

AIE

Advanced Implant Educators

TBS INOX[®]
USA



Immediate Implantation & Partial Extraction Therapy

Vertical sectioning

Isaac Tawil DDS MS

SLOWDENTISTRY[®]



We can preserve quality of life
While preserving & enhancing esthetics



5. None of these



AIE

Advanced Implant Educators

TREATMENT FOR
SUCCESS

INCREASE EFFICIENCY

MAXIMIZE PROFITABILITY

REDUCE SURGICAL TREATMENT

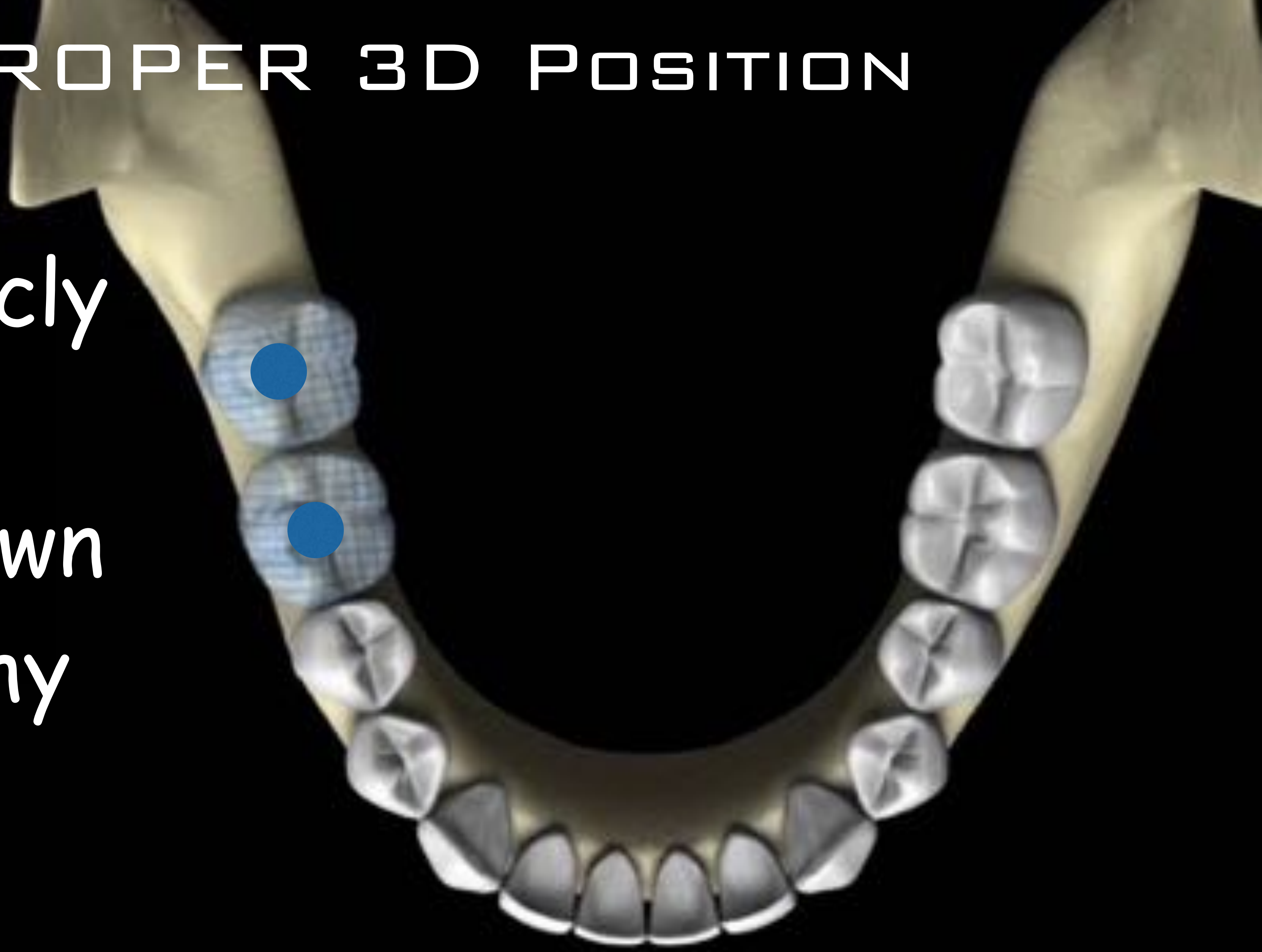
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ENHANCE PATIENT EXPERIENCE



PROPER 3D POSITION

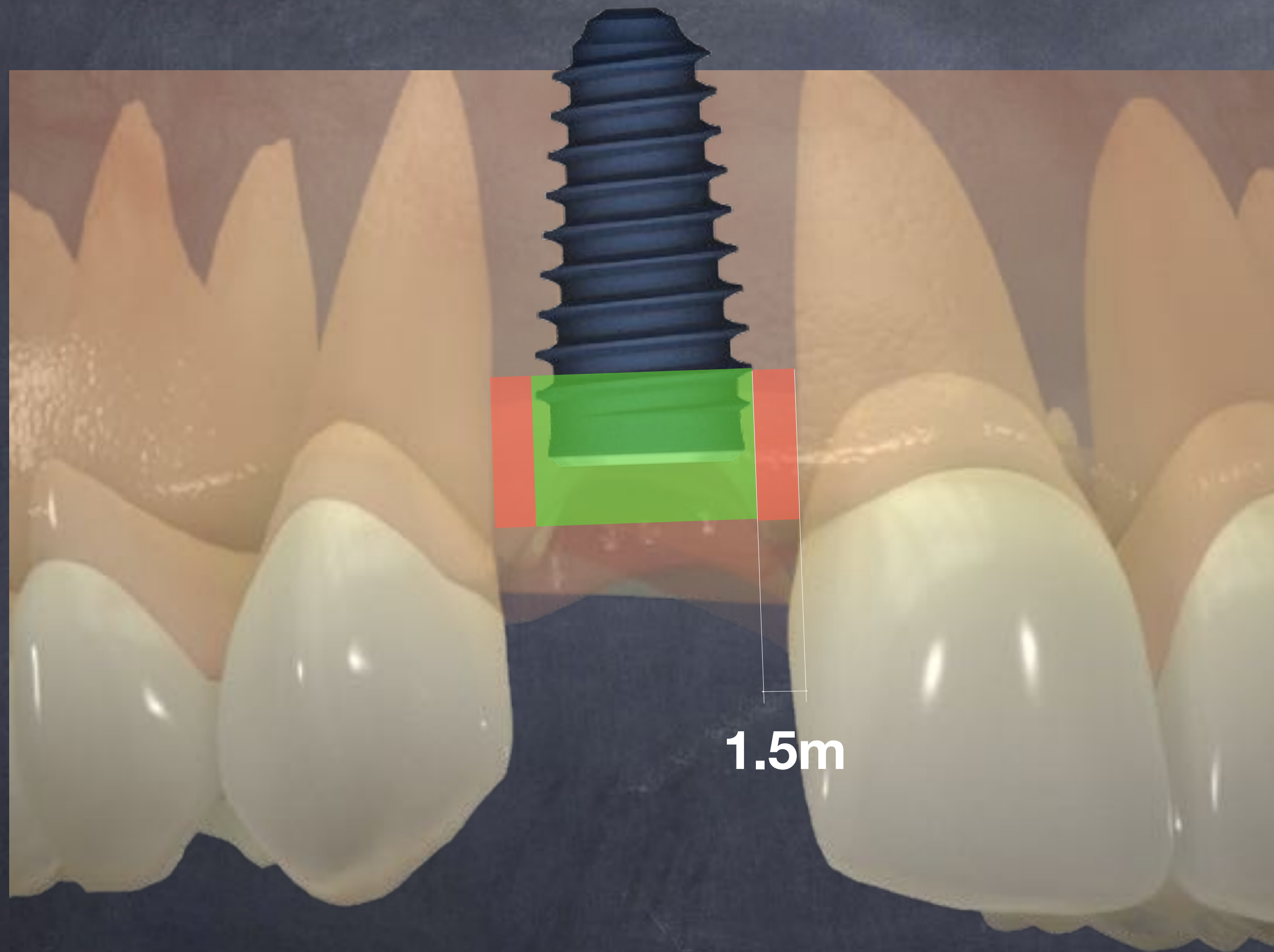
Prosthetically
Driven
Crown Down
Philosophy



A large, vibrant green tree stands prominently in the center of a vast, rolling forest landscape. The background features rolling hills covered in dense green trees under a clear blue sky. The text is overlaid on the tree and the forest.

**Keep your perspective
Dont miss the forest for the trees**

Distance from Natural Tooth

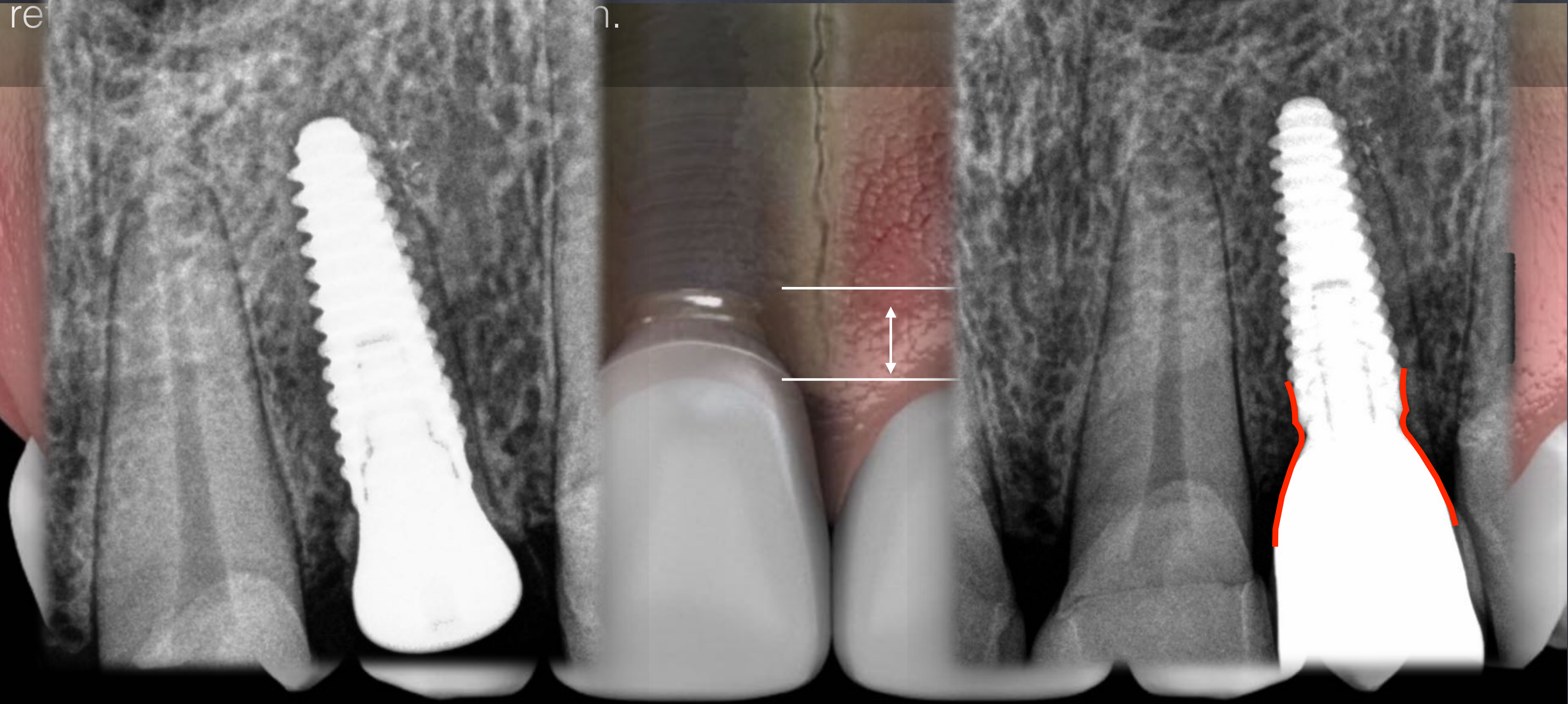


Mesio-distally: The implant should be at a distance of 1.5 mm from the adjacent teeth. This is the minimal distance although there are some articles that even showed that 2 mm would be an improvement (Gastaldo 2004).

Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future restoration. In immediate implants the reference is the gingival distance of the removed teeth. If there is no teeth previously, a wax- up should create a reference of the future restoration.



Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future restoration. In immediate implants the reference is the gingival distance of the teeth. In non-teeth previously, a reference is the alveolar bone.



Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future rest. In immediate implant, the reference is the gingival distance of rest.



Inter-implant Distance: The minimum distance between 2 implants to retain vertical and horizontal hard and soft tissue 3mm at the implant-abutment level(Tarnow,Cho, Wallace J Perio 2000).

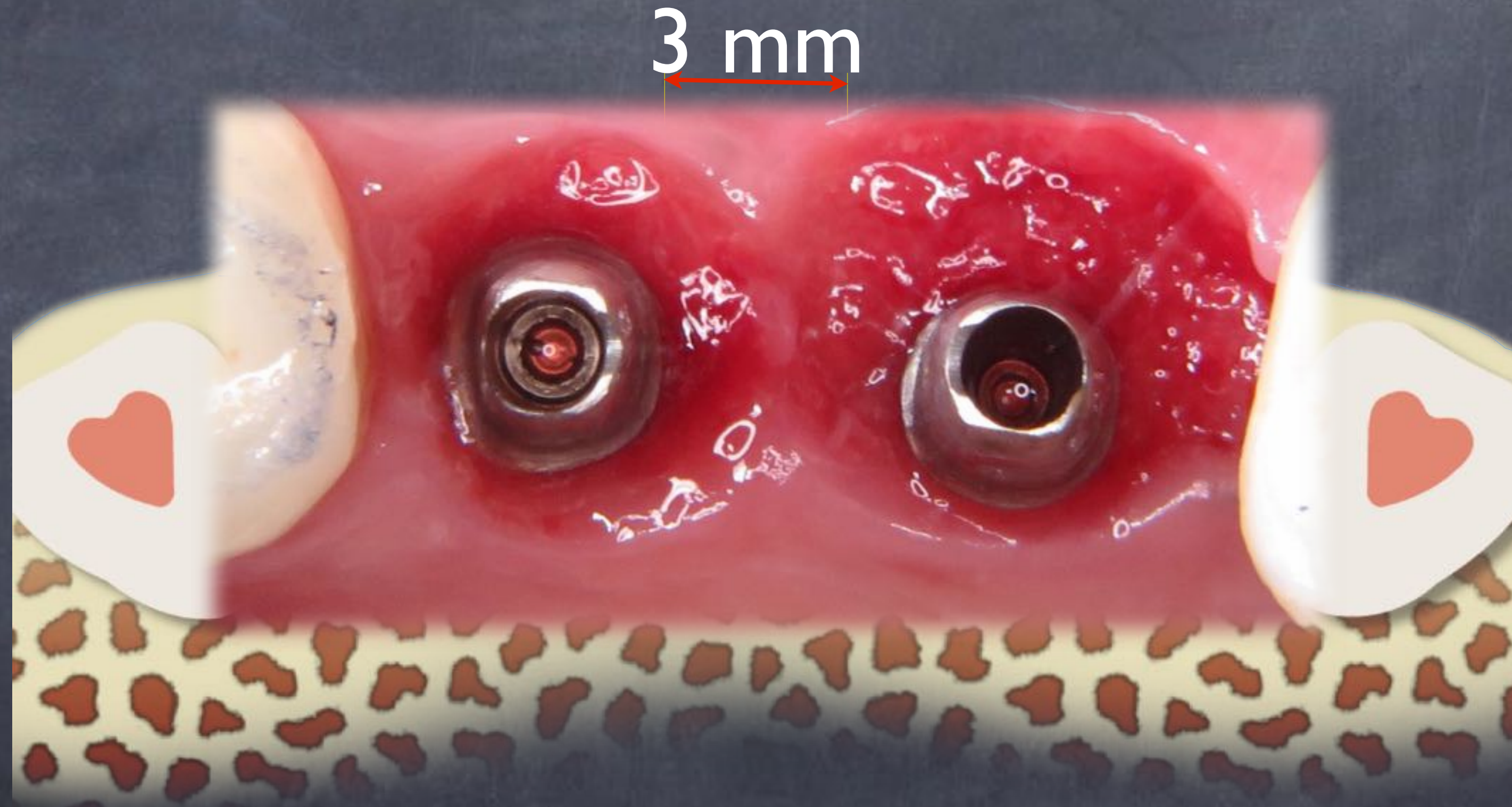
Allows
vascularity
to papilla
and
osseous
crest



Emergence
Profile

Inter-implant Distance: The minimum distance between 2 implants to retain vertical and horizontal hard and soft tissue 3mm at the implant-abutment level(Tarnow,Cho, Wallace J Perio 2000).

Allows
vascularity
to papilla
and
osseous
crest



Emergence
Profile

Timing of Implant placement in relation to tooth extraction

A p p r o a c h

- | | | |
|--------|---|--|
| Type 1 | → | Immediately following tooth extraction |
| Type 2 | → | Complete soft tissue coverage of the socket |
| Type 3 | → | Substantial radiographic bone fill of the socket |
| Type 4 | → | Fully healed ridge |

Timing of Implant placement in relation to tooth extraction

A p p r o a c h

Type 1

Type 2

Type 3

Type 4

Each has advantages and disadvantages but each is suitable for specific clinical situation

Hammerle et al. 2004

Timing of Implant placement in relation to tooth extraction

A p p r o a c h

Type 1

Type 2

Type 3

Type 4

Which one of these is more appropriate when an anterior tooth needs to be replaced by an implant ?

Immediate

Early (6-8 weeks)

Delayed (12-18 weeks)

Late (above 18 weeks)

Hammerle et al. 2004

Timing of Implant placement in relation to tooth extraction

Still remains a controversial issue

Nemcovsky CE, et al. 2002

Chen ST, et al. 2007

Kan JYK, et al. 2007

Evans CJD, et al. 2008

“Immediate implant placement has a greater risk of facial marginal defect and gingival recession compared to early or delayed placement”

Over the years, many solutions have been proposed in order to improve the clinical performance of dental implants

Implant design

Surface treatments

Implant-prosthetic connections

Abutment design

Immediate Implants Benefits

Minimally Invasive and More Efficient

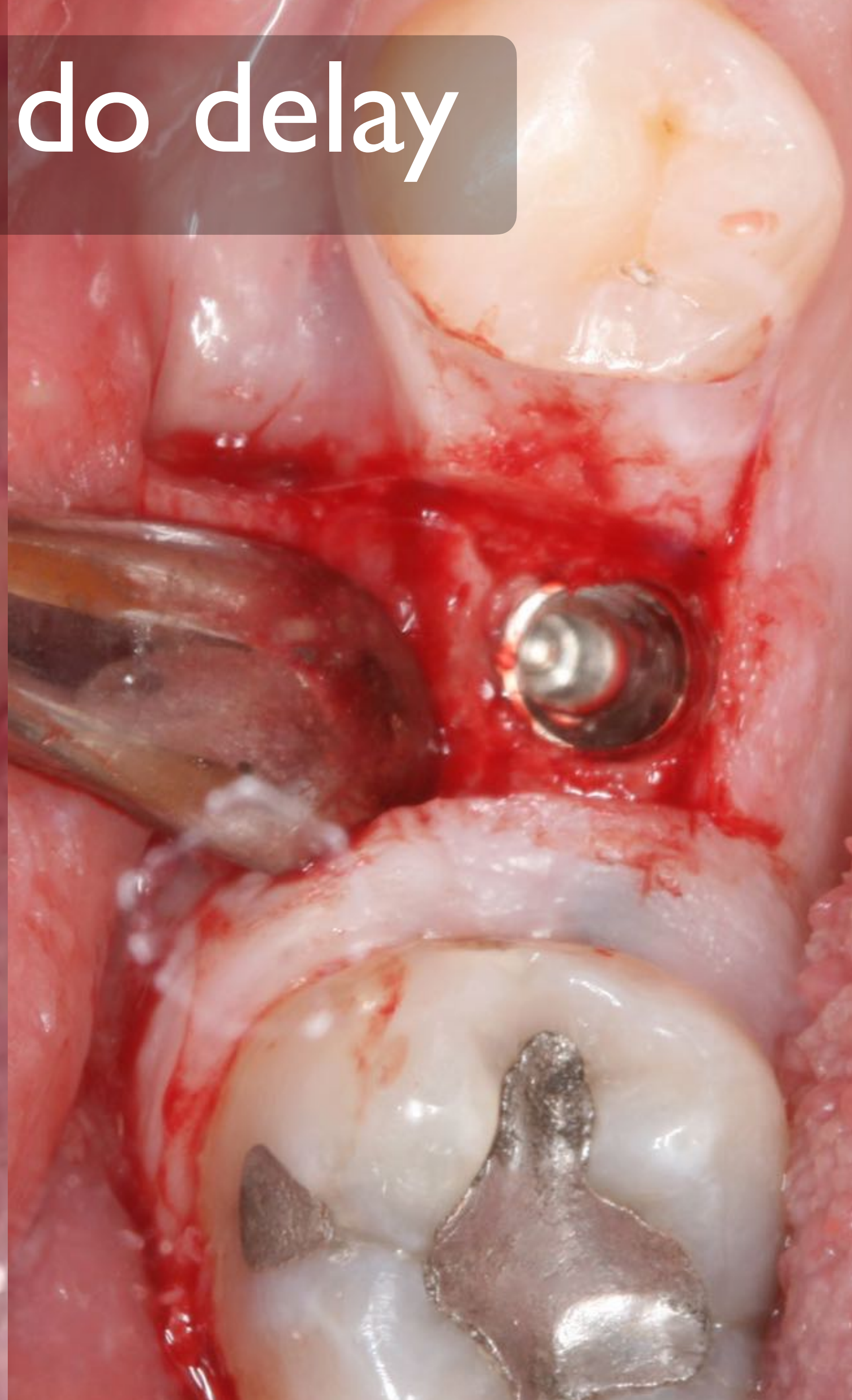


Less surgery
Less trauma
Less pain
Less morbidity



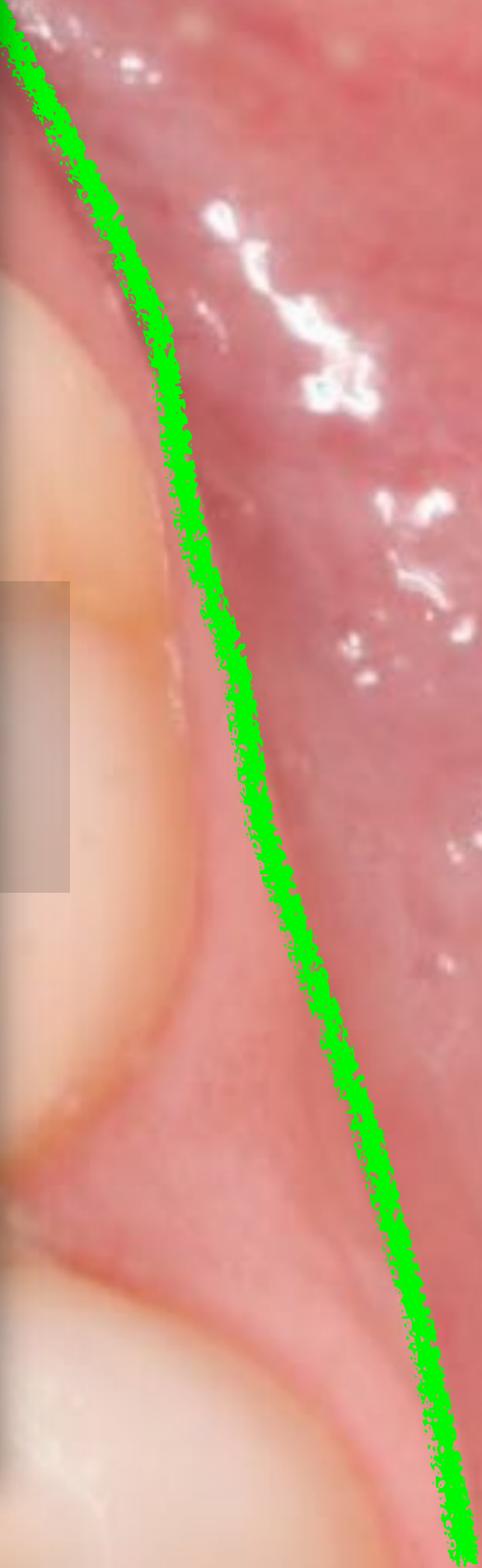
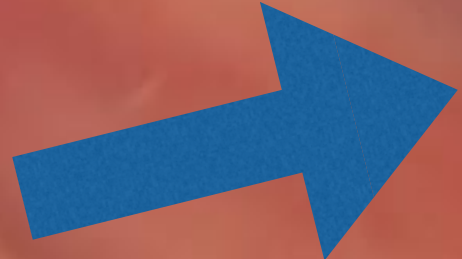
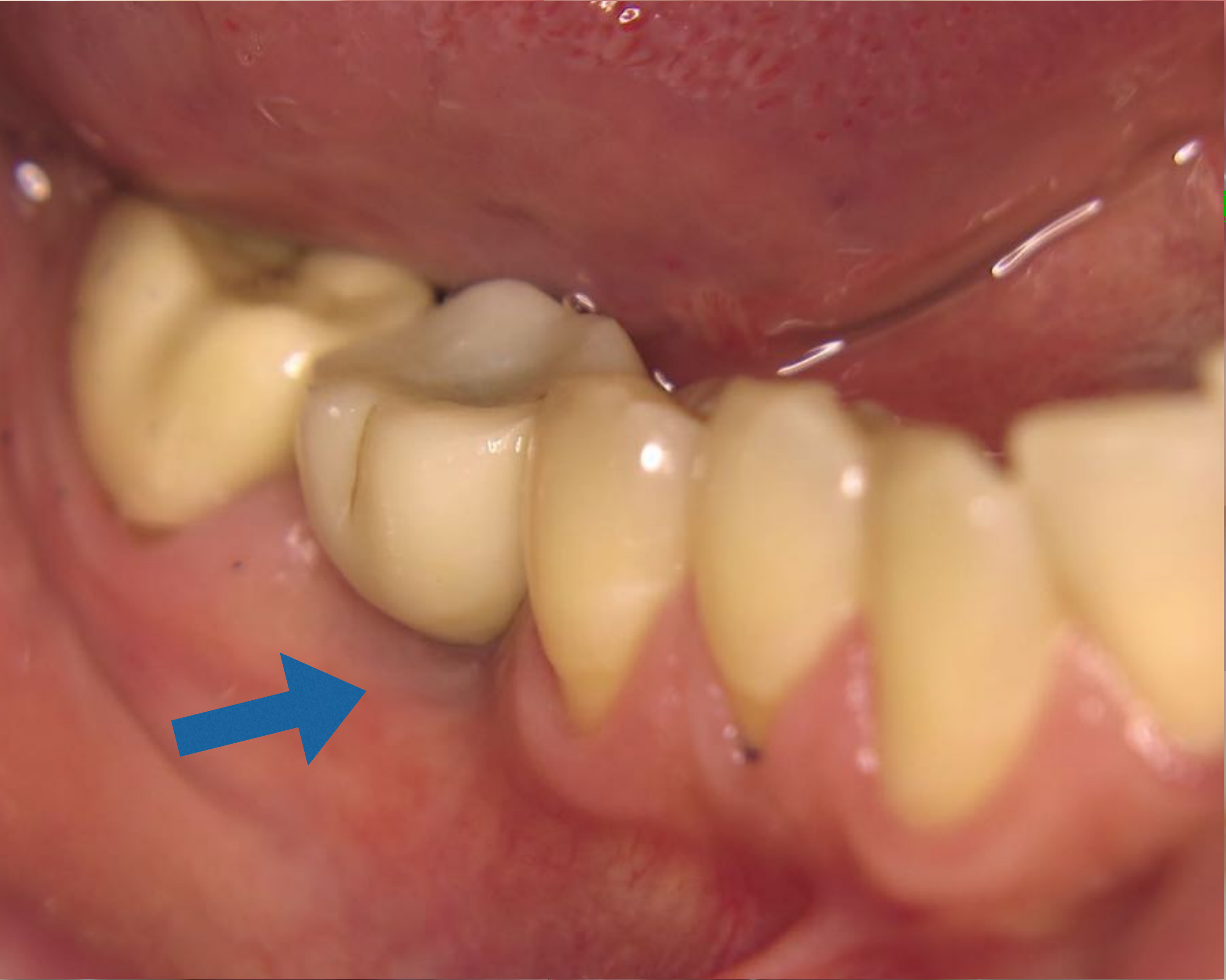
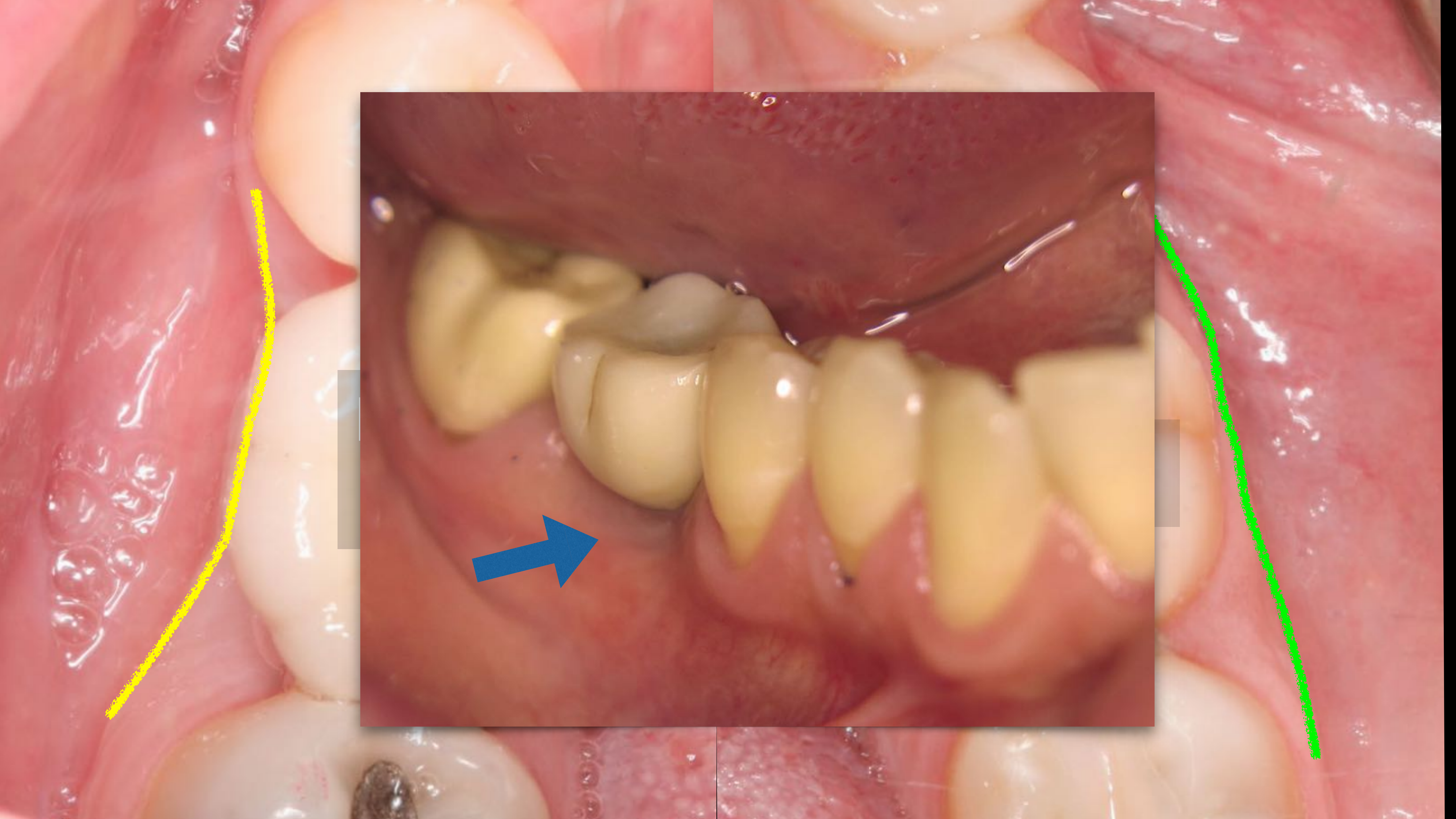
faster
better esthetic
increased preservation
function

What happens if you do delay



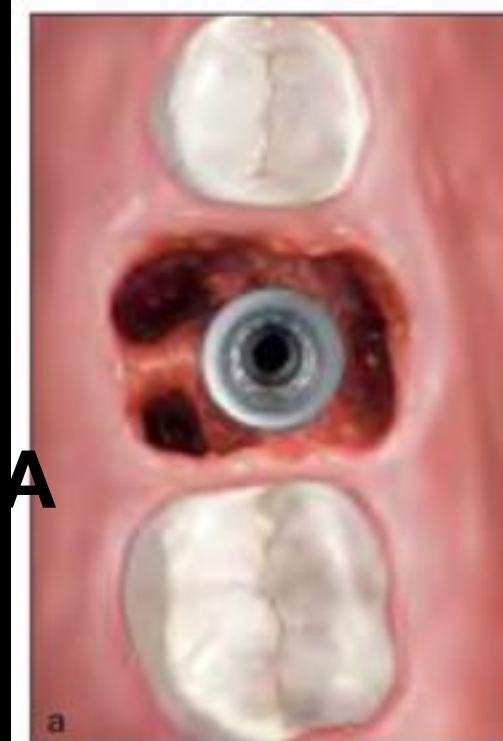
What happens if you do delay



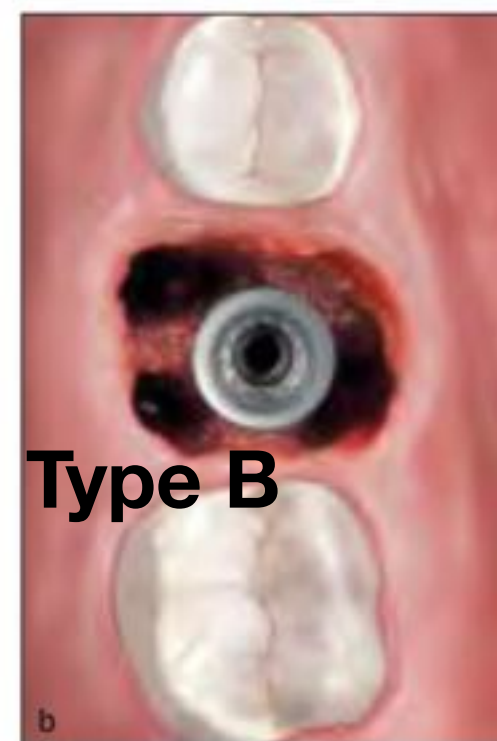


Classification of Molar Extraction Sites for Immediate Dental Implant Placement: Technical Note

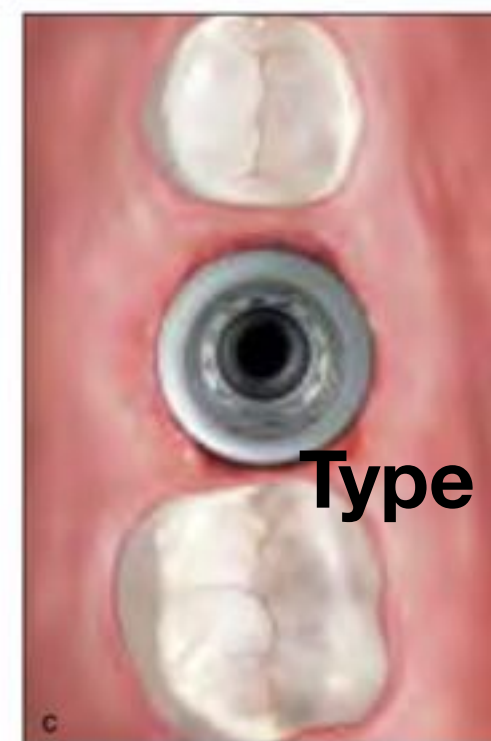
Richard B. Smith, DDS¹/Dennis P. Tarnow, DDS²



A



Type B



Type C

Fig 1a Type A socket. The coronal portion of the implant is completely contained within the septal bone.

Fig 1b Type B socket. The implant is stabilized but not completely contained by the septal bone; a gap is present between the implant and the inner socket walls.

Fig 1c Type C socket. No septal bone is available for implant stabilization. A wide-diameter implant must engage the inner aspects of the socket walls and/or bone apical to the socket to be stable.



Fig 2 (left) Maxillary first molar sectioned prior to extraction.

Fig 3 (right) Implant placed in the septal bone and at the base of the root trunk/top of the furcation results in adequate running room for proper prosthetic emergence profiles.

Immediate for Molars



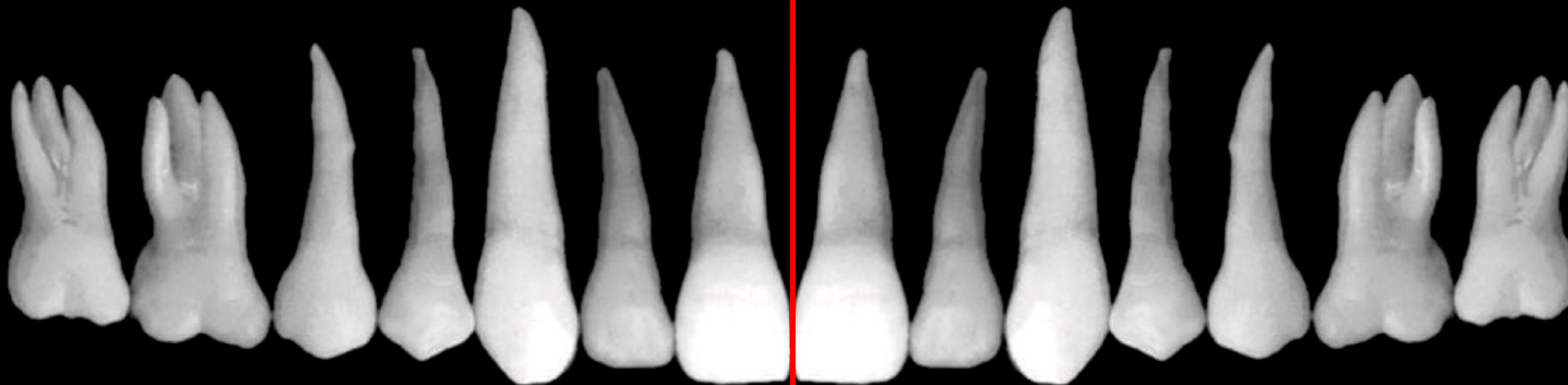


**The human surgical guide
for Immediate Molars**

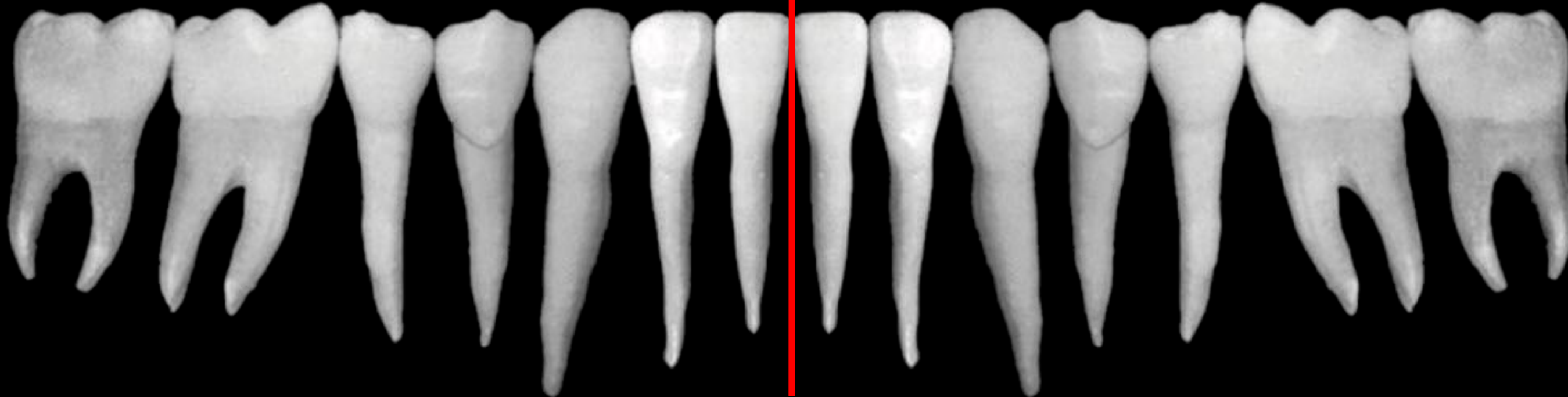
Tooth Morphology

(Maxillary)

(Median line)



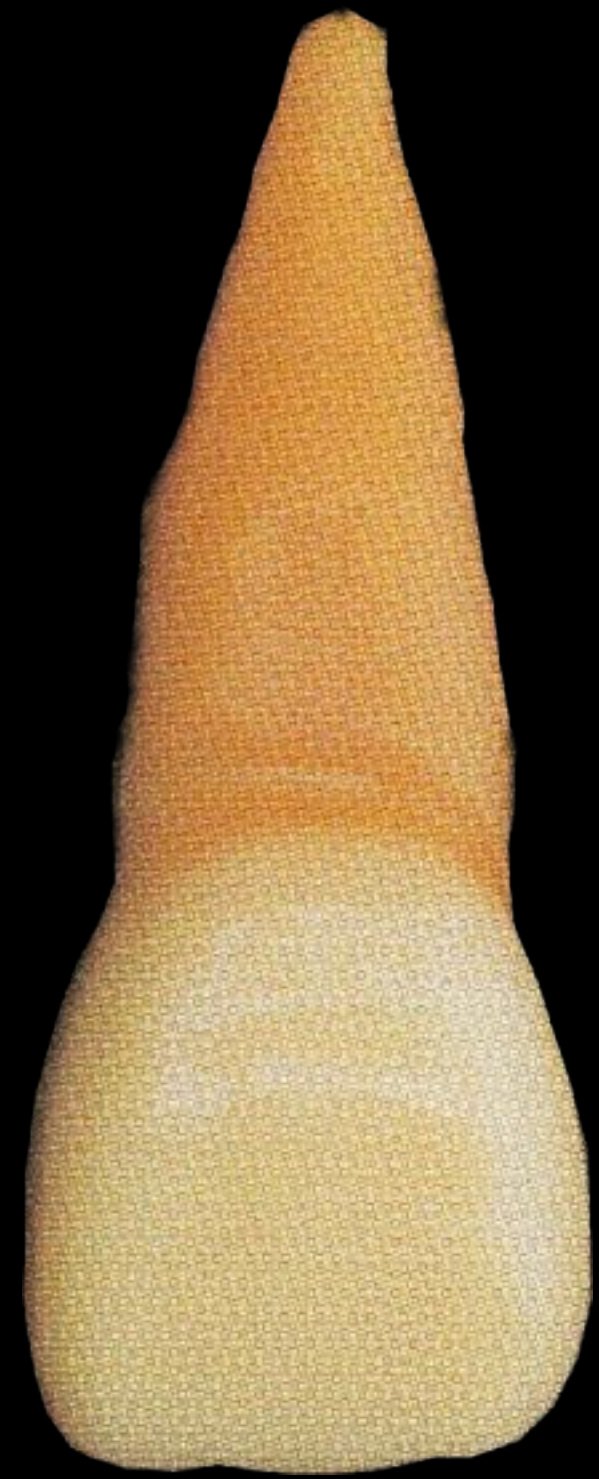
(Occlusal line)



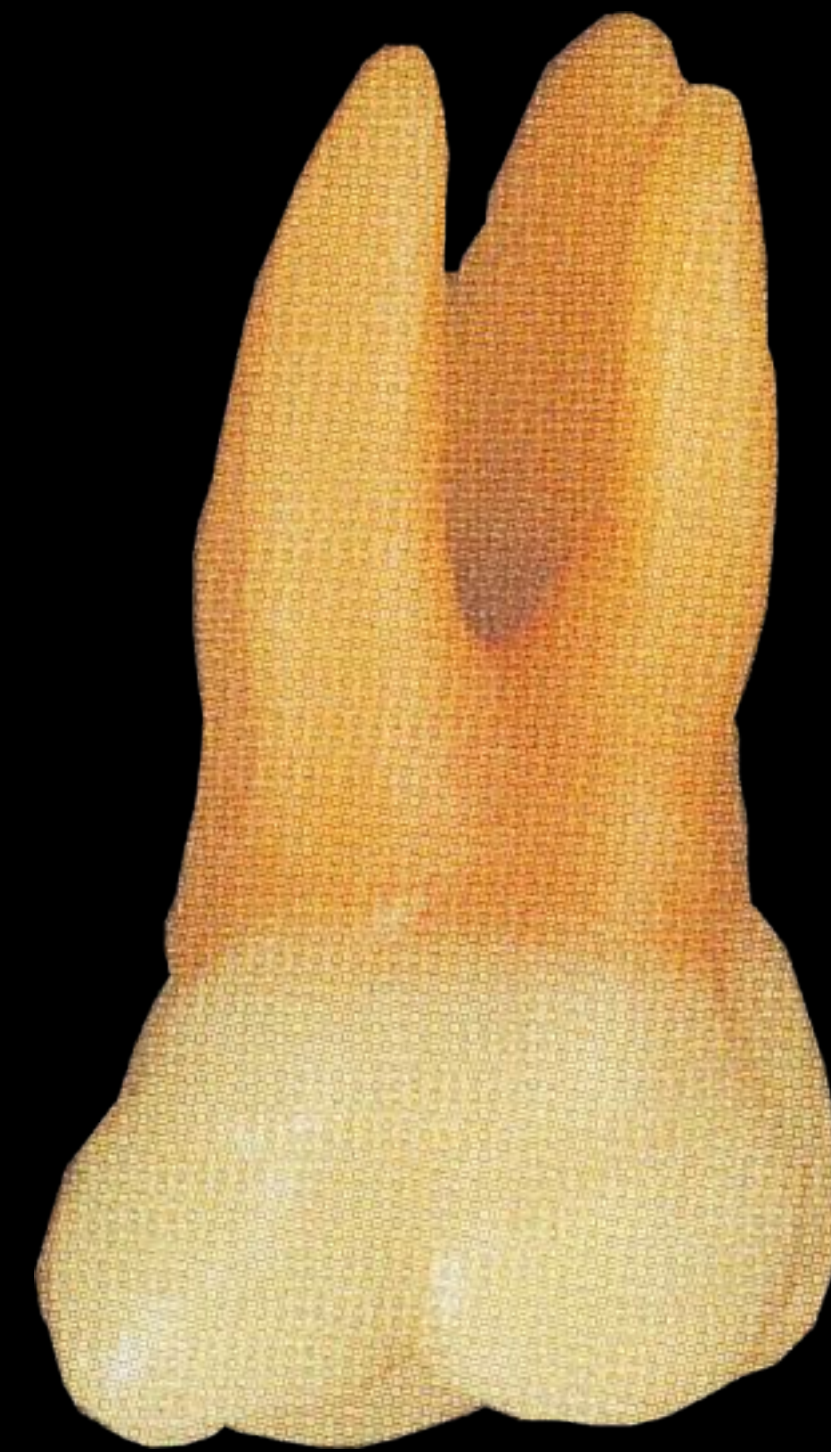
(Mandibular)

Tooth Morphology

Single root



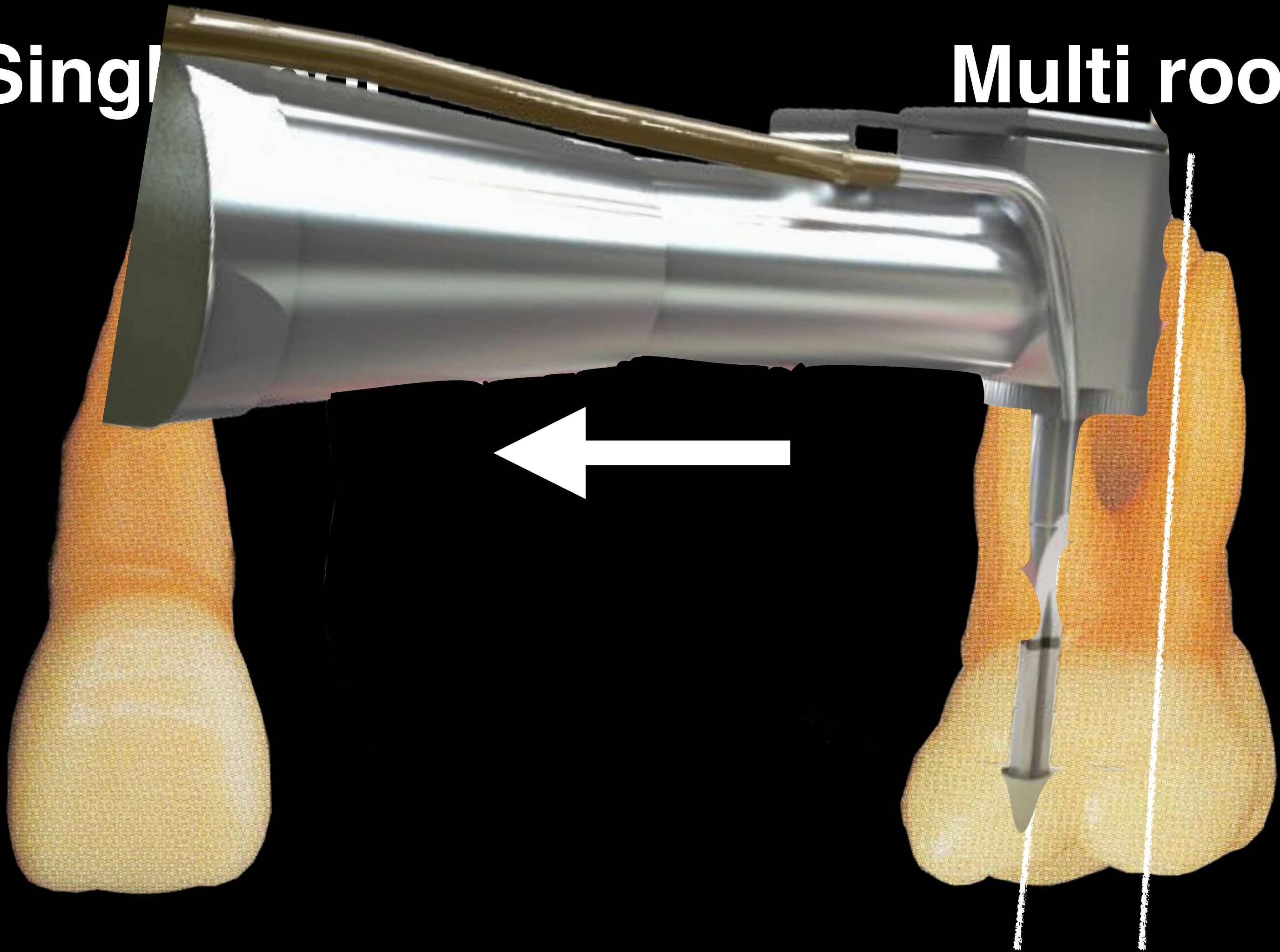
Multi root



Tooth Morphology

Singl

Multi root

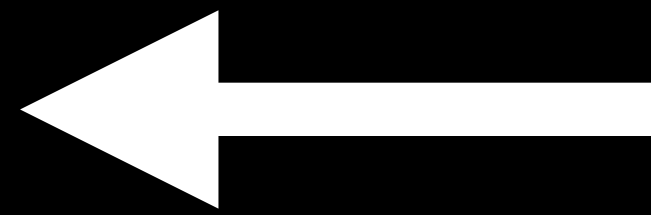
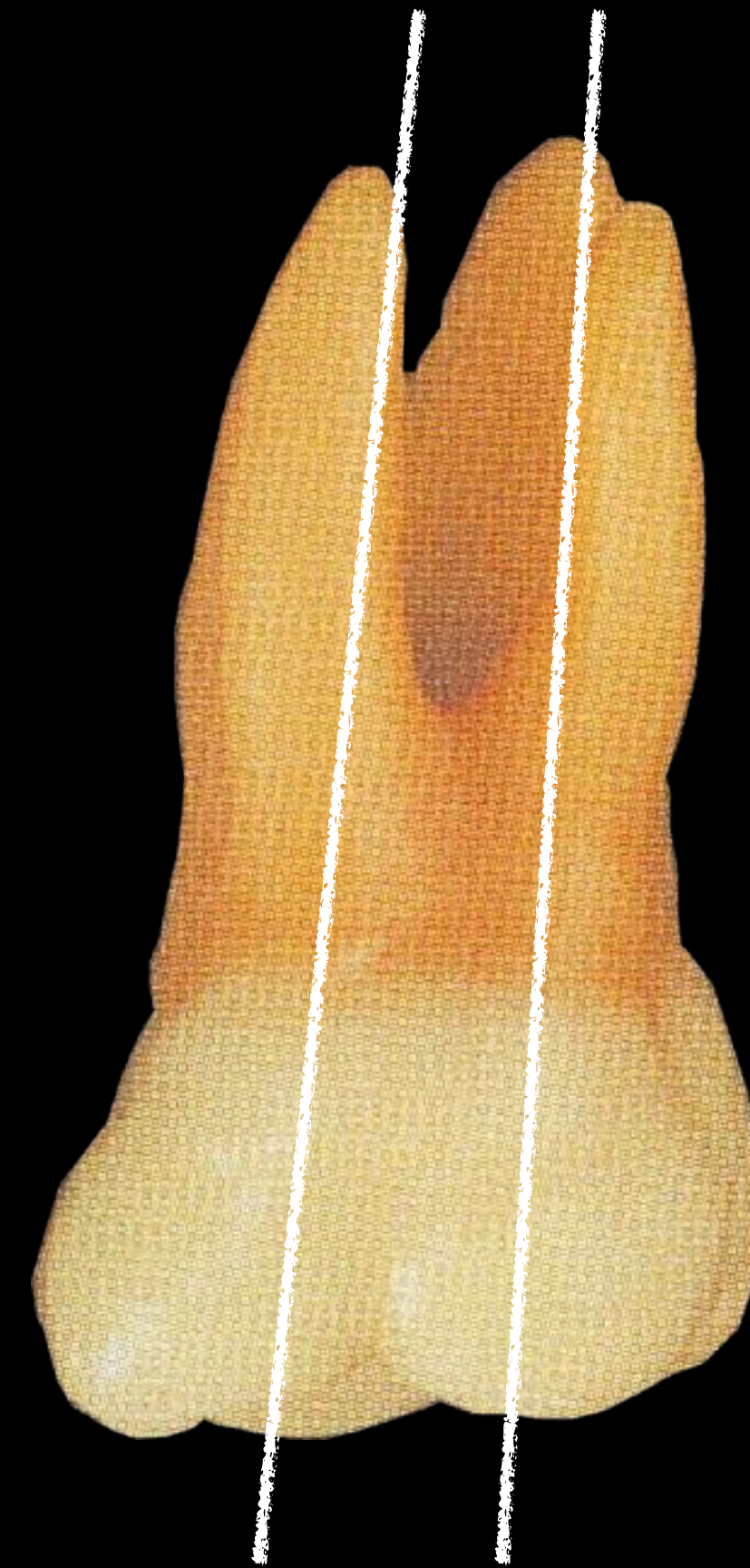


Tooth Morphology

3 Single roots



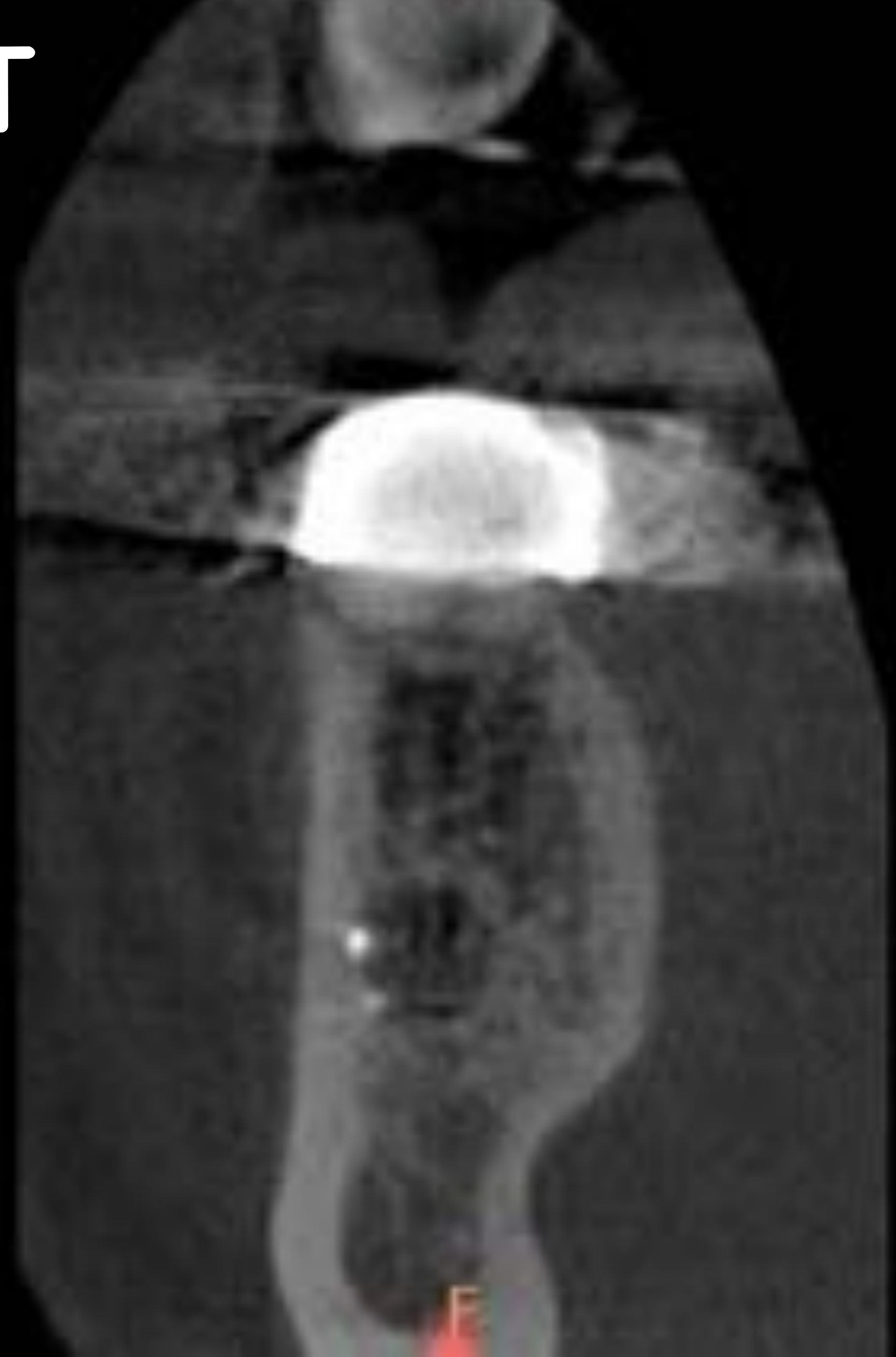
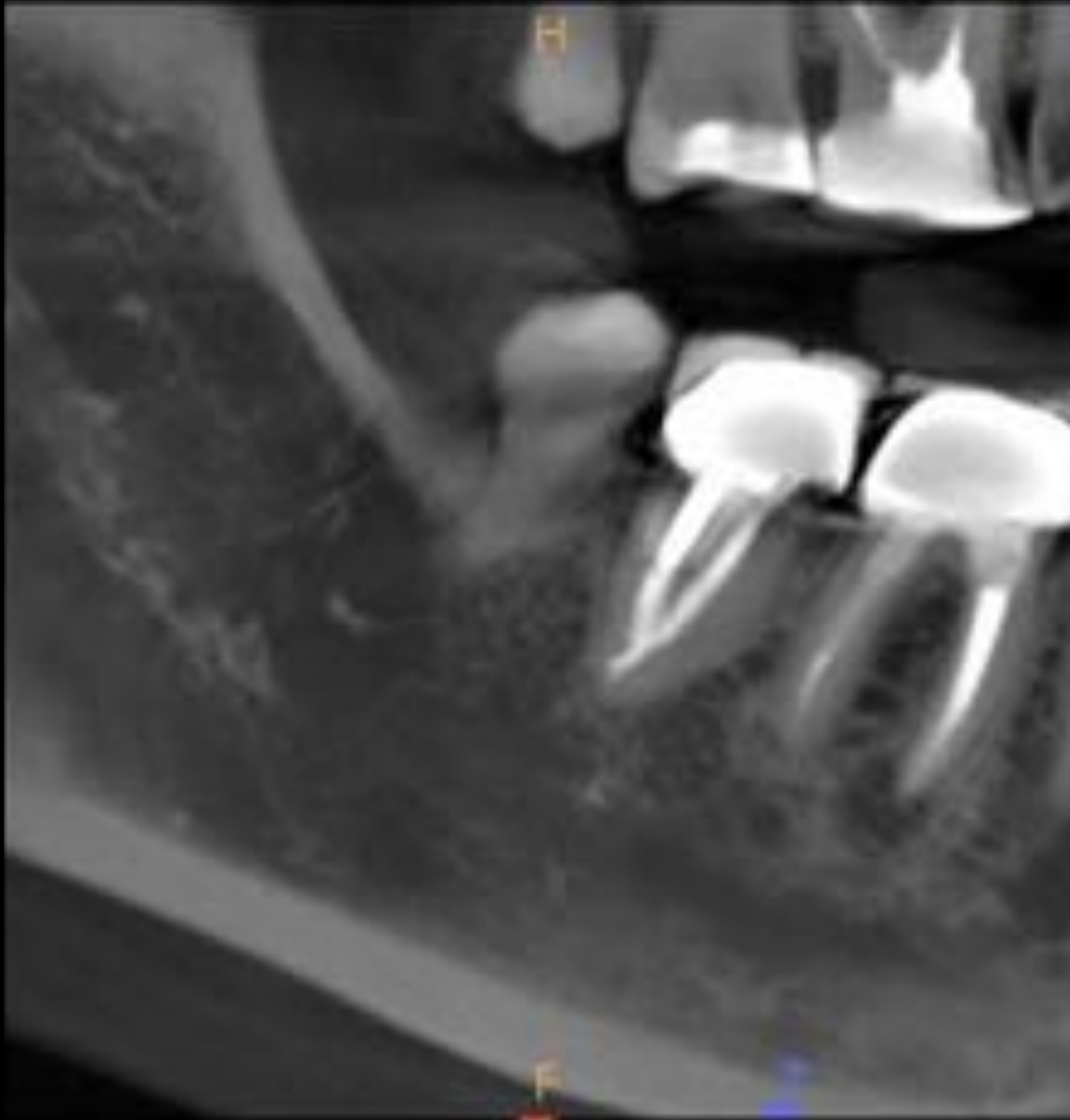
Multi root



The human surgical guide for Immediate Molars DTR (Drill Thru Roots)



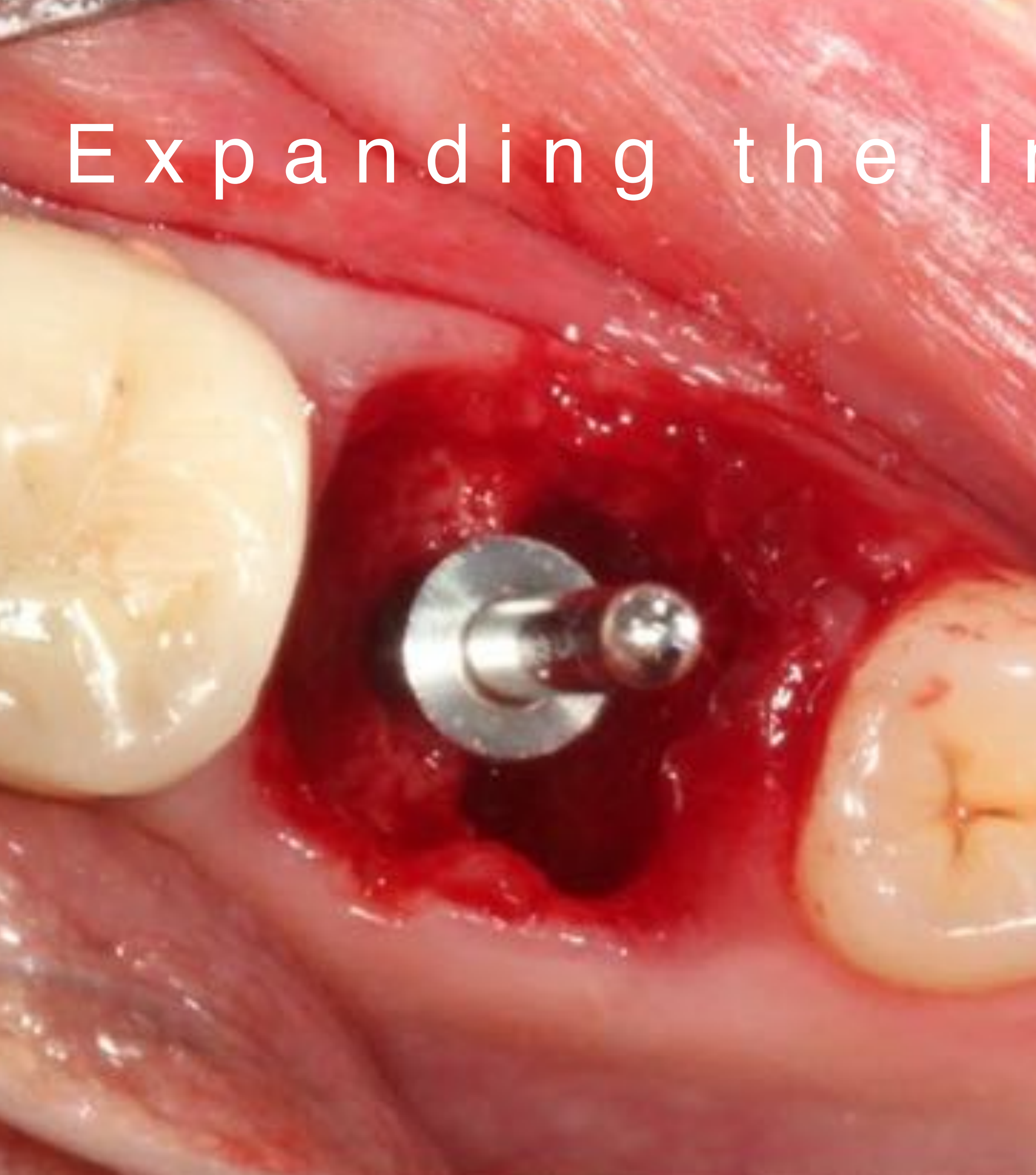
CBCT



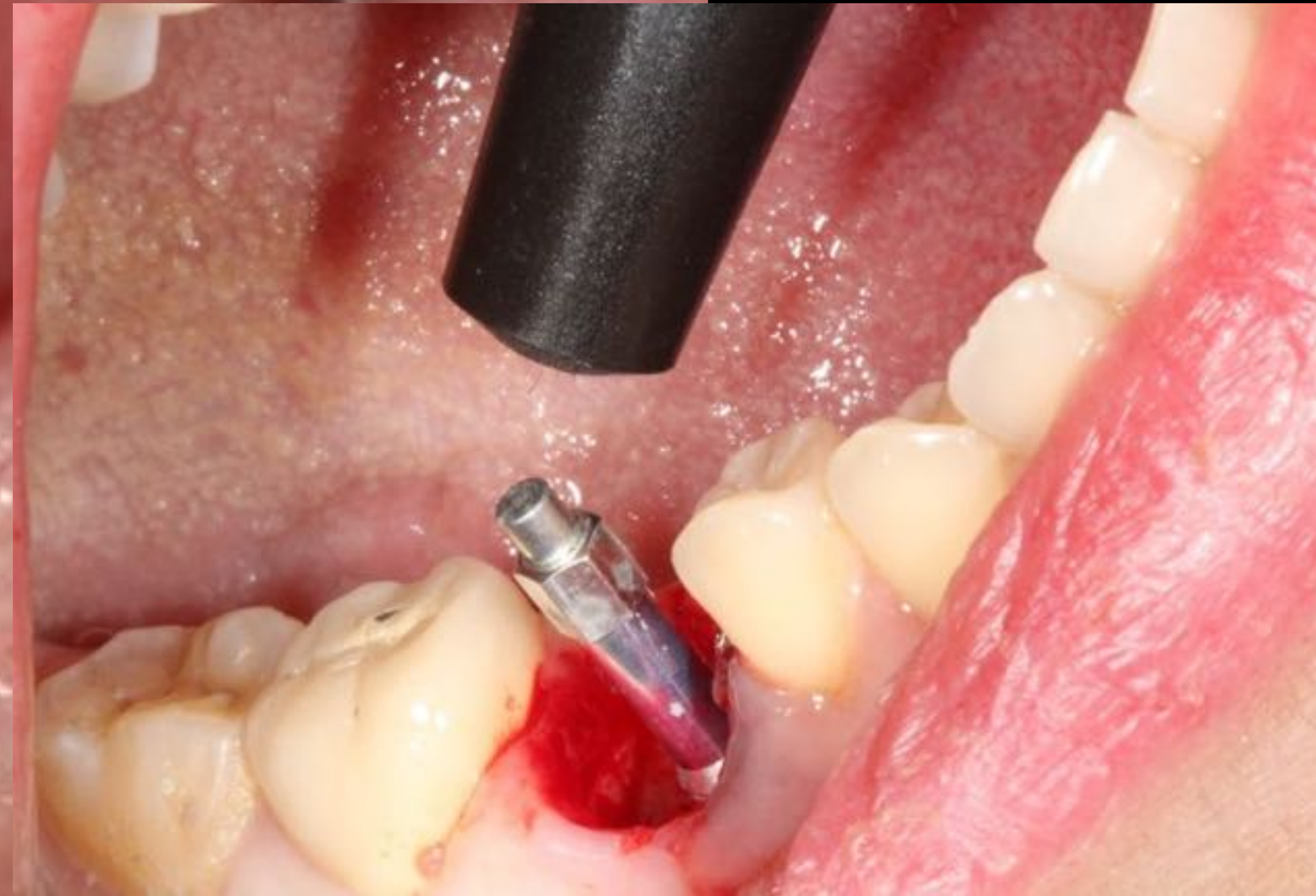
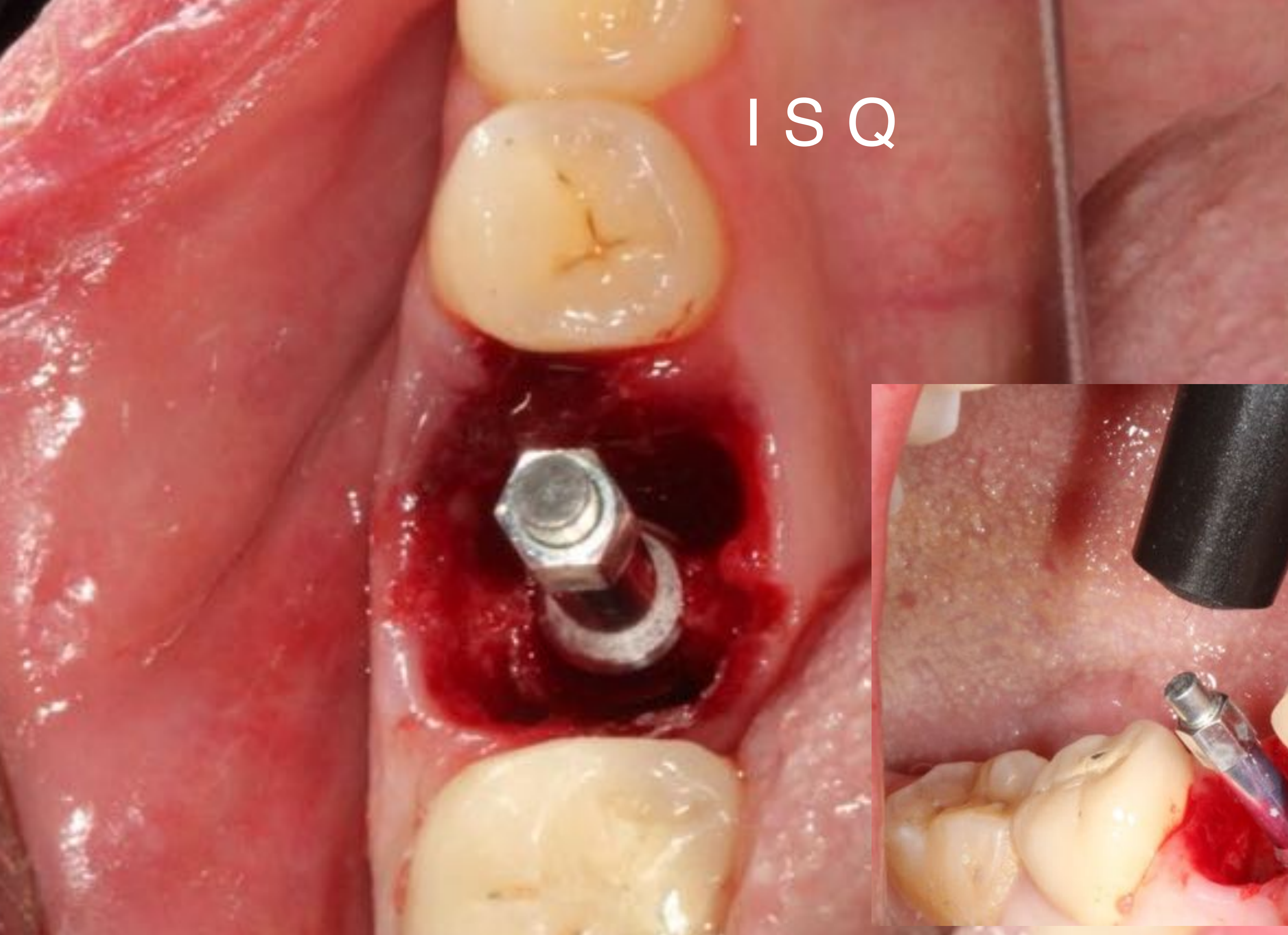
Drill **T**hrough **R**oot

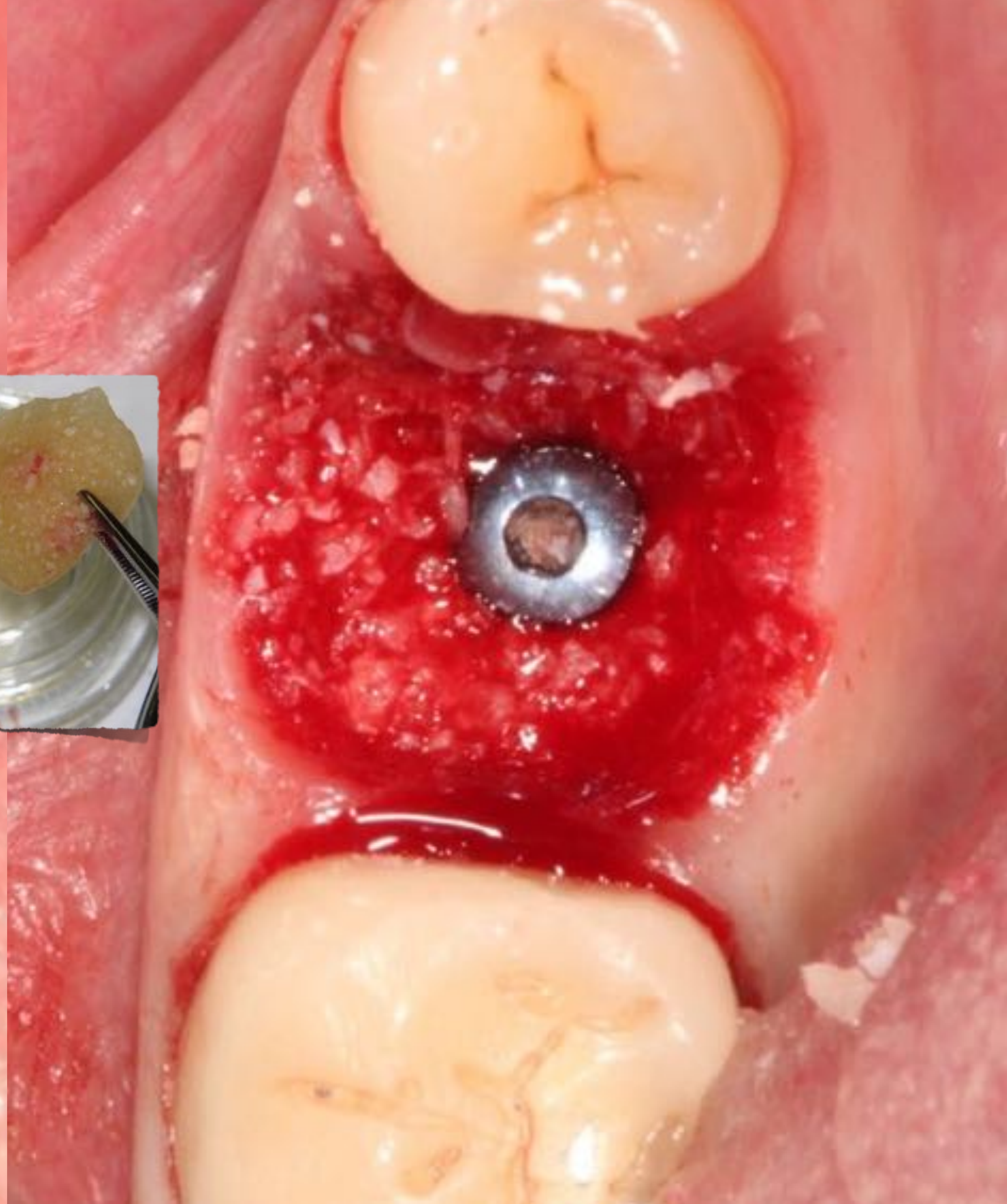
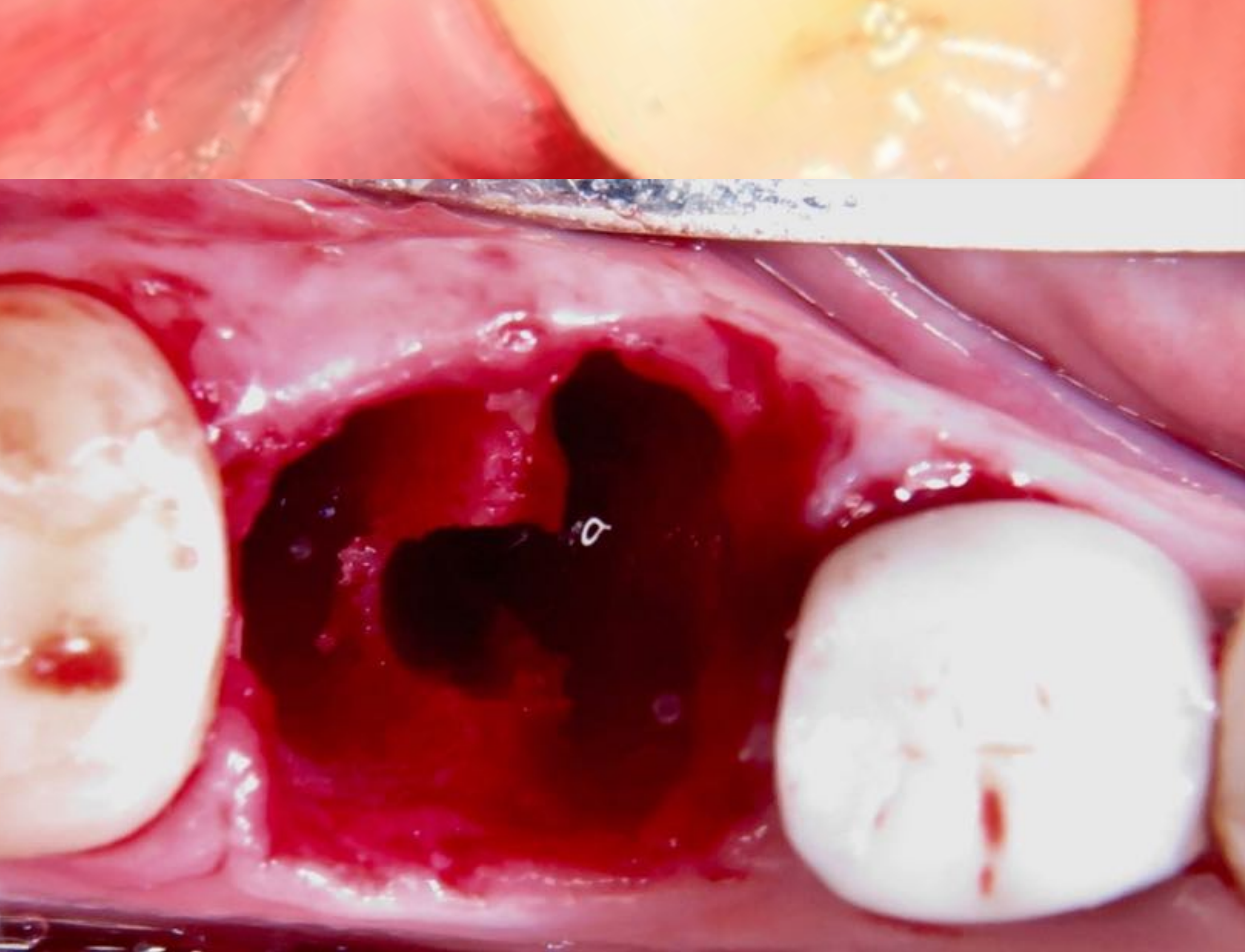


Expanding the Interseptal bone



ISQ



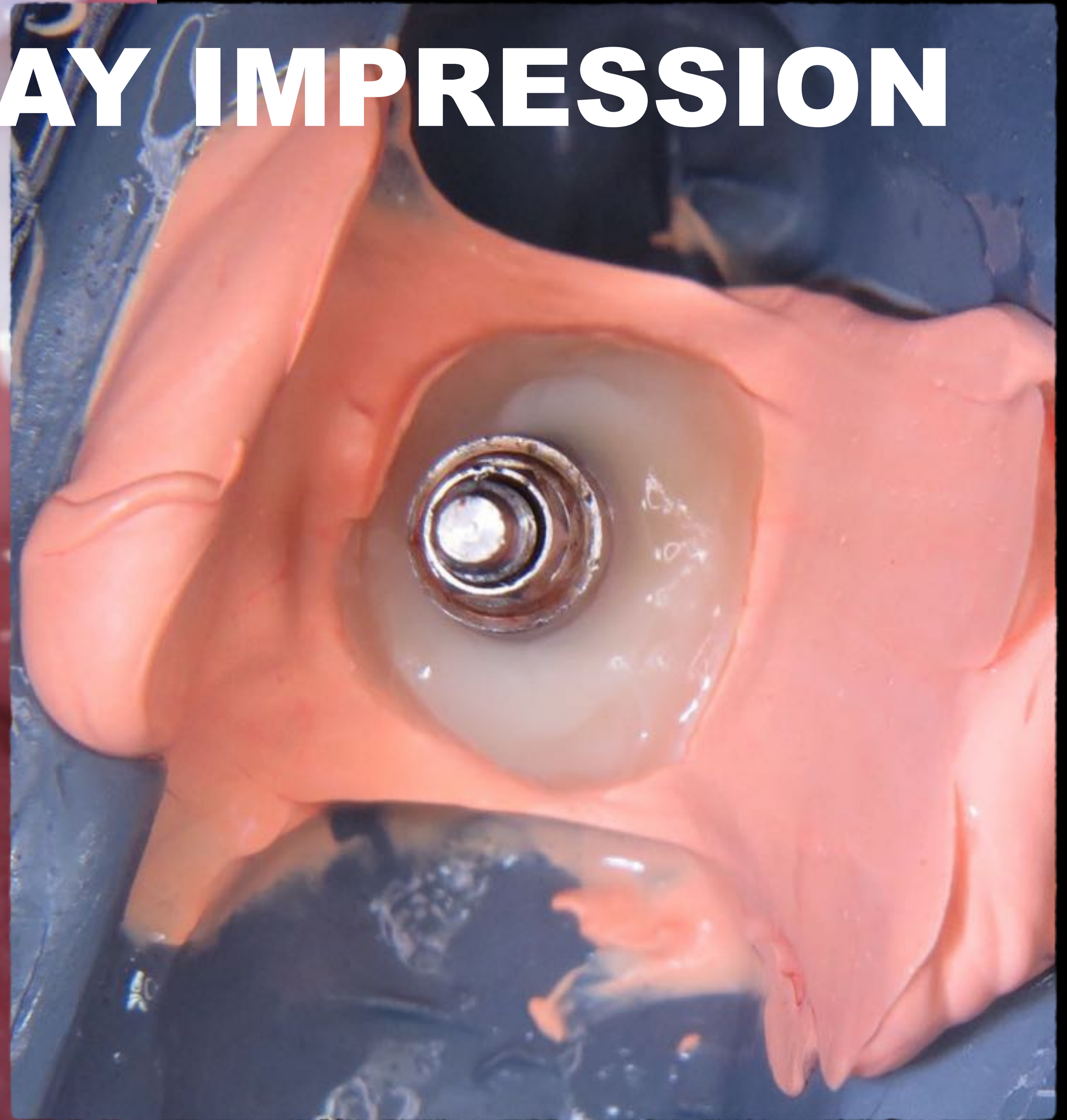


8 weeks post op

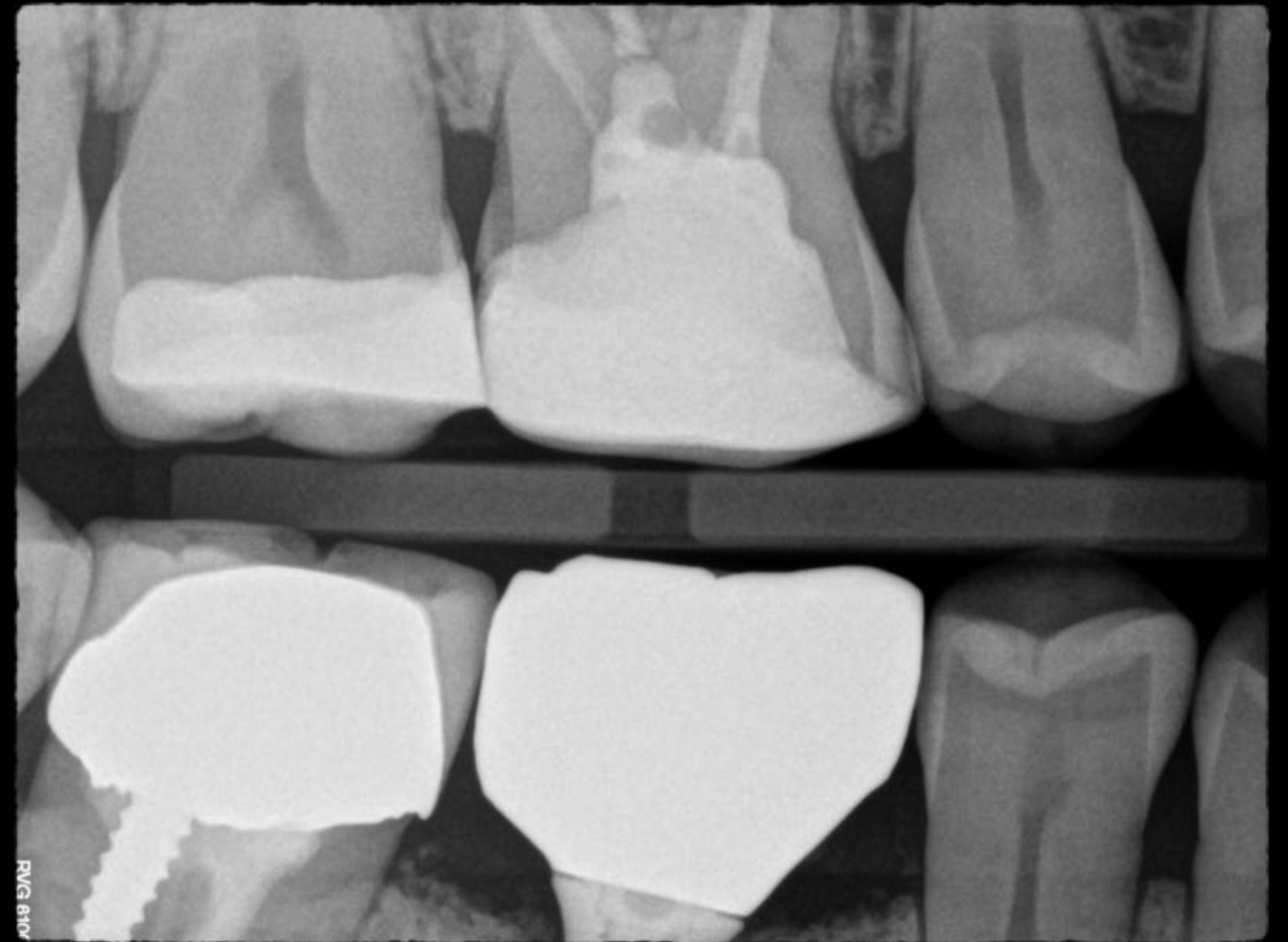
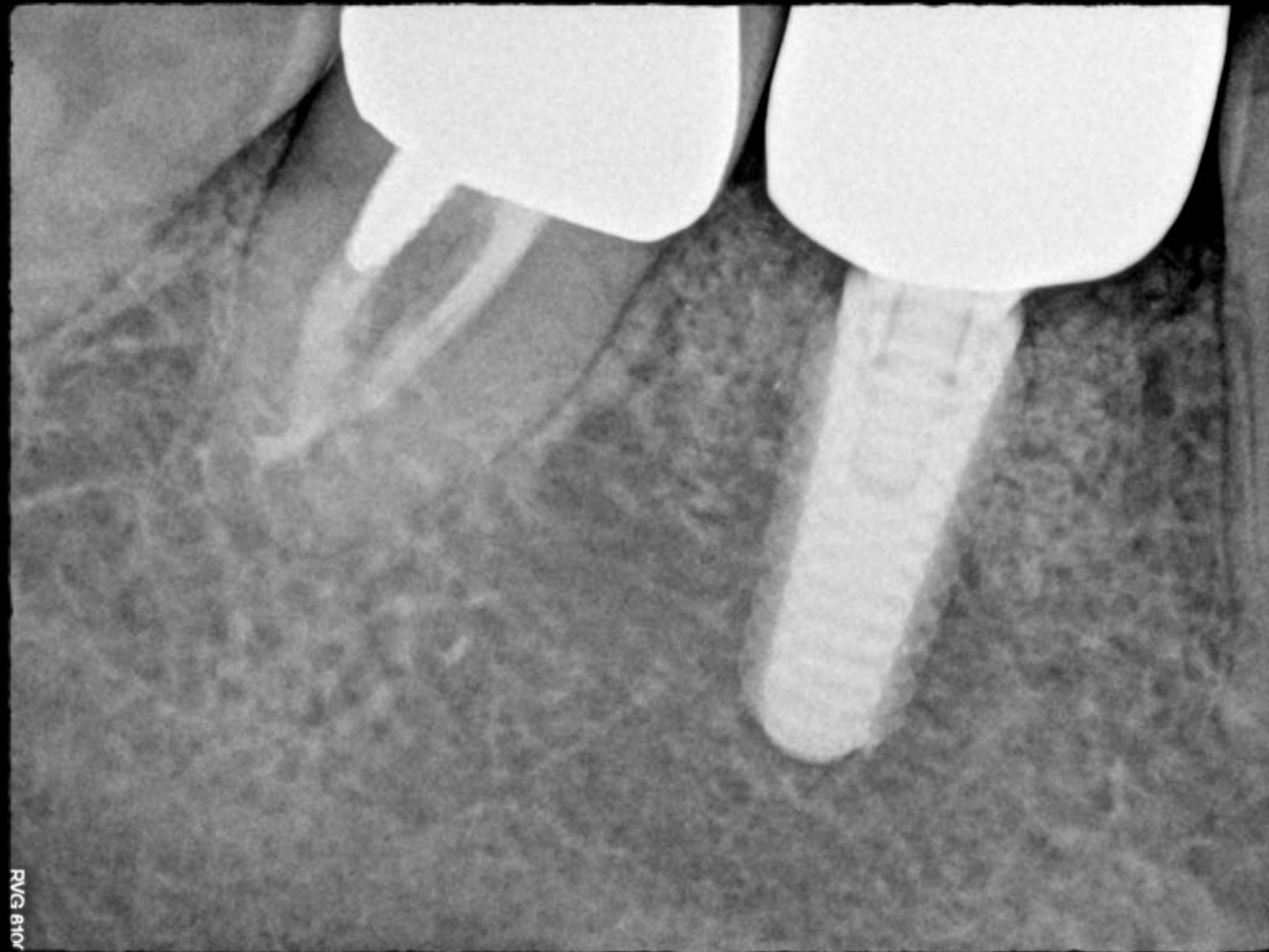


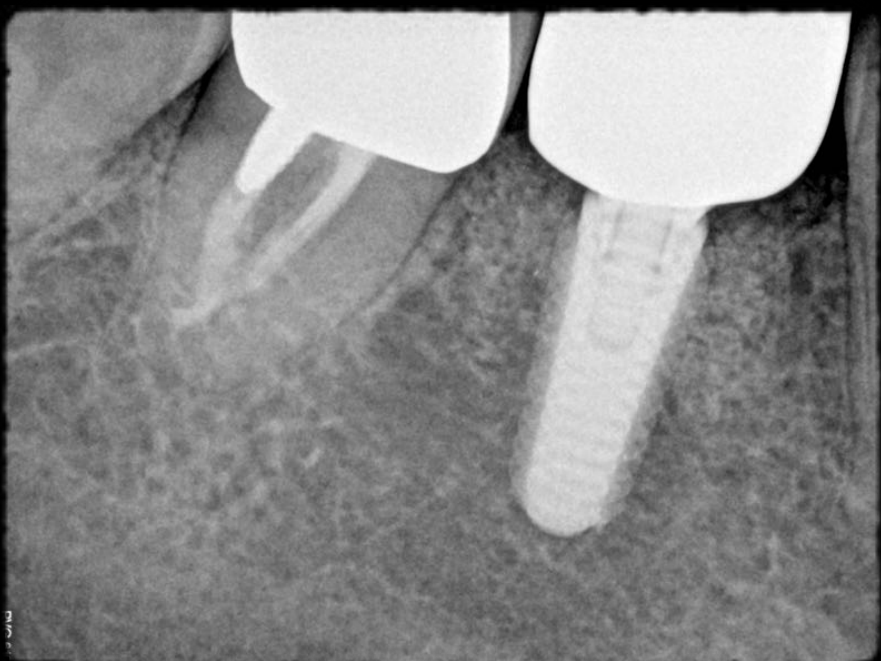
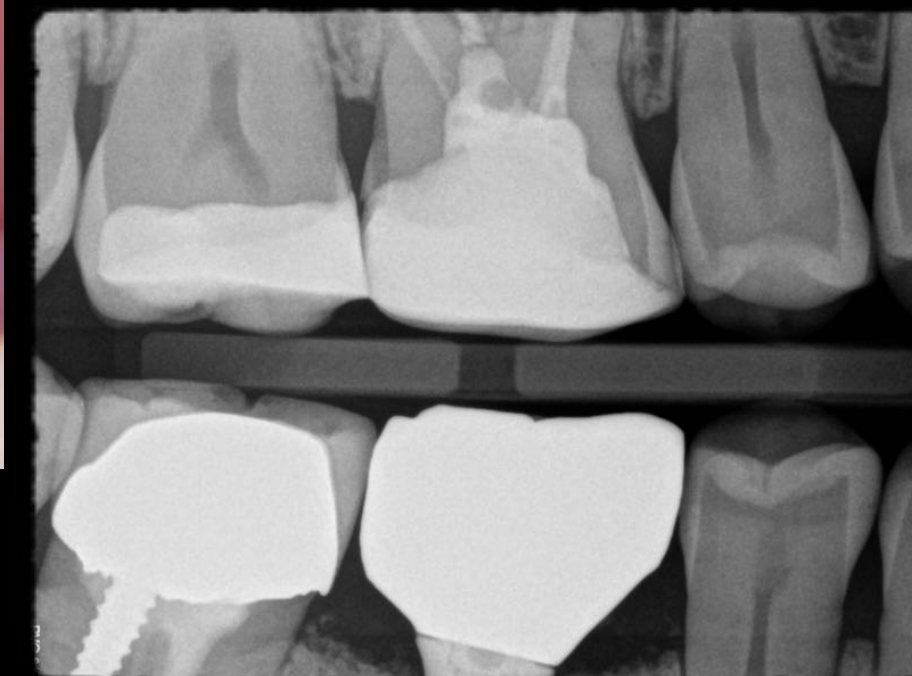
OPENTM

TRAY IMPRESSION



5 Year follow up

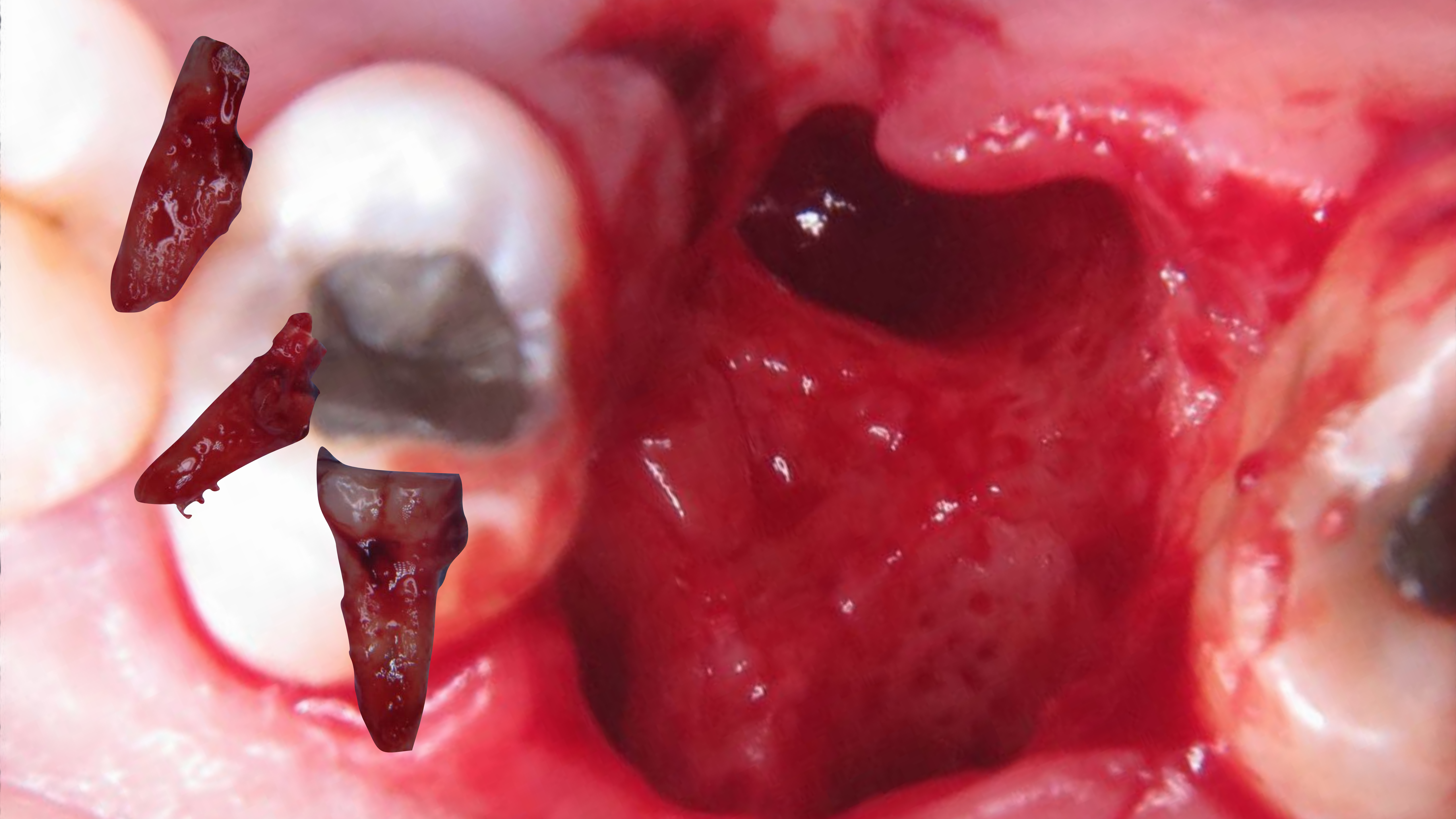




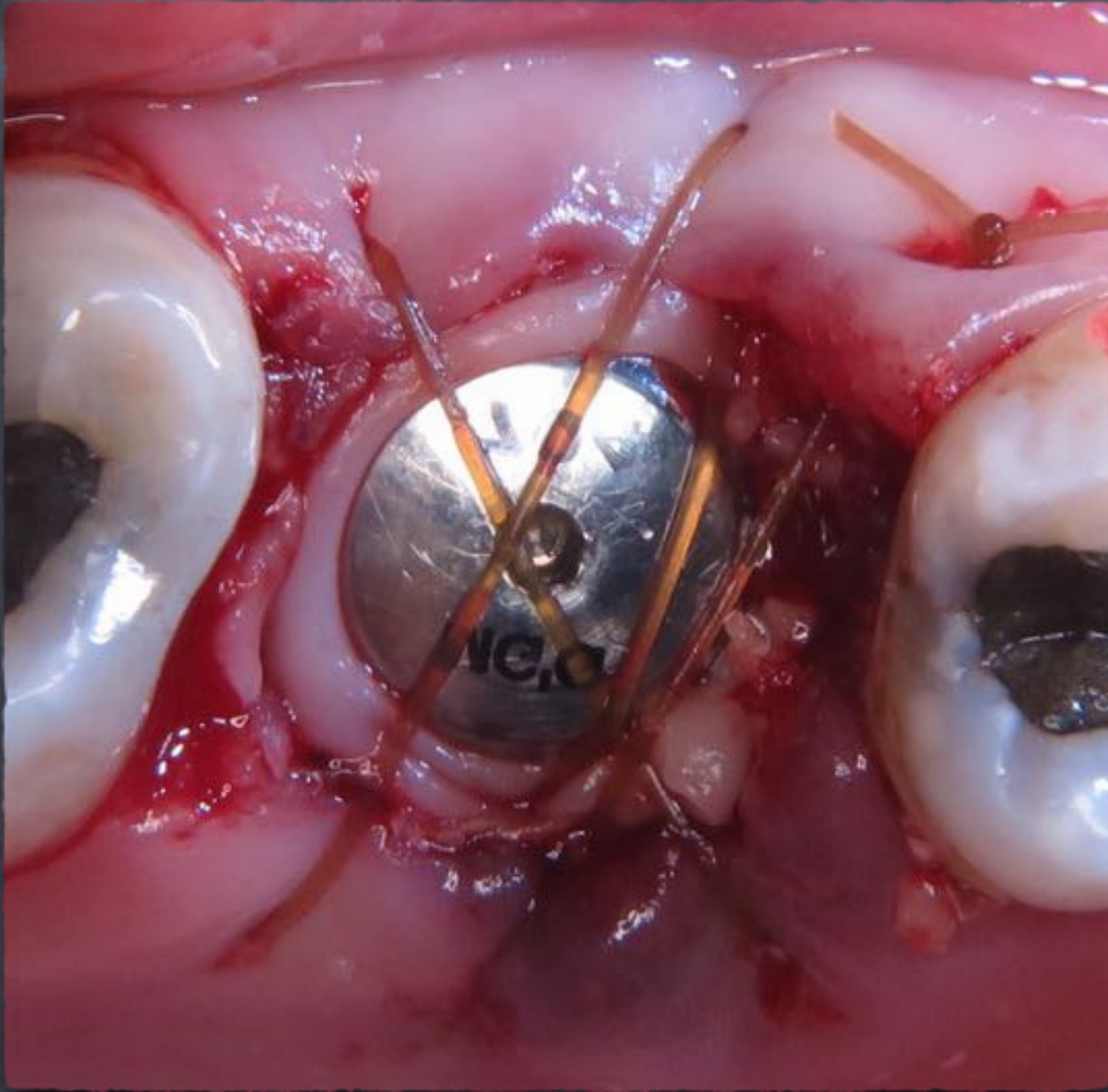
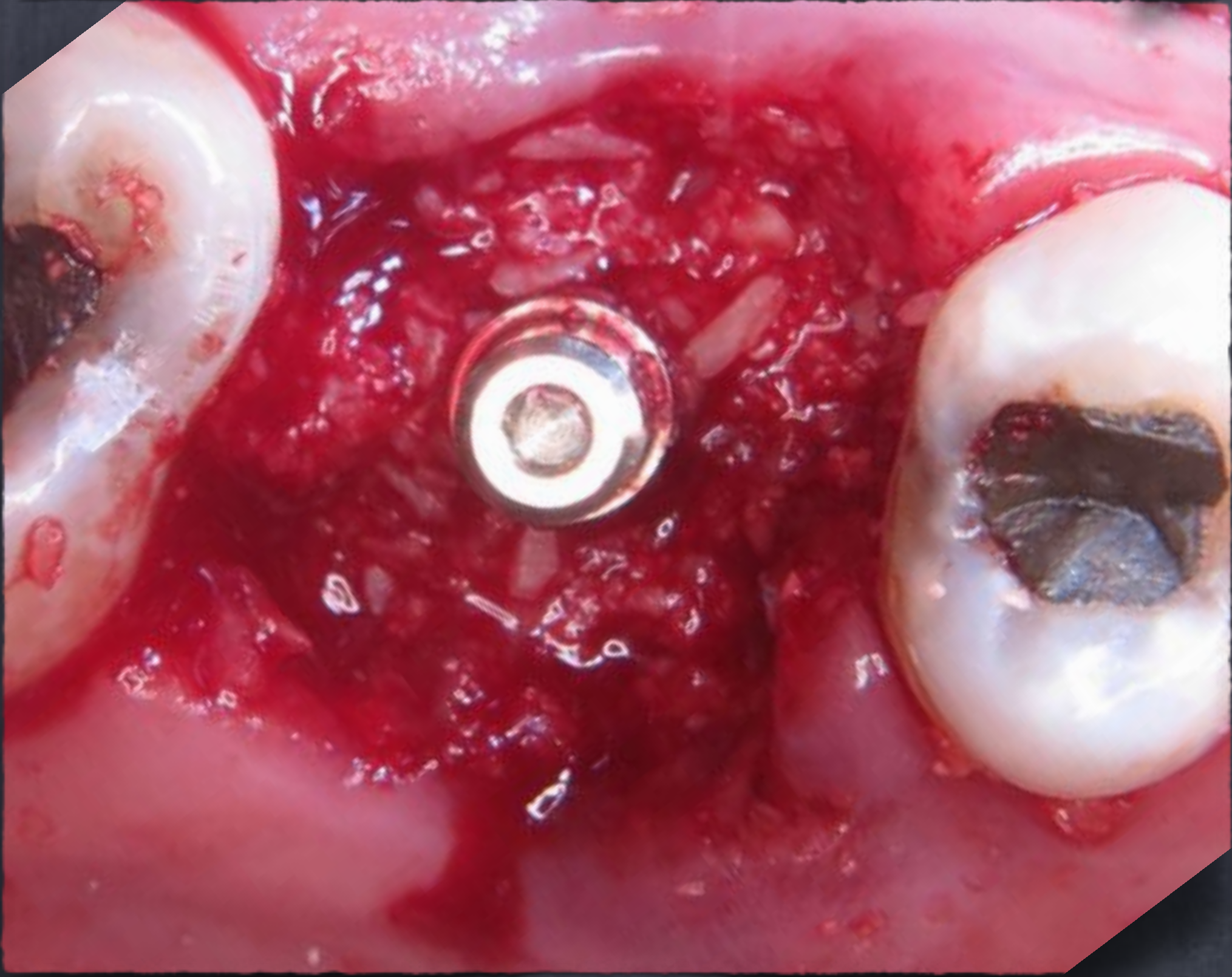
5 Year
follow up

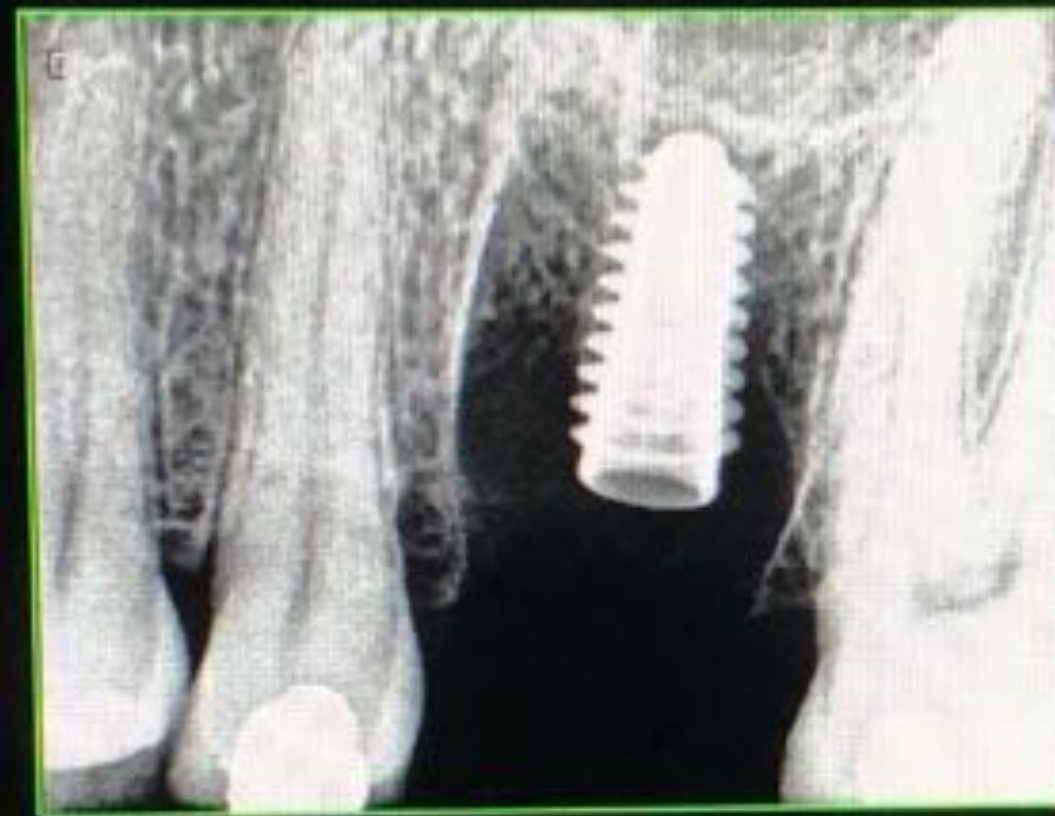


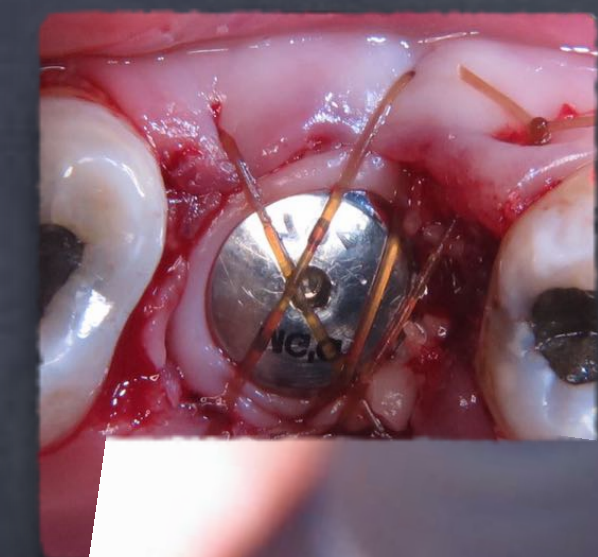


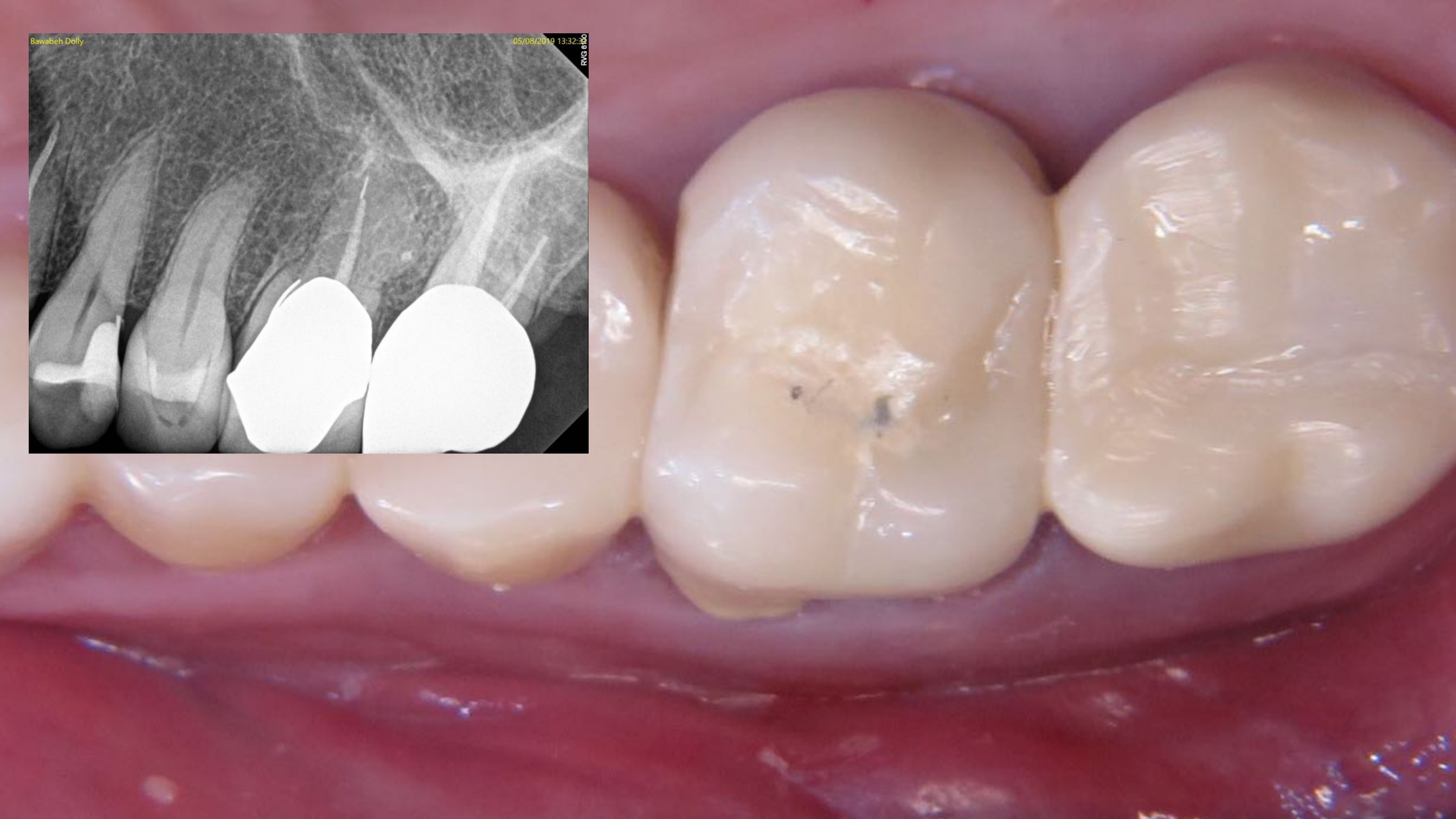


PRF





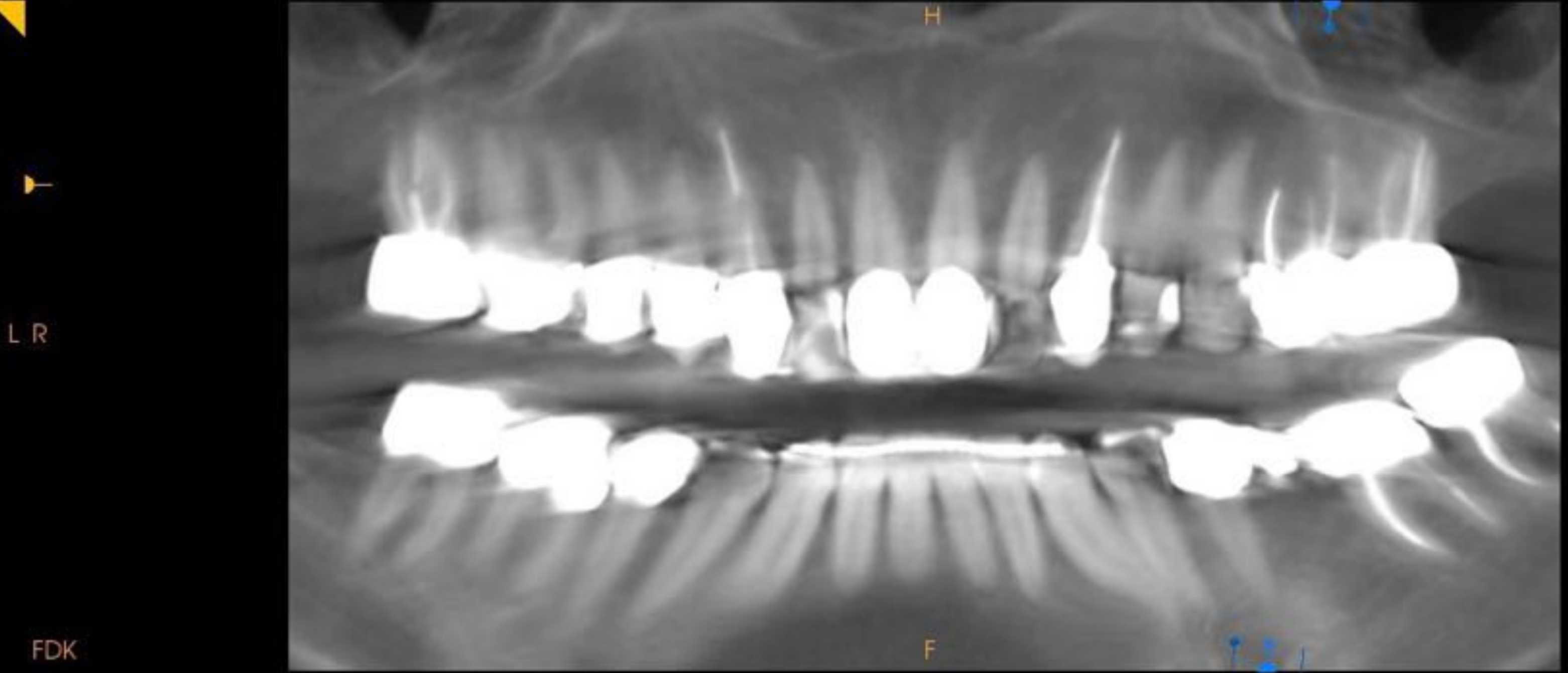




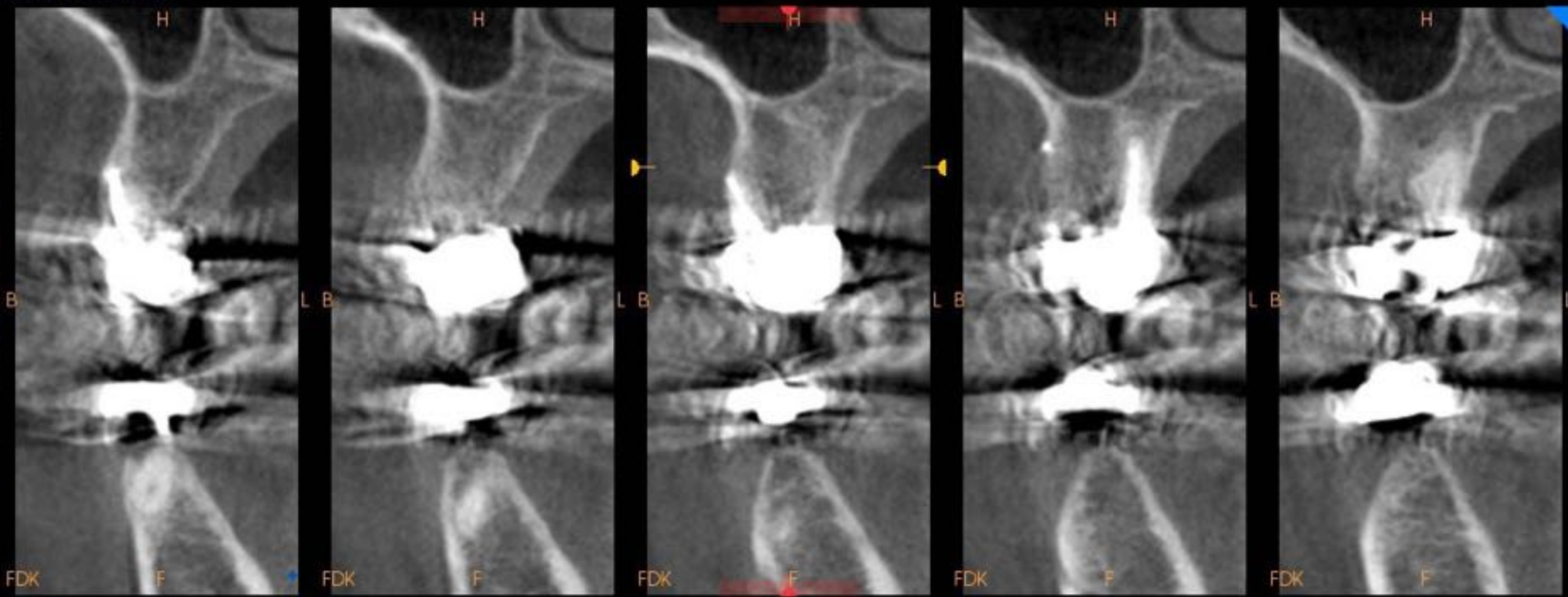
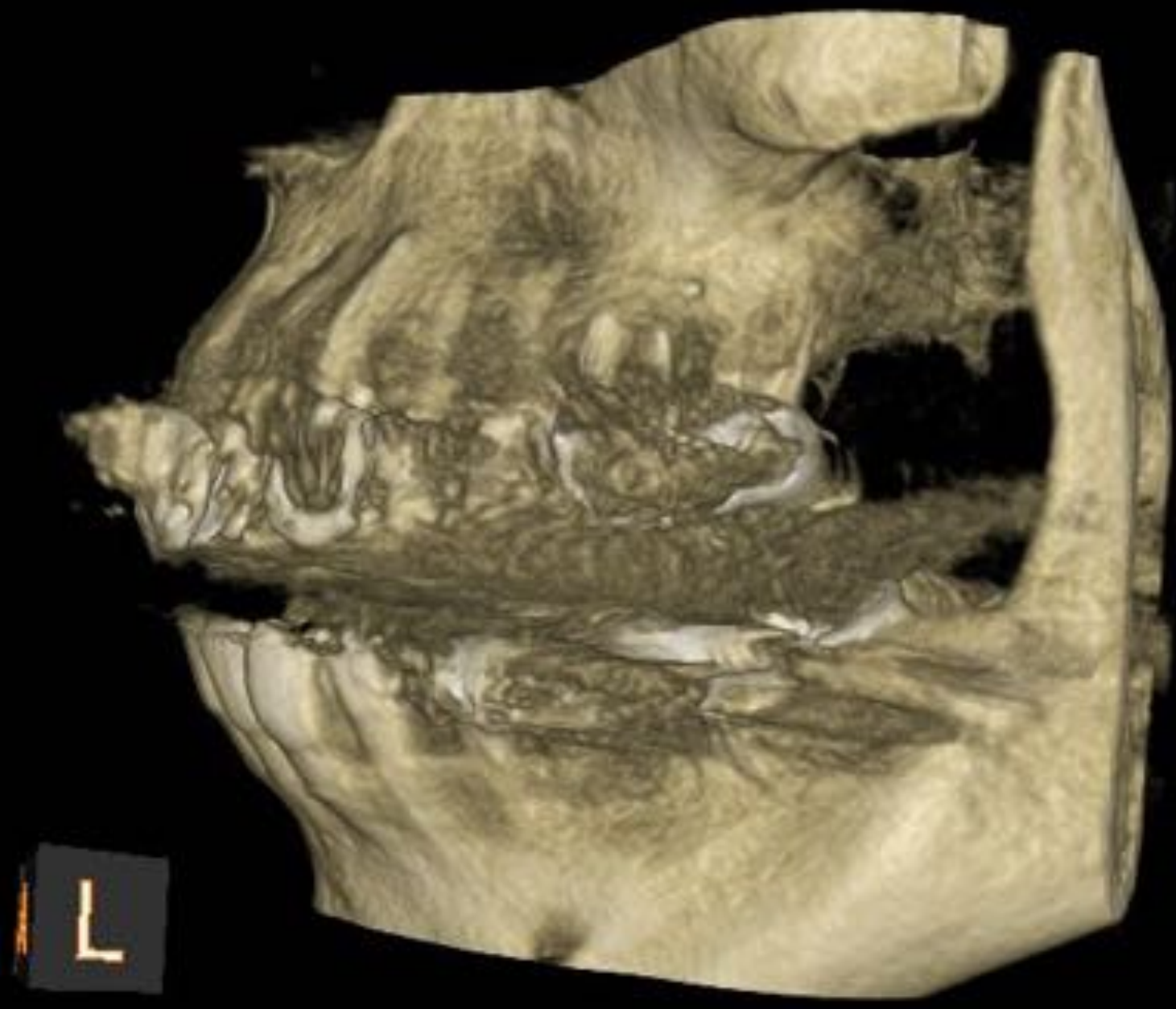
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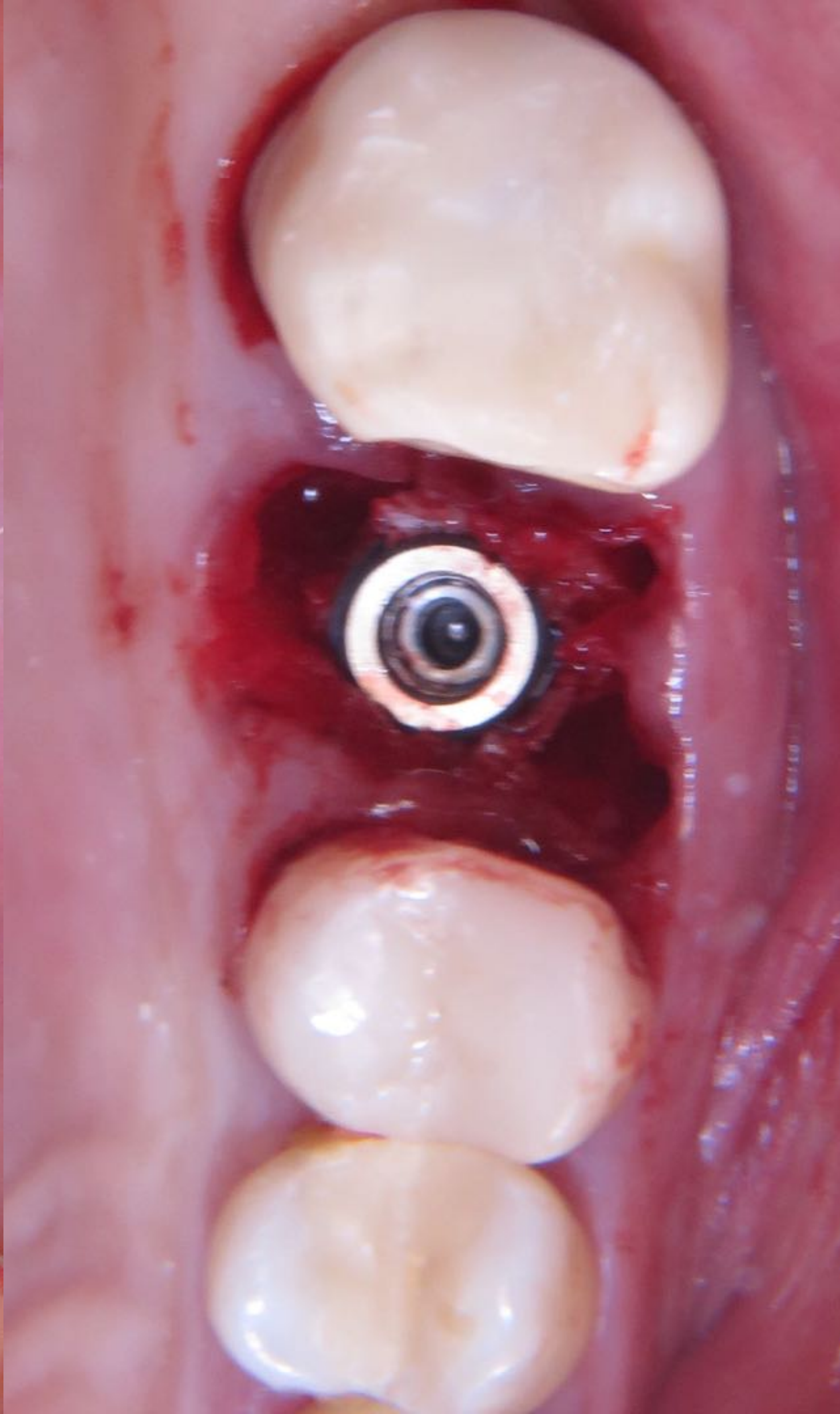
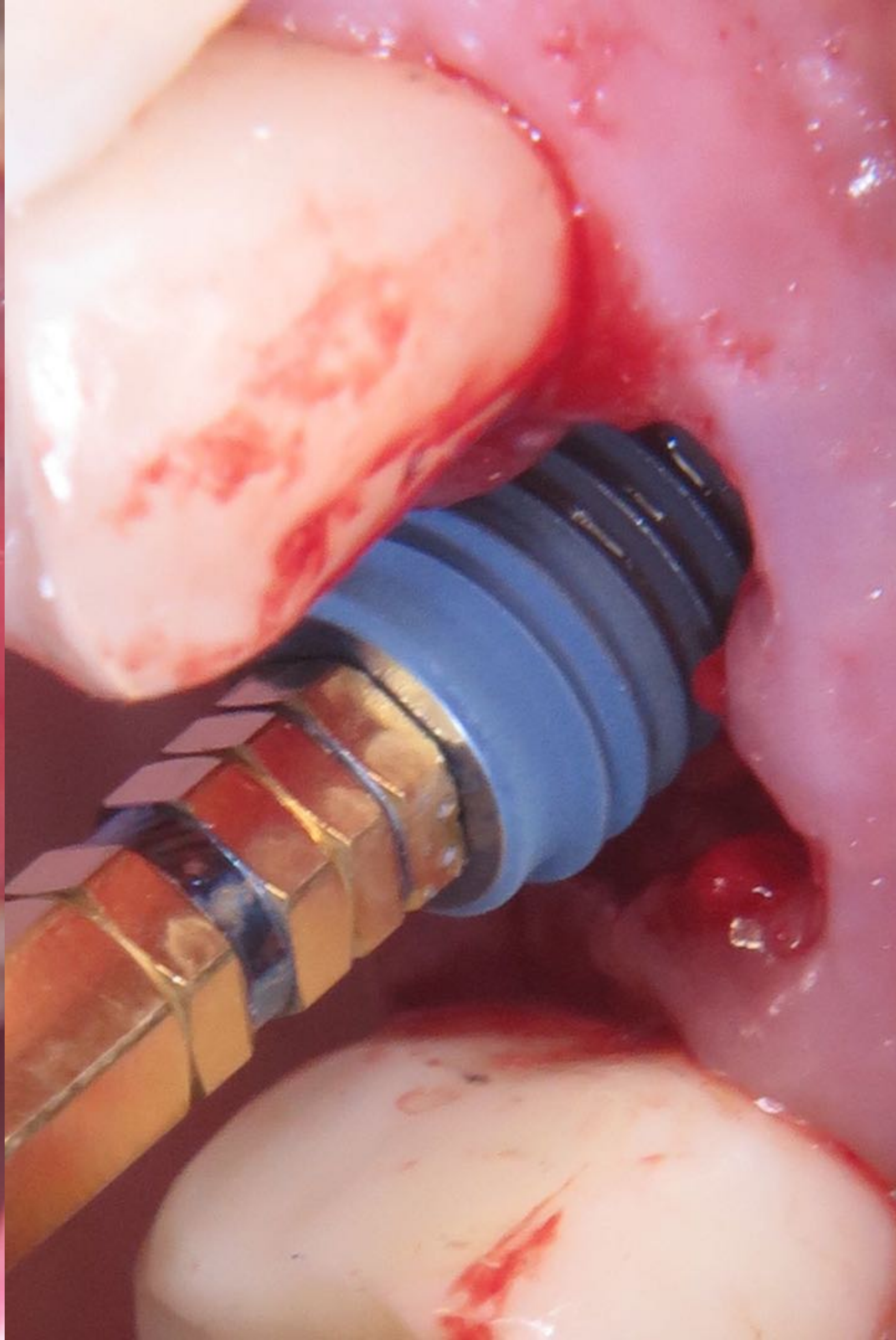
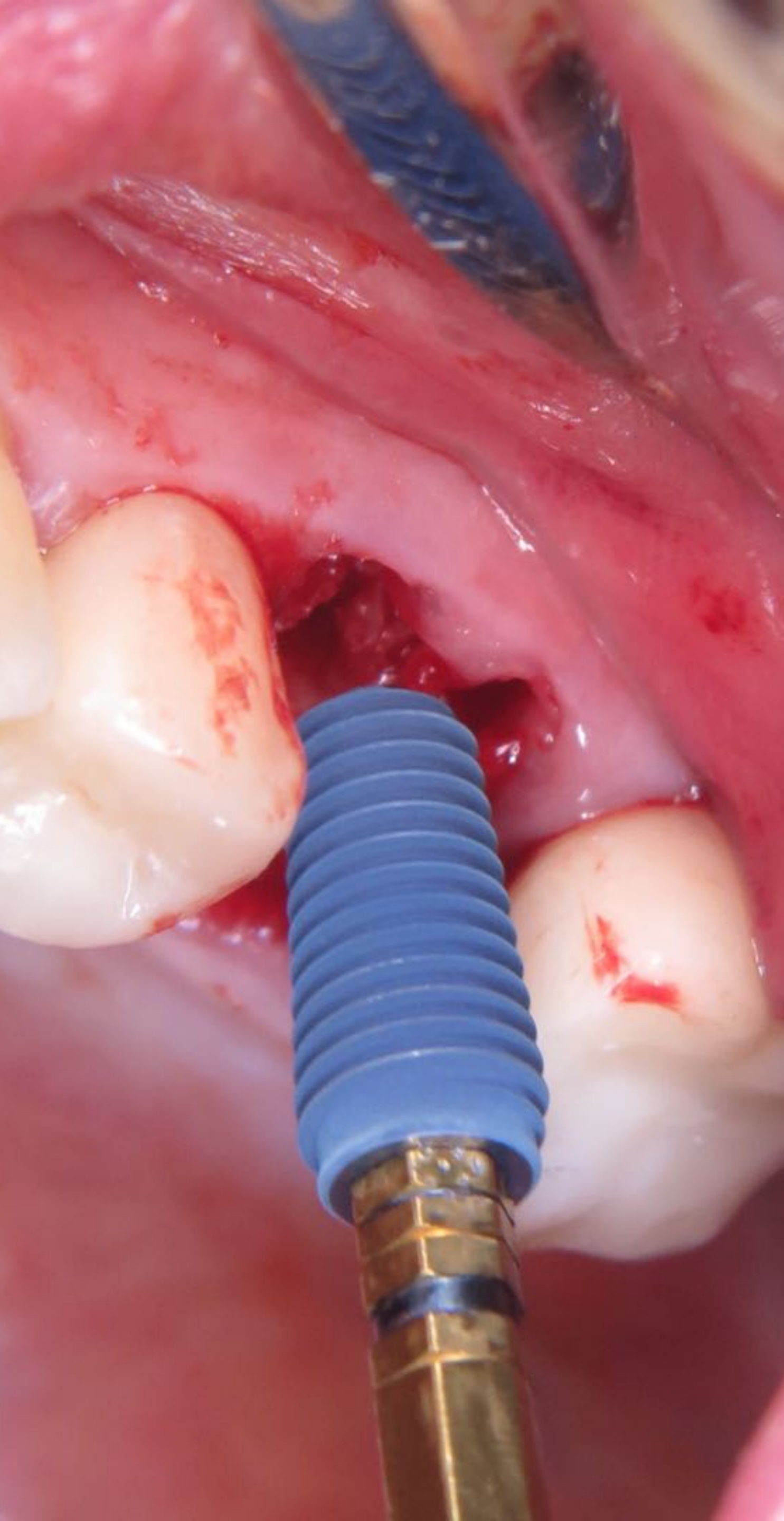
Integration mode: AVG. Slice thickness: 14.9 mm.

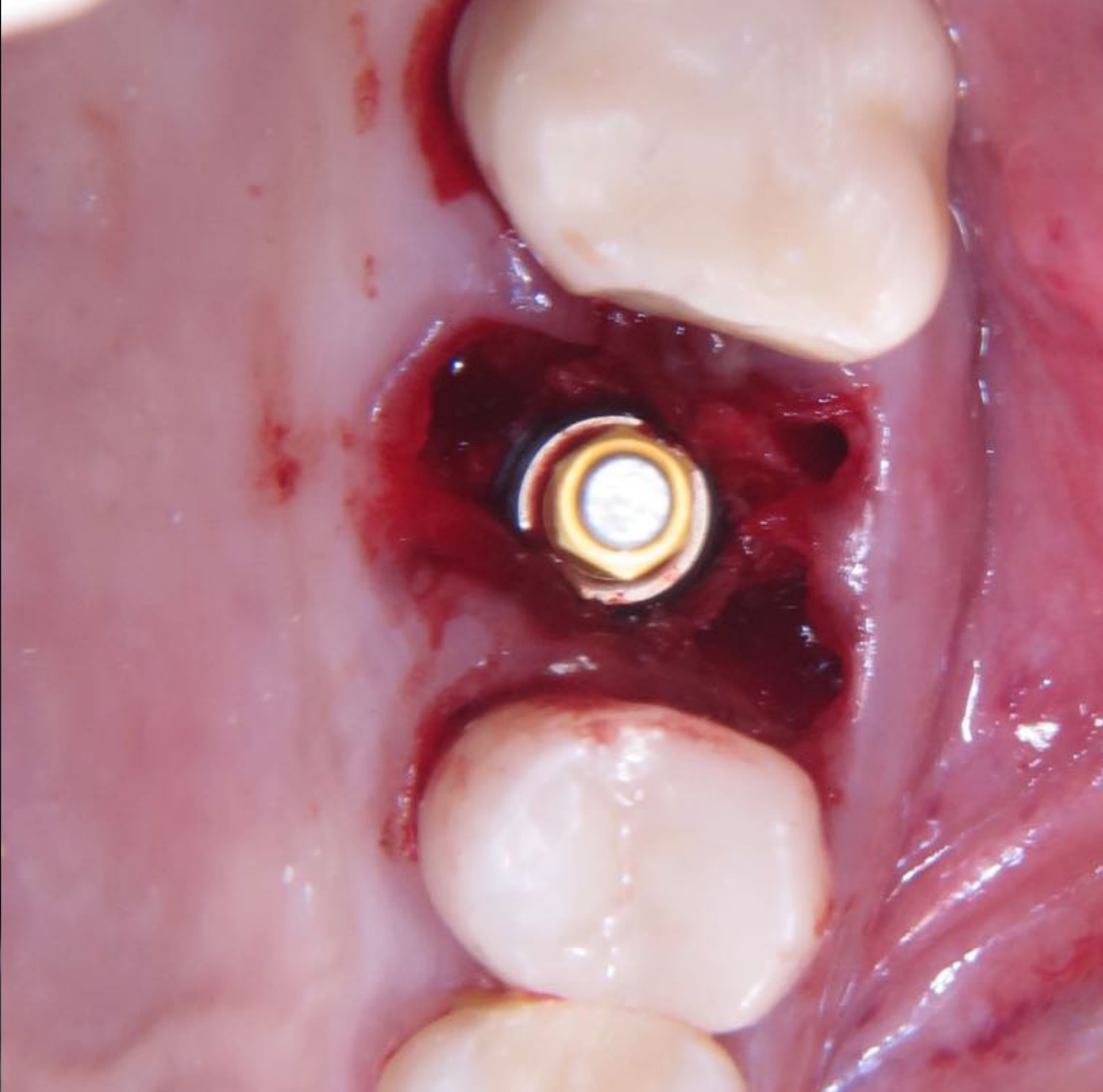
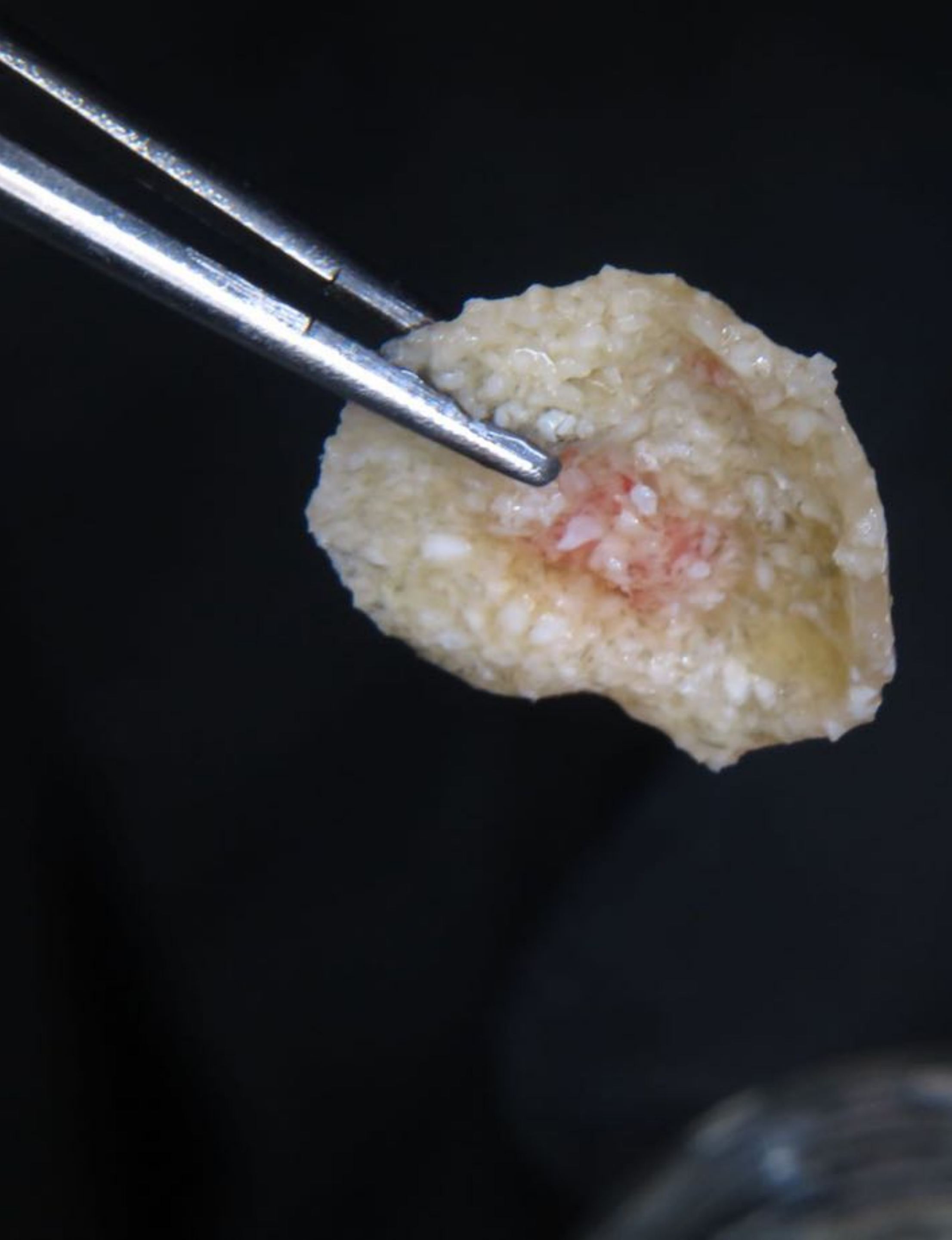


Slice spacing: 1.6 mm.







