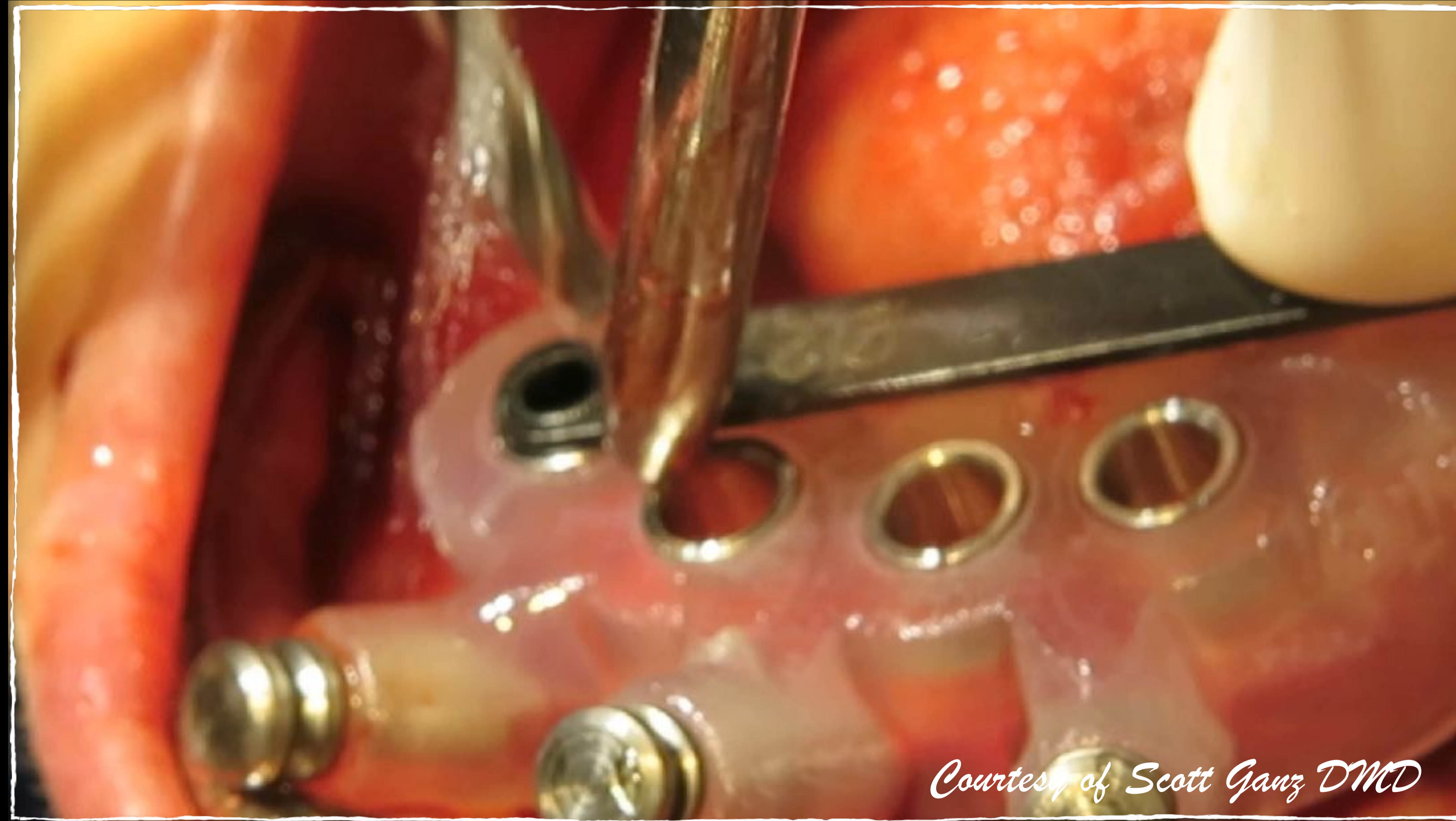
Younes F¹, Cosyn J^{1,2}, De Bruyckere T^{1,2}, Cleymaet R¹, Bouckaert E², Eghbali A^{1,2}.

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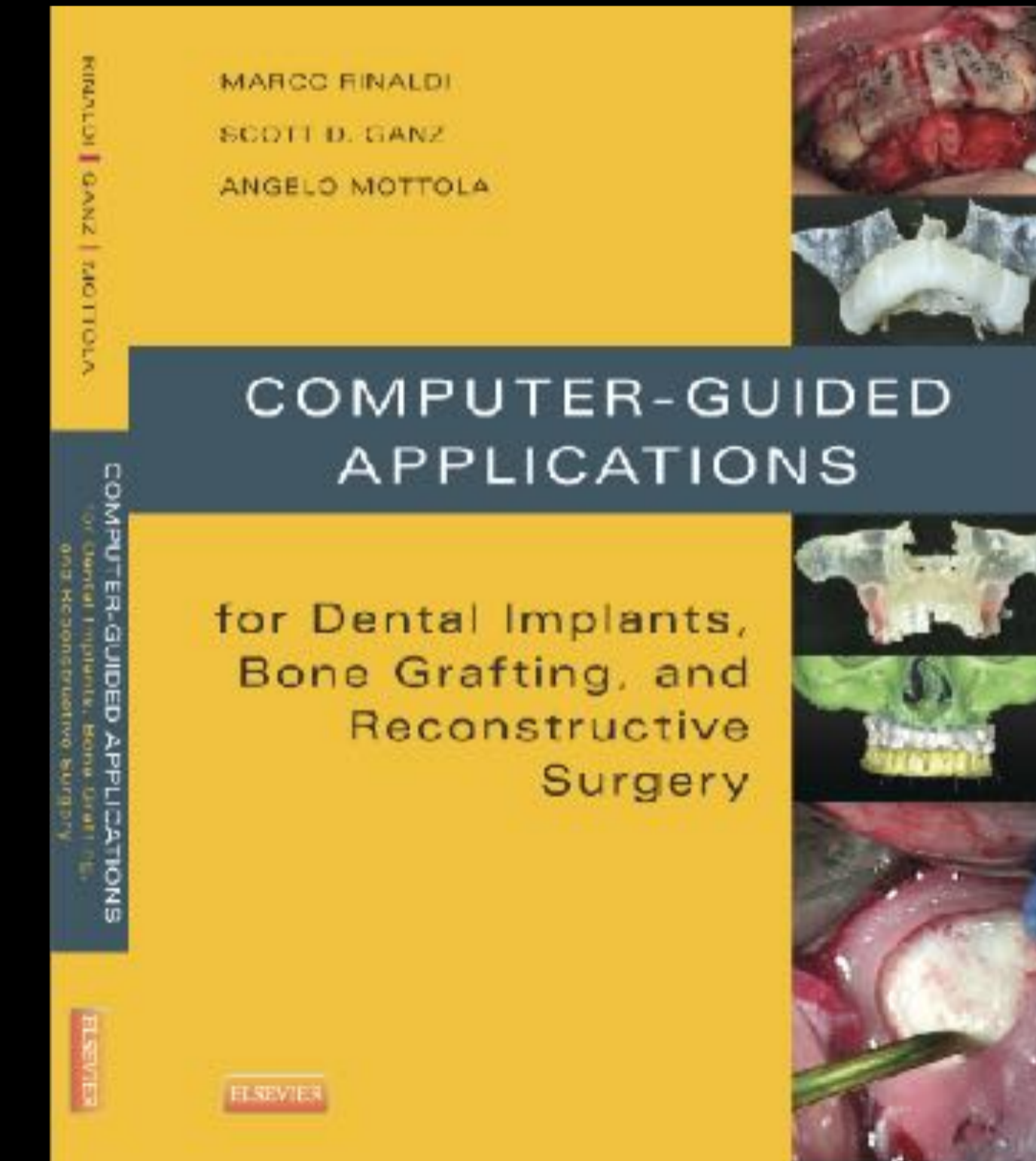
- **Diagnostic - Freehand**

- **Template-Assisted**

- **Full template-Guidance**



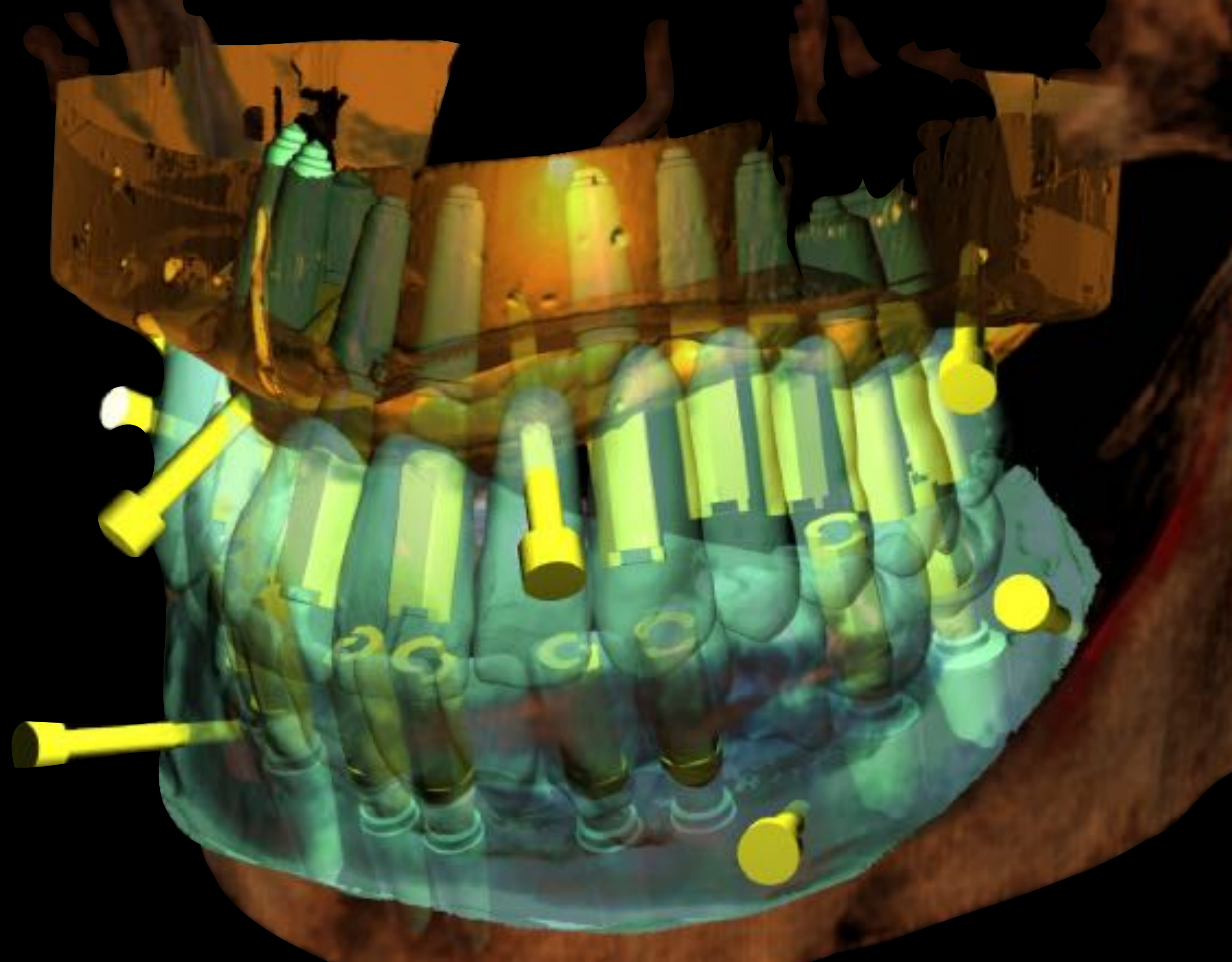
Courtesy of Scott Ganz DMD



- **Diagnostic - Freehand**

- **Template-Assisted**

- **Full template-Guidance**



A N A L O G → D I G I T A L



Essential technologies for Guided Implant placement *AND* restoration:

- **CBCT**
- **iOS/Impression**
- **Software**
- **RFA - ISQ**





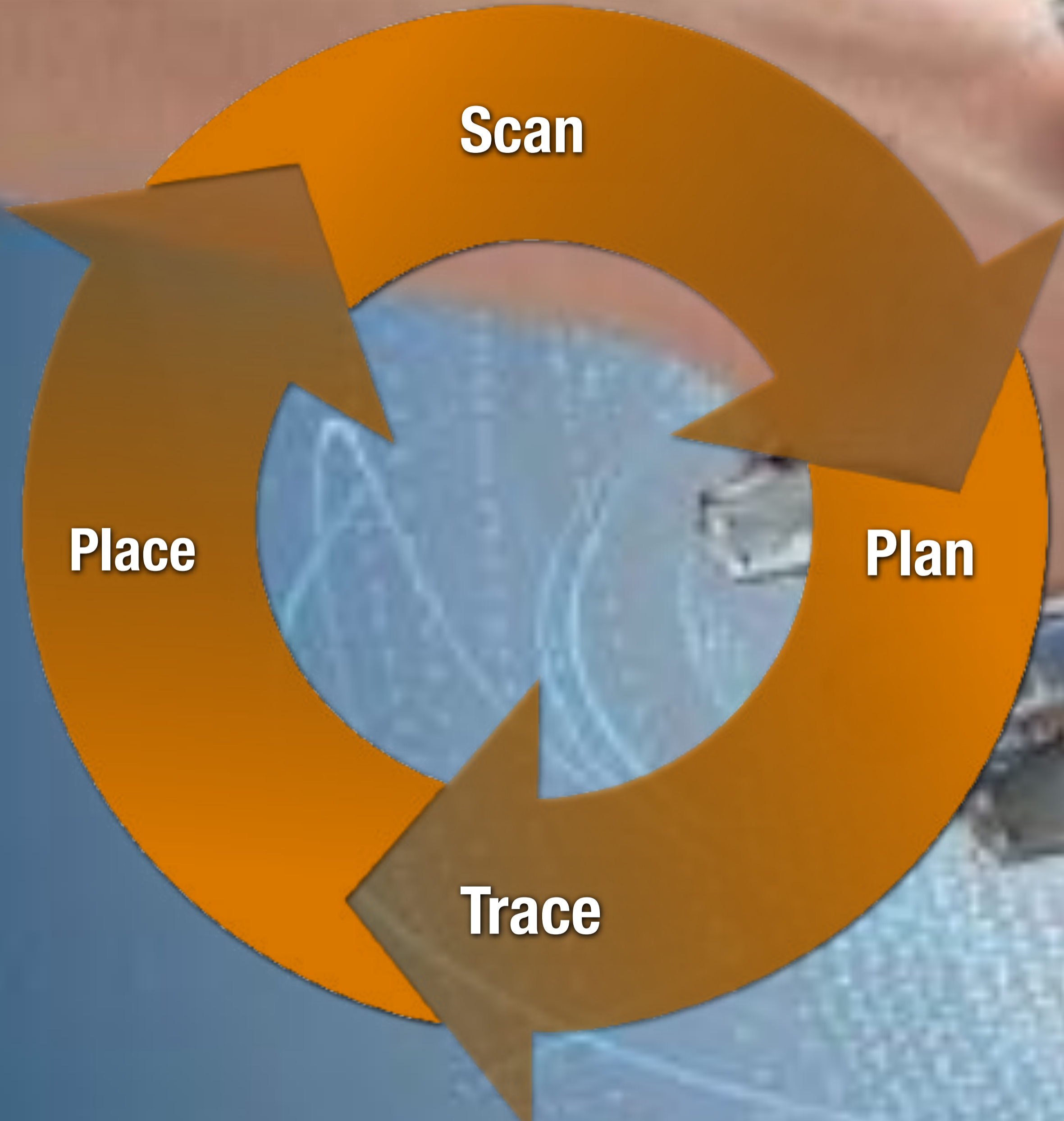
Inplace Implants

Why do I need one

Intraoral

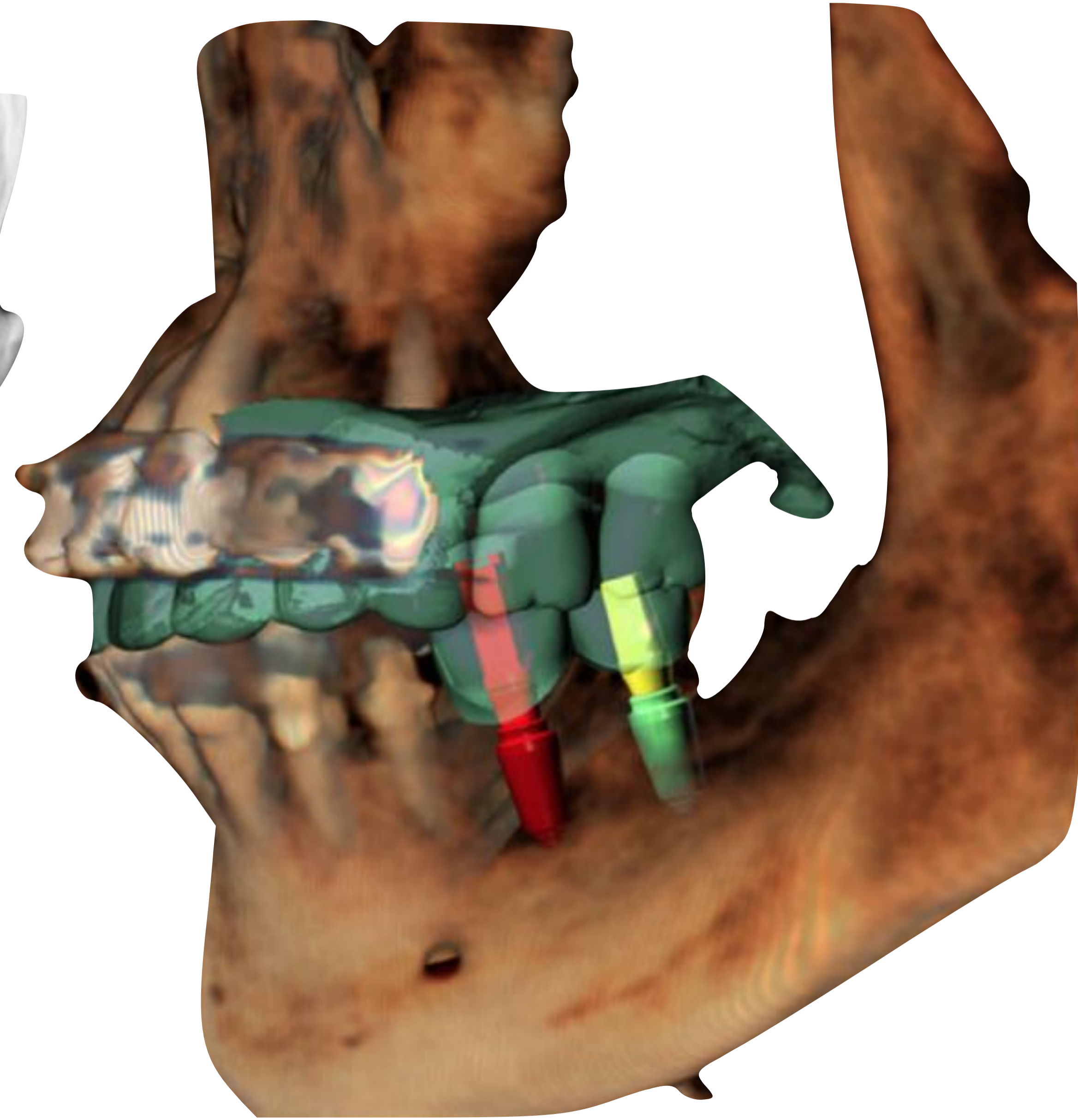
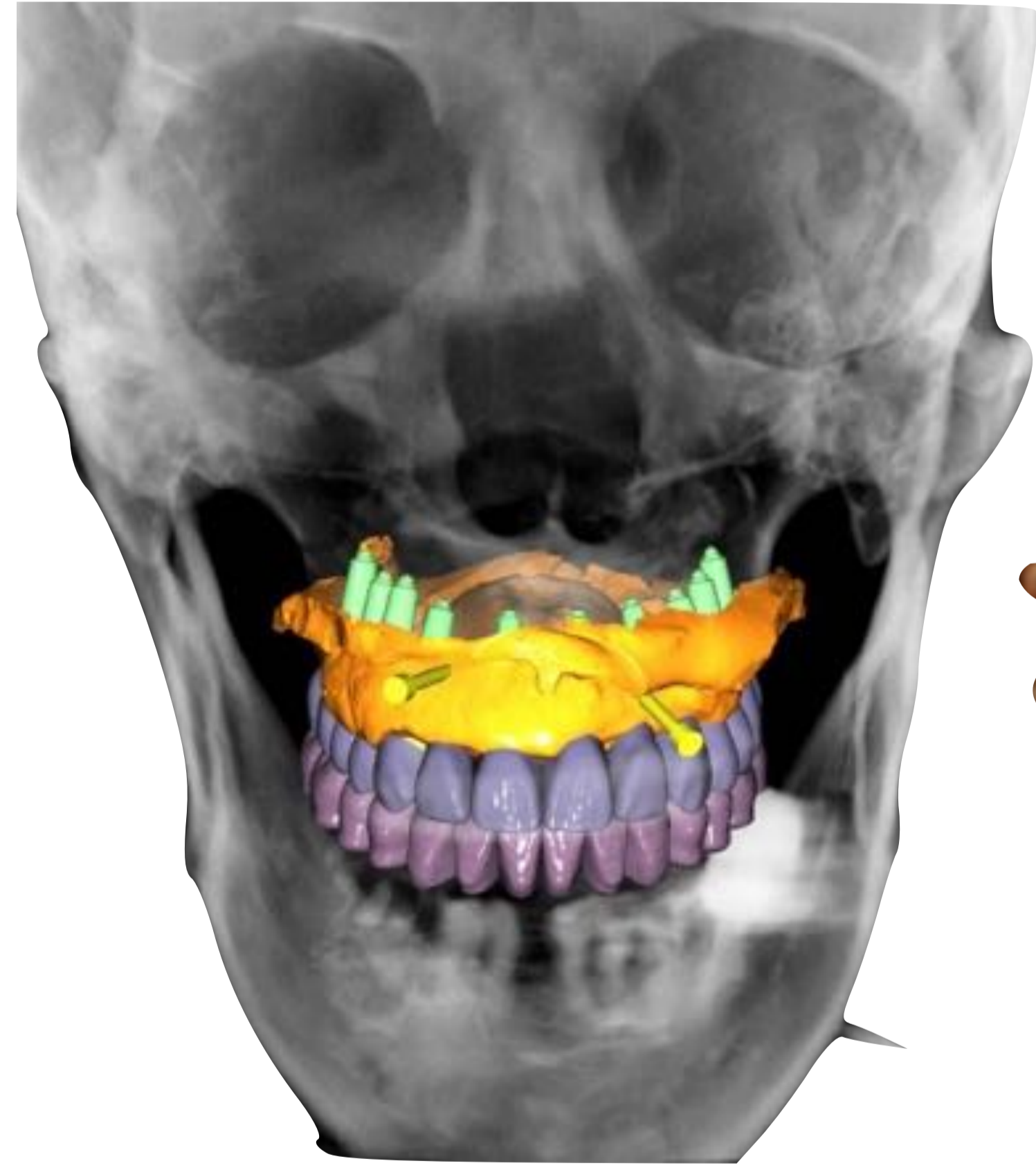
Scanner ?





The digital Handshake

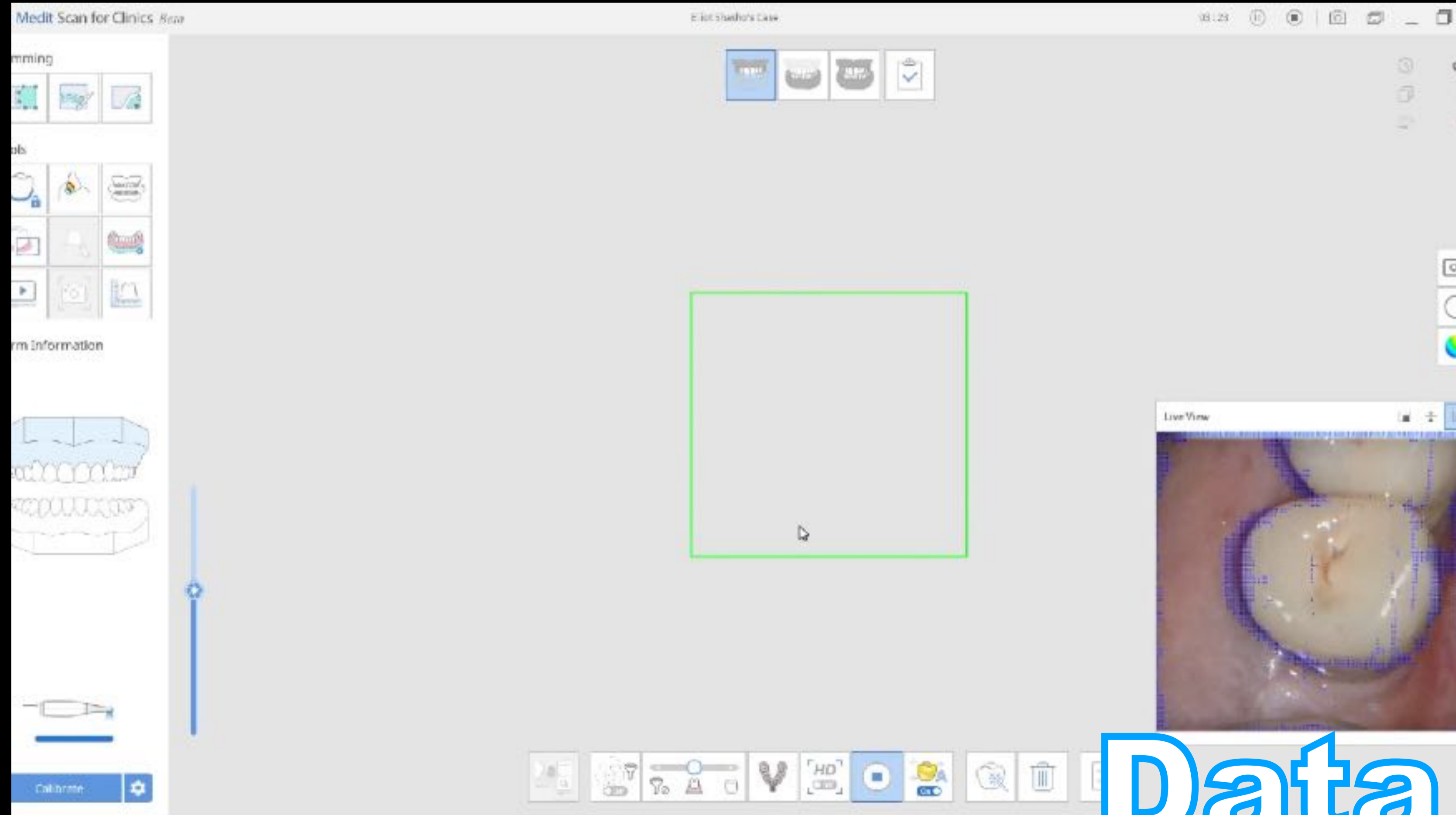




Reality



IOS



Data Collection

CBCT



PLAN

Radiopaque Scanning Appliance

Surgical Intervention

CT/CBCT Scan

Use of CBCT Native Software

CT-derived Surgical Template Fabrication

DATA-MERGE

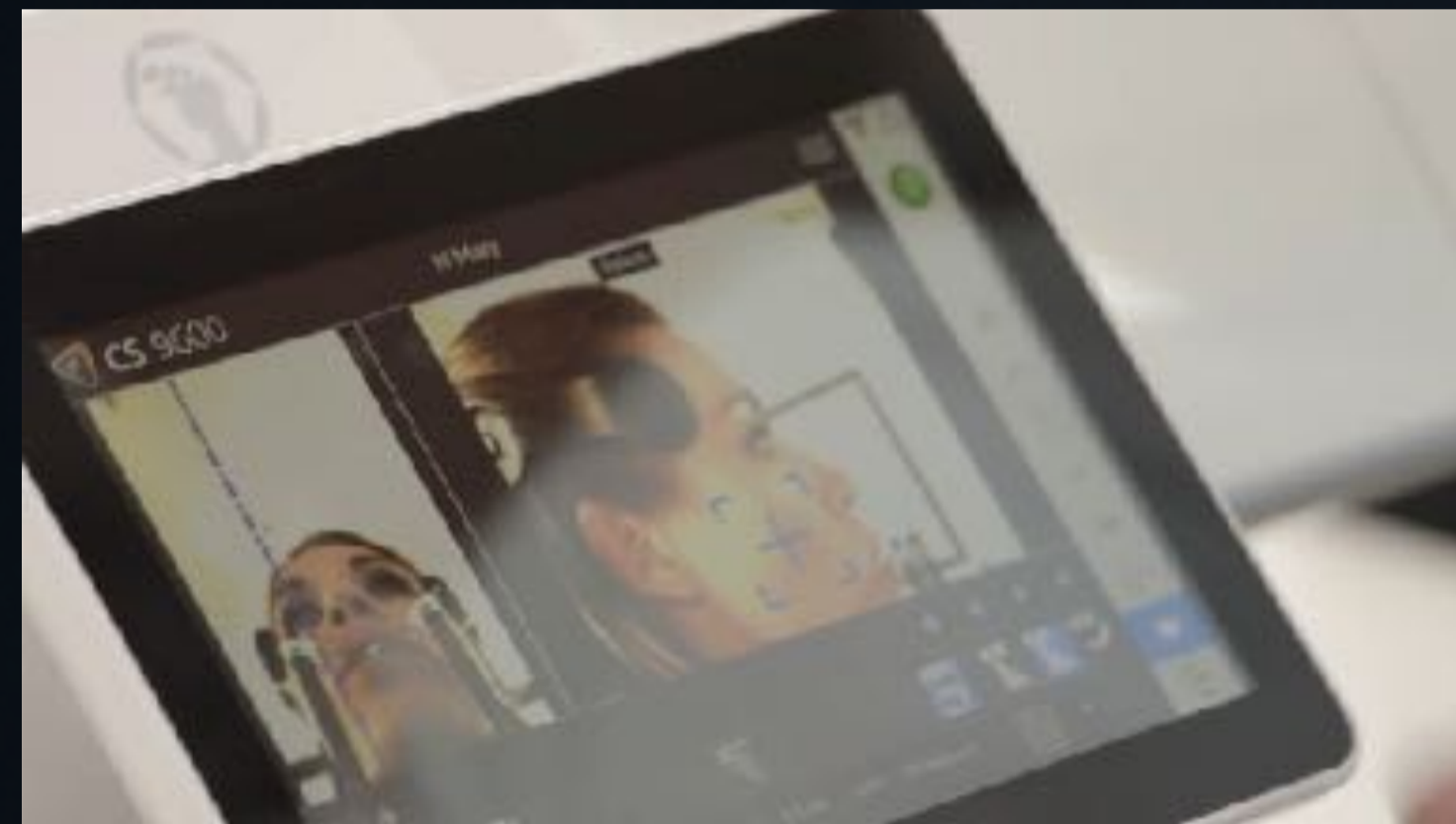
DICOM DATA

Use of Interactive Treatment Planning Software

Study Cast / Optical Scan

Intra Extra-Oral Optical Scan

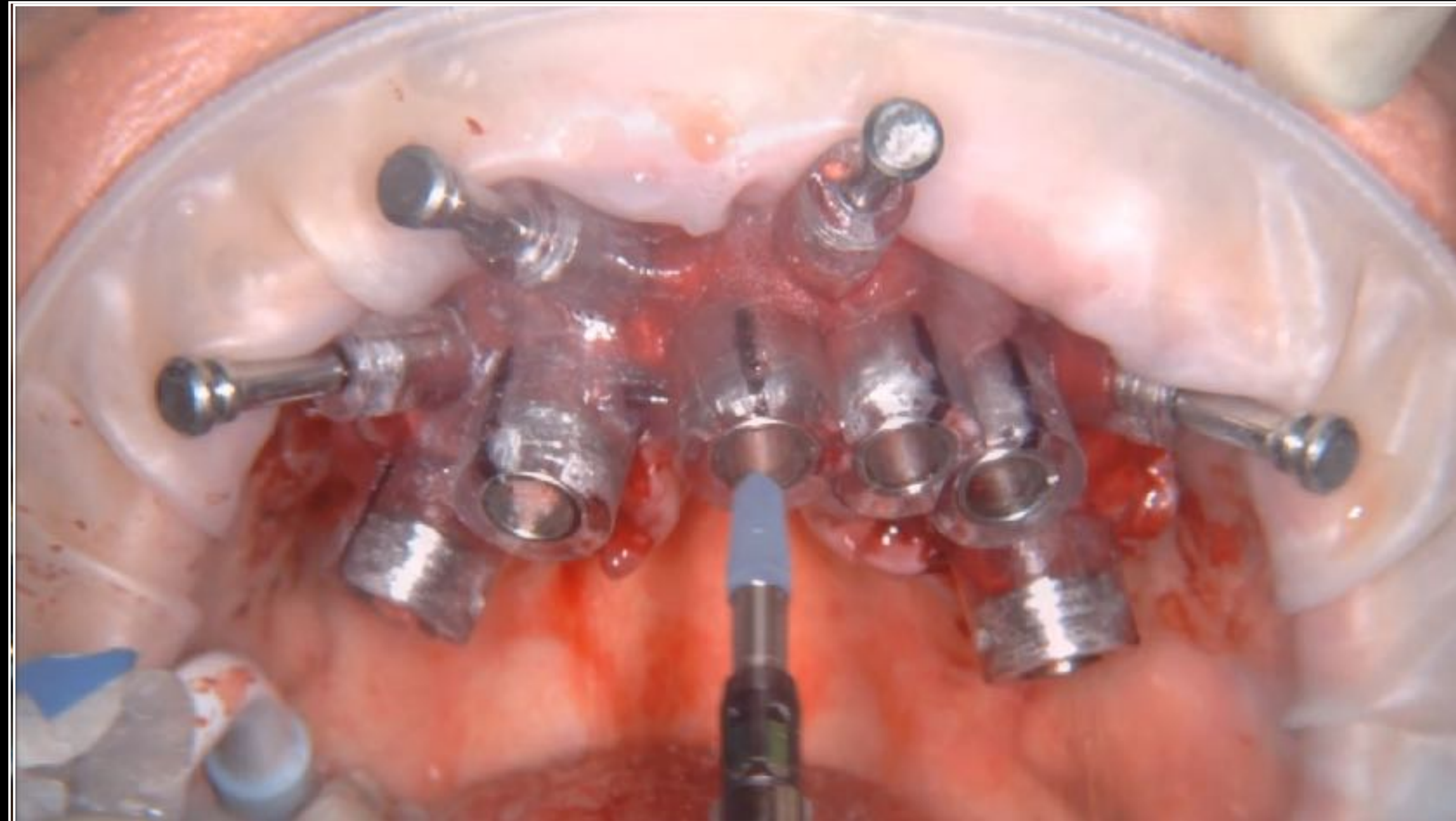
Blueprint For Success



**Static
Template**

• **Full template-Guidance**

**Dynamic Virtual
Template**



DIGITAL STATIC SURGERY





STACKABLE TOOTH GUIDE



Isaac D Tawil DDS MS

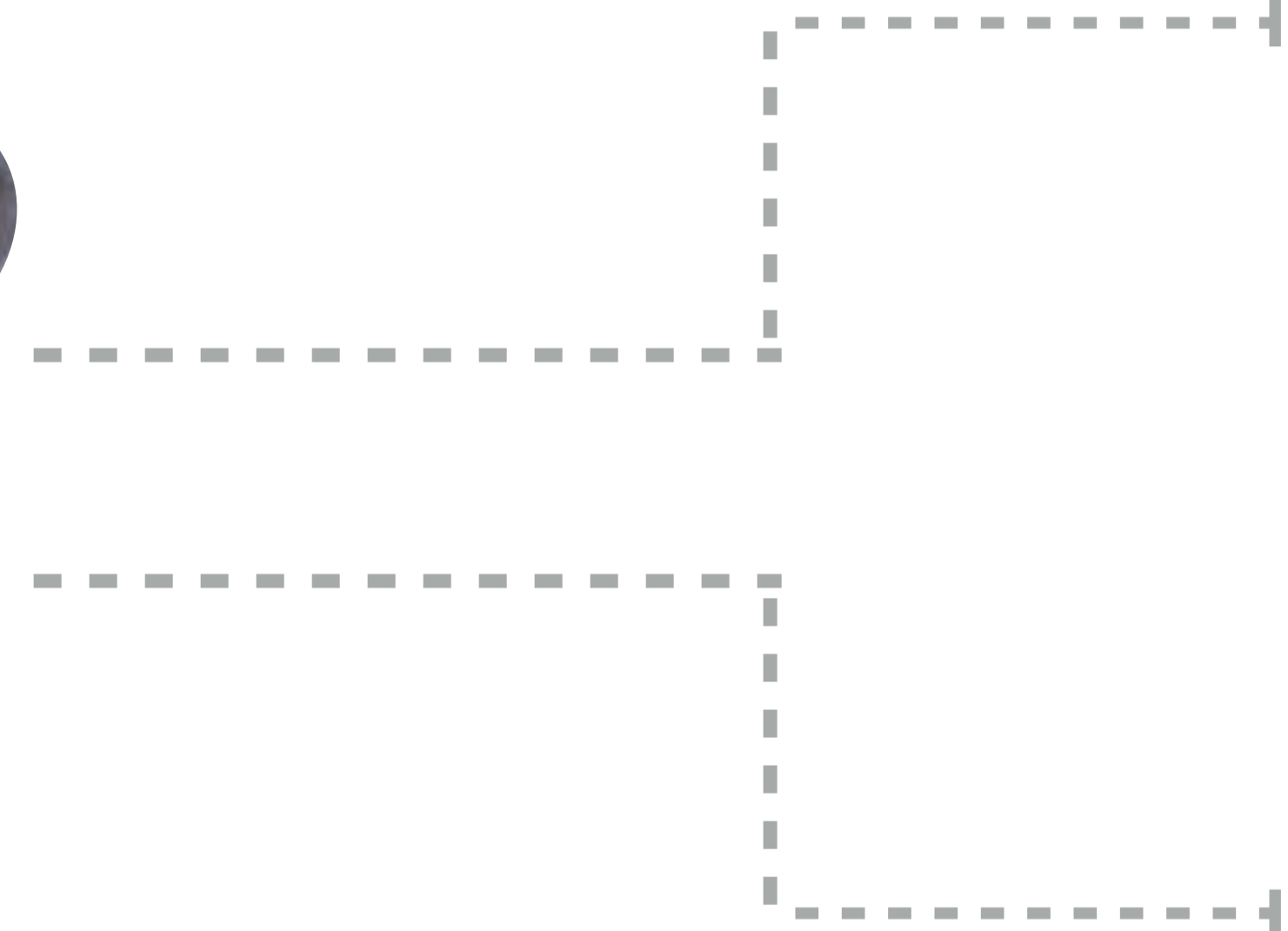




PET



SG



**Partial Extraction
Therapy**

**Full Template
Surgical Guidance**





PET



SG

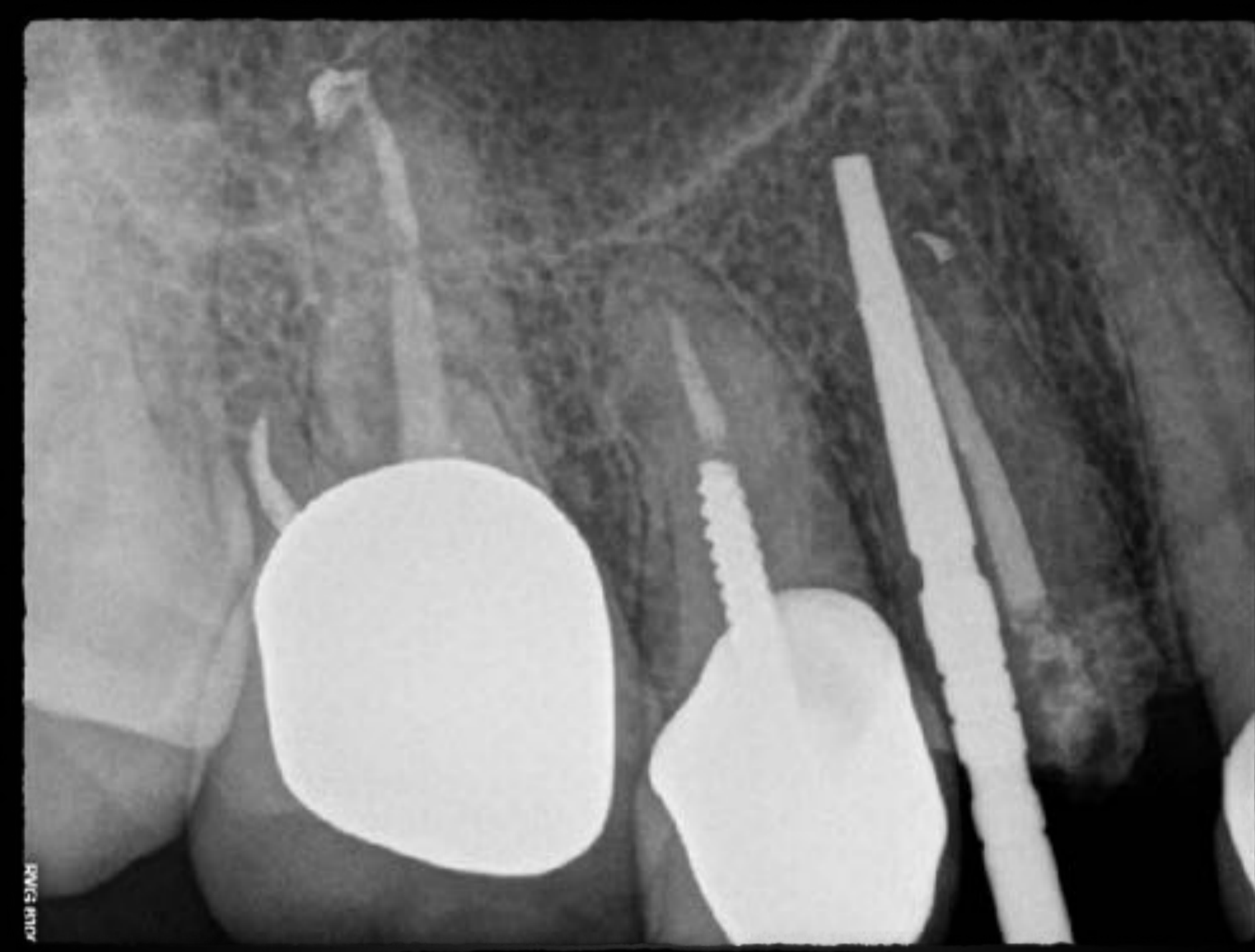


**Full Template
Surgical Guidance**



**Prefabricated
Final abutment
& Provisional**





Partial External Therapy



Digital Static Shield

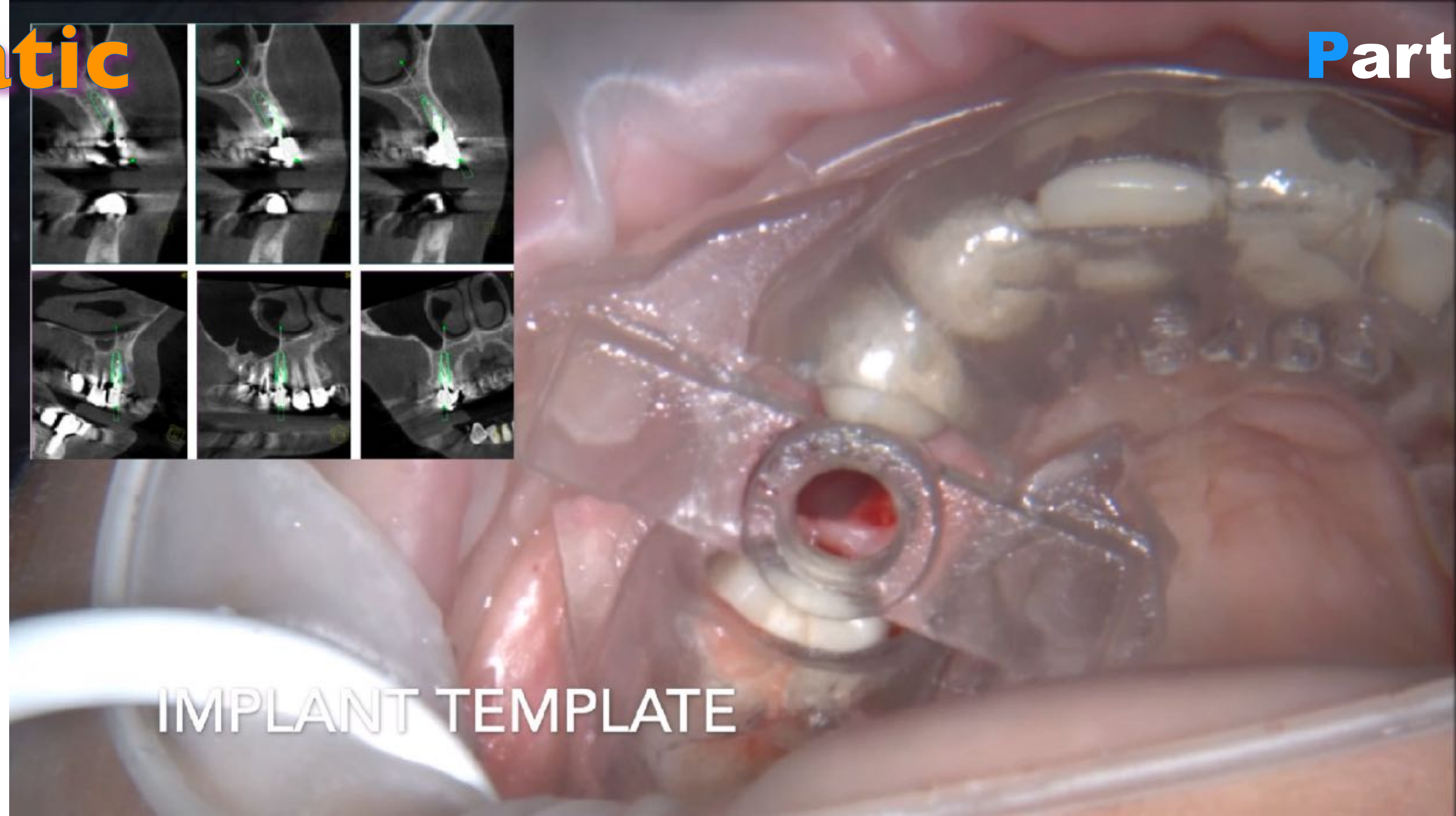
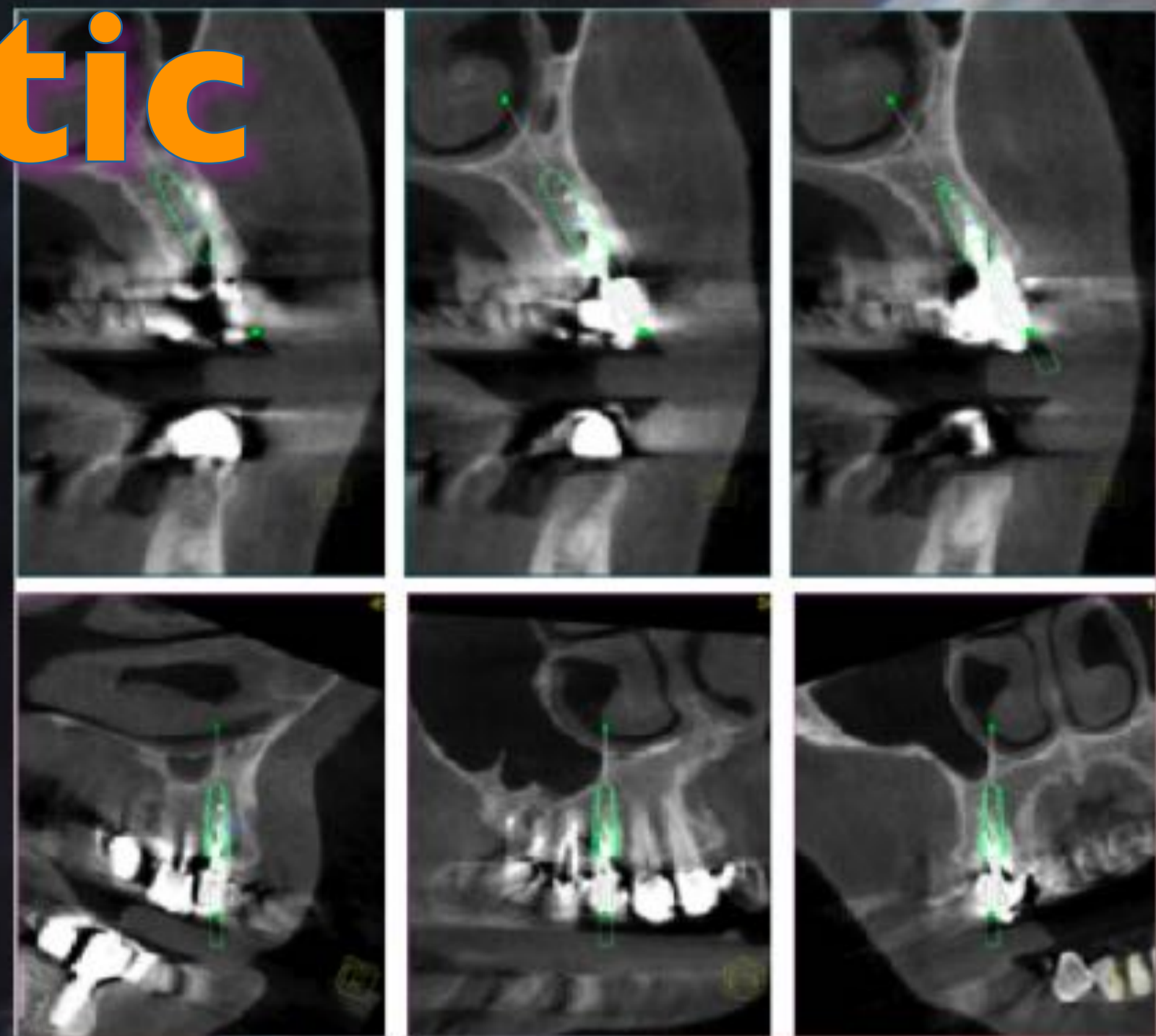


Partial Extrac Therapy



SG

Digital Static Shield



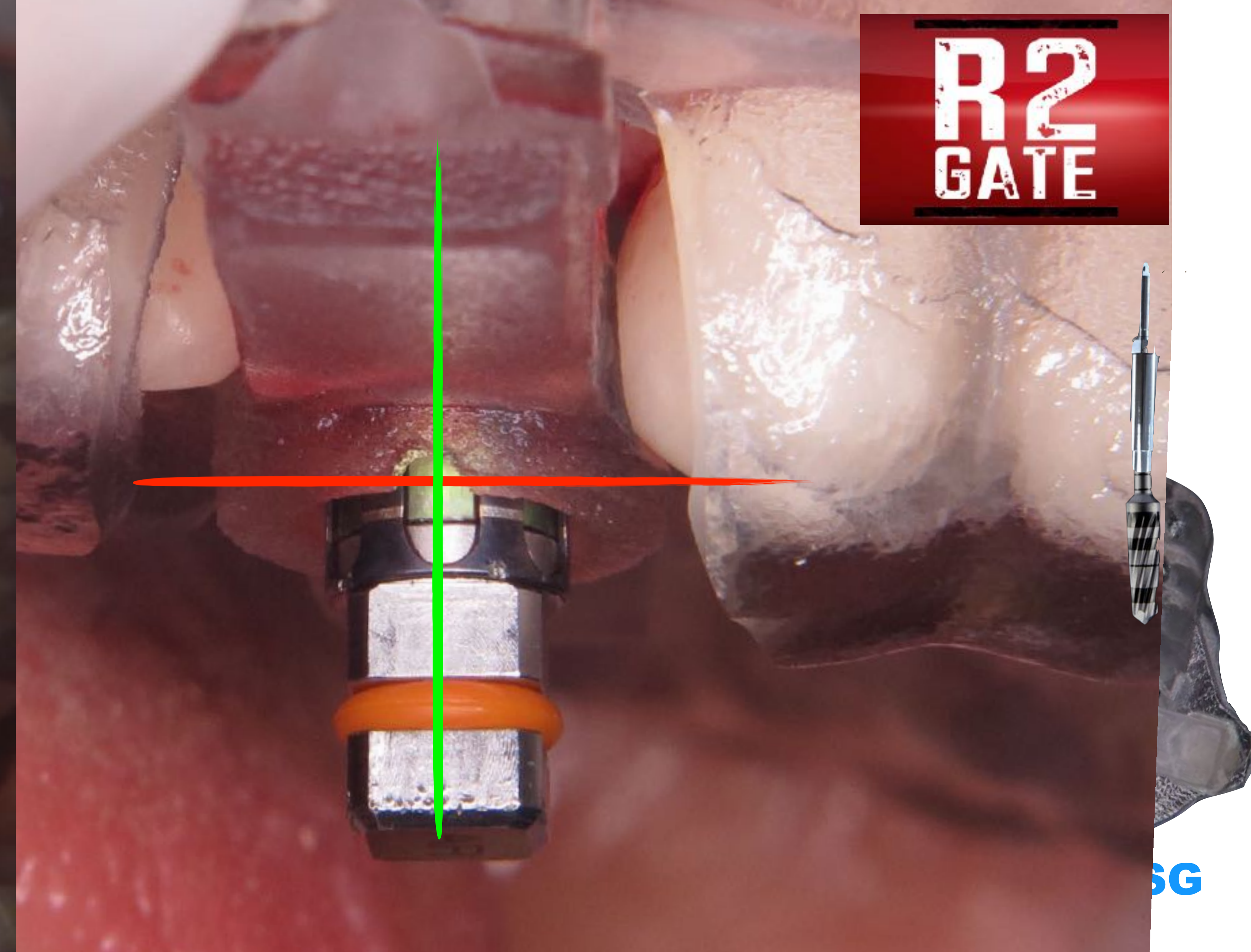
Part

E

T



SG

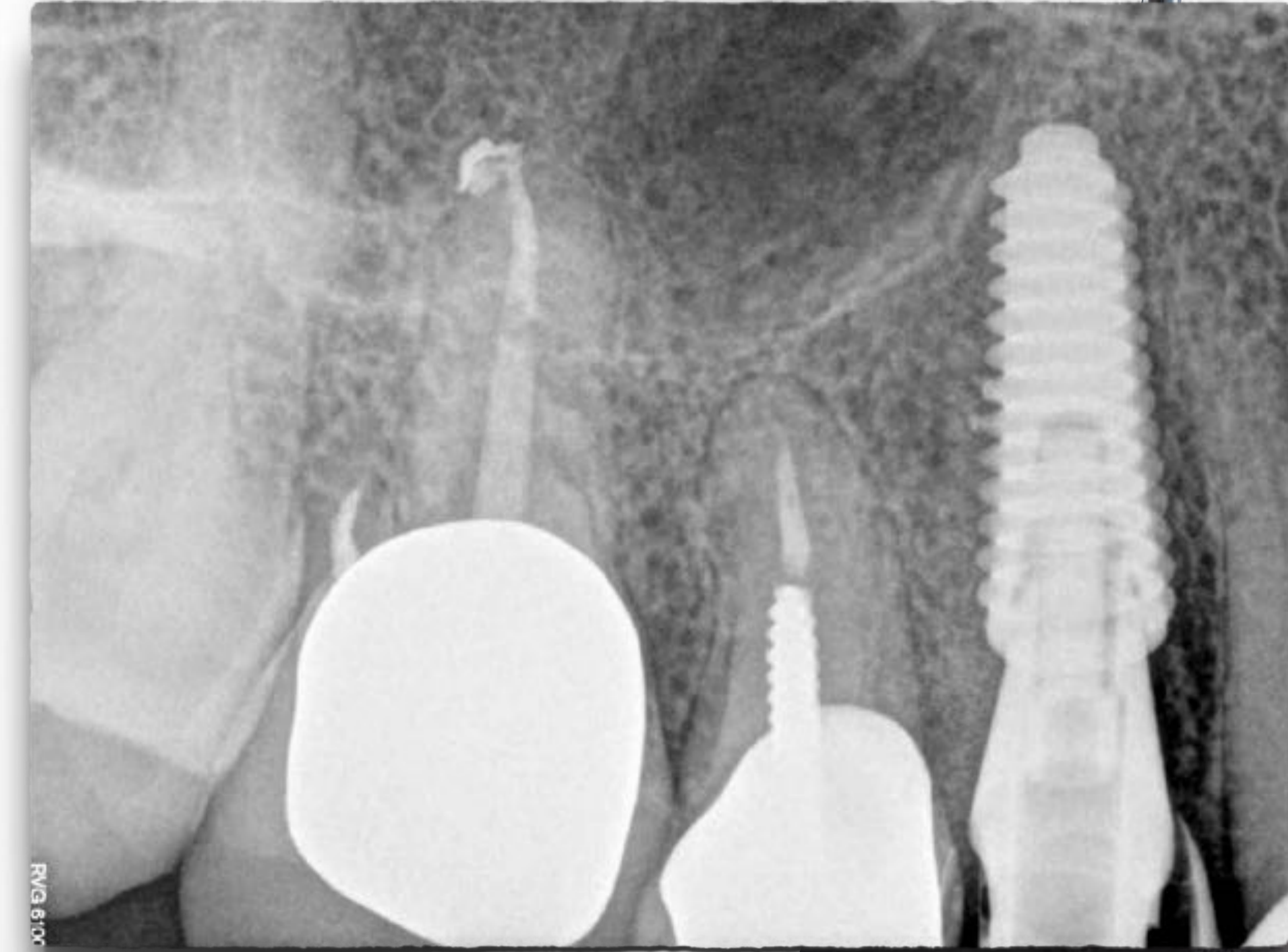


**R2
GATE**



SG

3 Week Post Op

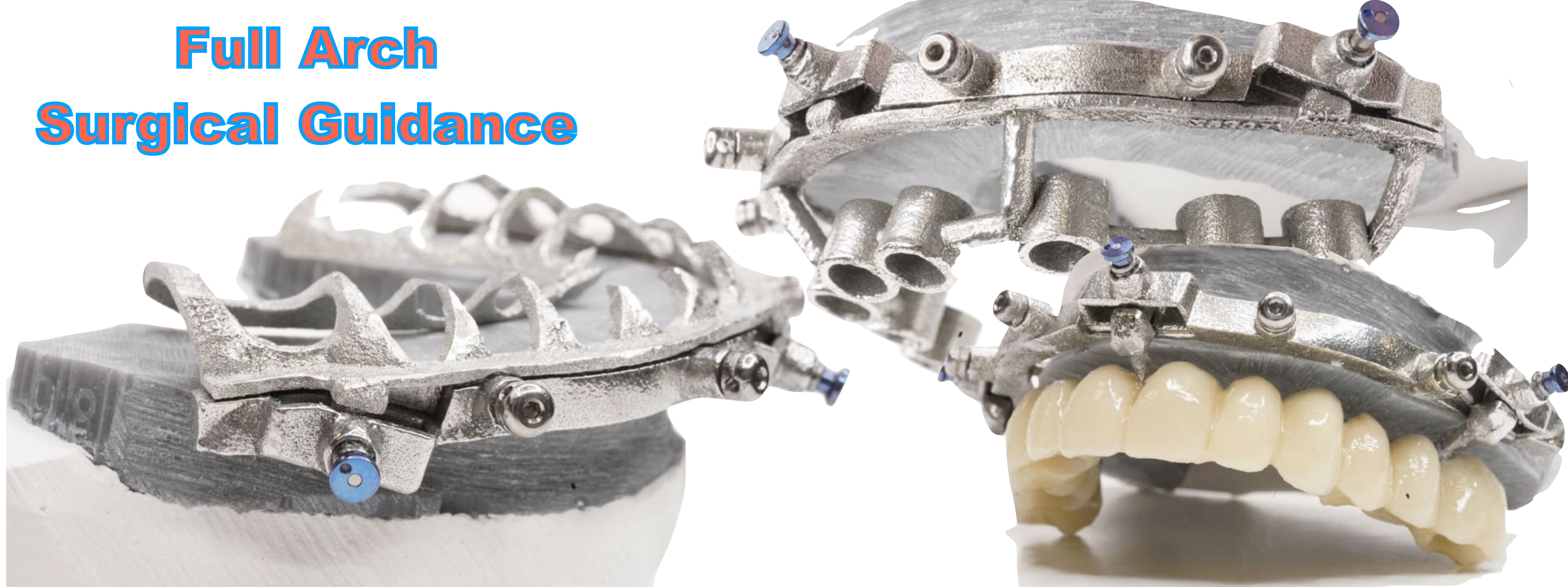


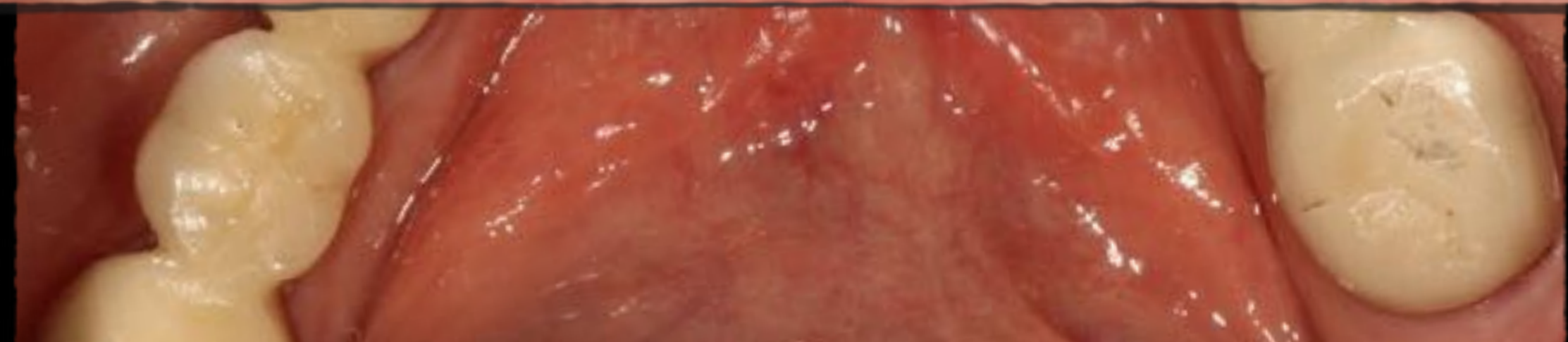
**2 Month
Post op**



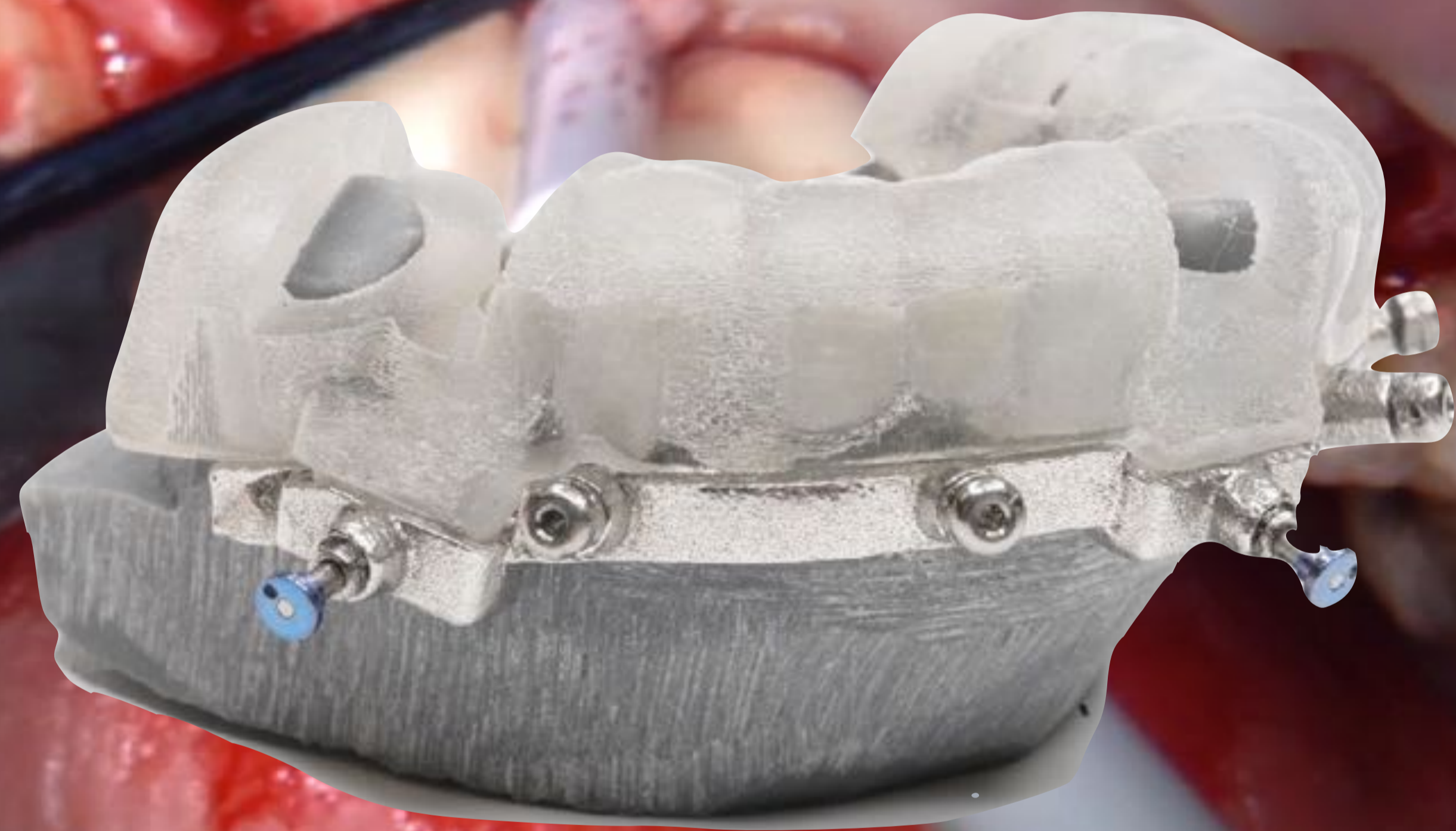


Full Arch Surgical Guidance





Partial Extraction Therapy



Flap to reduce to bone level

Foundation Guide - through tissue



Extractions due to mobility

Partial Extraction Therapy



Flap to reduce to bone level





Scalloping with guide



Scalloping Freehanded



Scalloping

The "Scalloped Guide": A Proof-of-Concept Technique for a Digitally Streamlined, Pink-Free Full-Arch Implant Protocol



Maurice A. Salama, DMD¹
Alessandro Pozzi, DDS, PhD²
Wendy Auclair Clark, DDS, MS³/Marko Tadros, DMD⁴
Lars Hansson, CDT, FICOI⁵/Pinhas Adar, MDT, CDT⁶

Inadequate restorative space can result in mechanical, biologic, and esthetic



Fig 5 An osseous recontouring guide (scalloped bone reduction guide) and a duplicate provisional are 3D printed.



Fig 6 (a) The osseous structure can then be reconoured/scalloped according to pre-treatment planning. (b) Verification with the milled PMMA provisional. Note the 3 mm space under pontic sites for soft tissue fill.



Fig 7 A surgical guide for implant placement is then pinned (stacked) into position, allowing implants to be placed per pre-treatment planning.



Fig 8 (a) A PMMA provisional is milled following the scallop scan. (b) Pins are inserted into the provisional, allowing it to stack to the guide. These will be removed after the provisional is later inserted.

Surgical Guidance



FP1

Floating Foundation Guide - on Bone





The Root Membrane Technique: A Retrospective Clinical Study With Up to 10 Years of Follow-up

Konstantinos D. Siormpas, DDS,* Miltiades C. Mitsias, DDS, MSc, PhD,† Georgios A. Kotsakis, DDS, MEd,‡ Isaac Tawil, DDS, MSc,§ Michael A. Pikos, DDS,¶ and Francesco G. Mangano, DDS, PhD||

Osseointegrated implants represent the most popular therapeutic solution for replacing compromised and nonrestorable teeth.¹⁻³ A fixed implant-supported restoration must, however, be able to meet all the biological, functional, and aesthetic requirements to be defined as truly successful.^{2,4} Until recently, the main focus of implant dentistry had been function and not aesthetics.^{5,6} Contemporaneously, however, implant rehabilitation is mainly focused toward aesthetic reconstruction of edentulism.³⁻⁶ A prerequisite for aesthetic success with a fixed implant-supported restoration is to maintain the bone anatomy, and the overlying soft-tissue architecture.^{7,8}

Extraction of 1 or more teeth causes alveolar bone resorption; this is a physiological phenomenon resulting from the fact that the periodontal ligament and its vascular support have been lost.^{9,10} The impairment of this vascular support has particularly marked consequences in the

Purpose: Immediate implant placement in conjunction with intentional root retention is a recently introduced technique, but the majority of existing documentation is limited to short-term reports with low level of evidence. Hence, the aim of this study was to document the long-term clinical and radiographic results of the root membrane technique.

Methods: This retrospective study reports on clinical results of the root membrane technique for periodontal ligament mediated immediate implant placement with up to 10 years of follow-up from 3 private dental practices. Anterior implants placed with immediate loading from January 2006 to December 2016 were assessed. Kaplan-Meier estimations were computed for reporting of implant success and survival.

Results: A sample of 182 patients (82 men and 100 women, age range: 18-83 years) received 250 immediate implants (230 maxilla, 20 mandible) after the root membrane concept and followed-up for a mean of 49.94 months (± 32.5). Overall, 5 implant failures were recorded for a 10-year cumulative patient-level implant survival rate of 96.5%. Considering mechanical and biological complications, the 10-year cumulative implant success rate was 87.9%.

Conclusions: Within the limits of the retrospective design, the root membrane technique showed long-term success rates comparable to those of conventional immediate implants. (Implant Dent 2018;27:1-11) **Key Words:** immediate implants, bone resorption, bone preservation, survival, success

anterior maxilla, an area with high aesthetic impact, where the delicate and thin buccal bone receives most of its vascular contribution from the periodontal ligament.^{11,12} The consequence of this is resorption of the buccal bone wall, that is greater in the first months after the extraction of teeth,^{9,11,13} causing a contraction or recession of the overlying soft tissues and loss of the papilla, in the case of extraction of multiple elements.^{11,14} Such soft-tissue contraction does not in itself represent an impediment to the

placement of implants but may result in an aesthetic challenge for the clinician, particularly in the anterior areas of jaws.^{5,7,8,14}

Over the years, various surgical techniques have been developed to limit or counteract this physiological bone resorption following the extraction of 1 or more irreversibly compromised teeth in the anterior areas of the jaw.¹⁵⁻²⁰ Among these, alone or in conjunction with implant placement, are several variants of socket preservation,^{16,17} gingival

Longitudinal Soft Tissue Changes During Periodontal Ligament-Mediated Immediate Implant Placement with the Root-Membrane Technique

Miltiades M. Mitsias, DDS, MS, PhD¹/Manuel Bratos, DDS, MS²/Konstantinos Siormpas, DDS³/Michael A. Pikos, DDS⁴/Root Membrane Group⁵/Georgios A. Kotsakis, DDS, MS⁶

Purpose: To assess longitudinal volumetric changes during immediate implant placement with simultaneous intentional retention of the buccal aspect of the root. **Materials and Methods:** This study assessed 20 cases drawn from a previously reported cohort that had study casts available preinsertion and at least 2 years after periodontal ligament (PDL)-mediated immediate implant placement. Gypsum casts were scanned using a laser scanner and converted into digital three-dimensional rendered files. The digital casts were superimposed, and semi-automated subtractive assessment was performed via specialized software. **Results:** Data from 10 patients with a minimum of 3 years follow-up (median follow-up time: 42 months) were analyzed. Each patient contributed one implant site in this study. All implants successfully maintained osseointegration during the follow-up period and demonstrated optimal soft tissue stability. Changes during the observation period ranged from 0.19 mm (95% confidence interval [95% CI]: 0.10 to 0.28) in the labial region 5 mm apical to the mucosal zenith to -0.06 mm (95% CI: -0.14 to 0.02) at 5 mm apical to the base of the distal papilla. All changes were noninferior to pre-extraction baseline measurements based on a 0.5-mm noninferiority margin. **Conclusion:** The intentional retention of the buccal aspect of the root with its periodontal apparatus during immediate implant placement led to optimal soft tissue dimensional stability in the esthetic zone. This technique holds promise for clinical application, and further controlled clinical studies are warranted to determine the comparative clinical benefit from the use of this procedure. Int J Oral Maxillofac Implants 2020;35:XXX-XXX. doi: 10.11807/ijom.7245

Keywords: flapless procedure, immediate placement, PDL-mediated implant placement, surgical procedure

In recent years, the intentional retention of a section of the root has been proposed as a biologic approach to alveolar ridge preservation.¹⁻⁴ In contrast to the use

of biomaterials to limit postextraction alveolar ridge dimensional alterations in conventional ridge preservation procedures,⁴ the retention of a portion of the root facilitates ridge preservation via the retention of part of the periodontal ligament (ie, PDL-mediated ridge preservation).^{1,2} It has long been established that maintenance of the PDL and the vasculature that is part of it or channels through it to reach the alveolar bone is adequate to nourish the alveolar bone and maintain its dimensional stability following loss of the tooth crown.⁵ This knowledge has been exploited for pontic site stability in the case of intentional root submergence, but has been impractical for implant sites.⁶ That was until the proof-of-concept study by Hürzeler et al⁷ that introduced an innovative technique, ie, socket-shield, for combining intentional root submergence with implant placement. This seminal publication demonstrated the feasibility of this technique in an animal model and provided histologic data showing that maintenance of the PDL is achieved when a

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⁵Department of Periodontology, LTHSCA, San Antonio, Texas, USA.

⁶Department of Periodontics, University of Texas Health at San Antonio, San Antonio, Texas, USA.

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Scott D. Gao, DMD



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The Root Membrane Concept: In the Zone With the "Triangle of Bone"

Implant dentistry has continued to evolve with refined techniques for immediate or delayed loading, immediate extraction placement, bone grafting, guided surgery applications, and restorative options. However, the importance of the diagnostic process of dental implant reconstruction cannot be underestimated to achieve both functional and aesthetic outcomes. The advent of 3-D imaging modalities and interactive treatment planning software has provided clinicians with an enhanced set of tools for accurate assessment of each individual patient presentation, especially when implant reconstruction may be considered. When evaluating potential implant recipient sites, it is important to appreciate the volume of bone, the thickness of the cortical plates, bone density, bony topography, and the position of existing tooth roots within the alveolus. The difficulty continues in finding agreement as to where an implant should be placed within a potential receptor site.

The "triangle of bone" (TOB) concept was initially proposed in 1992 and first published in 1995 to help define a "zone" of available bone for implant placement—originally by using computed tomography (CT) scan imaging.¹ The protocol has continued to evolve within subsequent publications with the advent of cone beam CT (CBCT) and the development of various treatment planning software applications with advanced diagnostic functionality. The goal is always to

The goal is always to place the implant in a restoratively driven position while preserving or augmenting the preexisting bone.

place the implant in a restoratively driven position while preserving or augmenting the preexisting bone. When teeth are still present, the relationship between the trajectory of the alveolus and the position of the root is critical when assessing for implant placement. The cross-sectional slice is one of the many views that are essential for the diagnostic phase utilizing the TOB concept (Figure 1a). The trajectory of the alveolus as it relates to the tooth root can be assessed with the existing bone volume or potential zone within the TOB for implant placement (Figure 1b). If it is desired to surround the implant with the most volume of bone, the implant is positioned to bisect the TOB (Figure 2a, cyan line), necessitating a cement-retained restorative protocol. The apical position of the implant should be decided buccally within the TOB for a screw-retained restoration (Figure 2b). Therefore, it is possible to predict aspects of the prosthetic phase using the TOB concept.

It is well known that tooth extraction alone, or when followed by immediate implant placement, can lead to crestal alveolar bone and soft-tissue loss. The buccal plate is extremely

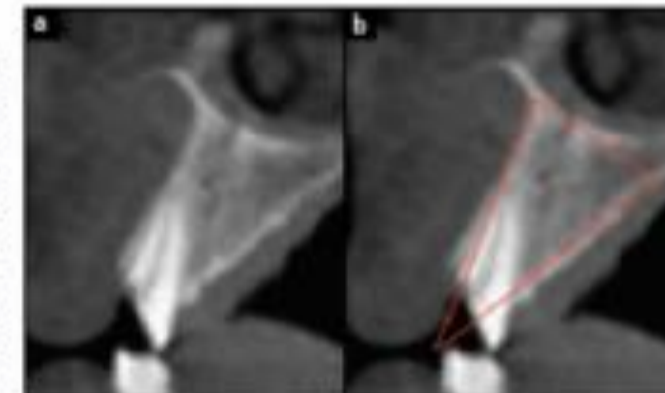


Figure 1. (a) The cross-sectional slice revealing the alveolar bone and (b) the trajectory of the tooth root within the alveolus to be assessed as a "zone" within the "Triangle of Bone" (TOB) for implant placement.

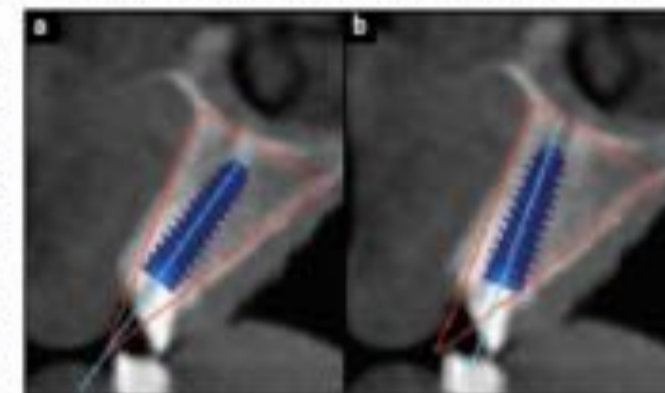


Figure 2. It is possible to predict aspects of the prosthetic phase (a) using the TOB concept for (a) the cement-retained restorative protocol or (b) a screw-retained restoration in which the apical position of the implant is directed buccally.

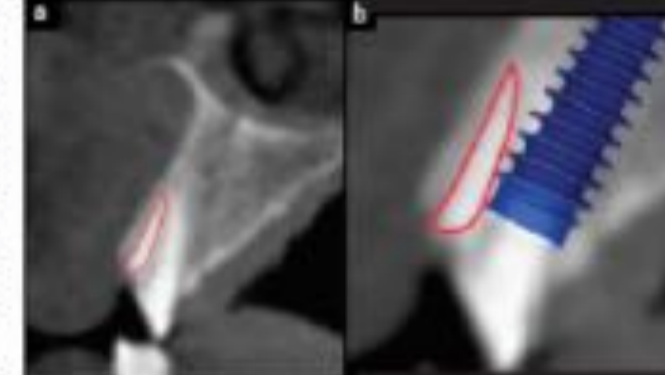


Figure 3. (a) The root fragment that will remain is depicted in the cross-sectional or sagittal slice (red outline), and (b) the alveolar ridge reveals the proximity of the simulated implant threads to the root.

*Private Practice, Larissa, Greece; †Department of Periodontology and Implant Dentistry, College of Dentistry, New York University, New York, NY; ‡Private Practice, Athens, Greece; §Department of Periodontology and Implant Dentistry, College of Dentistry, New York University, New York, NY; ¶Private Practice, Trinity, FL, & Founder, CEO, Pikos Institute; ||Department of Periodontology, LTHSCA, San Antonio, Texas, USA.