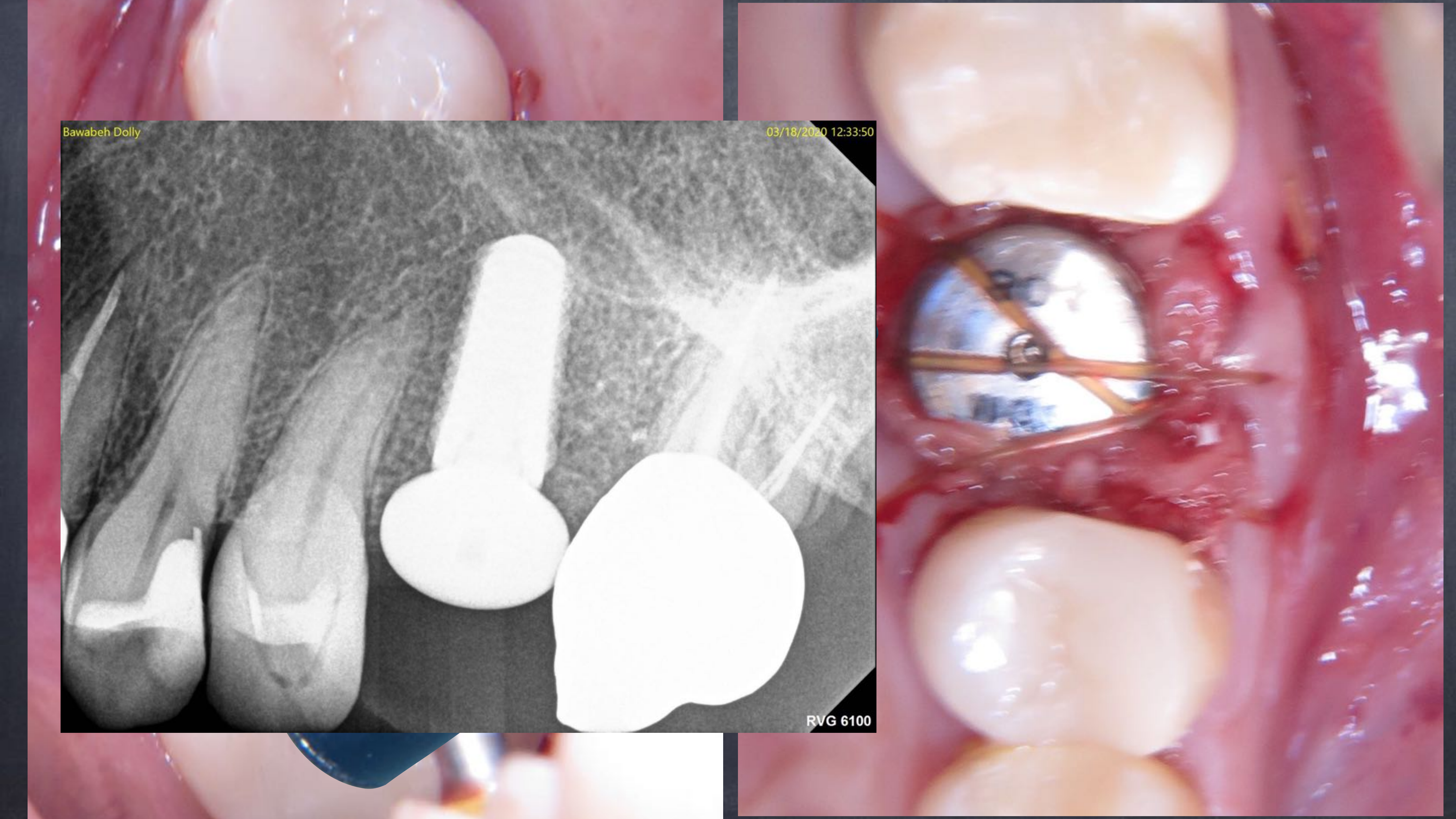


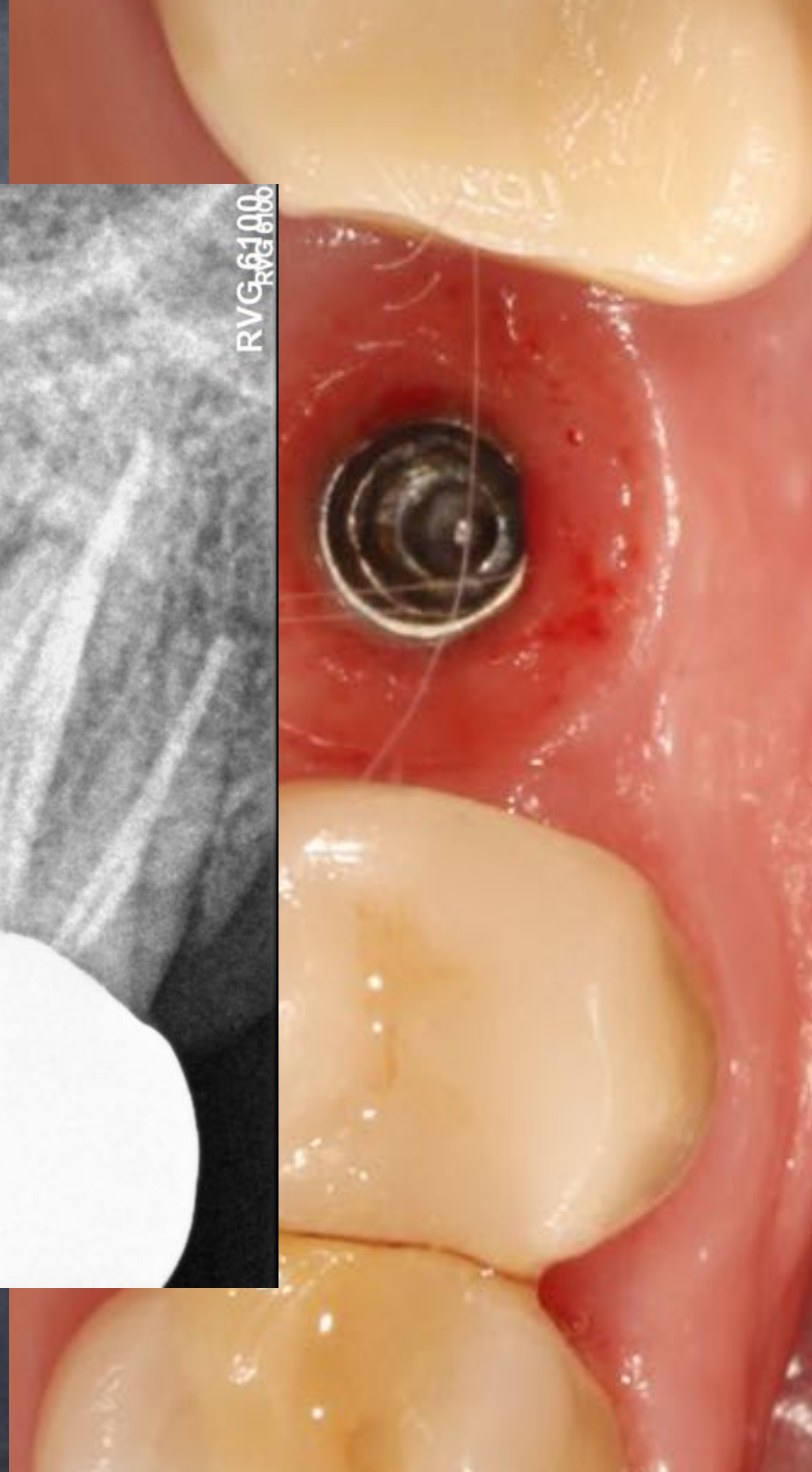
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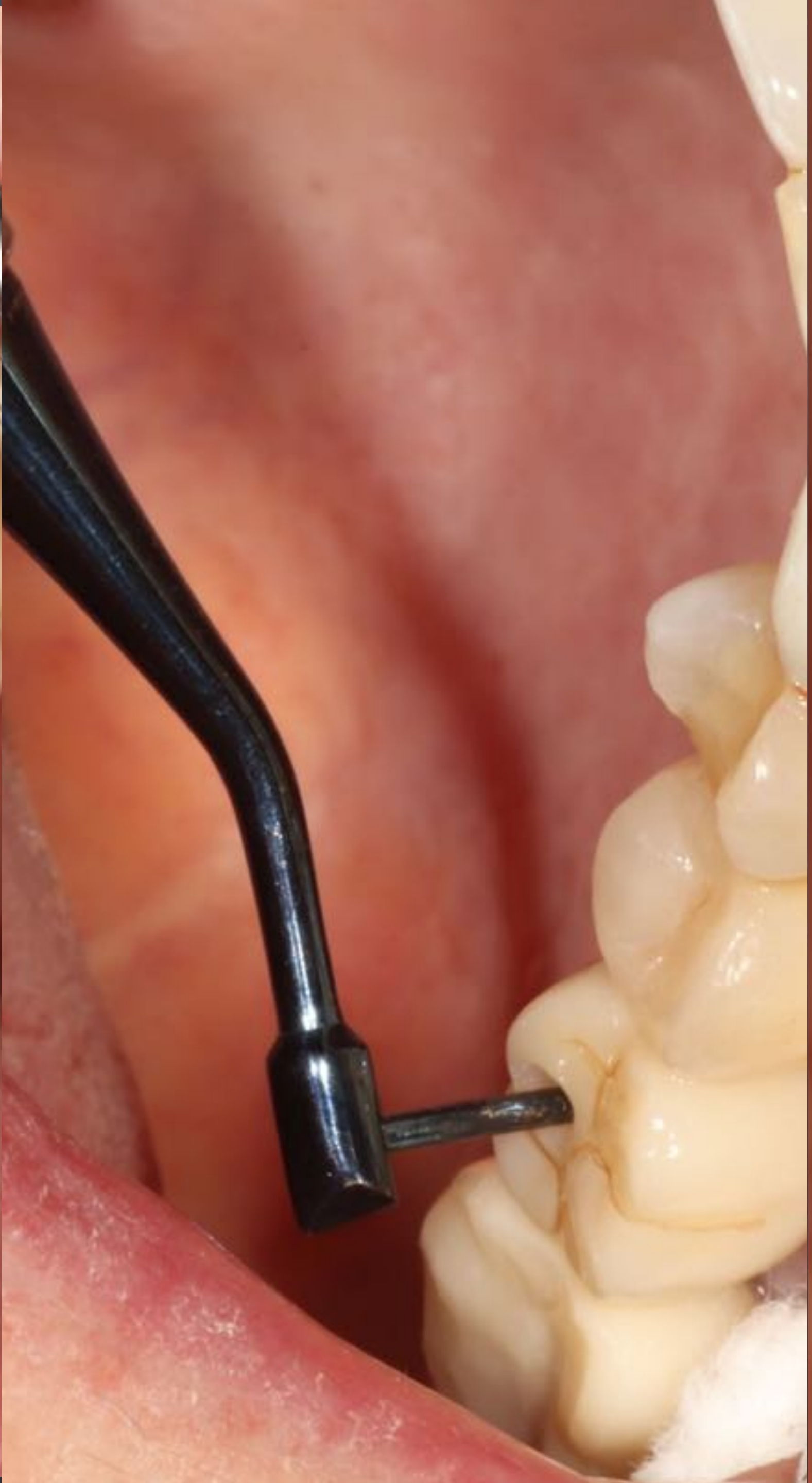
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RVG 6100

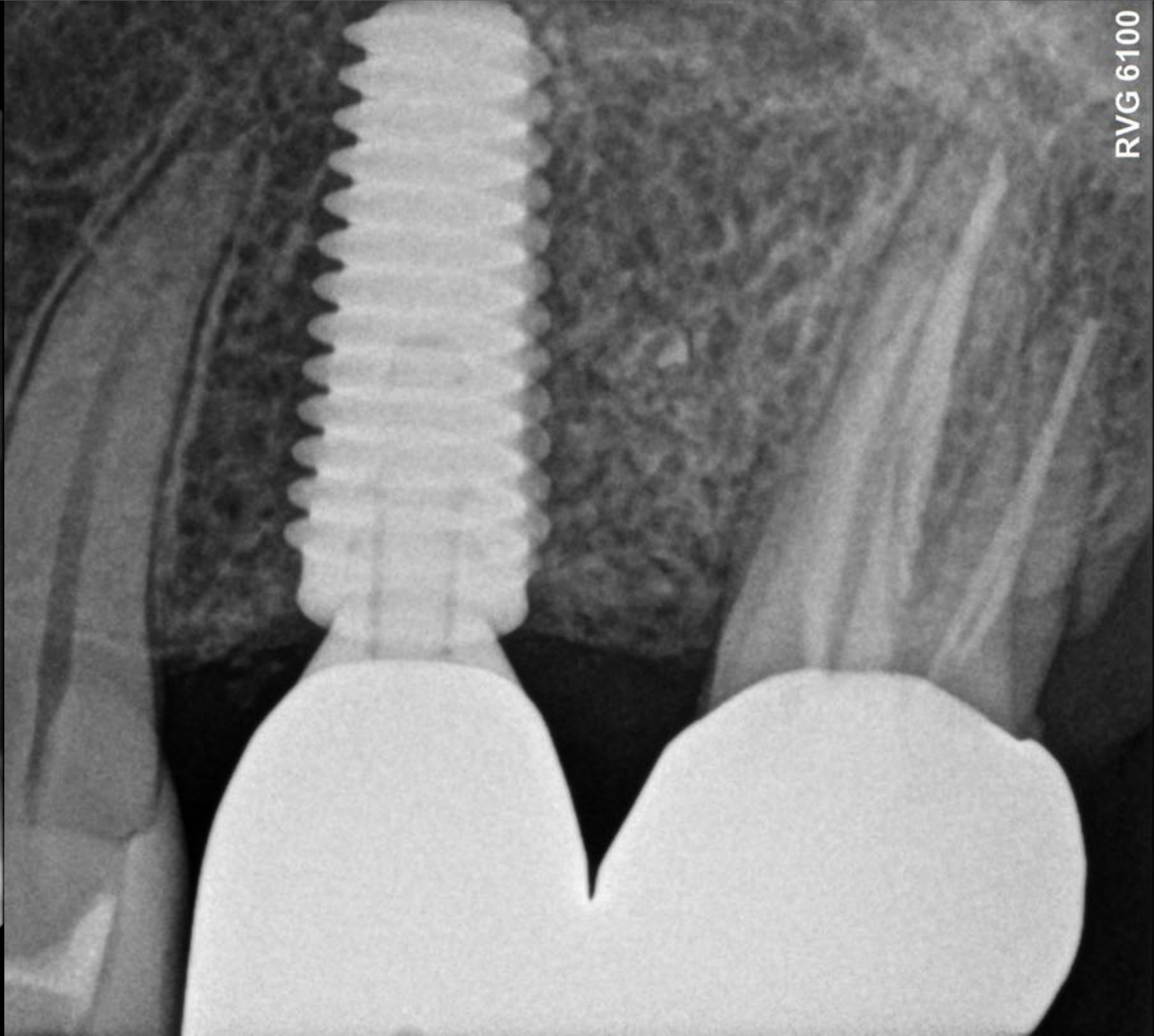
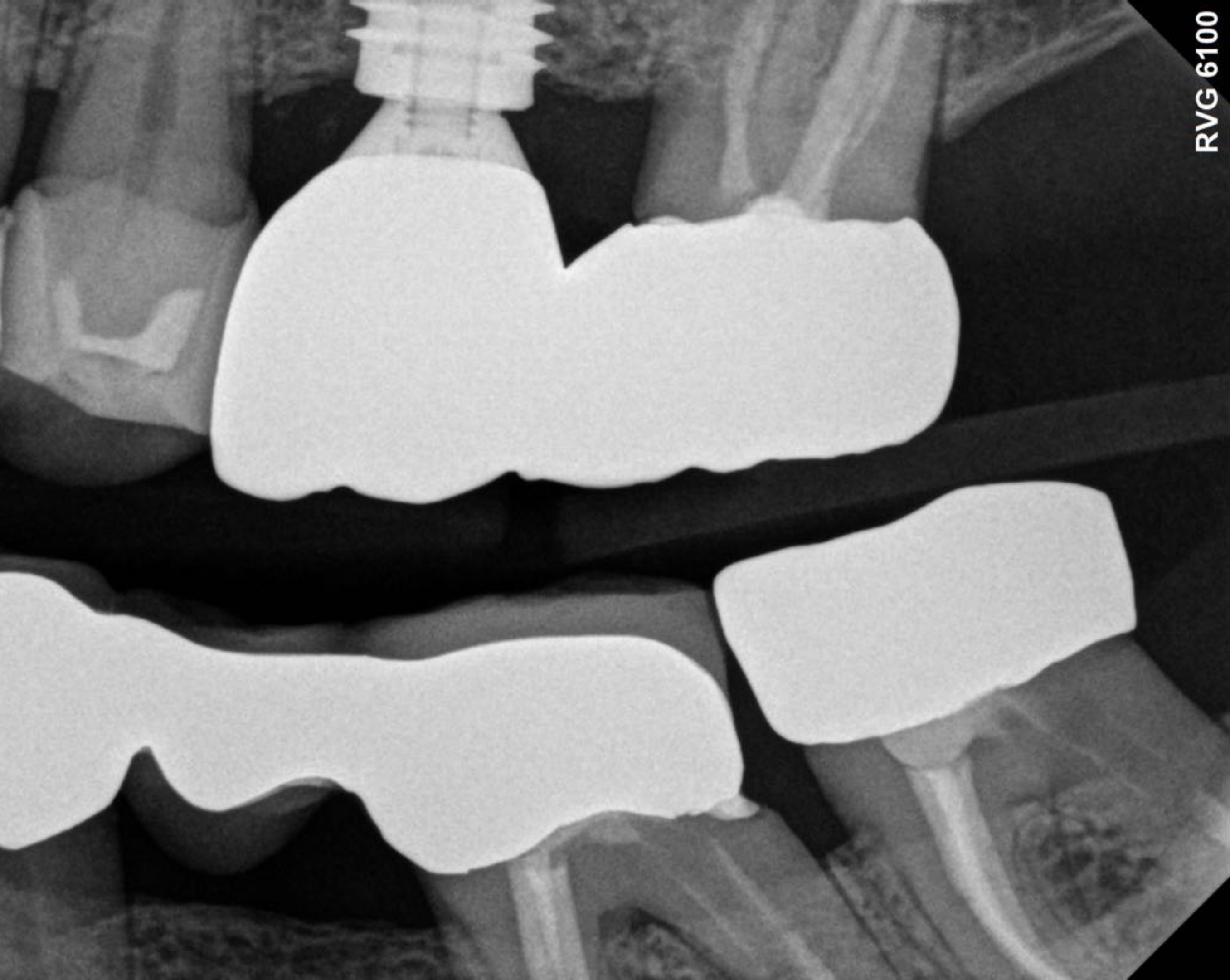




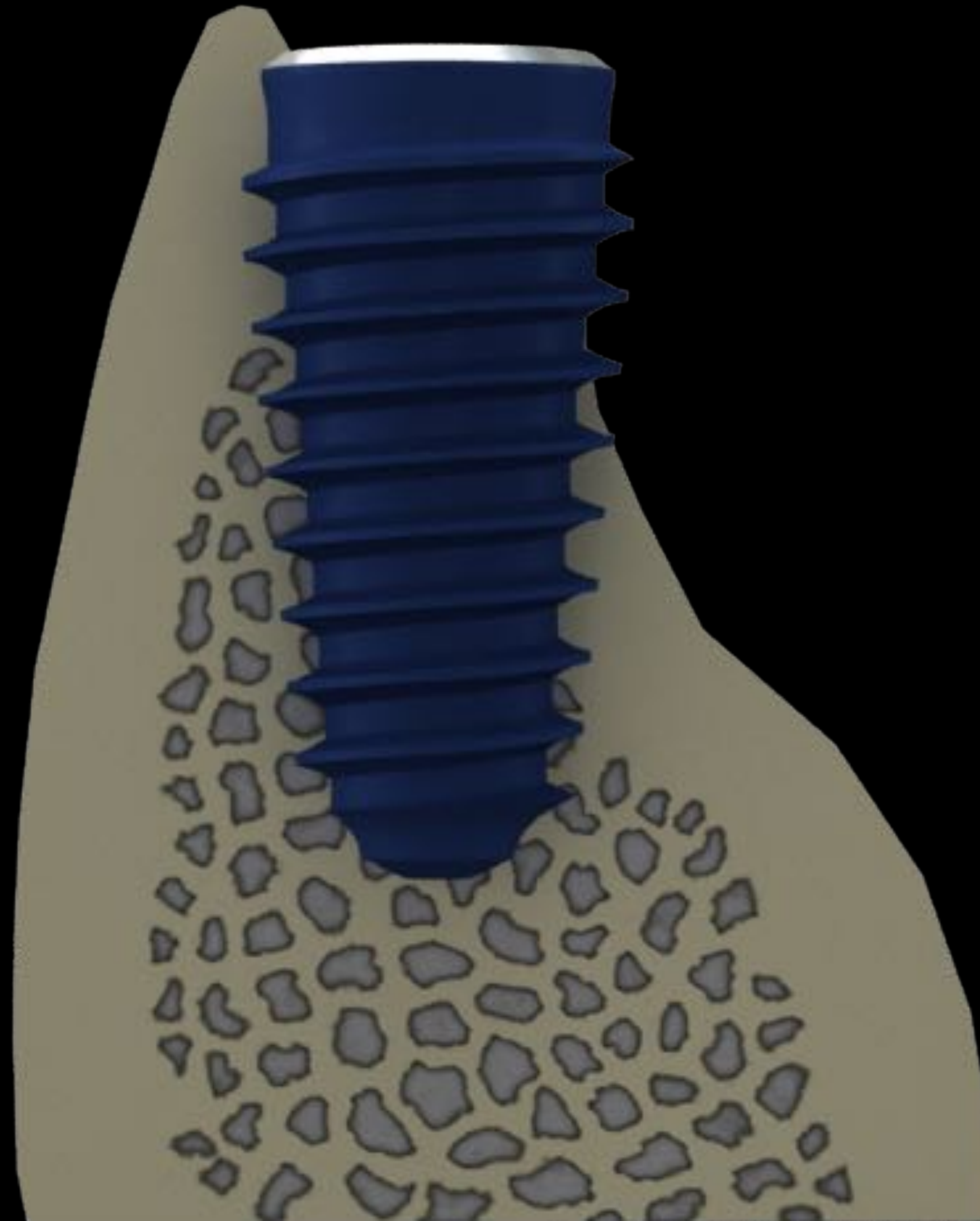


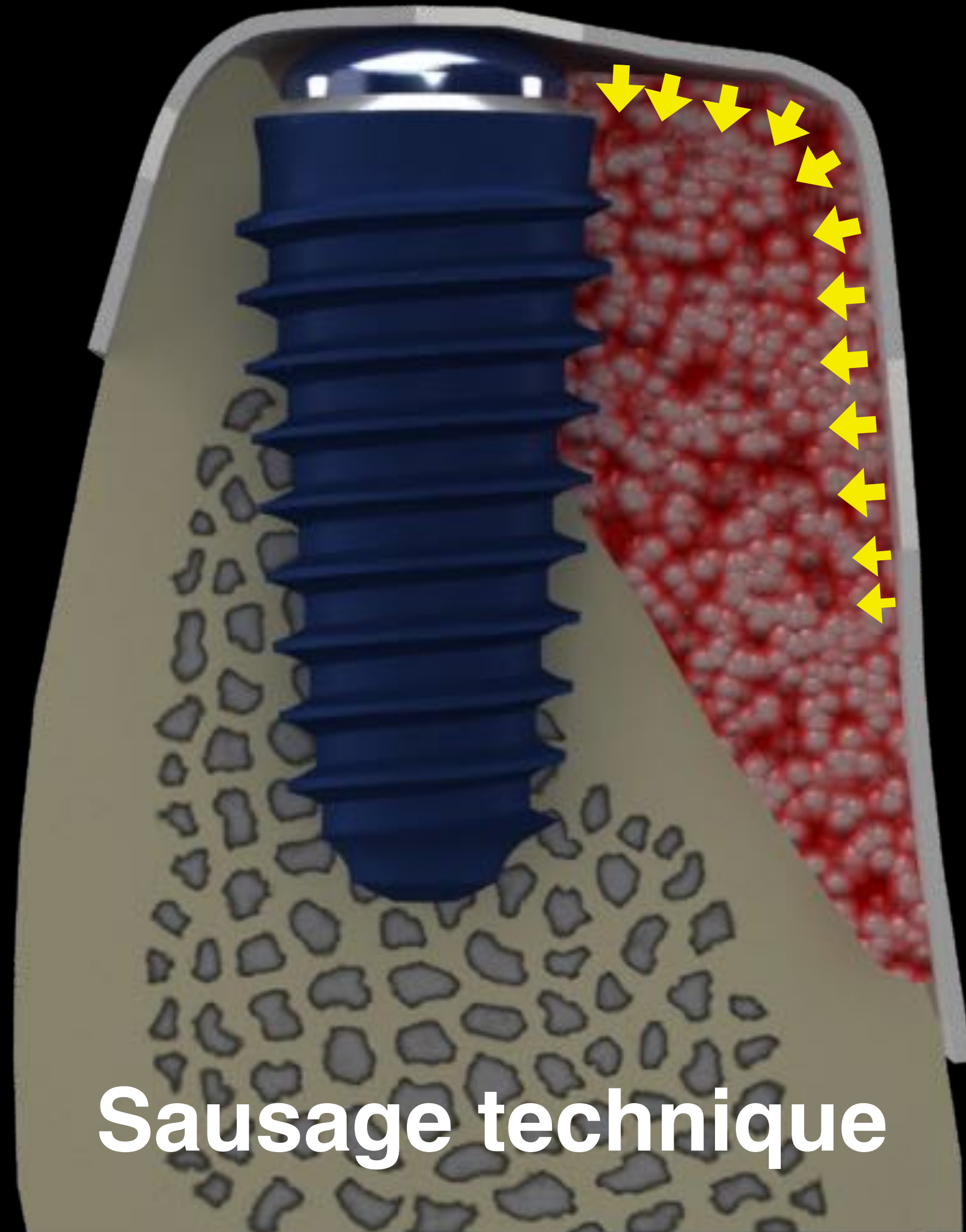




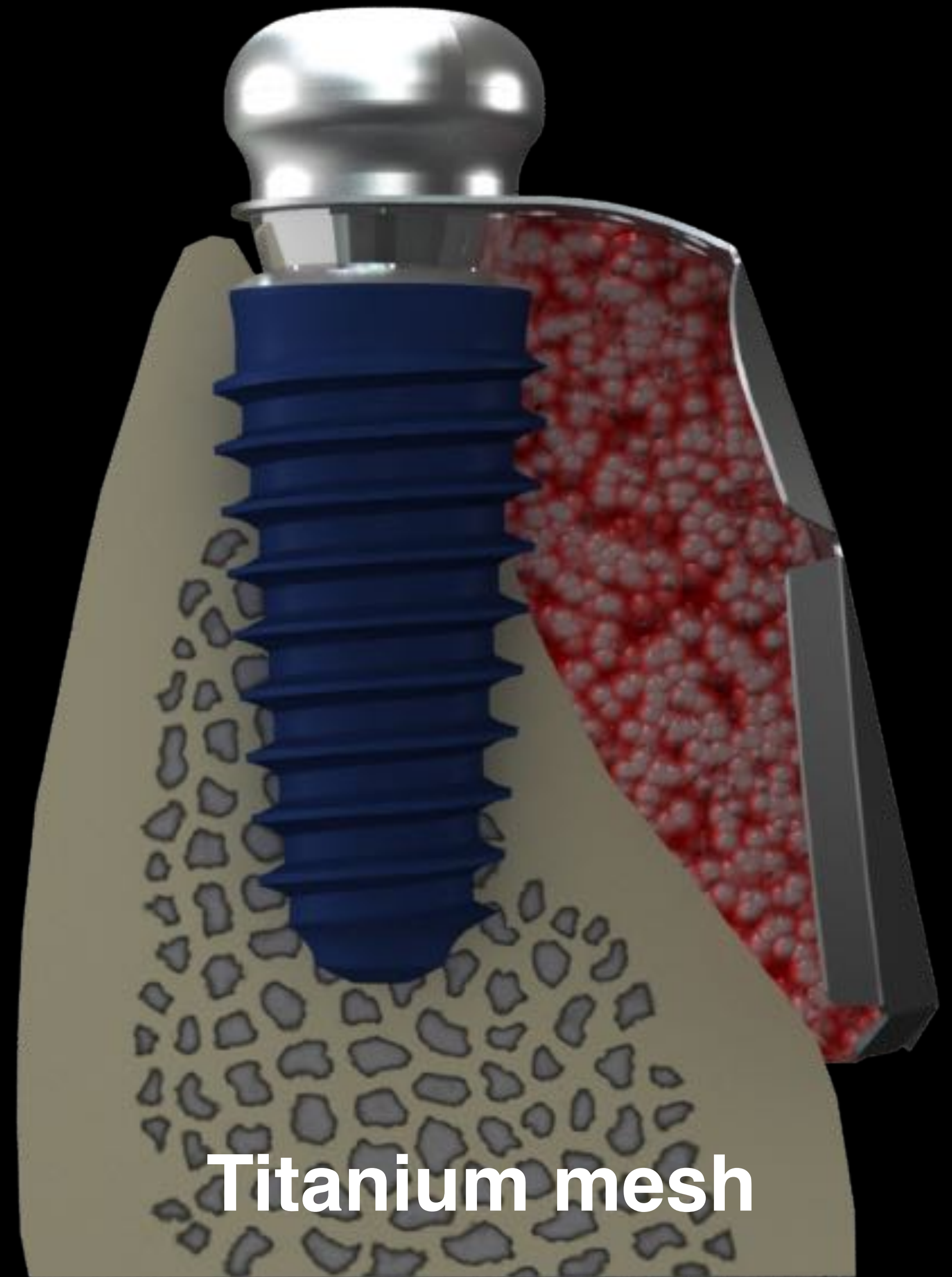


Without Buccal Plate we must rebuild



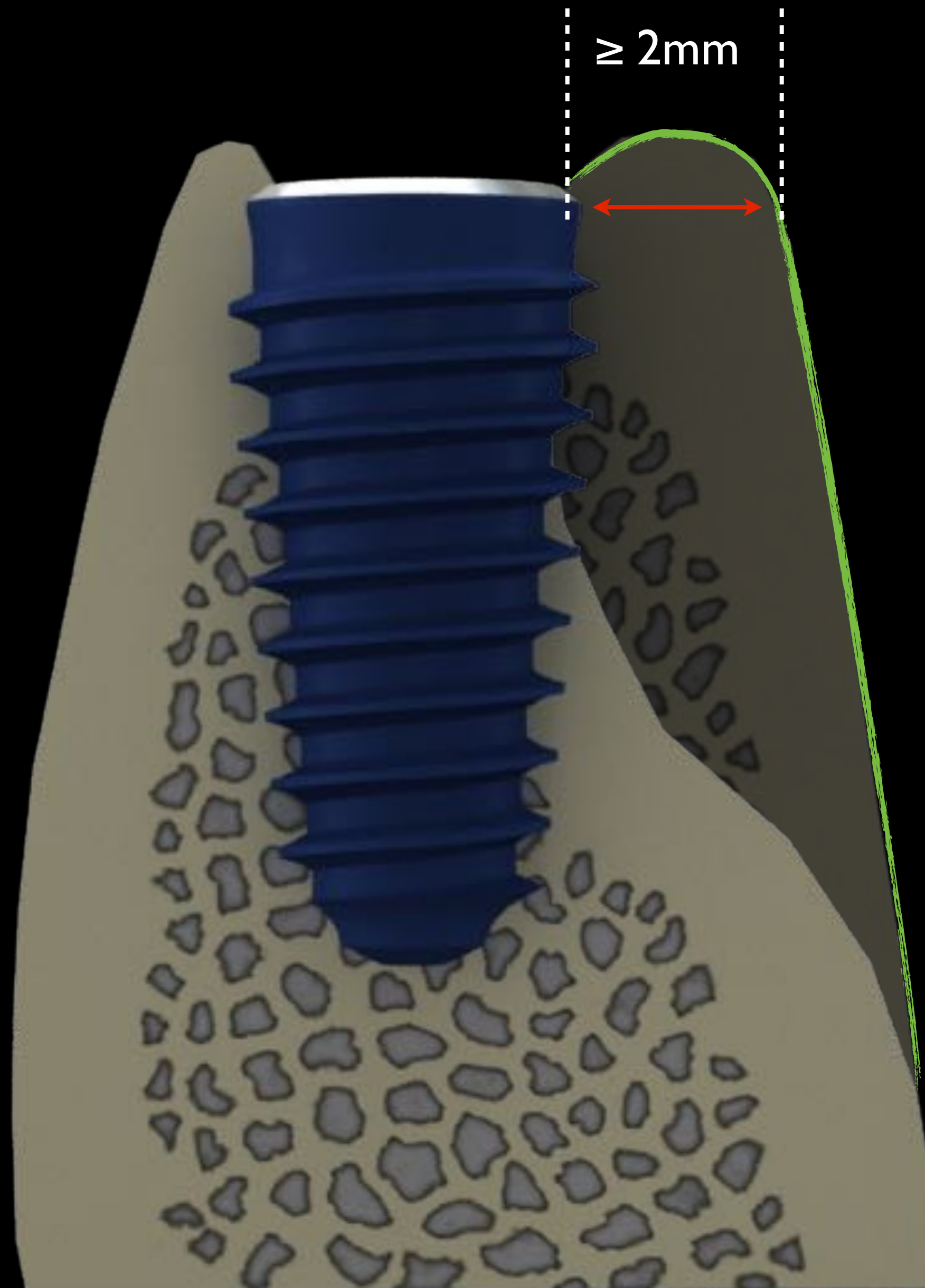


Sausage technique



Titanium mesh

2 mm is important in GBR for the ideal regeneration!



Influence of the 3-D Bone-to-Implant Relationship on Esthetics



Ueli Grunder, DMD*
Stefano Gracis, DMD**
Matteo Capelli, DMD**

There are biologic limits of the soft tissue dimension around implants; therefore, the limiting factor for the esthetic result of implant therapy is the bone level at the implant site. Clinicians must focus on the 3-D bone-to-implant relationship to establish the basis for an ideal and harmonic soft tissue situation that is stable over a long period. In some situations, missing bone is a limiting factor for esthetics; in others, it is possible to regenerate new bone around implants. As a certain amount of bone resorption occurs around implants as soon as the implant is in contact with the oral environment, the distance between an implant and adjacent tooth, as well as the distance between two implants, is as important as the bone volume on the buccal side of the implant head and in the papillary area, especially for the long-term result. This article discusses the 3-D bone-to-implant relationship and its influence on soft tissue esthetics around implants. (Int J Periodontics Restorative Dent 2005;25:113-119.)

To achieve an ideal esthetic result with implants, many parameters are of importance. The correct positioning of the implant is one of the key factors, together with the establishment of the optimum volume of hard and soft tissues. The optimal implant position is in the center of the tooth to be replaced, 1.5 to 2.0 mm more palatal than the expected buccal emergence profile at the gingival margin of the crown. What is more difficult to define is the ideal hard and soft tissue volume around the implant head that can guarantee the presence of an interproximal papilla and an esthetically stable mucosal margin over time.

The natural thickness of the connective tissue overlying the bone around implants (buccal side) is within a narrow range between 2.8 and 3.8 mm.¹⁻⁵ The height of the interproximal soft tissues between natural teeth, as well as between a natural tooth and an implant, ranges from 3.5 to 5.0 mm.⁶⁻⁸ The soft tissue dimension



CLINICAL APPLICATION



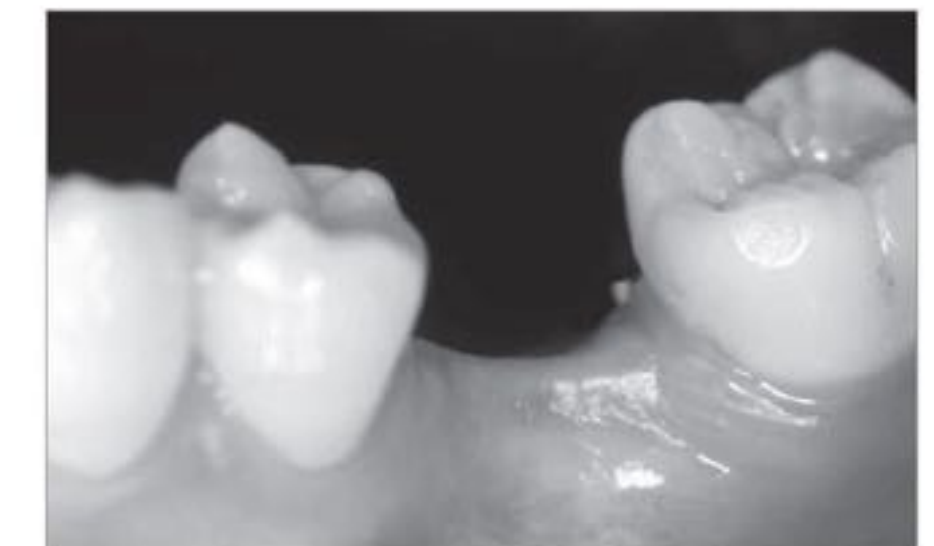
Biologic Height-Width Ratio of the Buccal Supra-Implant Mucosa

Takeshi Nozawa, DDS
Private Practice, Niigata, Japan

Hiroaki Enomoto, DDS
Visiting Professor, Nippon Dental University Niigata Hospital Oral Implant Center, Niigata, Japan

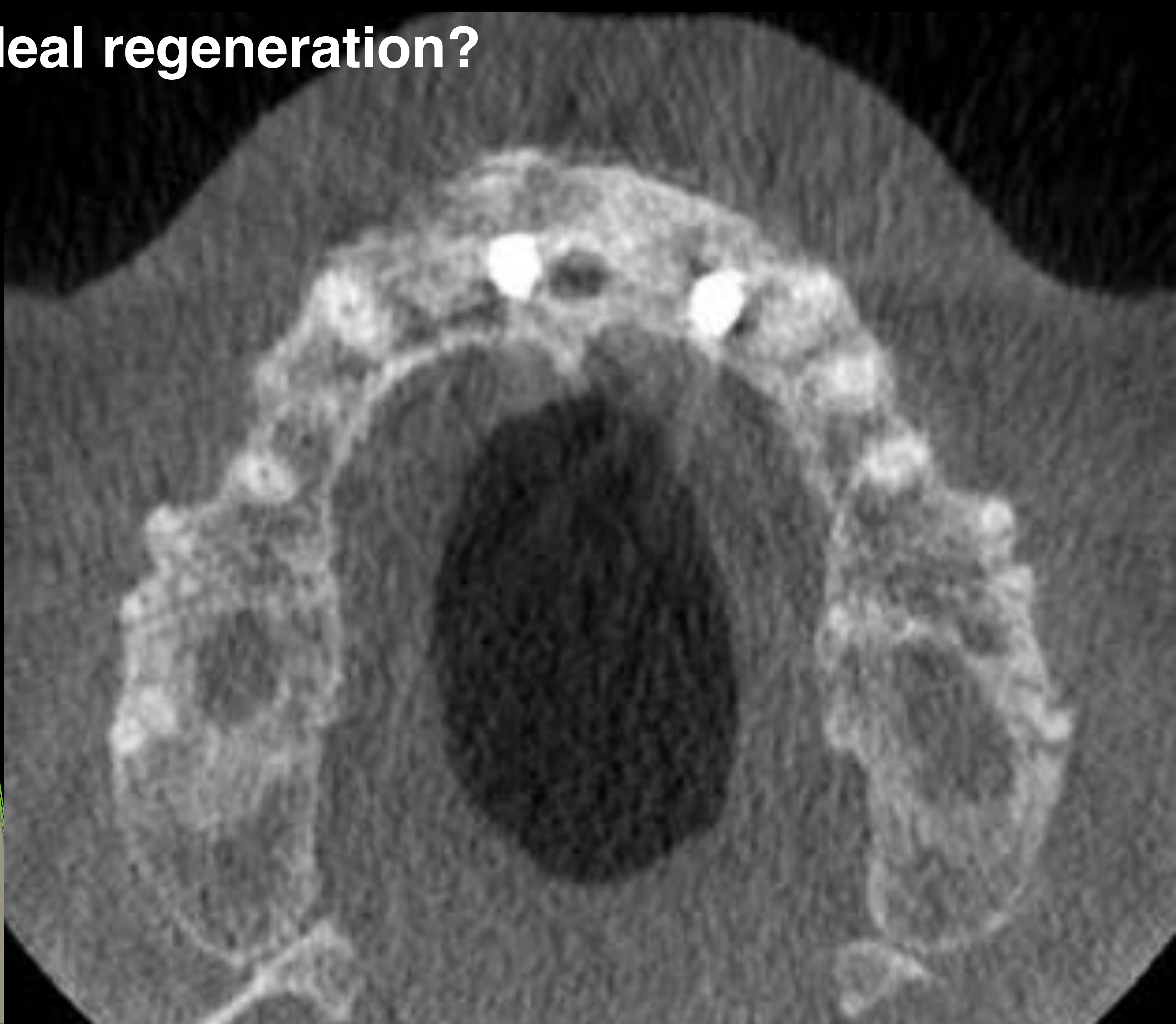
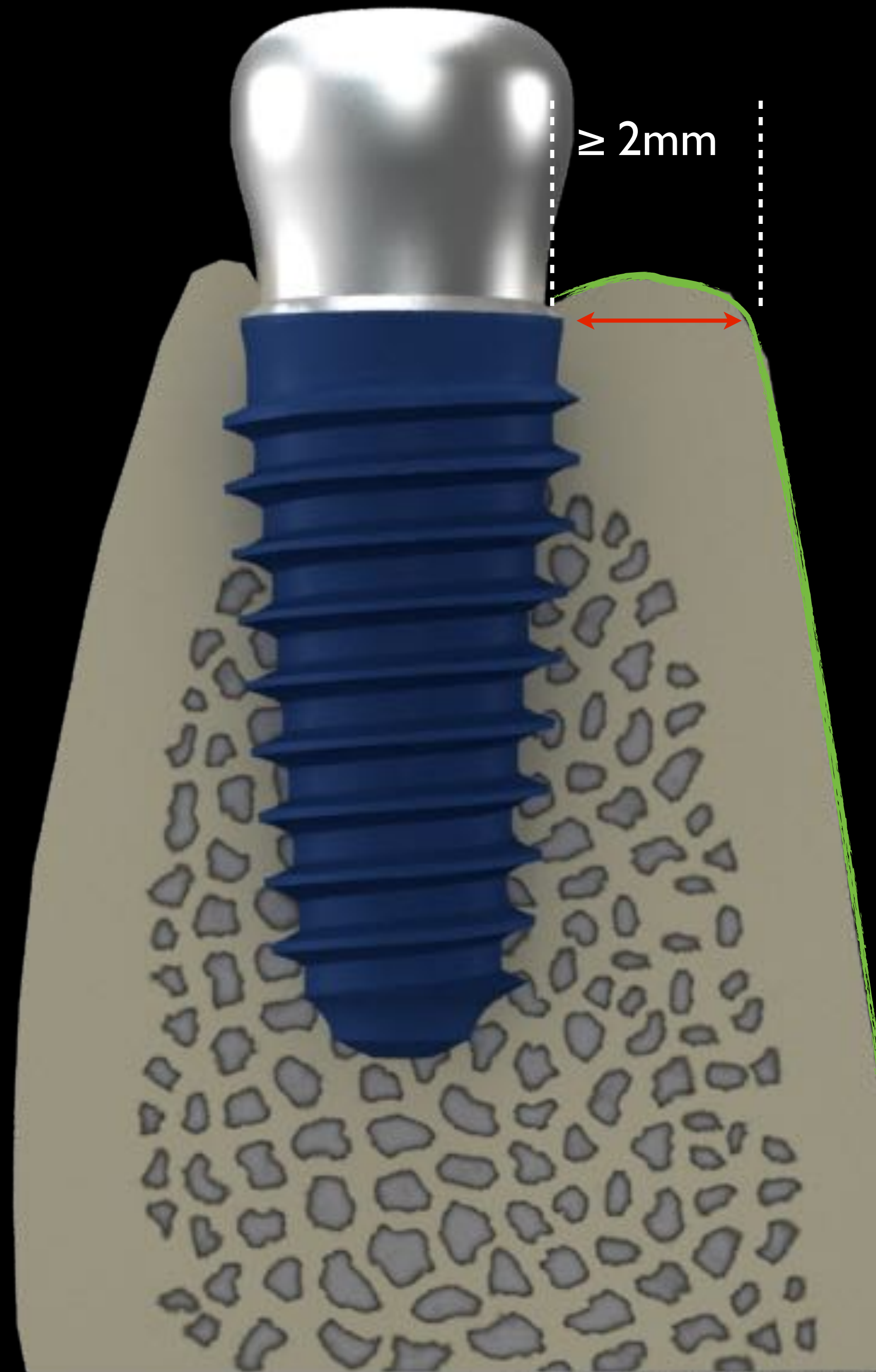
Shunzo Tsurumaki, CDT
Niigata, Japan

Koichi Ito, DDS, MSD, PhD
Professor and Chair, Department of Periodontology, Nihon University School of Dentistry, Tokyo, Japan



Correspondence to: Dr Takeshi Nozawa
9-7 Sakae-cho, Ojya-shi, Niigata-Ken, 947-0011, Japan;
phone: 81 258 82 0468; fax: 81 258 82 0957; e-mail: nozawa.perio.implant@world.ocn.ne.jp

What it should be for ideal regeneration?





8 minutes from extraction to graft material including sterilization process

Bone and teeth are similar chemically



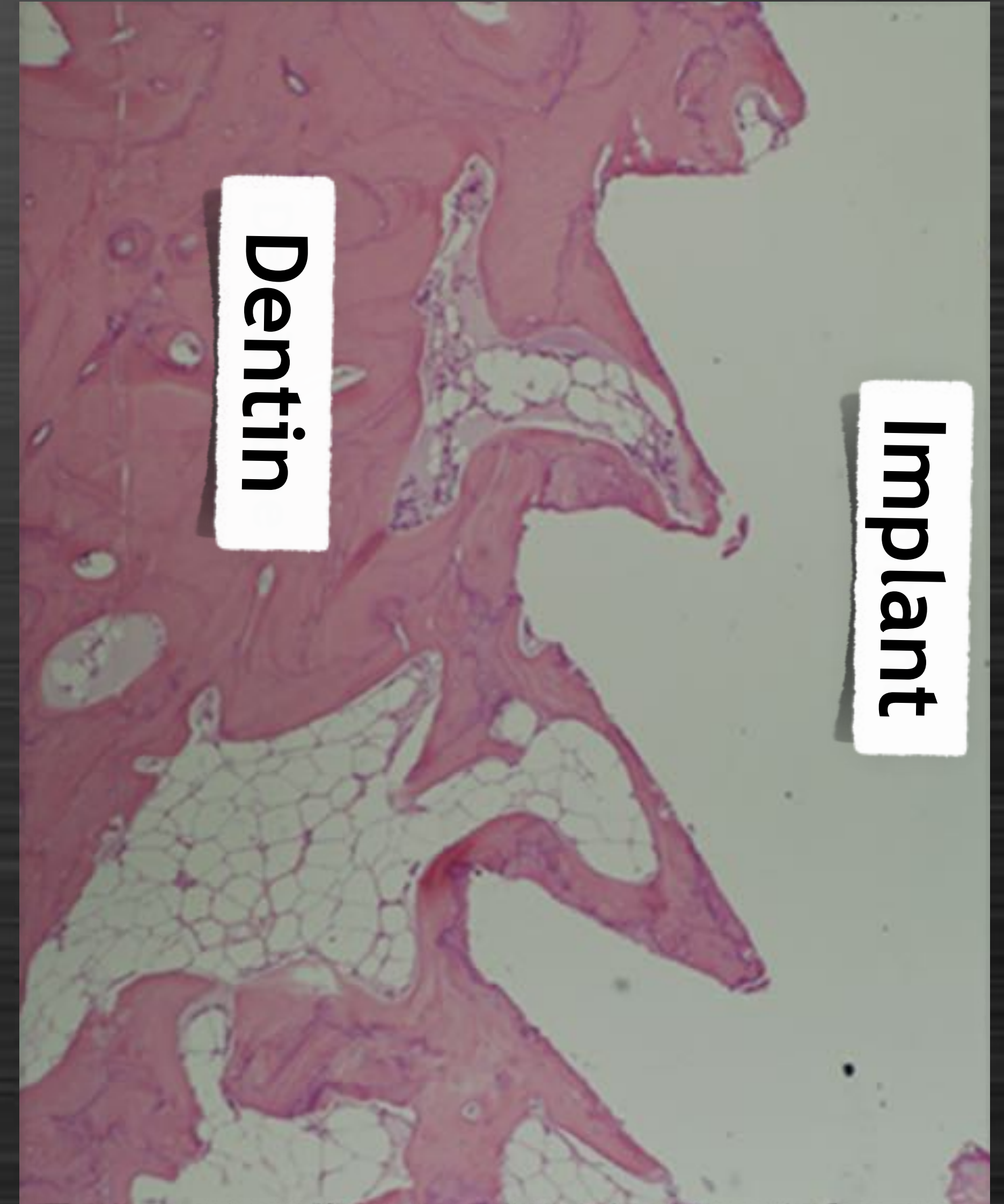
Enamel (10%)	HA (Crystalline Calcium Phosphate) Water and Collagen	96% 4%
Dentin (80%)	HA Collagen type I Water	70% 20% 10%
Cementum (5%)	HA Collagen type I Water	45% 33% 22%
BMP's and GF's	Typically more than in bone	

Cortical Bone	HA (Crystalline Calcium Phosphate) Collagen type I Water	60% 30% 10%
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Dentin to Bone - Interface



Dentin to Implant - Interface



Scientific Evaluation

Research on Bone-Dentin interface goes back to the 70's.

- Noncollagenous proteins of a rat dentin matrix possessing bone morphogenetic activity. *J Dent Res*, 56., 228-232. Butler, WT., Mikulski, A., Urist, MR., Bridges, G., & Uyeno, S. (1977).
- Bovine tooth-derived bone morphogenetic protein. *J Dent Res*, 68., 1069-1074. Kawai, T., & Urist, MD. (1989).
- Processed Allogenic Dentine as A Scaffold for Bone Healing: An in vivo study. 1 Dr. AL-Namnam, N.M., 1 Shanmuhasuntharam, P., 1 Dr. Ha K.O. and 2 Prof. Siar C.H. *Australian Journal of Basic and Applied Sciences*, 4(12): 5932-5940, 2010
- Human Dentin as Novel Biomaterial for Bone Regeneration. Masaru Murata, Toshiyuki Akazawa, Masaharu Mitsugi, In-Woong Um, Kyung-Wook Kim and Young-Kyun Kim. 2011
- A Novel Procedure to Process Extracted Teeth for Immediate Grafting of Autogenous Dentin. Itzhak Binderman, Gideon Hallel , Casap Nardy , Avinoam Yaffe, and Lari Sapoznikov. *Interdisciplinary Medicine and Dental Science*. 2014

Scientific References

- A Novel Procedure to Process Extracted Teeth for Immediate Grafting of Autogenous Dentin. – I. Binderman, G. H. 2014
- Tissue Engineering of Bone: Critical Evaluation of Scaffold Selection. Itzhak Binderman, Avinoam Yaffe, Yuval 1Department of Oral Biology, Maurice and Gabriela Goldschleger, School of Dental Medicine, Sackler Fac
- Processed Allogenic Dentine as A Scaffold for Bone Healing: An in vivo study; 1 Dr. AL-Namnam, N.M., 1 Shan
- Healing Mechanism and Clinical Application of Autogenous Tooth Bone Graft Material ; Intech; chapter 16; 2013
- Human Dentin as Novel Biomaterial for Bone Regeneration ; Masaru Murata1, Toshiyuki Akazawa2; Interchop
- A New Method for Alveolar Bone Repair Using Extracted Teeth for the Graft Material; Tomoki Nampo,* Junichi M
- Evaluation of Osteoconductive and Osteogenic Potential of a Dentin Based Bone Substitute Using a Calvarial Defec Dentistry;2012
- Bone Engineering Using Human Demineralized Dentin Matrix and Recombinant Human BMP-2; University of Ho
- Bone Graft Material Using Teeth; Young-Kyun Kim; Seoul National University Bundang Hospital, Seongnam
- Clinical application of auto-tooth bone graft material; Seoul National University Bundang Hospital, Seongnam
- Autograft of Dentin Materials for Bone Regeneration; Masaru Murata1, Toshiyuki Akazawa2; ; Intech;
- Development of a novel bone grafting material using autogenous teeth; ORAL AND MAXILLOFACIAL SURGERY
- New bone formation around xenogenic dentin grafts to rabbit tibia marrow; Al-Asfour A, Andersson L.; Dent Tra
- Dentin xenografts to experimental bone defects in rabbit tibia are ankylosed and undergo osseous replacement; And
- A prospective study on the effectiveness of newly developed autogenous tooth bone graft material for sinus bone gra Young Yun, Young-Kyun Kim; Journal of Advanced Prosthodont 2014;6:528-38
- Autogenous teeth used for bone grafting: a comparison with traditional grafting materials; Young Kyun Kim, DDS, National University, Chosun University, and Kangwon National University;
- Analysis of Organic Components and Osteoinductivity in Autogenous Tooth Bone Graft Material; Young-Kyun Kim Katsutoshi Ito; Department of Oral and Maxillofacial Surgery, Section of Dentistry, Seoul National Universi Oral and Maxillofacial Surgery, College of Dentistry, Dankook University, Department of Oral and Maxillof
- Coagulation of blood plasma of guinea pig by the bone matrix. Huggins, CB., & Reddi, AH. (1973). Proc Natl Ac
- Regenerative Medicine of Bone and Teeth. Kawakami, T., Kuboki, Y., Tanaka, J., Hijikata, S., Akazawa, T., Mu Tissue Biology, 16(3),95-113.
- Development of a novel bone grafting material using autogenous teeth. Kim, YK., Kim, SG., Byeon, JH., Lee, HJ Pathol Oral Radiol Endod., 109., 4., 496-503.
- Extracted tooth roots used for lateral alveolar ridge augmentation: a proof-of – concept study. Schwarz F, Golubov alveolar ridge augmentation: a proof-of-concept study. J Clinical Periodontol 2016; 43: 345–353. doi: 10.1 Deusseldorf, Deusseldorf, Germany;



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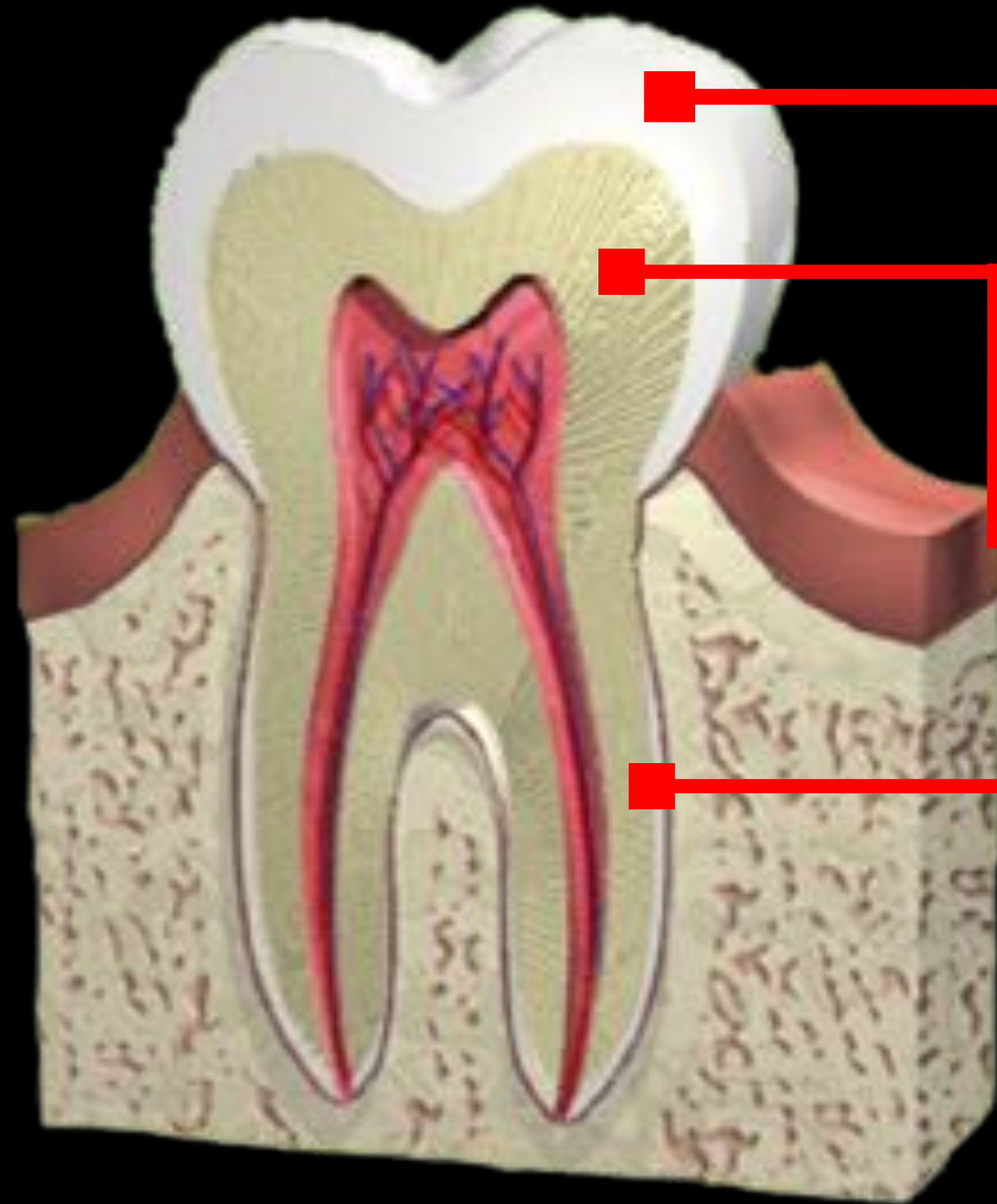
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Europe

**Enamel 96% HA
(Xenograft)**

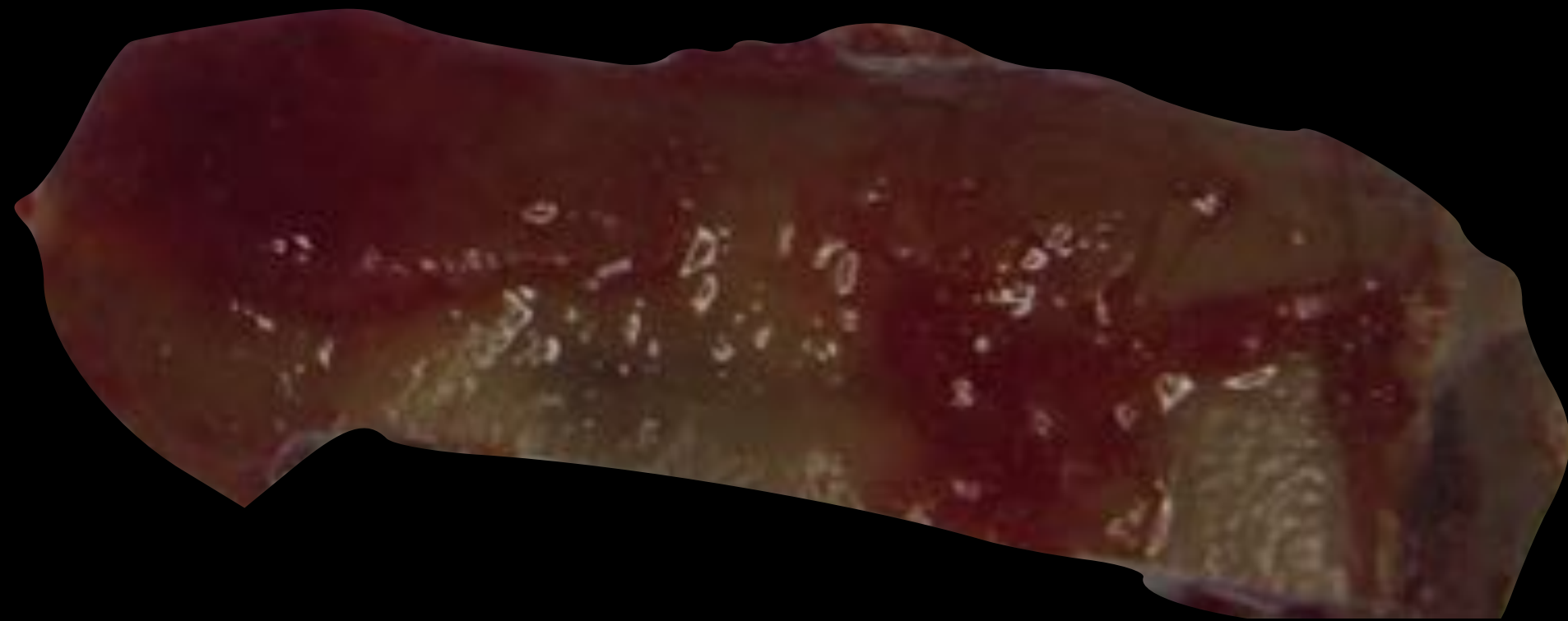


**Dentin
(Demineralized bone)**

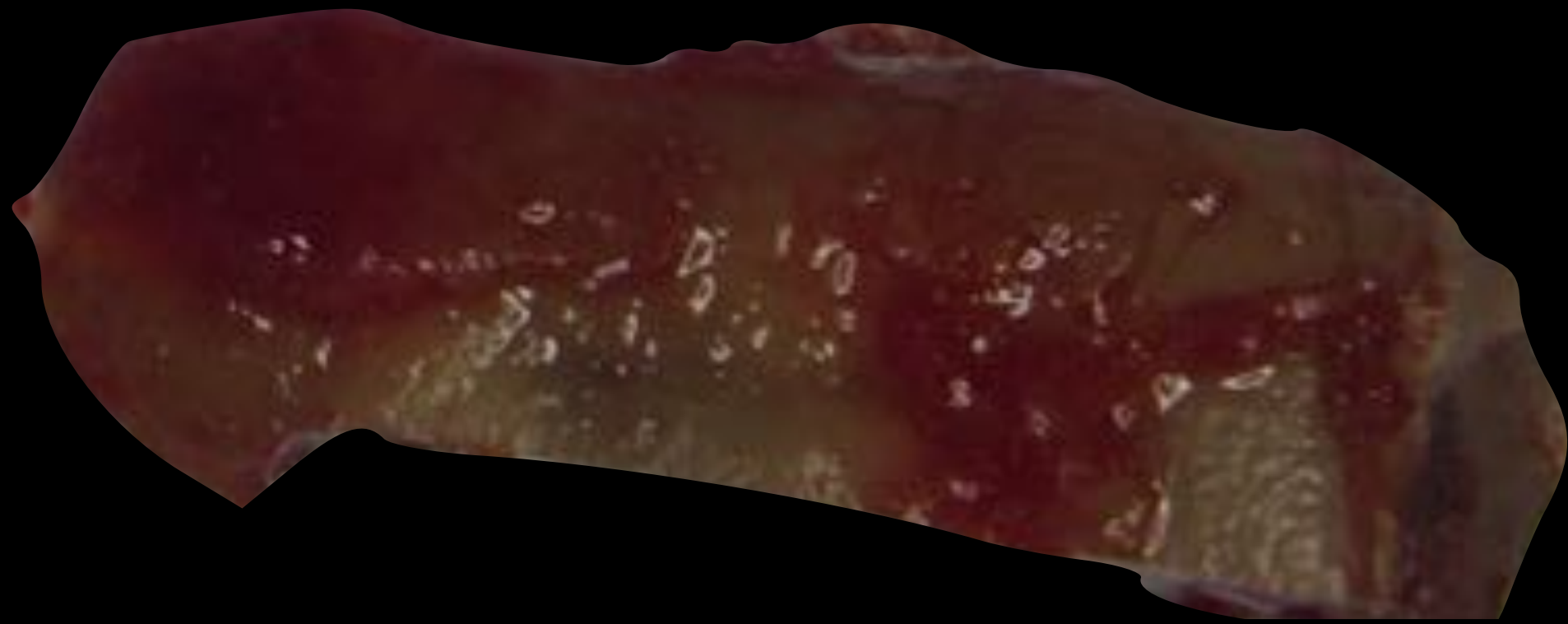
**Cementum
(Mineralized bone)**

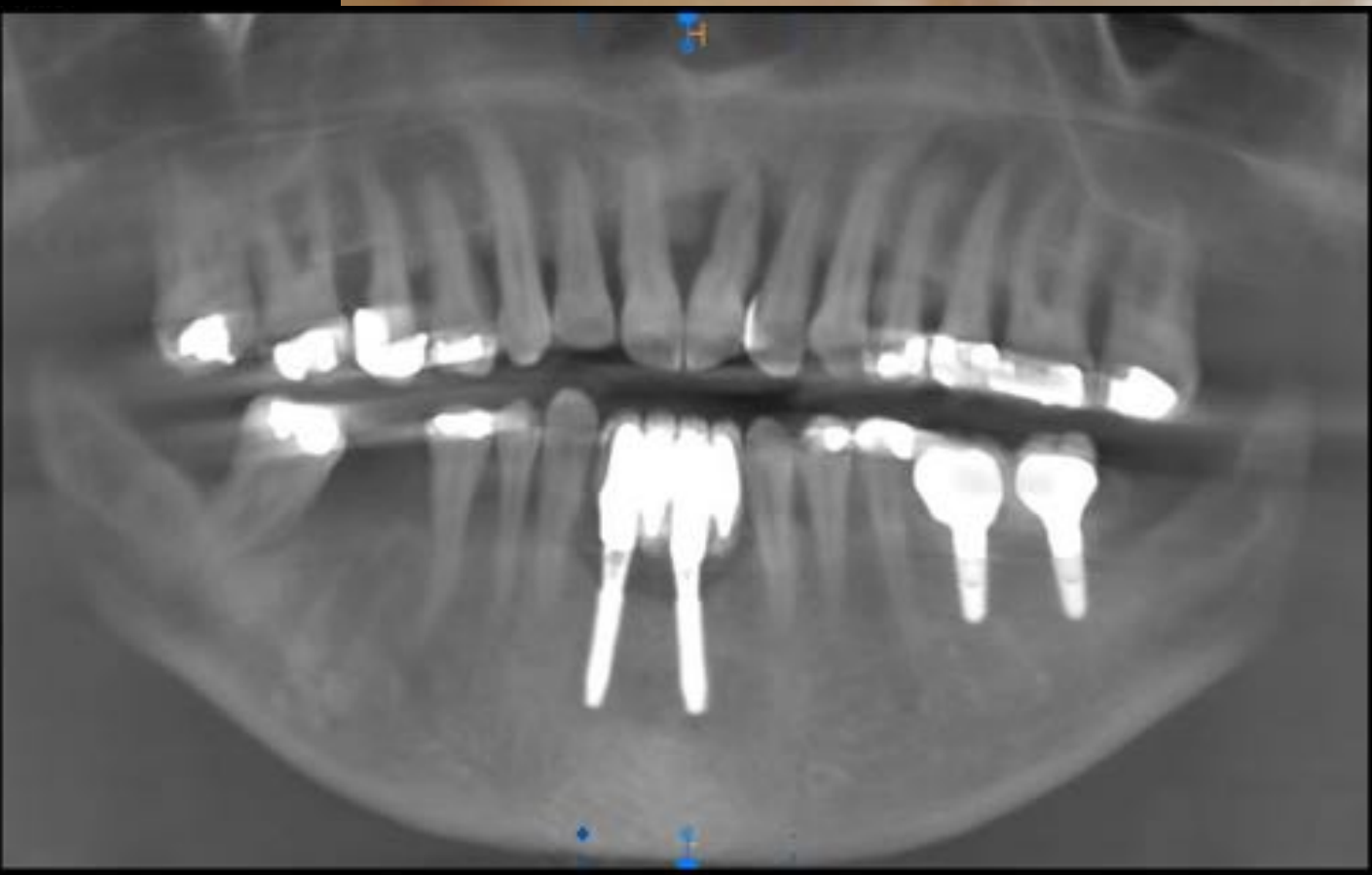
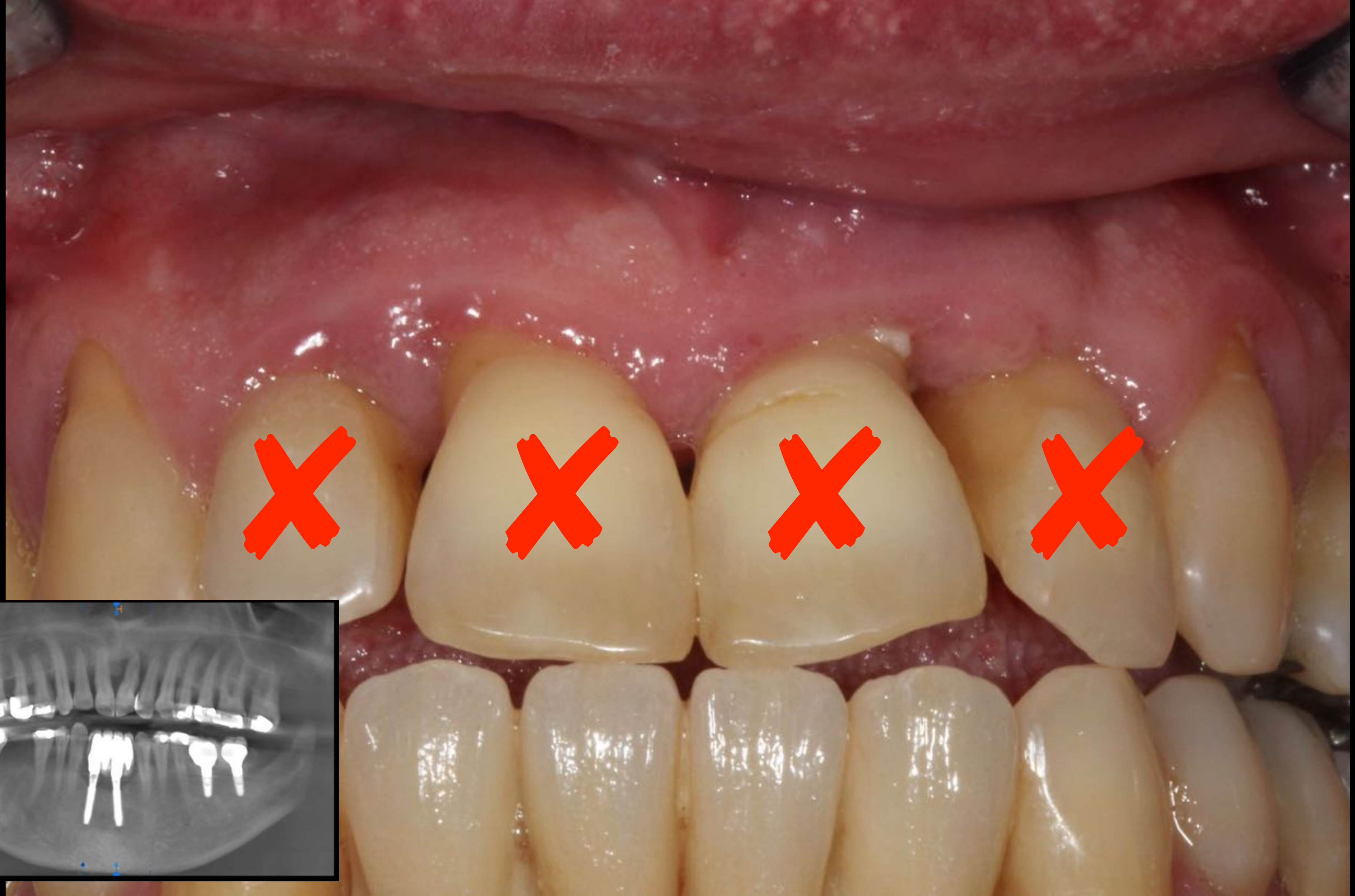


Dentin ground graft

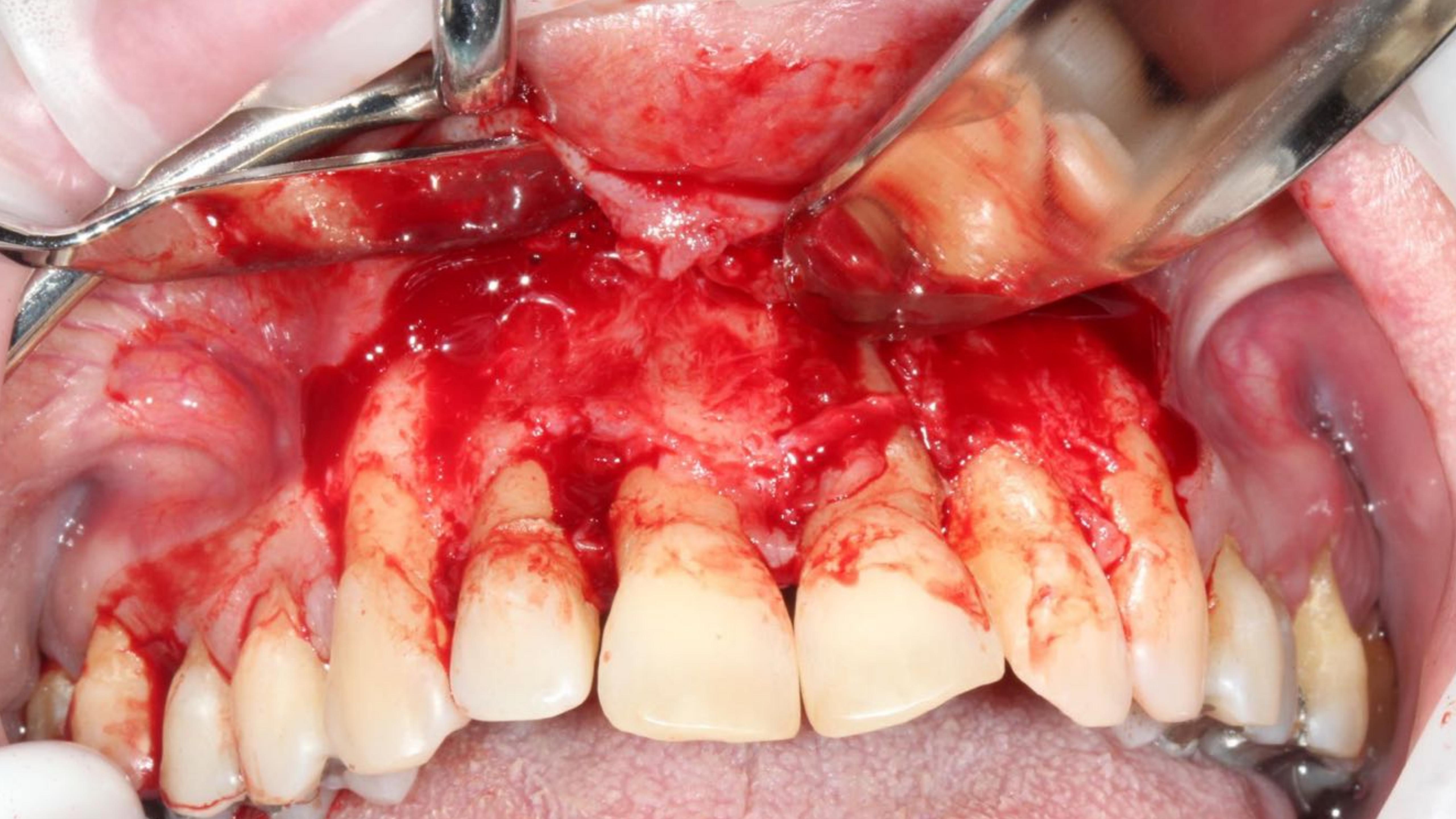


Dentin ground graft



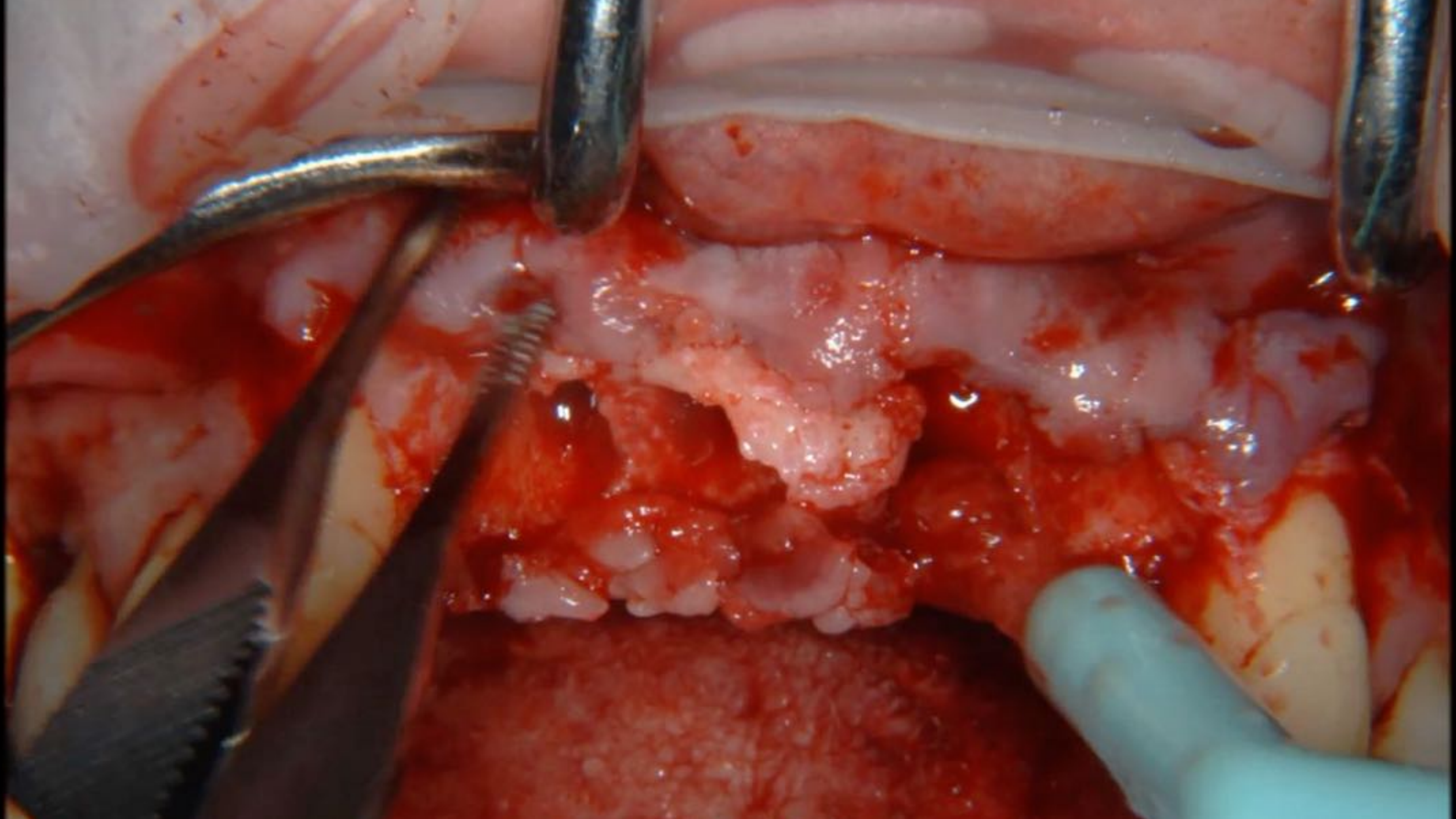


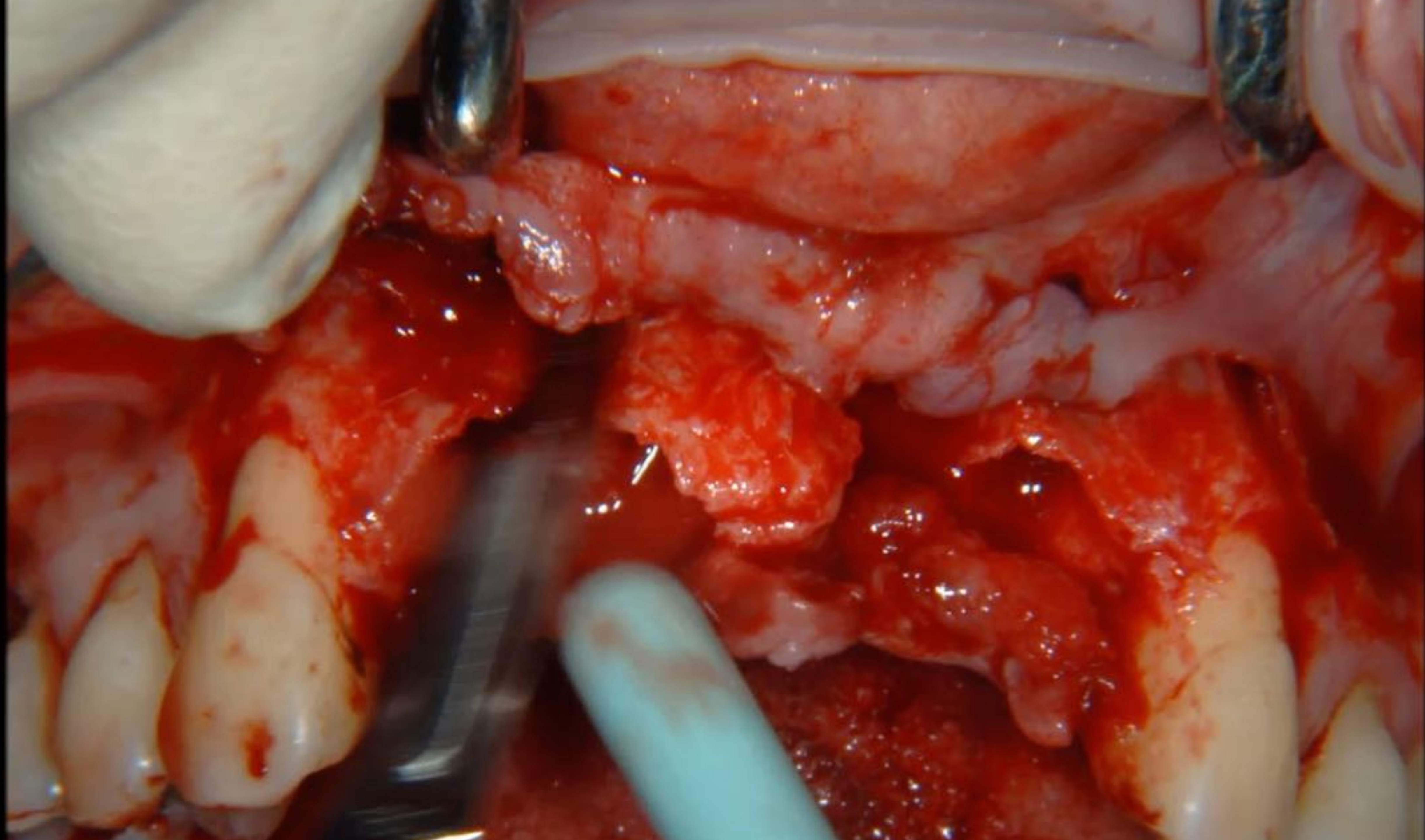


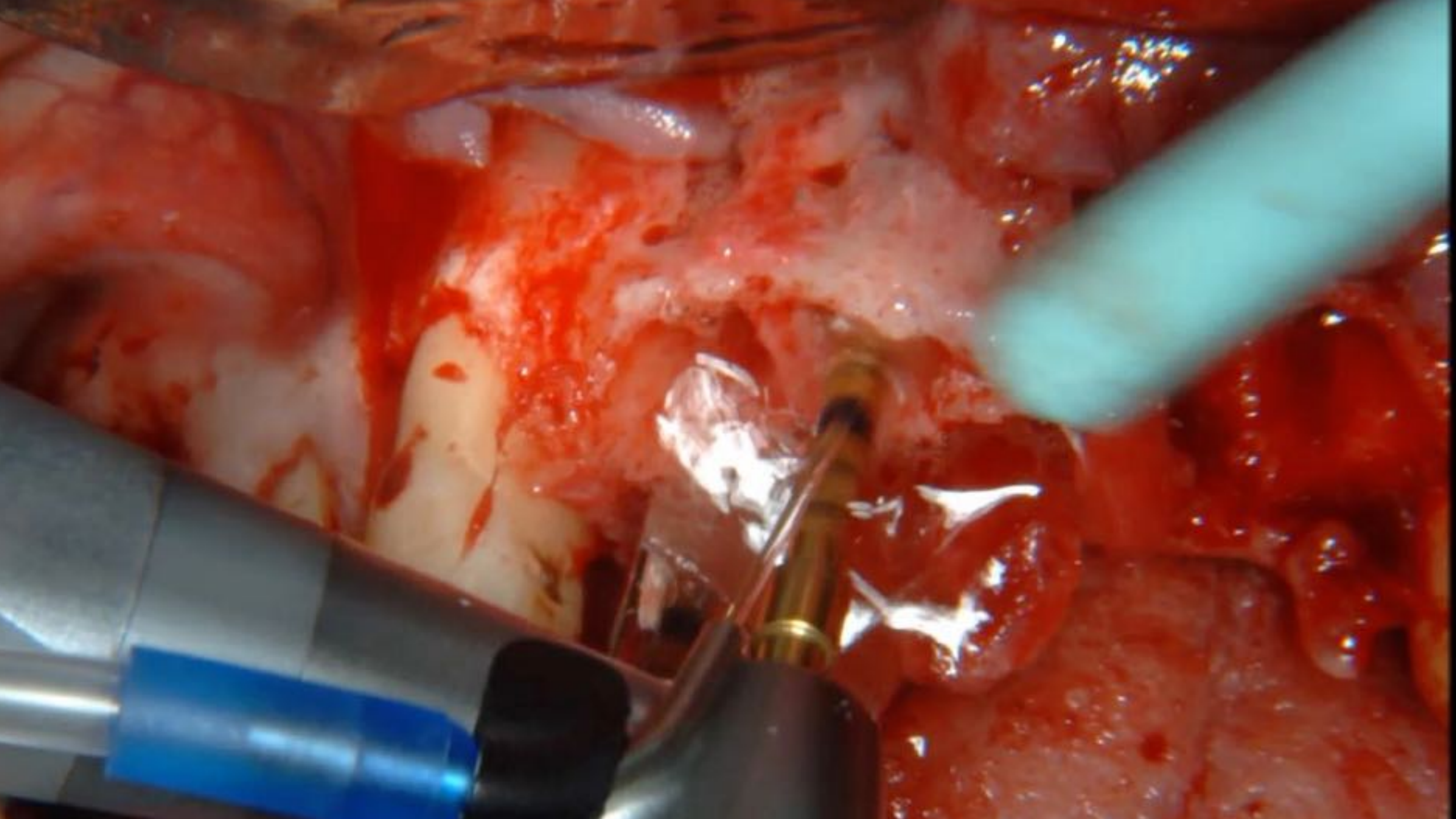


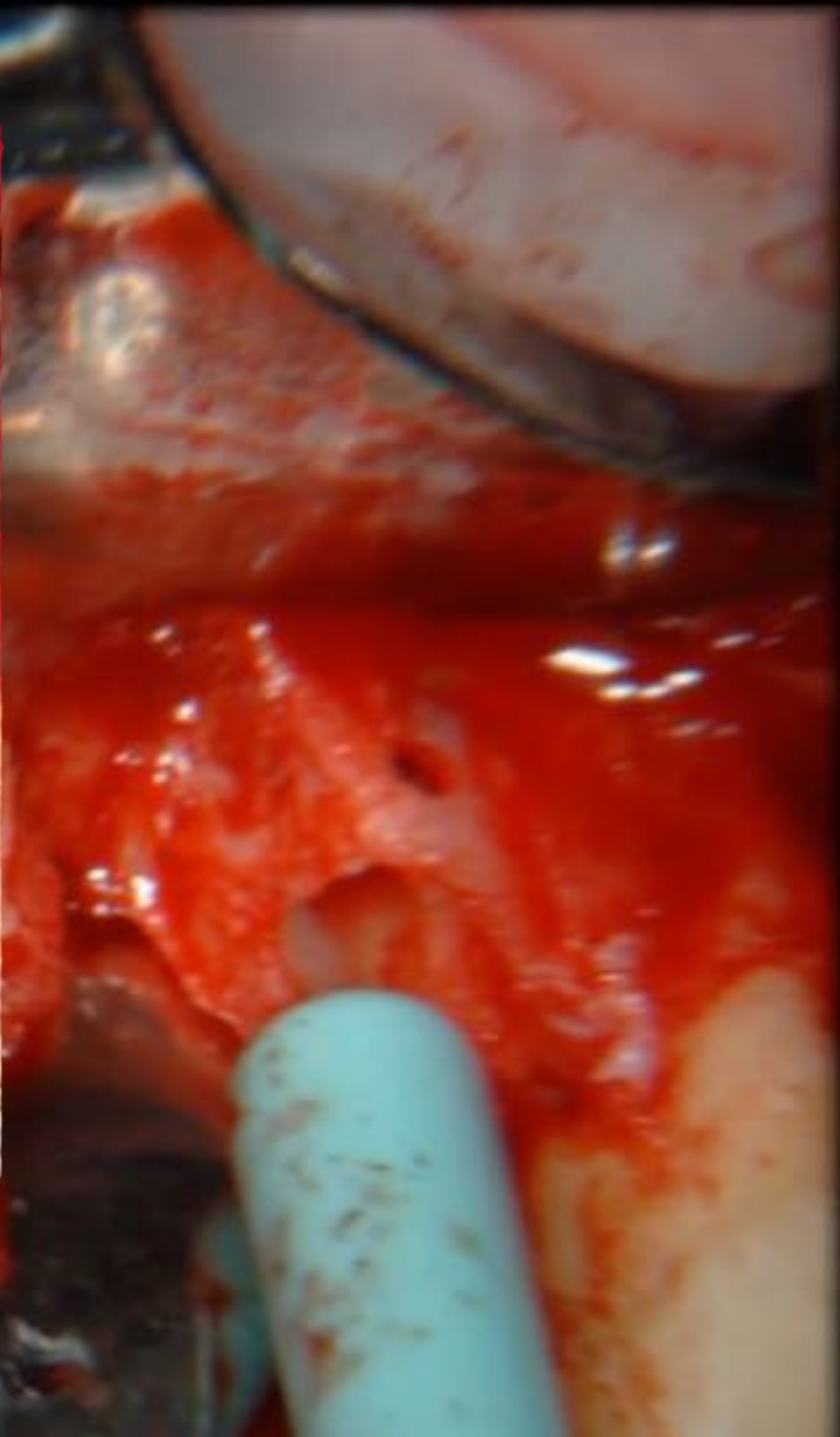
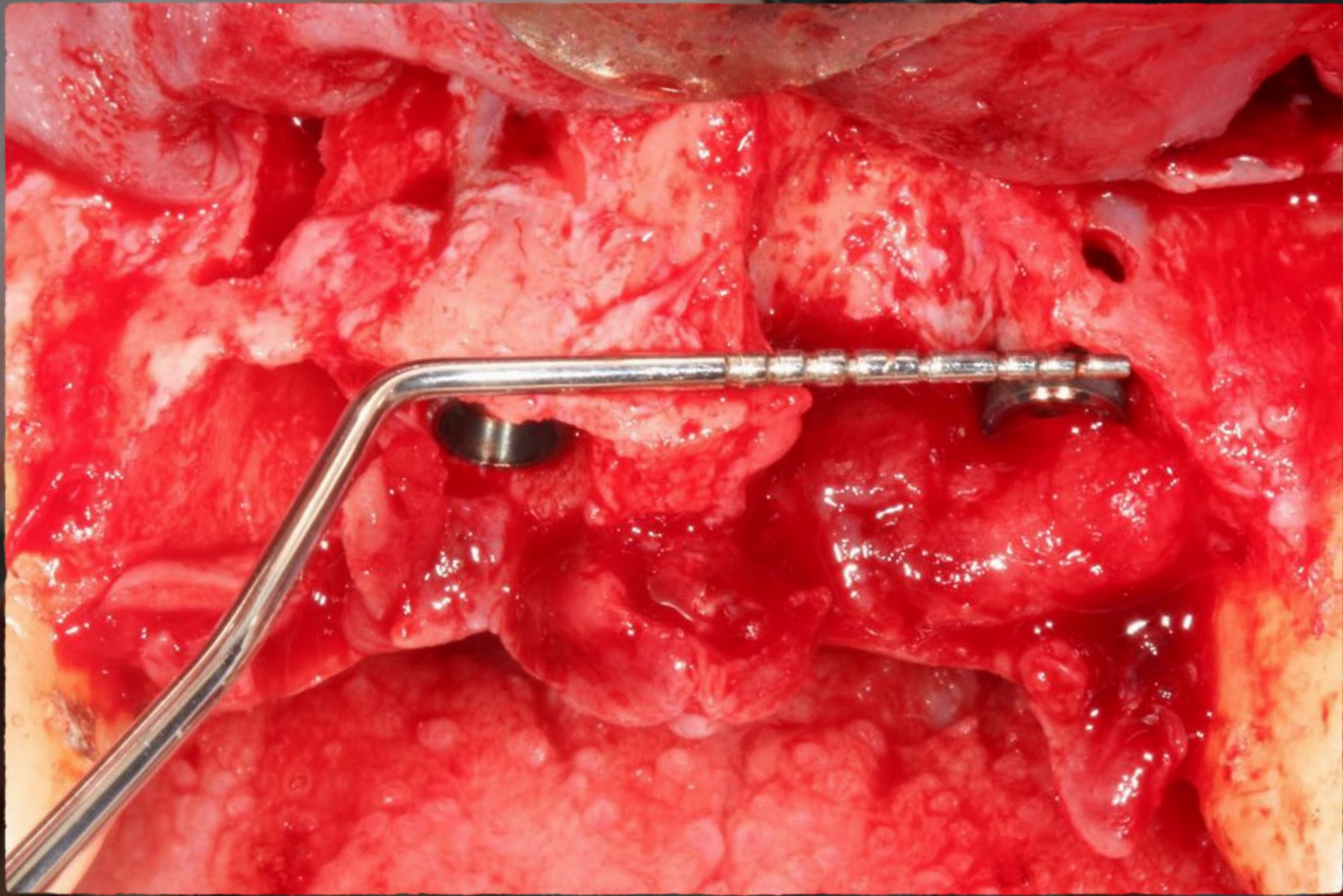


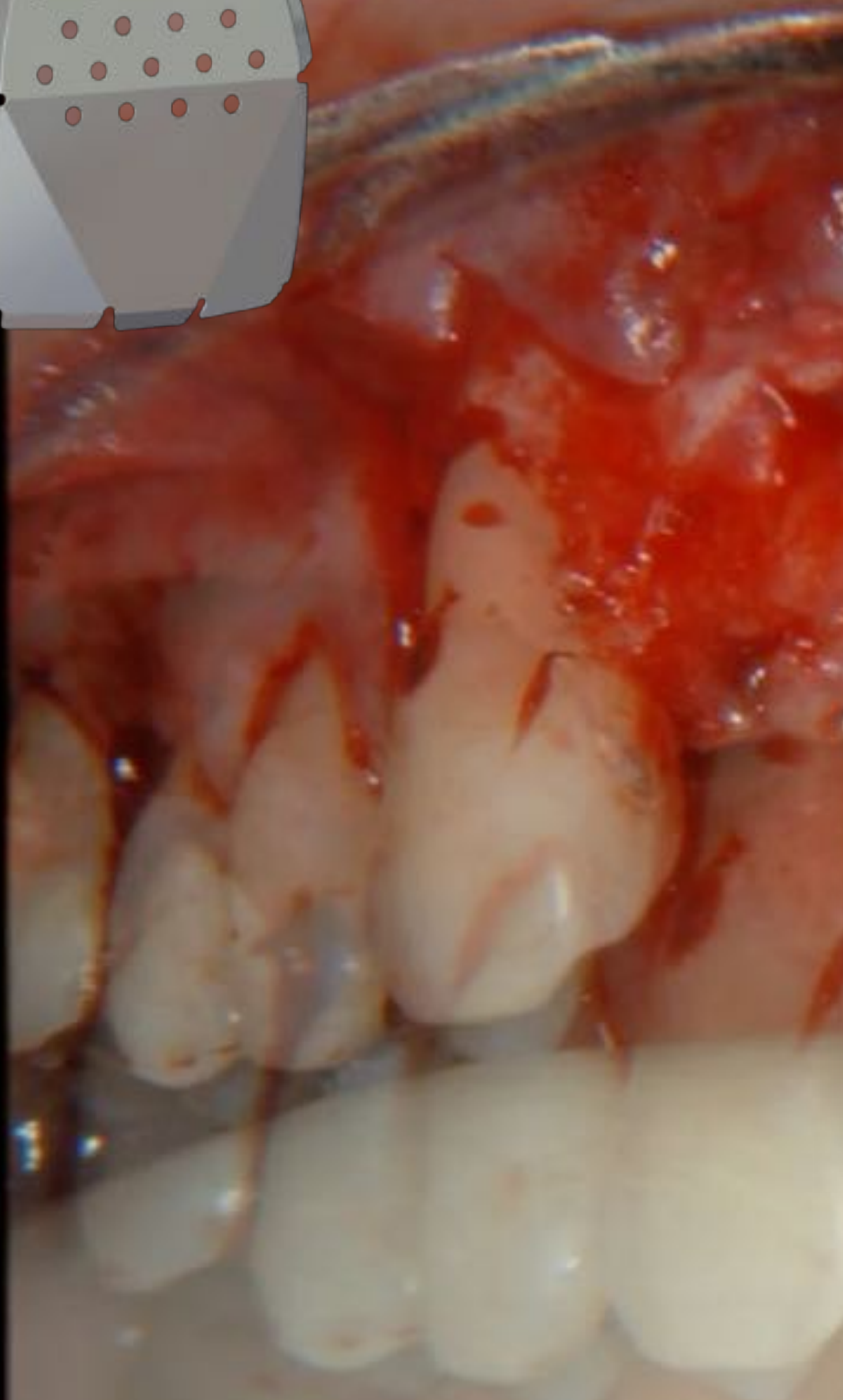
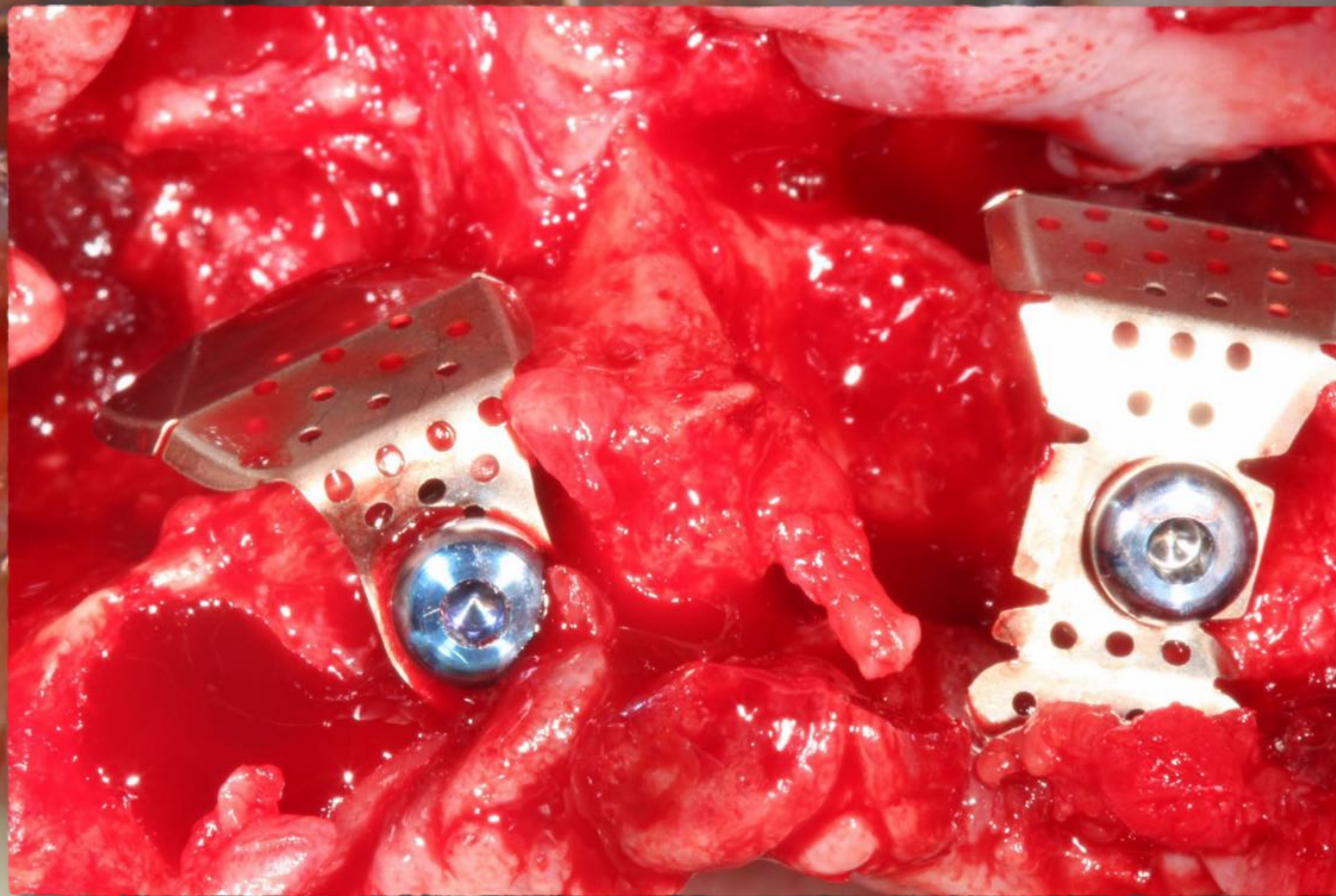


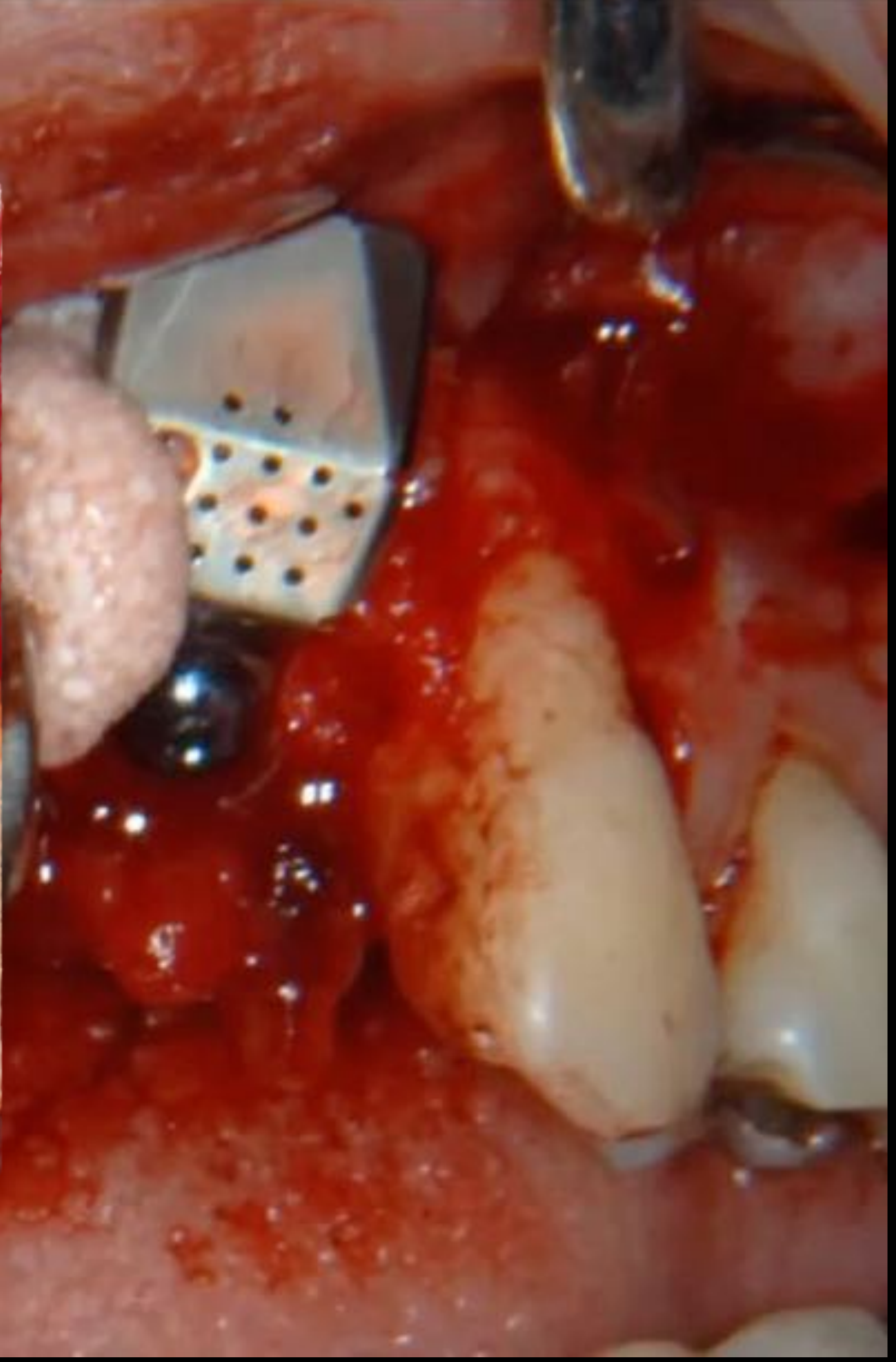
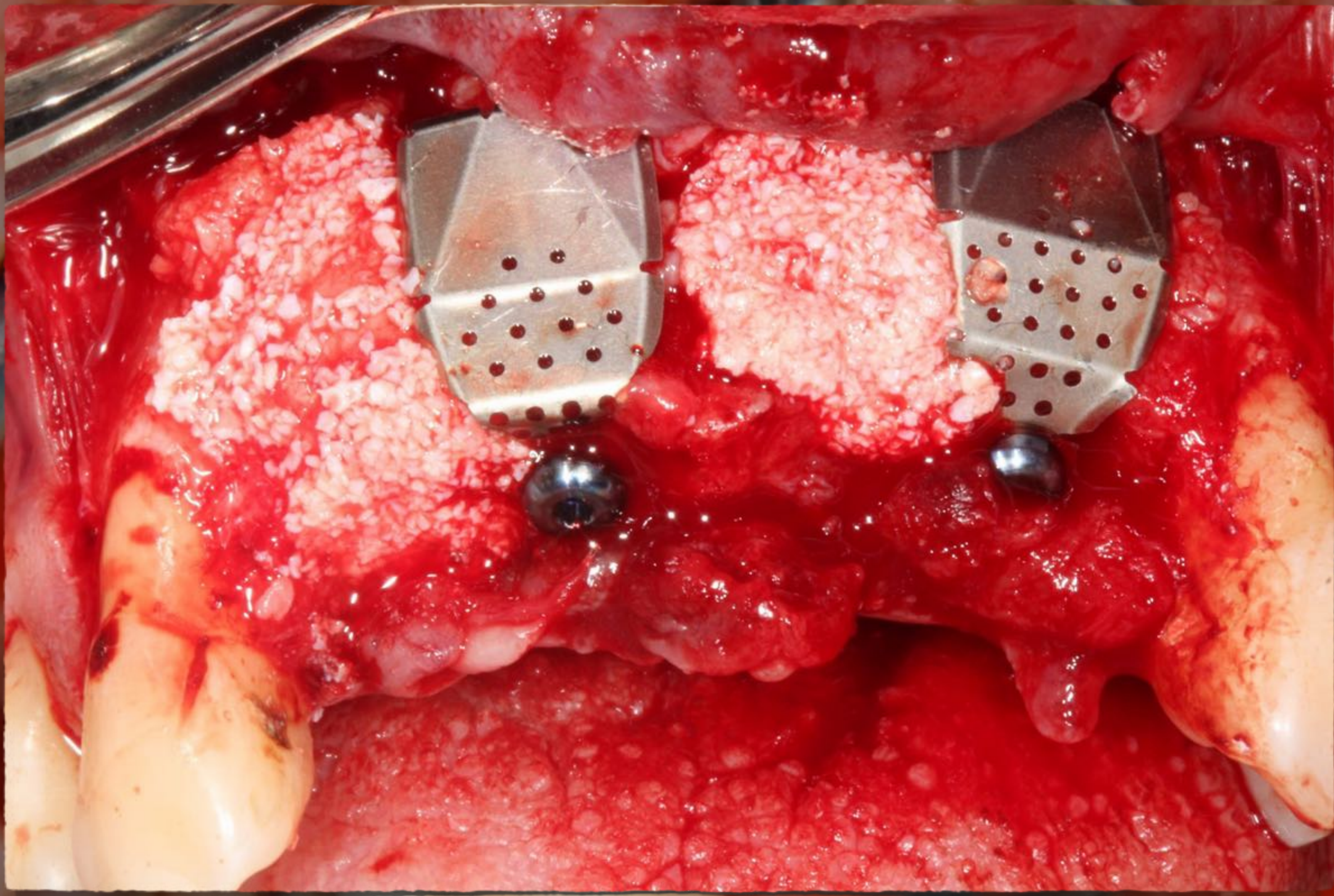




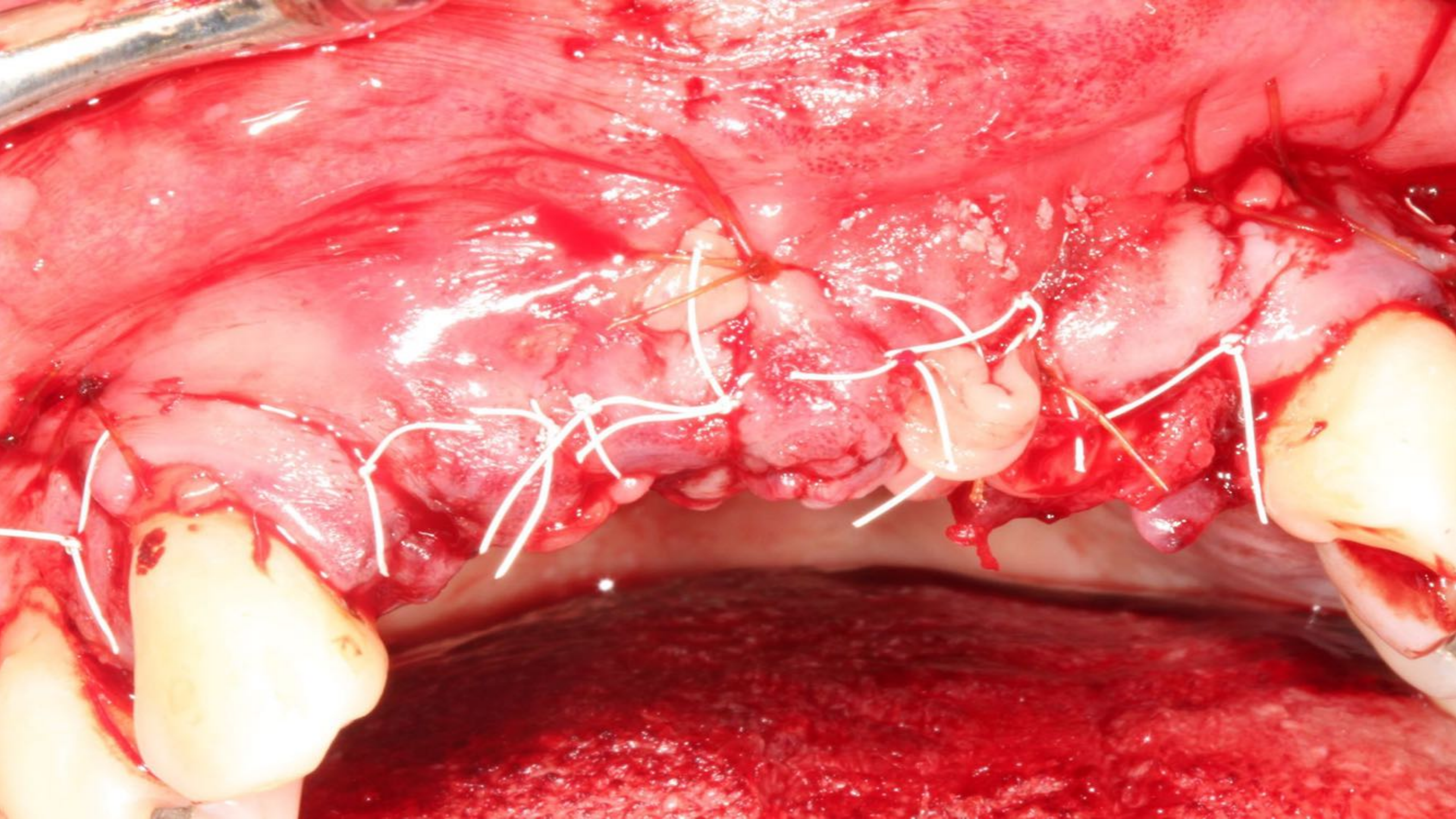




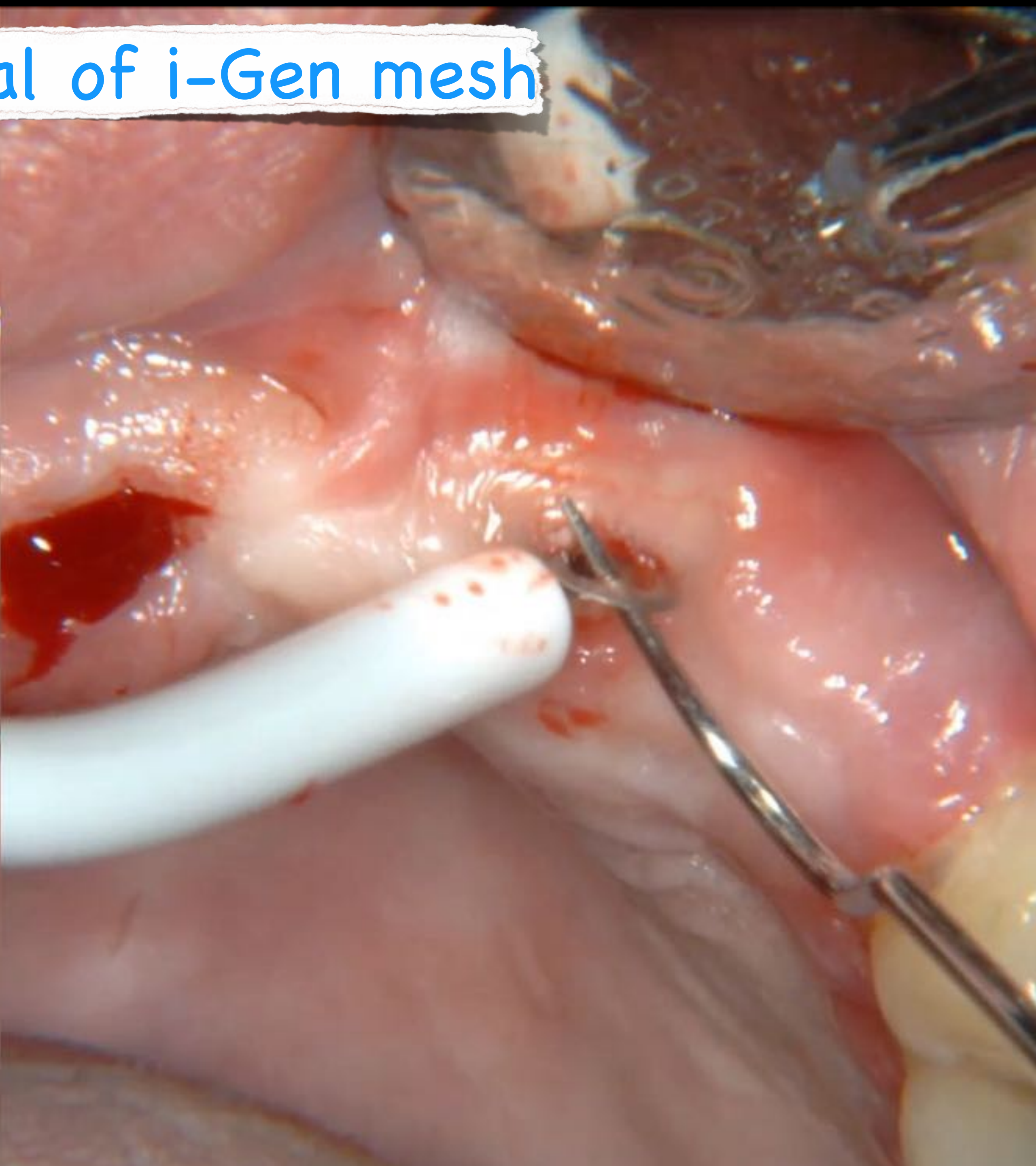






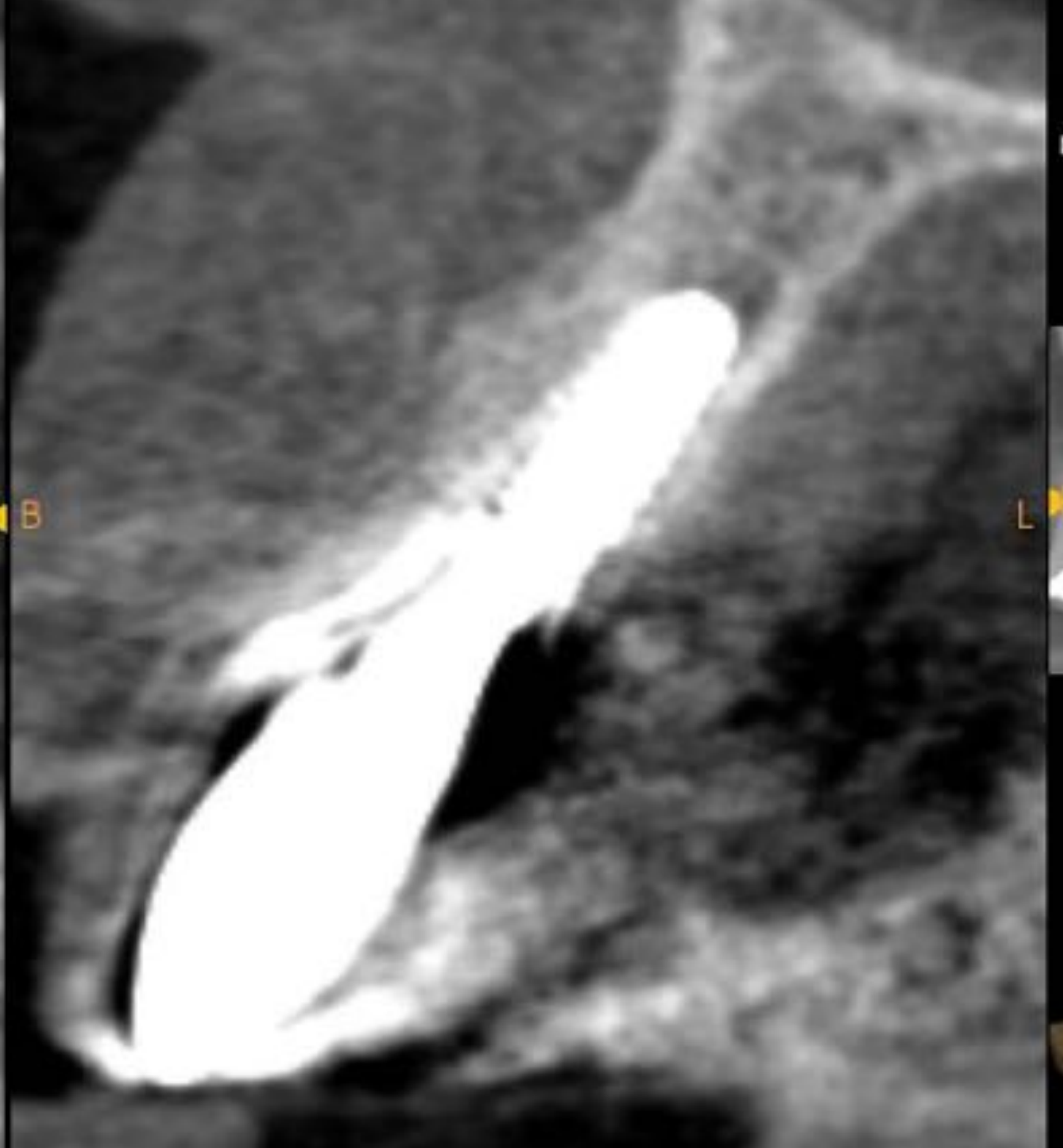


3 month removal of i-Gen mesh

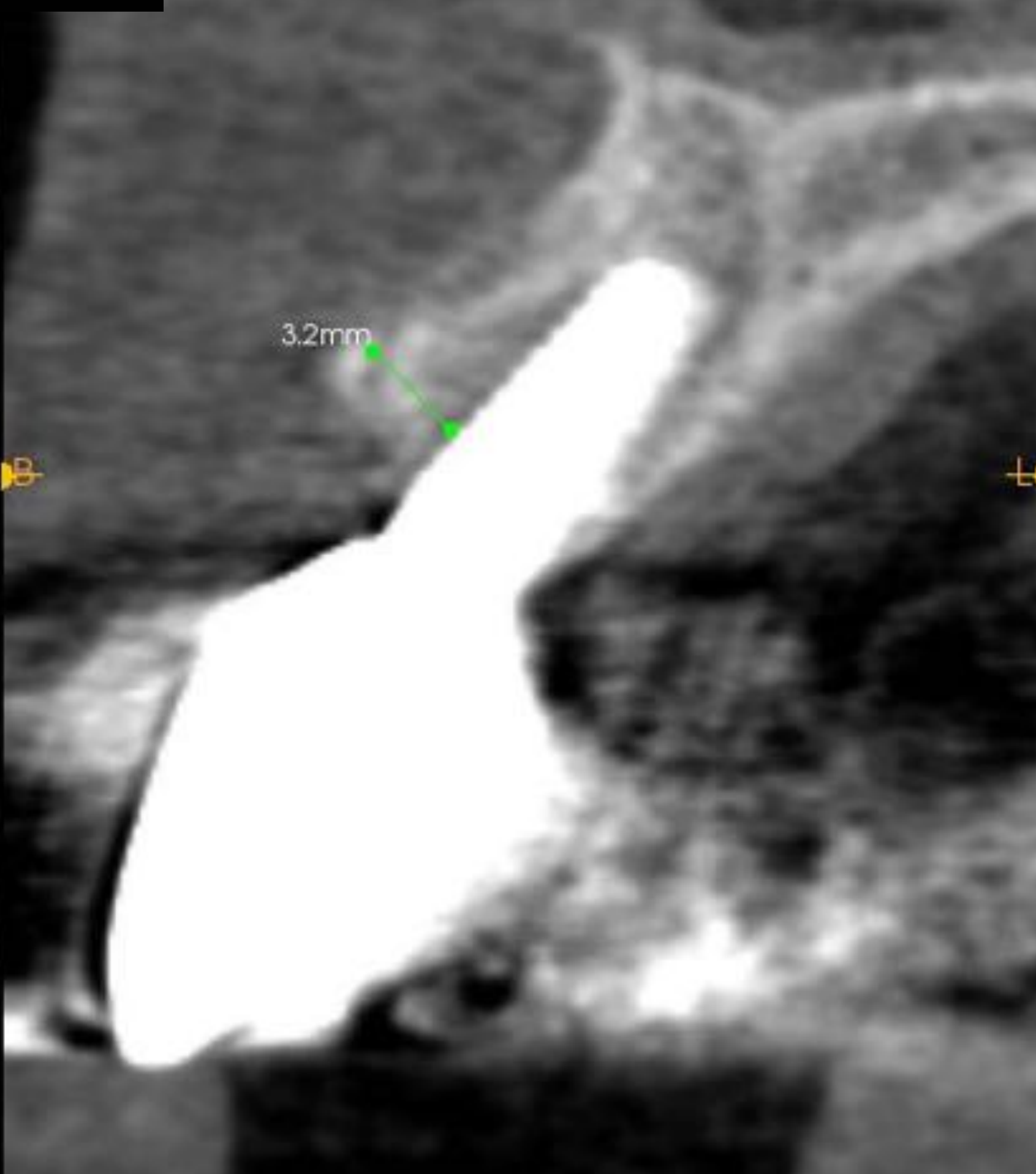


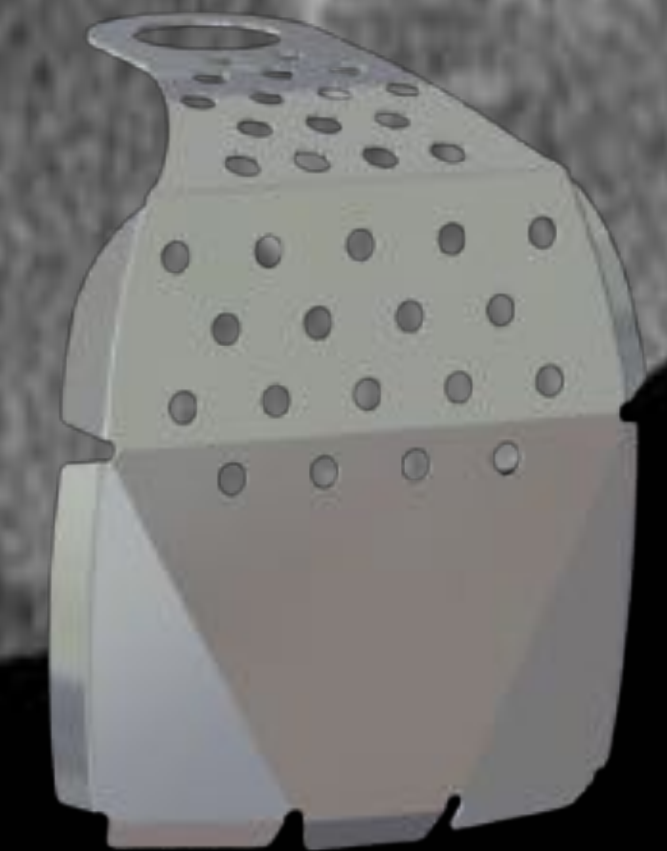


5 Years



5 Years





5 Years

Clinical Study

Alveolar Ridge Reconstruction with Titanium Meshes and Simultaneous Implant Placement: A Retrospective, Multicenter Clinical Study

Outcomes of i-Gen 25 cases 1 year after loading

Raquel Zita Gomes,¹ Andres Paraud Freixas,² Chang-Hun Han,³
Sohueil Bechara,⁴ and Isaac Tawil⁵

¹Faculty of Dental Medicine, University of Oporto, Rua Manuel Pereira da Silva, 4200-393 Oporto, Portugal

²Private Practice, Gamero #504, 2840941 Rancagua, Chile

³EasyPlant Dental Clinic, Seo-Gu, Gwangju 4455, Republic of Korea

⁴Department of Oral and Maxillofacial Surgery, Lithuanian University of Health Science, LT-44307 Kaunas, Lithuania

⁵Private Practice, 345 Kings Highway, Brooklyn, NY 11223, USA

Correspondence should be addressed to Raquel Zita Gomes; raquelzitagomes@hotmail.com

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Objective. To evaluate horizontal bone gain and implant survival and complication rates in patients treated with titanium meshes placed simultaneously with dental implants and fixed over them. **Methods.** Twenty-five patients treated with 40 implants and simultaneous guided bone regeneration with titanium meshes (i-Gen*, MegaGen, Gyeongbuk, Republic of Korea) were selected for inclusion in the present retrospective multicenter study. Primary outcomes were horizontal bone gain and implant survival; secondary outcomes were biological and prosthetic complications. **Results.** After the removal of titanium meshes, the CBCT evaluation revealed a mean horizontal bone gain of 3.67 mm (± 0.89). The most frequent complications were mild postoperative edema (12/25 patients: 48%) and discomfort after surgery (10/25 patients: 40%); these complications were resolved within one week. Titanium mesh exposure occurred in 6 patients (6/25: 24%); one of these suffered partial loss of the graft and another experienced complete graft loss and implant failure. An implant survival rate of 97.5% (implant-based) and a peri-implant marginal bone loss of 0.43 mm (± 0.15) were recorded after 1 year. **Conclusions.** The horizontal ridge reconstruction with titanium meshes placed simultaneously with dental implants achieved predictable satisfactory results. Prospective randomized controlled trials on a larger sample of patients are required to validate these positive outcomes.

1. Introduction

Dental implants are a predictable treatment procedure for the prosthetic rehabilitation of partially and fully edentulous patients [1–3].

An adequate bone volume is required for insertion of dental implants [4, 5]; the absence of a sufficient amount of horizontal and vertical bone is a problem that can affect the survival and success rates of dental implants in the short, medium, and long term [4, 5].

Since frequently patients present with bone defects of variable entity [4, 5], different surgical techniques have been

proposed to restore the ideal anatomical conditions required for implant insertion or to allow simultaneously positioned implants to succeed [6–14]. These techniques include onlay/inlay bone grafting [6, 7], distraction osteogenesis [8], maxillary sinus augmentation [9], inferior alveolar nerve transposition [10], alveolar ridge split [11], and guided bone regeneration (GBR) with resorbable [12] and nonresorbable membranes, such as those in polytetrafluoroethylene (PTFE) [13] or titanium [14].

GBR is considered one of the most predictable of these techniques in terms of clinical outcomes, as reported by several systematic reviews of the literature [12–15], particularly



97.5%

1/2013 - 4/2016

1 failure

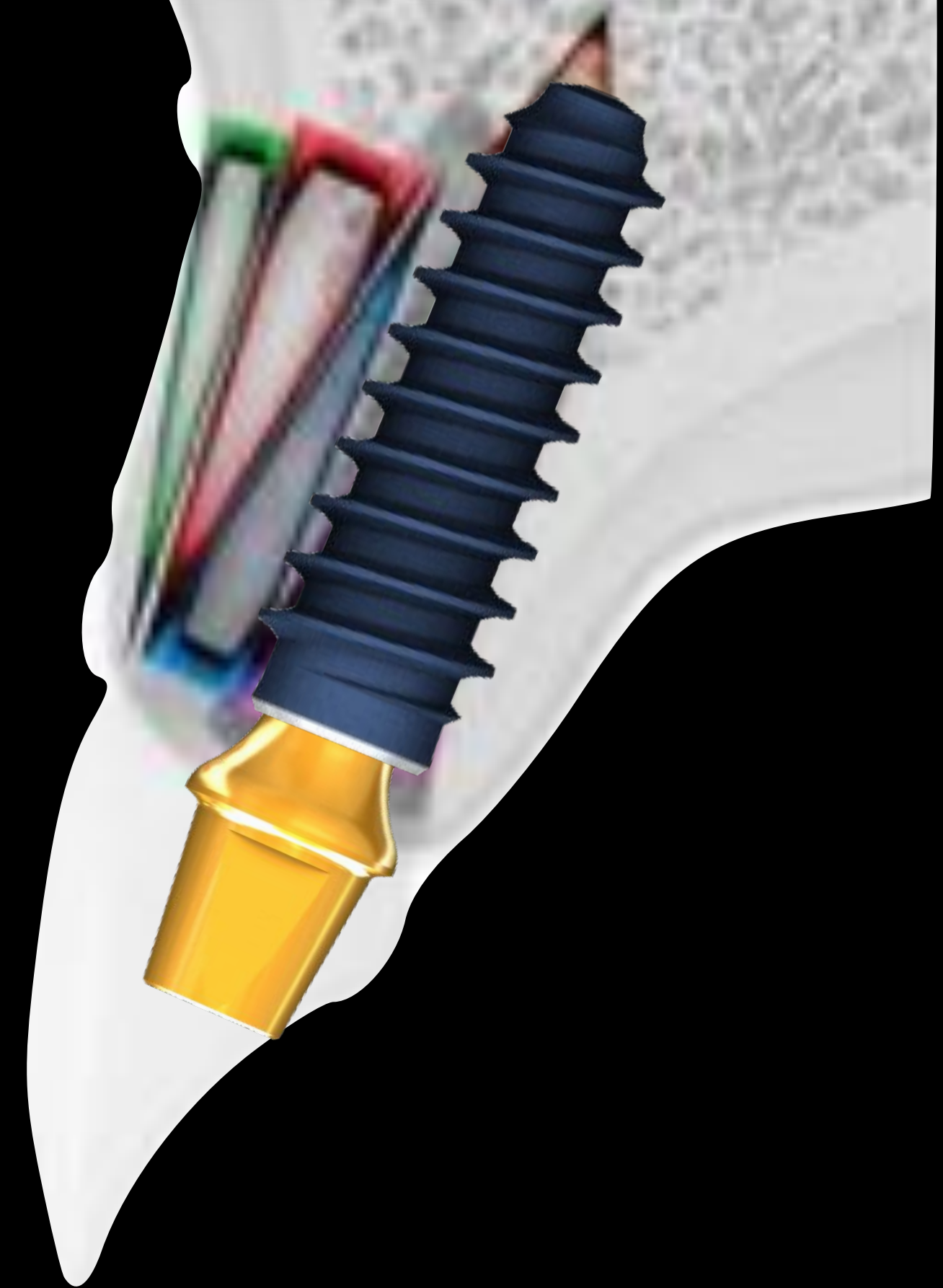


Megagen International Network of
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Advanced Implant Educators

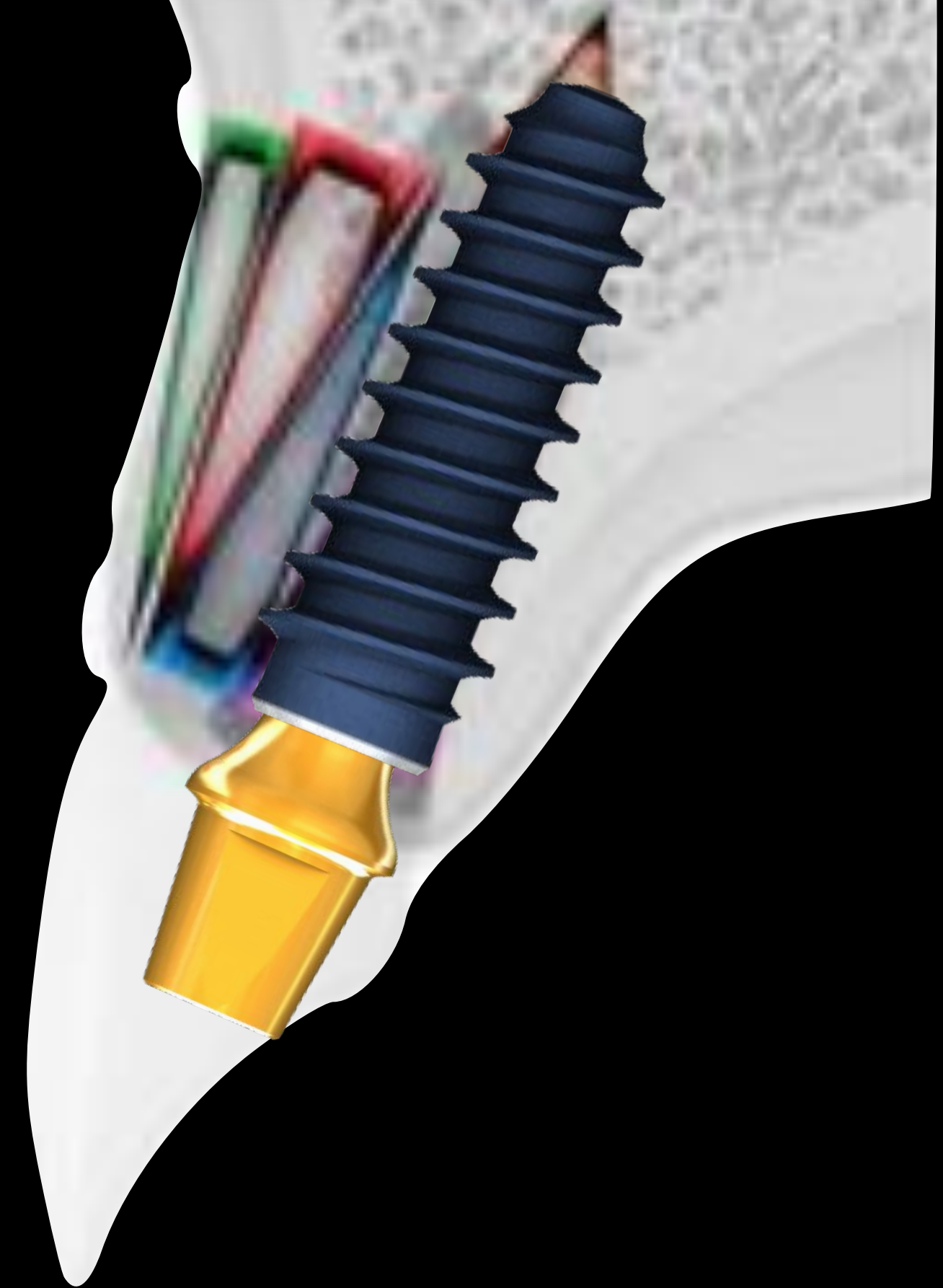
5 keys to consider for success with Immediate Implant

- (I) BUCCAL PLATE
- (II) PRIMARY STABILITY
- (III) IMPLANT DESIGN
- (IV) FILLING OF THE GAP
- (V) TISSUE BIOTYPE



5 keys to consider for success with Immediate Implant

- (I) BUCCAL PLATE
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- (V) TISSUE BIOTYPE



Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future restoration. In immediate implants the reference is the gingival distance of the removed teeth. If there is no teeth previously, a wax- up should create a reference of the future restoration.

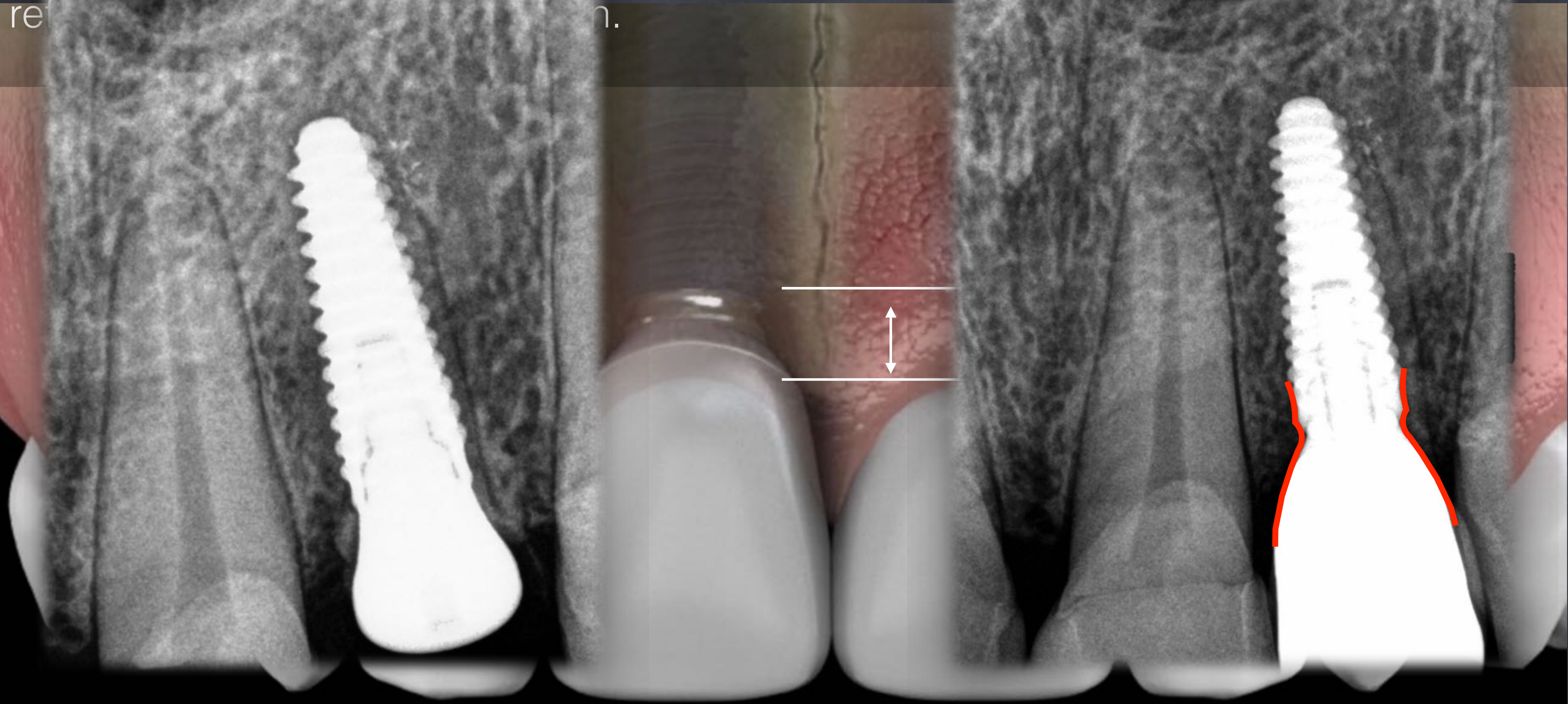
2D
POSITION

3~4m

Emergence
Profile



Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future restoration. In immediate implants the reference is the gingival distance of the teeth. In non-teeth previously, a reference is the alveolar bone.



Apico-coronally: This distance should be 3-4 mm distance from the gingival margin of the future rest. In immediate implant, the reference is the gingival distance of ref.

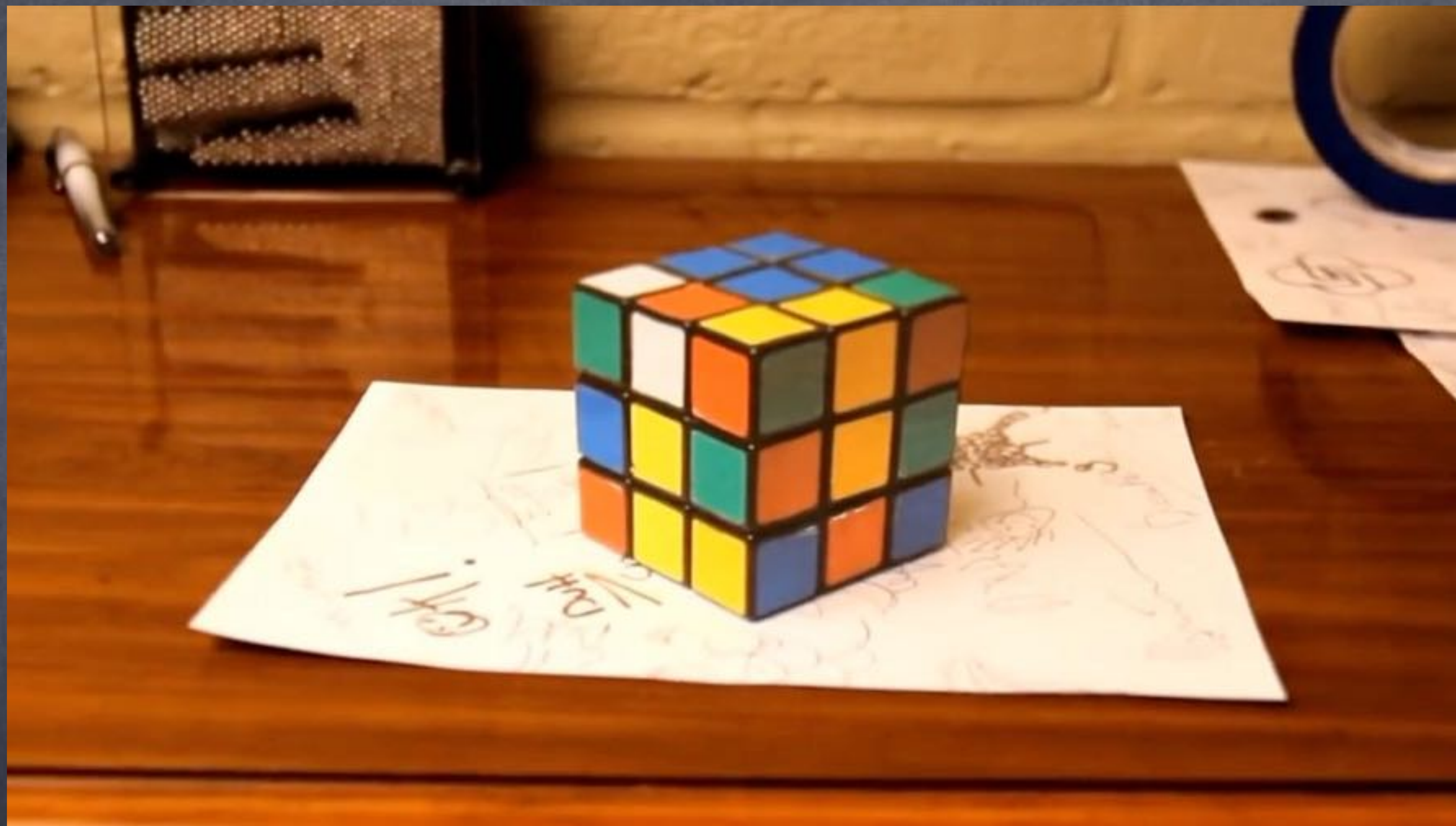


2D VS 3D



Perception vs Reality

2D VS 3D



Perception vs Reality

3D CBCT



Putts the information is in our hands

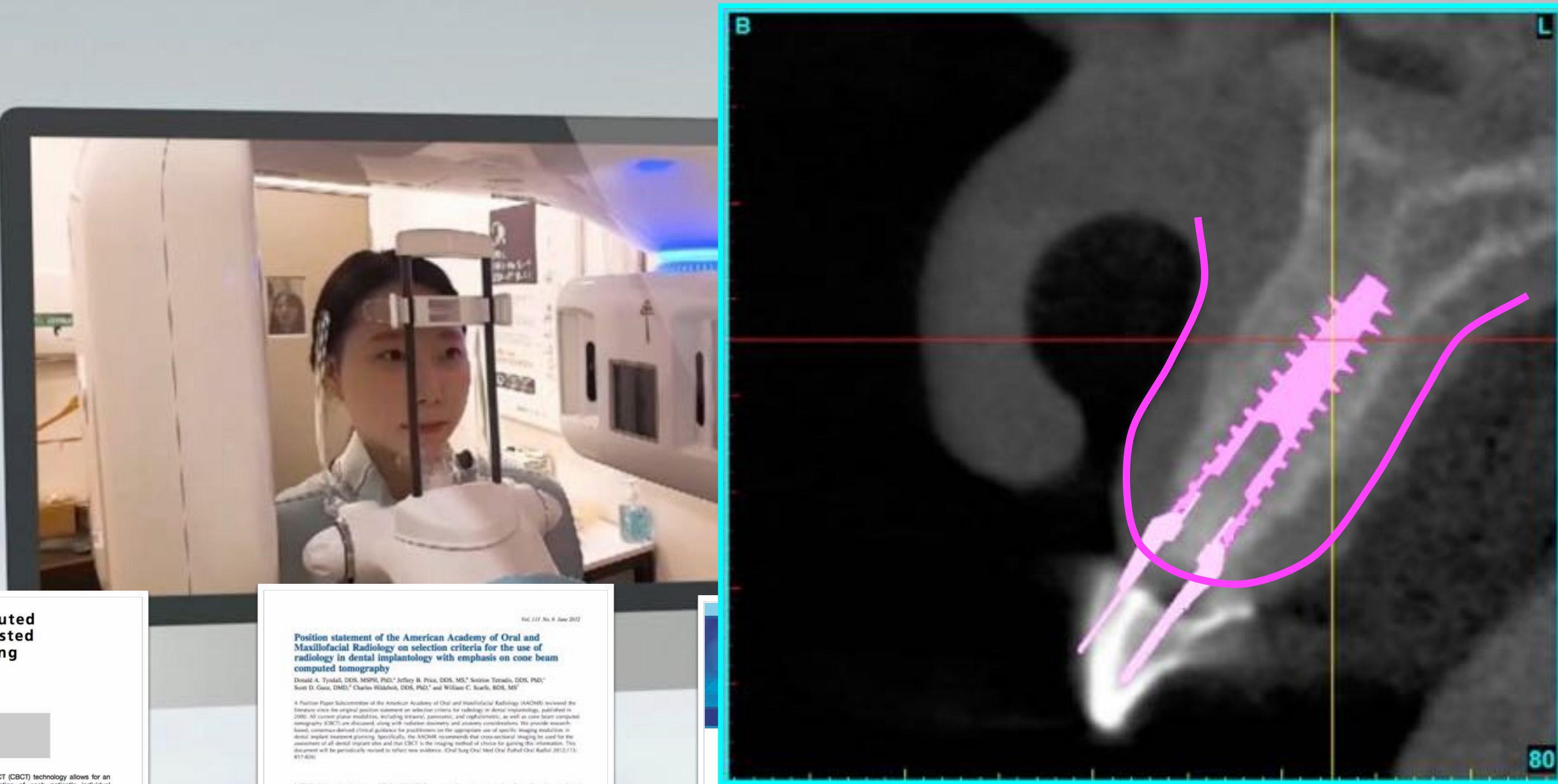


Reality



Becoming The Standard Of Care

TCM



Continuing Education 1

Defining New Paradigms for Assessment of Implant Receptor Sites The Use of CT/CBCT and Interactive Virtual Treatment Planning for Congenitally Missing Lateral Incisors

Scott D. Ganz, DMD*

Abstract: An emerging technology that encompasses computed tomography, cone beam computed tomography, and interactive software applications has slowly progressed and evolved into a necessary tool for diagnosis, treatment planning, and delivery of dental implant and associated restorative and surgical procedures. The integration of these innovative tools is helping to define new methods for appreciating anatomy, improving accuracy, and enhancing presurgical prosthetic planning to achieve true restorative-driven implant dentistry. This article will demonstrate how computed tomography combined with interactive virtual treatment planning software applications can empower clinicians with enhanced diagnostic capabilities for implant receptor-site assessment, generating new paradigms that eventually may supersede older methods of presurgical planning for dental implant reconstruction.

Learning Objectives:
After reading this article, the reader should be able to:

- understand the enhanced diagnostic information gained from computed tomography/cone-beam computed tomography imaging technology
- appreciate how interactive treatment planning software can be an effective tool for assessing patient anatomy
- understand how to recognize the "nose" as defined by the Triangle of Bone and how to apply the associated decision tree
- appreciate how this technology can aid clinicians in achieving true restorative-driven implant reconstruction.

Recent advances in CT and CBCT technology, combined with the evolution of interactive virtual treatment planning software applications, have empowered clinicians with enhanced diagnostic capabilities for implant receptor-site assessment. These innovative tools have allowed for new paradigms

*Private Practice in Prosthodontics, Maxillofacial Prosthodontics, and Implant Dentistry, Fort Lee, New Jersey
doi:10.1016/j.cden.2011.02.019
256 | Compendium | June 2008—Volume 29, Number 5

Cone Beam Computed Tomography-assisted Treatment Planning Concepts

Scott D. Ganz, DMD*

- KEYWORDS**
- Cone beam computed tomography
 - Dental implants • Computed tomography
 - Interactive treatment planning applications

Computed tomography (CT) and cone beam CT (CBCT) technology allows for an unprecedented three-dimensional (3D) evaluation of each patient's individual anatomy. The advent of this technology has evolved into an indispensable diagnostic tool that can be used for a variety of different clinical applications that include, but are not limited to: dental implant receptor site evaluation; alveolar bone defect and bone augmentation procedures; orthodontics; endodontics; temporomandibular (TM) joint diagnostics; sinus augmentation procedures; and orthognathic surgical interventions. The presurgical planning phase of these applications that benefit from CBCT technology starts with the accumulation of data for which educated treatment decisions can be accurately determined. Adapting to the ALARA (as low as reasonably achievable) principle, the radiation dosages from CBCT have been minimized through the process of collimation, and reduction in scan time, yet maintaining a high degree of diagnostic accuracy. The benefits versus the risks should be considered when determining the need for a scan. The purpose of this article is to show the benefits of using CBCT technology for dental implant applications. A myriad of CBCT scanning machines are available in the United States and around the world that claim to deliver high-quality diagnostic images with machine-specific variations on how this can be achieved. In addition, each machine is driven by

Portions of this text were published previously in Ganz SD. Case Report: CBCT-assisted treatment of the falling long span bridge with staged and immediate load implant restoration. *Dentalfocus*. Volume 11, Issue 11, Nov 2010 pp 42-46. Reprinted with permission of DentalTown Magazine and DentalTown.com.
*Department of Restorative Dentistry, University of Medicine and Dentistry, New Jersey, New Jersey Dental School, 110 Bergen Street, Newark, NJ 07103, USA
*Private Practice, 158 Linwood Plaza, Suite 204, Fort Lee, NJ 07024, USA
*Department of Restorative Dentistry, University of Medicine and Dentistry, New Jersey, New Jersey Dental School, 110 Bergen Street, Newark, NJ 07103.
E-mail address: dganz@dganz.com
Dent Clin N Am 55 (2011) 515-536
doi:10.1016/j.cden.2011.02.019
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Position statement of the American Academy of Oral and Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasis on cone beam computed tomography

Scott A. Tjebk, DDS, MSH, PhD,* Jeffrey B. Pritz, DDS, MS,* Scotton Tomatis, DDS, PhD,* Scott D. Ganz, DMD,† Charles Hildebolt, DDS, PhD,† and William C. Scafe, BDS, MS*

A Position Paper Subcommittee of the American Academy of Oral and Maxillofacial Radiology (AAOMR) reviewed the literature since the original position statement on selection criteria for radiology in dental implantology, published in 2000. All current status conditions, including structural, panoramic, and cephalometric, as well as cone beam computed tomography (CBCT) are discussed, along with radiative dosimetry and anatomy considerations. We provide research-based, consensus-derived clinical guidance for practitioners on the appropriate use of specific imaging modalities in dental implant treatment planning. Specifically, the AAOMR recommends that cross-sectional imaging be used for the assessment of all dental implant sites and that CBCT is the imaging method of choice for gaining this information. This document will be periodically revised to reflect new evidence. *J Oral Maxillofac Surg* 2012;70: 817-826.

In 2000, the American Academy of Oral and Maxillofacial Radiology (AAOMR) published a position paper on the role of imaging in dental implant treatment planning.¹ They state, "After reviewing the current literature, the AAOMR recommends that some form of cross-sectional imaging be used for implant sites and that conventional cross-sectional radiography be the method of choice for gaining this information for most patients receiving implants." Since then, the introduction and increased use of maxillofacial cone beam computed tomography (CBCT) has had an impact on the availability of digital, cross-sectional imaging and expanded imaging clinical applications for dental implant imaging.²⁻⁴ In 2008, the Executive Council (EC) of the AAOMR published an executive opinion statement on the performance and interpretation of CBCT in dentistry.⁵ The EC proposed guidelines and principles for CBCT

*Department of Oral and Maxillofacial Radiology, University of North Carolina at Chapel Hill School of Dentistry, Chapel Hill, NC.
*Department of Oral and Maxillofacial Radiology, Meharry Medical College School of Dentistry, Nashville, TN.
†Department of Oral and Maxillofacial Radiology, University of California at Los Angeles School of Dentistry, Los Angeles, CA.
*Recent practice limited to Prosthodontics, Maxillofacial Prosthodontics, and Implant Dentistry, Fort Lee, NJ.
*Maxillofacial Division of Radiology, Washington University in St. Louis School of Dentistry, St. Louis, MO.
†Department of Oral and Maxillofacial Radiology, University of Louisville School of Dentistry, Louisville, KY.
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0304-3980 - see front matter
http://dx.doi.org/10.1016/j.cden.2011.02.018

TREATMENT PLANNING AND THE TRIANGLE OF BONE: DEFINING NEW PARADIGMS FOR ASSESSMENT OF IMPLANT RECEPTOR SITES*

During the past 20 years, an emerging technology encompassing computed tomography (CT), cone beam computed tomography (CBCT), and interactive treatment planning software has slowly evolved into a necessary tool for diagnosis, treatment planning, and delivery of dental implant and associated restorative and surgical procedures. The integration of these innovative tools has helped to define new paradigms for appreciating anatomy, improving accuracy, and enhancing presurgical prosthetic planning to achieve true restorative-driven implant dentistry. In the past, the standard tools for diagnosis and treatment planning were two-dimensional (2-D) periapical and panoramic imaging.¹ The dental implant literature is replete with precepts and determinants for proper placement and angulation, methods to preserve interdental papilla, and implant-to-tooth and implant-to-implant parameters.²⁻¹⁰ However, until recently all documentation was based on 2-D radiography or direct clinical examination at the abutment crest, which could not allow a complete assessment of the patient's anatomy or spatial position of the implants. Recent advances in CT and CBCT technology combined with the evolution of interactive virtual treatment planning software applications, have empowered clinicians with enhanced diagnostic capabilities for implant receptor-site assessment. These innovative tools have allowed new paradigms to be developed, which may supersede current methods of presurgical planning for dental implant reconstruction.^{11,12} The concepts as presented in this chapter are related to missing maxillary lateral incisors—single-tooth replacements. Many clinicians do not see the value in scanning patients who are missing a single tooth because they feel that the anatomy is

*Part of this chapter, including Figures 10-1 through 10-10 were reprinted from Ganz SD (2008). *Diagnosis and treatment for assessment of receptor site for missing lateral incisors. Computer-Guided Oral Care* 2005:256-265. Copyright 2008, with permission from MEDUN Publications, LLC.

life and can negatively contribute to the maintenance of optimal health. Structural and functional adaptations of the soft and mineralized tissues of the maxilla and mandible occur overtime after tooth extraction and can

such as CBCT-derived bone density measurements, CBCT-aided surgical navigation, and postimplant CBCT artifacts need further research.

Materials and Methods: The literature regarding CBCT and implant dentistry was systematically reviewed. A PubMed search that included studies published between January 1, 2000, and July 31, 2011, was conducted. *Oral presentations*, in conjunction with these studies, were given by Dr. Erika Benavides, Dr. Scott Ganz, Dr. James Hsu, Dr. Myung-Jin Kim, and Dr. David Hatcher at a meeting of the International Congress of Oral Implantologists in Seoul, Korea, on October 5-8, 2011.

Results: The studies published could be divided into four main groups: diagnostic, implant planning, surgical guidance, and postimplant evaluation.

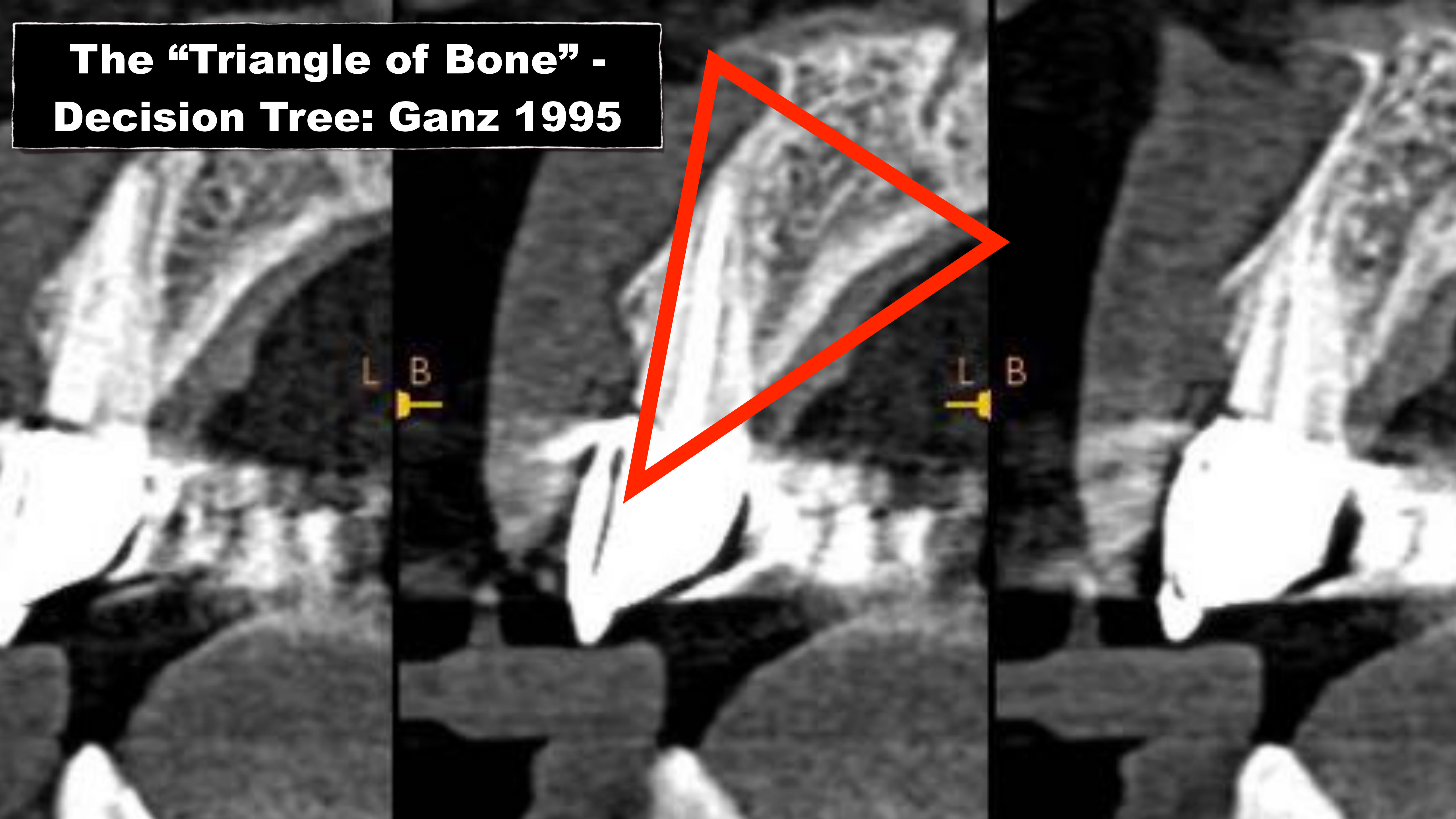
Conclusions: The literature supports the use of CBCT in dental implant treatment planning particularly in regards to linear measurements, three-dimensional evaluation of

ICOI Recommendations: All CBCT examinations, as all other radiographic examinations, must be justified on an individualized basis. The benefits to the patient for each CBCT scan must outweigh the potential risks. CBCT scans should not be taken without initially obtaining thorough medical and dental histories and performing a comprehensive clinical examination. CBCT should be considered as an imaging alternative in cases where the projected implant receptor or bone augmentation site(s) are suspect, and conventional radiography may not be able to assess the true regional three-dimensional anatomical presentation. The smallest possible field of view should be used, and the entire image volume should be interpreted. *Implant Dent* 2012;21:78-80.

Key Words: CBCT, dental implants, interactive treatment planning, soft-tissue, 3D implant planning, CBCT-aided surgical

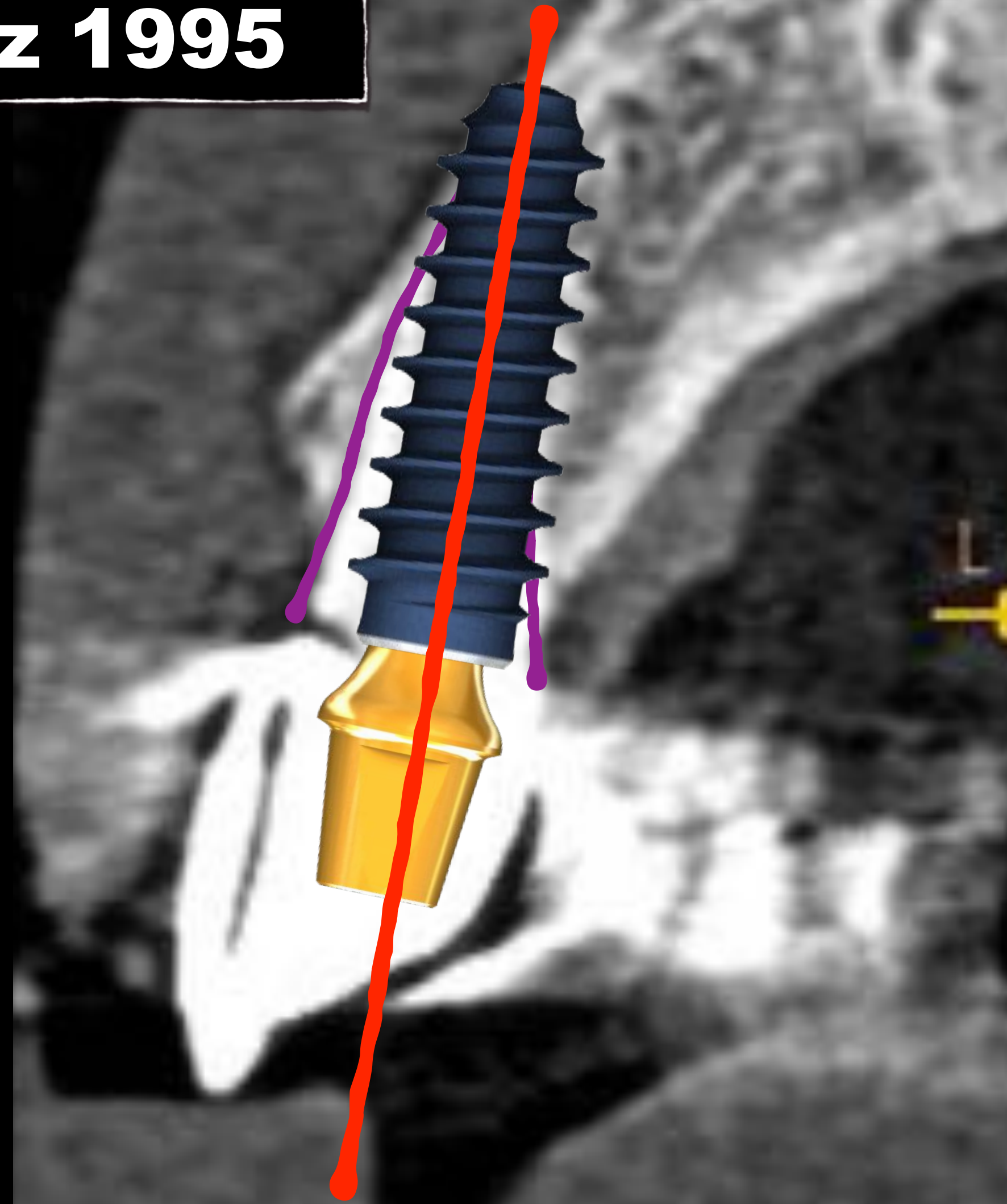
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**The “Triangle of Bone” -
Decision Tree: Ganz 1995**



The “Triangle of Bone” - Decision Tree: Ganz 1995

- Evaluate the bone
- Is there enough bone within the **TOB** to place an implant.
- Recognize the presence of a concavity.
- Determine **width** and **length** of implant.



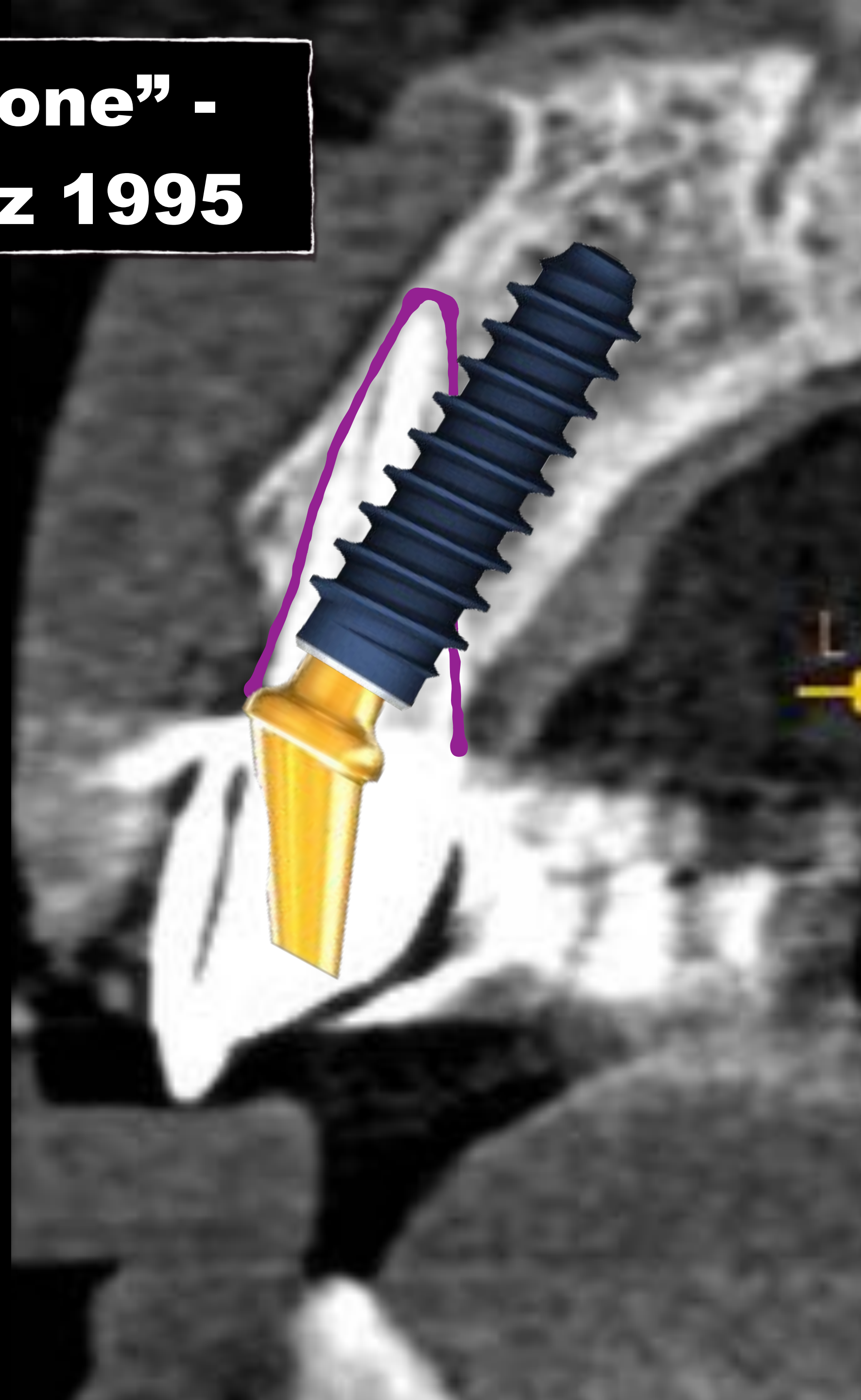
- Determine straight or *tapered* design implant.
- Determine one or *two-piece* implant design.
- Determine Abutment Type
- Screw-retained or Cemented
- Determine soft tissue graft, particular bone, or block bone graft to fill defect on facial.

Ganz, SD., Presurgical planning with CT derived fabrication of surgical guides. J Oral Maxillfac Surg 2005;63 [Suppl 2]

Ganz, SD
Various Publications 1995-2015

The “Triangle of Bone” - Decision Tree: Ganz 1995

- Determine straight or *tapered* design implant.
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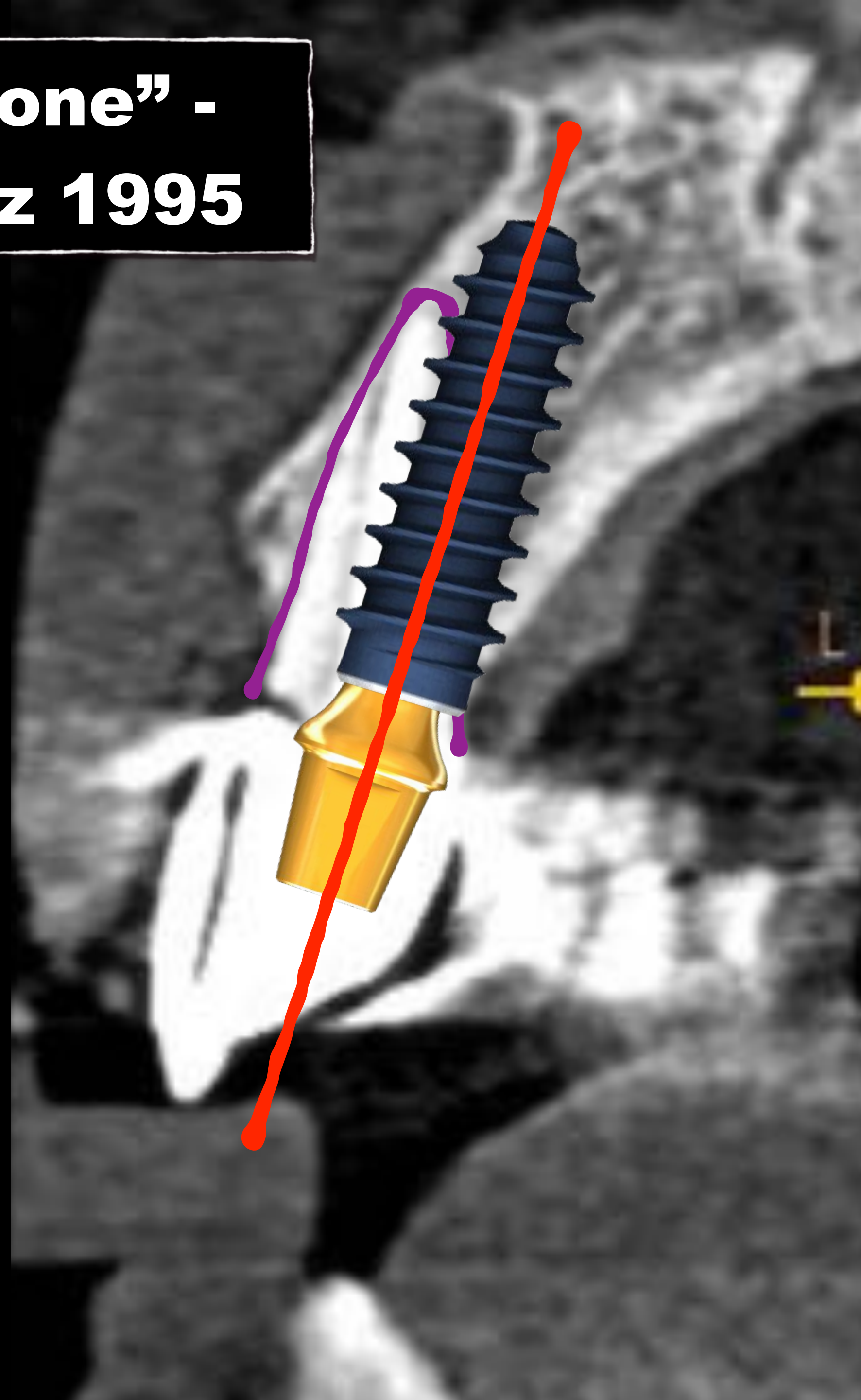
**Cementable-
angled
abutment**

Ganz, SD., Presurgical planning with CT derived fabrication of surgical guides. J Oral Maxillfac Surg 2005;63 [Suppl 2]

Ganz, SD
Various Publications 1995-2015

The “Triangle of Bone” - Decision Tree: Ganz 1995

- Determine straight or *tapered* design implant.
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**Screw -
Retained
Crown**

Ganz, SD., Presurgical planning with CT derived fabrication of surgical guides. J Oral Maxillfac Surg 2005;63 [Suppl 2]

Ganz, SD
Various Publications 1995-2015

BUCCAL PLATE

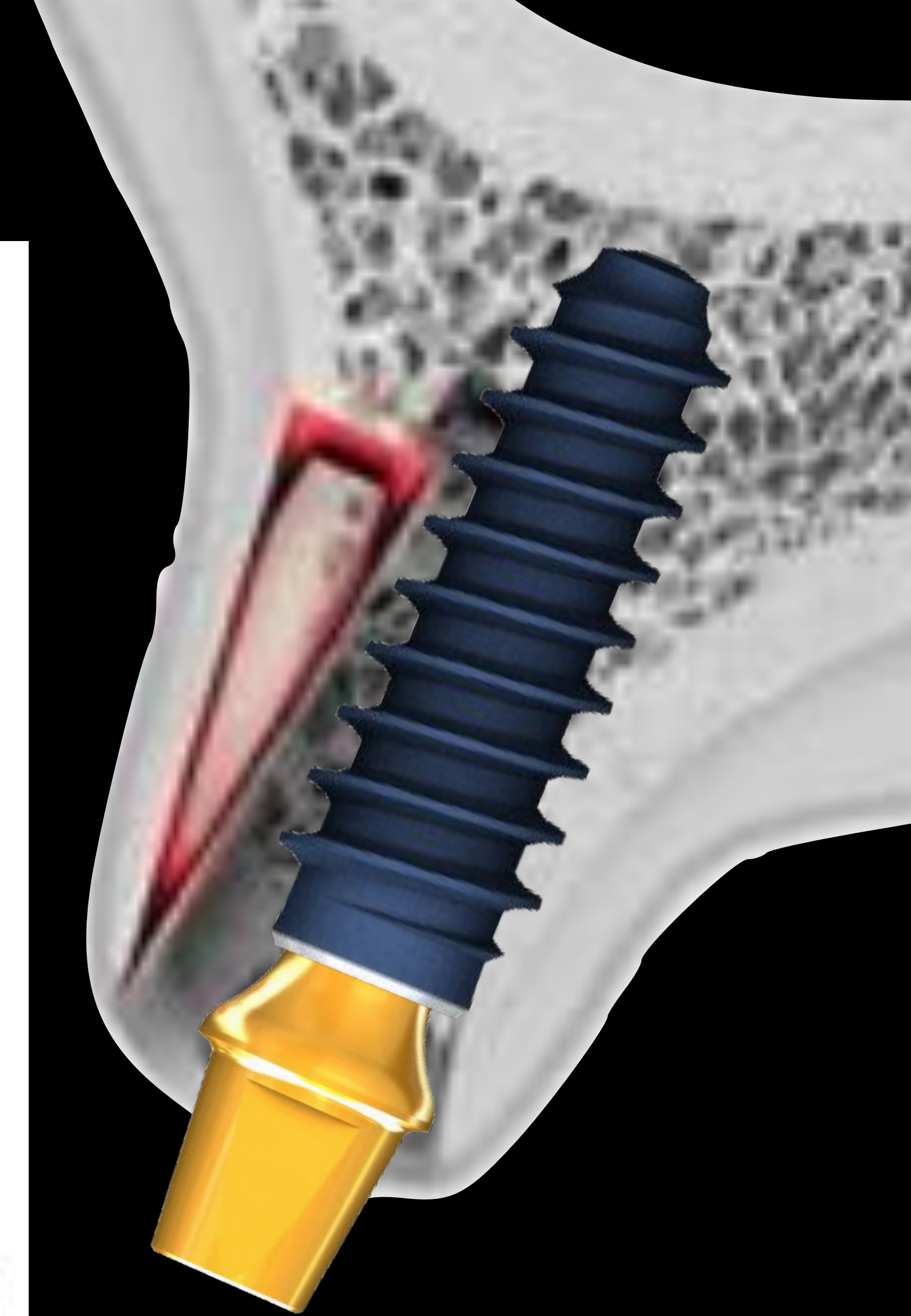
Immediate Implantation & Loading Case Selection

- Intact socket walls



Elian , Cho, Forum, Tarnow. A simplified socket classification and repair technique. *Pract Proced Aesthet Dent.* 2007;19:99-104

Elian Classification 2007



BUCCAL PLATE

Classification of Sagittal Root Position in Relation to the Anterior Maxillary Osseous Housing for Immediate Implant Placement: A Cone Beam Computed Tomography Study

Joseph Y. K. Kan, DDS, MS¹/Phillip Roe, DDS, MS²/Kitchai Rungcharassaeng, DDS, MS³/
Rishi D. Patel, BDS, MS²/Tomonori Waki, DDS, PhD²/Jaime L. Lozada, DMD⁴/Grenith Zimmerman, PhD⁵

Purpose: The purpose of this study was to classify the relationship of the sagittal root positions of the maxillary anterior teeth to their respective osseous housings using cone beam computed tomography (CBCT). The frequency of each classification was also reported. **Materials and Methods:** A retrospective review of CBCT images was conducted on 100 patients (40 men, 60 women; mean age, 53.1 years) who fulfilled the inclusion criteria. The CBCT images were evaluated and the relationship of the sagittal root position of the maxillary anterior teeth to its associated osseous housing was recorded as Class I, II, III, or IV. **Results:** The frequency distribution of sagittal root position of maxillary anterior teeth indicated that, of the 600 samples, 81.1%, 6.5%, 0.7%, and 11.7% were classified as Class I, II, III, and IV, respectively. **Conclusions:** An understanding of the clinical relevance of sagittal root position will provide adjunct data for the treatment planning of immediate implant placement and provisionalization in the anterior maxilla. A classification system may lead to improved interdisciplinary communication in treatment planning for implant-based therapy in the anterior maxilla. *INT J ORAL MAXILLOFAC IMPLANTS 2011;26:873-876*

Key words: anterior maxilla, cone beam computed tomography, esthetics, immediate implant placement, immediate provisionalization, osseous housing, sagittal root position, single-tooth replacement, treatment planning

Immediate implant placement and provisionalization (IIPP) of a single tooth in the esthetic zone was first advocated in the mid-1990s and has since been considered a predictable treatment option

for replacing failing teeth.¹⁻⁹ In addition to preserving tissue architecture, reducing treatment time, and providing the patient with the convenience of an immediate tooth replacement,^{1,3,7,8} IIPP procedures have also been documented with high success rates when established clinical guidelines are followed.^{3,6,9} To ensure successful IIPP, in addition to the presence of an intact bony socket following extraction and the absence of active infection, primary implant stability must be achieved by engaging the implant with the palatal wall and the bone approximately 4 to 5 mm beyond the root apex.⁶⁻⁸ Unfortunately, because the available bone around the failing tooth may not always be sufficient to achieve primary implant stability, alternative treatment options should be considered. Factors such as root length, sagittal root position (SRP), and the morphology of the osseous housing are important in determining the feasibility of IIPP and must be evaluated via the use of cone beam computed tomography (CBCT). While the effect of root length on the IIPP is easily

¹Professor, Department of Restorative Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.

²Assistant Professor, Department of Restorative Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.

³Associate Professor, Department of Orthodontics and Dentofacial Orthopedics, Loma Linda University School of Dentistry, Loma Linda, California.

⁴Professor and Director, Advanced Education in Implant Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.

⁵Associate Dean and Professor, School of Allied Health Professions, Loma Linda University, Loma Linda, California.

Correspondence to: Dr Joseph Kan, Center for Prosthodontics and Implant Dentistry, Loma Linda University School of Dentistry, Loma Linda, CA 92350. Fax: +909-558-4803. Email: jkan@llu.edu

Kan et al



Fig 1 Class I sagittal root position.

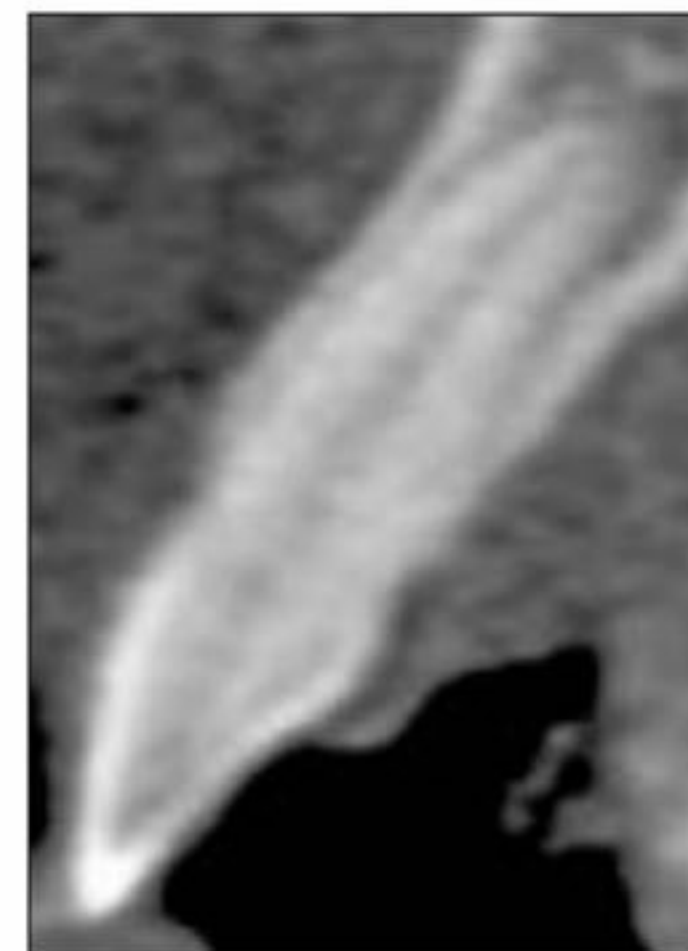


Fig 2 Class II sagittal root position.



Fig 3 Class III sagittal root position.

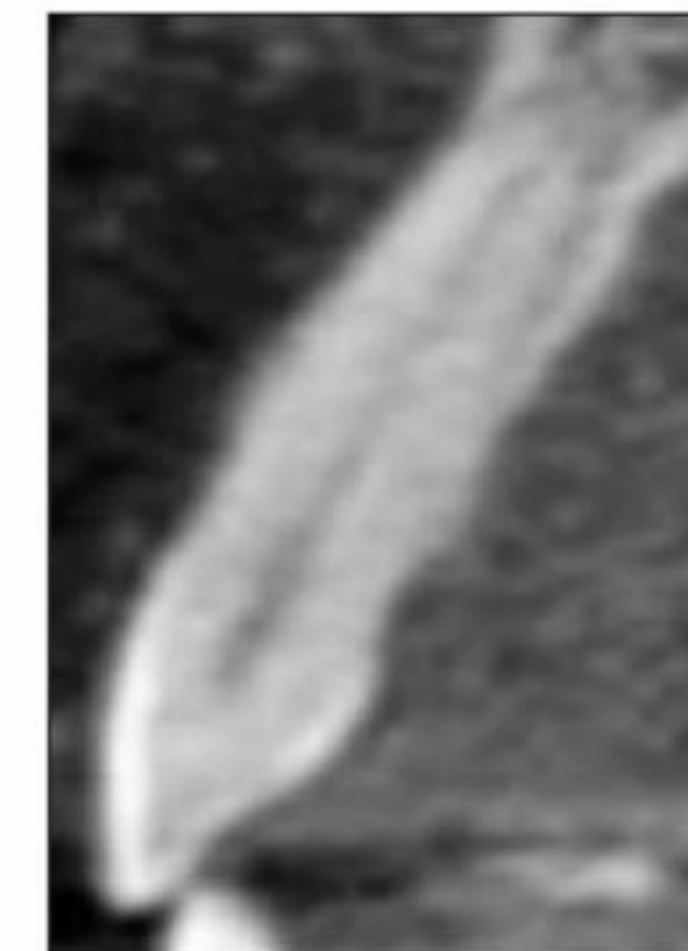


Fig 4 Class IV sagittal root position.

BUCCAL PLATE

Kan et al

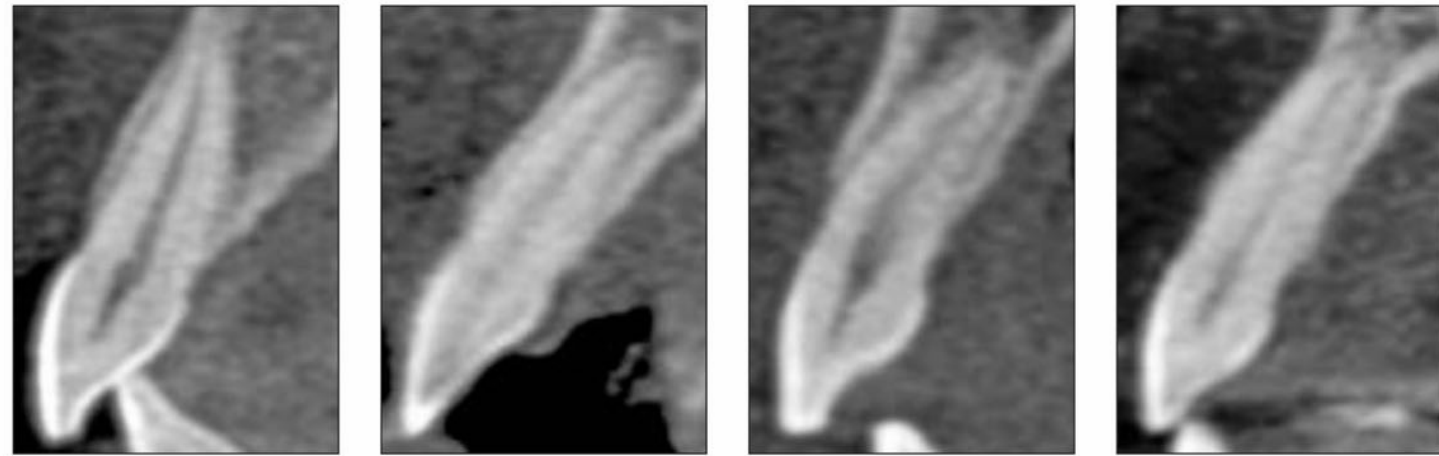


Fig 1 Class I sagittal root position. **Fig 2** Class II sagittal root position. **Fig 3** Class III sagittal root position. **Fig 4** Class IV sagittal root position.

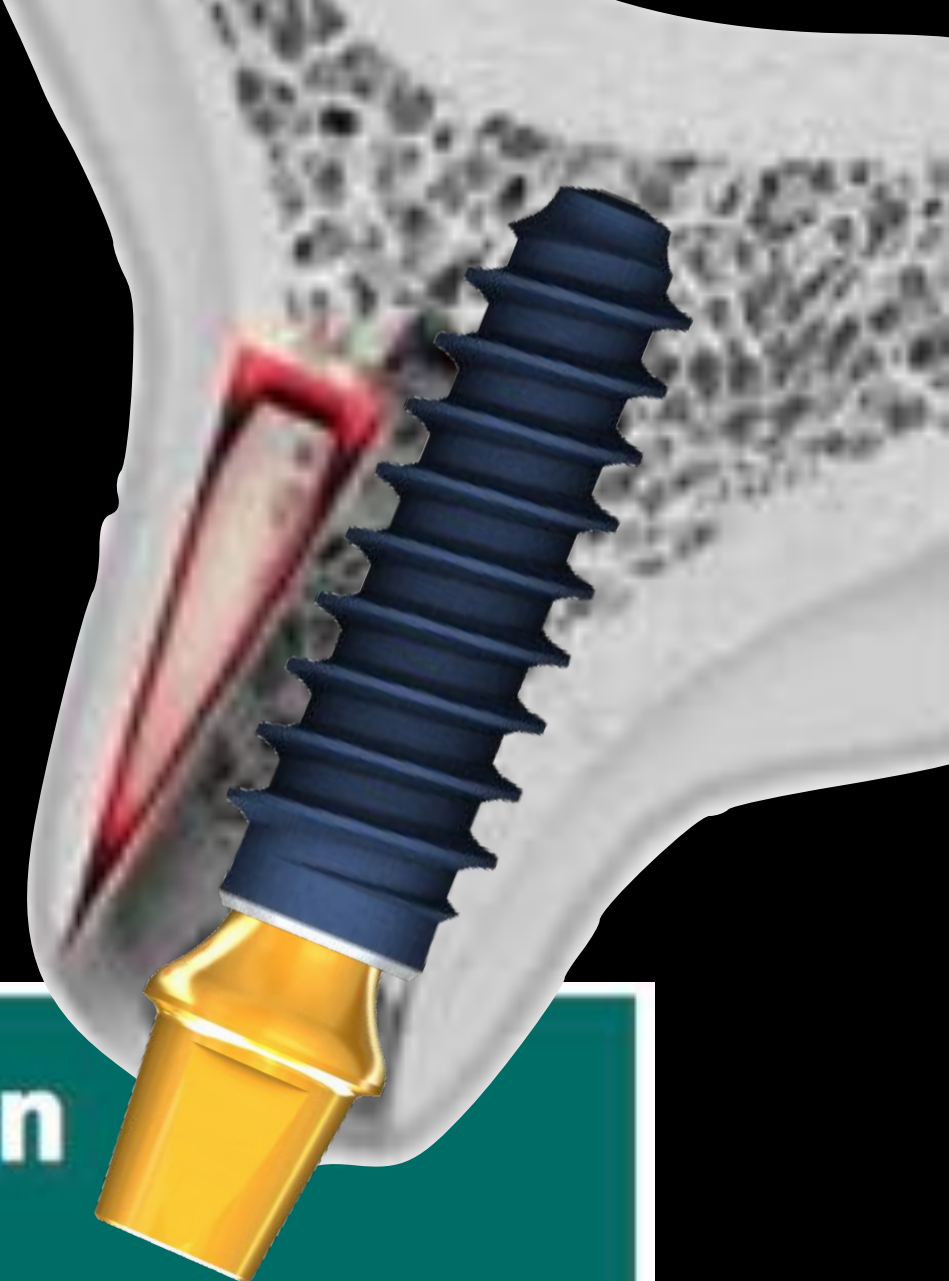


Table 1 Frequency Distribution of Sagittal Root Position Classification

SRP	Percentage (no.)			
	Central incisor	Lateral incisor	Canine	Overall
Class I	86.5 (173)	76 (152)	81 (162)	81.1 (487)
Class II	5 (10)	8.5 (17)	6 (12)	6.5 (39)
Class III	0.5 (1)	1.5 (3)	0 (0)	0.7 (4)
Class IV	8 (16)	14 (28)	13 (26)	11.7 (70)
Total	100 (200)	100 (200)	100 (200)	100 (600)

Classification of Sagittal Root Position in Relation to the Anterior Maxillary Osseous Housing for Immediate Implant Placement: A Cone Beam Computed Tomography Study

Joseph Y. K. Kan, DDS, MS/Philip Roe, DDS, MS/Kidwai Rungthasamee, DDS, MS/Rah D. Patel, BDS, MS/Tamoor Wali, DDS, PhD/Jaime L. Lozada, DMD/Greth Zimmerman, PhD

Purpose: The purpose of this study was to classify the relationship of the sagittal root position of the maxillary anterior teeth to their respective osseous housings using cone beam computed tomography (CBCT). The frequency of each classification was also reported. **Materials and Methods:** A retrospective review of CBCT images was conducted on 100 patients (40 men, 60 women; mean age, 53.1 years) who fulfilled the inclusion criteria. The CBCT images were evaluated and the relationship of the sagittal root position of the maxillary anterior teeth to its associated osseous housing was recorded as Class I, II, III, or IV. **Results:** The frequency distribution of sagittal root position of maxillary anterior teeth indicated that, of the 600 samples, 81.1%, 6.5%, 0.7%, and 11.7% were classified as Class I, II, III, and IV, respectively. **Conclusions:** An understanding of the clinical relevance of sagittal root position will provide a guide for the treatment planning of immediate implant placement and provisionalization in the anterior maxilla. A classification system may lead to improved interdisciplinary communication in treatment planning for implant-based therapy in the anterior maxilla. (Int J Oral Maxillofac Implants 2015;30:873-876)

Key words: anterior maxilla, cone beam computed tomography, esthetics, immediate implant placement, immediate provisionalization, osseous housing, sagittal root position, single-tooth replacement, treatment planning

Immediate implant placement and provisionalization (IPP) of a single tooth in the esthetic zone was first advocated in the mid-1990s and has since been considered a predictable treatment option

for replacing falling teeth.¹⁻⁴ In addition to preserving tissue architecture, reducing treatment time, and providing the patient with the convenience of an immediate tooth replacement,^{1,2} IPP procedures have also been documented with high success rates when established clinical guidelines are followed.^{3,4} To ensure successful IPP, in addition to the presence of an intact bony socket following extraction and the absence of active infection, primary implant stability must be achieved by engaging the implant with the palatal wall and the bone approximately 4 to 5 mm beyond the root apex.⁵⁻⁷ Unfortunately because the available bone around the falling tooth may not always be sufficient to achieve primary implant stability, alternative treatment options should be considered. Factors such as root length, sagittal root position (SRP), and the morphology of the osseous housing are important in determining the feasibility of IPP and must be evaluated via the use of cone beam computed tomography (CBCT). While the effect of root length on the IPP is easily

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Associate Dean and Professor, School of Allied Health Professions, Loma Linda University, Loma Linda, California.
Correspondence to: Dr. Joseph Kan, Center for Prosthetic and Implant Dentistry, Loma Linda University School of Dentistry, Loma Linda, CA 92303. Fax: 930-938-4833. Email: jkan@llu.edu

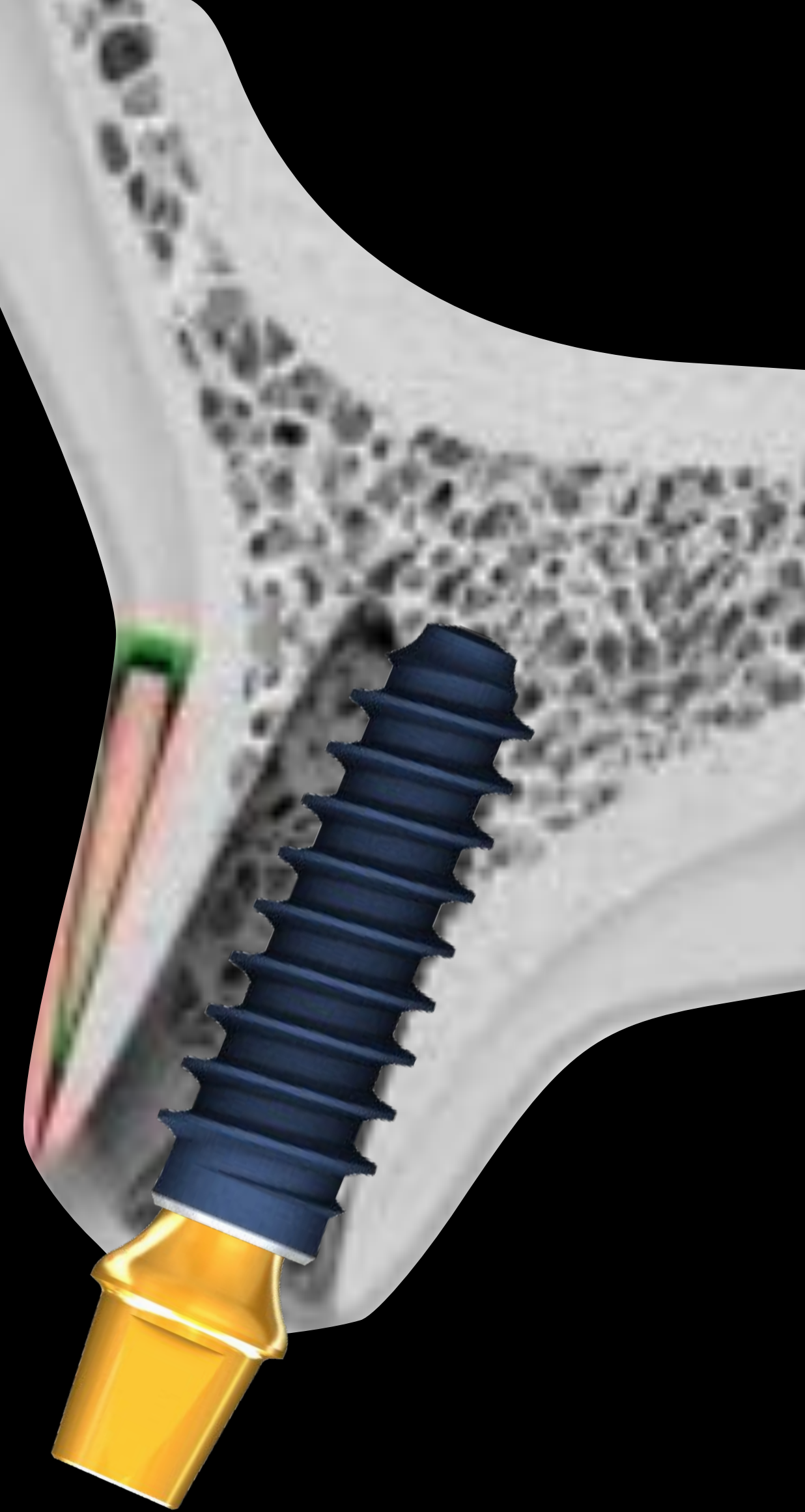
A clinical photograph showing a maxillary anterior implant site. The implant is partially submerged in the gingiva. There is a significant buccal bone dehiscence, which is a gap between the implant and the bone. The gingiva is red and inflamed, and there is visible bleeding. The text overlaid on the image states: "When a buccal bone dehiscence is present the risk of future gingival recession is very high!"

When a buccal bone dehiscence is present the risk of future gingival recession is very high!

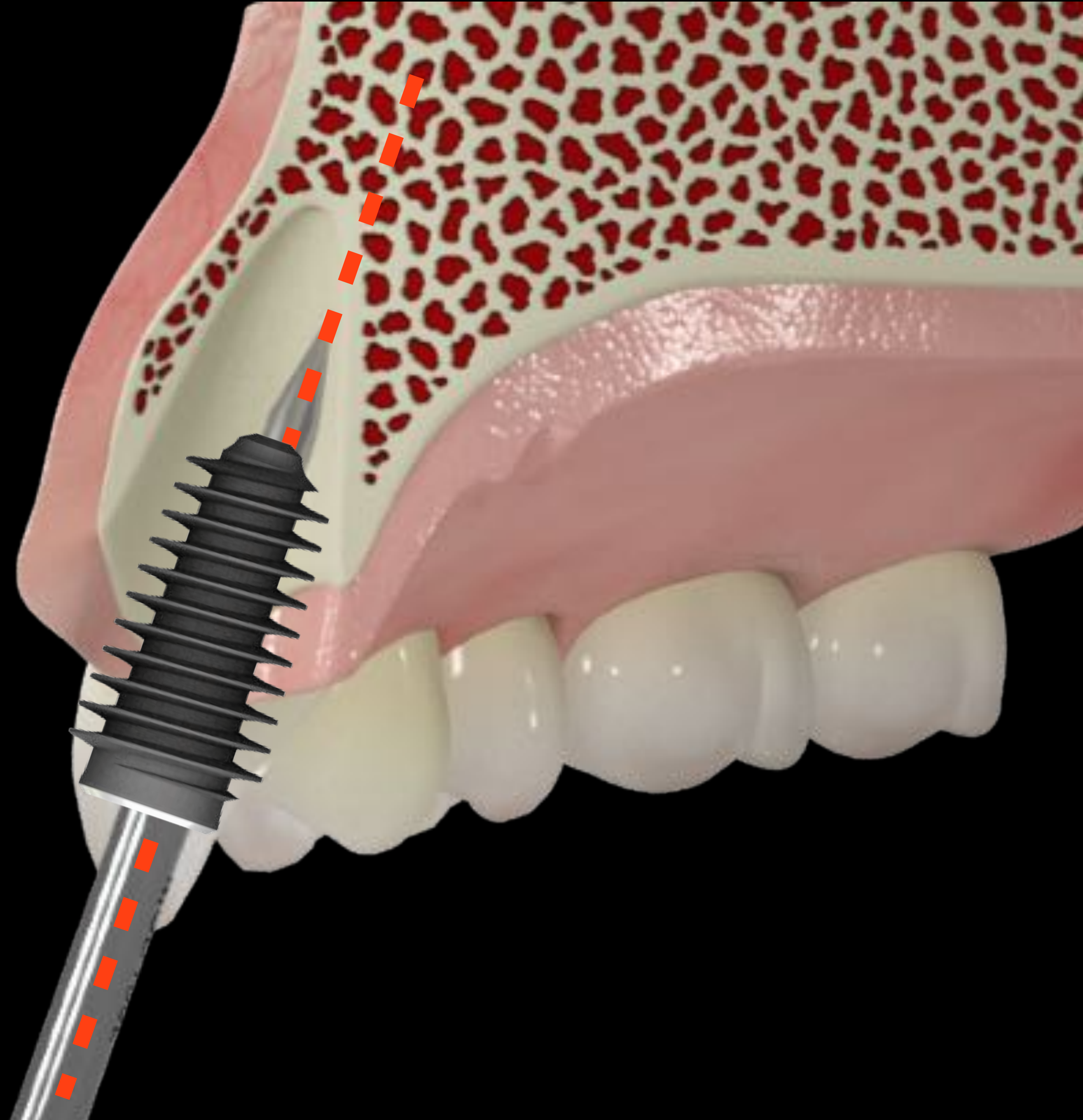
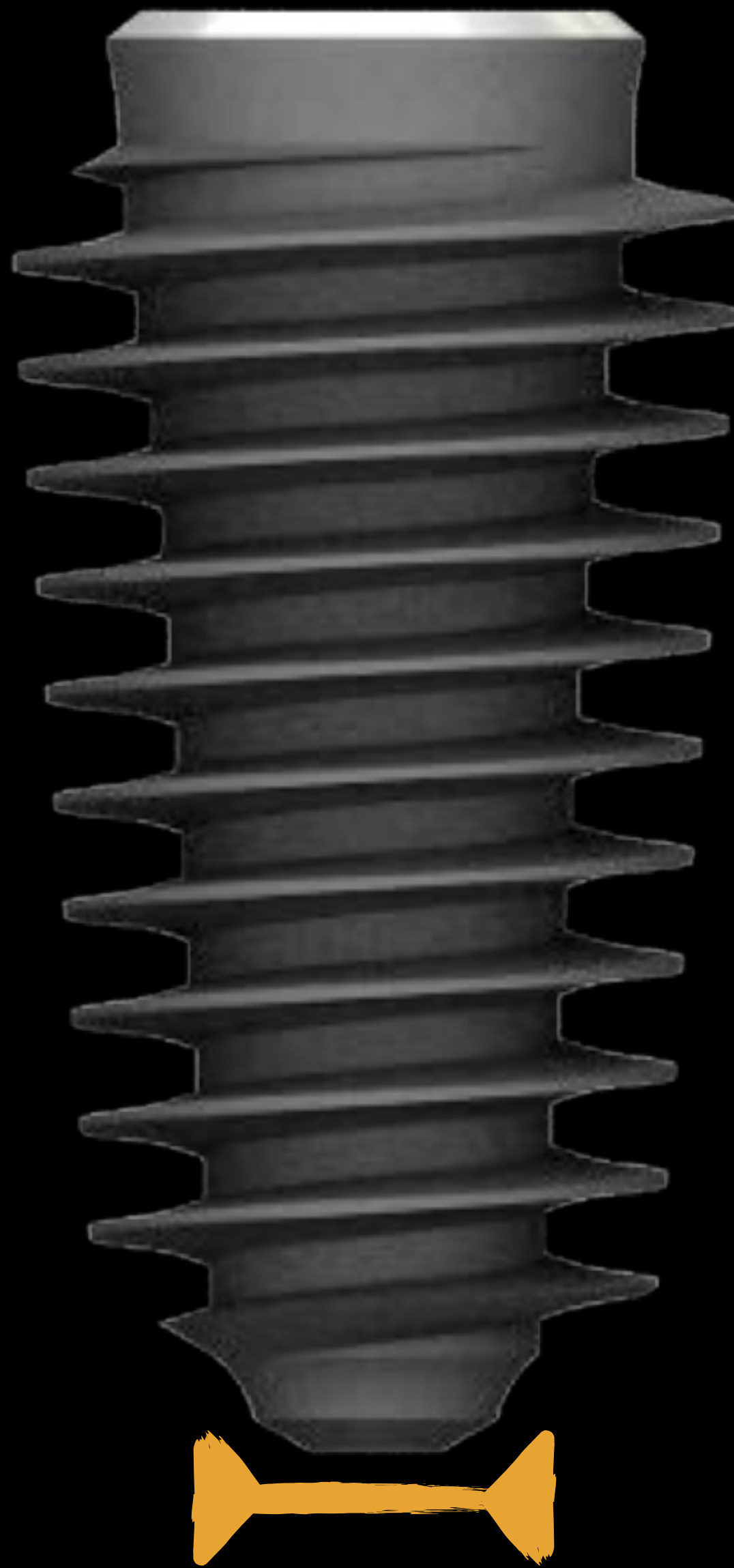
Except, if we graft the site by bone substitute and/or gingival graft if needed.

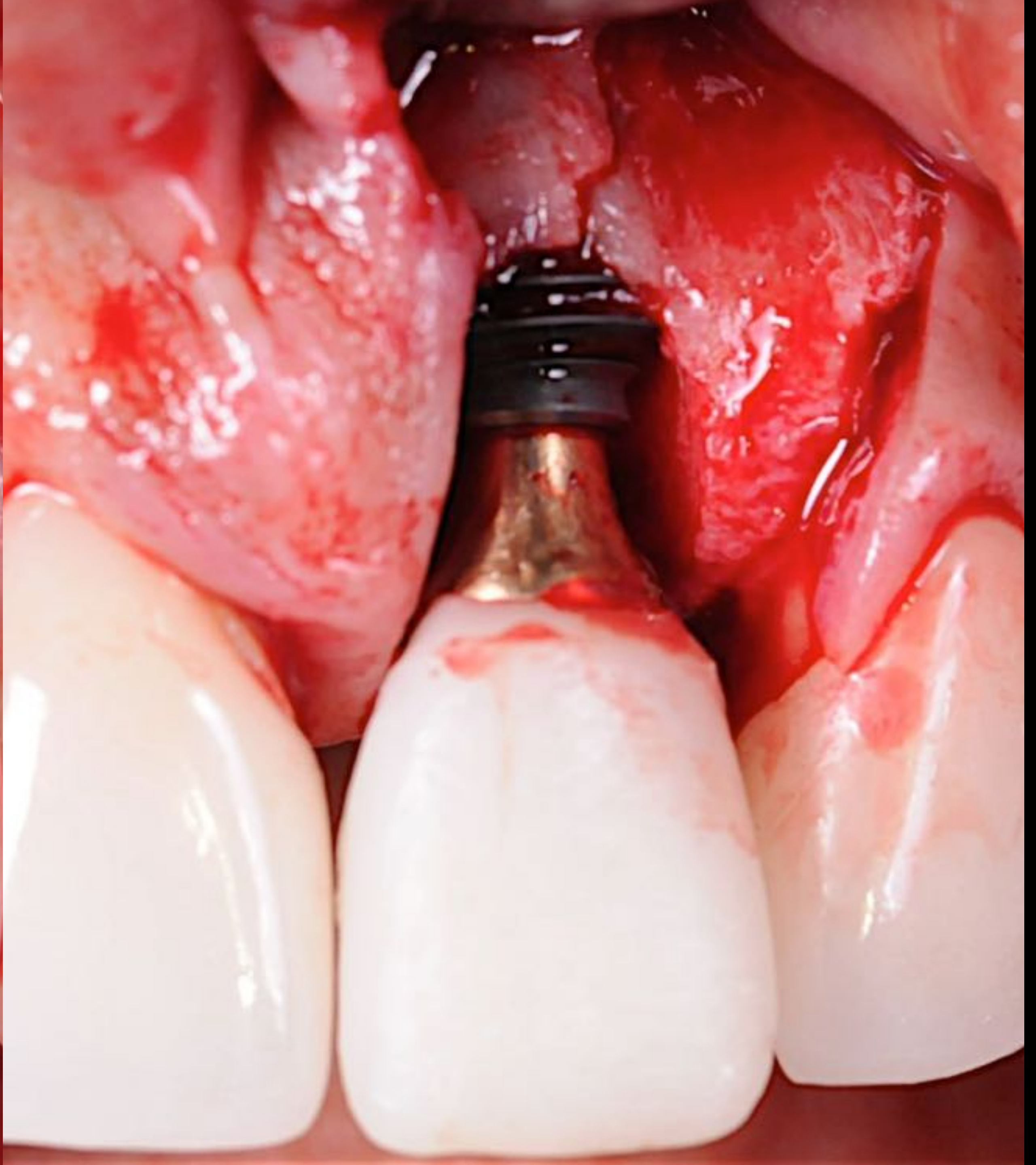
II. Primary Stability

- SUFFICIENT BONE APICAL TO THE EXTRACTED TOOTH'S ALVEOLUS
- 2-4 MM OF BONE APICAL TO THE ALVEOLUS CREATES STABLE ANCHOR
- ENHANCED BY THE TYPE OF IMPLANT (TAPERED DESIGN)



II. Primary Stability





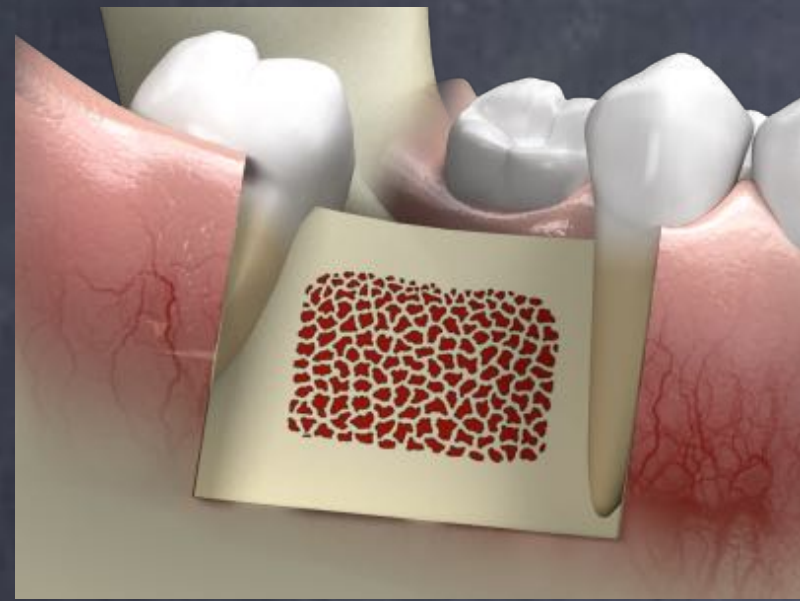


After 4 years

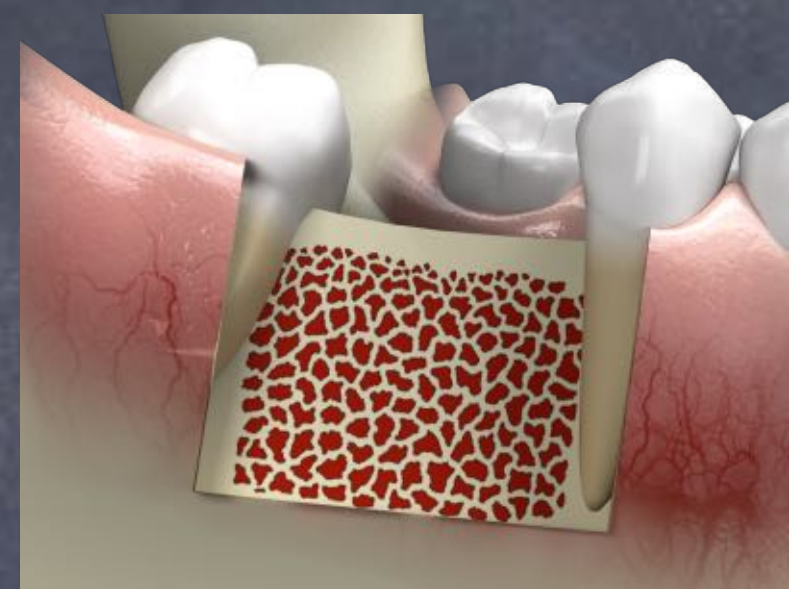


2019

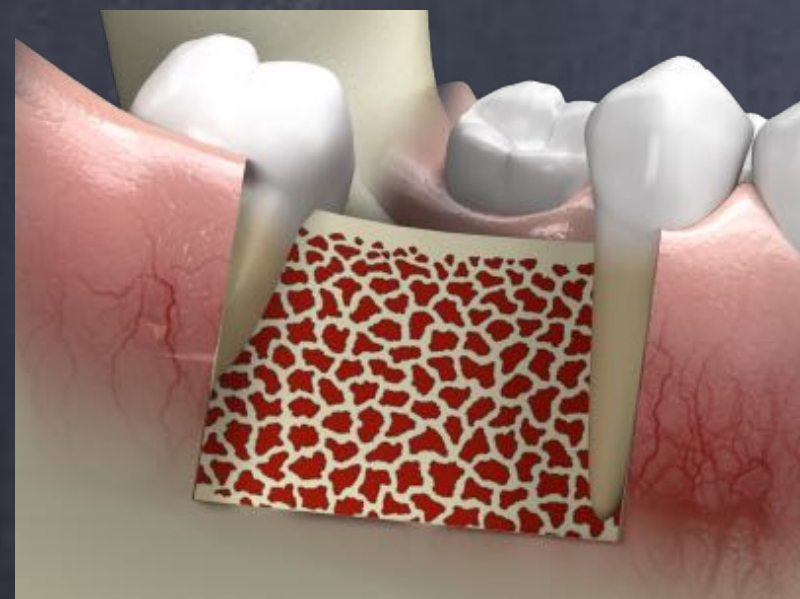
UNDER DRILLING



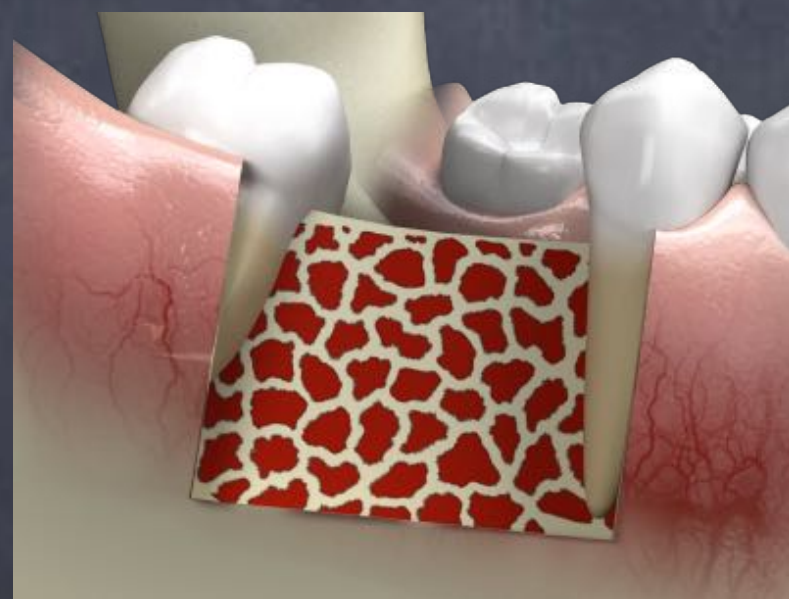
D1



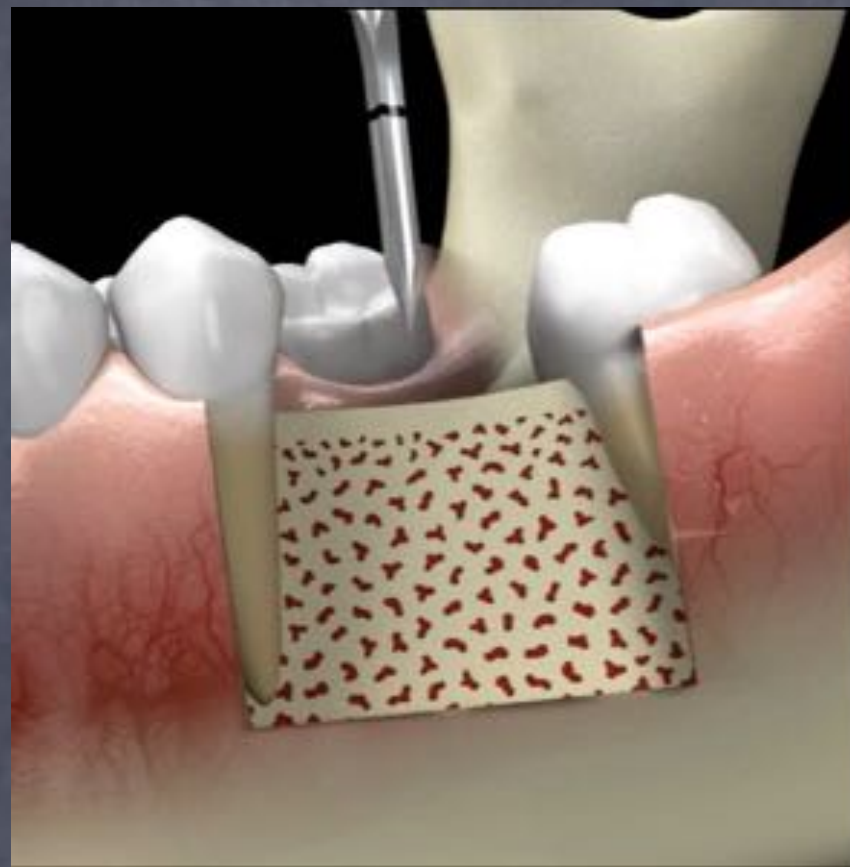
D2



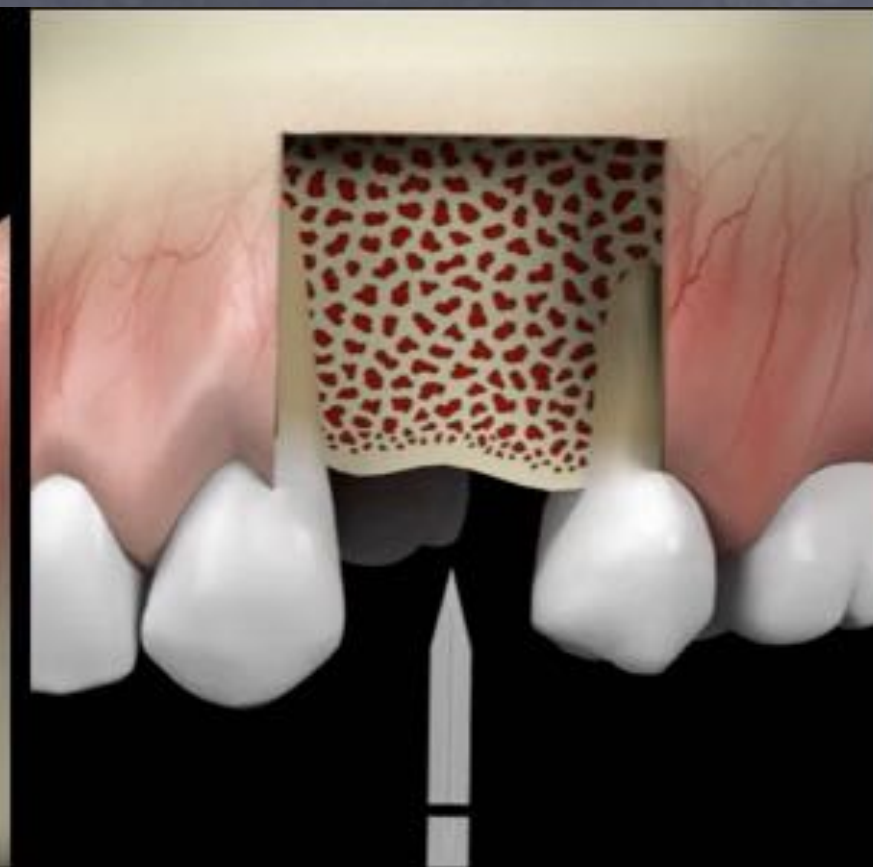
D3



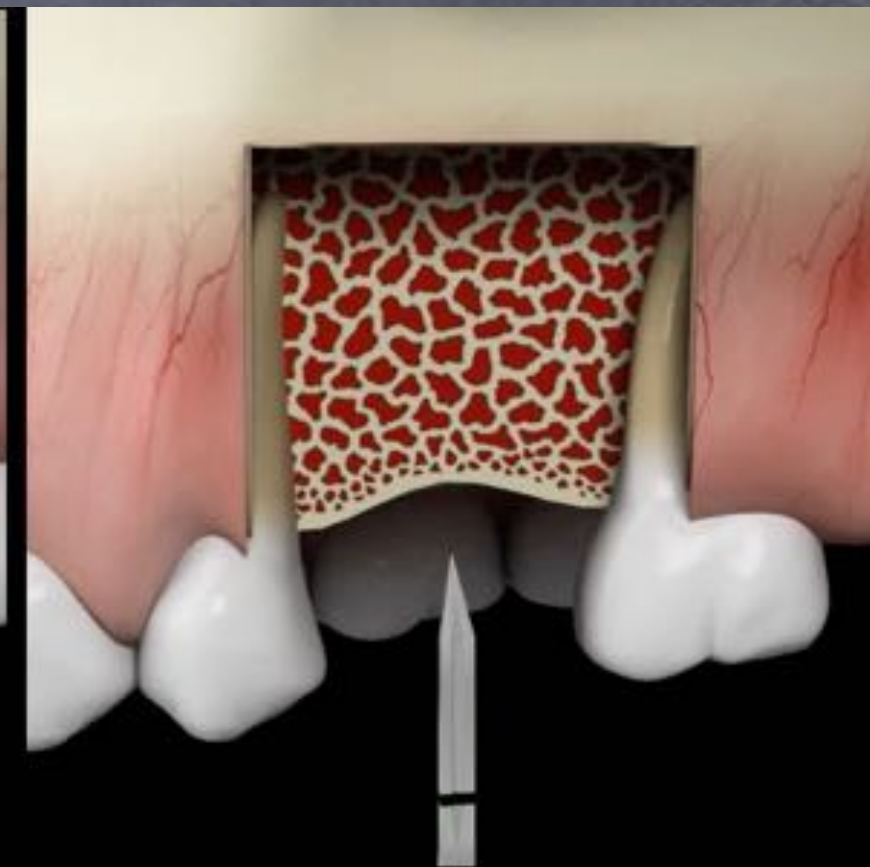
D4-5



D 1



D 2-3



D 4-5

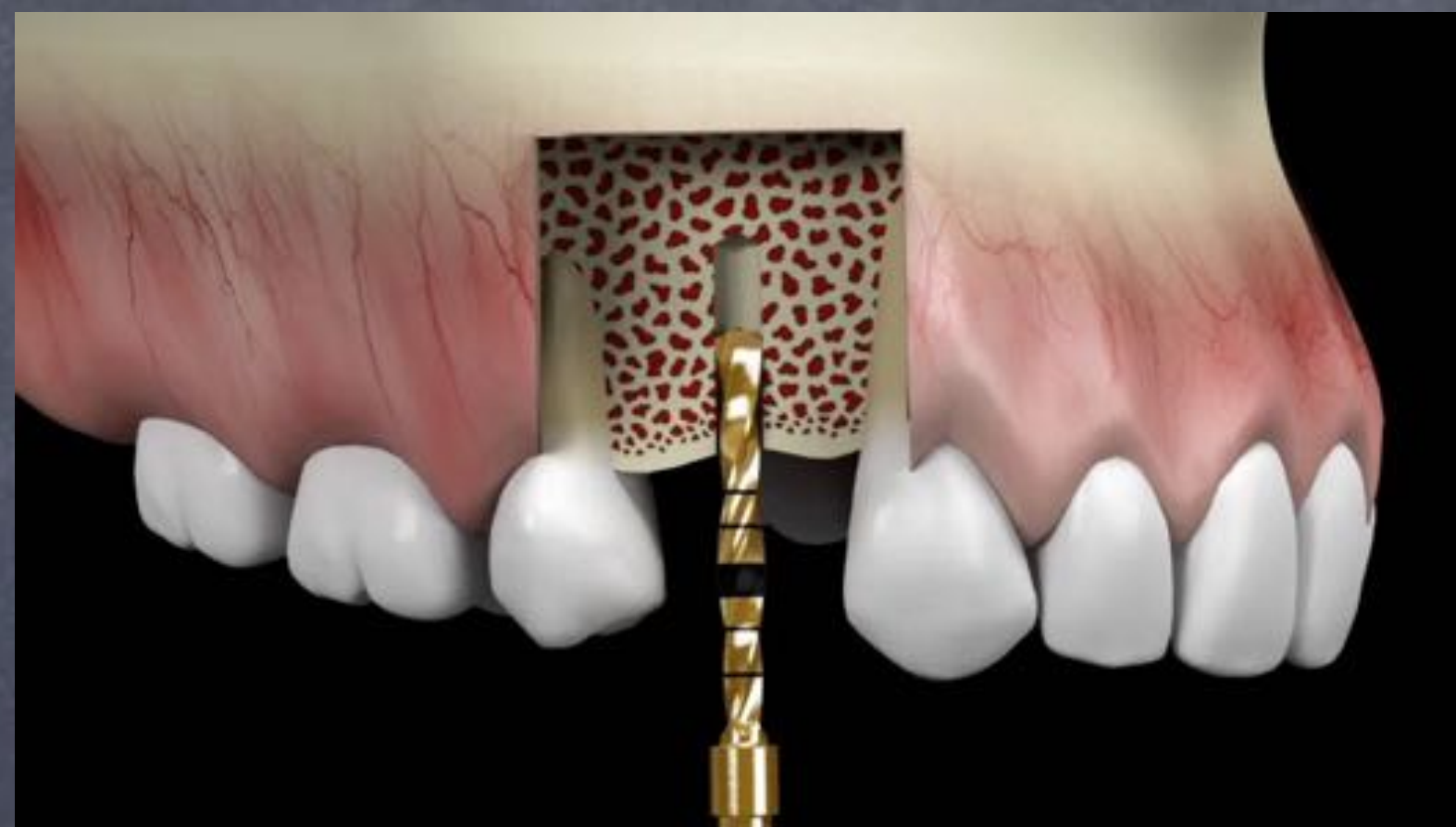
D RILLING
TECHNIQUE



FINAL DRILL

D 4 2.0 OR 2.9

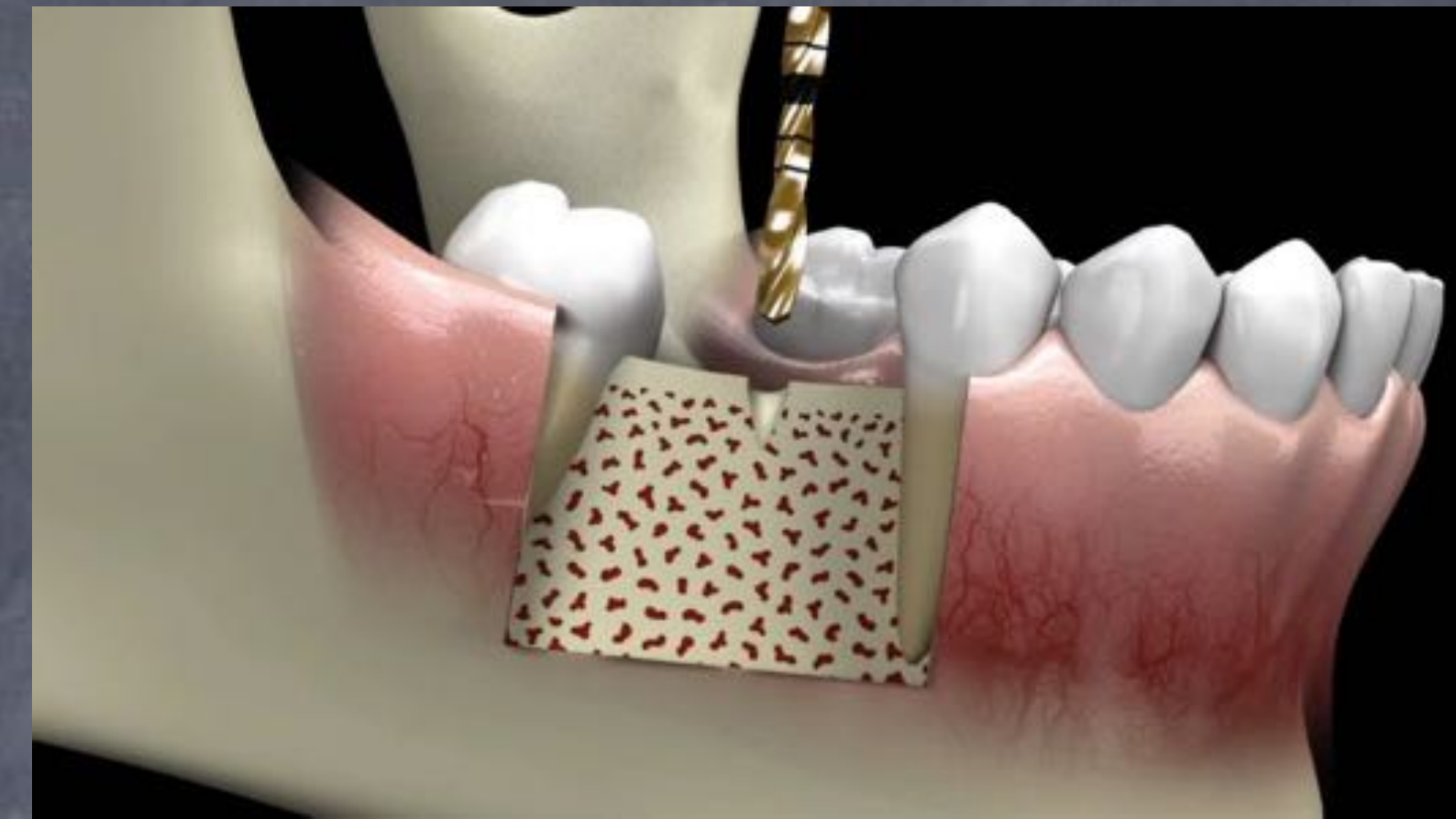
D 5 2



FINAL DRILL

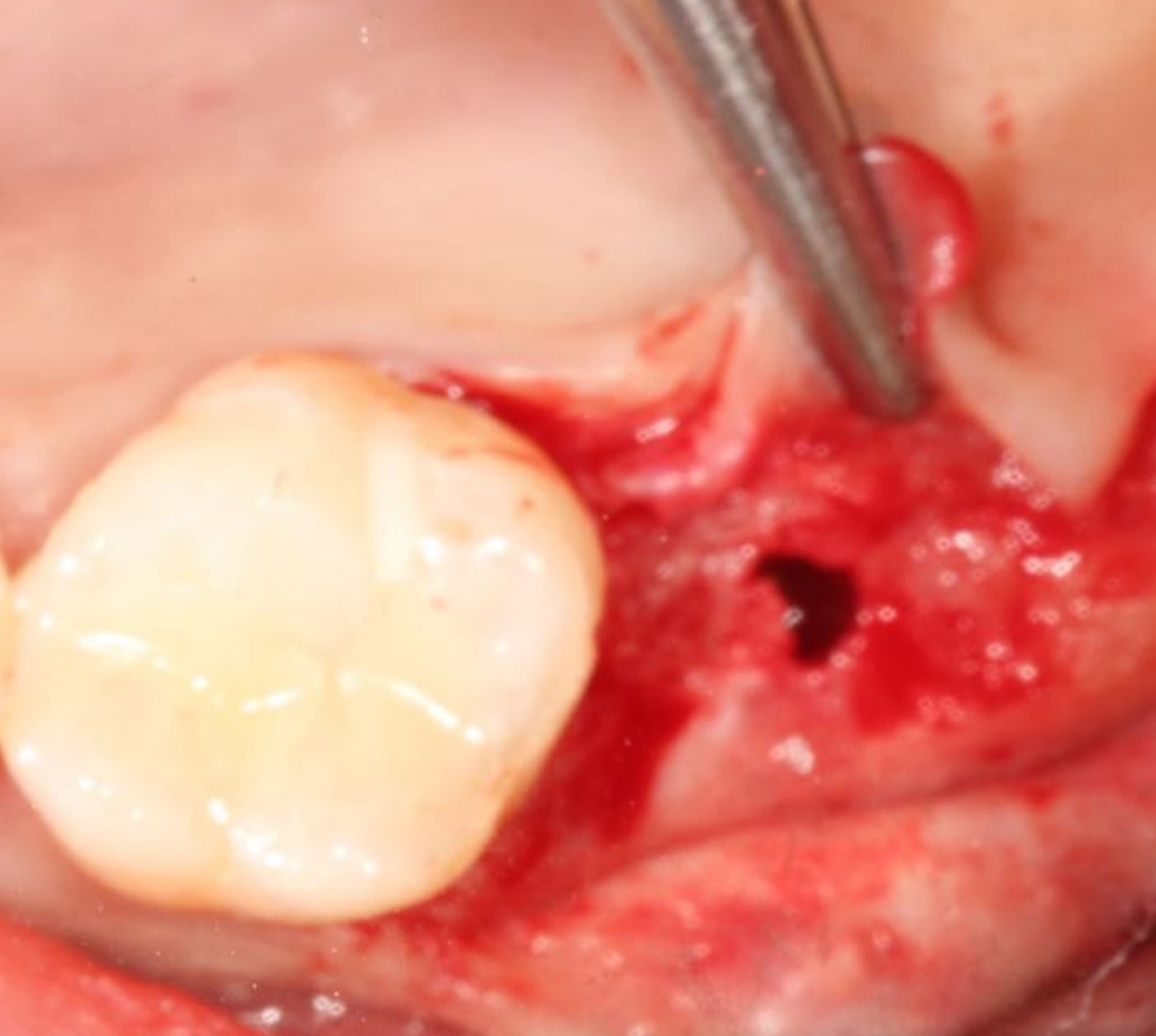
D2 3.3 OR 3.8

D3 2.9 OR 3.3



FINAL DRILL

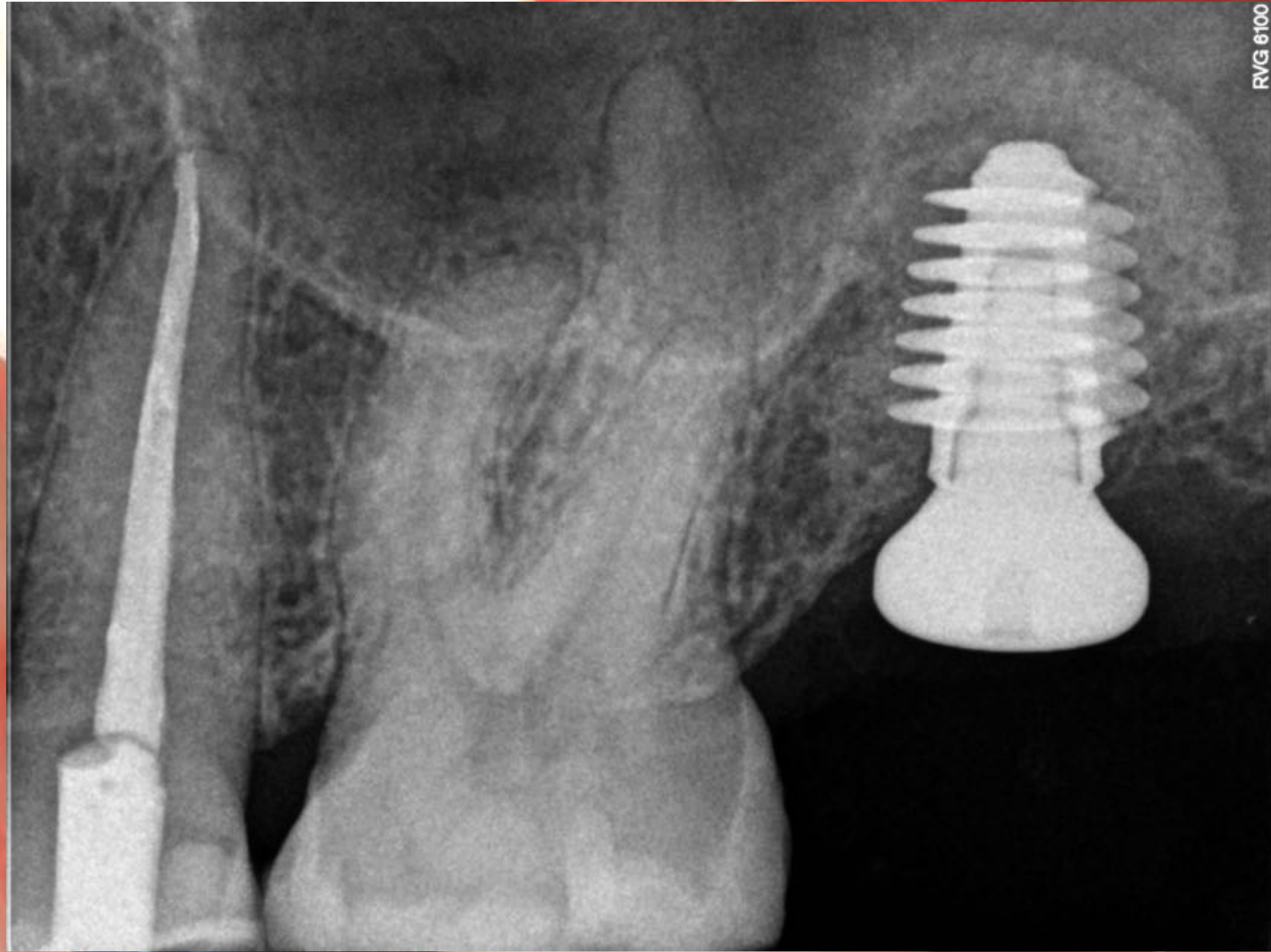
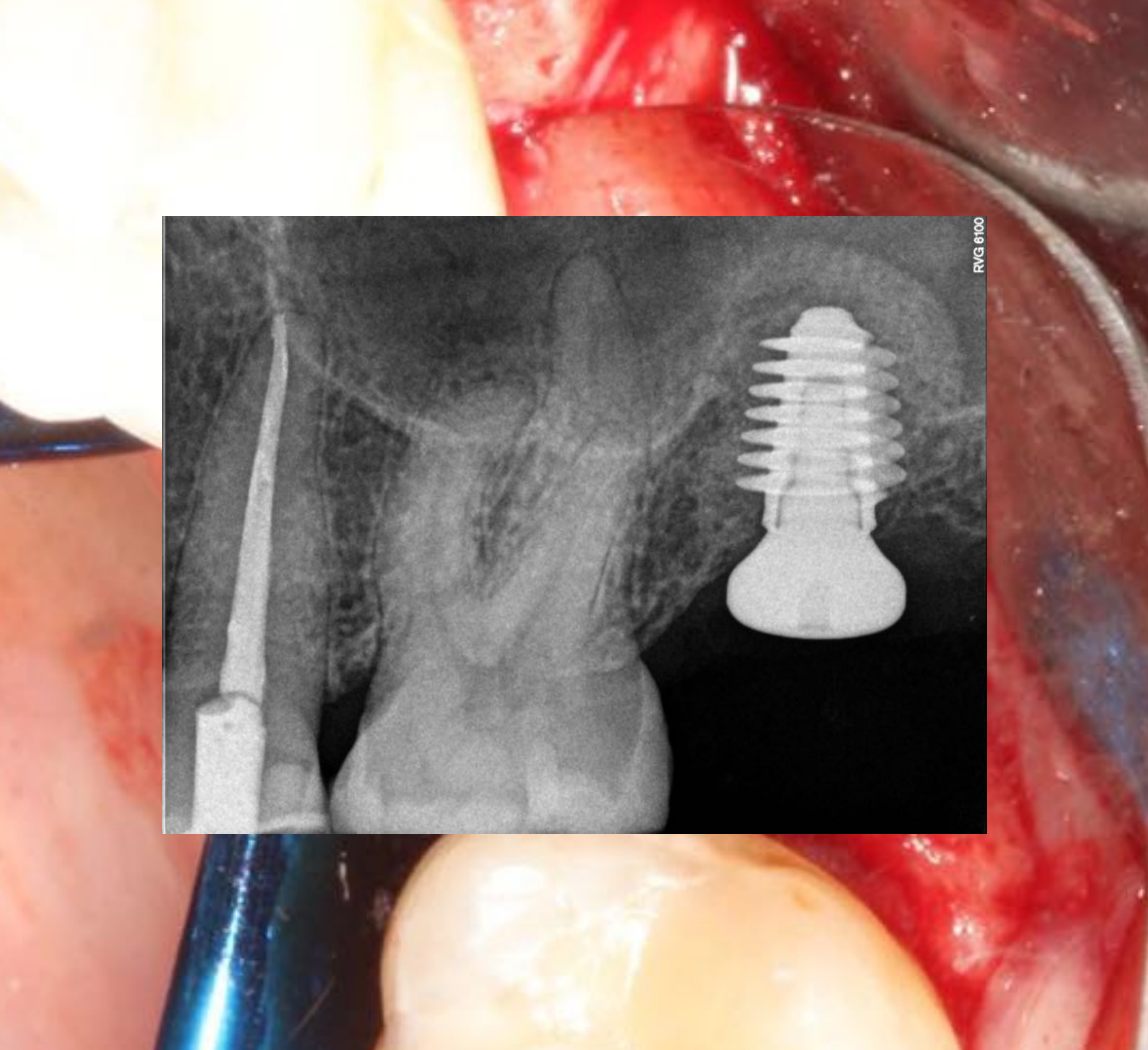
D1 4.3MM



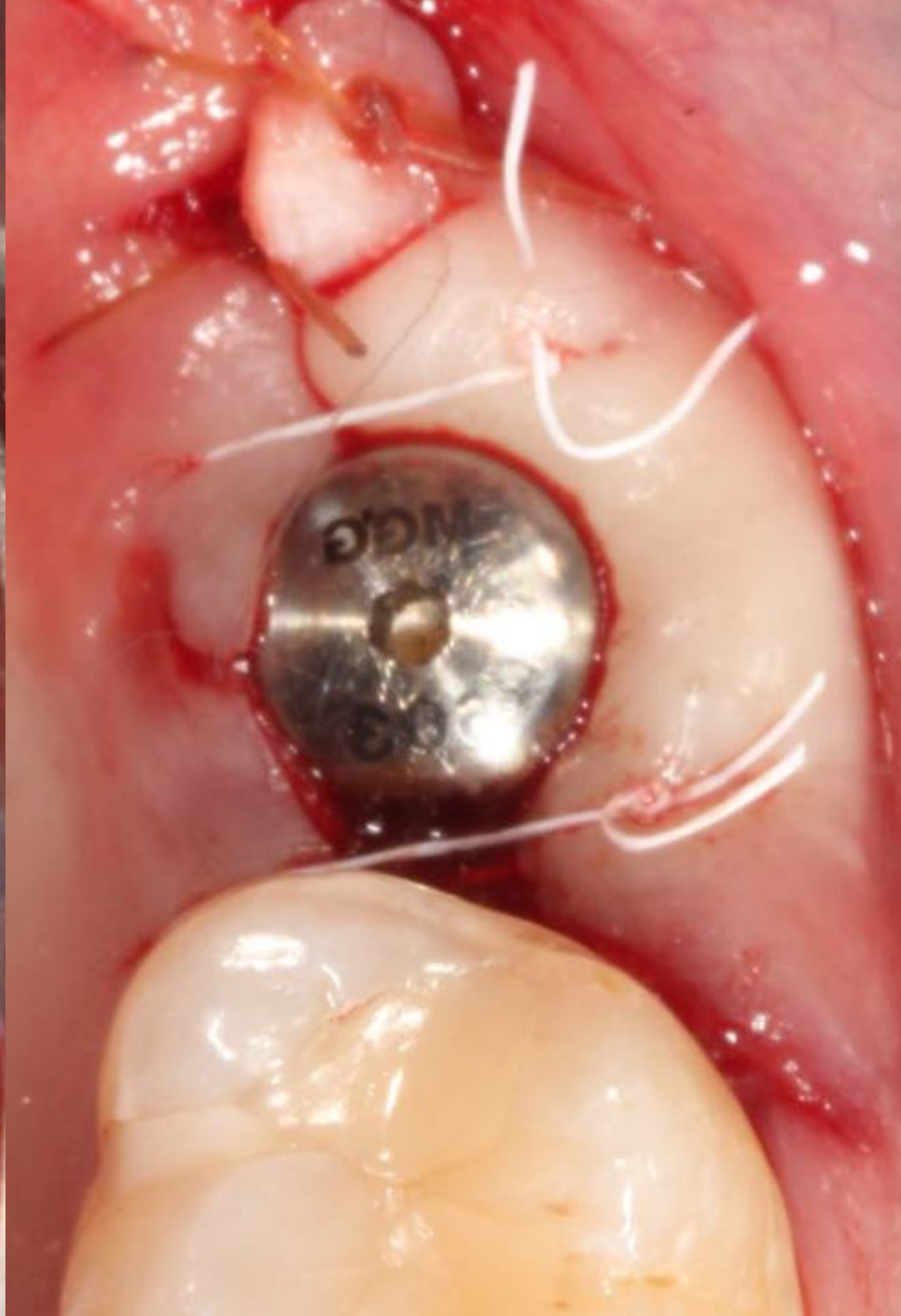
3.3mm Osteotomy

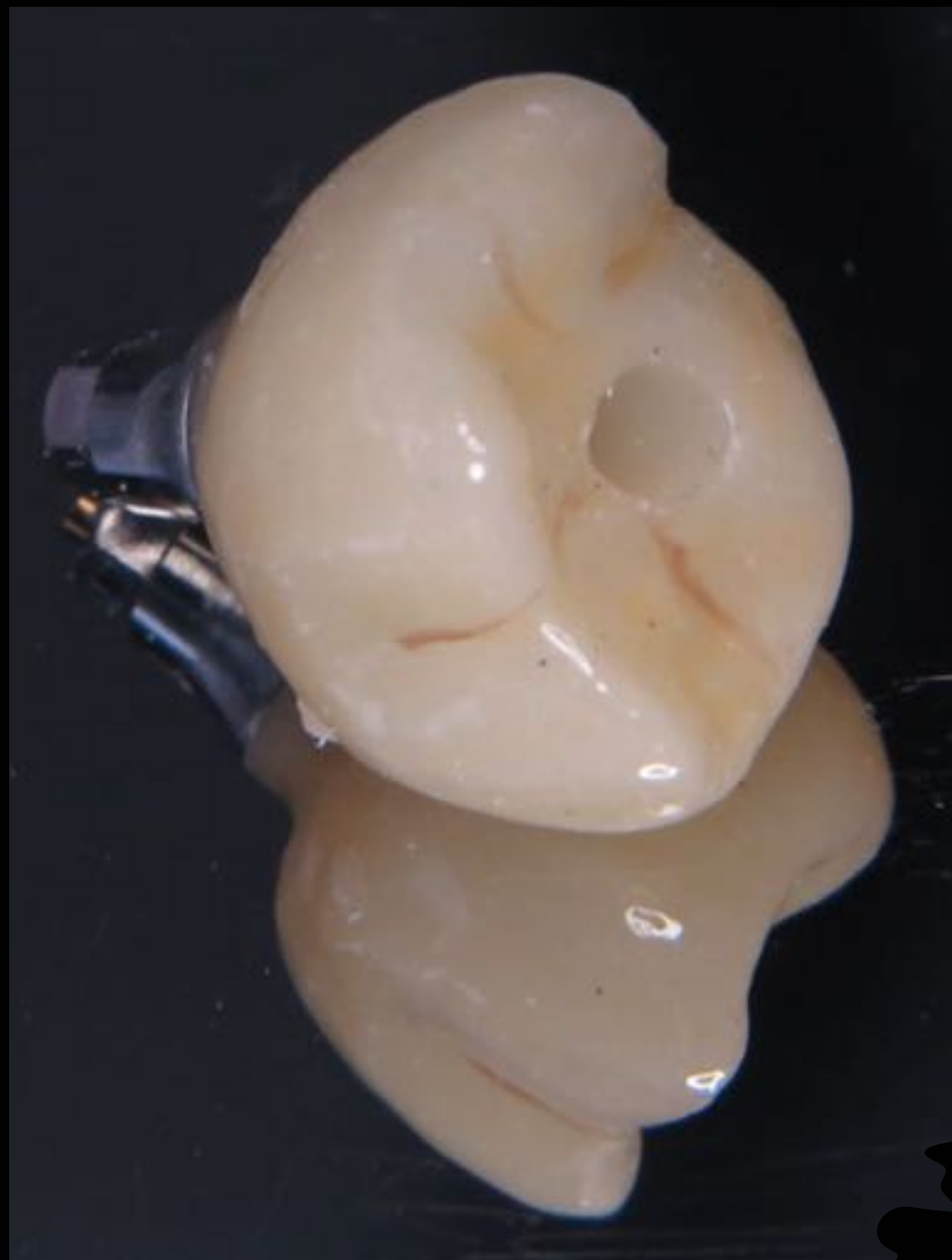


5.5mm implant 3.3mm osteotomy @60ncm



RVG 6100





III. Implant Design

Timing of Implant placement in relation to tooth extraction

Old Protocol Old Design

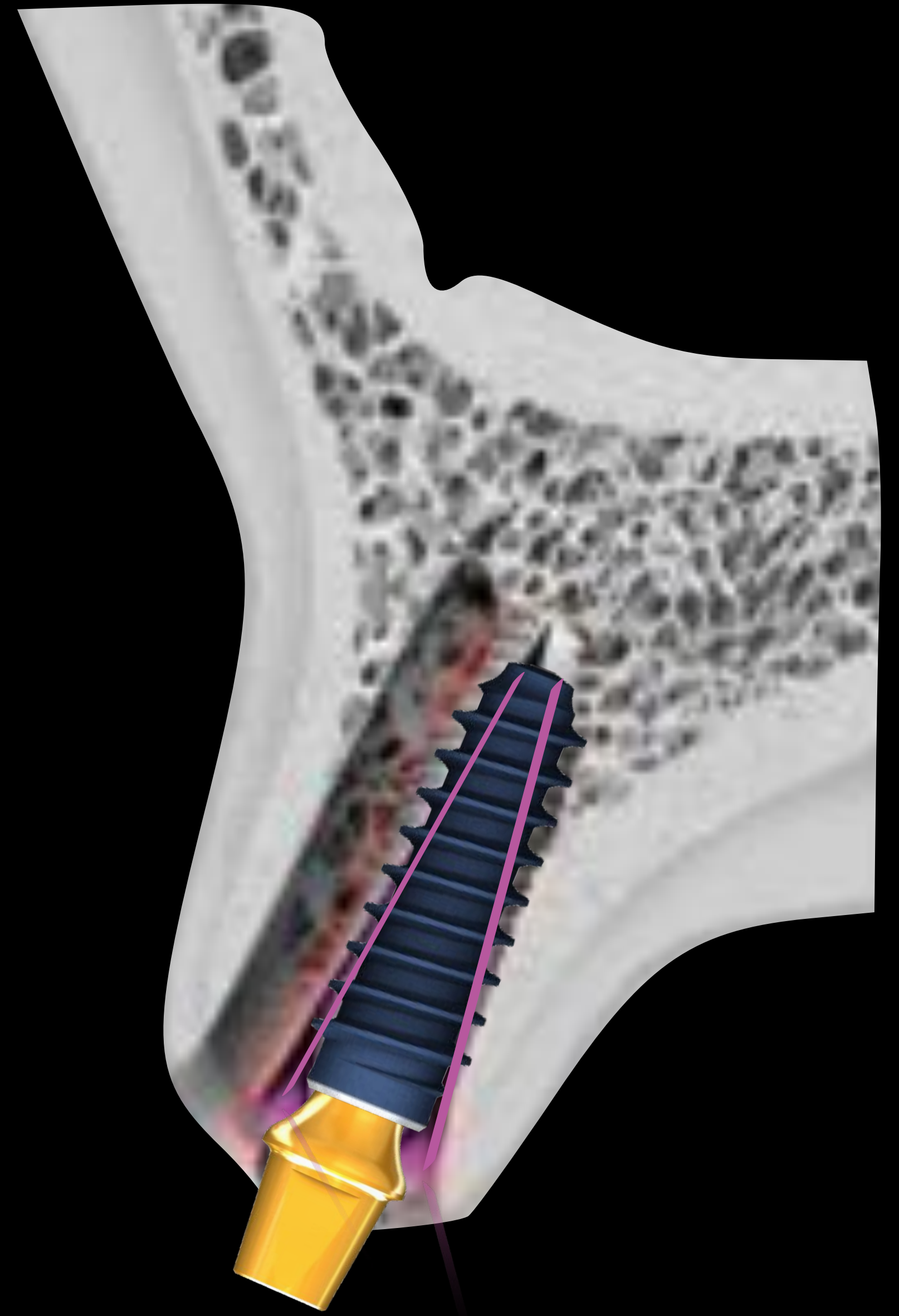


- Wider Implant neck diameter
- No buccal gap
- No peri-implant bone graft



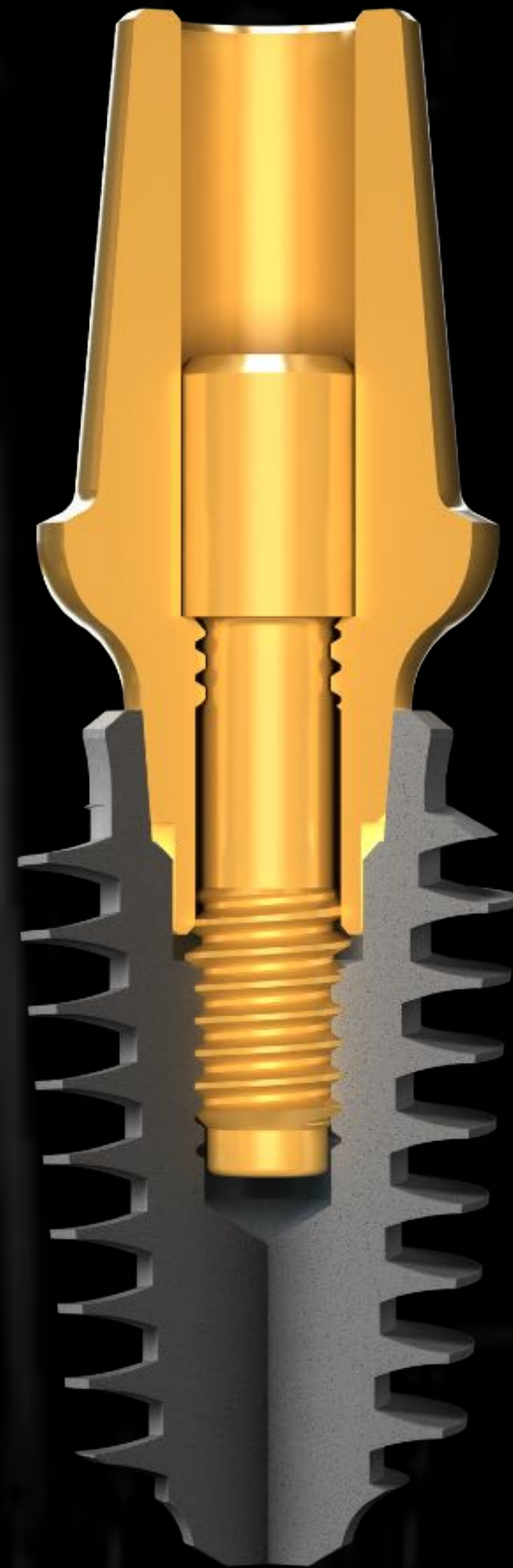
- No connective tissue graft
- No switching platform
- Weak connection (implant abutment)

III. Implant Design



Ideal Fixture

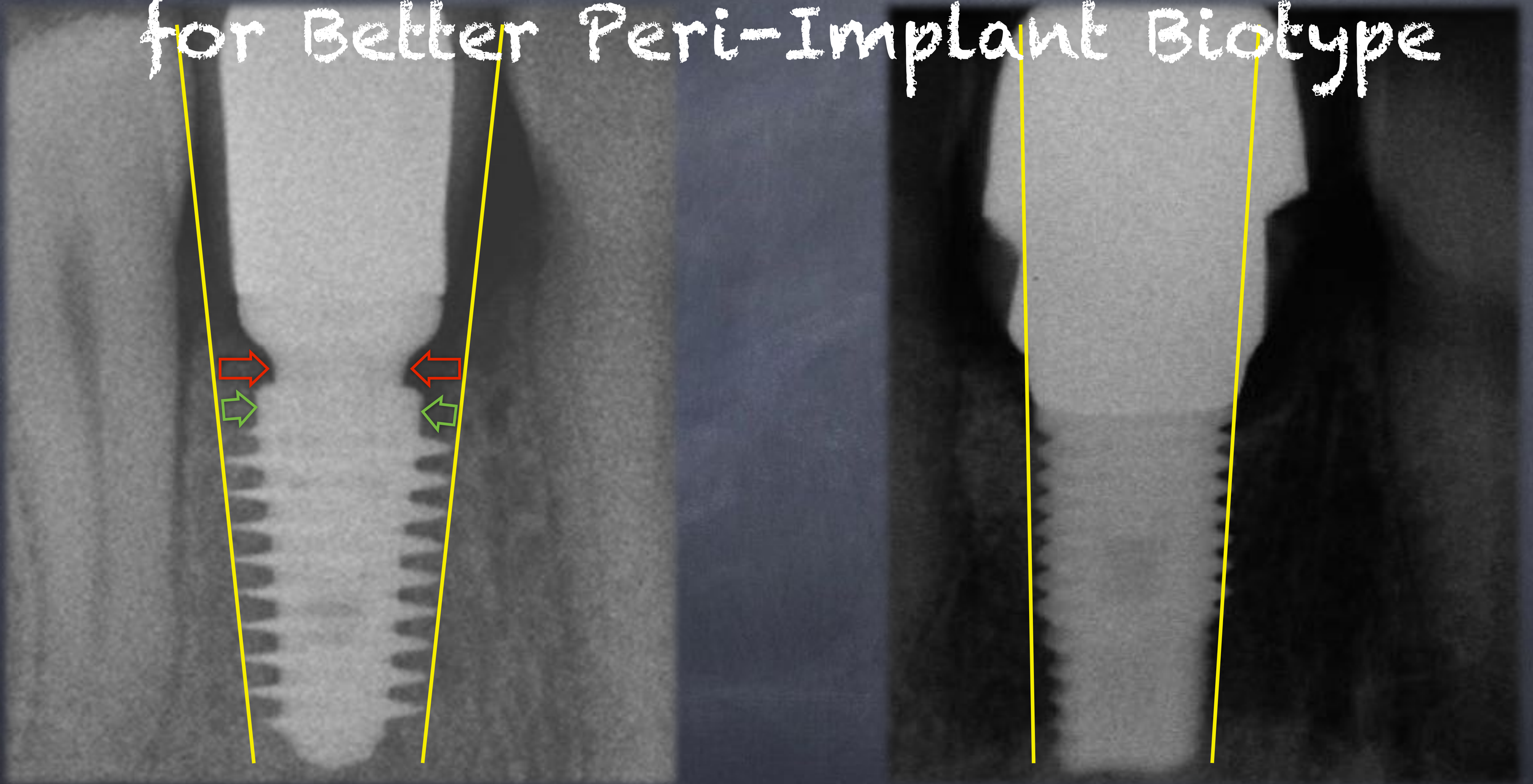
- Less bone reduction
- Excellent initial stability
- Immediate placement
- Immediate provisionalization
- Immediate or early loading
- Fast integration
- Earlier final restoration
- Less crestal bone loss
- Less failure
- Strong body
- Better stability to lateral force



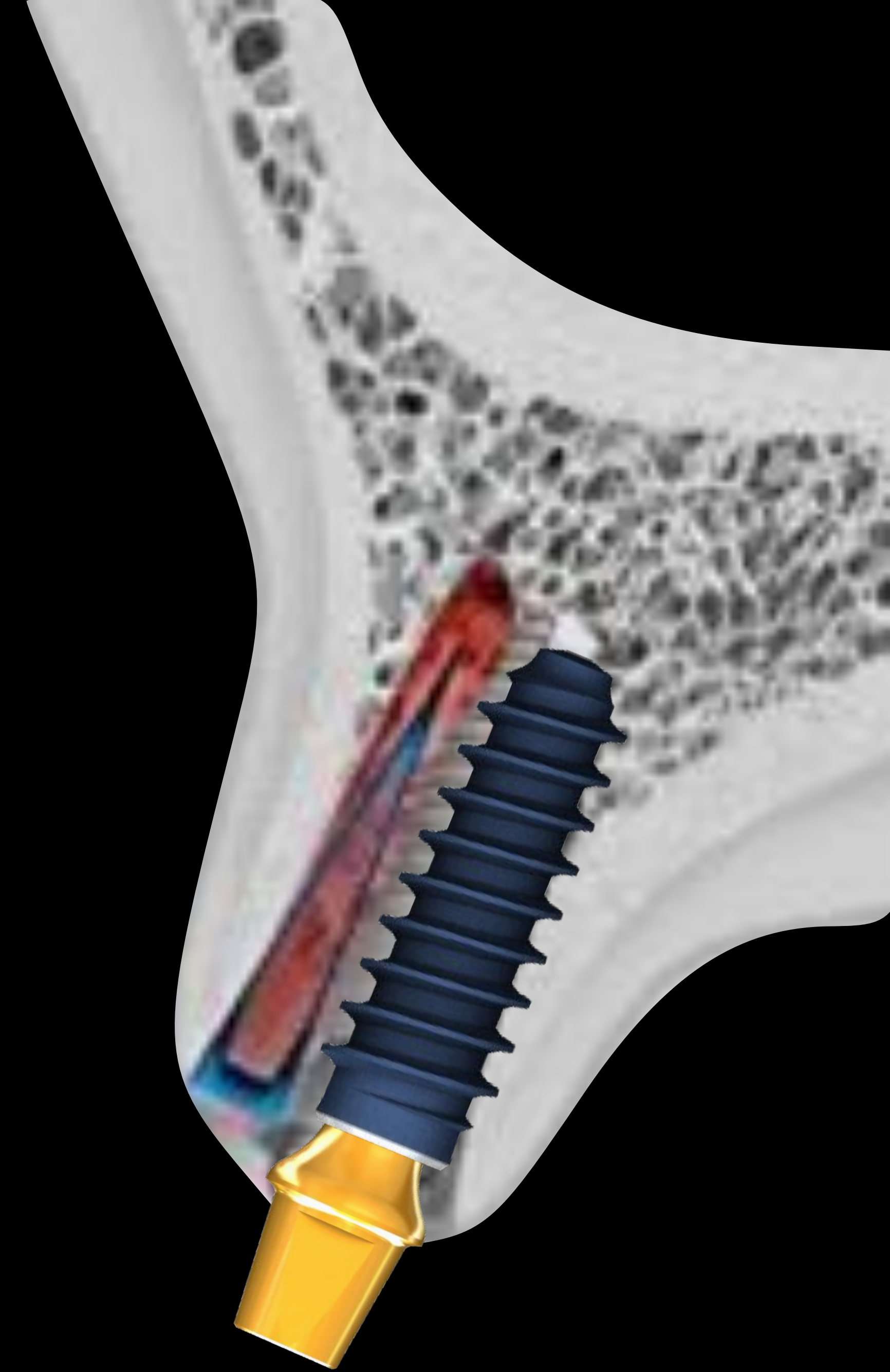
Ideal Abutment

- Stable Connection
- No screw loosening
- Preservation of the crestal bone
- Preservation of the biologic width

Double Offset for Better Peri-Implant Biotype



IV. "Fill the Gap"



Separation of Soft Tissue - PDL



The first step in removing a tooth using the simple technique is **to sever or loosen the soft tissue** attachment surrounding the tooth.

Instruments are required to sever the soft tissue attachment:

straight or curved periostomes

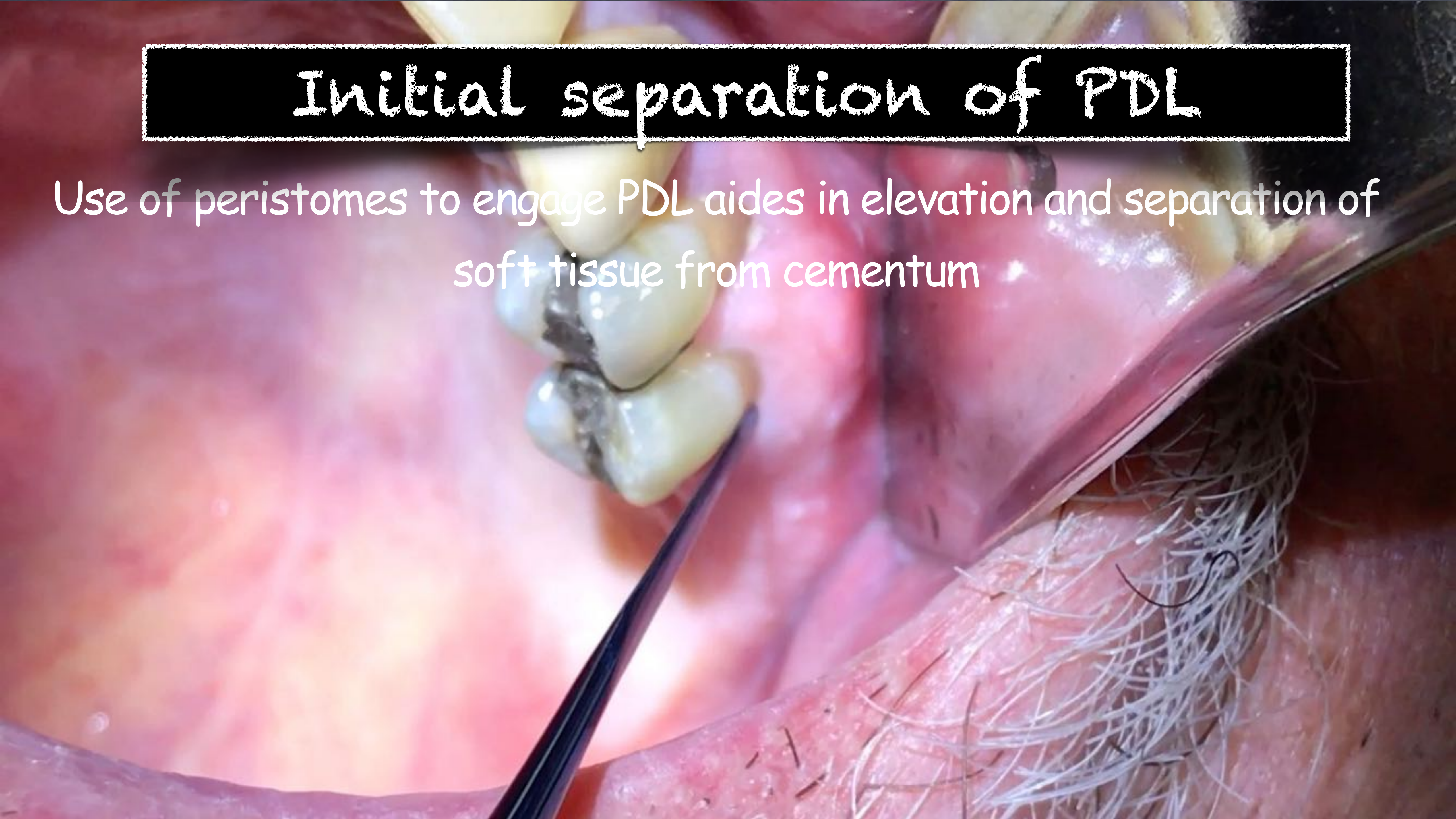
Initial separation of PDL

Use of peristomes to engage PDL aides in elevation and separation of soft tissue from cementum



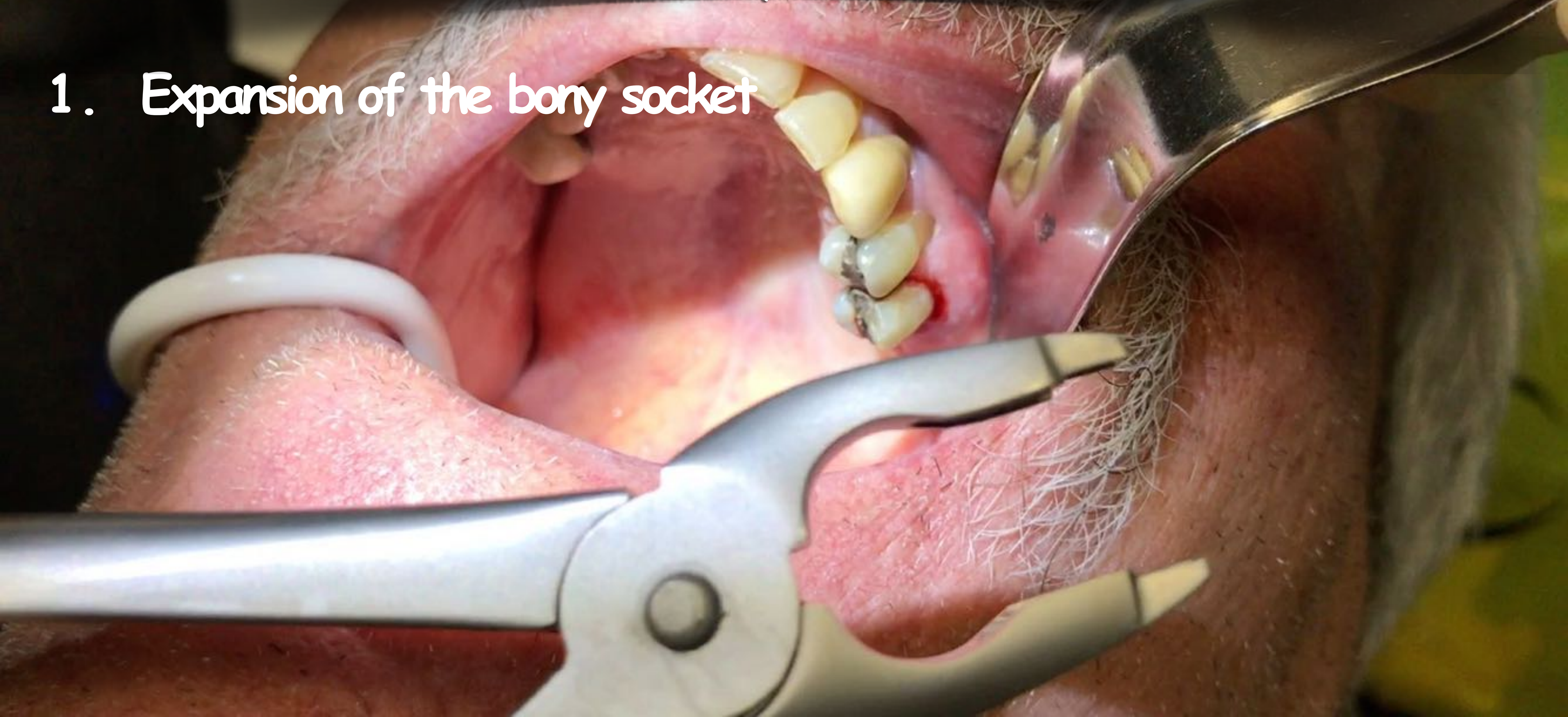
Initial separation of PDL

Use of peristomes to engage PDL aides in elevation and separation of soft tissue from cementum



Mechanical Principles for Extractions

1. Expansion of the bony socket



Special Addition



MODIFIED 151
LOWER UNIVERSAL

FRINGS®
forceps with spring



TAWIL
SKU: 33005F



MODIFIED 23
LOWER 3RD MOLARS

FRINGS®
forceps with spring



PATEL
SKU: 33006F



MICRO ROOTS

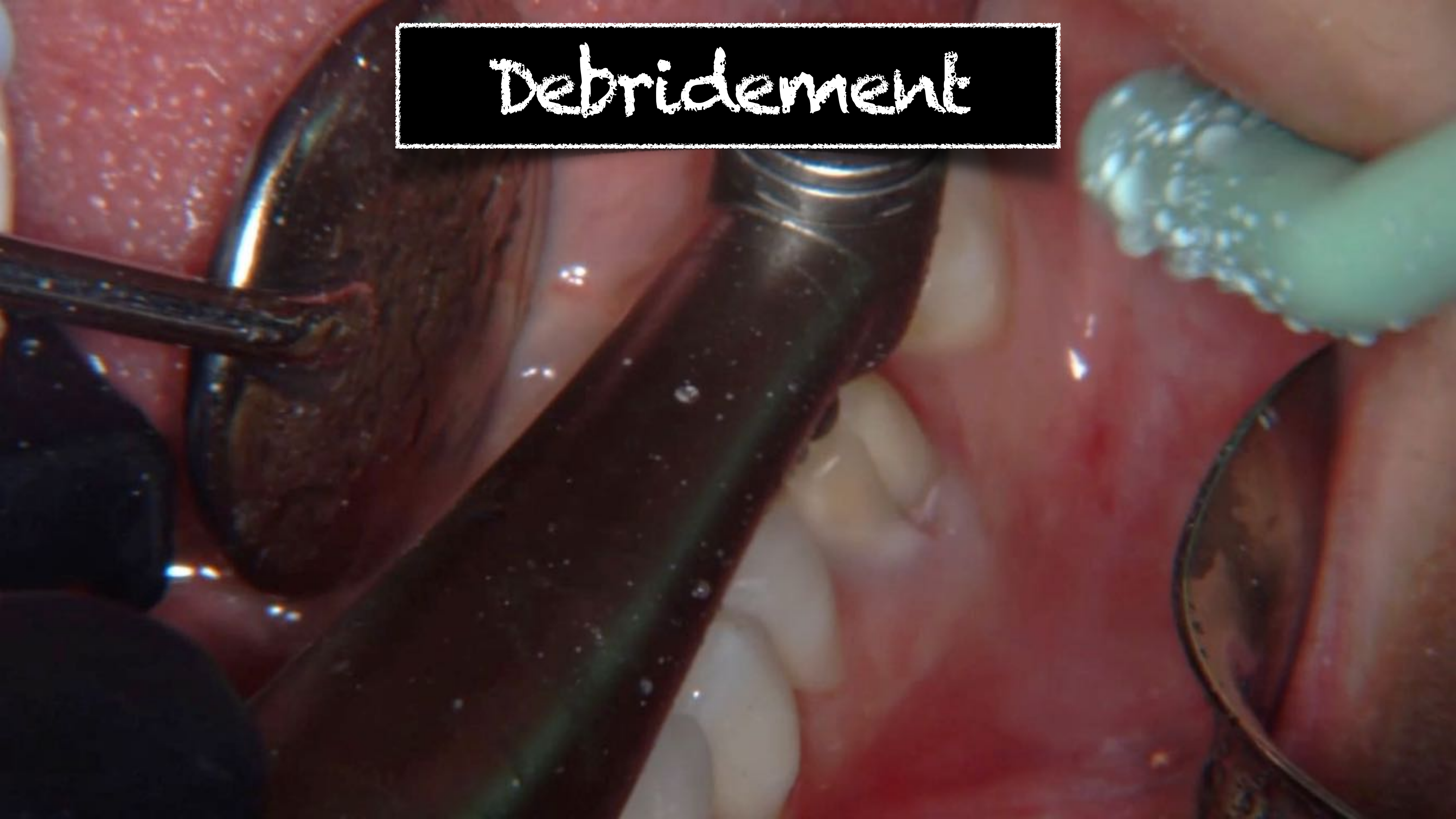
FRINGS®
forceps with spring



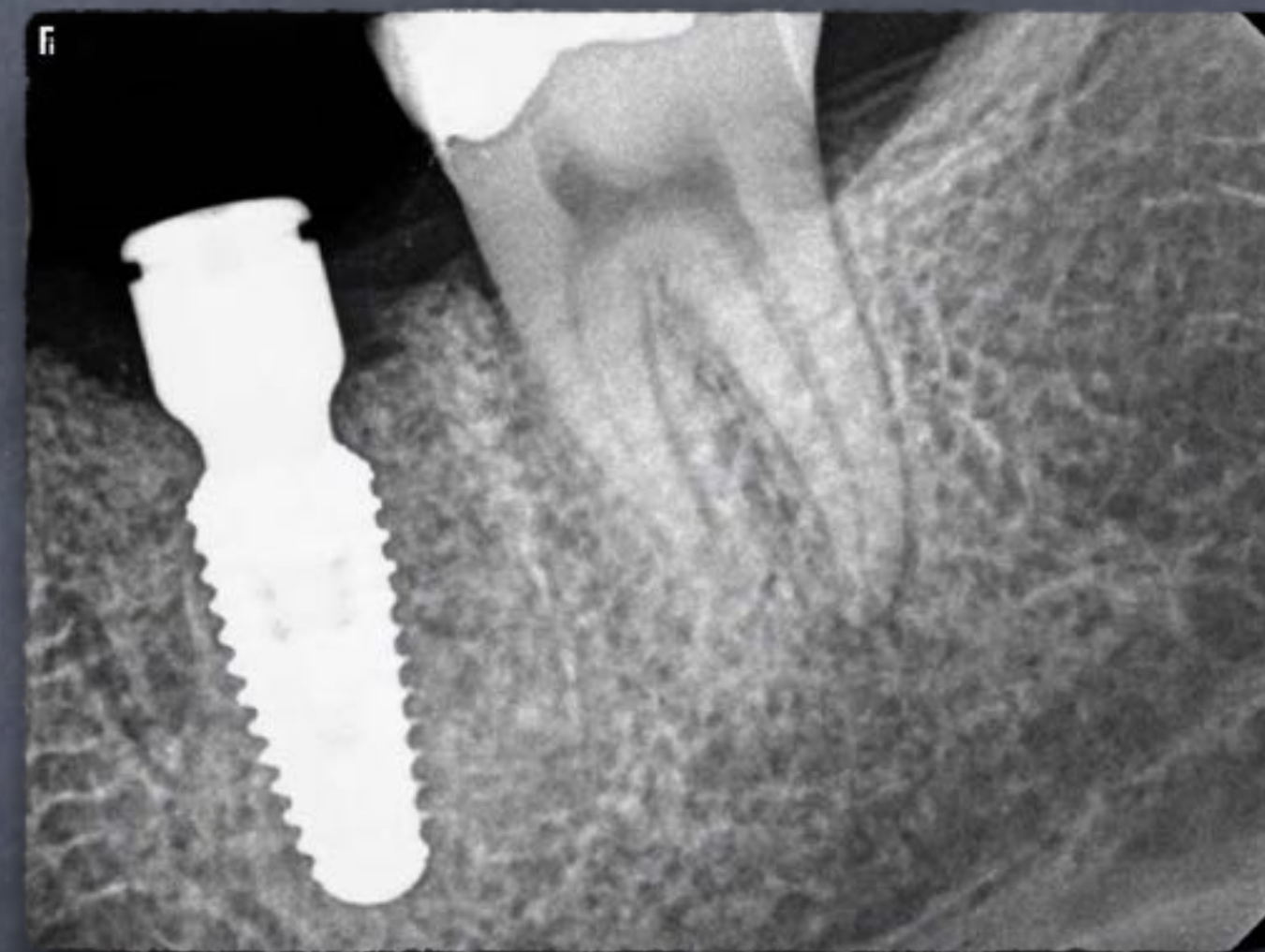
GANZ
SKU: 33011F



Debridement

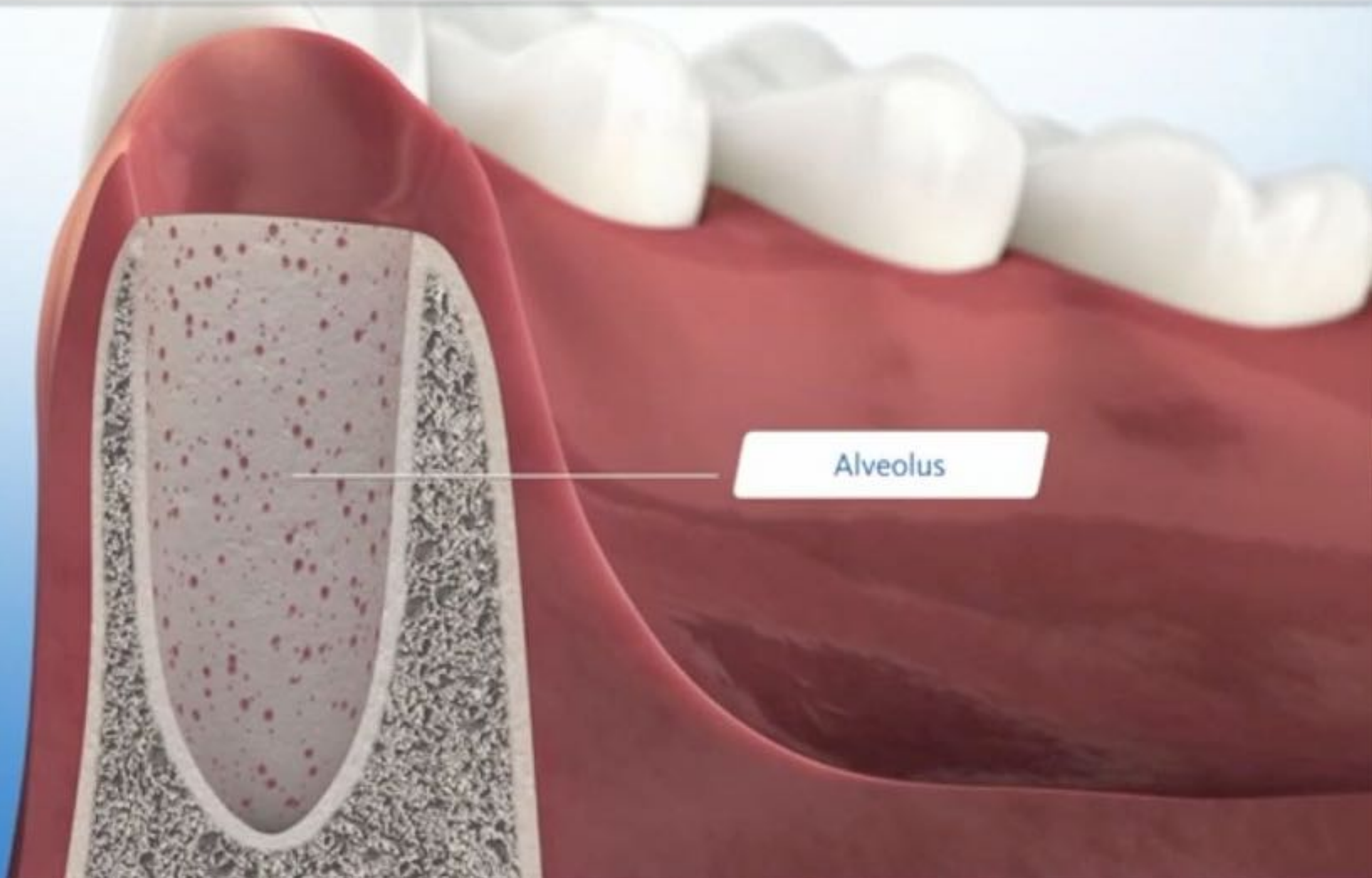


Serrated Curettage



What happens when we extract a tooth?

An alveolus is left after a tooth extraction



What happens when we extract a tooth?

Delaying Implantation (by 6-8 weeks)
-Without socket augmentation

1. **Aesthetic problem** for the fabrication of conventional or implant supported prostheses
2. **Resorption of the buccal wall** of the extraction socket make a correct placement of an endosseous implant difficult or even impossible, especially in the anterior part of the maxilla.
3. A buccal concavity in the alveolar process or an **implant placed more lingually** than the neighboring teeth can result in poor aesthetics

Horowitz R, Holtzclaw D, Rosen PS, 'Tooth extraction induces significant dimensional changes of the alveolar ridge'. J Evid Based Dent Pract. 2012 Sep;12(3 Suppl):

Arau'jo MG, Lindhe J: Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Periodontol 2005; 32: 212–218.

**3-6 mm loss of width and
2-3 mm loss of height,
3-6 month after extractions**



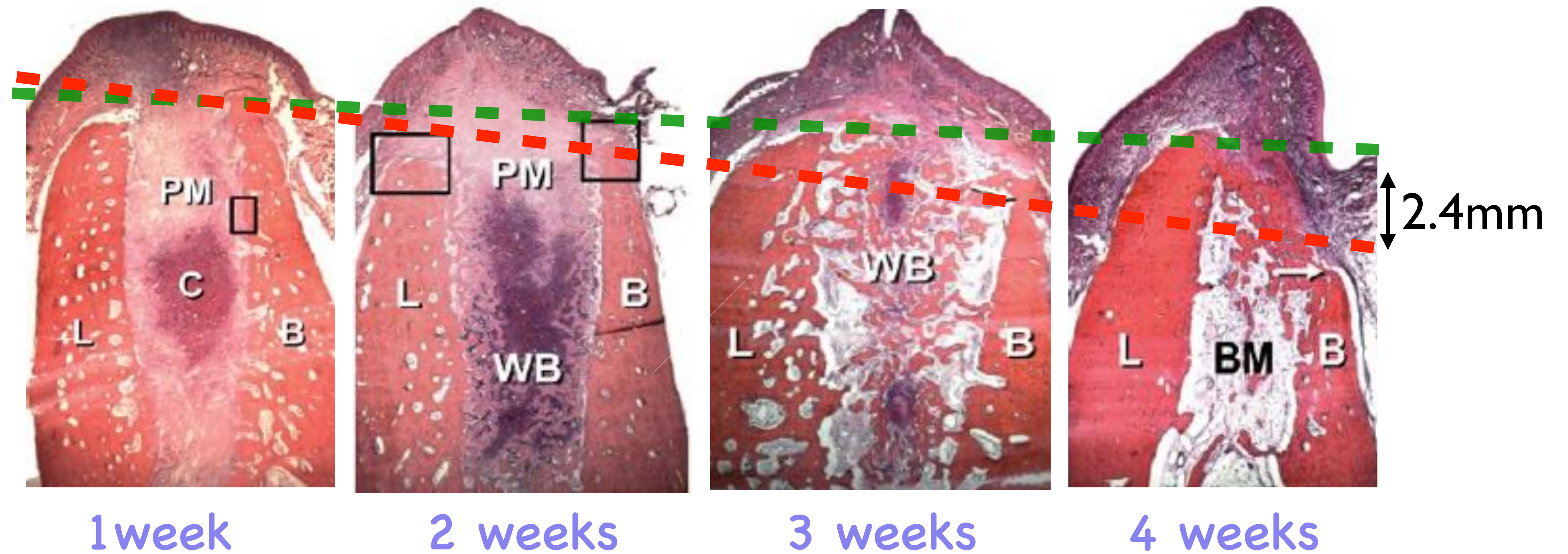
EXTRACTION SOCKET

To Graft or Not To Graft???