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DOI: 10.11807/ijom.7245

Osseodensification



Sinus



Elevation

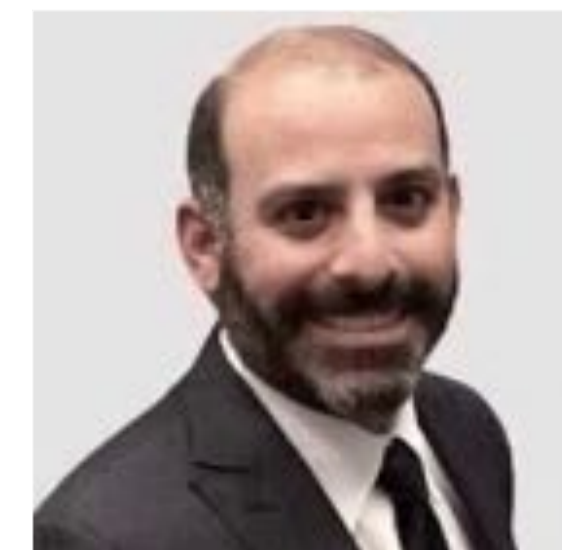
Multi-Center Retrospective 5-year follow up of 253 implants Implants with Six Different Thread Design Placed in 184 Patients with Osseodensification



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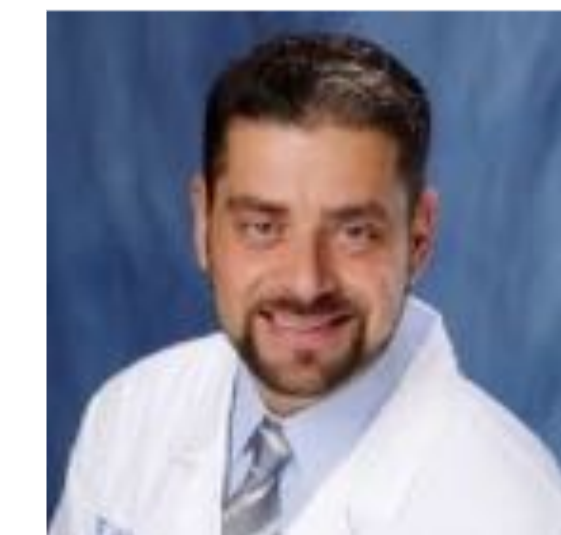
Isaac Tawil, DDS, MS
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School of Dentistry

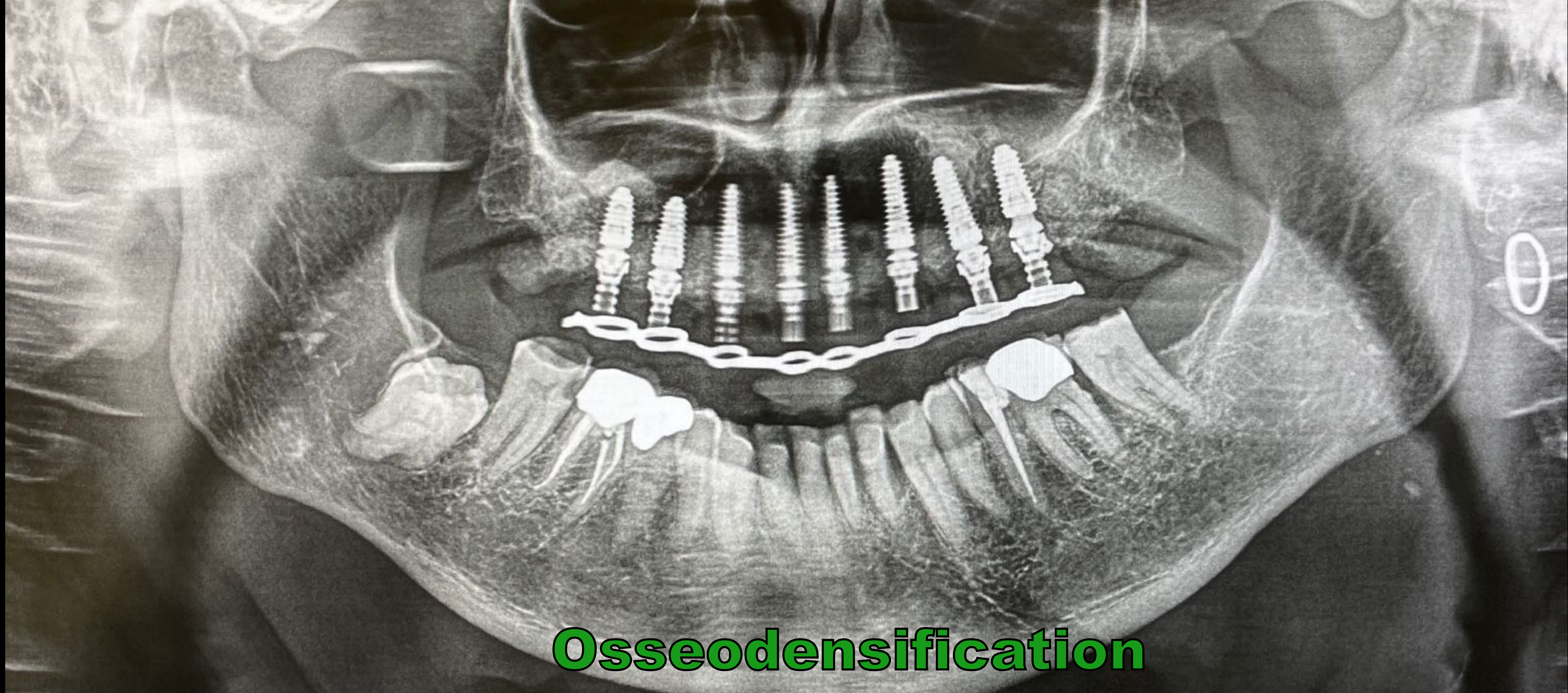


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Tanello, Rosen, Tawil, Johnson, Huwais, Neiva



Osseodensification

**Sinus
Elevation**

Osseodensification



Immediate Loading



ISQ

Immediate Loading



FP1

PHOTOBIO-MODULATION



BIOTECH DENTAL



PHOTOBIO-MODULATION

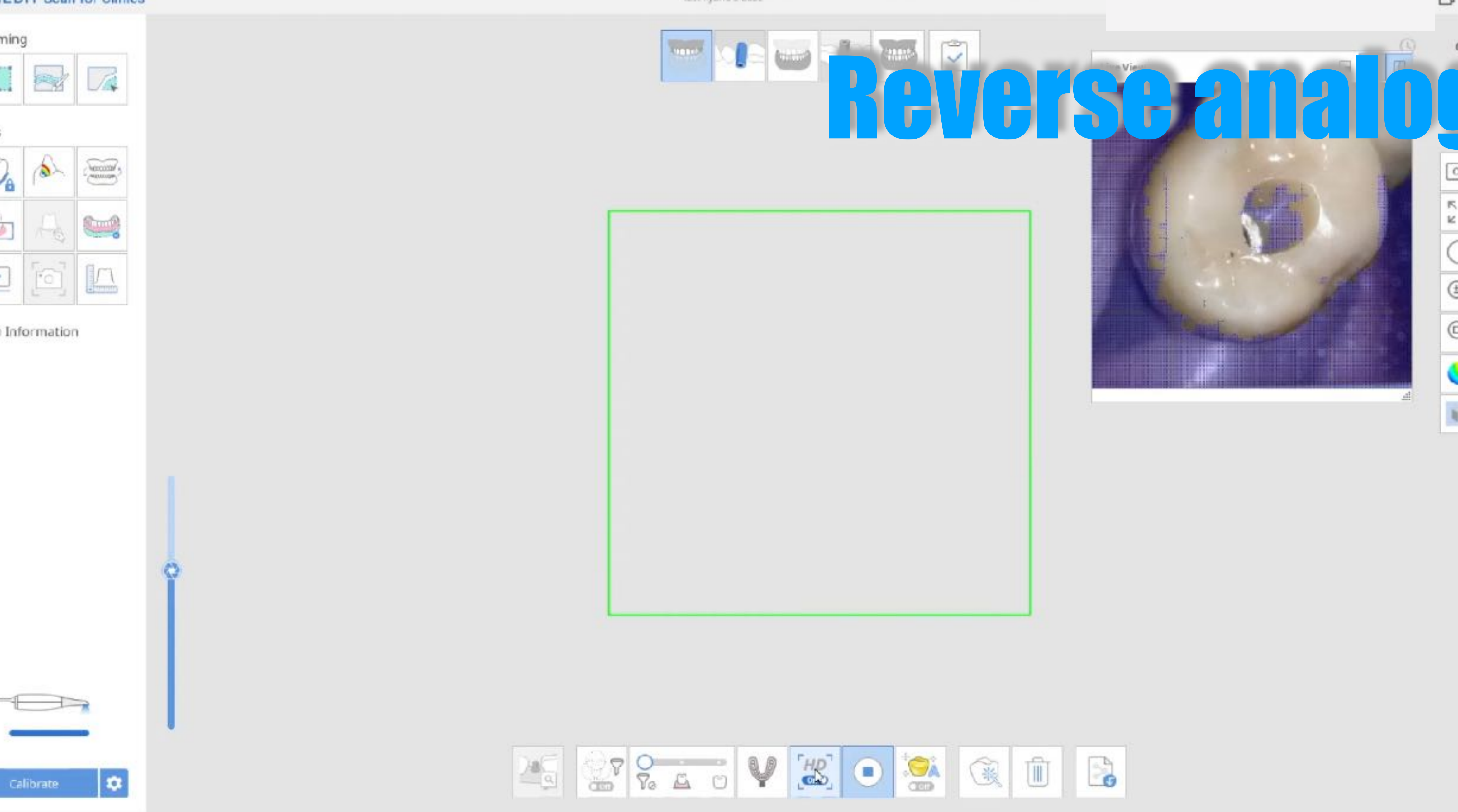


PET

Scalloped



Extraction



Reverse analog scan



iJig

Full-Arch Implant Surgical and Restorative Considerations:

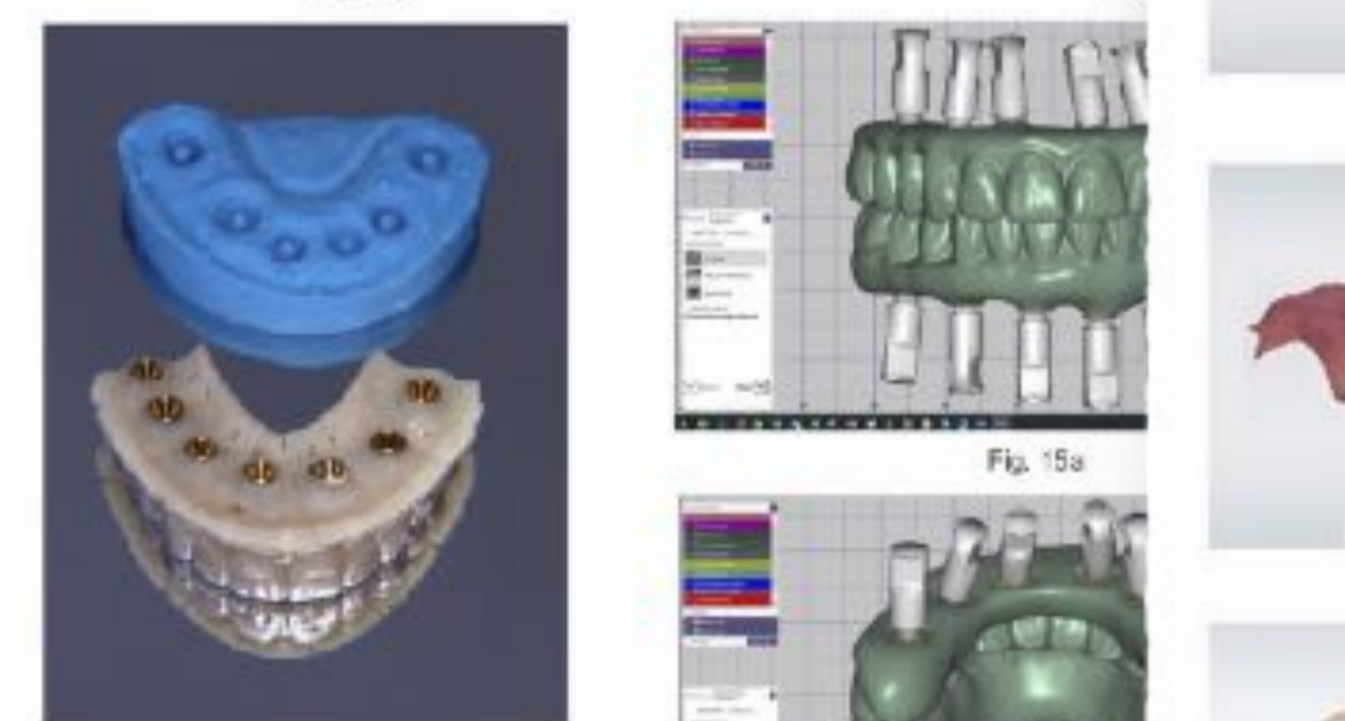
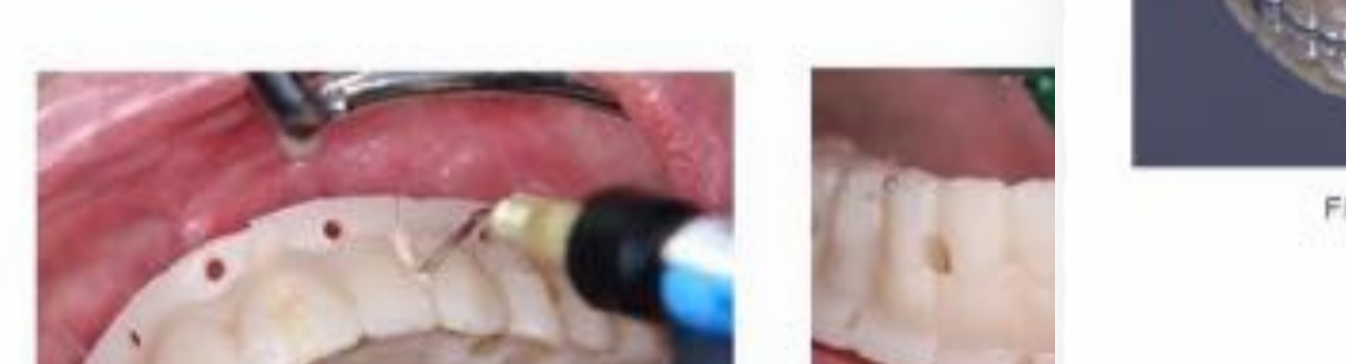
Innovations in the Digital Workflow with iJIG

Introduction:

When a patient presents with a failing dentition there are several different treatment options available when a fixed prosthetic result supported by dental implants is considered. This could include extraction and bone grafting allowing the ridge to heal before implants are placed, or extractions and immediate placement of implants with concurrent bone grafting to fill any voids in the remaining bony architecture. These two examples would usually leave the patient with a removable complete denture during the healing phase prior to loading of the implants for either a fixed or removable restoration. A treatment alternative was presented in the September 2019 (Ganz-Tawil) issue of Dentistry Today which described the necessary steps to achieve restoratively-driven surgical planning for full-arch implant reconstruction where implants were loaded the day of surgery with a pre-fabricated fixed provisional restoration.

Immediate loading of dental implants offers many advantages over delayed treatment alternatives including: (1) the surgical phase is generally completed in one visit; (2) the pre-established occlusion can be planned in advance to achieve an immediate functional and esthetic result; (3) reduced overall treatment time to definitive restoration; and (4) a reduction in the number of patient visits. As technology continues to evolve, so do the variations in protocols that have been developed to enhance the process of delivering both pre-operative and post-operative treatment. This current article presents innovations that can improve the workflow essential to improve efficiencies and reduce success with single and dual full-arch implant reconstruction.

A 58-year-old male presented with a failing dentition. The pre-operative intra-oral clinical view illustrates missing, broken, fractured, and decayed teeth, plaque and calculus accumulation, with severe soft tissue inflammation (Figs



Jan 2020

CFR

Photogrammetry



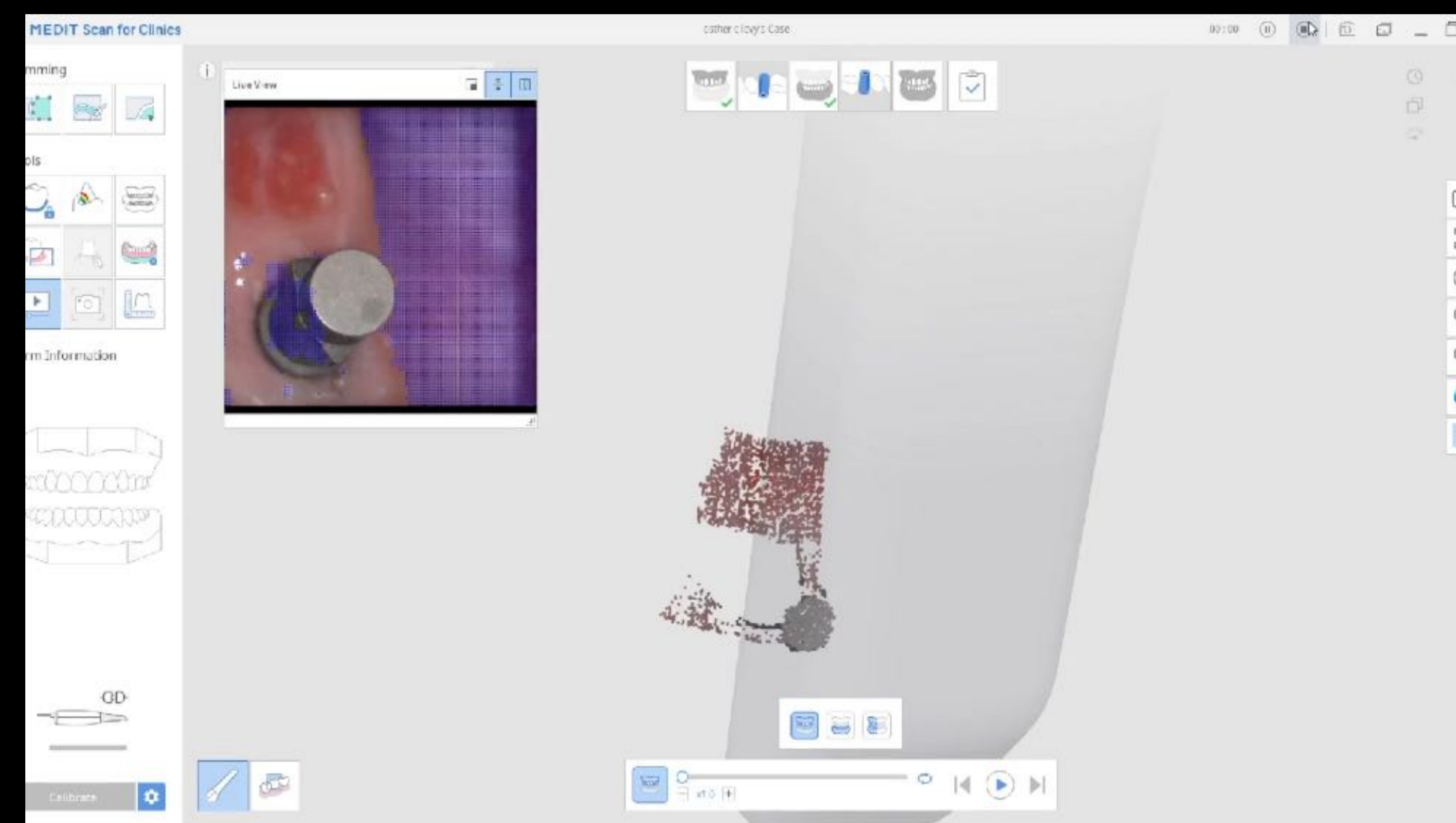
Imetric4D



Photogrammetry

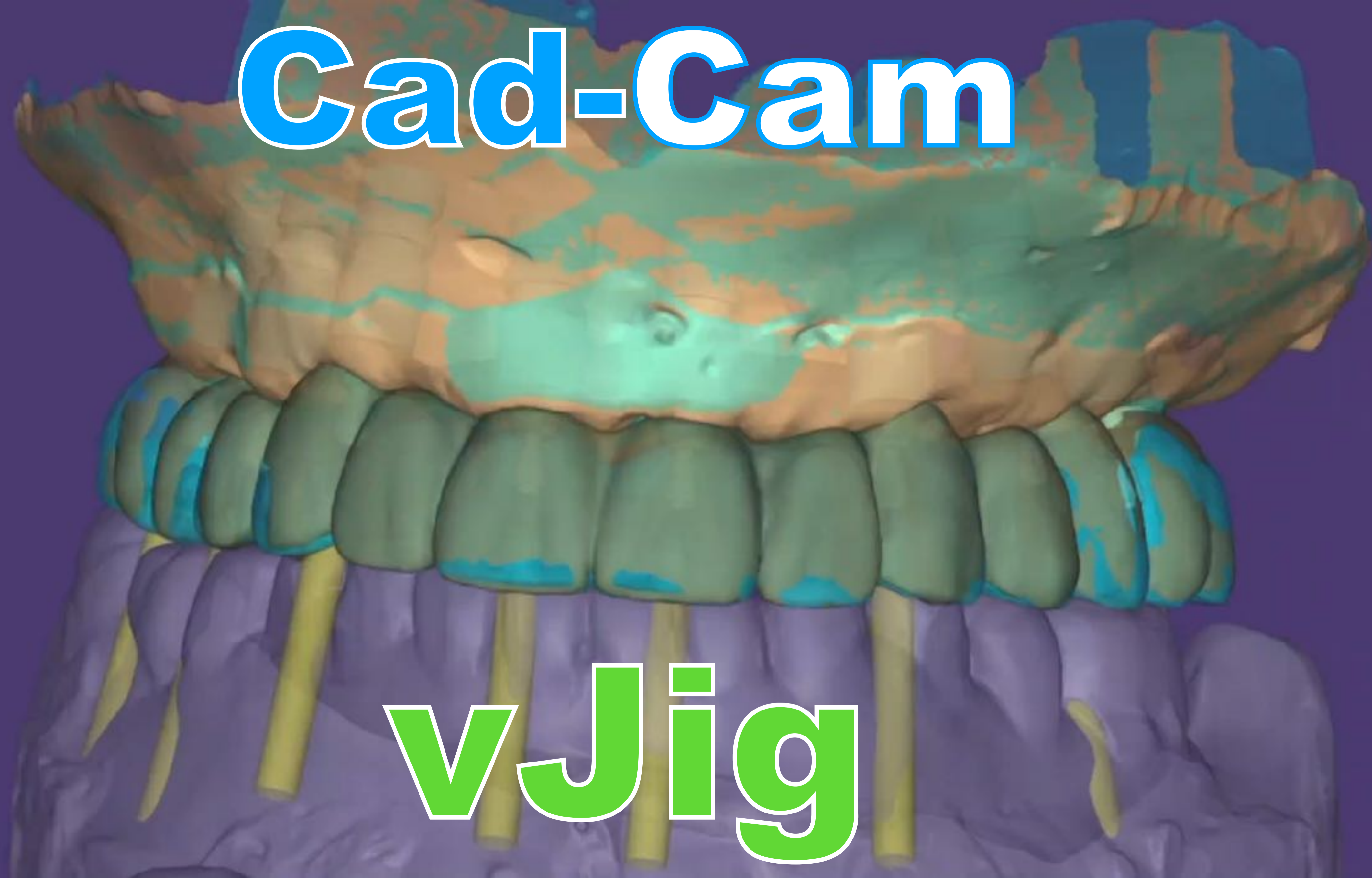


Imetric4D



ios

Design



Cad-Cam

vJig

MILL

Deliver



FP1

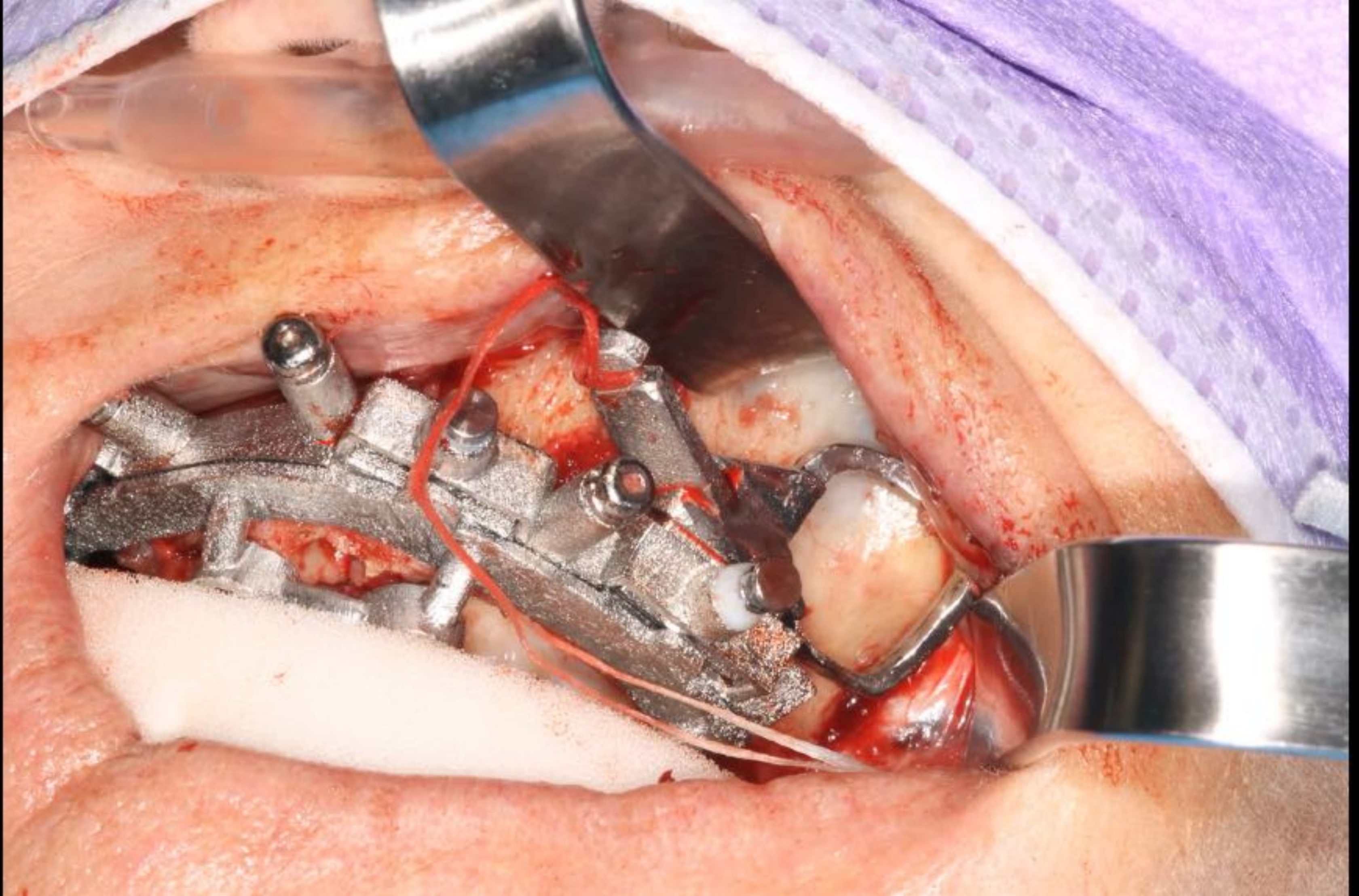


Changing lives one smile at a time





ZYGO



**Static
Template**

• Full template-Guidance

**Dynamic Virtual
Template**



Dynamic Virtual Template

Dynamic Virtual Template - Evidence (navident.com)



Accuracy of a Dynamic Dental Implant Navigation System in a Private Practice

Stefanelli et al IJOMI 2018

Table 2 Key Deviation Statistics of All Implants Inserted (n = 231)

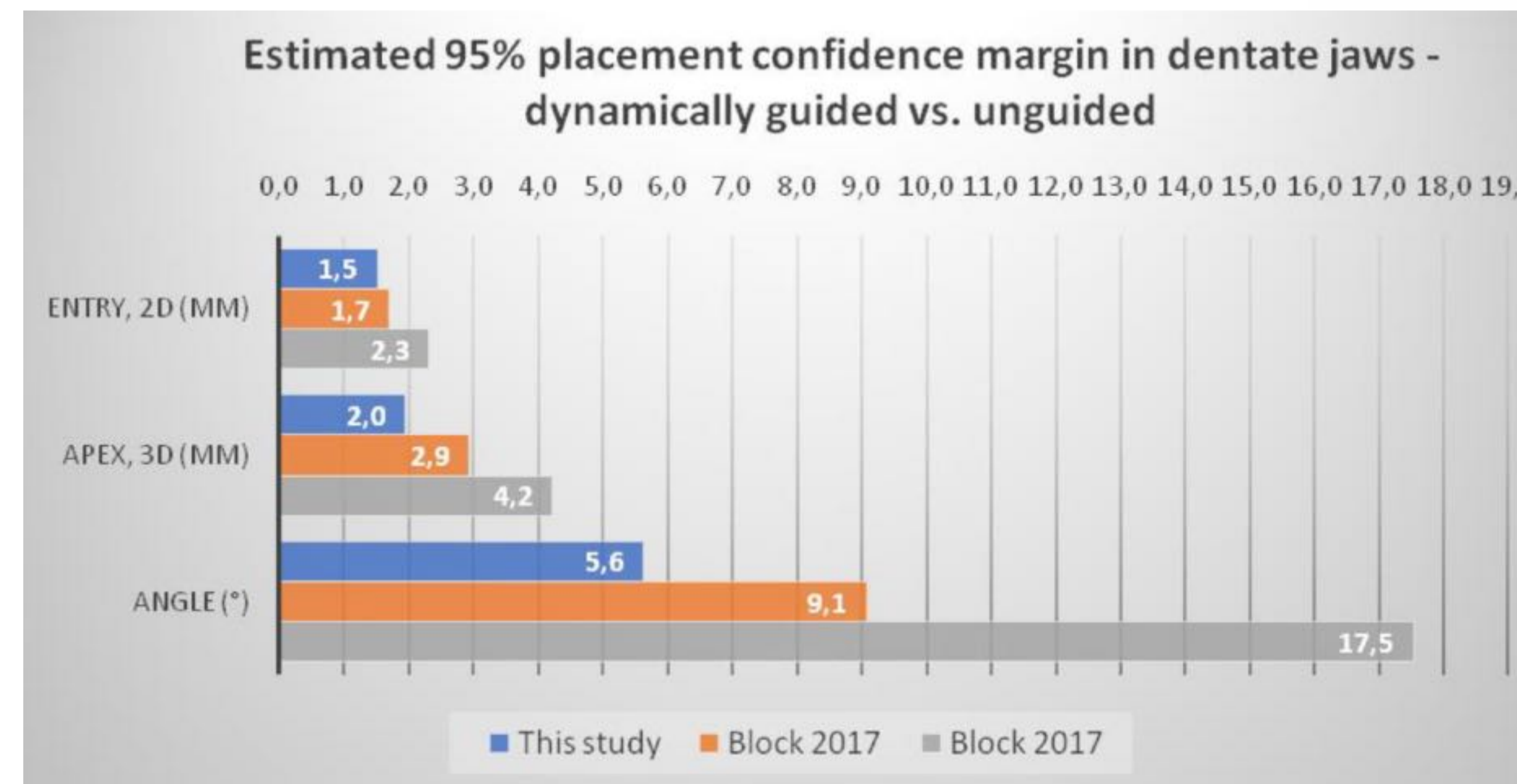
Deviation	Mean	SD
Entry (2D, mm)	0.71	0.40
Apex (3D, mm)	1.00	0.49
Angle (deg)	2.26	1.62

Conclusions

Dynamic computer assisted surgery systems allow more accurate implant placement in comparison with the conventional freehand method, regardless of the surgeon's experience. However, this system seems to offer more advantages to novice professionals, since it allows them to reduce their deviations significantly and achieve similar results to those of experienced clinicians.

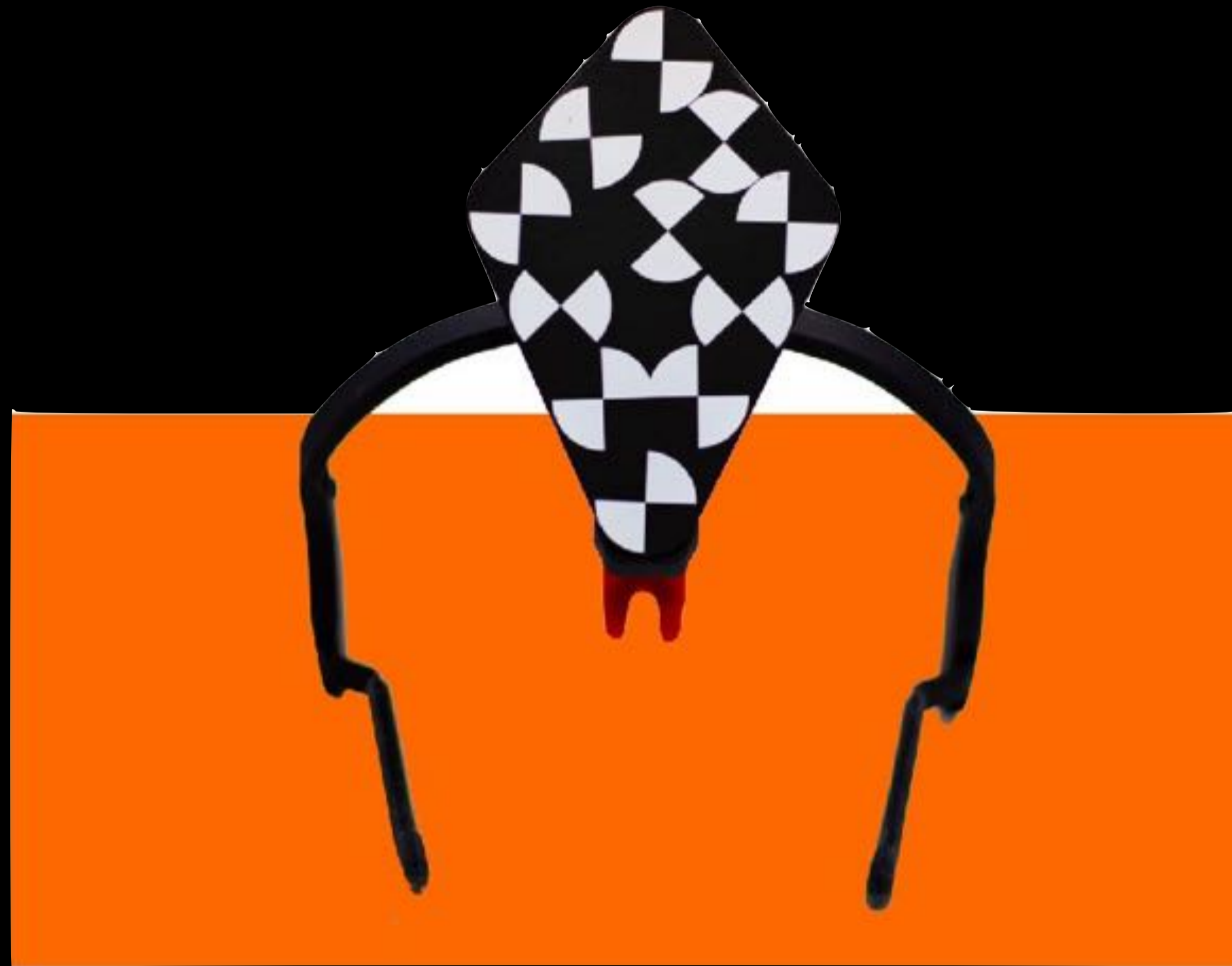
Implant Placement Accuracy Using Dynamic Navigation

Block, Emery et al IJOMI 2016



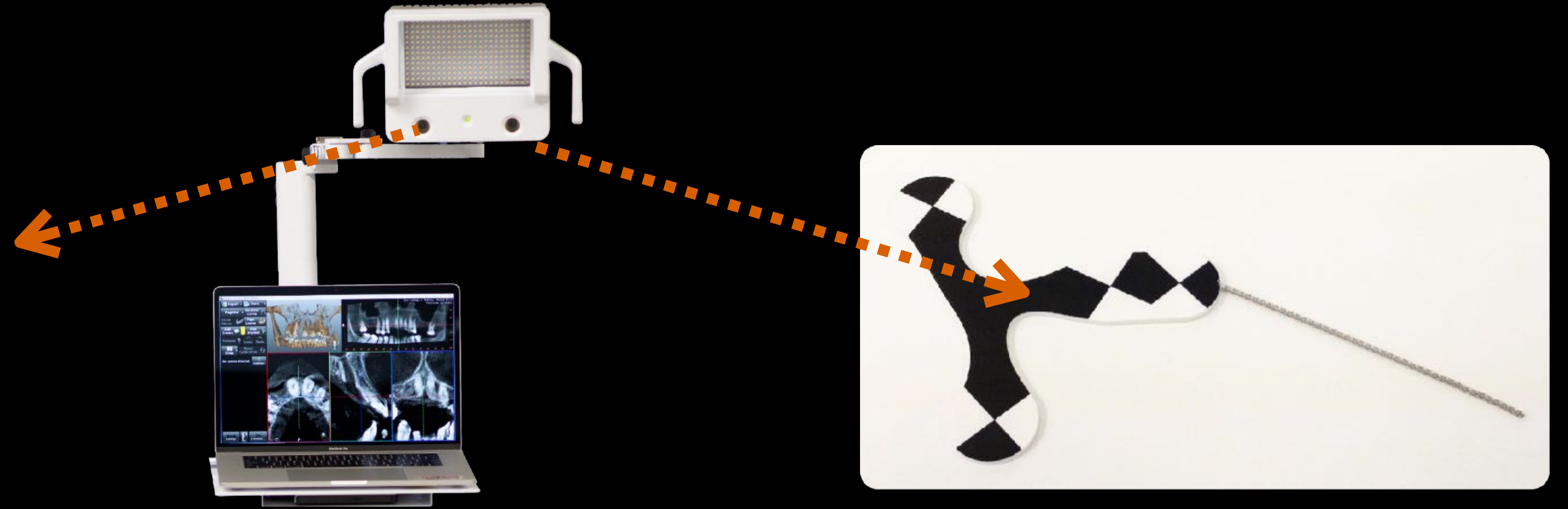
**Dynamic
Virtual
Template**

Maxilla



• **Full template-Guidance**

Micron Jaw Tracking Camera



Mandible

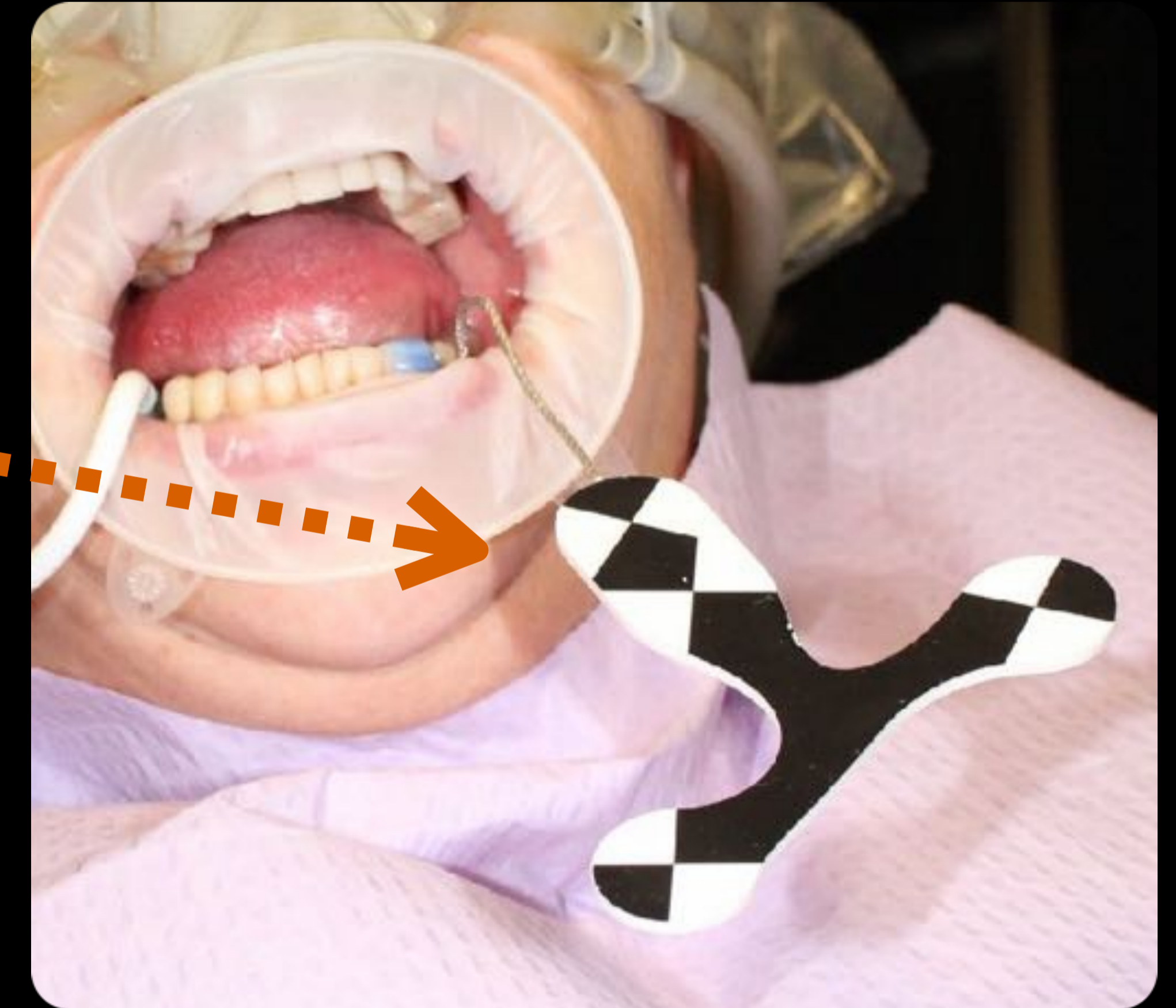
**Dynamic
Virtual
Template**

- **Full template-Guidance**

Micron Jaw Tracking Camera

Maxilla

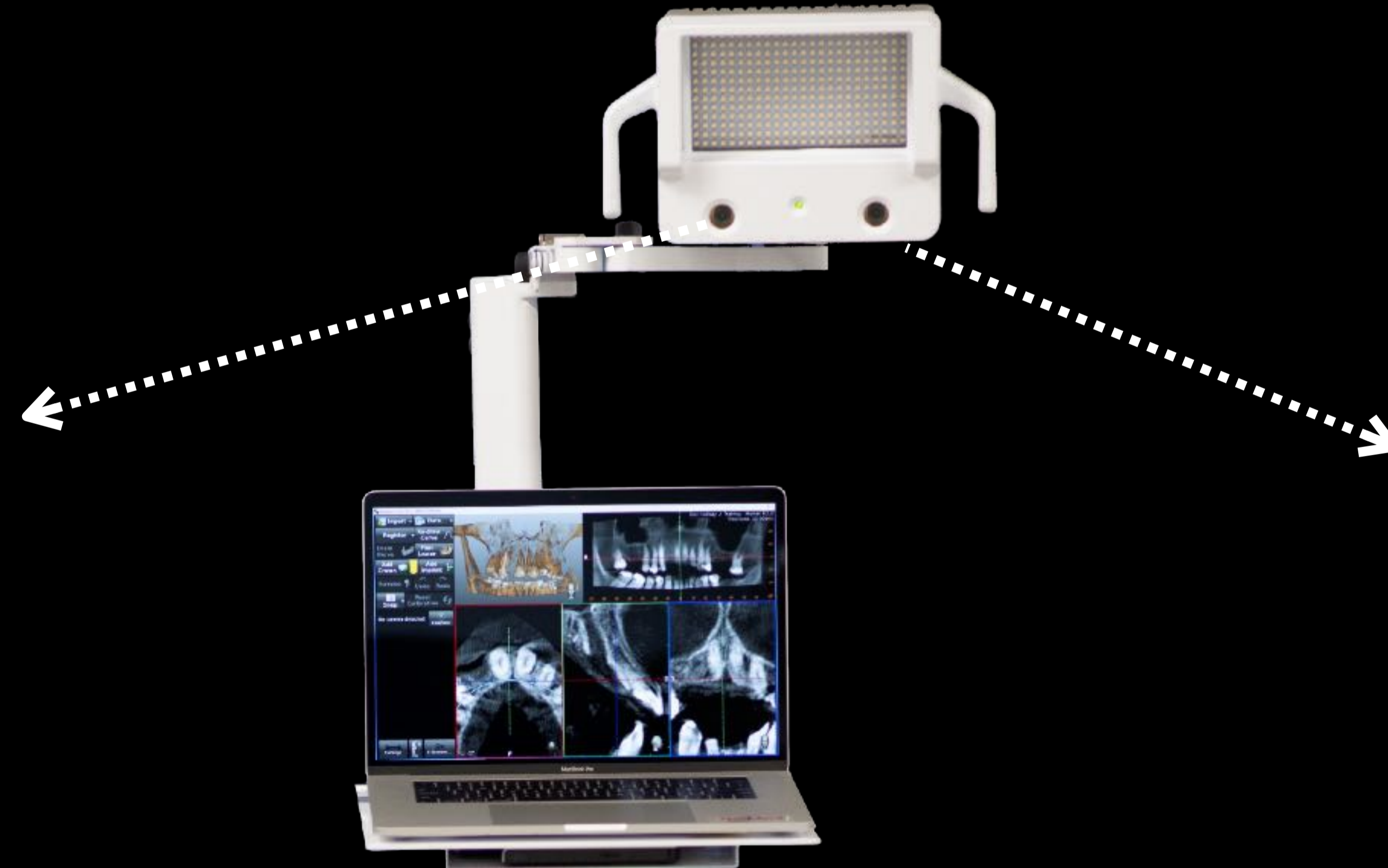
Mandible



**Dynamic
Virtual
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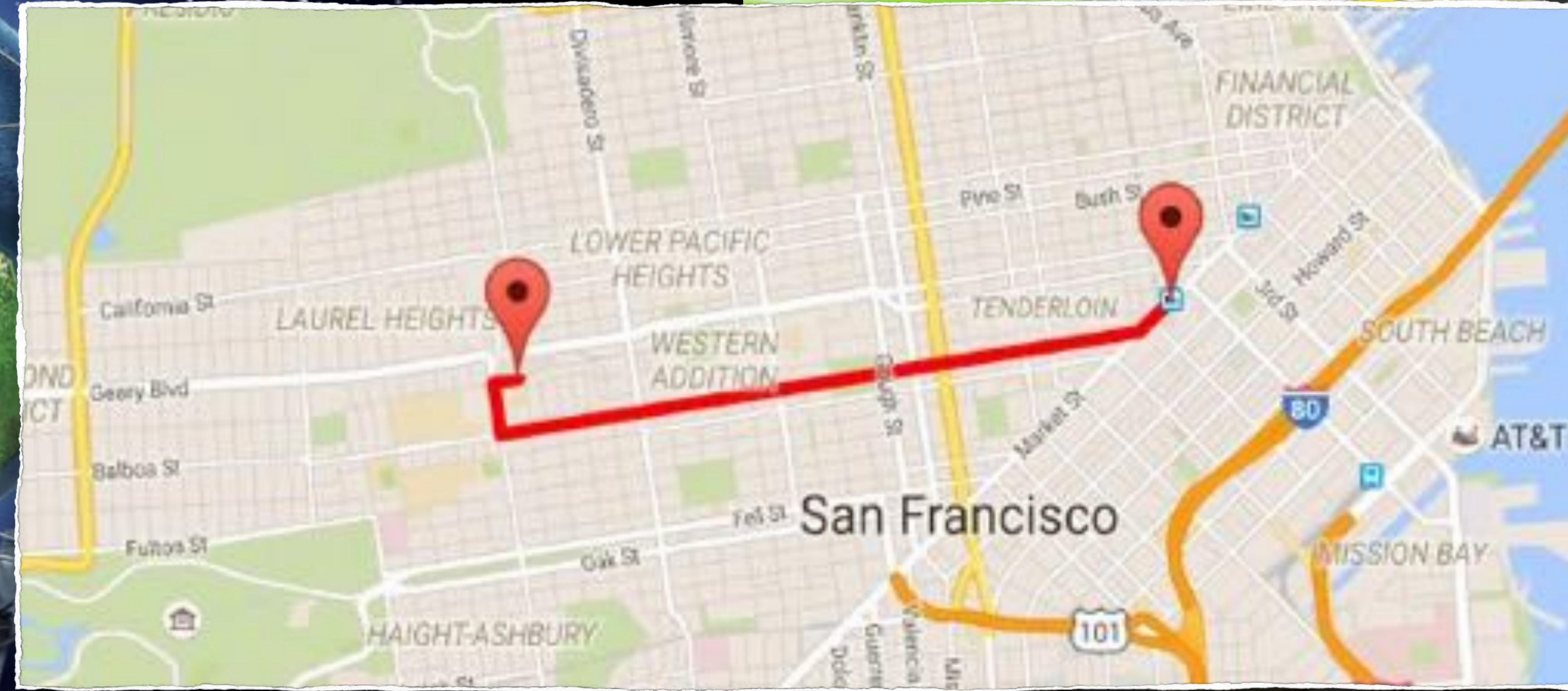
- **Full template-Guidance**

Calibrate any Handpiece Any Drill



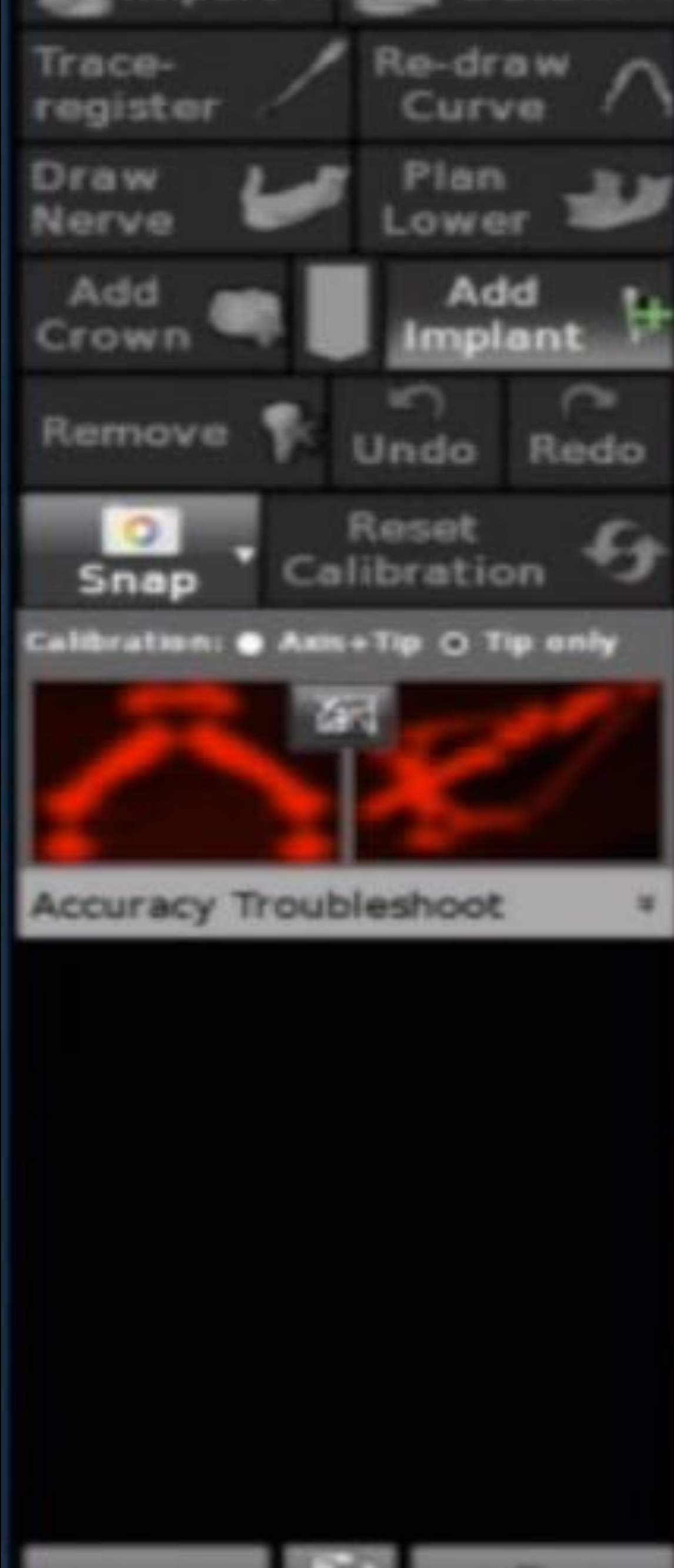
**Dynamic
Virtual
Template**

GPS Comparabile Technology

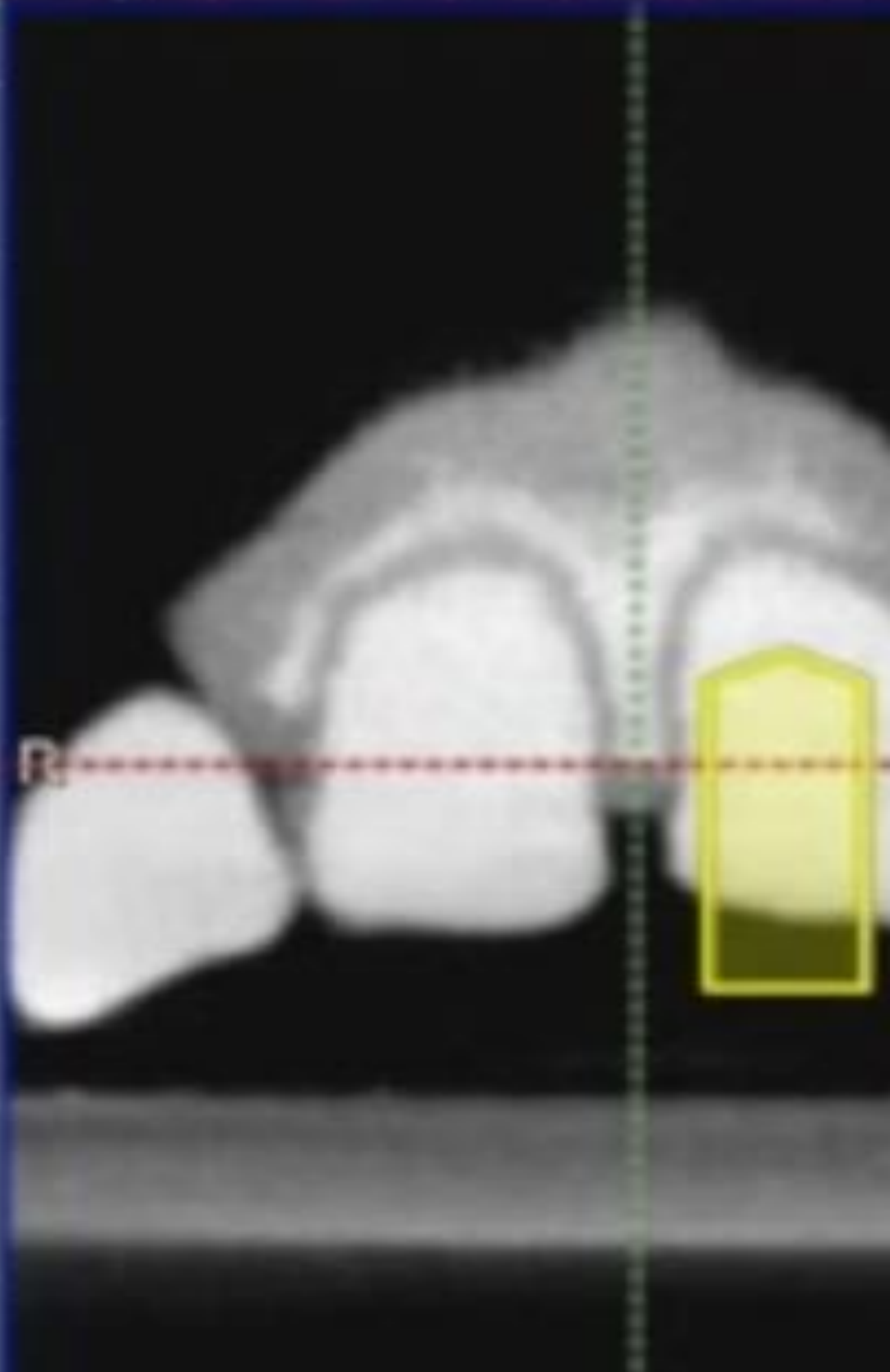
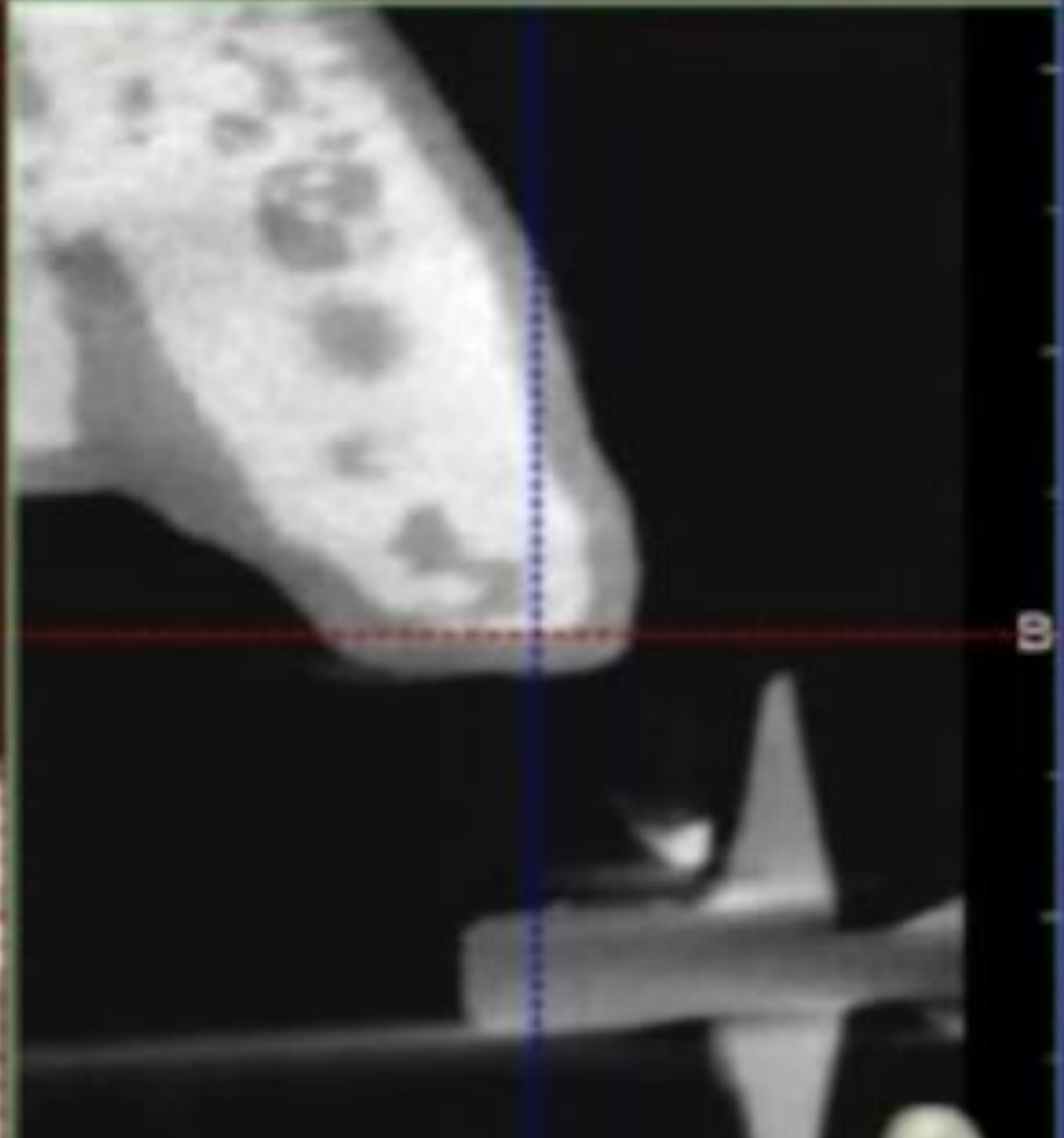
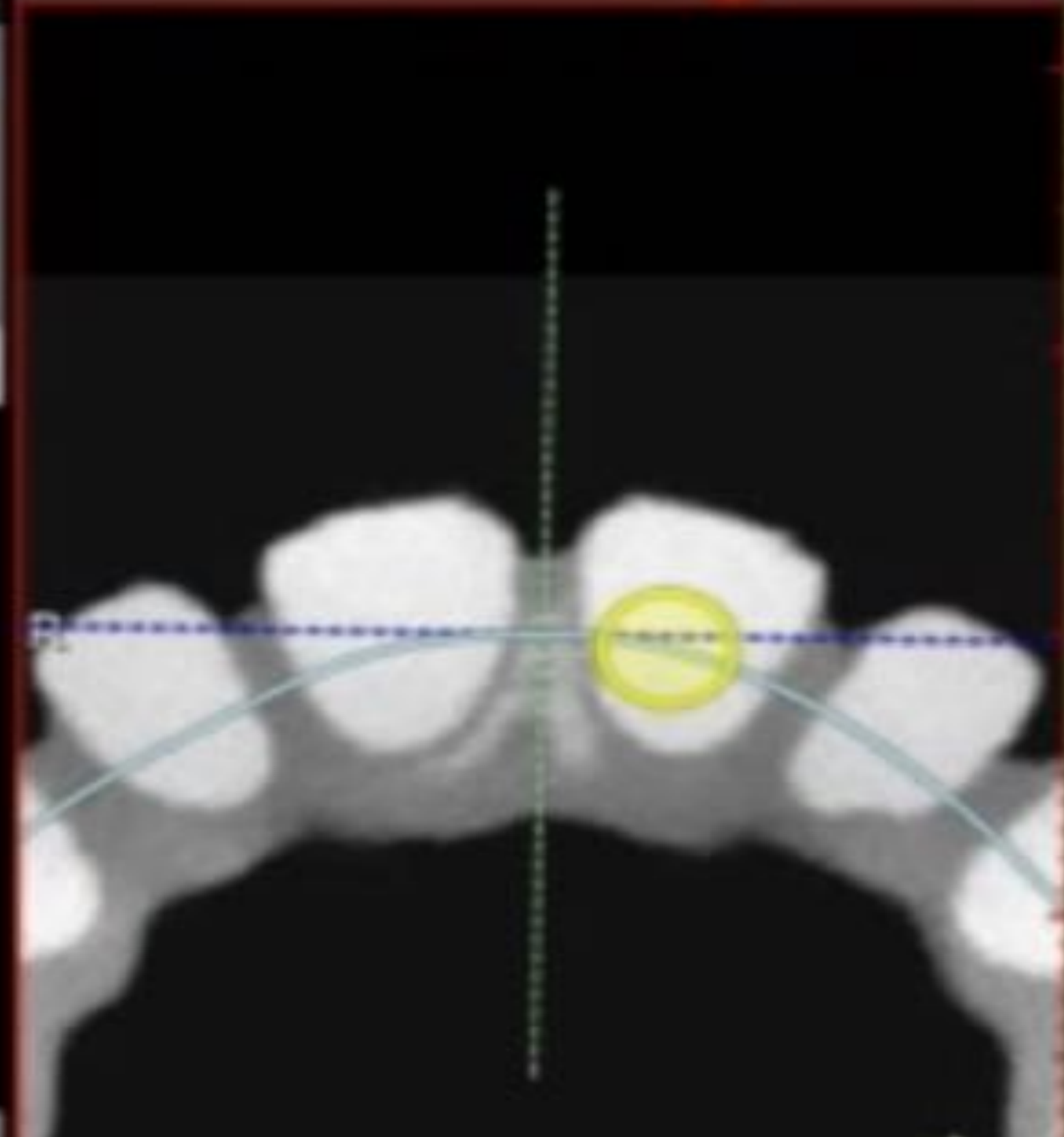
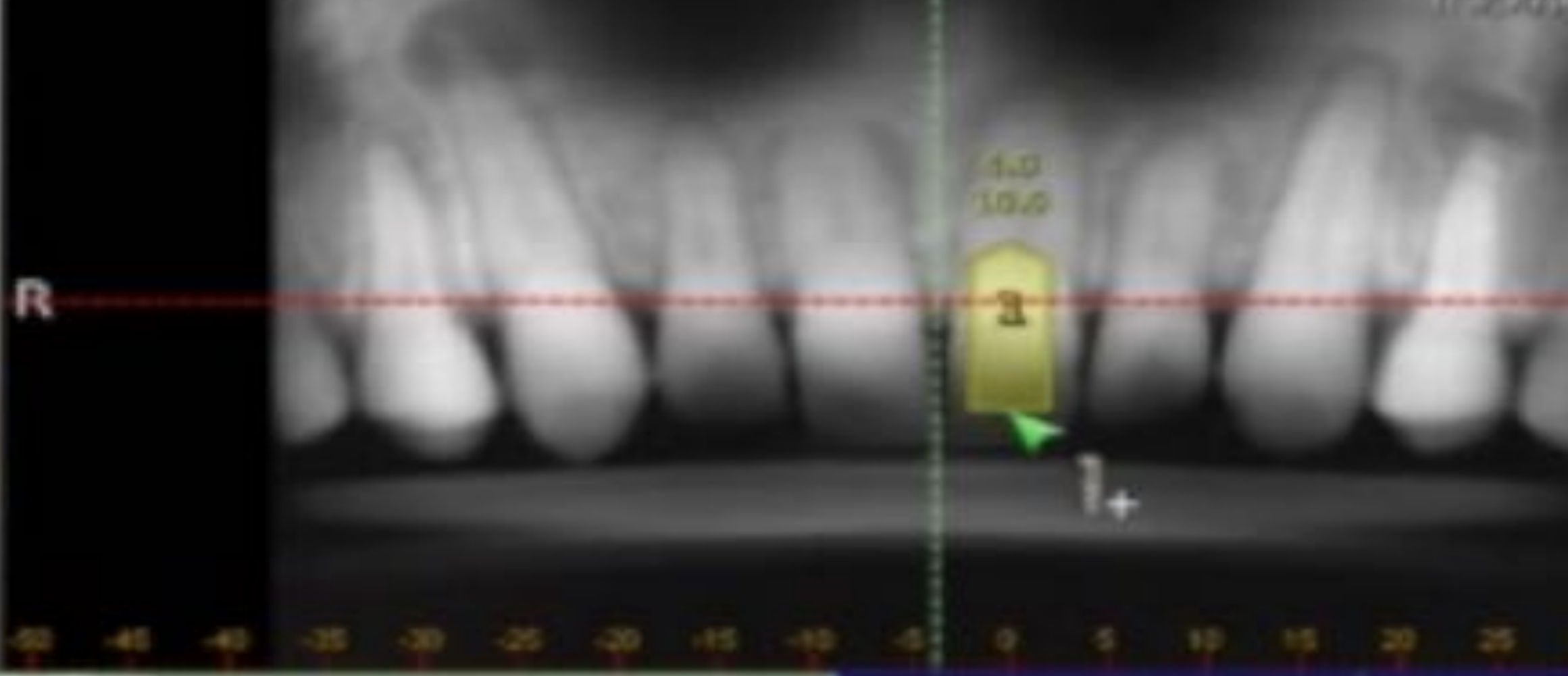


Dynamic Endo

• ENDODONTICS



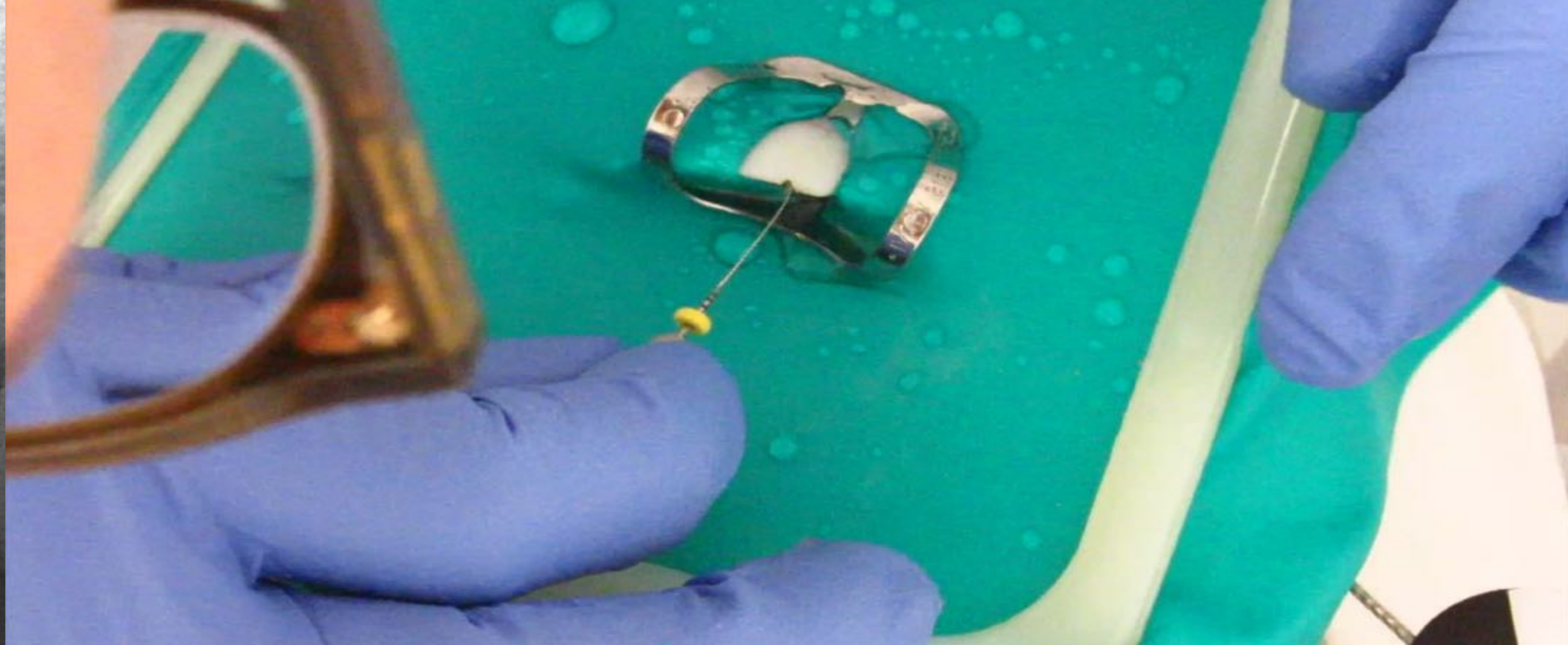
Trace-register Re-draw Curve
Draw Nerve Plan Lower
Add Crown Add Implant
Remove Undo Redo
Snap Reset Calibration
Calibration: ● Axis+Tip ○ Tip only
Accuracy Troubleshoot



**Dynamic
Guided Access**



**Dynamic
Guided Endo**



**Dynamic
Guided Endo**

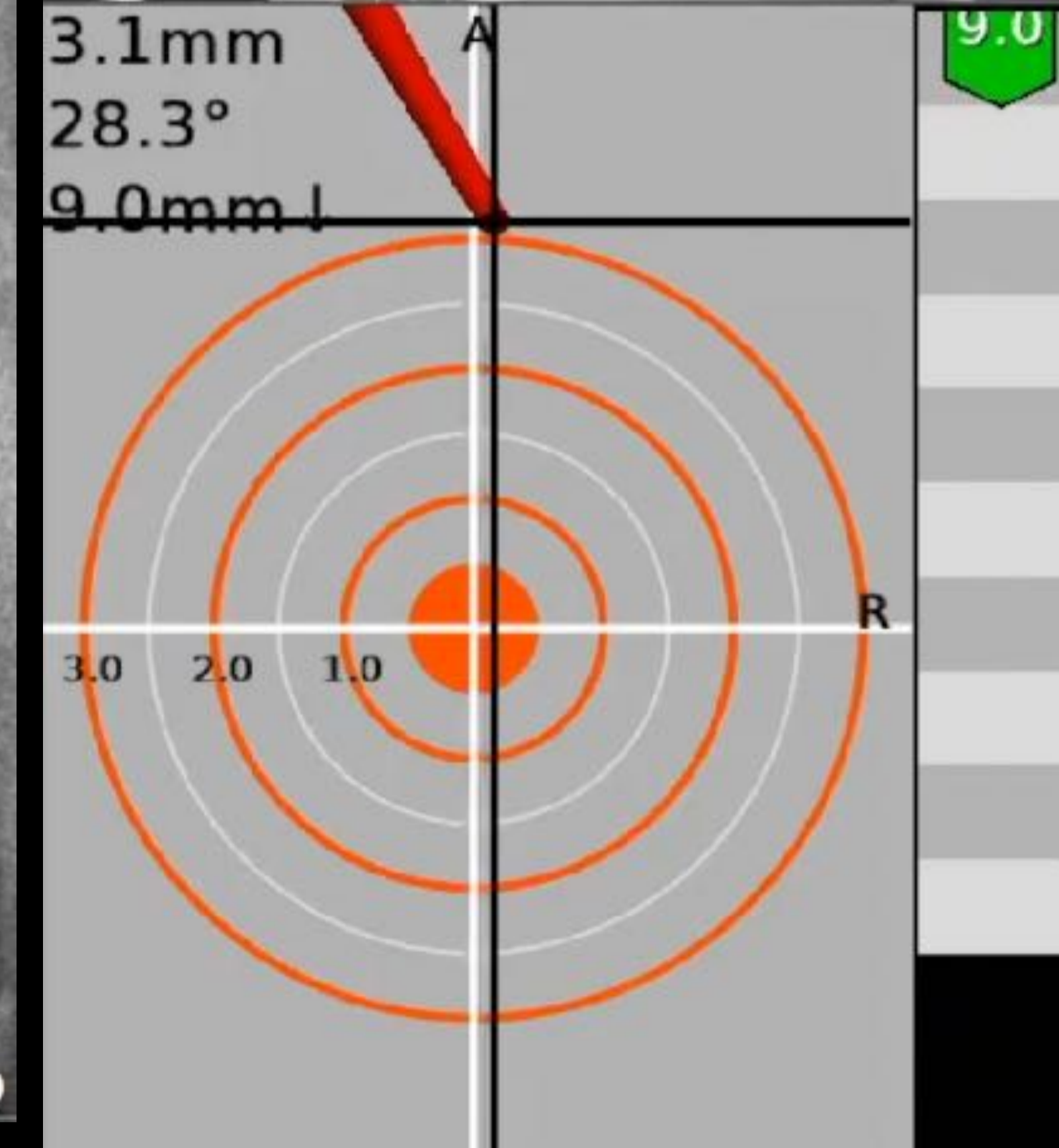


Dynamic Guided Surgical Endo

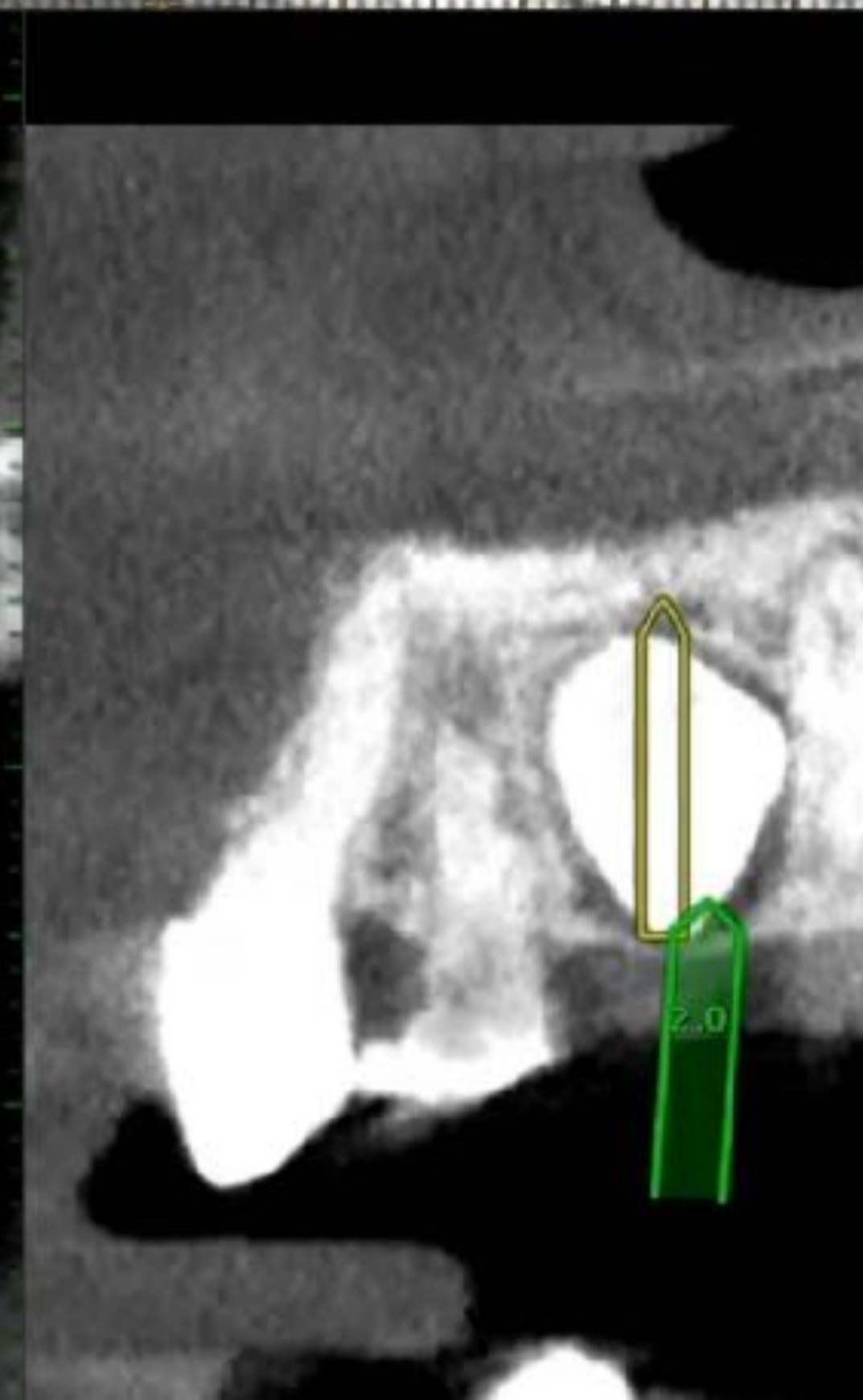
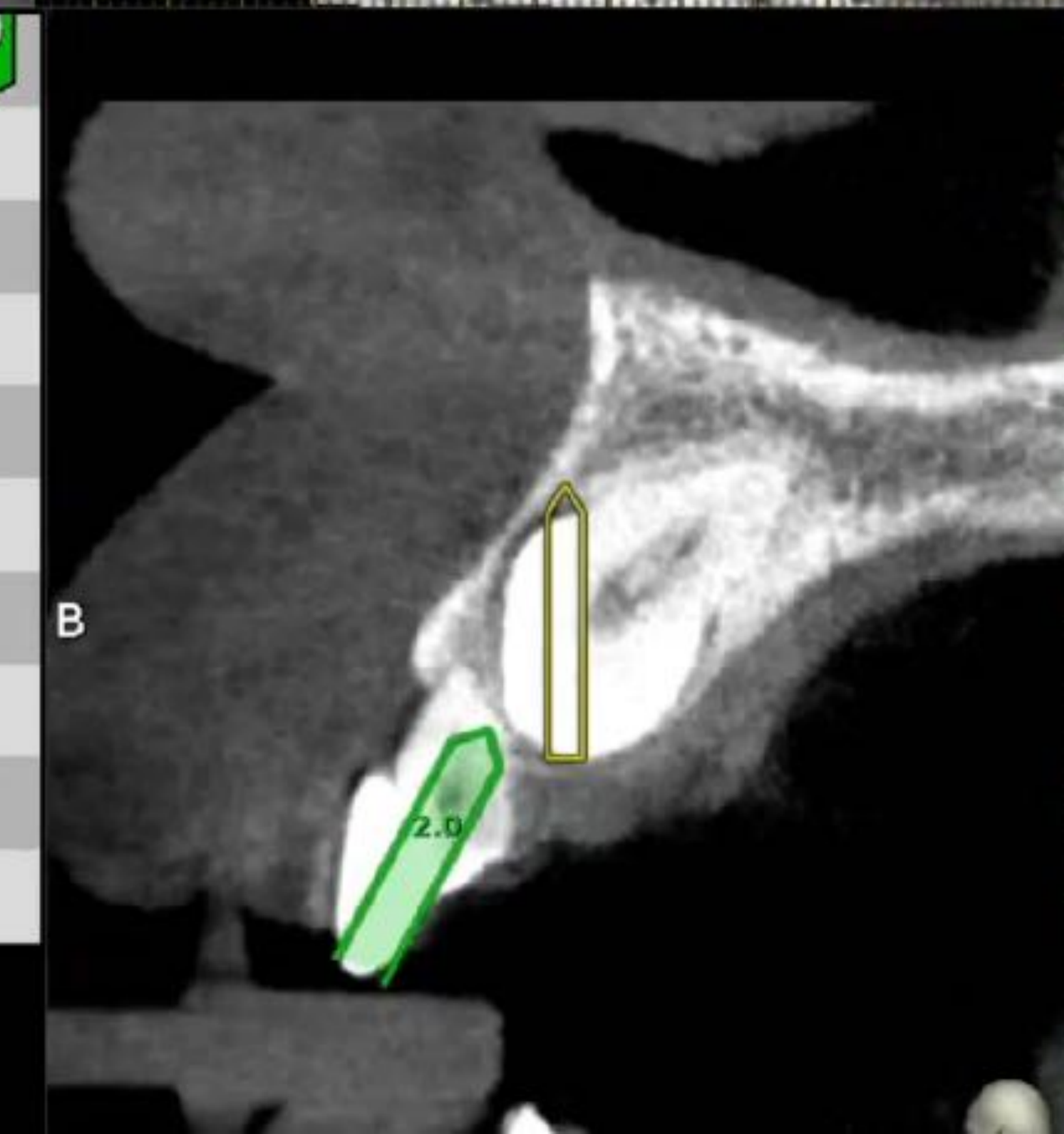
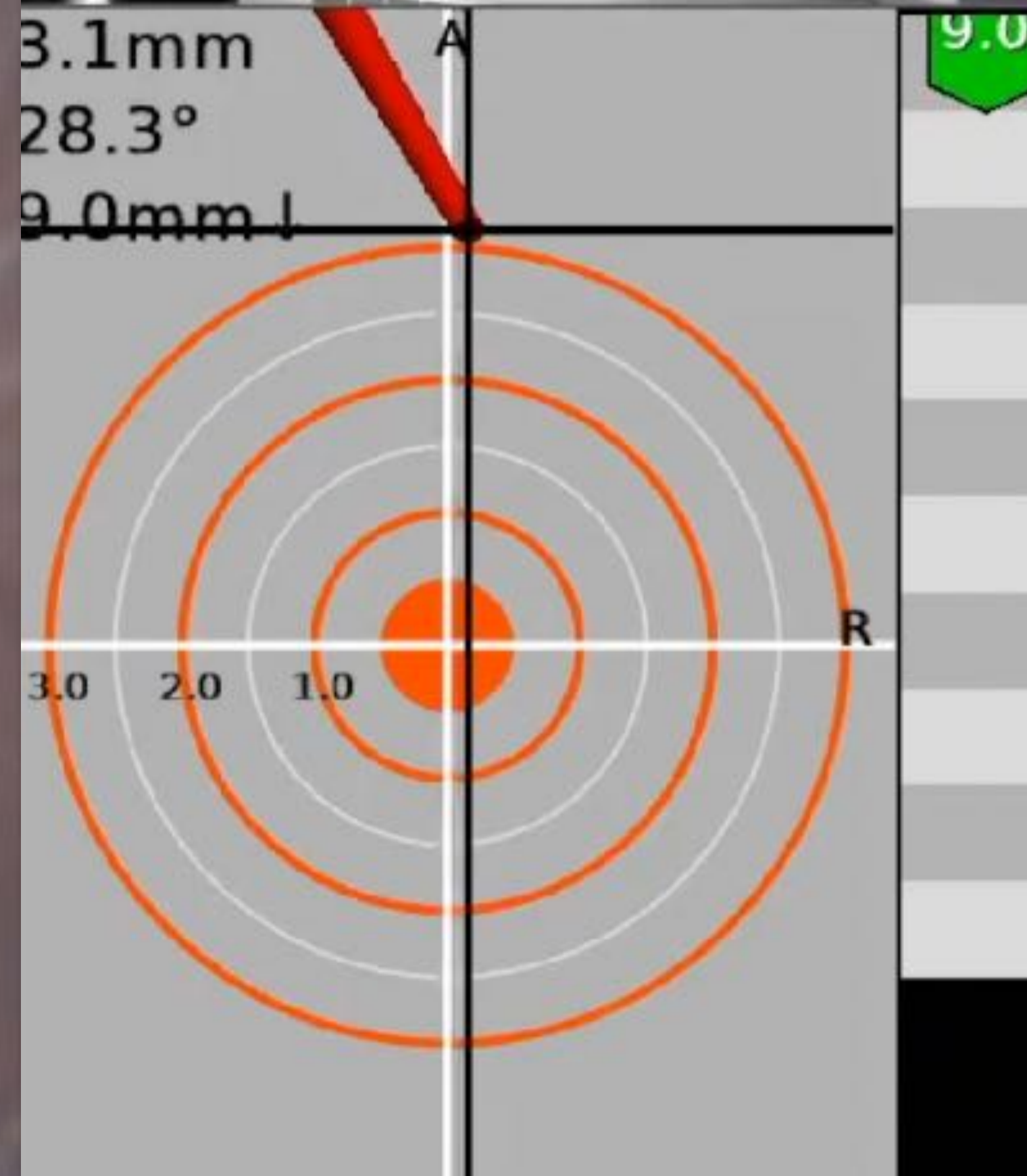
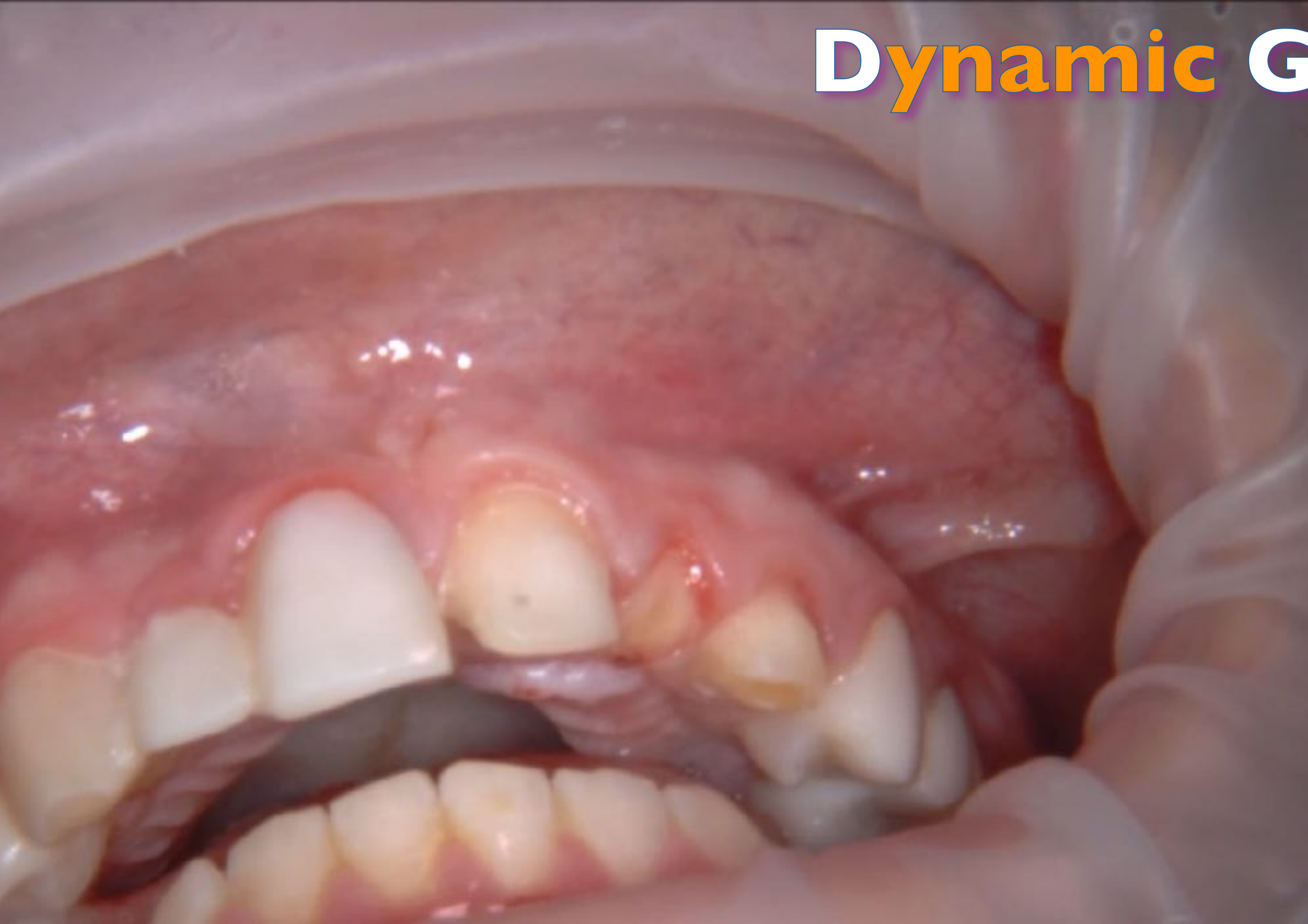