Dimensional Ridge alterations following extraction

An experimental study in the dog



EXTRACTION SOCKET

To Graft

Or

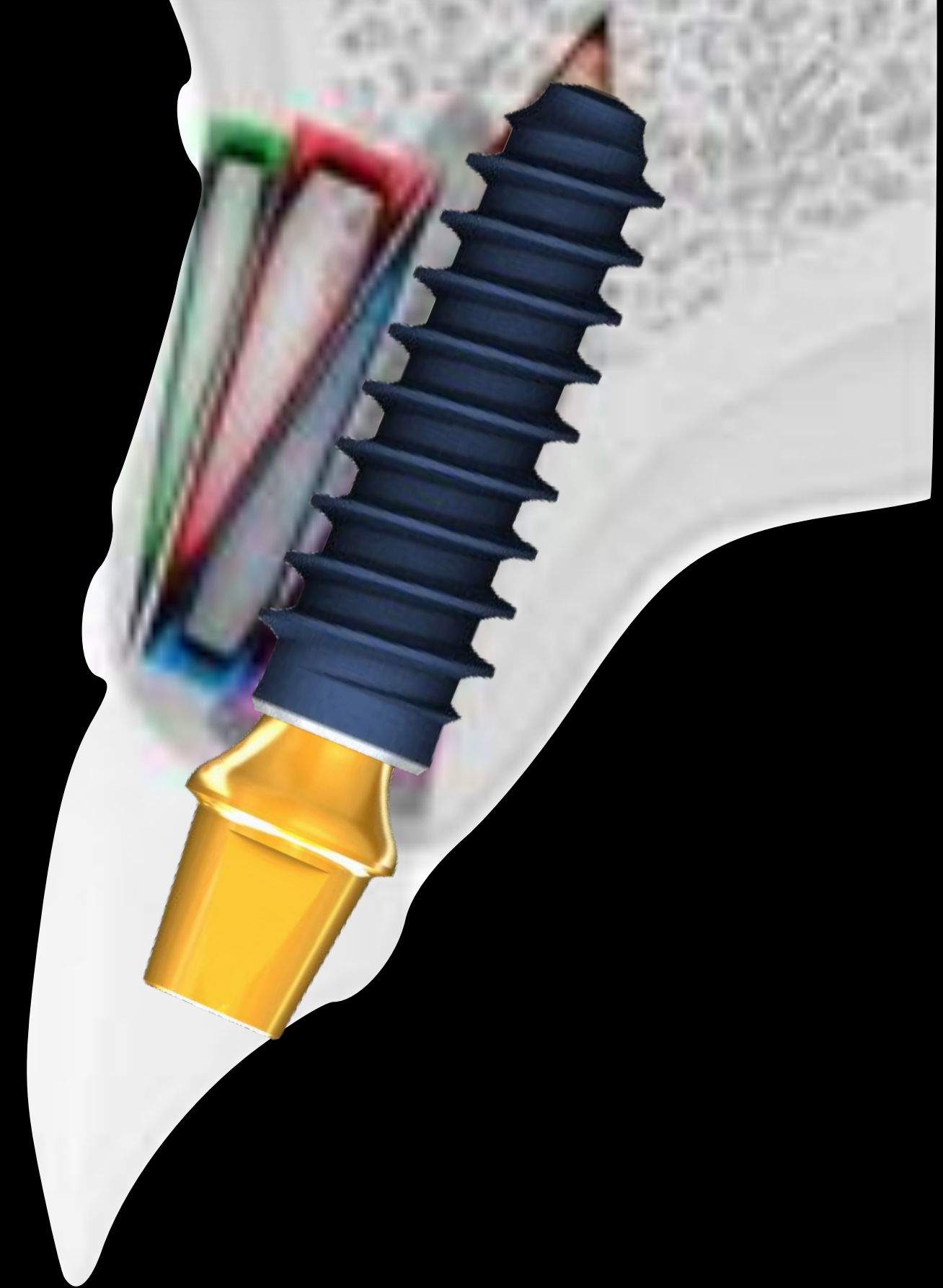
Not To Graft

by
William
Shakespeare



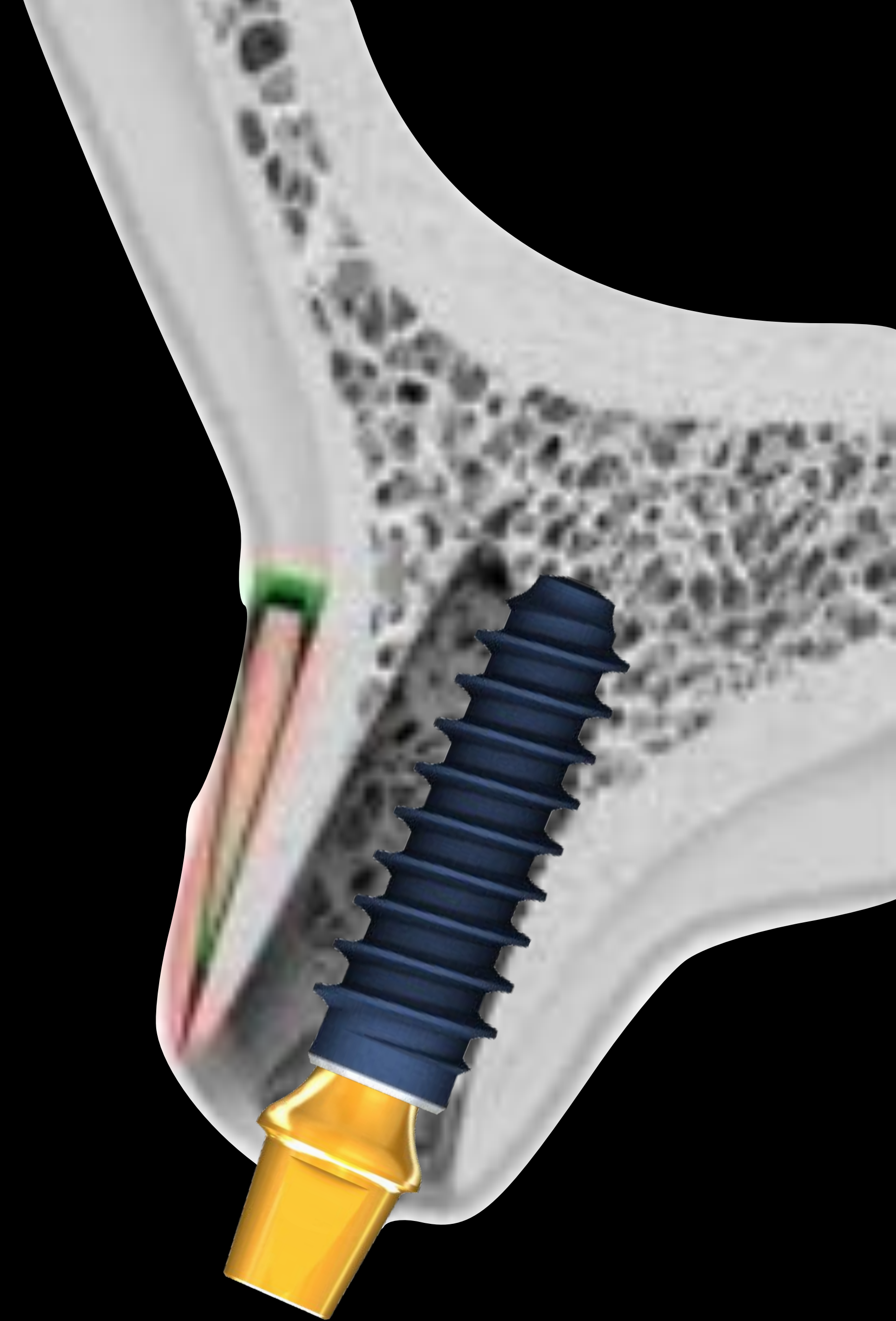
5 keys to consider for success with Immediate Implant

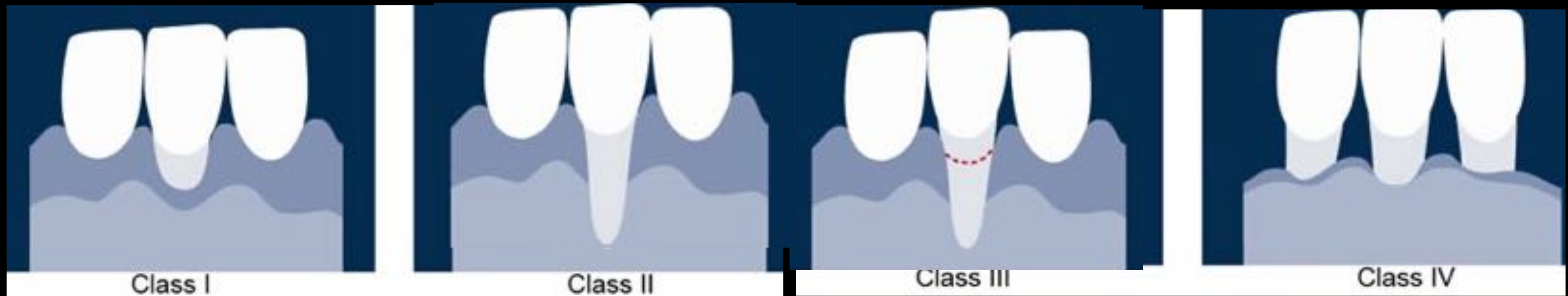
- (I) BUCCAL PLATE
- (II) PRIMARY STABILITY
- (III) IMPLANT DESIGN
- (IV) FILLING OF THE GAP
- (V) TISSUE BIOTYPE



V. Biotype

Classifications of gingival defects





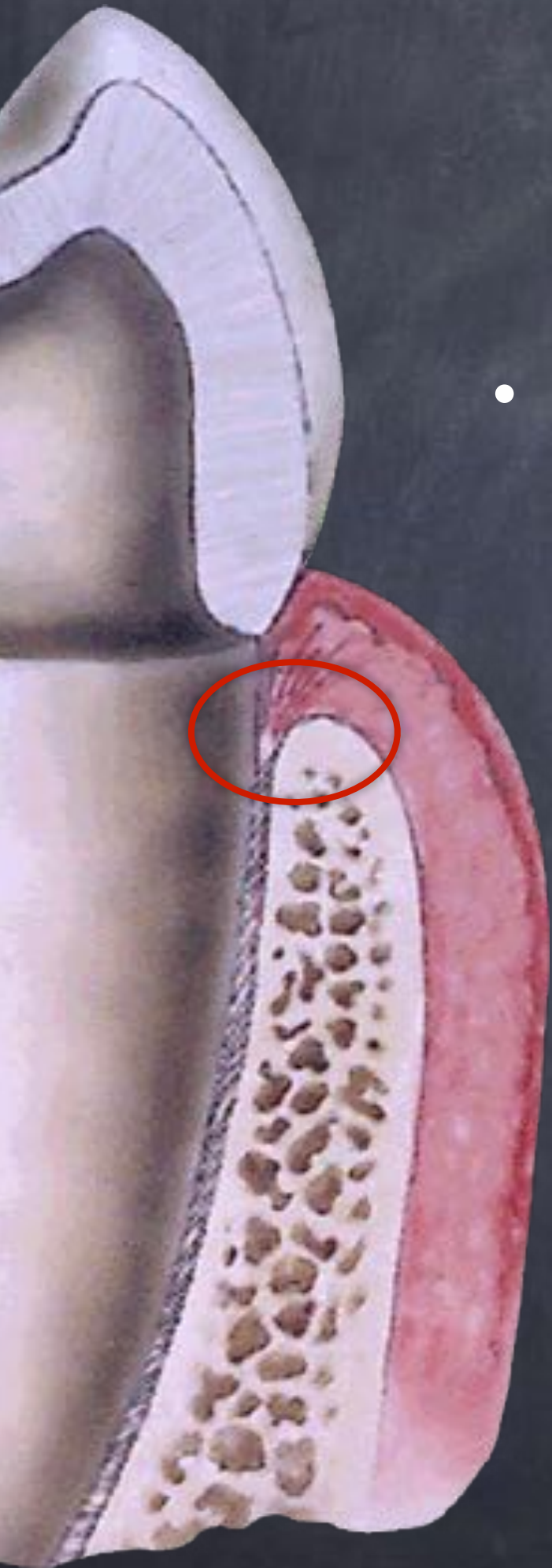
CLASSIFICATION OF MARGINAL TISSUE RECESSSION.*

CLASSIFICATION	CRITERIA
Class I	Marginal tissue recession that does not extend to the mucogingival junction
Class II	Marginal tissue recession that extends to or beyond the mucogingival junction, with no periodontal attachment loss (bone or soft tissue) in the interdental area
Class III	Marginal tissue recession that extends to or beyond the mucogingival junction, with periodontal attachment loss in the interdental area or malpositioning of teeth
Class IV	Marginal tissue recession that extends to or beyond the mucogingival junction, with severe bone or soft-tissue loss in the interdental area and/or severe malpositioning of teeth

* Source: Miller.⁴⁰

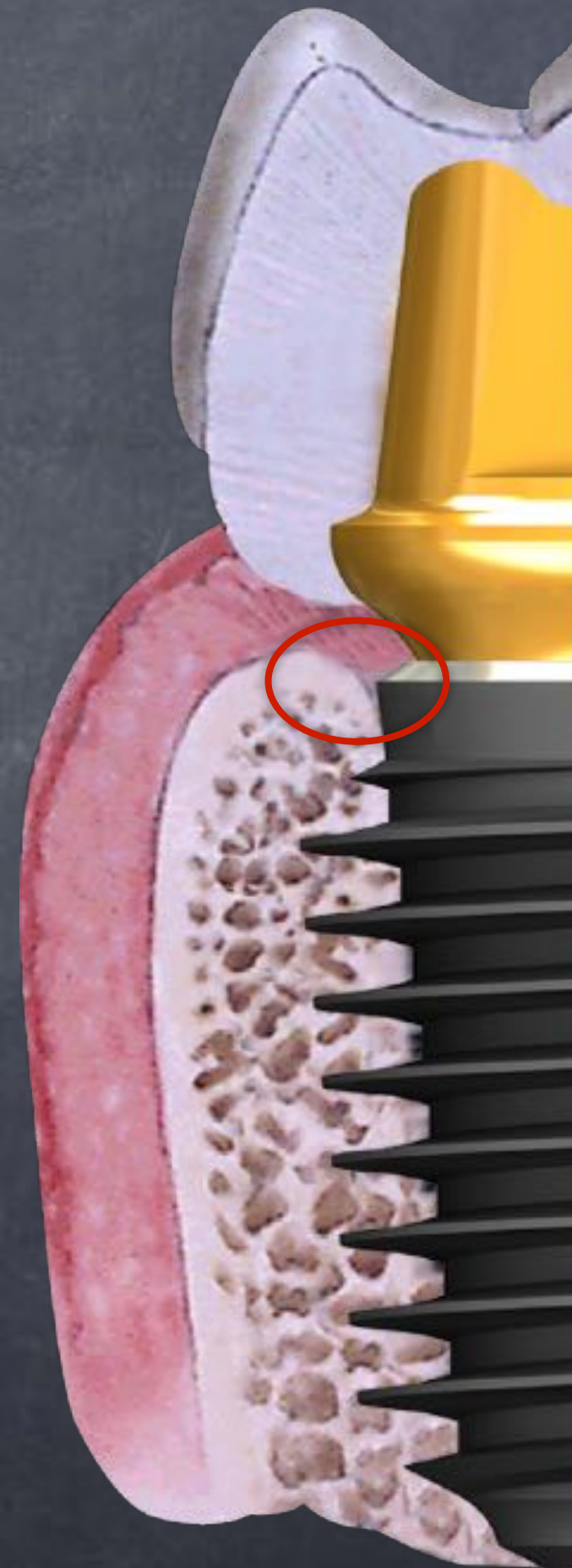
NATURAL TEETH VS. IMPLANTS

Biological Comparisons



- Around teeth, blood supply support originates from the periodontal ligament to the connective tissue ; from the alveolar process to the PDL and then to the CT ; and from the alveolar process to the CT

- Vascular supply **very few vessels** were found in the connective tissue near the transmucosal portion of the implant. This **limited blood supply** makes the peri-implant tissues less resilient to both mechanical and microbiological insults.



A BIOLOGICAL POINT OF VIEW



Stable soft tissue

Dimension

**Ideal thickness of
soft tissue : 3mm**

Nozawa, Enomoto et al.

Minimum soft tissue

**thickness :
2mm**

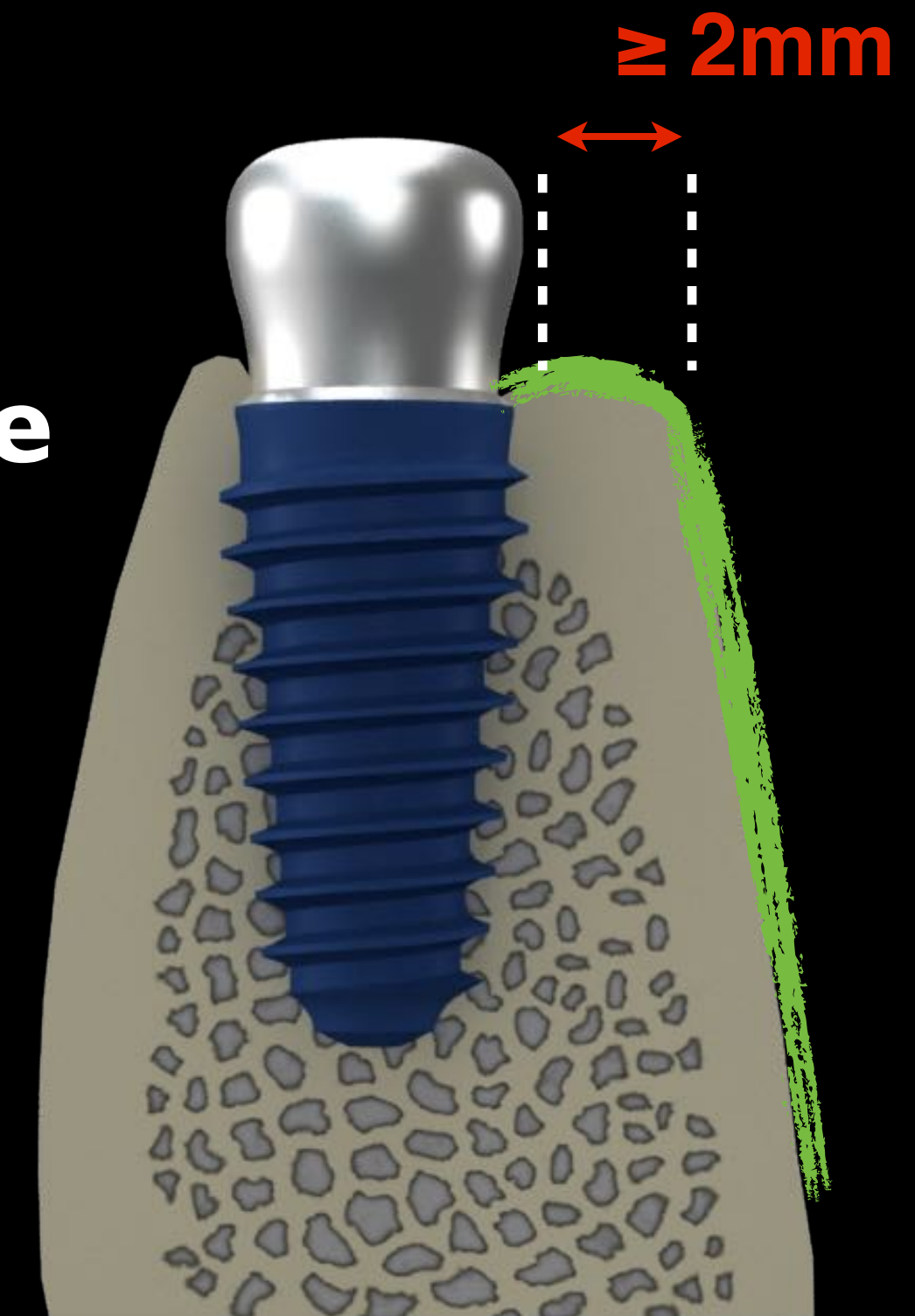
Salama et al.

**Facial bone
thickness
 $\geq 1.8\text{mm}$ = no bone
loss**

Spray et al.

2~4mm

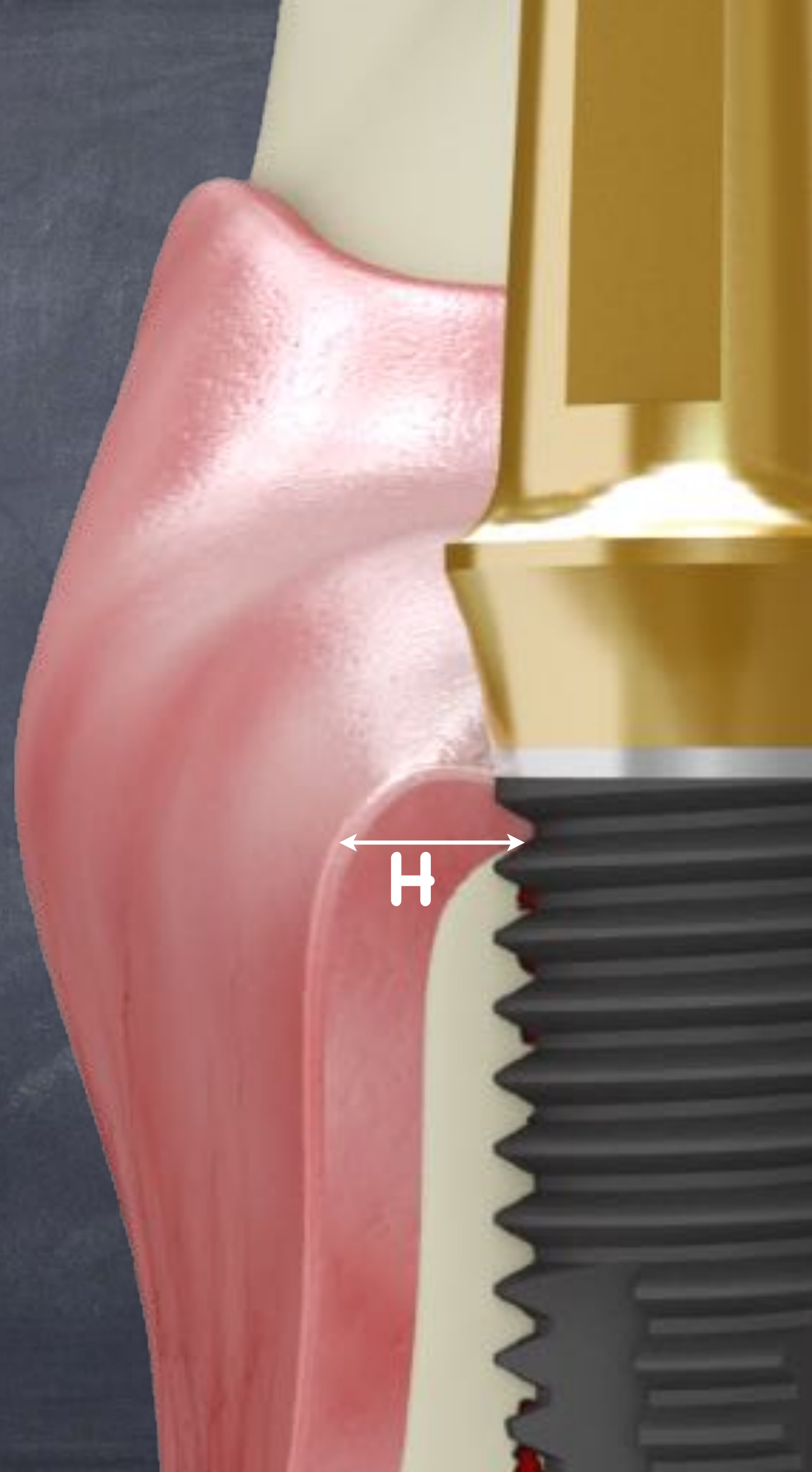
Grunder



Zero Bone Loss Concept

H = 3mm

Initial gingival tissue thickness at the crest may be considered as a significant influence on marginal bone stability around implants. If the tissue thickness is 2.0 mm or less, crestal bone loss up to 1.45 mm may occur, despite a supracrestal position of the implant-abutment interface.



The Influence of Soft Tissue Thickness on Crestal Bone Changes Around Implants: A 1-Year Prospective Controlled Clinical Trial

Tomas Linkevicius, DDS, Dip Prosthodontics, PhD; Petrus Apse, Prof, DDS, Dip Prosthodontics, MSc, Dr Habil Med; Simonas Grybulevicius, DDS, MDS, MD, RCSEd, PhD; Agnė Puleytė, DDS*

Purpose: The aim of this clinical trial was to evaluate the influence of gingival tissue thickness on crestal bone loss around dental implants after a 1-year follow-up. **Materials and Methods:** Forty-six implants (23 test and 23 control) were placed in 19 patients. The test implants were placed about 2 mm supracrestally, whereas the control implants were positioned at the bone level. Before implant placement, the tissue thickness at implant sites was measured with a periodontal probe. After healing, metal-ceramic cement-retained prostheses were constructed. According to tissue thickness, the test implants were divided into A (thin) and B (thick) groups. Intraoral radiographs were performed and crestal bone changes were measured at implant placement and after 1 year. **Results:** Mean bone loss around the test implants in group A (thin mucosa) was 1.81 ± 0.24 mm (SE), range, 0.9 to 2.3 mm on the mesial and 1.28 ± 0.267 mm (range, 0.8 to 2.1 mm) on the distal. Mean bone loss in test group B (thick mucosa) implants was 0.26 ± 0.56 mm (range, 0.2 to 0.9 mm) on the mesial aspect and 0.29 ± 0.25 mm (range, 0.2 to 0.6 mm) on the distal aspect. Mean bone loss around control implants was 1.8 ± 0.264 mm (range, 0.6 to 4.0 mm) and 1.87 ± 0.266 mm (range, 0.0 to 4.1 mm) on the mesial and distal aspects, respectively. Analysis of variance revealed a significant difference in terms of bone loss between test A (thin) and B (thick) groups on both the mesial and the distal. **Conclusion:** Initial gingival tissue thickness at the crest may be considered as a significant influence on marginal bone stability around implants. If the tissue thickness is 2.0 mm or less, crestal bone loss up to 1.45 mm may occur, despite a supracrestal position of the implant-abutment interface. *Int J Oral Maxillofac Implants* 2009;24:712-719

Key words: biologic width, crestal bone loss, dental implants, microgap, mucosal thickness

The concept of early crestal bone loss after prosthetic reconstruction of an implant was suggested by Albrektsson et al¹ more than two decades ago. Since then, many factors have been identified as possible reasons for this phenomenon. Overlaid on the microgap at the implant-abutment interface,² a polished implant neck,³ and others have been discussed extensively; however, the stability of the crestal bone remains controversial. Moreover, the influence of mucosal thickness and biologic width formation on crestal bone loss around implants has

been discussed only recently and has received little attention in comparison to other factors.^{4,5}

It has been proposed that a minimum of 3 mm of peri-implant mucosa is required for a stable epithelial connective tissue attachment to form.⁶ This soft tissue extension is usually referred to as the biologic width around implants, and it serves as a protective mechanism for the underlying bone.⁷ Some have suggested that if a minimal dimension of gingival tissue is not available, bone loss may occur to ensure the proper development of biologic width.⁸ These findings are consistent with prior tooth-related studies, which showed that the establishment of biologic width after tooth crown lengthening involved crestal bone loss.⁹

The transition of alveolar mucosa to peri-implant soft tissues after implant placement is a difficult and complex process. Berglundh et al¹⁰ described the morphogenesis of the peri-implant mucosa and implied that the characteristics of gingival tissues may be important in this process. However, data regarding the relationship between mucosal thickness and marginal bone loss around implants are

Assistant Professor, Institute of Odontology, Faculty of Medicine, Vilnius University, Vilnius, Lithuania.
Professor, Department of Prosthodontics, Rigas Stradiņi University, Riga, Latvia.
Private Practice, Vilnius Implantology Center, Vilnius, Lithuania.
Correspondence to: Dr Tomas Linkevicius, Institute of Odontology, Faculty of Medicine, Vilnius University, Laisvės av. 33, LT-06121, Vilnius, Lithuania. Fax: +370 6 527 2805.
Email: tomas@imc.vilnius.lt

712 Volume 24, Number 4, 2009

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Tomas Linkevicius DDS Phd et al

Increasing Keratinized tissue **Thickness** and **Quality** for Implants

Apically Repositioned Flap



Connective Tissue Graft



Free Gingival Graft

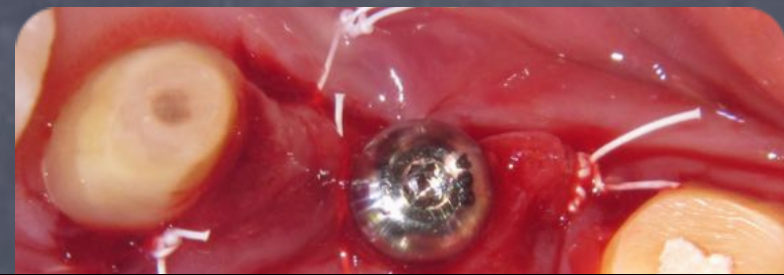
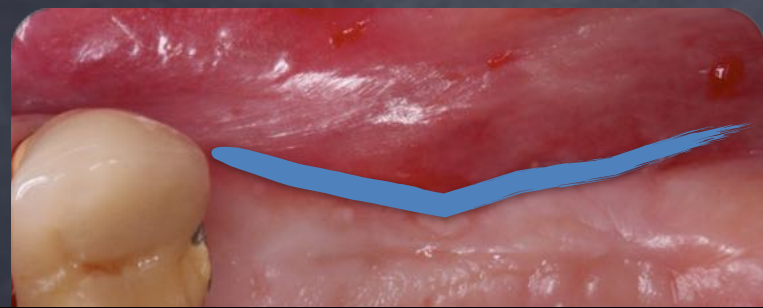


Increasing Keratinized tissue **Thickness** and **Quality** for Implants

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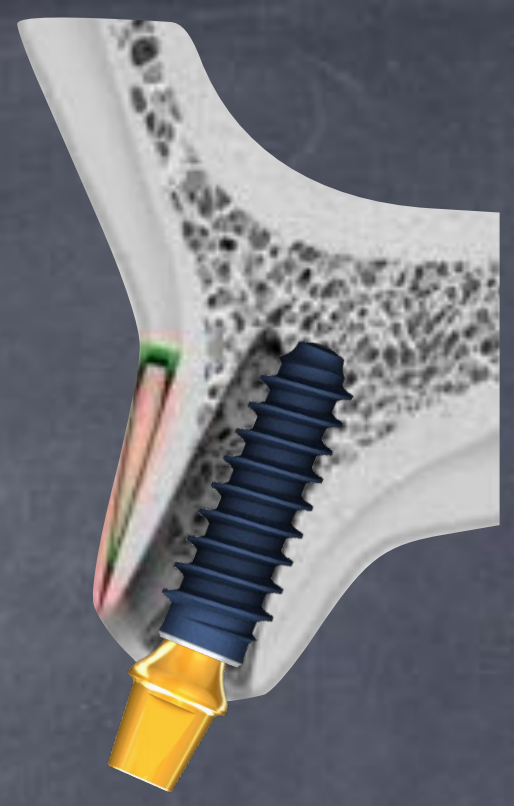


The **Tissue** is the **Issue**





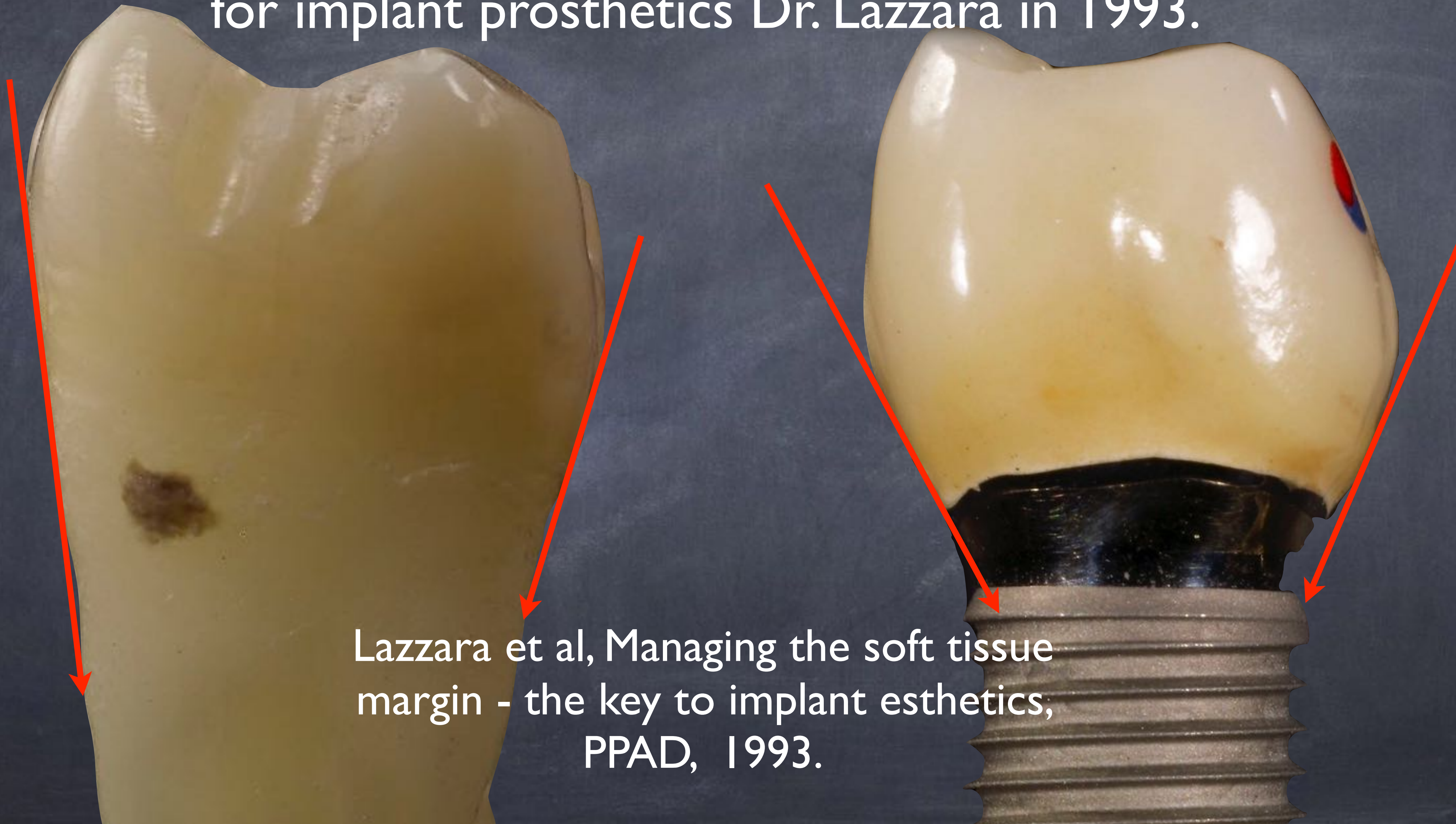
Platform shifting for Better Peri-Implant Biotype



RESULTED FROM A MISTAKE WHEN WIDE IMPLANTS WERE USED AND **MIS-MATCHING** ABUTMENTS WERE PROVIDED TO THE CLINICIANS.

AFTER THESE ABUTMENTS WERE DELIVERED, DURING THE OBSERVATIONAL PERIOD, THE **MARGINAL BONE LOSS WAS NOT PRESENT** IN ALMOST EVERY CASES (LAZZARA & PORTER 2006).

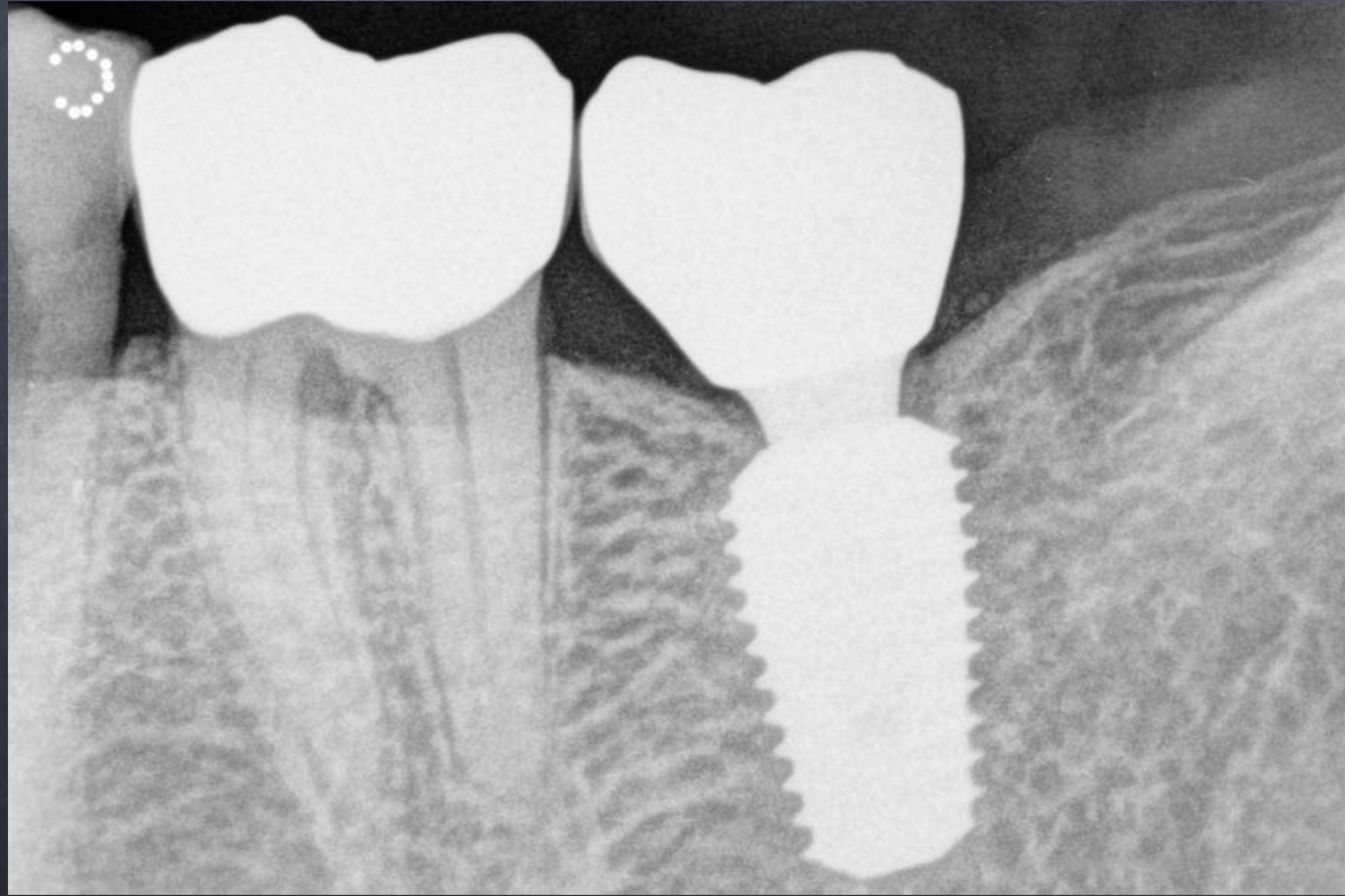
Emergence profile concept -
for implant prosthetics Dr. Lazzara in 1993.



Lazzara et al, Managing the soft tissue
margin - the key to implant esthetics,
PPAD, 1993.

S-LINE





S-LINE



'Double Offset'

design

for better peri-marginal
tissues



Courtesy of Dr Ed Shimaj

A BIOLOGICAL POINT OF VIEW

The **Bone** sets the **Tone**

Dimension
Ideal thickness of
soft tissue : 3mm

Nozawa, Enomoto et al.

Facial bone
thickness
 $\geq 1.8\text{mm}$ = no bone
loss

The **Tissue** is the **Issue** &

thickness :
2mm

Salama et al.

2~4mm
Grunder

The **Buccal Plate** sets your **Fate**

BUCCAL PLATE

Kan et al

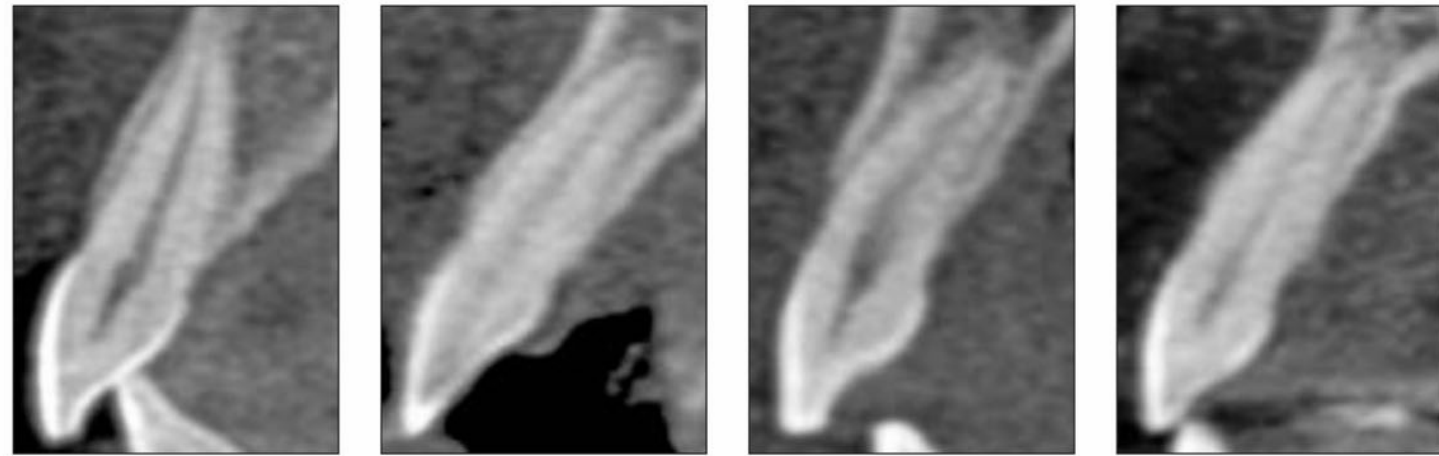


Fig 1 Class I sagittal root position.

Fig 2 Class II sagittal root position.

Fig 3 Class III sagittal root position.

Fig 4 Class IV sagittal root position.

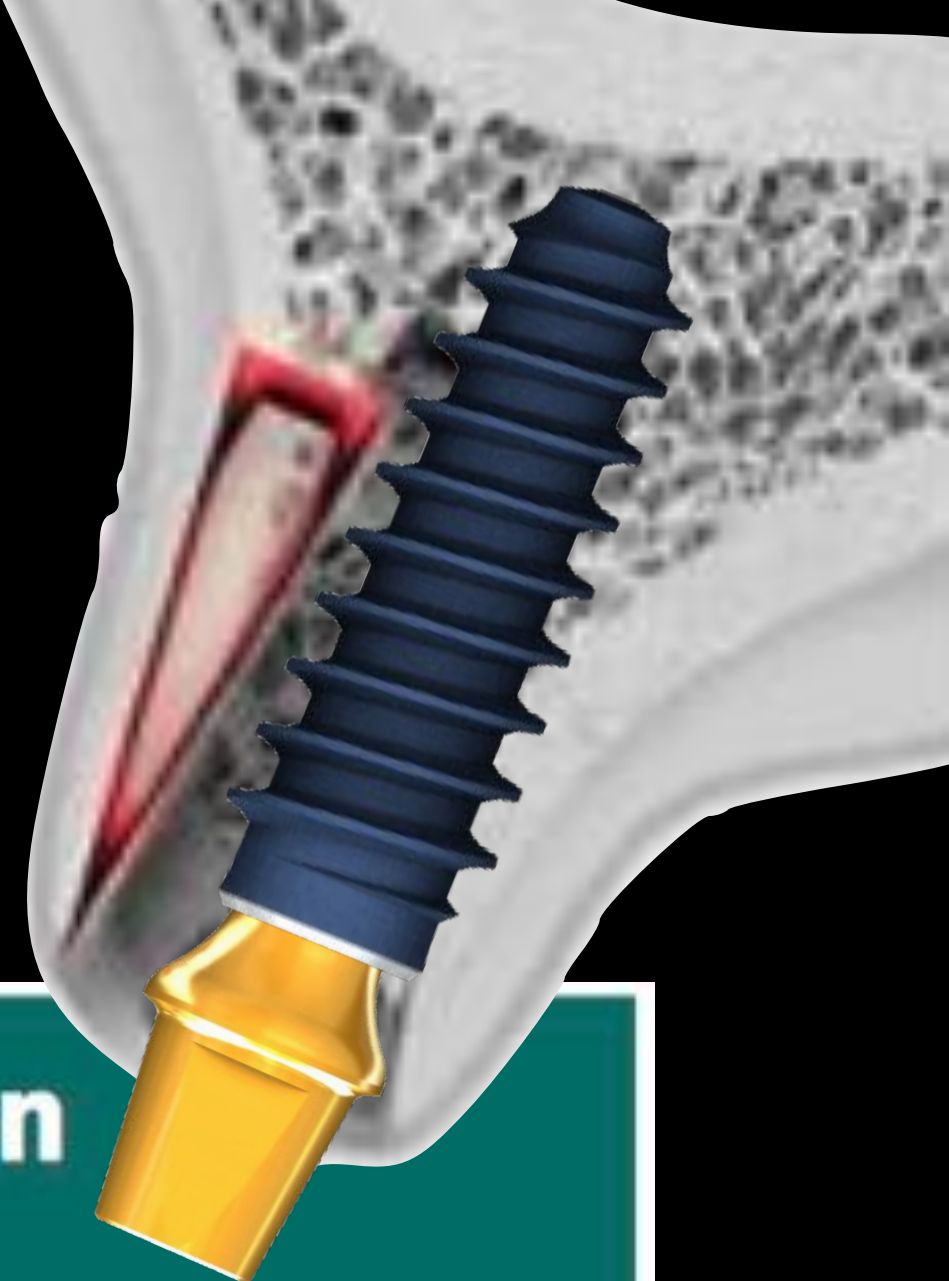


Table 1 Frequency Distribution of Sagittal Root Position Classification

SRP	Percentage (no.)			
	Central incisor	Lateral incisor	Canine	Overall
Class I	86.5 (173)	76 (152)	81 (162)	81.1 (487)
Class II	5 (10)	8.5 (17)	6 (12)	6.5 (39)
Class III	0.5 (1)	1.5 (3)	0 (0)	0.7 (4)
Class IV	8 (16)	14 (28)	13 (26)	11.7 (70)
Total	100 (200)	100 (200)	100 (200)	100 (600)

Classification of Sagittal Root Position in Relation to the Anterior Maxillary Osseous Housing for Immediate Implant Placement: A Cone Beam Computed Tomography Study

Joseph Y. K. Kan, DDS, MS/Philip Roe, DDS, MS/Kidwai Rungtharsamee, DDS, MS/Rah D. Patel, BDS, MS/Tamoor Wali, DDS, PhD/Jaime L. Lozada, DMD/Greth Zimmernan, PhD

Purpose: The purpose of this study was to classify the relationship of the sagittal root position of the maxillary anterior teeth to their respective osseous housings using cone beam computed tomography (CBCT). The frequency of each classification was also reported. **Materials and Methods:** A retrospective review of CBCT images was conducted on 200 patients (102 men, 98 women; mean age, 53.1 years) who fulfilled the inclusion criteria. The CBCT images were evaluated and the relationship of the sagittal root position of the maxillary anterior teeth to its associated osseous housing was recorded as Class I, II, III, or IV. **Results:** The frequency distribution of sagittal root position of maxillary anterior teeth indicated that, of the 600 samples, 81.1%, 6.5%, 0.7%, and 11.7% were classified as Class I, II, III, and IV, respectively. **Conclusions:** An understanding of the clinical relevance of sagittal root position will provide a guide for the treatment planning of immediate implant placement and provisionalization in the anterior maxilla. A classification system may lead to improved interdisciplinary communication in treatment planning for implant-based therapy in the anterior maxilla. (Int J Oral Maxillofac Implants 2015;30:873-878)

Key words: anterior maxilla, cone beam computed tomography, esthetics, immediate implant placement, immediate provisionalization, osseous housing, sagittal root position, single-tooth replacement, treatment planning

Immediate implant placement and provisionalization (IPP) of a single tooth in the esthetic zone was first advocated in the mid-1990s and has since been considered a predictable treatment option

for replacing falling teeth.¹⁻⁴ In addition to preserving tissue architecture, reducing treatment time, and providing the patient with the convenience of an immediate tooth replacement,^{1,2} IPP procedures have also been documented with high success rates when established clinical guidelines are followed.^{3,4} To ensure successful IPP, in addition to the presence of an intact bony socket following extraction and the absence of active infection, primary implant stability must be achieved by engaging the implant with the palatal wall and the bone approximately 4 to 5 mm beyond the root apex.⁵⁻⁷ Unfortunately because the available bone around the falling tooth may not always be sufficient to achieve primary implant stability, alternative treatment options should be considered. Factors such as root length, sagittal root position (SRP), and the morphology of the osseous housing are important in determining the feasibility of IPP and must be evaluated via the use of cone beam computed tomography (CBCT). While the effect of root length on the IPP is easily

Professor, Department of Restorative Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.
 Assistant Professor, Department of Restorative Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.
 Associate Professor, Department of Orthodontics and Dental Facial Orthopedics, Loma Linda University School of Dentistry, Loma Linda, California.
 Professor and Director, Advanced Education in Implant Dentistry, Loma Linda University School of Dentistry, Loma Linda, California.
 Associate Dean and Professor, School of Allied Health Professions, Loma Linda University, Loma Linda, California.
 Correspondence to: Dr. Joseph Kan, Center for Prosthetic and Implant Dentistry, Loma Linda University School of Dentistry, Loma Linda, CA 92350. Fax: 930-938-4853. Email: jkan@llu.edu

Sagittal Root Position in Relation to the Anterior Maxillary Osseous Housing For Immediate Implant Placement

Positioned against the labial cortical plate

Centered in the middle of the alveolar housing without engaging either the labial or the palatal cortical plates at the apical third of the root

Positioned against palatal cortical plate

Two thirds of the root is engaging both the labial and the palatal cortical plates

Is there another way?

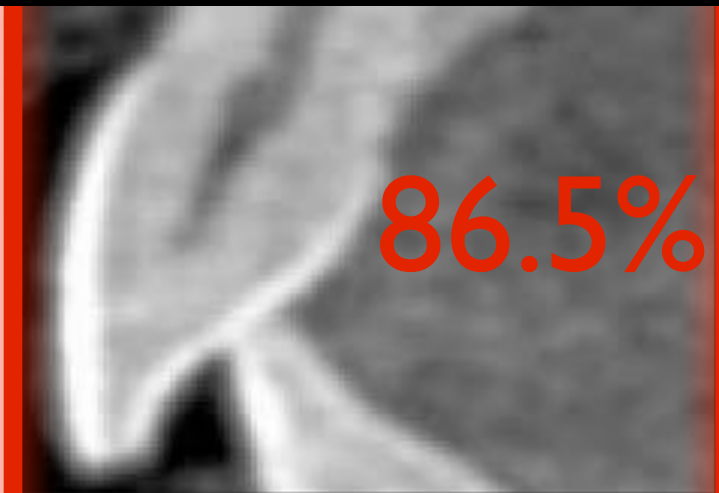


Fig 1 Class I sagittal root position.

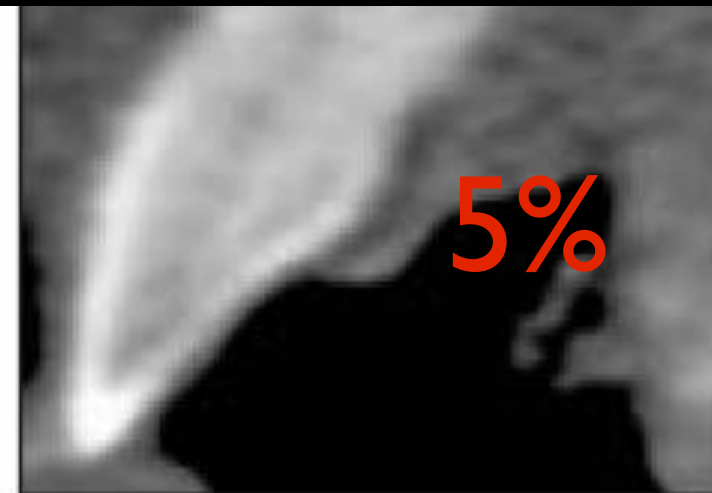


Fig 2 Class II sagittal root position.

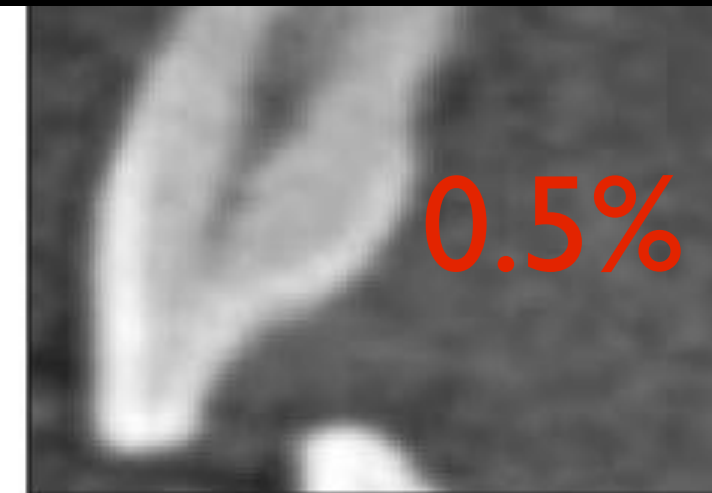


Fig 3 Class III sagittal root position.

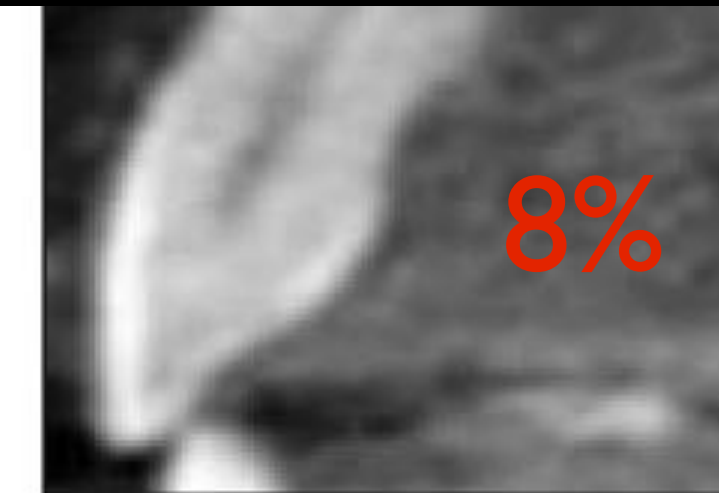
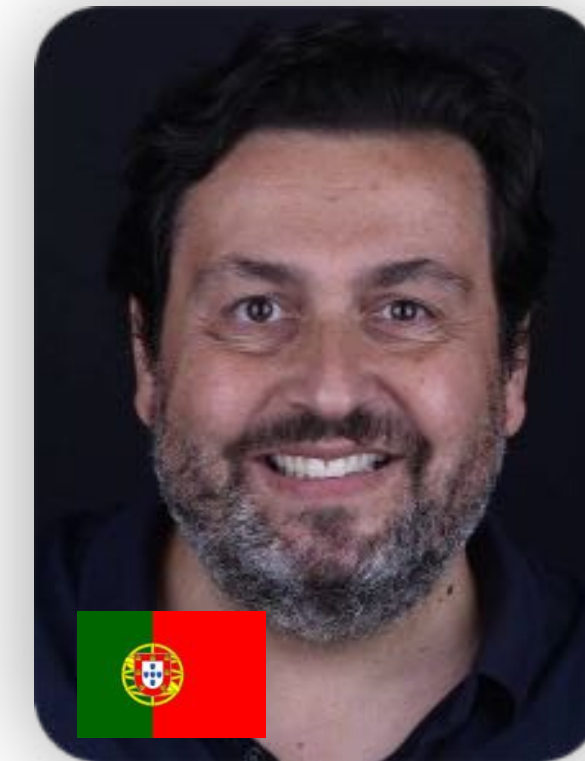
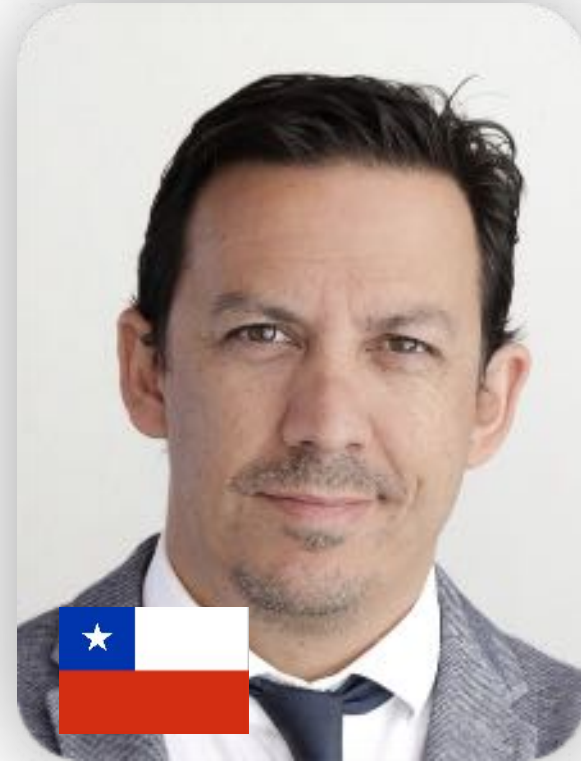


Fig 4 Class IV sagittal root position.

Joseph Y. K. Kan et al. Classification of Sagittal Root Position in Relation to the Anterior Maxillary Osseous Housing For Immediate Implant Placement: A Cone Beam Computed Tomography Study. IJOMI Volume 26, Number 4, 2011

P E T Global Research Group



dentalxp

pet research group



HOWIE GLUCKMAN



JONATHAN DU TOIT



MAURICE SALAMA



SNJEZANA POH



MARCELO FERRER



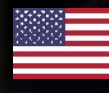
MARCIO FONSECA



JOEY CHEN



DAVID GARBER



SALAH HUWAIS



ISAAC TAWIL



UDATTA KHER



HAAKON KUIT



RICHARD MARTIN



JORGE ALIAGA



CHARLES SCHWIMER



ARMANDO PONZI



EHAB MOUSSA



ALI TUNKIWALA



ATTILA BODROGI

NEW TOOLS

Courtesy: Miguel Stanley DDS

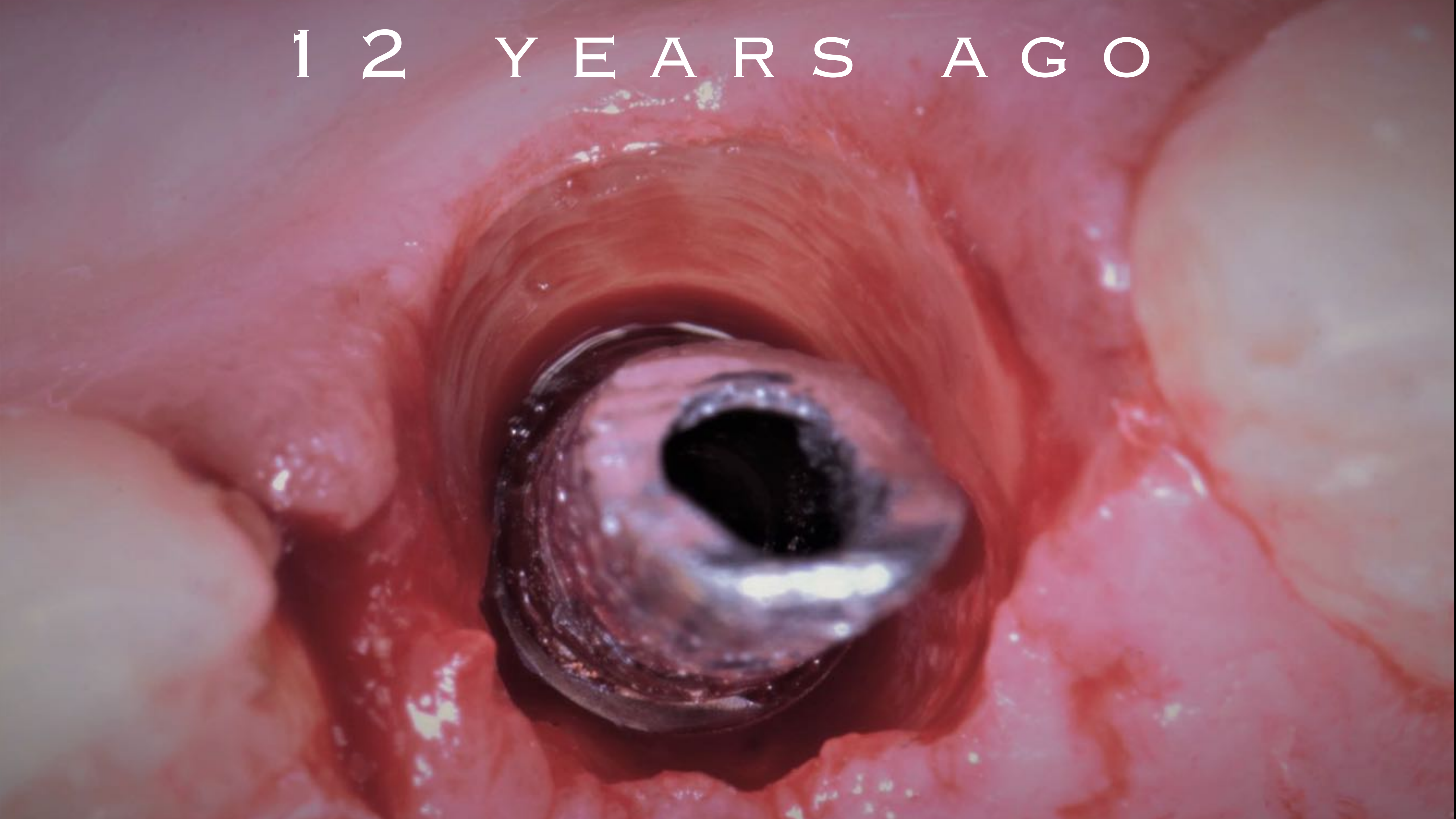
FUTURE DIRECTIONS

PARTIAL EXTRACTION THERAPIES

"PET" Partial Extraction Therapies is a term first described on Dentalxp.com in 2015 that encompasses any and ALL terms and procedures that involve the maintenance or utilisation of all or parts of the tooth root, PDL and cementum above and below the alveolar bone to preserve ridge form and soft tissue levels.

This first started as "SRT" Submerged Root Technique in 2007 Salama & Ishikawa and then onto "SS" Socket Shield in 2010 Hurzeler & Zuhr, "Root Membrane Technique" in 2014 Mitsias & Siormpas, "PS" Pontic Shield in 2014 Glocker and then in 2016 Gluckman & Salama.

1 2 Y E A R S A G O



FUTURE DIRECTIONS

SOCKET SHIELD

PONTIC SHIELD

ROOT MEMBRANE

J-
SHIELD

**PARTIAL
EXTRACTION
THERAPIES**

ROOT
SUBMERGENCE

HEMISECTION

PROXIMAL SOCKET
SHIELD

ROOT T BELT

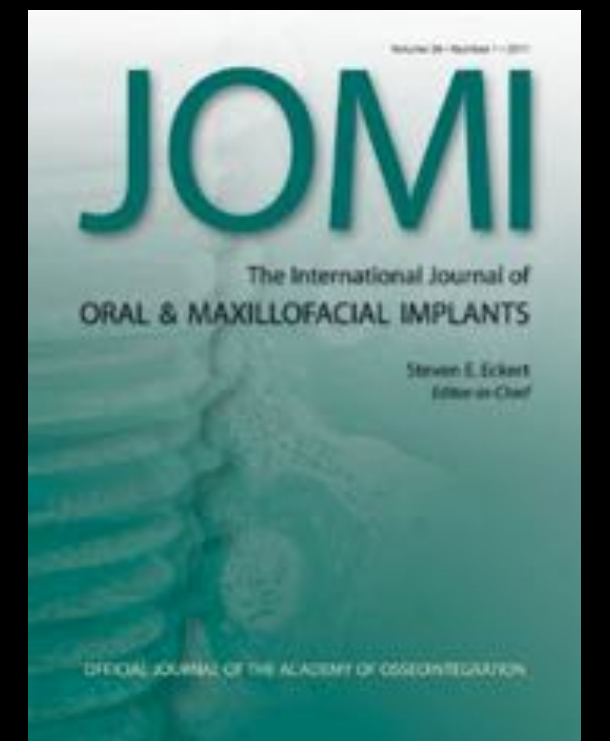
2006

12 YEARS OF ROOT MEMBRANE

2019

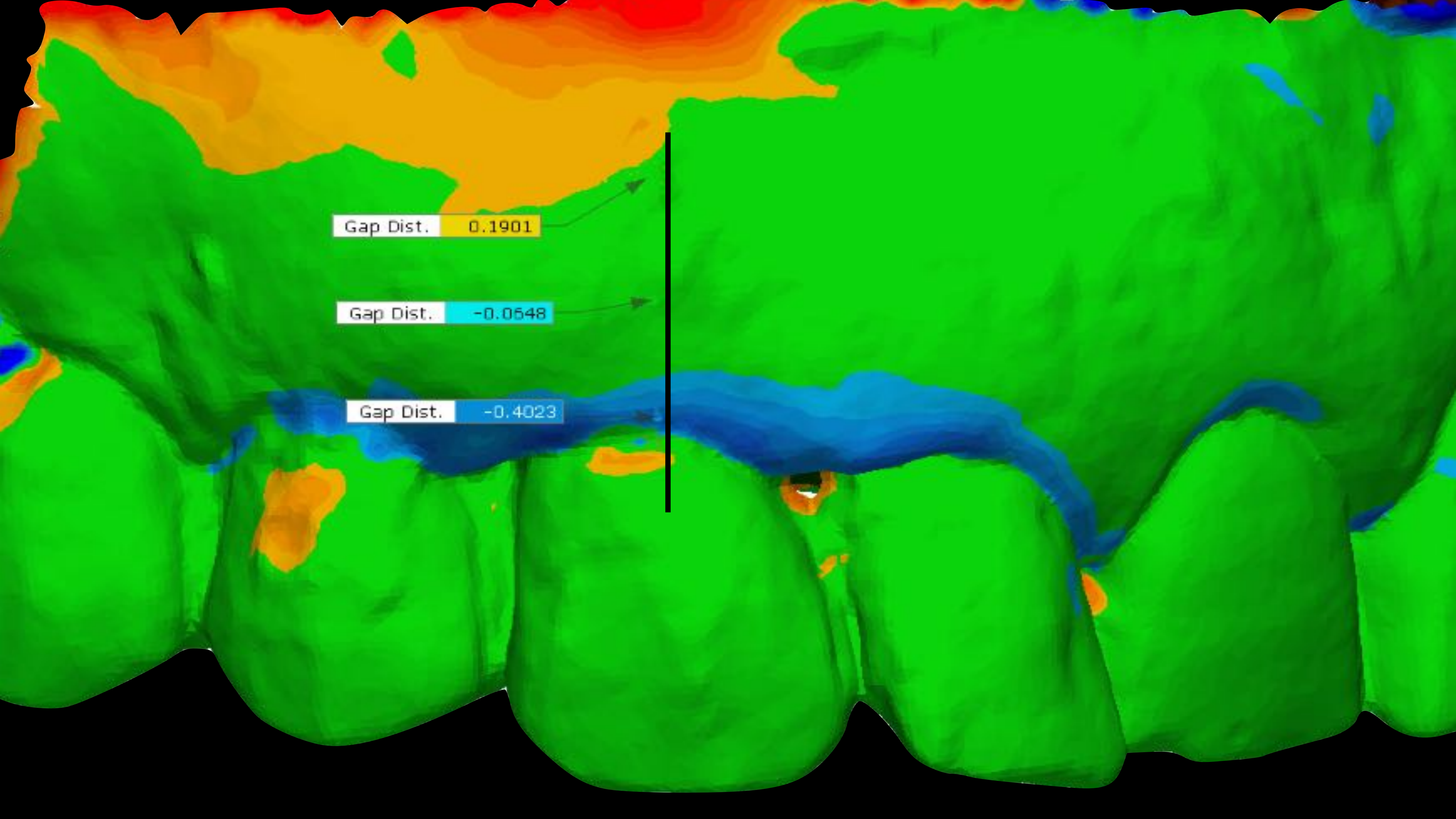


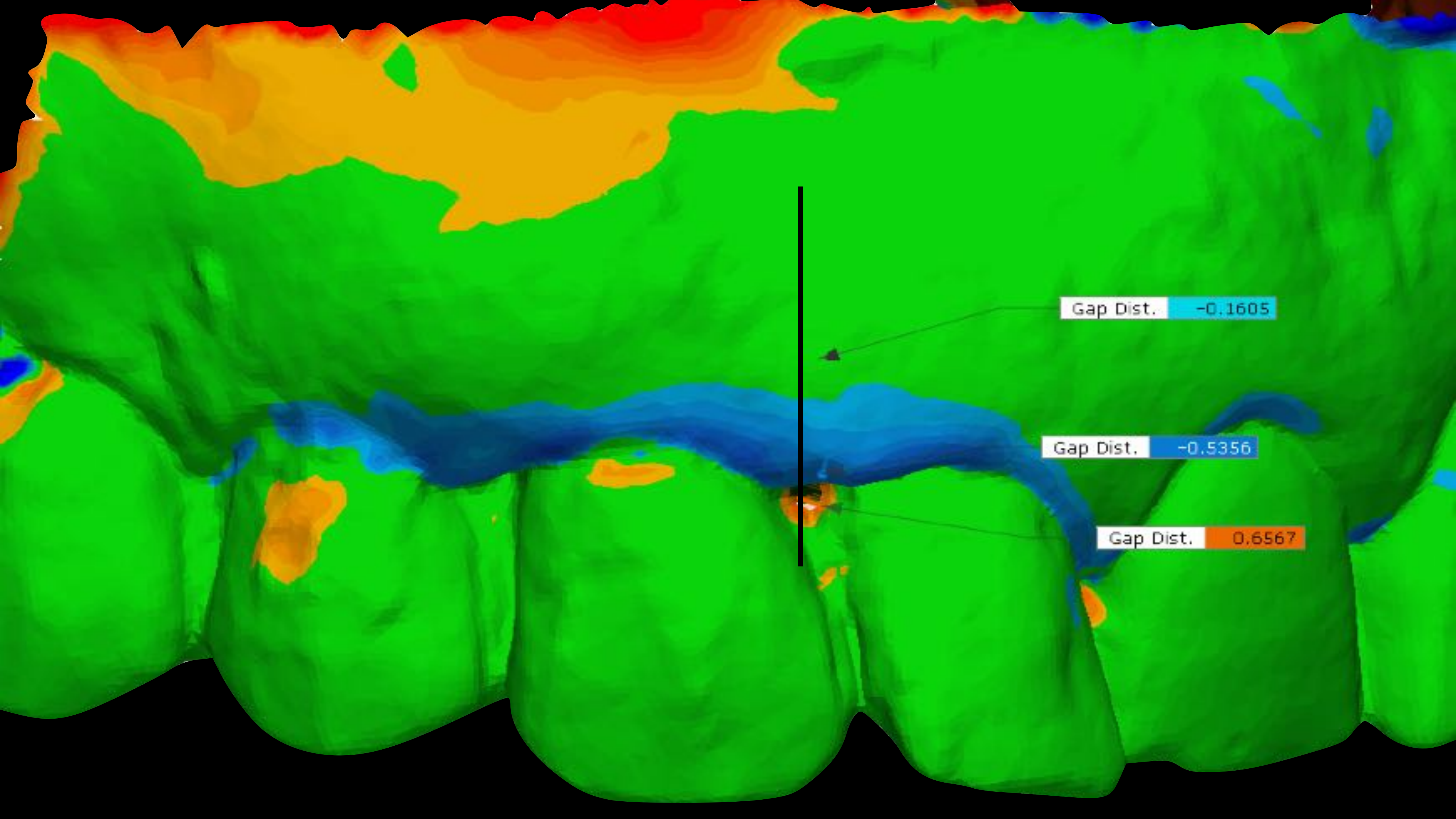
SIORMPAS KD, MITSIAS ME, KONTSIOTOU-SIORMPA E, GARBER D, KOTSAKIS GA. IMMEDIATE IMPLANT PLACEMENT IN THE ESTHETIC ZONE UTILIZING THE "ROOT-MEMBRANE" TECHNIQUE: CLINICAL RESULTS UP TO 5 YEARS POSTLOADING. INT J ORAL MAXILLOFAC IMPLANTS. 2014;29(6):1397-405.

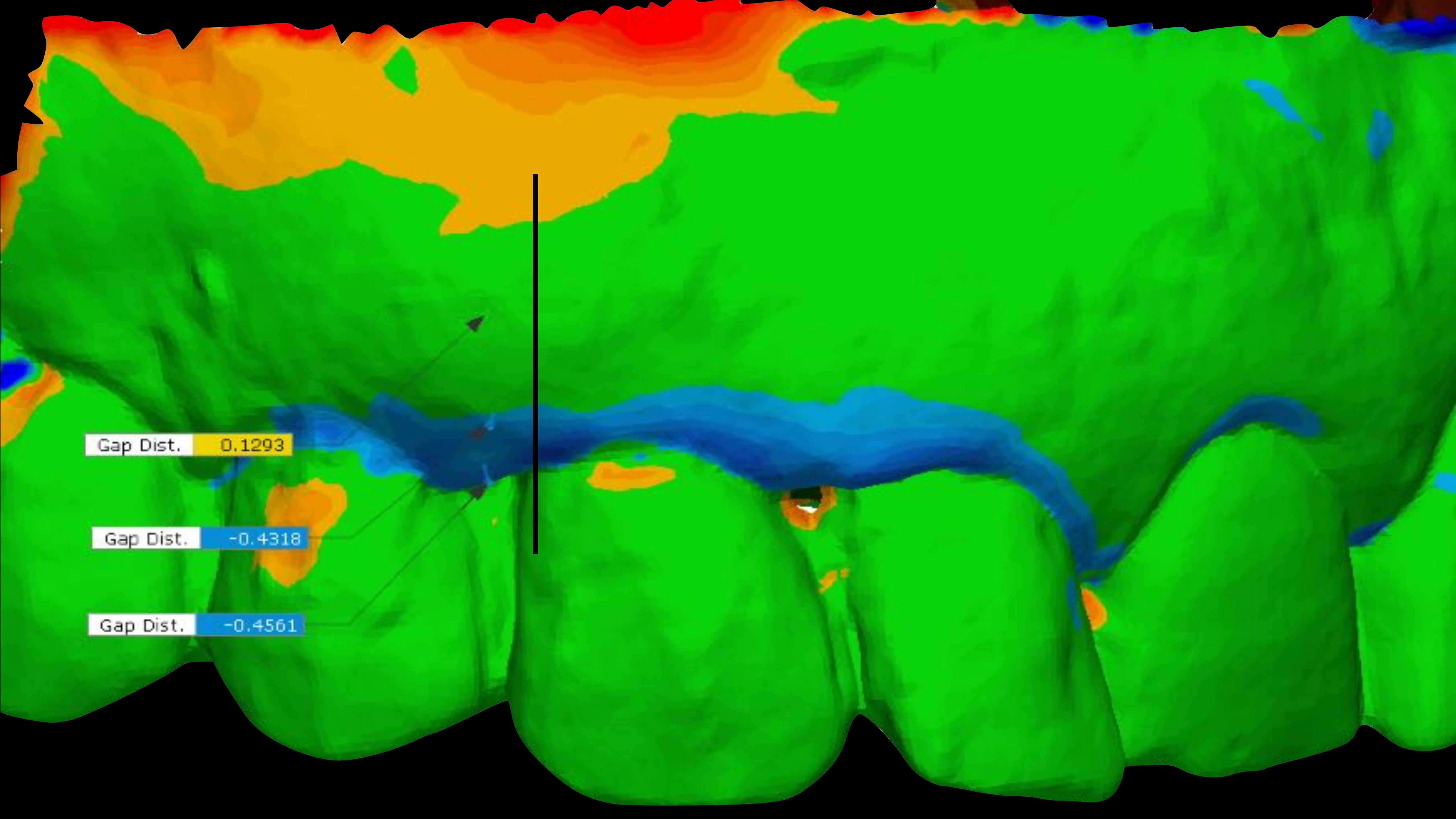


TECHNOLOGICAL ADVANCES
TO ACCURATELY
ASSESS TREATMENT
OUTCOMES

3D - VOLUMETRIC ANALYSIS





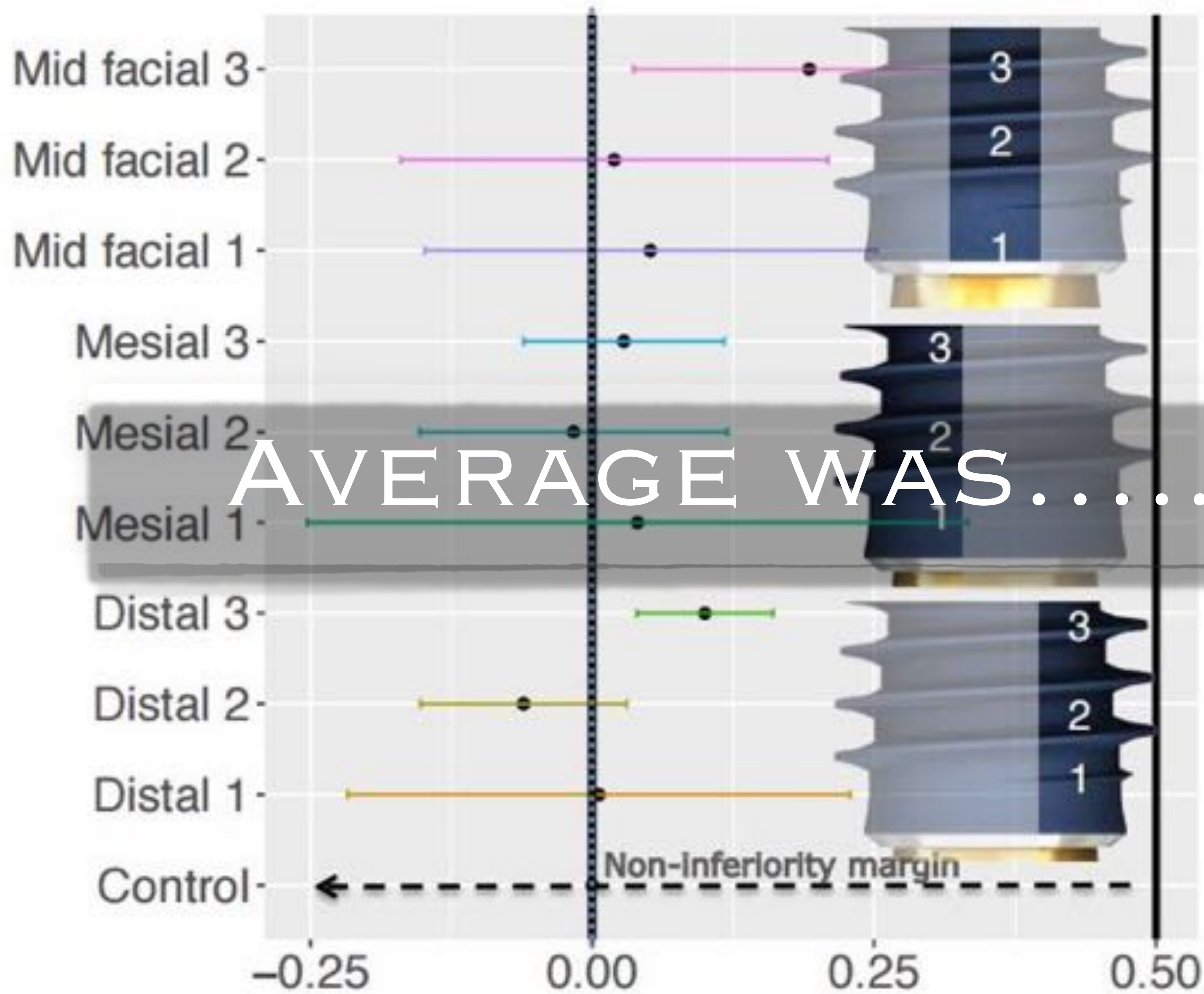


Gap Dist. 0.1293

Gap Dist. -0.4318

Gap Dist. -0.4561

Non-inferiority testing per implant location

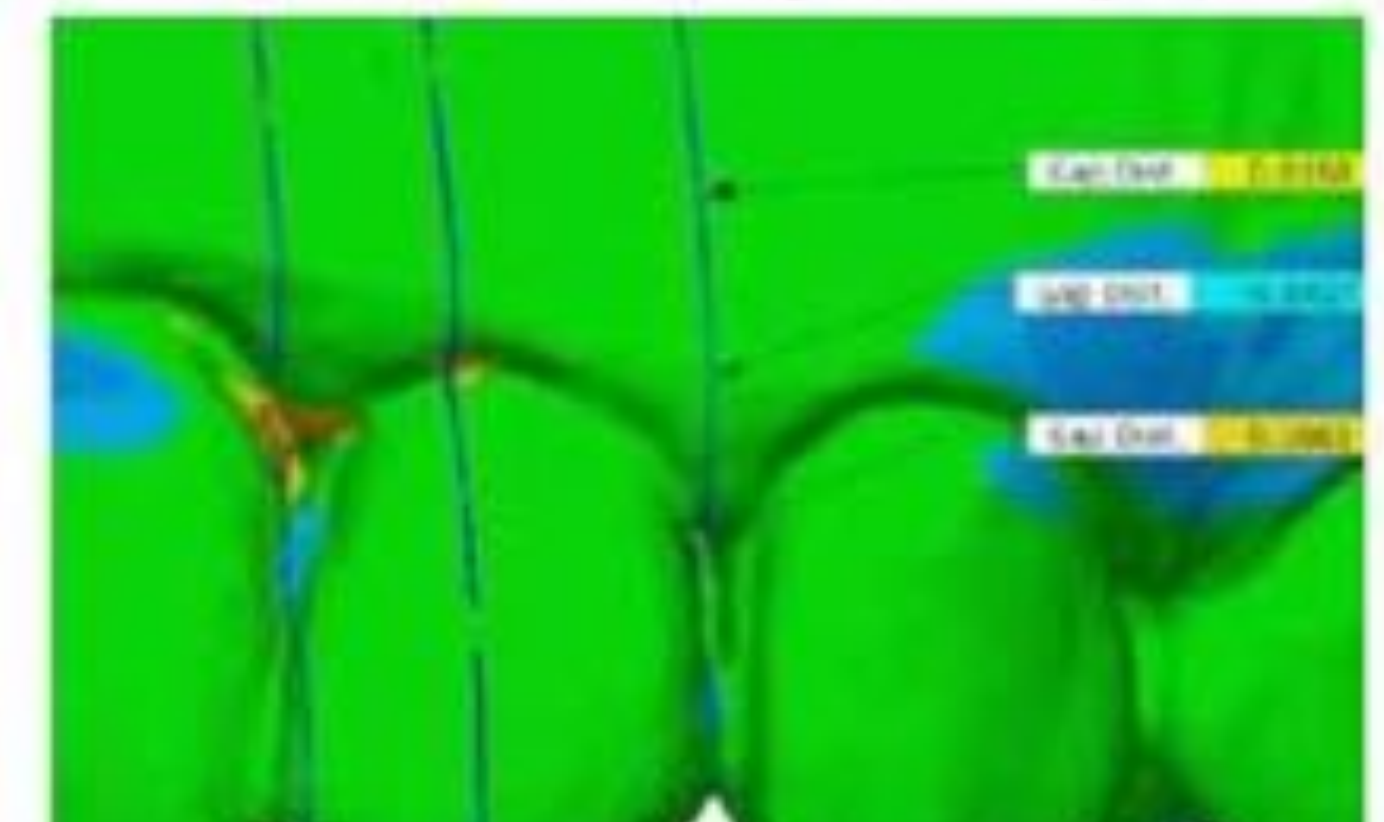


2-D subtractive assessment



AVERAGE WAS.....0.2MM!

3-D rendered superimposition





Immediate Implant Placement in the Esthetic Zone Utilizing the "Root-Membrane" Technique: Clinical Results up to 5 Years Postloading

Konstantinos D. Siormpas, DDS¹/Mitsias E. Mitsias, DDS, MSc, PhD²/
Eleni Kontsiotou-Siormpa, DDS³/David Garber, DMD⁴/Georgios A. Kotsakis, DDS⁵

Purpose: To clinically evaluate immediate implant placement with simultaneous intentional retention of the buccal aspect of the root and to report longitudinal data on survival of implants placed with the use of this novel technique. **Materials and Methods:** A retrospective case series of implants placed with the root-membrane technique in the maxillary anterior region of adult patients was conducted. Clinical and radiographic analysis was performed to assess implant success and to evaluate the survival of the retained root fragment based on predetermined criteria. A Kaplan-Meier method analysis was used to estimate the 5-year success rate of implants placed with this technique. **Results:** Data from 46 patients (median follow-up time, 40 months; range, 24 to 60 months) were evaluated. Each patient contributed one implant site in this study. All implants successfully maintained osseointegration at the end of the follow-up period for a 100% cumulative survival rate, based on clinical and radiographic criteria. Radiographic examination revealed good crestal bone stability with mean crestal bone loss on the mesial and distal aspects of the implants estimated to be 0.18 ± 0.09 mm and 0.21 ± 0.09 mm, respectively. The only complication noted in this patient cohort was apical root resorption of a single retained root fragment that did not interfere with the osseointegration of the implant. **Conclusion:** The intentional retention of the buccal aspect of the root with its periodontal apparatus during immediate implant placement can lead to predictable and sustainable osseointegration of implants placed in the maxillary anterior region of healthy adults. *Int J Oral Maxillofac Implants* 2014;29:1397-1405. doi: 10.11607/jomi.3107

Key words: alveolar bone preservation, dental implant, dentin fragment, esthetics, immediate implant placement, root retention

The replacement of a maxillary anterior tooth with an implant is a complex surgical procedure, mainly because of the cascade of events that follow every tooth extraction.^{1,2} Alveolar ridge resorption is a physiologic process that cannot be entirely prevented based on current evidence.³⁻⁸ Ridge resorption can be categorized as a multifactorial phenomenon that is

partially attributed to the loss of blood supply that is derived from the periodontal ligament (PDL) prior to tooth extraction.⁹

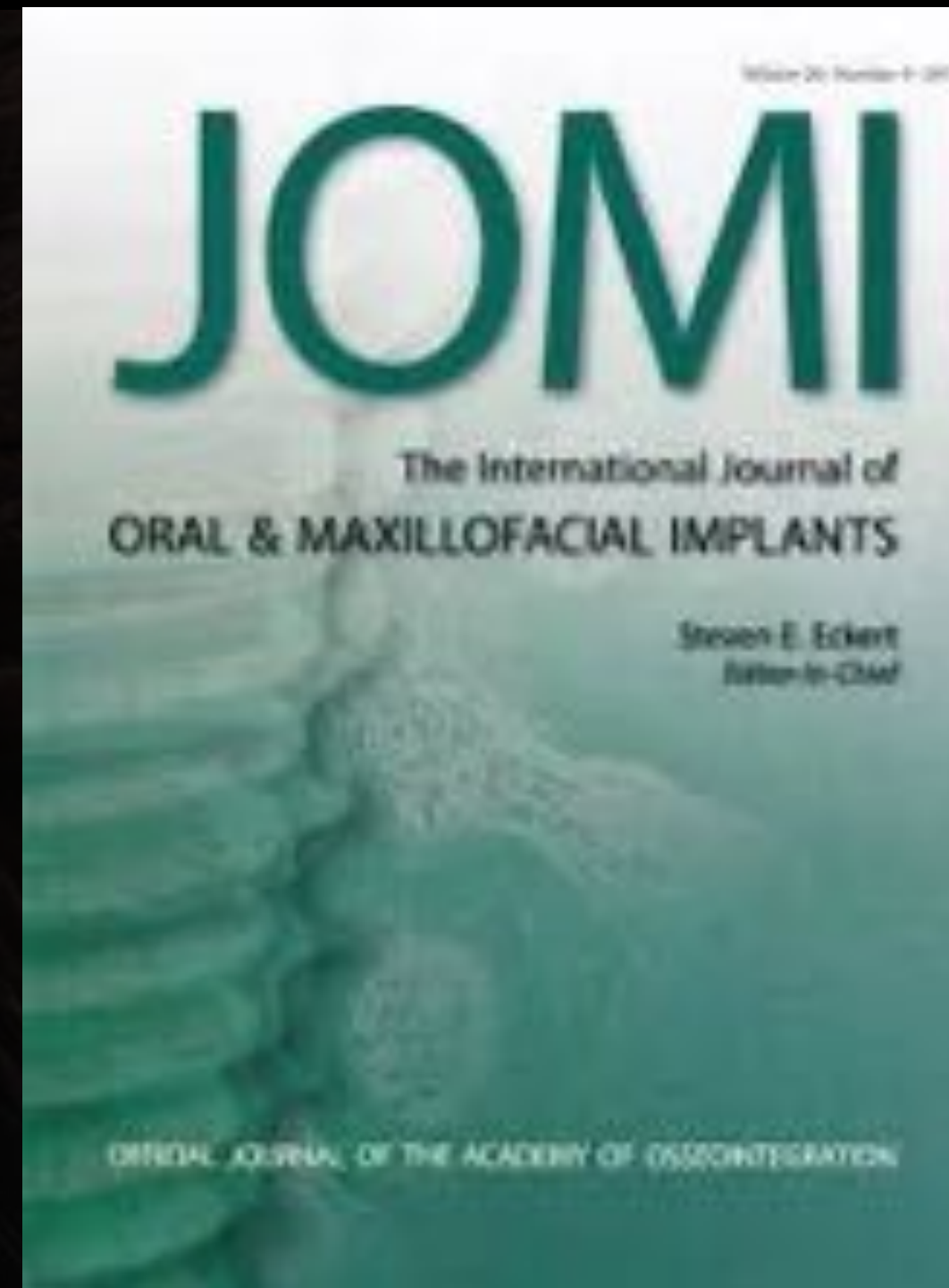
The buccal plate of the teeth in the maxillary anterior dentition is most often very thin, leading to significant dimensional alterations during the immediate postextraction period.^{10,11} The aforementioned alterations are three-dimensional and lead to apical migration of the soft tissue at the crest of the ridge as well as concavities on the flat facial surface of the ridge.¹² When an implant is placed in such a compromised site, it is very challenging for the clinician to achieve an esthetic emergence profile for the implant-supported restoration. Recreating a mucosal zenith at the same level as that of the gingival zenith points of the proximal teeth is equally challenging, even if significant tissue grafting is performed.¹³

In retrospective, early attempts for an evidence-based approach to the documentation of the magnitude and significance of this phenomenon can be dated back to the early 1960s.¹⁴⁻¹⁸ The intentional retention of roots was the first approach that was introduced

¹Private Practice, Larissa, Greece.
²Adjunct Instructor, Department of Periodontology and Implant Dentistry, New York University College of Dentistry, New York, New York, USA; Private Practice, Athens, Greece.
³Private Practice, Larissa, Greece.
⁴Private Practice, Atlanta, Georgia, USA.
⁵Resident, Advanced Education Program in Periodontology, Division of Periodontology, University of Minnesota, Minneapolis, Minnesota, USA.

Correspondence to: Dr Georgios A. Kotsakis, Advanced Education Program in Periodontology, University of Minnesota, 515 Delaware Street SE, Minneapolis, MN 55455. Email: kotsa001@umn.edu

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Volume 29 Number 9 2014

JOMI

The International Journal of
ORAL & MAXILLOFACIAL IMPLANTS

Steven E. Eckert
Editor-in-Chief

OFFICIAL JOURNAL OF THE ACADEMY OF OSSEOINTEGRATION

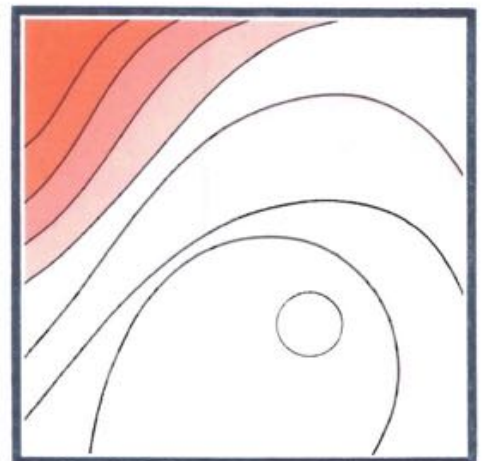




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THE INTERNATIONAL JOURNAL
OF

**PERIODONTICS
&
RESTORATIVE
DENTISTRY**



Volume 21
Number 6
December 2001



MILTADIS MITSIAS, KONSTANTINOS SIORMPAS, ELENI KONTSIOTOU-SIORMPA, HARI PRASAD, DAVID GARBER, GEORGIOS A KOTSAKIS. A STEP-BY-STEP DESCRIPTION OF IMMEDIATE IMPLANT REHABILITATION IN THE ESTHETIC REGION UTILIZING THE "ROOT-MEMBRANE" TECHNIQUE. [INT J PERIODONTICS RESTORATIVE DENT 2015;35:835-41.](#)

ABSTRACT

Background: Th
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Conclusion: The
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KEY WORDS:
volumetric tiss

INTRODUCTI

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*Dentist, Private F
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Department of O
Dental School, Ur

Keywords: e

Case Report

Ridge Prese
A Methodol

Markus Glocker ¹

¹ Private Practice

² Clinic of Preven

University of Zu

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* Author to whom

Tel.: +41-43-34

Received: 22 Octol

Published: 23 Janu

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

Konstantinos D. Siormpas, DDS,* Miltiadis E. Mitsias, DDS, MSc, PhD,† Georgios A. Kotsakis, DDS, MS,‡ Isaac Tawil, DDS, MSc,§ Michael A. Fikos, 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.³⁻⁵ 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.⁵⁻⁸ A pre-

***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*

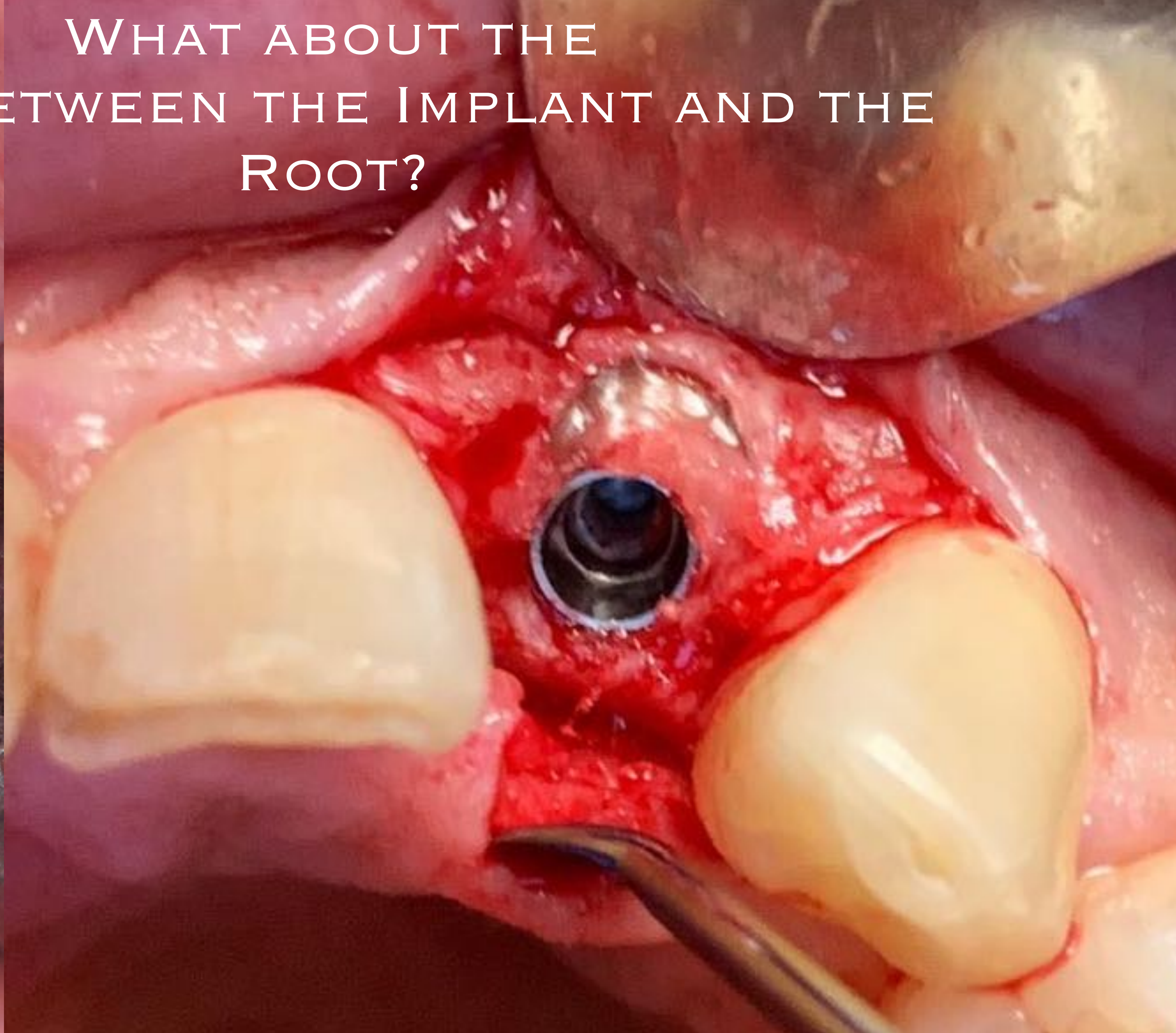
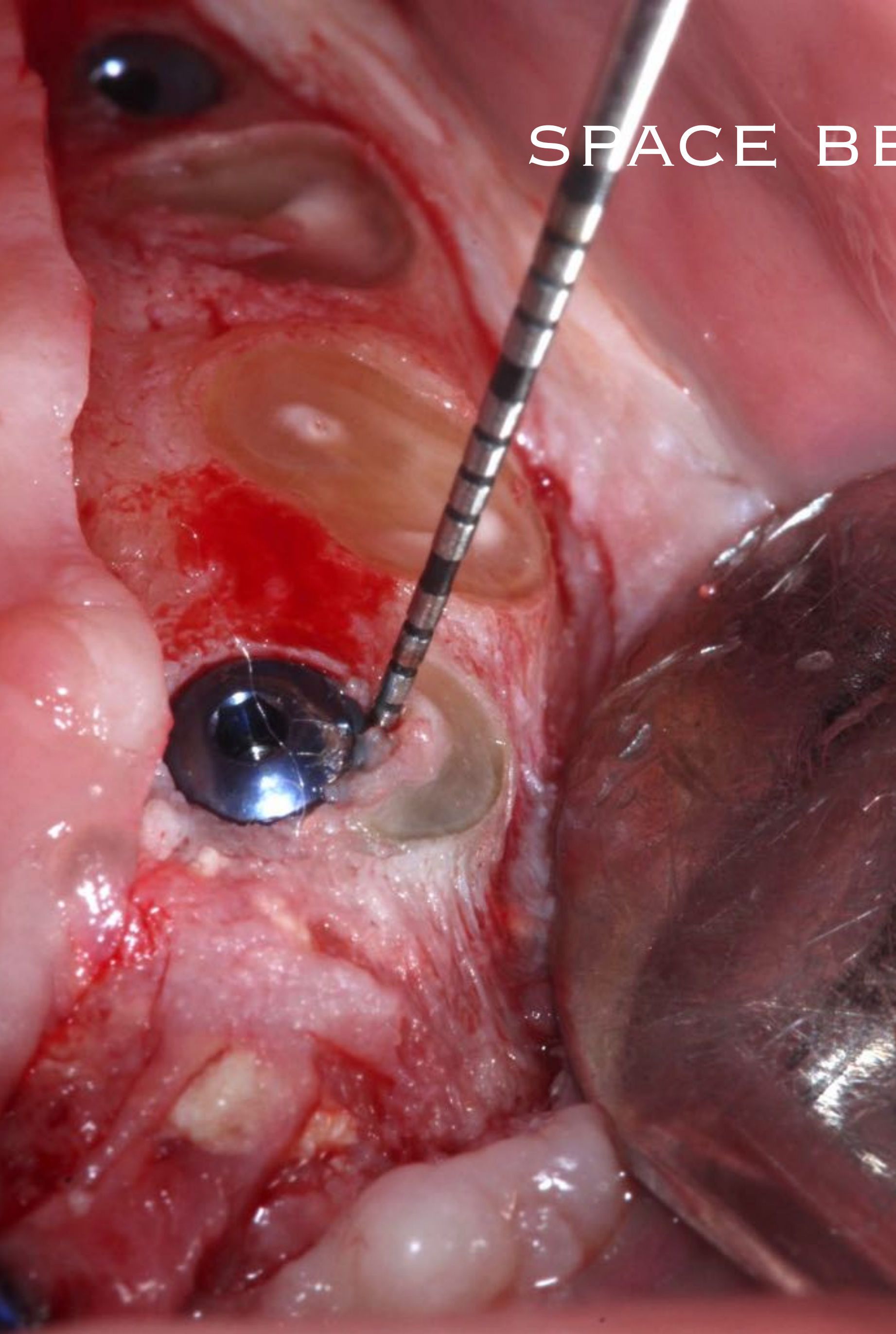
***Results:** A sample of 182 patients (82 men and 100 women, age range: 18-83 years) received 250 immediate implants (230 maxilla, 20 mandible) after the root membrane concept and followed-up for a mean of 49.94 months (±32.5). Overall, 5 implant failures were recorded for a 10-year cumulative patient-level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

Therapy for Development

Resorption of the alveolar ridge commences immediately postextraction, is more pronounced on the buccal aspect, plateaus after 3 months of healing, and may result in as much as 56% loss of the residual ridge.¹ This loss occurs as a result of the destruction of the bundle bone-periodontal ligament (BB-PDL) complex following the removal of a tooth and leads to resorption of the buccofacial ridge contour.² Positioning a pontic restoration at a missing tooth site requires residual ridge tissue bulk and a positive contour to create esthetic harmony between the restoration and the alveolar ridge. It is a well-established concept that to ideally or even adequately restore an edentulous or partially dentate patient in most instances requires management of these extraction sites either to prevent tissue loss or to augment the already collapsed tissues.^{3,4} These may be divided into pre-ridge collapse interventions, namely ridge preservation techniques, and post-ridge collapse interventions, namely bone augmentation, soft tissue augmentation, or a combination thereof.³⁻⁶

To maintain this tissue complex the tooth root, its ligament fibers, its vascular supply, and its attachment to bone need to be retained.⁷ The root submergence concept has been demonstrated with success in the development of pontic sites.⁸

WHAT ABOUT THE
SPACE BETWEEN THE IMPLANT AND THE
ROOT?





BioMed
Research International

Hindawi Publishing Corporation
<http://www.hindawi.com>

Volume 2014

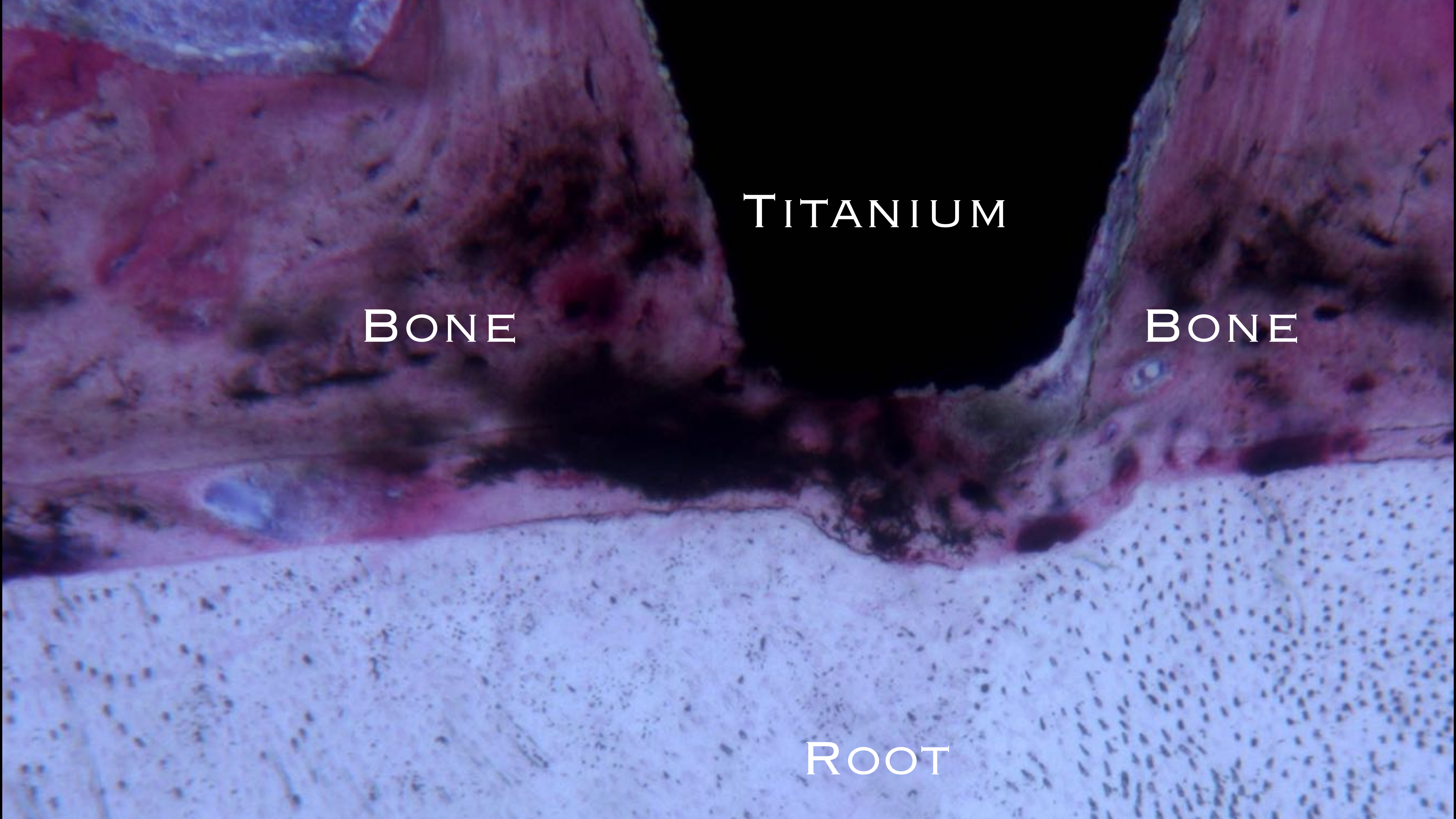
2.5 Impact Factor

THE ROOT MEMBRANE TECHNIQUE:

HUMAN HISTOLOGIC EVIDENCE AFTER **FIVE YEARS** OF FUNCTION

MITSIAS M, SIORMPAS K, KOTSAKIS G, GANZ S, MANGANO C, LEZZI C

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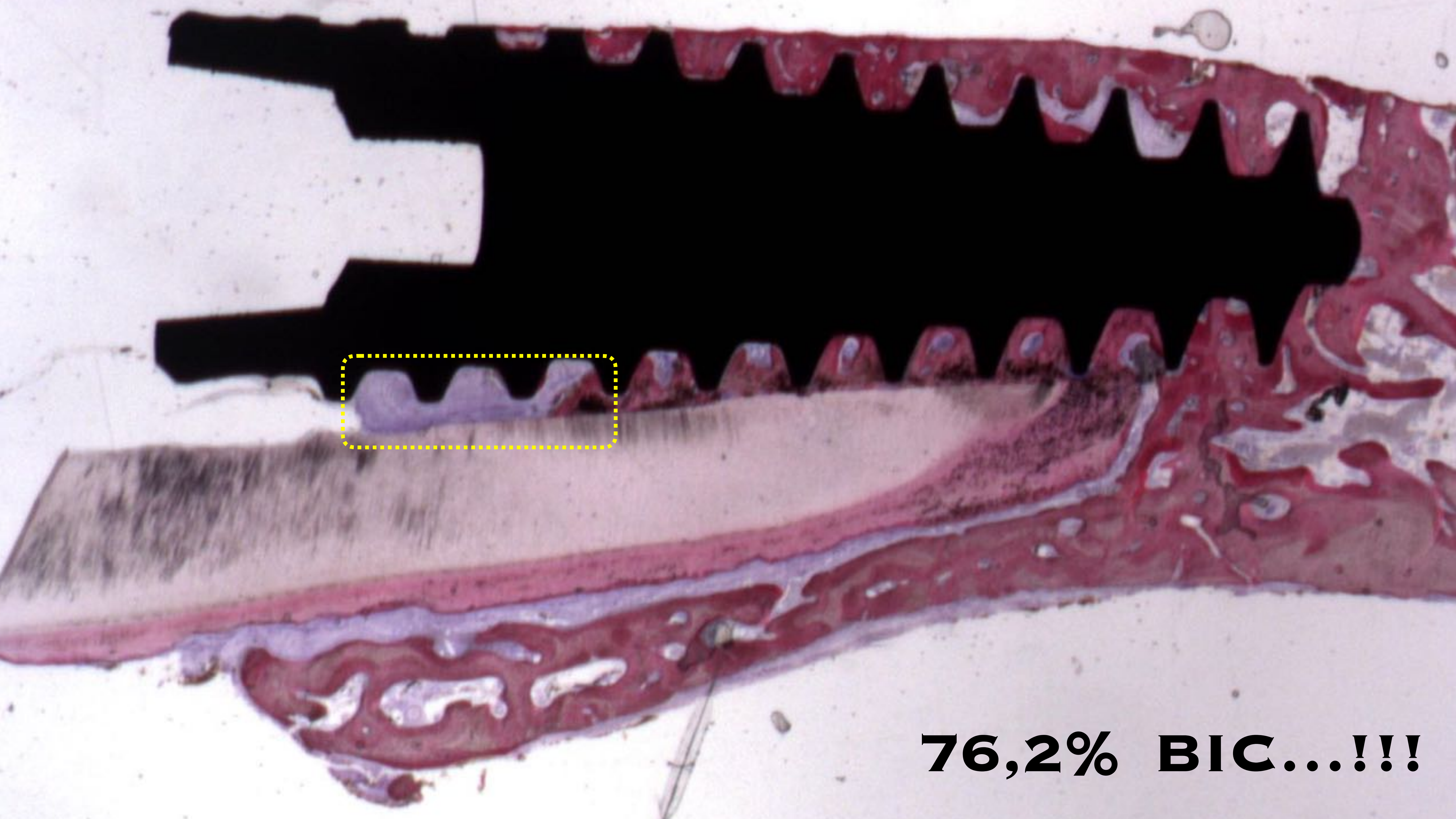


TITANIUM

BONE

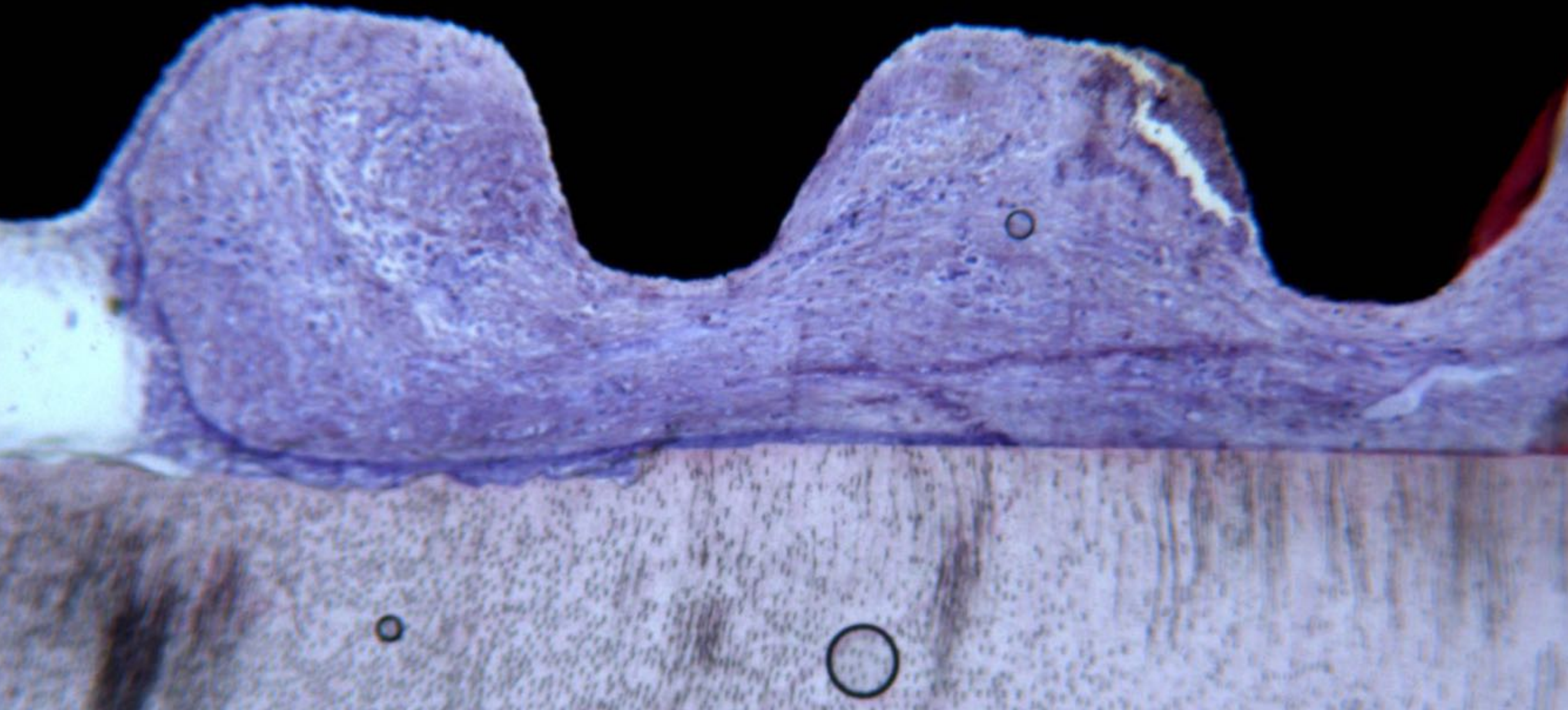
BONE

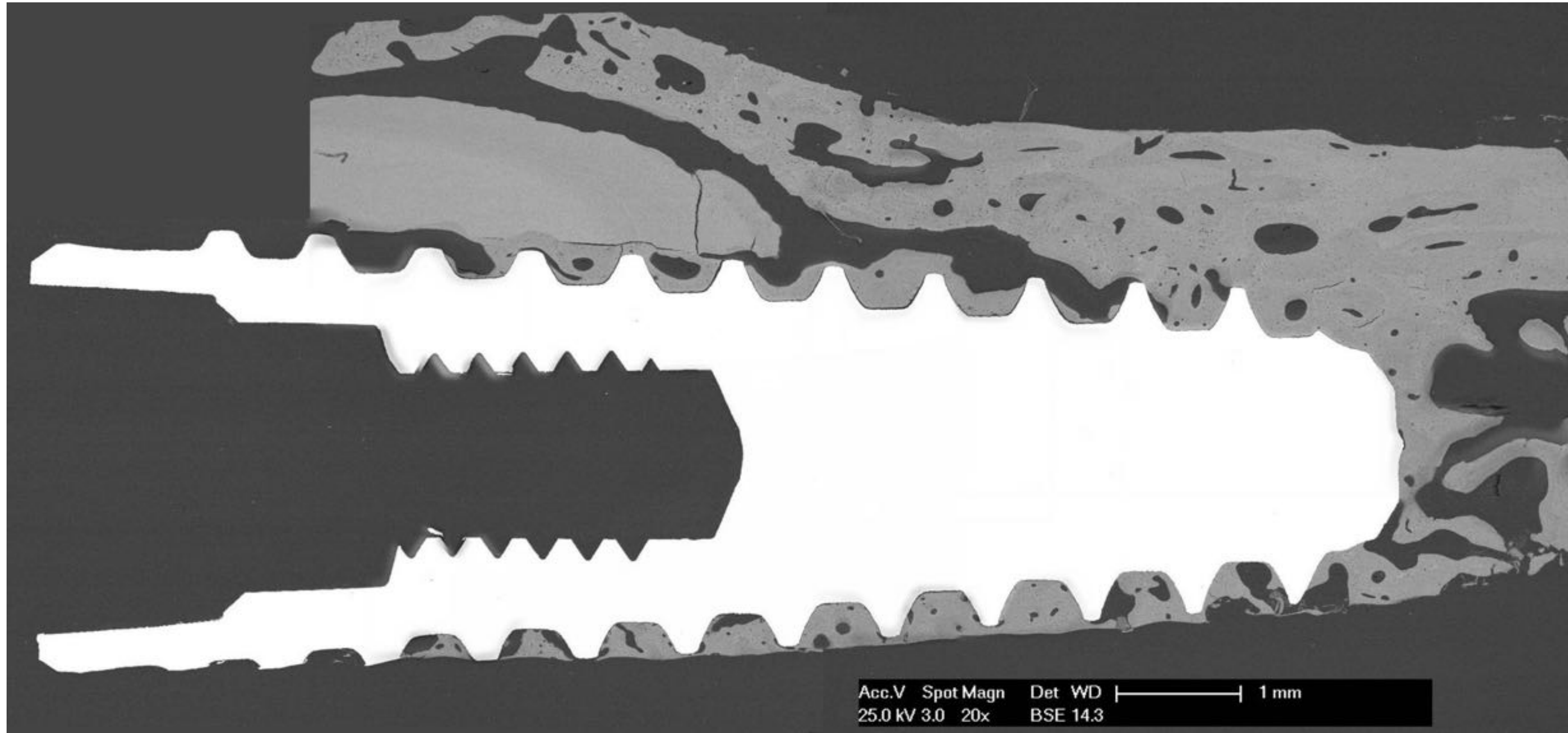
ROOT



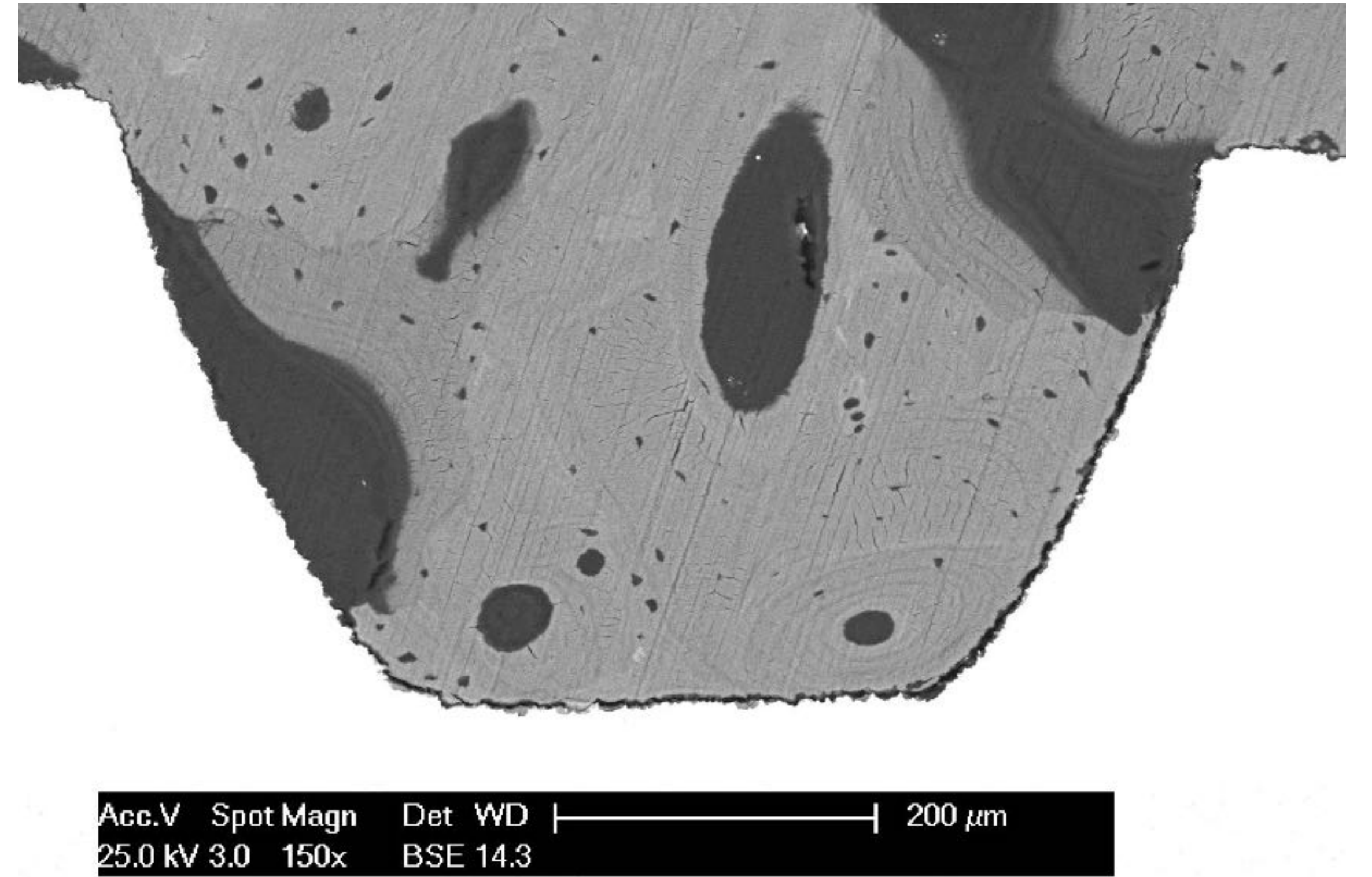
76,2% BIC...!!!

NON- INFILTRATED CONNECTIVE TISSUE





SCANNING ELECTRON MICROSCOPY



SCANNING ELECTRON MICROSCOPY

Human histological evidence of new bone formation and osseointegration between root dentin (unplanned socket shield) and dental implant

Schwimer C, Pette G, Du Toit J, Gluckman H, and Salama M.

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, BDS, 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

¹Private Practice, Pittsburgh, Pennsylvania, USA.

²Private Practice, Naples, Florida, USA.

³Director, Implant and Aesthetic Academy, Specialist in Periodontics and Oral Medicine, The Implant Clinic, Cape Town, South Africa.

⁴Clinical Assistant Professor of Periodontics, University of Pennsylvania, Philadelphia, Pennsylvania; Medical College of Georgia, Augusta, Georgia; Private Practice, Atlanta, Georgia, USA.

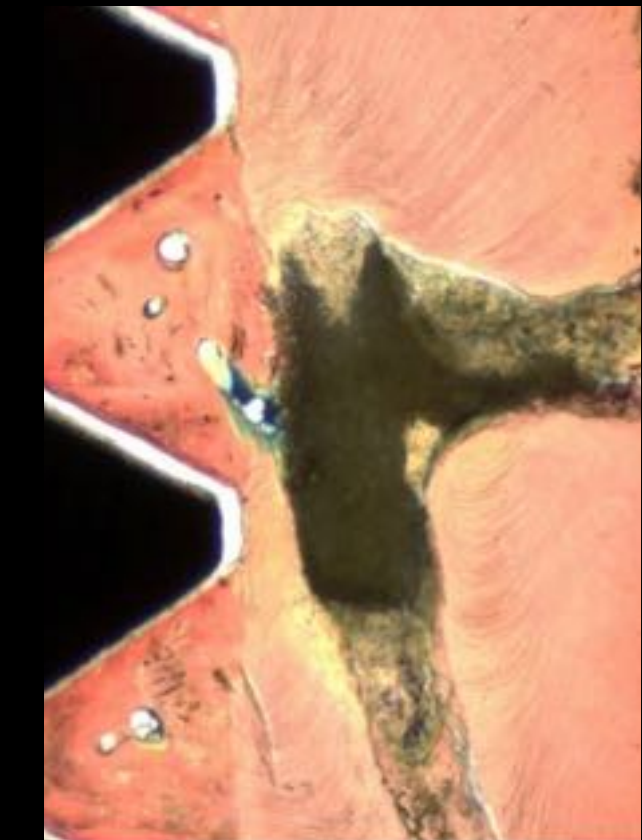
⁵Resident, Department of Periodontics and Oral Medicine, University of Pretoria, Faculty of Health Sciences, School of Dentistry, South Africa.

Correspondence to: Dr Charles Schwimer, 6201 Steubenville Pike, McKees Rocks, PA, 15136, USA. Email: F40chuck@aol.com

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X40



X100

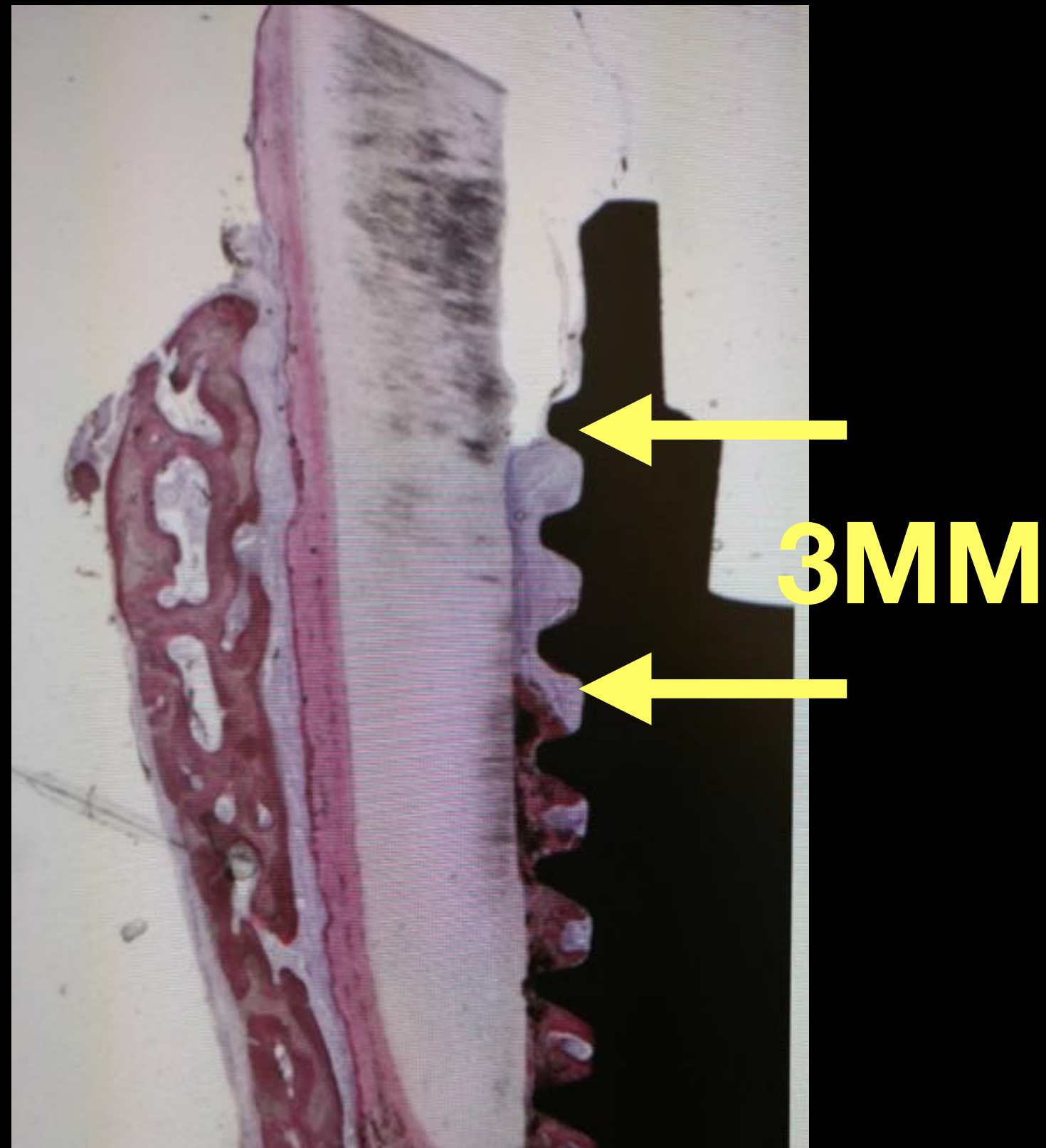


X100

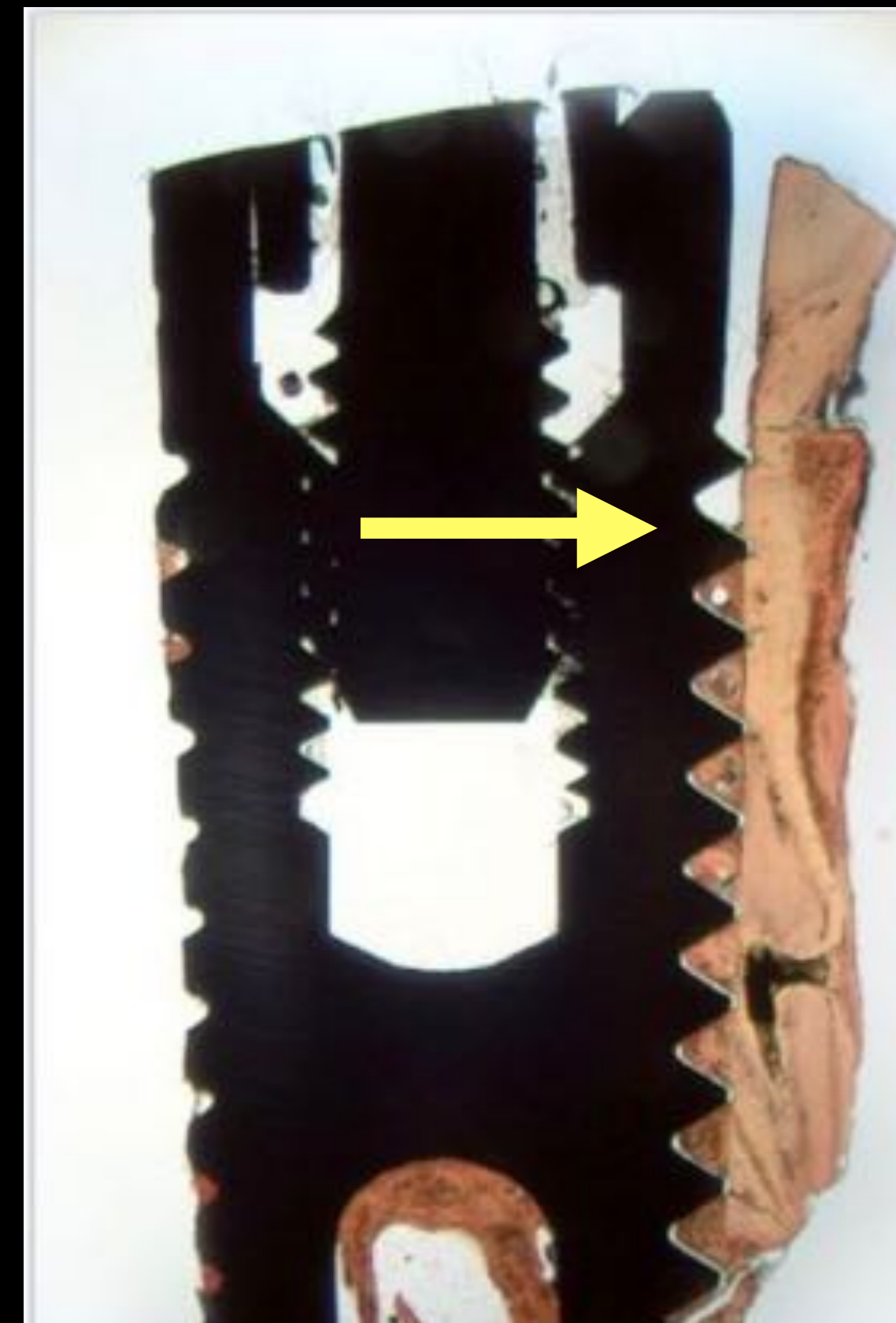


HUMAN HISTOLOGY

GAP



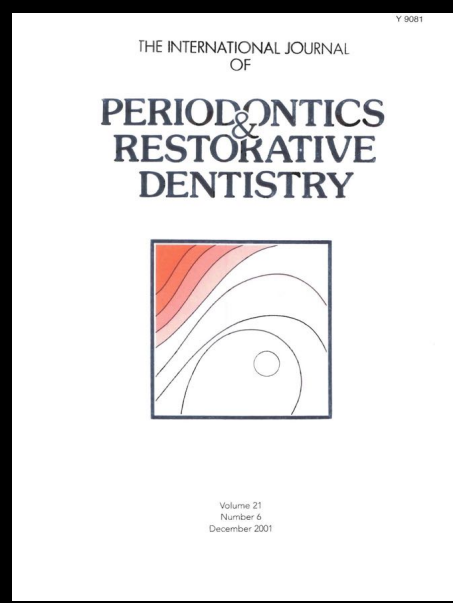
NO GAP



IMPLANT DEPTH? GAP DISTANCE?

MITSIAS

SCHWIMMER



INDICATIONS - CONTRAINDICATIONS

Patients with good general health and high level of oral hygiene.

Teeth with poor prognosis, big carious lesions,

Horizontal fractured teeth, up to bone level.

Chronic inflammatory teeth-OK

Cannot be applied on periodontal teeth.

No sub-crestal vertically fractured teeth.

No periodontally compromised teeth.

No teeth with acute inflammation.

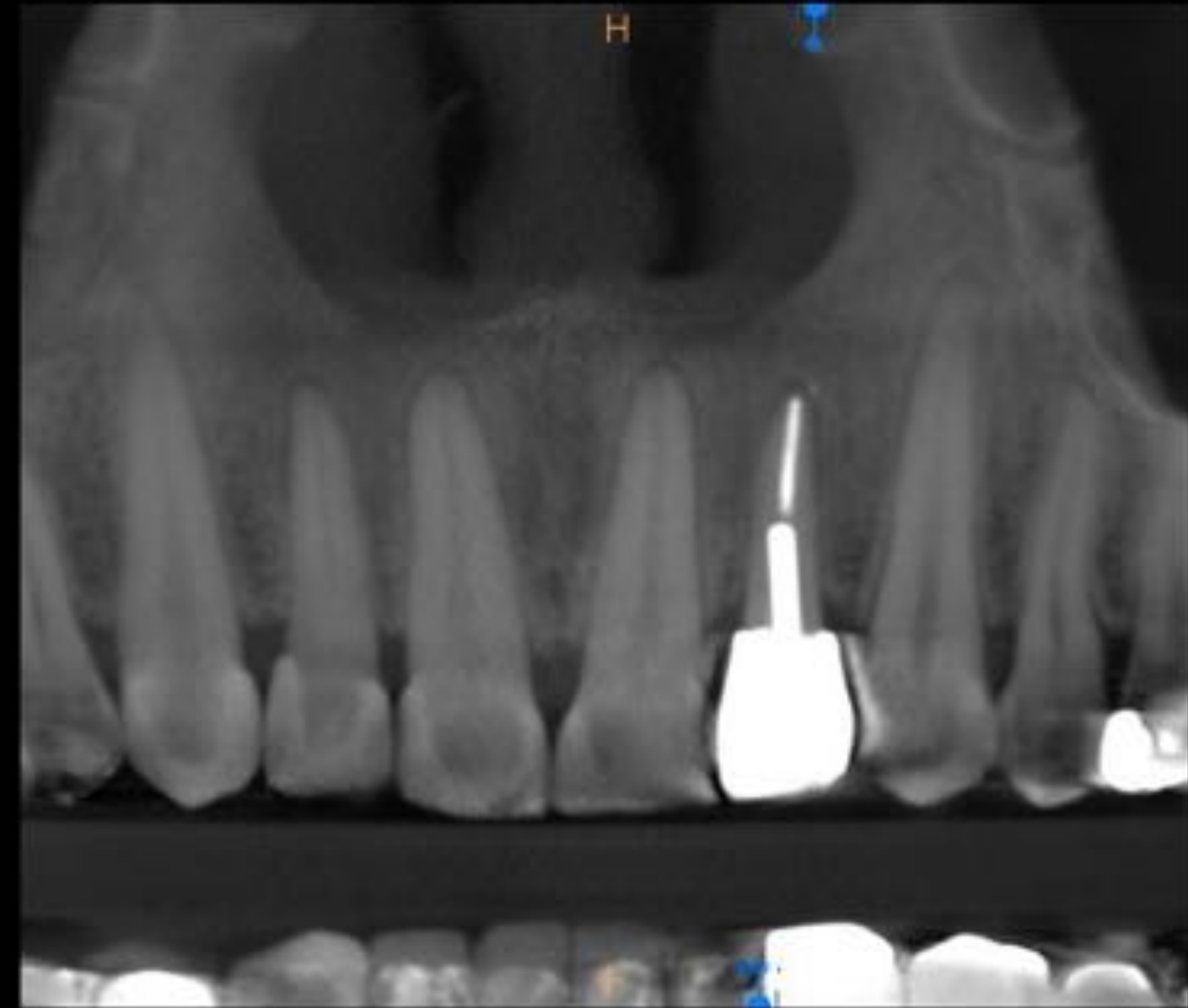


CASES

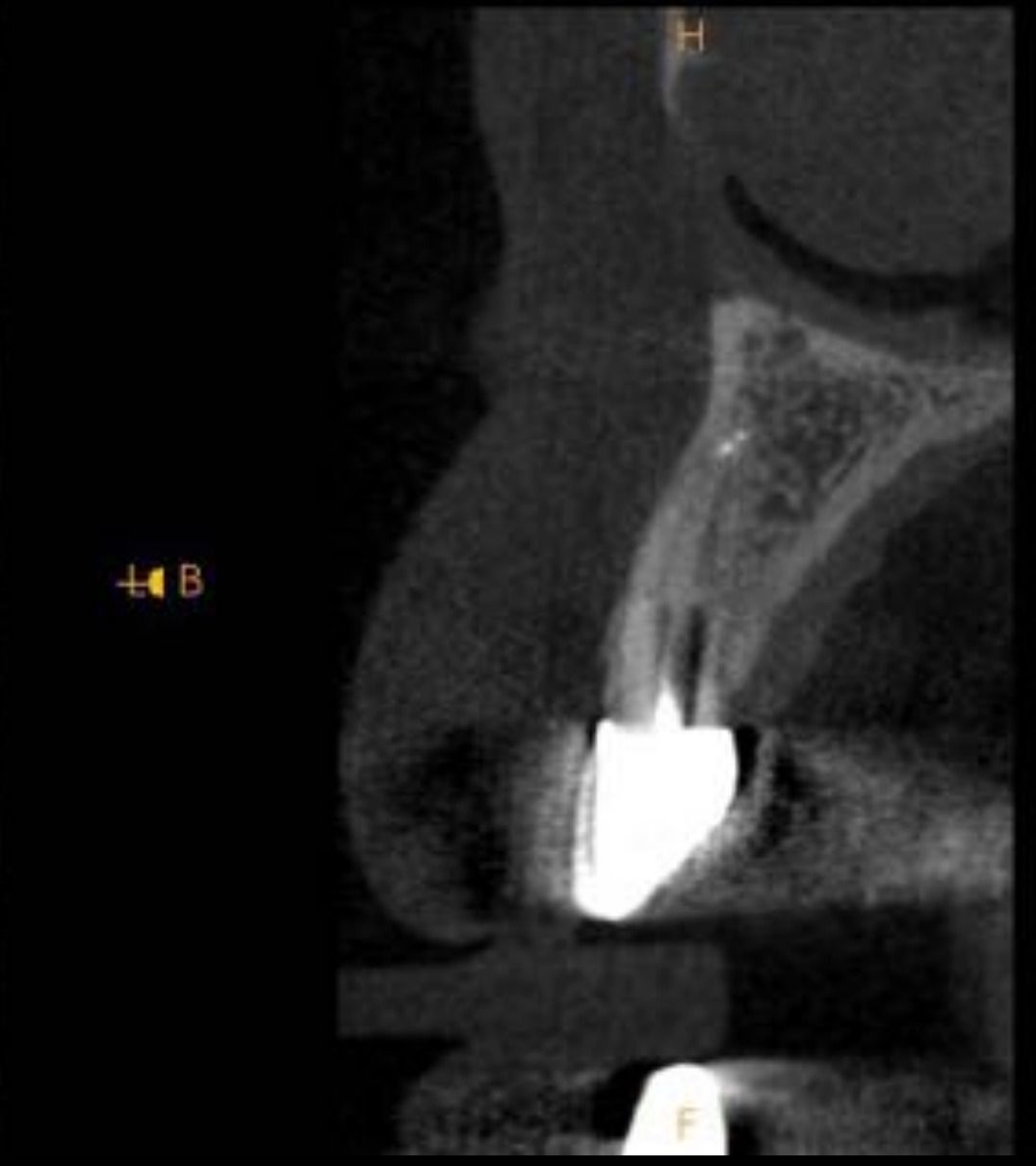
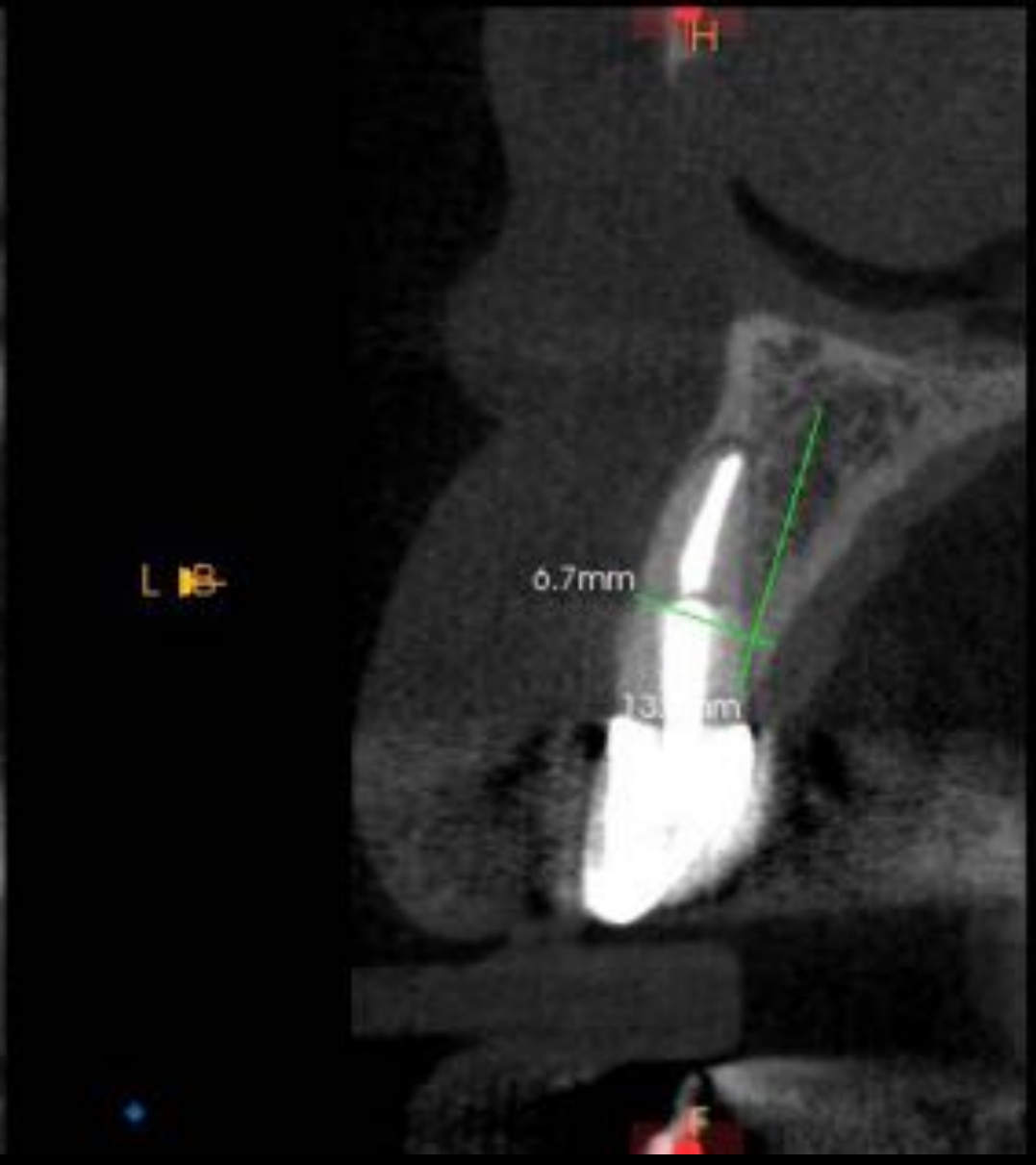
Integration mode: AVG. Slice thickness: 90 µm.

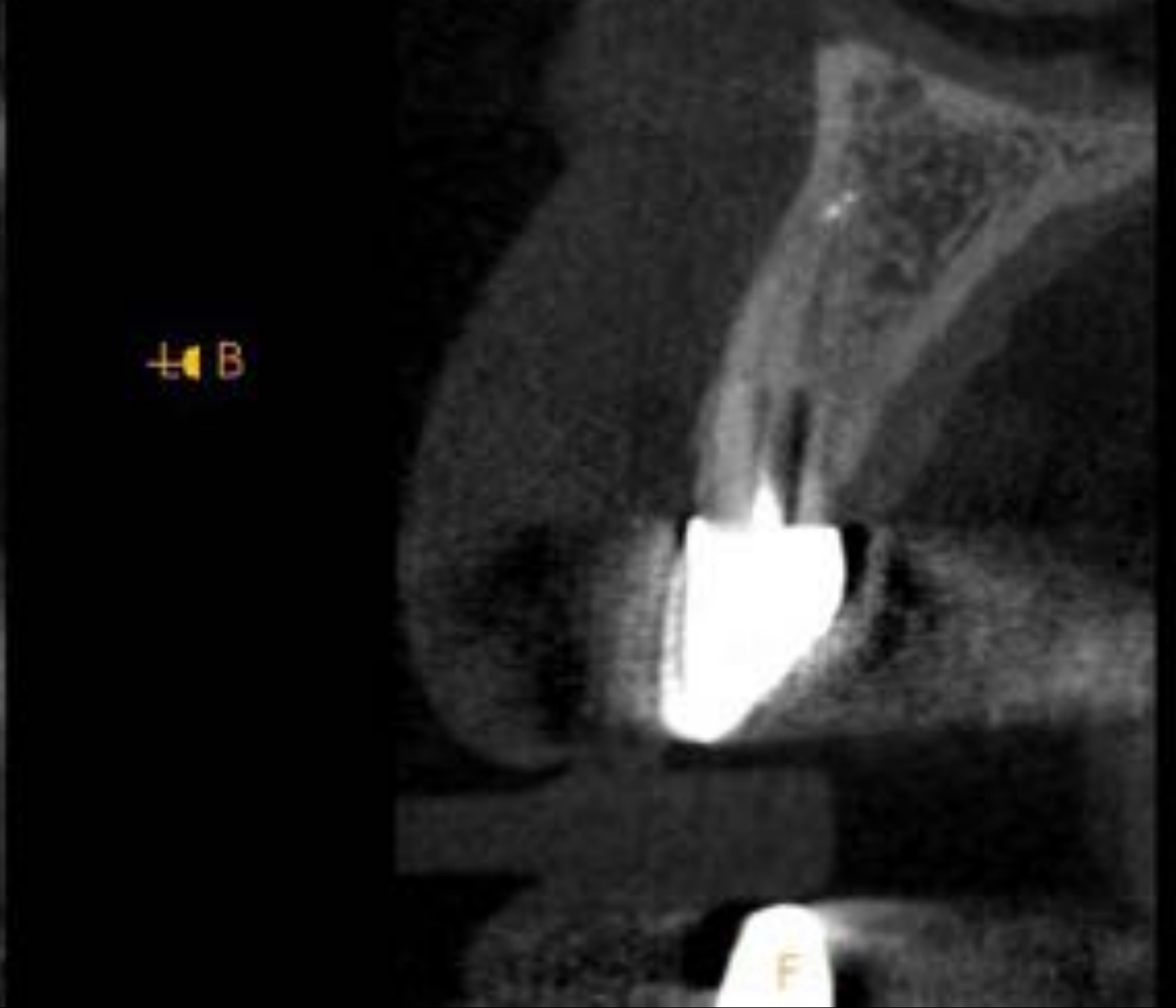
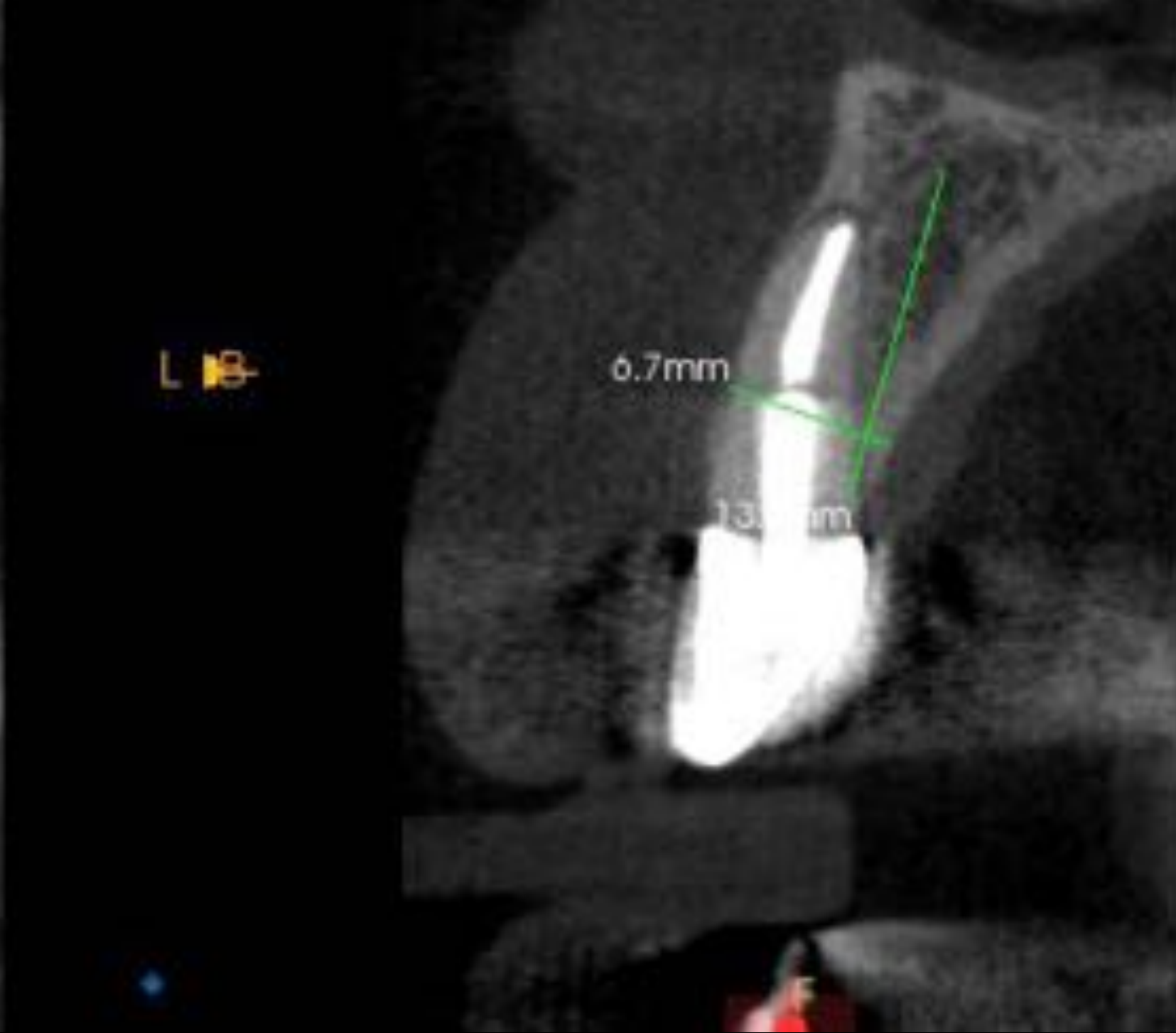


Integration mode: AVG. Slice thickness: 5.0 mm.



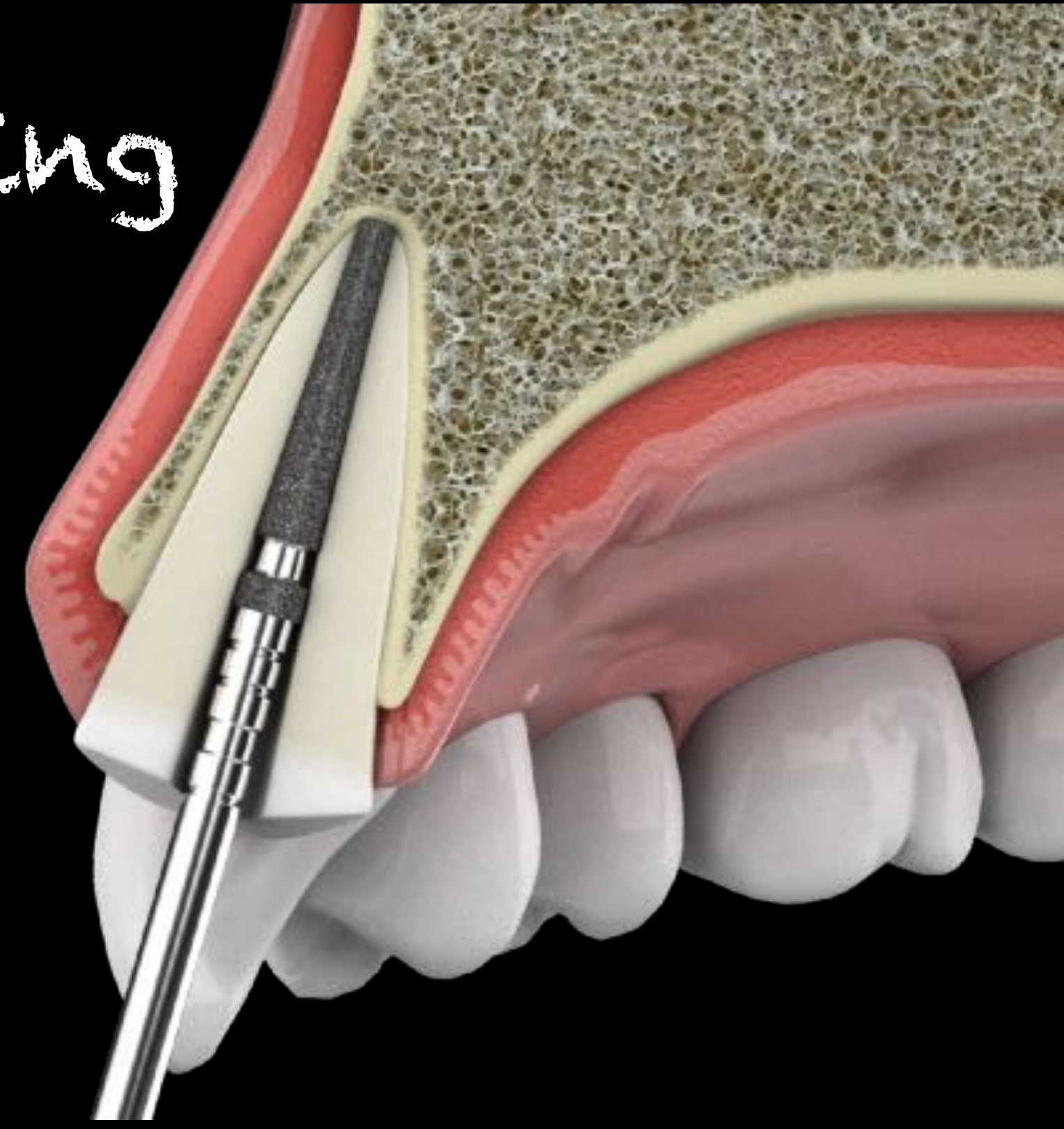
Slice spacing: 899 µm.

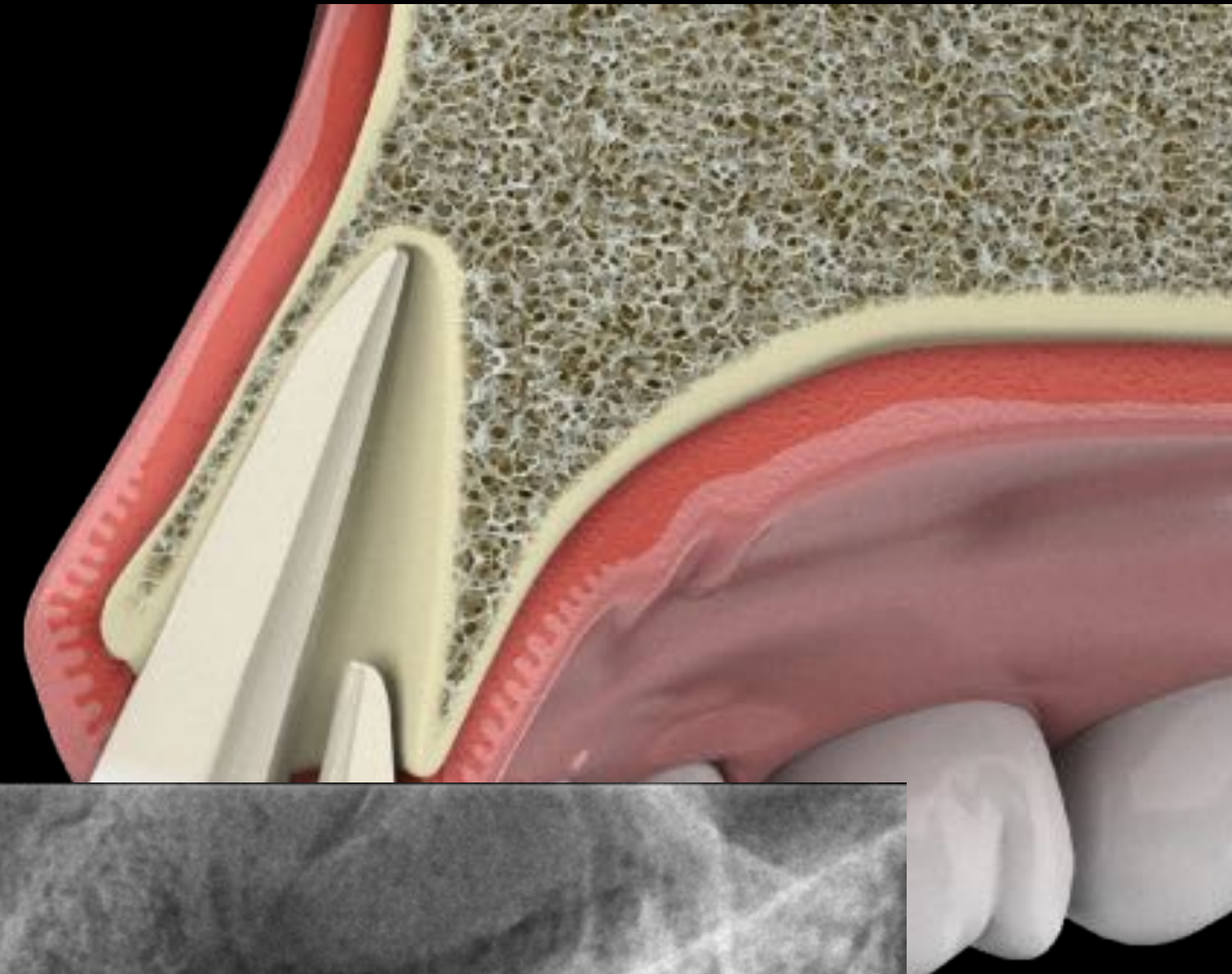
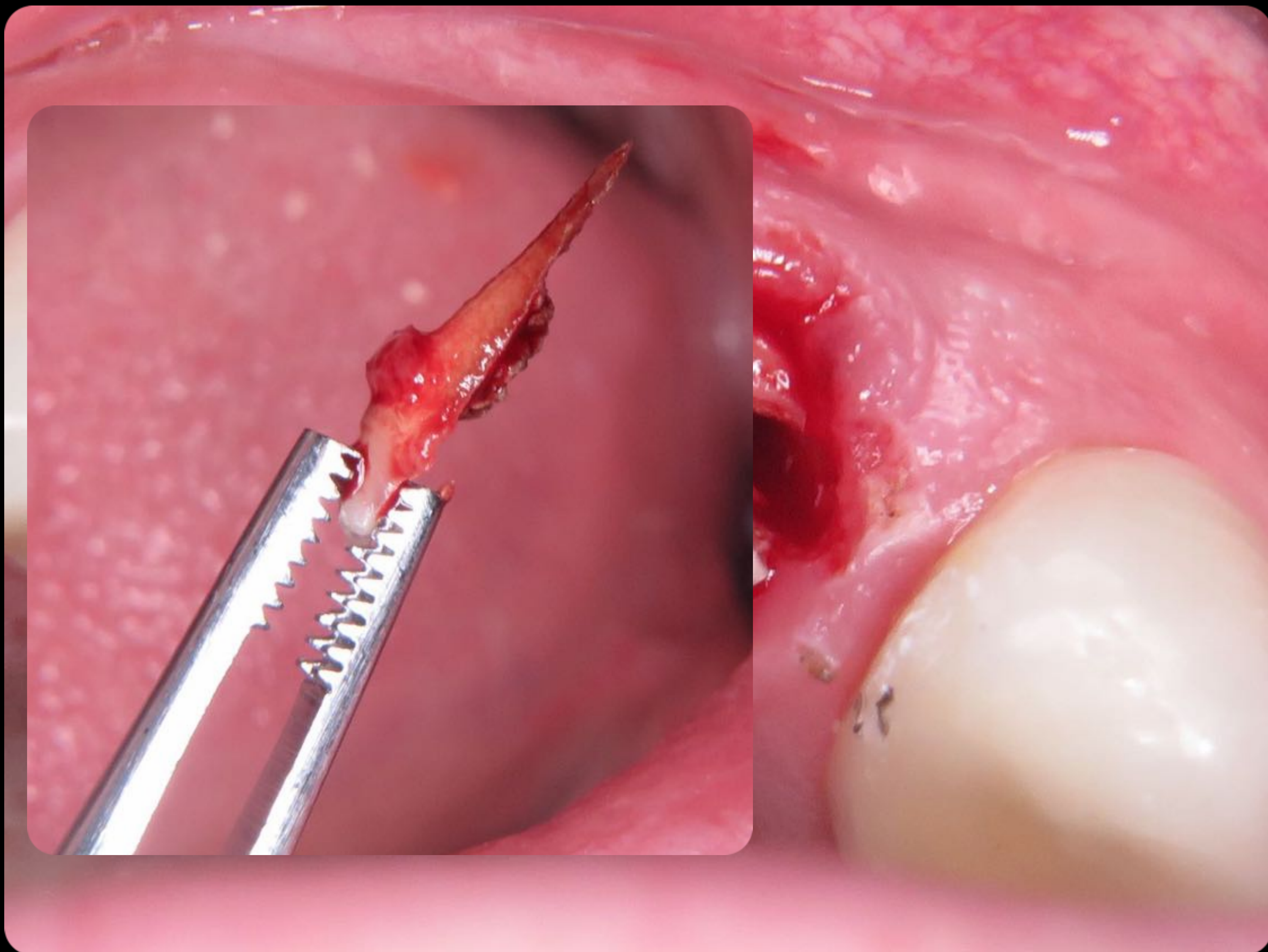






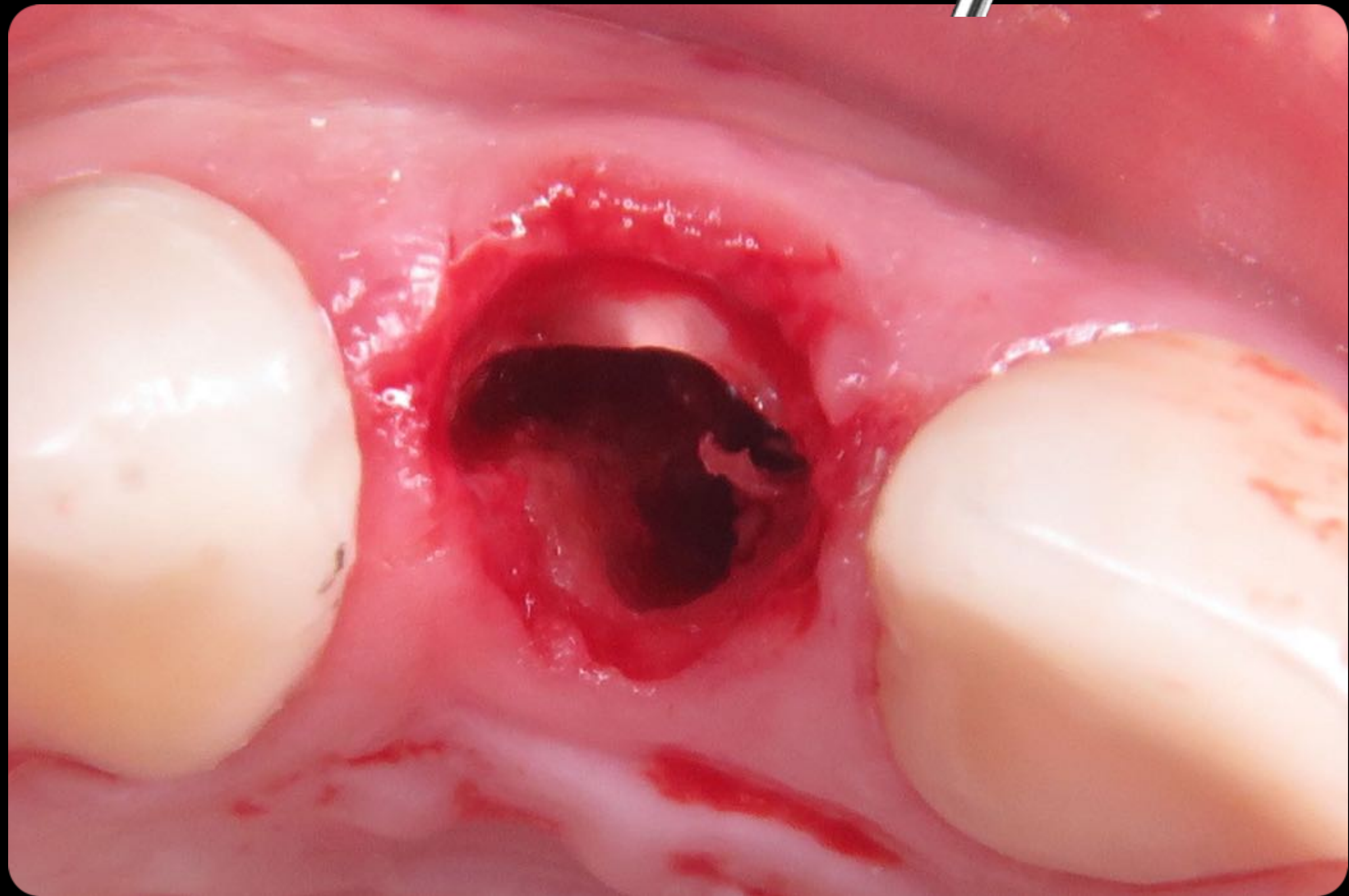
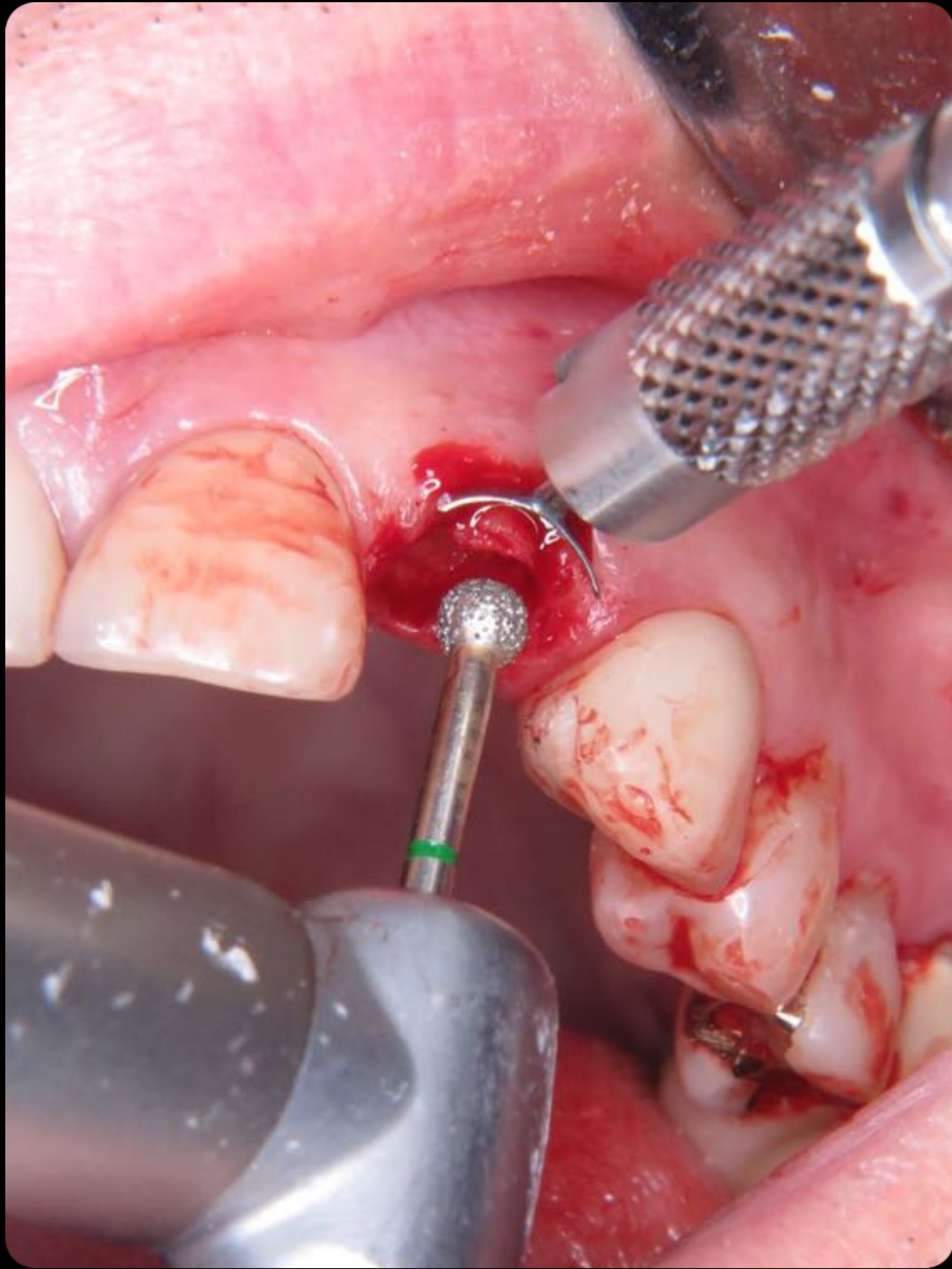
Drill through tooth - Vertical sectioning





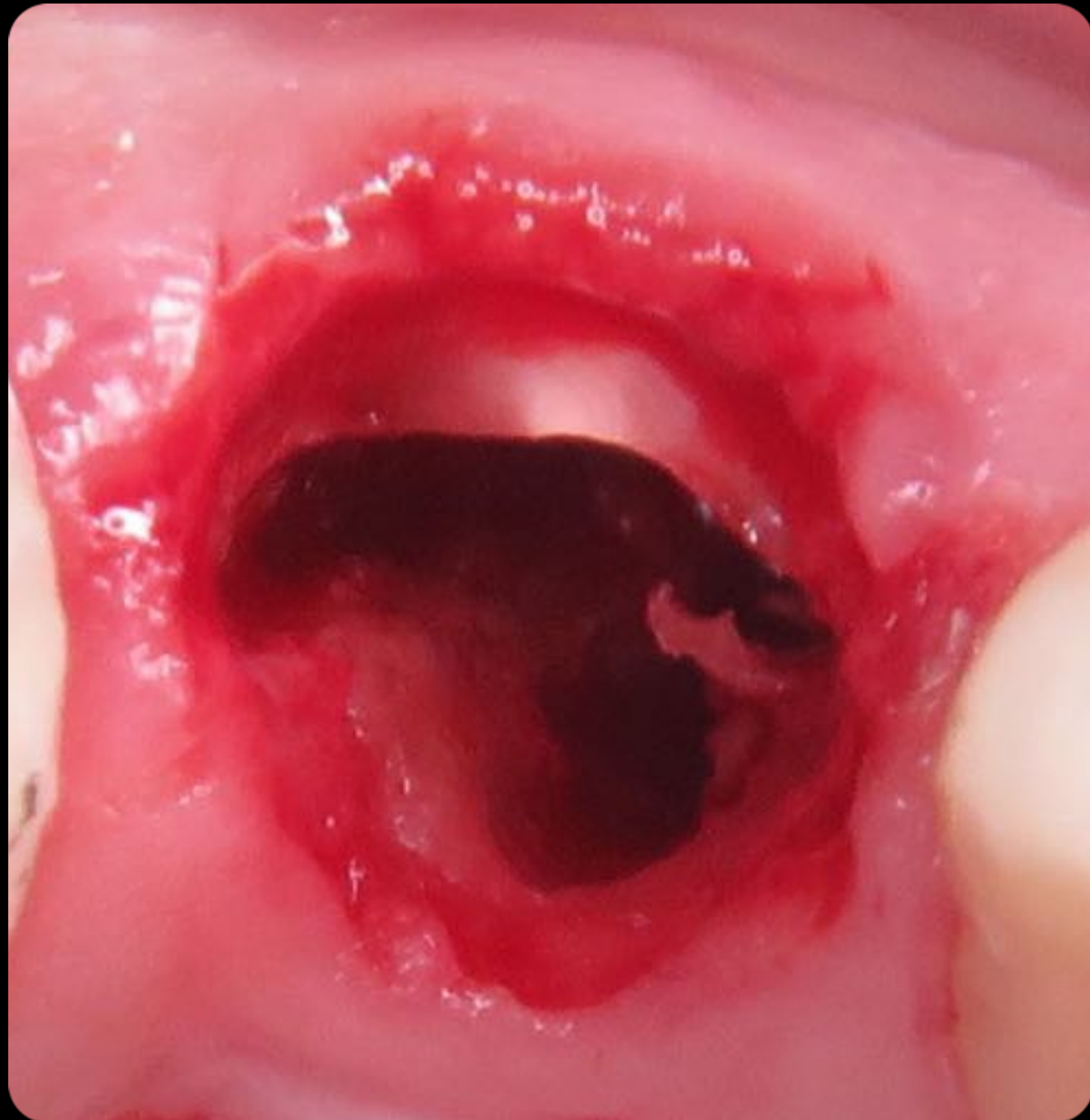
Palatal extraction

Round bur -
Smooth Shield





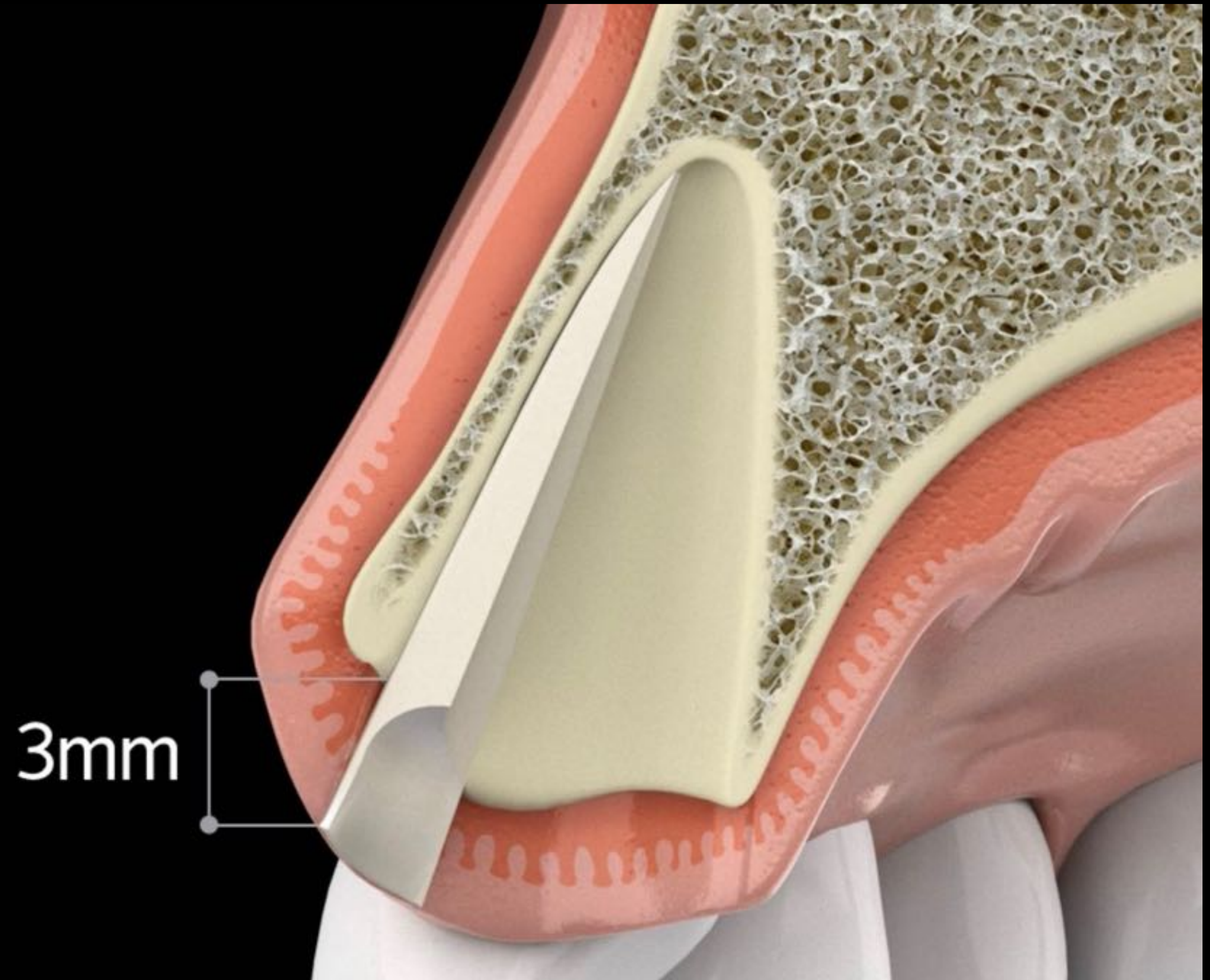
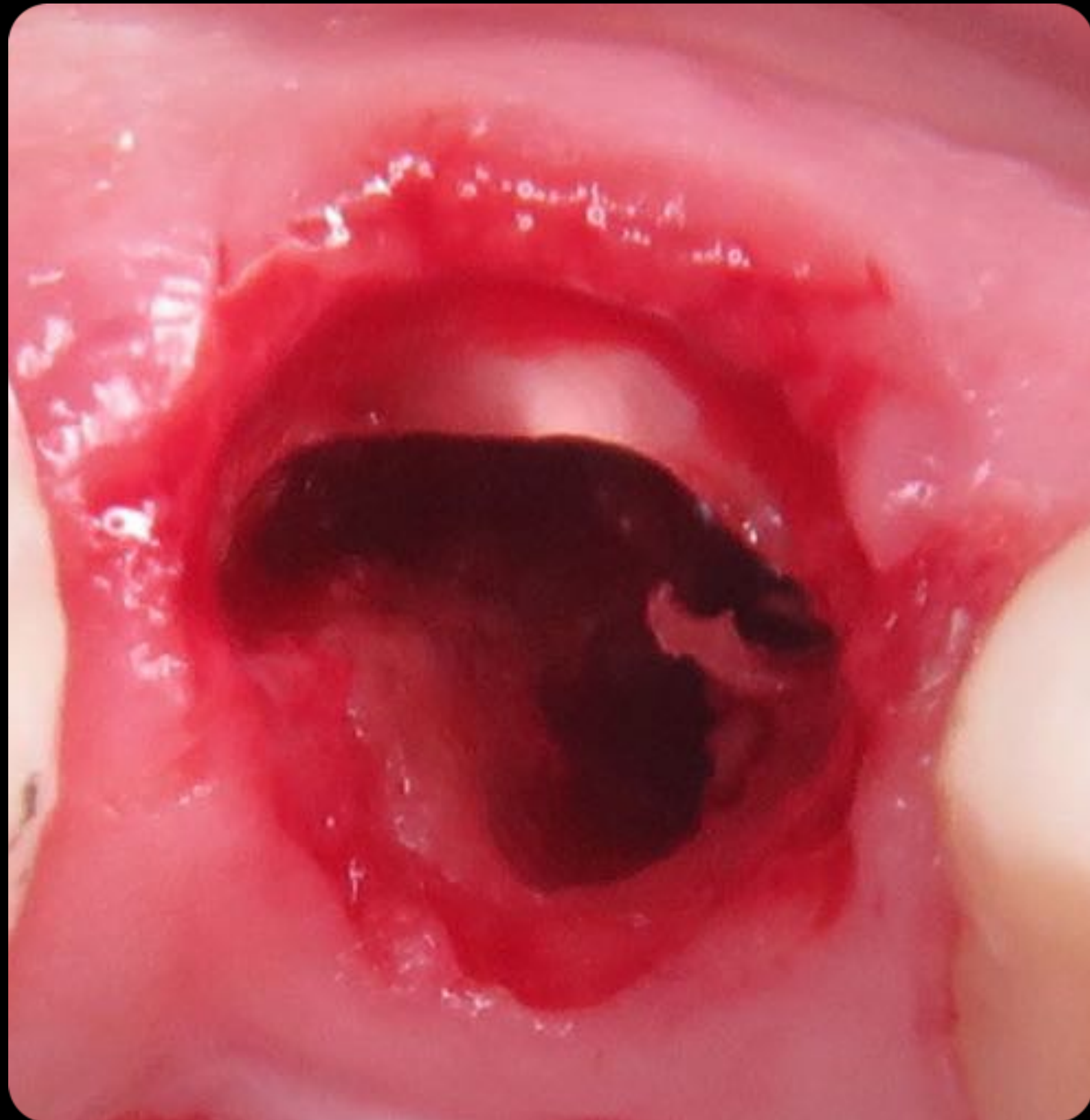
Recommended **Width** Of root fragment



1.5~2mm

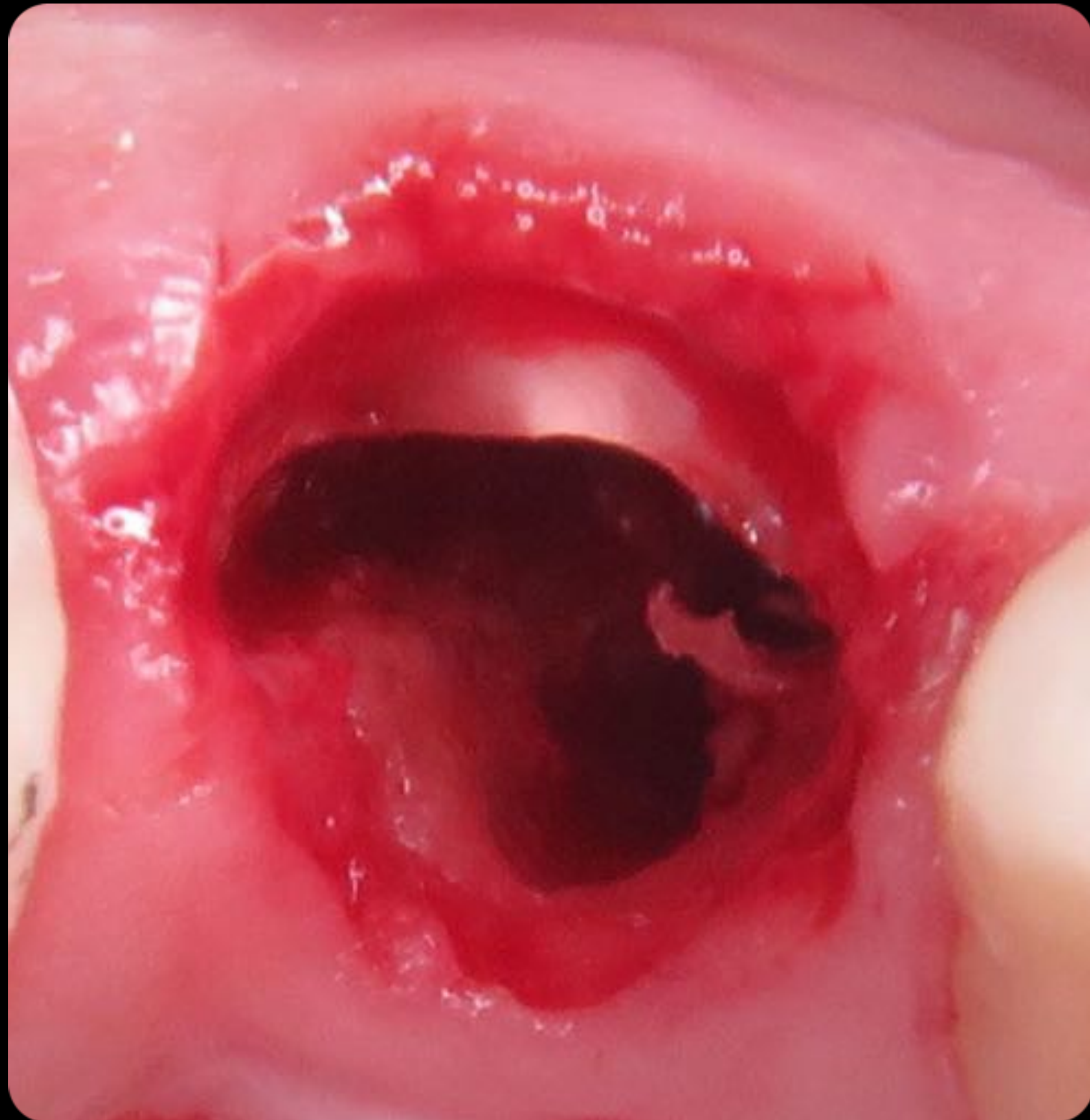


Recommended length Of root fragment

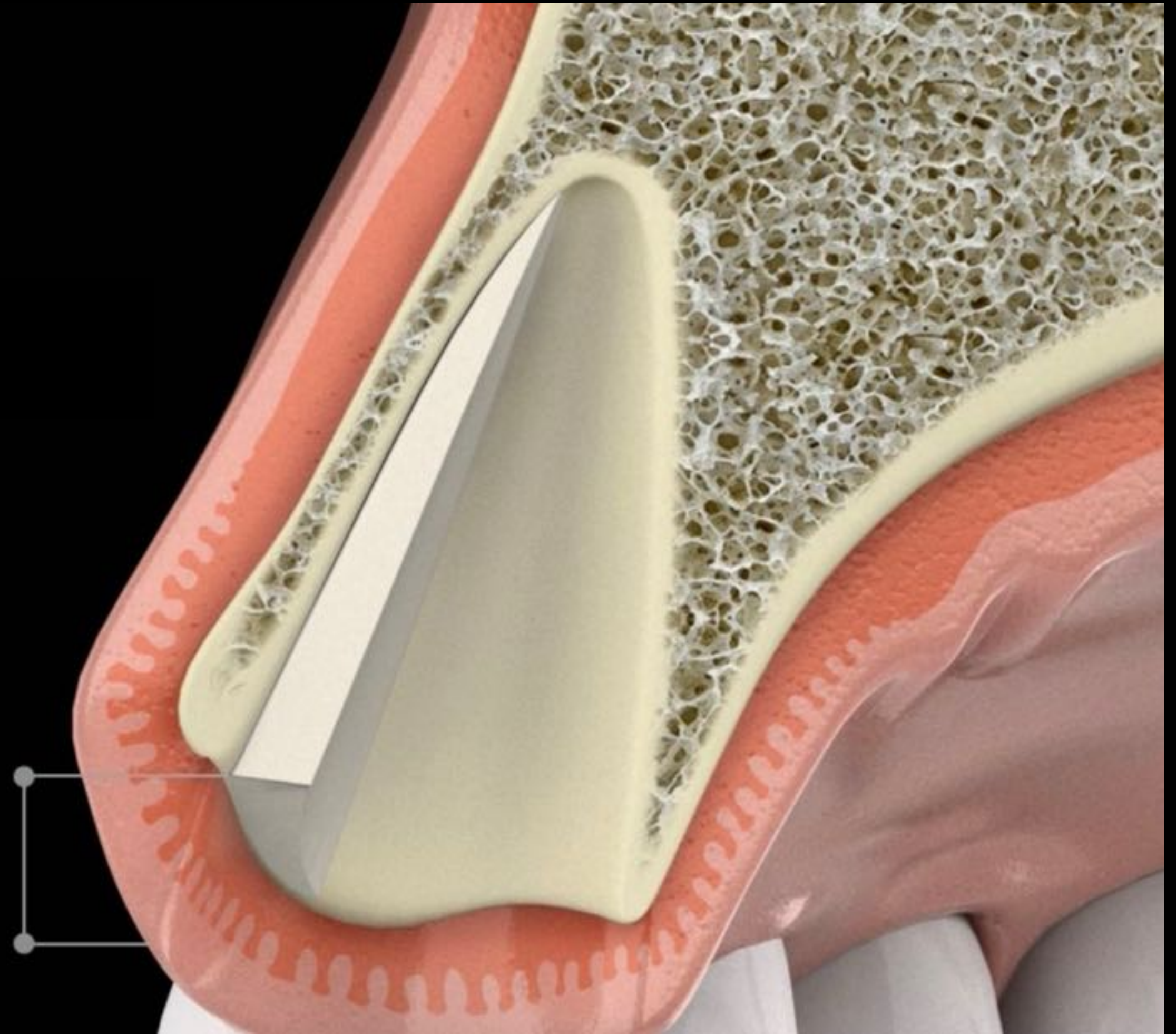


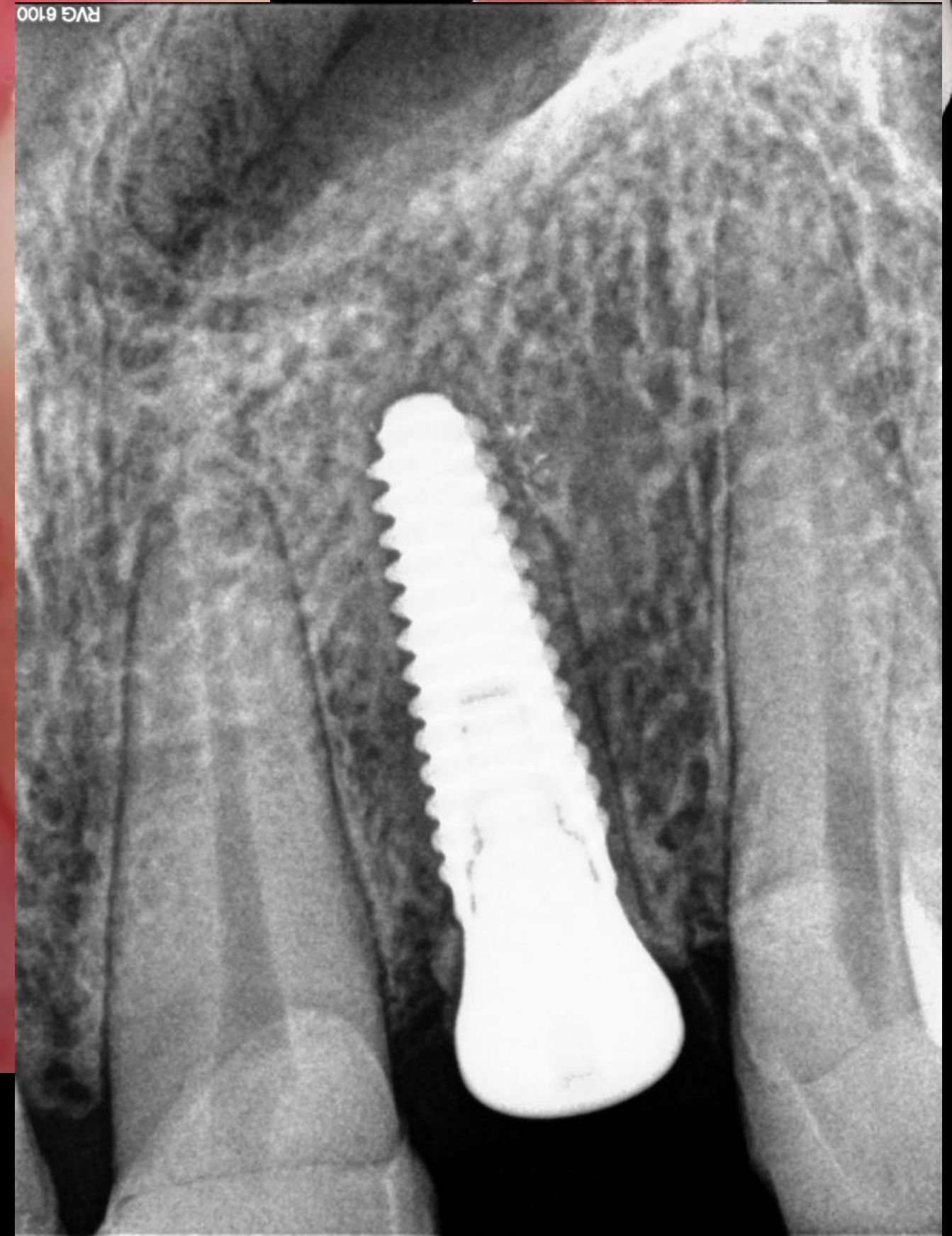
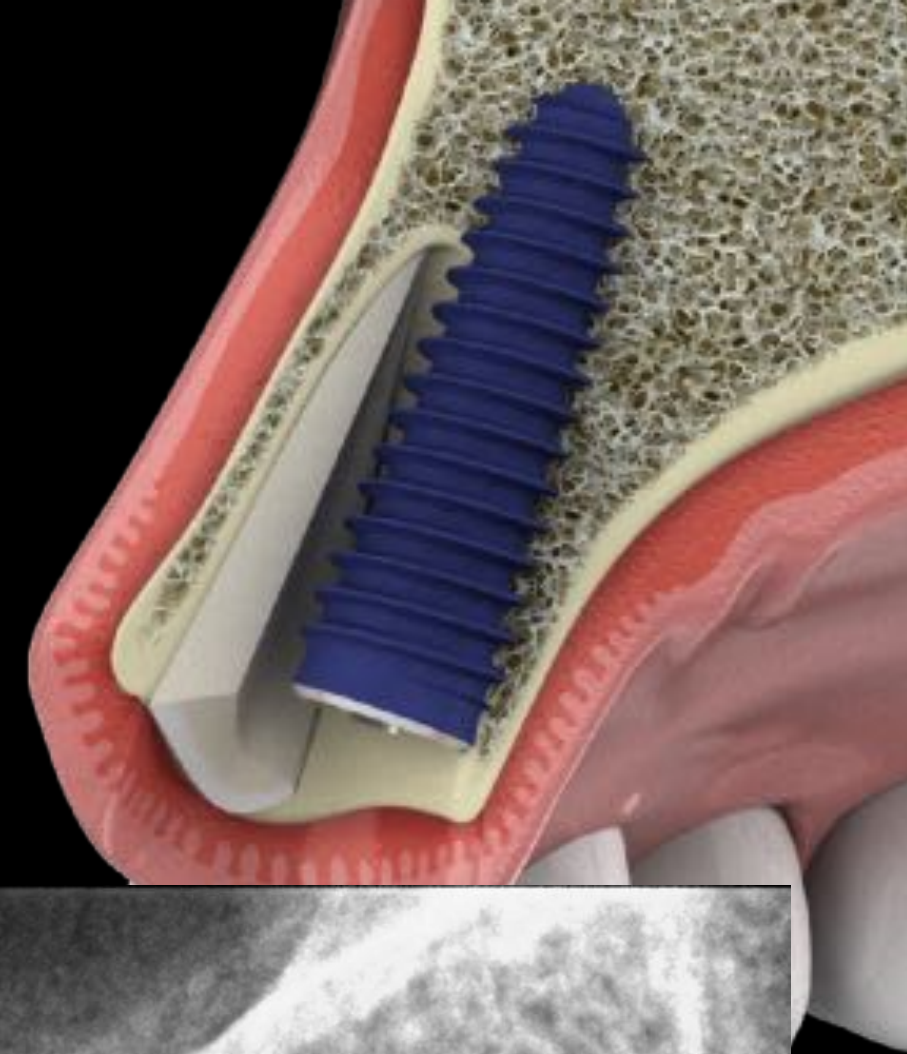
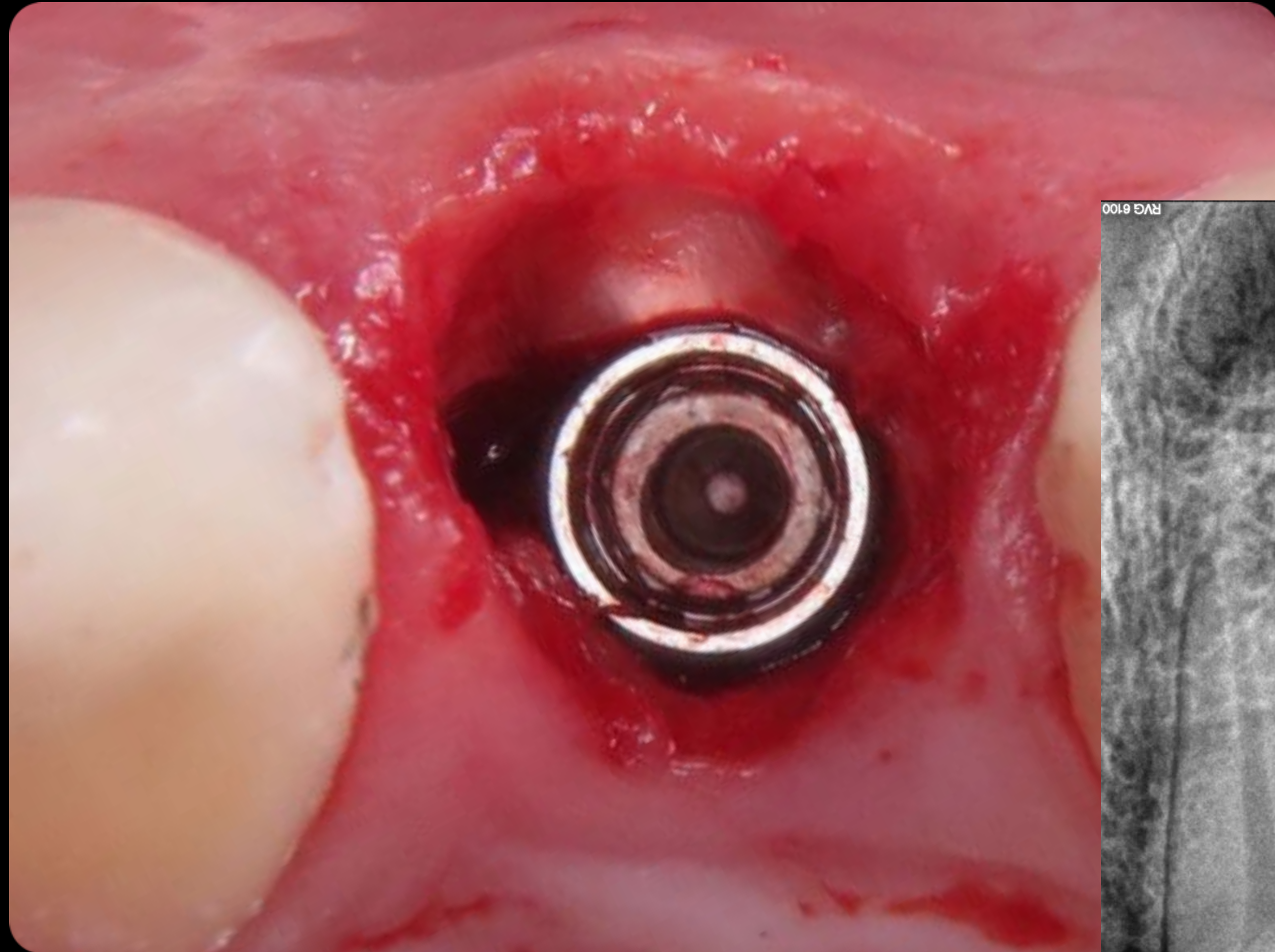


Recommended length Of root fragment

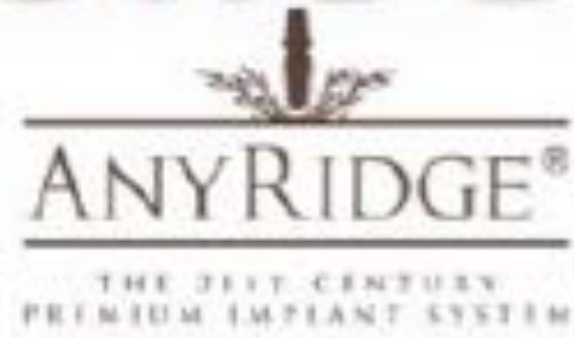


3mm



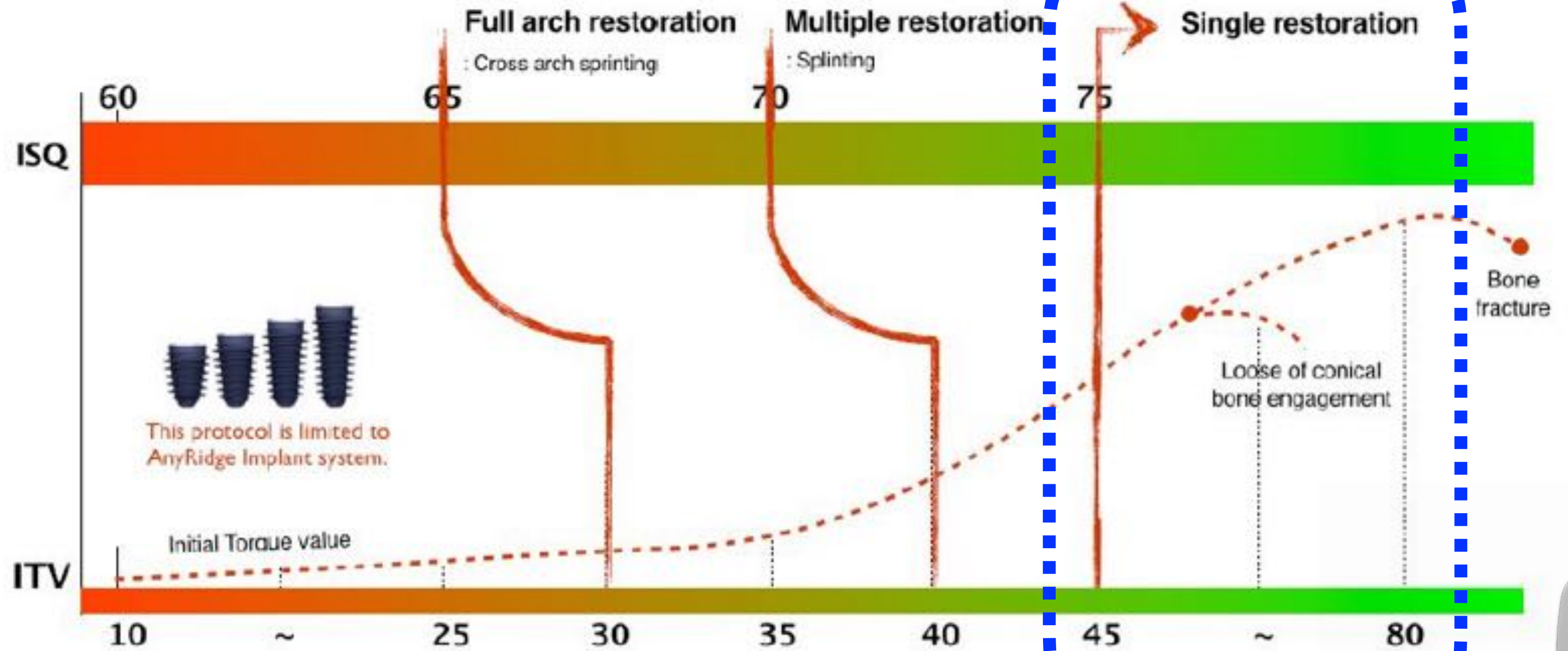


One Day Implant



Immediate Loading Protocol

under the value of
ISQ & ITV

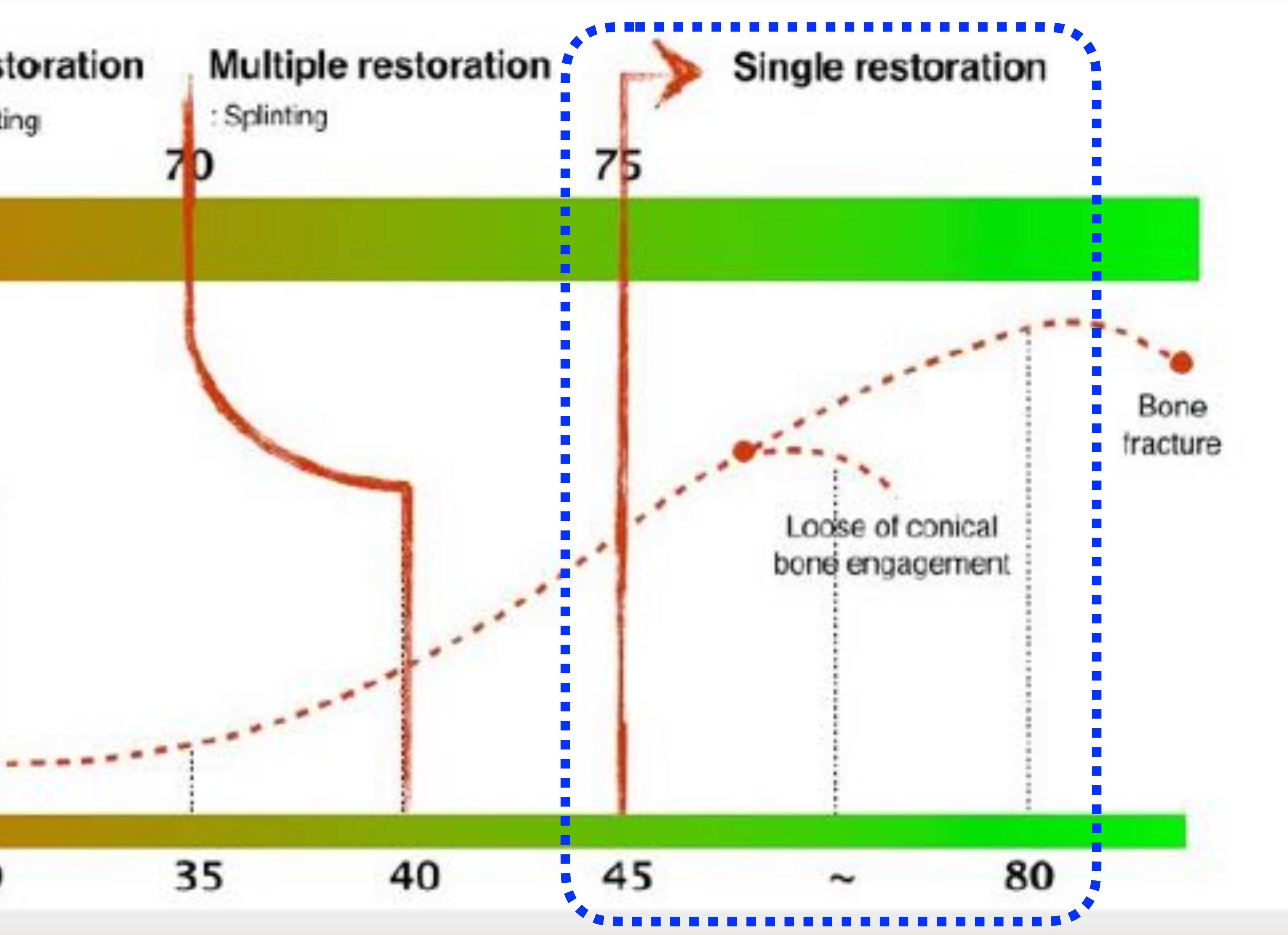


This protocol is limited to AnyRidge Implant system.

European Scientific Meeting of
MegaGEN
6th Jun. 2014, Zurich, Swiss

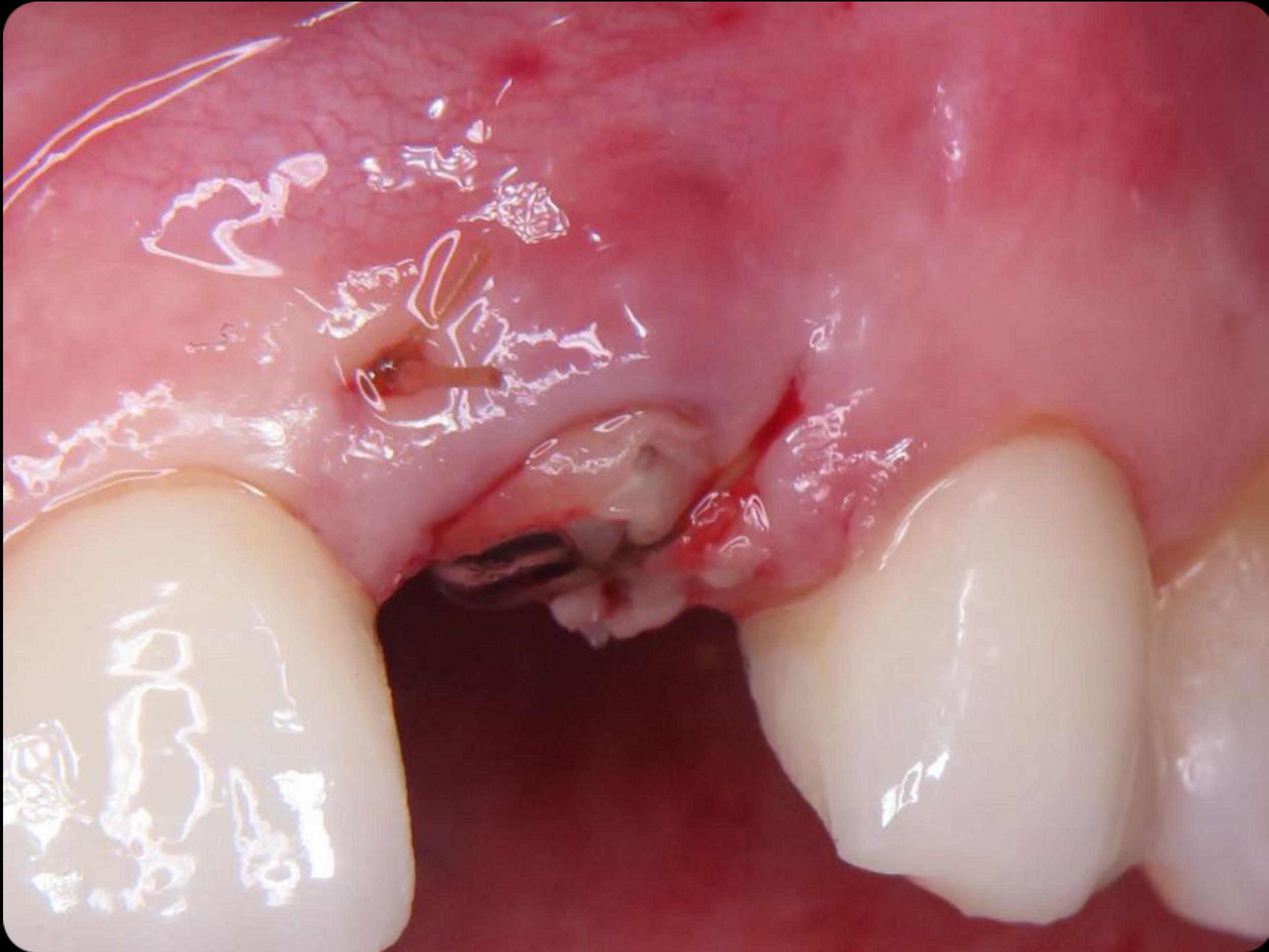
T E A M
EUREKA R2

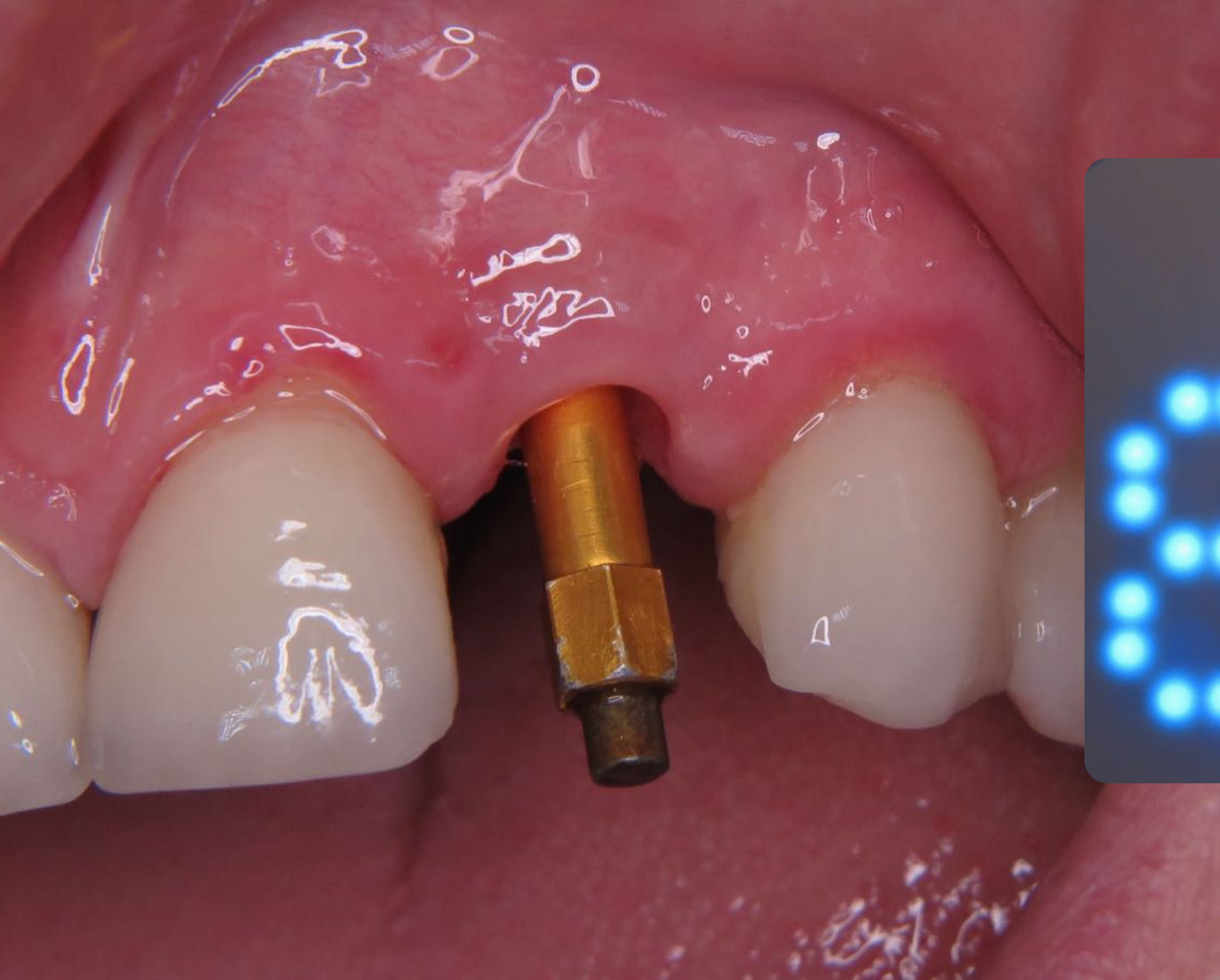




POST OP

2 WK POST OP





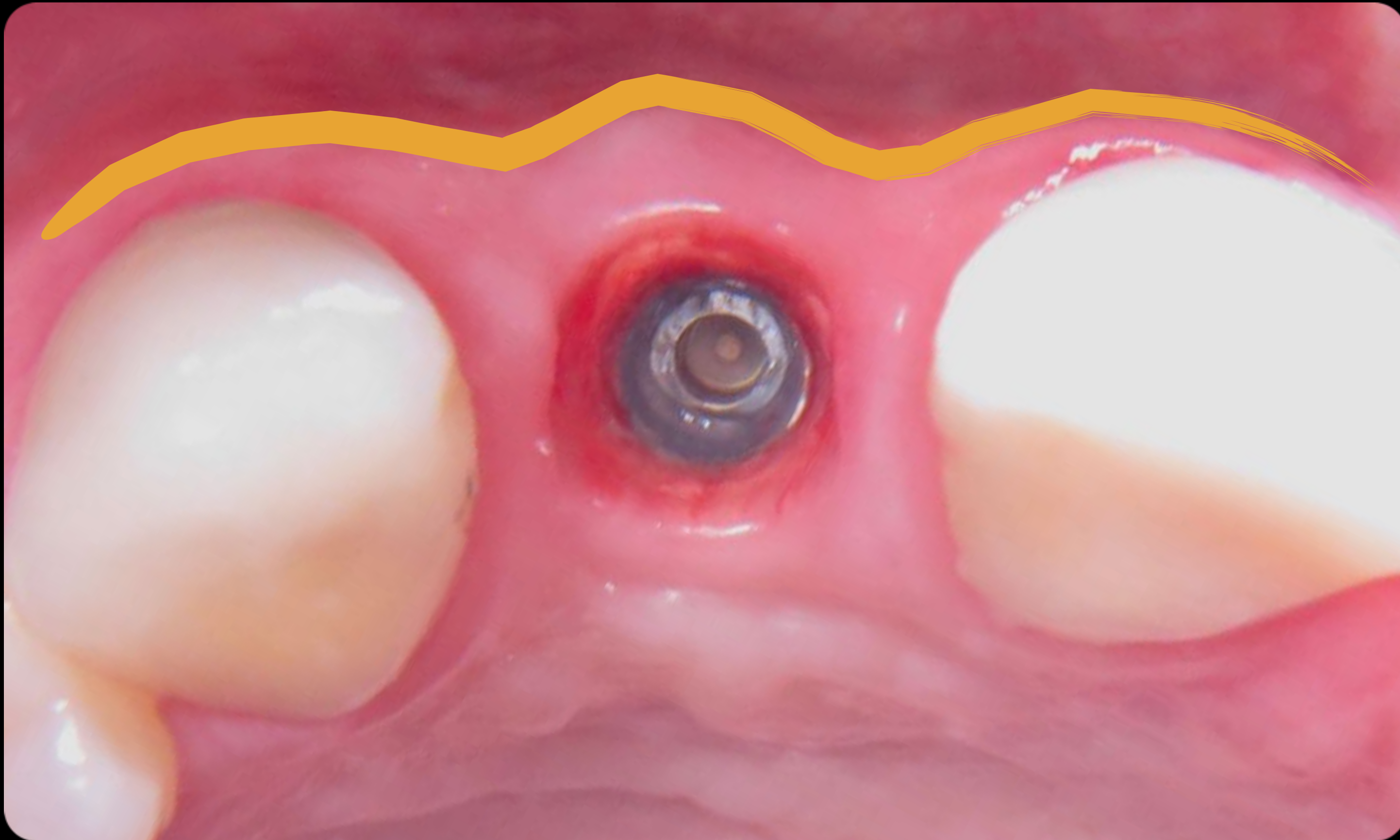
MEGA ISQ™
Original Osstell Technology



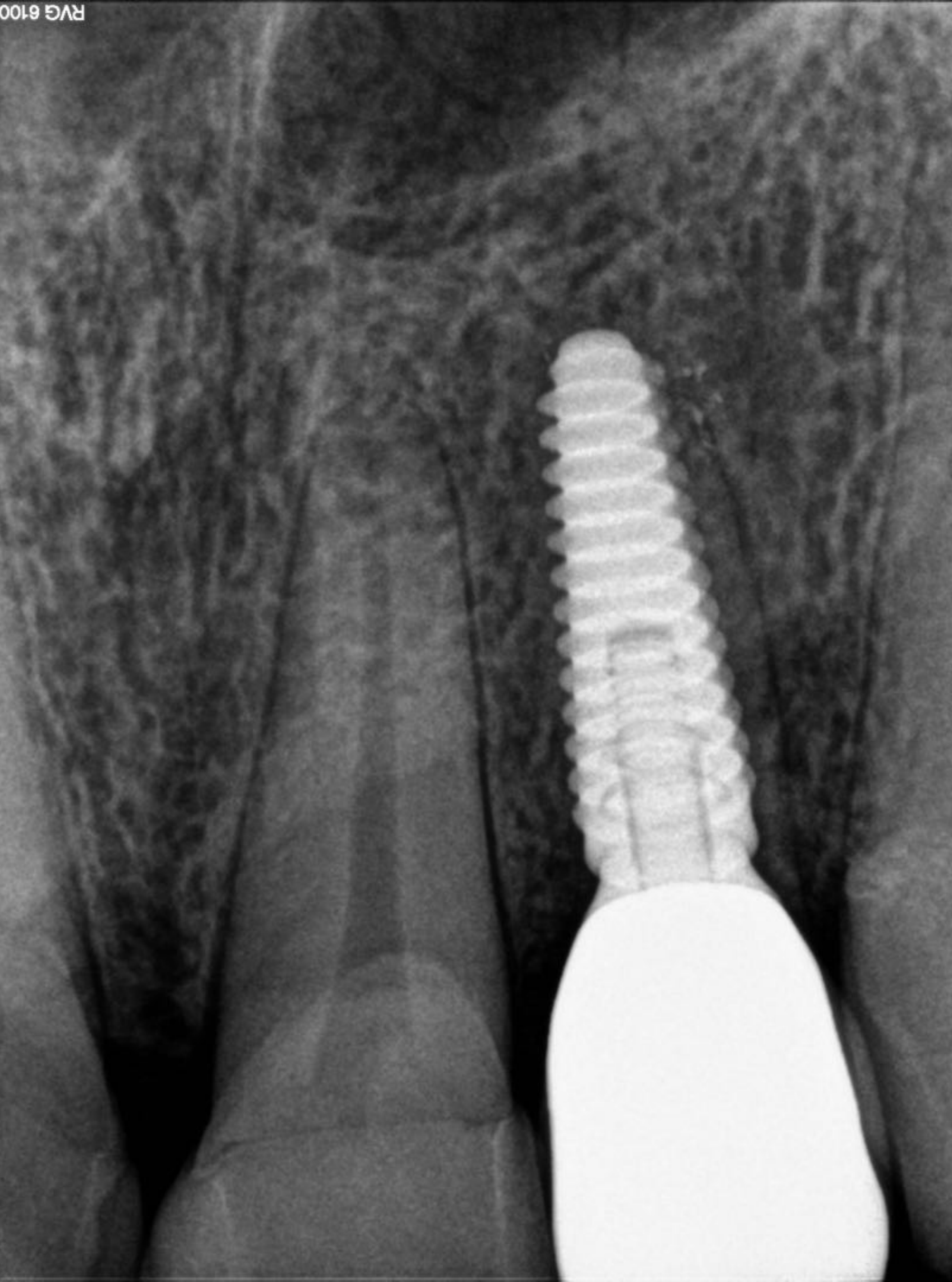
Screw Retained



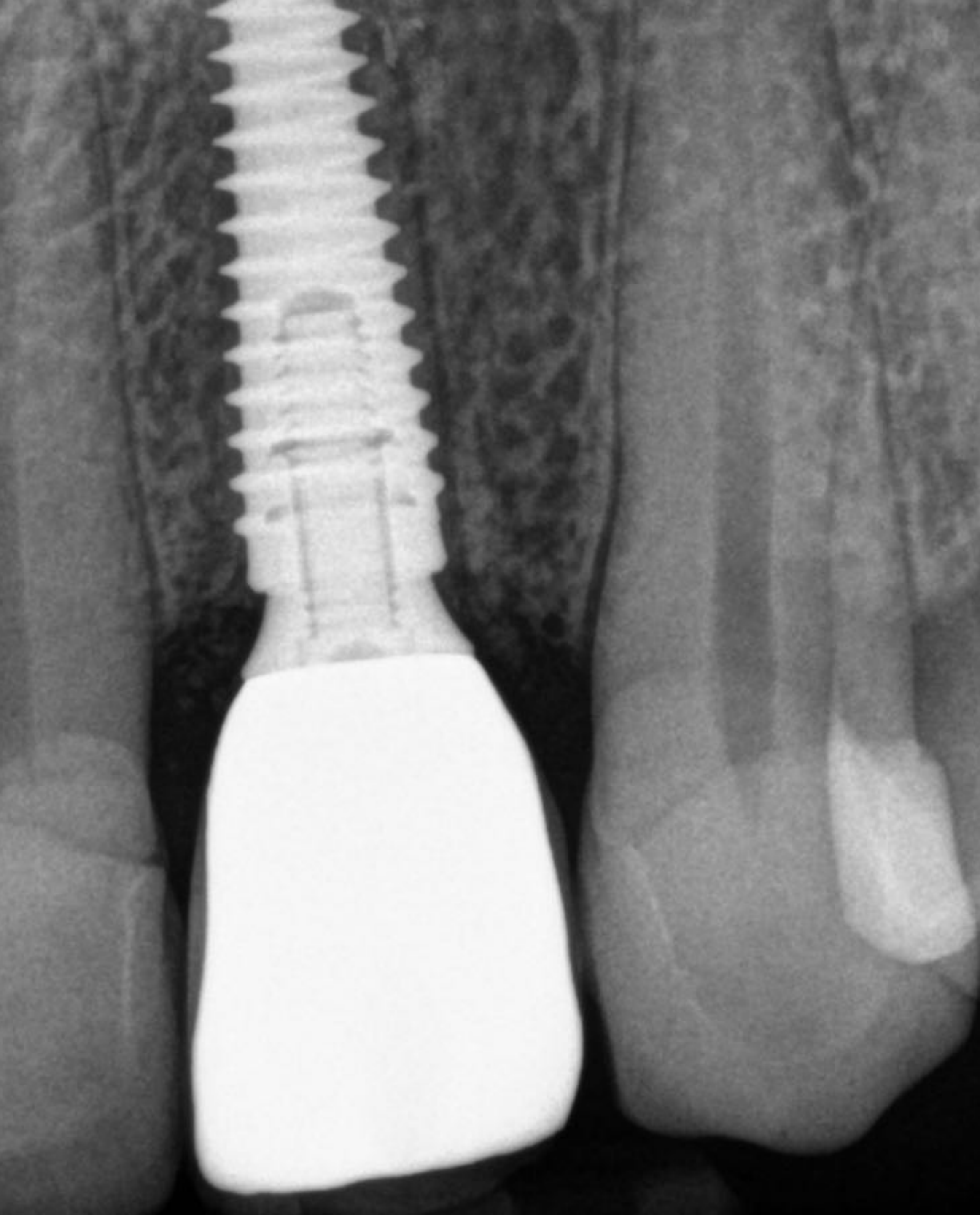
Contour -
Emergence Profile



6 WK POST OP



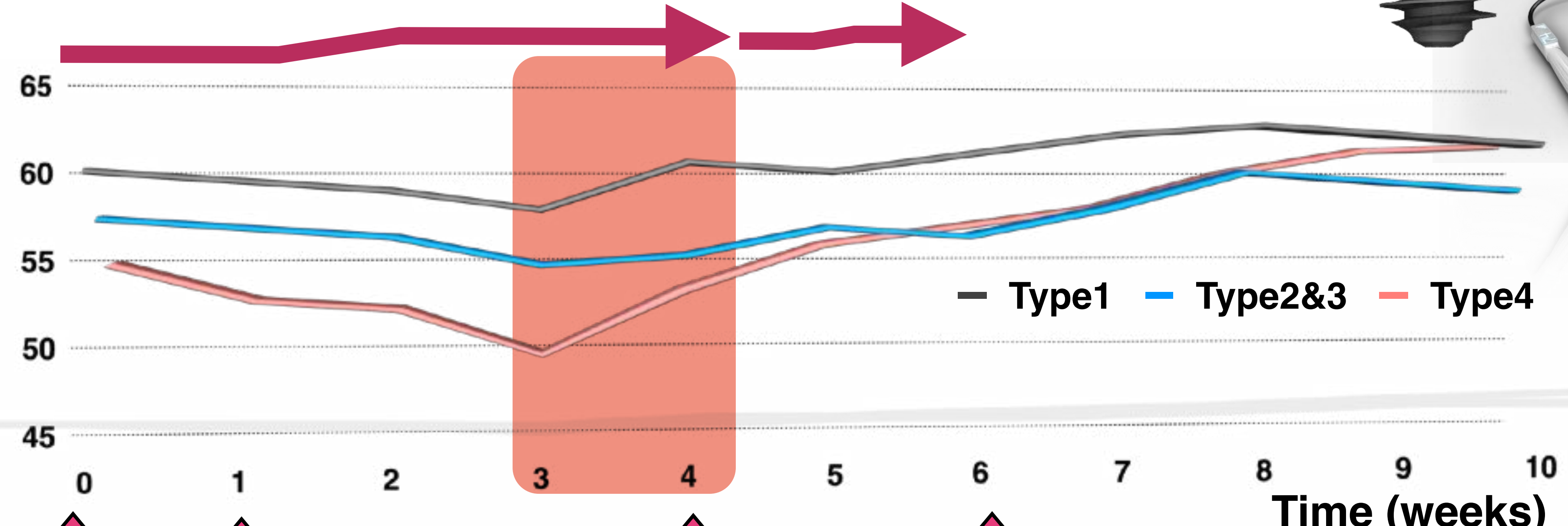
6 YR POST OP



Loading Time with AnyRidge Implant (predictable 6 week loading protocol)



ISQ mean values



↑
Day 0 :
Implant
placement

↑
1 wk :
stitch
out

↑
4 wk :
check
up

↑
6 wk :
loading
starts

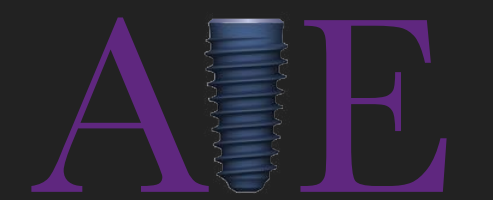
Measure ISQ again and deliver prosthesis if it has not decreased.

If the ISQ value is **higher than 70** and making a plateau or increasing, take an impression!



HORIZONTAL FRACTURE

PET/RM/SS TECHNIQUE

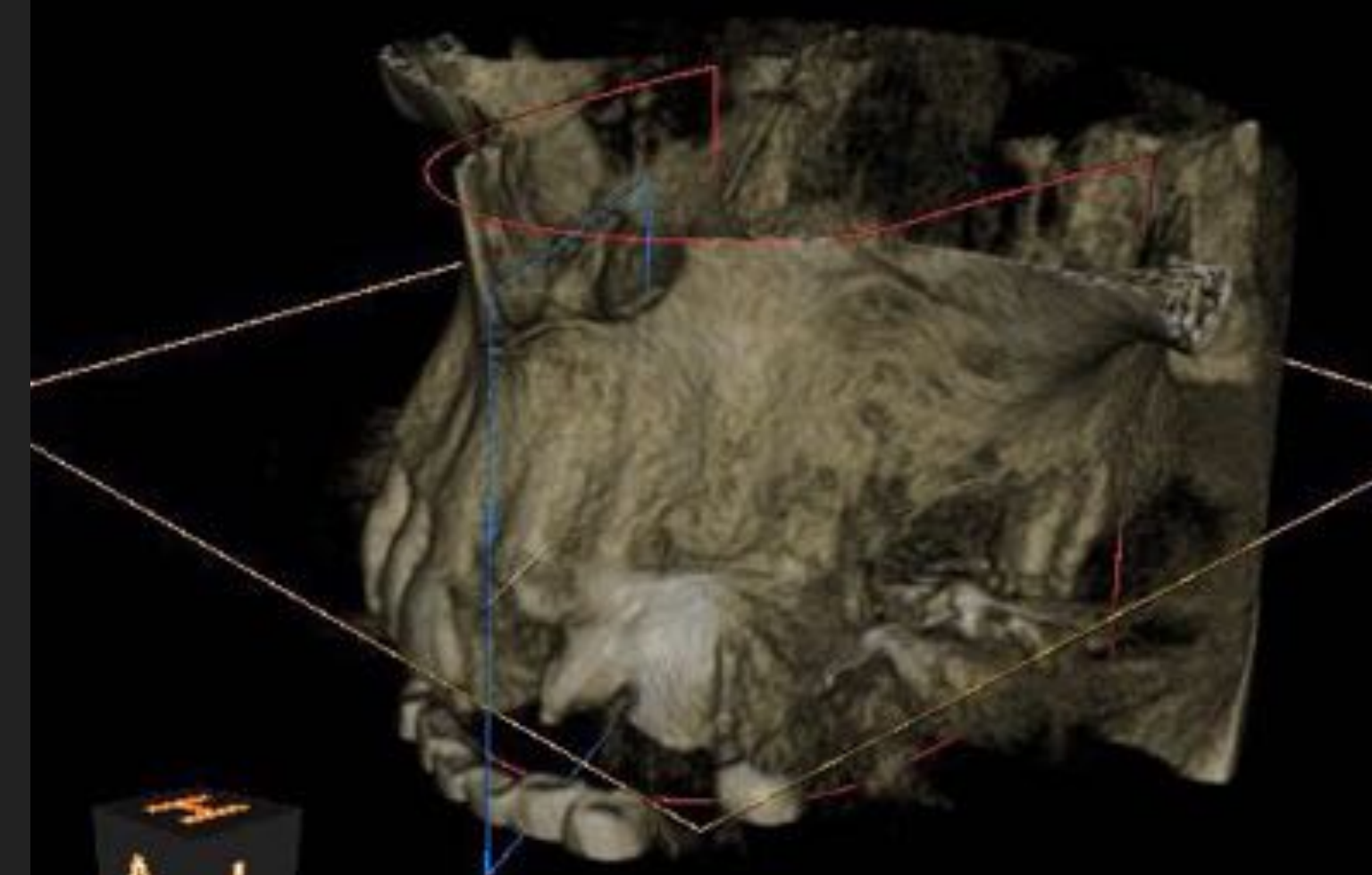


Advanced Implant Educators



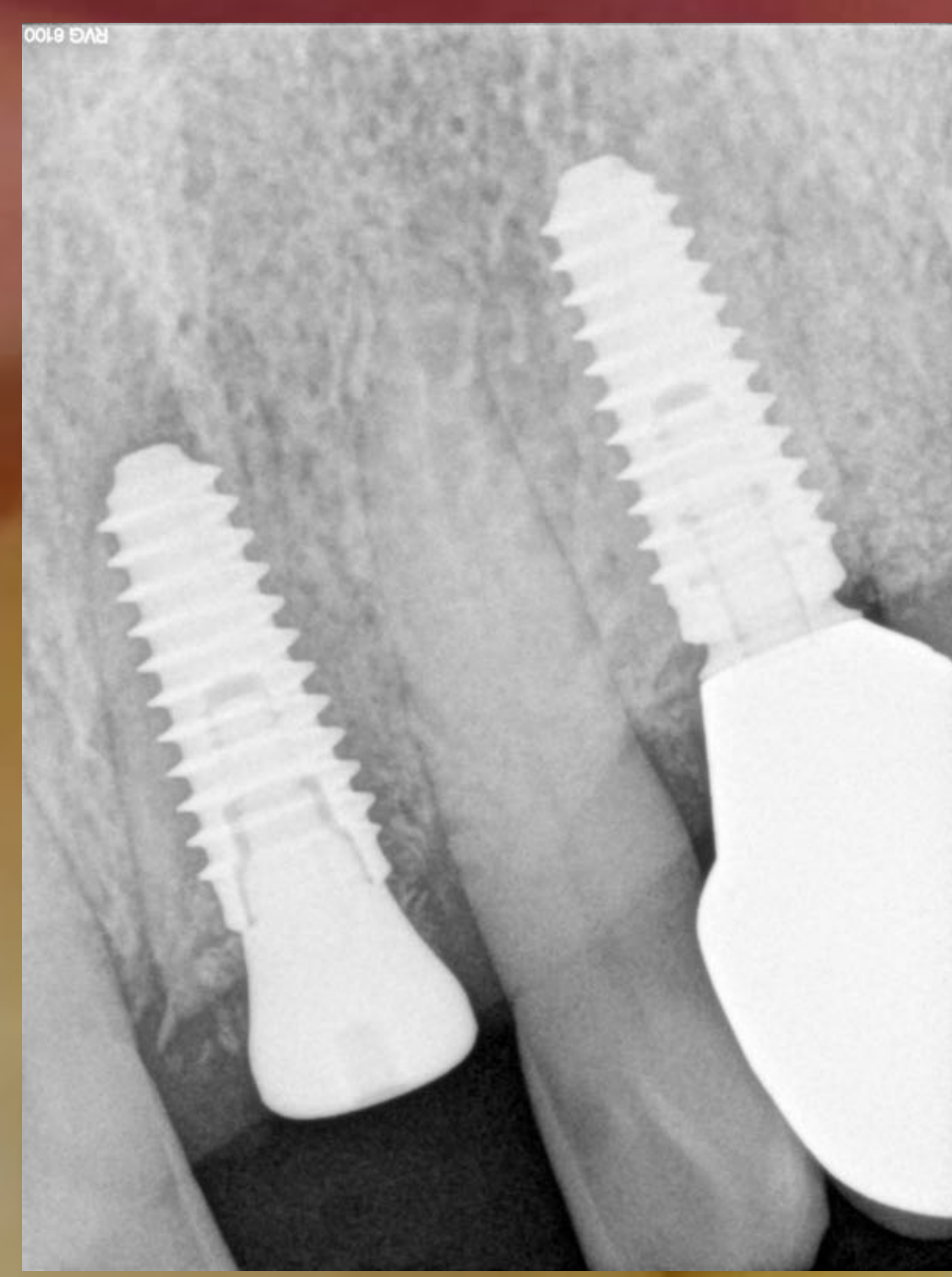


Integration mode: AVG. Slice thickness: 180 µm.



POST OP

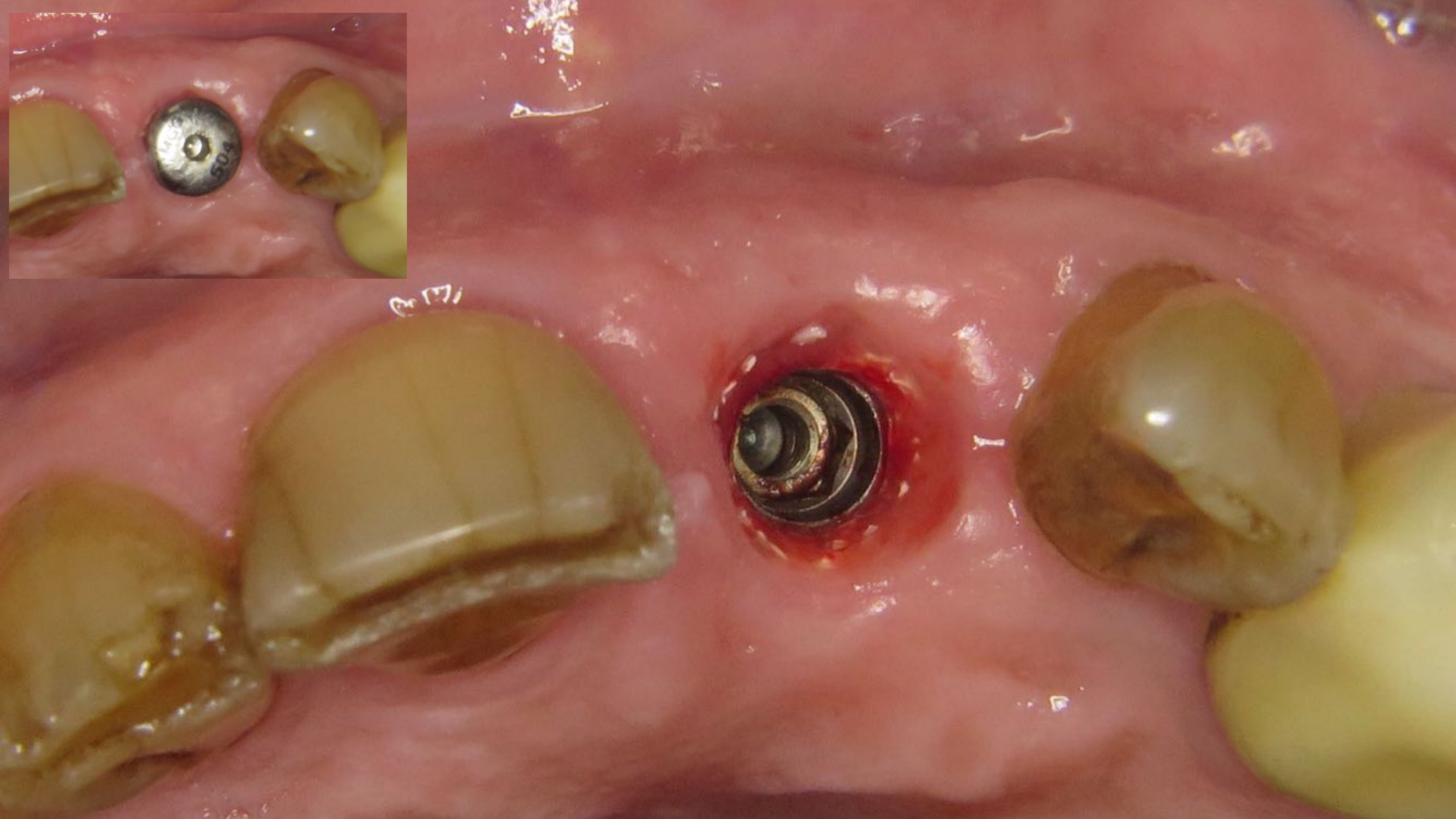




2 WEEK PO



6 WEEK PO







3 YR PO

Integration mode: AVG. Slice thickness: 180 µm.



Integration mode: AVG. Slice thickness: 30.1 mm.



Slice spacing: 1.1 mm.



3 YR PO



3 YR PO

Marie



Failing Lateral

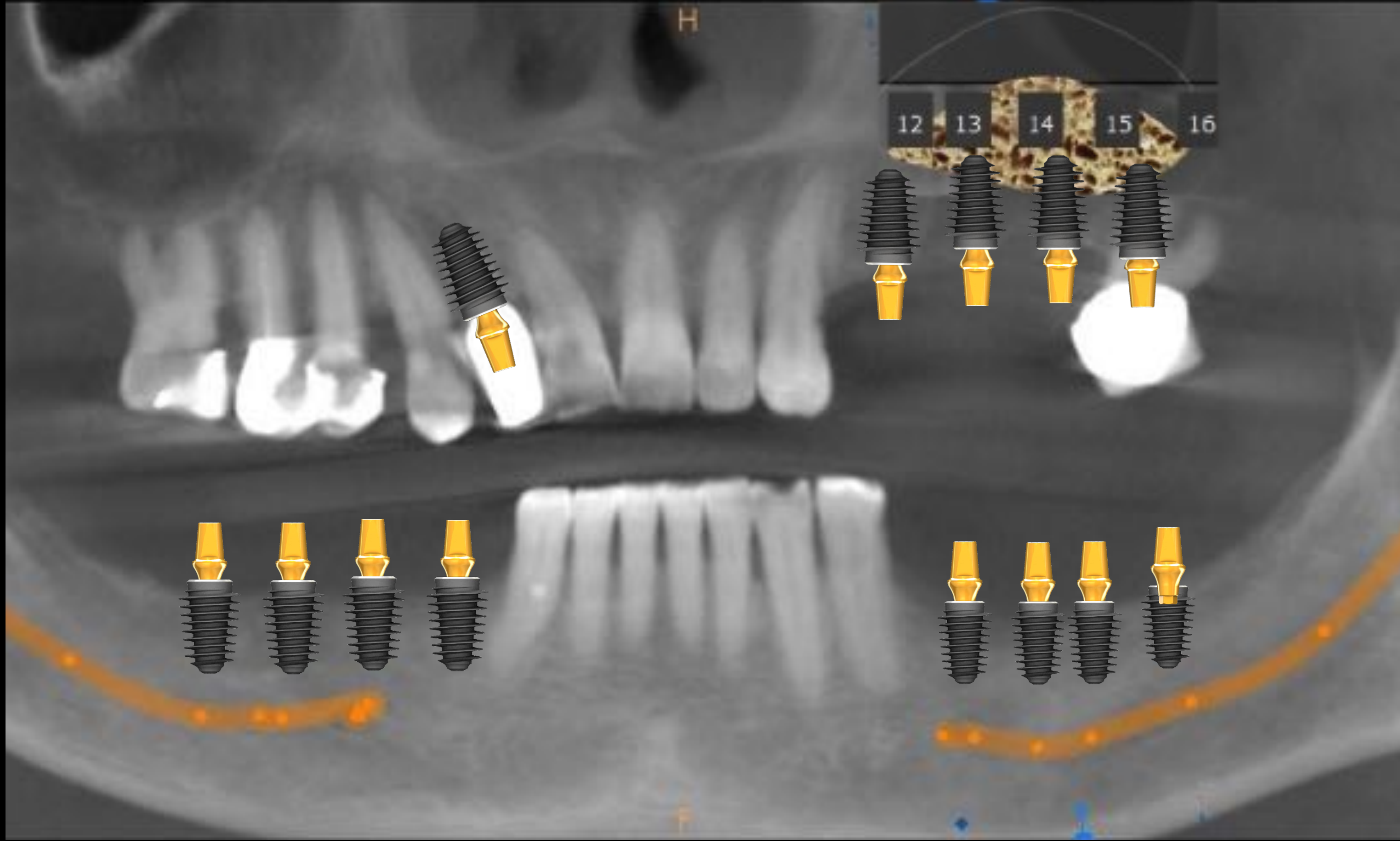
Integration mode: AVG. Slice thickness: 20.0 mm.

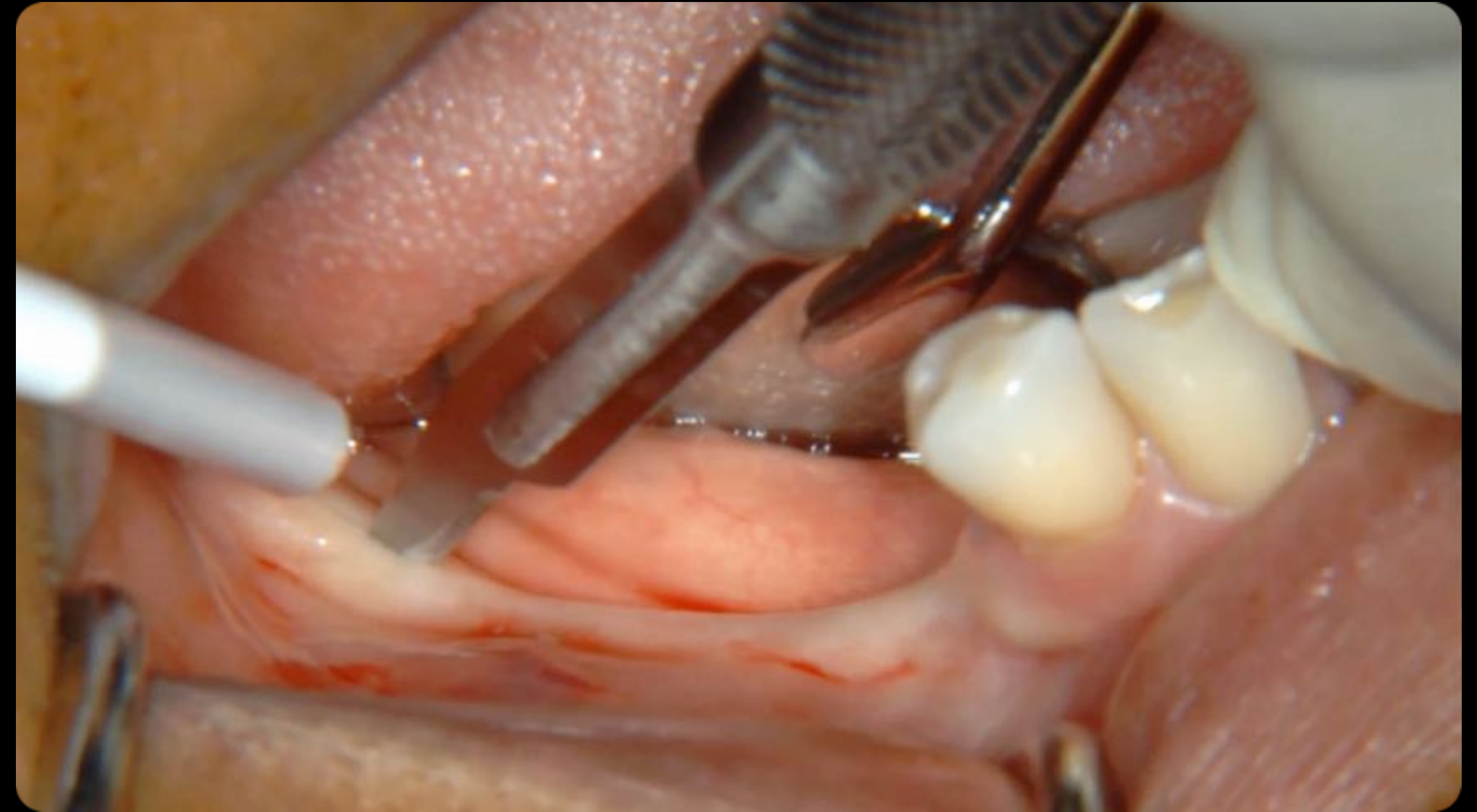


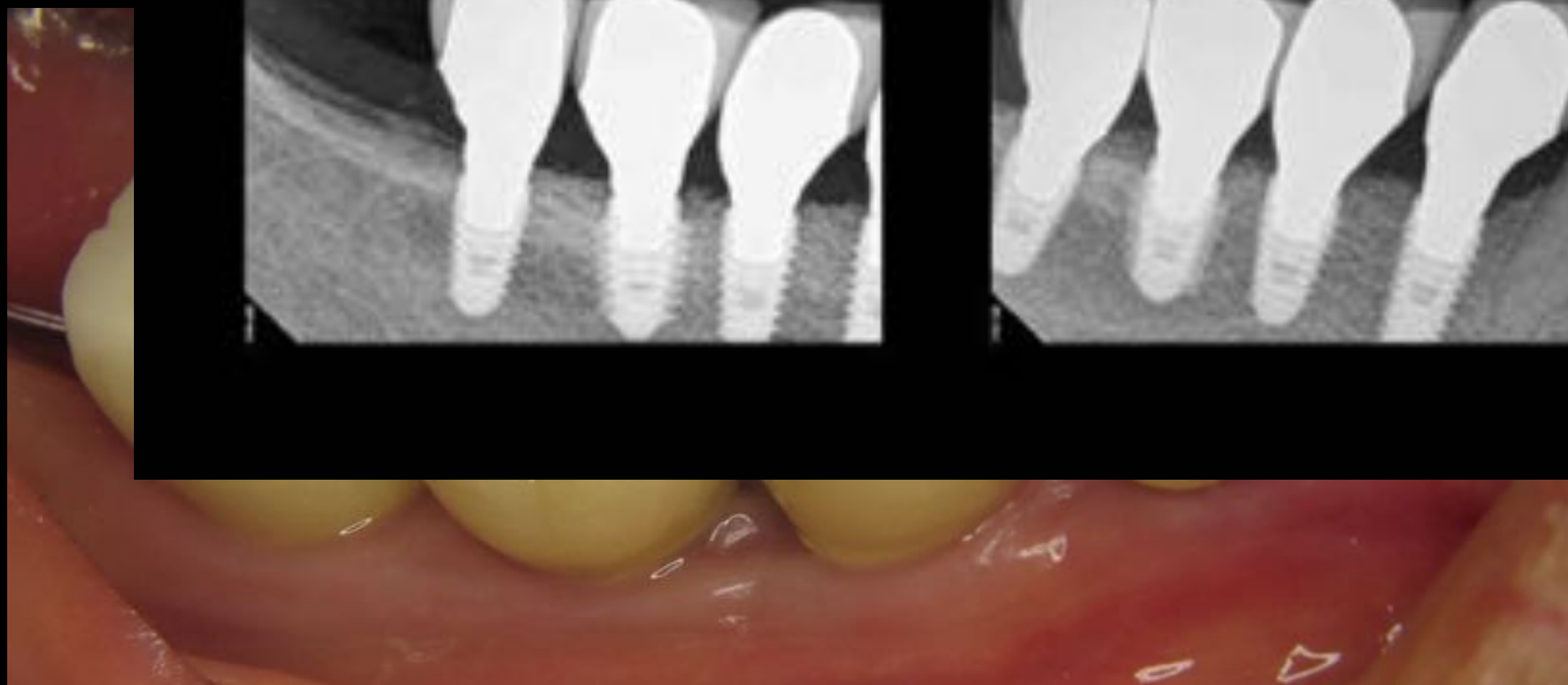
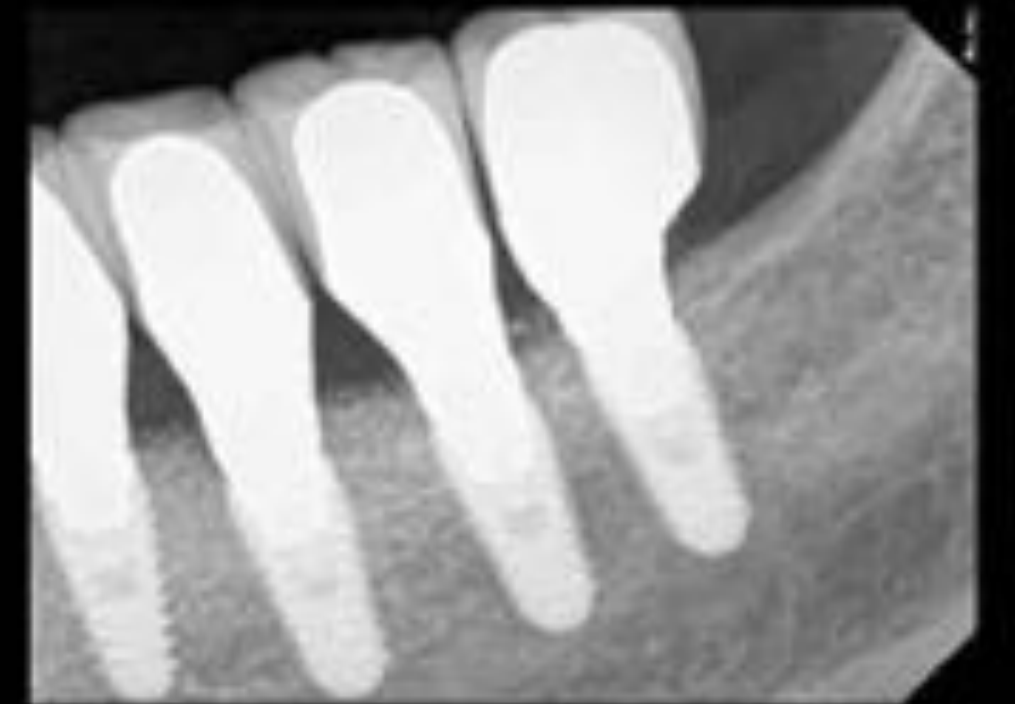
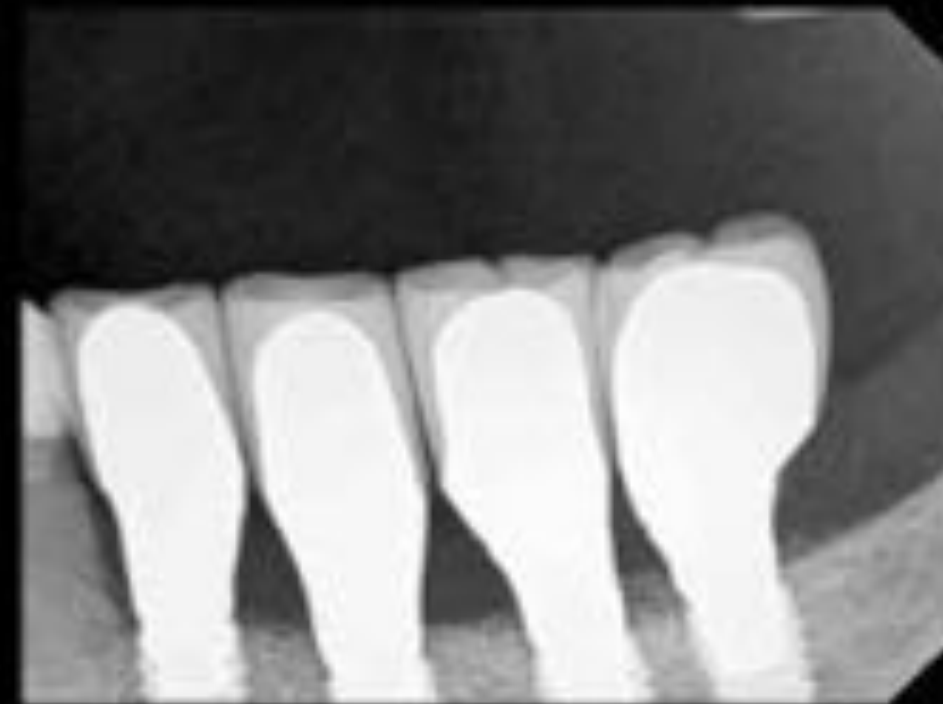
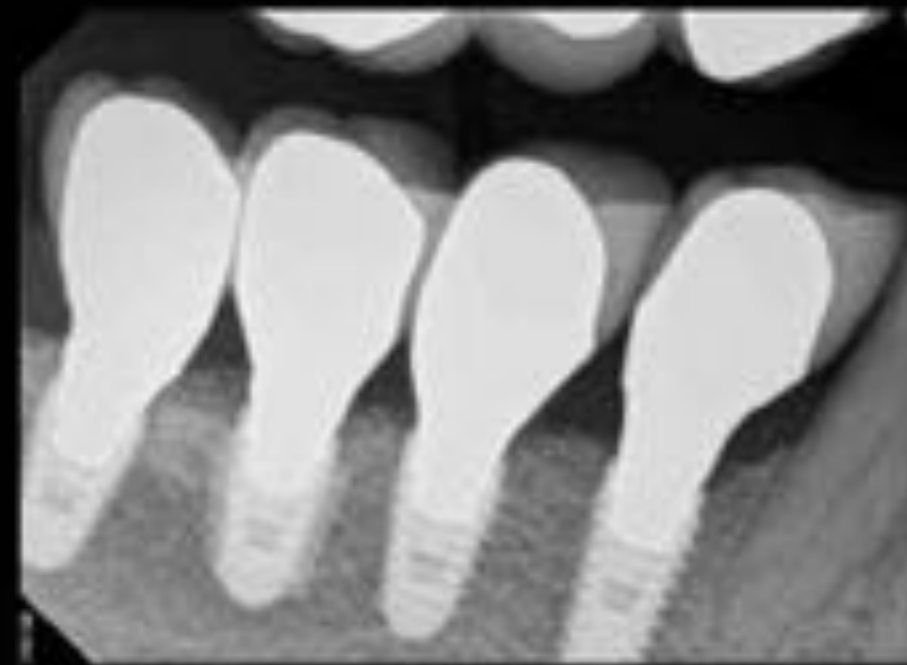
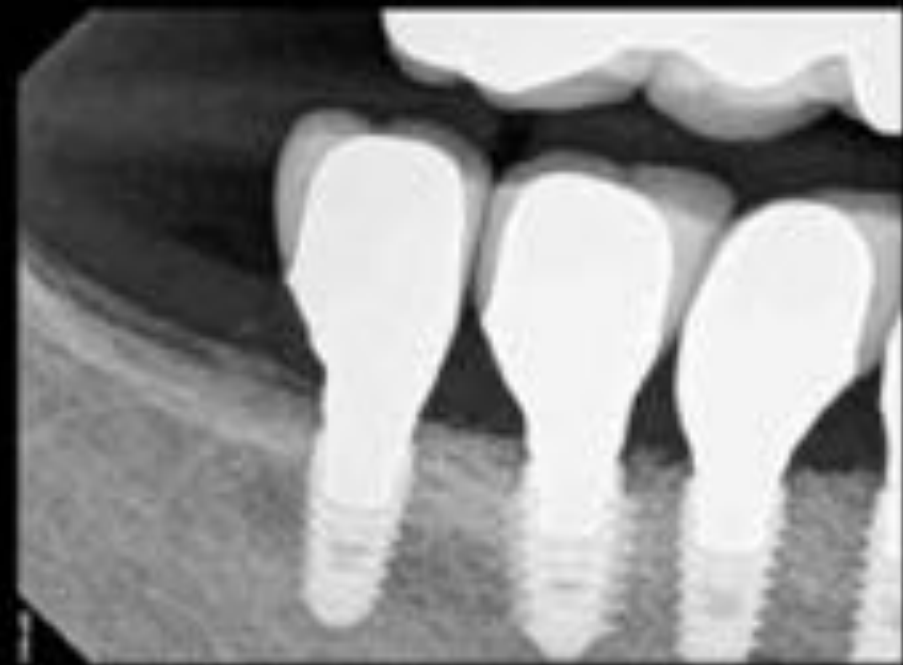
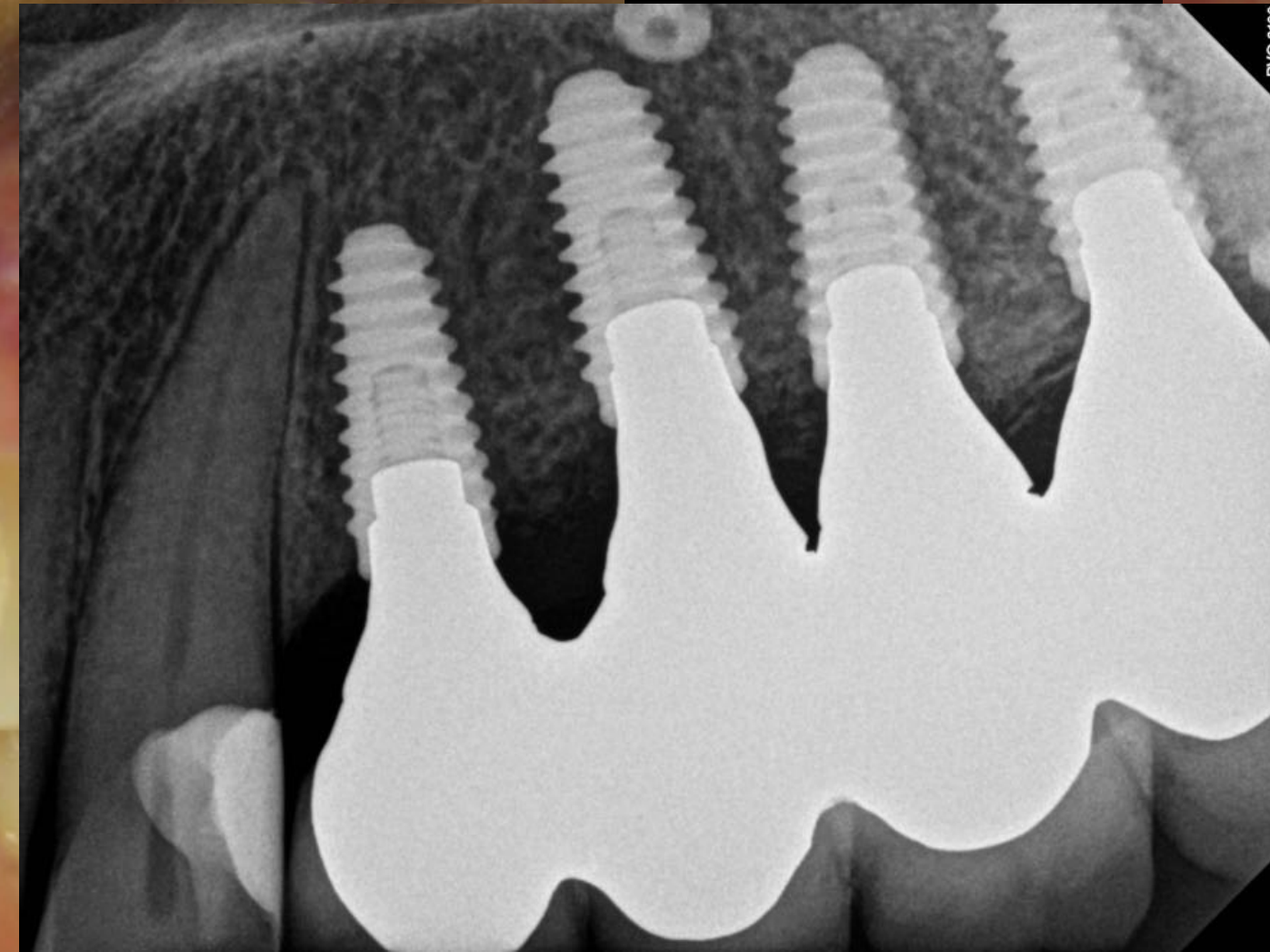


Marie





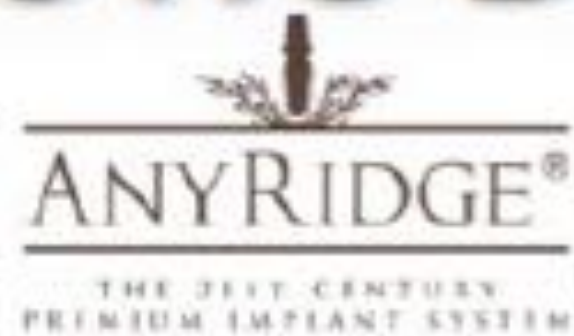




PET

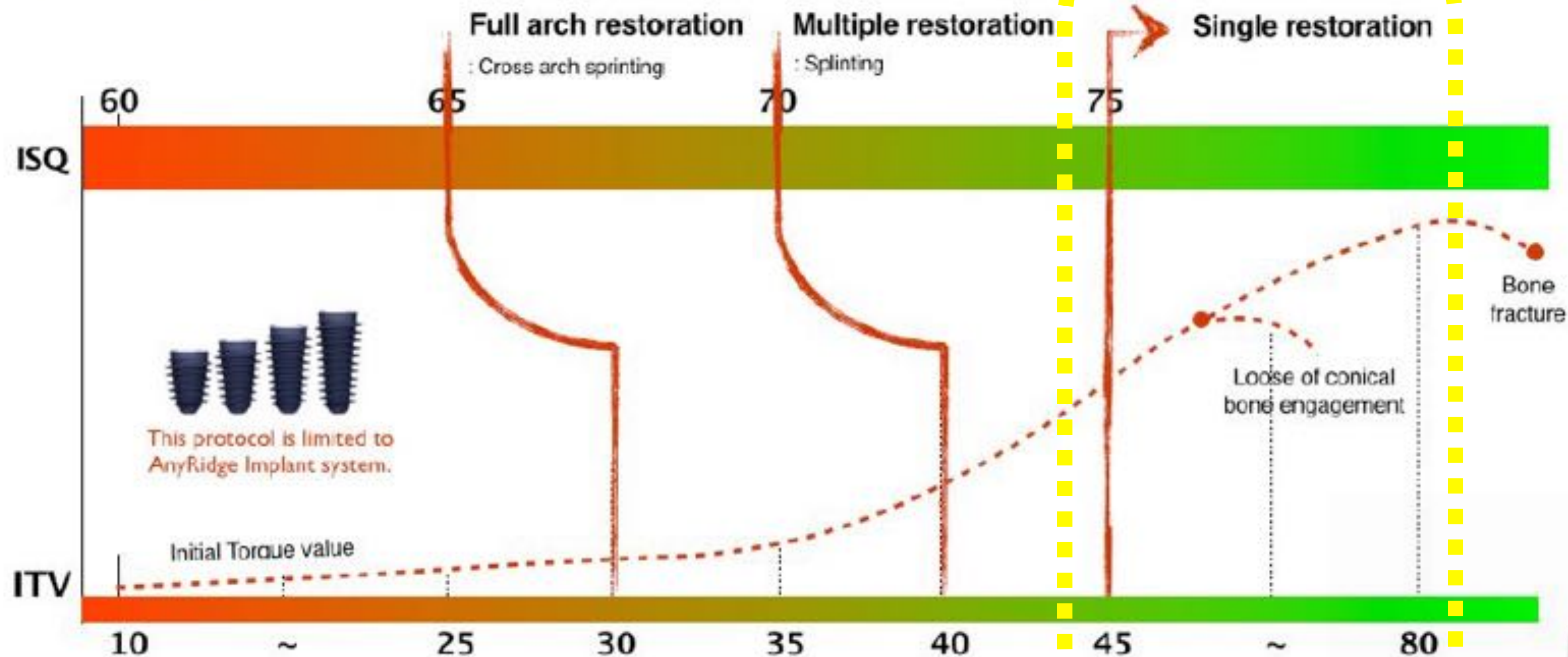


One Day Implant



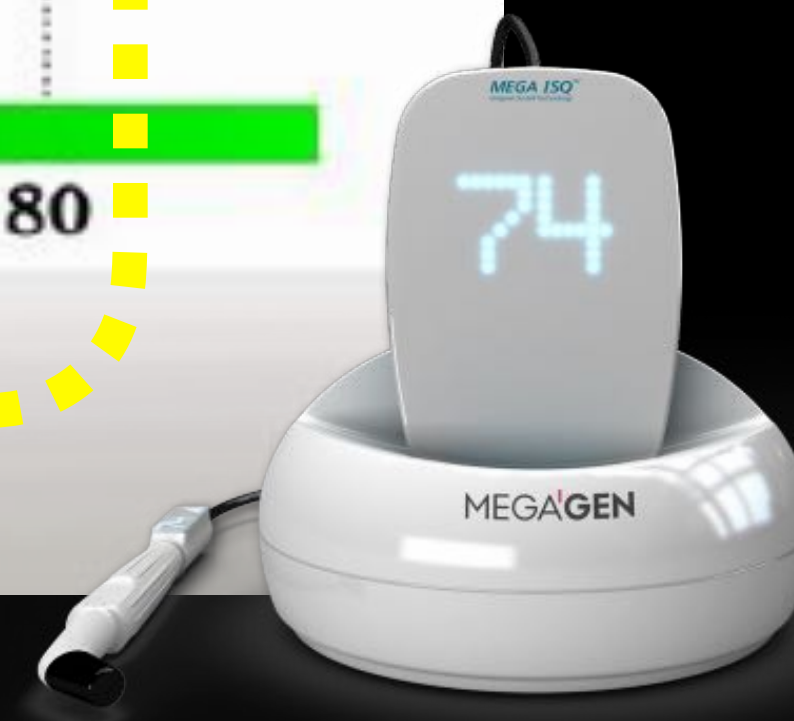
Immediate Loading Protocol

under the value of
ISQ & ITV



European Scientific Meeting of
MegaGEN
6th Jun. 2014, Zurich, Swiss

T E A M
EUREKA R2



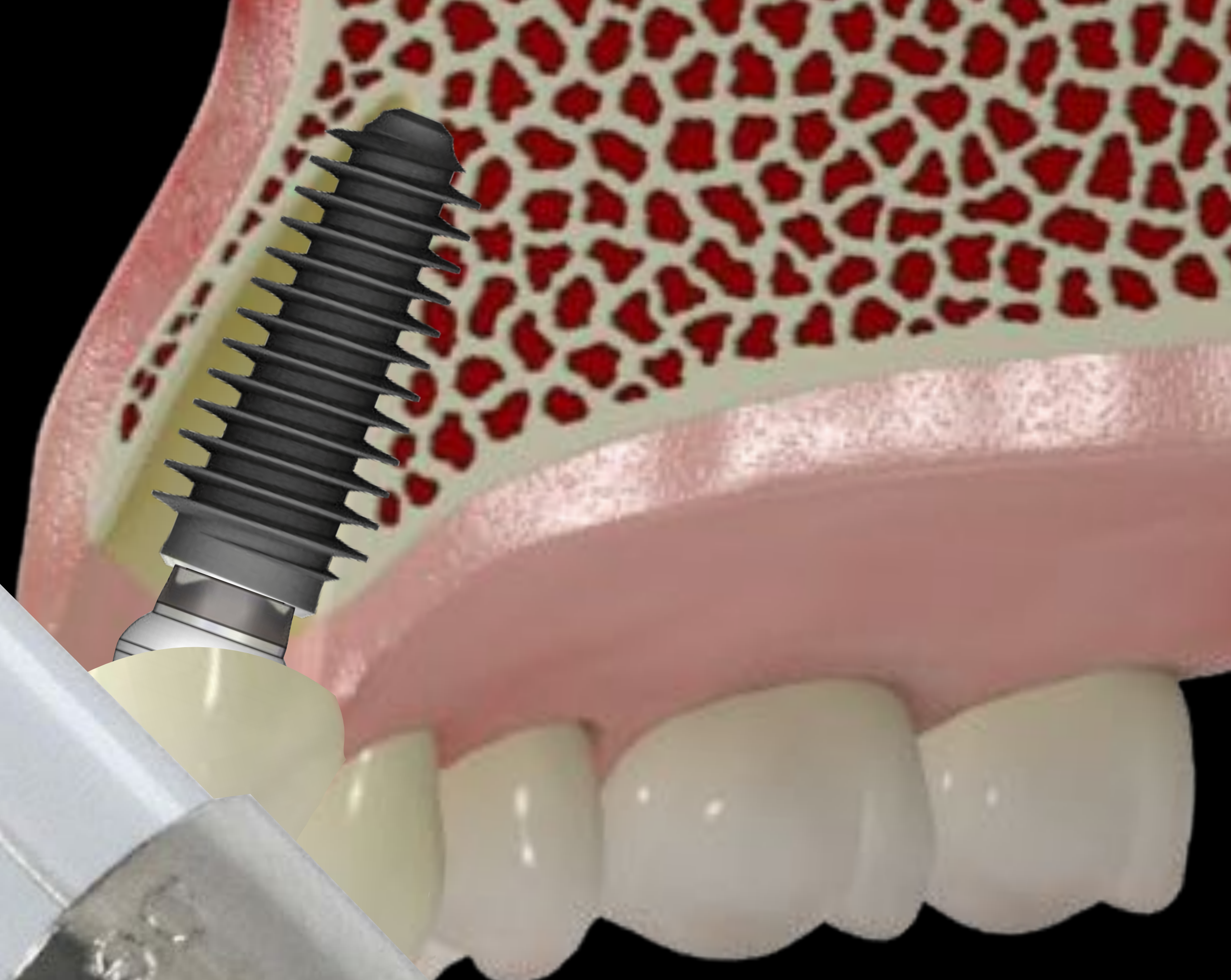
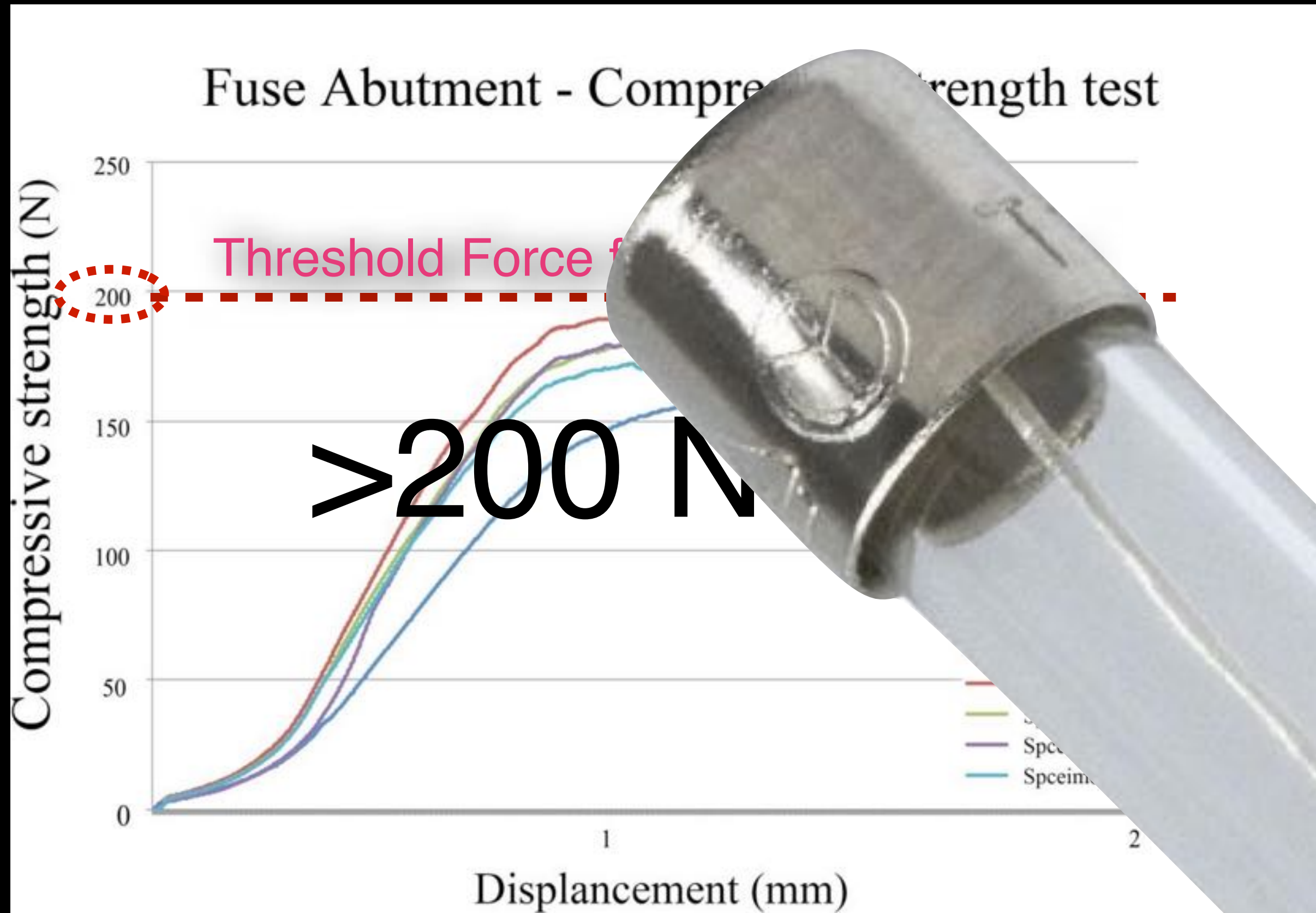
Temp screw-retained

Fuse Abutment



AIE

Advanced Implant Educators



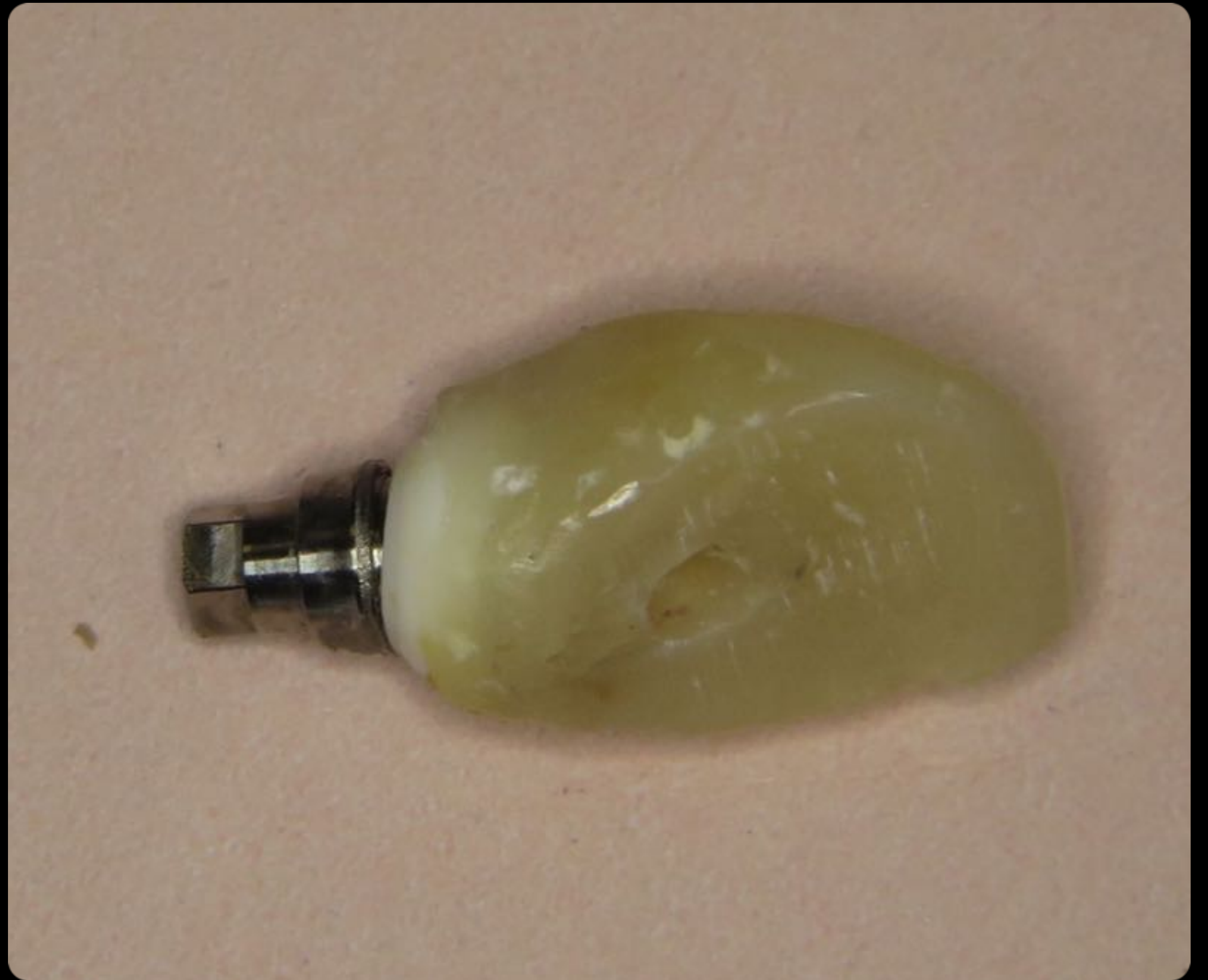
Brunski JB (1992) Biomechanical factors affecting the bone–dental implant interface. Clin Mater 10:153–201
 --- 100 μm movements is critical for osseointegration.
 --- It needs about 220N (22.4 kgf) force.







Snap back on



12 weeks



Slice spacing: 1.1 mm.