Courtesy Dr Paula Villa

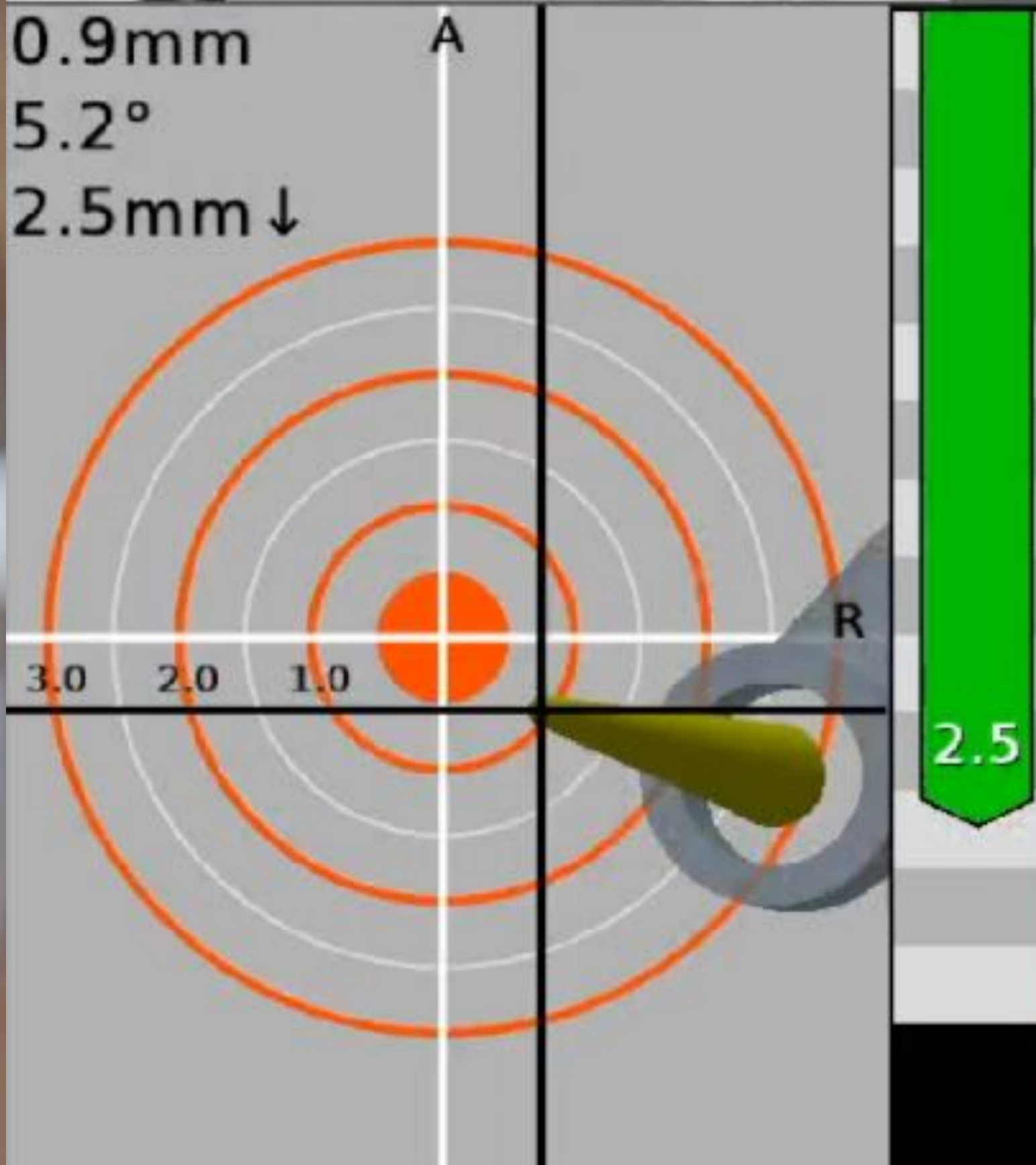
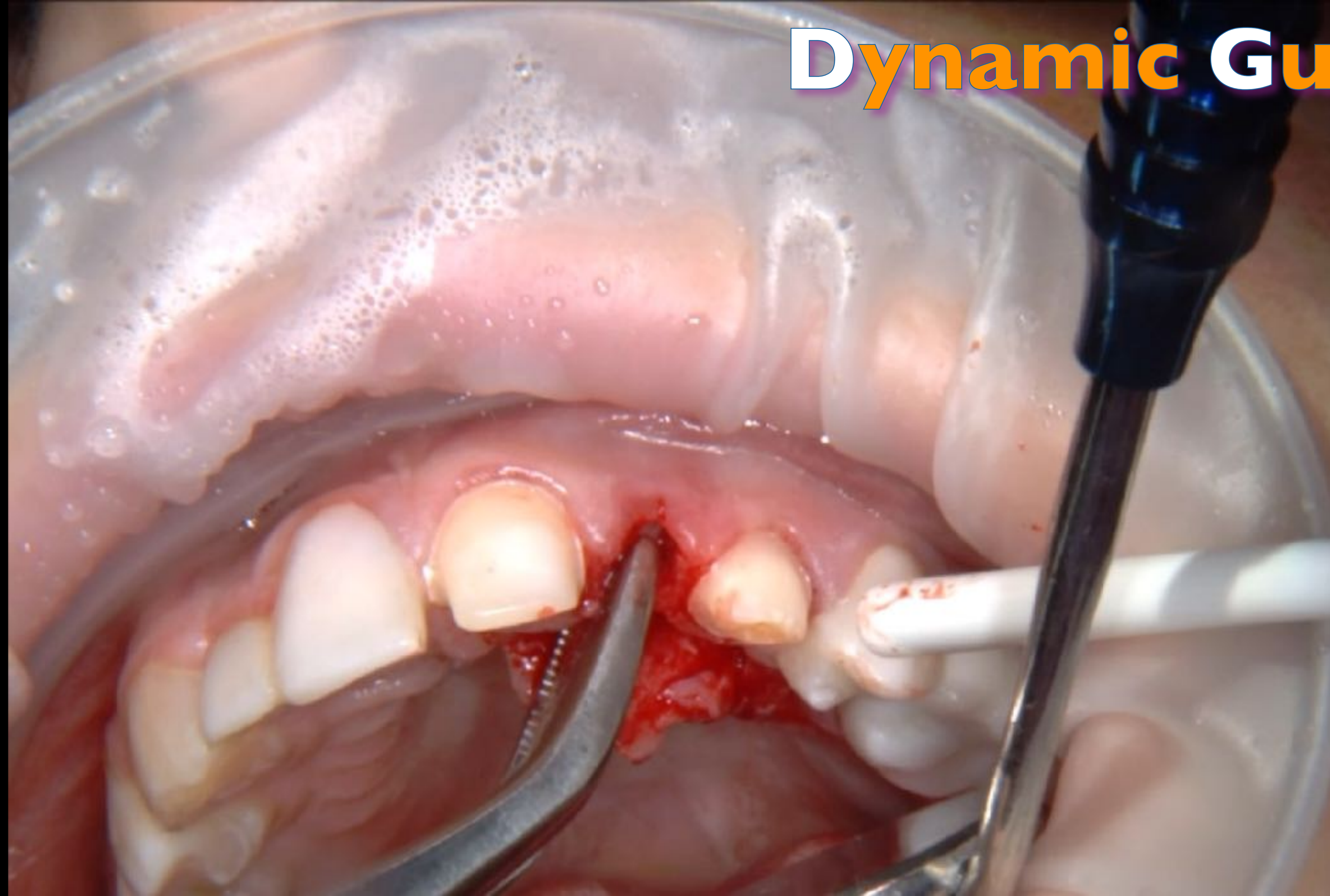
Dynamic Guided Surgery

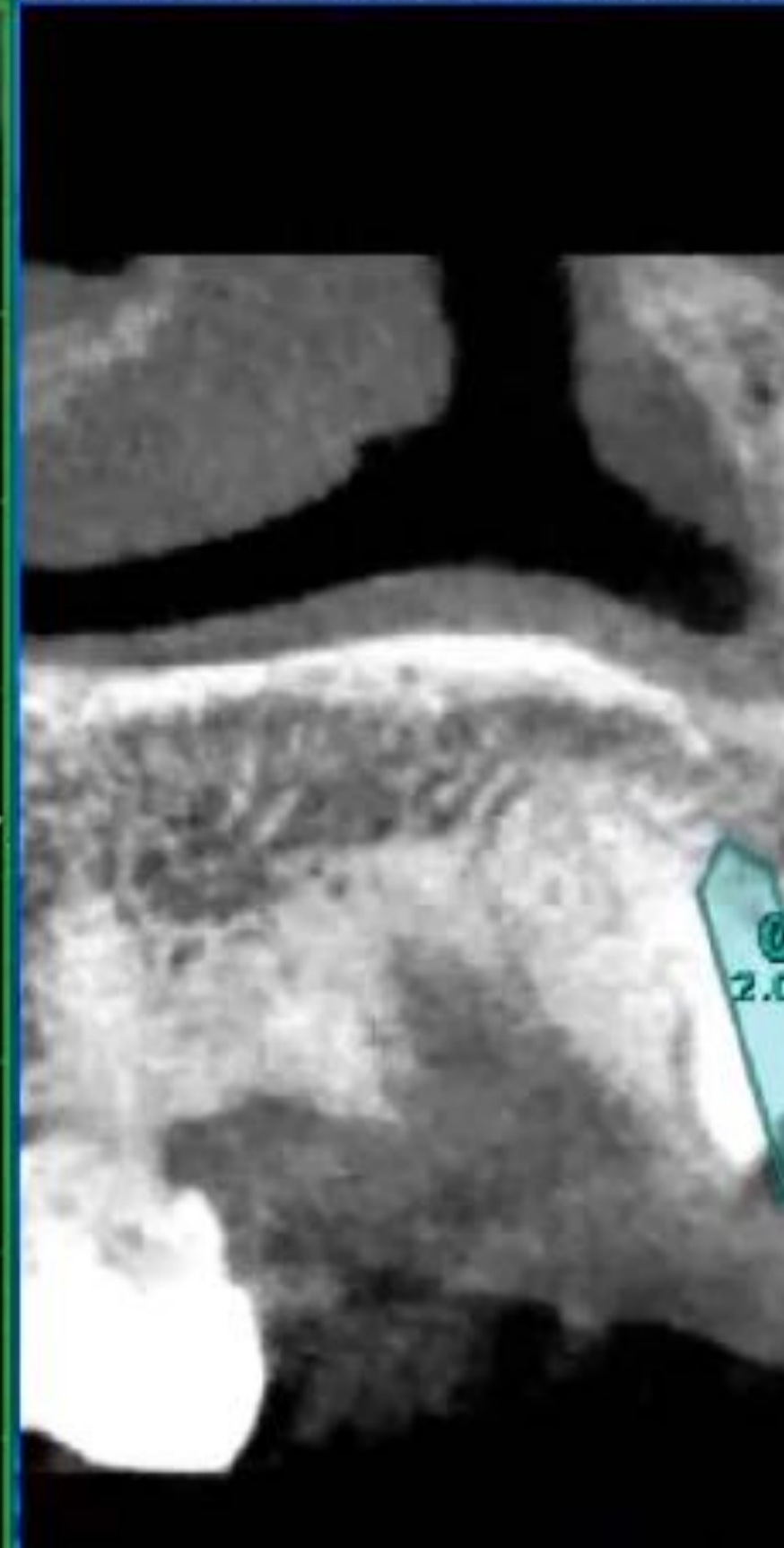
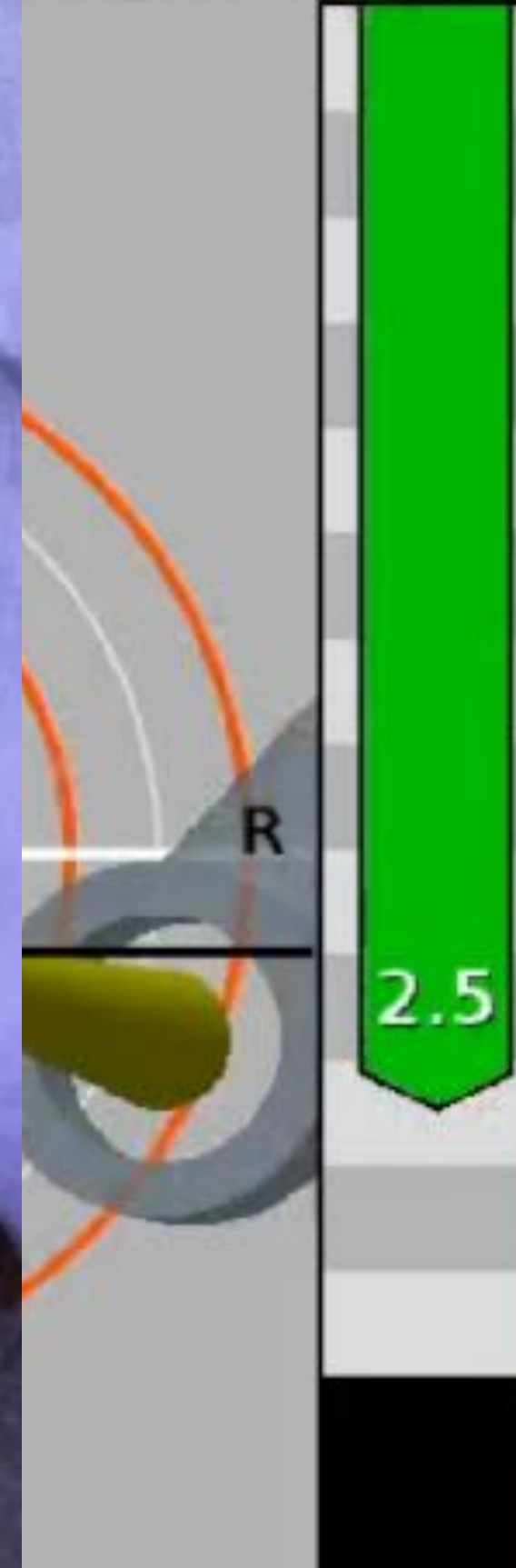
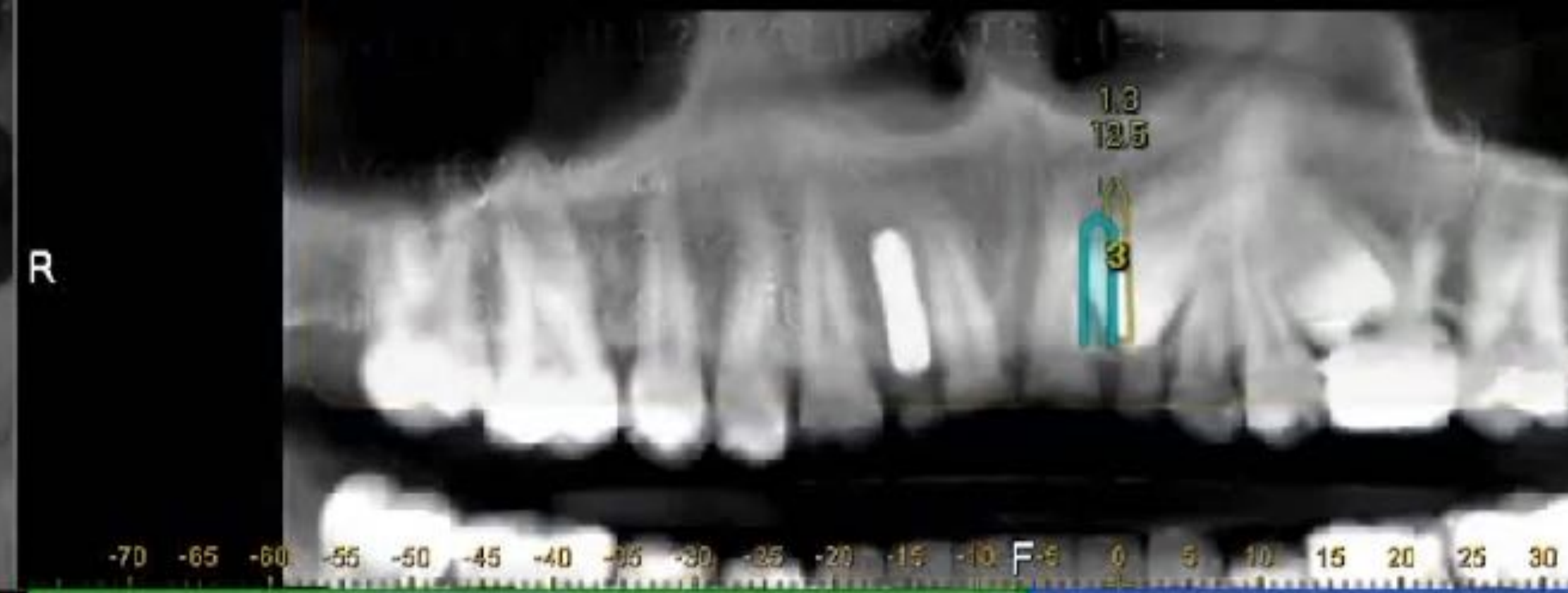
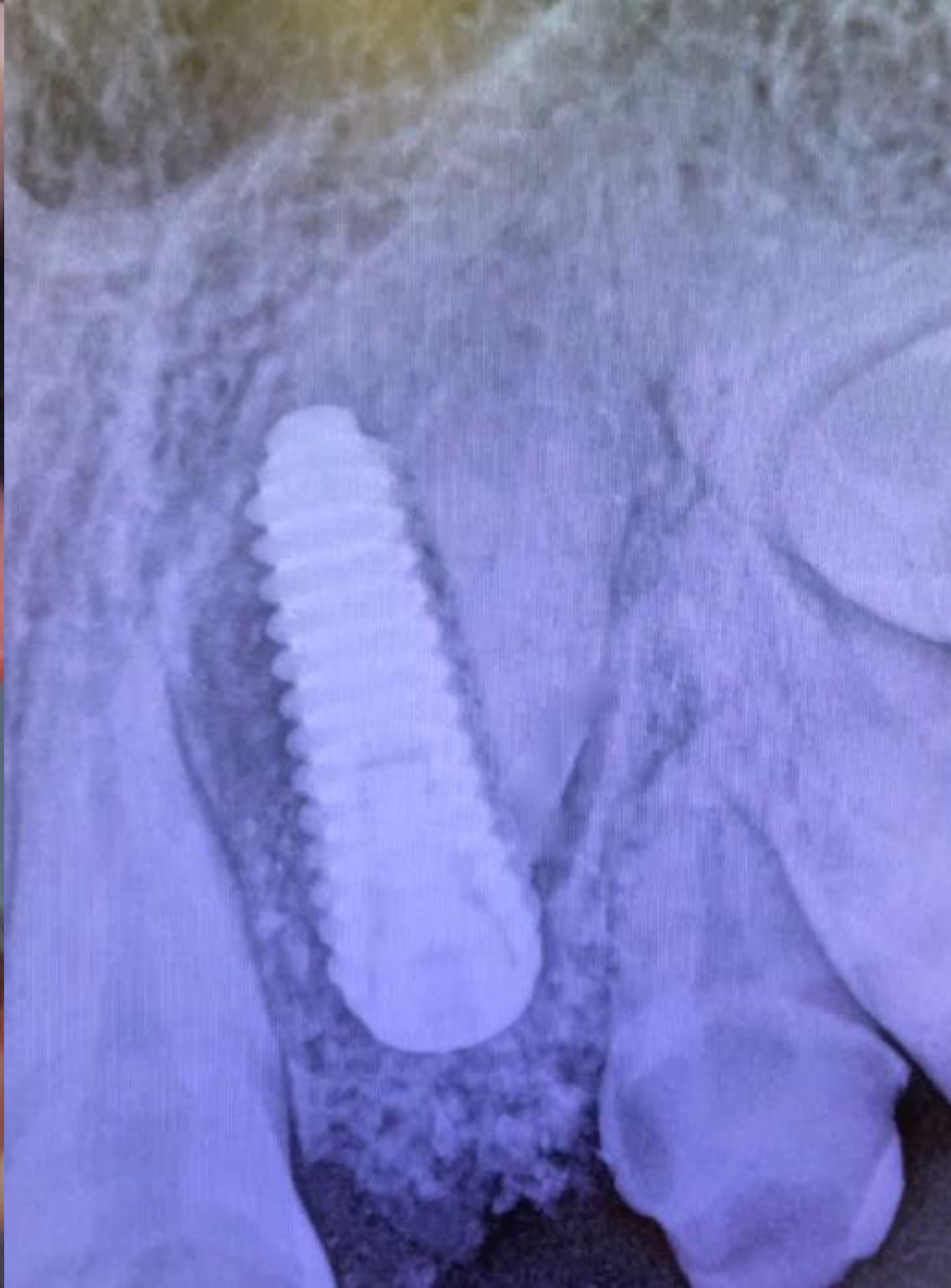


Dynamic Guided Surgery

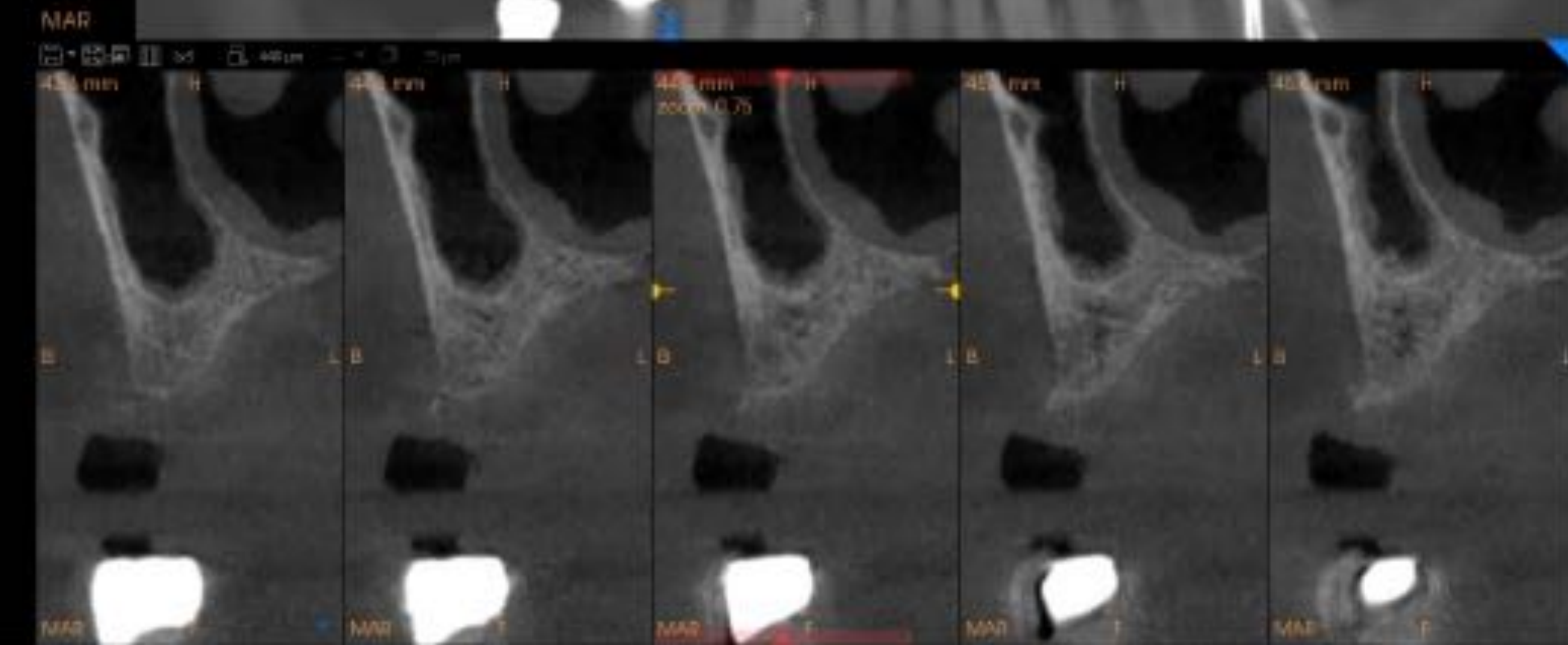
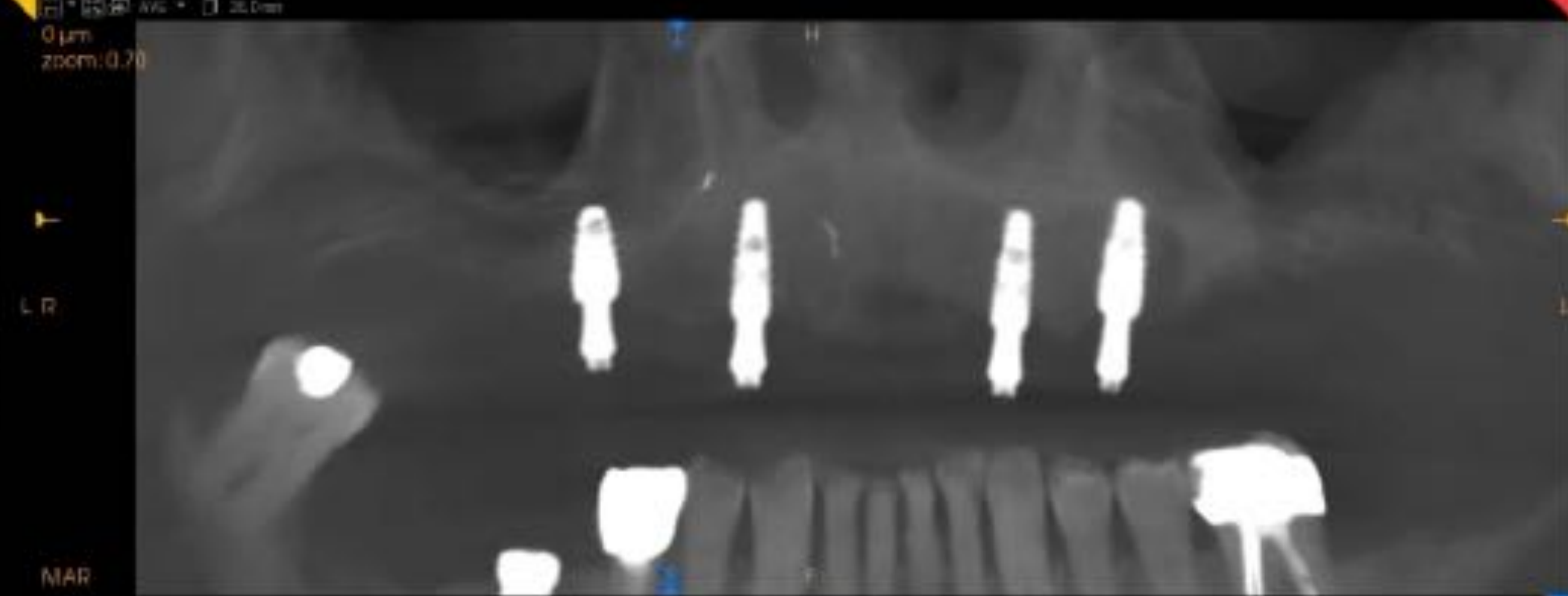


Dynamic Guided Surgery



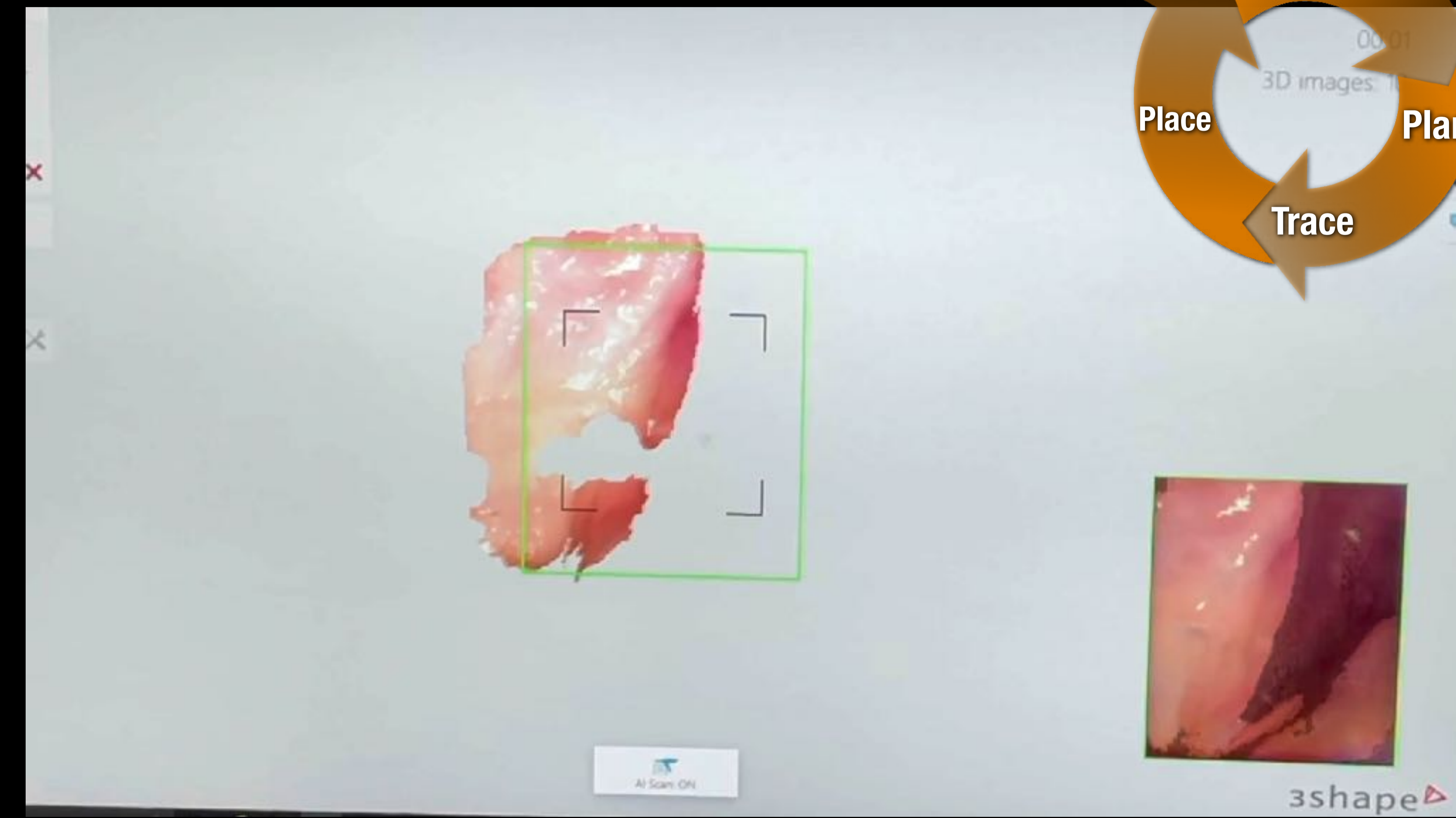


CBCT



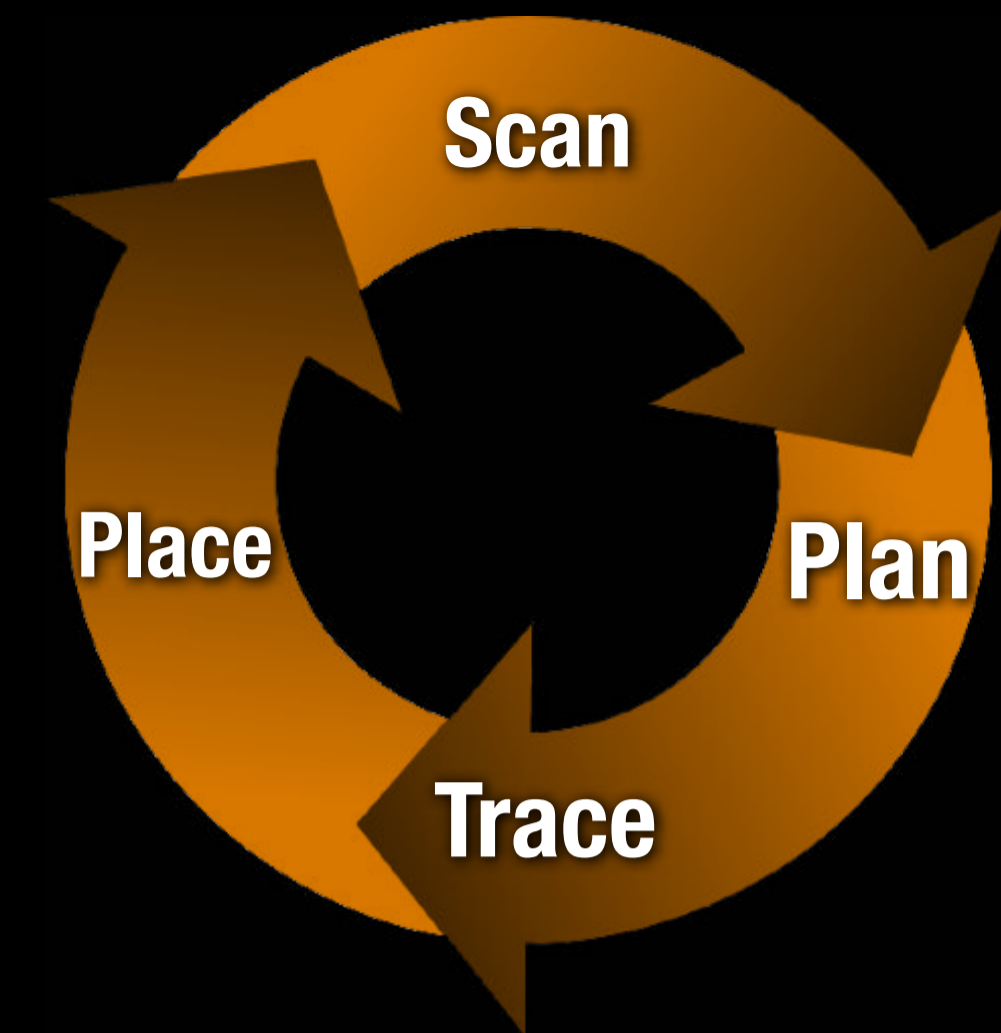
- Full template-Guidance

SCAN

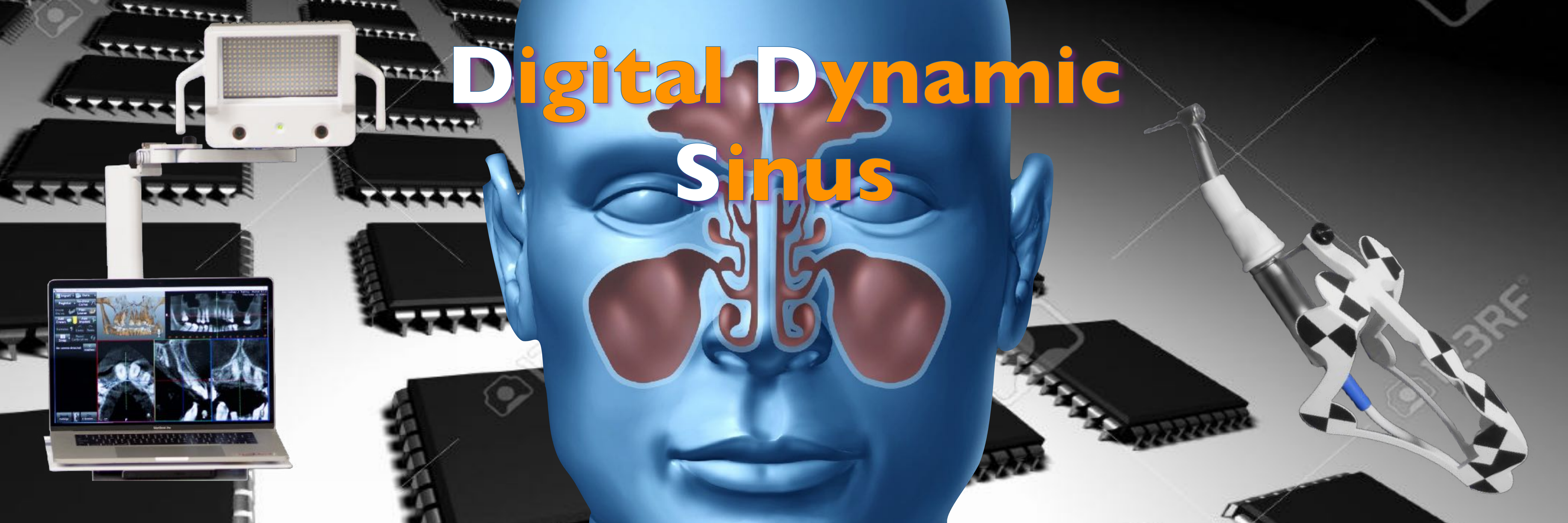


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PLAN



Digital Dynamic Sinus



Clinical Evidence

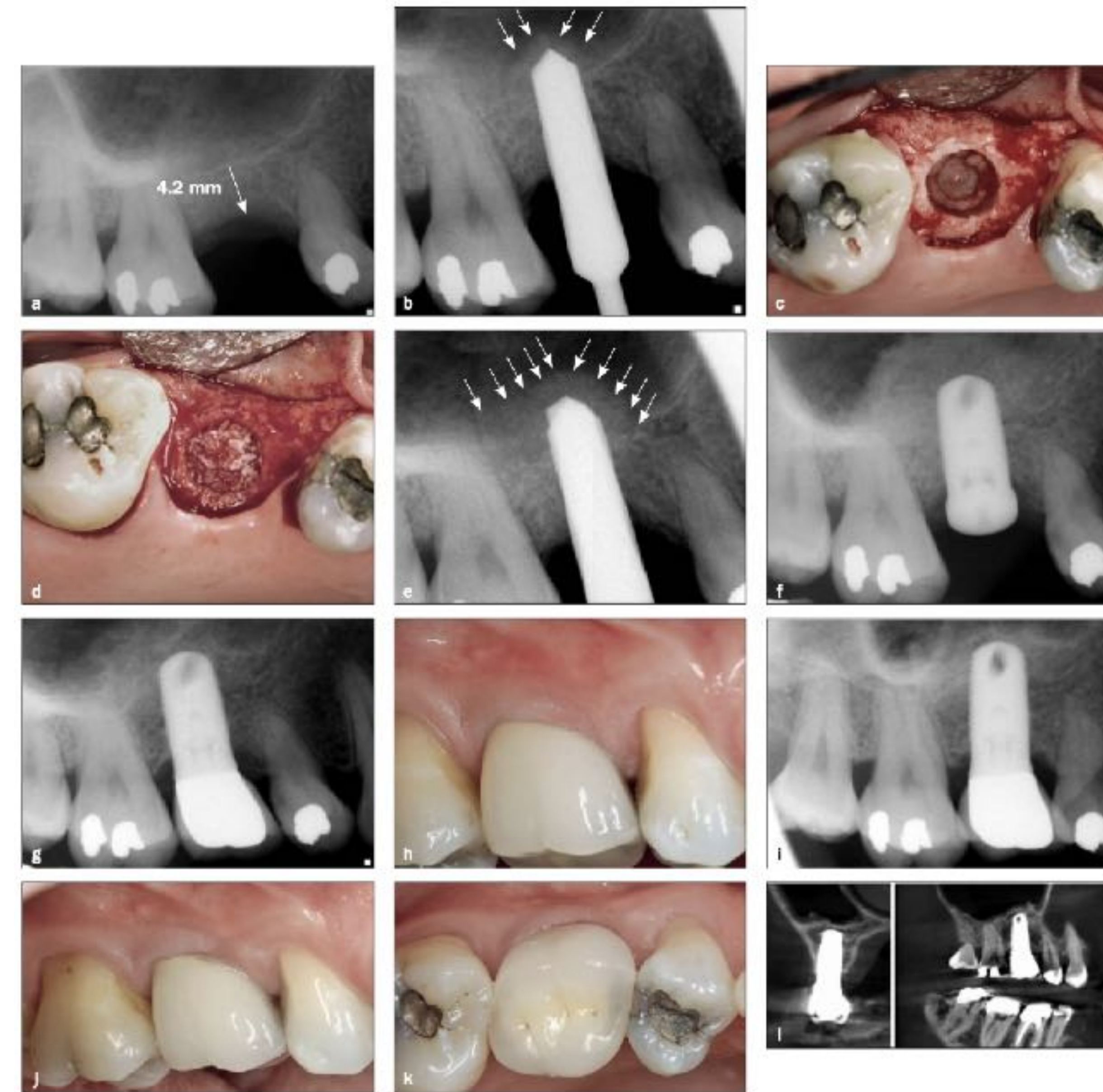
Trans-crestal Sinus Augmentation

JOMI

The International Journal of
ORAL & MAXILLOFACIAL IMPLANTS

**A Multicenter Retrospective Clinical Study with
Up-to-5-Year Follow-up Utilizing a Method that
Enhances Bone Density and Allows for Transcrestal
Sinus Augmentation Through Compaction Grafting**

Salah Huwais, DDS¹/Ziv Mazor, DMD²/Andreas L. Ioannou, DDS, MS³/
Howard Gluckman, BDS, MChD (OMP)⁴/Rodrigo Neiva, DDS, MS⁵



Clinical Evidence

A Multicenter Retrospective Clinical Study with Up-to-5-Year Follow-up Utilizing a Method that Enhances Bone Density and Allows for Transcrestal Sinus Augmentation Through Compaction Grafting

Salah Huwais, DDS¹/Ziv Mazor, DMD²/Andreas L. Ioannou, DDS, MS³/
Howard Gluckman, BDS, MChD (OMP)⁴/Rodrigo Neiva, DDS, MS⁵

Purpose: To evaluate the effectiveness and predictability of a novel biomechanical, minimally invasive bone instrumentation technique that enhances bone density through compaction grafting, called osseous densification, and allows for transcrestal sinus membrane elevation and augmentation with simultaneous implant placement. **Materials and Methods:** Patients who were consecutively treated with the bone densification and transcrestal sinus augmentation technique and were followed up in three treatment centers between May 2012 and September 2017 were included in this retrospective study. The summary statistics are presented as means for continuous variables and percentages for categorical variables. **Results:** In total, 222 patients with 261 implants were included in the final clinical analysis. The included follow-up period ranged from 6 to 64 months with a mean of 35 months. The subsinus residual bone height at baseline was 5.4 mm (SD: 1.9). Following the sinus augmentation, a significant vertical increase of 7 mm (SD: 2.49) was observed. No sinus membrane perforations and no late implant failures were observed from 6 up to 64 months of follow-up, yielding a cumulative implant survival rate of 97%. **Conclusion:** This osseous densification technique for maxillary implant site preparation with transcrestal sinus augmentation and simultaneous implant placement led to favorable clinical outcomes with up to 64 months of follow-up. *INT J ORAL MAXILLOFACIAL SURG* 2018;33:1305–1311. doi: 10.11607/jomi.6770

atrophic maxilla, bone substitutes, compaction autografting, densifying burs, maxillary sinus, osseous densification, sinus augmentation, sinus elevation procedure

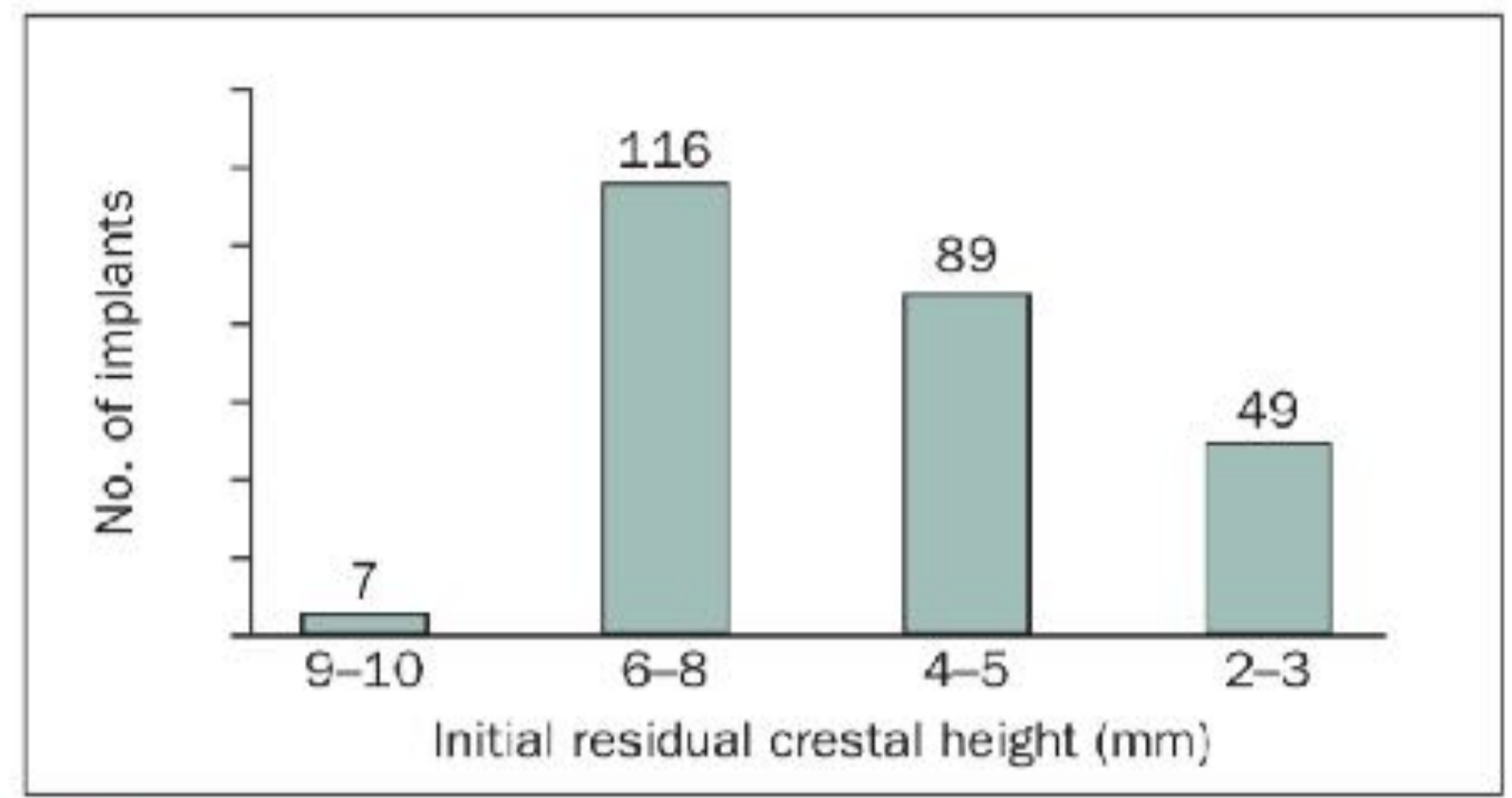
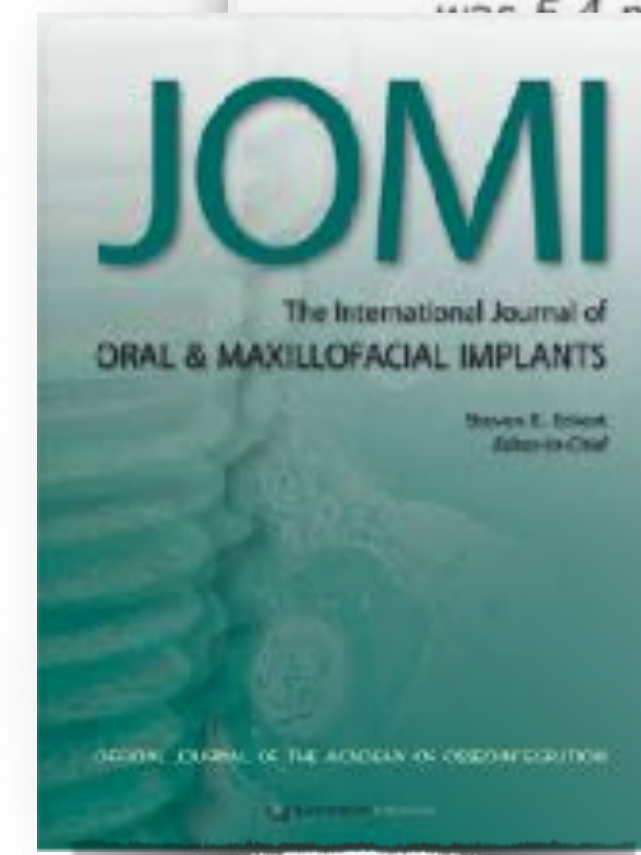


Fig 2 Number of implants placed in 222 patients according to the initial residual crestal height prior to sinus augmentation.

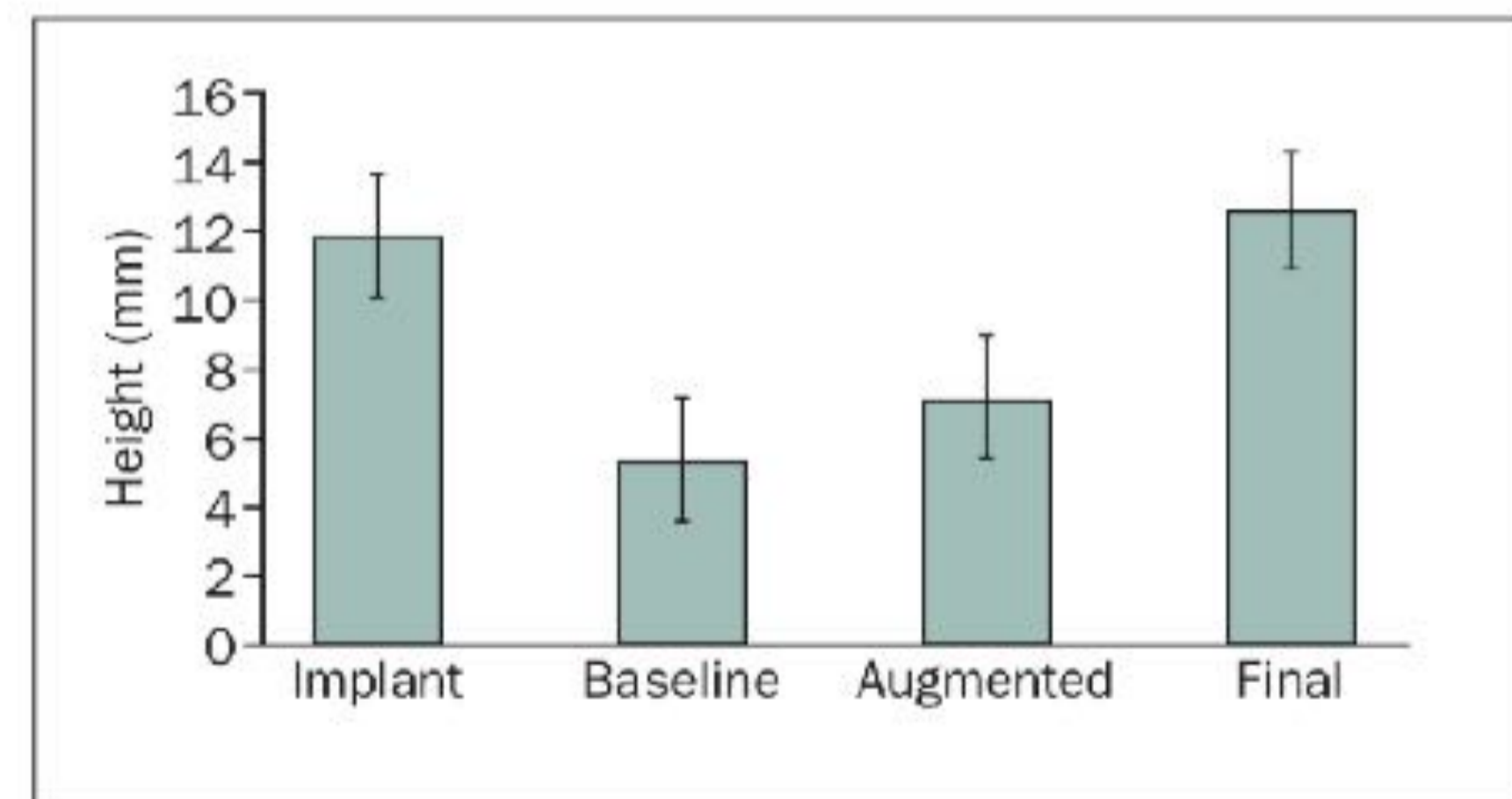
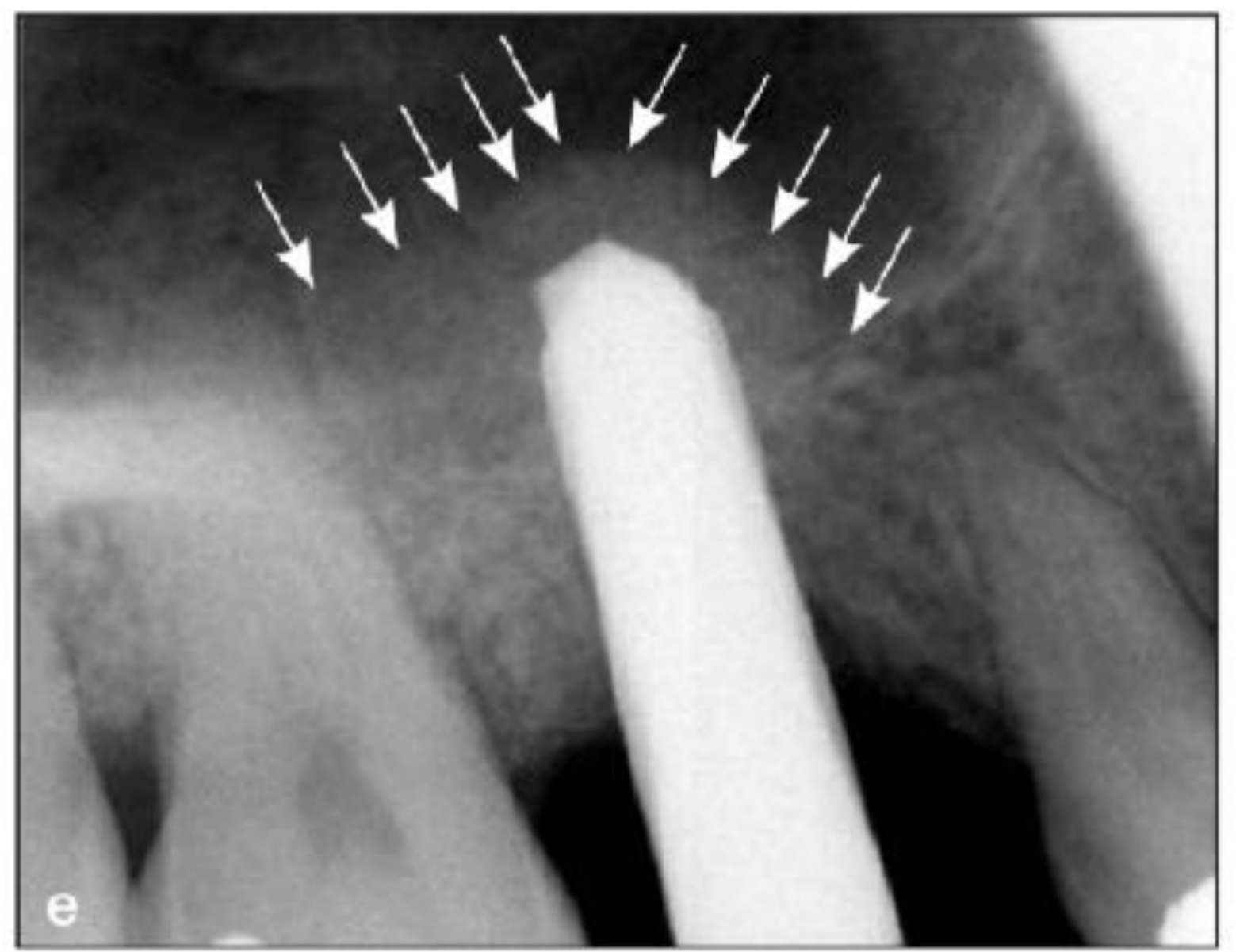


Fig 3 A significant augmentation of 7 mm ($P < .05$) was observed following the osseous densification technique, allowing for the placement of implants at a median height of 11.5 mm.

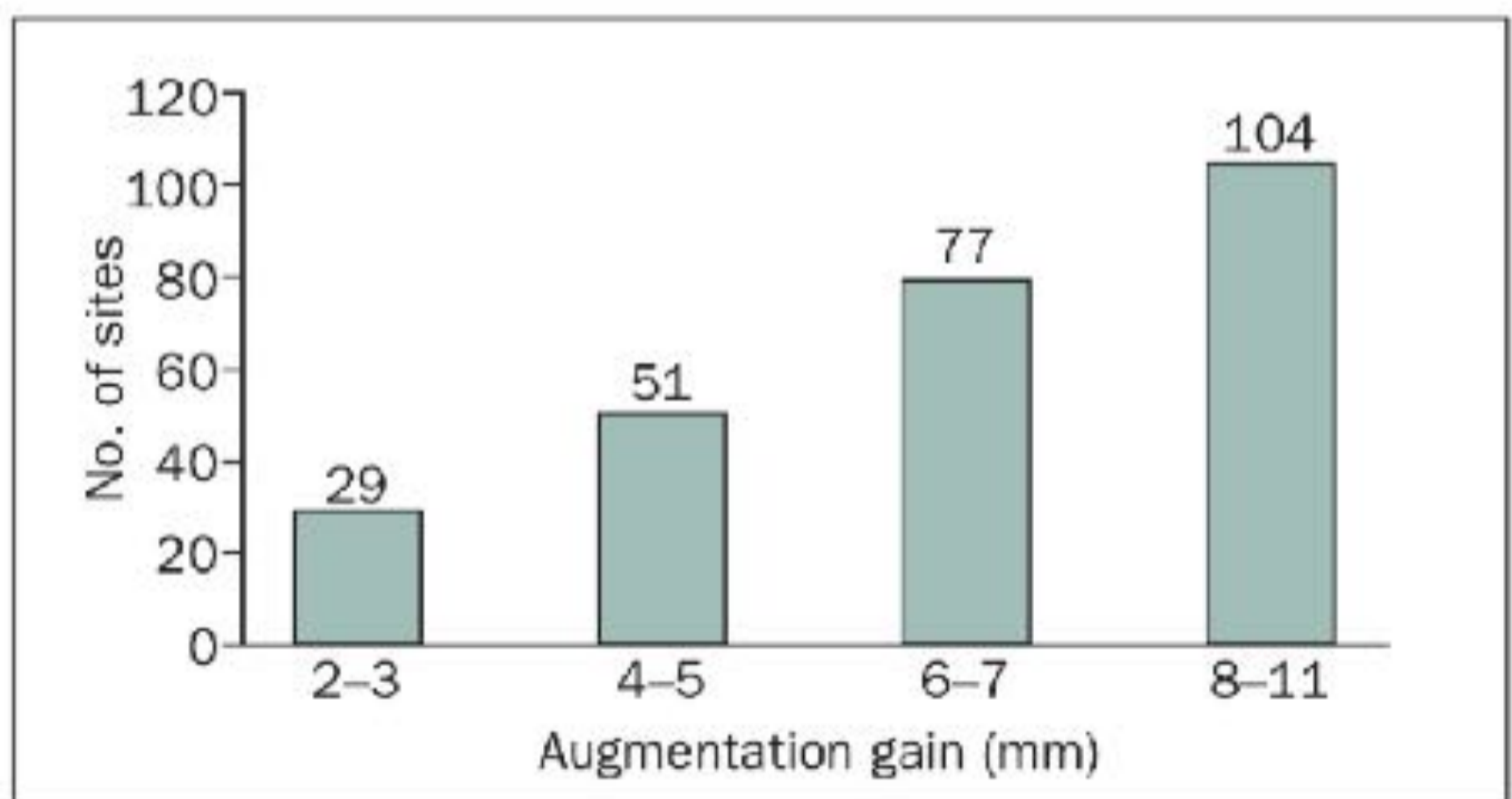
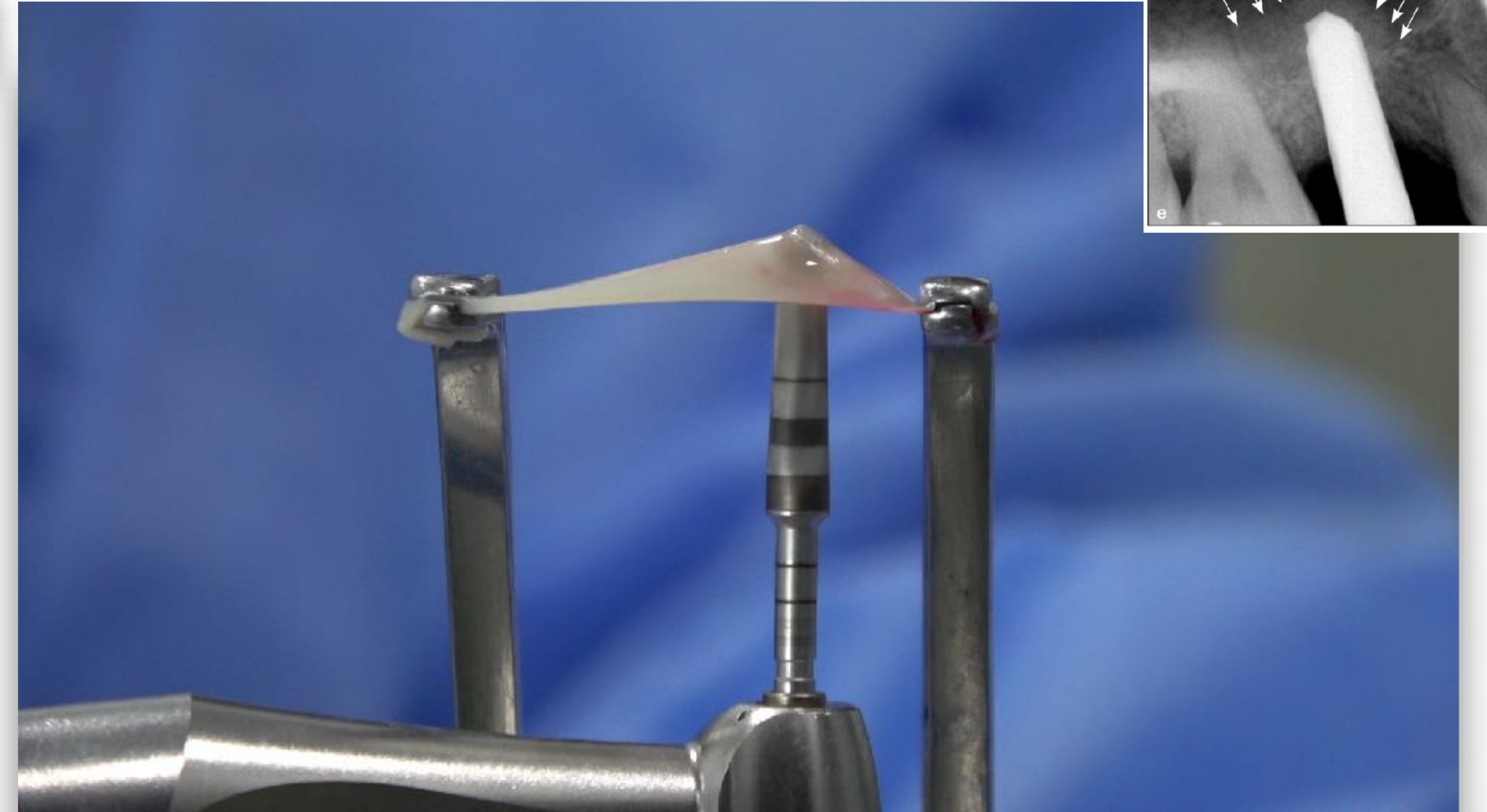


Fig 4 Number of sites according to augmentation gain.

Trans-crestal Sinus Augmentation

**PRF Membrane (Fibrin
membrane)
with different Densah Burs**

**0.3mm Thickness -
1200 RPM CCW**



Courtesy Prof. Nelson R. Pinto

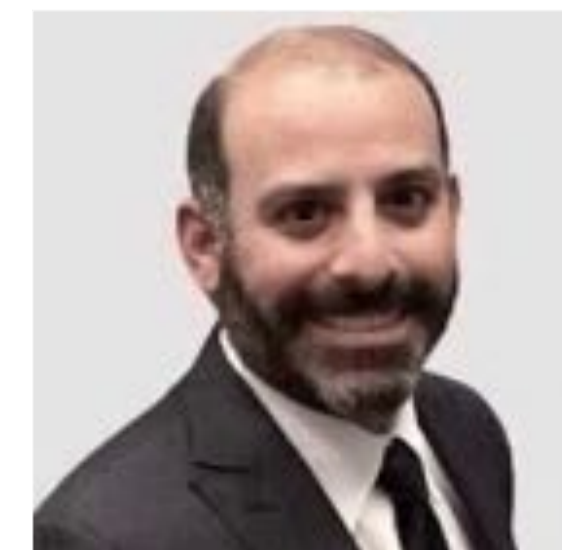
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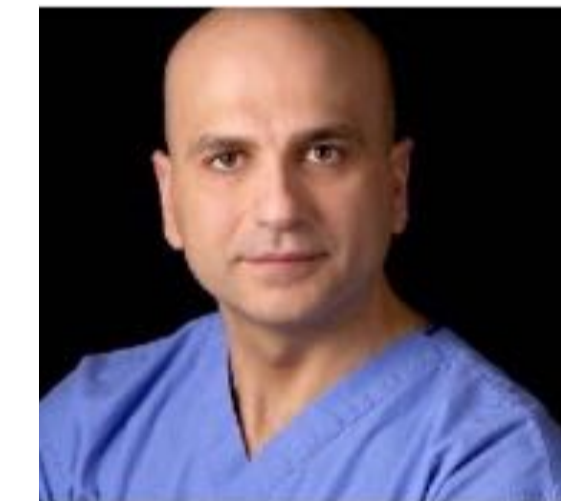
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University of Minnesota
School of Dentistry



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Dental Implant Fellowship Program
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School of Dentistry
Private Practice, Jackson, MI

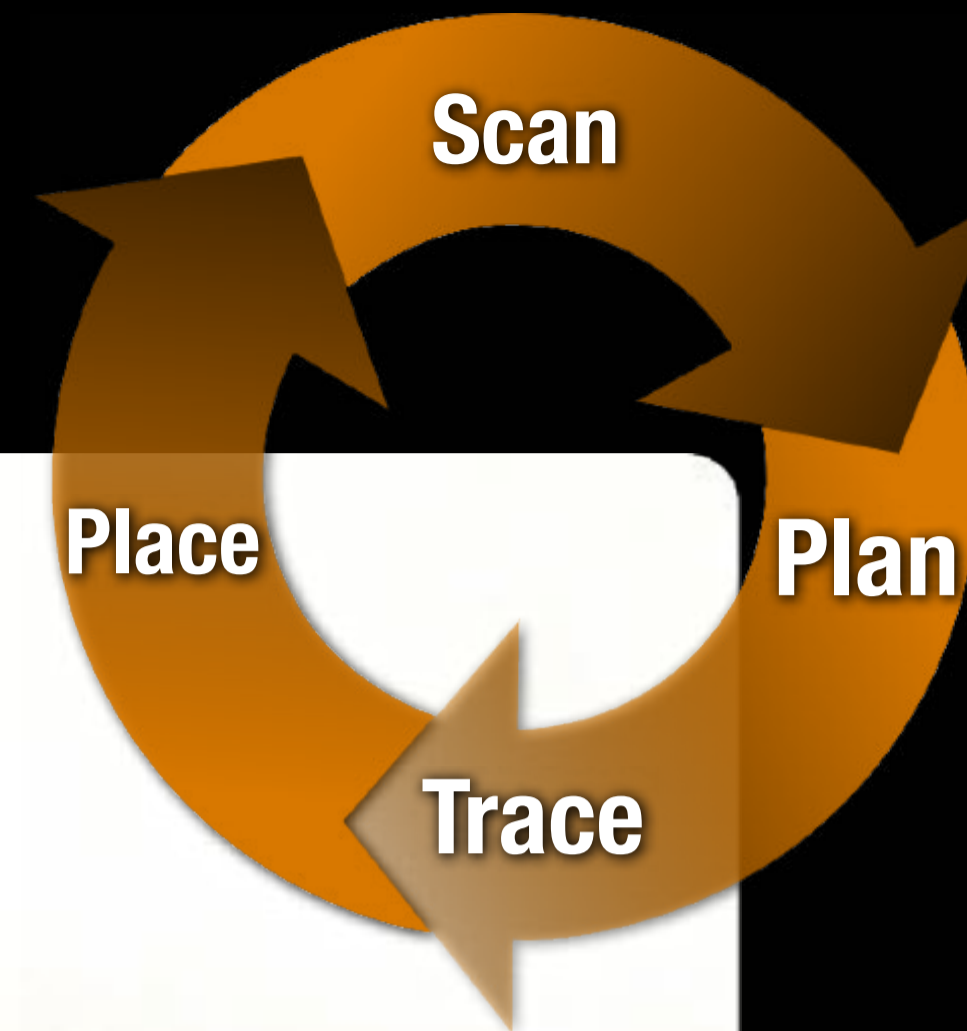
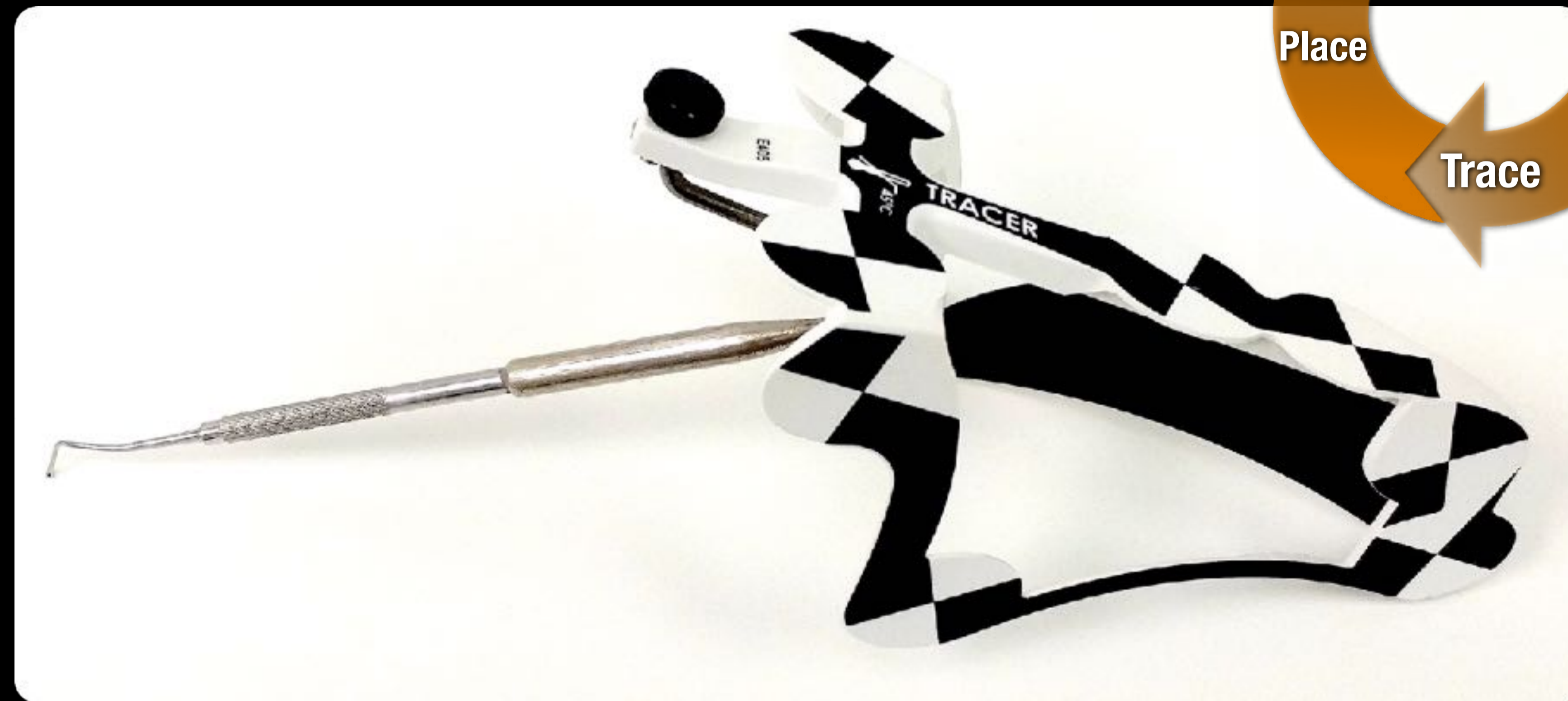
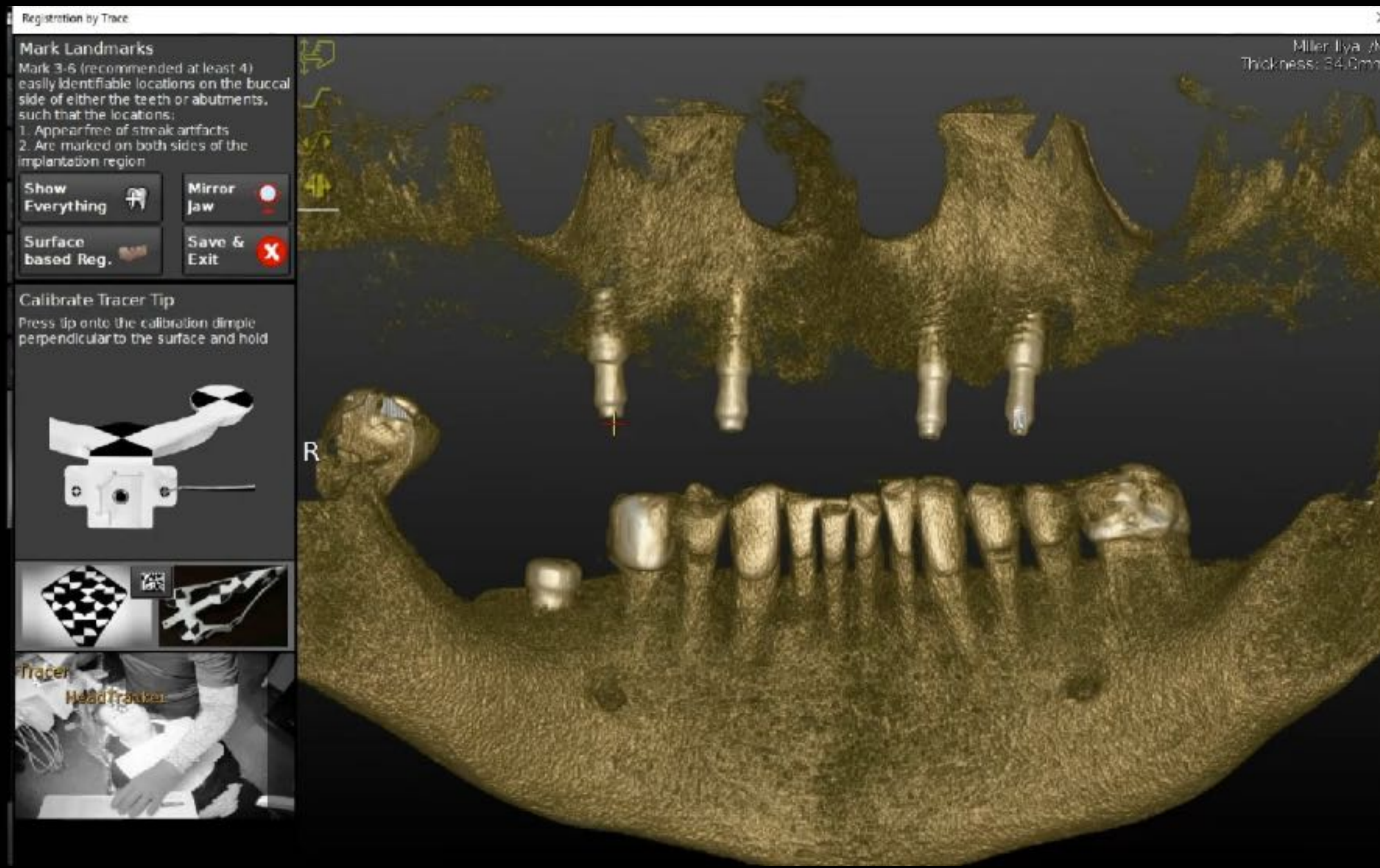


Rodrigo Neiva, DDS, MS
Director of Graduate Program
Department of Periodontology
University Of Florida, School of Dentistry

Tanello, Rosen, Tawil, Johnson, Huwais, Neiva

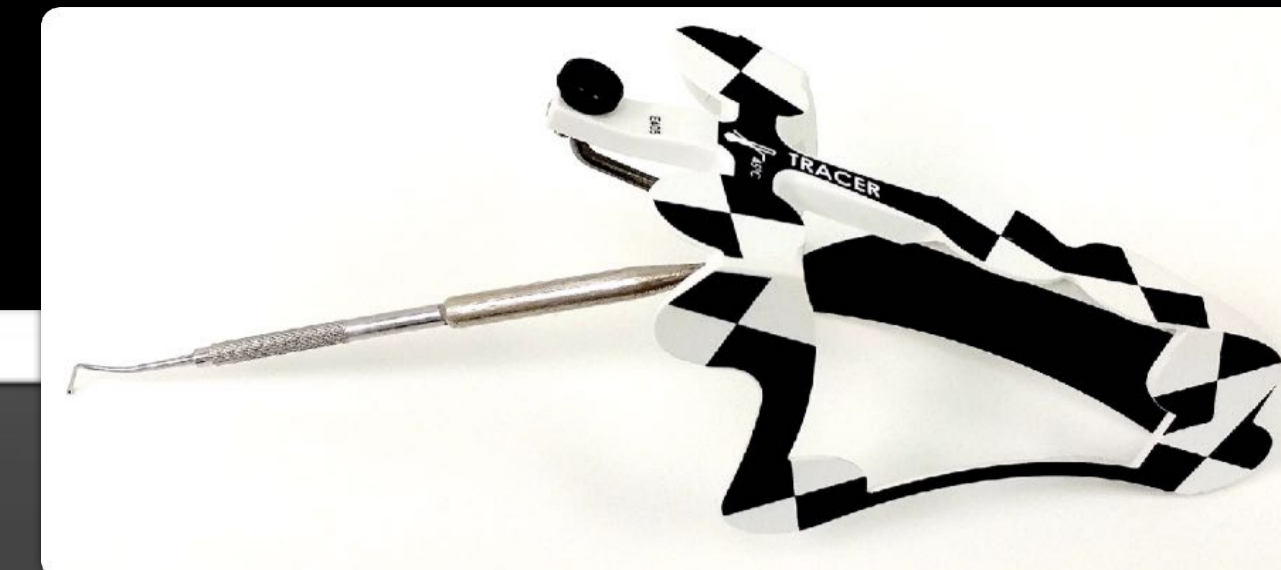
- Full template-Guidance

TAP - Trace



• Full template-Guidance

TAP - Trace



Registration by Trace

Mark Landmarks
Mark 3-6 (recommended at least 4) easily identifiable locations on the buccal side of either the teeth or abutments, such that the locations:
1. Appear free of streak artifacts
2. Are marked on both sides of the implantation region

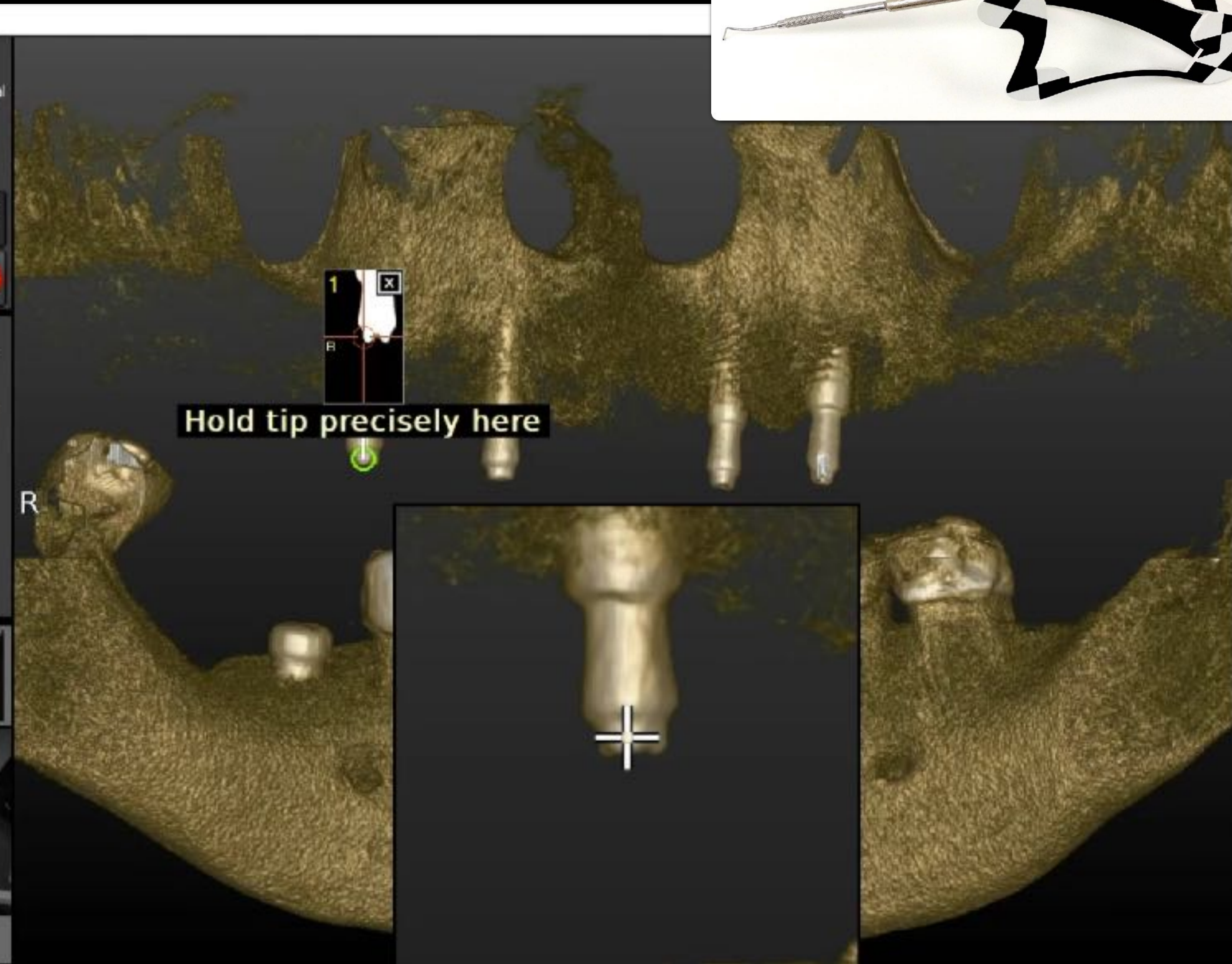
Show Everything Mirror Jaw
Surface based Reg. Save & Exit

Trace around Landmarks
1. Hold tip still at the location marked on the tooth
2. Once indicated, trace around the tooth with the tracer tip, making sure to trace from at least 3 sides
3. Continue to trace nearby teeth if possible

Undo Last Trace
Reset Tracer Calibration

HeadTracker Tracer

Start tracing ...