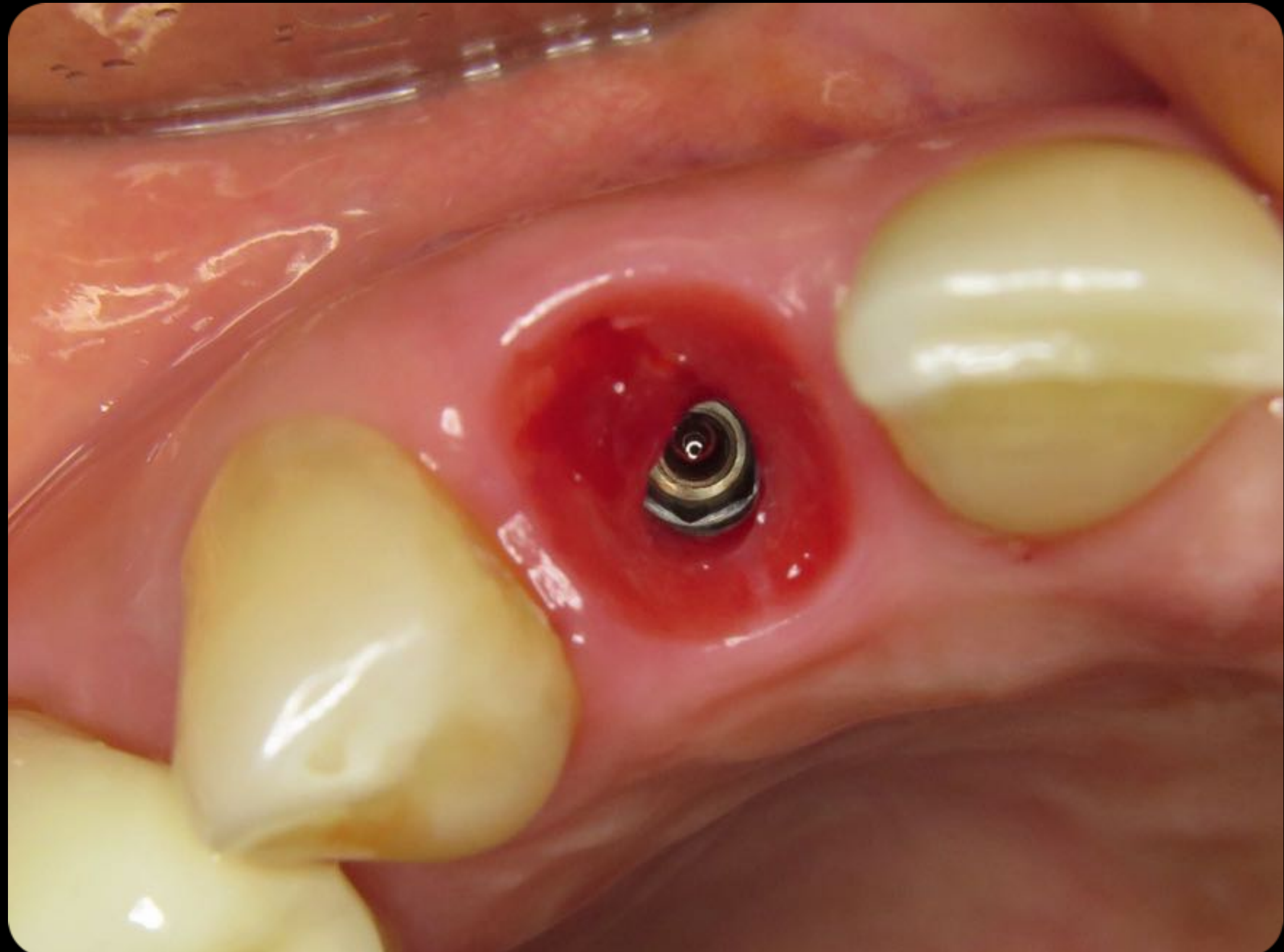
L B



L B



12 weeks

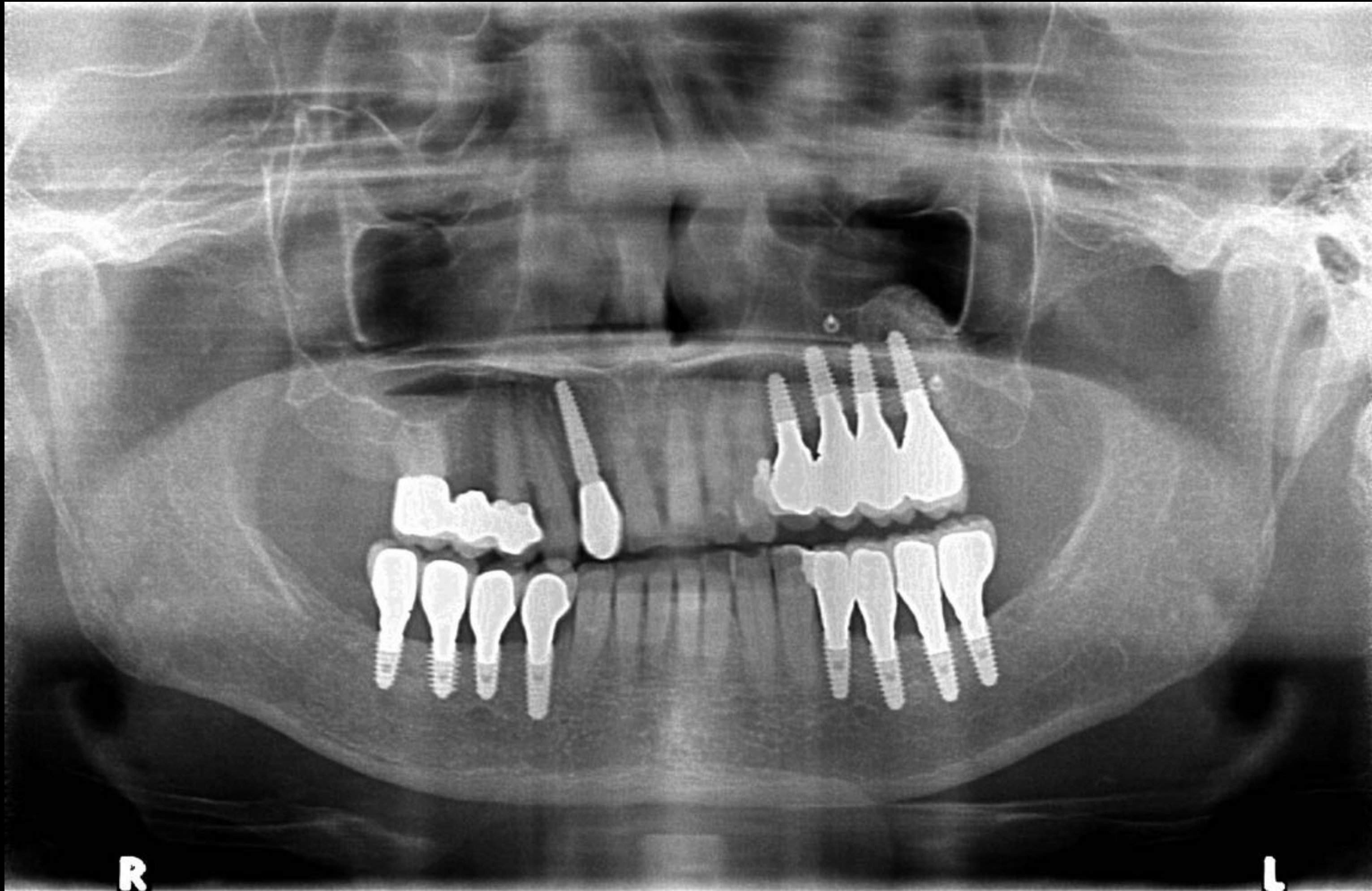
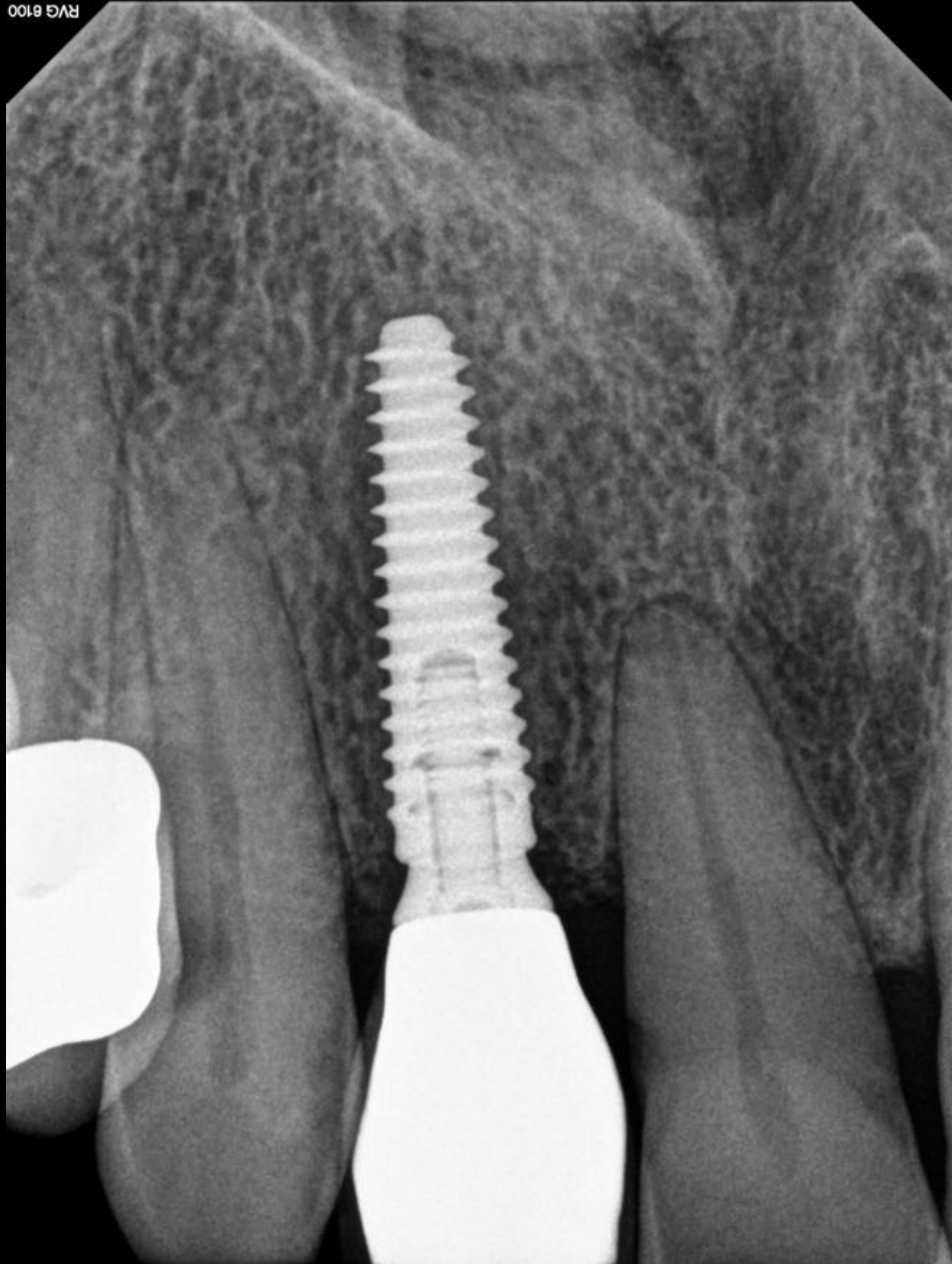


14 weeks



32 MONTHS FOLLOW UP

RVG 8100



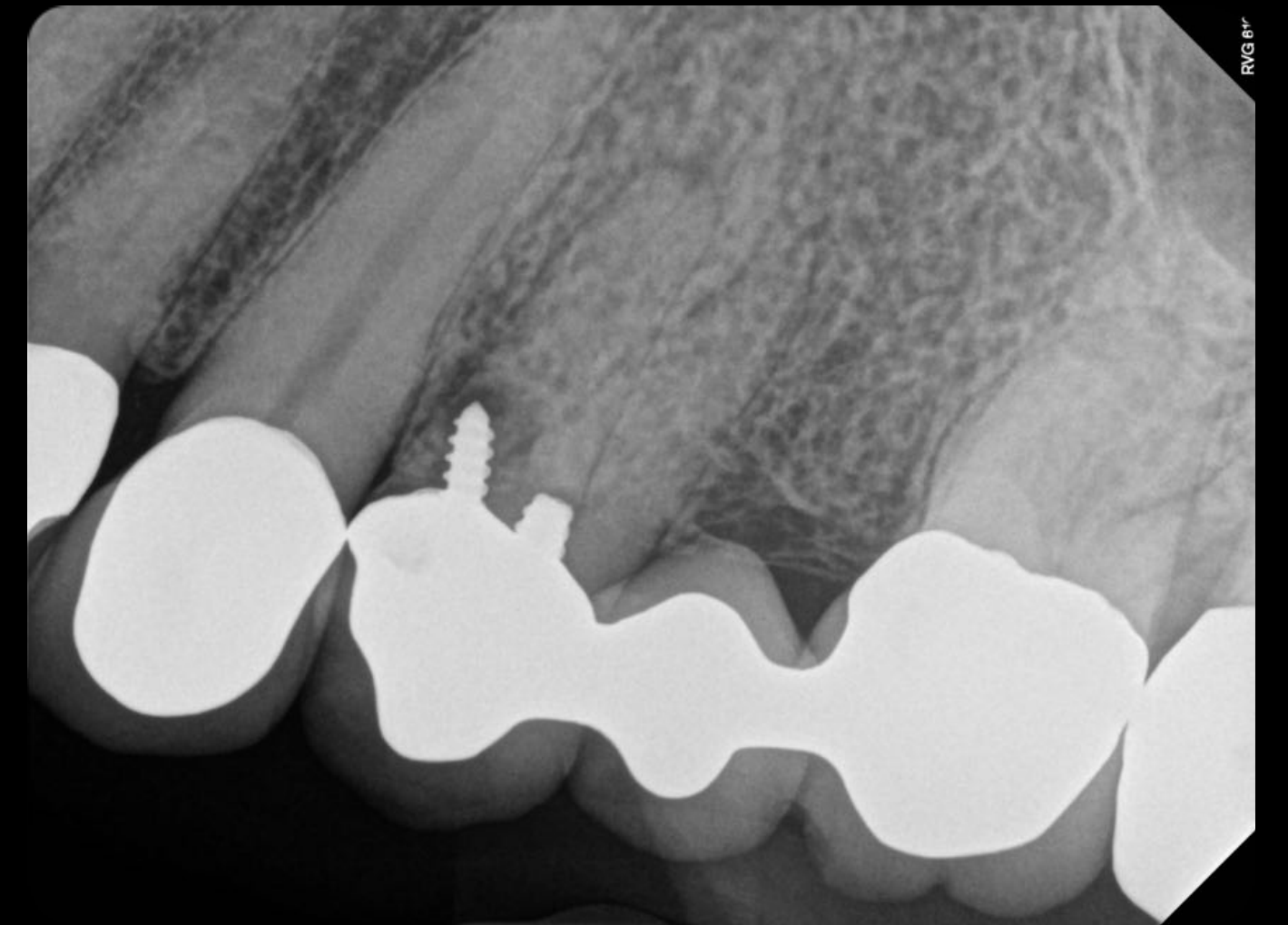
YEAR FOLLOW UP

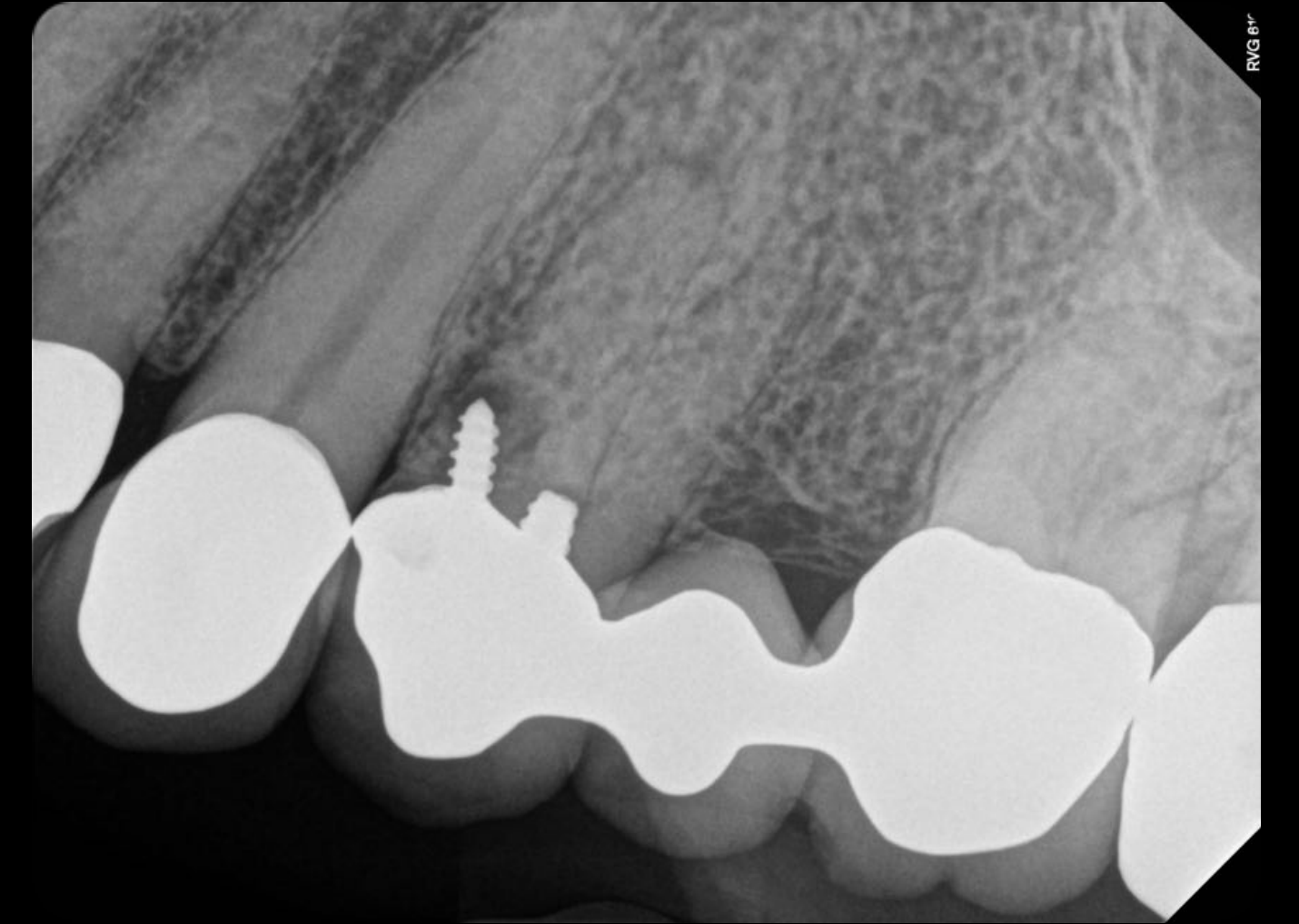


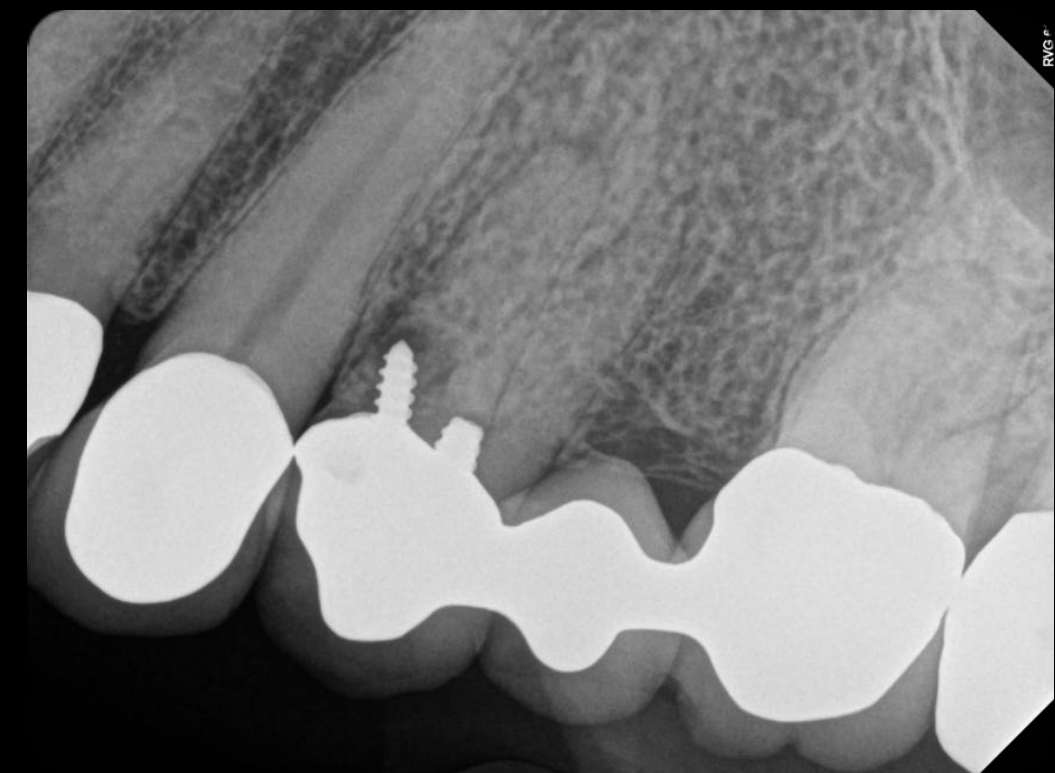
AIE

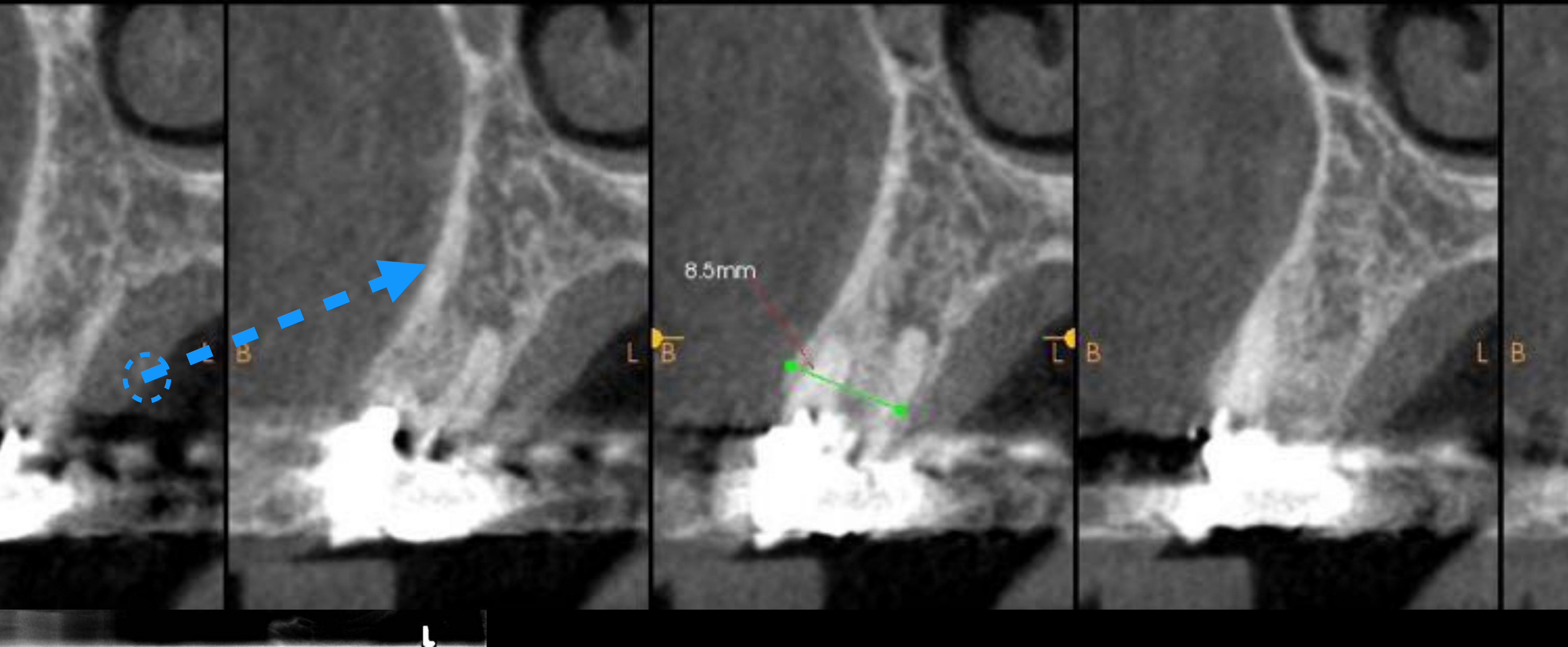
Advanced Implant Educators

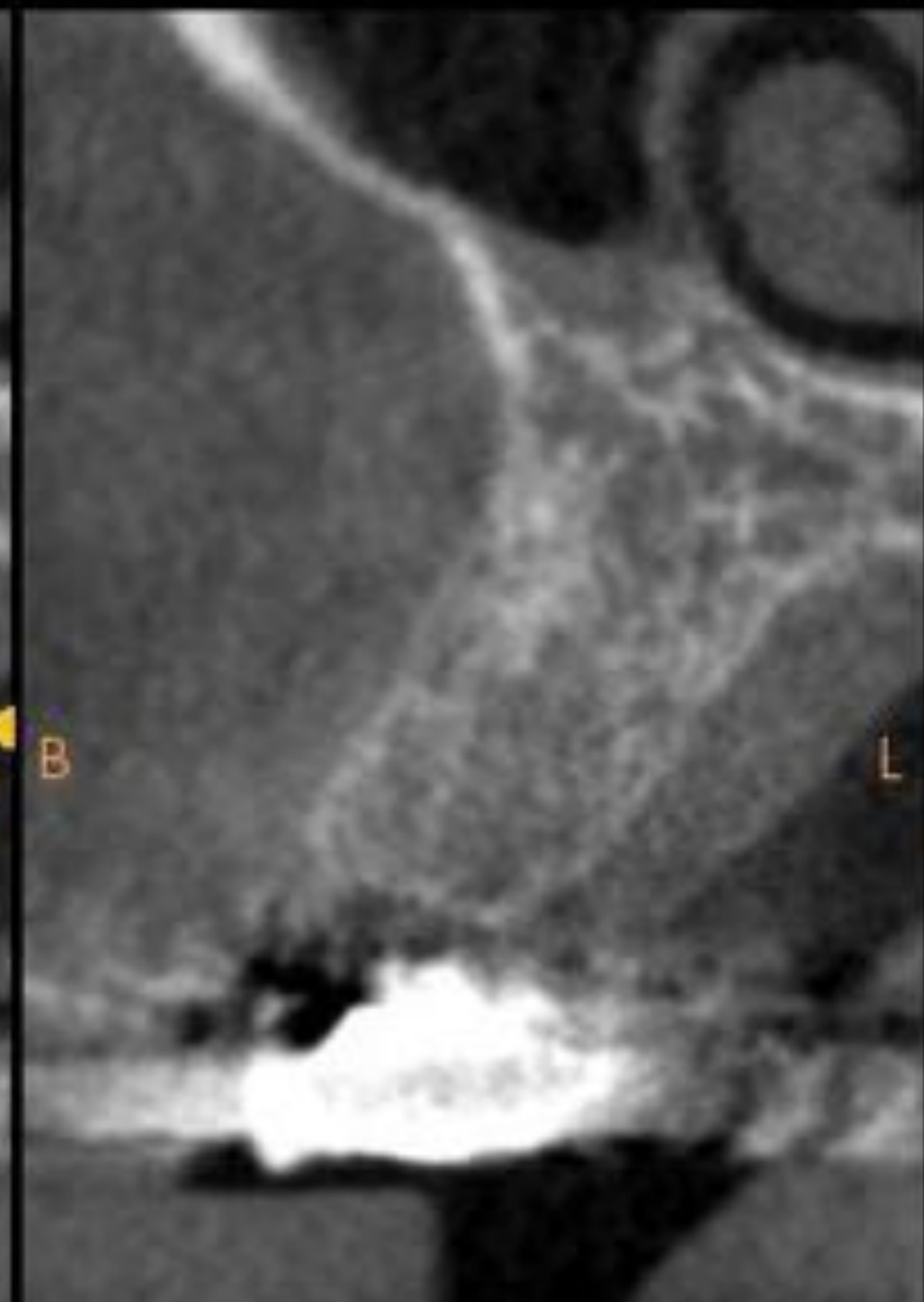
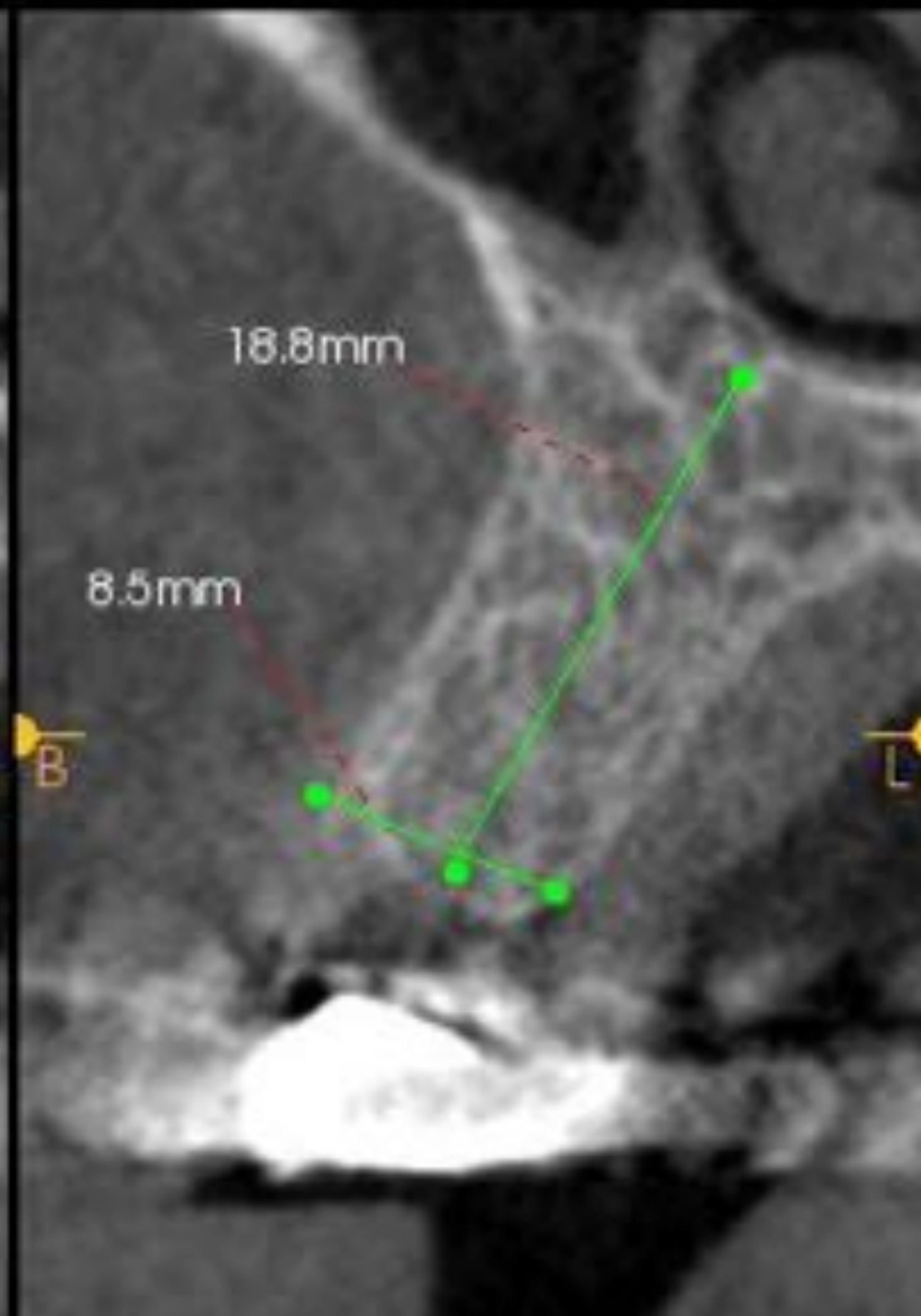
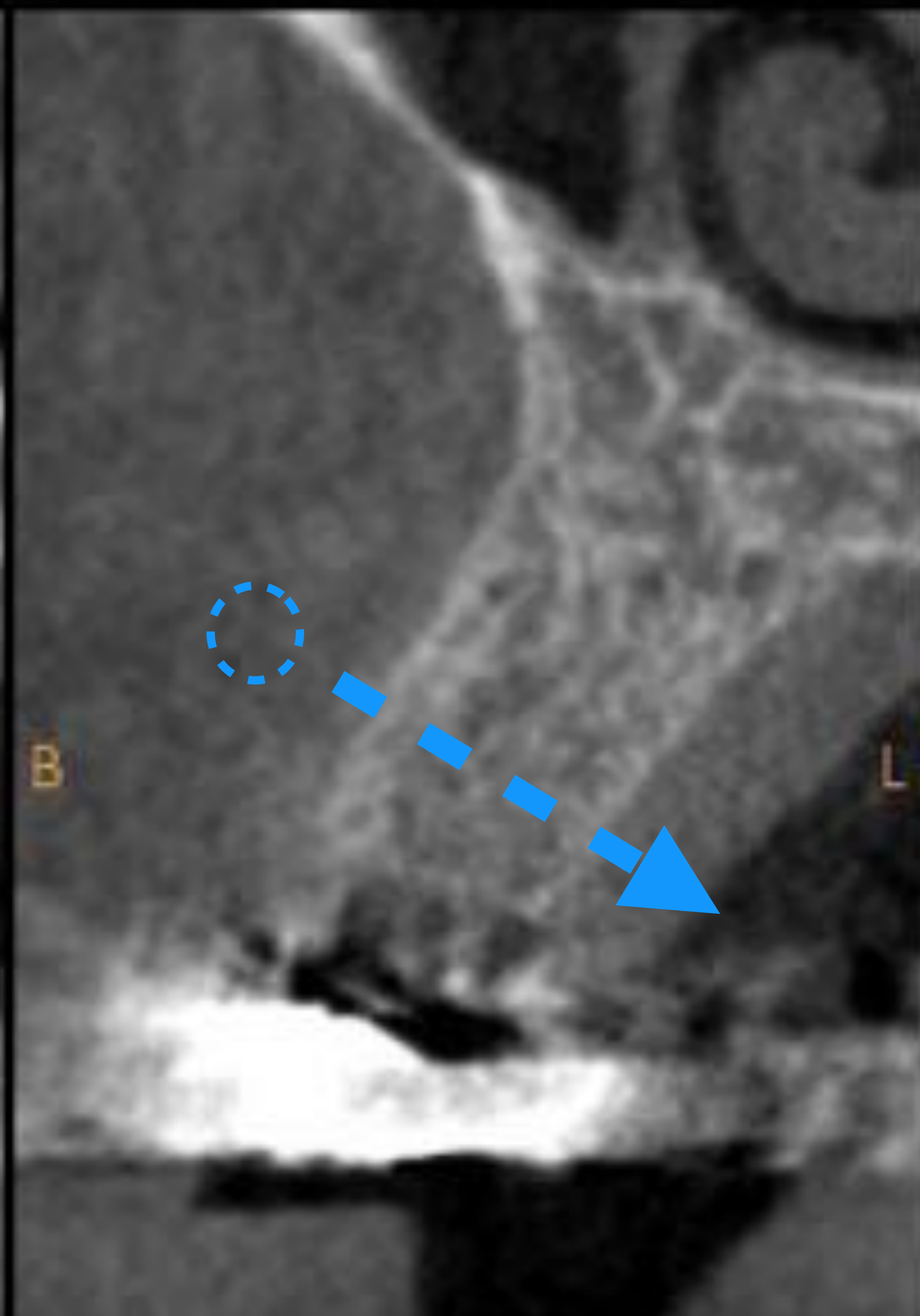
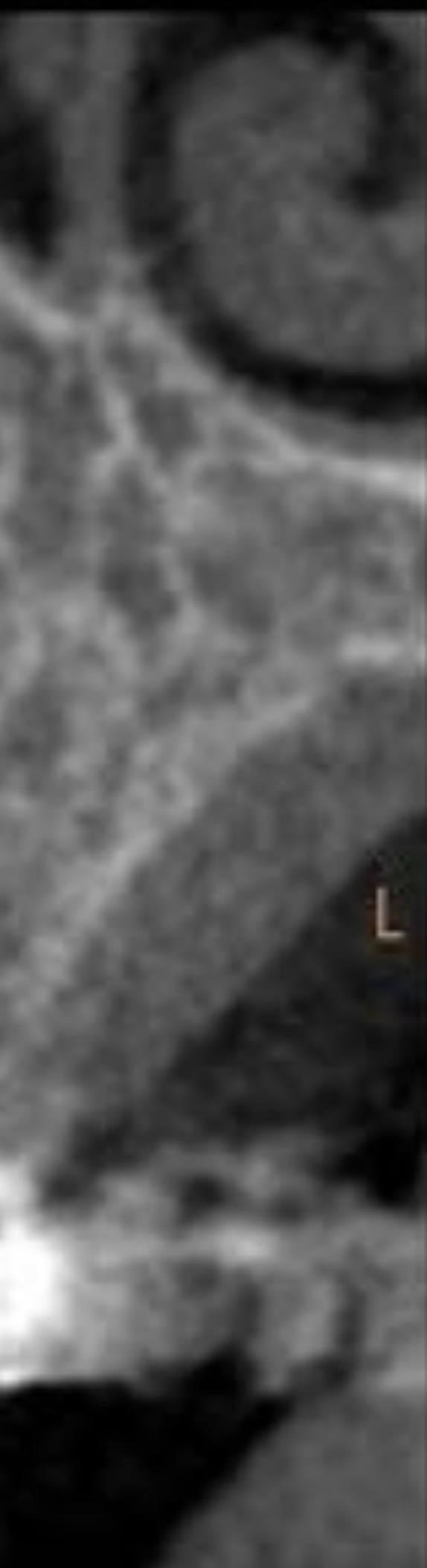
Diane

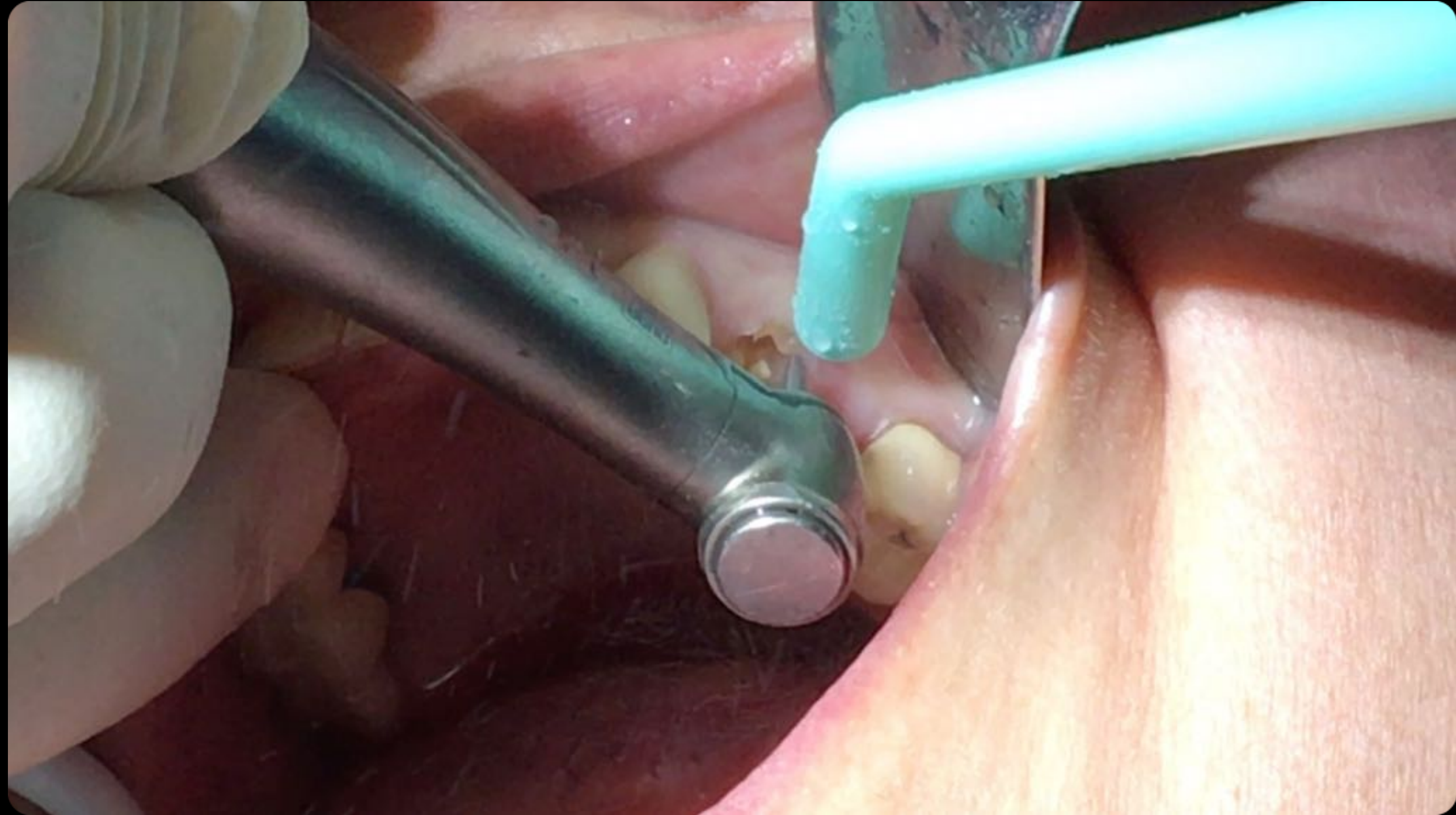






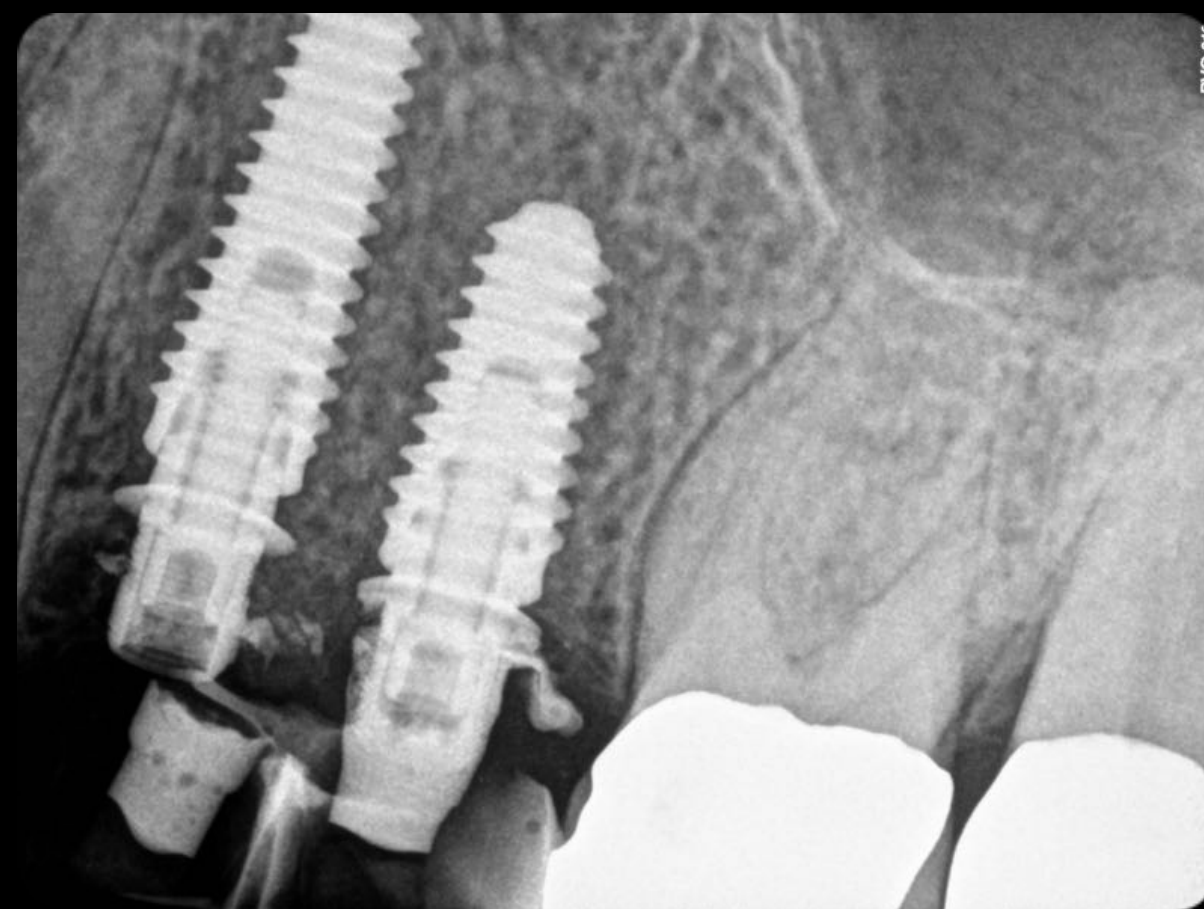
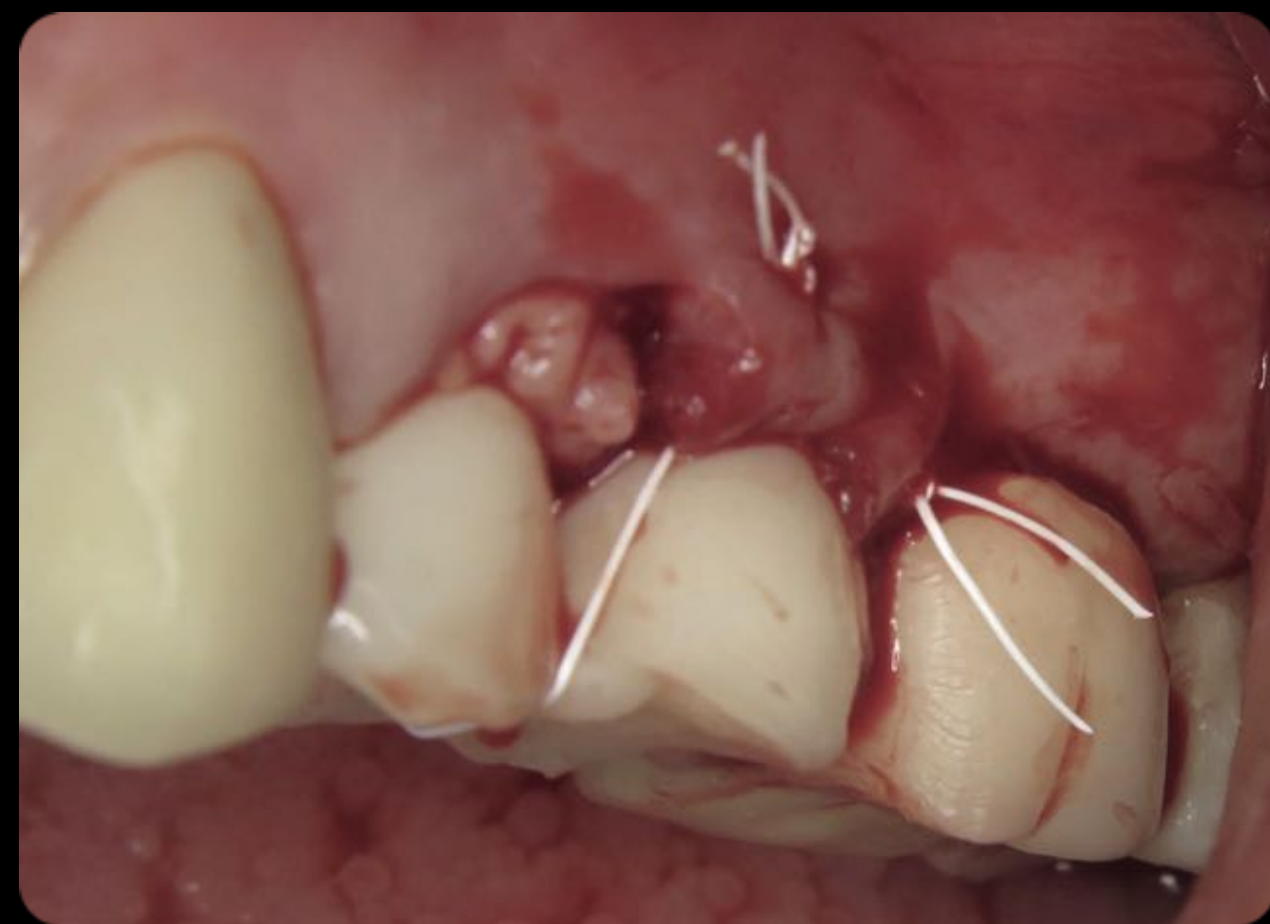








Post op



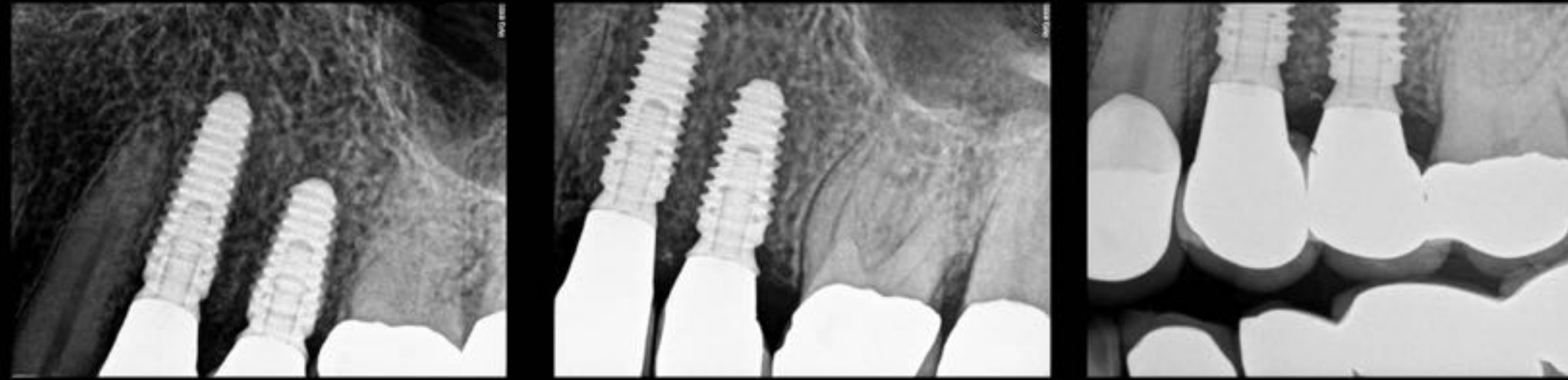
1 Month



3 Months



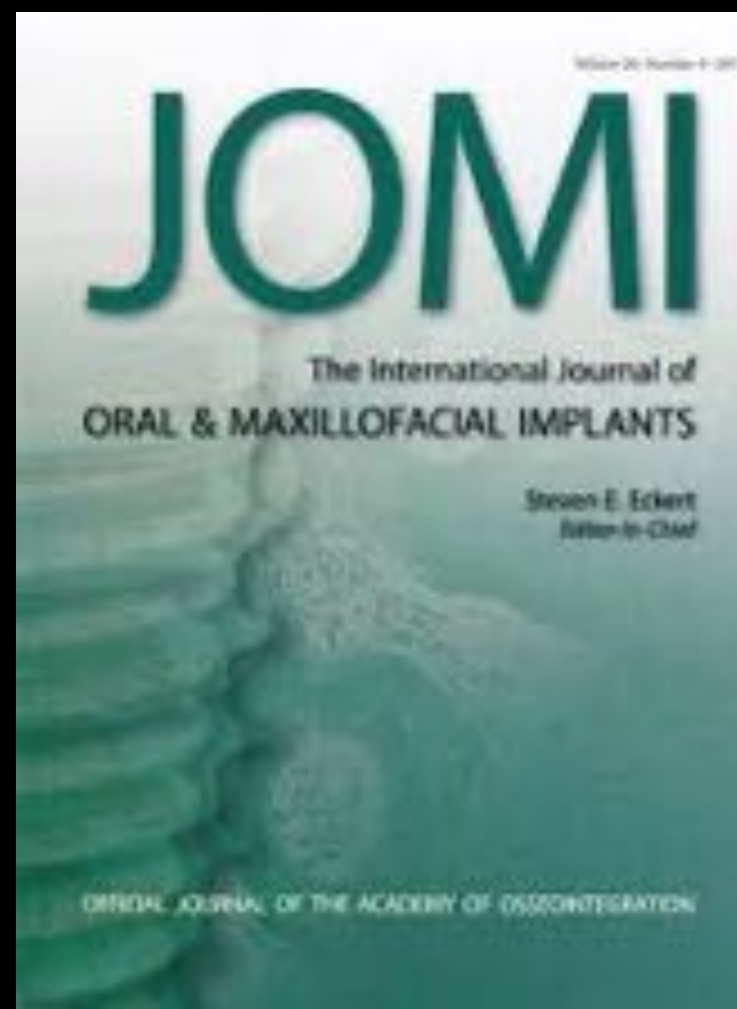
19 month post op





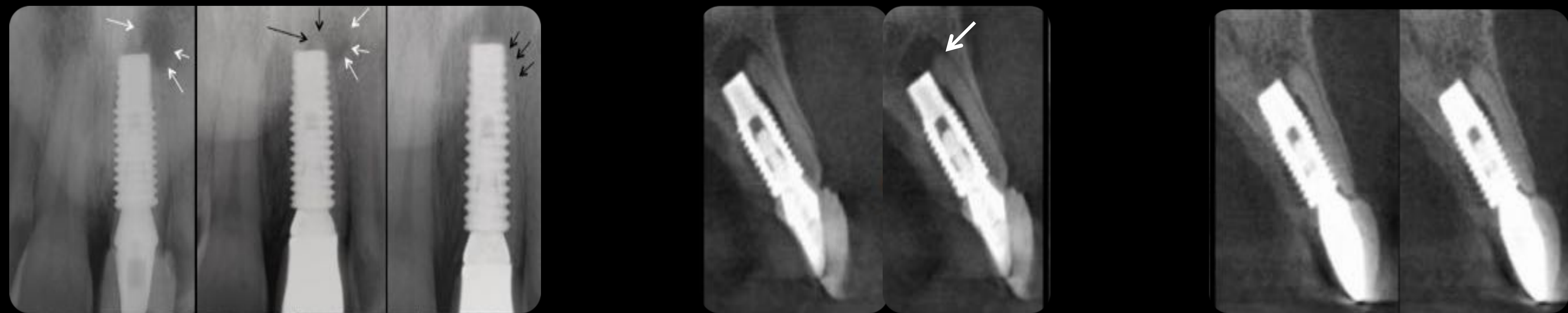
Root membrane in presence of periapical pathology





- ONE IMPLANT SITE PER PATIENT (N=46)
- MEAN FOLLOW-UP(\pm SD): 44.9 ± 5.7 MONTHS
- ALL IMPLANTS WERE IMMEDIATELY, NON-FUNCTIONALLY LOADED AND FOUND TO BE CLINICALLY STABLE AT SUBSEQUENT EVALUATIONS
- FINAL LOADING WAS PERFORMED WITH FIXED PROSTHESES AND ALL RESTORATIONS FUNCTIONALLY SURVIVED THROUGHOUT THE FOLLOW-UPS
- CRESTAL BONE LOSS WAS MINIMUM:
 0.19 ± 0.08 MM (MESIAL) & 0.22 ± 0.06 MM (DISTAL)

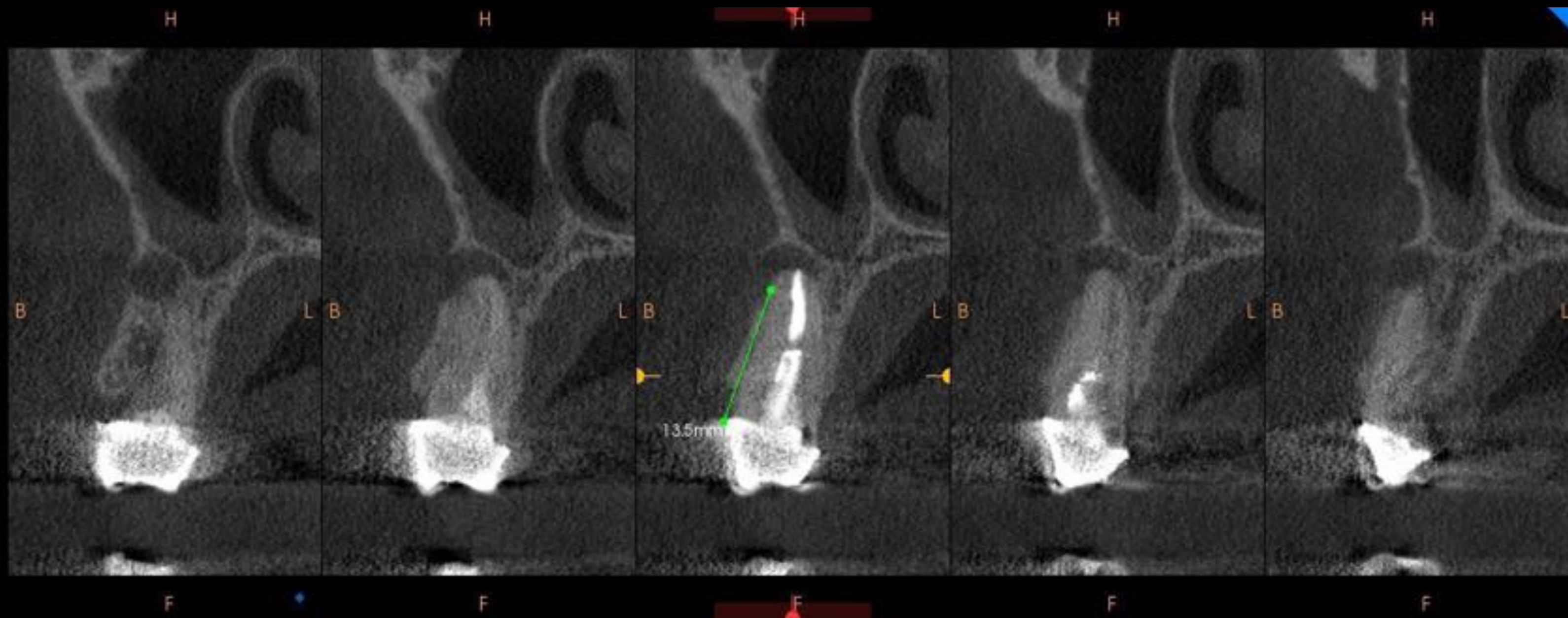
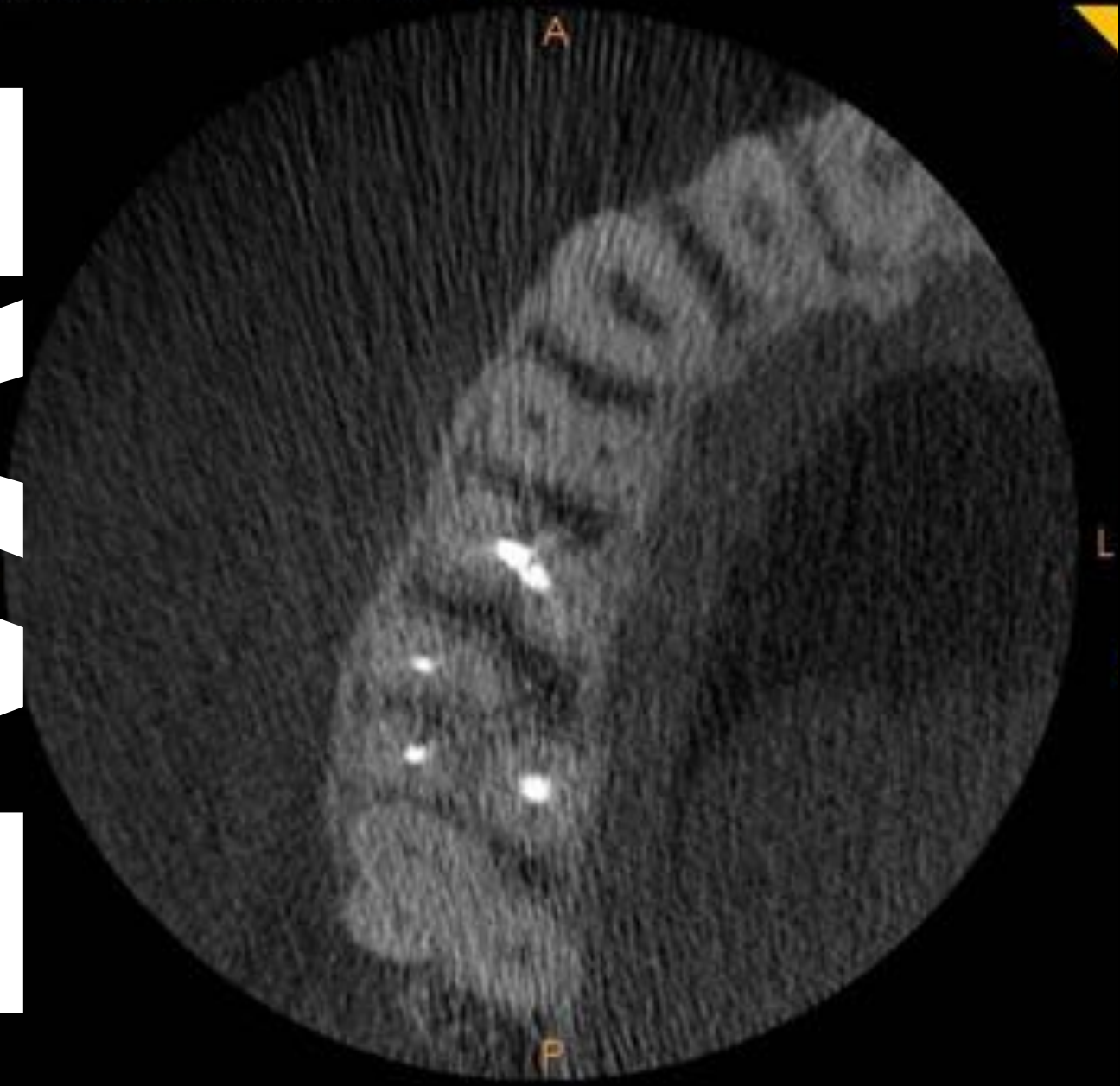




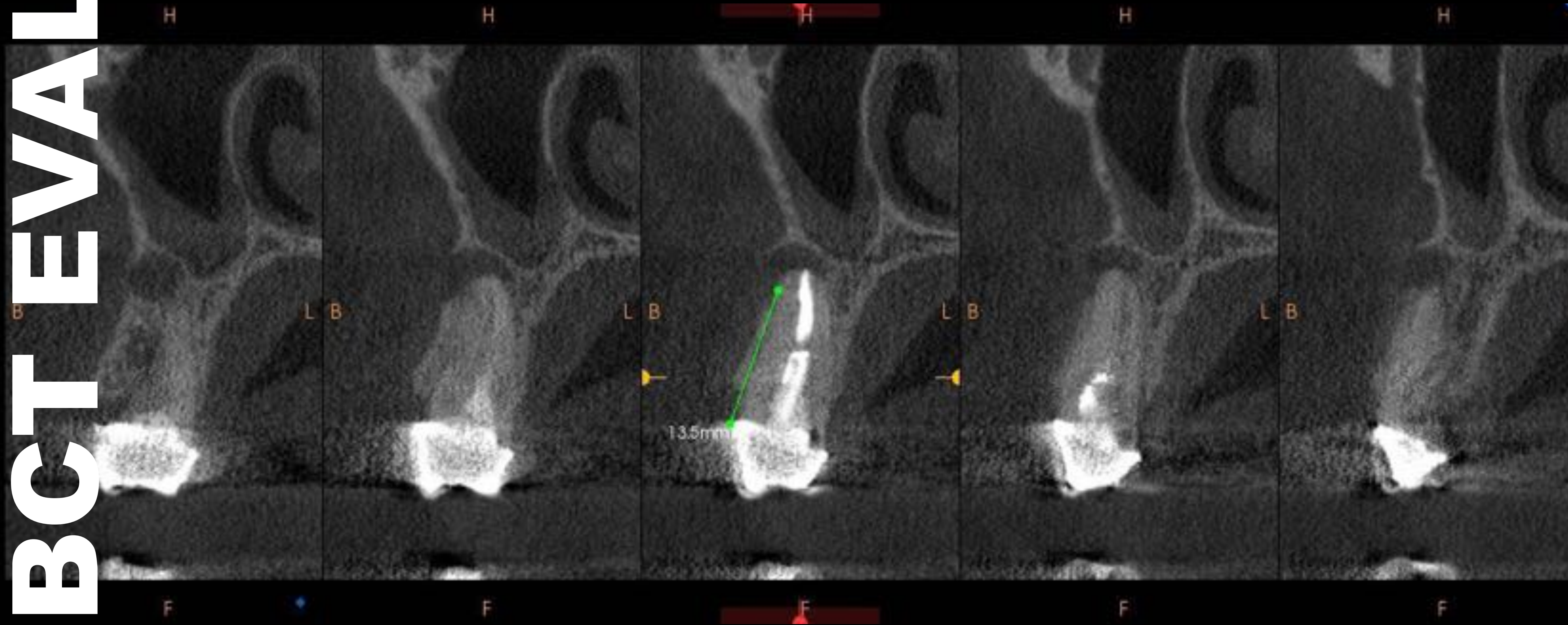
- SINGLE INCIDENT OF ROOT RESORPTION
- NO SUBJECTIVE SYMPTOMS
- UNCOMPROMISED IMPLANT AND RESTORATION FUNCTION
- WAS CONSIDERED “FAILURE” UNDER STRICT SUCCESS CRITERIA

CBCT EVAL

Integration mode: AVG. Slice thickness: 90 µm.

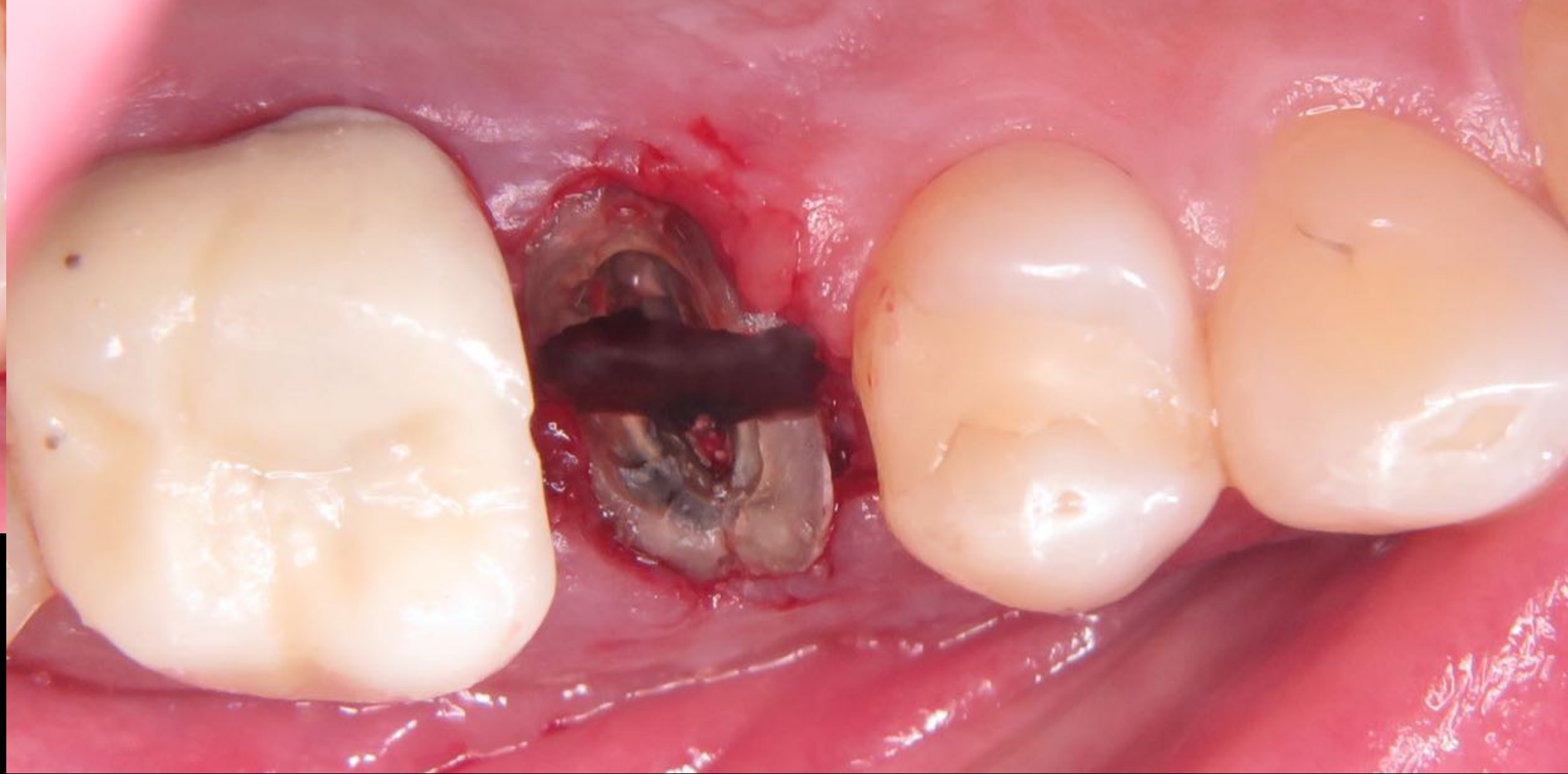


CBCT EVAL

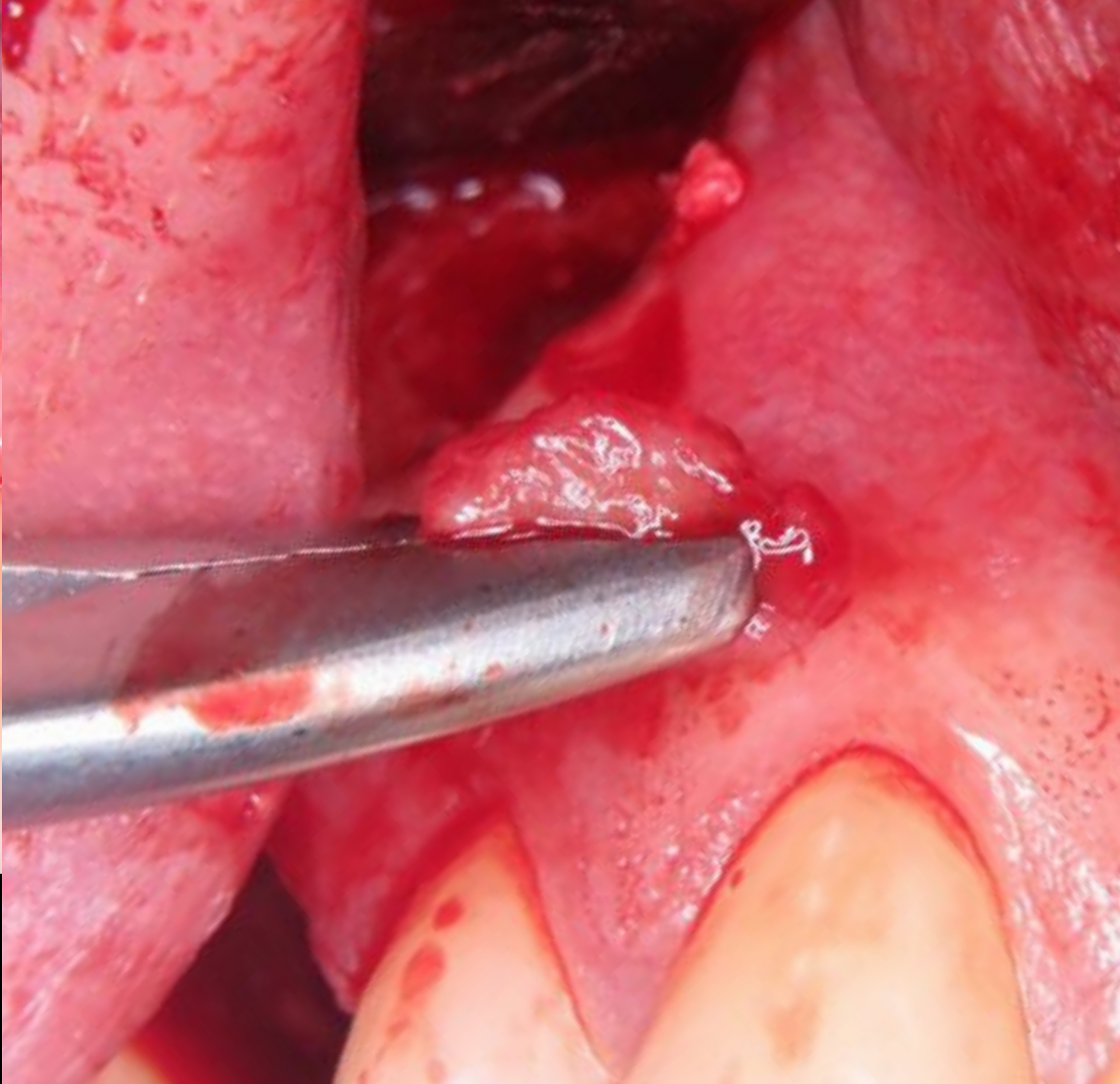
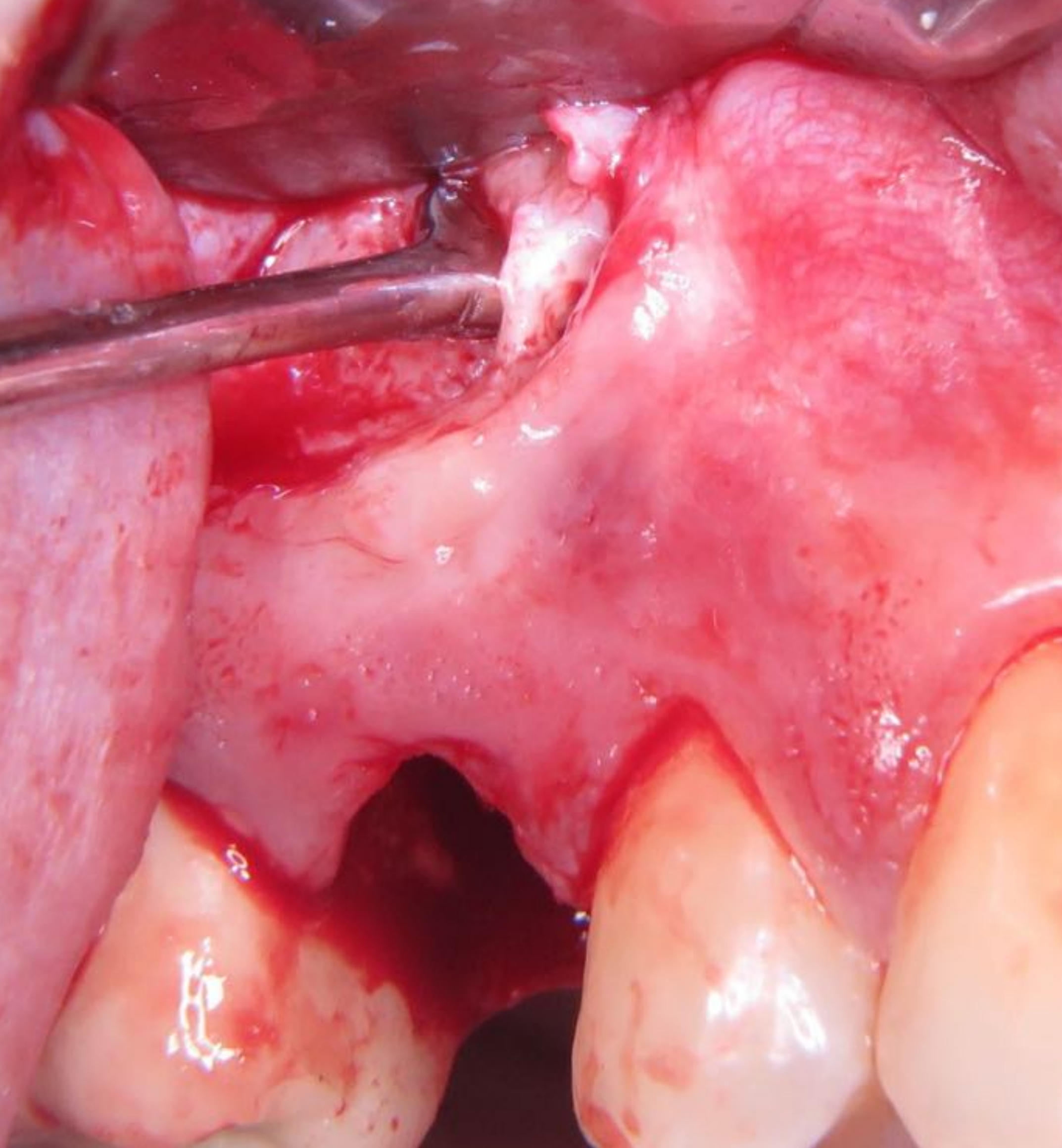


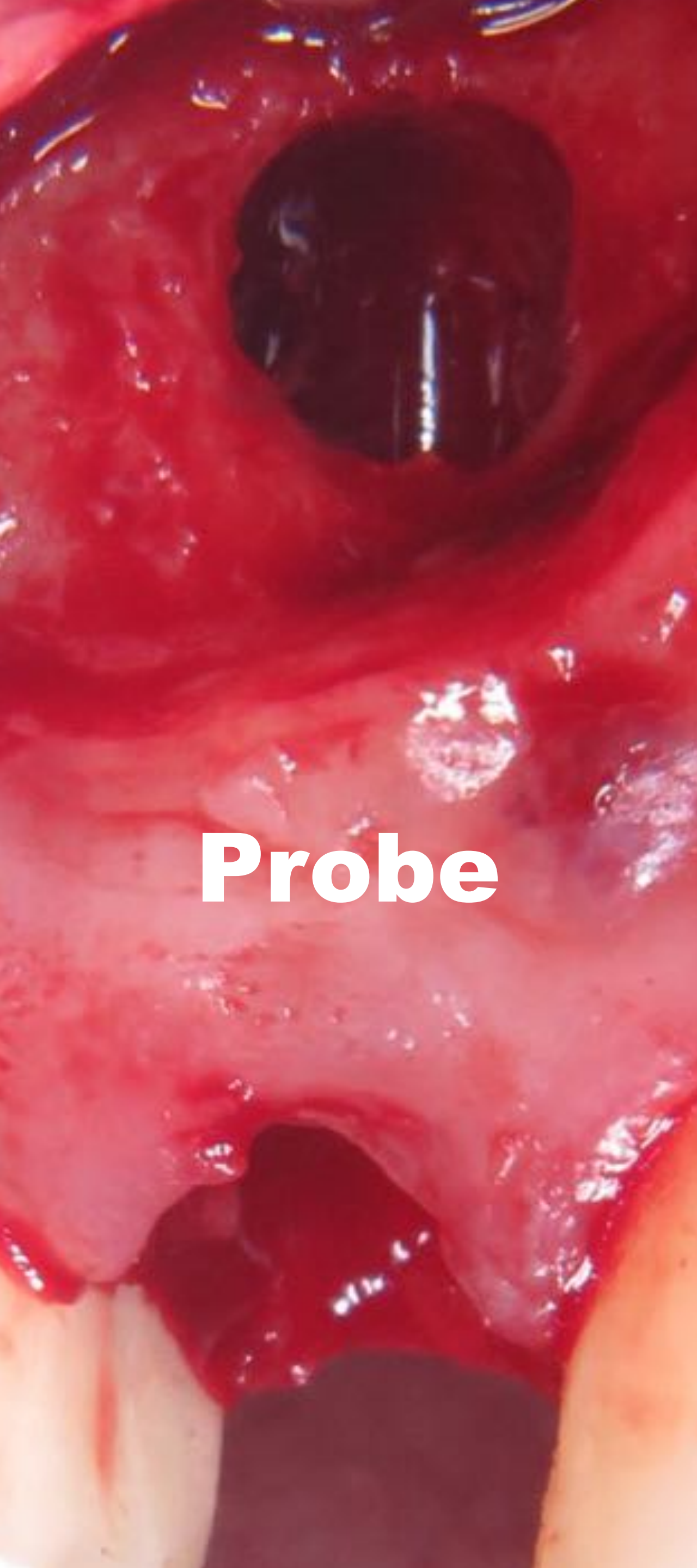
CBCCT EVAL



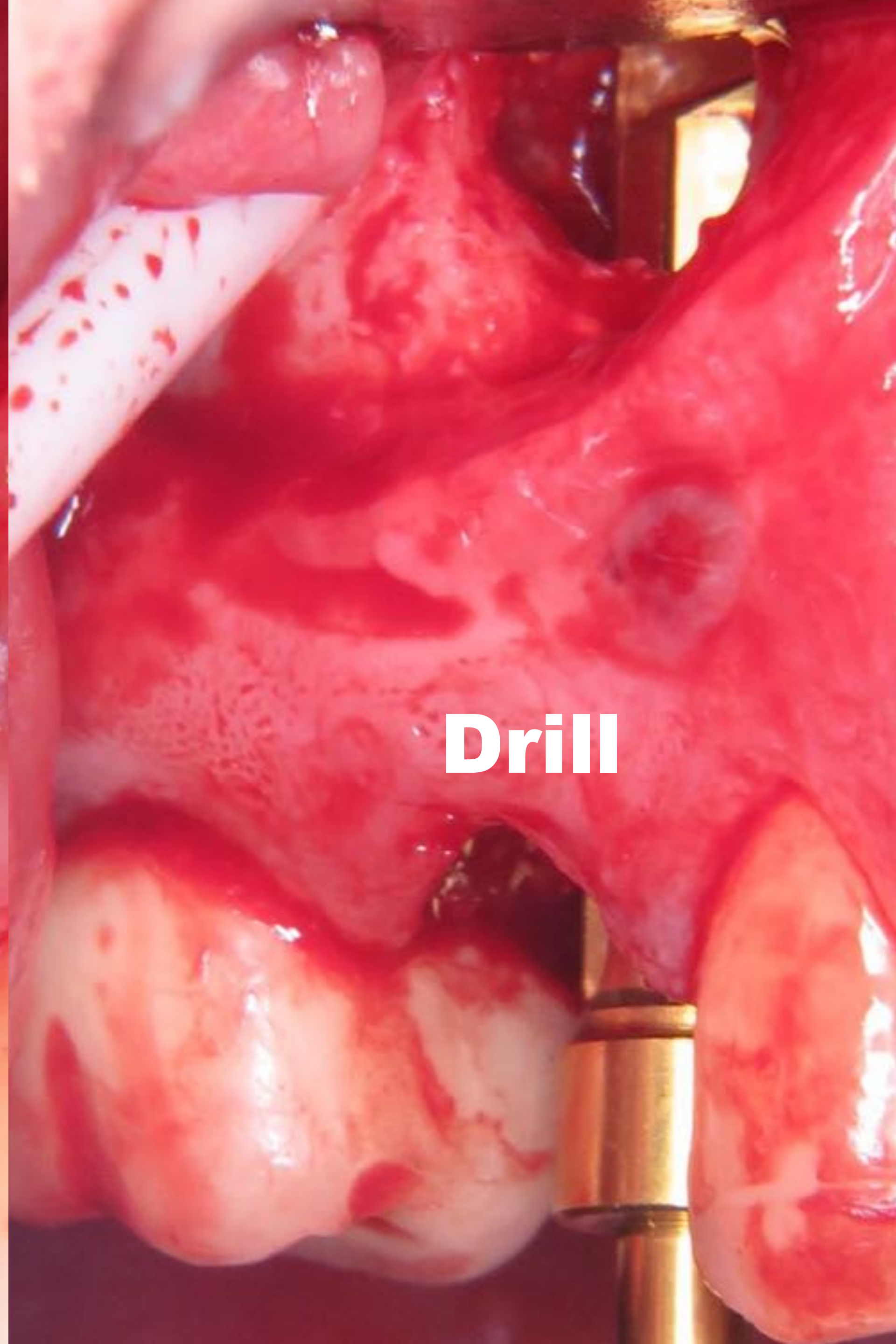




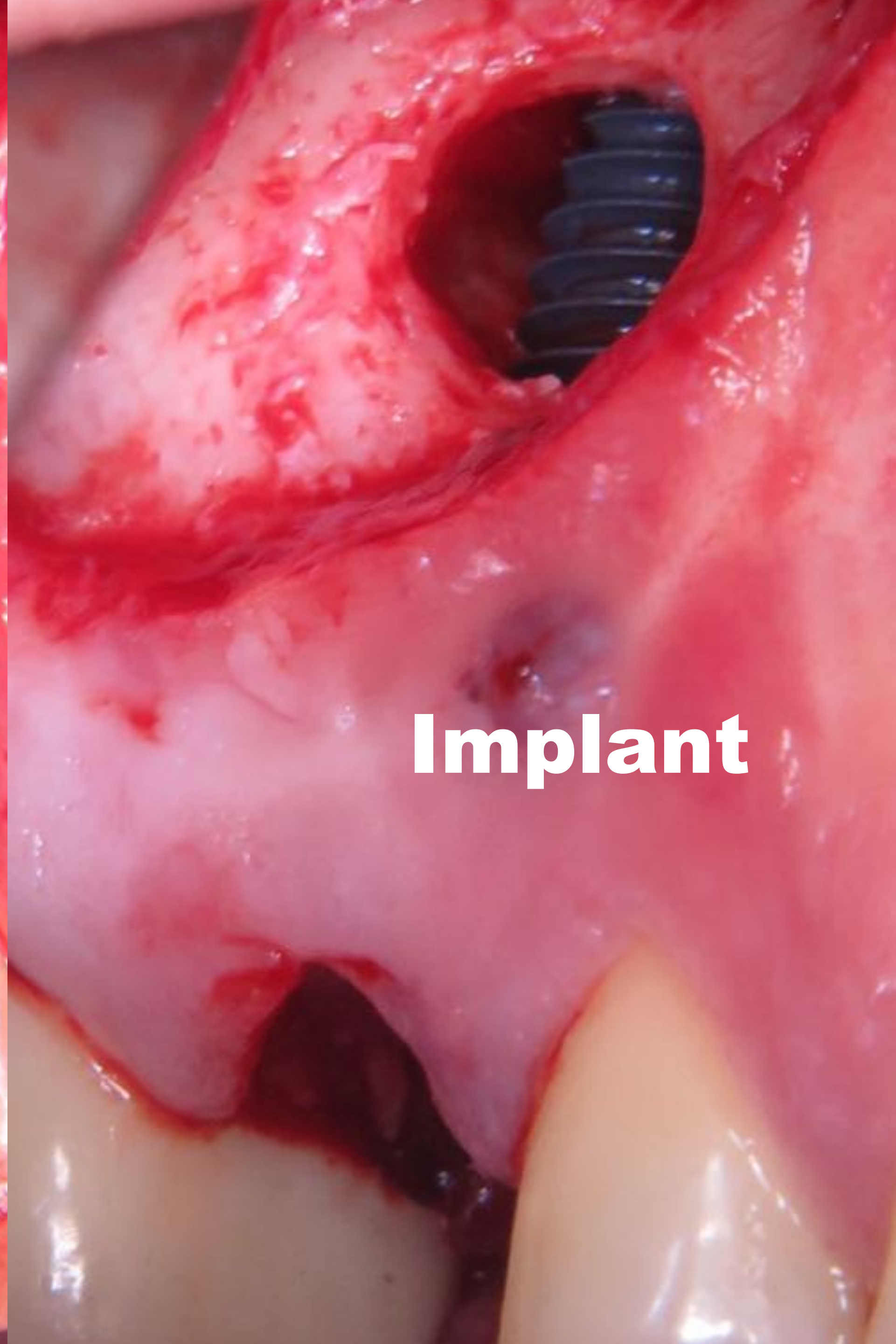




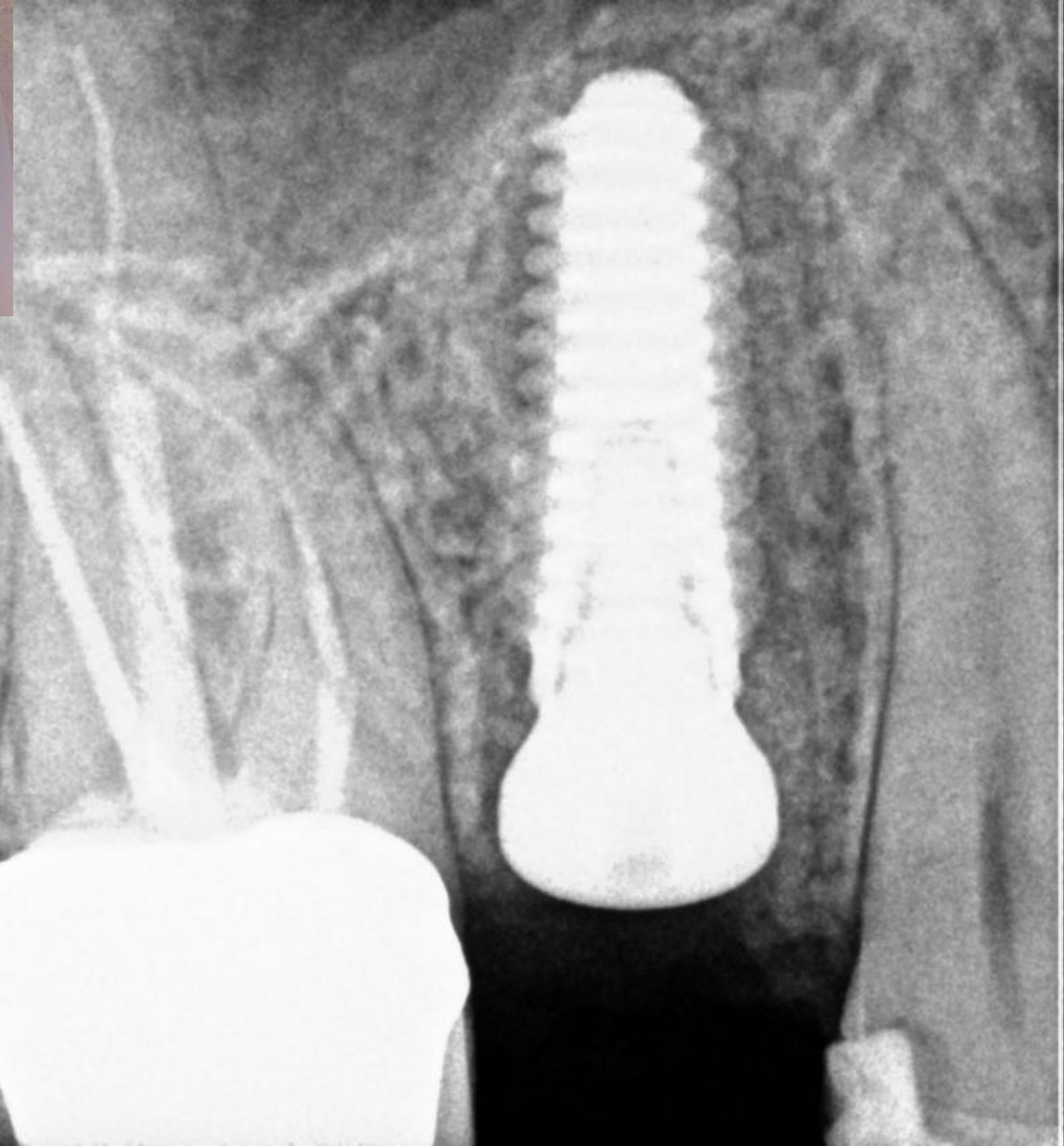
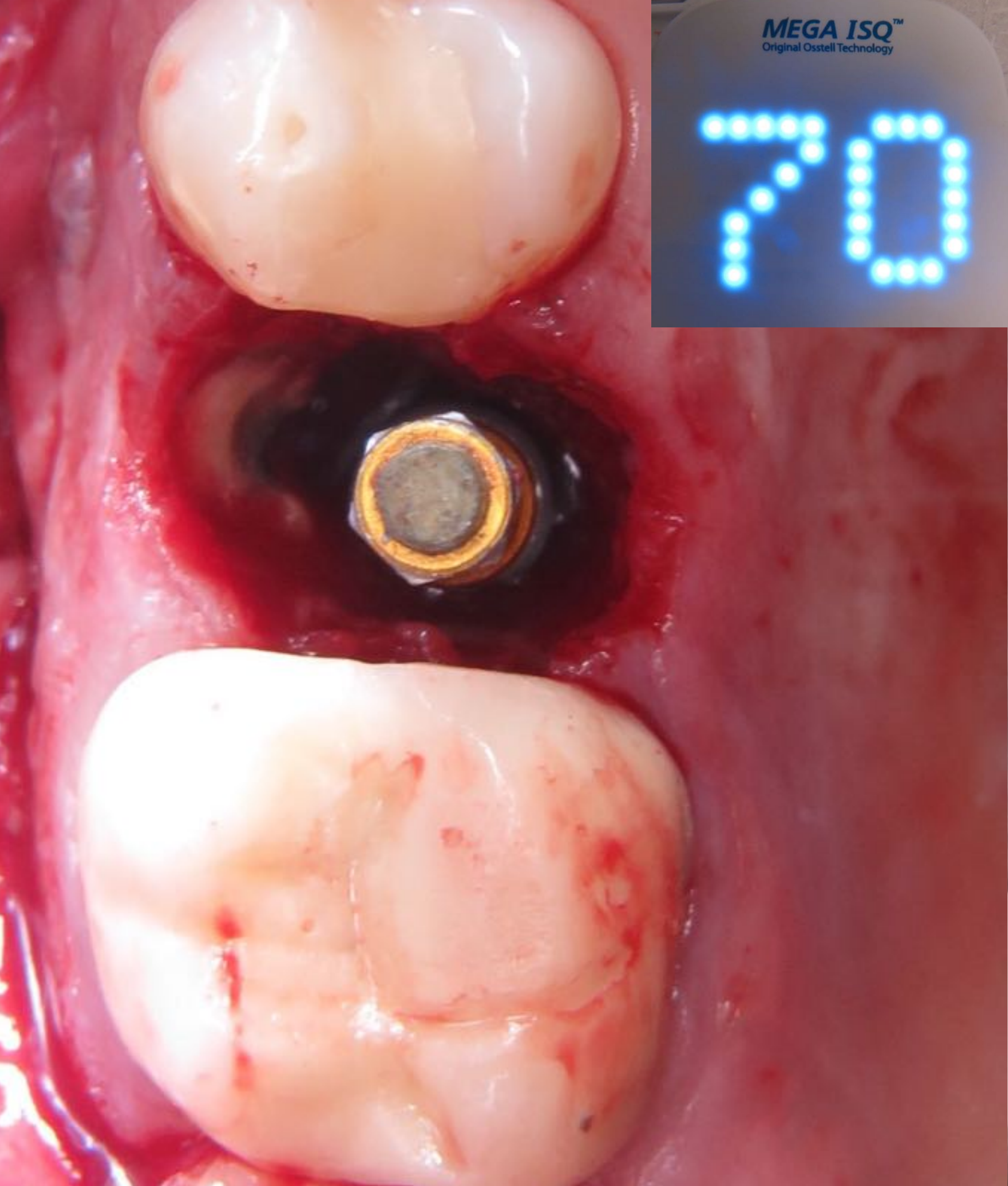
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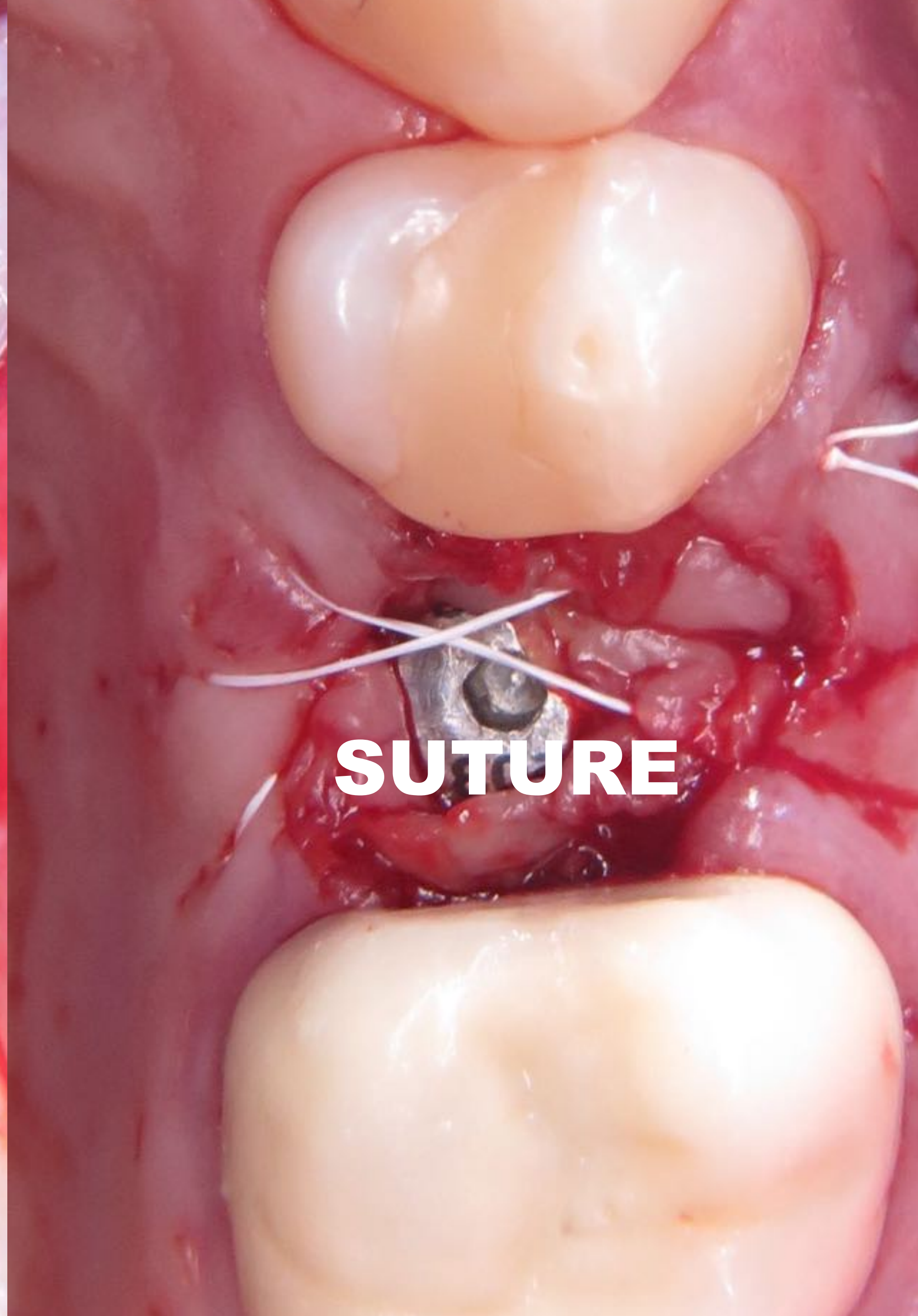
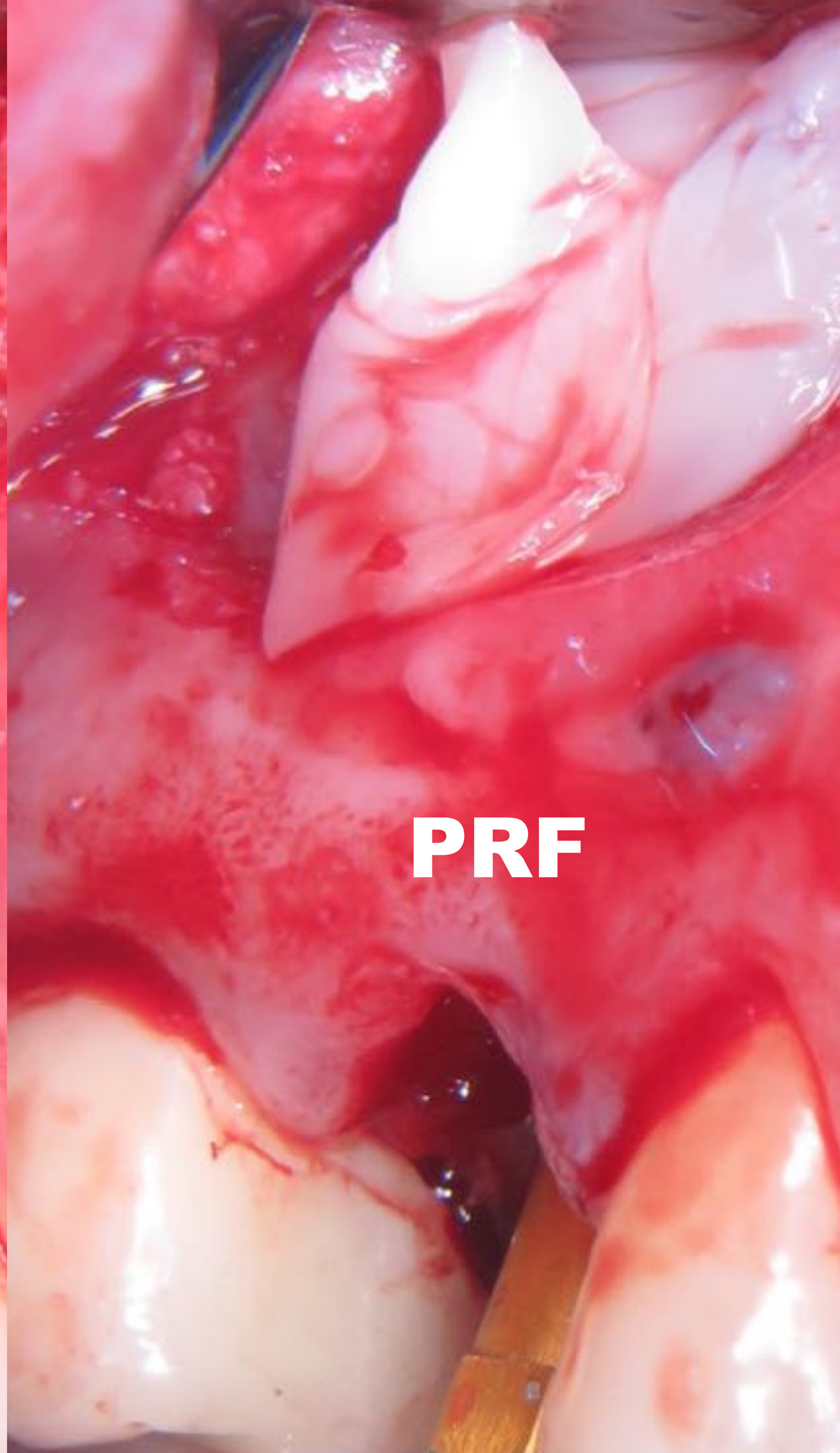
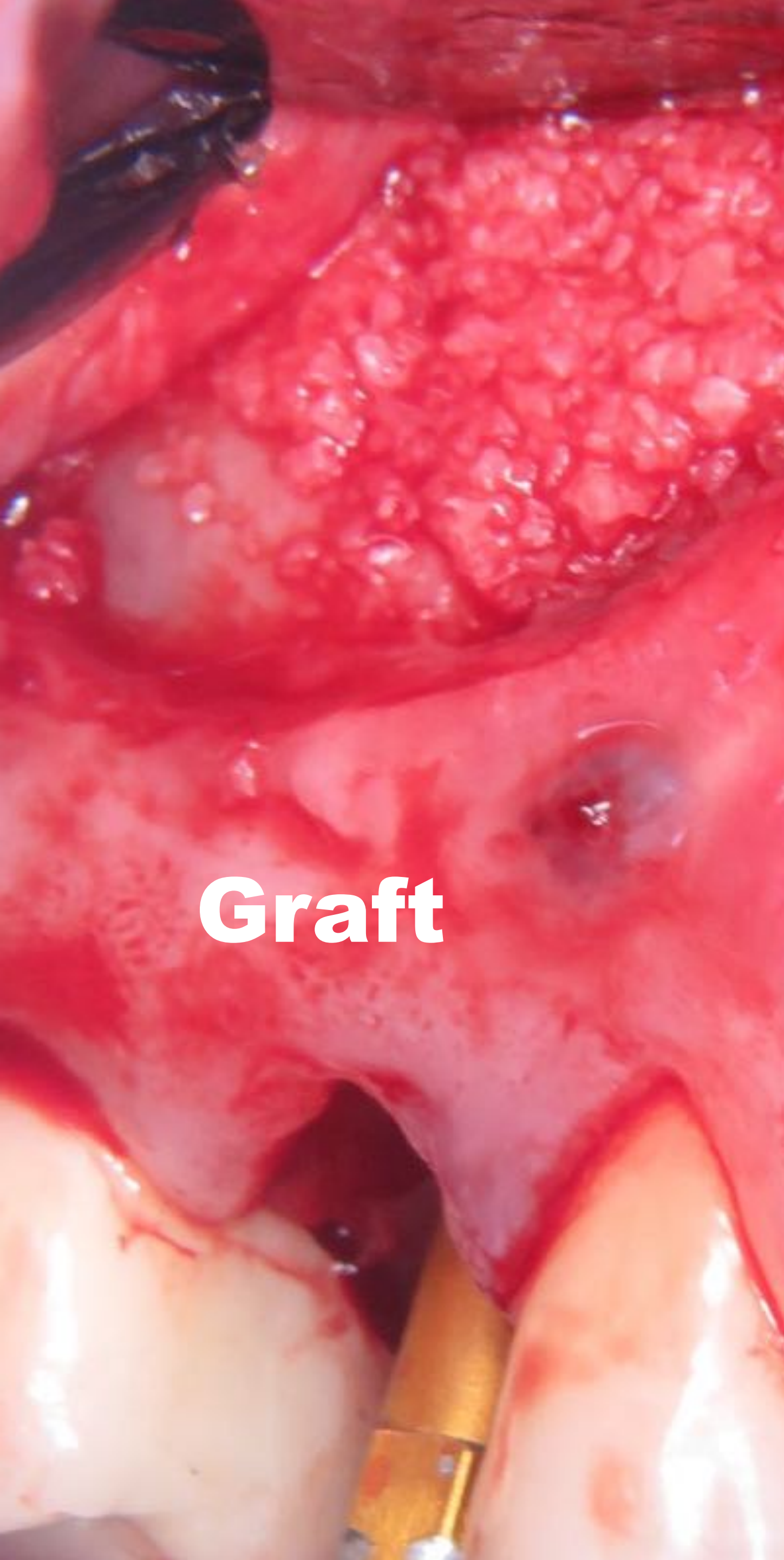


Drill



Implant

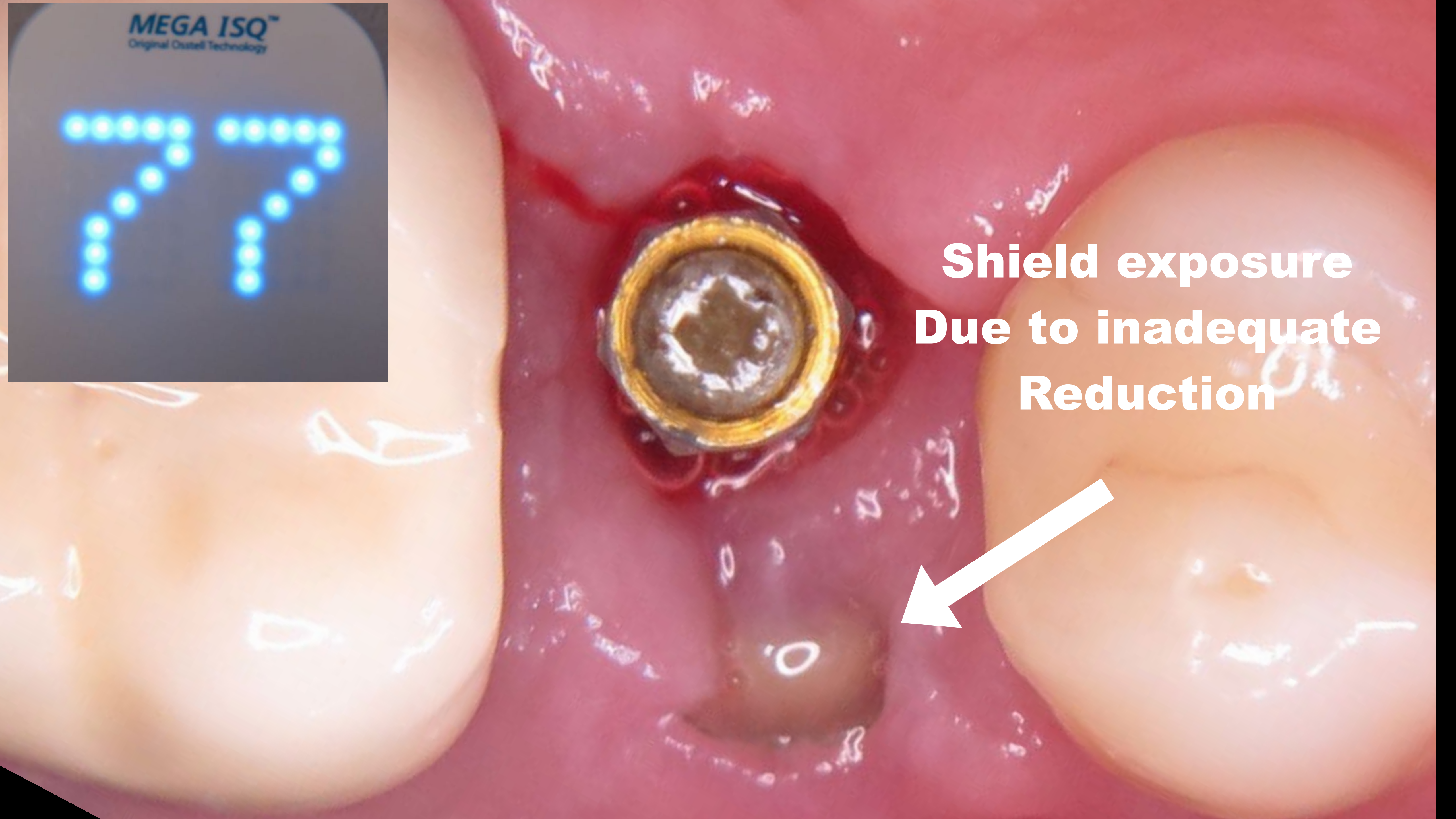




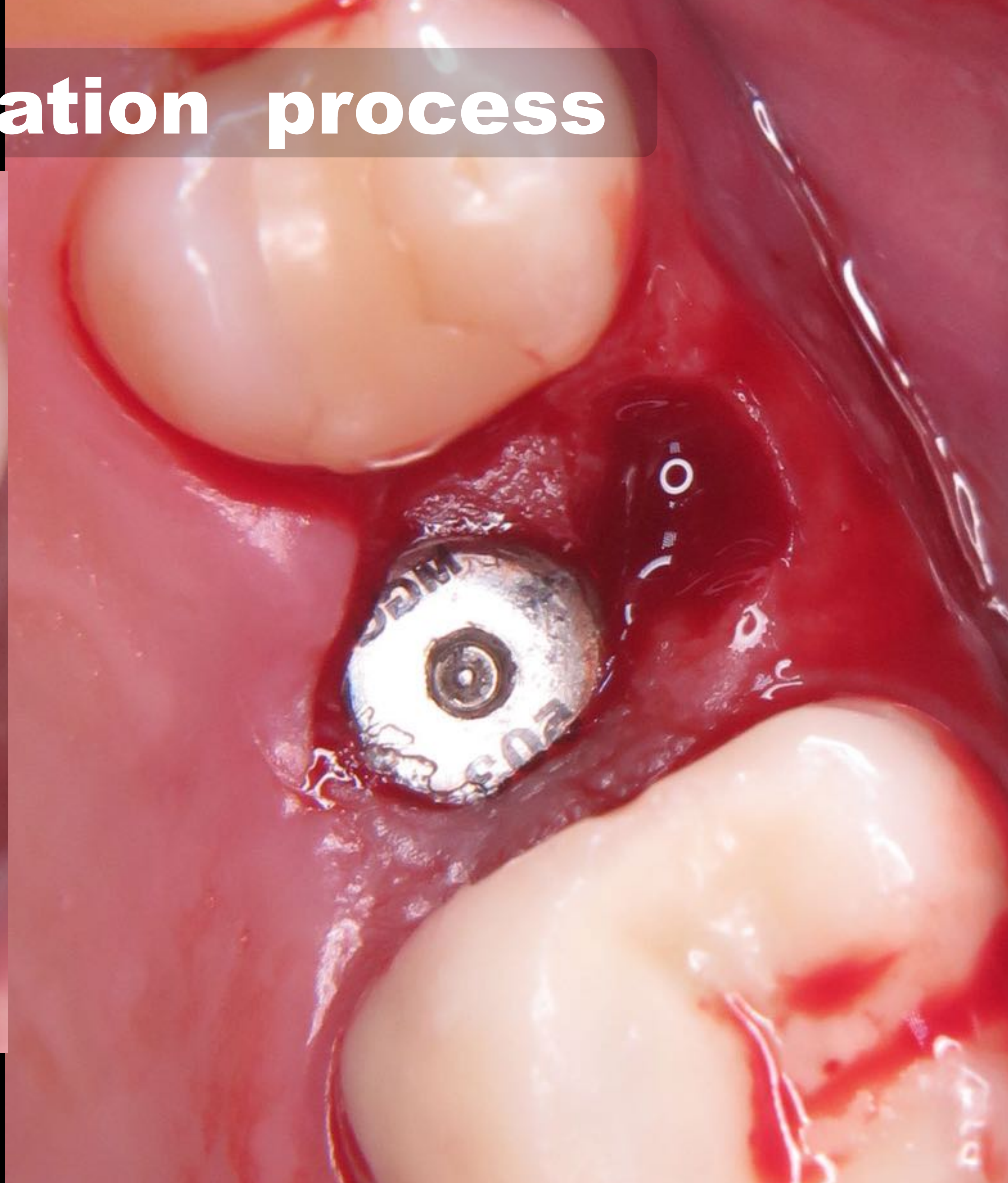
MEGA ISQ™
Original Ostell Technology



**Shield exposure
Due to inadequate
Reduction**



Restart coagulation process



Healing 2 weeks

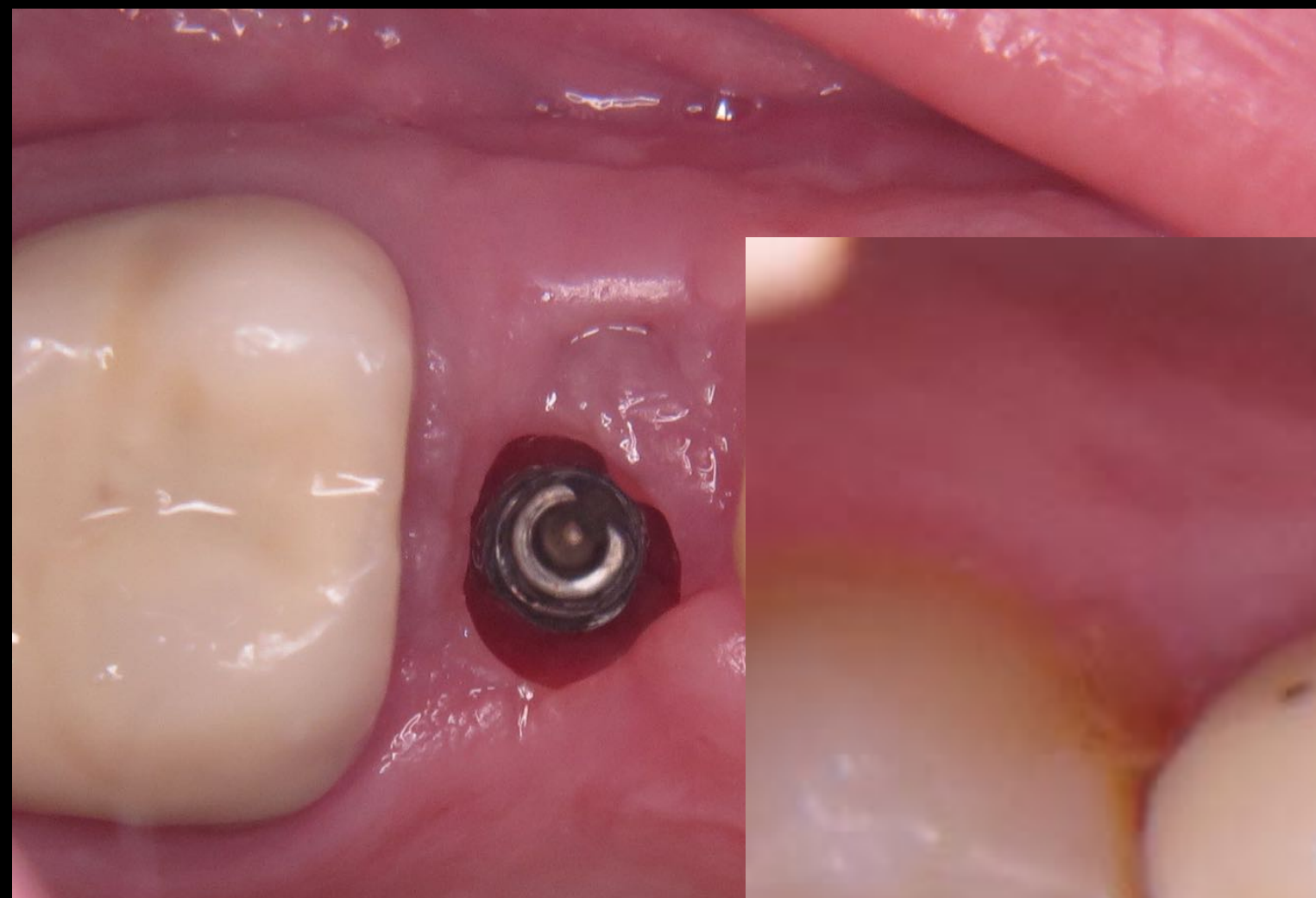


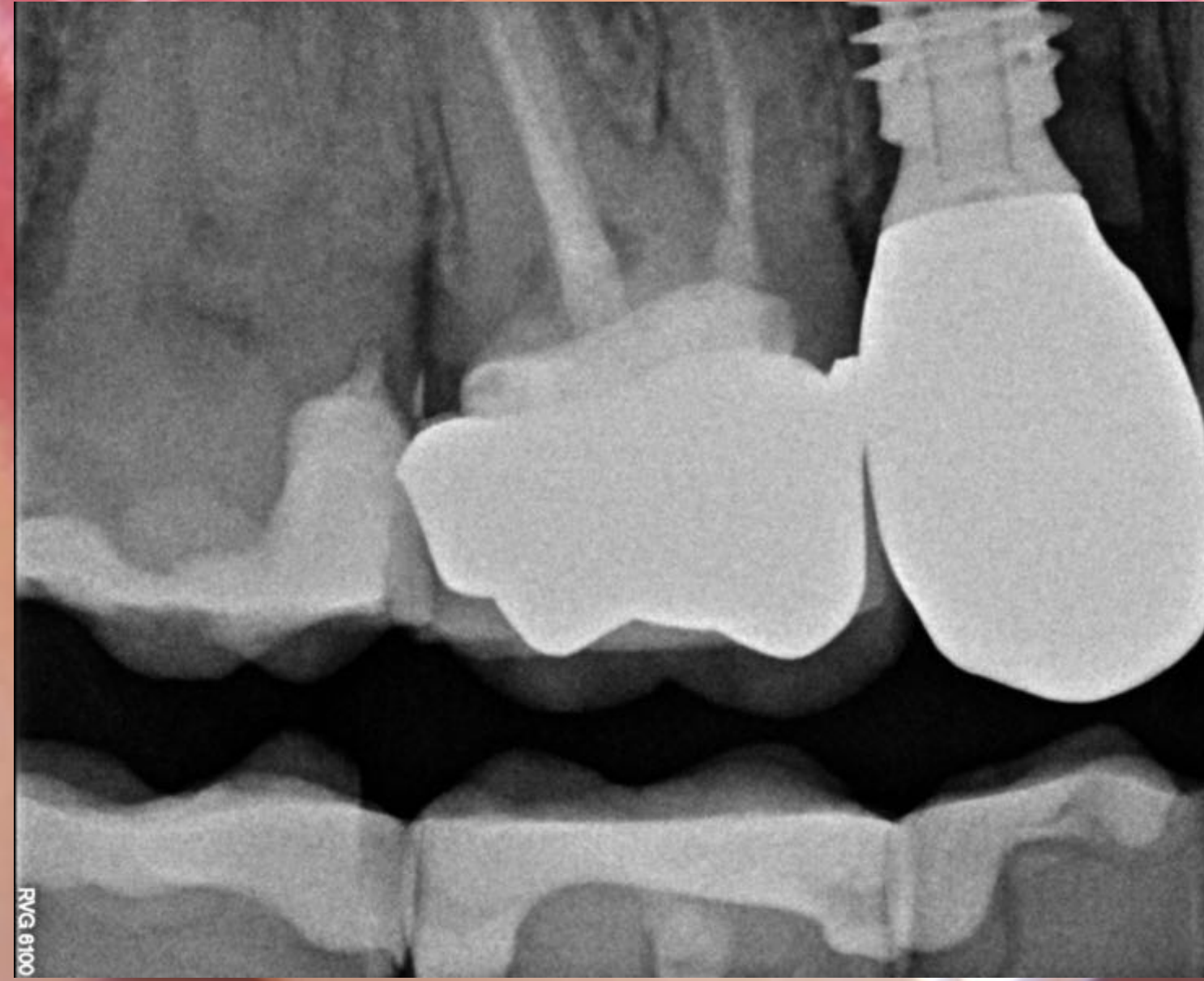
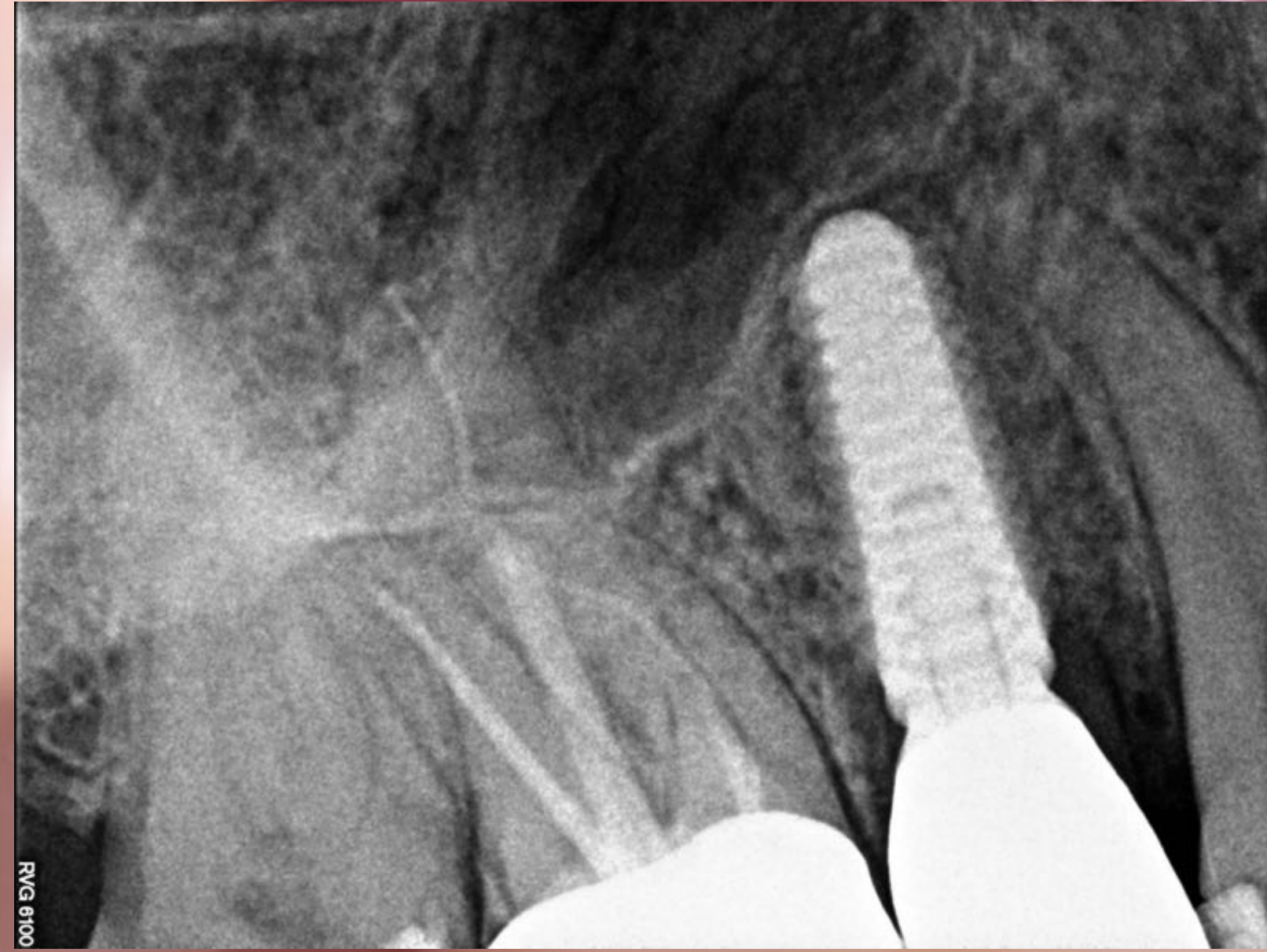
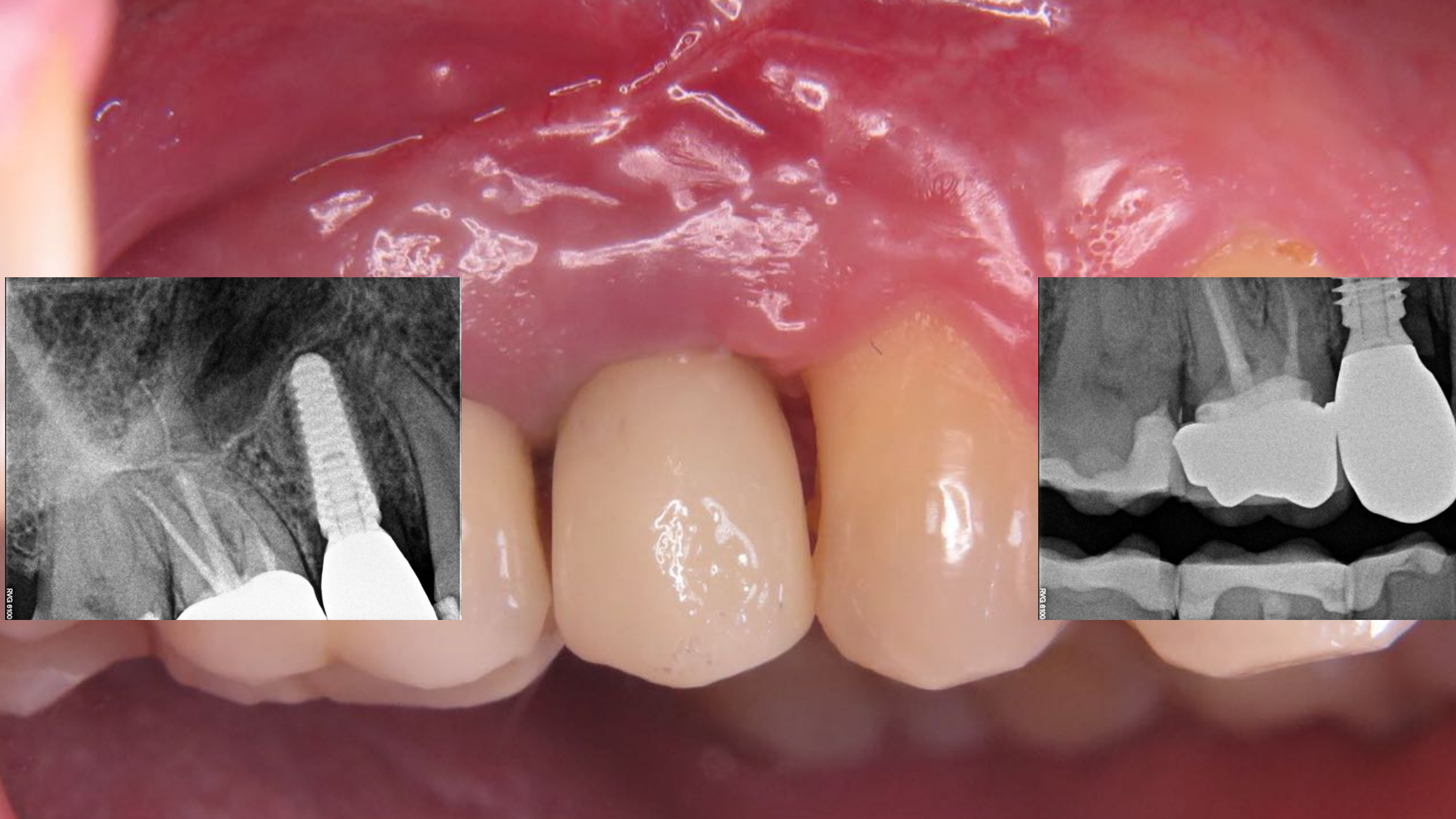


Open tray impression



Healing 4 weeks





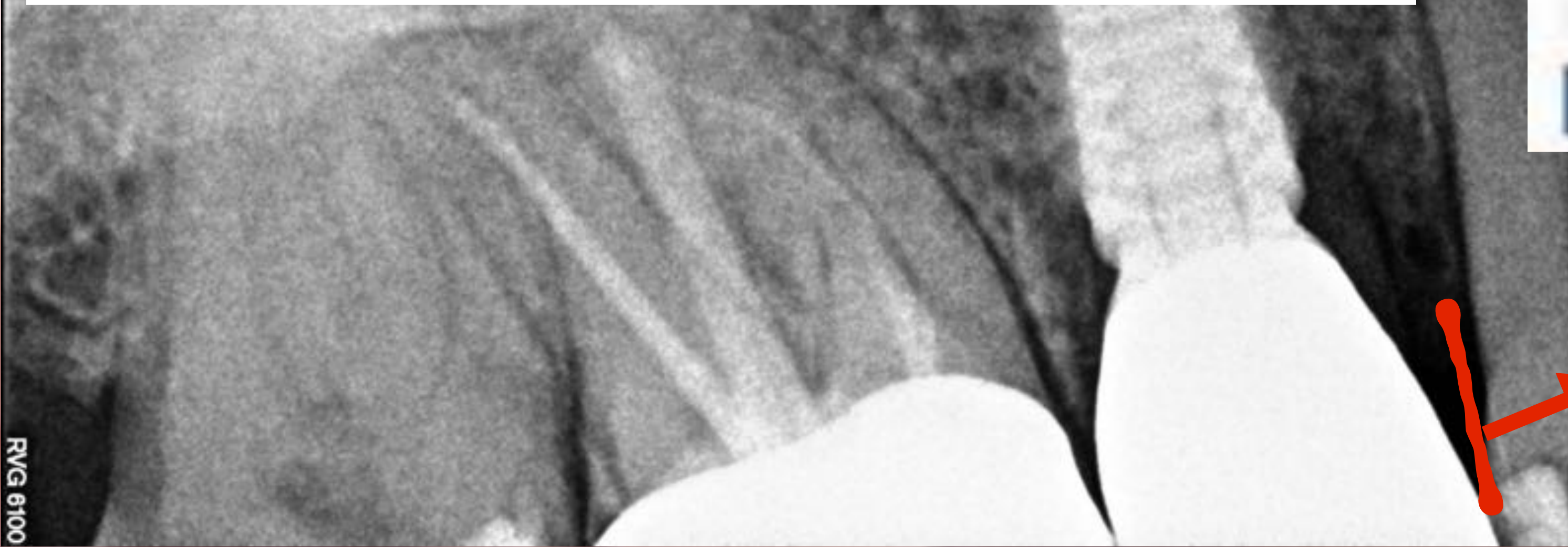
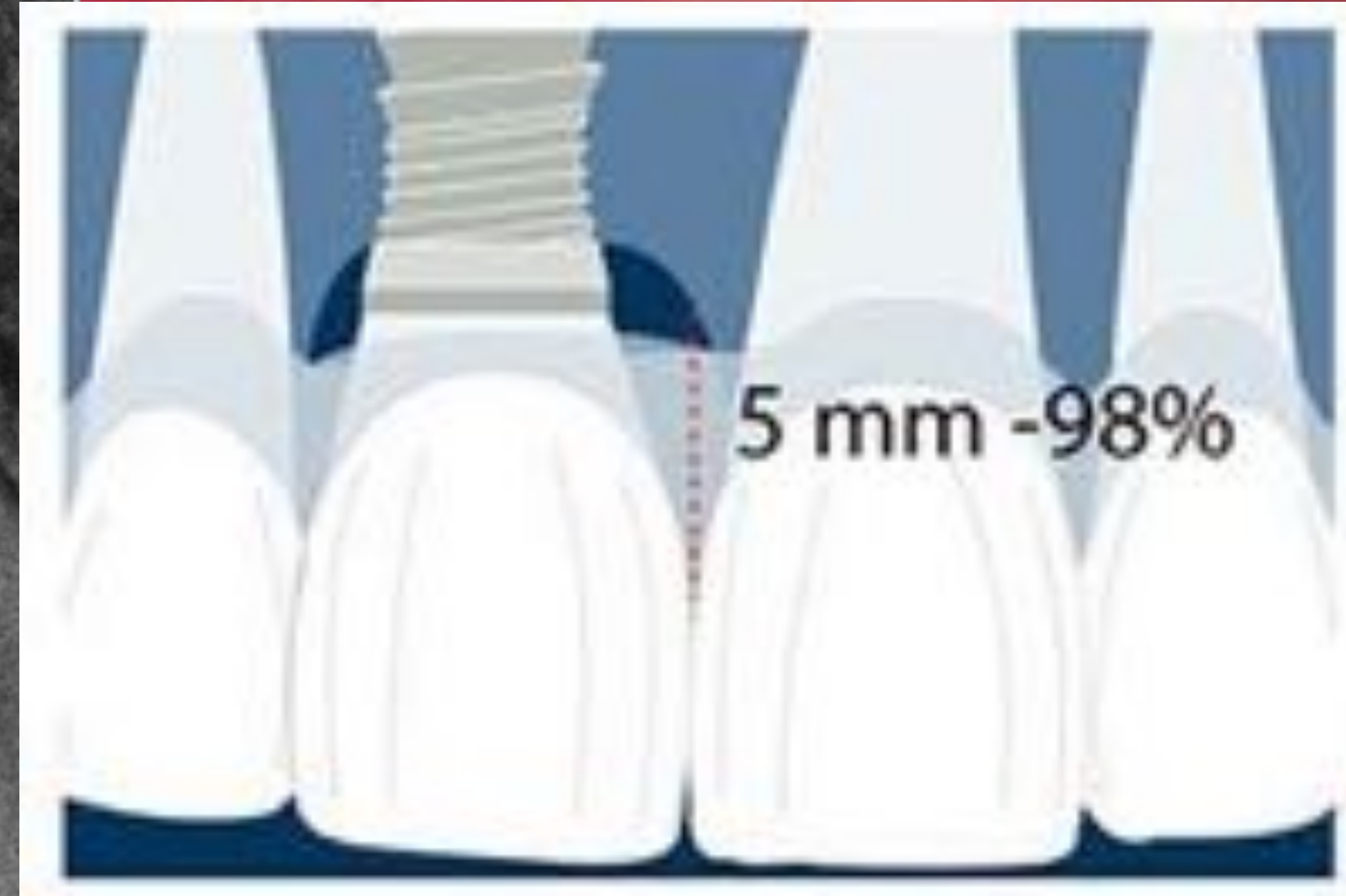
The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla.

J Periodontol. 1992 Dec;63(12):995-6.

Tarnow DP, Magner AW, Fletcher P.

Abstract

This study was designed to determine whether the distance from the base of the contact area to the crest of bone could be correlated with the presence or absence of the interproximal papilla in humans. A total of 288 sites in 30 patients were examined. If a space was visible apical to the contact point, then the papilla was deemed missing; if tissue filled the embrasure space, the papilla was considered to be present. The results showed that when the measurement from the contact point to the crest of bone was 5 mm or less, the papilla was present almost 100% of the time. When the distance was 6 mm, the papilla was present 56% of the time, and when the distance was 7 mm or more, the papilla was present 27% of the time or less.

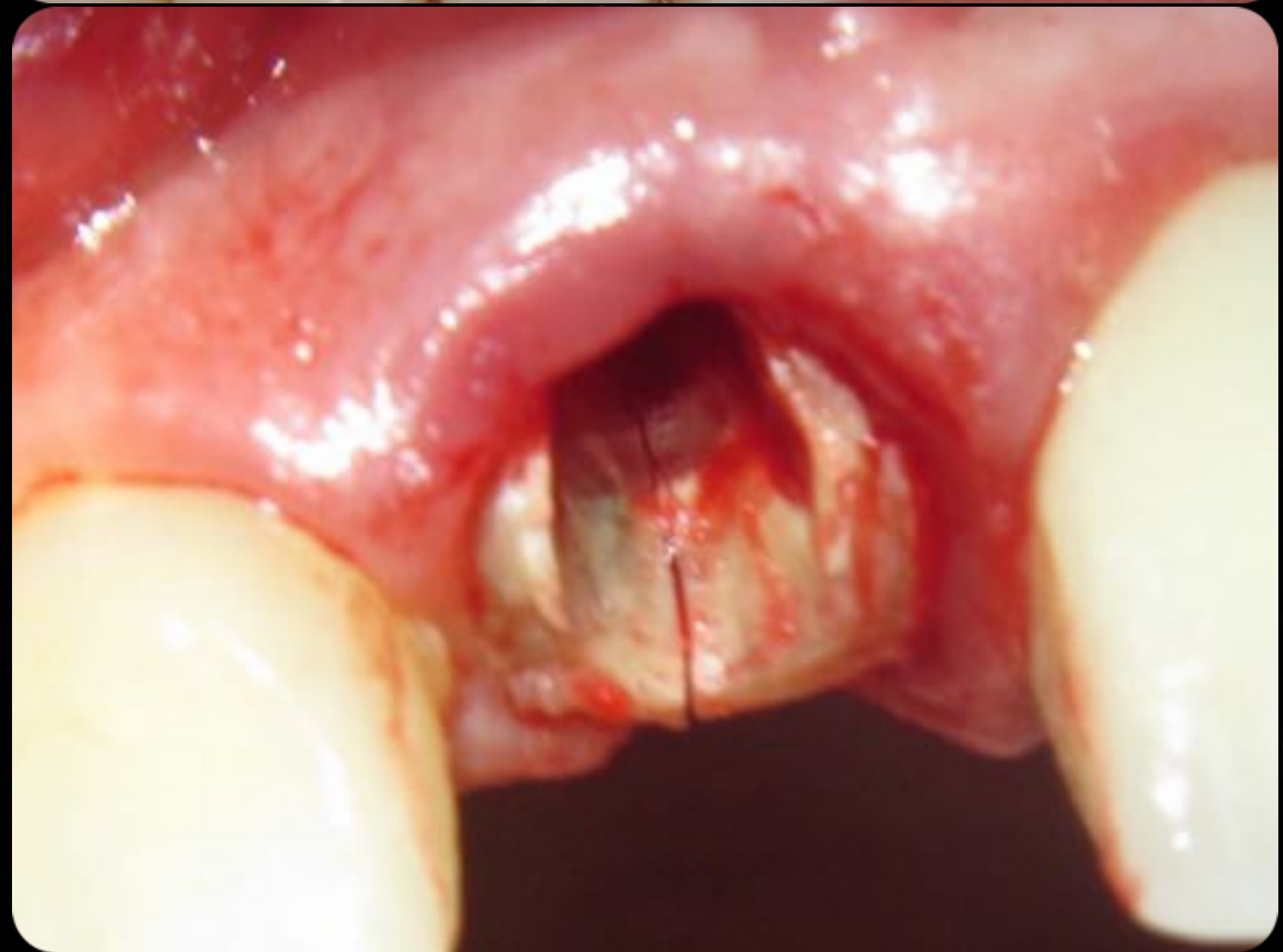


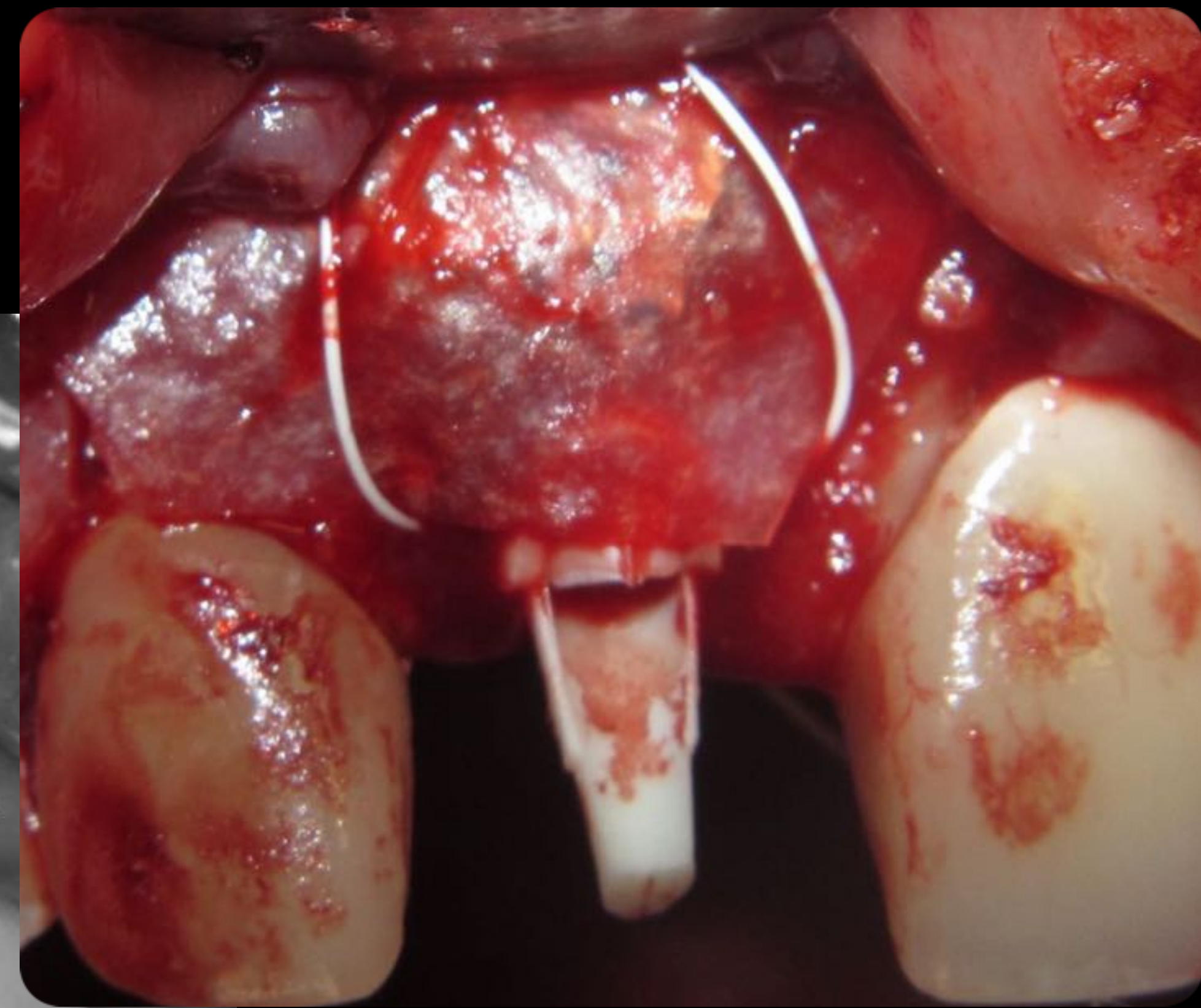
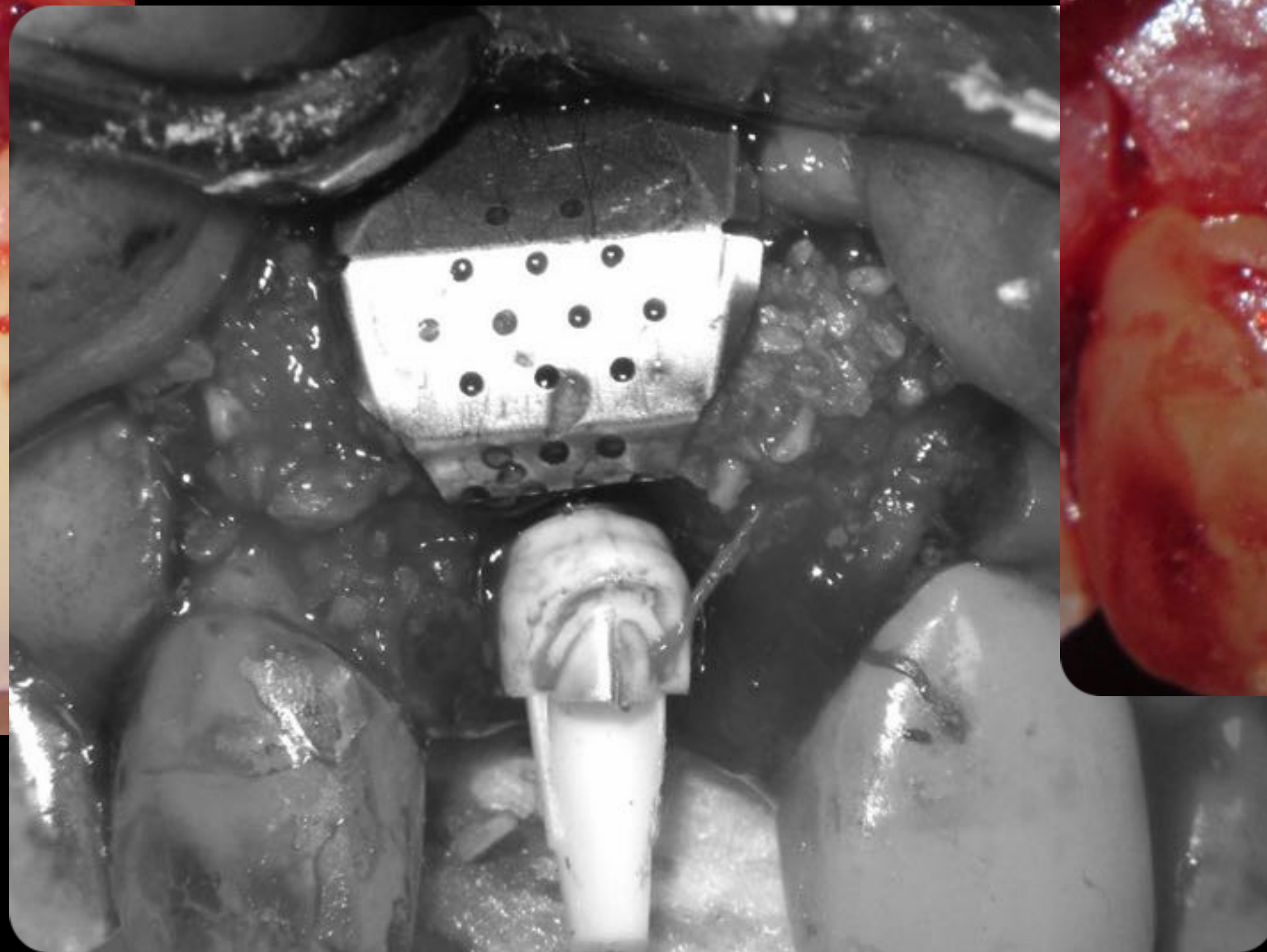
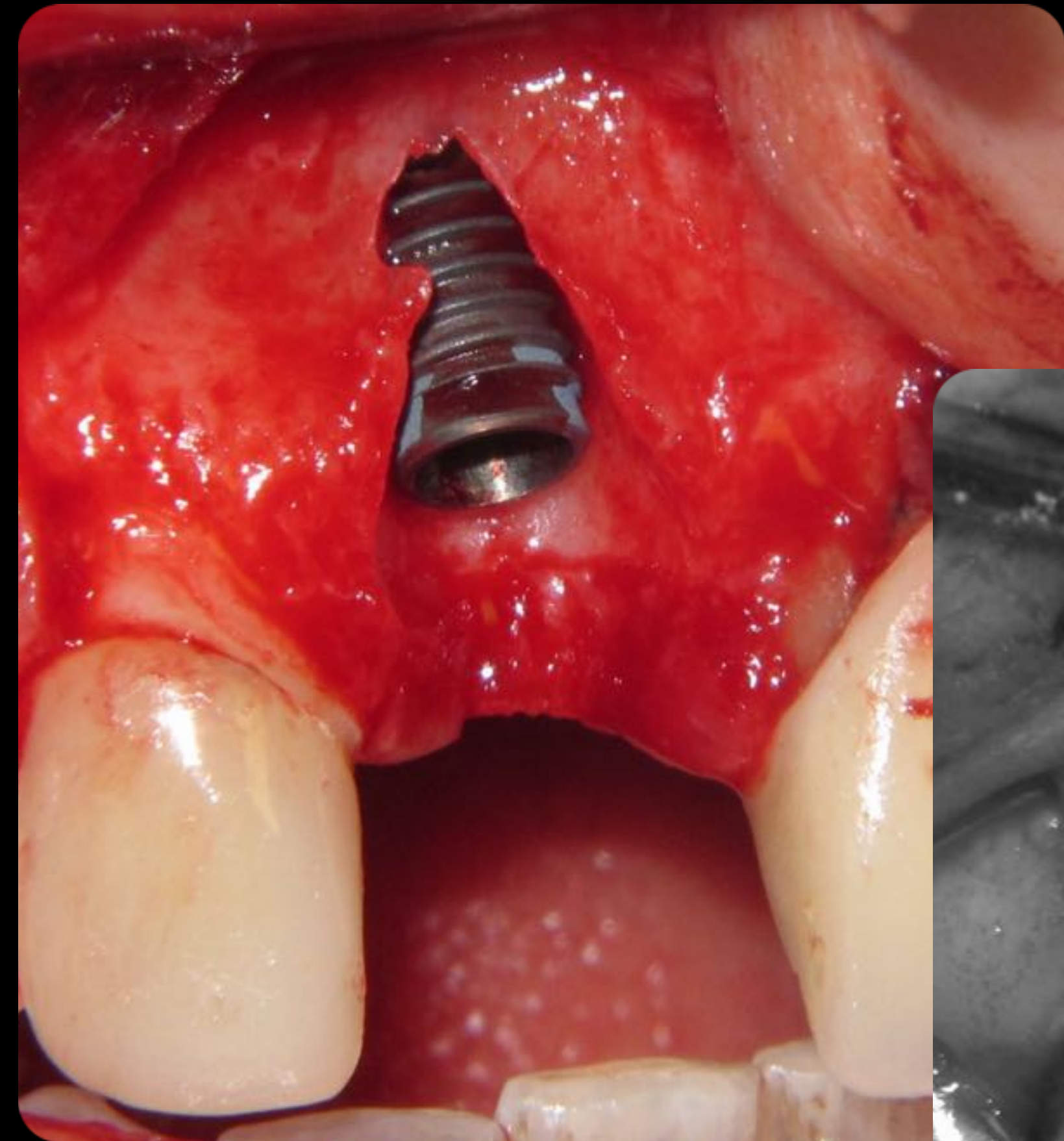
6 months post op



GBR/CTG vs Socket shield

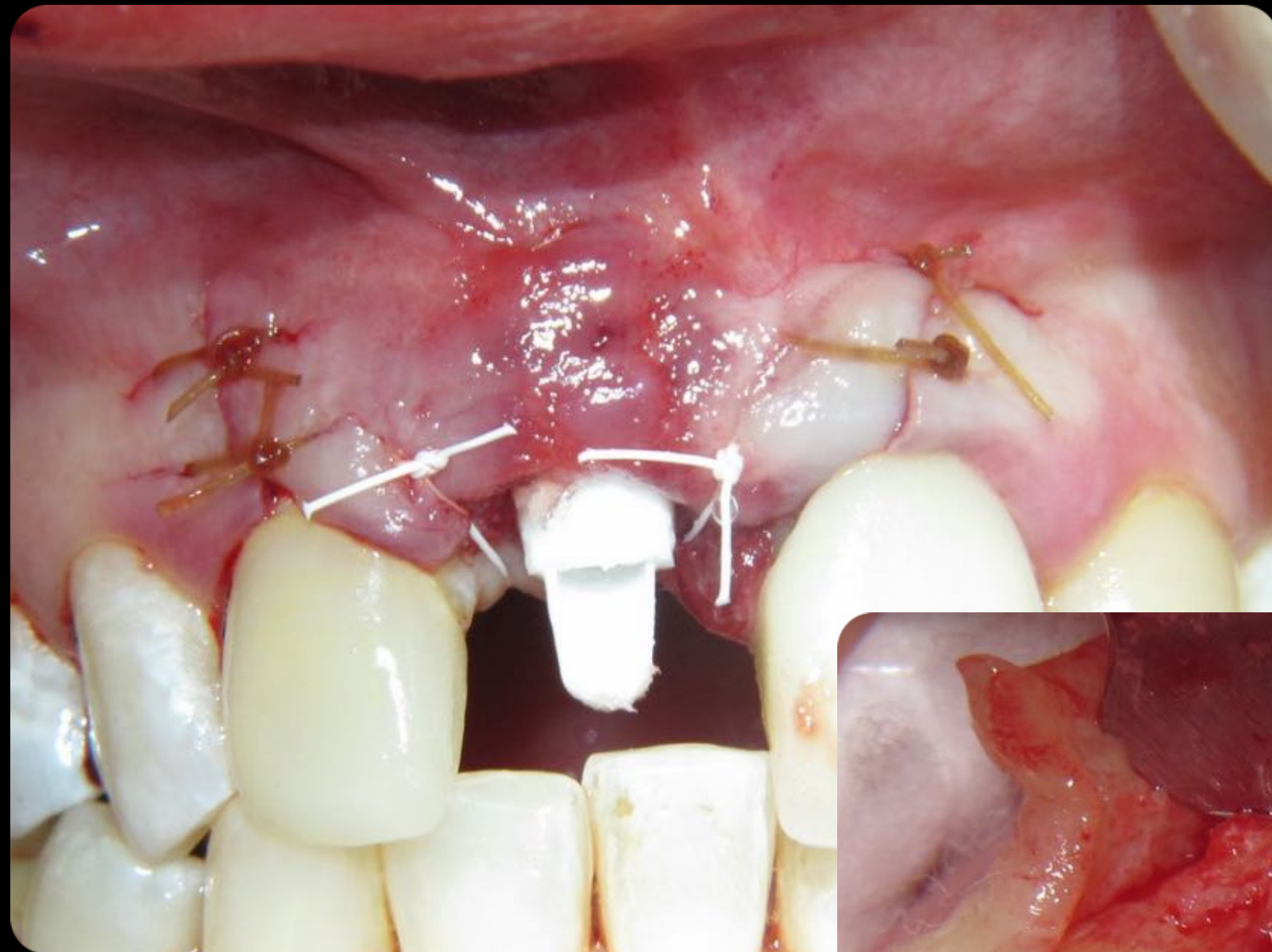




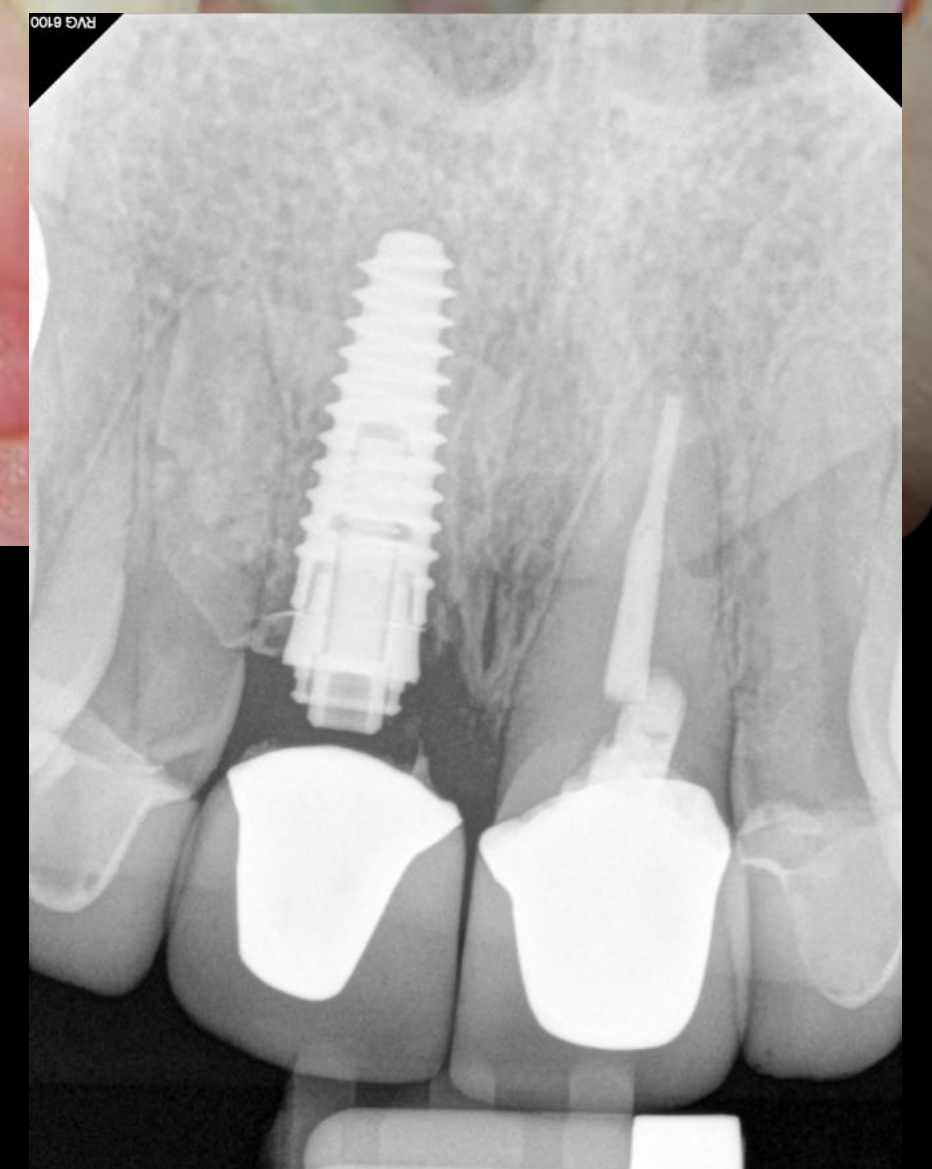
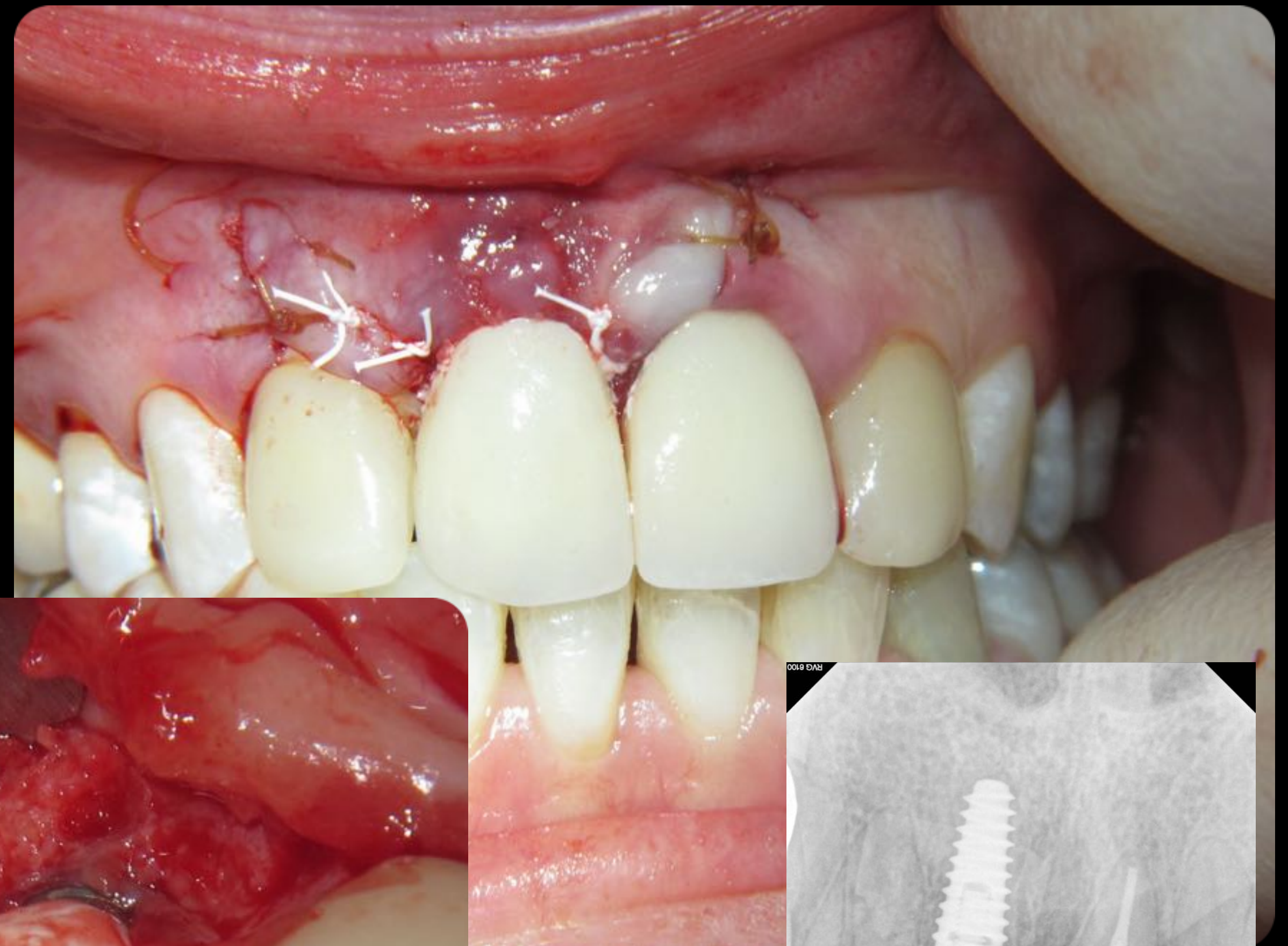


I-Gen
membrane

Fuse abutment



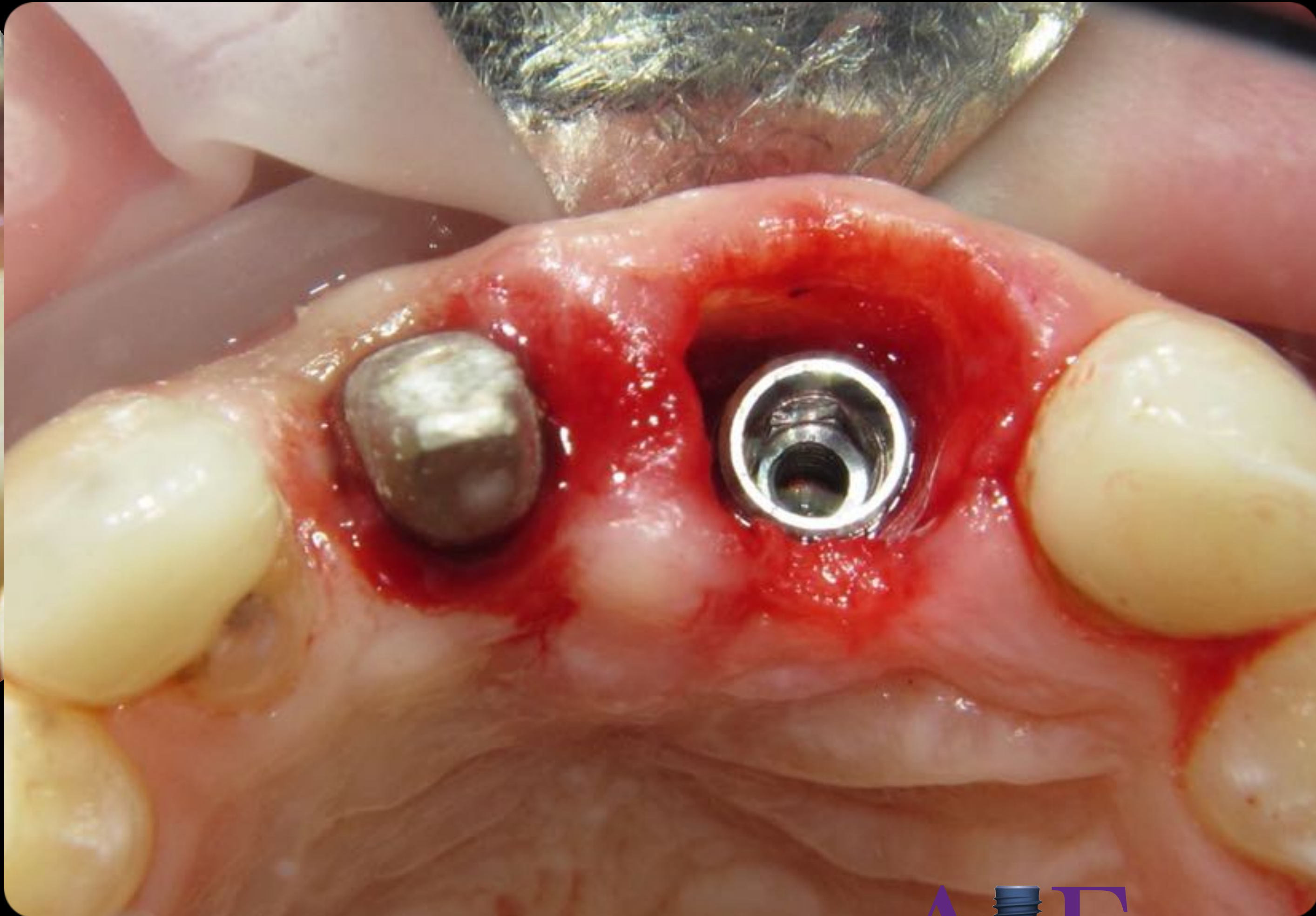
Temp



AE

Advanced Implant Educators

6 months later adjacent tooth fractures
PET employed

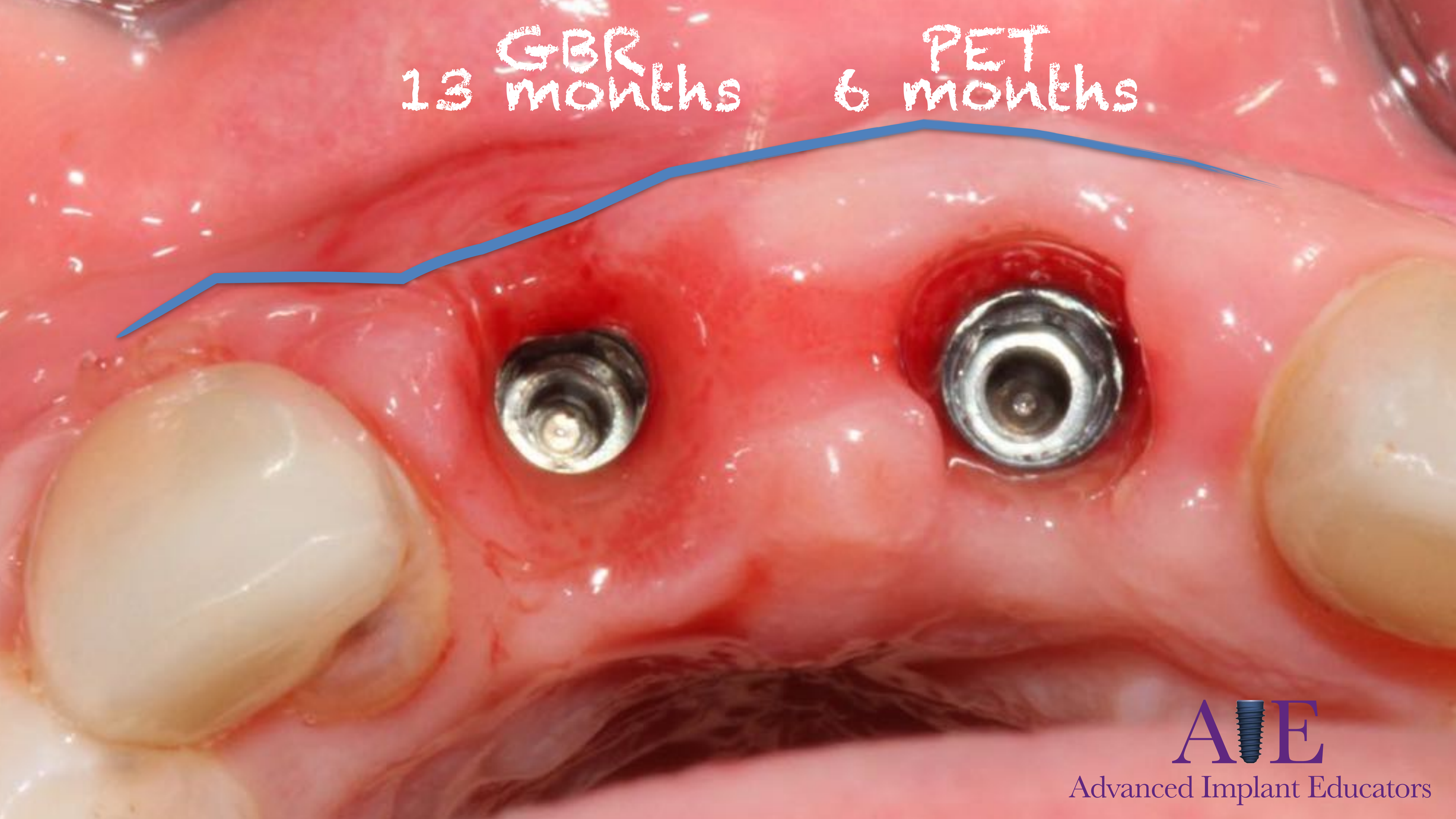


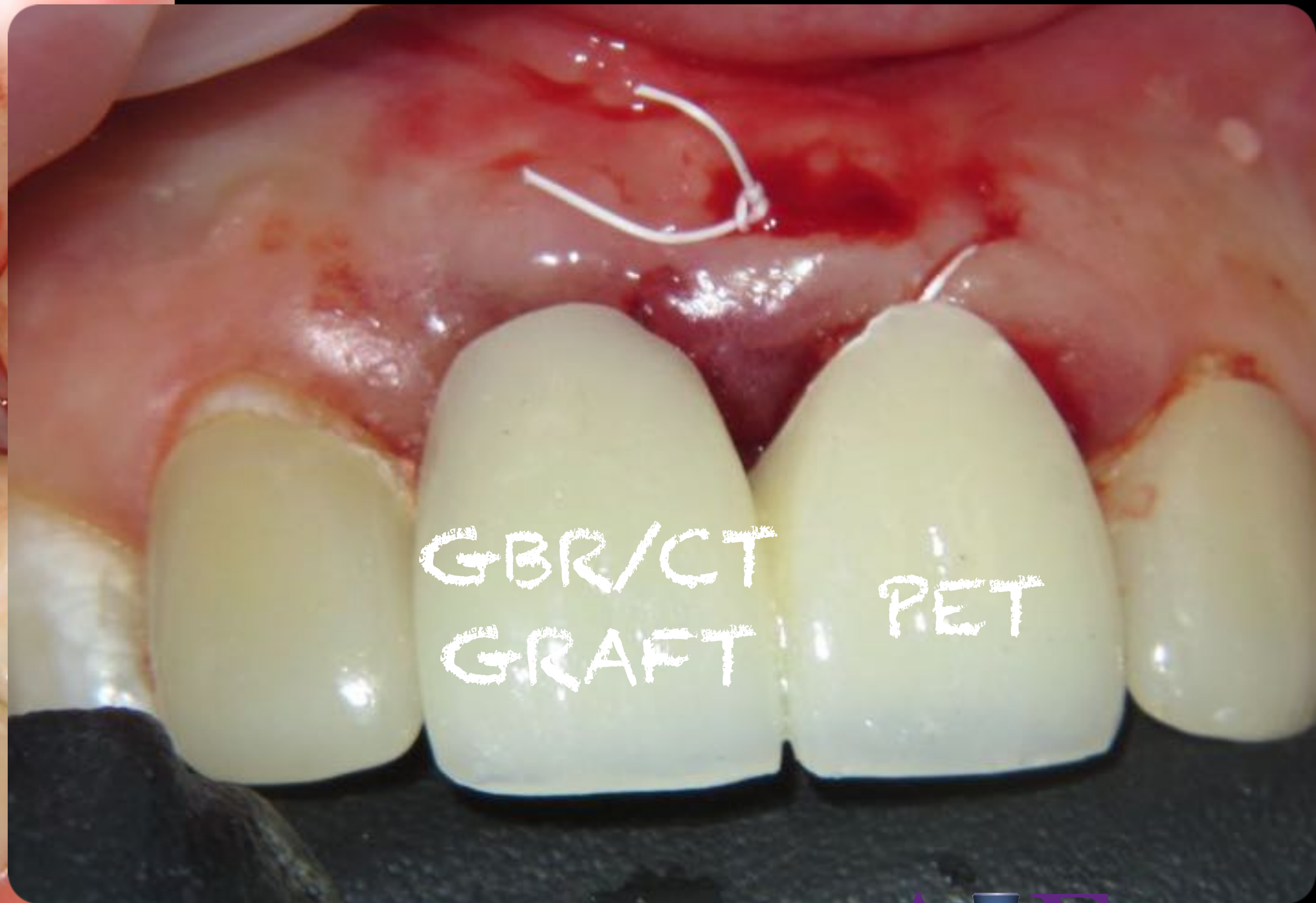
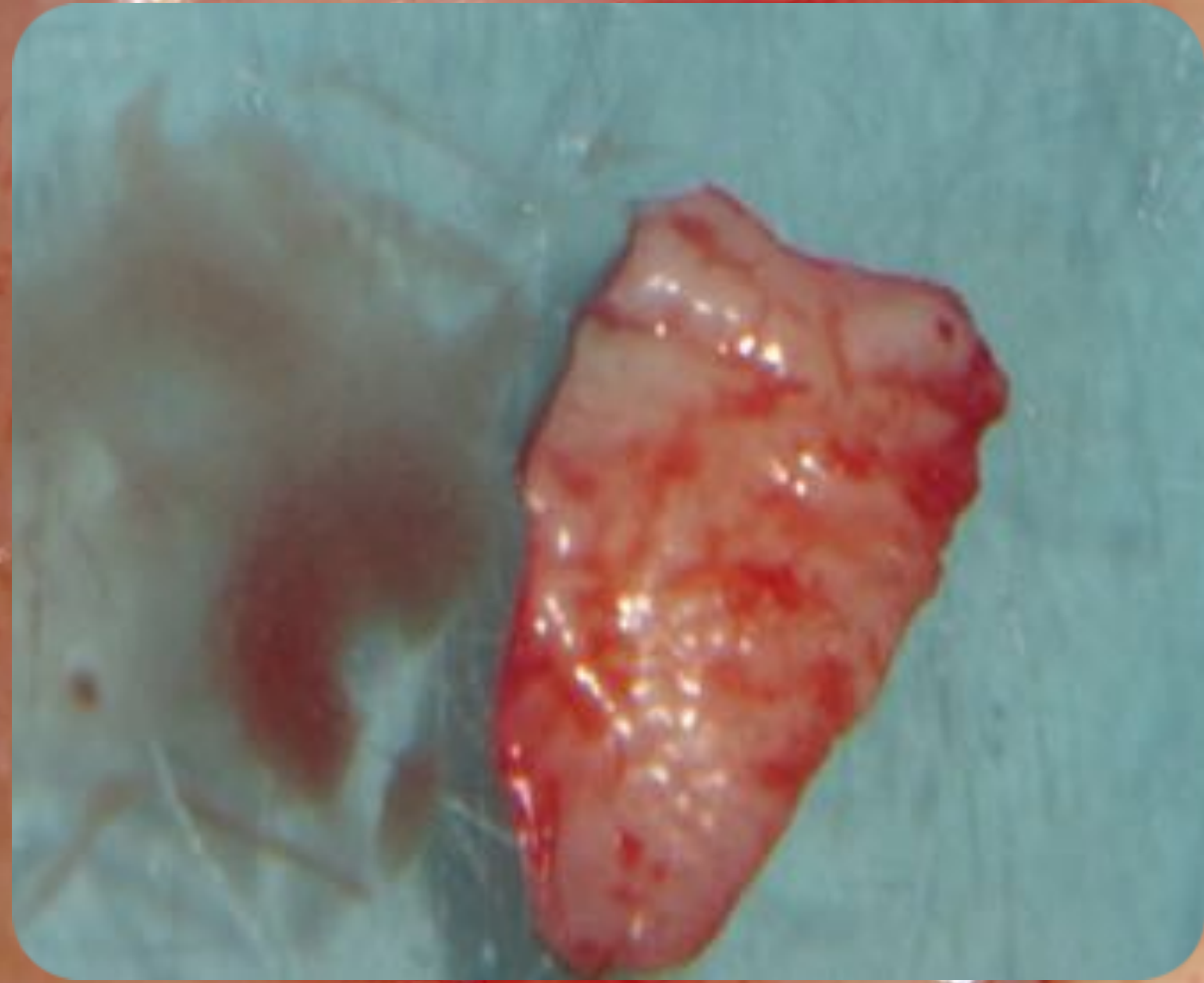
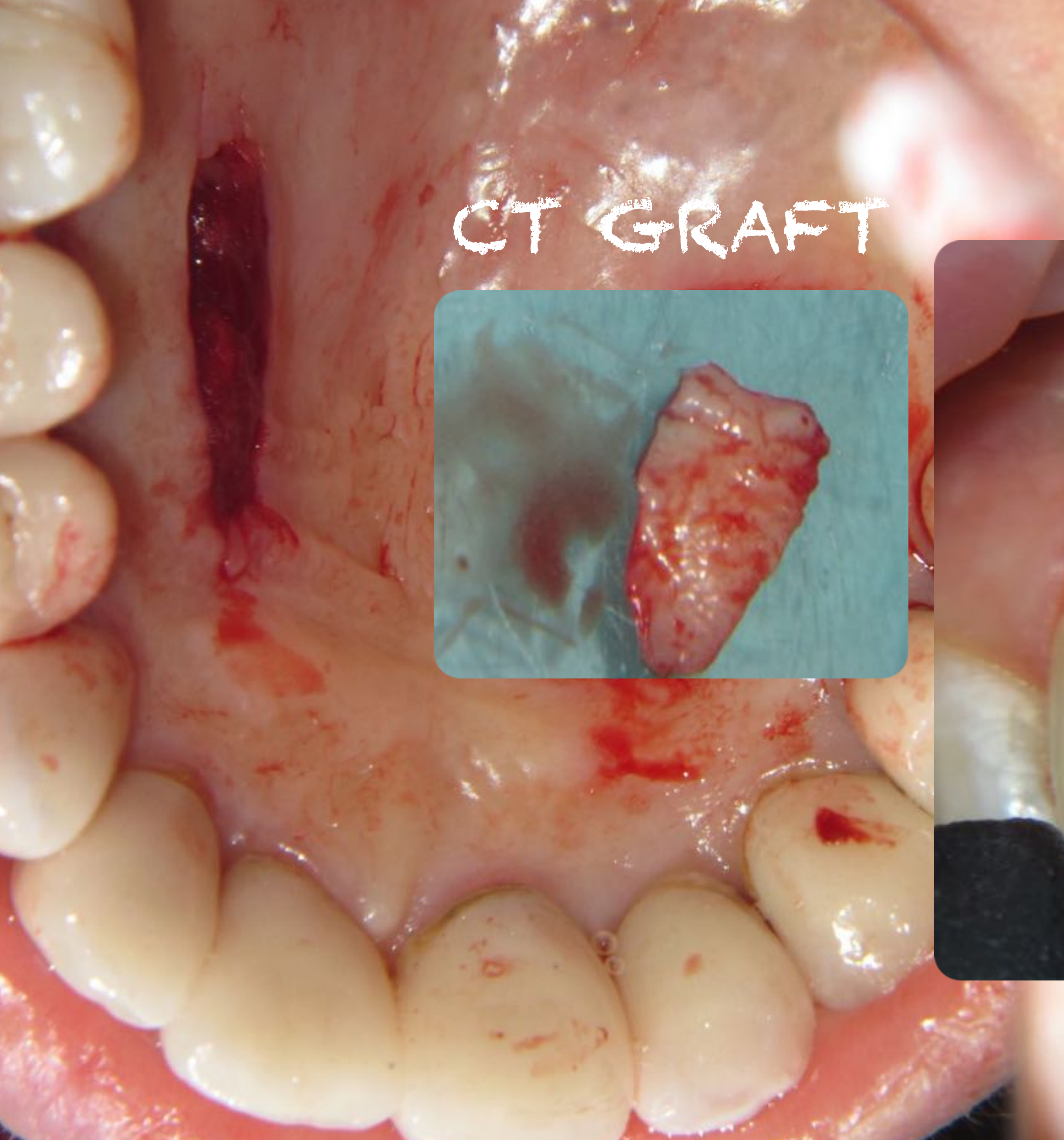
AIE

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GBR
13 months

PET
6 months

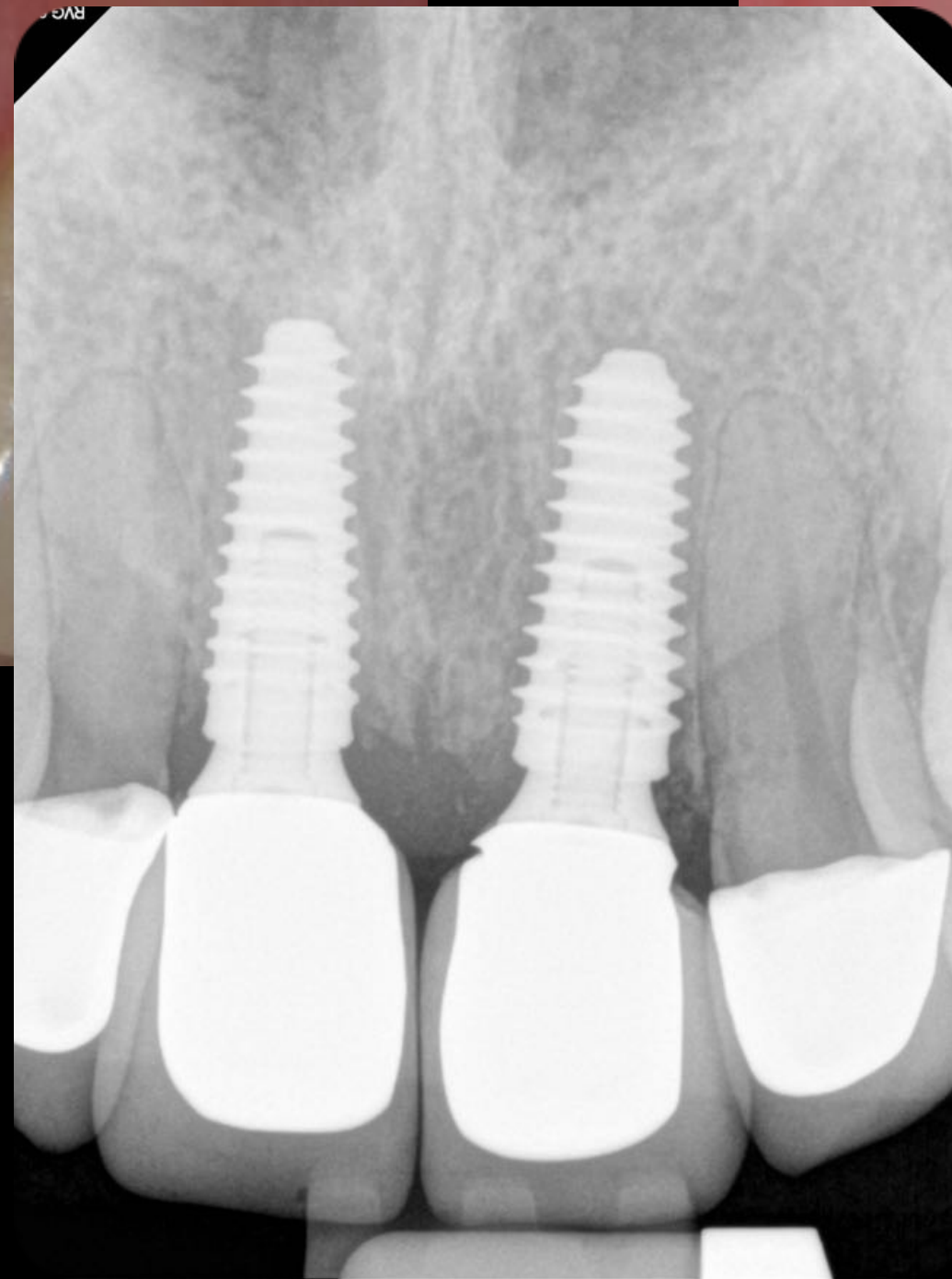




16 DAY post CT graft



4 year Post op



AIE

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GBR/CTG vs Socket shield

EXTRACT

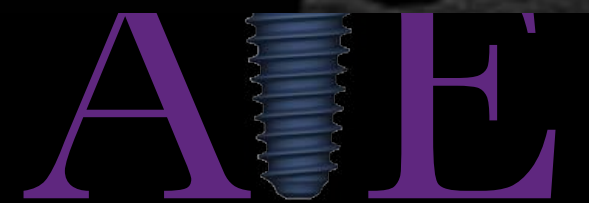
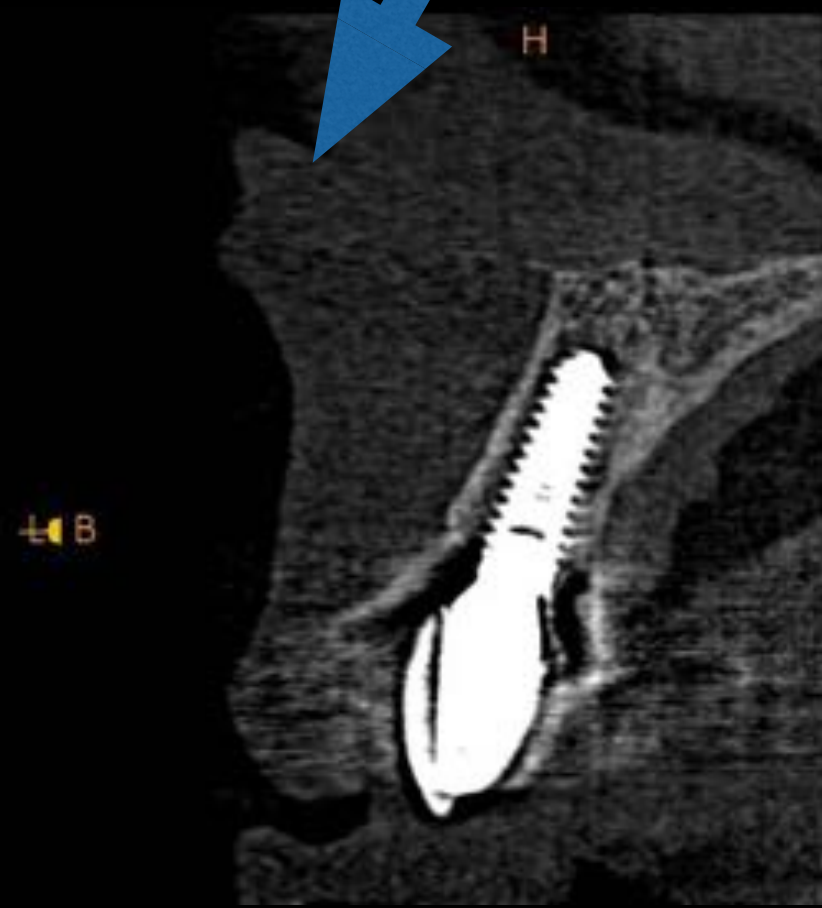
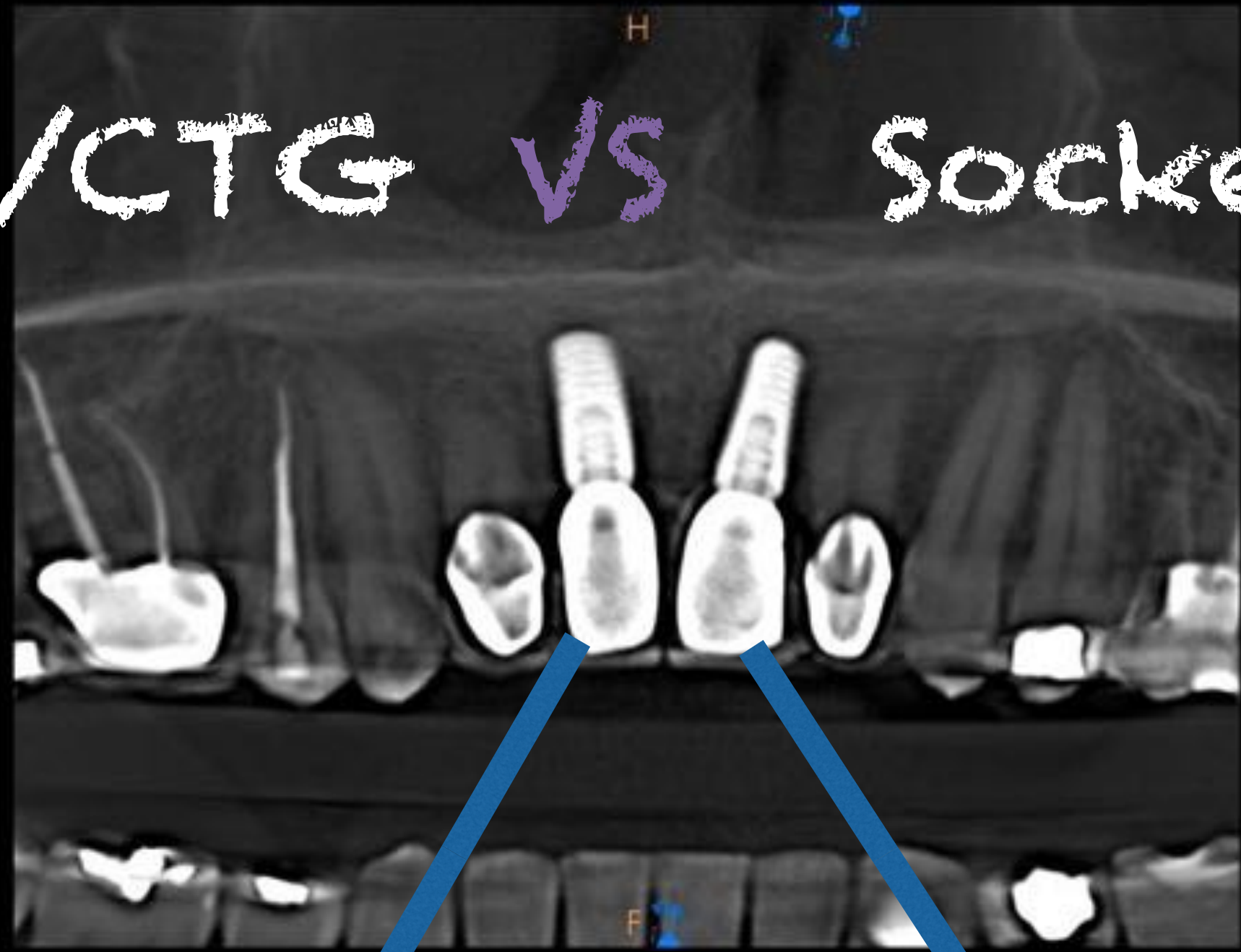
Implant

GBR Ti-Mesh

CTG

EXTRACT

Implant



Partial Extraction Therapies (PET) Part 1: Maintaining Alveolar Ridge Contour at Pontic and Immediate Implant Sites



Howard Gluckman, BDS, MChD (OMP)¹
Maurice Salama, DDS²
Jonathan Du Toit, BChD, Dipl Implantol, Dip Oral Surg,
MSc Dent³

Buccopalatal collapse of the postextraction ridge is a significant challenge in restorative and implant dentistry. A variety of ridge preservation techniques using tissue and augmentative materials have been proposed in the literature. A slightly different approach is to use the tooth itself. Root submergence has been reported in the literature for more than 4 decades, and it has been demonstrated that the submerged tooth root retains the periodontal tissues and preserves the bone in pontic sites or below dentures to retain the ridge. The socket-shield technique entails preparing a tooth root section simultaneous to immediate implant placement and has demonstrated histologic and clinical results that are highly promising to esthetic implant treatment. The pontic shield technique preserves the alveolar ridge at sites intended for pontic development where the root submergence technique is not possible. The aforementioned techniques collectively may be termed partial extraction therapies (PET), a term newly introduced into the literature and clinical environment. This article is a review of these ridge preservation therapies, providing a classification and a guide to their application. Int J Periodontics Restorative Dent 2016;36:681–687. doi: 10.11607/prd.2783

¹Specialist in Periodontics and Oral Medicine, Director of the Implant and Aesthetic Academy, Cape Town, South Africa.

²Clinical Assistant Professor of Periodontics, University of Pennsylvania, Philadelphia, Pennsylvania, USA; Medical College of Georgia, Augusta, Georgia, USA; Private Practice, Atlanta, Georgia, USA.

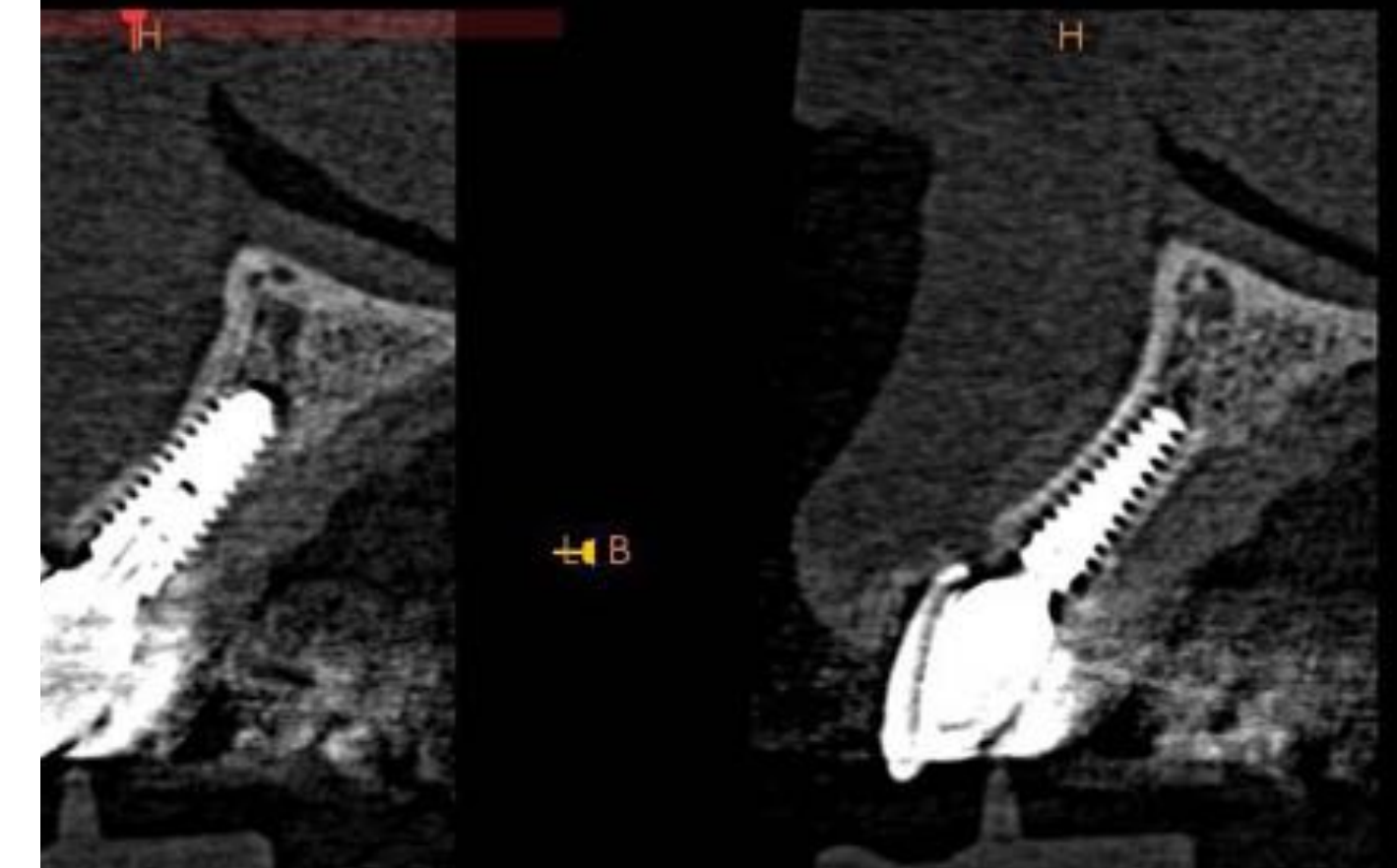
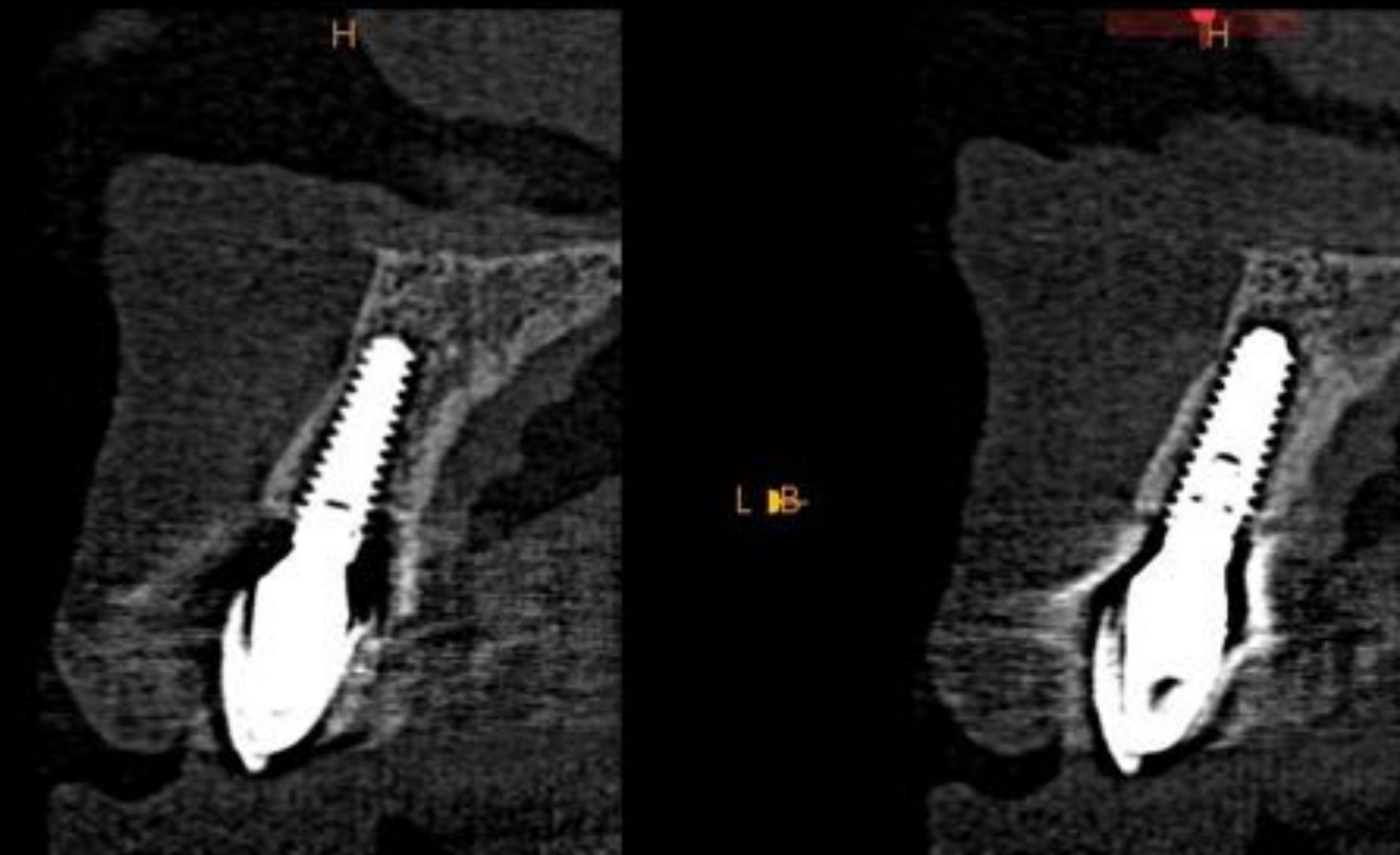
³Postgraduate, Department of Periodontics and Oral Medicine, School of Dentistry, Faculty of Health Sciences, University of Pretoria, South Africa.

Correspondence to: Dr Howard Gluckman, The Implant and Aesthetics Academy, 39 Kloof Street, Cape Town, South Africa. Fax: +2721 426 3053. Email: docg@theimplantclinic.co.za

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Ridge resorption as a result of tooth loss is well reported in the literature.¹ This loss of alveolar bone and change in ridge contour is the result of the bundle bone-periodontal ligament (BB-PDL) complex lost following the removal of a tooth.^{2,3} To restore an edentulous or partially dentate patient in many instances requires management of these resorbed sites by careful surgical intervention. The literature is abundant with guidelines to limit tissue loss (ridge preservation techniques) or restore the ridge architecture (bone and soft tissue augmentation).^{4,5} However, none of these circumvent the primary cause of resorption, ultimately resulting in partial or total ridge collapse.³ Partial extraction therapies (PET) represent a subgroup of precollapse interventions that collectively use the tooth itself to offset the loss of alveolar tissue. By retaining the tooth root and its attachment to bone, the BB-PDL complex with its vascular supply may be maintained. Root submergence has been demonstrated with success in the preservation of the postextraction ridge and development of pontic sites.^{6,7} However, the technique is limited by apical pathology and endodontic treatment requiring an alternative partial extraction therapy.

The socket-shield technique introduced by Hürzeler et al uses the



AIE

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GBI

Shield

GBR/CTG vs Socket shield

Table 1: Comparative tabulation of procedures to manage the effects of post-extraction resorption adjunct to implant therapy

Advantages		Disadvantages
	GBR	
Tissues gains		Surgically invasive (autogenous)
Well supported in the literature		Technique sensitive
		Additional healing time
		Additional co-morbidity
		Additional expense (xeno / allograft)
		Additional risk of infection / complication
		Vertical gains are challenging
	Sub-epithelial connective tissue graft	
Reliable, predictable		Surgically invasive (autogenous)
Well supported in the literature		Technique sensitive
No additional material cost		Additional healing time
		Additional co-morbidity
	Socket-shield technique	
No additional material cost		Not yet reliable or predictable
No co-morbidity		No long-term data yet
Single surgery		Technique sensitive
Applicable in sites with endodontic apical pathology		

*Gluckman and Salama
INTERNATIONAL DENTISTRY – AFRICAN EDITION VOL. 5, NO. 3

Partial Extraction Therapies (PET) Part 1: Maintaining Alveolar Ridge Contour at Pontic and Immediate Implant Sites



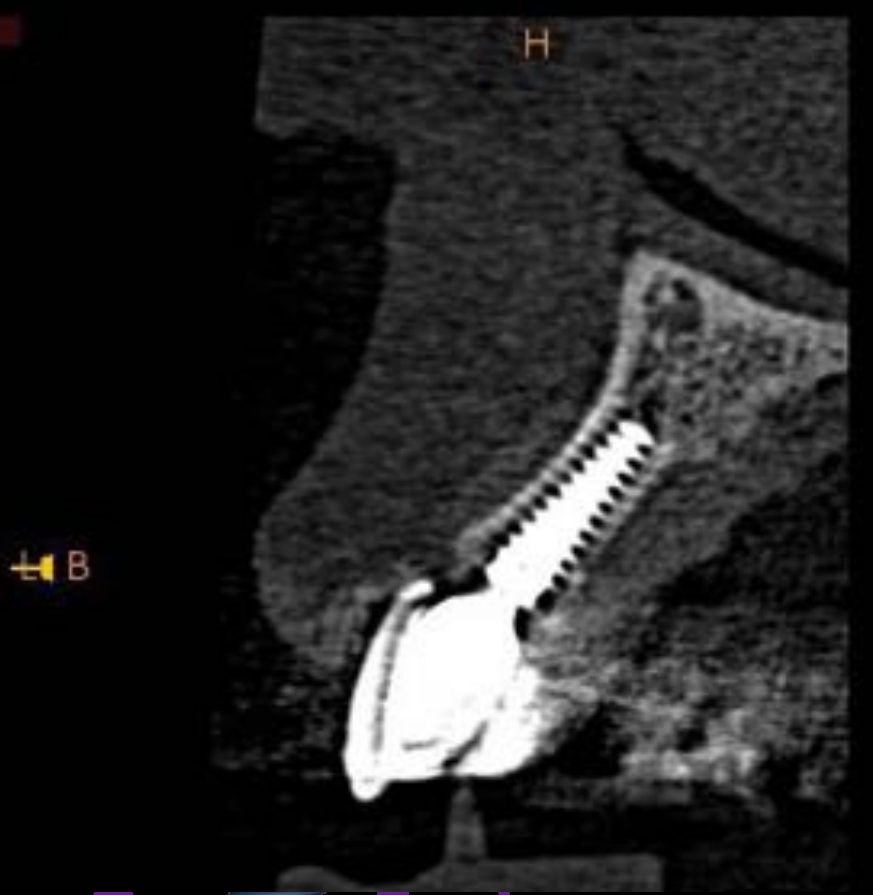
Howard Gluckman, BDS, MChD, CMT, Maurice Salama, DDS, Jonathan Du Toit, BChD, Dip Implant, Dip Oral Surg, MSc, Dent

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The socket-shield technique introduced by Hürstel et al uses the

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³Postgraduate, Department of Periodontics and Oral Medicine, School of Dentistry, Faculty of Health Sciences, University of Pretoria, South Africa.
Correspondence to: Dr Howard Gluckman, The Implant and Aesthetic Academy, 39 Kloof Street, Cape Town, South Africa. Fax: +2721 424 3053. Email: hgluck@mybroadband.co.za

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Partial Extraction Therapies (PET) Part 1: Maintaining Alveolar Ridge Contour at Pontic and Immediate Implant Sites



Howard Gluckman, BDS, MChD, CMT, Maurice Salama, DDP, Jonathan Du Toit, BChD, Dip Implantol, Dip Oral Surg, MSc Dent

Reciprocal collapse of the postextraction ridge is a significant challenge in restorative and implant dentistry. A variety of ridge preservation techniques using bone and augmentative materials have been proposed in the literature. A slightly different approach is to use the tooth itself. Root submergence has been reported in the literature for more than 4 decades, and it has been demonstrated that the submerged tooth root retains the periodontal tissue and preserves the bone in pontic sites or below dentures to retain the ridge. The socket-shield technique entails preparing a tooth root section simultaneous to immediate implant placement and has demonstrated histologic and clinical results that are highly promising to aesthetic implant treatment. The pontic shield technique preserves the alveolar ridge at sites intended for pontic development where the root submergence technique is not possible. The aforementioned techniques collectively may be termed partial extraction therapies (PET), a term newly introduced into the literature and clinical environment. This article is a review of these ridge preservation therapies, providing a classification and a guide to their application. Int J Periodontics Restorative Dent 2016;36:681-687. doi: 10.11607/prd.2383

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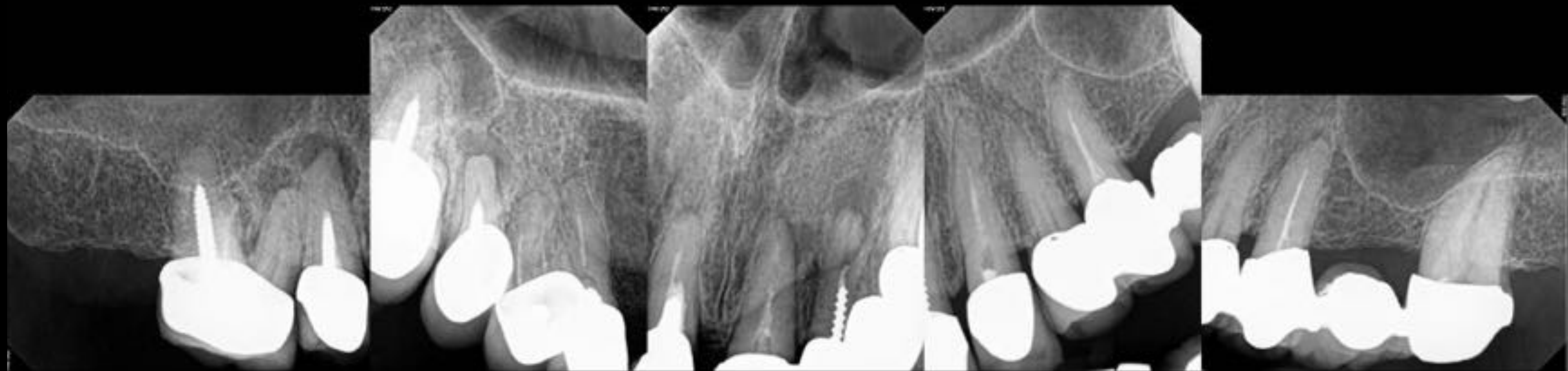
*Specialist in Periodontics and Oral Medicine, Director of the Implant and Aesthetic Academy, Cape Town, South Africa.
†Clinical Assistant Professor of Periodontics, University of Pennsylvania, Philadelphia, Pennsylvania, USA, Medical College of Georgia, Augusta, Georgia, USA, Private Practice, Atlanta, Georgia, USA.
‡Paediatrician, Department of Periodontics and Oral Medicine, School of Dentistry, Faculty of Health Sciences, University of Pretoria, South Africa.
Correspondence to: Dr Howard Gluckman, The Implant and Aesthetic Academy, 39 Kloof Street, Cape Town, South Africa. Fax: +2721 428 3553. Email: drhug@implantinc.co.za
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Surgically invasive (autogenous)
Technique sensitive
Additional healing time
Additional co-morbidity

Socket-shield technique

Not yet reliable or predictable
No long term data yet
Technique sensitive

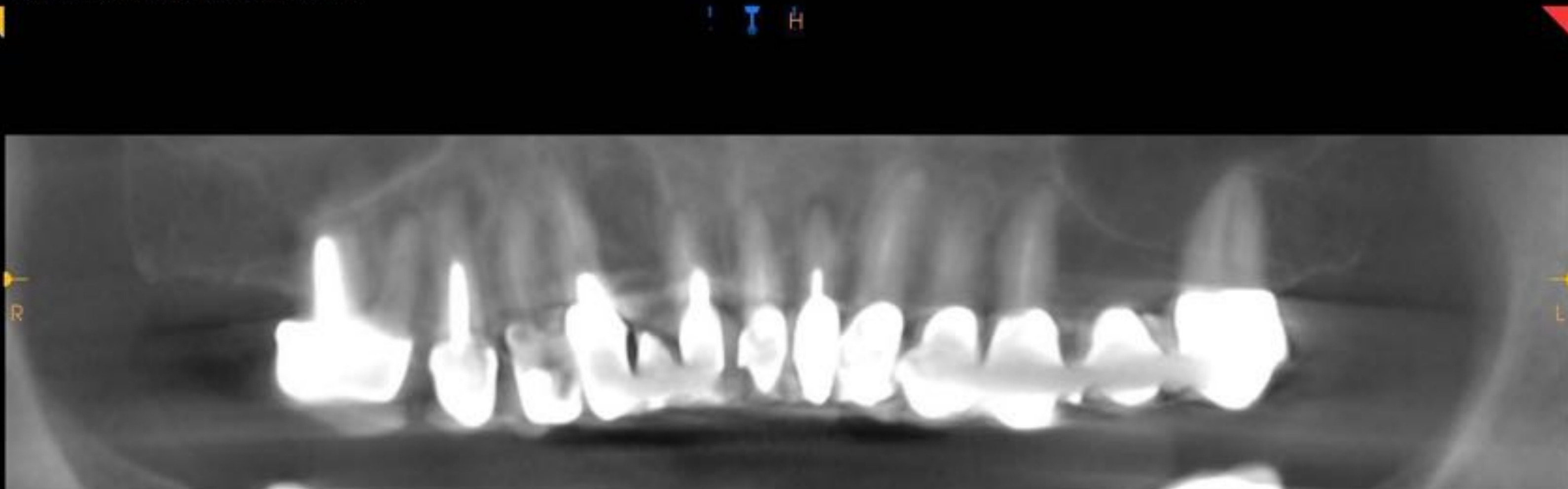
THE ALL AUTOGENOUS TOOTH (AAT)



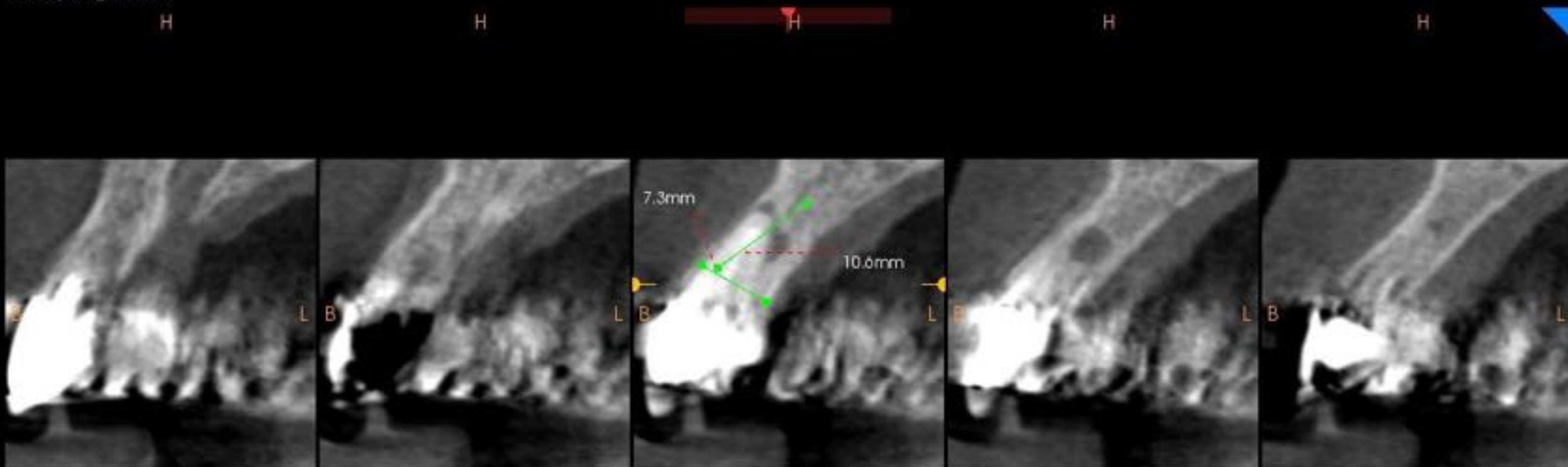
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Integration mode: AVG. Slice thickness: 20.0 mm.



Slice spacing: 1.8 mm.



A

Slice spacing: 1.8 mm.

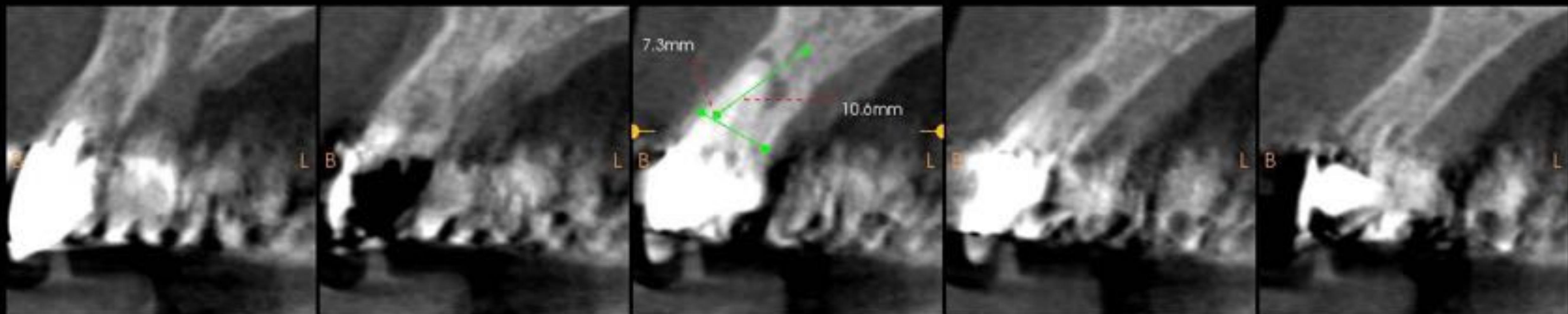
H

H



H

H



F

F

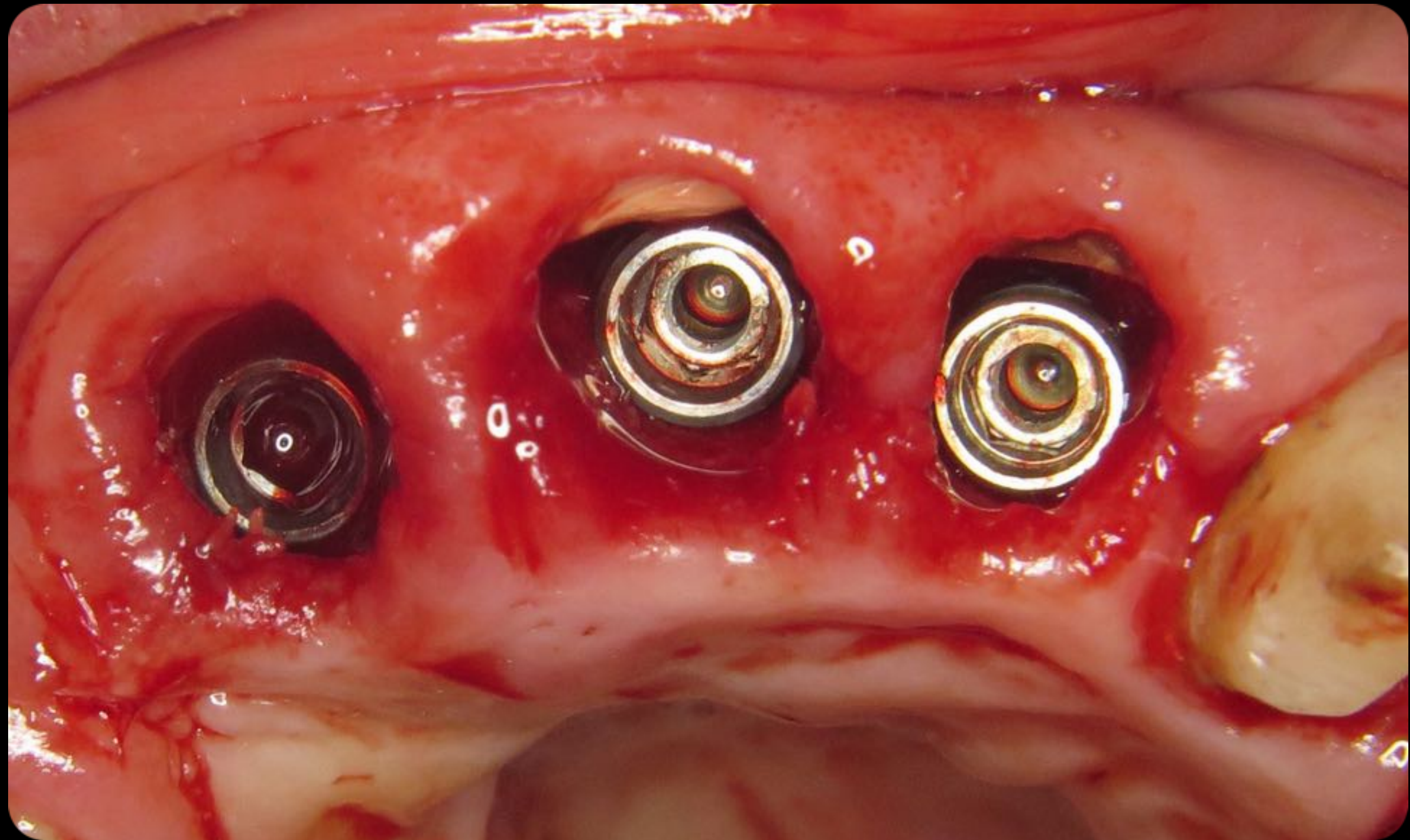
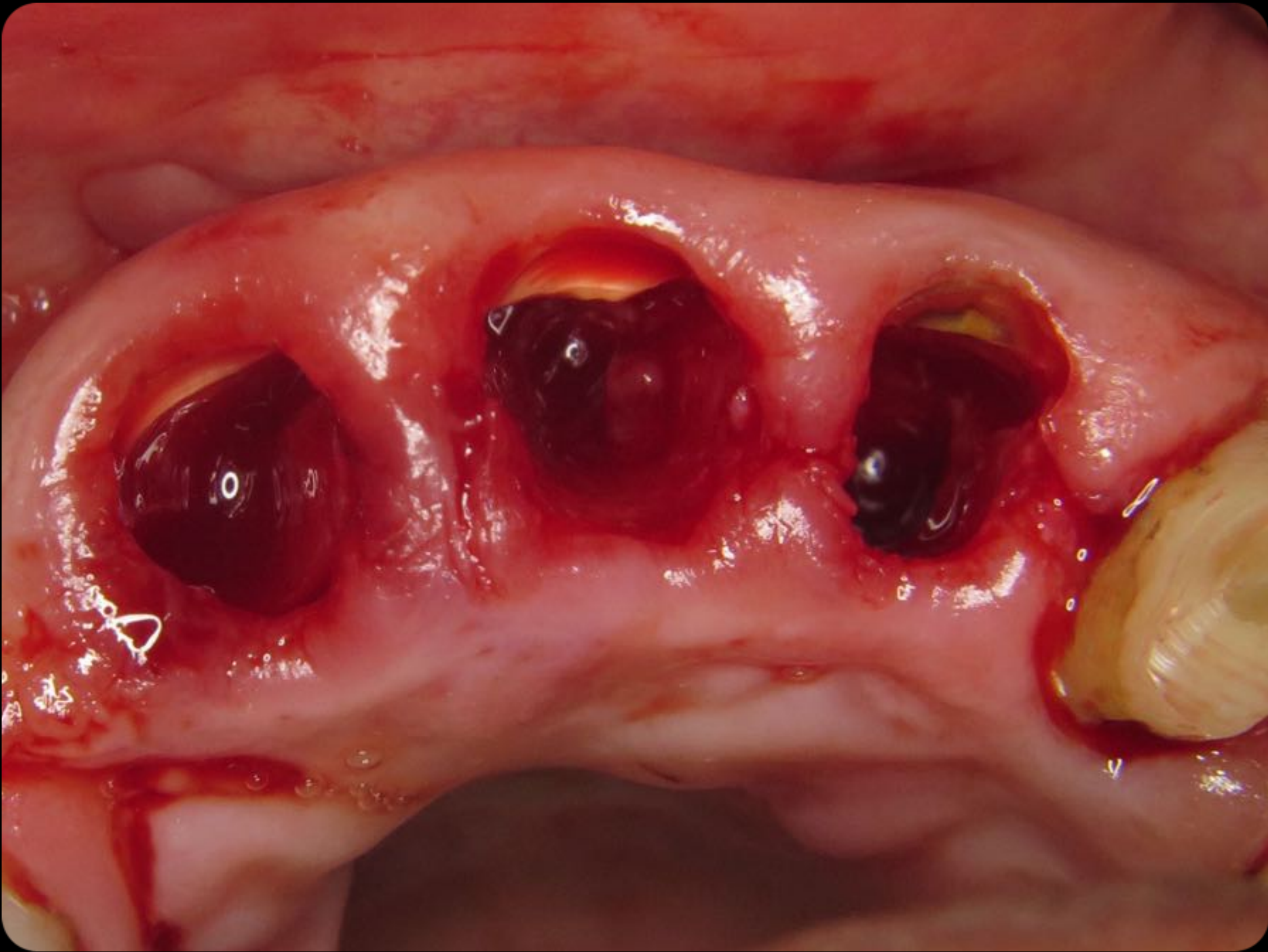


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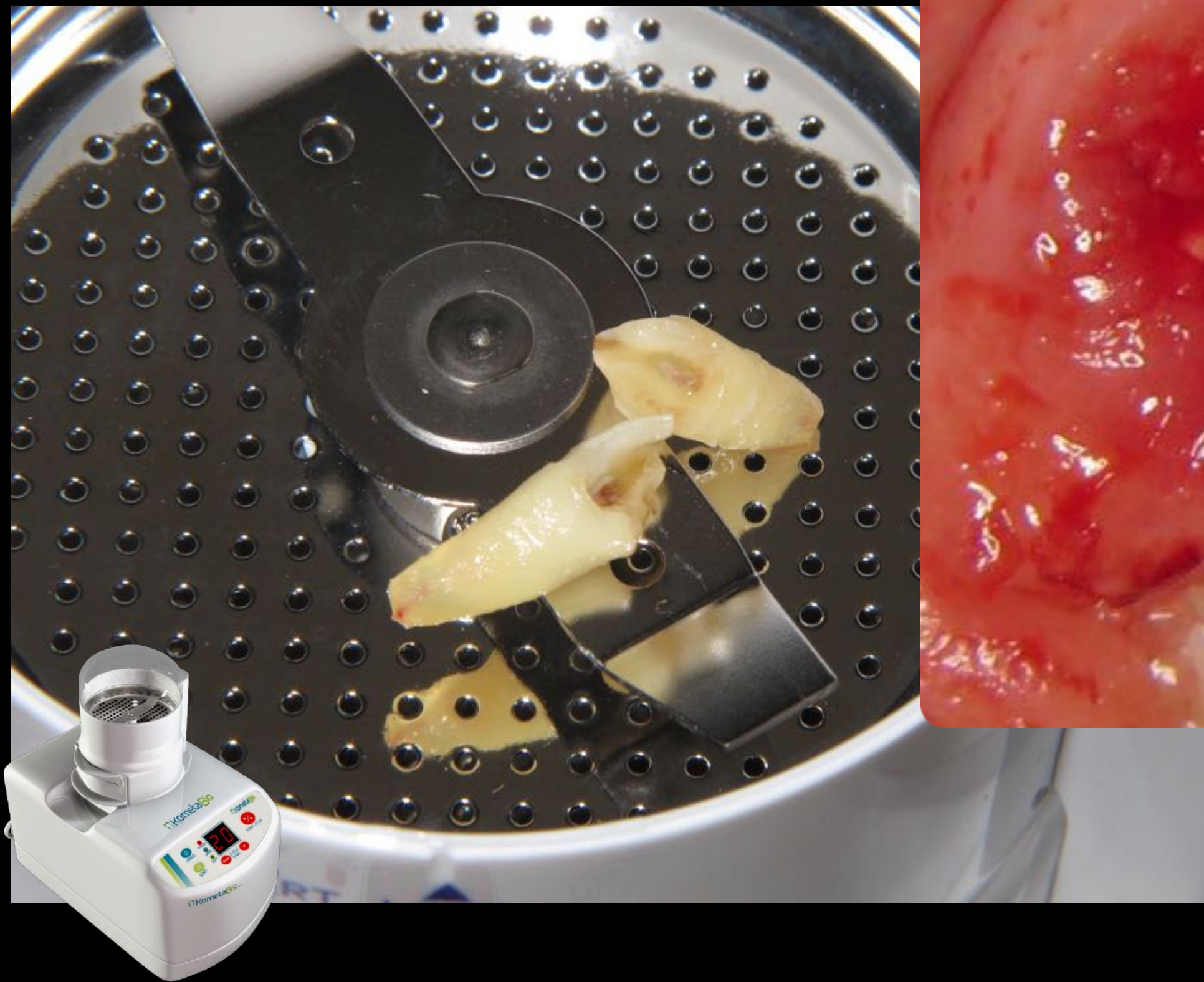
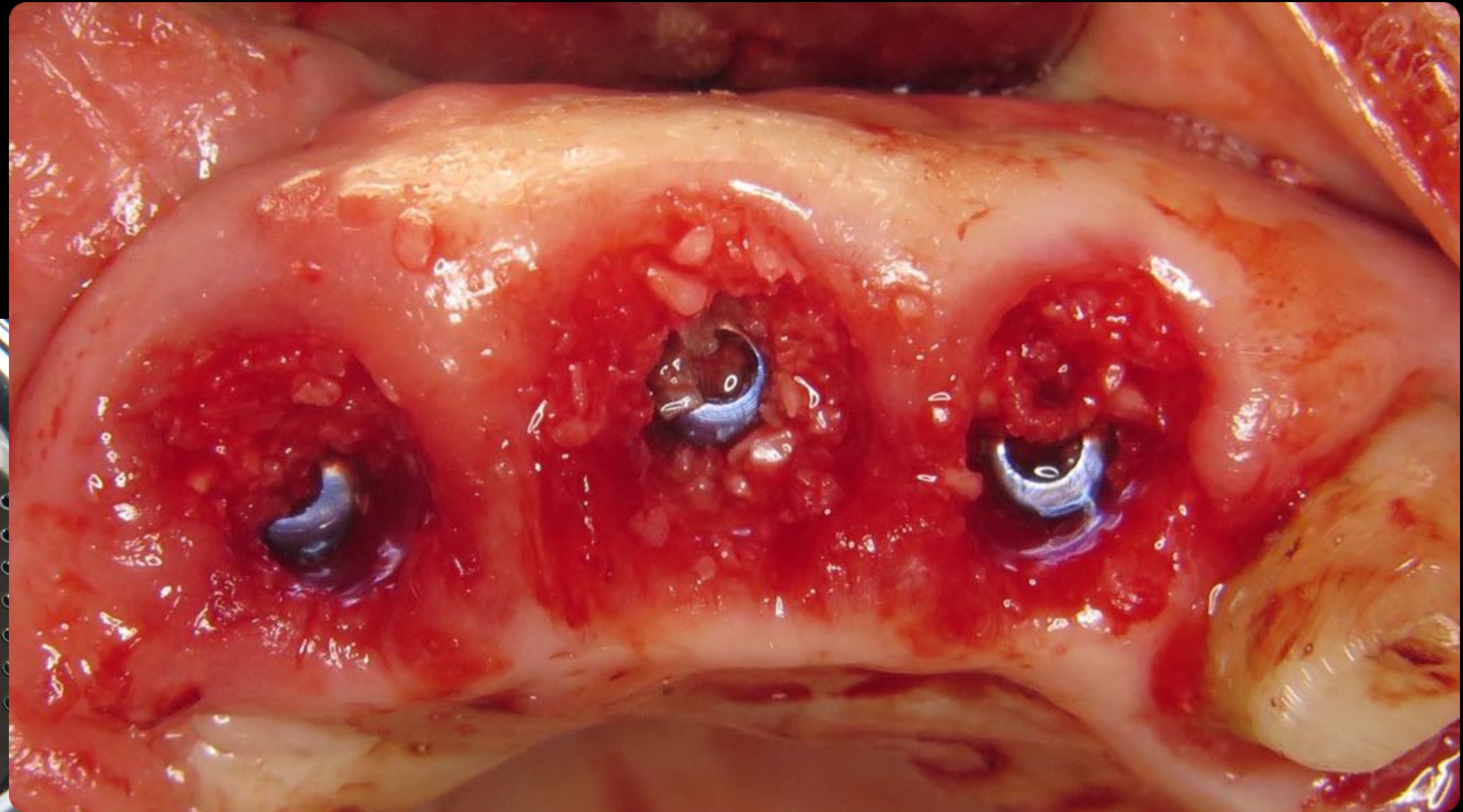
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Multiple Teeth
Socket Shield







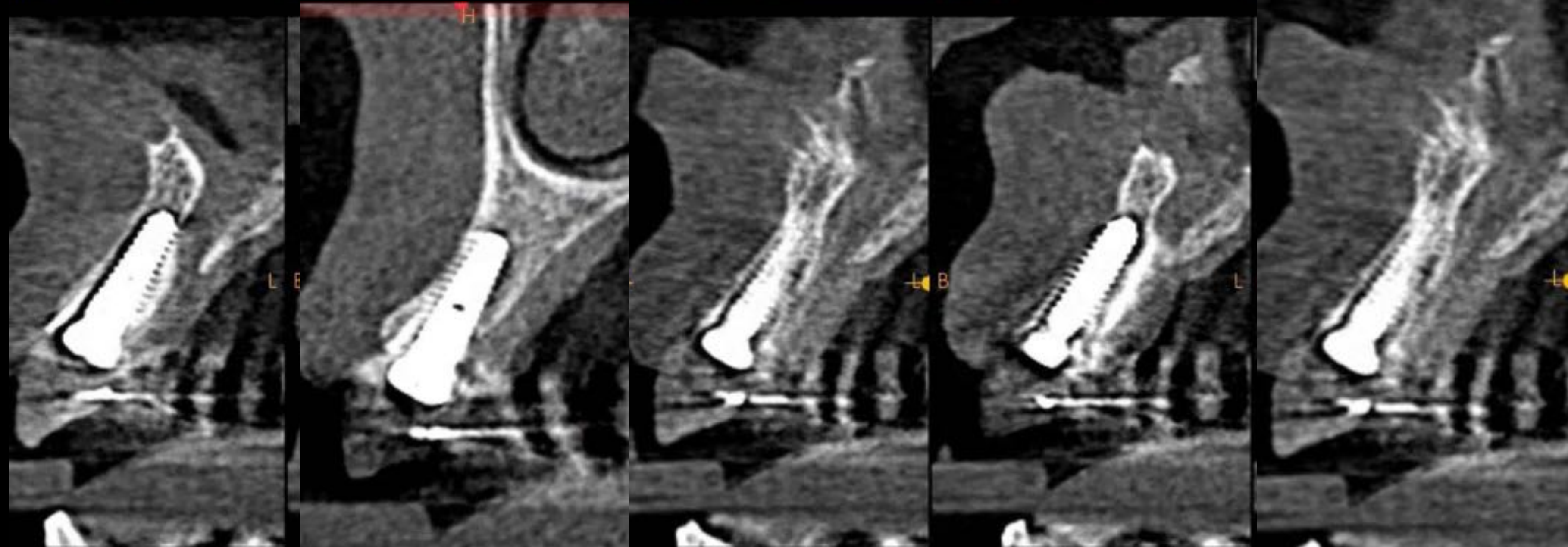




mm 1.68

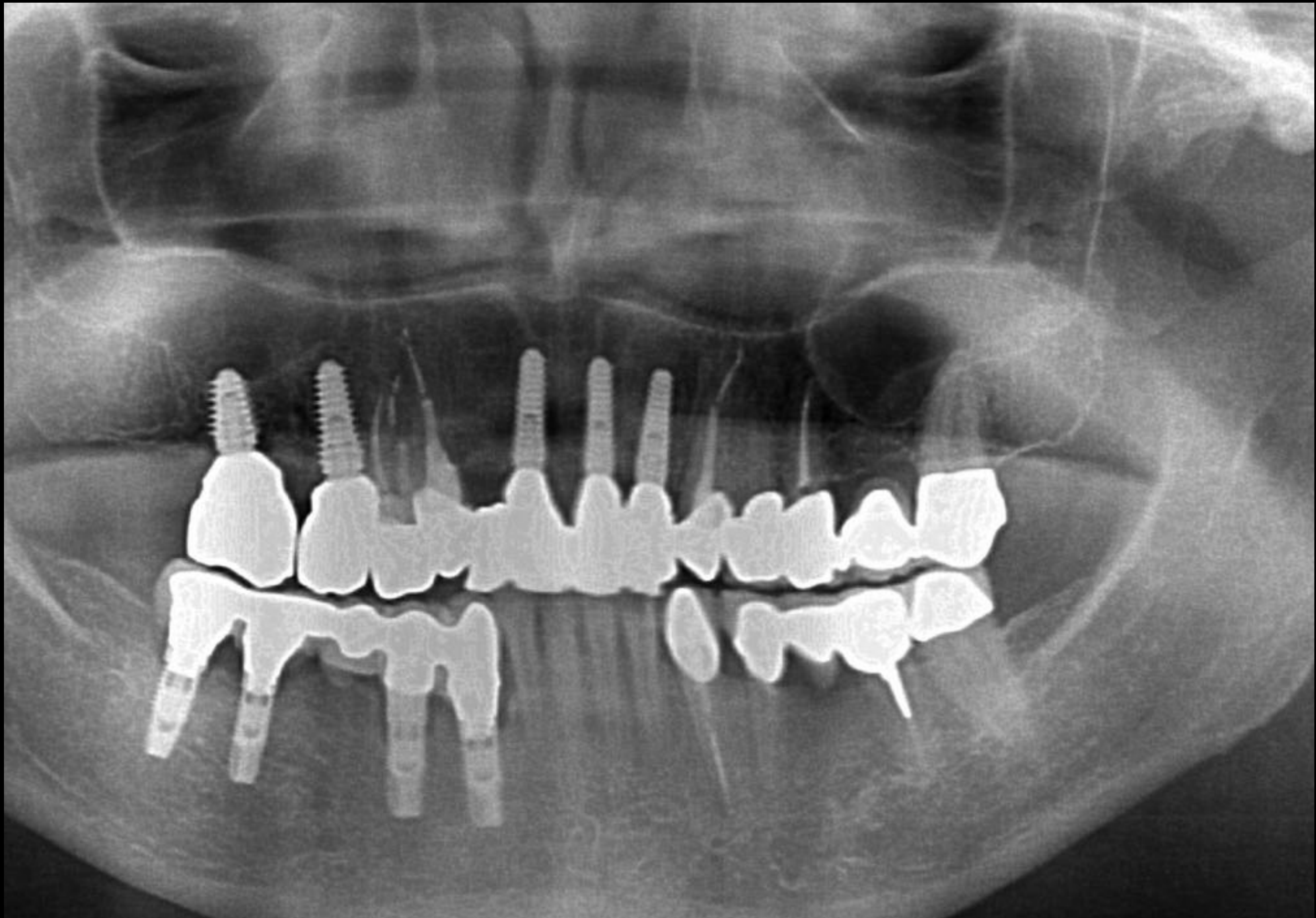
1x5 2.7 mm 180 μm

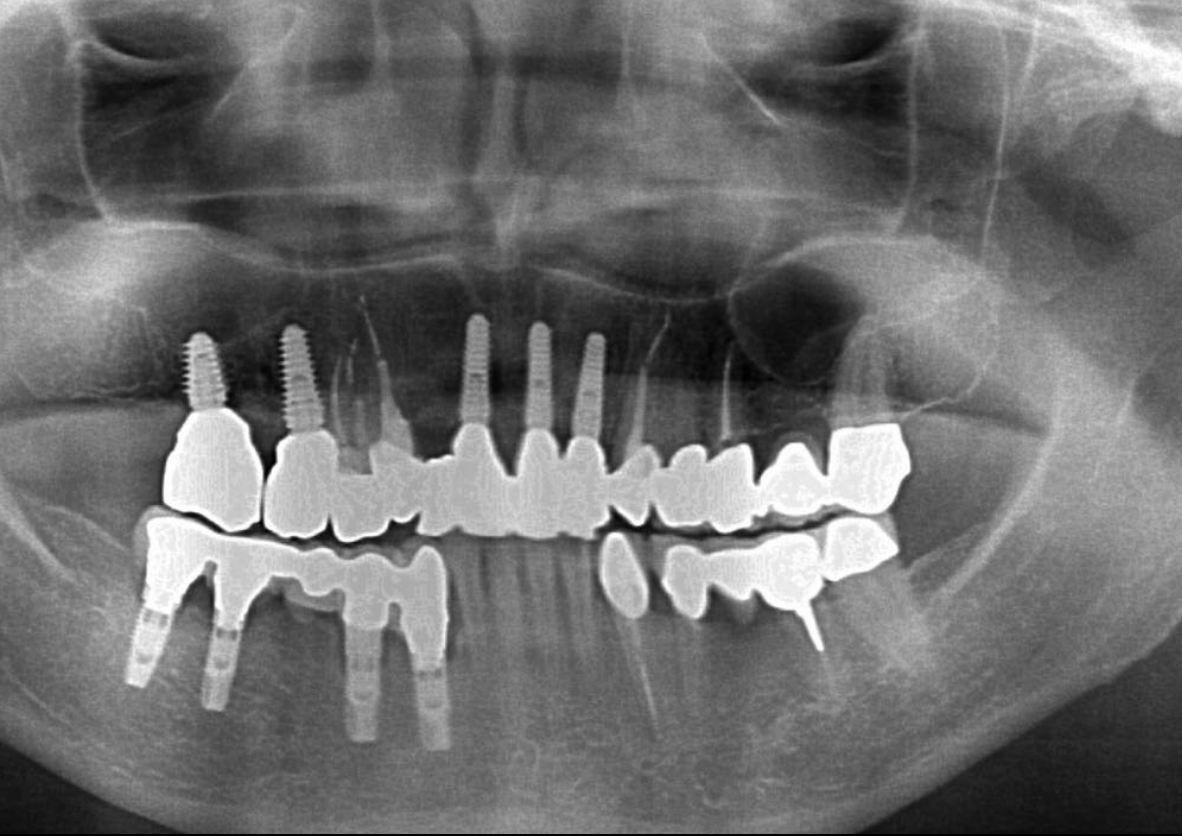
mm H 55.6 mm H 58.3 mm H 61.0 mm H 63.7 mm H





ZR Abutments and Temps





15 month follow up

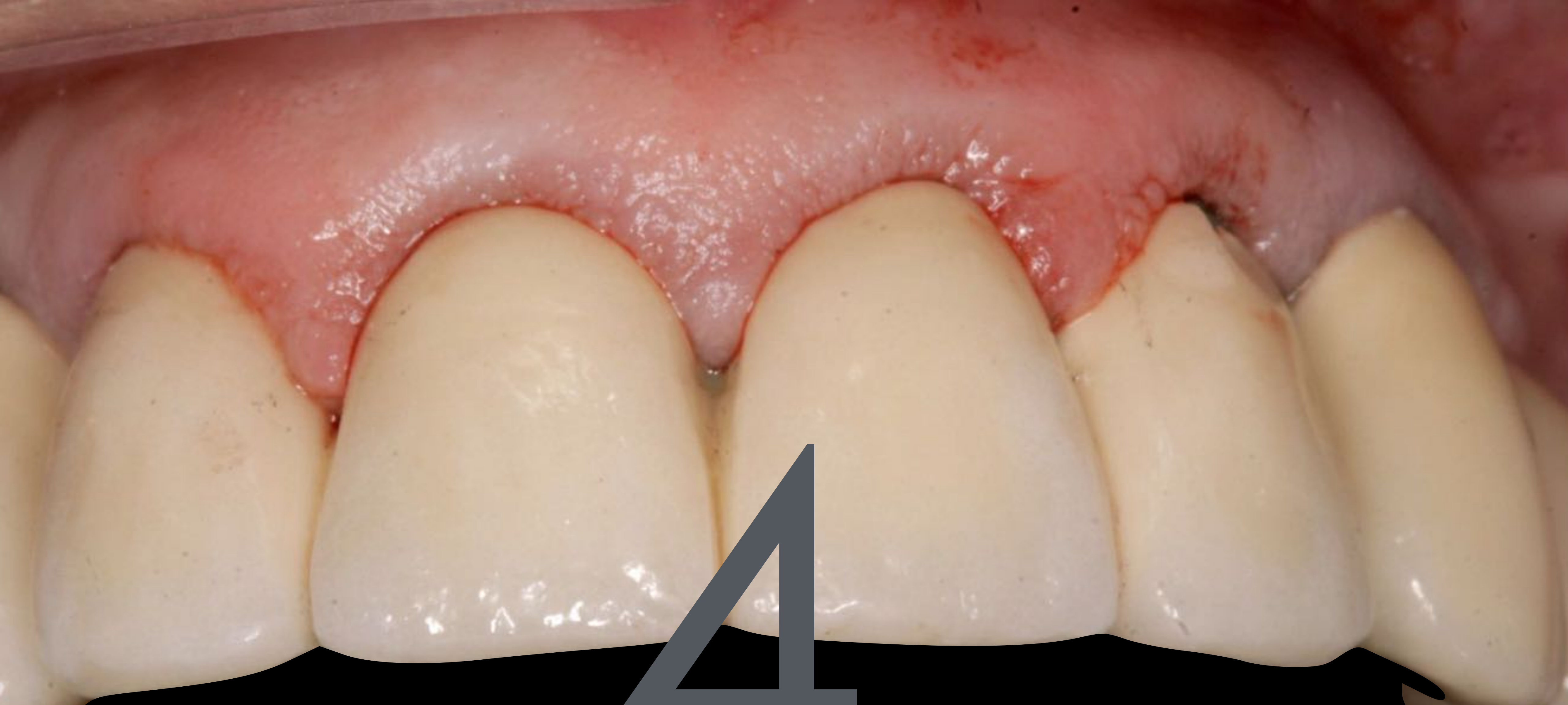


Case By:
Miltiadis E. Mitsias,
DDS, MSc, PhD

4 ADJACENT IMPLANTS



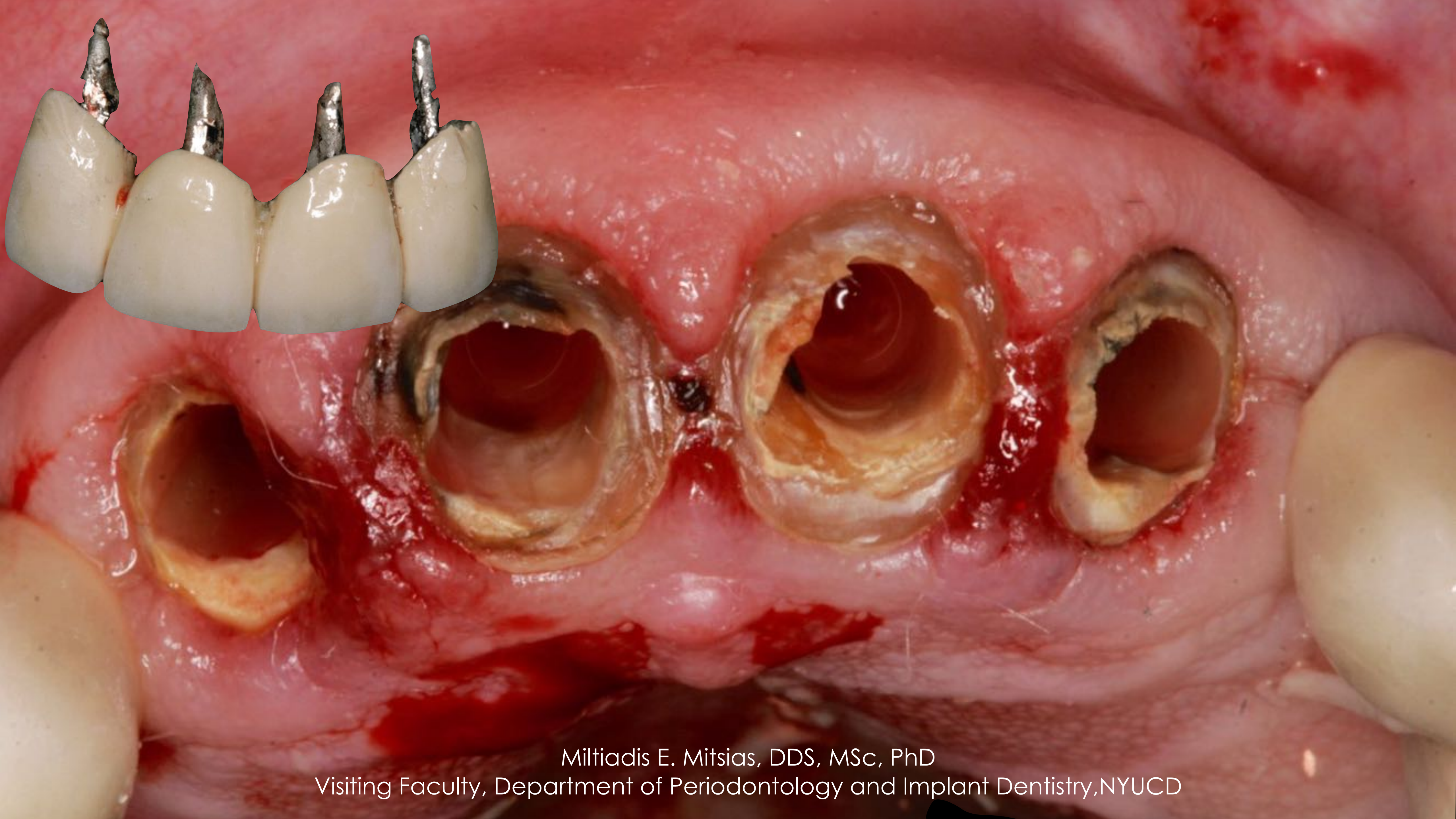
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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



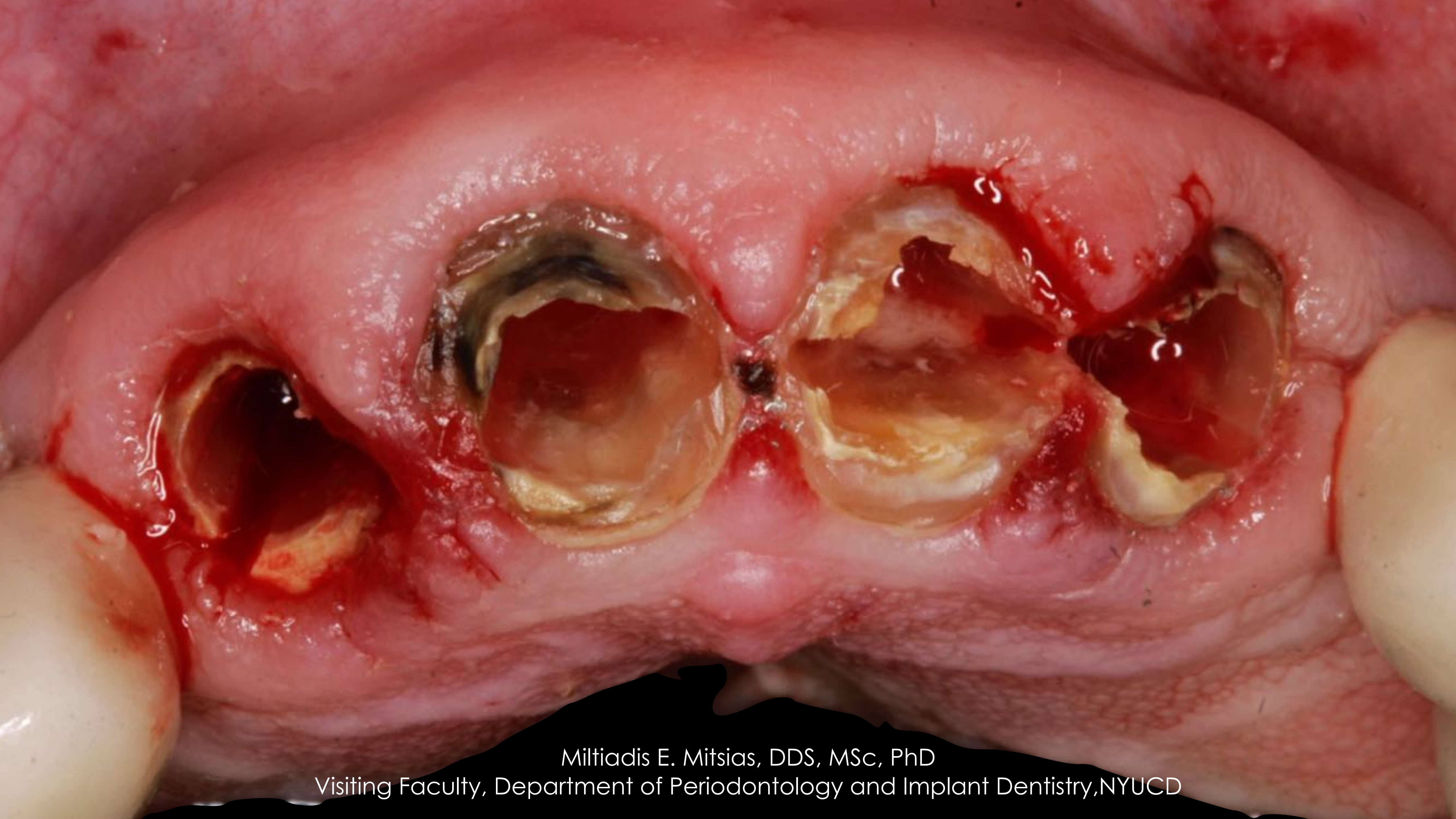
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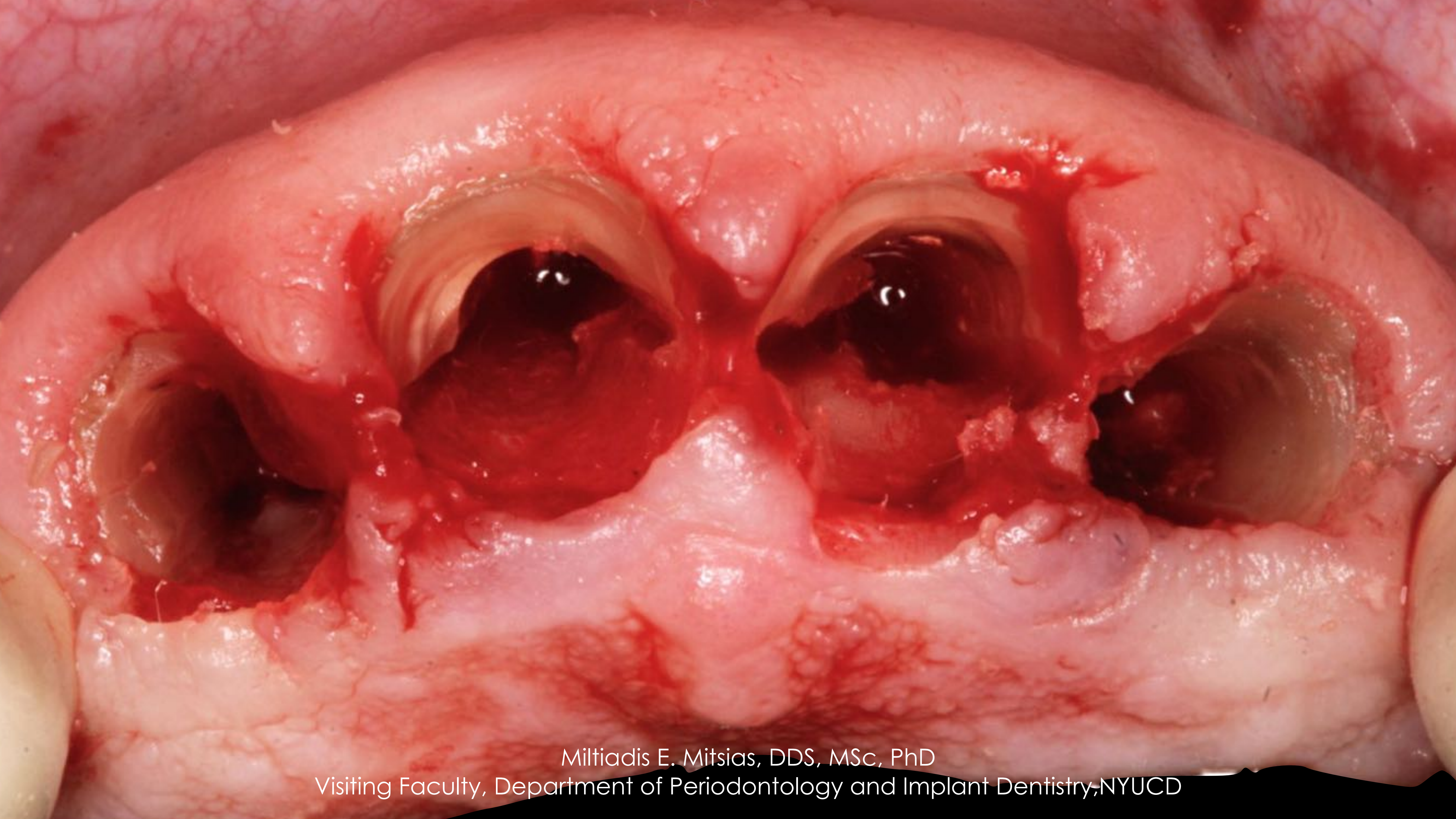
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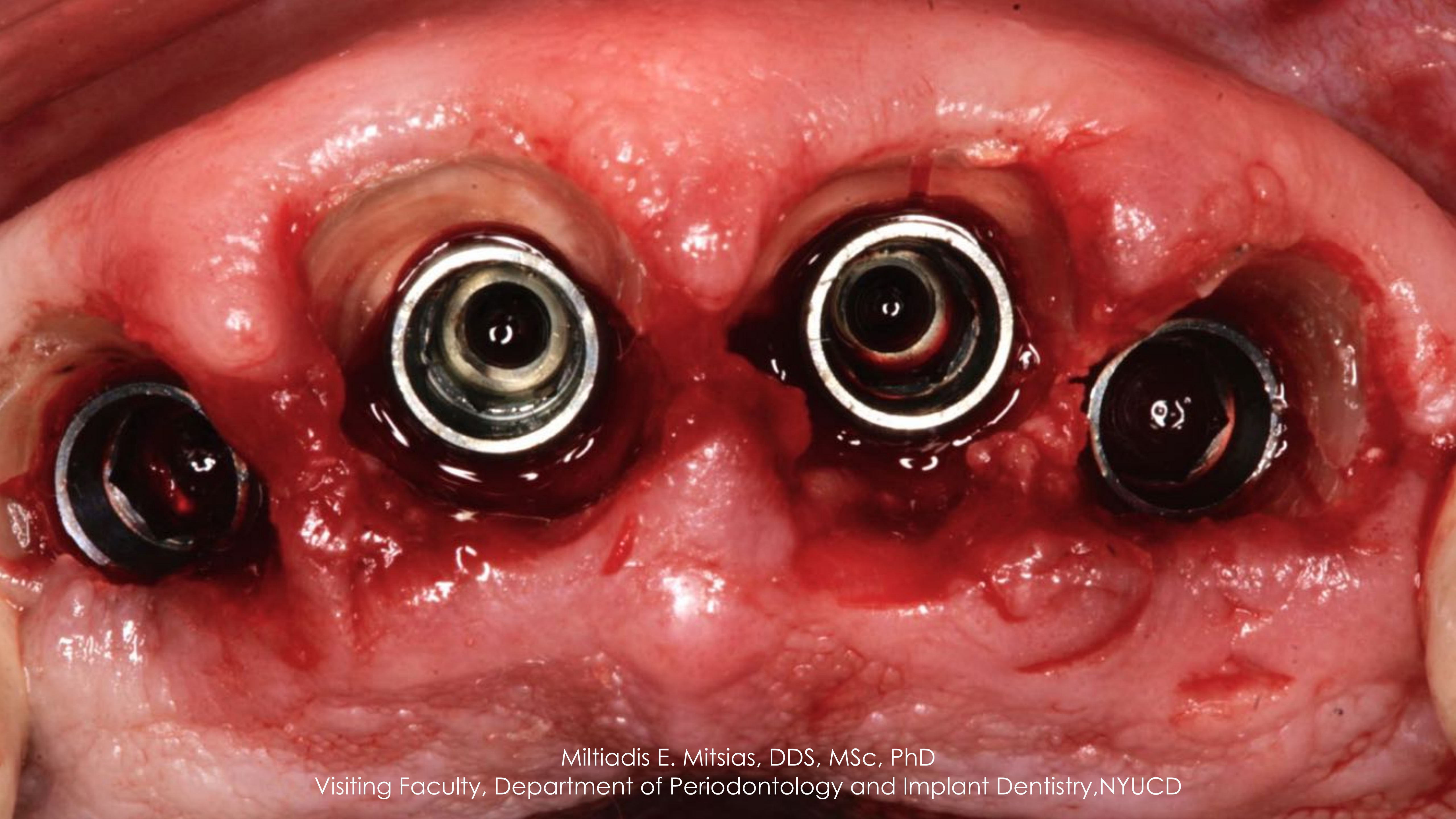
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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD

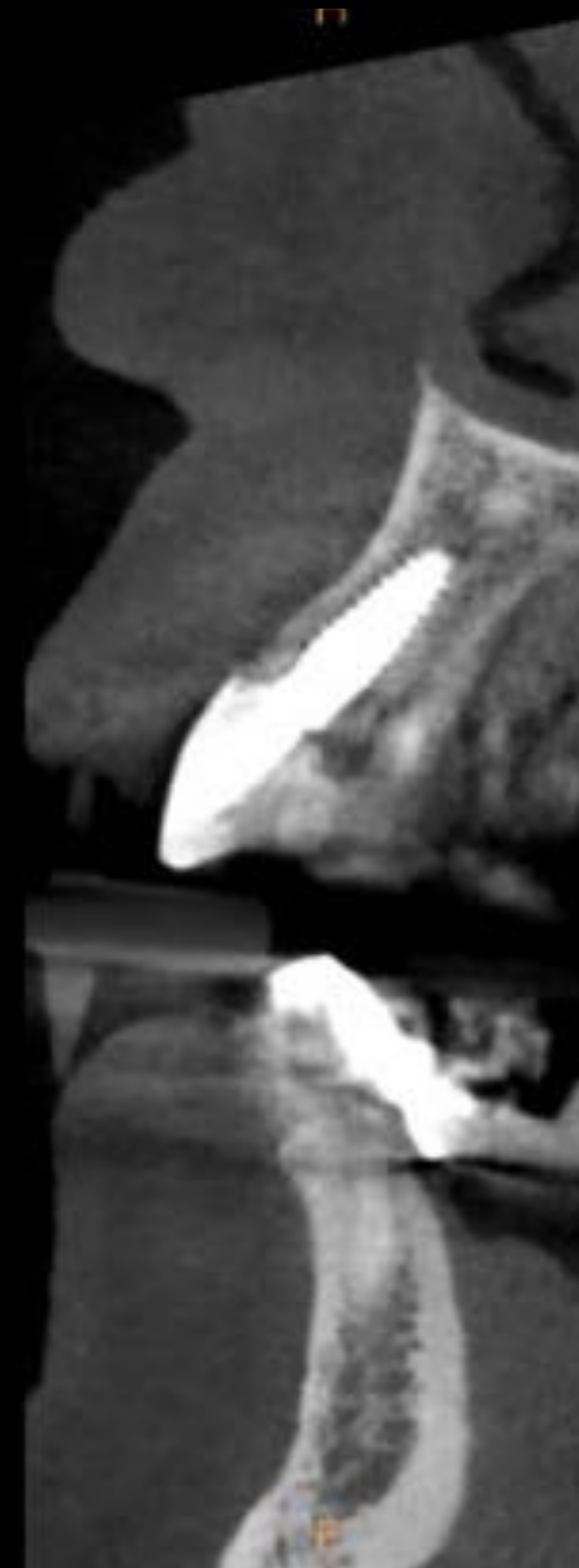
Post-op CBCT



L B



L B

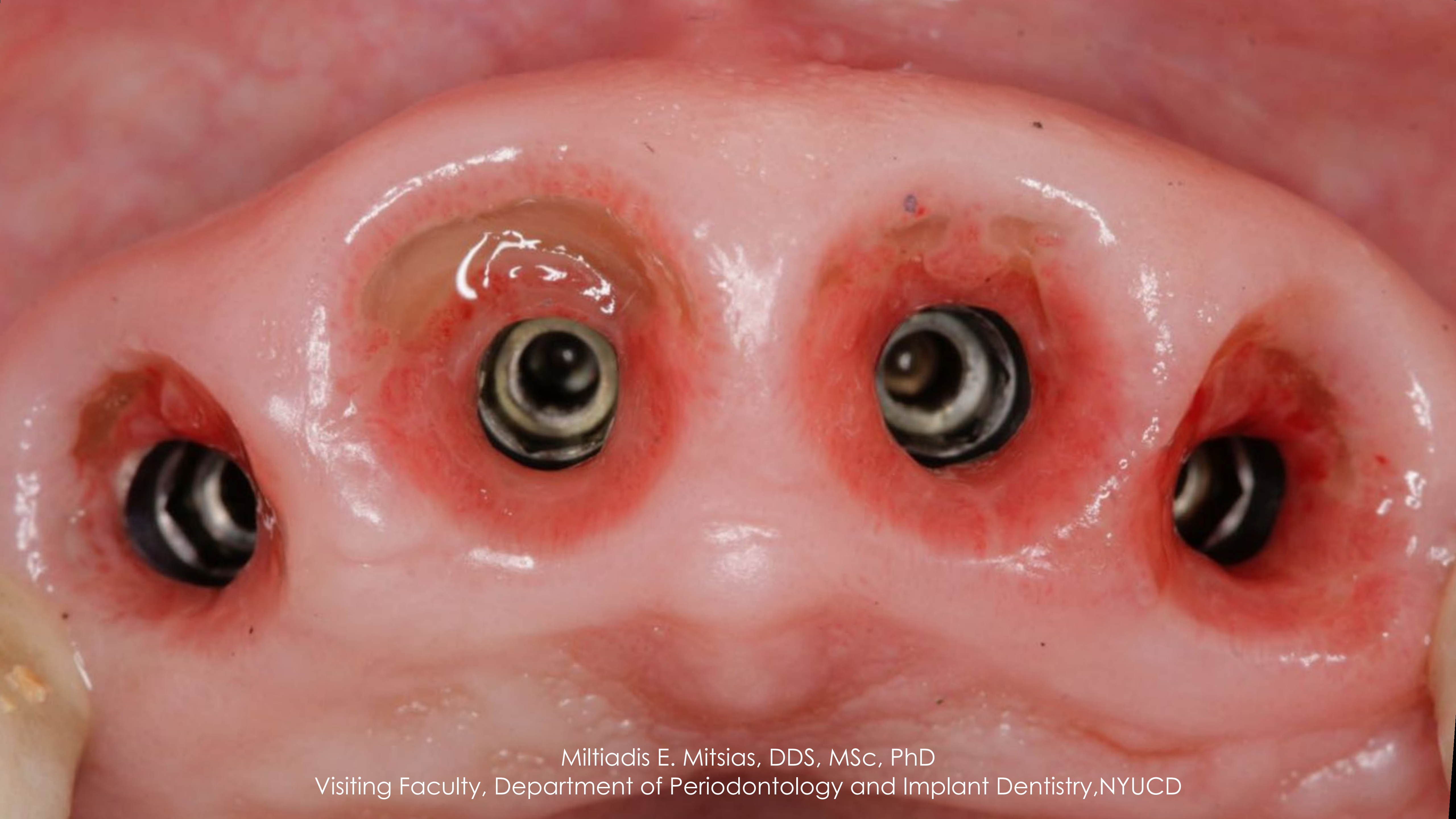


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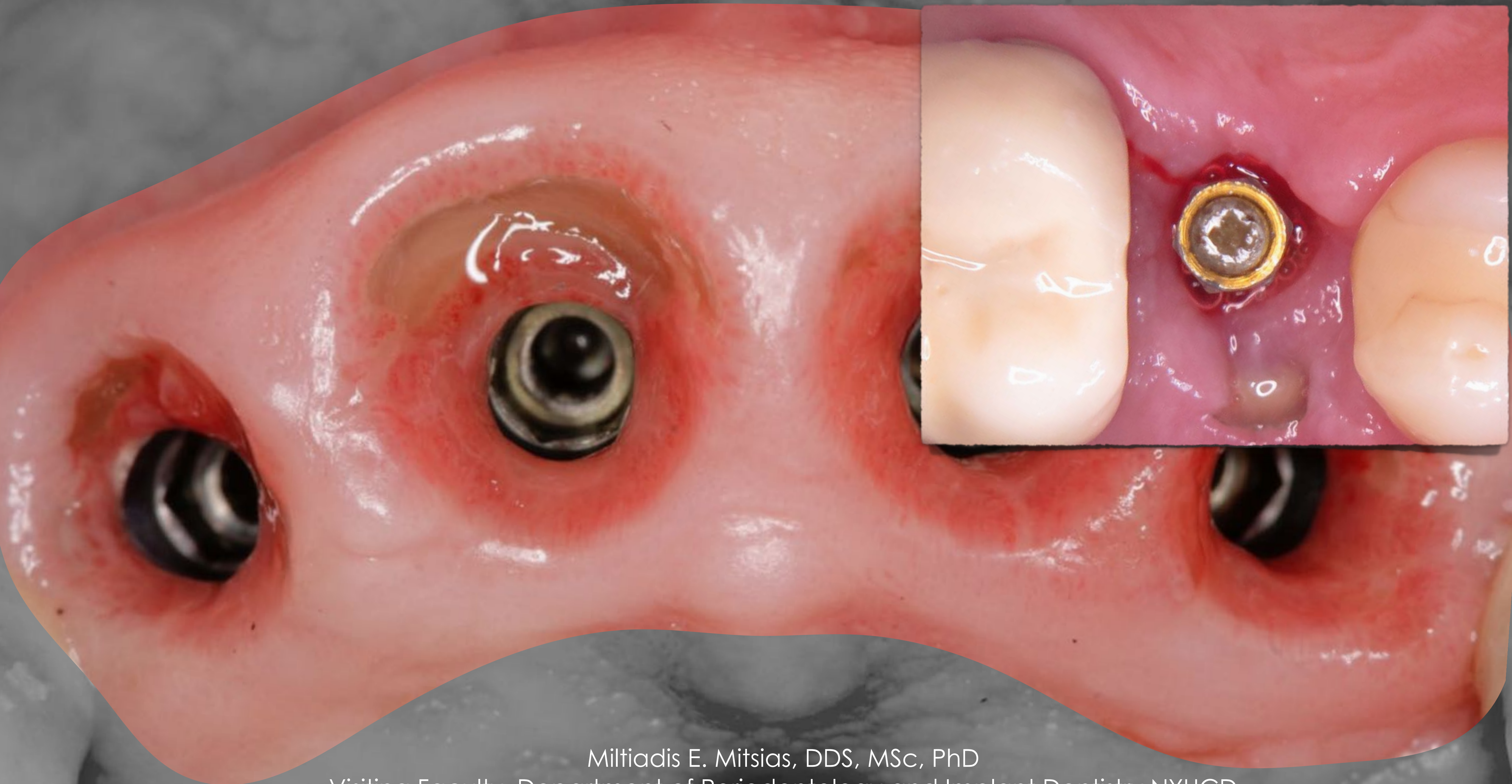
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Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



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Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD



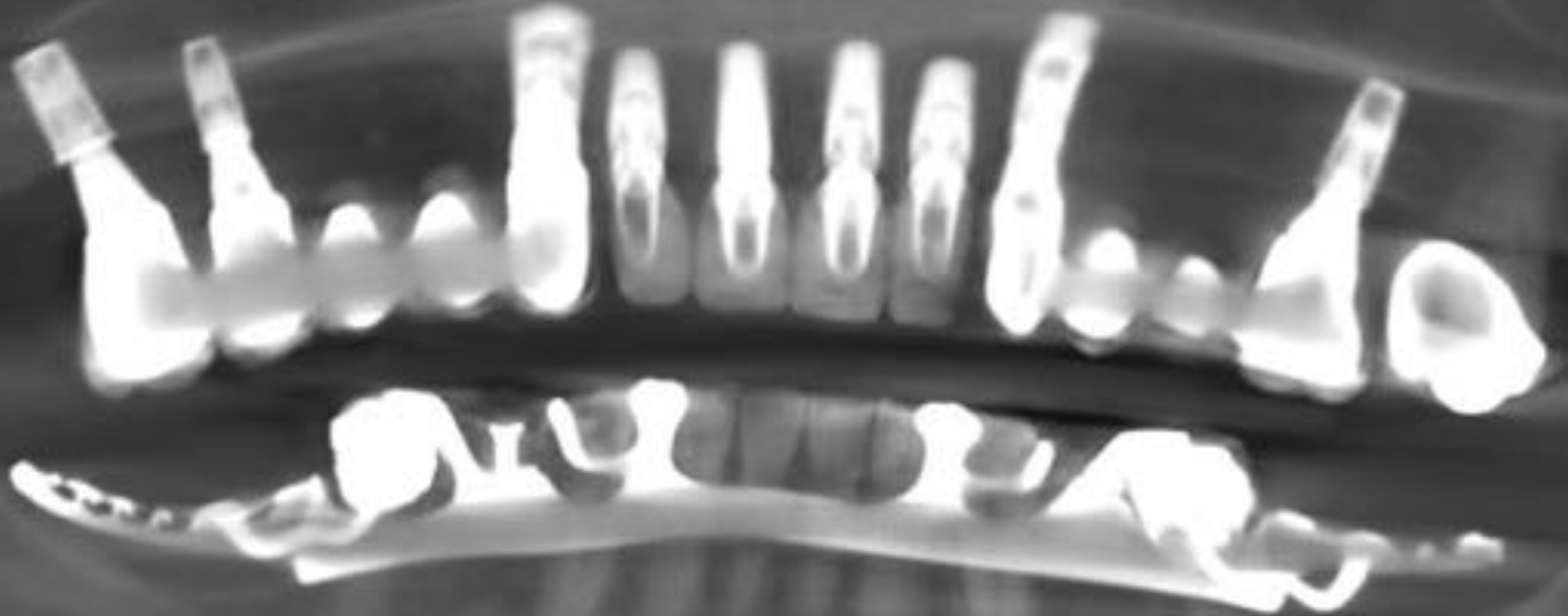
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1 year follow up

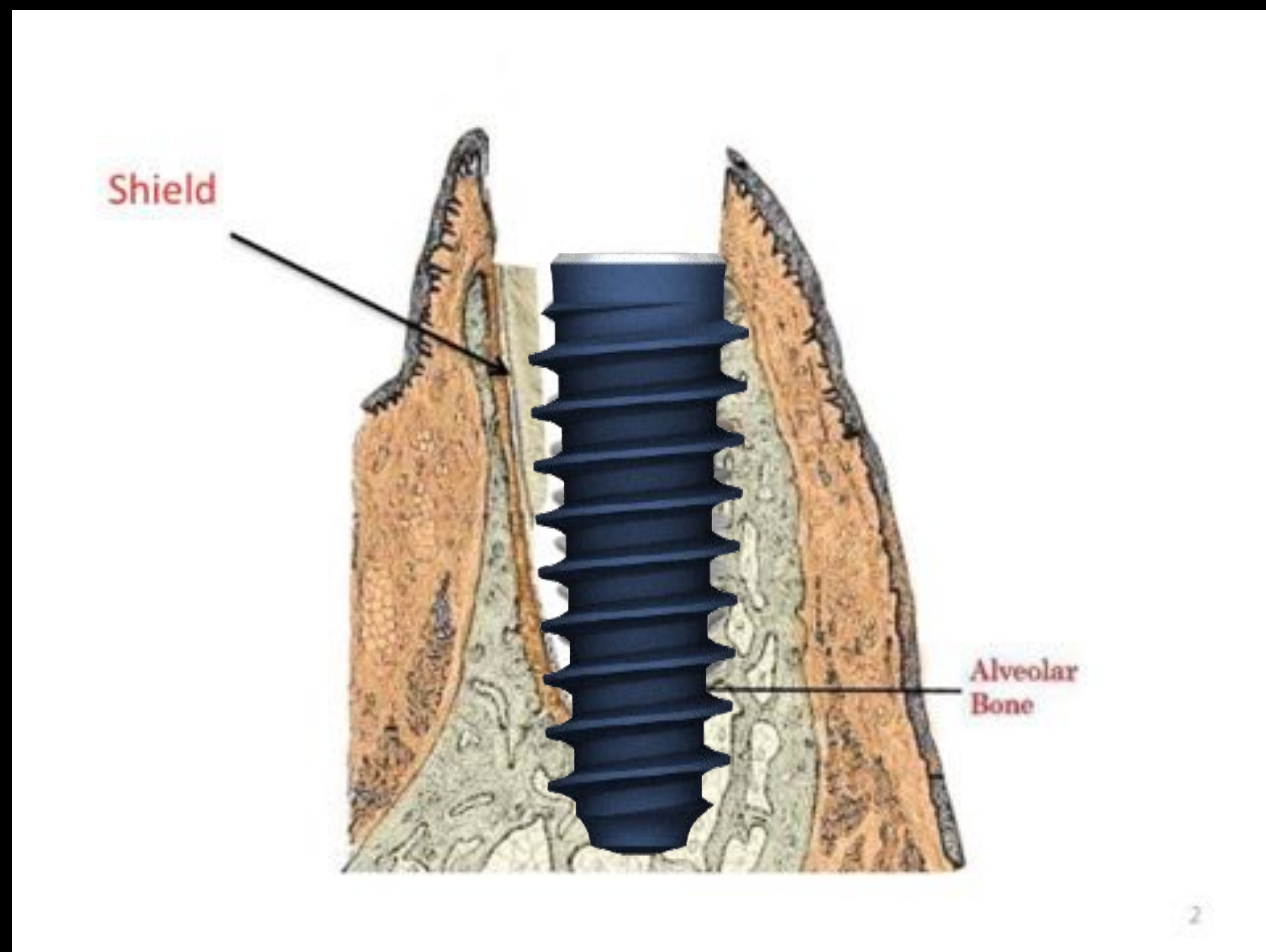


Miltiadis E. Mitsias, DDS, MSc, PhD
Visiting Faculty, Department of Periodontology and Implant Dentistry, NYUCD

Post-op



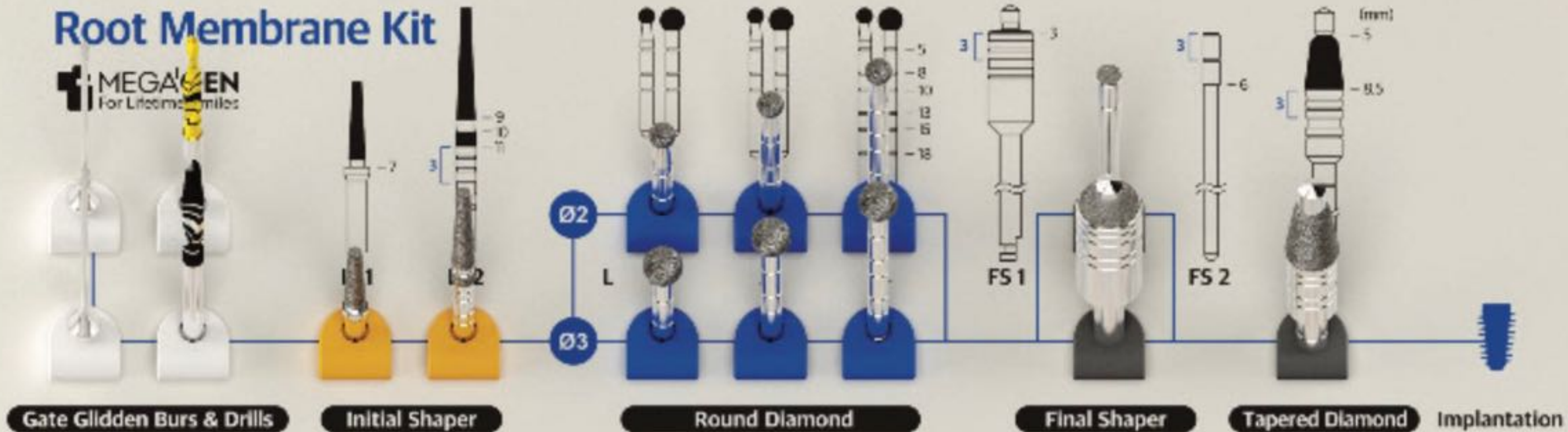
Root Membrane
Partial Extraction
Therapy
Socket Shield
Pontic Shield



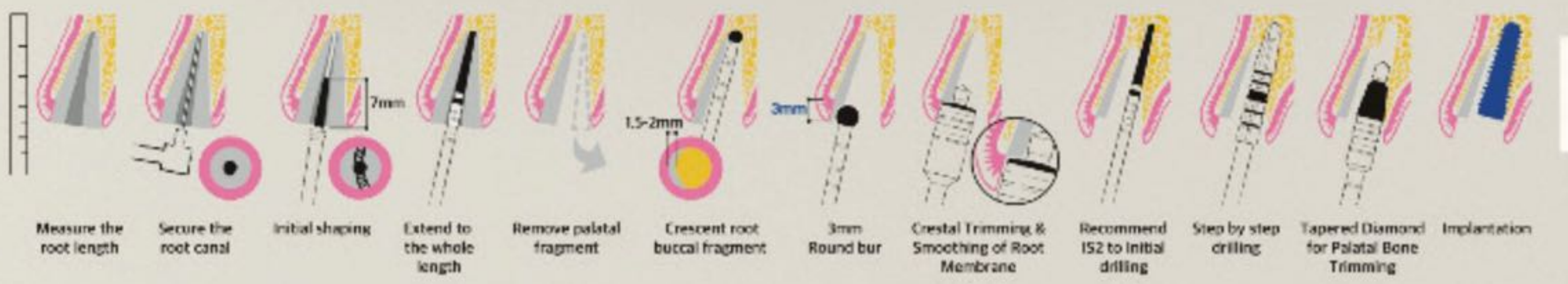
MEGAGEN ROOT MEMBRANE KIT

Root Membrane Kit

MEGAGEN
For Lifetime Smiles



Gate Glidden Burs & Drills Initial Shaper Round Diamond Final Shaper Tapered Diamond Implantation



Measure the root length Secure the root canal Initial shaping 7mm Extend to the whole length Remove palatal fragment Crescent root buccal fragment 1.5-2mm 3mm Round bur Crestal Trimming & Smoothing of Root Membrane 3mm Recommend IS2 to Initial drilling Step by step drilling Tapered Diamond for Palatal Bone Trimming Implantation



The KIT !!!

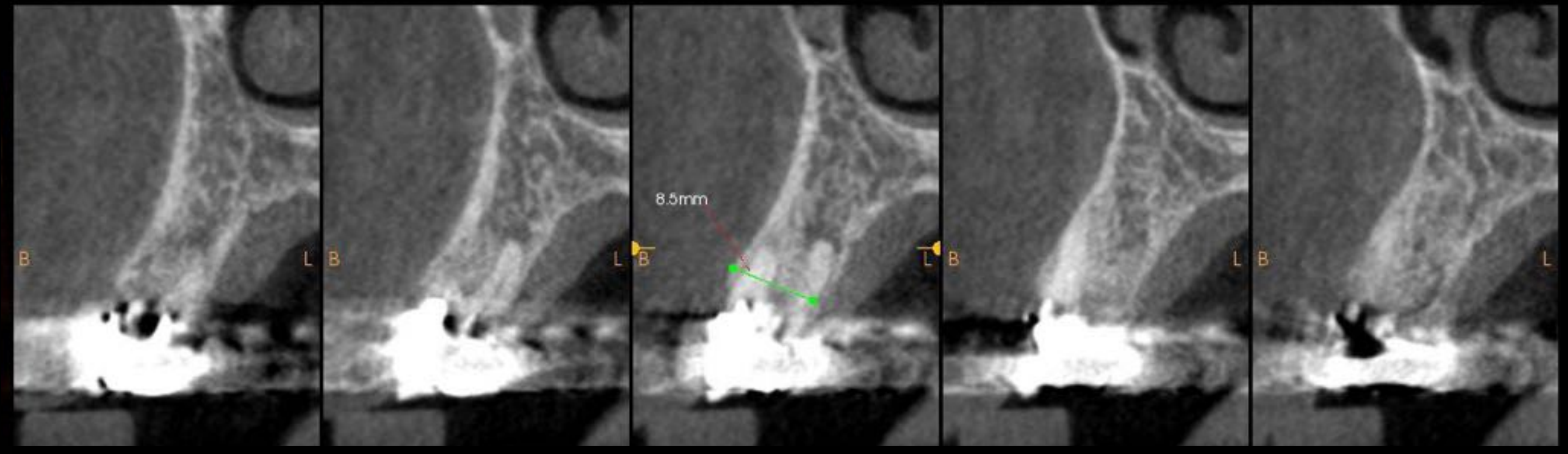
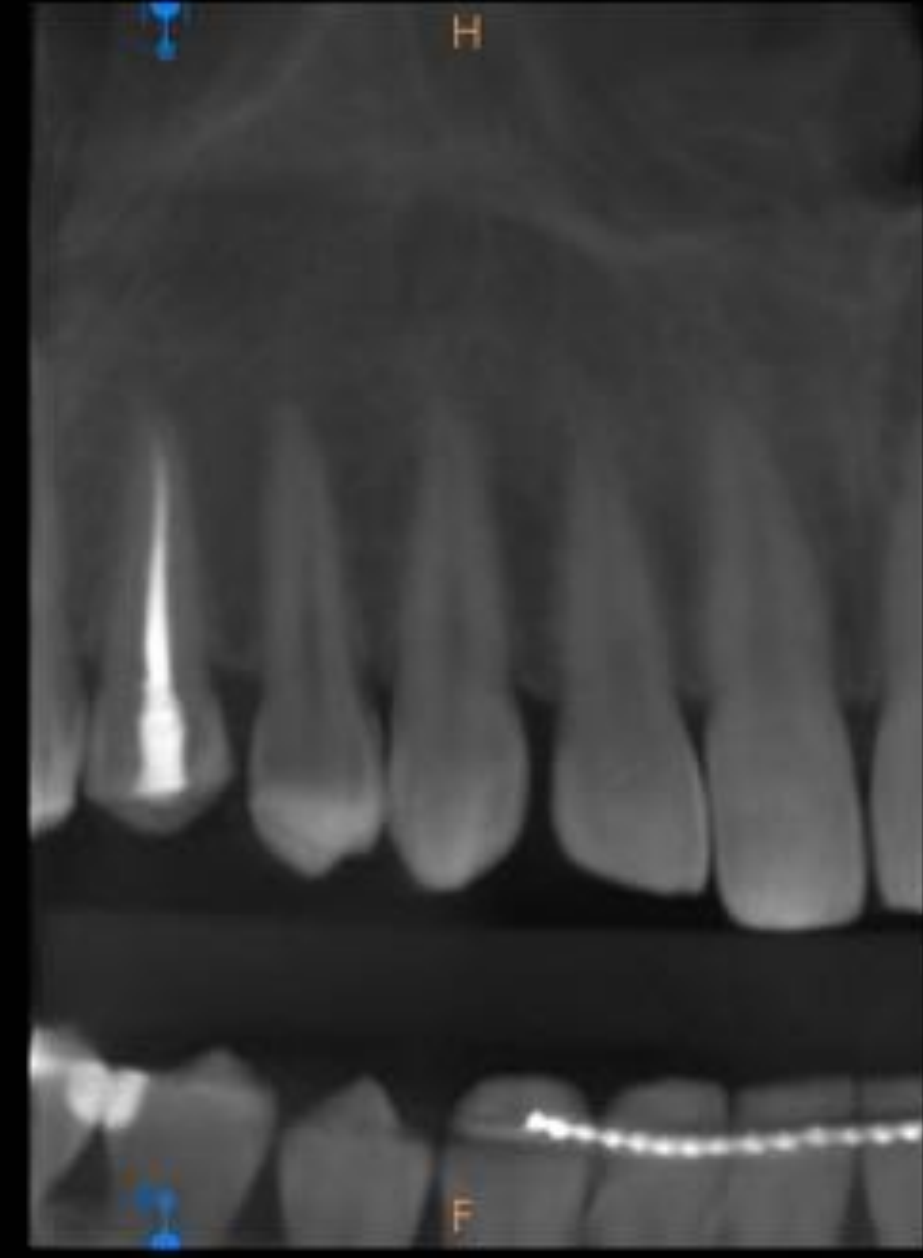




Integration mode: AVG. Slice thickness: 90 µm.



Integration mode: AVG. Slice thickness: 20.1 mm.

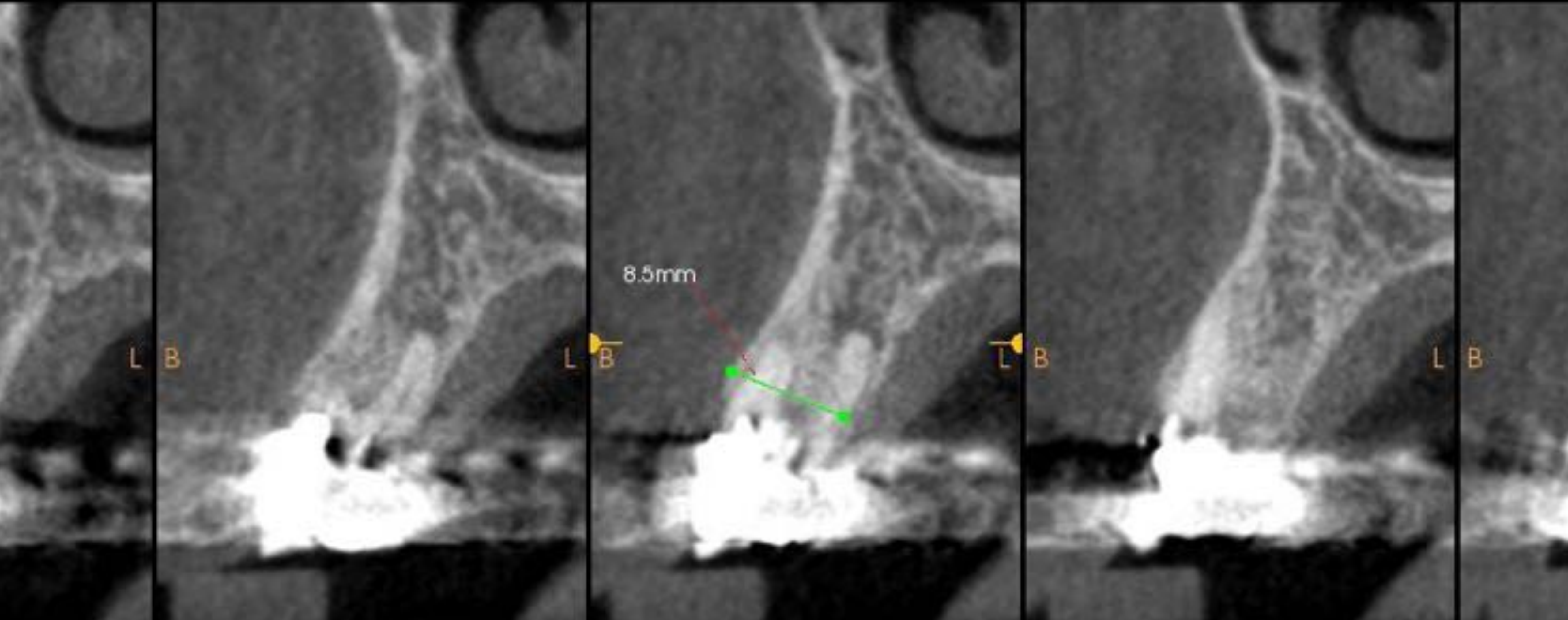


Integration mode: AVG. Slice thickness: 90 µm.

Integration mode: AVG. Slice thickness: 20.1 mm.