- Full template-Guidance

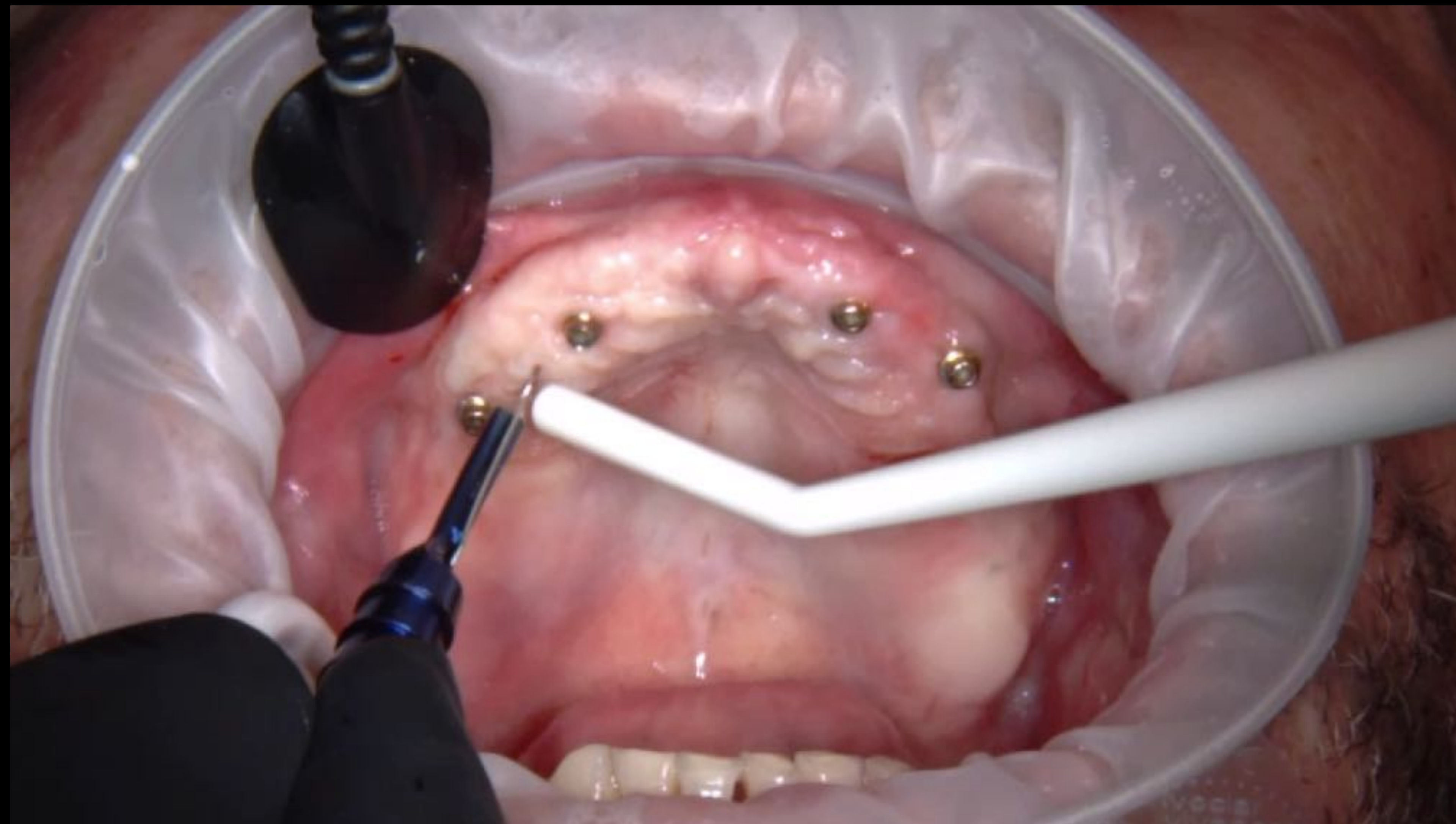
Verify Accuracy



- Full template-Guidance

SURGERY

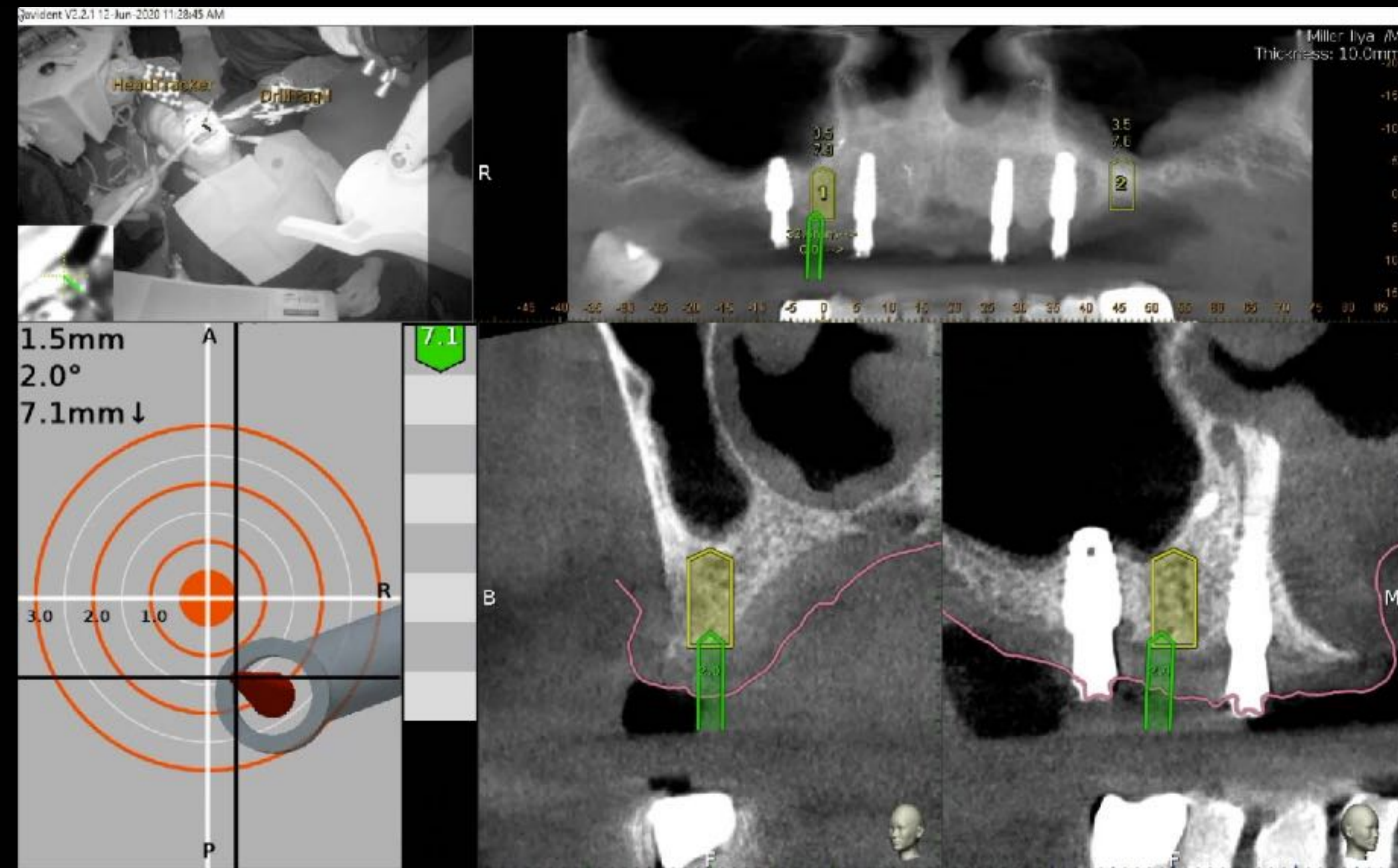
**SOFT
TISSUE**



**PRESERVATION
&
ENHANCEMENT**

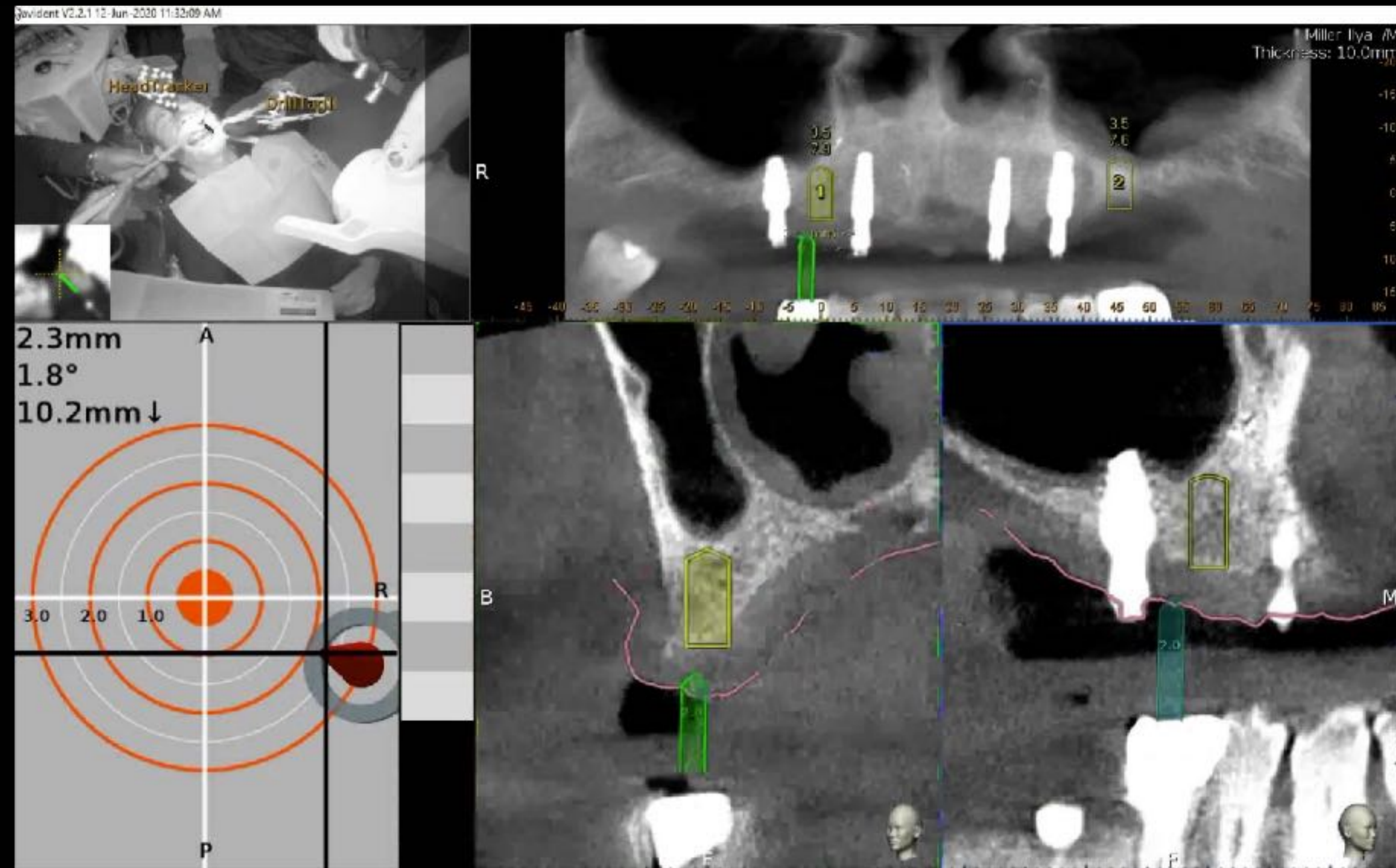
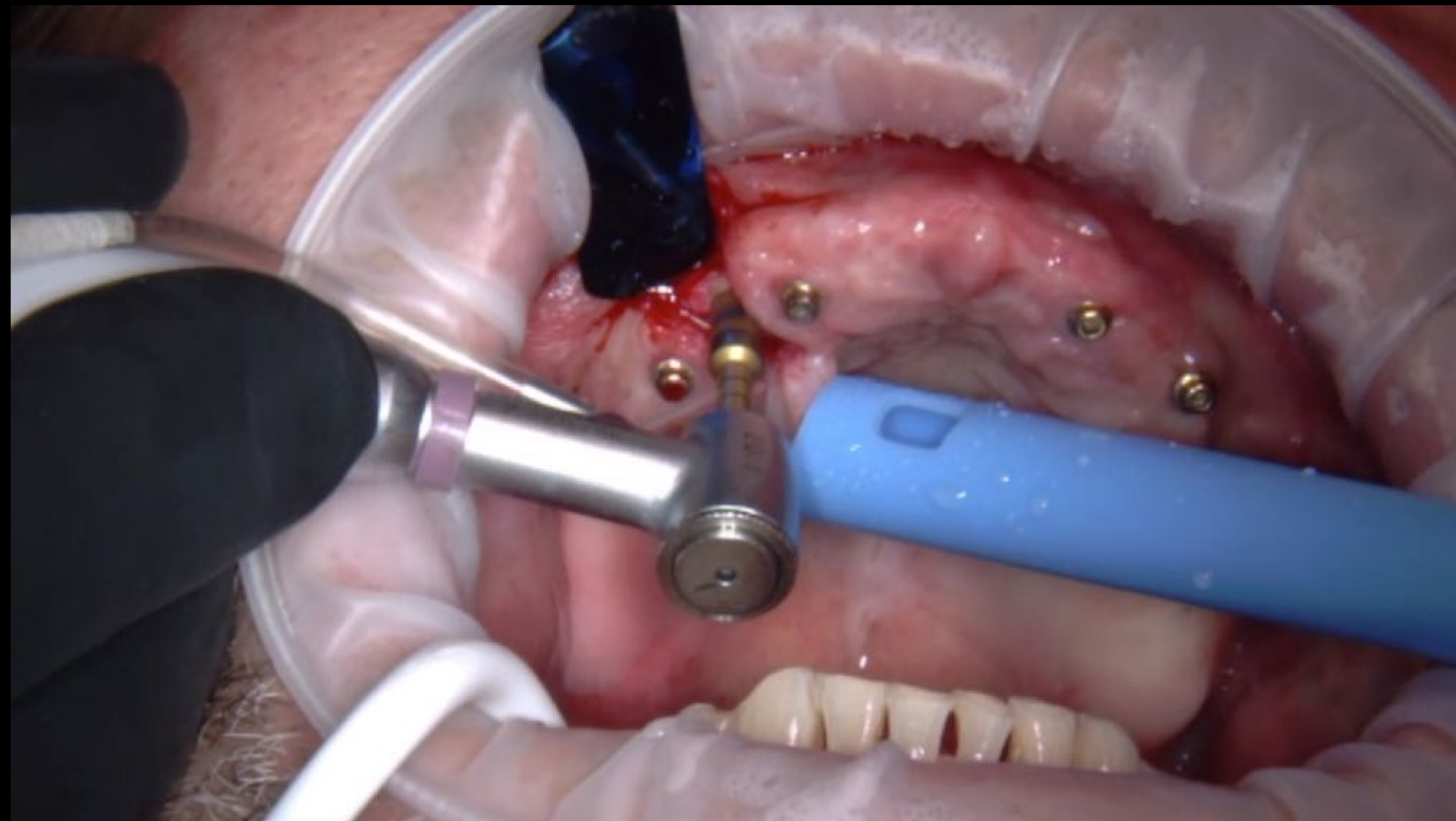
- Full template-Guidance

DRILL



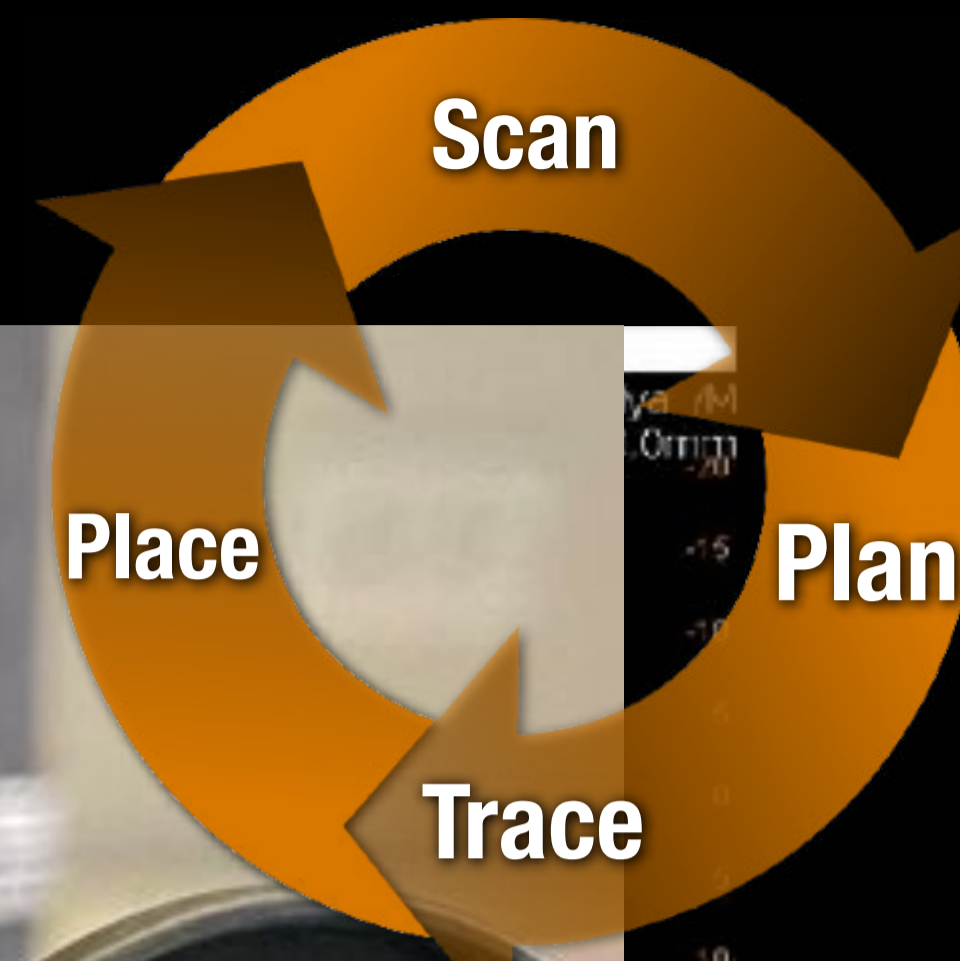
- Full template-Guidance

DRILL - Break through sinus floor



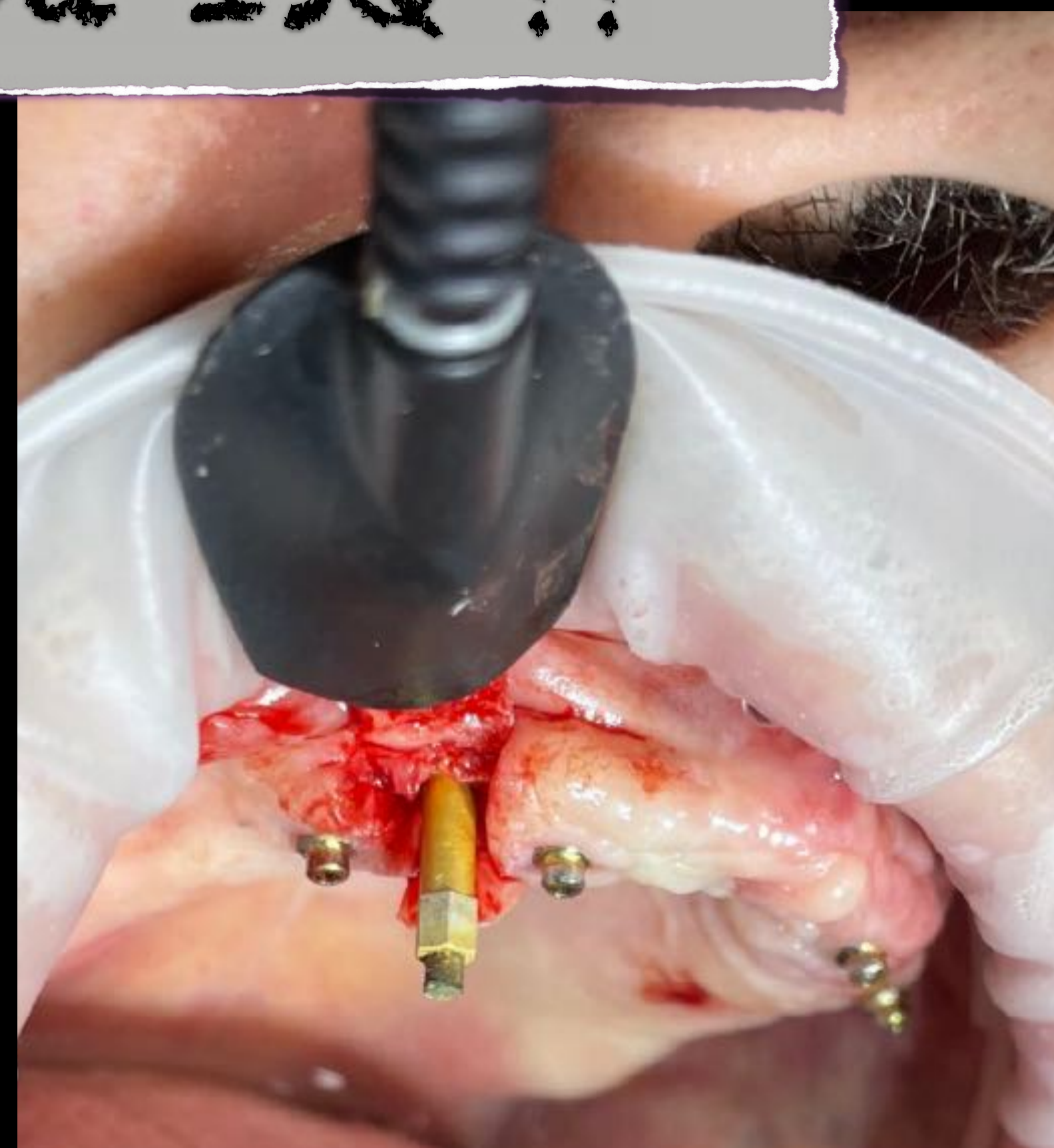
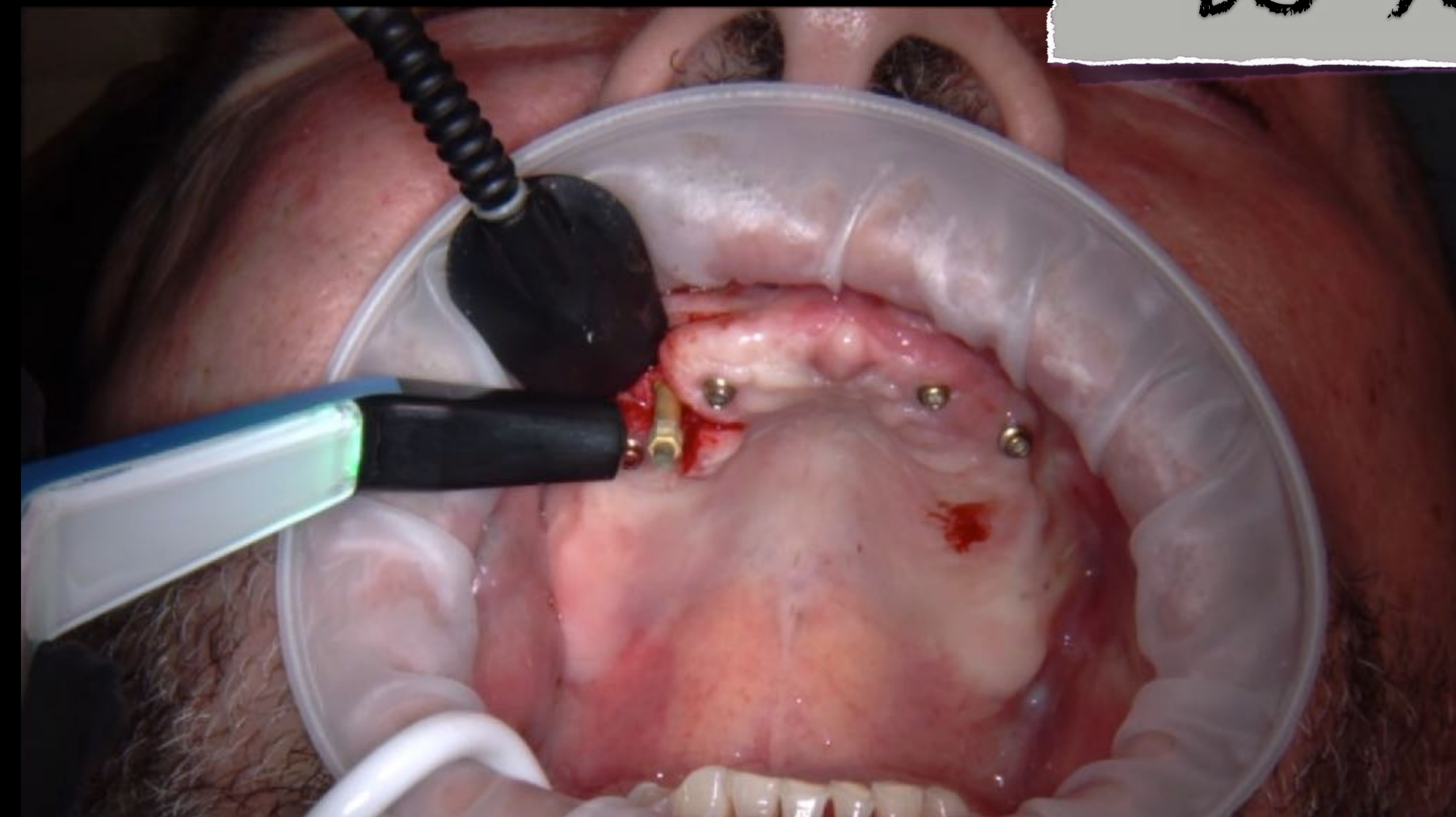
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TAP - PLACE

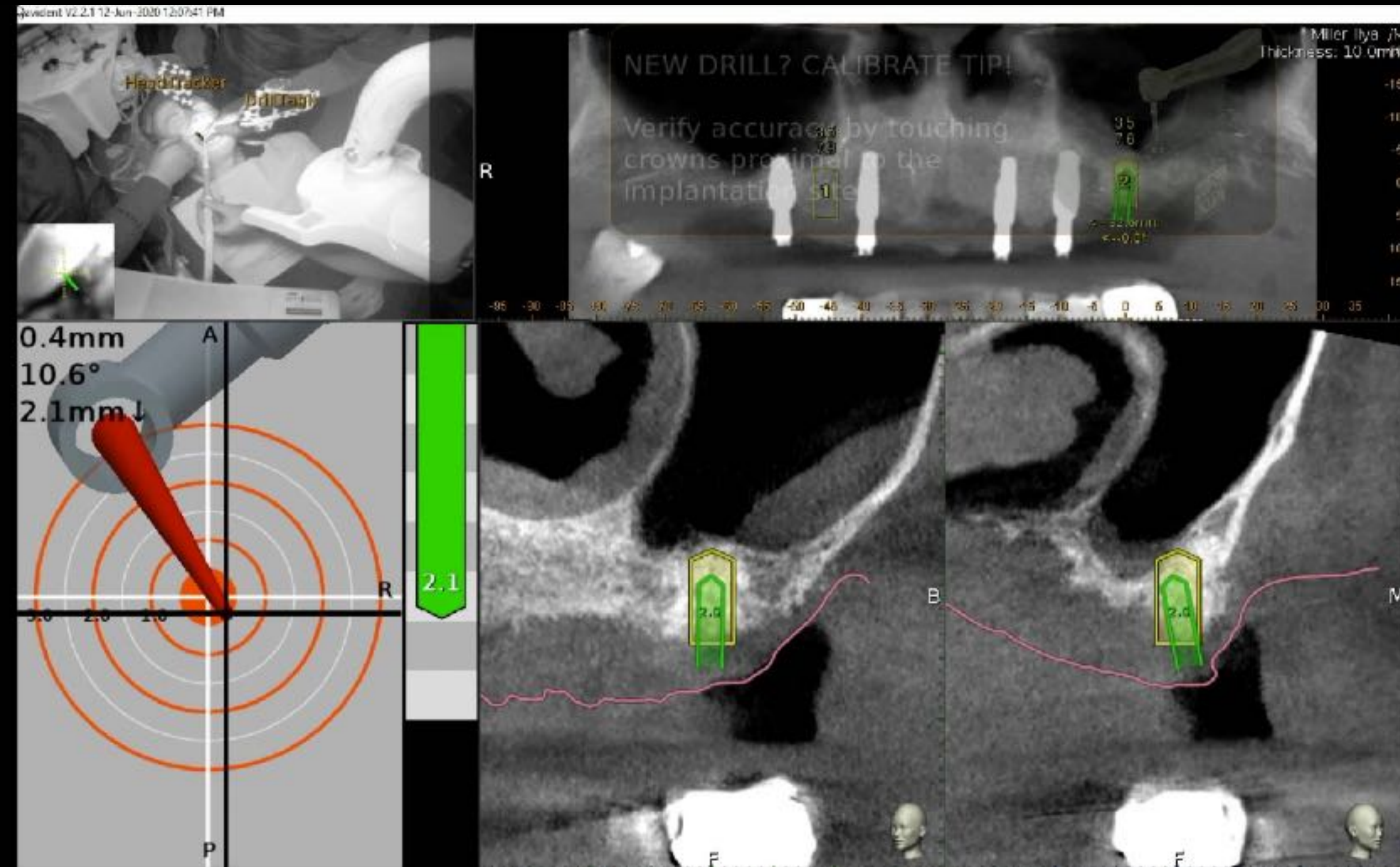
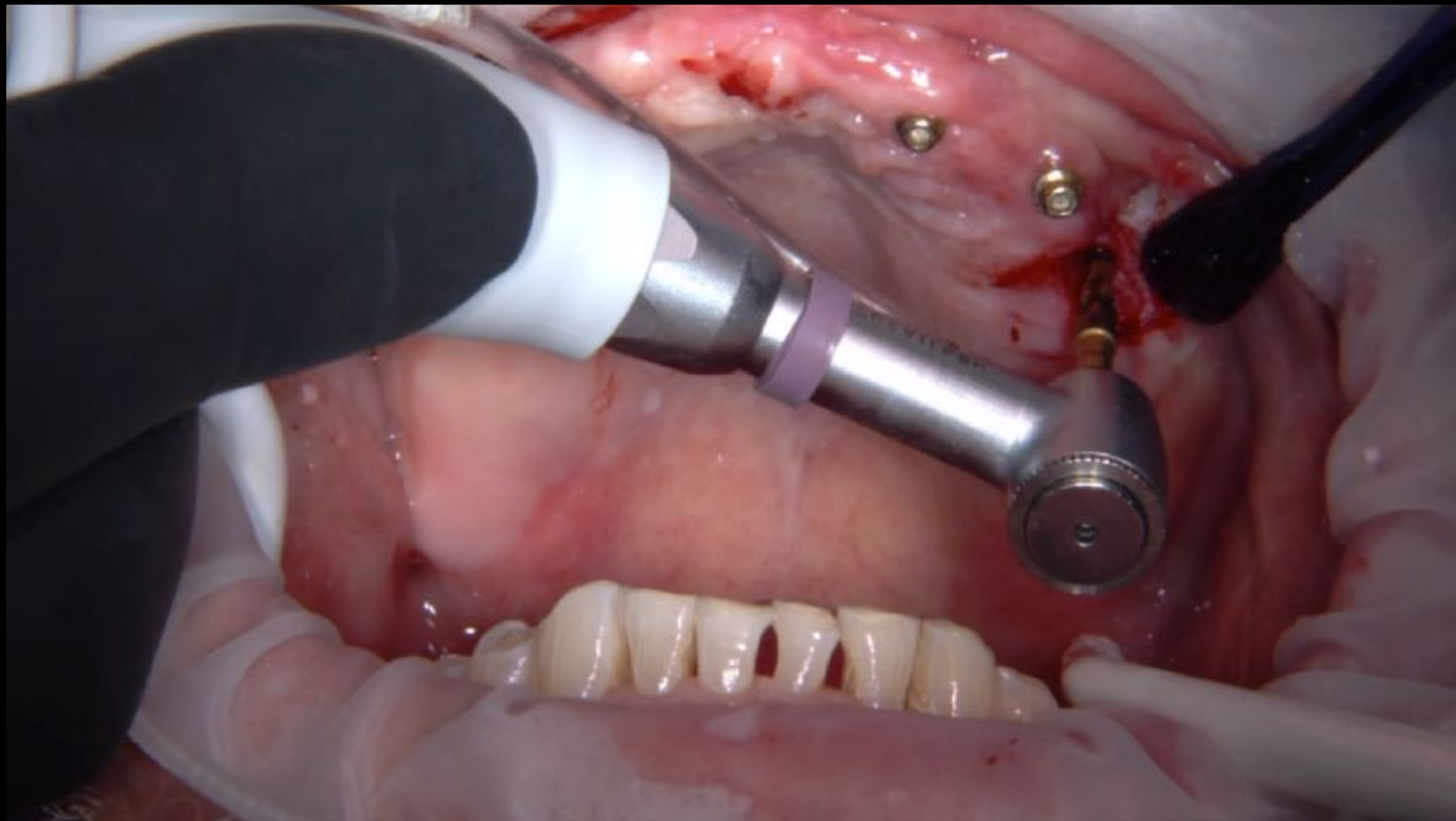


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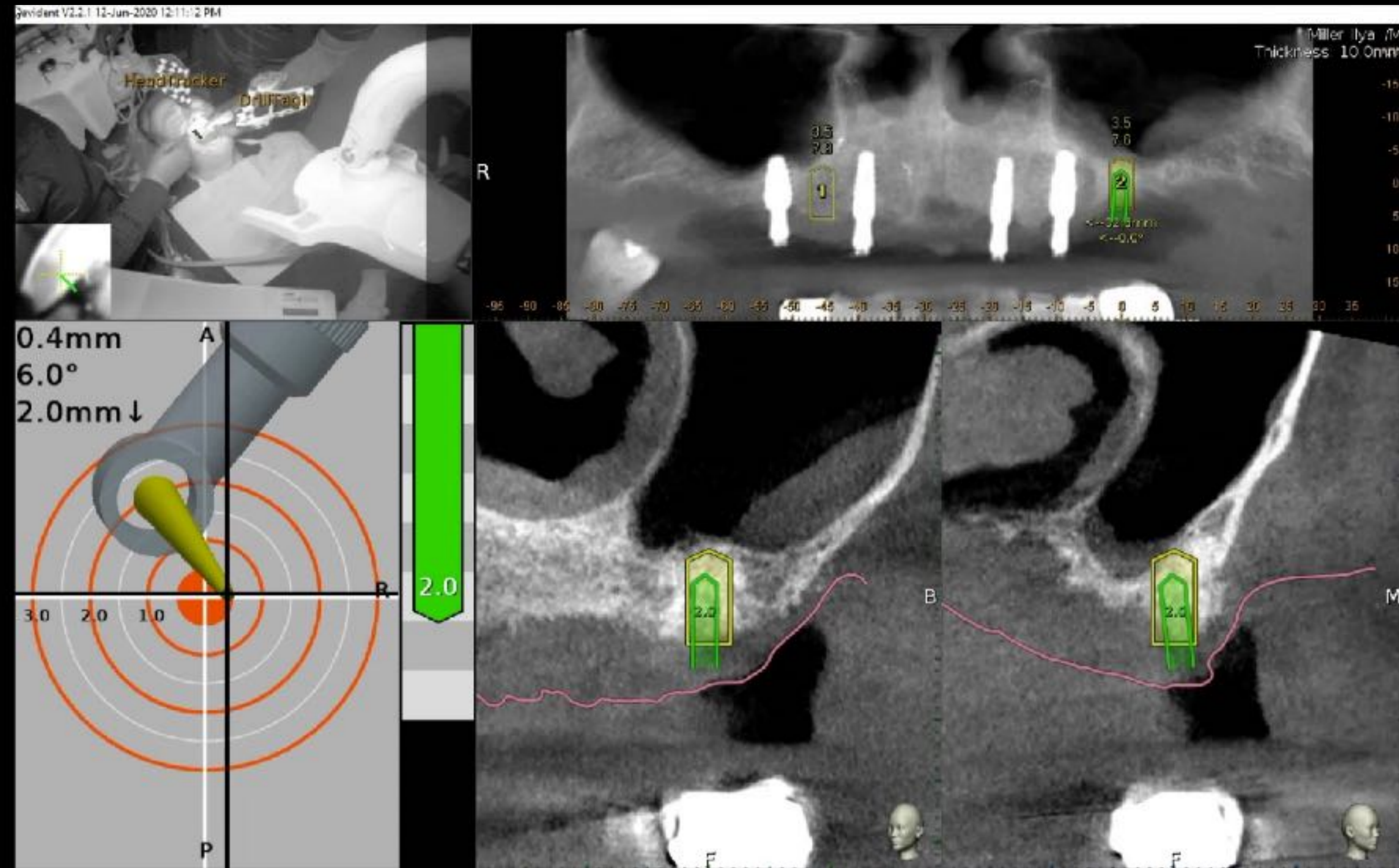
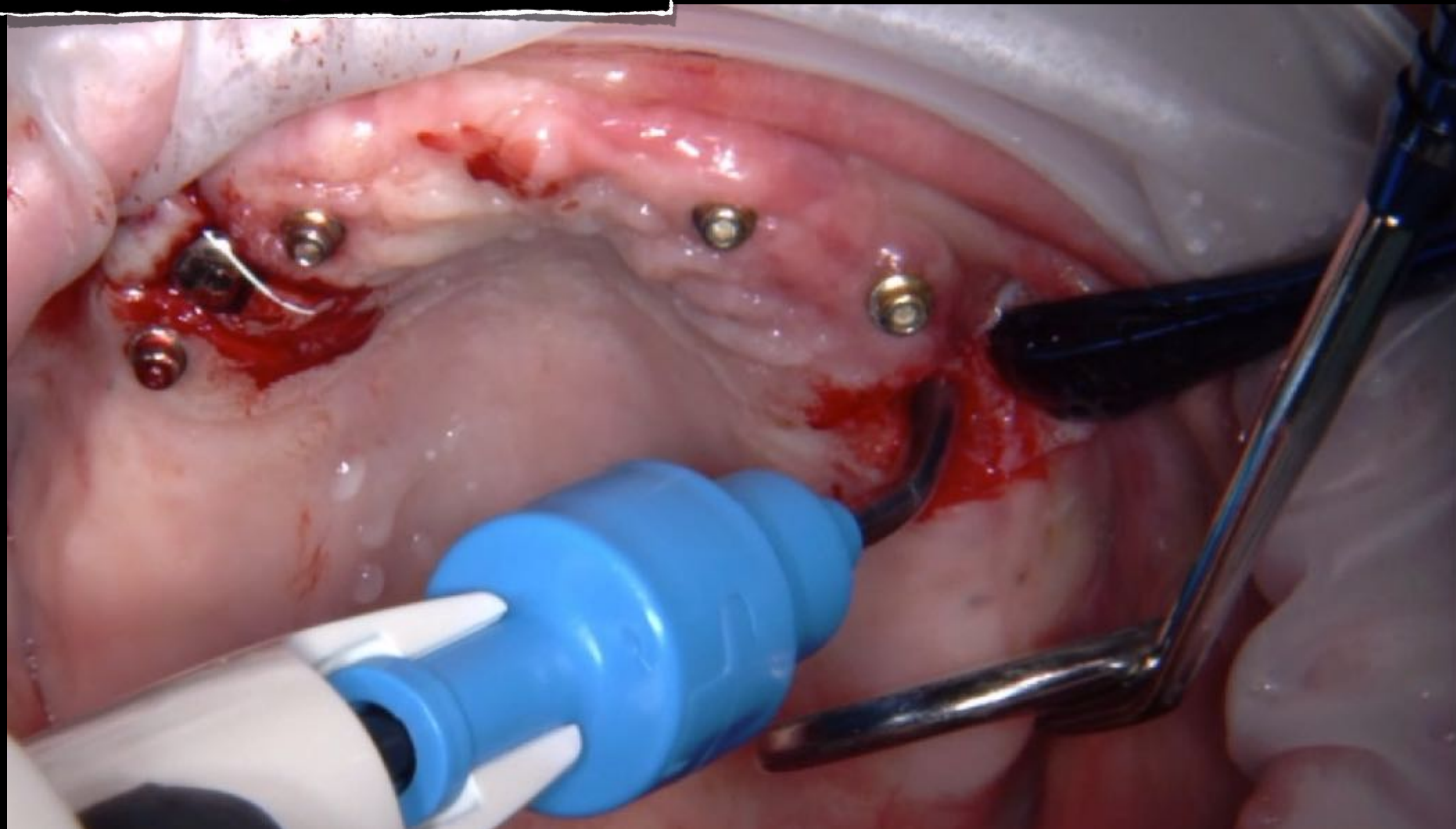
Do You ISQ ??



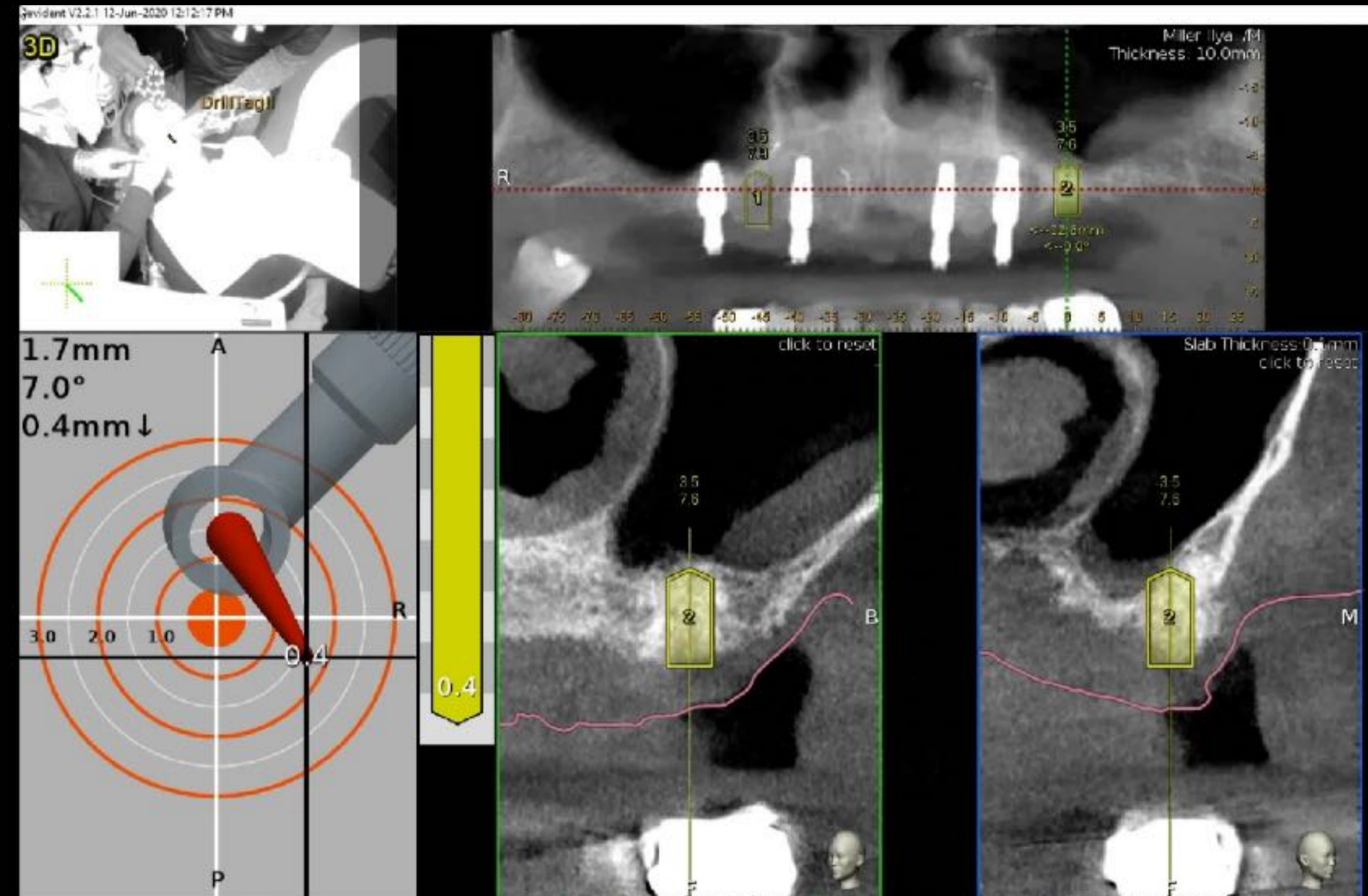
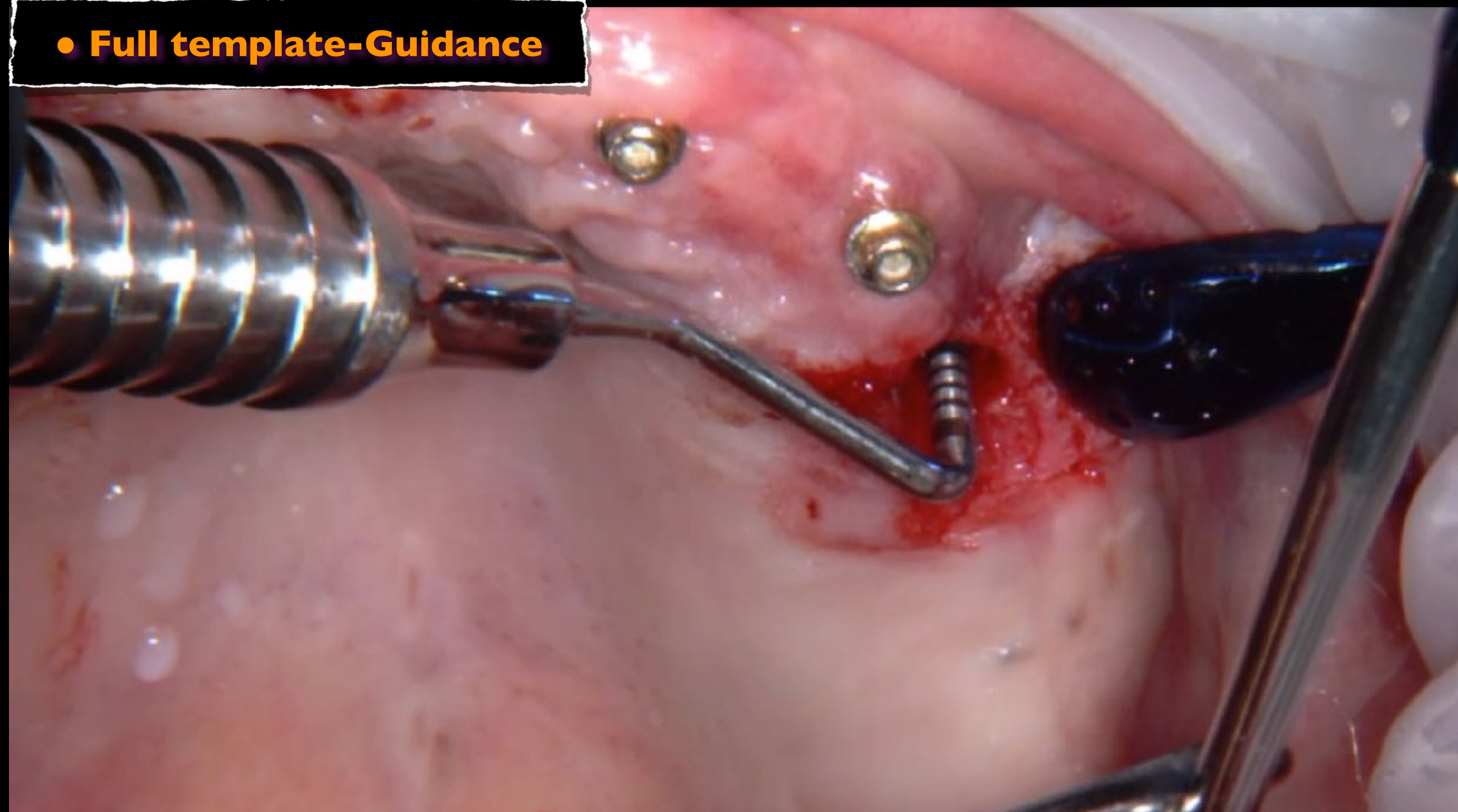
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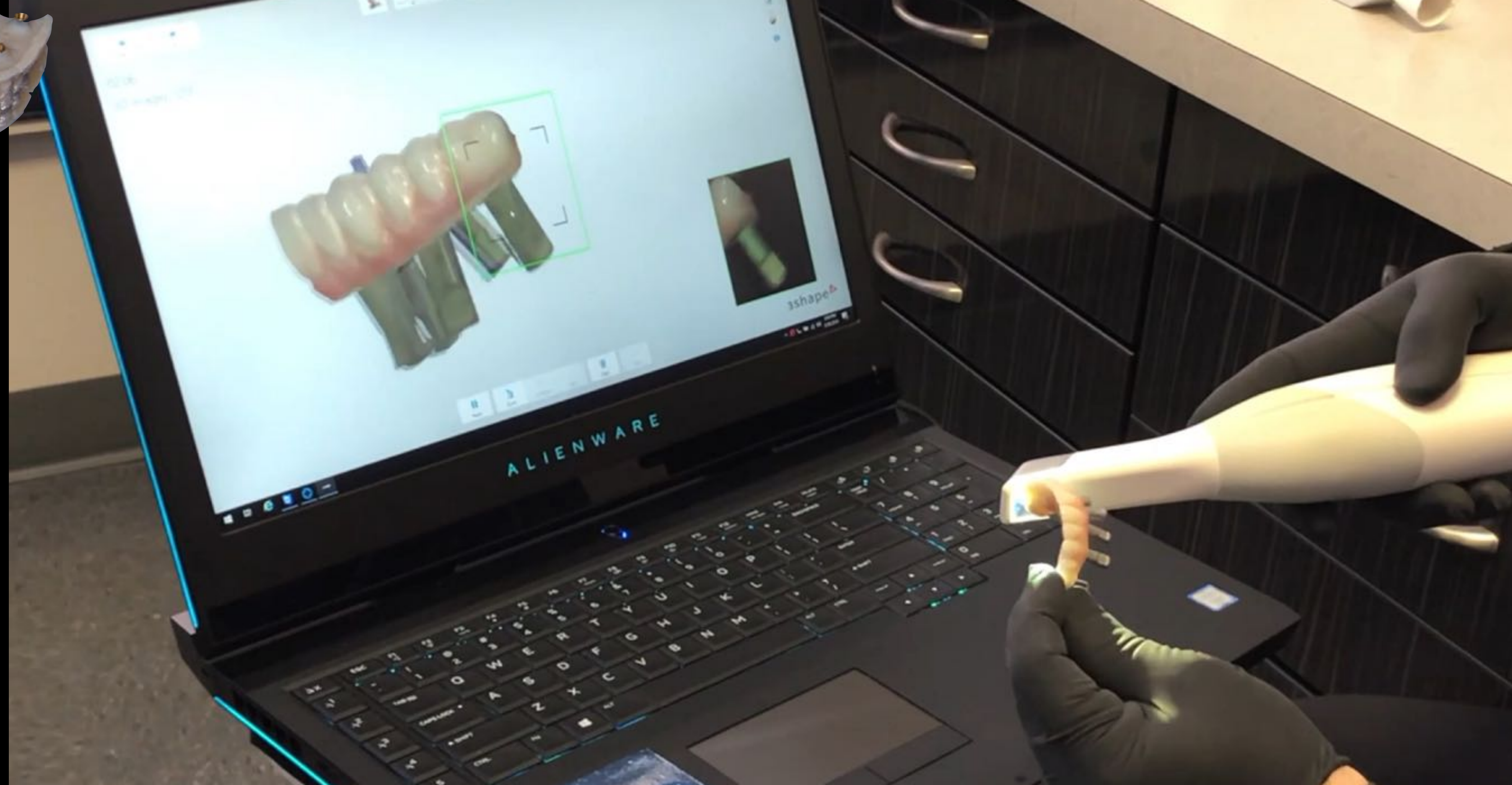


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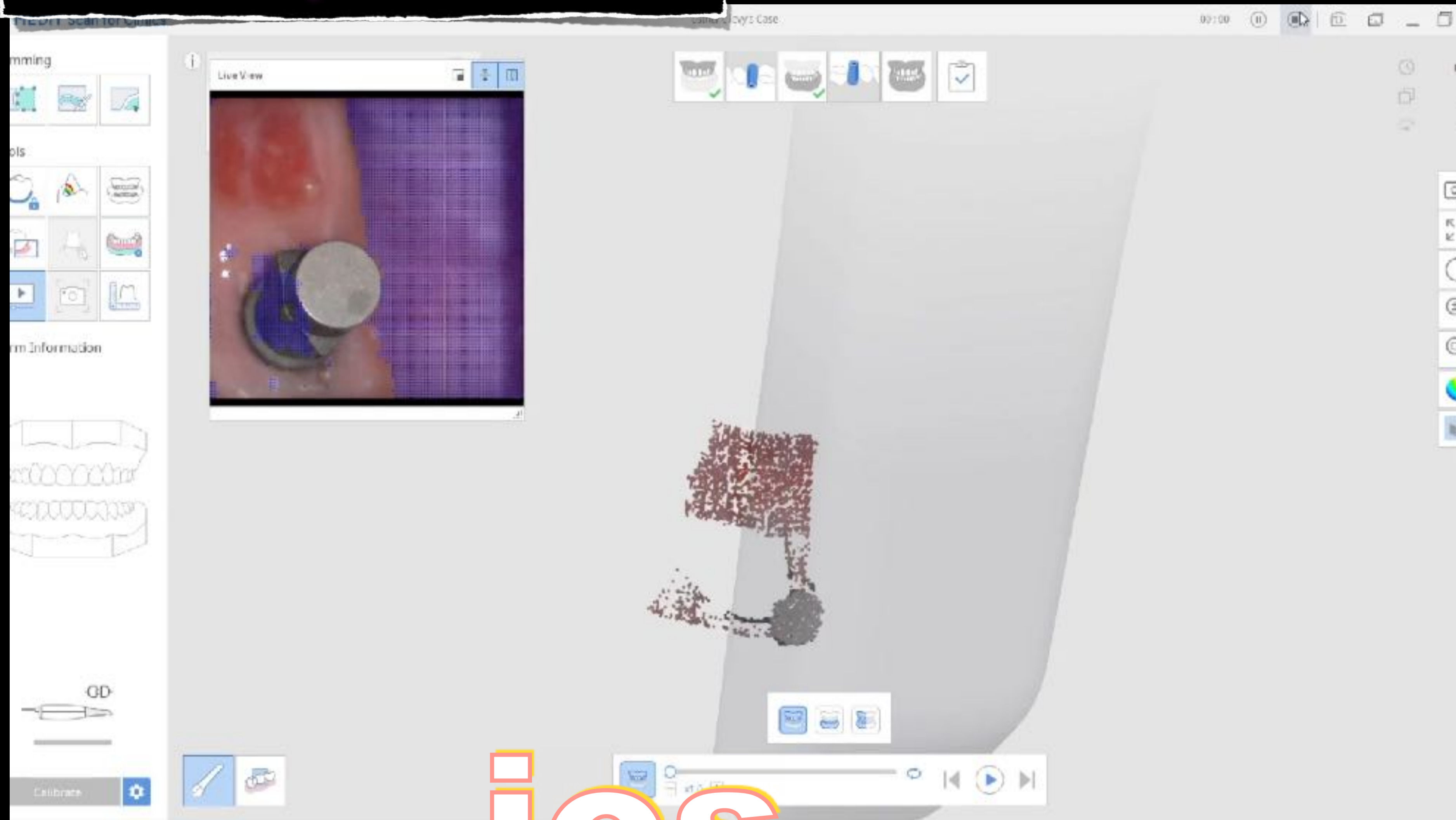


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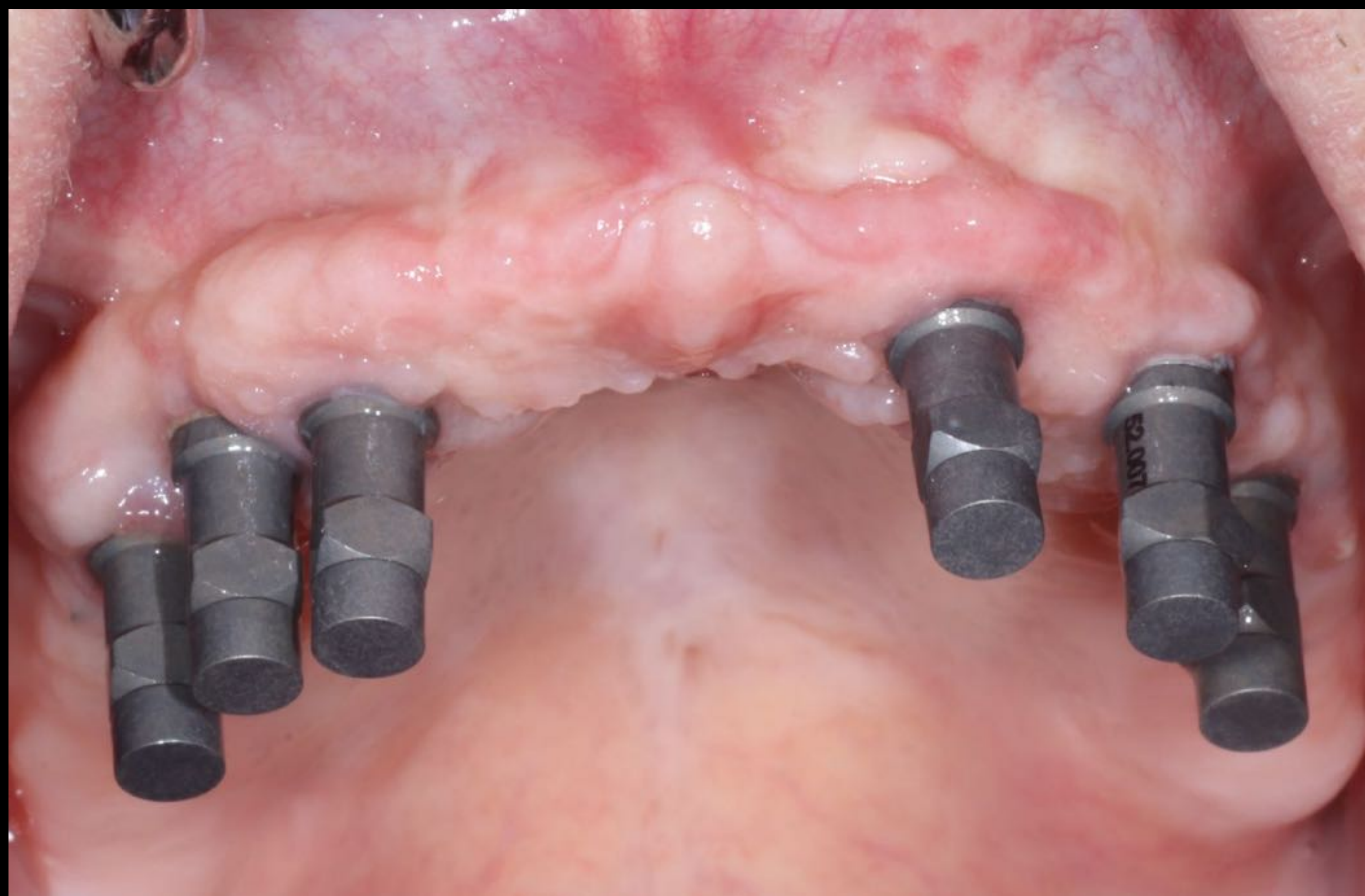
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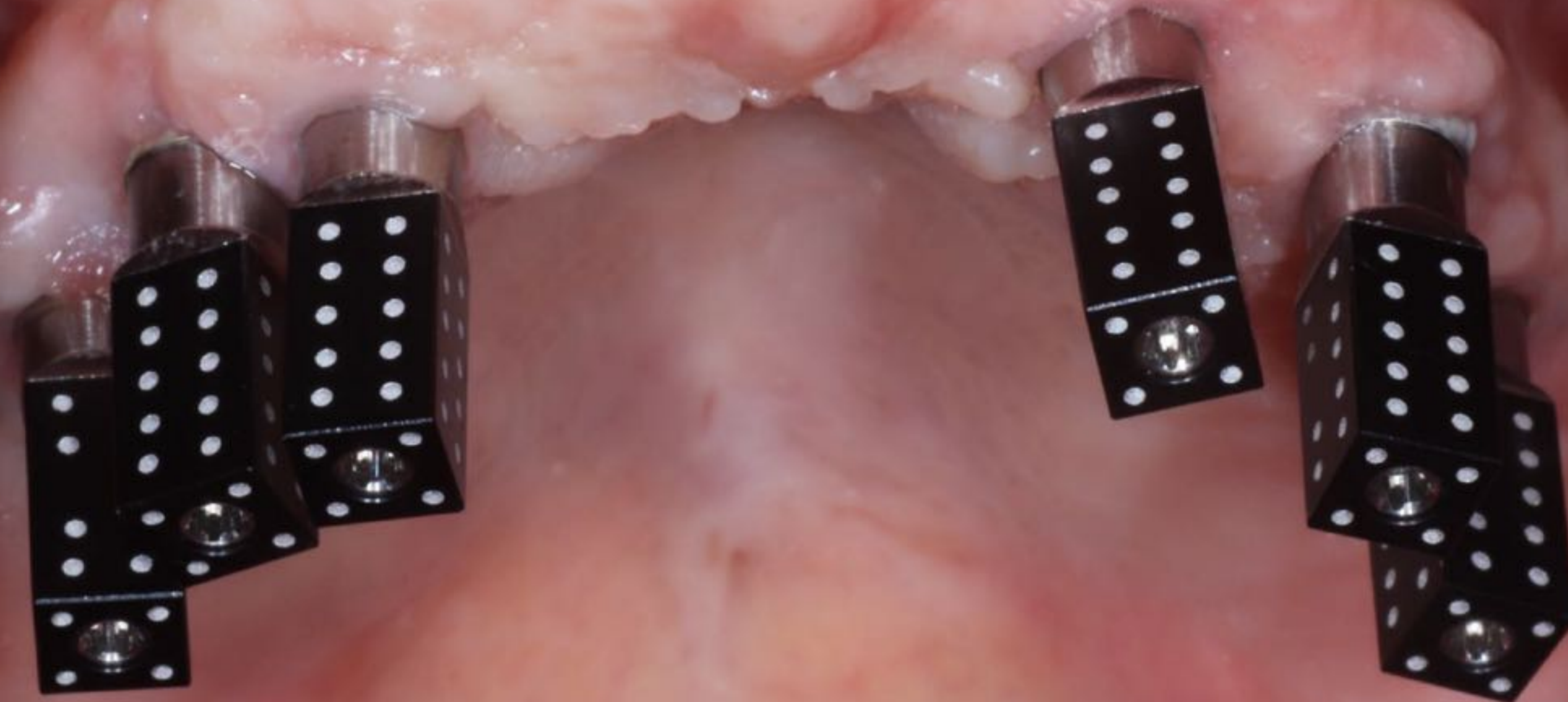
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icam

Imetric4D



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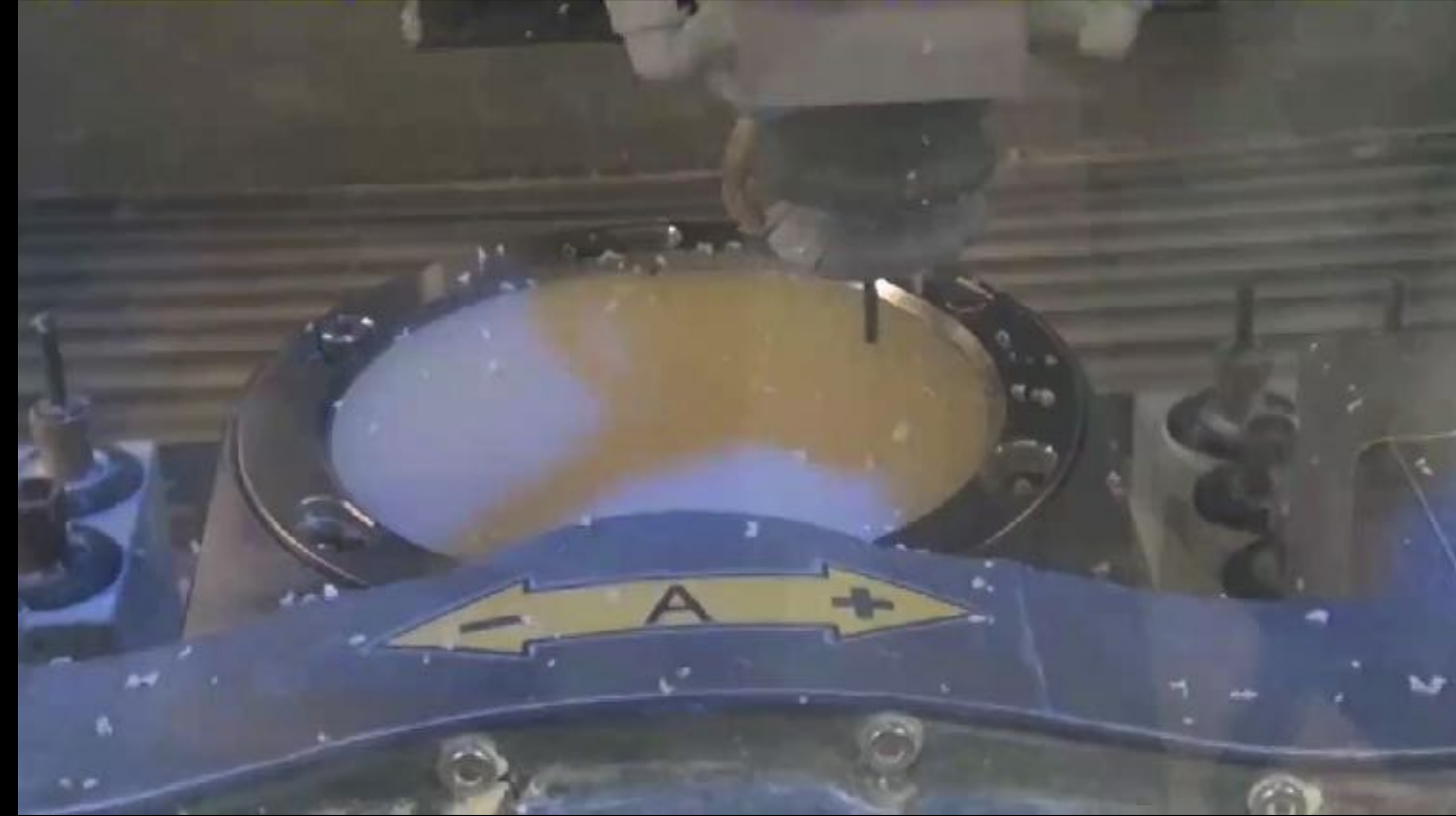


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Cad-Cam

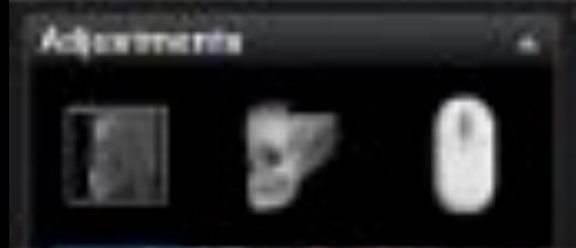
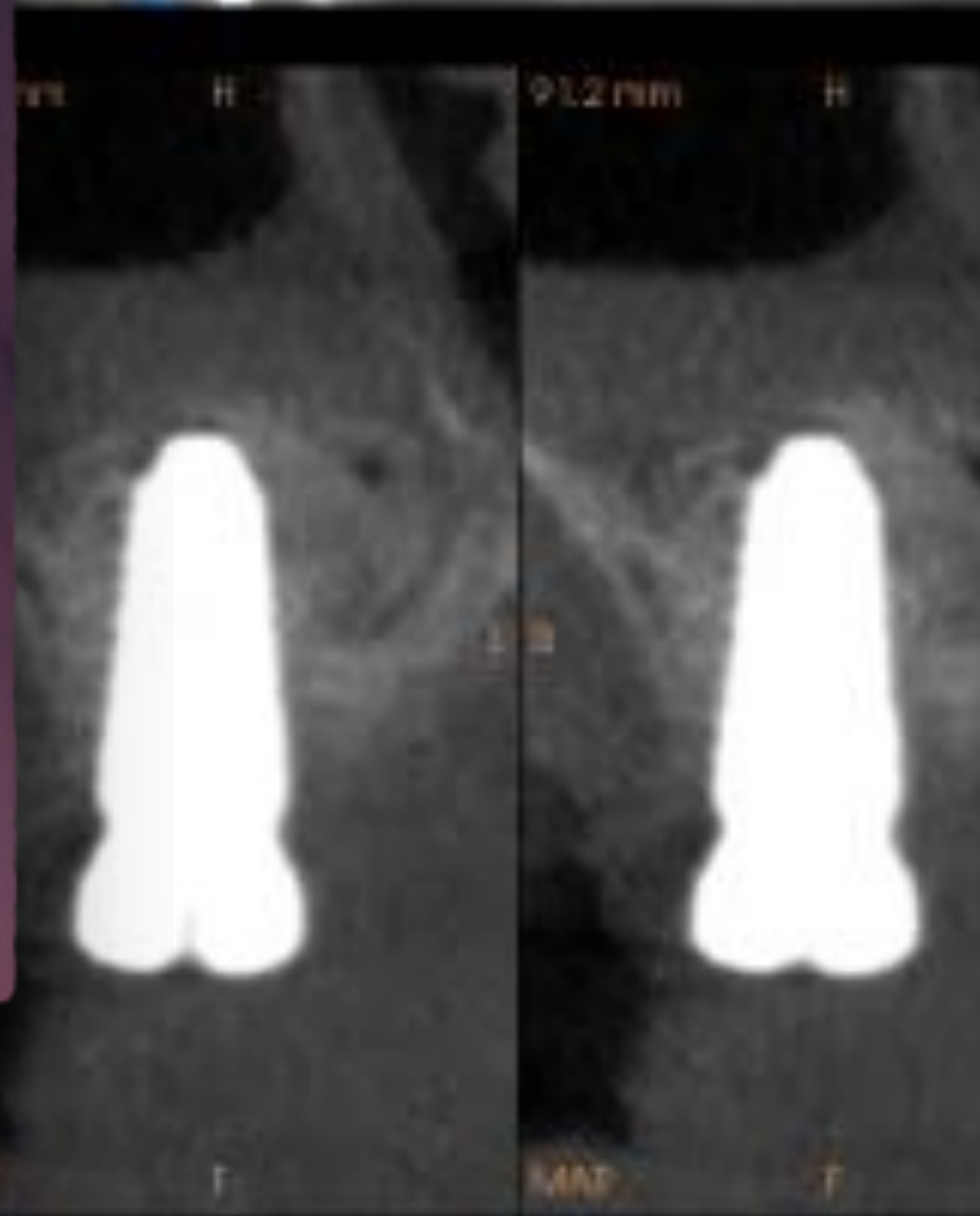


vJig



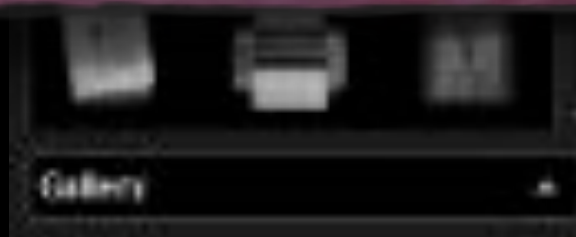
MILL

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30.2 mm
zoom: 0.34

0.1 mm
zoom: 0.70



AL

MAR

F

MAR

F

MAR

F

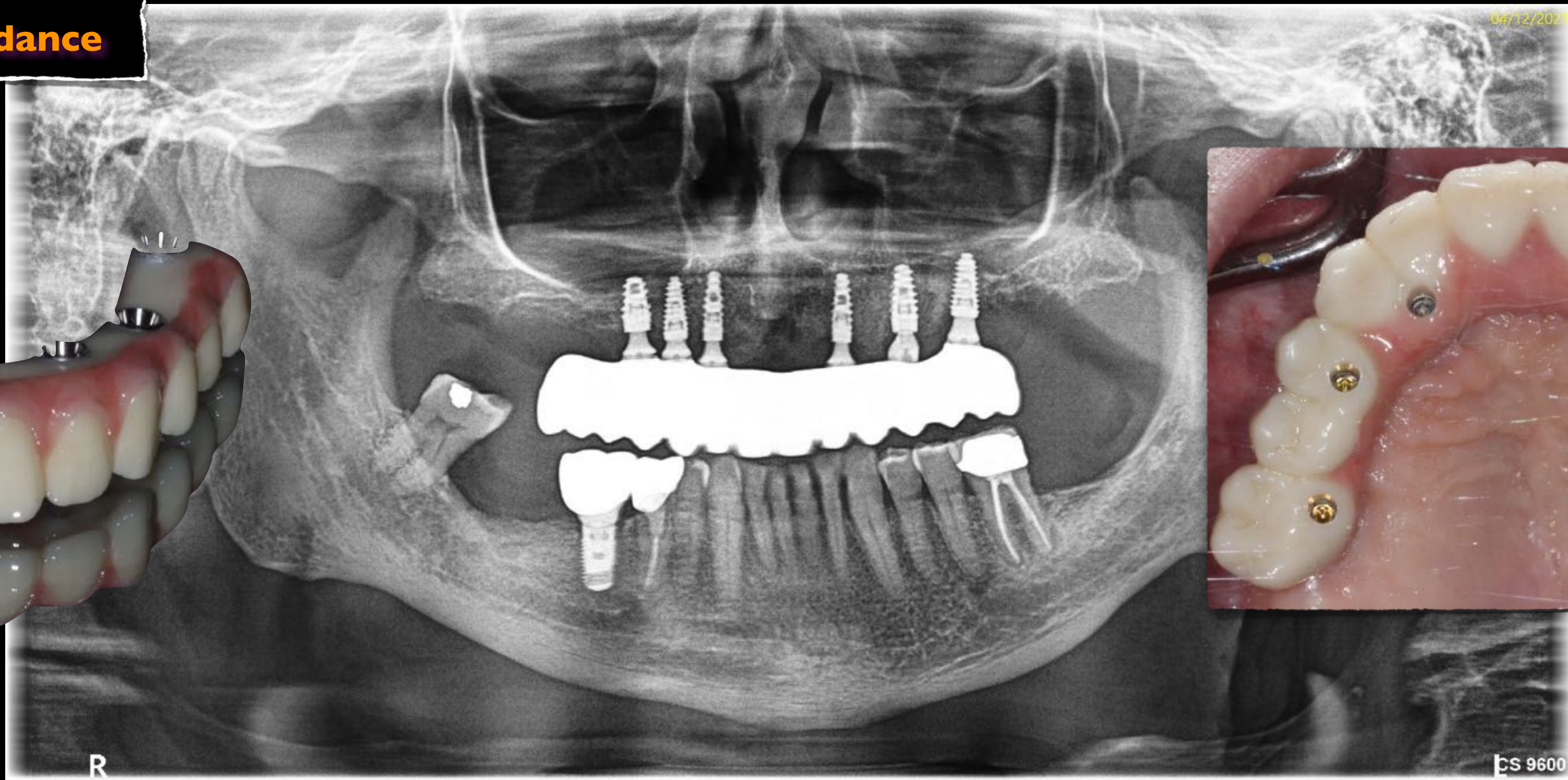
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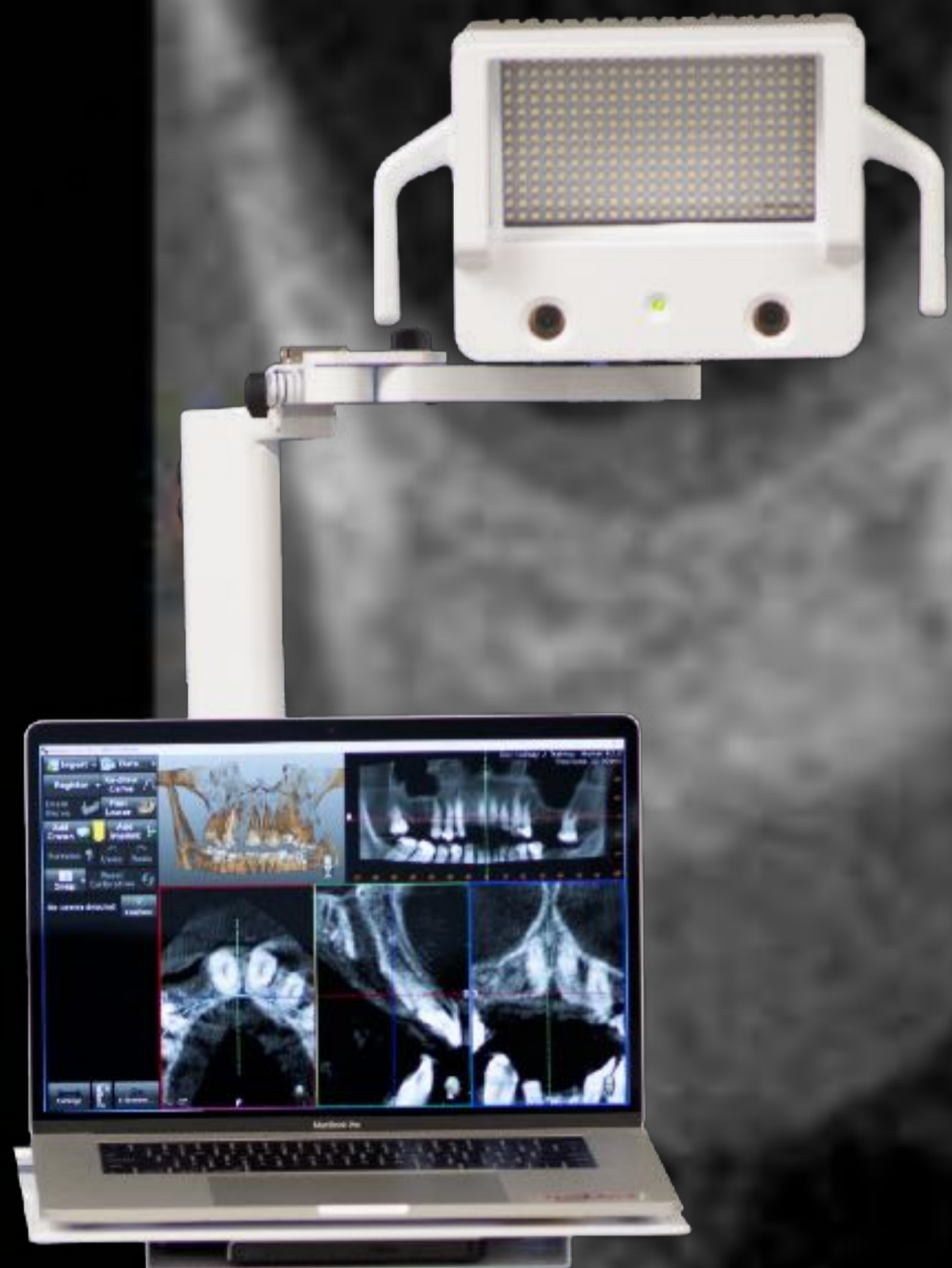
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Digital Dynamic Sinus



L

E

L

B

5.7mm

L

B

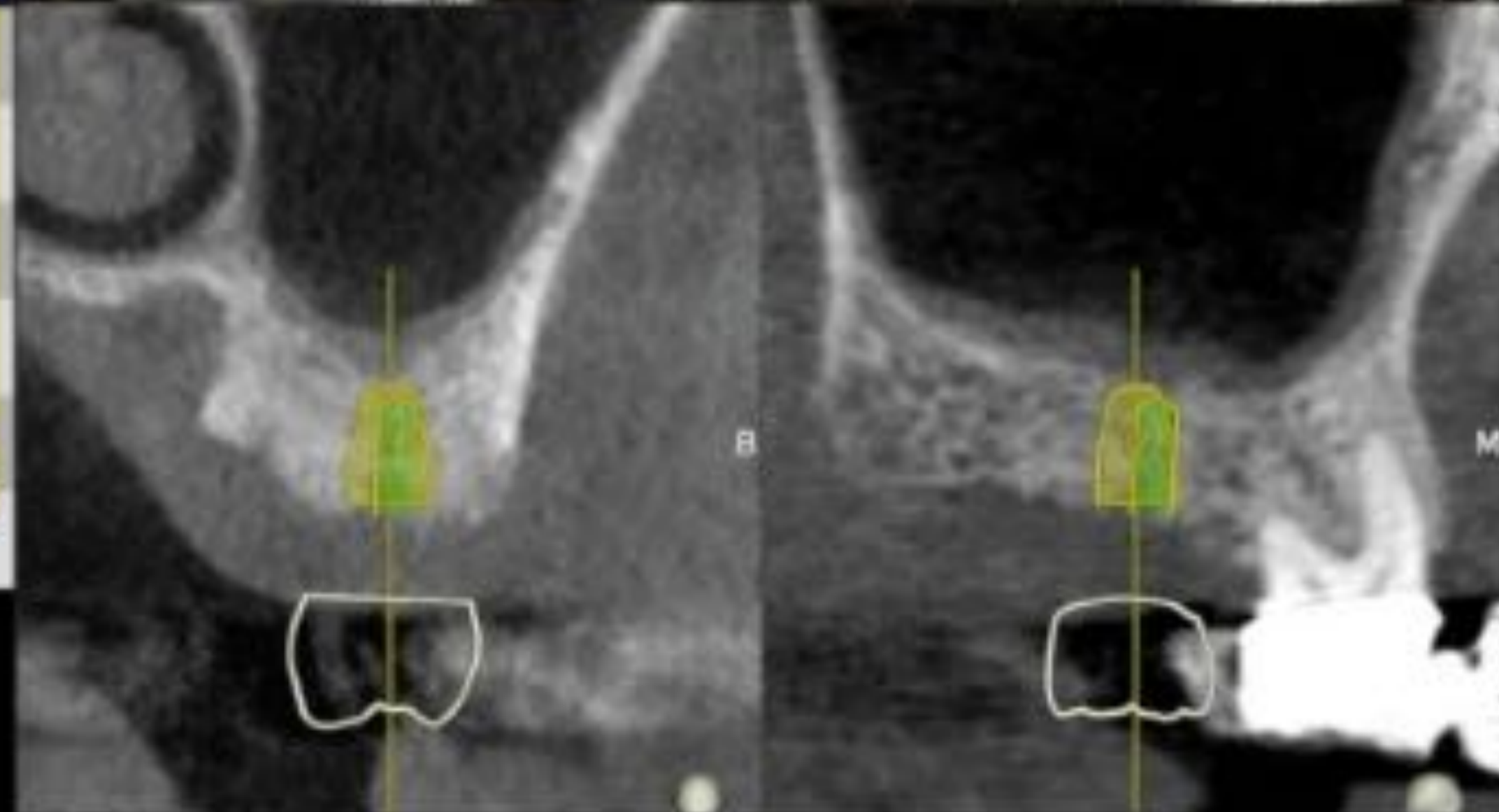
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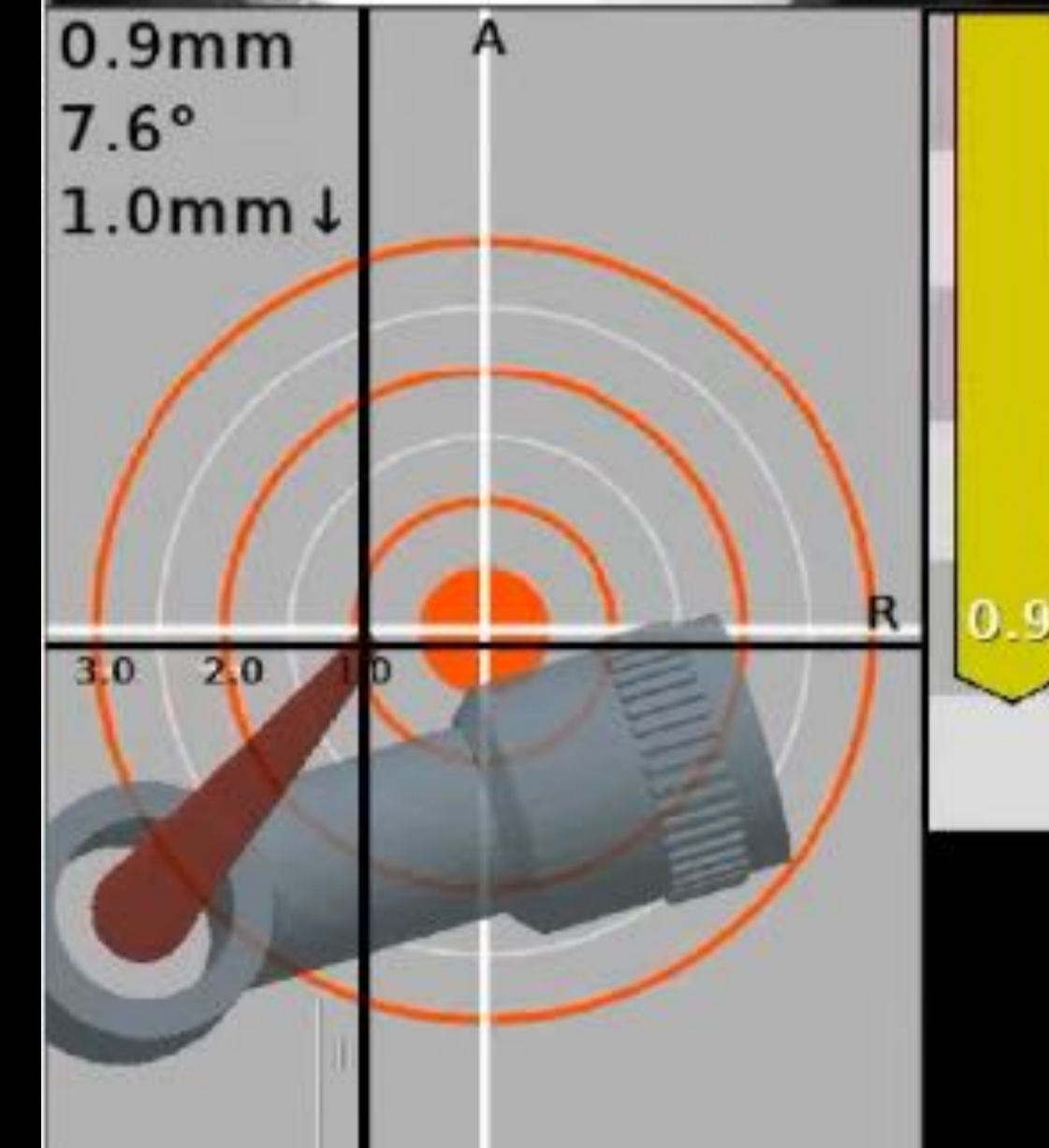
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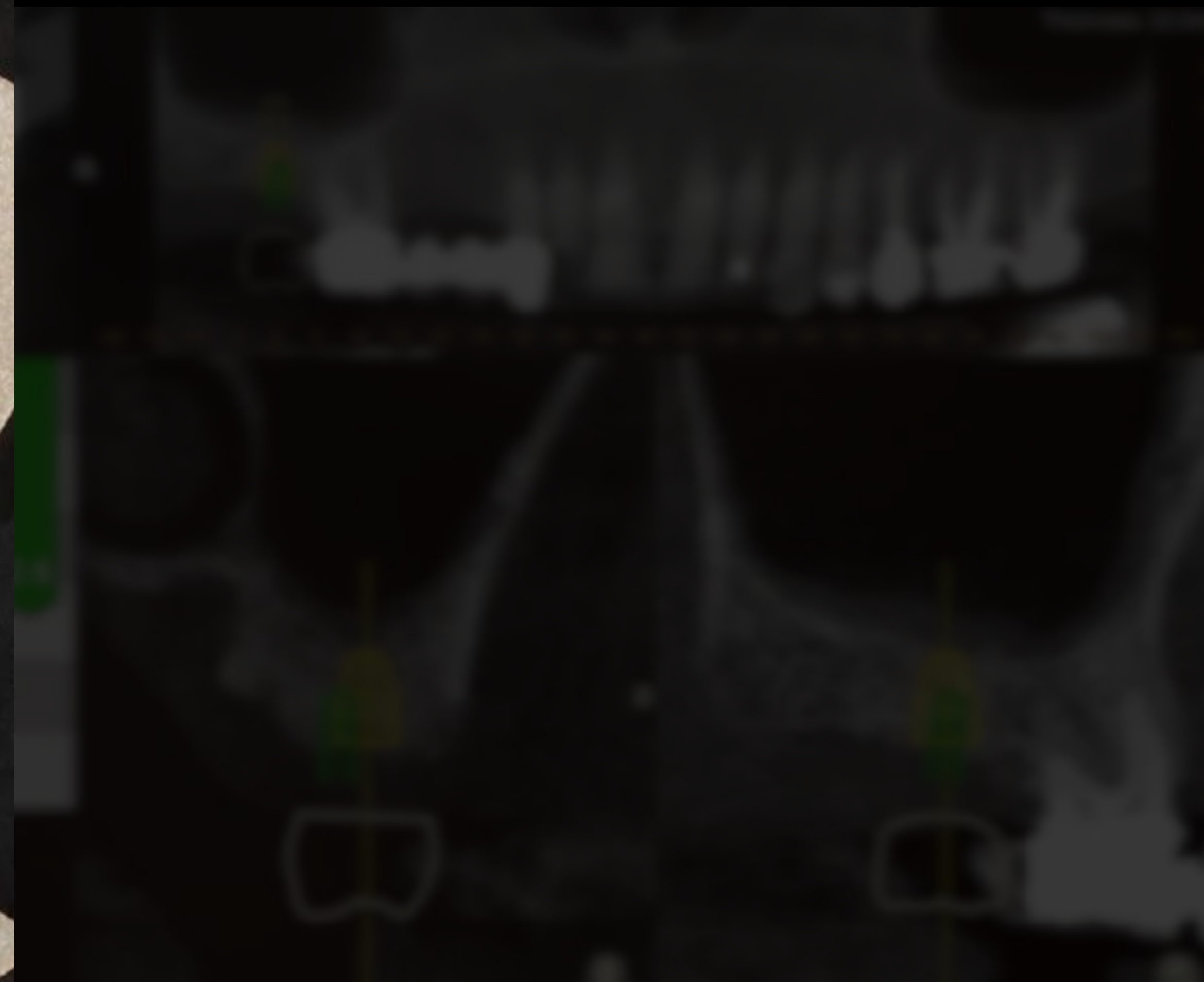
Digital Dynamic Sinus



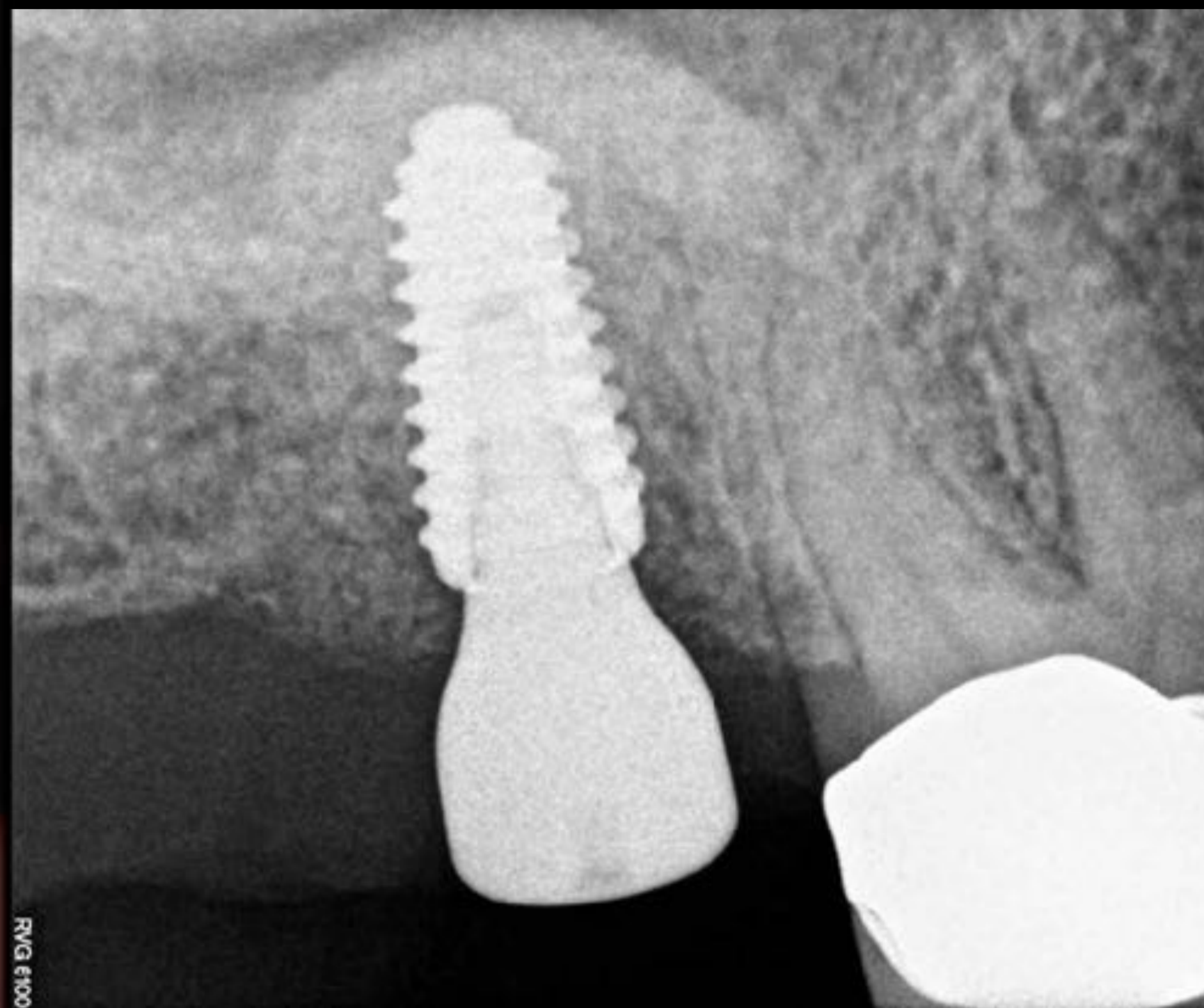
Digital Dynamic Sinus



Digital Dynamic
Sinus



Digital Dynamic Sinus



EvalNav

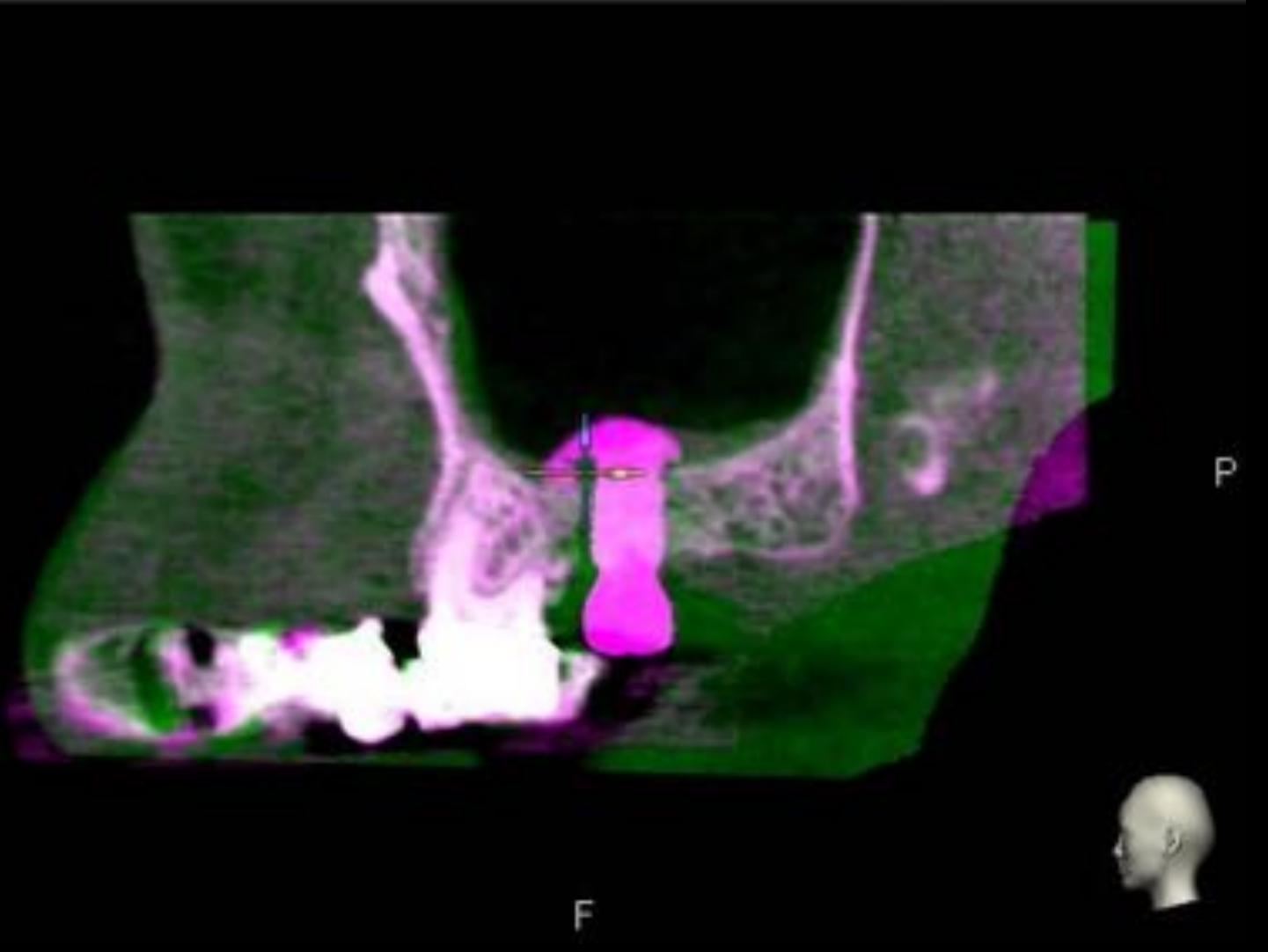
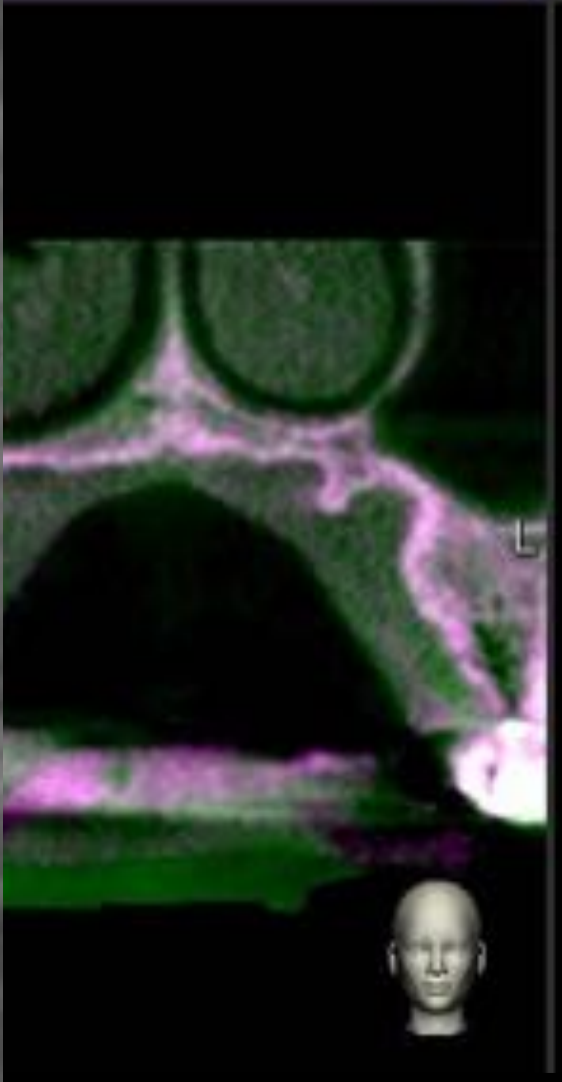
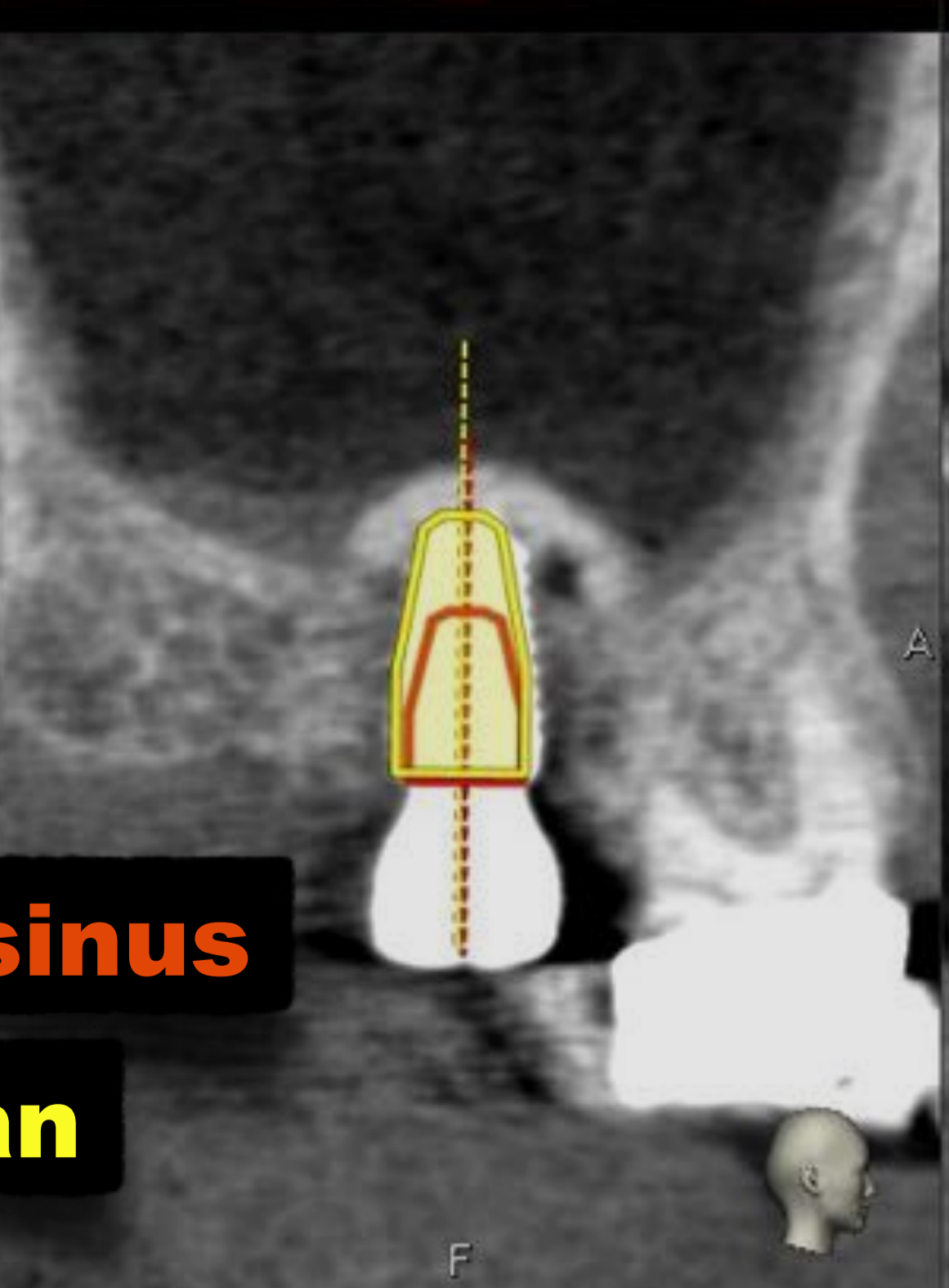
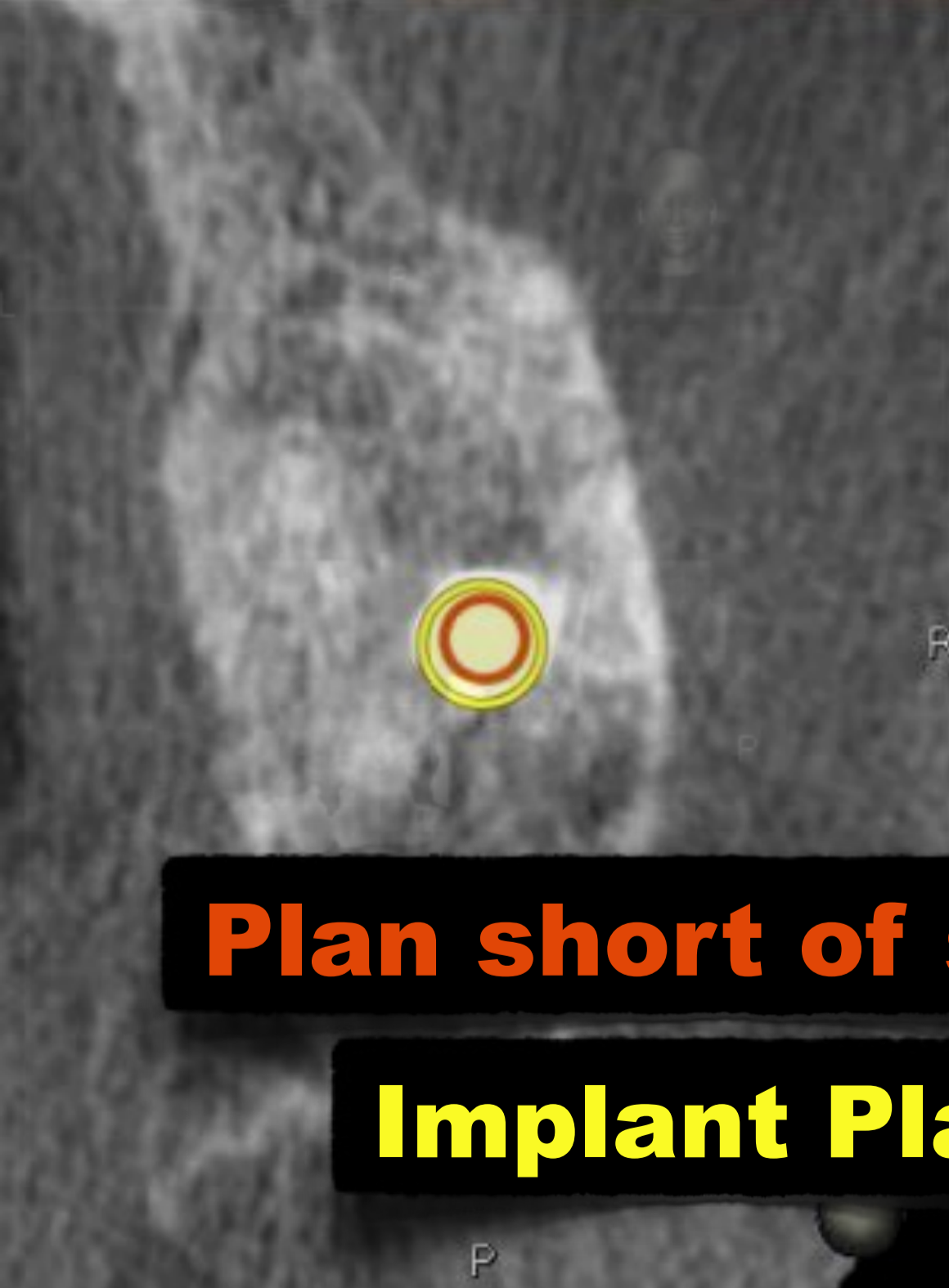
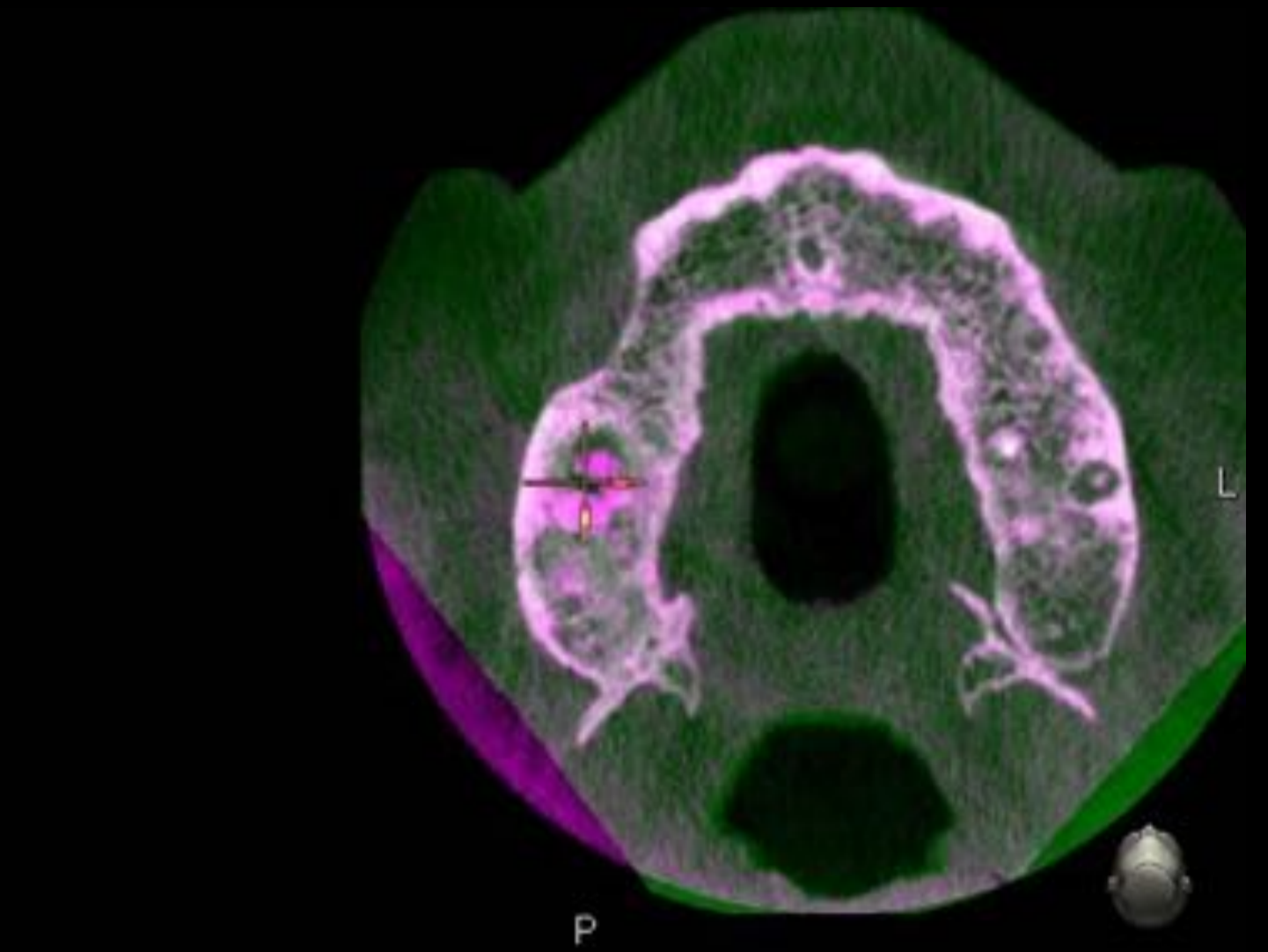
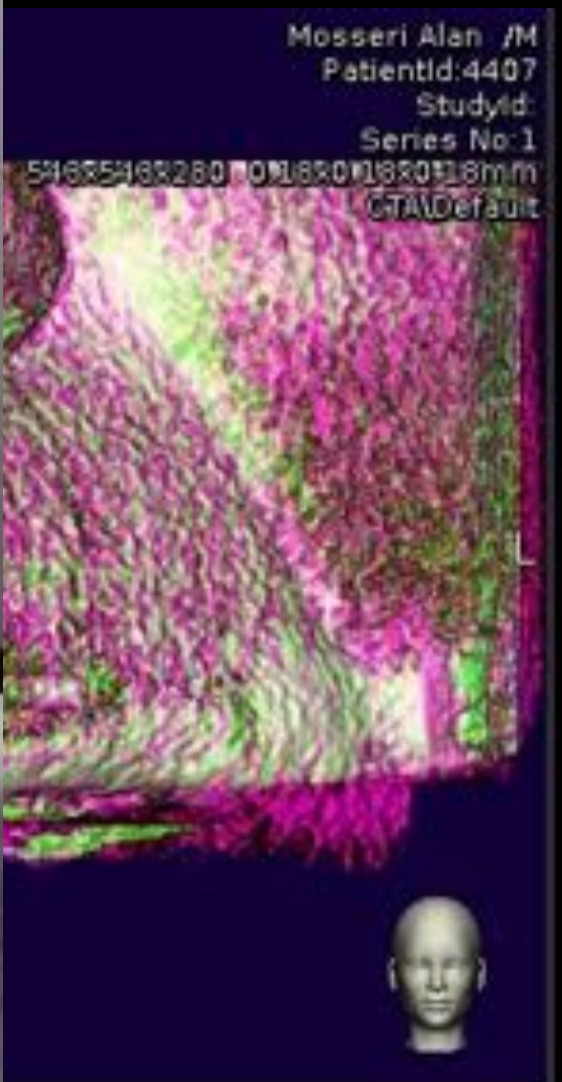
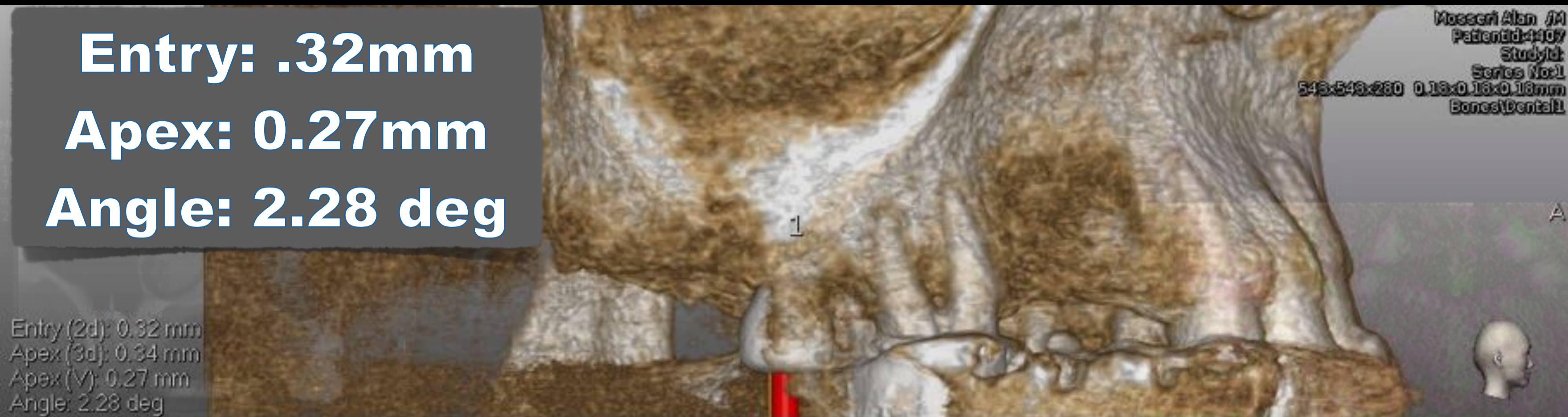
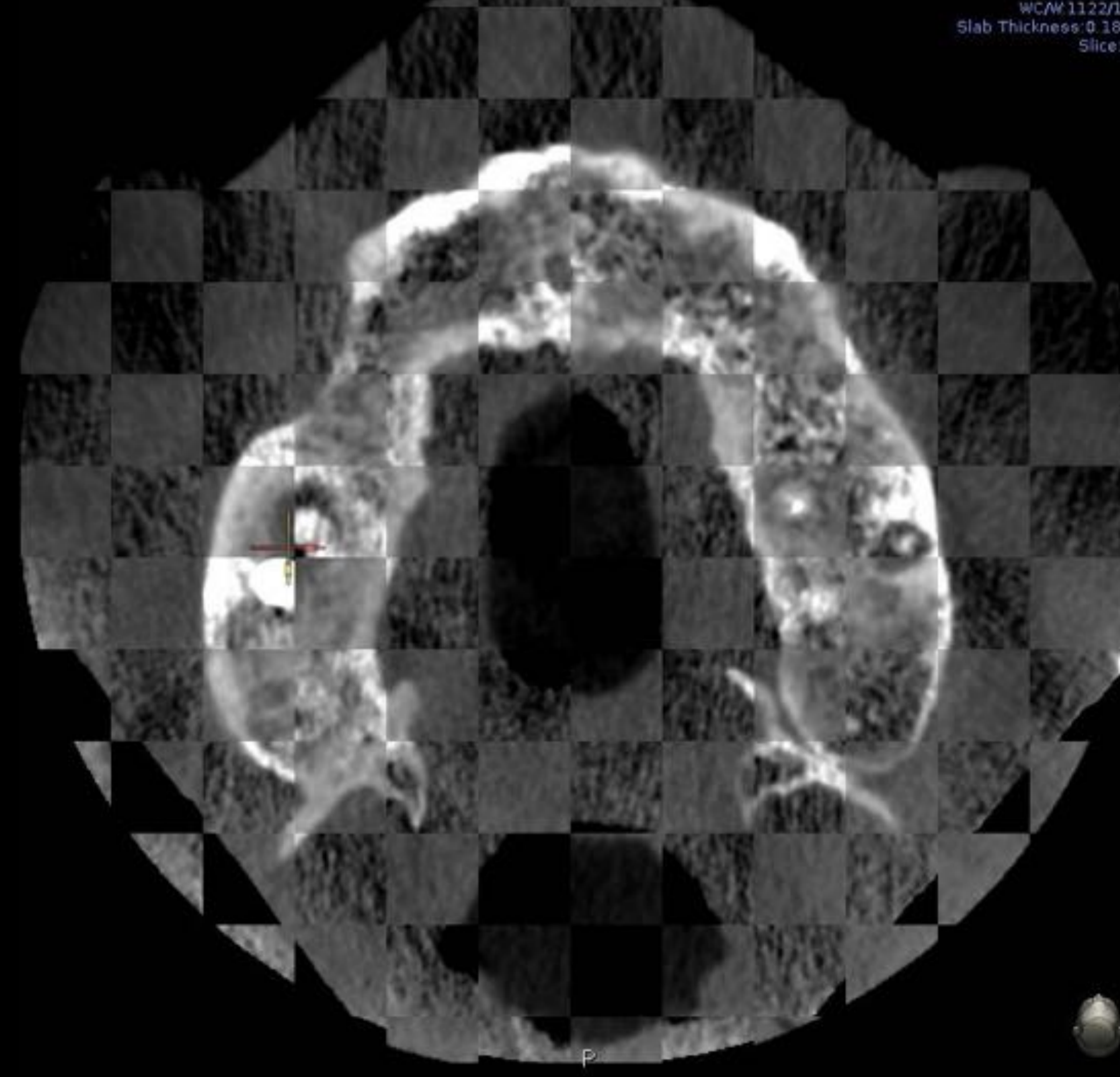
Mosseri Alan JM
PatientId:4407
StudyId:
Series No:
WCW 1122/196
Slab Thickness:0.18mm
Slice:17

Entry: .32mm
Apex: 0.27mm
Angle: 2.28 deg

Entry (2d): 0.32 mm
Apex (3d): 0.34 mm
Apex (V): 0.27 mm
Angle: 2.28 deg

Mosseri Alan JM
PatientId:4407
StudyId:
Series No:1
549:549:280 0.18x0.18x0.18mm
Bones(Dental1)

Mosseri Alan JM
PatientId:4407
StudyId:
Series No:1
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CTADefault



Plan short of sinus

Implant Plan

Digital Dynamic
Sinus

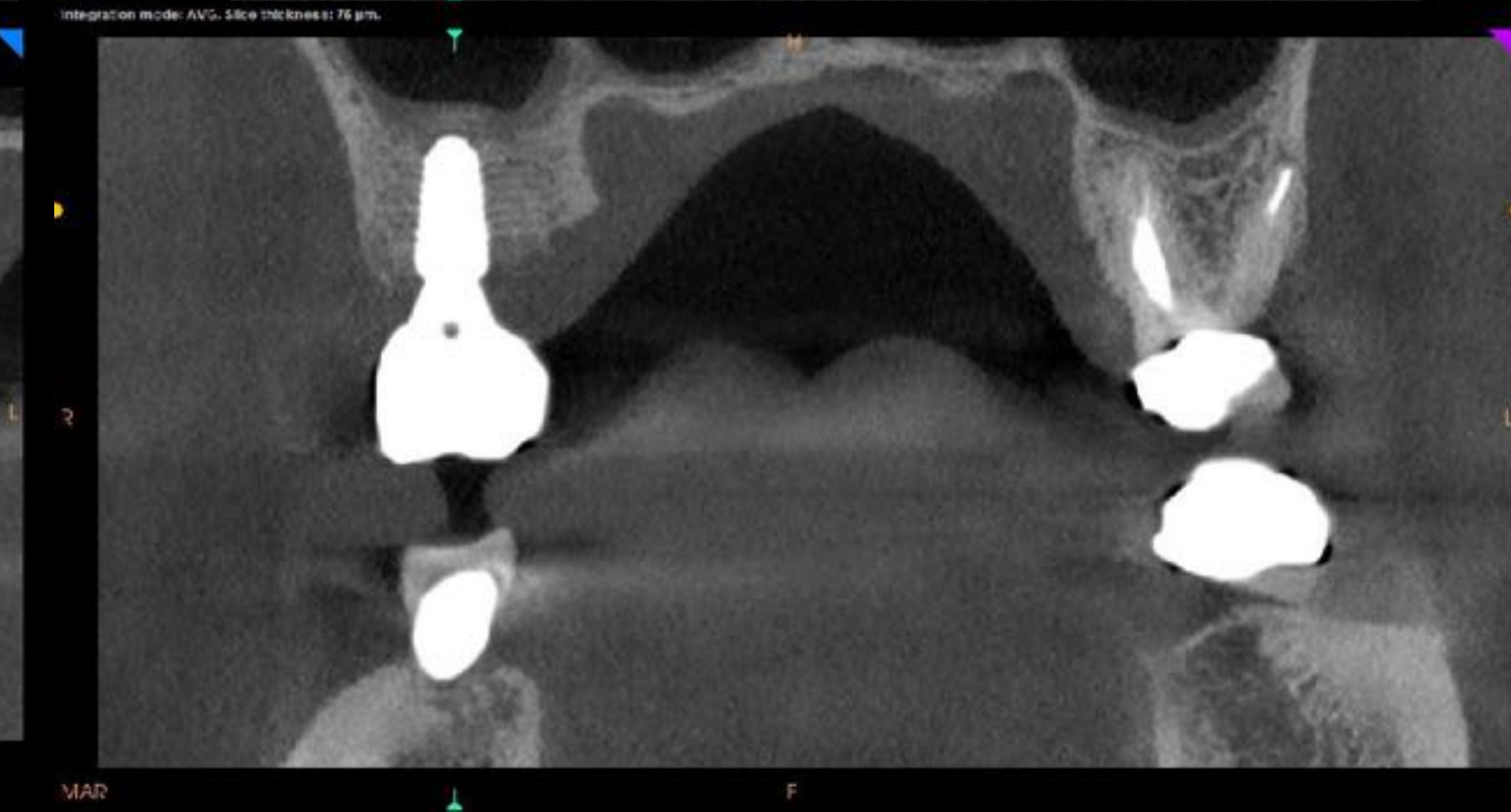
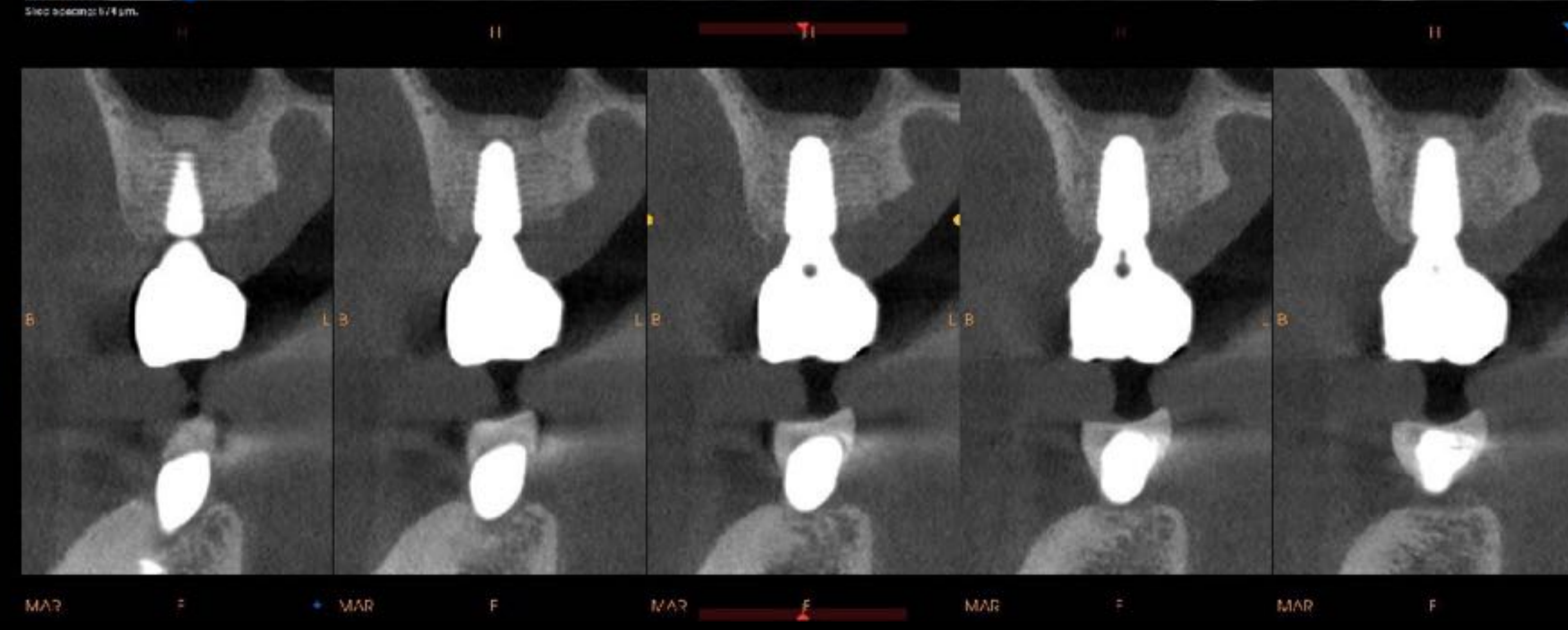
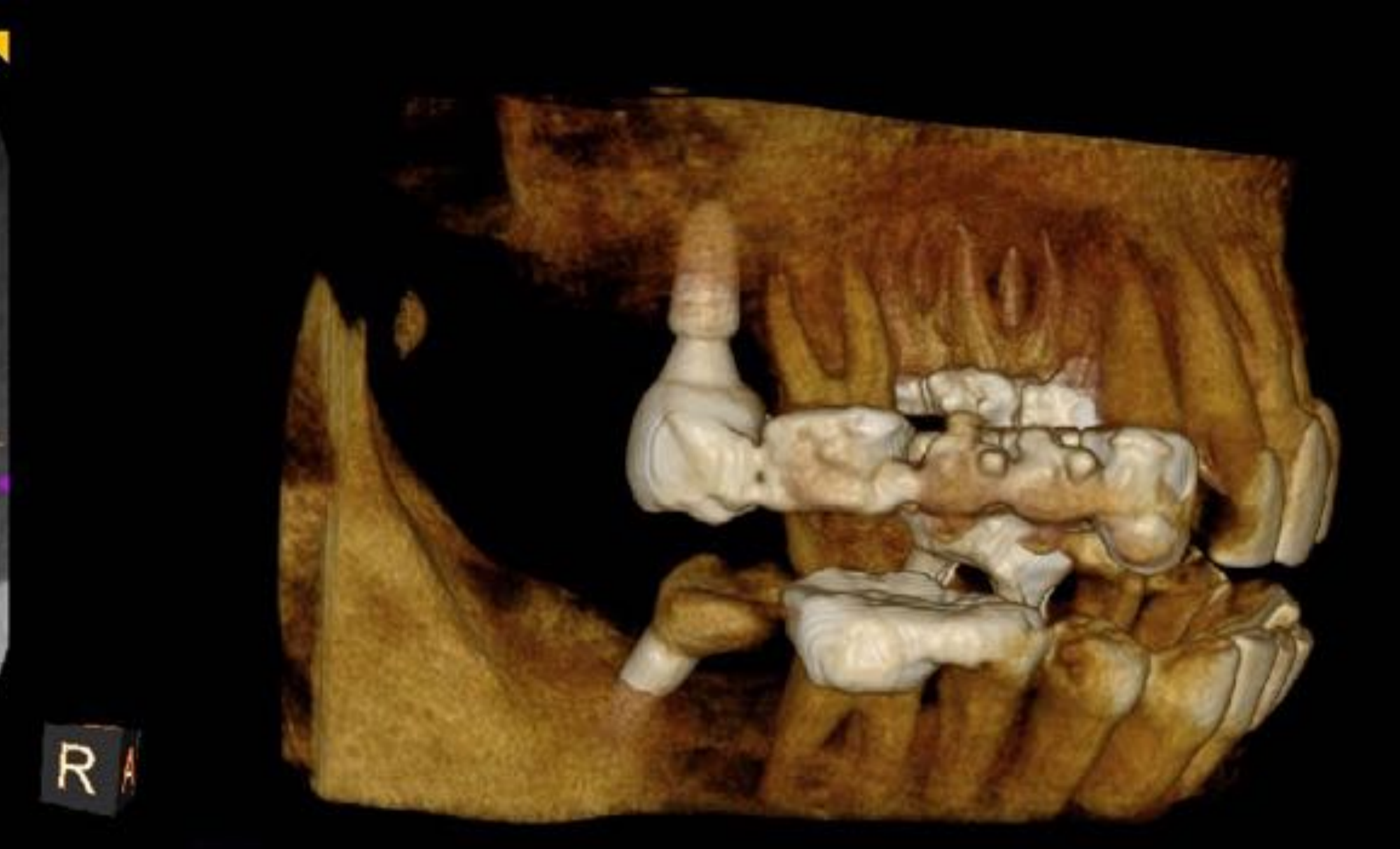
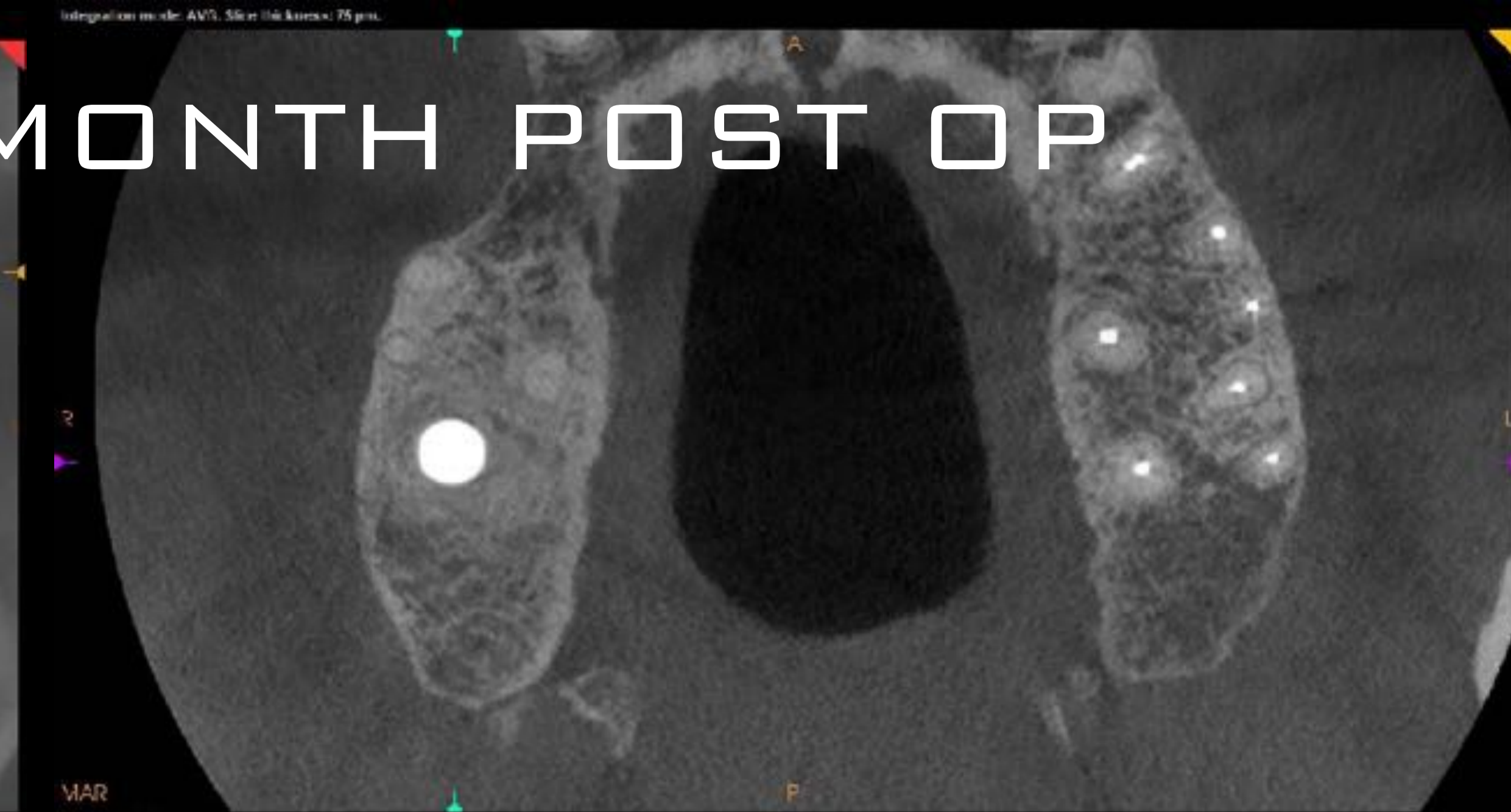
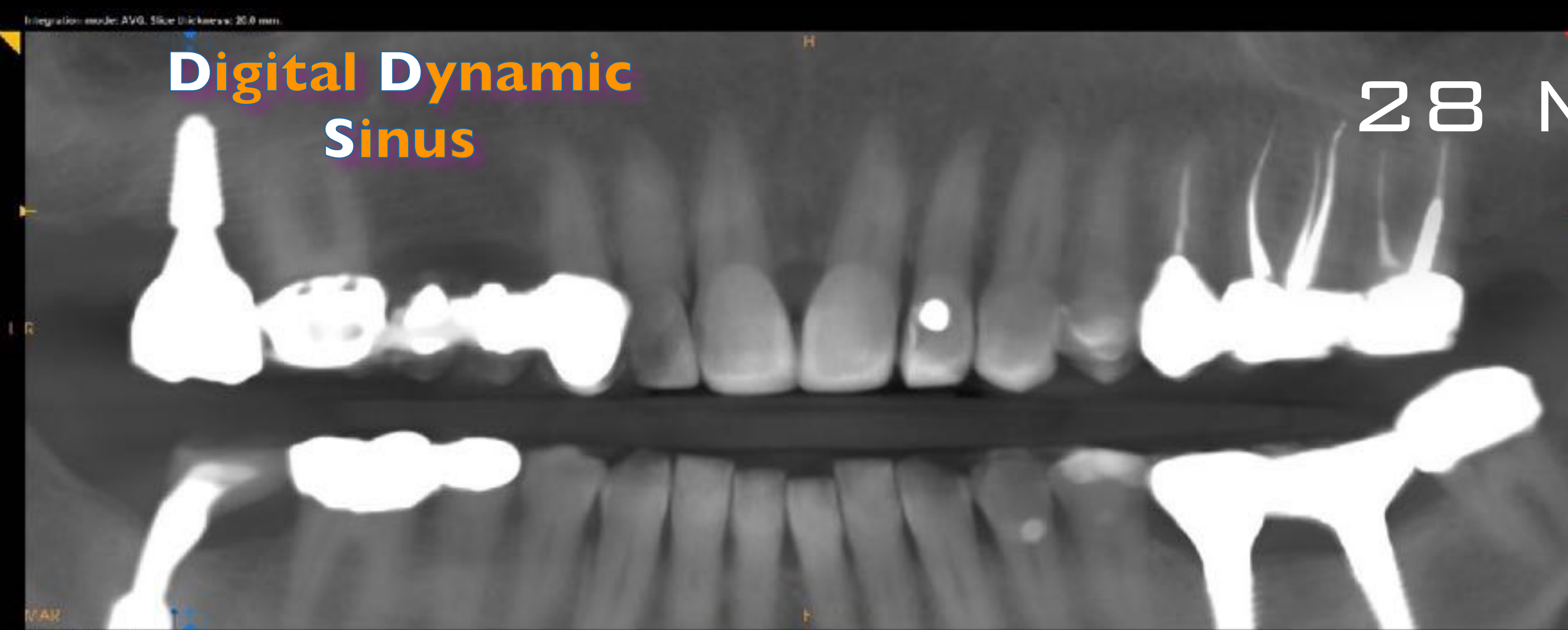
6 WEEK ISQ — 8 WEEK LOADING



MEGA ISQ™
Original Osstell Technology

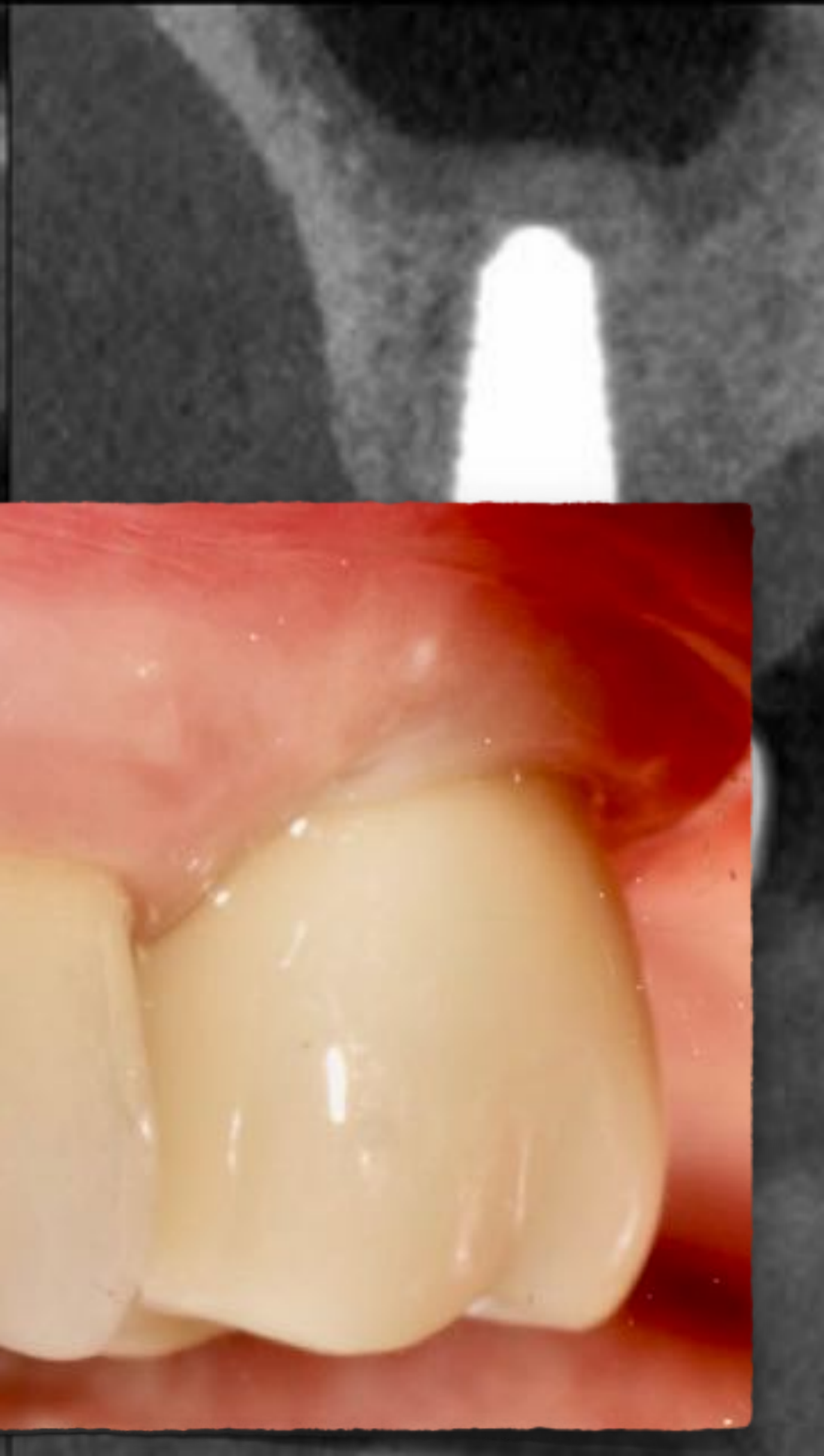
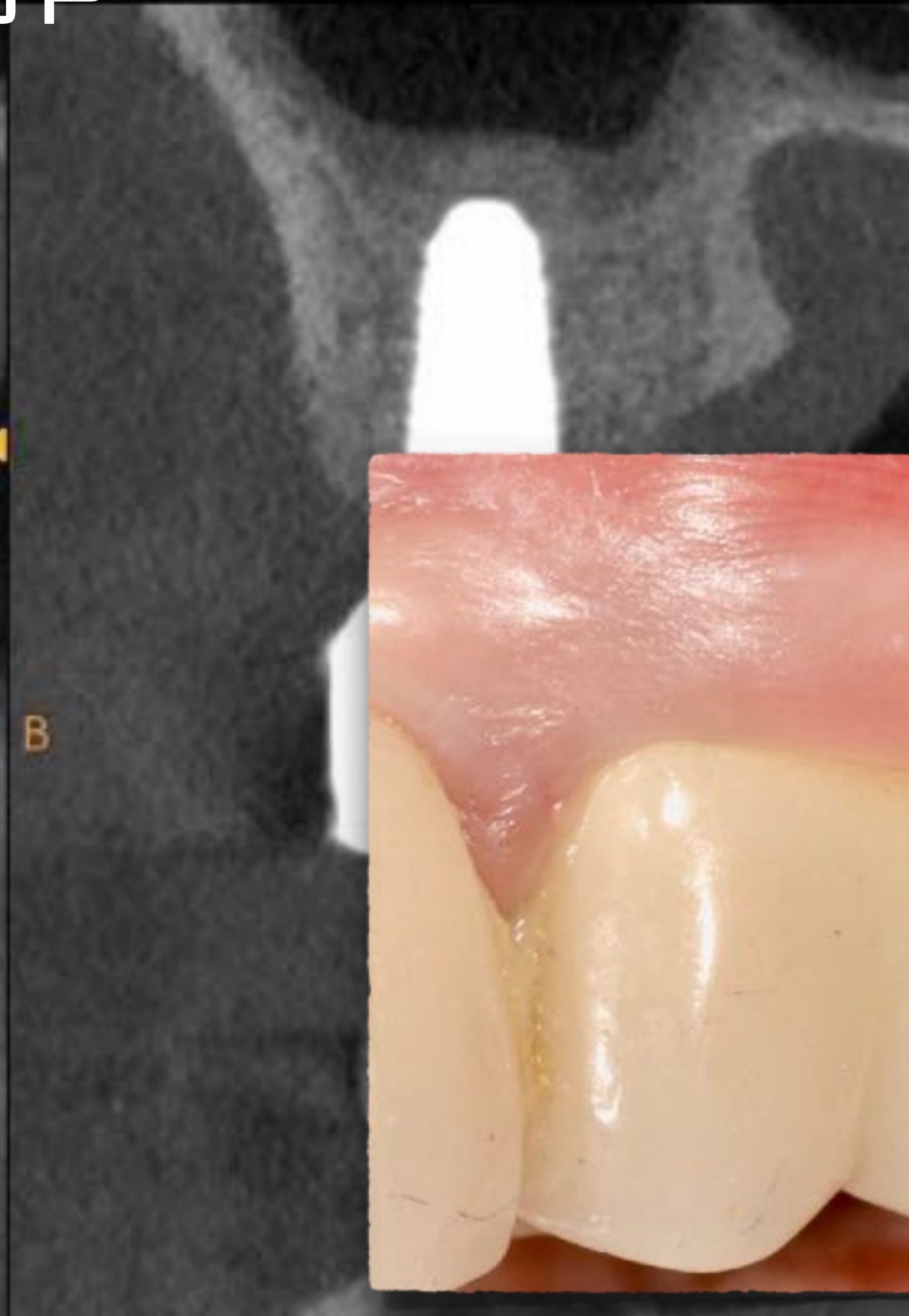
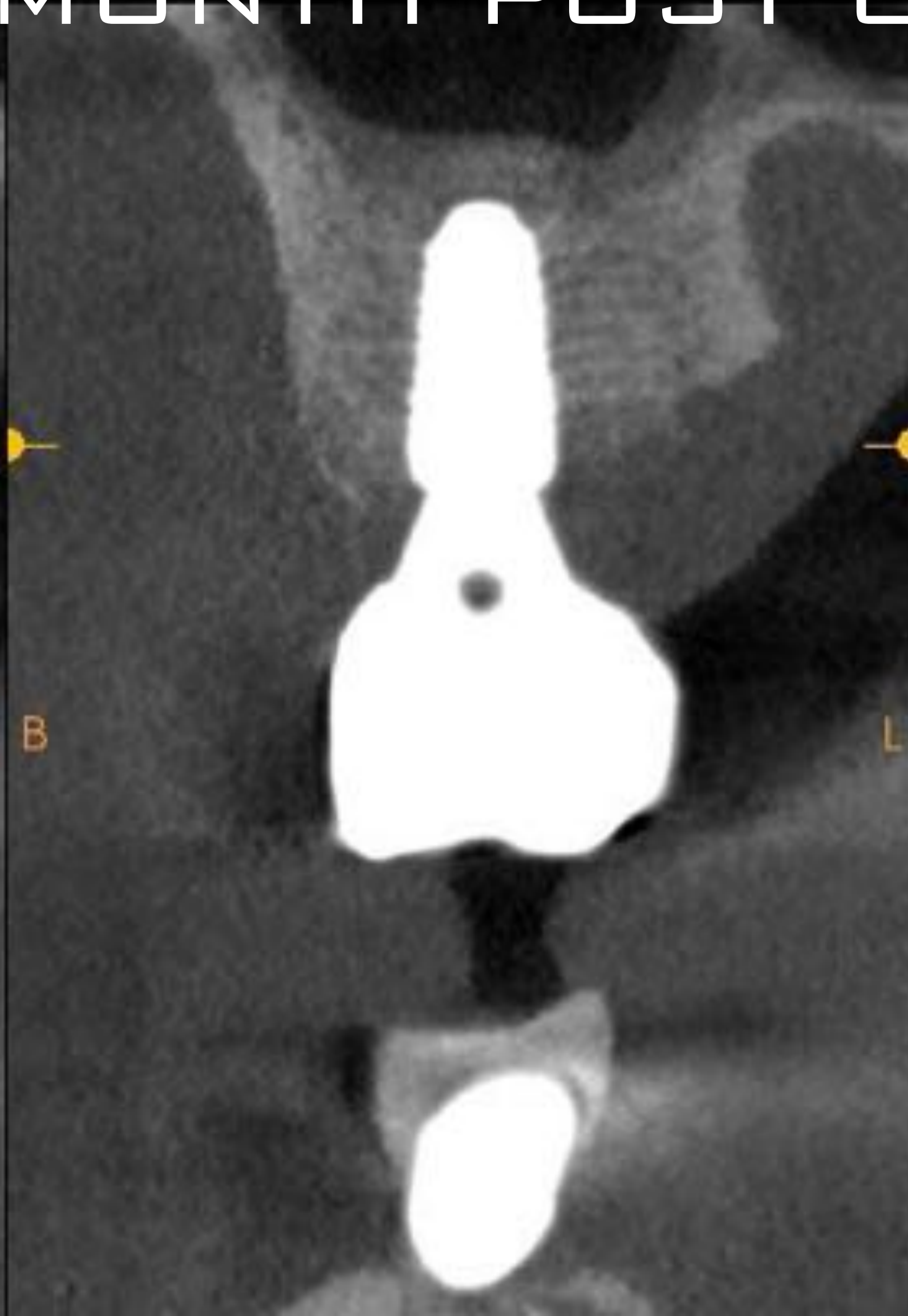
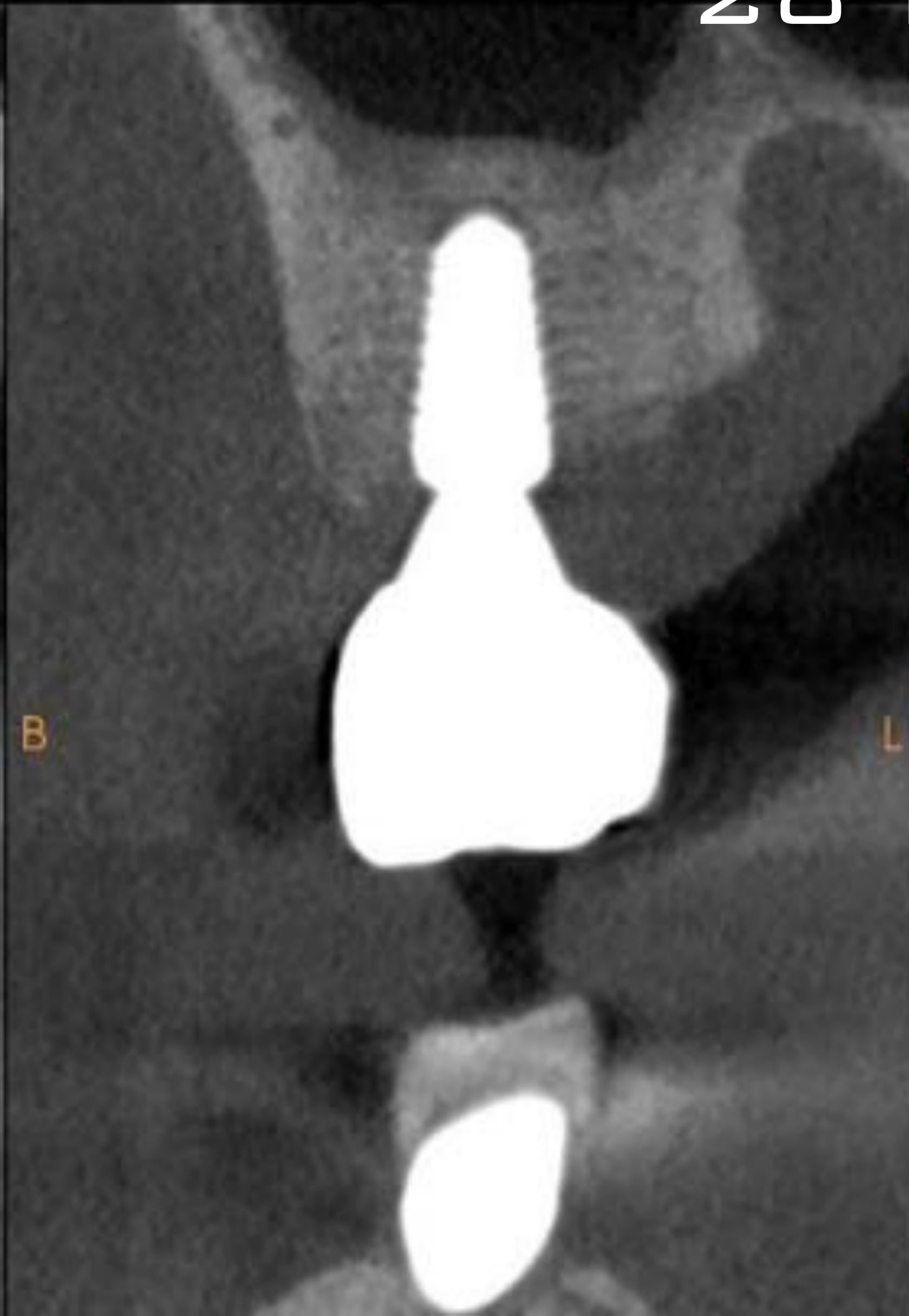
80





H
**Digital Dynamic
Sinus**

H H H H H
28 MONTH POST OP



Navigation Guided Crestal Sinus & Densah burs

Densah Lift

Numbers of Cases

18

Number of Implants

27

Avg Height Gain

4.3 mm

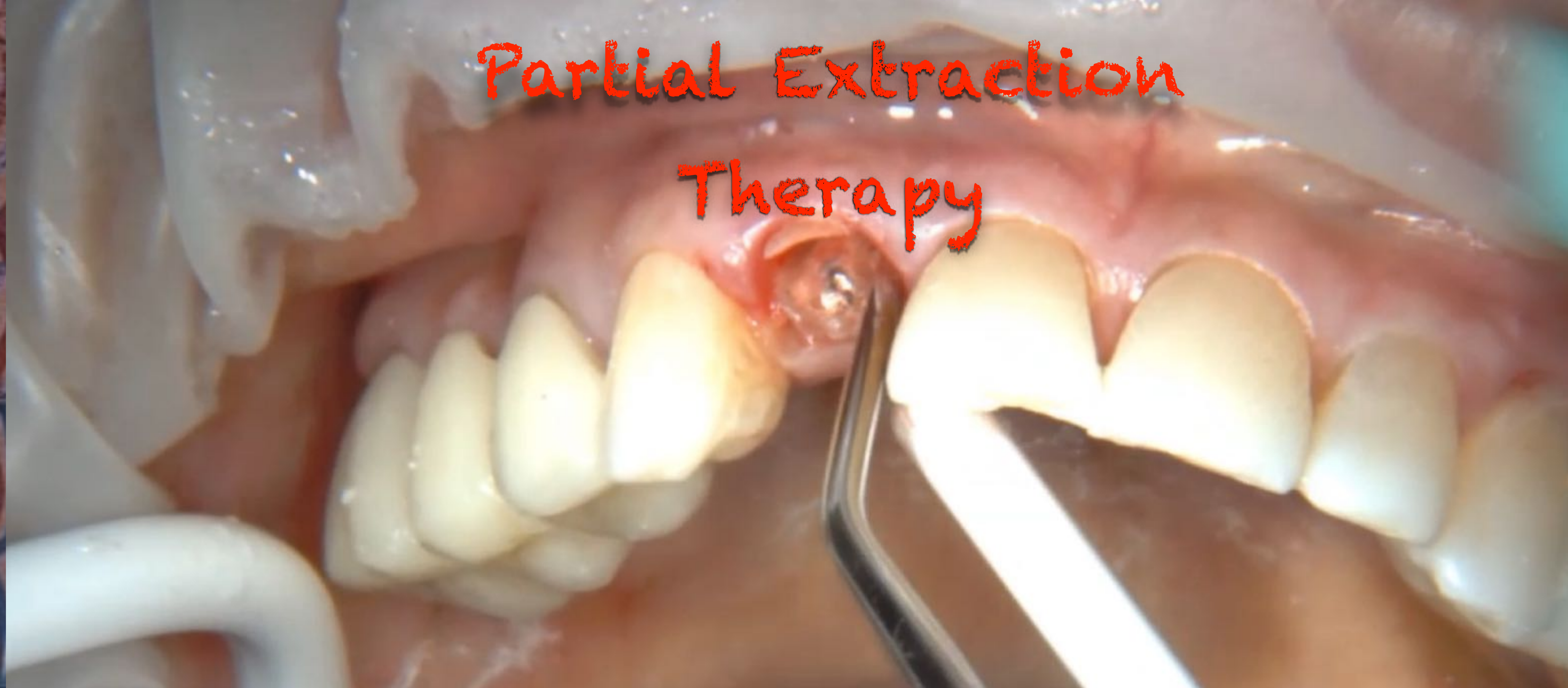
Failures

0

Complication

Swelling (1), Infection (0)

Partial Extraction Therapy



Advantages of the Root Submergence
Technique for Pontic Site Development
in Esthetic Implant Therapy



Maurice Salama, DMD*
Tomohiro Ishikawa, DDS**
Henry Salama, DMD***
Akiyoshi Funato, DDS****
David Garber, DMD*

- NO FUNCTIONAL BENEFIT AS THE AREA CAN ONLY BE UTILIZED AS A PONTIC
- PRESERVATION OF THE PERIODONTIUM
- HARD AND SOFT TISSUE 3 DIMENSIONAL STABILITY

**Salama et al. Int J Periodontics Restorative Dent.
2007 Dec;27(6):521-7**





The Root Membrane Technique: A Retrospective Clinical Study With Up to 10 Years of Follow-up

Konstantinos D. Siormpas, DDS,* Miltiades C. Mitsias, DDS, MSc, PhD,† Georgios A. Kotsakis, DDS, MEd,‡ Isaac Tawil, DDS, MSc,§ Michael A. Plikos, DDS,¶ and Francesco G. Mangano, DDS, PhD||

Osseointegrated implants represent the most popular therapeutic solution for replacing compromised and nonrestorable teeth.¹⁻³ A fixed implant-supported restoration must, however, be able to meet all the biological, functional, and aesthetic requirements, to be defined as truly successful.^{2,4} Until recently, the main focus of implant dentistry had been function and not aesthetics.^{5,6} Contemporaneously, however, implant rehabilitation is mainly focused toward aesthetic reconstruction of edentulism.^{3,6} A prerequisite for aesthetic success with a fixed implant-supported restoration is to maintain the bone anatomy, and the overlying soft-tissue architecture.^{7,8}

Extraction of 1 or more teeth causes alveolar bone resorption; this is a physiological phenomenon resulting from the fact that the periodontal ligament and its vascular support have been lost.^{9,10} The impairment of this vascular support has particularly marked consequences in the

Purpose: Immediate implant placement in conjunction with intentional root retention is a recently introduced technique, but the majority of existing documentation is limited to short-term reports with low level of evidence. Hence, the aim of this study was to document the long-term clinical and radiographic results of the root membrane technique.

Methods: This retrospective study reports on clinical results of the root membrane technique for periodontal ligament mediated immediate implant placement with up to 10 years of follow-up from 3 private dental practices. Anterior implants placed with immediate loading from January 2006 to December 2016 were assessed. Kaplan-Meier estimations were computed for reporting of implant success and survival.

Results: A sample of 182 patients (82 men and 100 women, age range: 18-83 years) received 750 immediate implants (230 maxilla, 20 mandible) after the root membrane concept and followed-up for a mean of 49.94 months (±32.5). Overall, 5 implant failures were recorded for a 10-year cumulative patient-level implant survival rate of 96.5%. Considering mechanical and biological complications, the 10-year cumulative implant success rate was 87.9%.

Conclusions: Within the limits of the retrospective design, the root membrane technique showed long-term success rates comparable to those of conventional immediate implants. (Implant Dent 2018;27:1-11) **Key Words:** immediate implants, bone resorption, bone preservation, survival, success

anterior maxilla, an area with high aesthetic impact, where the delicate and thin buccal bone receives most of its vascular contribution from the periodontal ligament.^{11,12} The consequence of this is resorption of the buccal bone wall, that is greater in the first months after the extraction of teeth,^{9,11,13} causing a contraction or recession of the overlying soft tissues and loss of the papilla, as the case of multiple elements.^{11,14}

Over the years, various surgical techniques have been developed to limit or counteract this physiological bone resorption following the extraction of 1 or more irreversibly compromised teeth in the anterior areas of the jaw.¹⁵⁻²⁰ Among these, alveolar ridge preservation with implant placement at the junction

Longitudinal Soft Tissue Changes During Periodontal Ligament-Mediated Immediate Implant Placement with the Root-Membrane Technique

Miltiades M. Mitsias, DDS, MS, PhD¹/Manuel Bratos, DDS, MS²/Konstantinos Siormpas, DDS²/Michael A. Plikos, DDS³/Root Membrane Group⁴/Georgios A. Kotsakis, DDS, MS⁵

Purpose: To assess longitudinal volumetric changes during immediate implant placement with simultaneous intentional retention of the buccal aspect of the root. **Materials and Methods:** This study assessed 20 cases drawn from a previously reported cohort that had study casts available preinsertion and at least 2 years after periodontal ligament (PDL)-mediated immediate implant placement. Gypsum casts were scanned using a laser scanner and converted into digital three-dimensional rendered files. The digital casts were superimposed, and semi-automated subtractive assessment was performed via specialized software. **Results:** Data from 10 patients with a minimum of 3 years follow-up (median follow-up time: 42 months) were analyzed. Each person contributed one implant site in this study. All implants successfully maintained osseointegration during the follow-up period and demonstrated optimal soft tissue stability. Changes during the observation period ranged from 0.19 mm (95% confidence interval [95% CI]: 0.10 to 0.28) in the labial region 5 mm apical to the mucosal zenith to -0.06 mm (95% CI: -0.14 to 0.02) at 5 mm apical to the base of the distal papilla. All changes were noninferior to pre-extraction baseline measurements based on a 0.5-mm noninferiority margin. **Conclusion:** The intentional retention of the buccal aspect of the root with its periodontal apparatus during immediate implant placement led to optimal soft tissue dimensional stability in the esthetic zone. This technique holds promise for clinical application, and further controlled clinical studies are warranted to determine the comparative clinical benefit from the use of this procedure. Int J Oral Maxillofac Implants 2020;35:XXX-XXX. doi: 10.11807/ijom.7245

Keywords: flapless procedure, immediate placement, PDL-mediated implant placement, surgical procedure

In recent years, the intentional retention of a section of the root has been proposed as a biologic approach to alveolar ridge preservation.¹⁻⁴ In contrast to the use

of biomaterials to limit postextraction alveolar ridge dimensional alterations in conventional ridge preservation procedures,⁴ the retention of a portion of the root facilitates ridge preservation via the retention of part of the periodontal ligament (ie, PDL-mediated ridge preservation).^{1,2} It has long been established that maintenance of the PDL and the vasculature that is part of it or channels through it to reach the alveolar bone is adequate to nourish the alveolar bone and maintain its dimensional stability following loss of the tooth crown.⁵ This knowledge has been exploited for pontic site stability in the case of intentional root submergence, but has been impractical for implant sites.⁶ That was until the proof-of-concept study by Hürzeler et al⁷ that introduced an innovative technique, ie, socket-shield, for combining intentional root submergence with implant placement. This seminal publication demonstrated the feasibility of this technique in an animal model and provided histologic data showing that maintenance of the PDL is achieved when a

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Correspondence to: Dr Georgios A. Kotsakis, Department of Periodontics, University of Texas Health at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX 78229, USA. Email: Kotsakis@uthscsa.edu

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Scott D. Gore, DMD



Isaac Tawil, DDS, MSc



Miltiades C. Mitsias, DDS, MSc, PhD

The Root Membrane Concept: In the Zone With the "Triangle of Bone"

Implant dentistry has continued to evolve with refined techniques for immediate or delayed loading, immediate extraction placement, bone grafting, guided surgery applications, and restorative options. However, the importance of the diagnostic process of dental implant reconstruction cannot be underestimated to achieve both functional and aesthetic outcomes. The advent of 3-D imaging modalities and interactive treatment planning software has provided clinicians with an enhanced set of tools for accurate assessment of each individual patient presentation, especially when implant reconstruction may be considered. When evaluating potential implant receptor sites, it is important to appreciate the volume of bone, the thickness of the cortical plate, bone density, bony topography, and the position of existing tooth roots within the alveolus. The difficulty continues in finding agreement as to where an implant should be placed within a potential receptor site.

The "Triangle of Bone" (TOB) concept was initially conceived in 1992 and first published in 1995 to help define a "zone" of available bone for implant placement—originally by using computed tomography (CT) scan imaging.⁸ The protocol has continued to evolve within subsequent publications with the advent of cone beam CT (CBCT) and the development of various treatment planning software applications with advanced diagnostic functionality. The goals always to place the implant in a restoratively driven position while preserving or augmenting the preexisting bone.

When teeth are still present, the relationship between the trajectory of the alveolus and the position of the root is critical when assessing an implant placement. The cross-sectional slice is one of the many views that are essential for the diagnostic phase utilizing the TOB concept (Figure 1). The trajectory of the alveolus as it relates to the tooth root can be assessed with the existing bone volume or potential zone within the TOB for implant placement (Figure 1b). If it is desired to surround the implant with the most volume of bone, the implant is positioned to intersect the TOB (Figure 2a, cyan lines), necessitating a cement-retained restorative protocol. The apical position of the implant should be directed buccally within the TOB for a screw-retained restoration (Figure 2b). Therefore, it is possible to predict aspects of the prosthetic phase using the TOB concept.

It is well known that tooth extraction alone or when followed by immediate implant placement, can lead to crestal alveolar bone and soft tissue loss. The buccal plate is extremely thin and may be easily compromised after tooth extraction, leading to aesthetic issues. Innovative concepts continue to evolve in an attempt to meet the demands of maintaining both the



Figure 1. (a) The cross-sectional view revealing the alveolar bone and (b) the trajectory of the tooth root within the alveolus to be assessed as a "zone" within the "Triangle of Bone" (TOB) for implant placement.

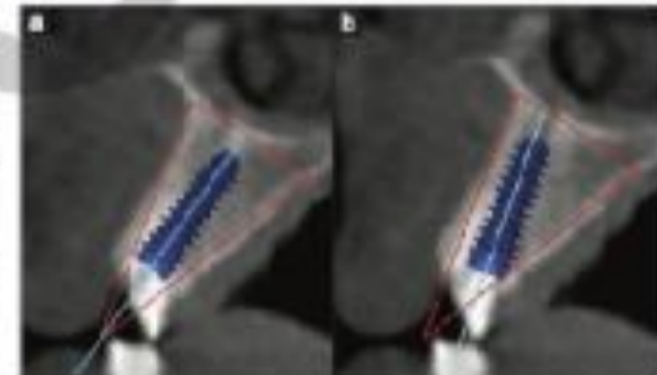


Figure 2. It is possible to predict aspects of the prosthetic phase (cyan lines) using the TOB concept for (a) the cement-retained restorative protocol or (b) a screw-retained restoration in which the apical position of the implant is directed buccally.

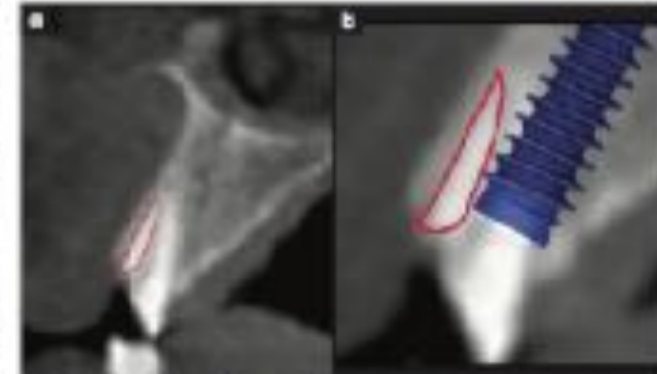


Figure 3. (a) The root fragment that will remain is located in the cross-sectional or sagittal slice (red outline), and (b) the enlarged image reveals the proximity of the simulated implant threads to the root.

Root Membrane

Human Histologic Evidence of New Bone Formation and Osseointegration Between Root Dentin (Unplanned Socket-Shield) and Dental Implant: Case Report

Charles Schwimer, DMD, BS¹/Gregory A. Pette, DMD, MS²/Howard Gluckman, EDS, MChD (OMP)³/Maurice Salama, DMD⁴/Jonathan Du Toit, BChD, MSc(Dent)⁵

The socket-shield technique described 7 years ago has since grown in its reporting in the literature as a valid method of ridge preservation at immediate implant placement. To date, large clinical cohorts with up-to-4-year follow-up have been reported. Additionally, evidence of tissue histology at the dental implant and socket-shield has been demonstrated in the animal model. However, human histologic evidence has not yet been available, and the clinician's uncertainty regarding the tissues that may form between the socket-shield and dental implant may remain unanswered until now. This case report presents the first human histologic evidence that bone may entirely fill the space between root dentin and an osseointegrated implant surface. *Int J Oral Maxillofac Implants* 2018;33:e19–e23. doi: 10.11607/jomi.6215

Keywords: dental implant, implantology, partial extraction therapies, ridge preservation, socket-shield

Literature reporting on the retention of the tooth root or part of the tooth root to maintain alveolar ridge volume and offset postextraction collapse has been growing in recent years.¹ The socket-shield technique has been proposed as such a method, sectioning the facial root portion for it to remain submerged in situ with its physiologic attachment to bundle bone intact.² The hypothesis asserts that this root portion, when retained, circumvents the destruction of Sharpey's fibers inserted into bundle bone and "shields" the facial alveolar ridge from collapsing adjacent to the implant.^{2,3} The literature to support this theory is growing.^{1–14} As yet, the technique requires additional data to advocate in everyday practice, especially data ranking higher in the hierarchy of scientific evidence.

Hürzeler and coworkers² as well as Bäumer and coworkers³ have provided valuable histologic evidence of the healed socket-shield and implant sectioned from the alveolar ridge. Yet, these have been presented in the canine model. The clinician may still be uncertain as to what tissue grows between the socket-shield and dental implant in a human. Is it periodontal ligament, new cementum, or partial or full periodontal regeneration? Will the identification of this tissue architecture affect the decision-making when selecting the socket-shield technique to offset resorptive complications at immediate implant placement? The objective of this case report was to present the first human histologic evidence that demonstrates the healing possibility of new bone and osseointegration between root dentin and dental implant.

CASE REPORT

A woman aged 45 years presented to the offices of her periodontist for a routine check-up, and provided a history that included among others discomfort and vague sensation associated with her implant crown at the left maxillary first premolar site. The patient's medical history was noncontributory. The dental history entailed loss of the premolar tooth 2 years prior and an immediate implant being placed. A period of submerged healing followed, with subsequent implant exposure and definitive restoration with a cement-retained crown. Intraoral examination noted no overt inflammation, peri-implant mucositis, or tissue

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Research Article

The Root Membrane Technique: Human Histologic Evidence after Five Years of Function

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Background. The "root membrane" (RM) is a technique that has become popular among implantologists for placement of immediate implants in the anterior maxilla. **Purpose.** To present histologic evidence of an immediate implant placed in the human anterior maxilla, according to the RM technique, and retrieved after five years. **Methods.** A fixture, along with the surrounding tissues, was retrieved from the anterior maxilla of a 68-year-old patient, who had been treated five years earlier with immediate implant placement and RM technique. The specimen was processed for histologic/histomorphometric evaluation. **Results.** The buccal bone plate was maintained without any resorption; a healthy periodontal ligament was evidenced. The implant showed osseointegration, with a high percentage of bone-to-implant contact (BIC = 76.2%). With regard to the space between the RM and the implant, the apical and medial thirds were filled with compact, mature bone; the coronal third was colonized by noninfiltrated connective tissue. **Conclusions.** The RM technique appears to be effective in preventing bone resorption of the buccal bone plate of the human anterior maxilla, five years after the placement of an immediate implant.

1. Introduction

To date, the rehabilitation of the anterior maxilla with post-extractive single implants represents a successful treatment procedure characterized by high survival rates, as evidenced by several short- [1, 2] and long-term [3, 4] clinical studies.

However, this surgical procedure remains complex for the surgeon because it can be difficult to obtain a prosthetic restoration that mimics the emergency profile and the appearance of the natural, contralateral tooth, in perfect symmetry with it [2–4].

In order to achieve a complete aesthetic result, the rehabilitation of the anterior maxilla is distinguishable from the natural contralateral tooth. The goal is to preserve and maintain the architectural features of the natural teeth [5, 6].

Unfortunately, as has been known, tooth extraction triggers a physiological resorption process: in fact, tooth loss leads to the destruction of the periodontal ligament and the vascularization of the bone [7–9]. Since these vessels help to maintain the bone, especially in the anterior maxilla,





 HOWIE GLUCKMAN




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 EHAB MOUSSA



 ALI TUNKIWALA



 ATTILA BODROGI

Navigation System in Socket Shield

Case Letter

A Novel Application of Dynamic Navigation System in Socket Shield Technique

Joey T. Chen, DDS

Introduction

Advancing osteotomies after dental implant placement has been proven to be a predictable process, and implant restorations can maintain adequate function for many years.^{1,2} Obtaining optimal long-term esthetic results in implant therapy, however, remains a challenging task. One of the main reasons for this difficulty is avascular bone resorption after tooth extraction, which leads to significant reduction in the horizontal and vertical dimensions of the hard and soft tissues.^{3,4}

The socket shield technique has been developed to decrease the tissue resorption process.^{5,6} By retaining the buccal and/or the lingual portions of the root to be extracted, the periodontal ligament and surrounding bone can be maintained. This leads to the preservation of soft tissue contour, hence a natural appearing socket shell can be achieved.

The socket shield technique, however, is technique-sensitive. Preparing the radiolucid to the correct shape, thickness, and length without damaging the remaining tissues can be challenging because the socket has limited visibility and access, and the root anatomy varies. It is difficult to visualize the root during preparation and know exactly how much structure to reduce or remove.

The image-guided dynamic navigation system was developed to have real-time visualization of anatomical structures such as bone and teeth, as well as drill tips during implant surgery procedures. This type of system has advantages in placing implants in a pre-planned, precisely drilled sockets, avoiding crucial anatomical structures such as the inferior alveolar nerve and maxillary sinus. Since the system provides real-time feedback, any malpositioning or false alignment of the drills can be immediately corrected.

The present report describes a novel method in applying the image-guided dynamic navigation system in the socket shield preparation and immediate invasive placement.

Case Report

Part 1—The dynamic navigation workflow

A 23-year-old female with noncontributory medical history presented with a non-restorable maxillary left first premolar

due to severe caries. Clinical photographs and a cone-beam computerized tomography (CBCT) scan were taken (Figs 1 and 2), and a preliminary impression was made with polyvinyl silicate matrix. A diagnostic wax-up of tooth #12 was made on the preliminary study cast from the impression. The study cast was then scanned and transferred into standard registration language (STL, file), both the DICOM dataset (DIC) scan, and the STL file were imported into the Navient software (Navient, 8331, Clonville, Inc, Toronto, Canada) for case analysis and treatment planning. The two files were merged and mapped together as the following to obtain an accurate image of the bone, teeth, roots, and soft tissue.

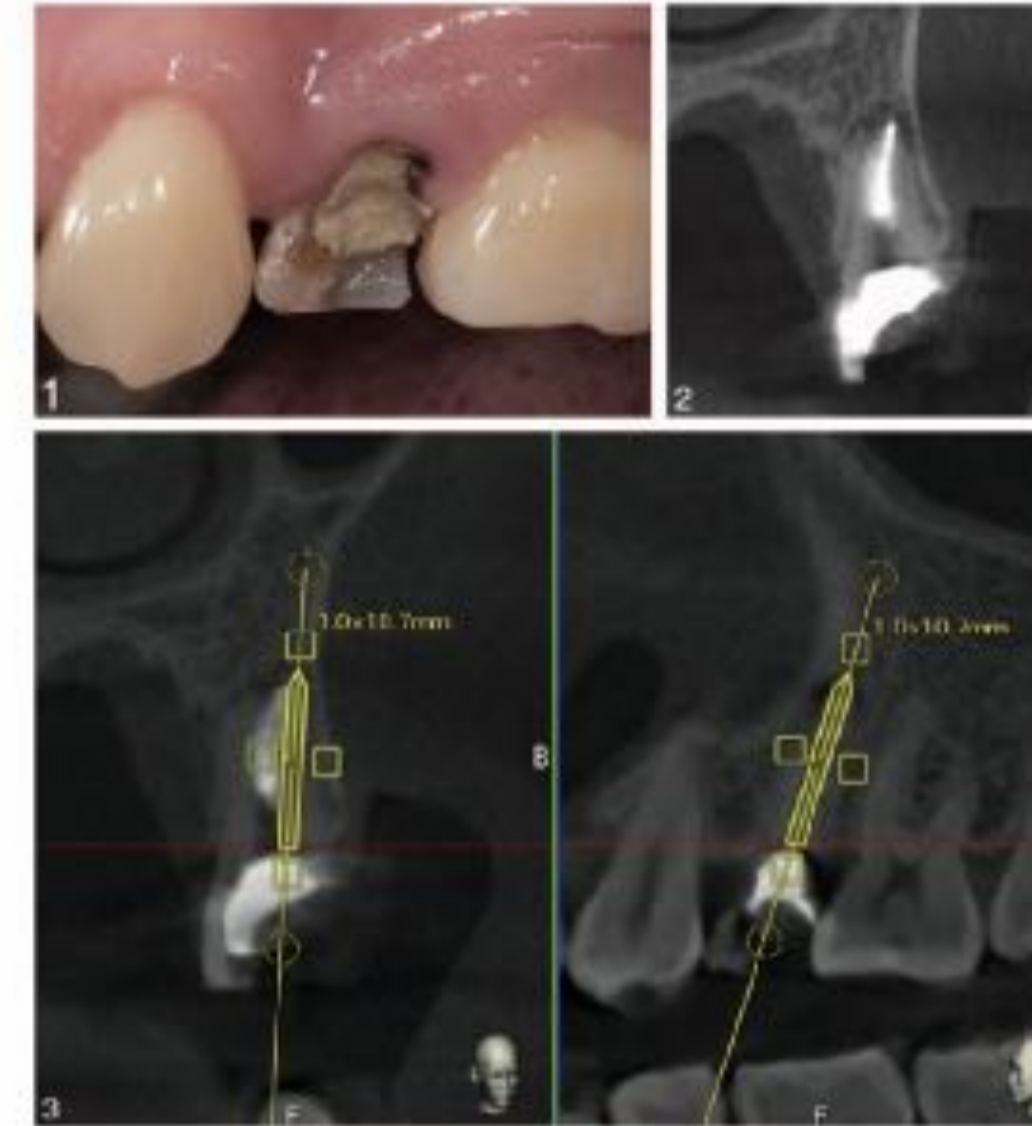
On the Navient software, a 1-mm diameter osteotomy was planned from the buccal border of the root canal chamber to the root apex with a slight tilt towards the buccal side (Fig 3). The osteotomy was planned buccal to the root apex and passed the gingival margin area. This osteotomy would indicate the apico-coronal direction of the root apex and any principal perforation.

To accurately guide the drilling process, the navigation system must map the drill tip to a CT scan image of the jaw. This was done in three steps: registration, calibration, and tracking. Registration was the process of mapping the CBCT image to the patient's physical jaw structures. First, on the preliminary study cast, the wax-up of the jaw tracker, which was a rig used for real-time tracking of the patient's jaw, was bent and fitted onto the occlusal surfaces of the maxillary right premolar and molars. Then the Jaw Tracker was attached to the maxillary right premolar and molar with flexible composite (see Fig 4). The system's tracking camera (JawTrac, Clonville Inc) tracked the Jaw Tracker in the physical 3D space, thereby allowing for a continuous tracking of the patient's maxillary anatomical structures.

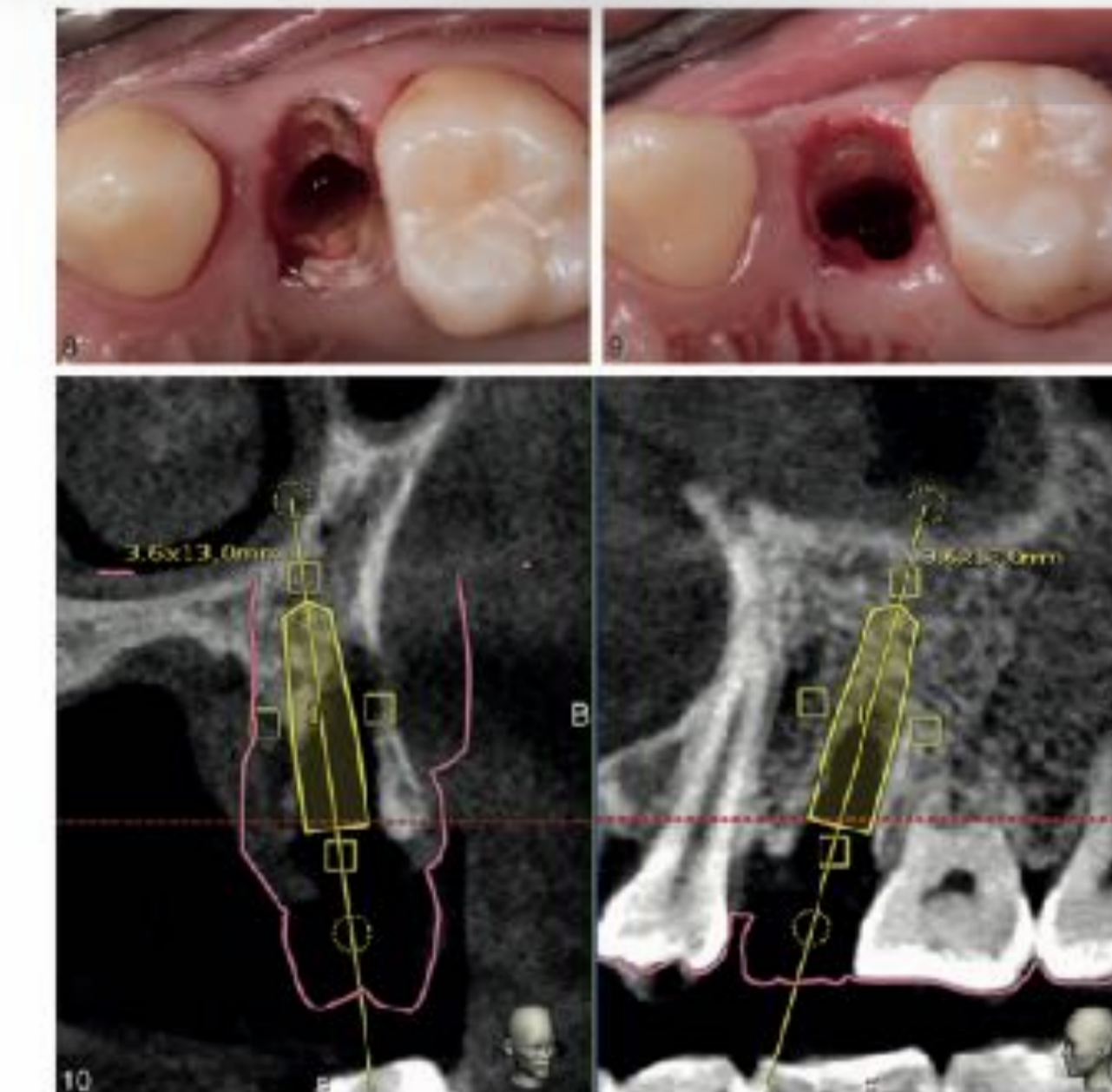
Next is the track registration procedure. The Tracer Tool with a TracerTag attached was calibrated on the Calibrator (Fig 5a and b). The tracking camera tracked both parts: the Calibrator and the TracerTag, so when the Tracer Tool was placed in the device of the Calibrator, the computer calculates the Tracer Tool's tip in relation to the TracerTag. Then the Tracer Tool was used to trace the surfaces of four pre-selected teeth around the maxillary arch. As the Tracer Tool's ball tip slid over the tooth surfaces, the system continuously sampled its position in space, creating a virtual "cloud of points" or a 3D mesh, in relation to the Jaw Tracker attached to the patient's jaw (Fig 6). The virtual 3D mesh was then restored by the software to the outer surface of the traced teeth in the CT

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Dynamic navigation in Socket Shield technique



Figures 1-4. Figure 1, Tooth #12 was nonrestorable due to severe caries. Figure 2, Pre-operative cone-beam computerized tomography scan image of tooth #12 indicating presence of buccal bone and adequate volume of apical bone. Figure 3, Planning of the initial osteotomy for socket shield preparation on the Navient software. The osteotomy was placed in a buccally inclined position. Figure 4, The JawTag was attached to the patient's maxillary right anterior teeth with flowable composite.



Figures 5-10. Figure 5, The initial osteotomy was prepared according to the planned position, and a mesiodistal cut was performed to separate the buccal and lingual portions of the root. Figure 6, A C-shaped socket shield was prepared, and the coronal portion of the shield was reduced to the level of the buccal bone crest. Figure 10, A 3.6x13-mm implant was planned on the Navient software for a screw-retained restoration.

- Avoidance of potential inaccuracy caused by removing and seating the steel during CBCT scanning and surgical procedures.
- An additional CBCT scan with fiducial markers is not needed, or patient's exposure to radiation is reduced.
- A small field-of-view CBCT scan can be used.

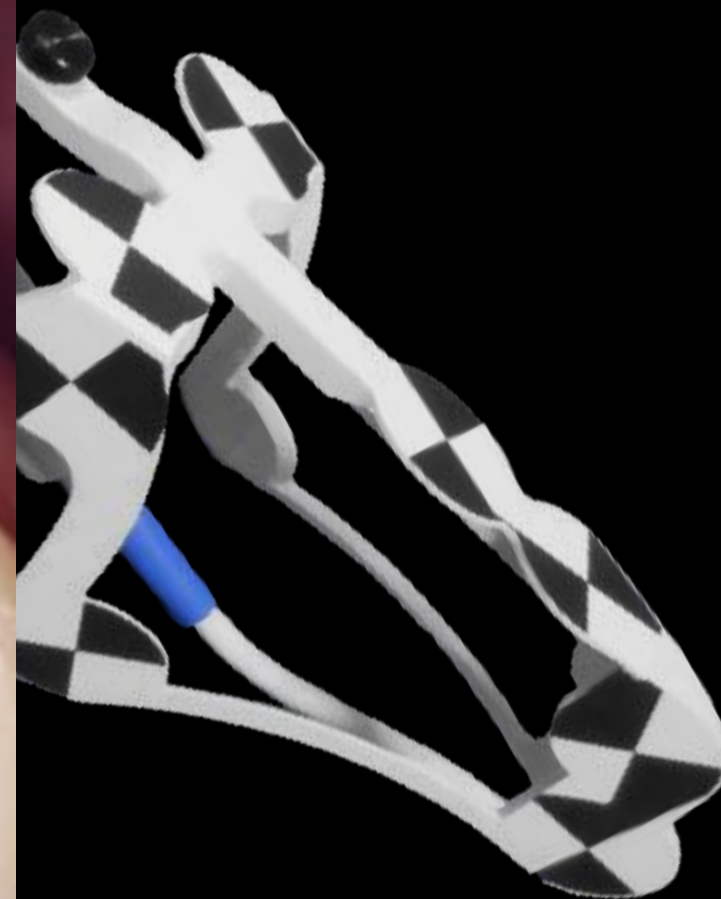
Stefanel et al studied the positional and angulation accuracy using the same dynamic navigation system (Navient, Clonville Inc, Toronto, Canada) as that of the present study.¹¹ The discrepancies between the actual and planned implant positions were 0.71 (0.46) mm at the entry point and 1.05 (0.49) mm at the apex. The mean angular discrepancy was 2.24 degrees (1.52). Studies using different navigation systems also showed similar positional and angular accuracies.¹²⁻¹⁸ These studies indicated that the dynamic navigation system had comparable accuracy to the static, computer-generated surgical



Joey Chen, DDS

Dynamic Virtual Template

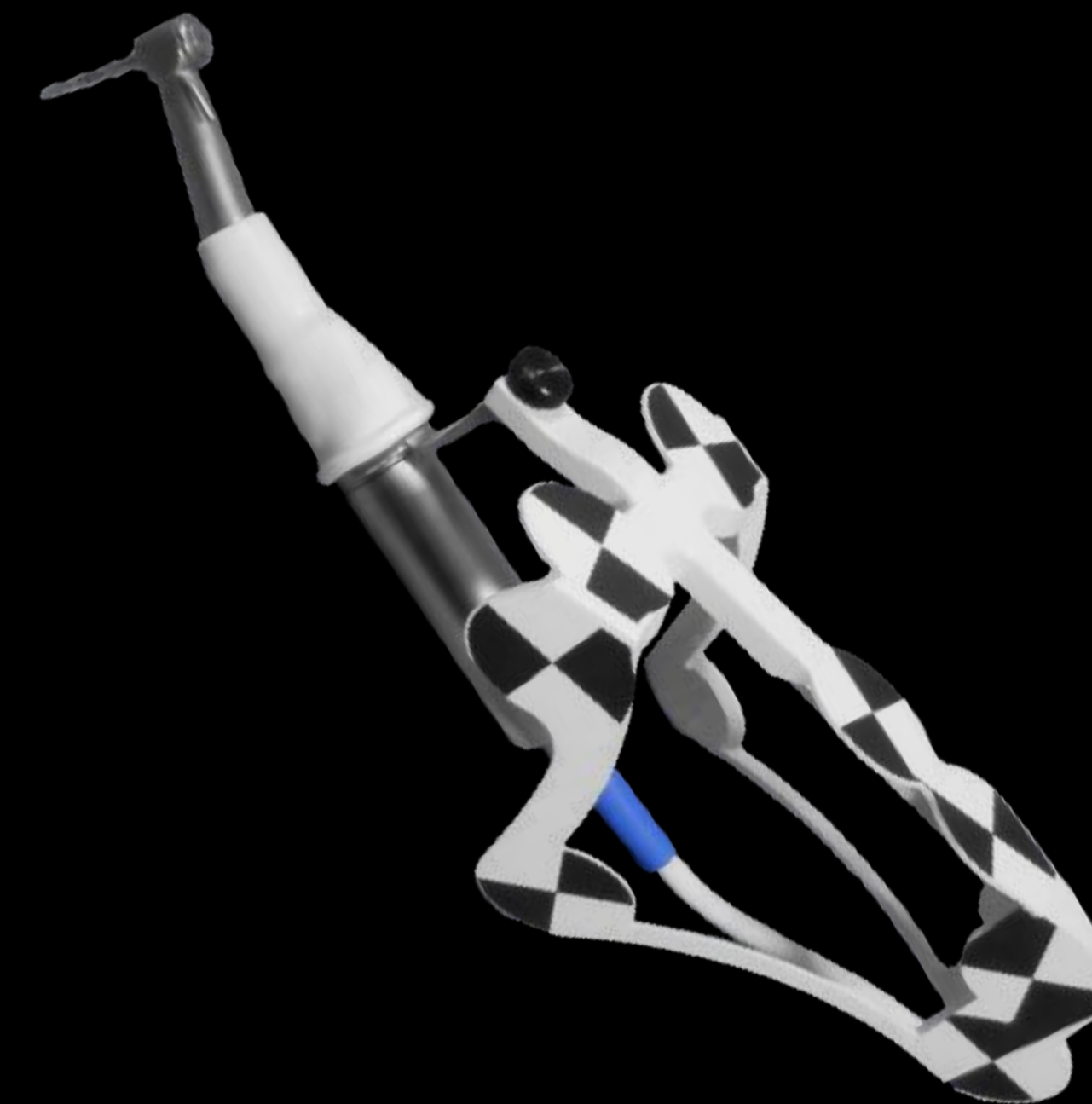
- Full template-Guidance



**Dynamic
Virtual
Template**

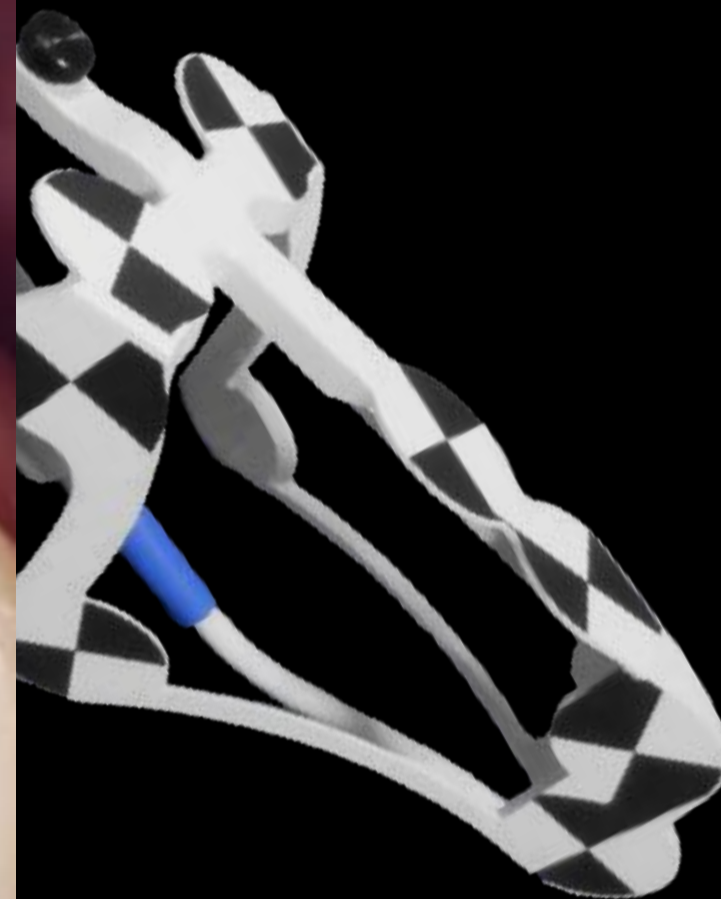
Root Membrane Kit

• **Full template-Guidance**



Dynamic Virtual Template

- Full template-Guidance



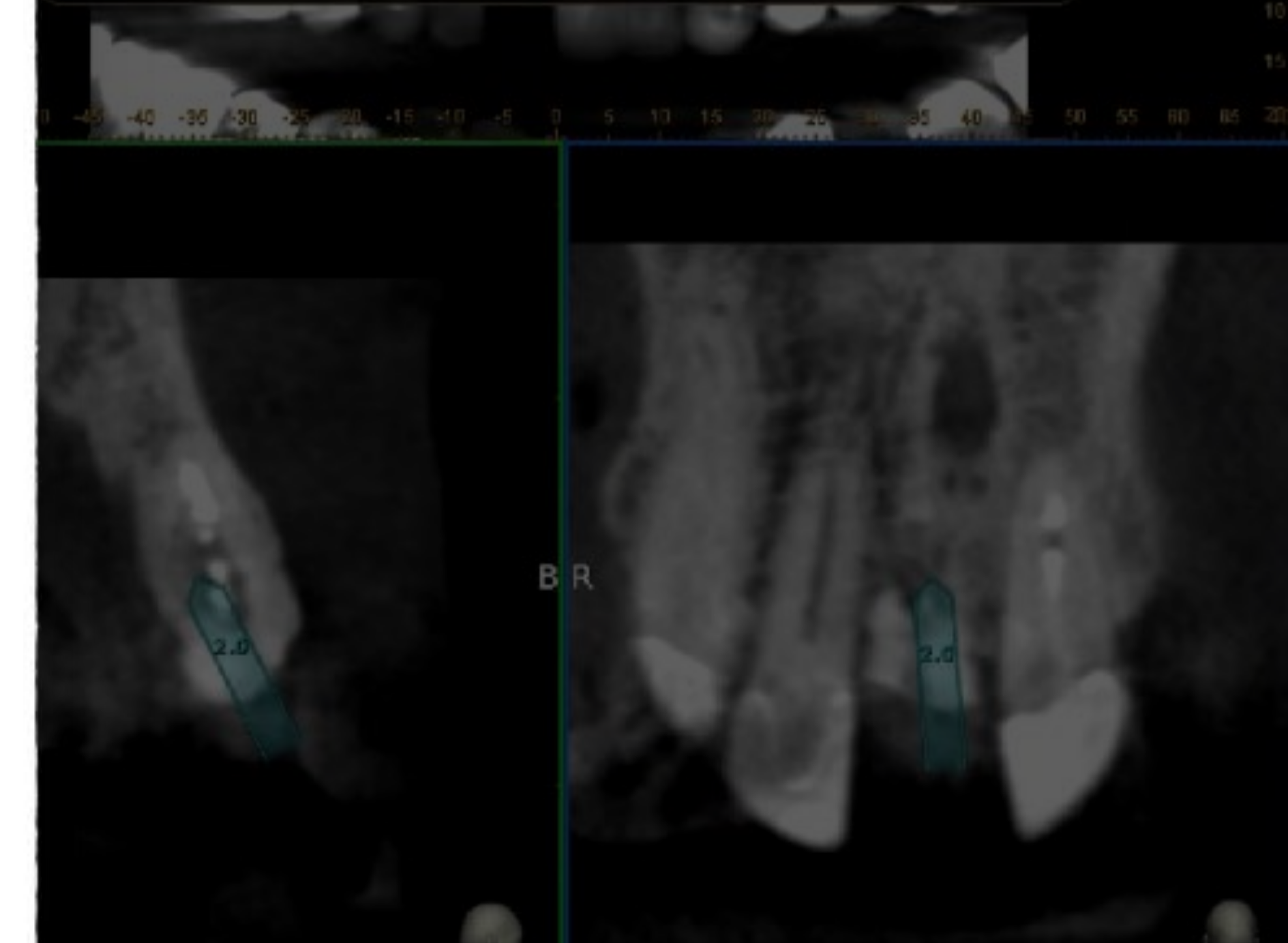
Digital Dynamic
Shield



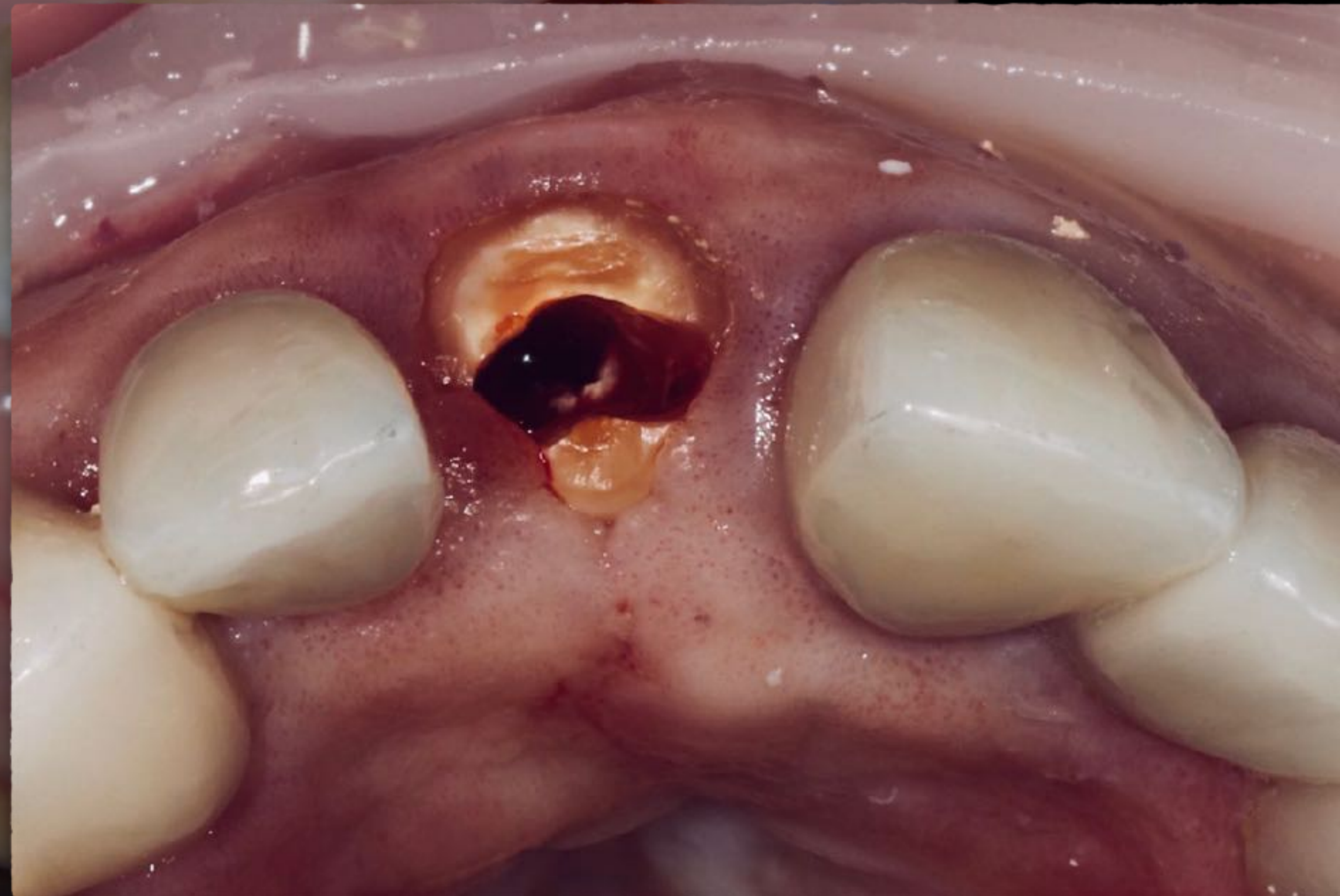
Partial Extraction Therapy

NEW DRILL? CALIBRATE TIP!

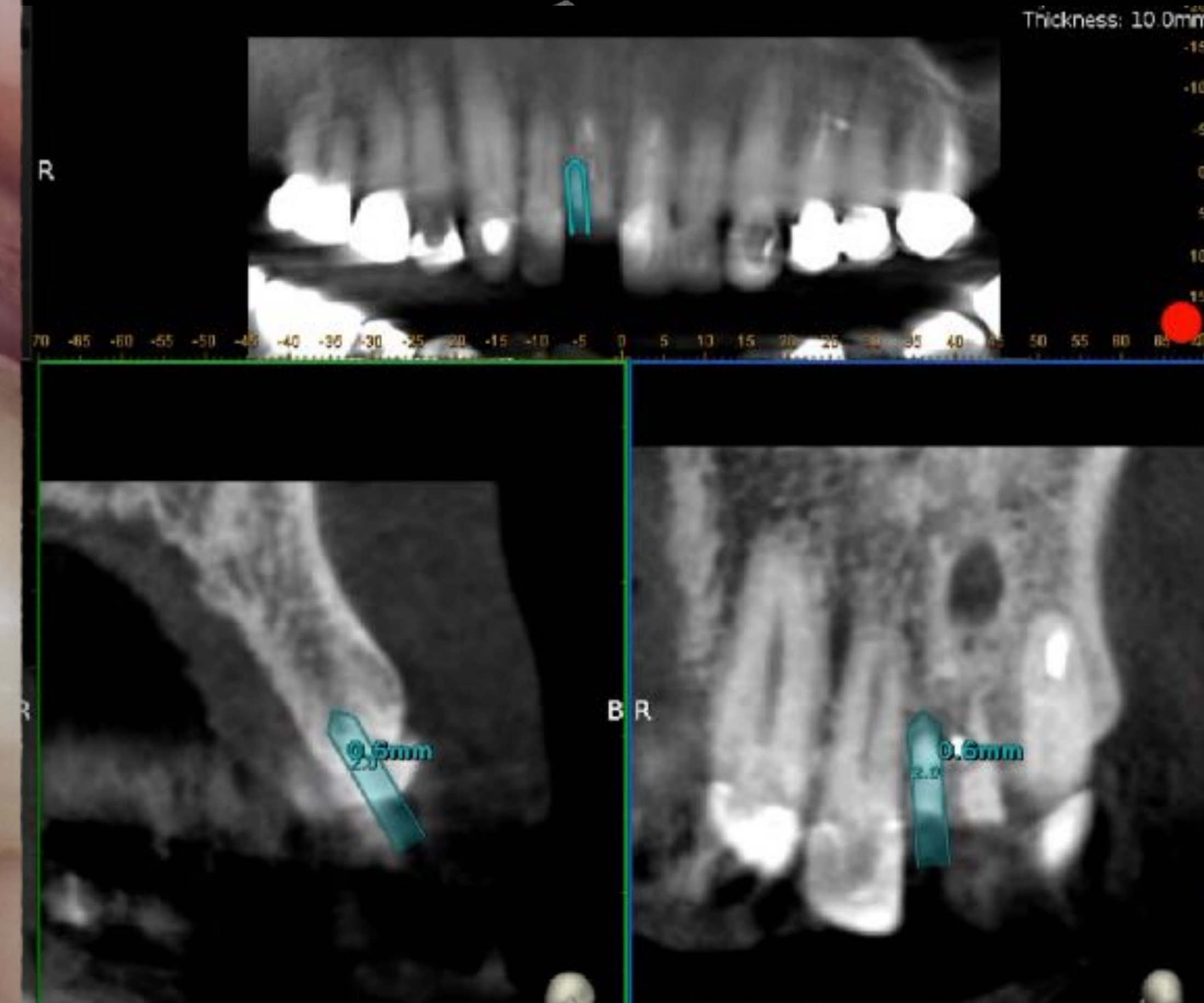
Verify accuracy by touching
crowns proximal to the
implantation site



Digital Dynamic
Shield



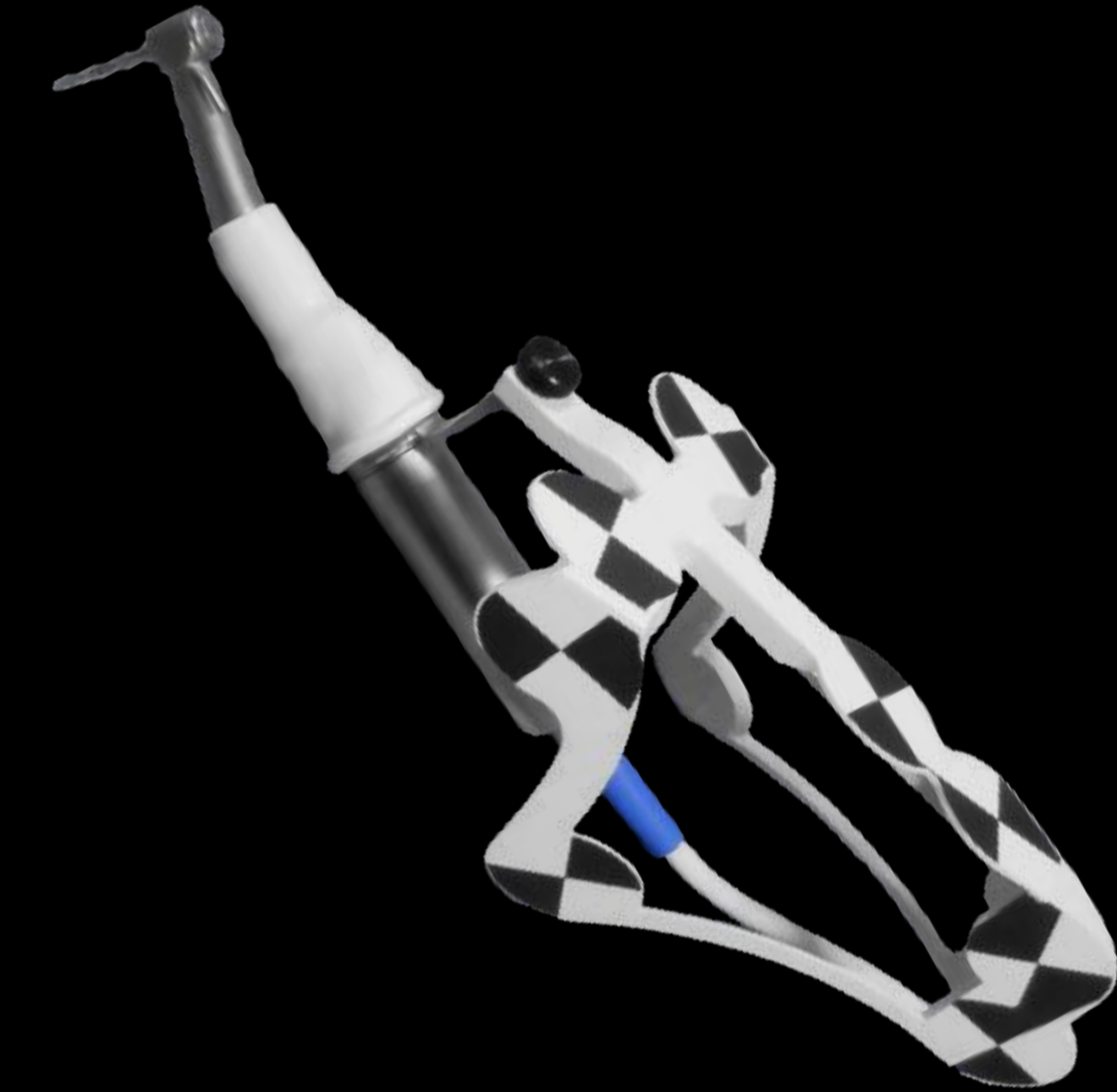
Partial Extraction Therapy



Digital Dynamic Shield



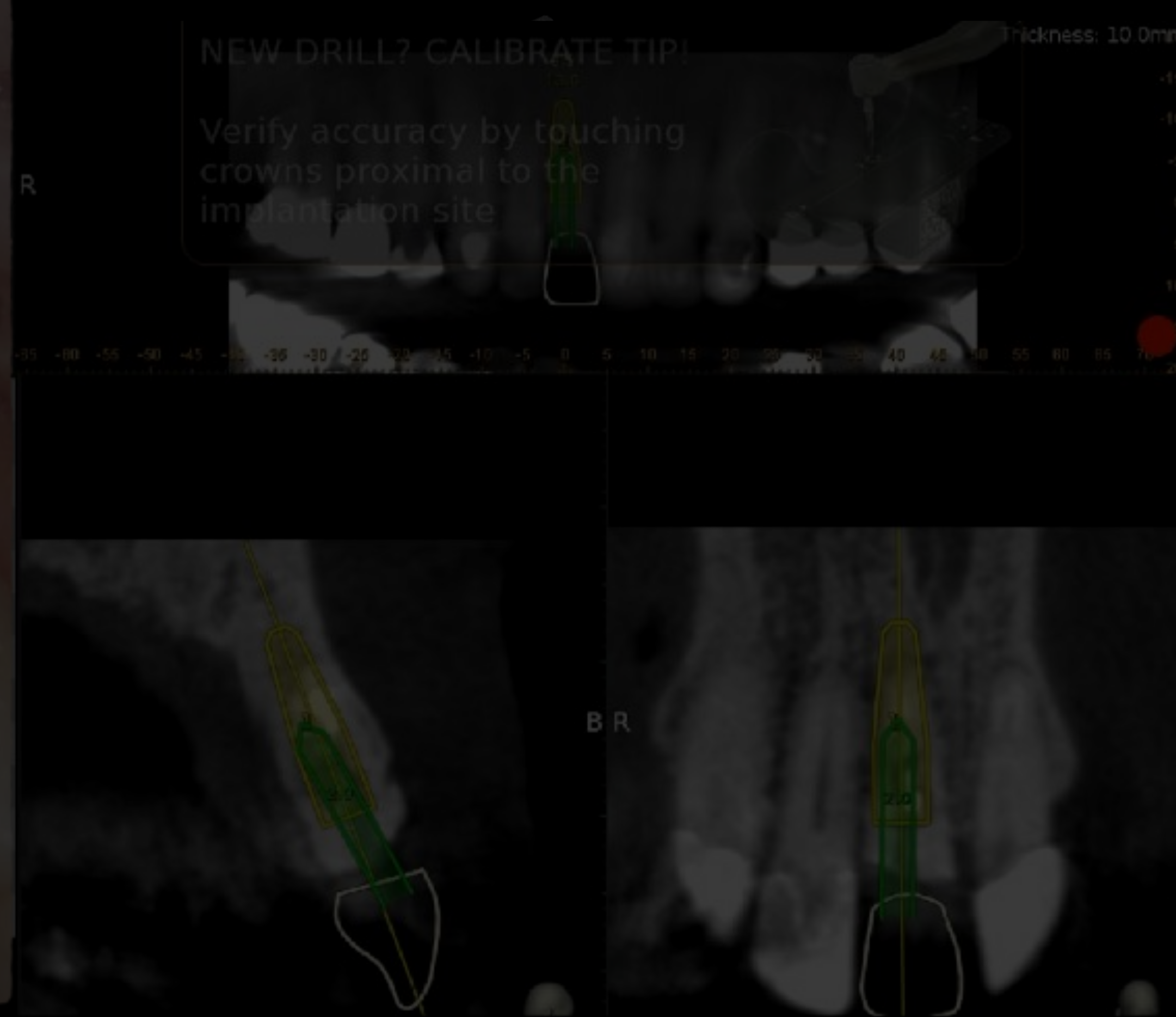
Partial Extraction Therapy



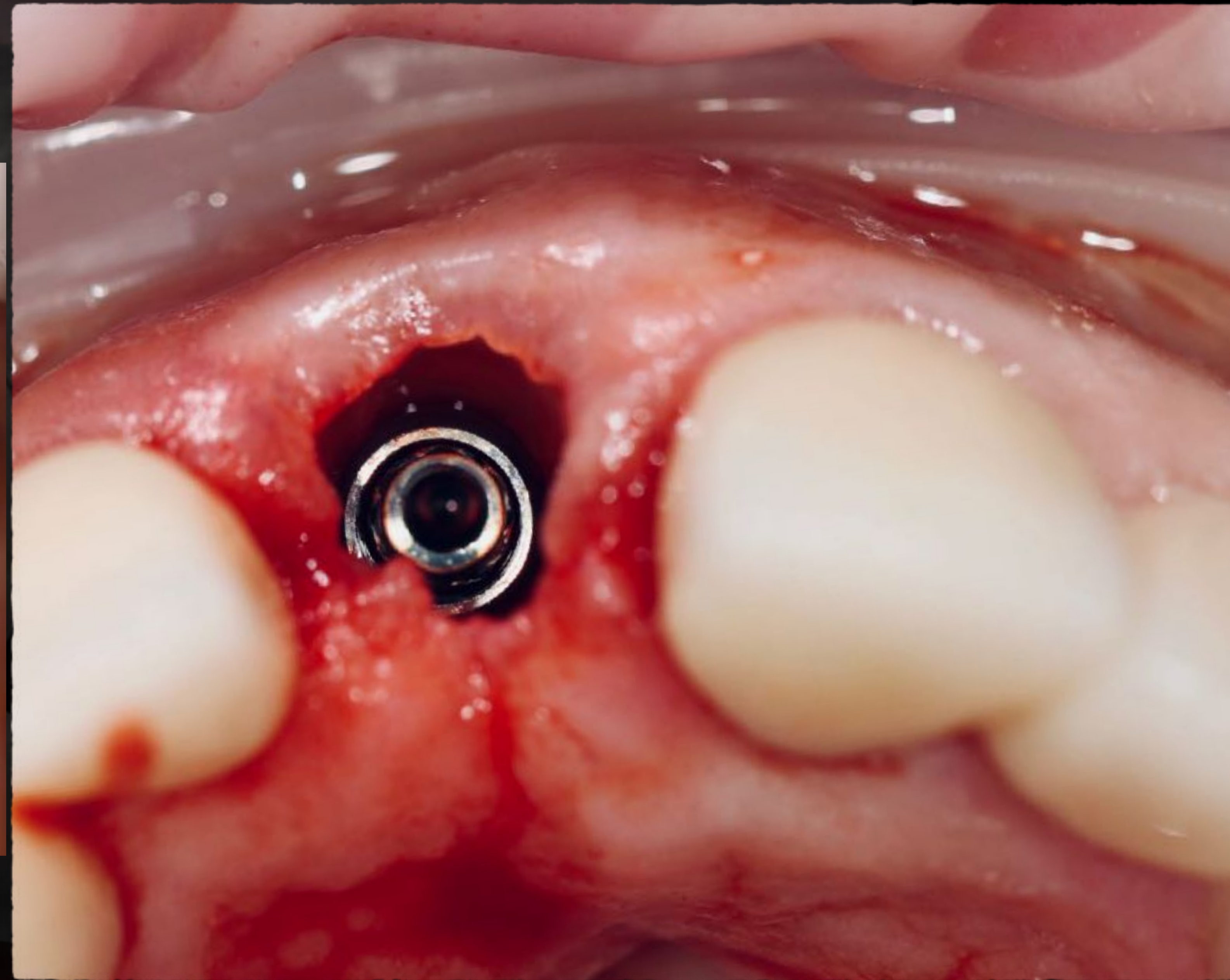
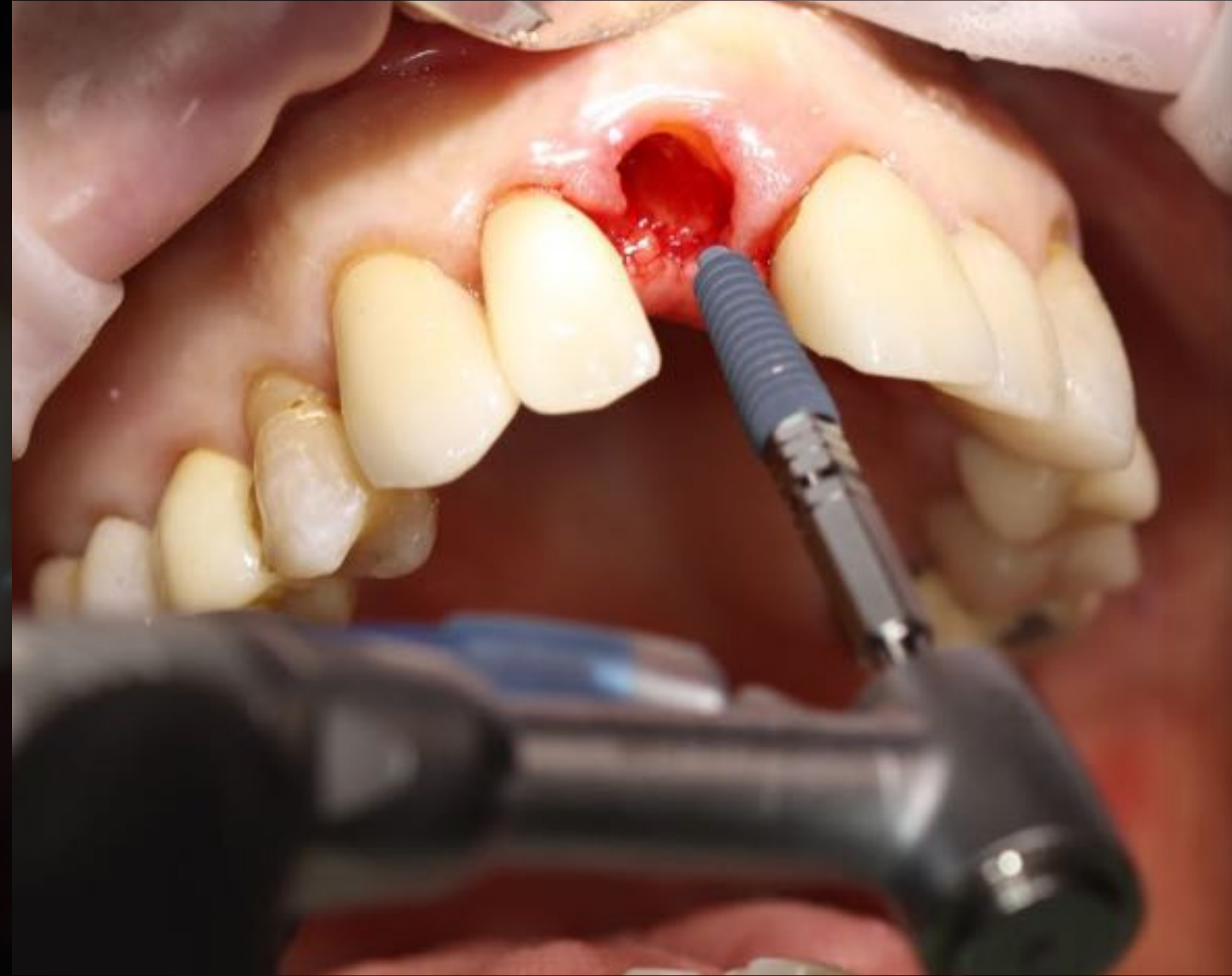
Digital Dynamic Shield



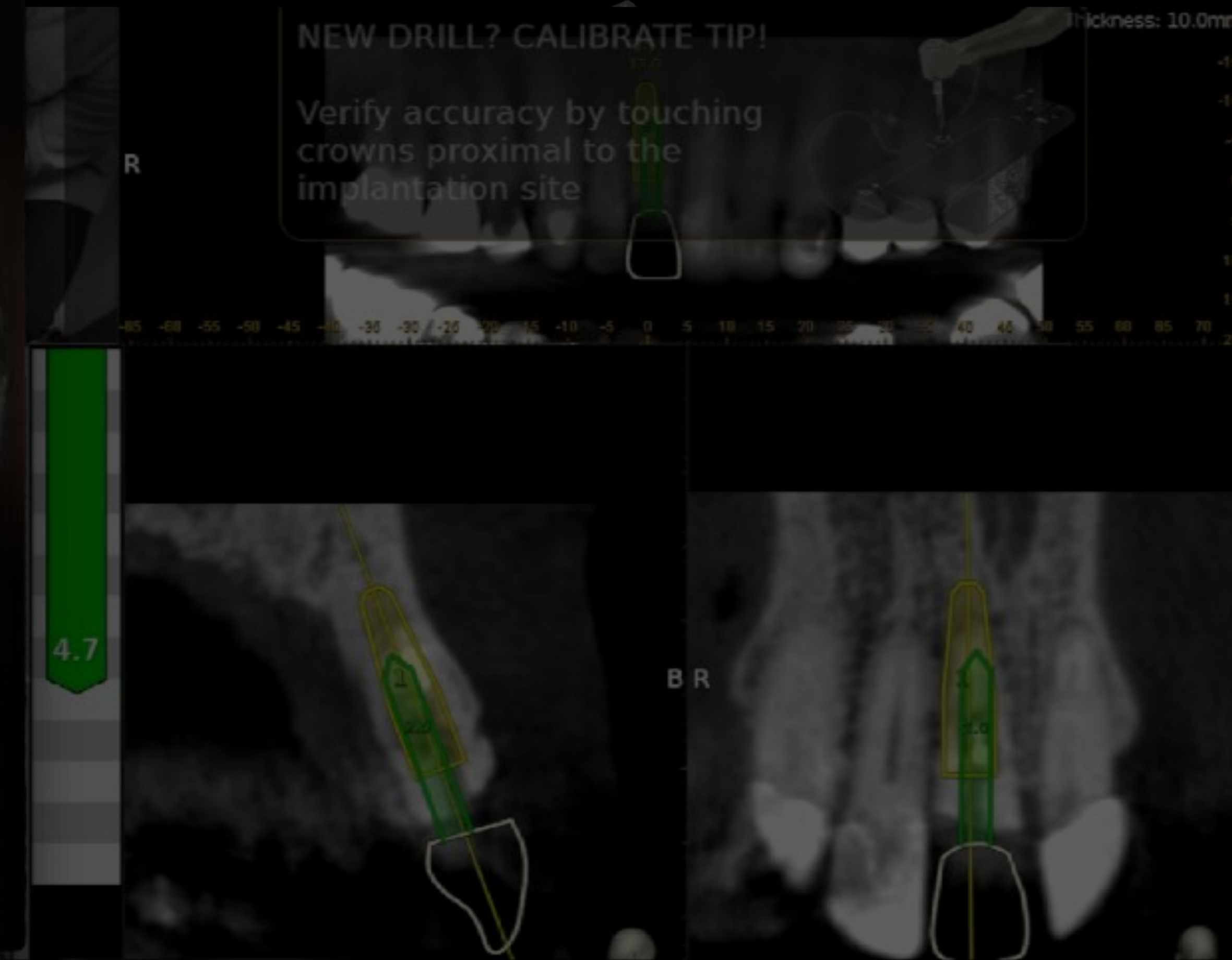
Partial Extraction Therapy



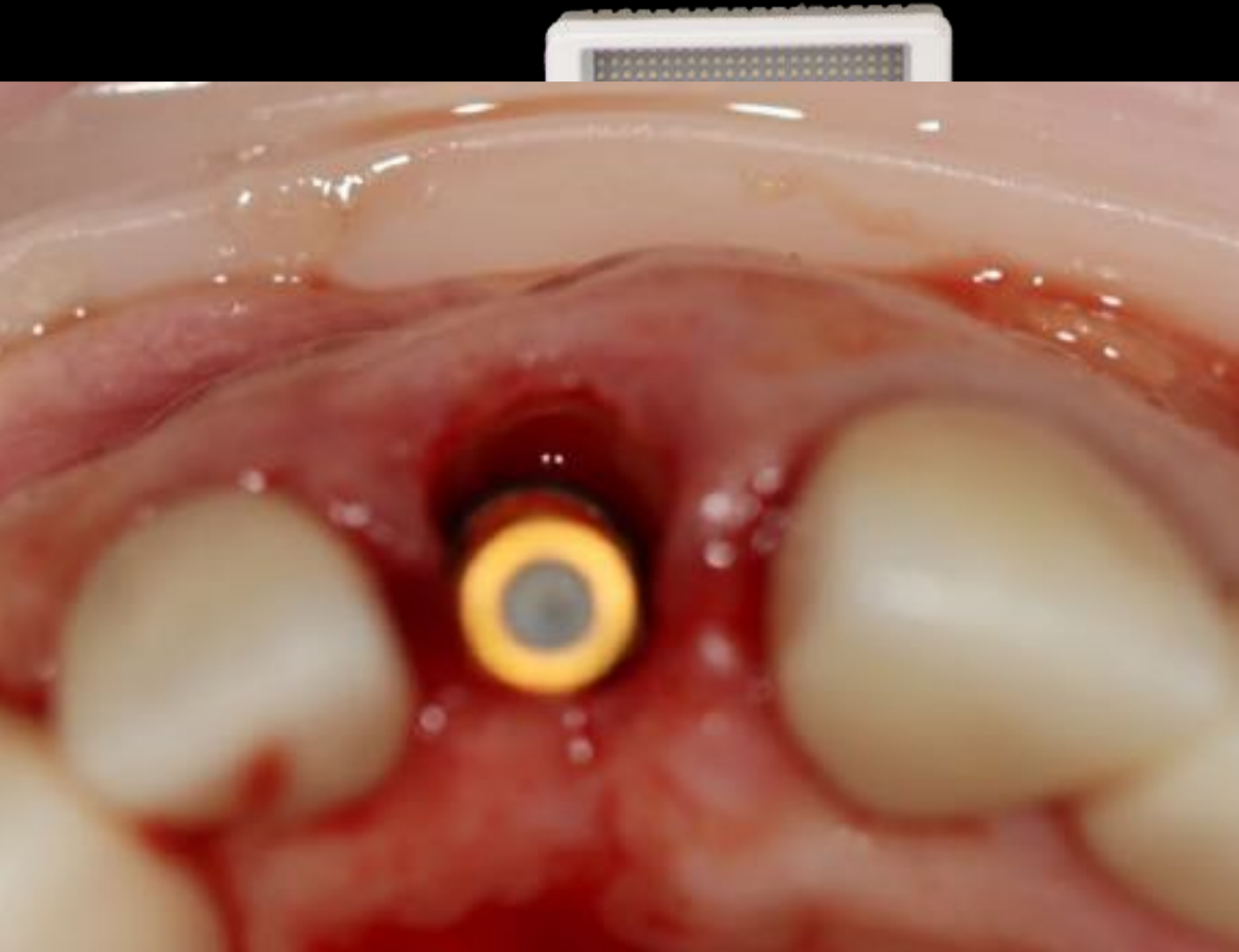
Digital Dynamic
Shield



Partial Extraction Therapy



**Digital Dynamic
Shield**



**Partial Extraction
Therapy**

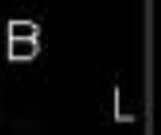
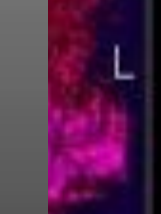
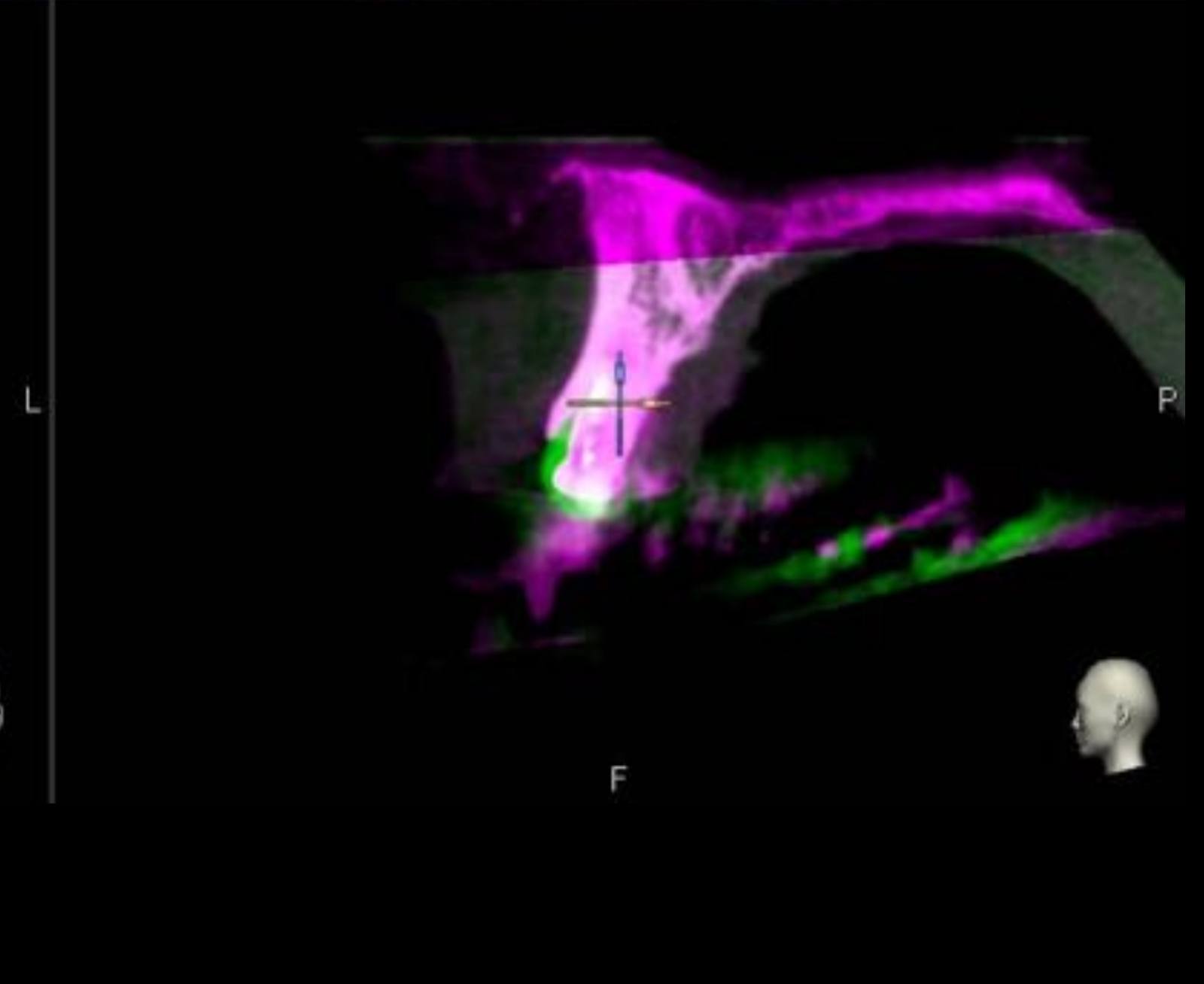
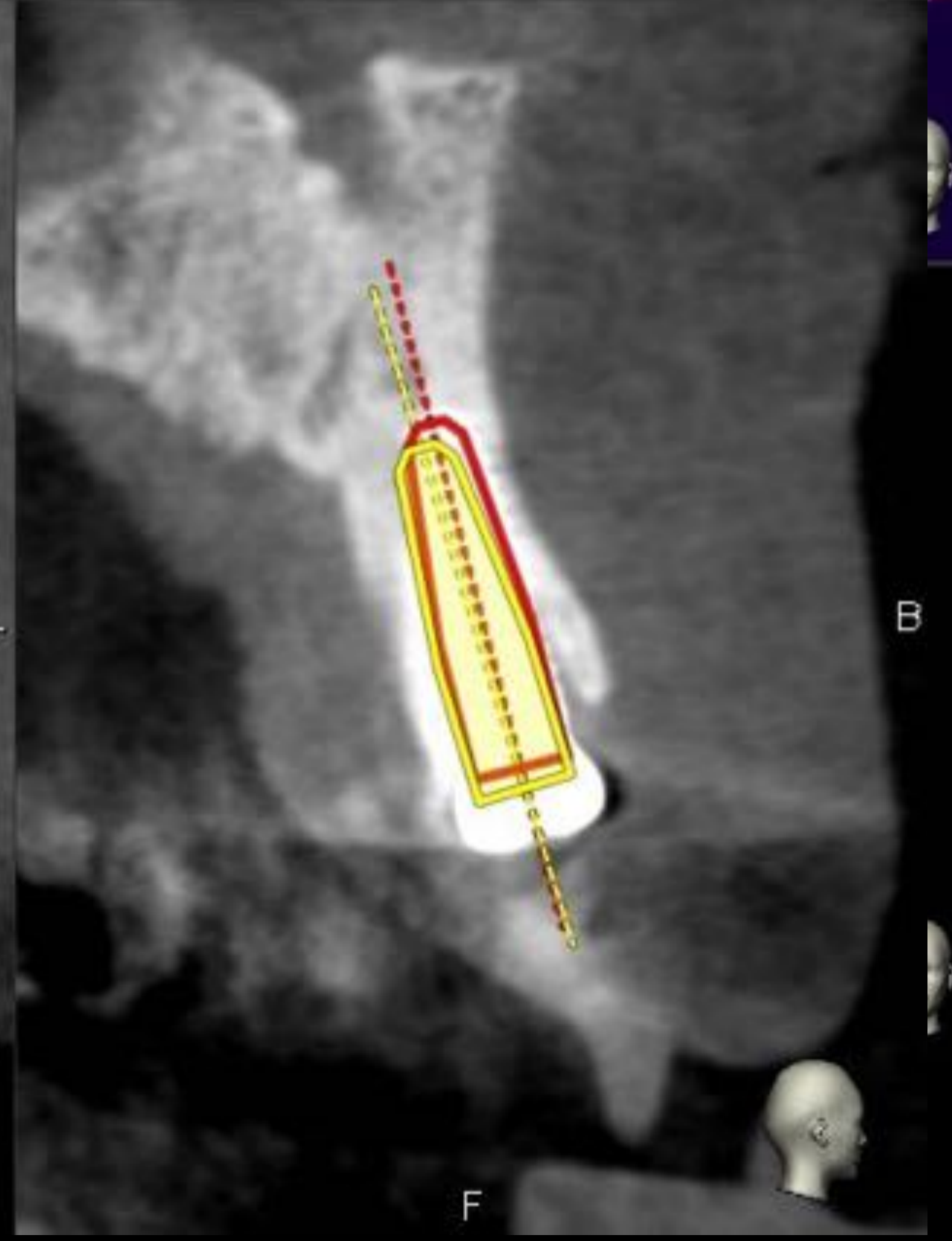
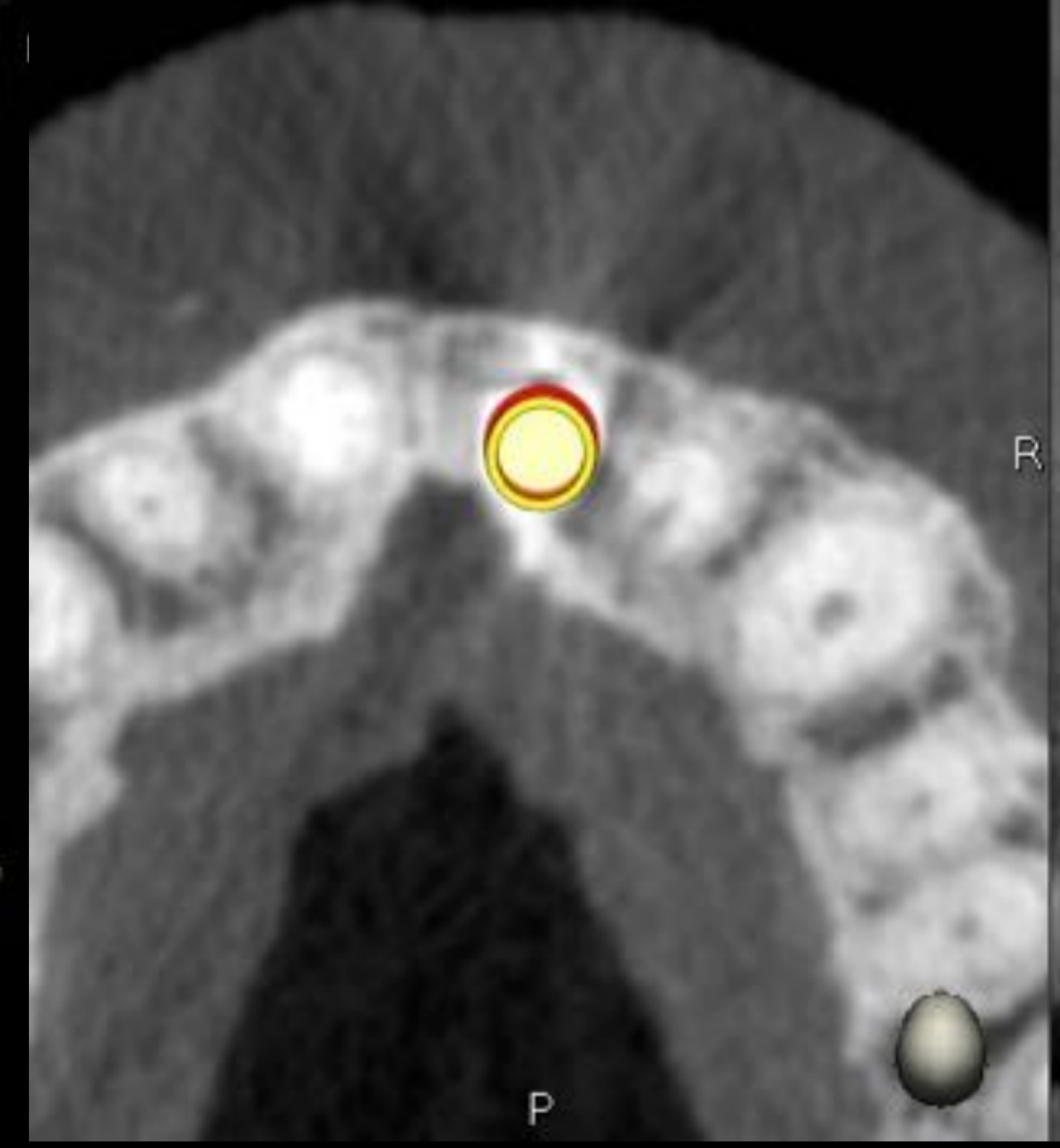
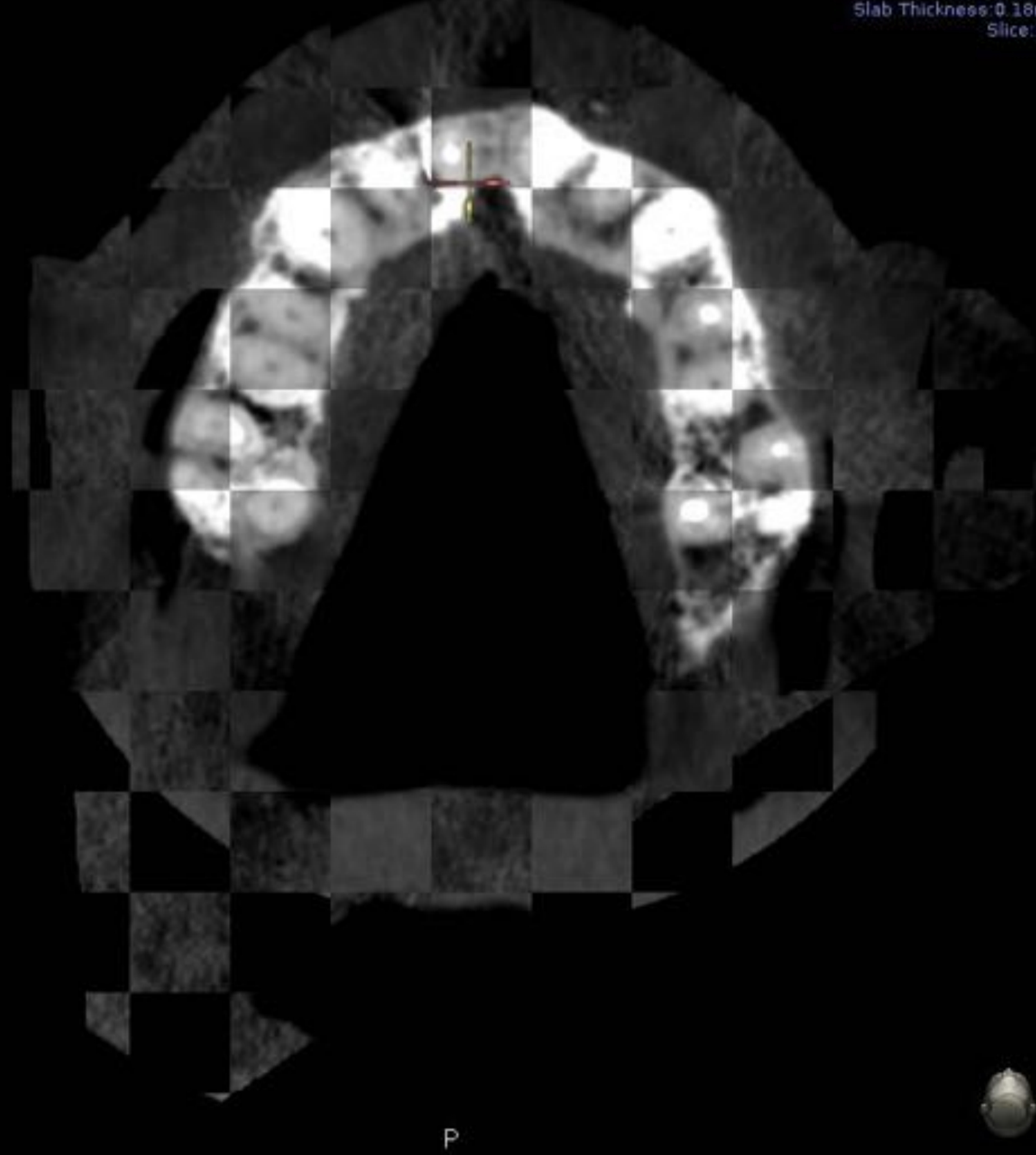


EvalNav

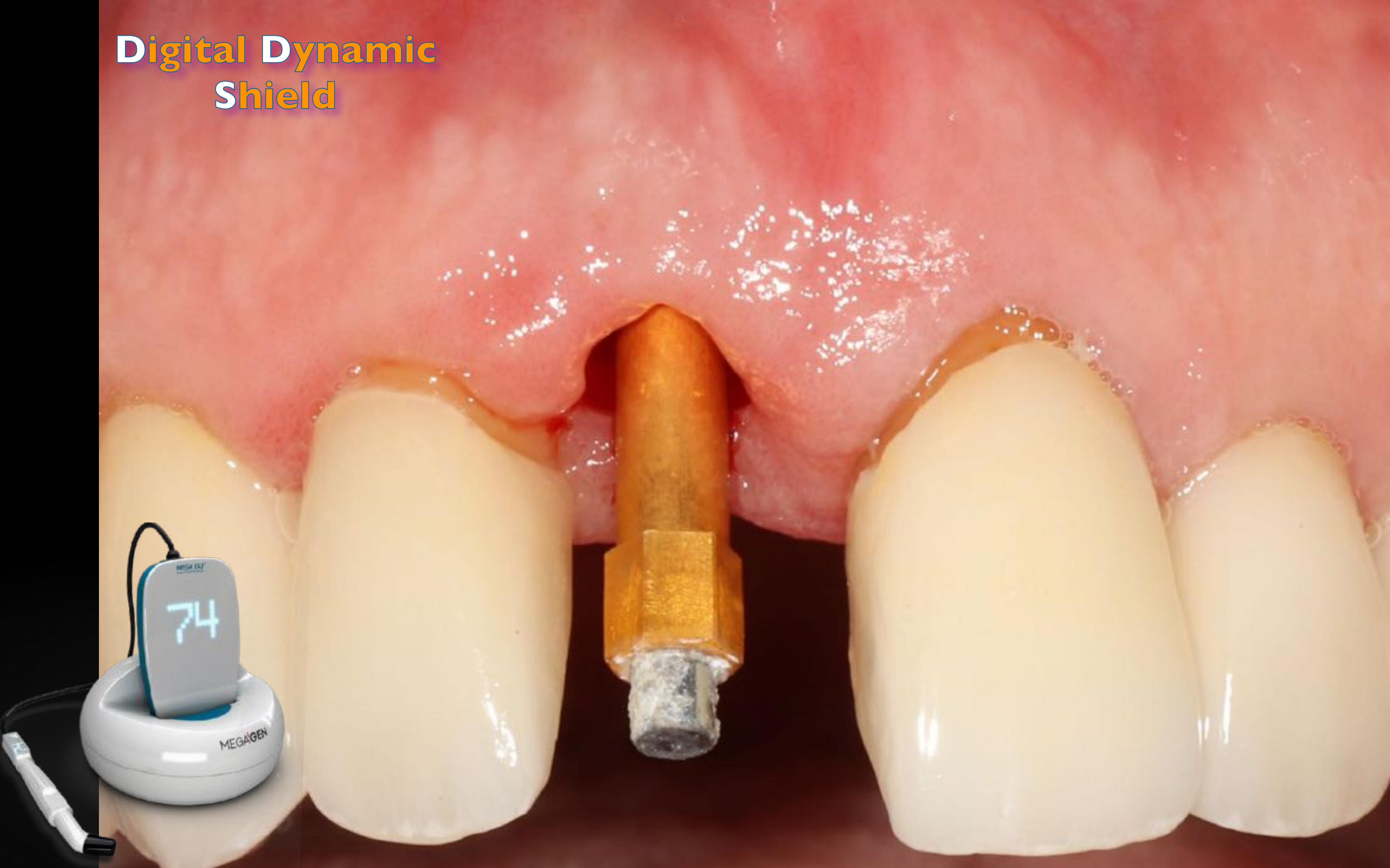
Entry: .05mm
Apex: 0.75mm
Angle: 2.35 deg

Entry (2d): 0.05 mm
Apex (3d): 0.95 mm
Apex (V): 0.75 mm
Angle: 2.35 deg

Ryan Sr. William /M
PatientId:141
StudyId:
Series No:1
546x546x280 0.18x0.18x0.18mm
Bones@ental1



Digital Dynamic
Shield



Partial **E**xtraction
Therapy



**Digital Dynamic
Shield**

**Partial Extraction
Therapy**



**Digital Dynamic
Shield**



**Partial Extraction
Therapy**



Digital Dynamic Shield

Partial Extraction Therapy



Navigation Guided Partial Extraction Therapy

PET

Numbers of Cases

24

Number of Implants

32

Failures

1

Complication

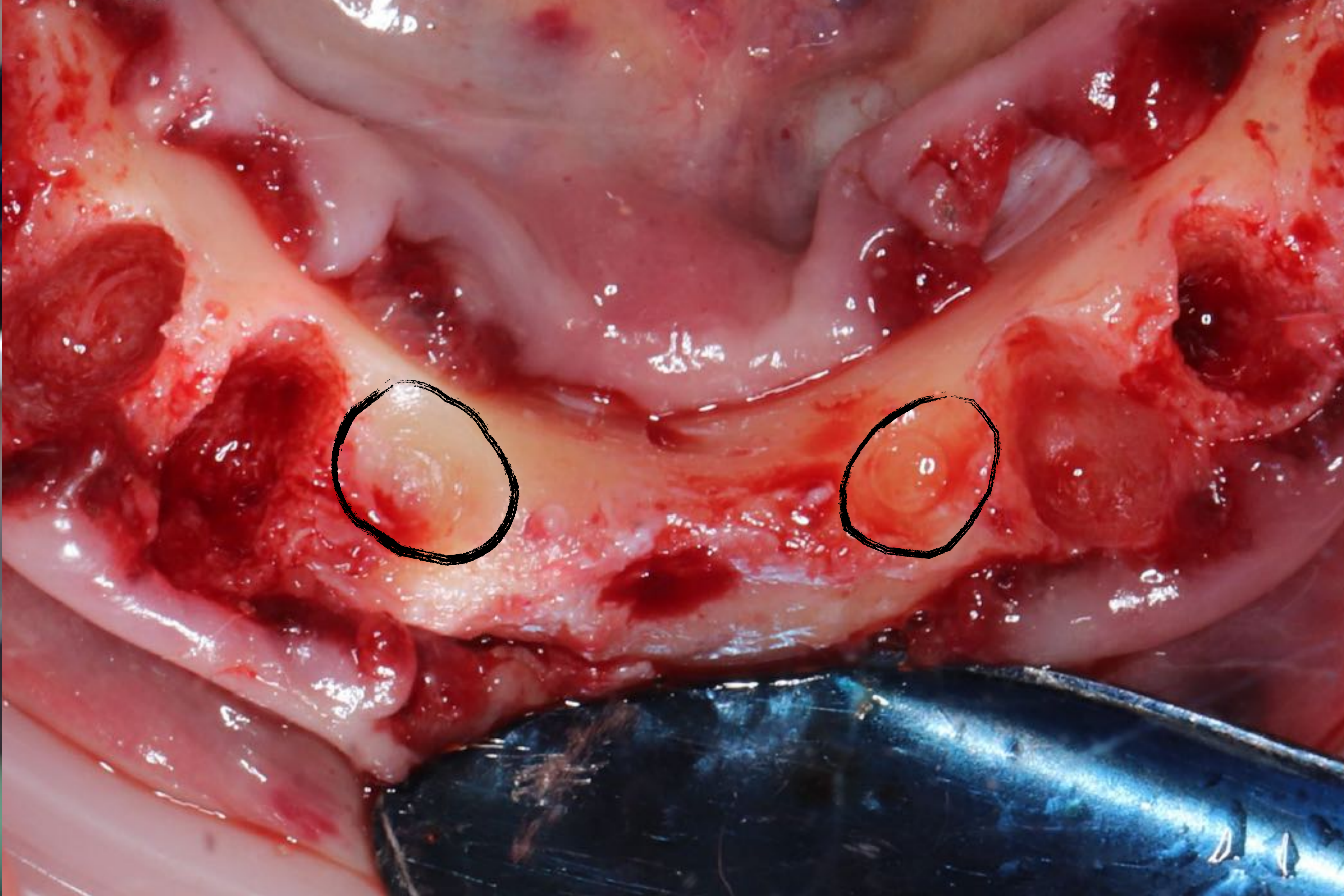
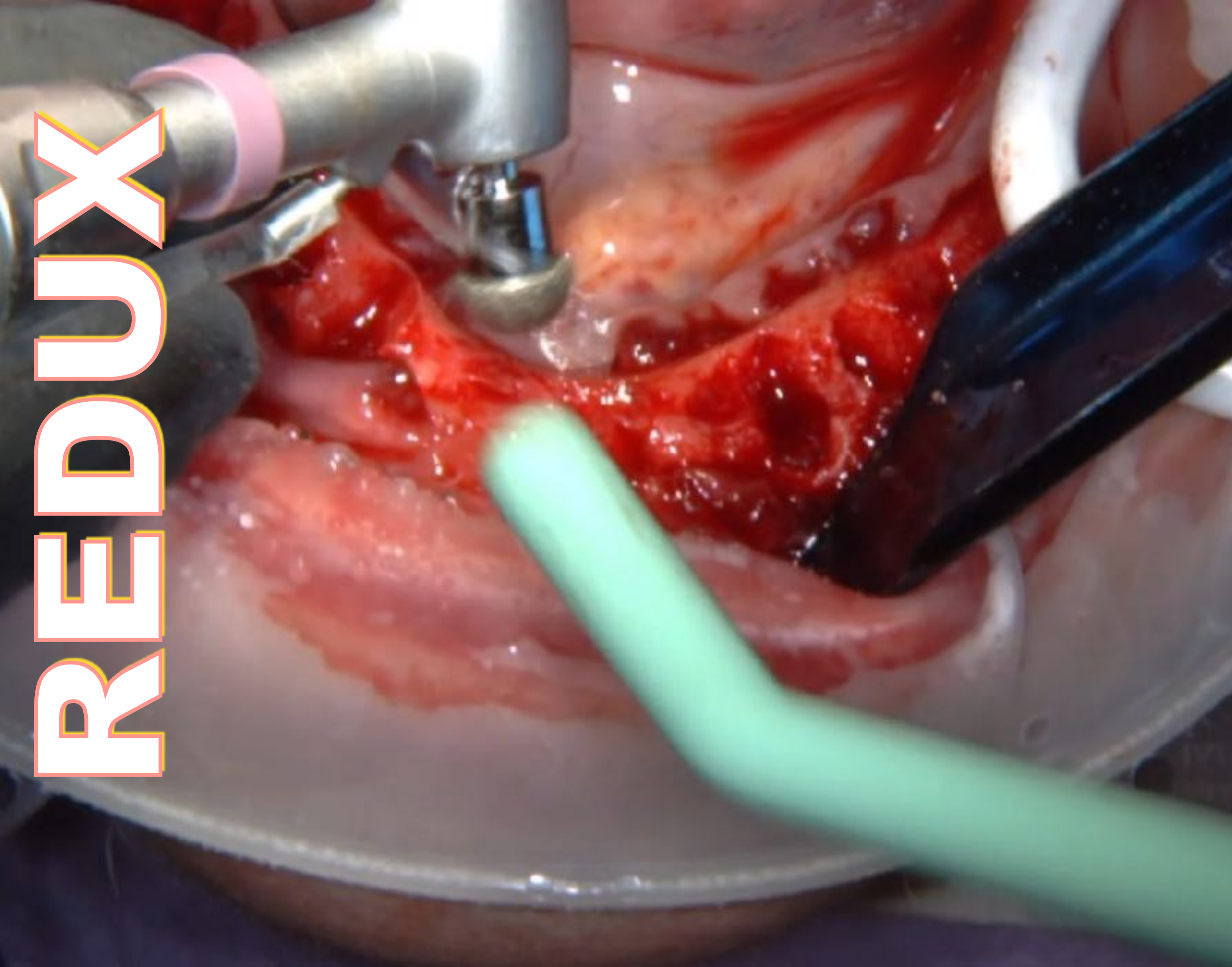
Swelling (1), Infection (0)

Virtual Guidance



Virtual Guidance

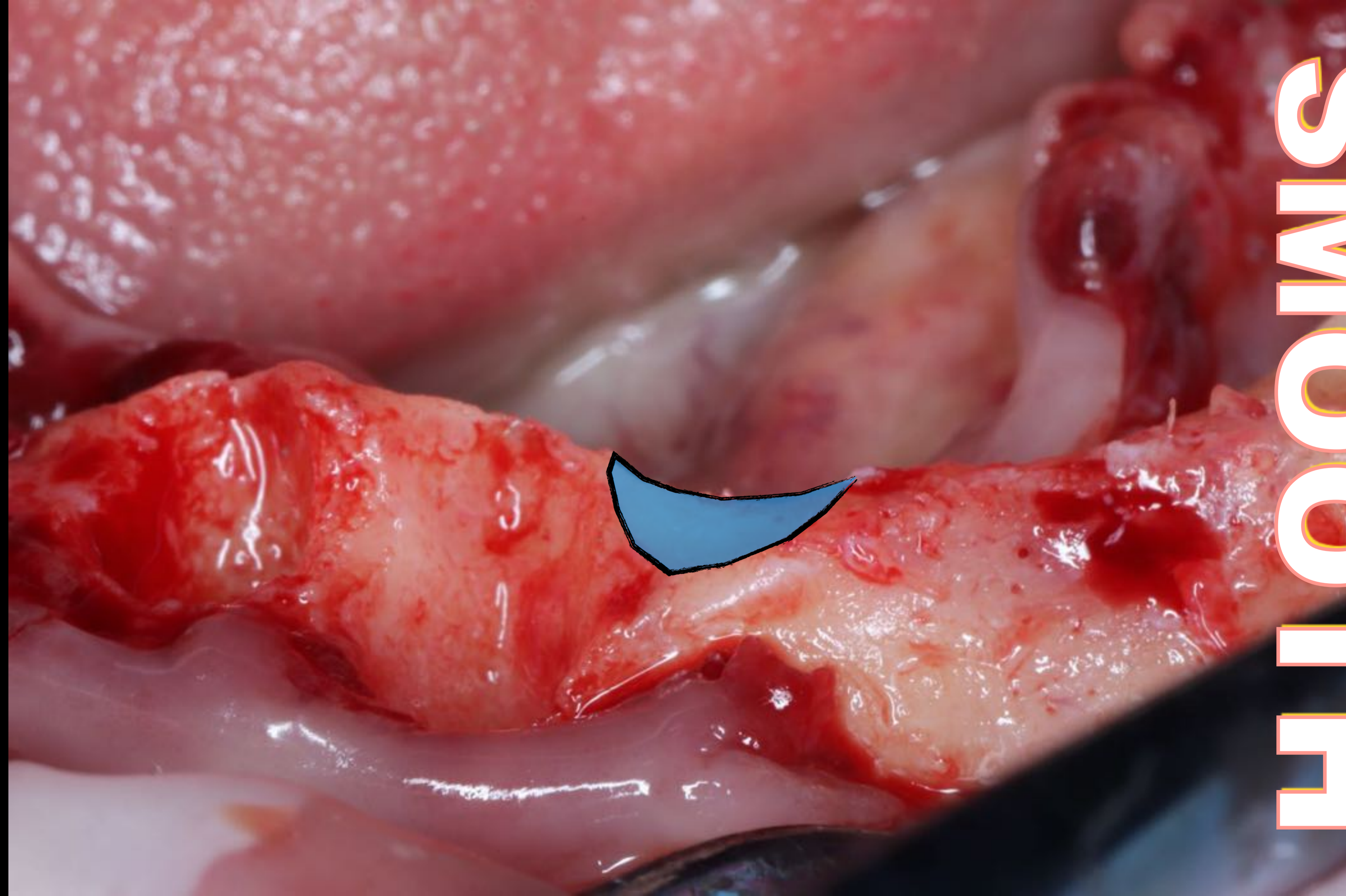
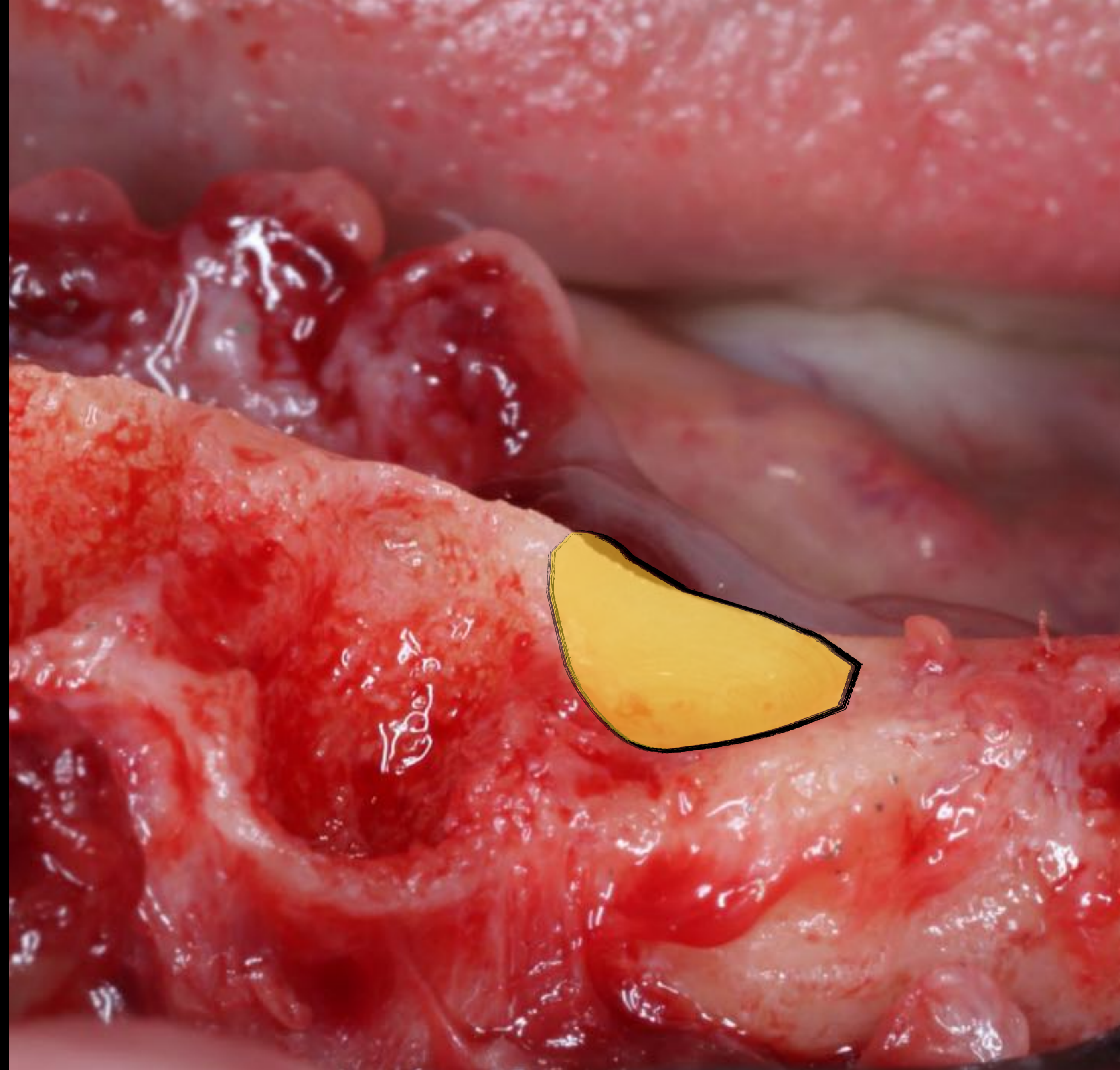




REDUX

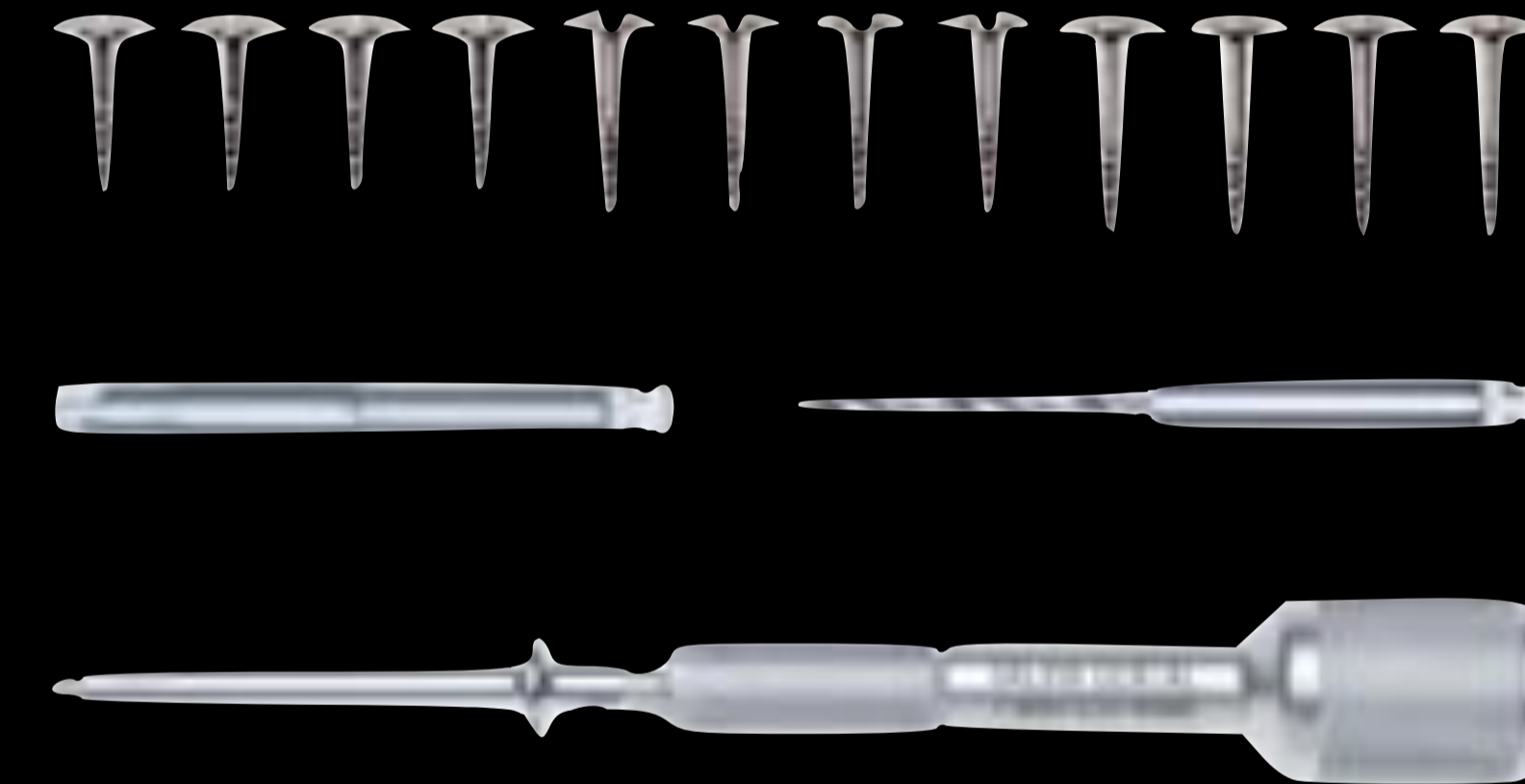
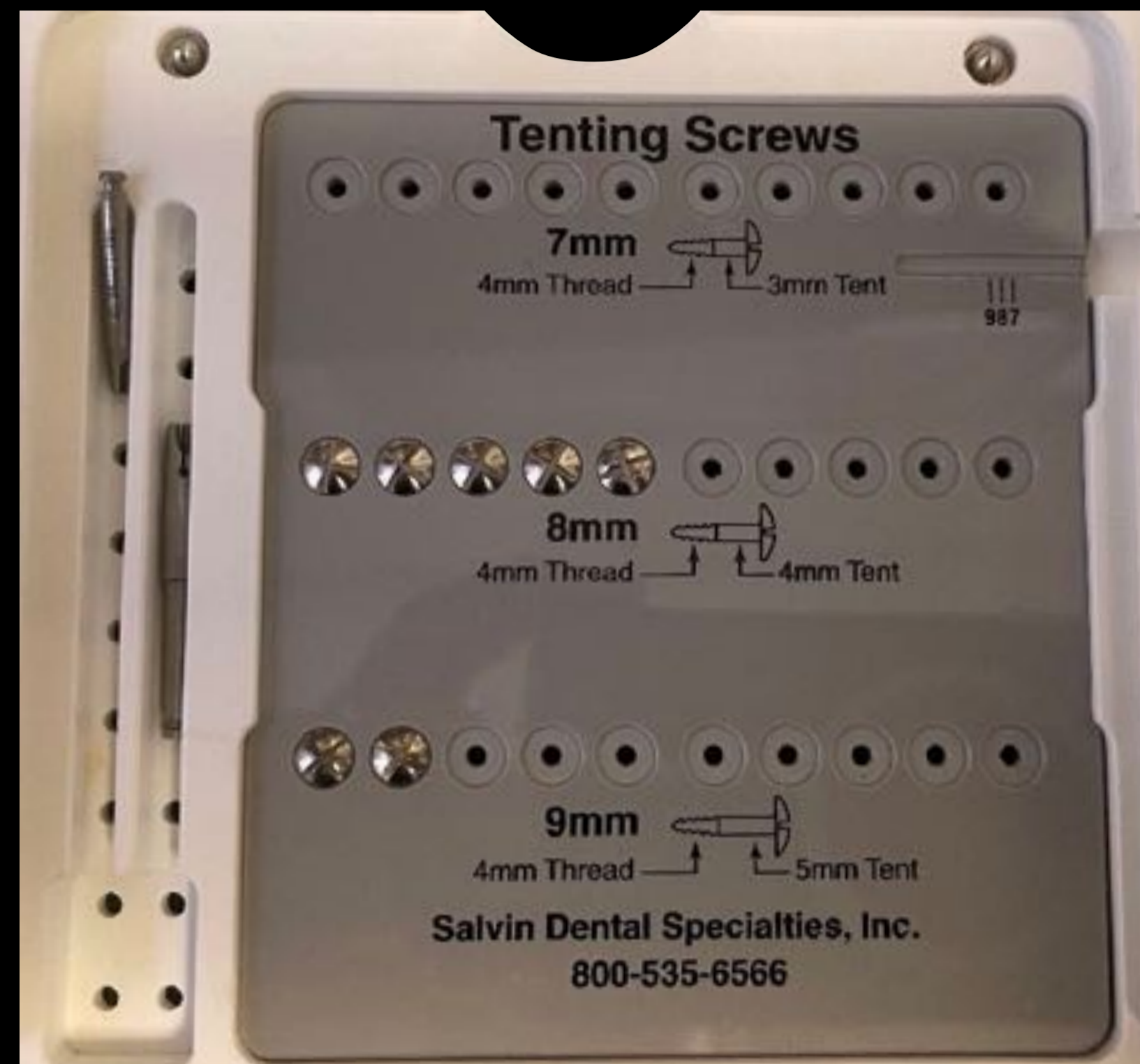
SMOOTH

REDUX



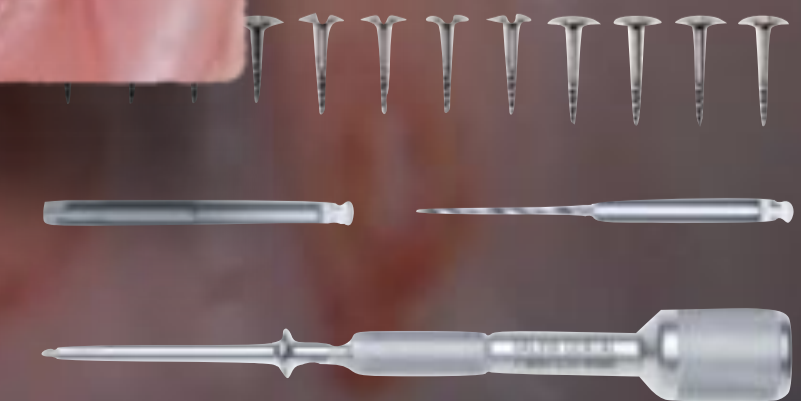
SMOOTH

Identifying

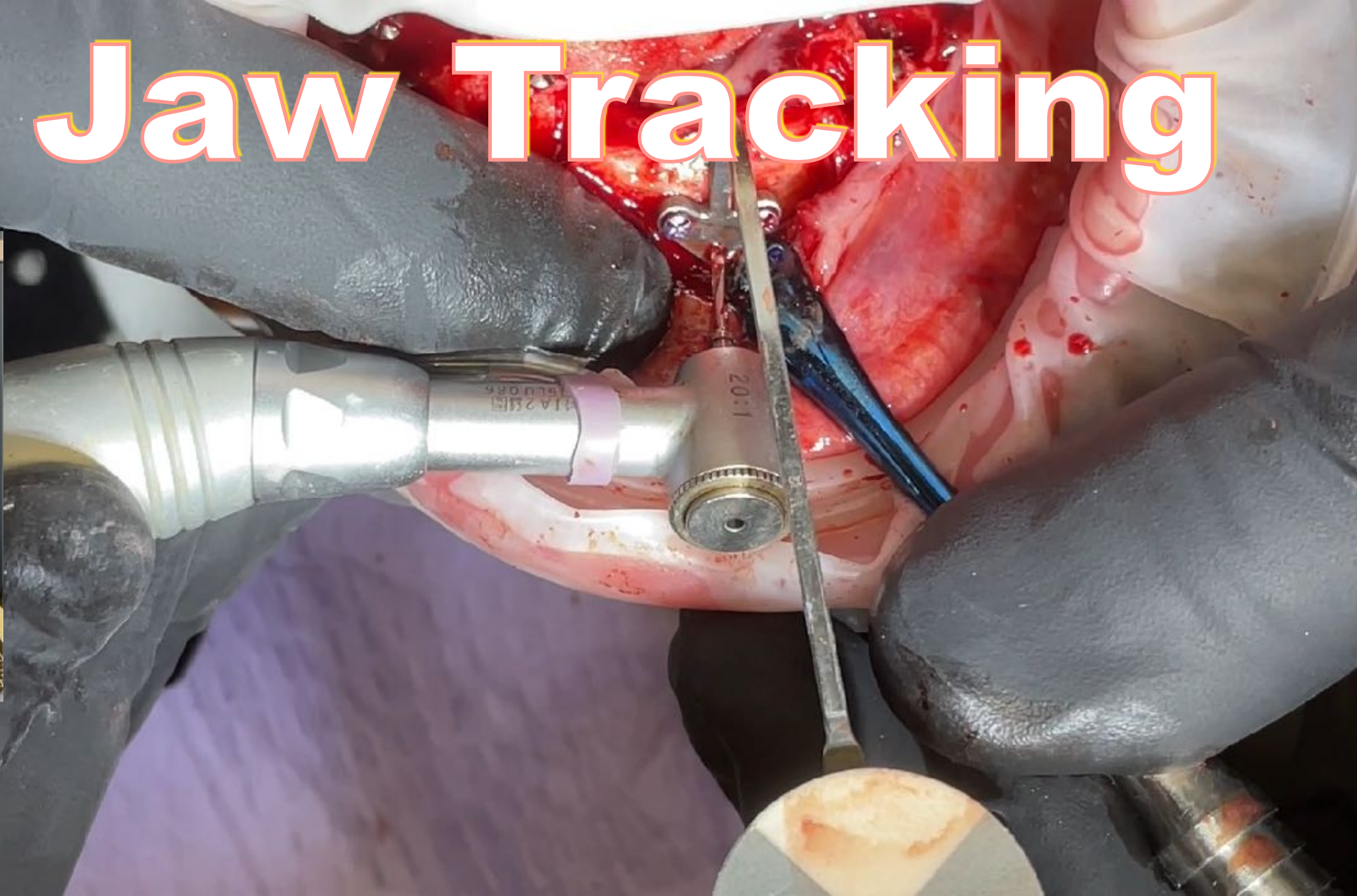


Screws

Screws



Jaw Tracking



Jaw



Tracking

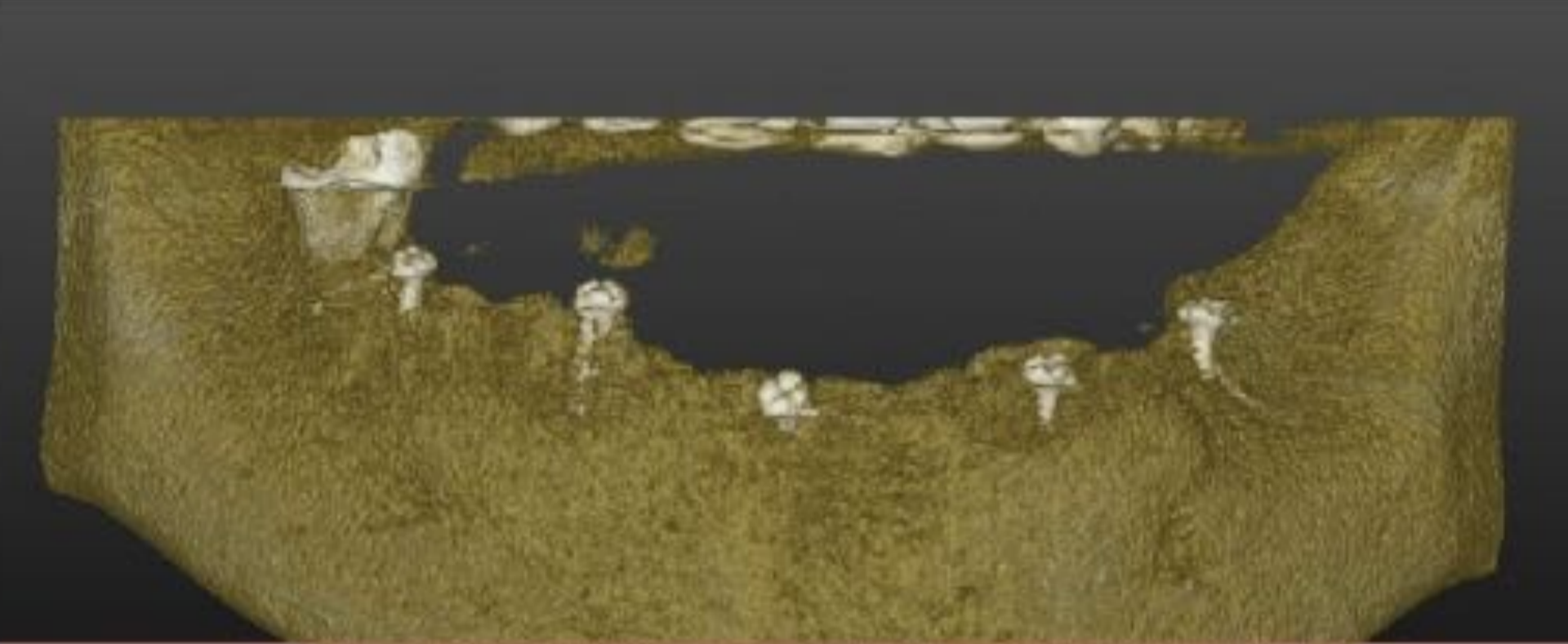
Draw

Navident V3.0.1 04-Jun-2021, Tamil Dental 13:58:55 PM

Import CT Data... Surface Scans Re-draw Curve Draw Nerve Plan Add Crown Add Implant Add Saw Remove Register Undo Redo Reset Calib. Snap Calibration: Axis + Tip Tip only

Law Selection

If the dataset contains a fiducial then click on "Delineate Fiducial". If it is intended for Trace & Place then, using the mouse, please place the line at the approximate level of the Occlusal plane.



Cancel Import X Delineate Fiducial Plan Upper Plan Lower

Settings 6 licenses

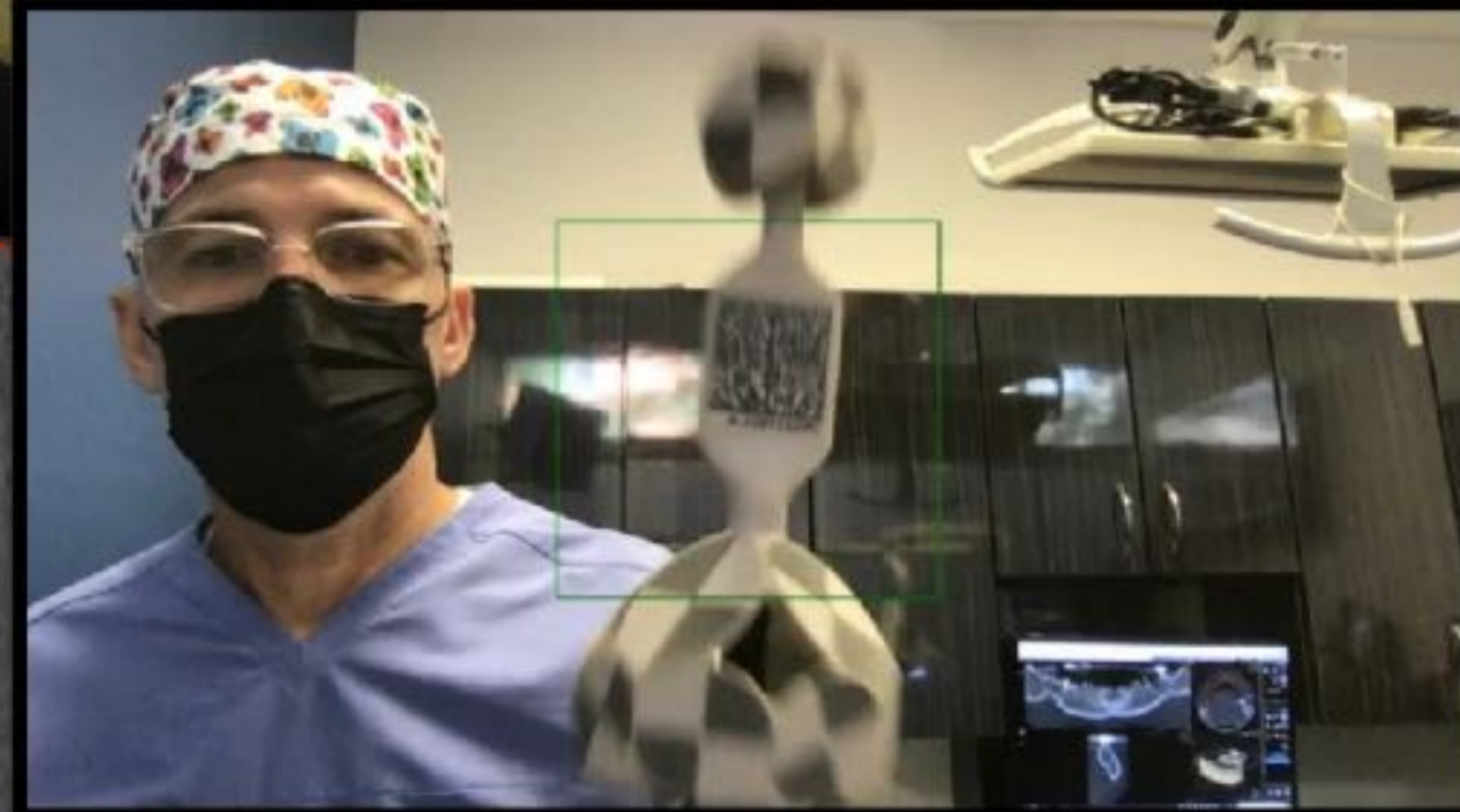
Navident V3.0.1 04-Jun-2021, Tamil Dental 14:29:18 PM

Import CT Data... Surface Scans Re-draw Curve Draw Nerve Plan Upper Add Crown Add Implant Add Saw Cut Remove Trace-register Undo Redo Reset Calib. Snap Calibration: Axis + Tip Tip only

Scan Markers Barcode


Please verify the part serial number (SN) shown below for your disposable tools.

If you have a new part then please scan the barcode for the part accordingly. Hold the barcode in front of the laptop camera keeping it within the green outline. Select "No barcode" if it is not available, or if the system is unable to scan it.



Tracer Tag Drill Tag Callibrator Reusable Tracer Barcode No barcode Barcode No barcode Scan required for new units only Barcode scanned TR52316 01

Diagnose Scanned Reusable Parts Exit Exiting...



Naranyo Leda / Thickness: 10.1mm

Slab Thickness: 0.1mm click to reset

Settings 6 licenses

Trace Points

Verification

Registration by Trace

Mark Landmarks
Mark 3-6 (recommended at least 4) easily identifiable locations on the buccal side of either the teeth or abutments.

Screw type:

Show Everything Mirror Jaw

Surface based Reg. Save & Exit

Trace around Landmarks
1. Hold tip still at the location marked on the tooth
2. Once indicated, trace around the tooth with the tracer tip, making sure to trace from at least 3 sides
3. Continue to trace nearby teeth if possible

Undo Last Trace

Reset Tracer Calibration

Start tracing ...

JawTracker not detected

Hold tip precisely here

Import CT Data...

Surface Scans Re-draw Curve

Draw Nerve Plan Upper

Add Crown Add Implant

Add Saw Cut Remove

Trace-register Undo Redo

Reset Callb. Snap

Verified

Cancel Import

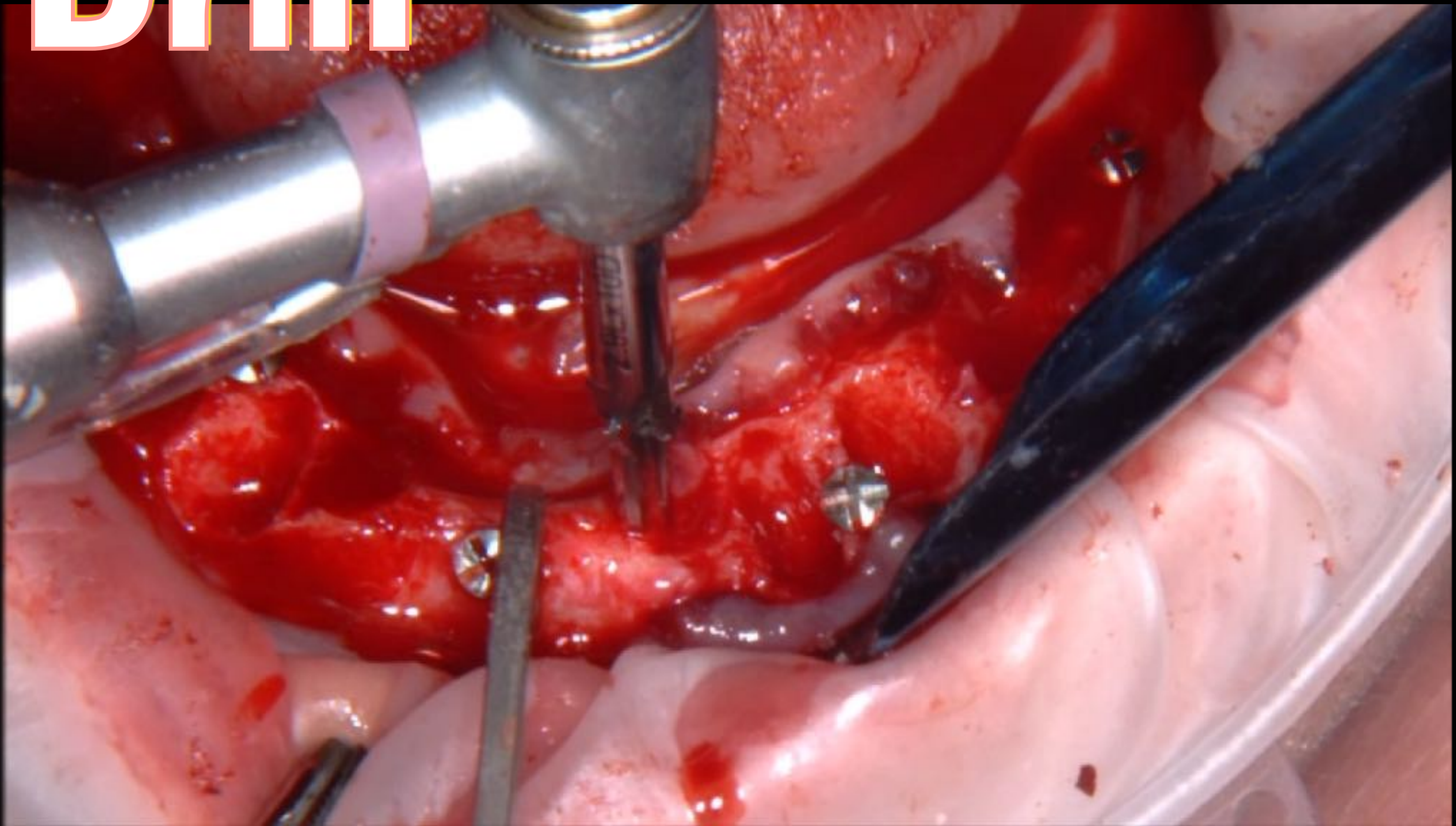
Settings 6 licenses



Plan



Drill



Navident V3.0.1 04-Jun-2021, Towil Dental 15:23:43 PM

Nerajo Leda / Thickness: 10.1mm

Navigation not active - DrillTag not detected

B

R

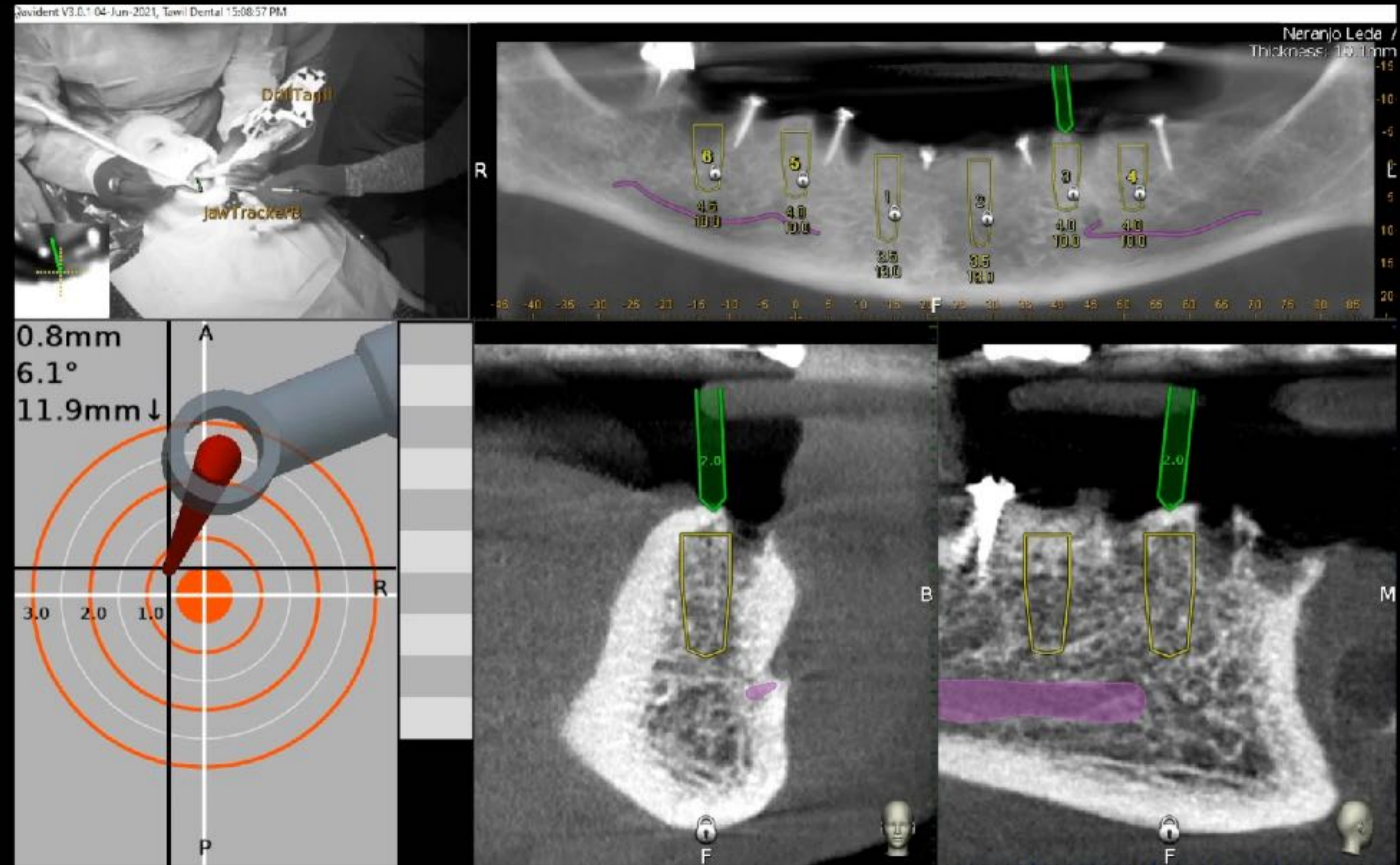
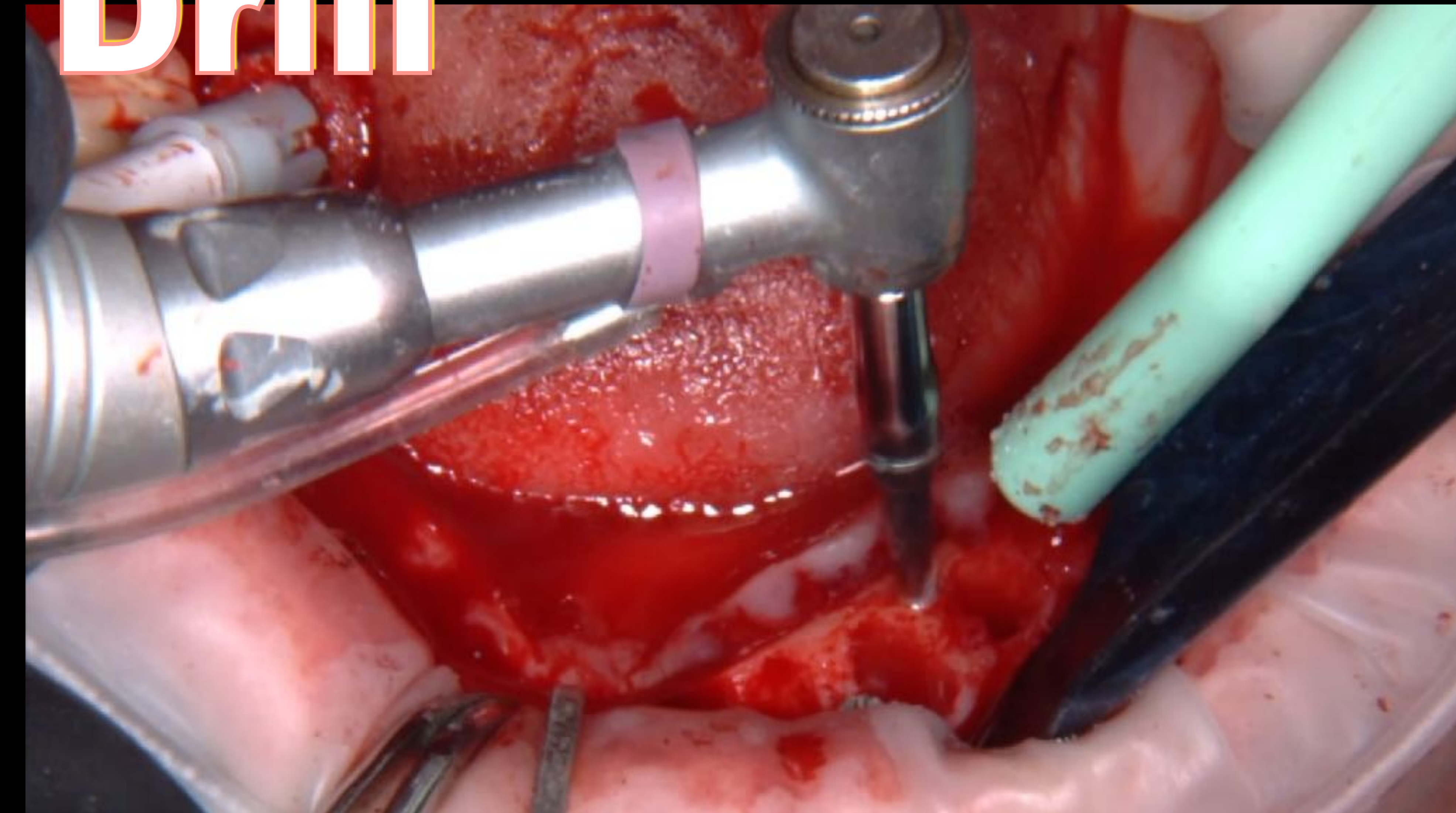
F

R

F

The image shows the Navident navigation software interface. It consists of several panels: a top-left panel showing a live video feed of the patient's mouth with a 'JawTrackerPB' label; a top-right panel showing a 3D model of the dental arch with numbered points (1-6) and associated coordinates (e.g., 4.5, 10.0); a bottom-left panel showing a 3D model of the dental arch with a red error message 'Navigation not active - DrillTag not detected'; and a bottom-right panel showing a 3D model of the dental arch with a red error message 'Navigation not active - DrillTag not detected'. The interface also includes a coordinate system with 'R' (Right) and 'F' (Front) labels, and a '2.0' measurement indicator.

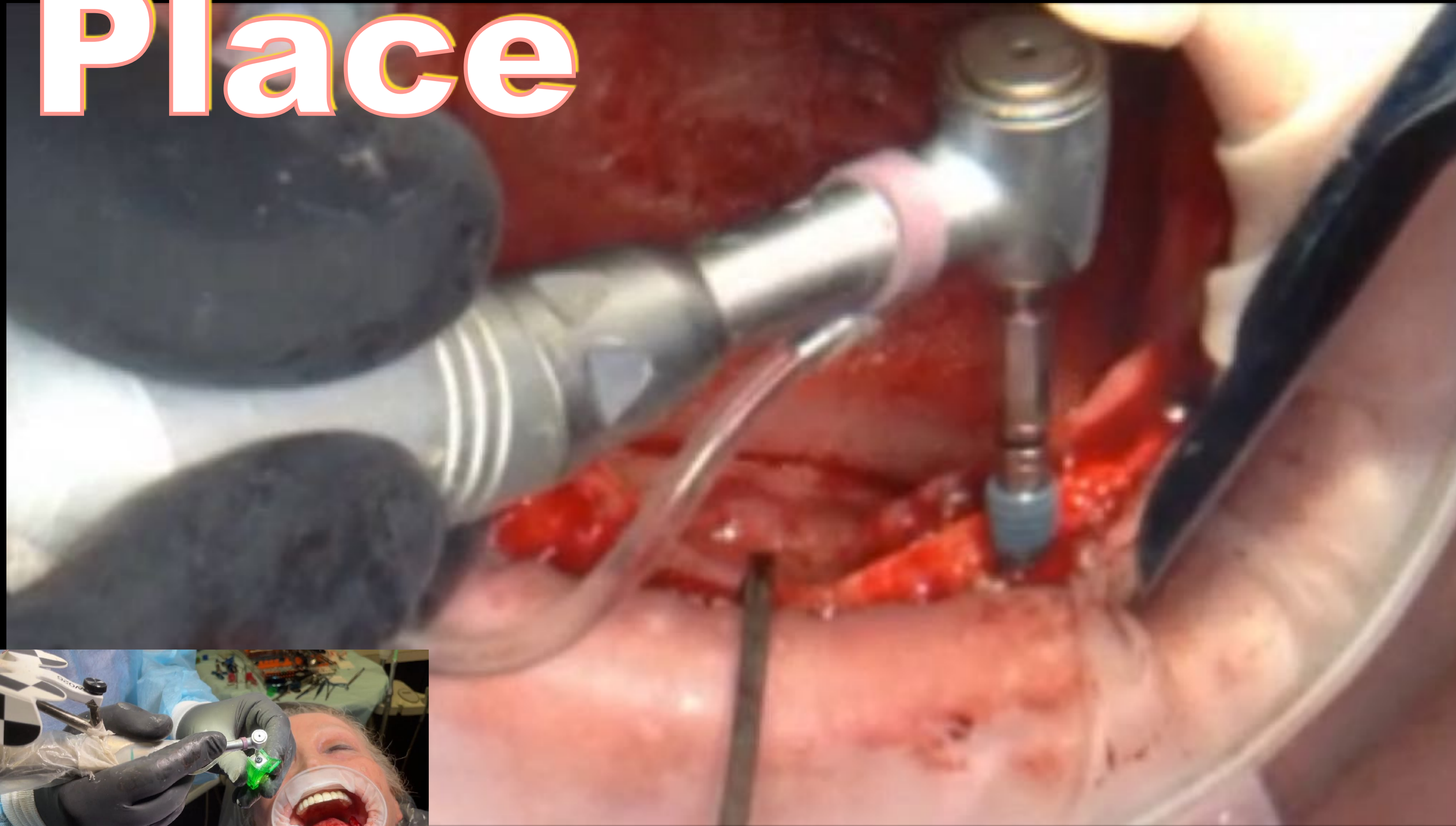
Drill



Place



Place



Qvident V3.0.1-04-Jun-2021, Tovi Dental 15:32:18 PM

DrillTag
Tilt Camera Up
JawTrackerB
↑

Navigation not active - JawTracker not detected

2.4mm
17.3°
9.6mm ↓

3.0 2.0 1.0

R

P

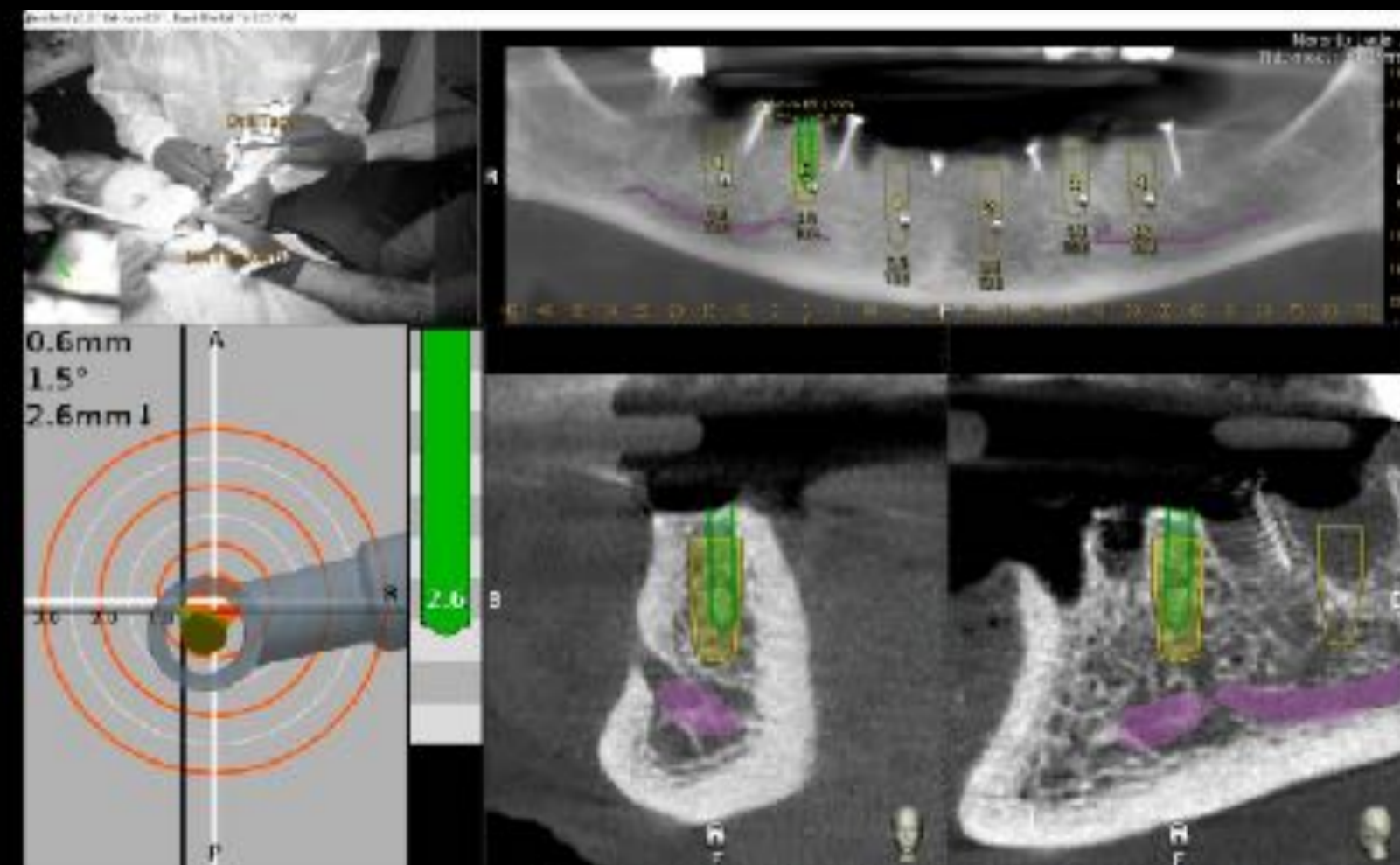
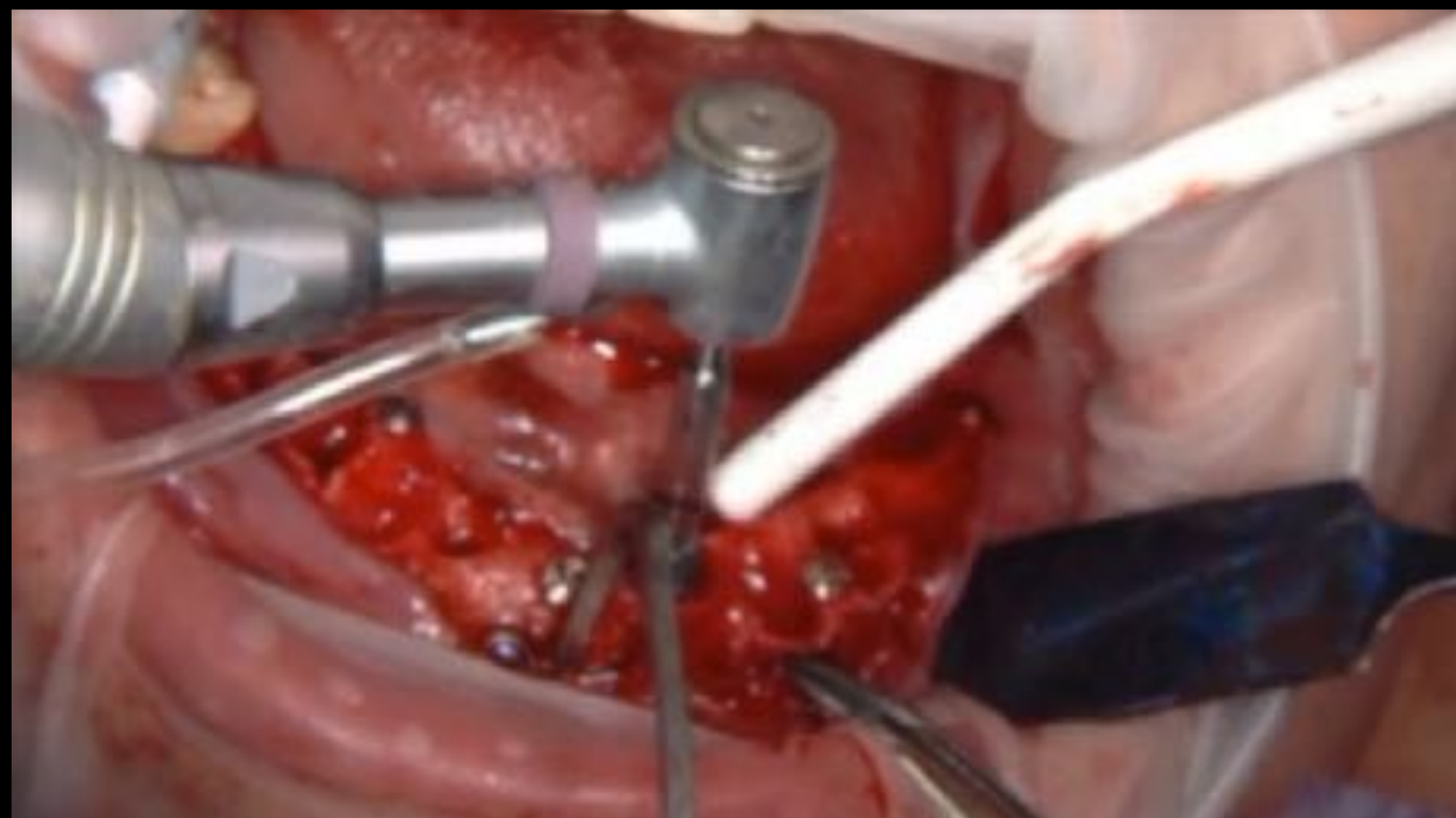
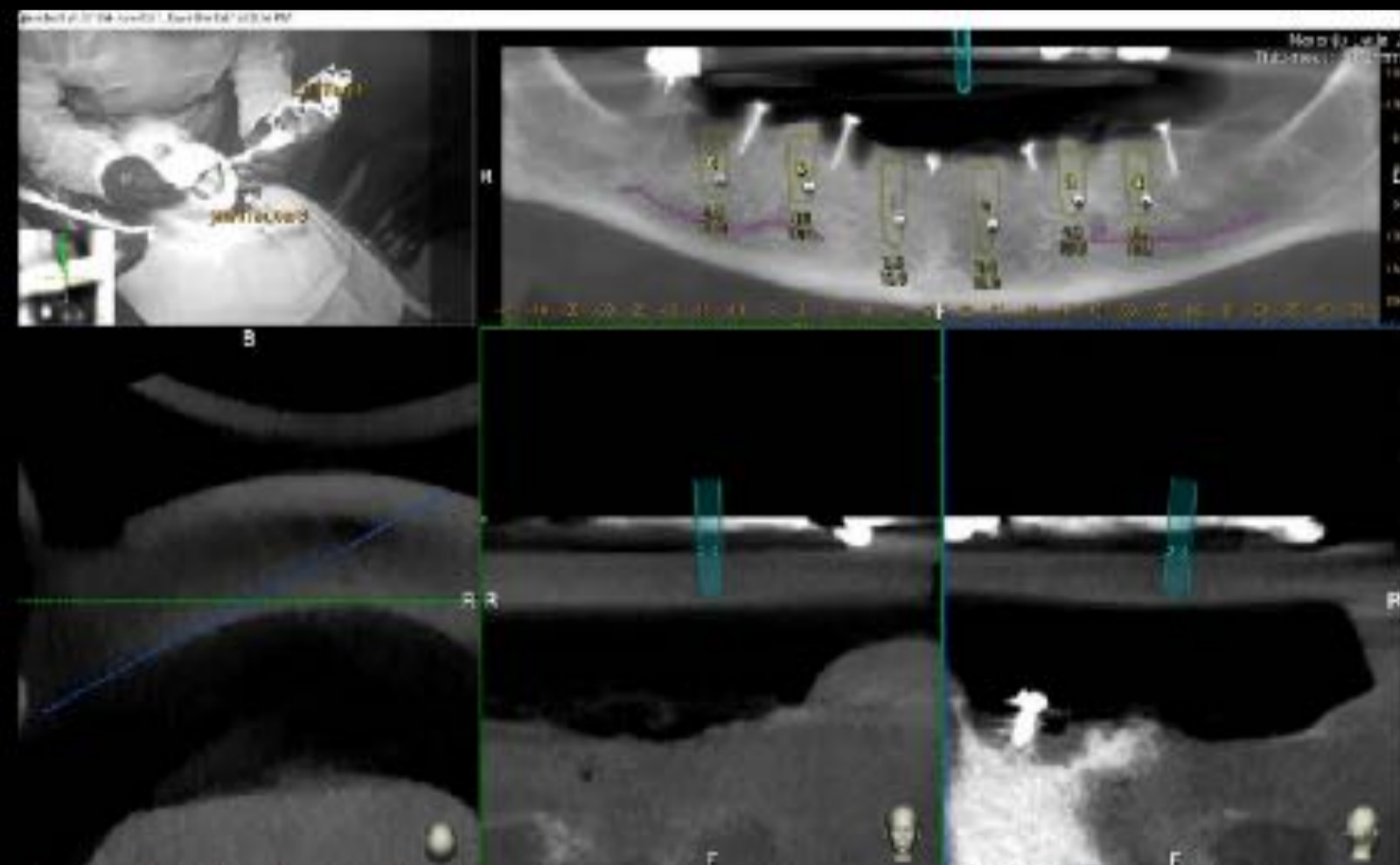
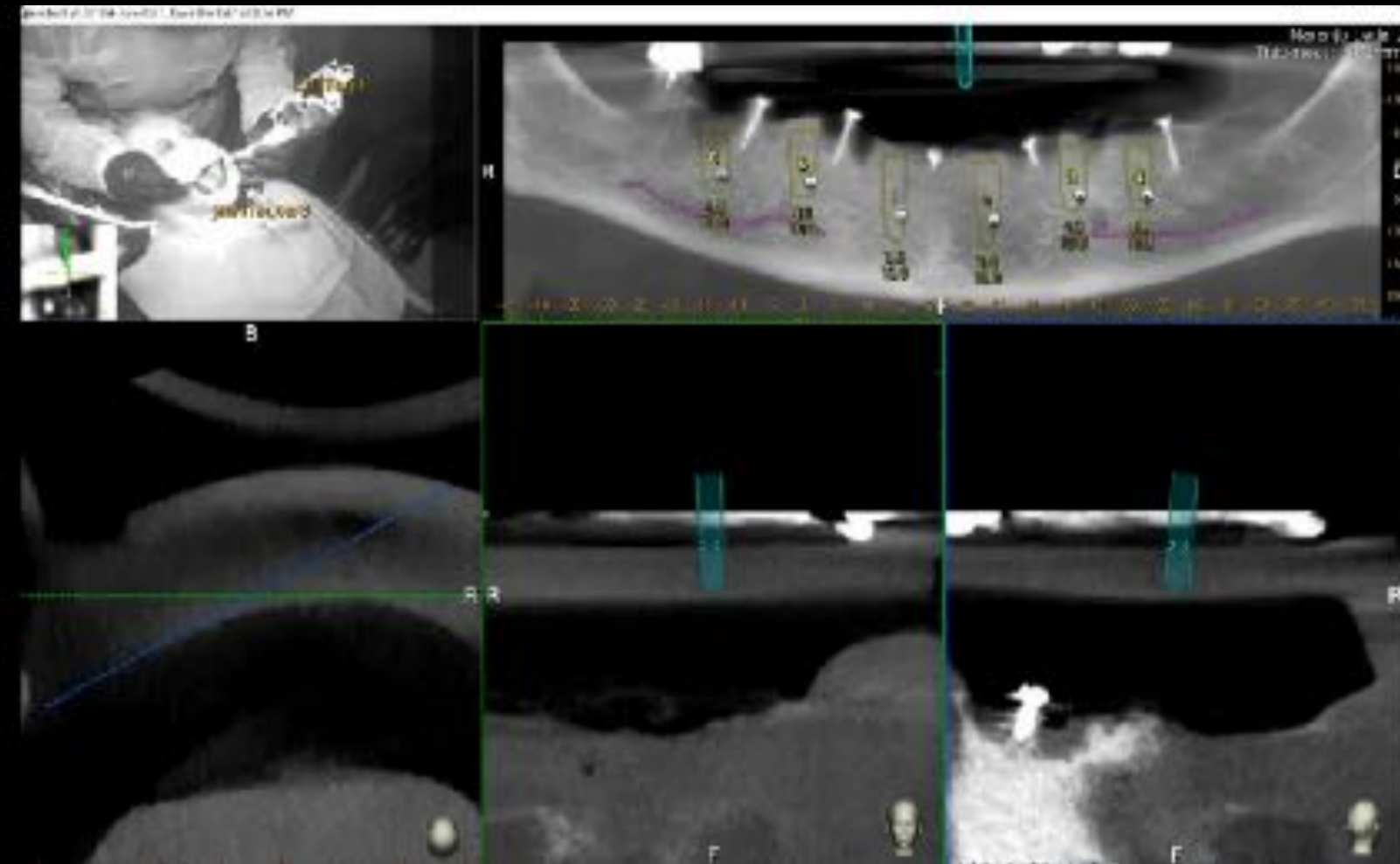
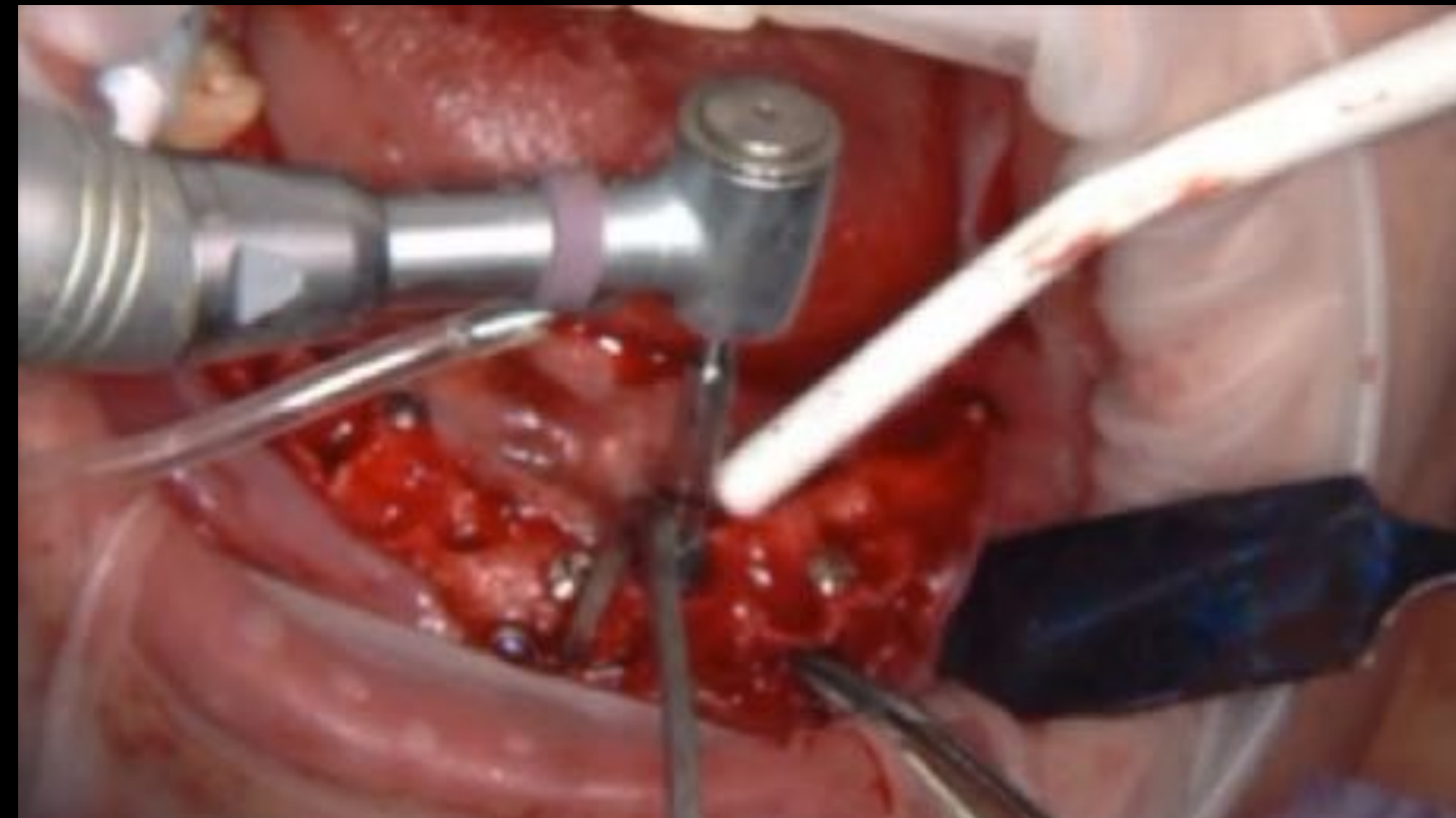
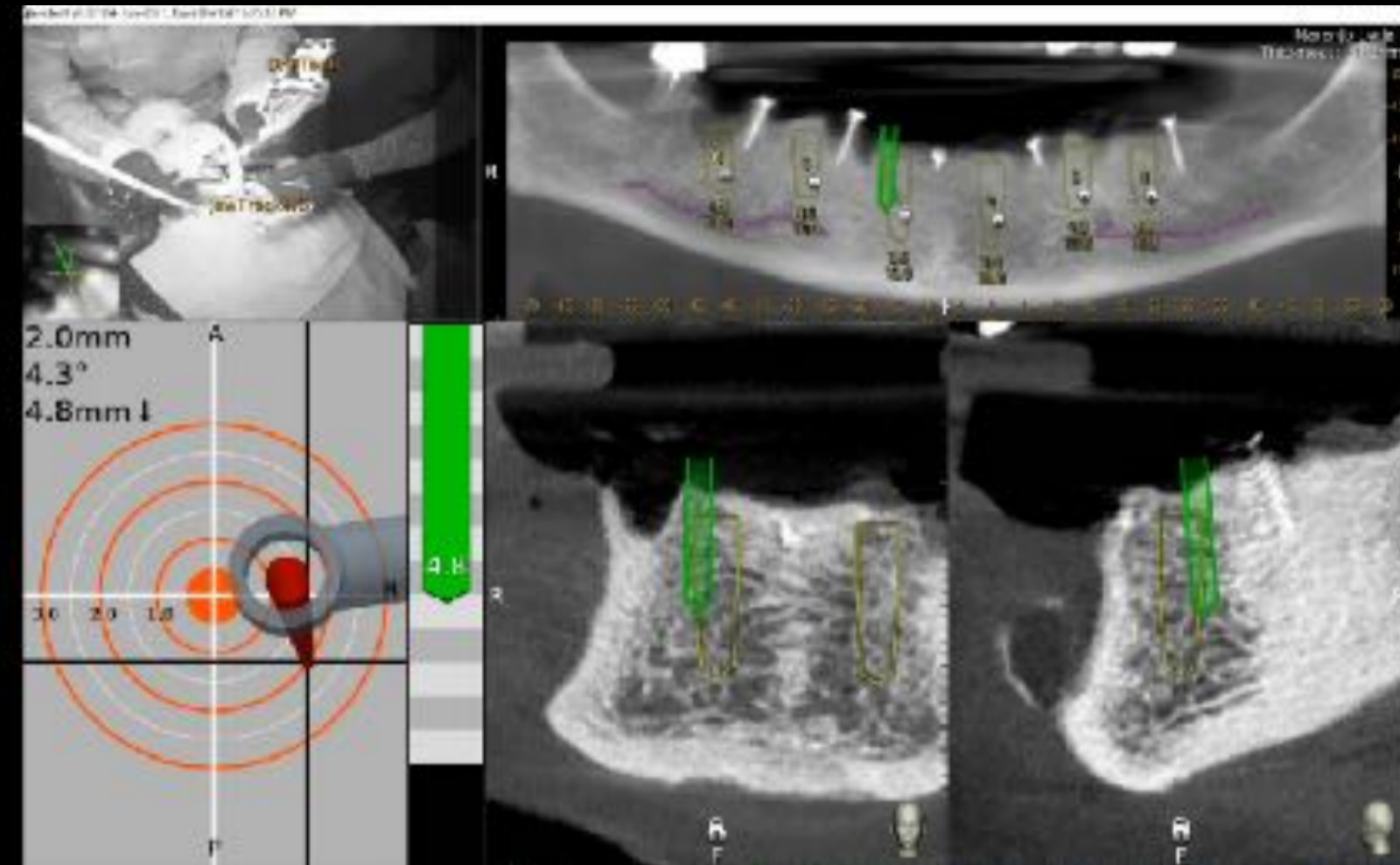
Merano Leda / Thickness: 1000um

8 4.0 10.0
9 4.0 10.0
1 3.5 10.0
2 3.5 10.0
3 4.0 10.0
4 4.0 10.0

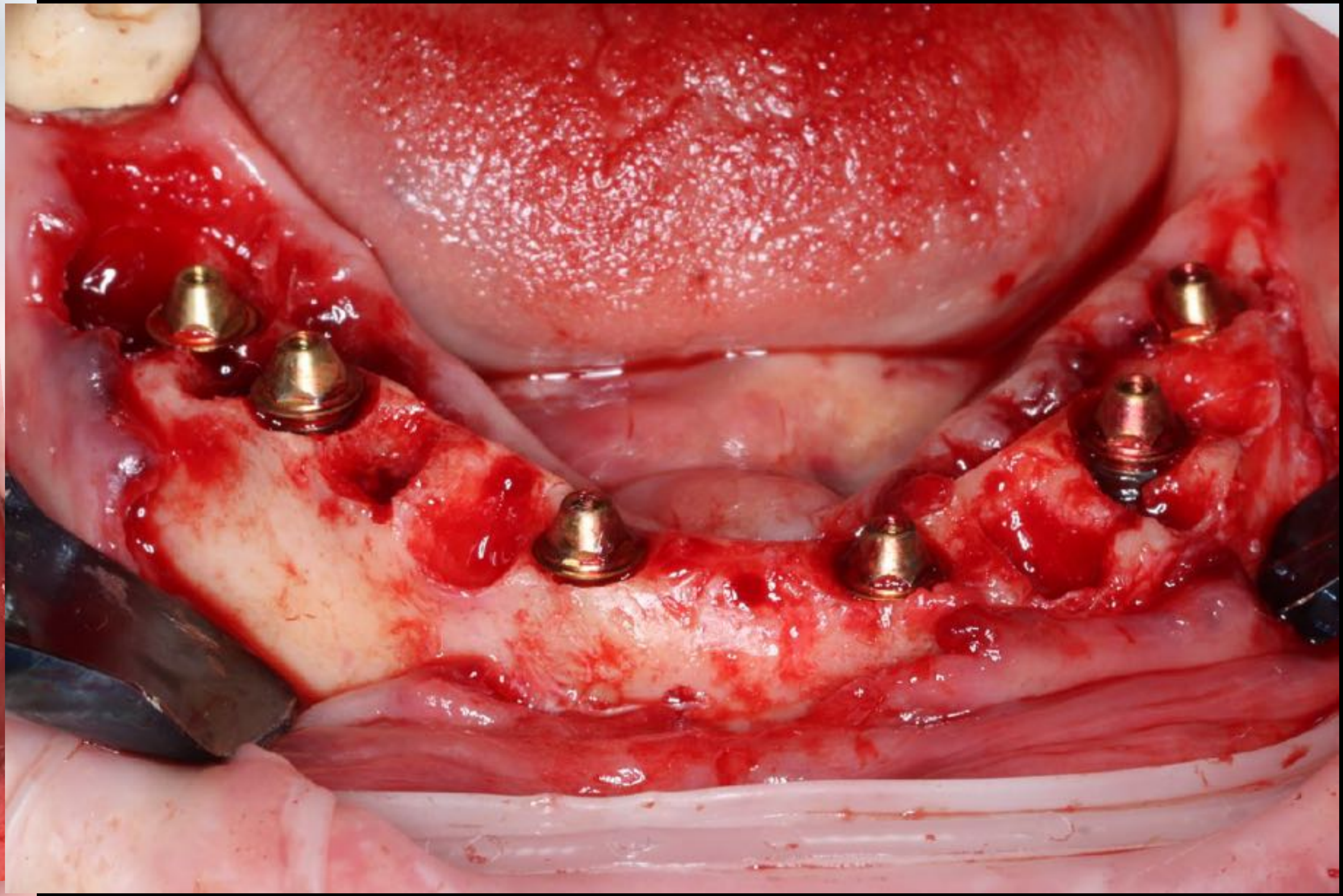
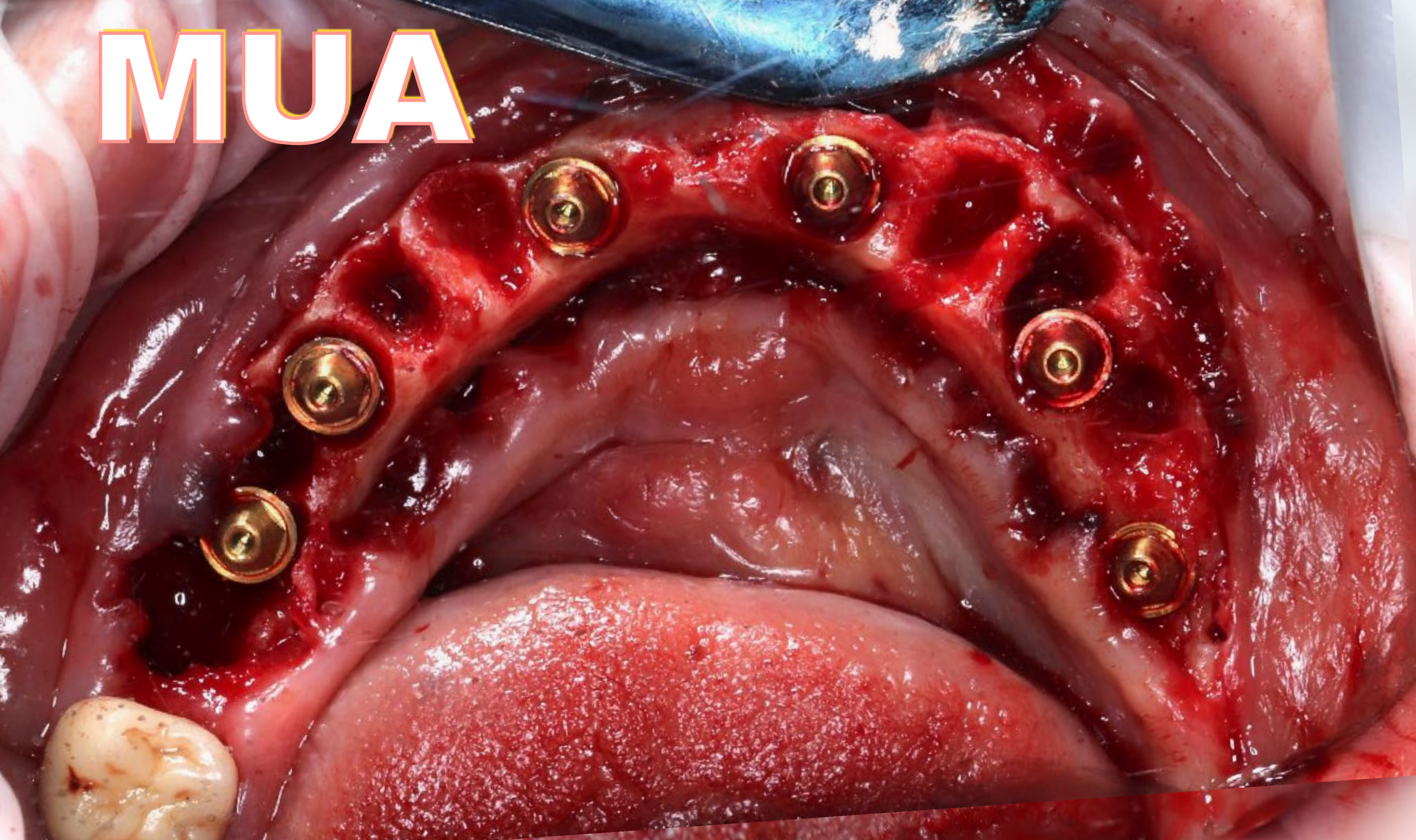
B M

F F

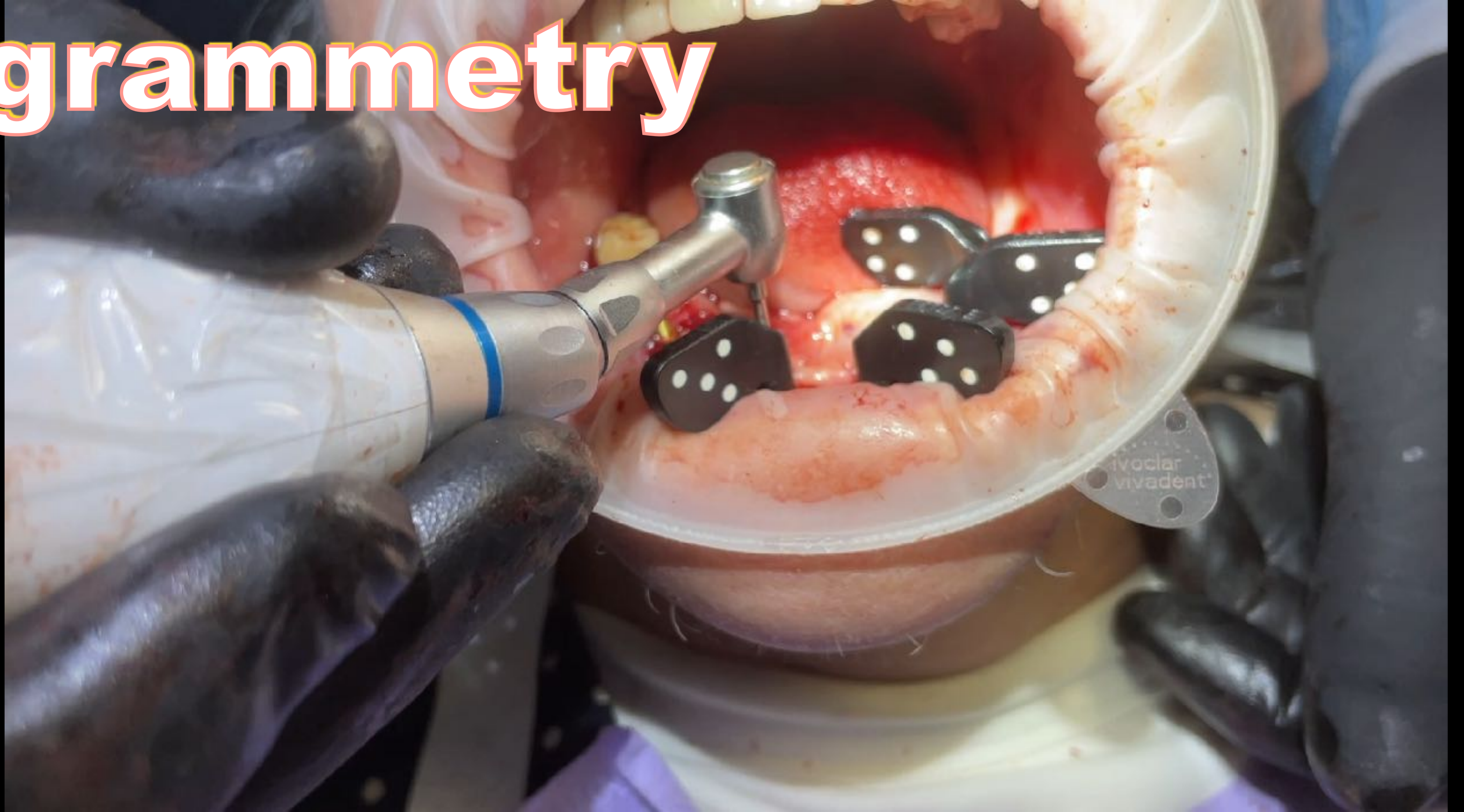
Place



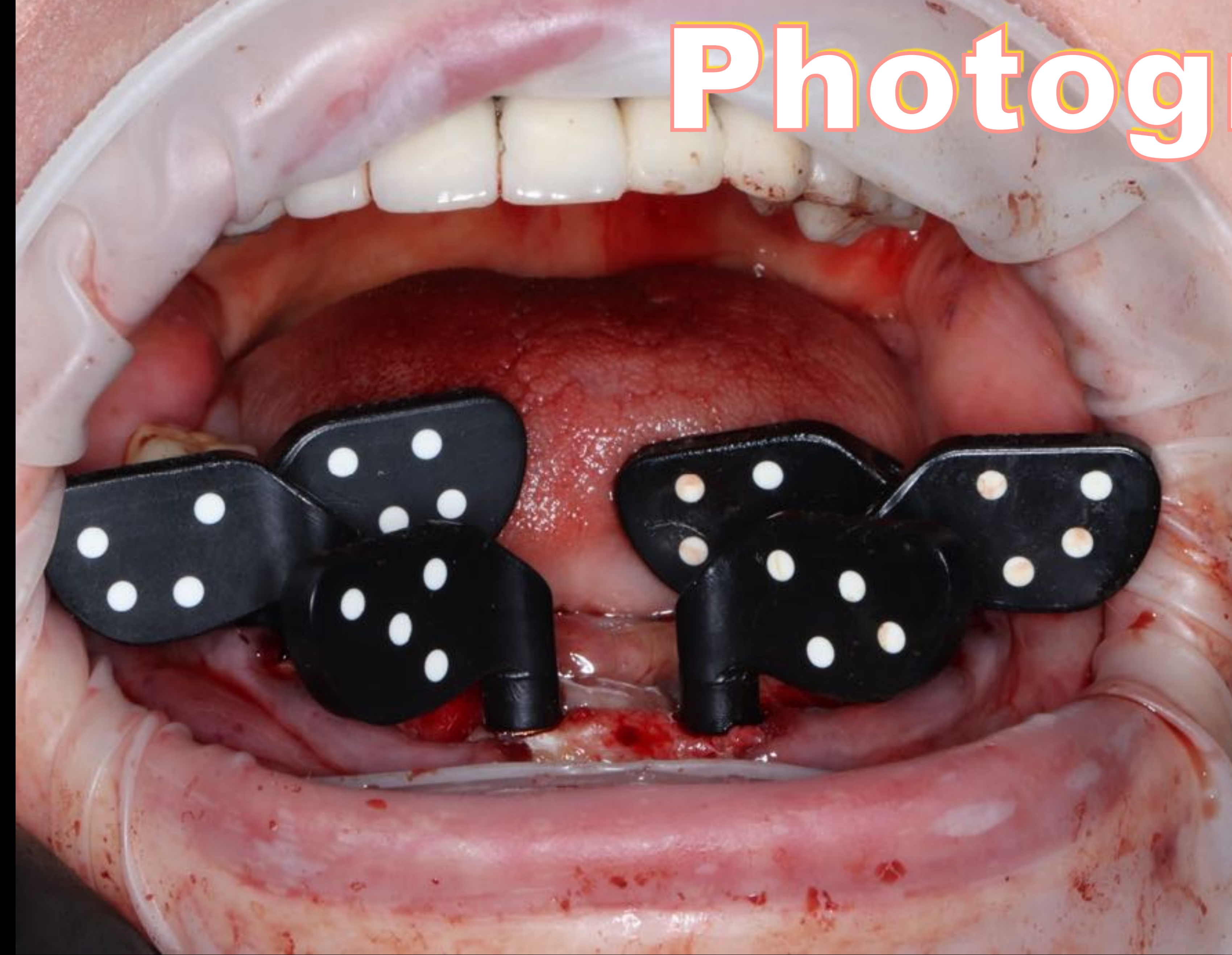
MUA



Photogrammetry



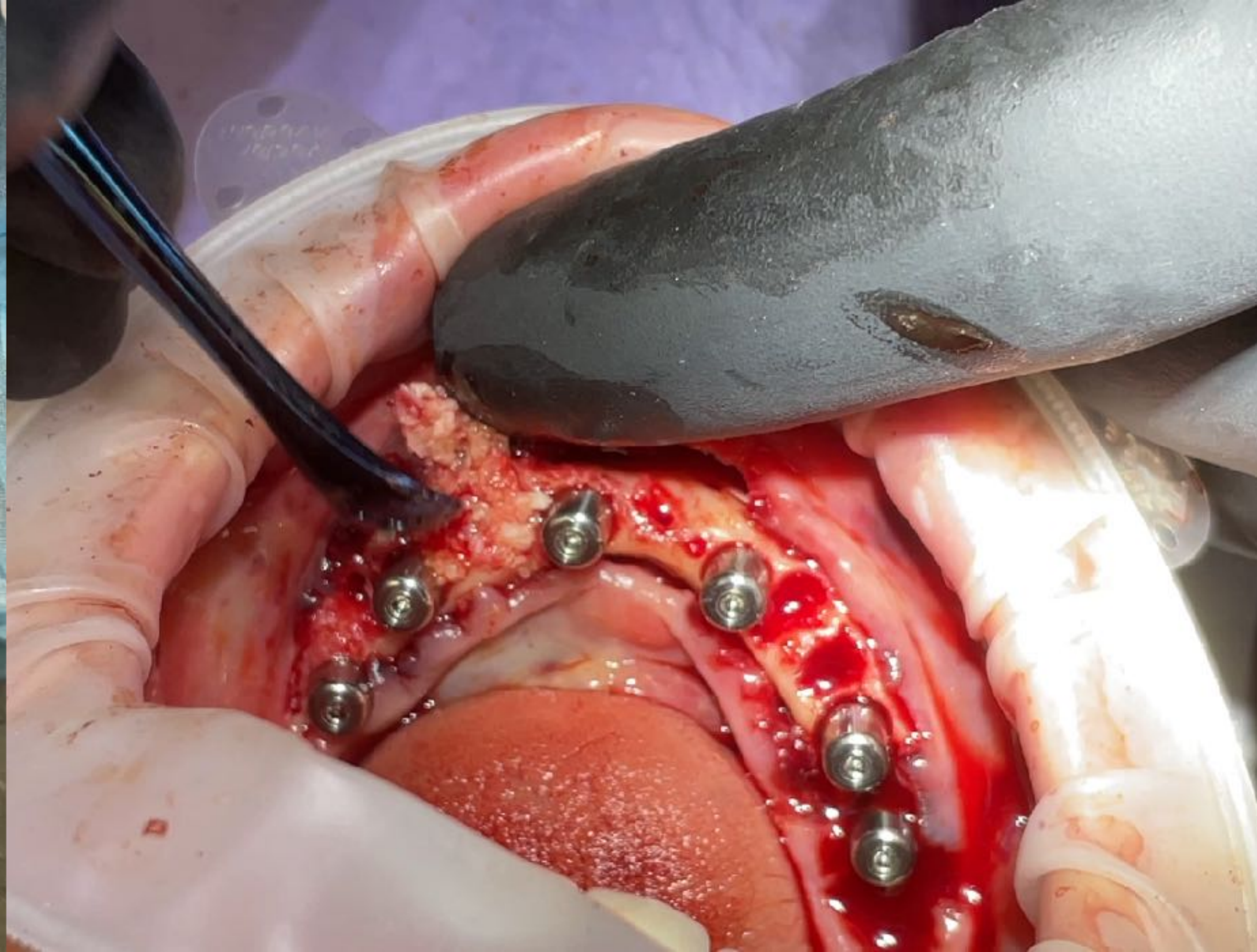
Photogrammetry



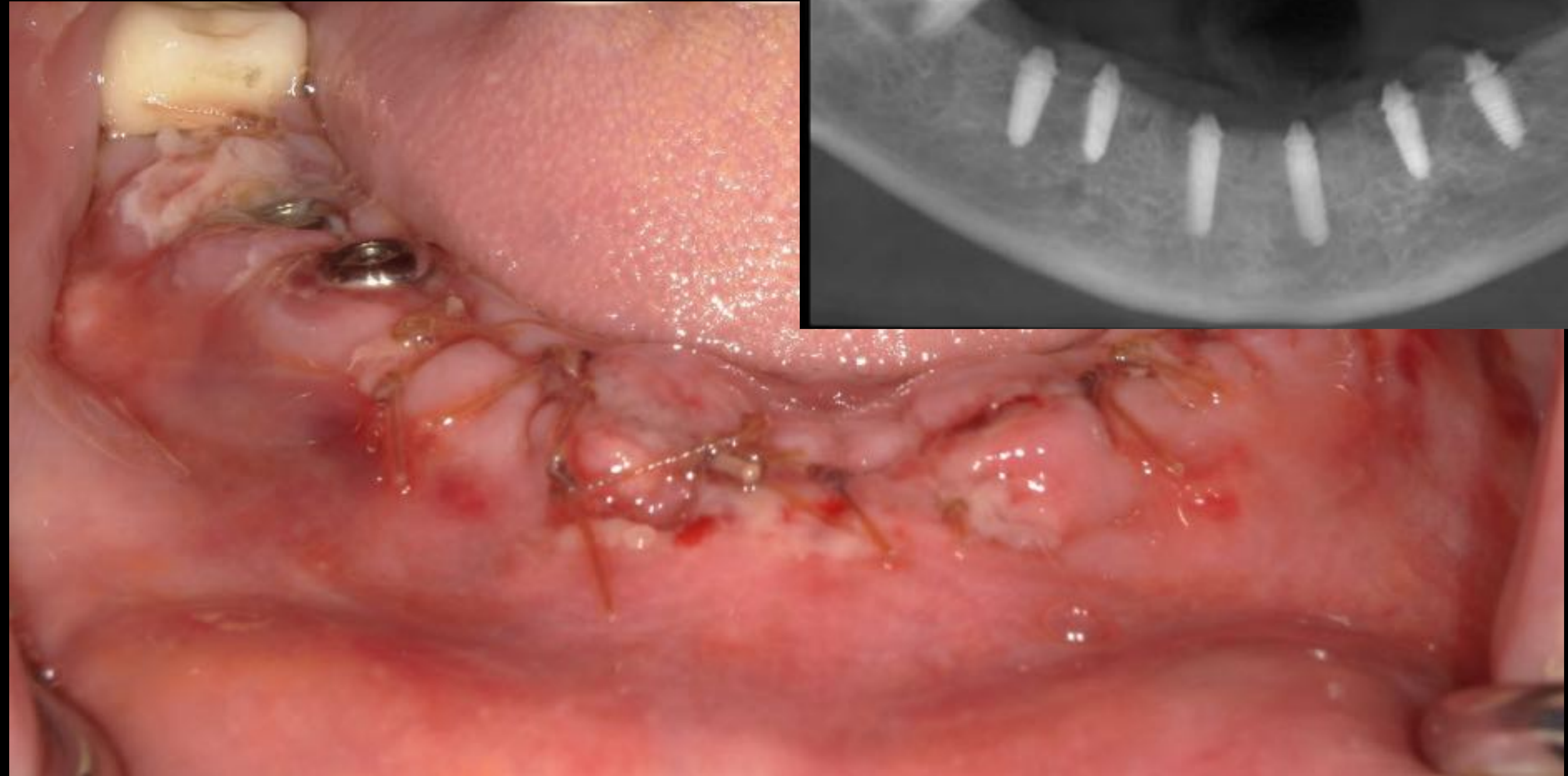
Dentin Graft



Dentin Graft/PRF

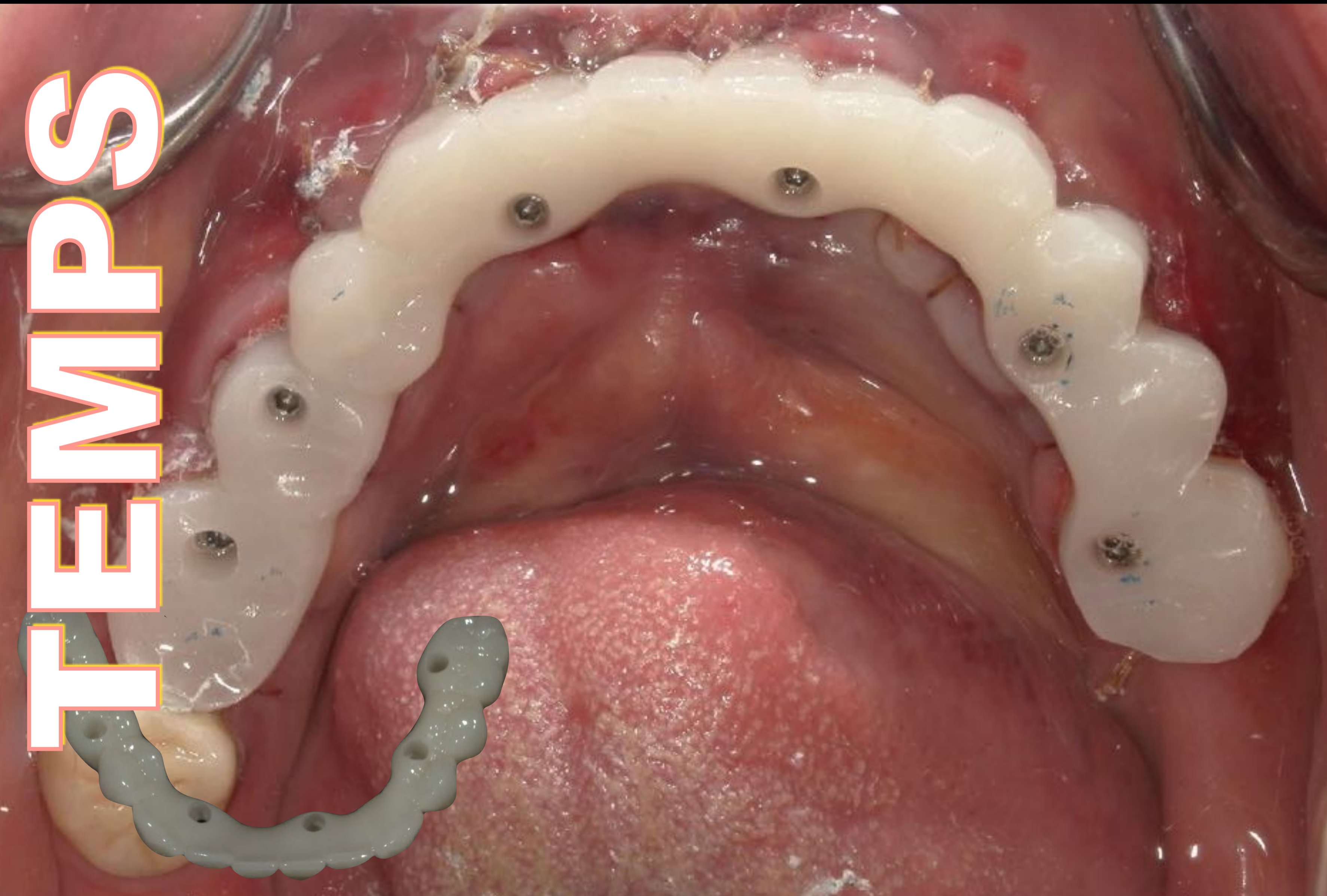


Post op



TEMPERS





1 week

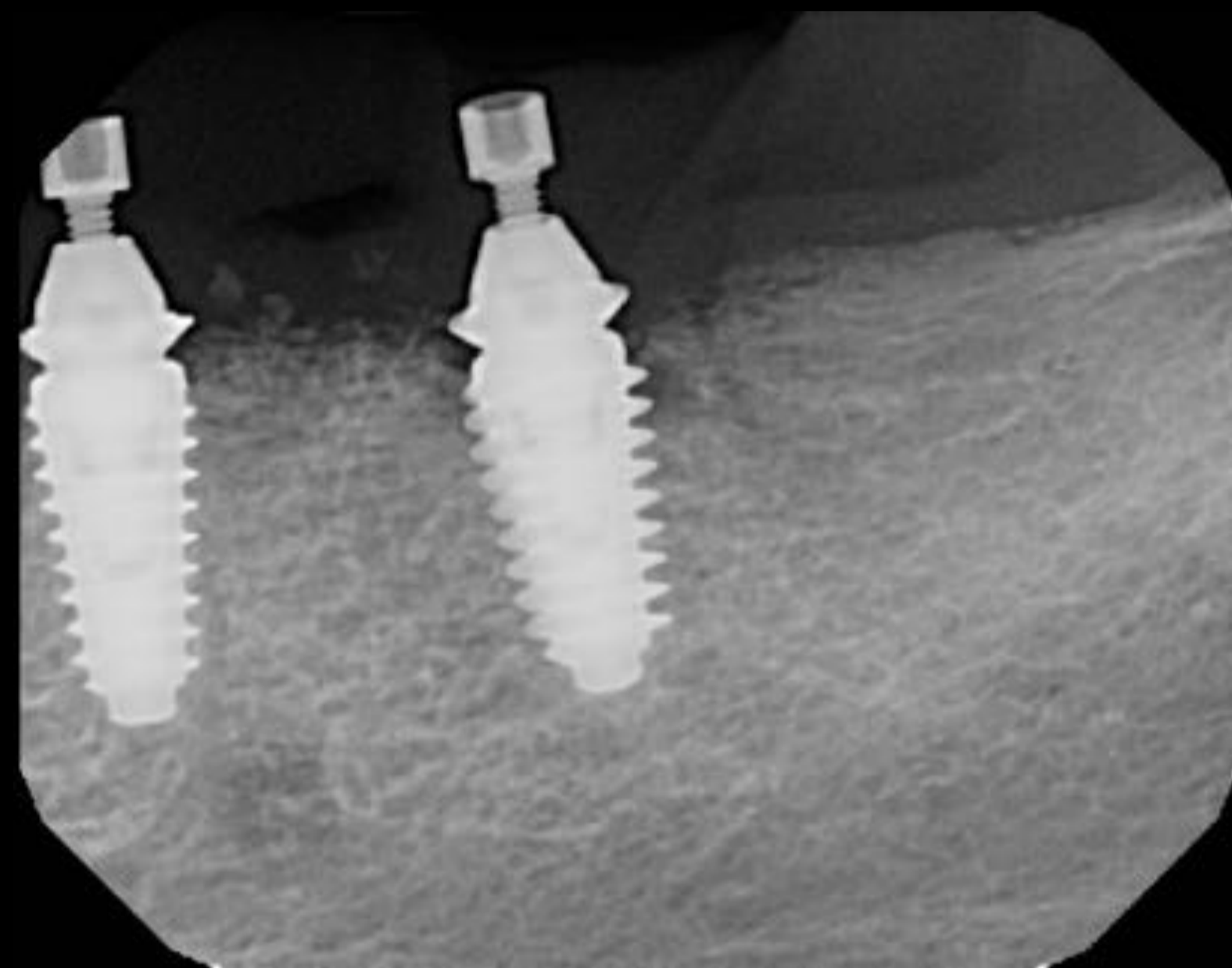
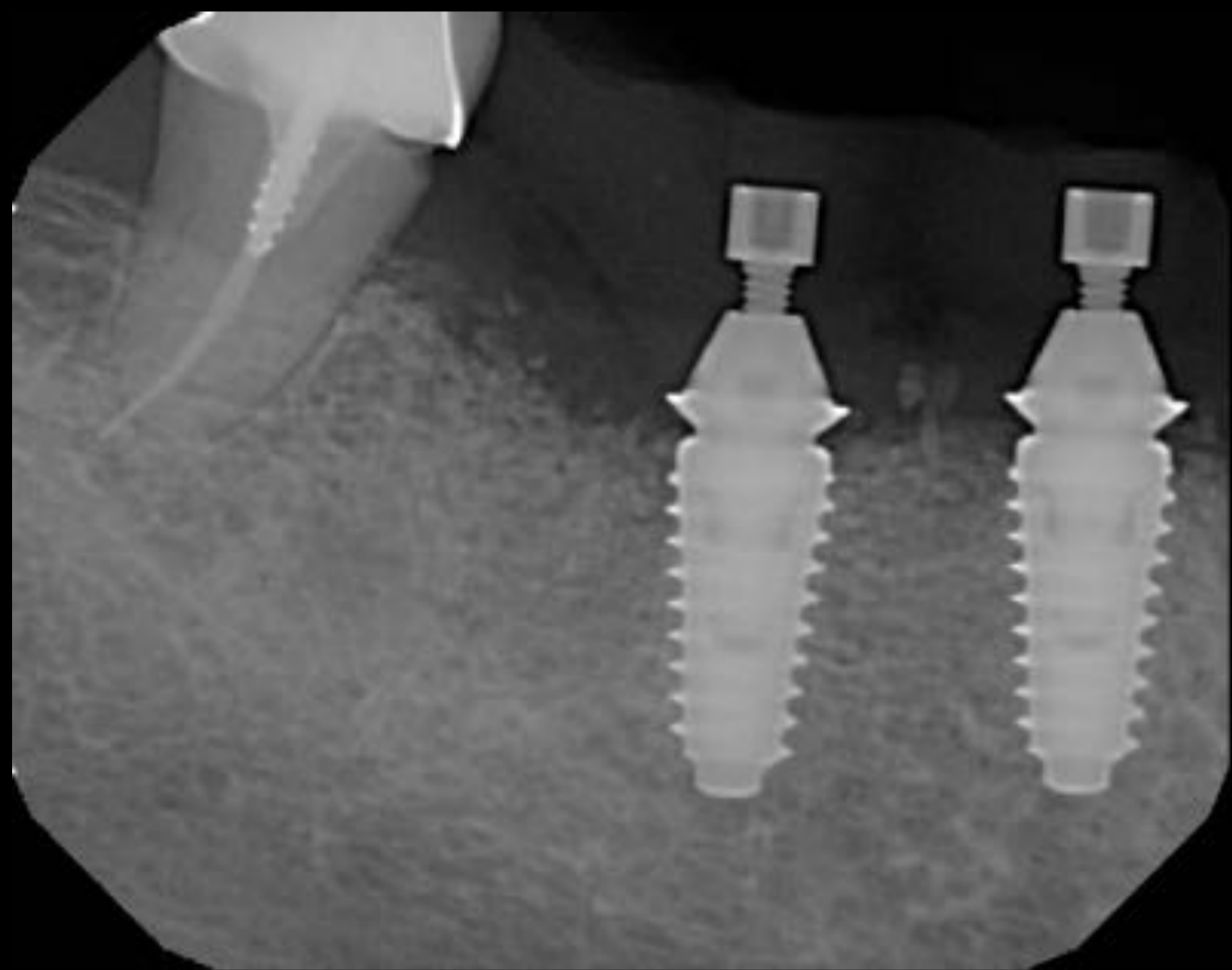


1 Month



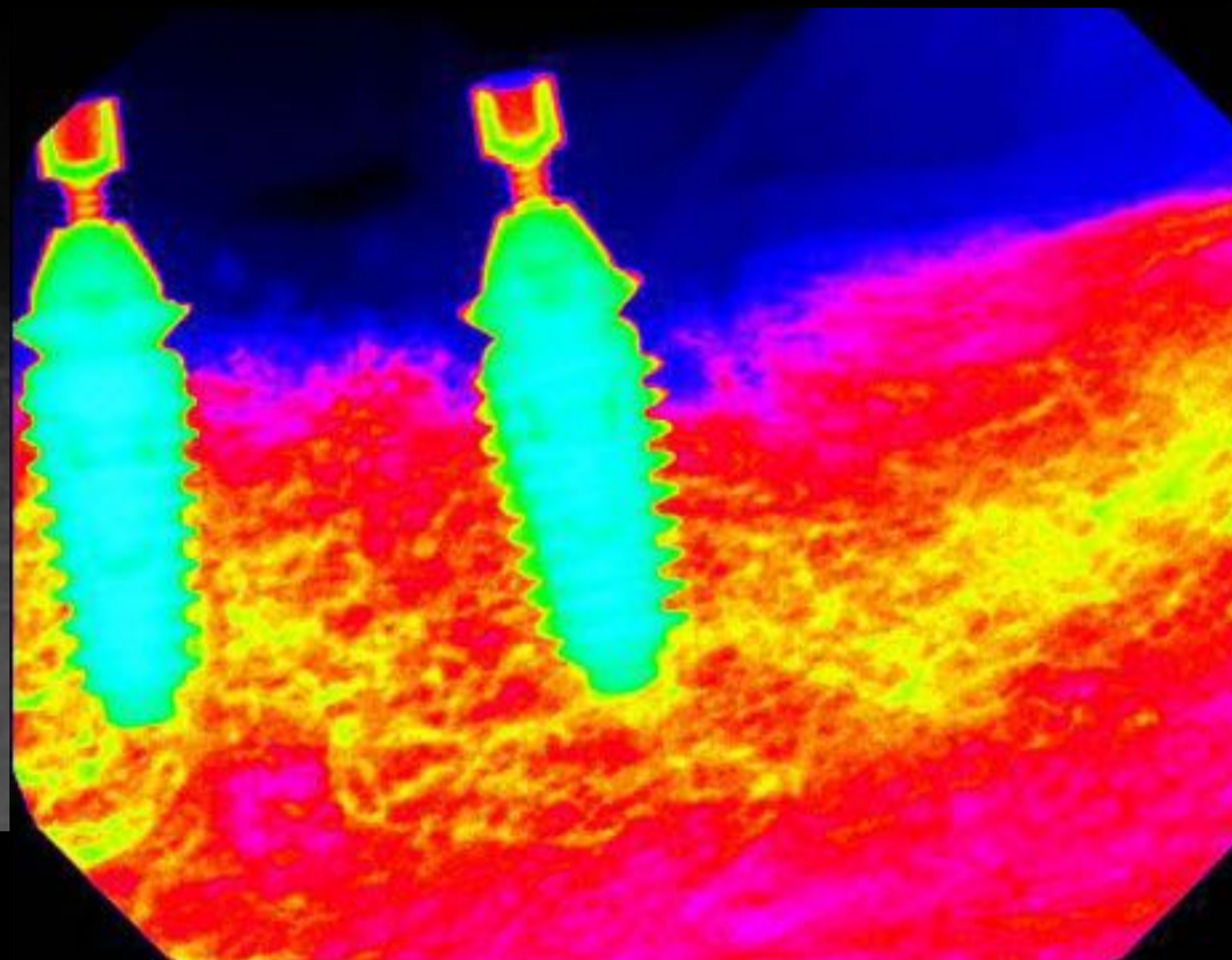
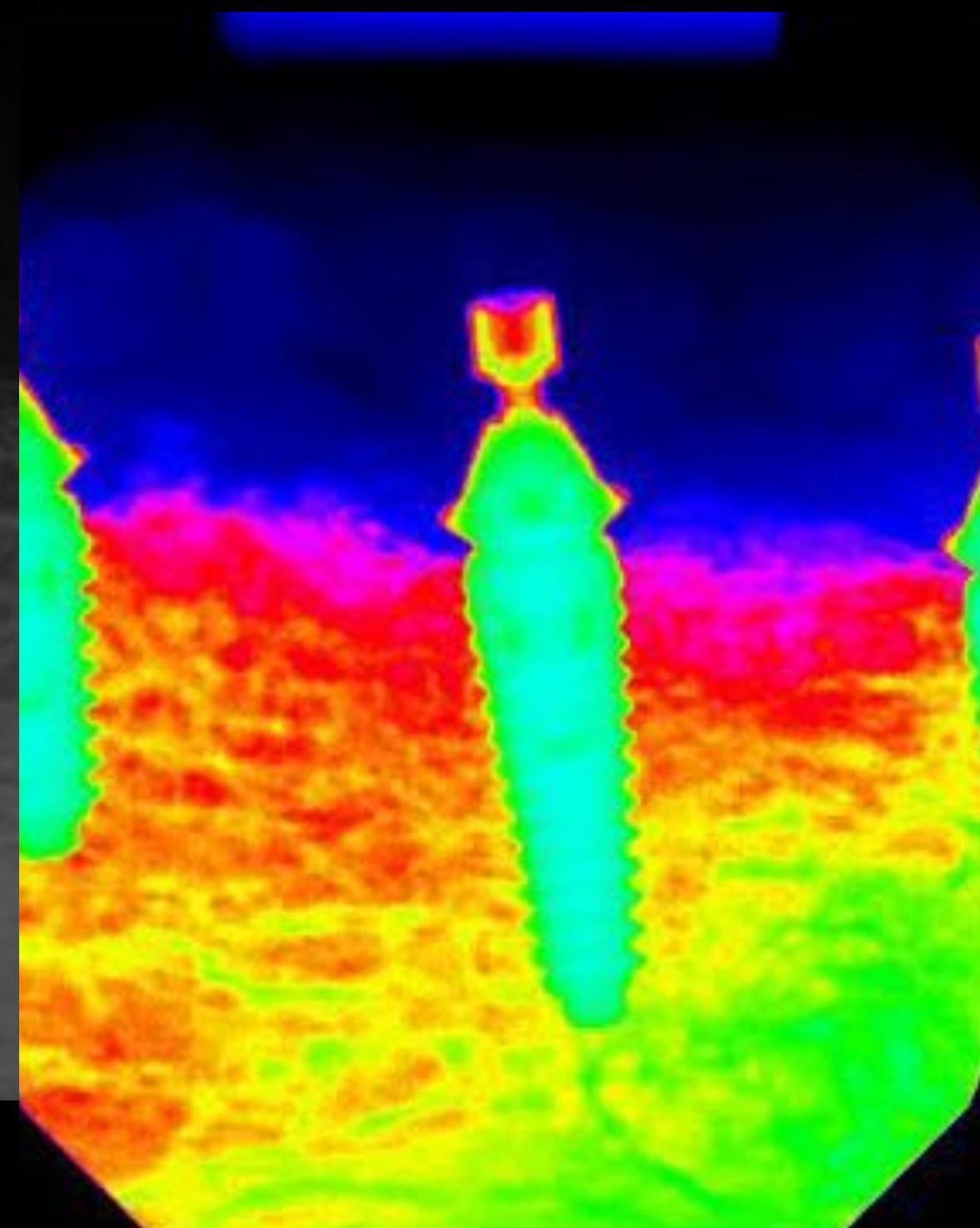
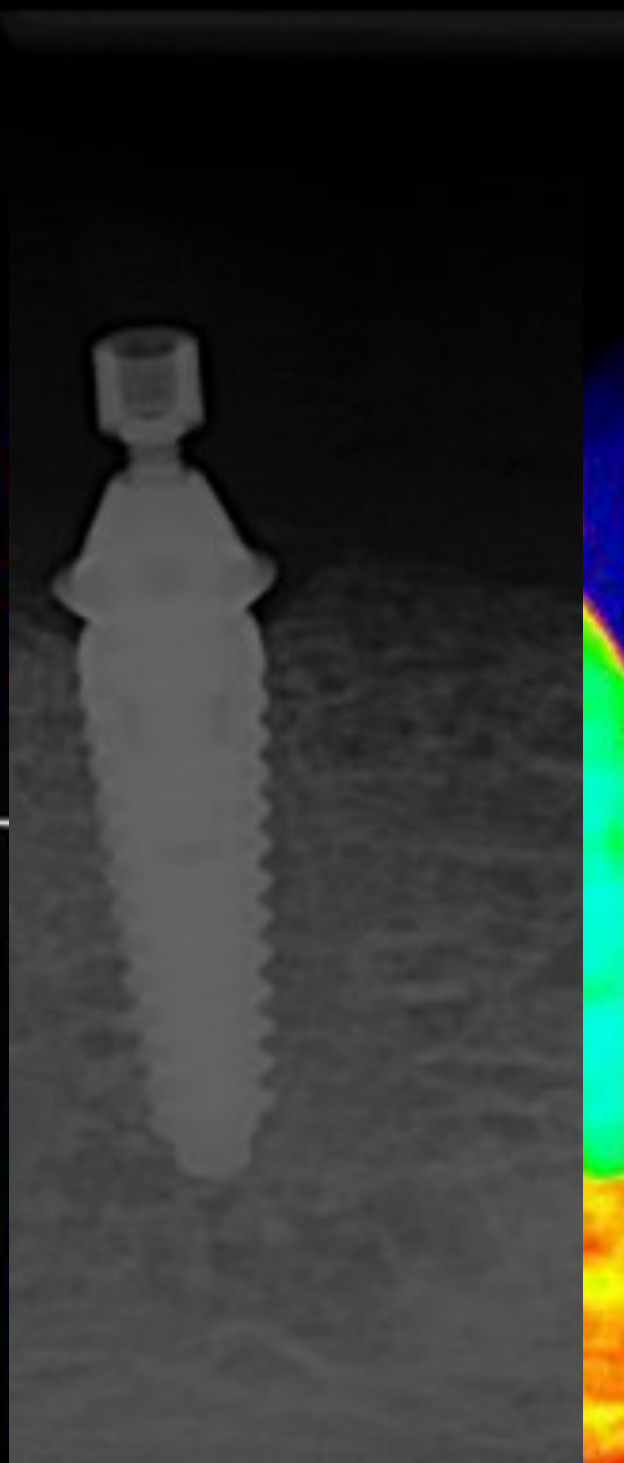
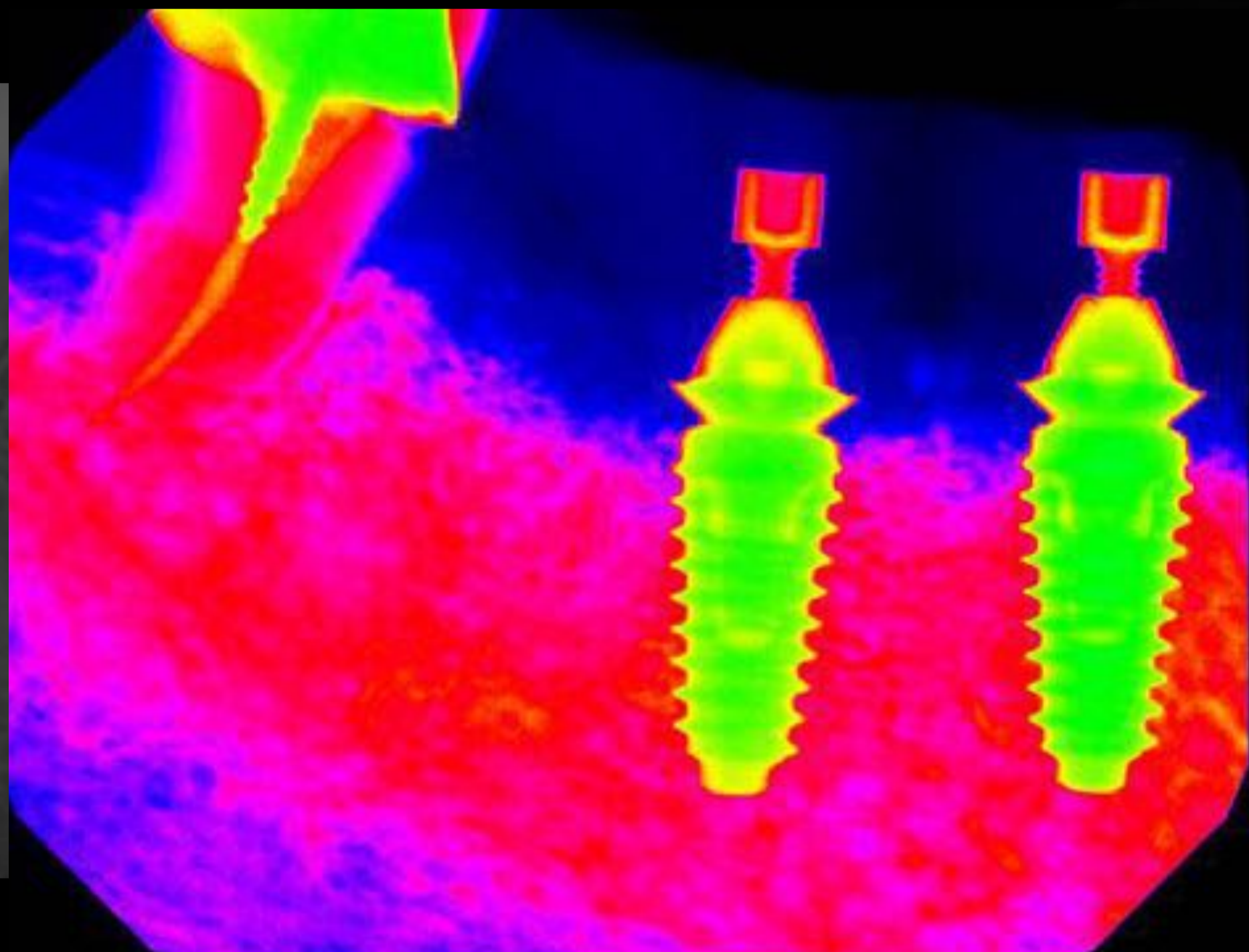
1 Month

- Full template-Guidance



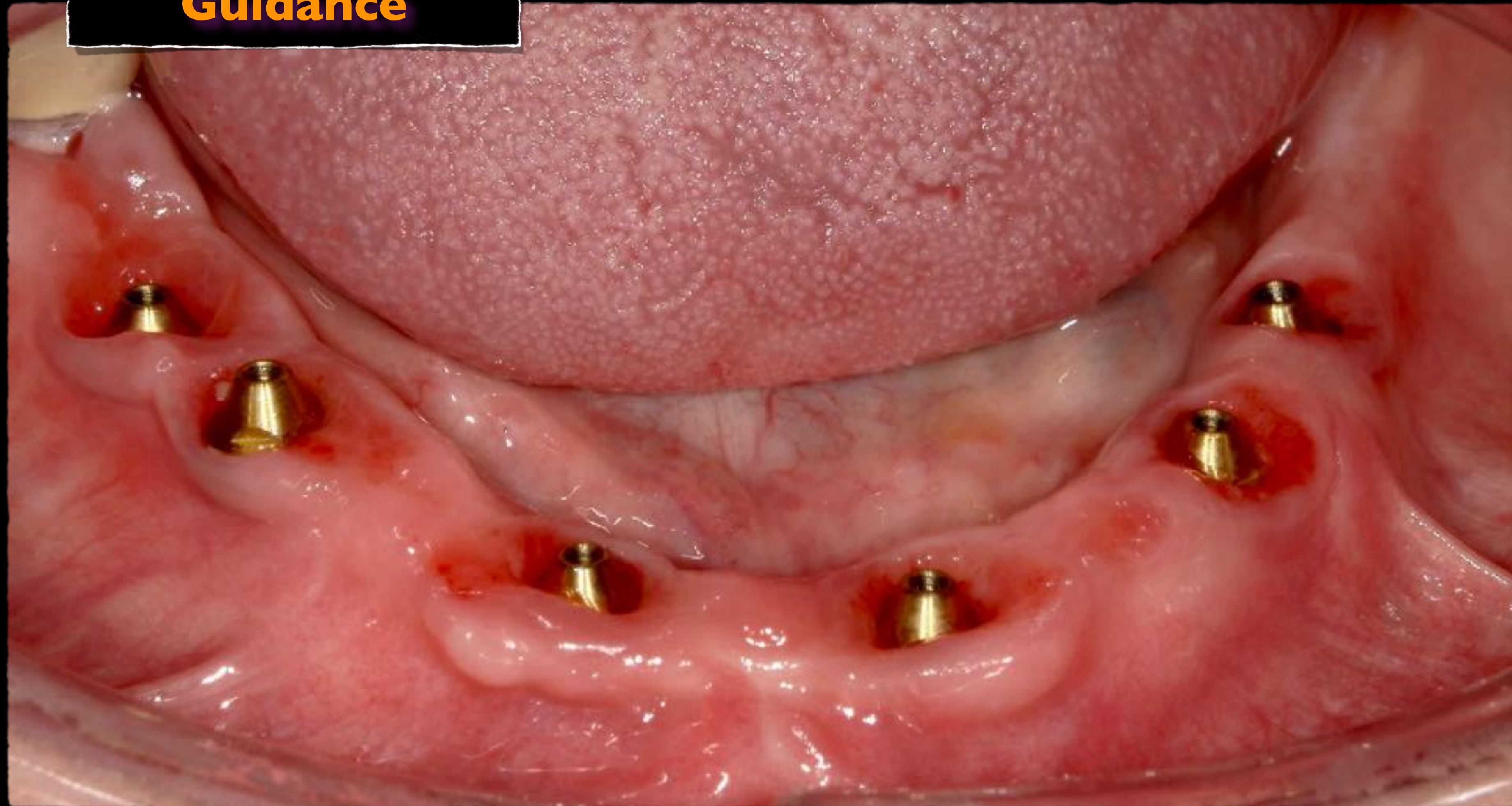
1 Month

- Full template-Guidance



4 Month

• Full template-Guidance



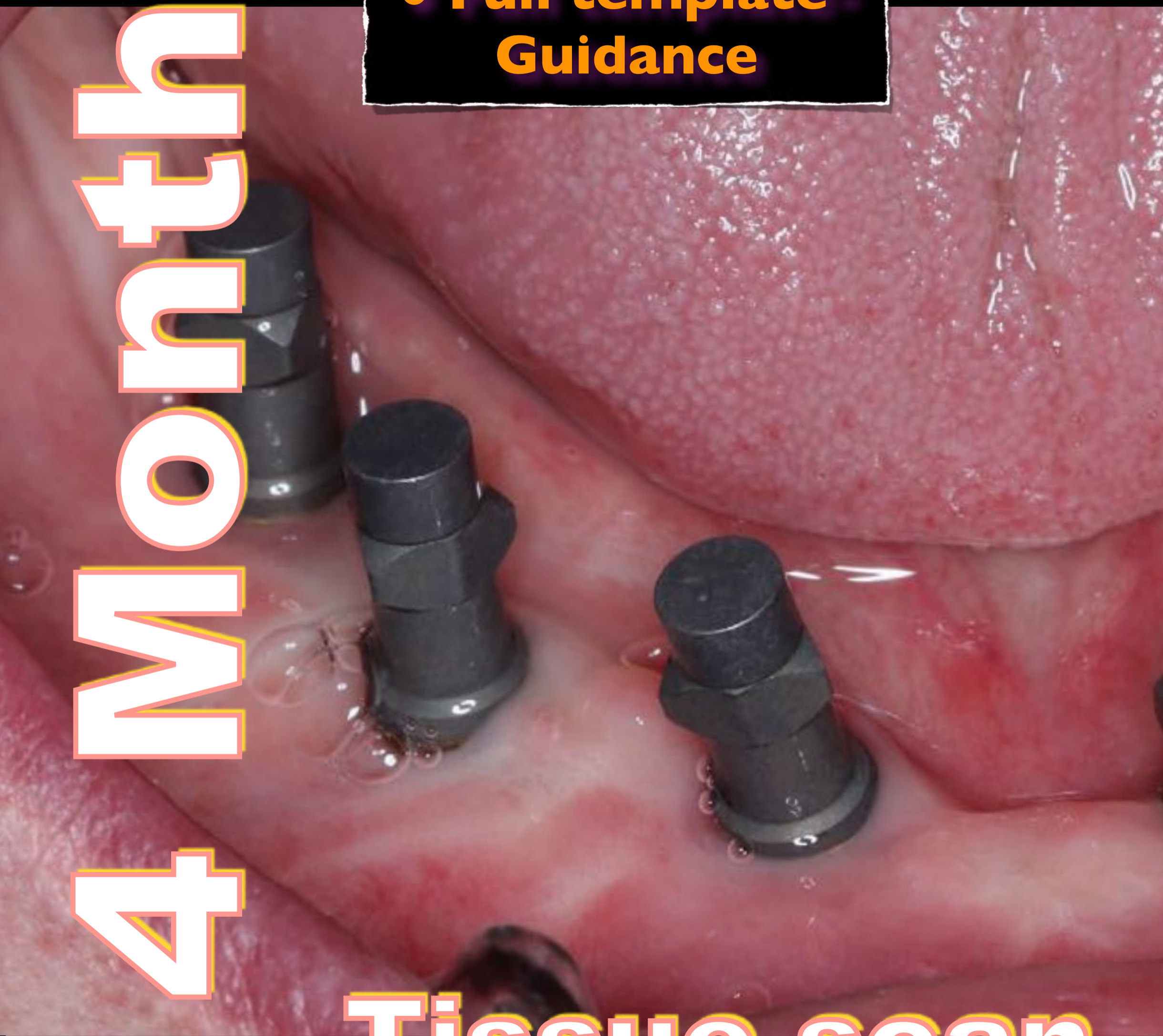
4 Month

- Full t
Gui



4 Month

• Full template-Guidance



Tissue scan

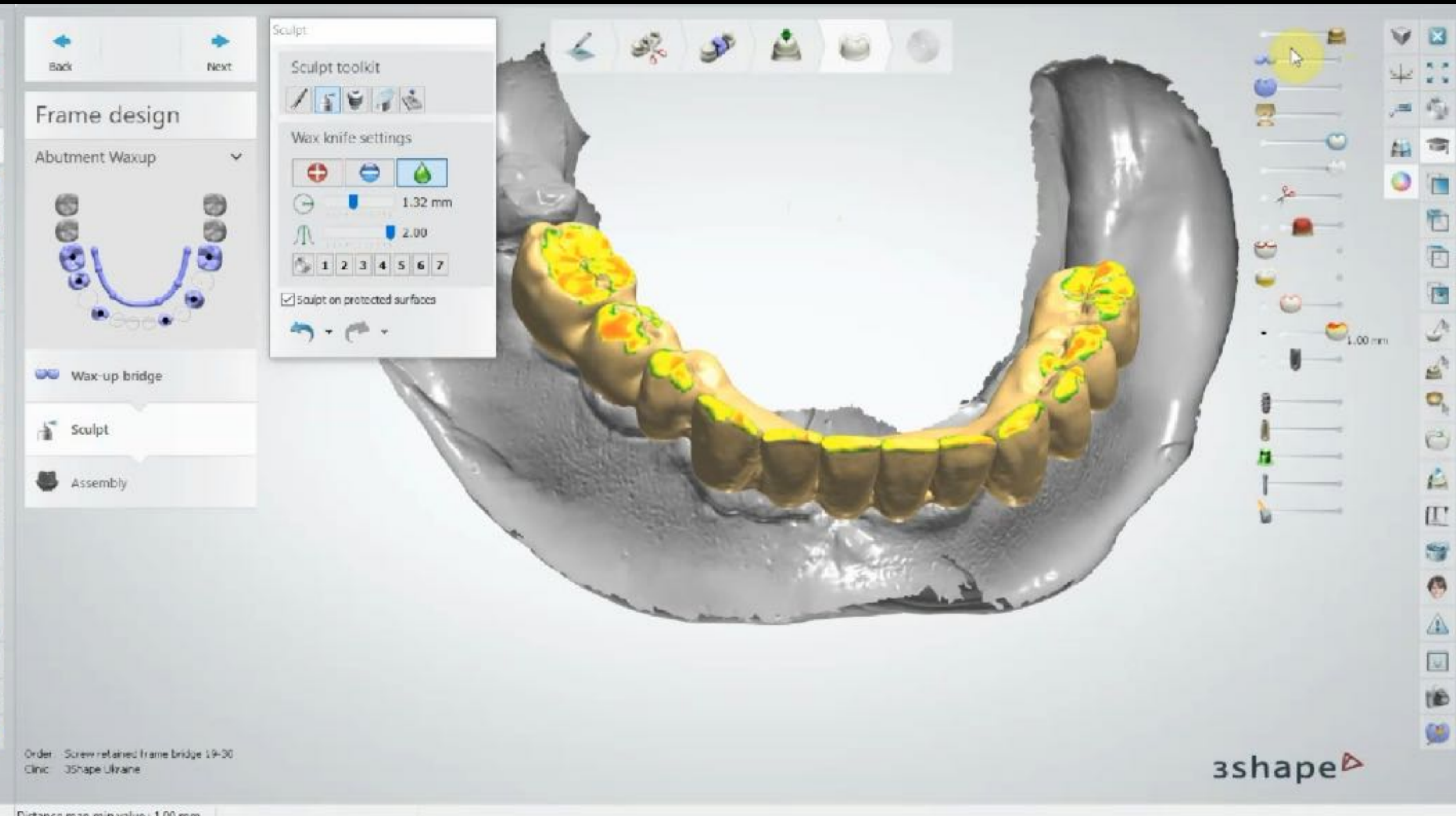
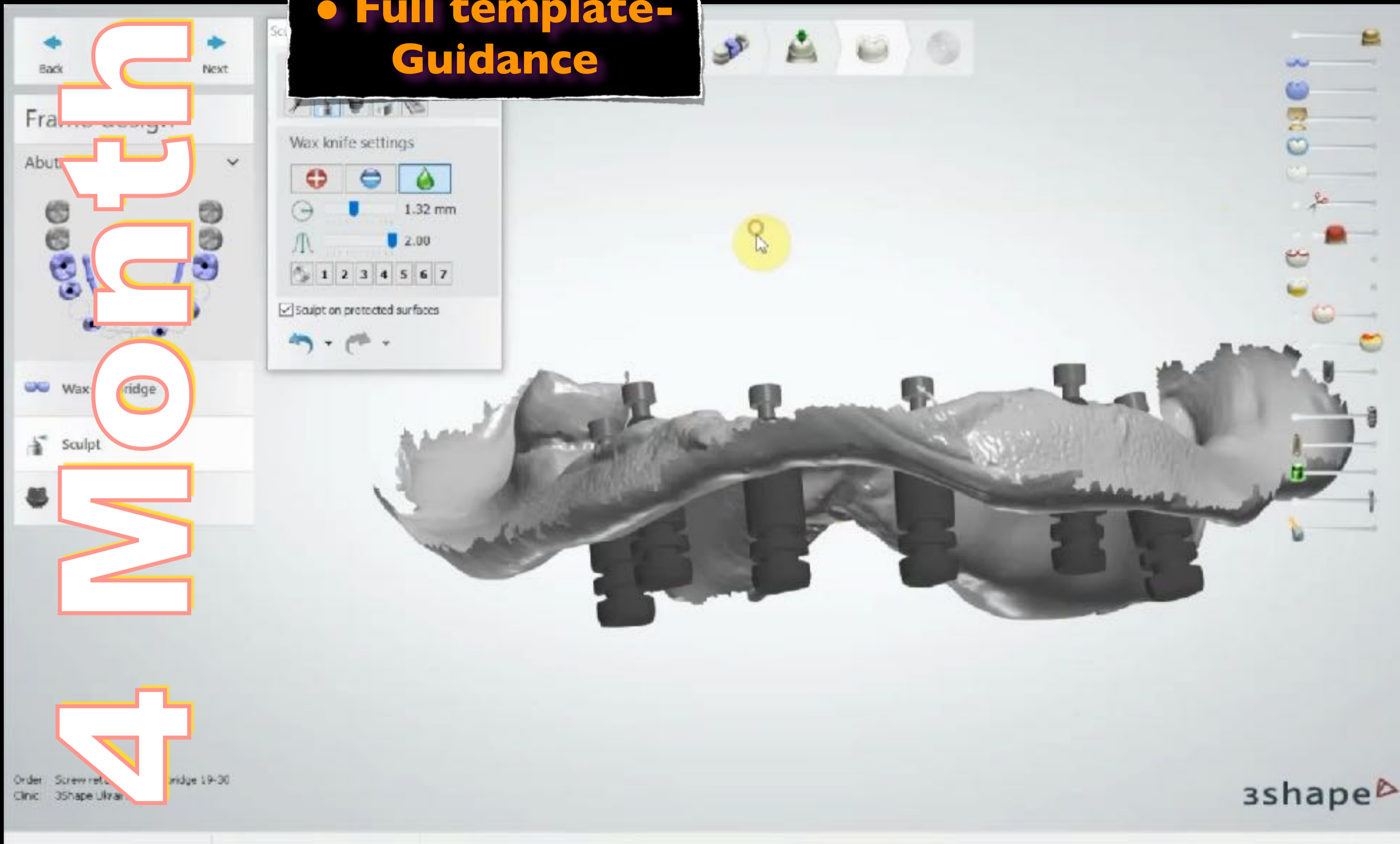


Photogrammetry



• Full template-Guidance

Worint 4



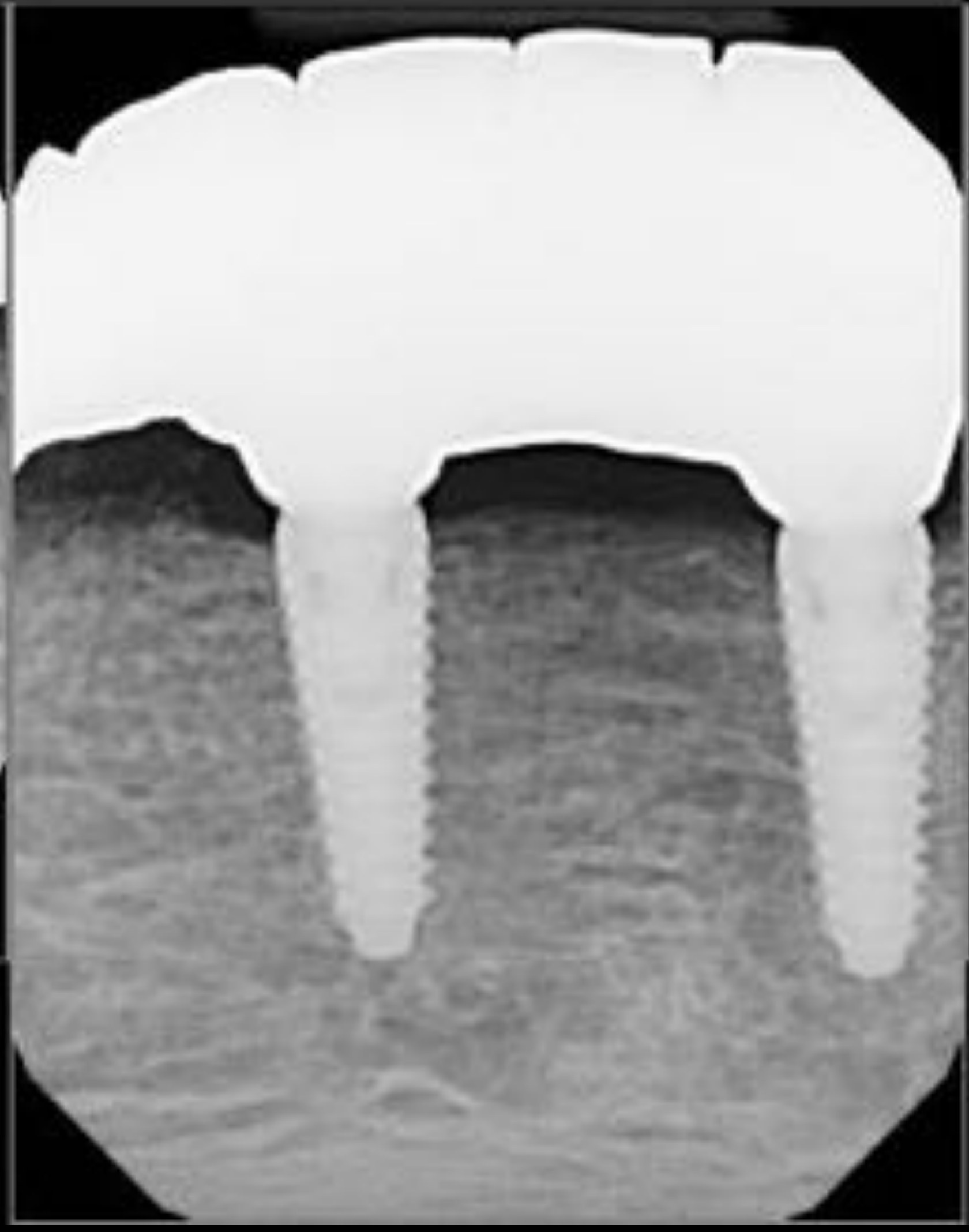
Distance map min value: 1.00 mm

Full template



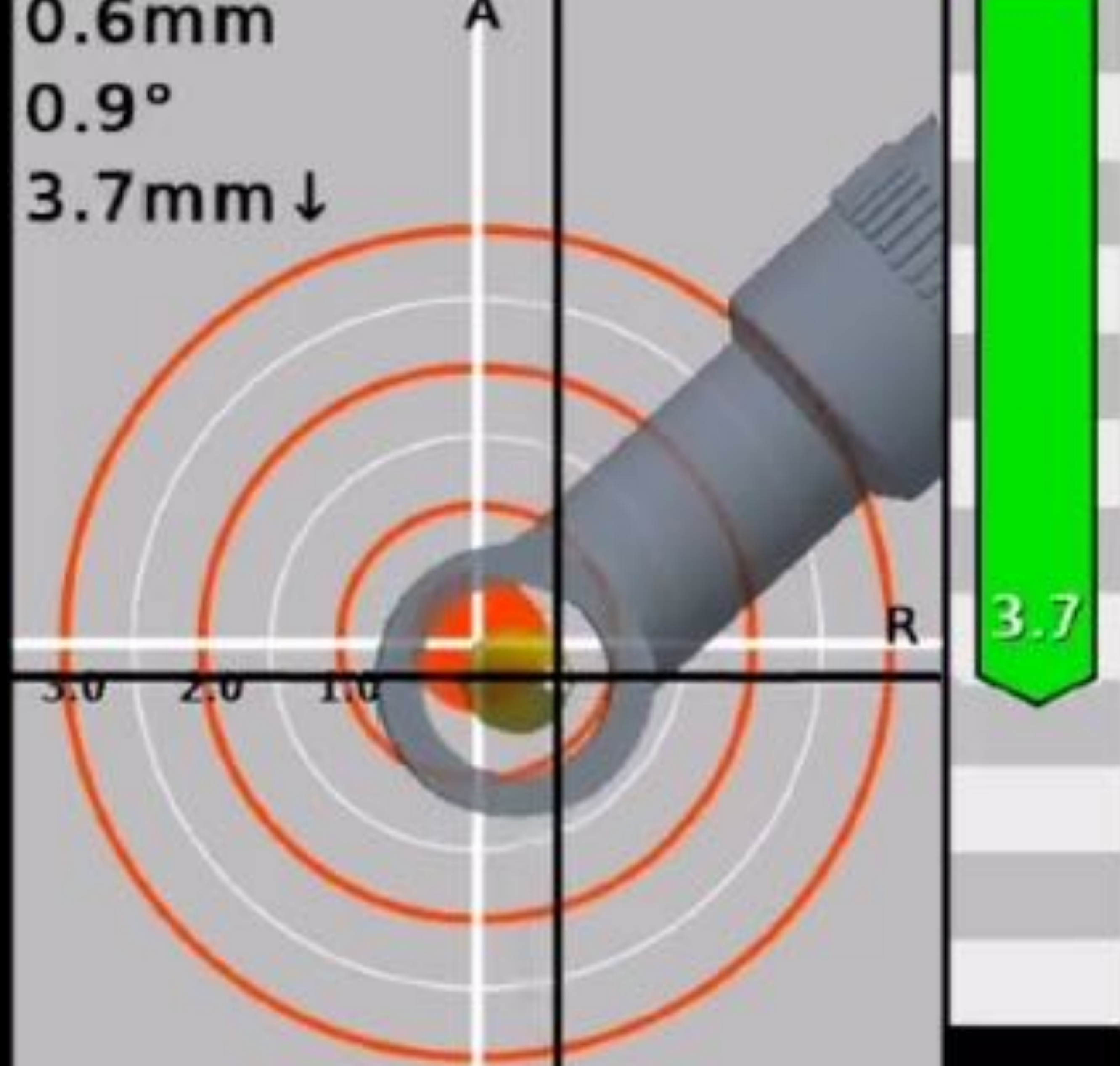
8 Month

- Full template-Guidance



Naranjo, Leda *2/7/1945 (10796/Gary M. Bram)

IT'S NOT WHAT'S NEXT IT'S WHAT NOW



STAY ON TARGET



STAY ON TARGET

PRECISION & ACCURACY

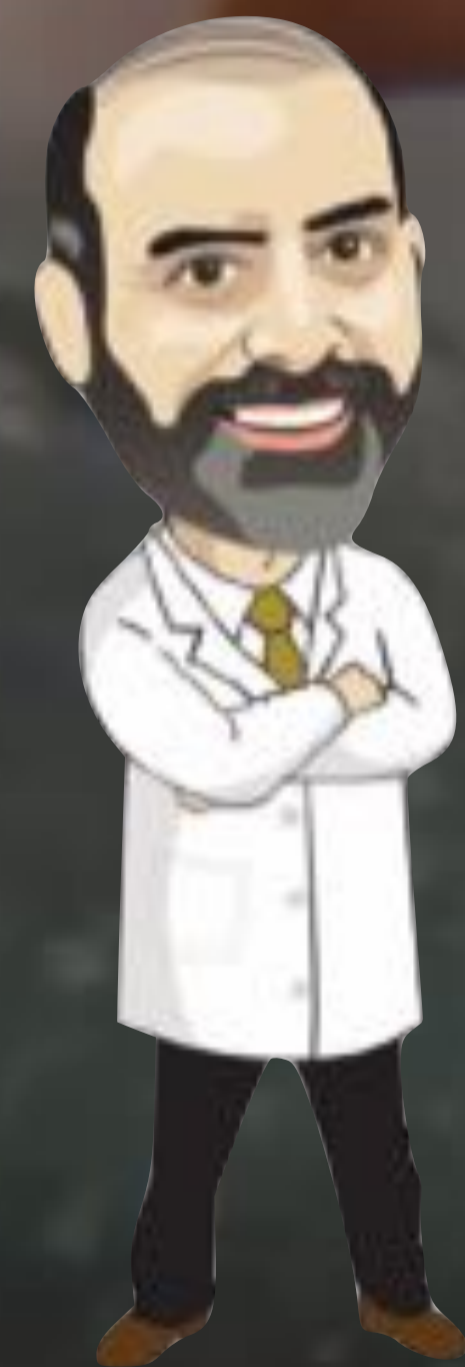


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