A

H



RA

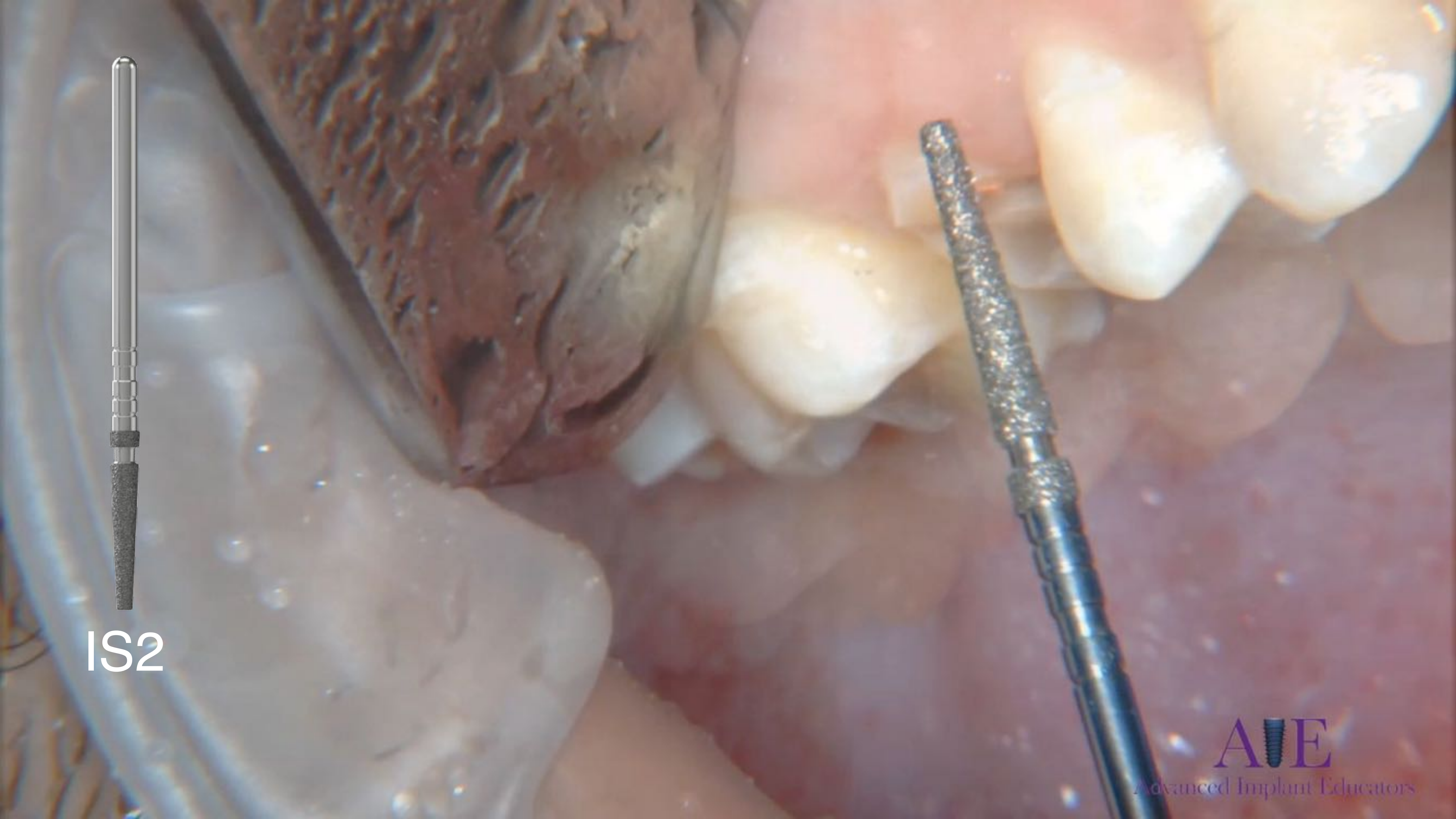


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IS2



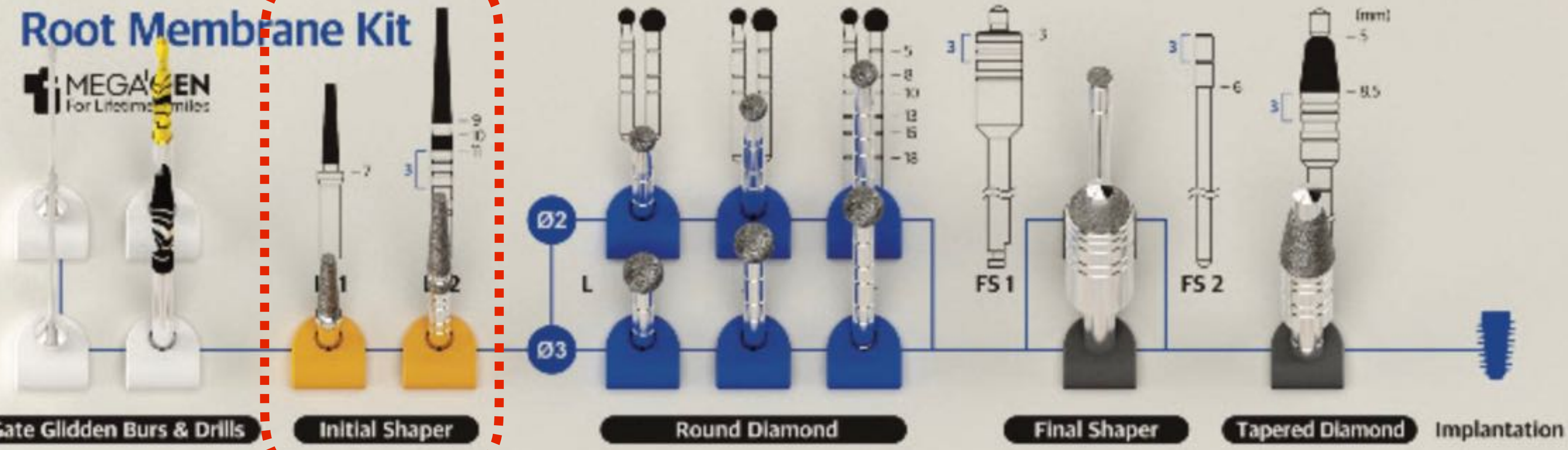
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Root Membrane Kit

MEGA
For Lifetime Smiles



Gate Glidden Burs & Drills

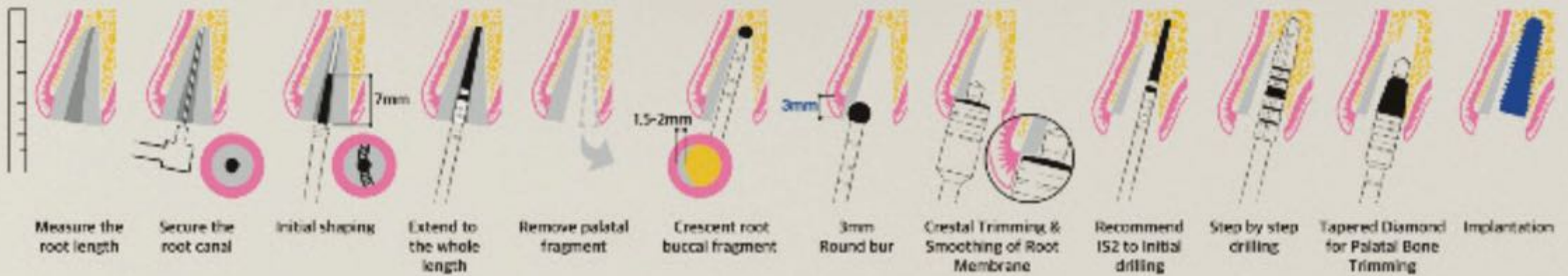
Initial Shaper

Round Diamond

Final Shaper

Tapered Diamond

Implantation



Measure the root length

Secure the root canal

Initial shaping

Extend to the whole length

Remove palatal fragment

Crescent root buccal fragment

3mm Round bur

Crestal Trimming & Smoothing of Root Membrane

Recommend IS2 to Initial drilling

Step by step drilling

Tapered Diamond for Palatal Bone Trimming

Implantation

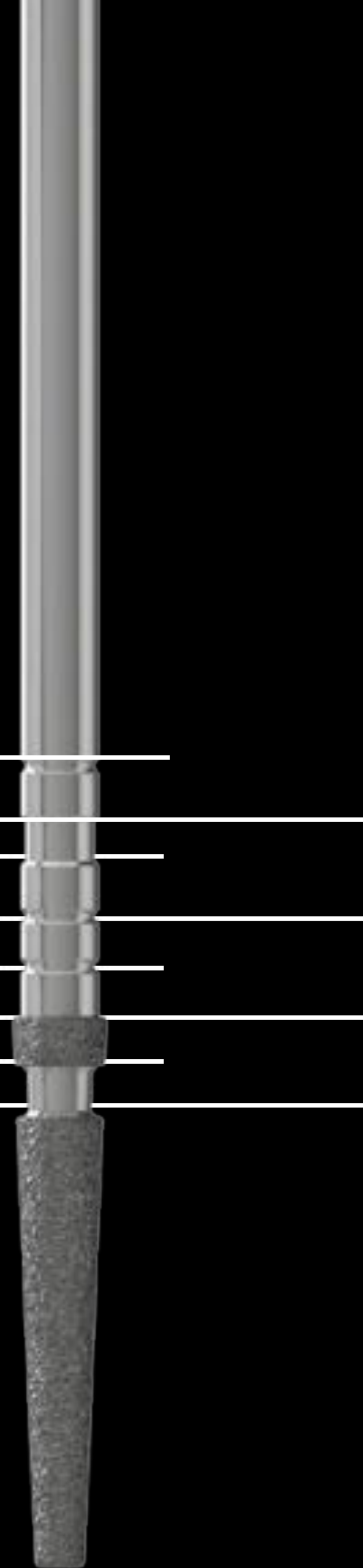
ane Kit



Initial Shaper

- 16mm
- 14mm
- 12mm
- 10mm

- 15mm
- 13mm
- 11mm
- 9mm



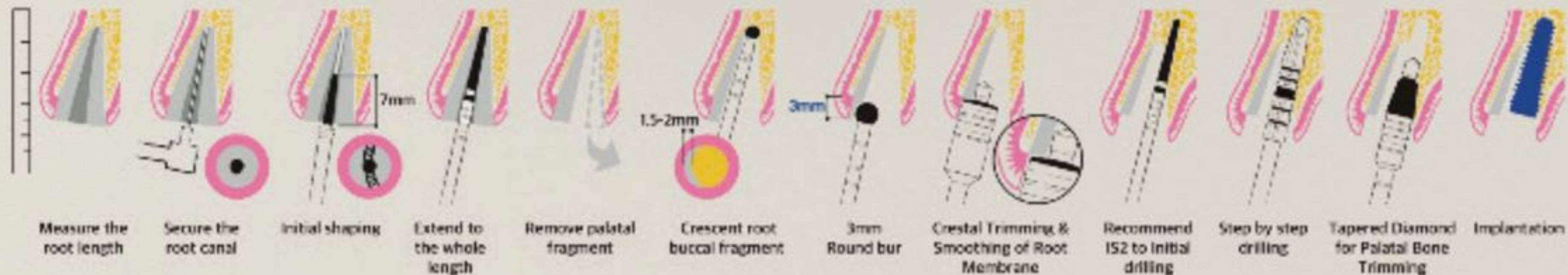
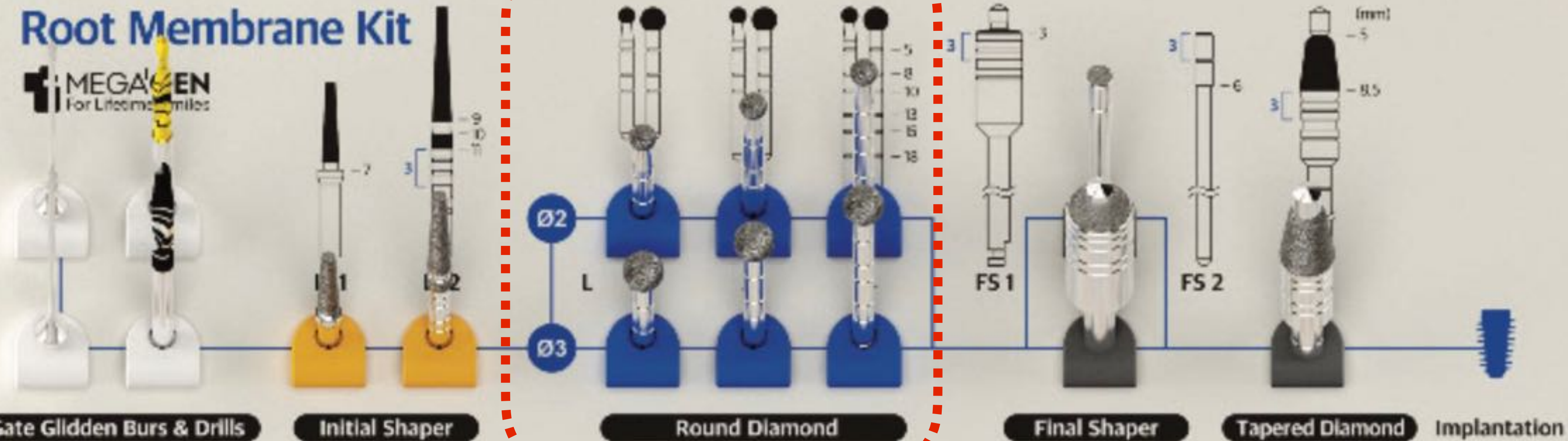


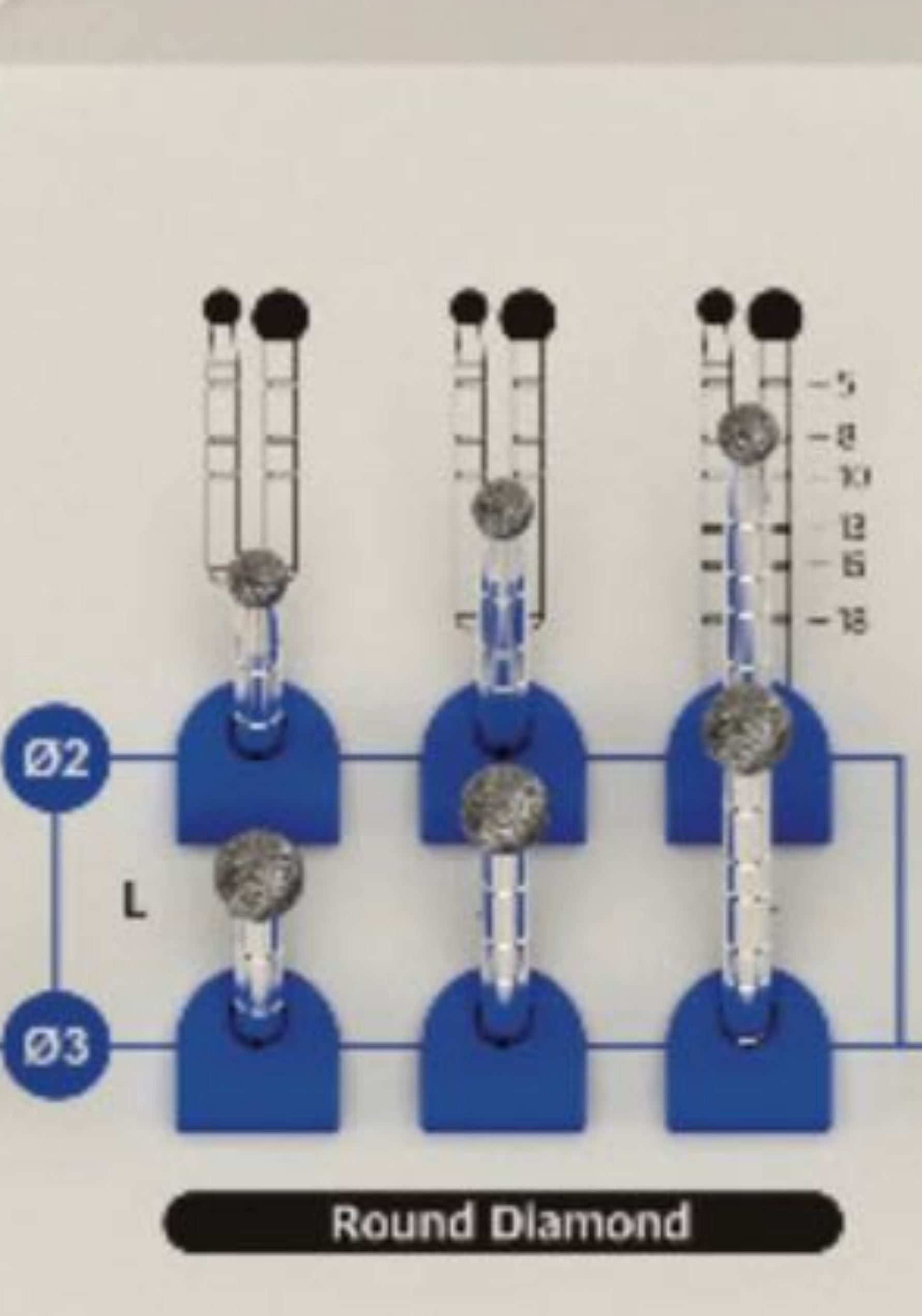


P
REPARATION. O T S

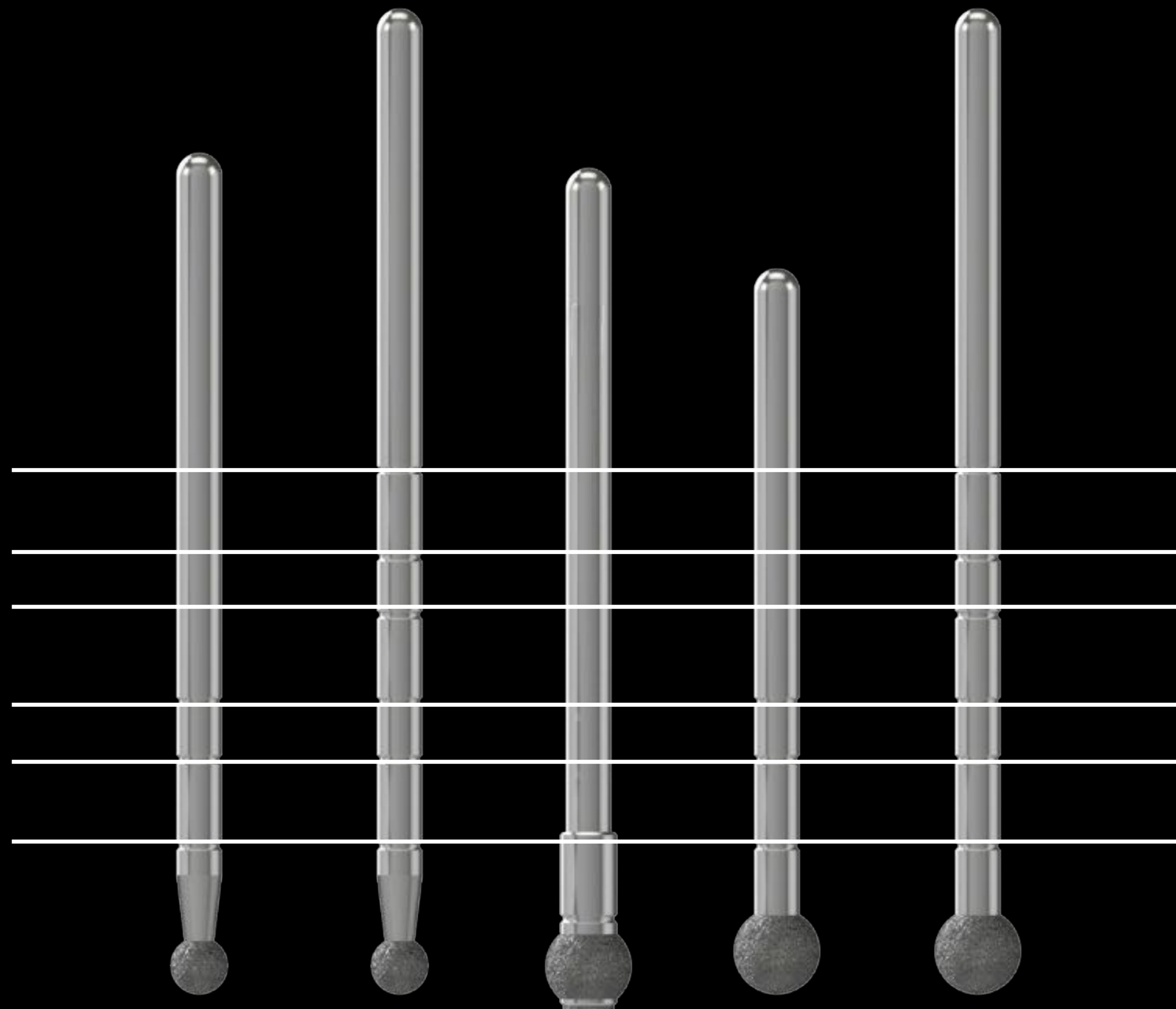
Root Membrane Kit

MEGAZEN
For Lifetime Smiles





18mm
15mm
13mm
10mm
8mm
5mm



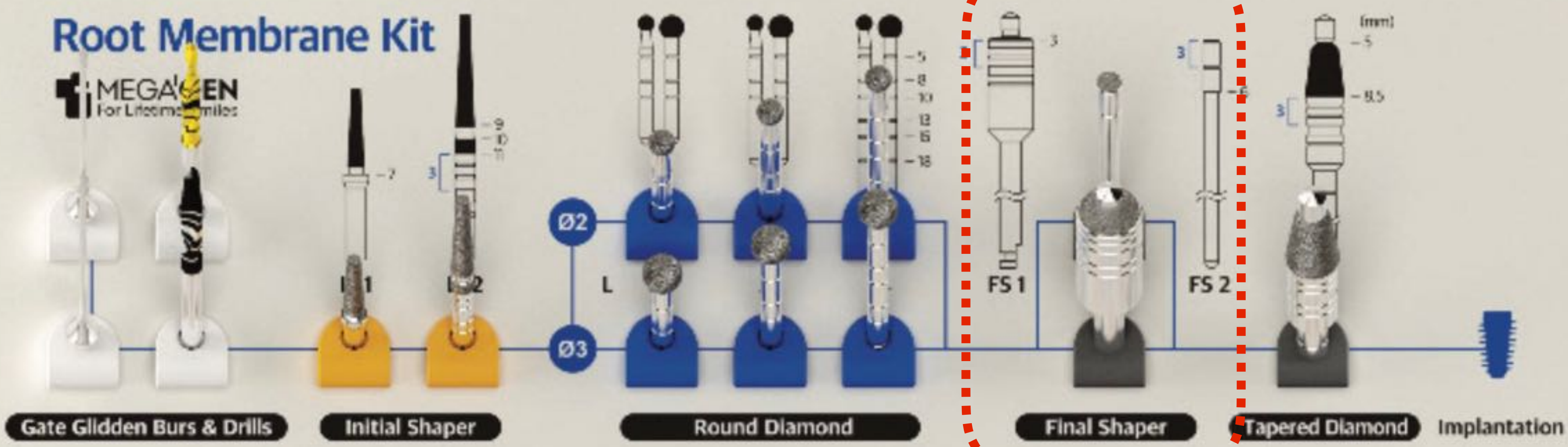


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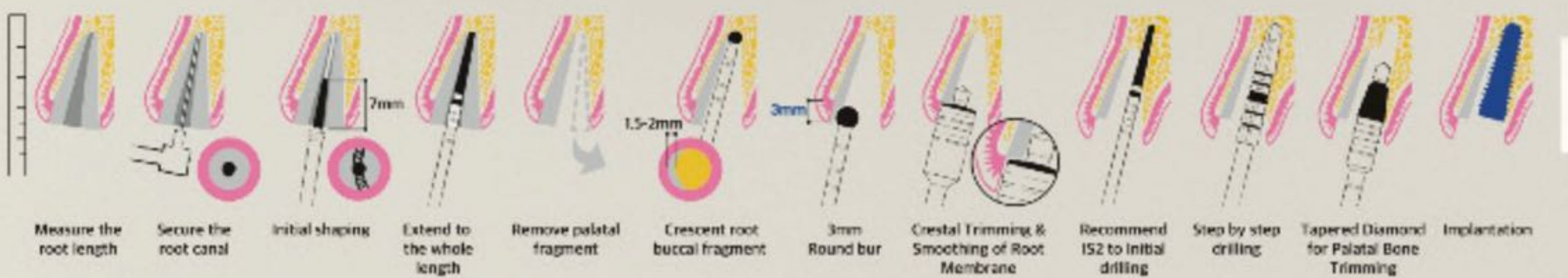
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Root Membrane Kit

MEGA **KEN**
For Lifetime Smiles



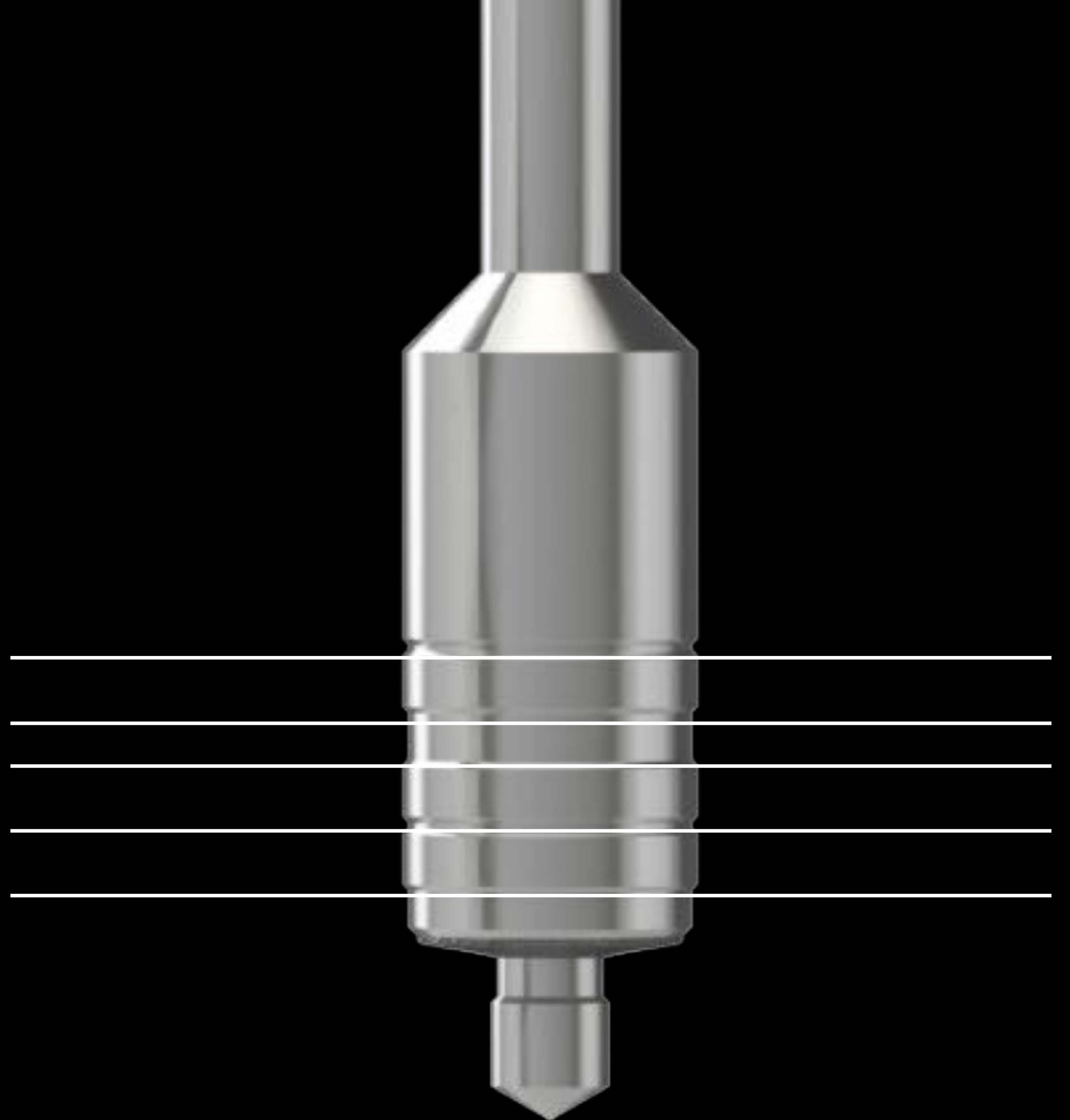
Gate Glidden Burs & Drills Initial Shaper Round Diamond Final Shaper Tapered Diamond Implantation

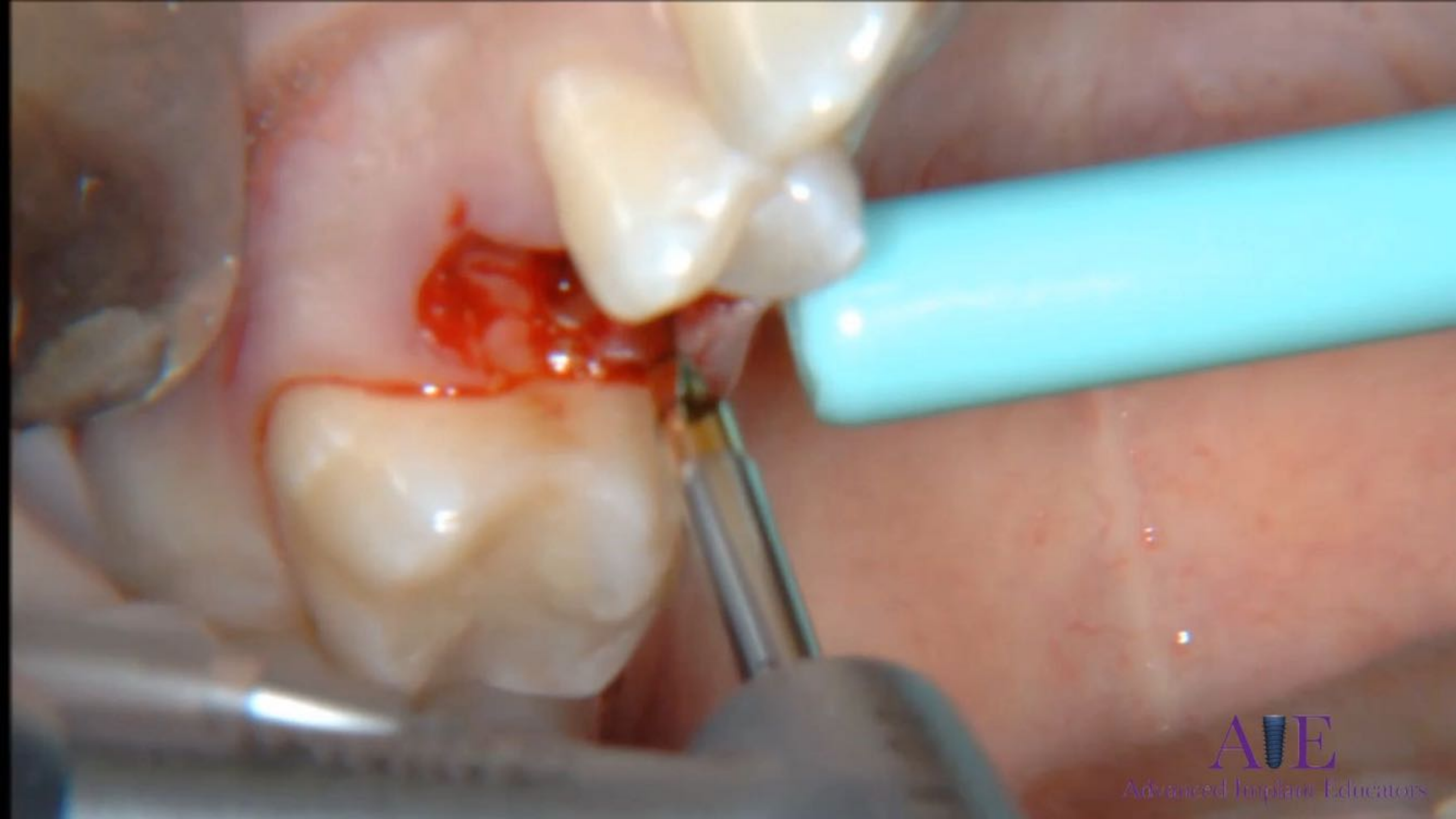


Measure the root length Secure the root canal Initial shaping Extend to the whole length Remove palatal fragment Crescent root buccal fragment 3mm Round bur Crestal Trimming & Smoothing of Root Membrane Recommend IS2 to Initial drilling Step by step crilling Tapered Diamond for Palatal Bone Trimming Implantation



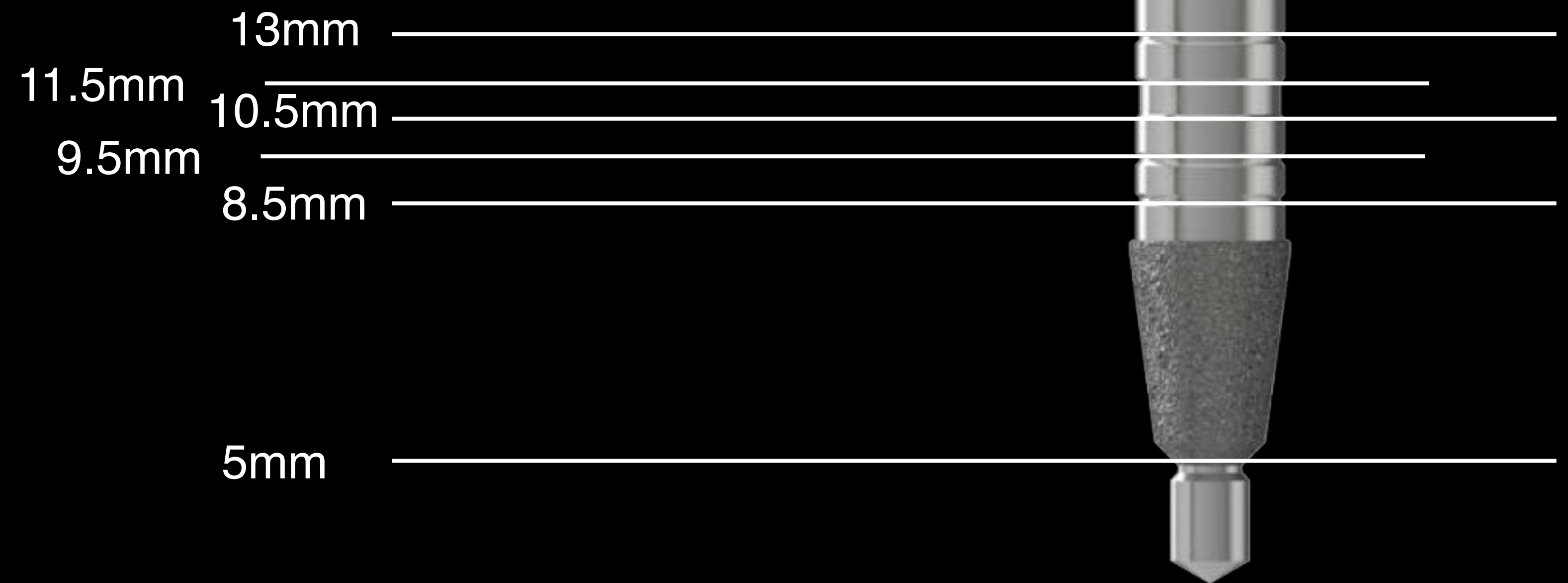
5mm
4mm
3mm
2mm
1mm





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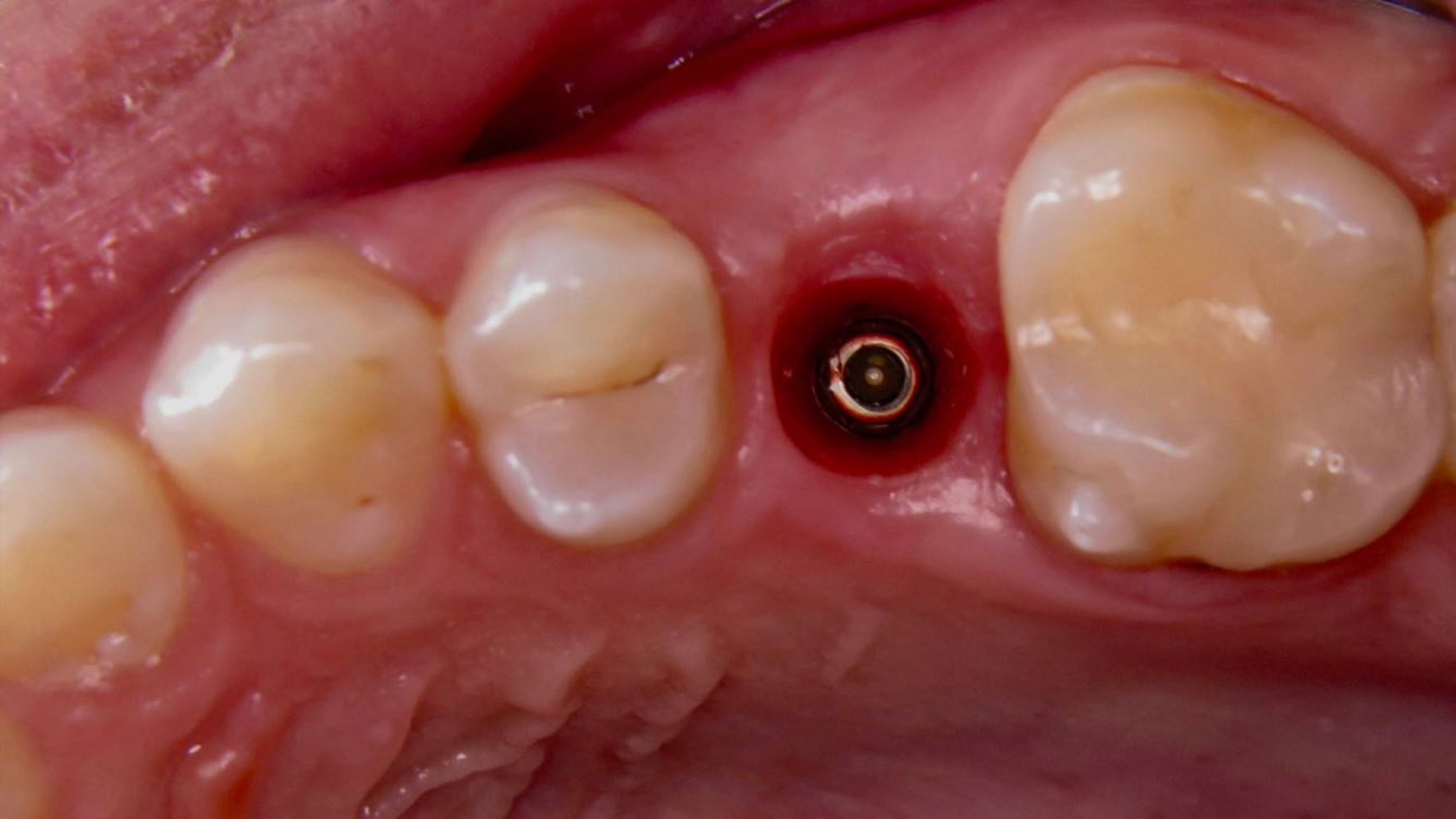
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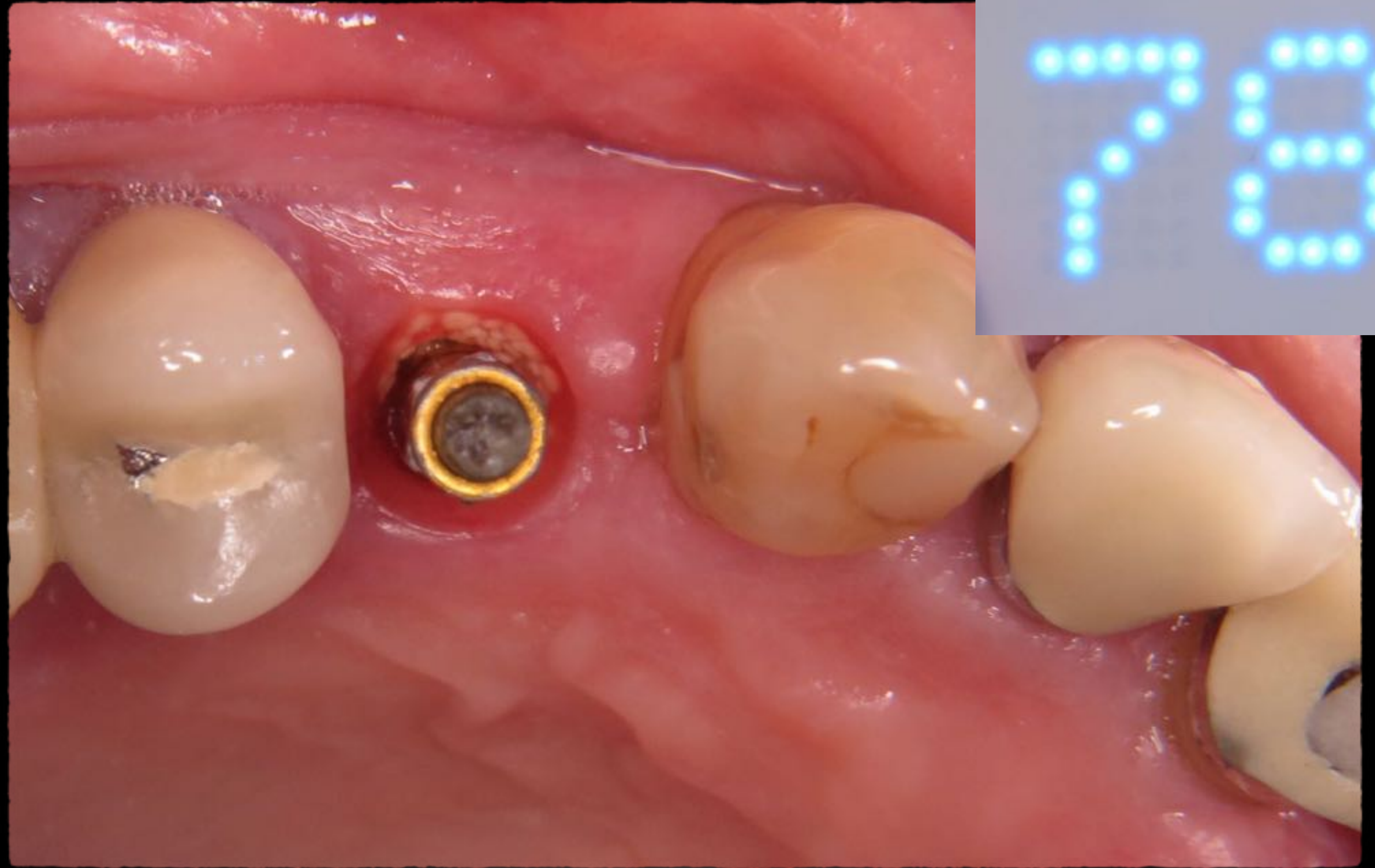
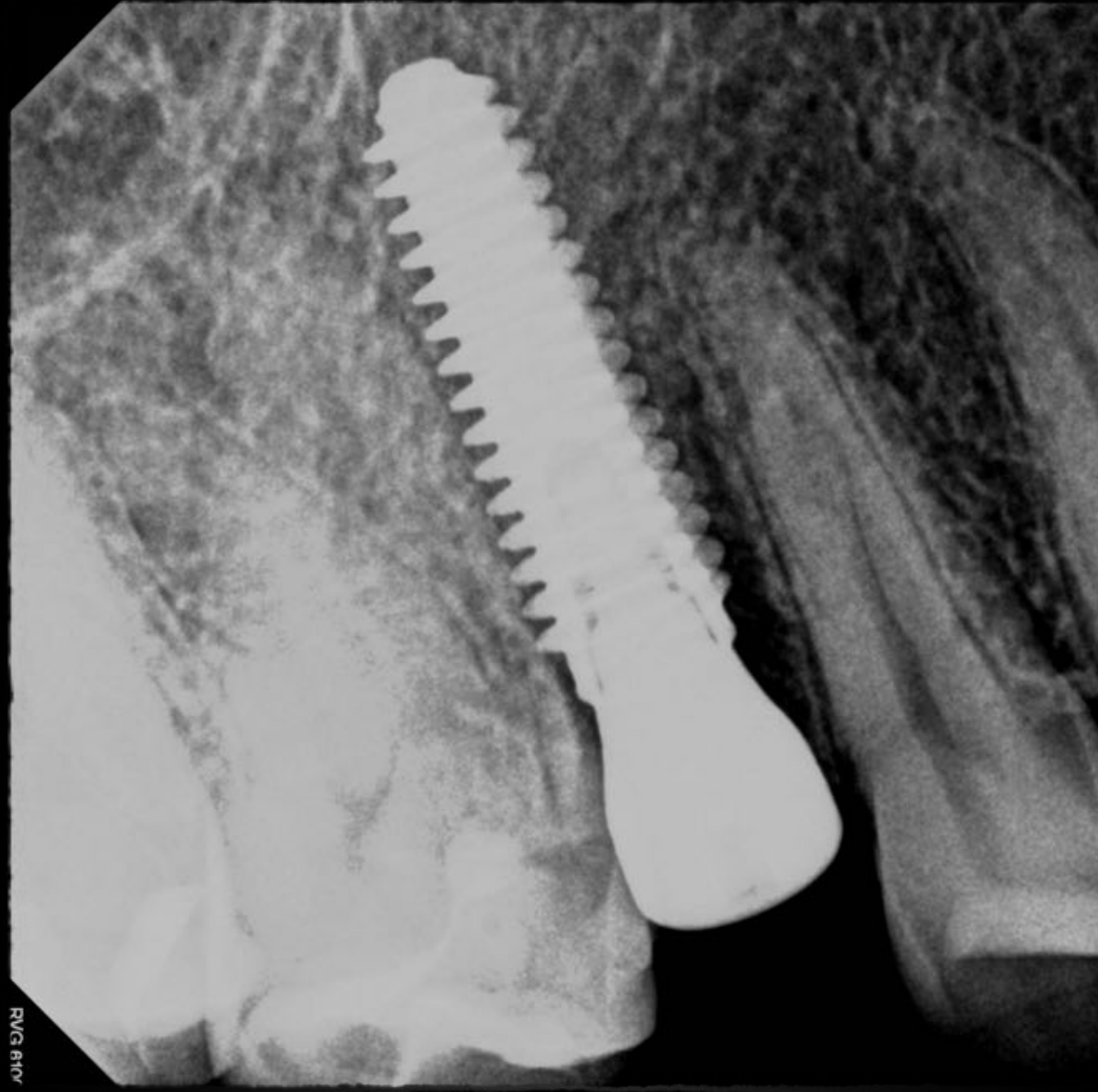


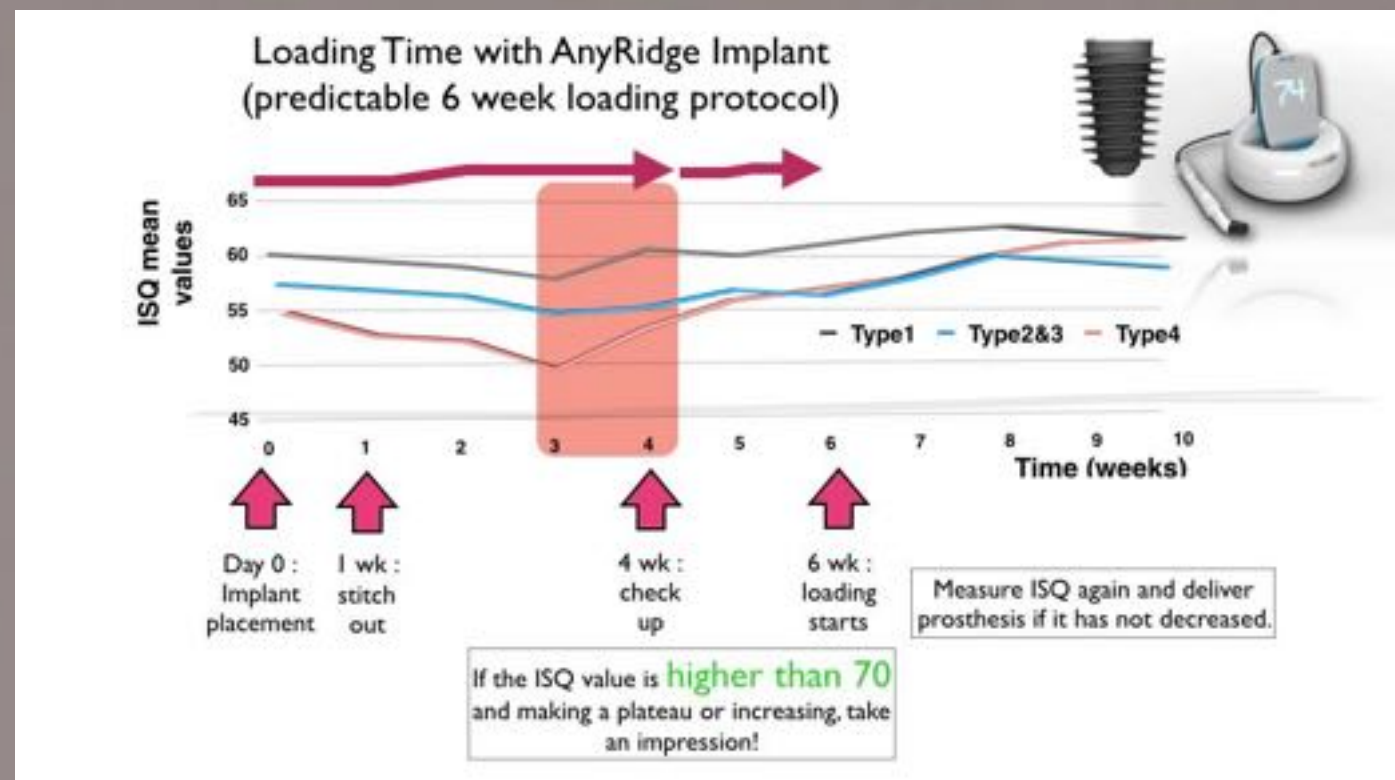
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4 WEEK POST OP





6 WEEK LOADING

6 MONTH POST OP



Dentistry Today Oct 2017

CONTINUING EDUCATION



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

Effective Date: 10/01/17 Expiration Date: 10/01/20

About the Author



Dr. Ganz graduated from the University of Medicine and Dentistry of New Jersey (UMDNJ) Dental School and then completed a 3-year specialty program in maxillofacial prosthodontics at MD Anderson Cancer Center in Houston. He is a member of the board of directors of the International Congress of Oral Implantologists (ICOI), a Fellow of the Academy of Otolaryngology (AO), on staff at Hackensack University Medical Center, and on faculty at Rutgers School of Dental Medicine. He was a founding member of the Simplant Academy, headquartered in Lueven, Belgium, and past president of both the Computer Aided Implantology Academy, and the NJ section of the American College of Prosthodontists. He has served as a consultant for numerous dental companies for the past 27 years. He is on the editorial staff of several publications, published more than 100 articles in scientific journals, and has contributed to 14 textbooks to date. He also authored *An Illustrated Guide to Understanding Dental Implants* and co-authored *Computer Guided Applications for Dental Implants, Bone Grafting, and Reconstructive Surgery* (Elsevier). He is a featured speaker for the AO, ICOI, and many others. He is considered a leading expert in the field of computer utilization for dental and treatment planning applications. He can be reached at drganz@drganz.com.

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INTRODUCTION

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 plates, bone density, bony topography, and the position of existing tooth roots within the alveolus. The difficulty continues to be the assessment of the relationship between the tooth root and the potential implant receptor site.

The Root Membrane Concept was initially conceived to help define a "zone" of bone around the tooth root—originally by using CBCT imaging.¹ The protocol has been published in subsequent publications with the development of software applications with the goal of always to place the implant in the correct position while preserving the relationship between the tooth root and the potential implant receptor site.

The cross-sectional slice of the root is critical for the diagnostic process. The trajectory of the root can be assessed with

IMPLANTS



Figure 4. (a) Modification of the root membrane with a round diamond, (b) further contouring, (c) palatal position for contouring, (d) a cone-shaped diamond used to refine the contouring, and (e) the implant, positioned to avoid the root membrane.

The Root Membrane Concept—continued from page 83

thin and can 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 bone and the soft tissue, especially when both are present in the anterior maxilla. When a tooth is extracted, the resulting socket will then receive an implant, often with a "gap" between the implant and the buccal cortical plate of bone. Certain clinicians have recommended grafting the gap, while others do not. In either situation, the biological entity that surrounds the natural tooth—the periodontal ligament and the vascularization of the area—is compromised.

Recently, a new kit was introduced that provides a series of drills that can be used to accurately prepare the "root membrane" to help preserve the buccal bone during implant reconstruction. Once the root has been sectioned and the palatal aspect has been removed, the remaining root membrane can be carefully contoured and beveled to leave adequate room for the restorative preparation (Figure 4).

Figure 5. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.



Figure 5. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.

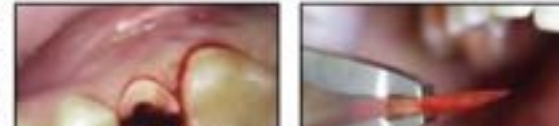


Figure 6. The tooth root was then sectioned horizontally and vertically as per the CBCT scan and treatment plan.



Figure 7. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.



Figure 8. (a) The cross-sectional view could not confirm a root fracture, but was (b) useful to assess the remaining bone as a potential implant receptor site.

Figure 9. (a) The cross-sectional view could not confirm a root fracture, but was (b) useful to assess the remaining bone as a potential implant receptor site.

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Figure 10. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.

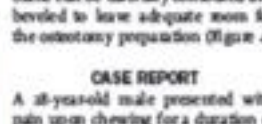


Figure 10. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.

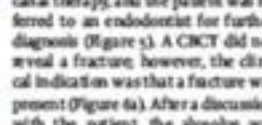


Figure 11. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.

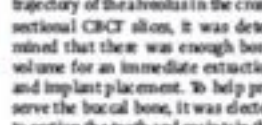


Figure 12. The root membrane kit (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant.

IMPLANTS

The TOB concept identifies a zone within the available bone as seen in the cross-sectional CT and CBCT images.

The root membrane. The Root Membrane Kit (RMK) (integrated dental system) contains a step-by-step protocol to remove the root membrane, section the tooth, and contour the root in anticipation of the implant (Figure 5).

According to protocol, the coronal aspect of the tooth was removed, leaving access to the root. The root was then sectioned horizontally (Figure 6), and the palatal aspect was carefully removed (Figure 7). The diamond drills of the RMK helped to carefully contour the root membrane into a shape. The coronal aspect of the root was reconstructed to provide room for the implant (Figure 10). Once the root membrane was prepared, the osteotomy could then be initiated in a palatal location within the TOB. A 4.5-mm diameter by 130-mm length implant (Ankylos Integrated dental system) was then carefully placed, gaining apical stabilization at 45 Ncm of torque (Figure 11). Using resonance frequency analysis (Mega IQ) (integrated dental system). Based upon the protocol documented by Skerfving et al² during the past 10 years, the residual buccal gap was not filled with bone. However, as the implant was well-fixed, it was elected to use a one-step surgical approach using platelet-rich fibrin wrapped around a titanium healing collar in a "pouch" technique (Figure 12).

The occlusal view of the implant site is seen in Figure 13a and after suturing in Figure 13b. A periapical radiograph reveals the excellent positioning of the implant (Figure 14). The 6-week follow-up appointment revealed the site's excellent healing (Figure 15).

IN SUMMARY

It is well established that bone preservation is vital to long-term implant success, and that the loss of both hard and soft tissue can lead to functional and aesthetic complications. The TOB concept identifies a zone within the available bone as seen in the cross-sectional CT and CBCT images. The TOB is a useful concept when planning for implants, bone grafting, and in anticipation of the restorative components needed for cement-retained or screw-retained restorations. The concept is to maximize bone volume surrounding the potential implant within the receptor site or suggest when bone grafting may be recommended (Figure 16). It should be noted that the single cross-sectional slice could represent a slice thickness of less than 0.1 mm, and, therefore, it should be required when choosing an implant position that all other views afforded by the 3-D imaging modality and interactive treatment planning software be fully appreciated.

Through the use of CT and, now, CBCT imaging, the "Reality of Anatomy" as described by Ganz³ illustrates how little bone actually surrounds the natural tooth root. The concept that thickness should strive to achieve 1.0 mm of bone buccal to the implant is difficult to achieve when the buccal cortical plate has been shown to be 1.0 mm or less with cross-sectional imaging. A CBCT study entitled "Classification of Sagittal Root Position in Relation to the Anterior Maxillary Ossous Housing" revealed the minimal bone surrounding natural teeth, and the relationship of the tooth root with the anterior maxillary alveolus as found in cross-sectional slices.⁴

IMPLANTS



Figure 13a. The occlusal view of the implant site and (b) after suturing.



Figure 13b. The occlusal view of the implant site and (b) after suturing.



Figure 14. A periapical radiograph revealed excellent positioning of the implant.



Figure 15. The 6-week follow-up appointment revealed the site's good osseous healing.



Figure 16. The TOB position should allow for maximum volume of bone surrounding the implant while avoiding contact with the root membrane.

CONCLUSION

The Root Membrane Concept was developed with the intent of maintaining hard and soft tissue by retaining a portion of the tooth root.¹ The RMK provides a logical step-by-step protocol to carefully section and prepare the root approximately 3.0 mm below the gingival crestal tissue. Specially designed diamond burs allow for the root fragment to be prepared in a 0 or crown preparation when viewed occlusally. The coronal part of the root fragment should ideally measure from 1.5 to 2.0 mm in a buccal-lingual direction. The lingual or palatal placement of the implant requires precise drilling to avoid migration of the drill due to the slope of the cortical socket housing (Figure 4).

REFERENCES

1. Ganz D. The triangle of bone—a formula to successful implant placement and restoration. *Implants*. 2016;12(4):24.
2. Skerfving H, Malmström M, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.
3. Ganz D, Zeh J, Skerfving H, et al. The "Reality of Anatomy": a retrospective study of the relationship between the tooth root and the alveolus. *J Oral Maxillofac Surg*. 2015;73(12):2473-2478.
4. Ganz D, Zeh J, Skerfving H, et al. Classification of sagittal root position in relation to the anterior maxillary alveolus using cone-beam computed tomography scans. *J Oral Maxillofac Surg*. 2017;75(1):1-10.
5. Mitsias M, Skerfving H, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.
6. Mitsias M, Skerfving H, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.
7. Mitsias M, Skerfving H, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.
8. Mitsias M, Skerfving H, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.
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10. Mitsias M, Skerfving H, Hansson C, et al. A retrospective study of implant placement in the maxilla using the "root membrane" technique. *J Oral Maxillofac Surg*. 2014;72(12):2473-2478.

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Treating Facial Trauma

Amanda Green, MD

**Can We
Prevent Posterior
Food
Traps with PET
Molars?**

100

Transparent Bone*

S 0

F 0

B 0

D 23

E 2

A 30

G

Tools

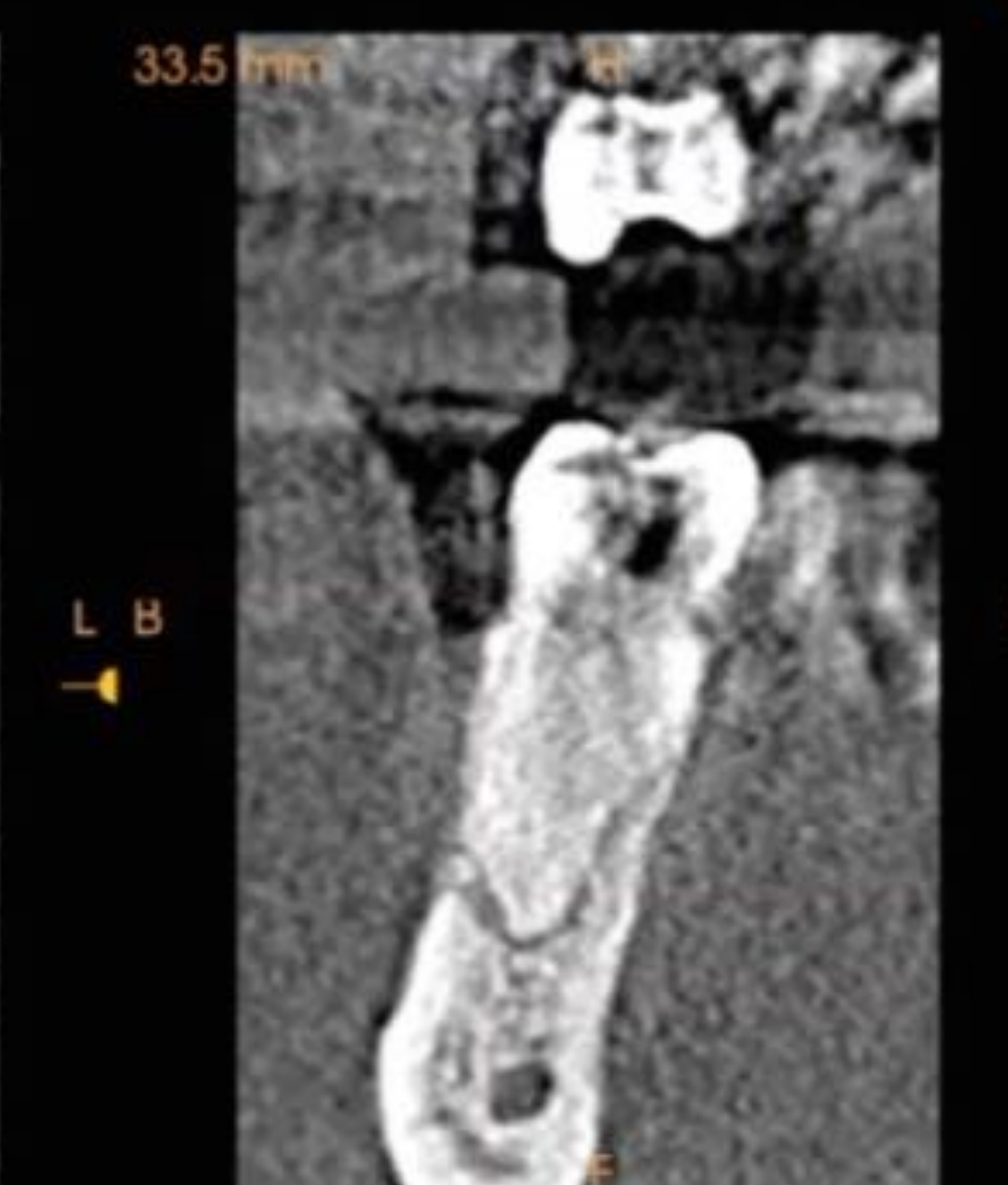
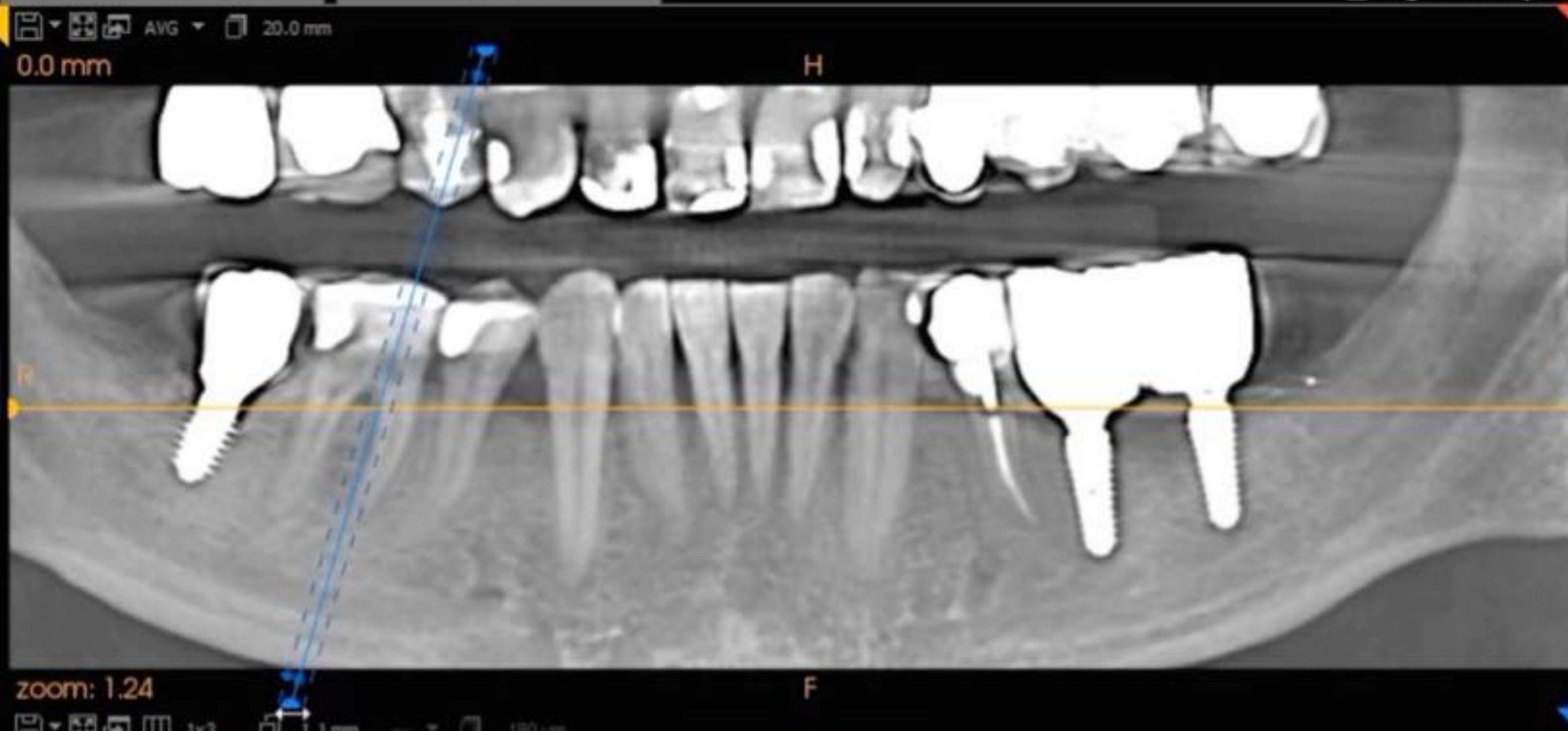
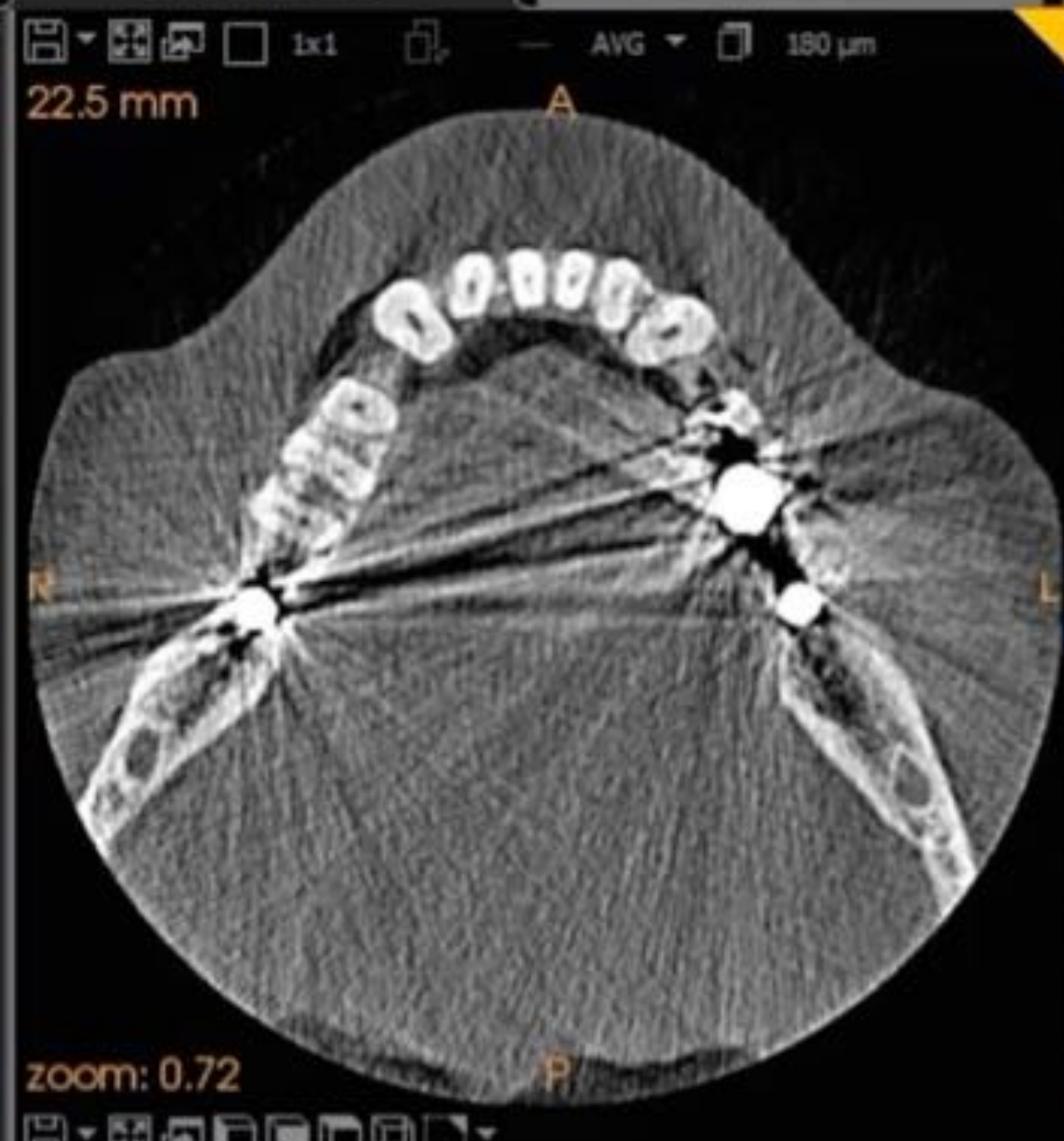
Measurement

8.3mm

12.8mm

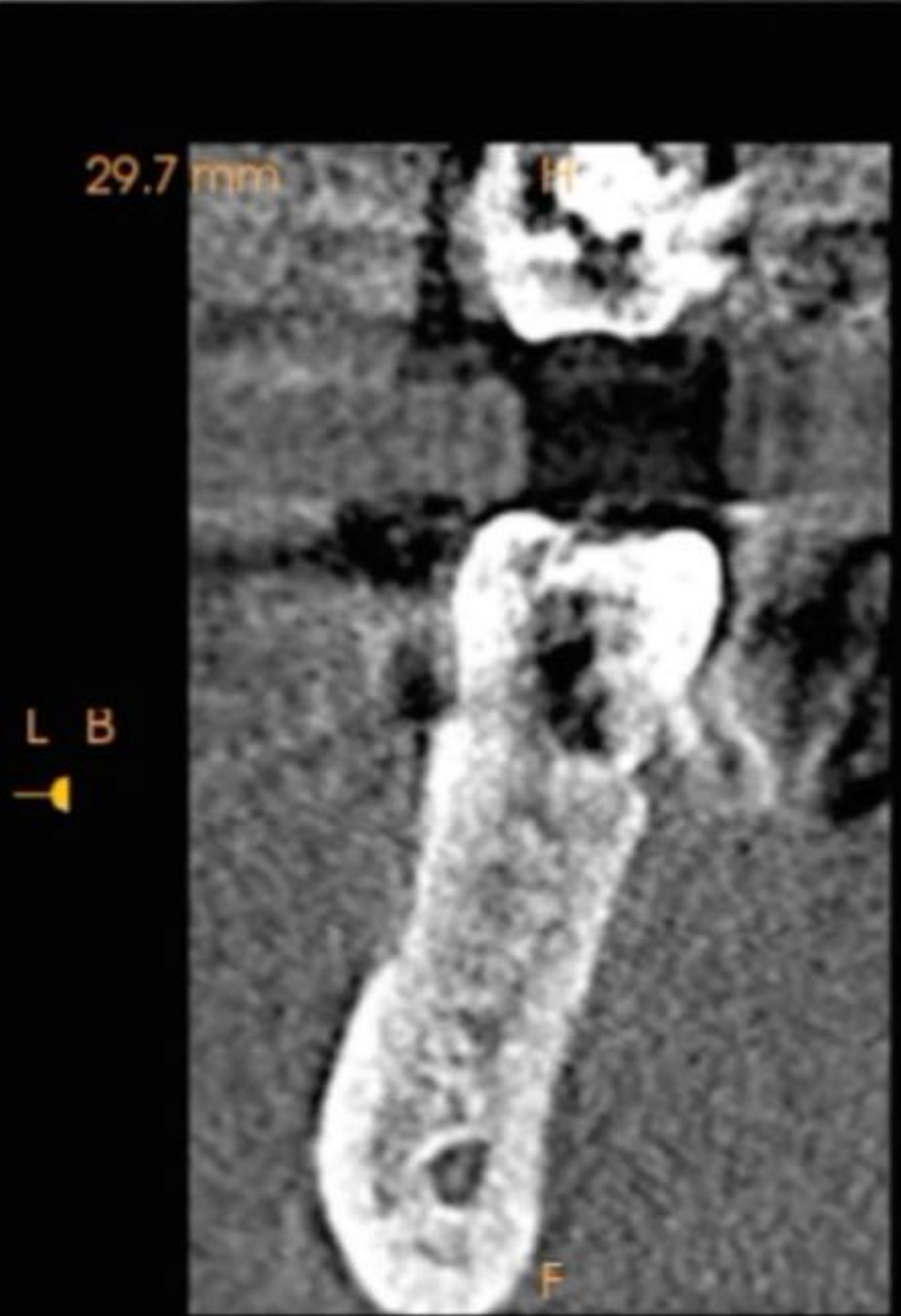
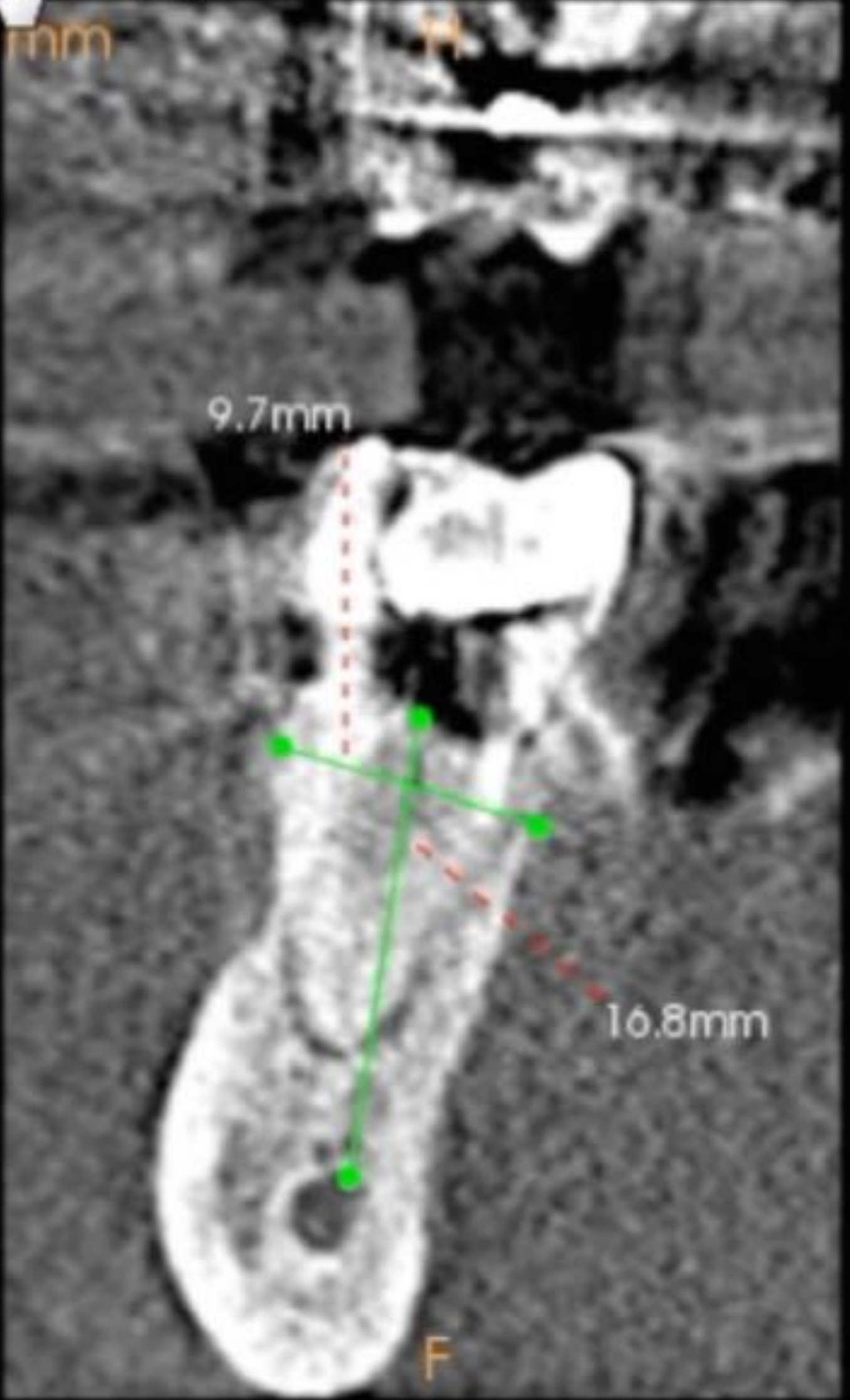
Export

Gallery



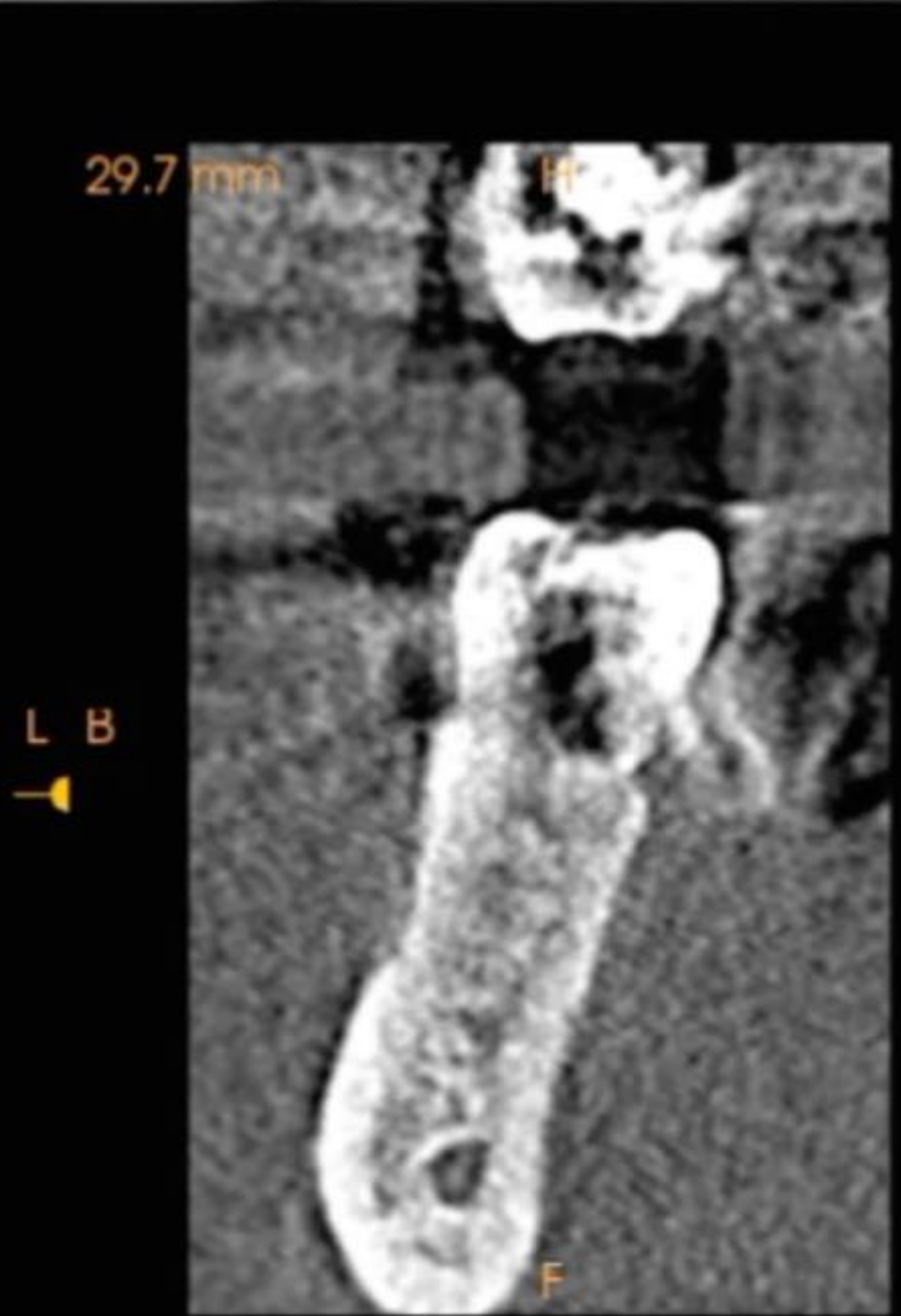
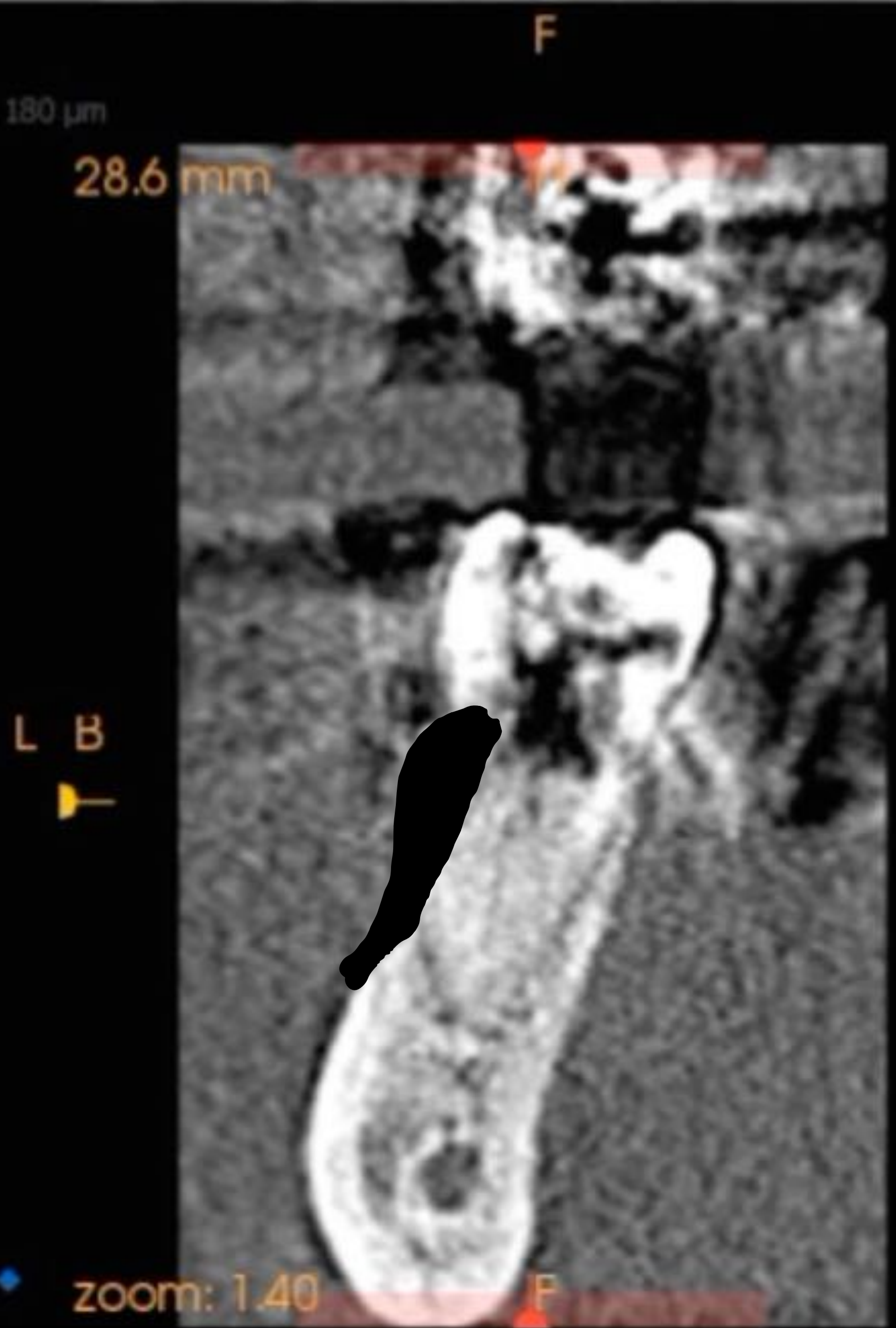
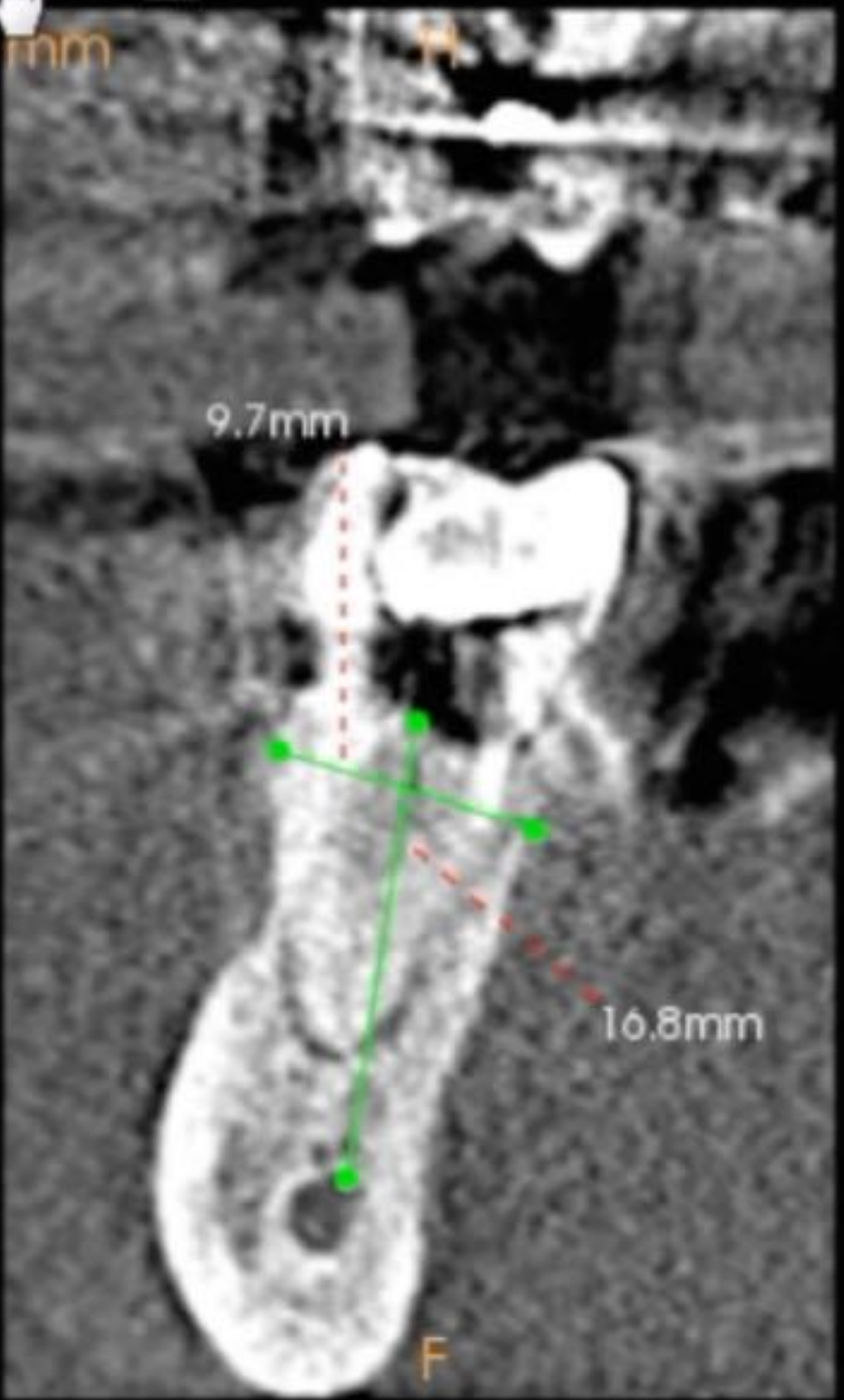
n: 1.24

1.1 mm 180 μm

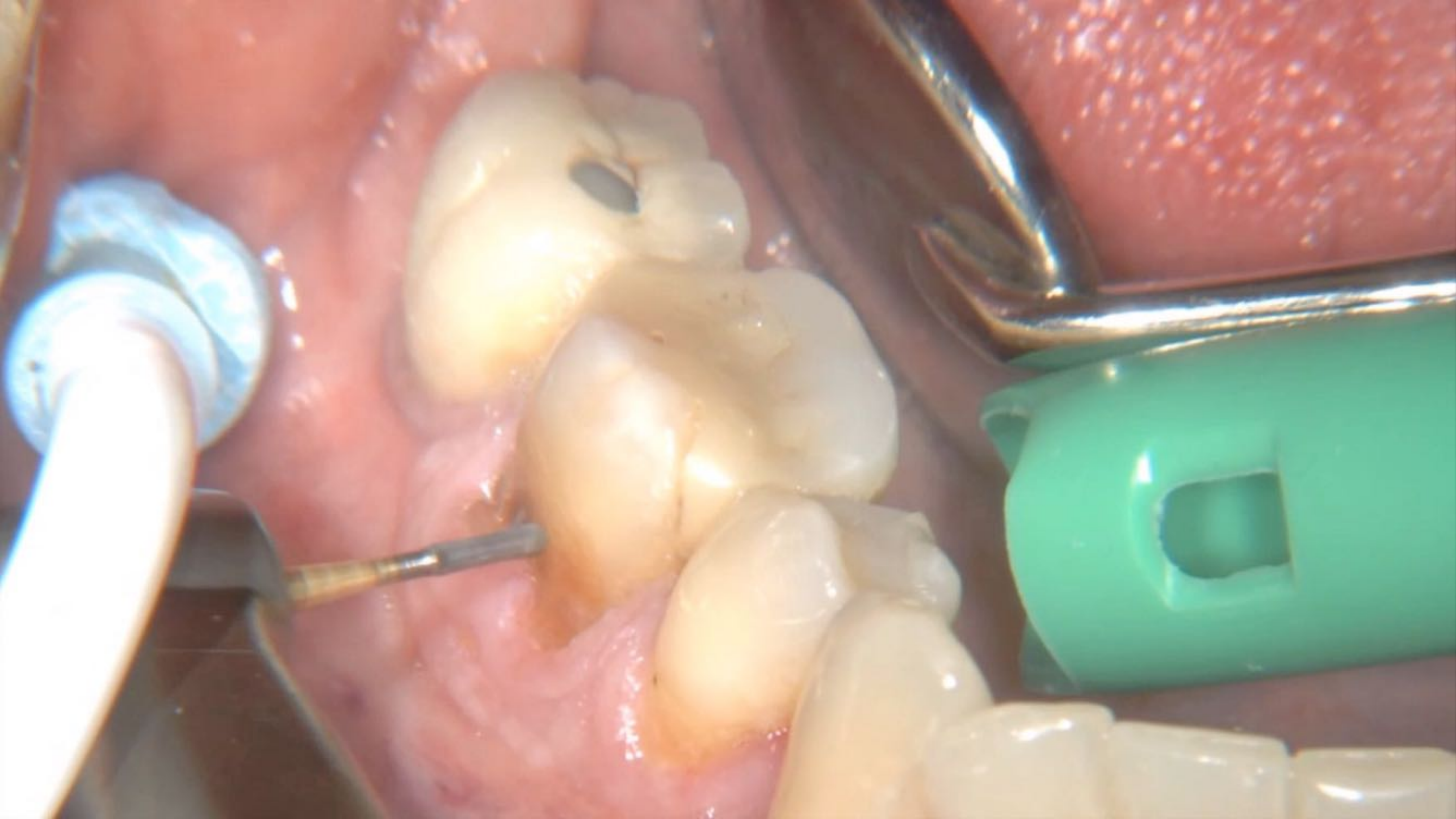


n: 1.24

1.1 mm 180 μm

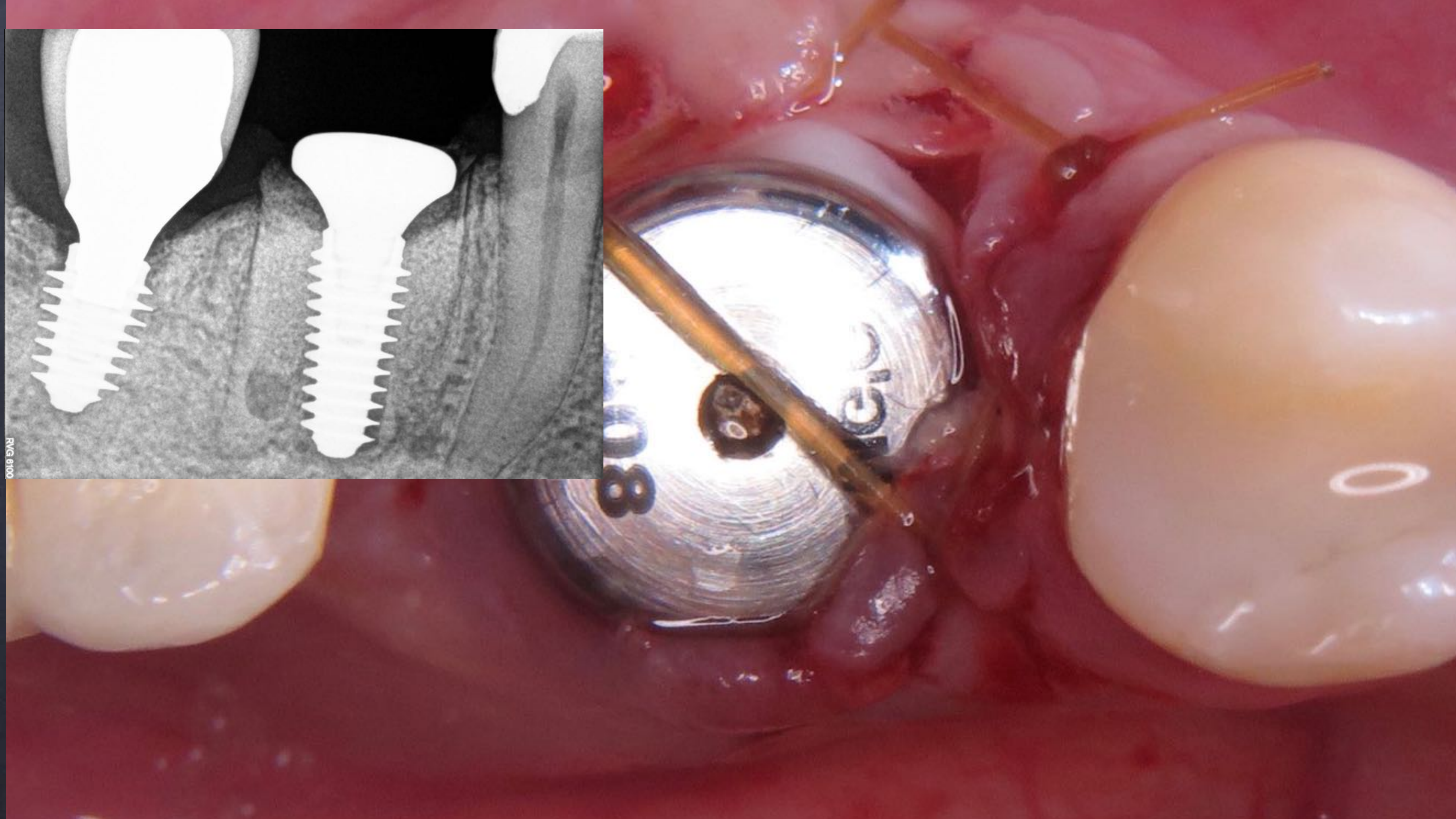


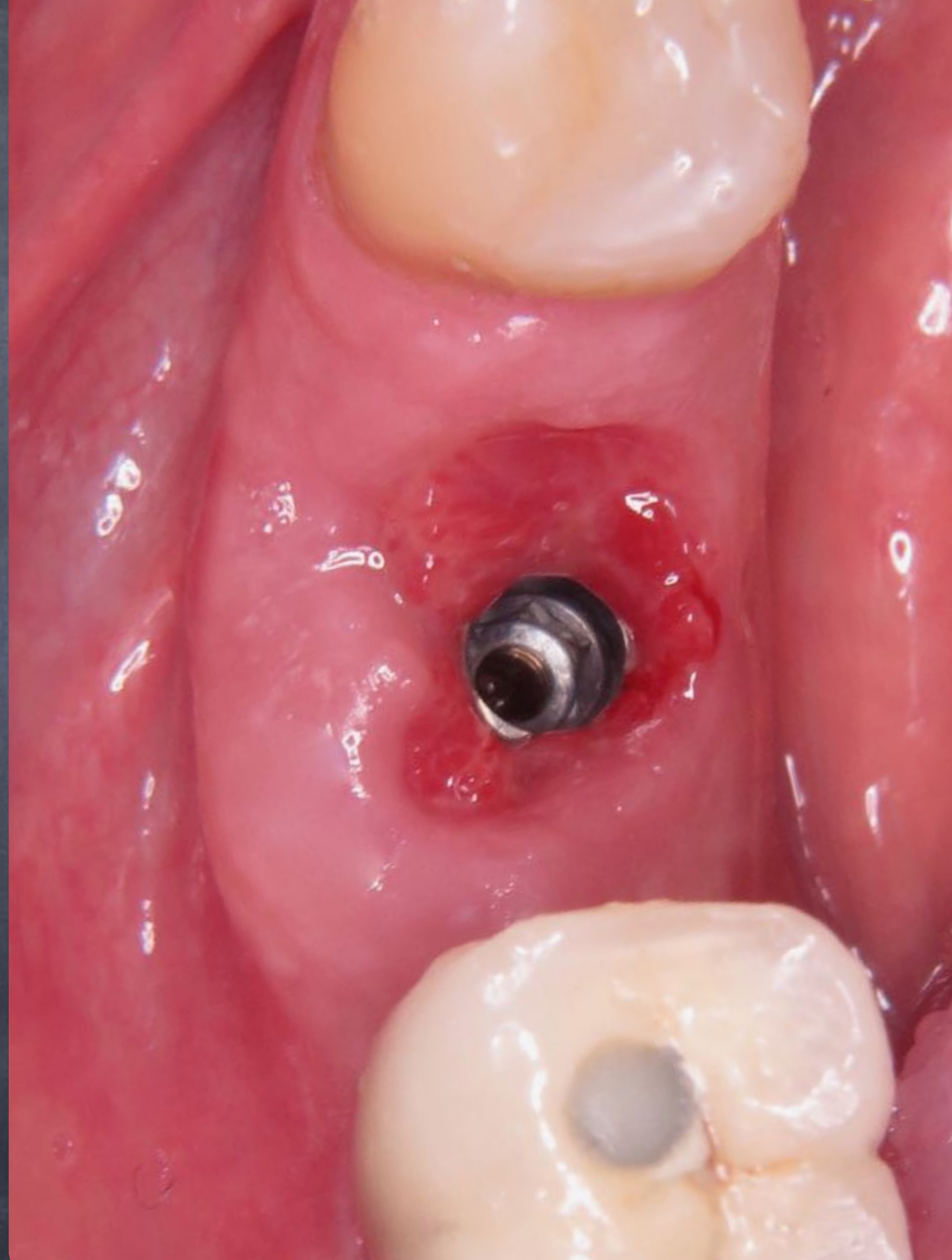


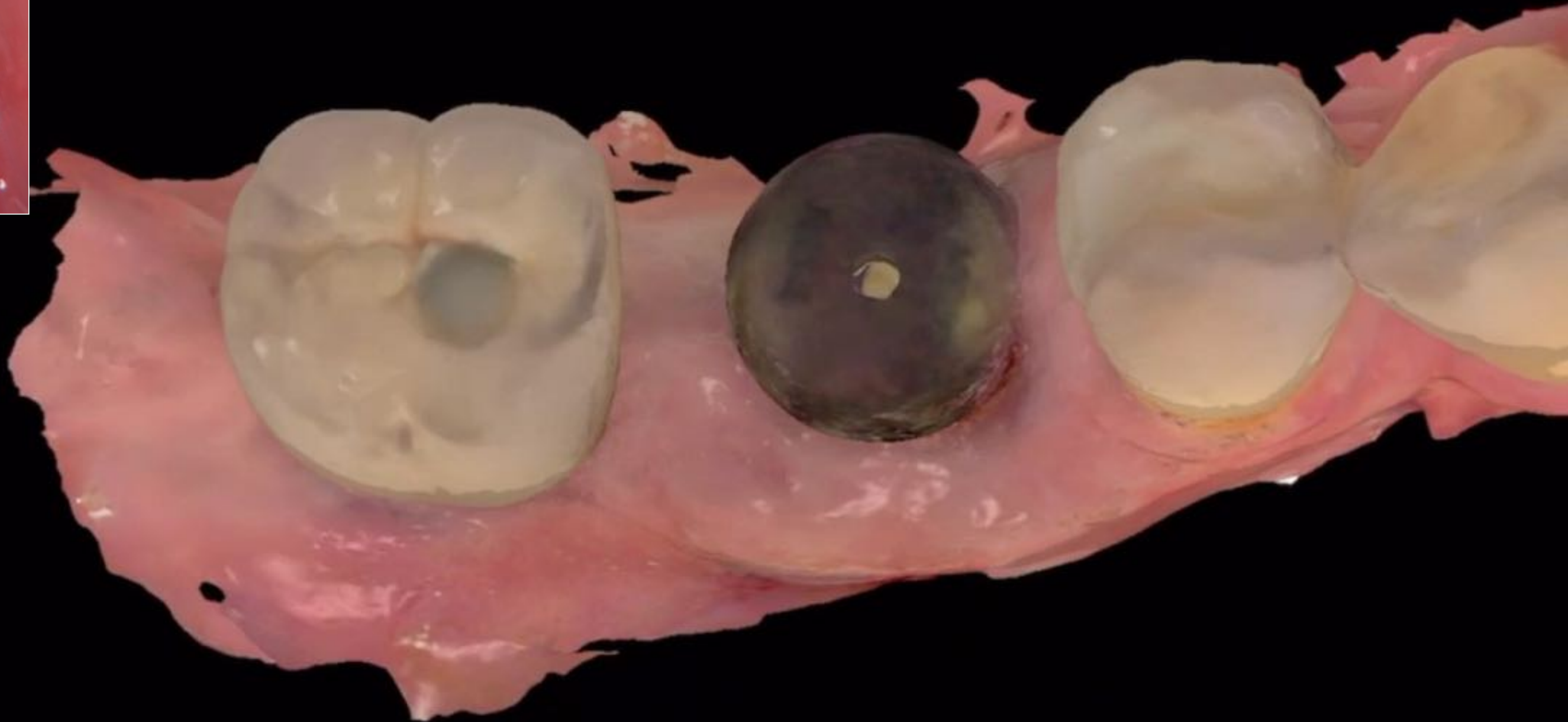




RVG 8100

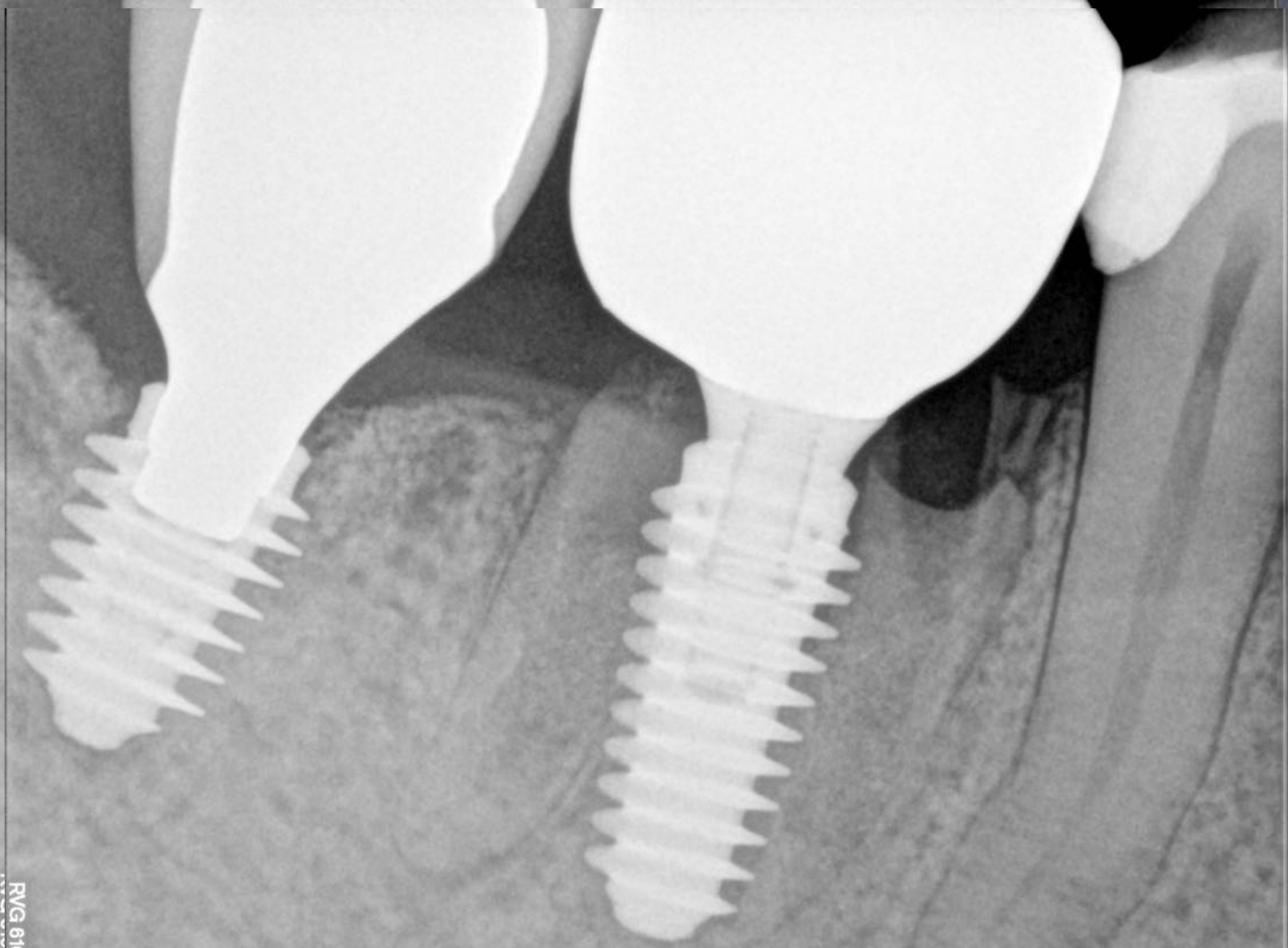




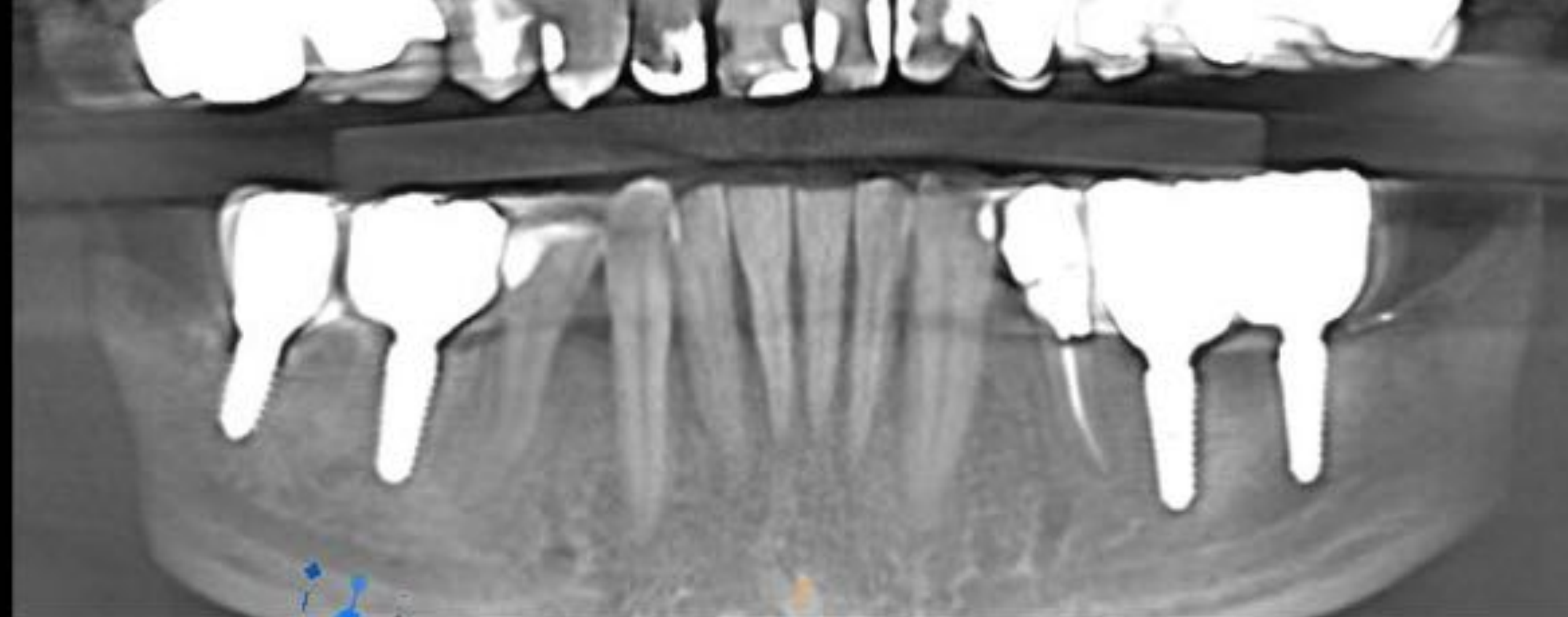
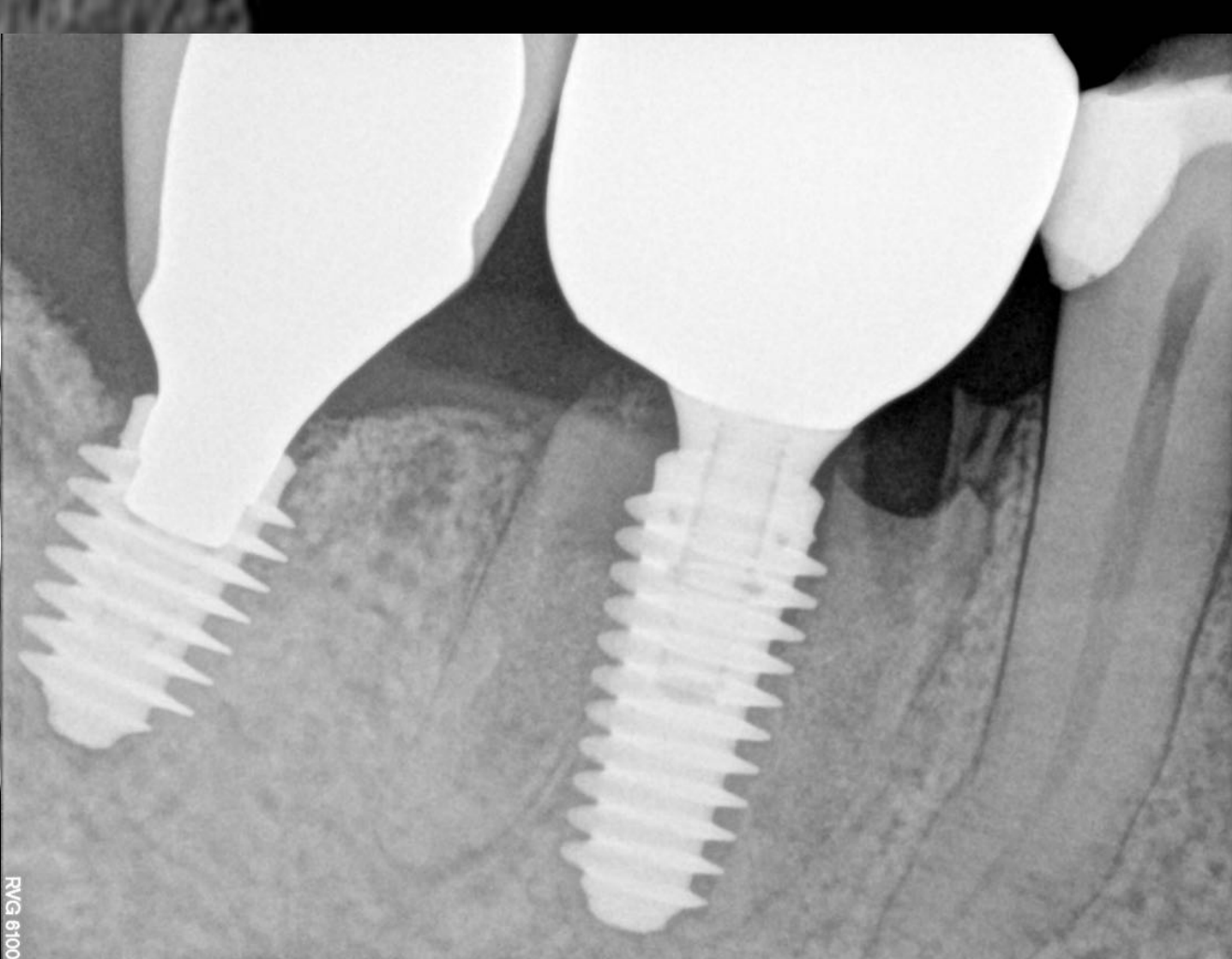




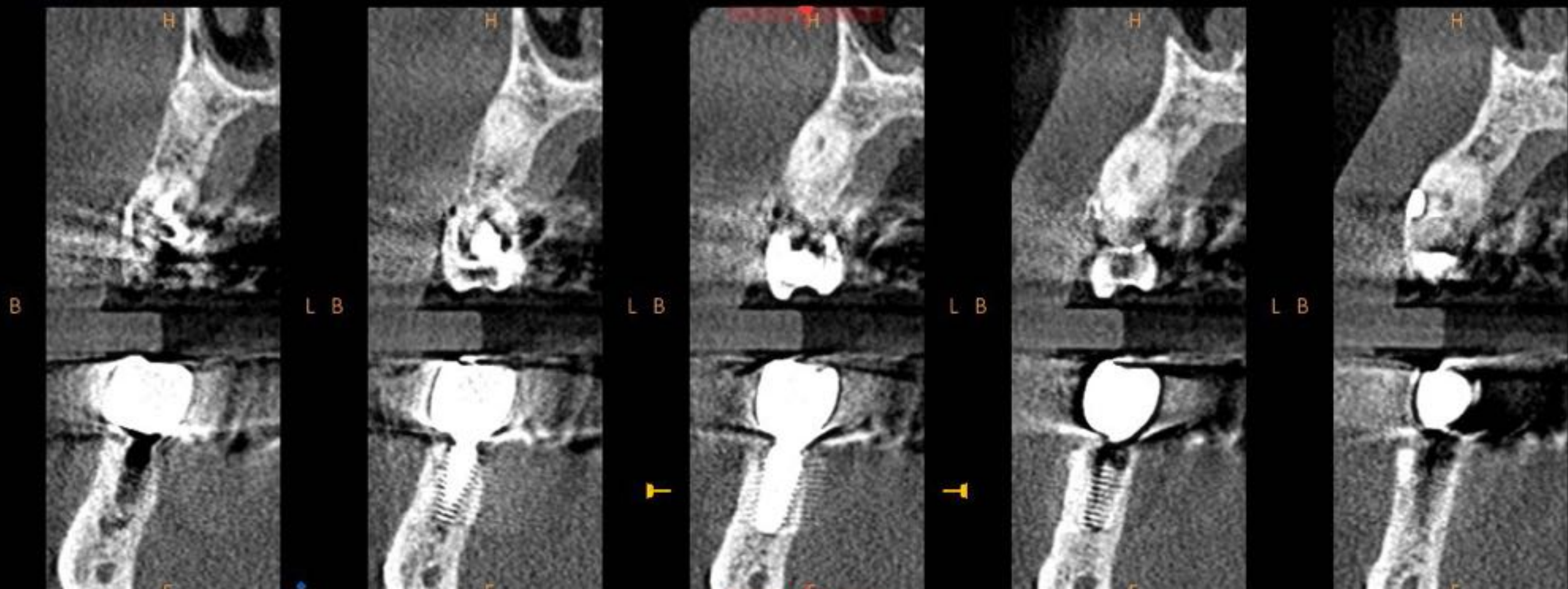




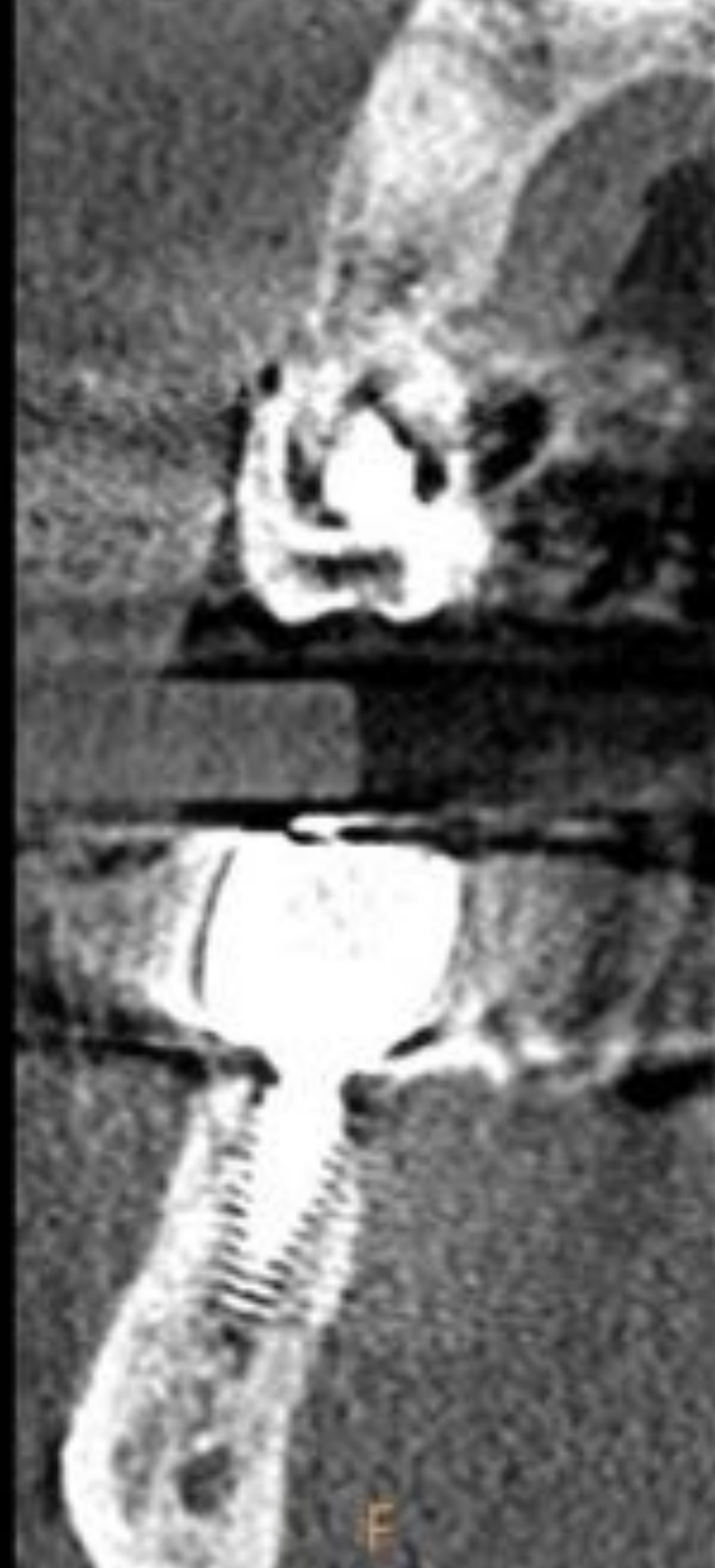
RVG 61
100 010



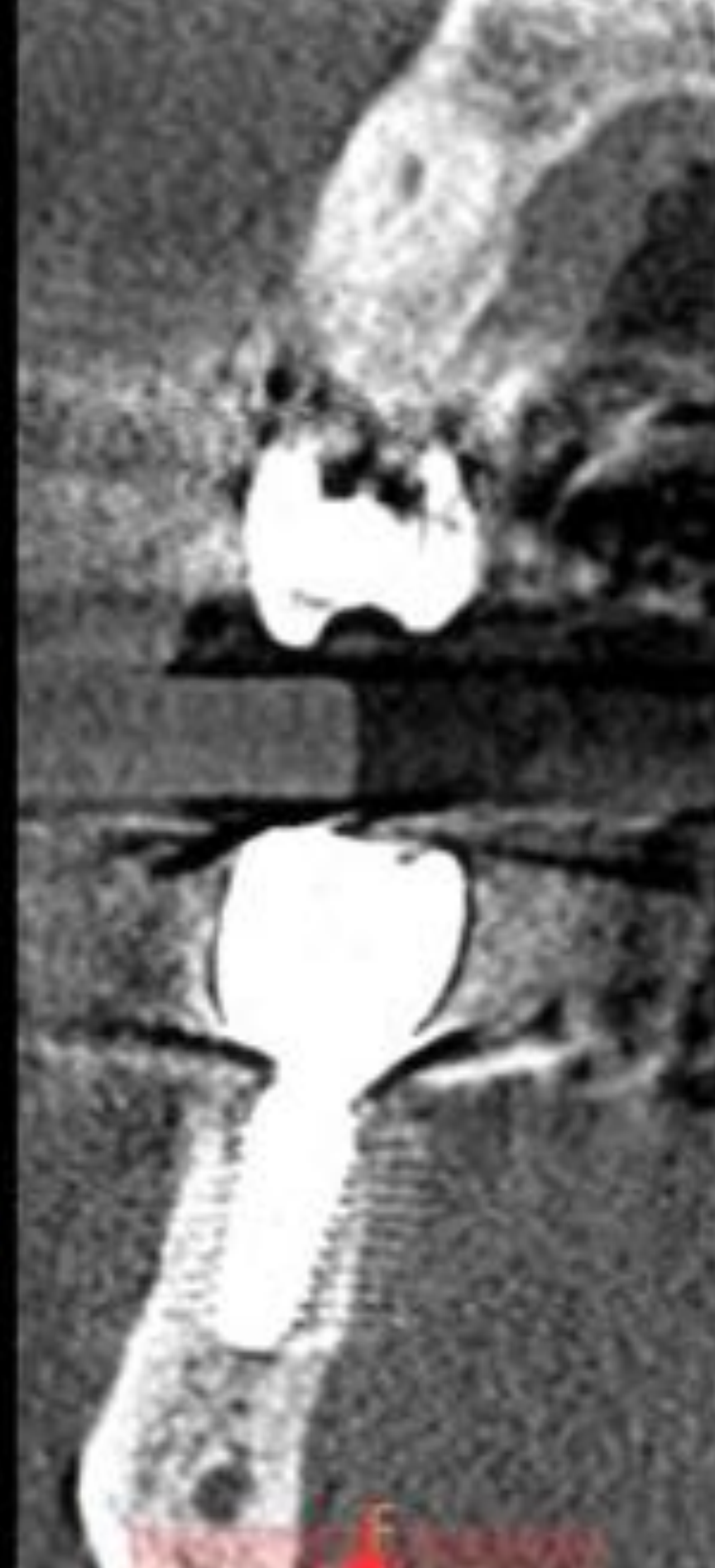
Slice spacing: 1.8 mm.



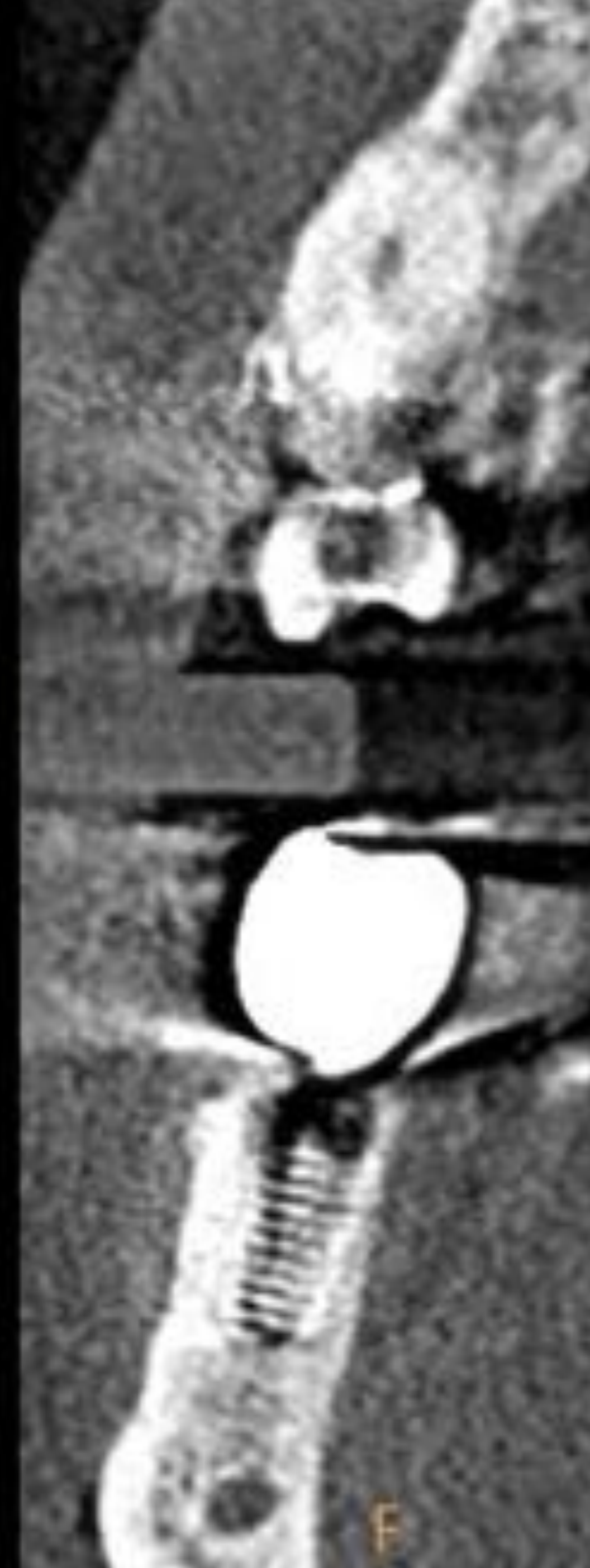
L B



L B



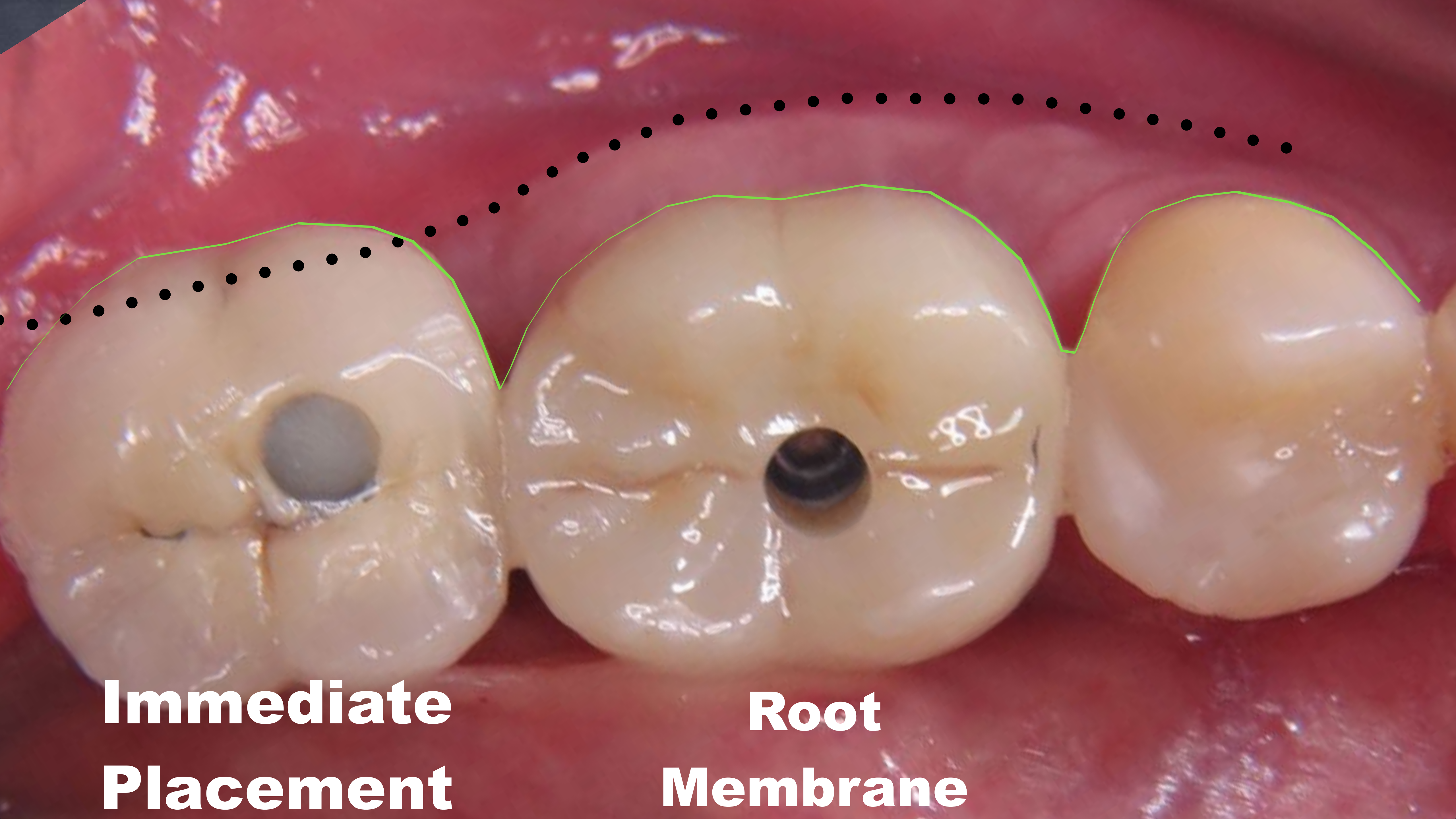
L B



F

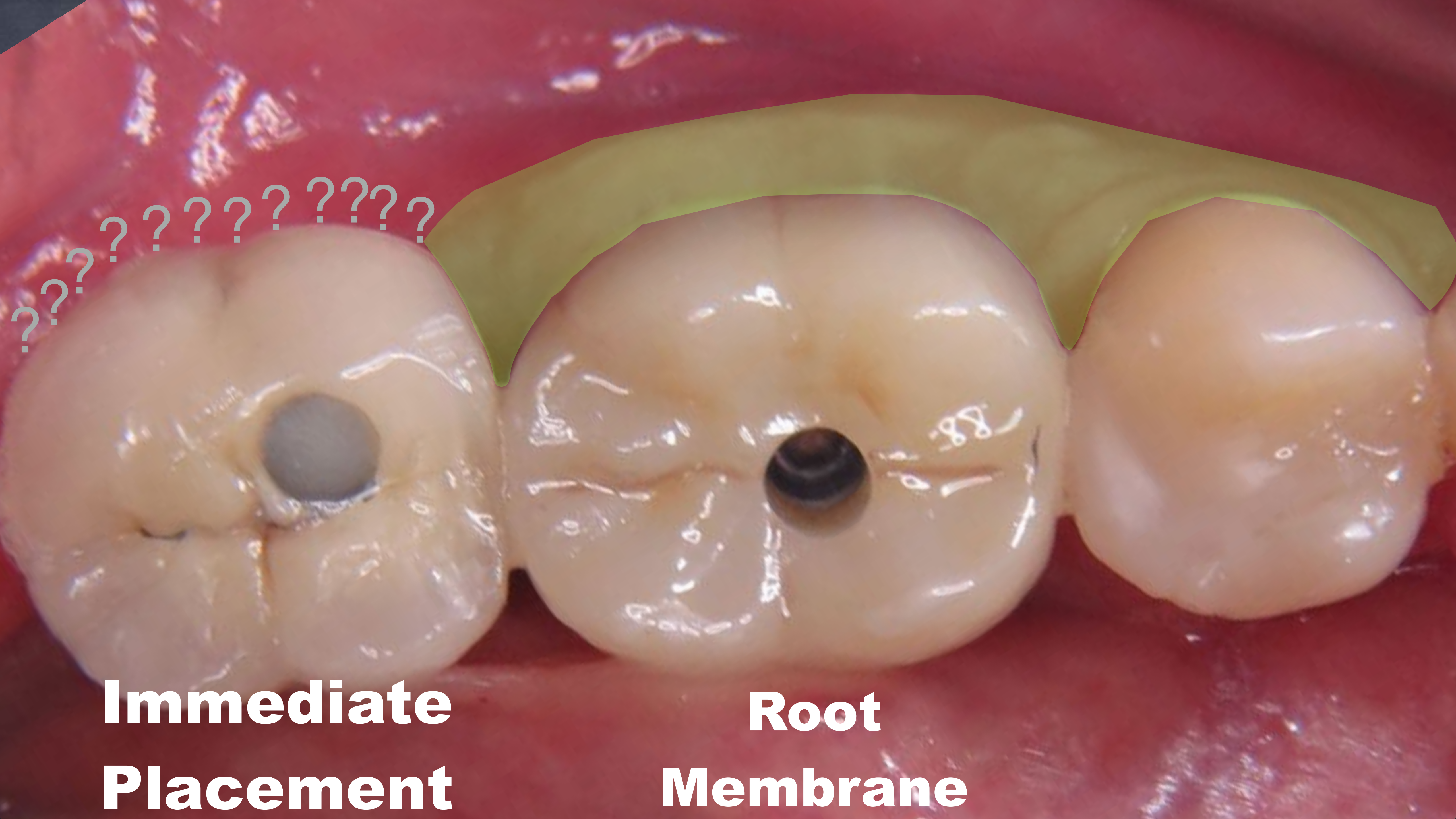
F

F



**Immediate
Placement**

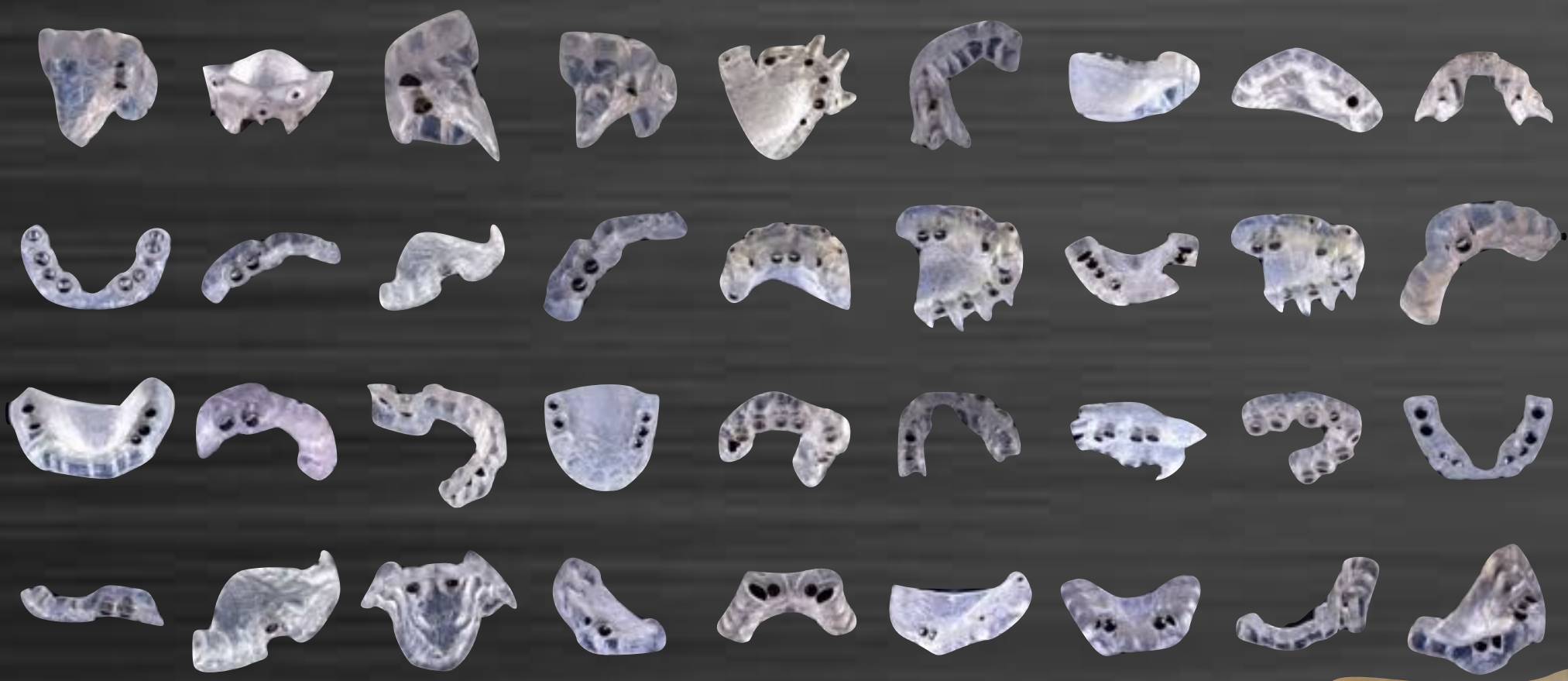
**Root
Membrane**



?????
?????
?????

**Immediate
Placement**

**Root
Membrane**



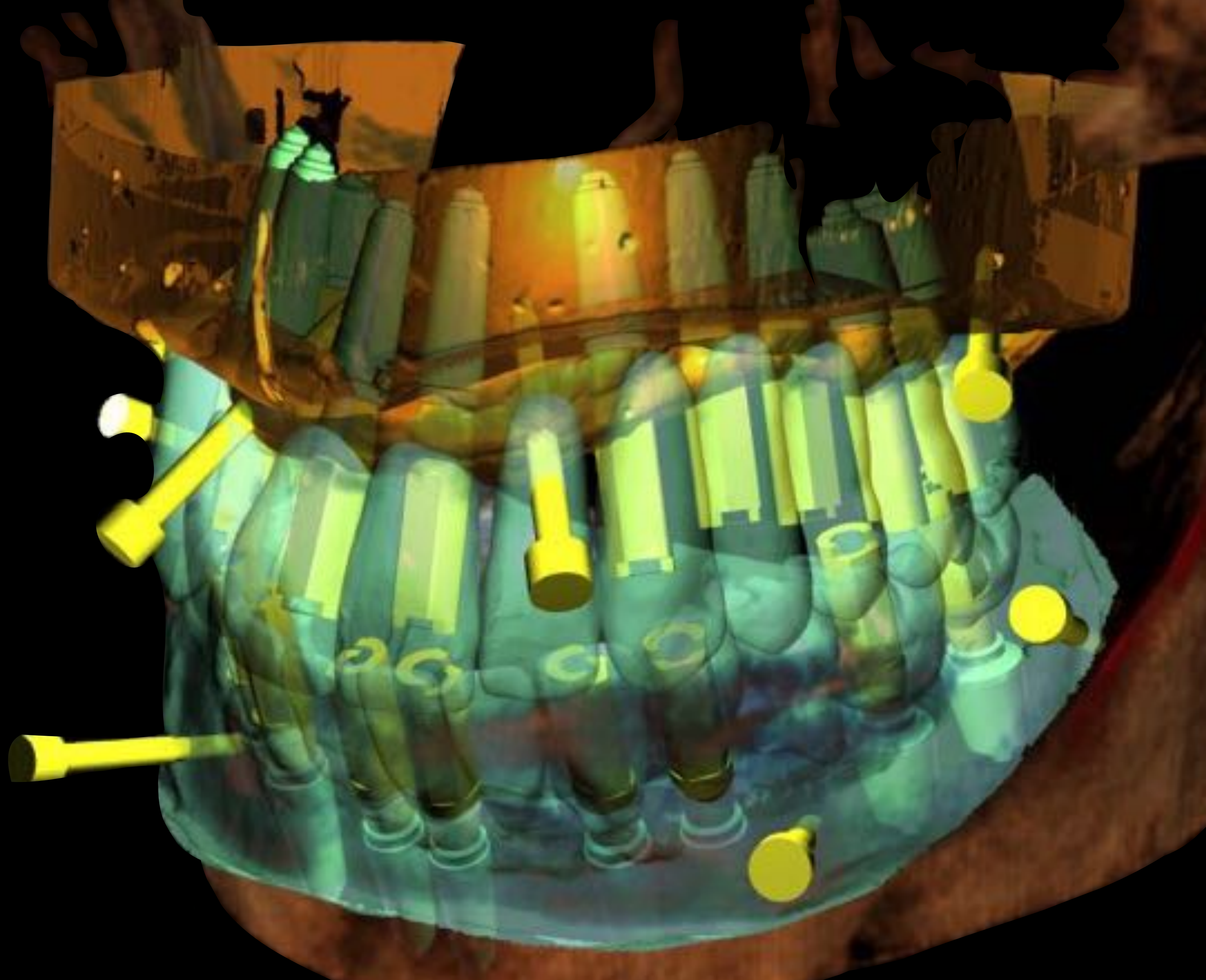
FULLY GUIDED



- **Diagnostic - Freehand**

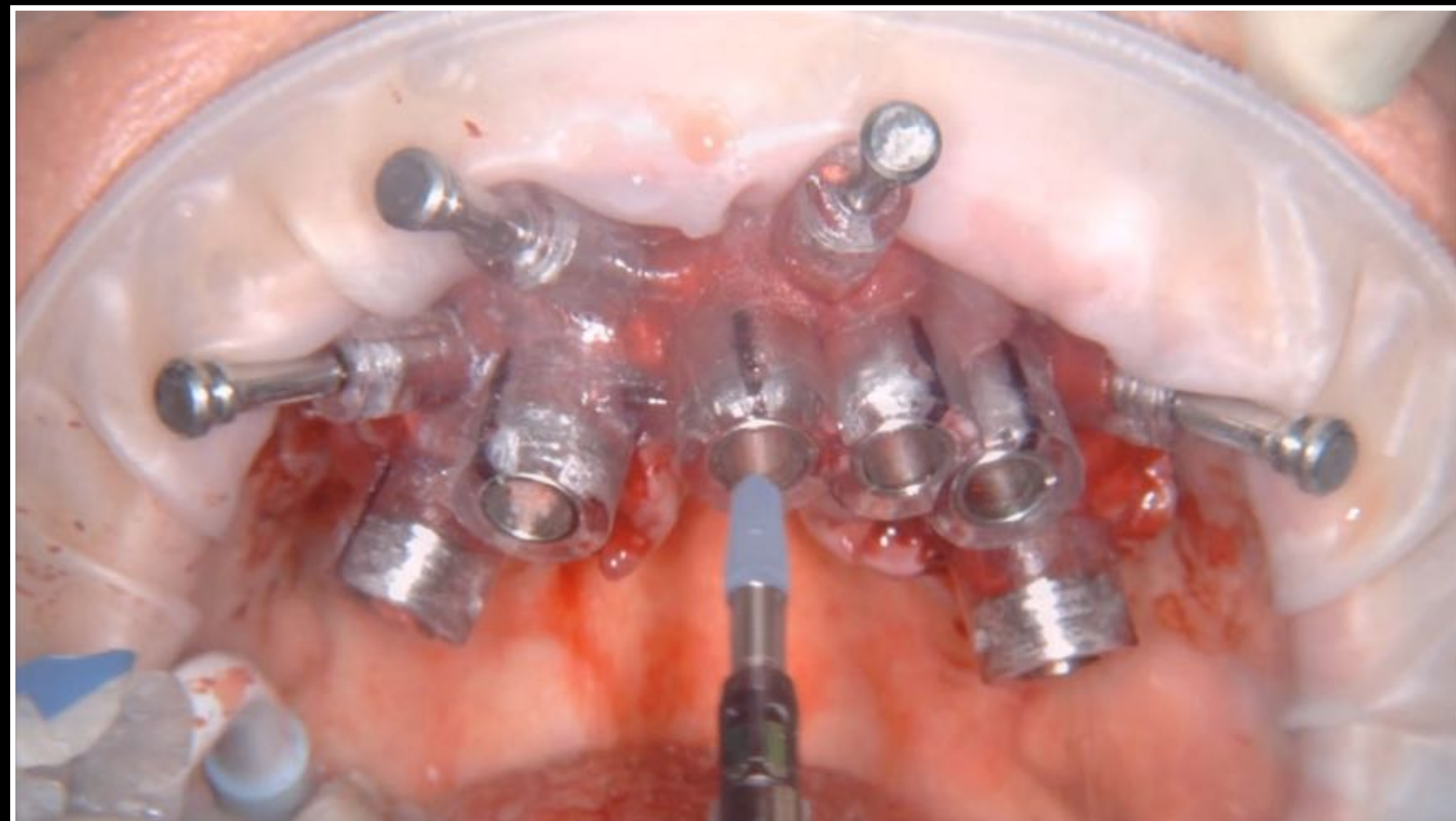
- **Template-Assisted**

- **Full template-Guidance**

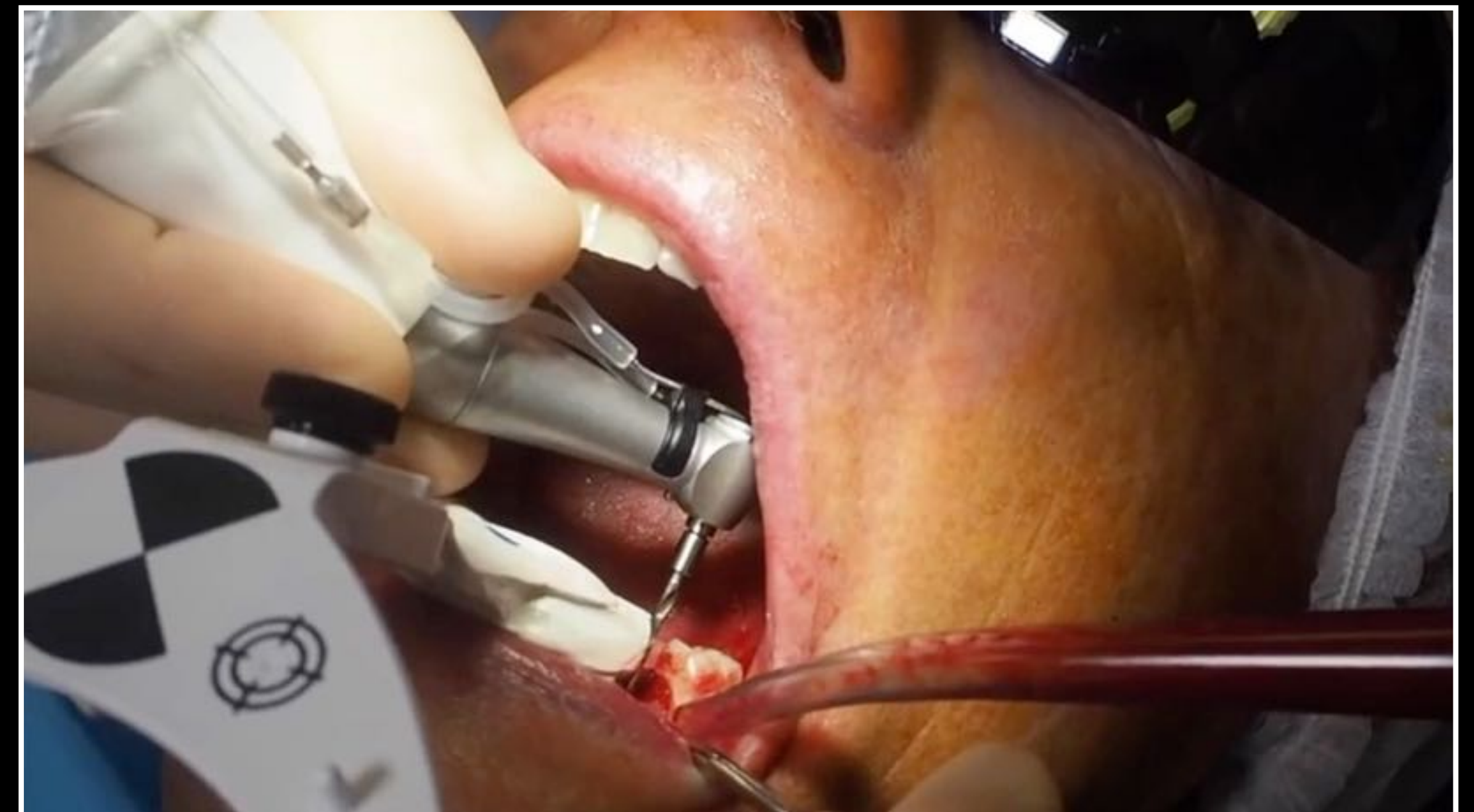


- **Full template-Guidance**

**Static
template**



**Dynamic Virtual
Template**



Courtesy of Navident

Digital Workflow

Surgical

Radiopaque Scanning Appliance

Use of CBCT Native Software

CT/CBCT Scan

DICOM DATA

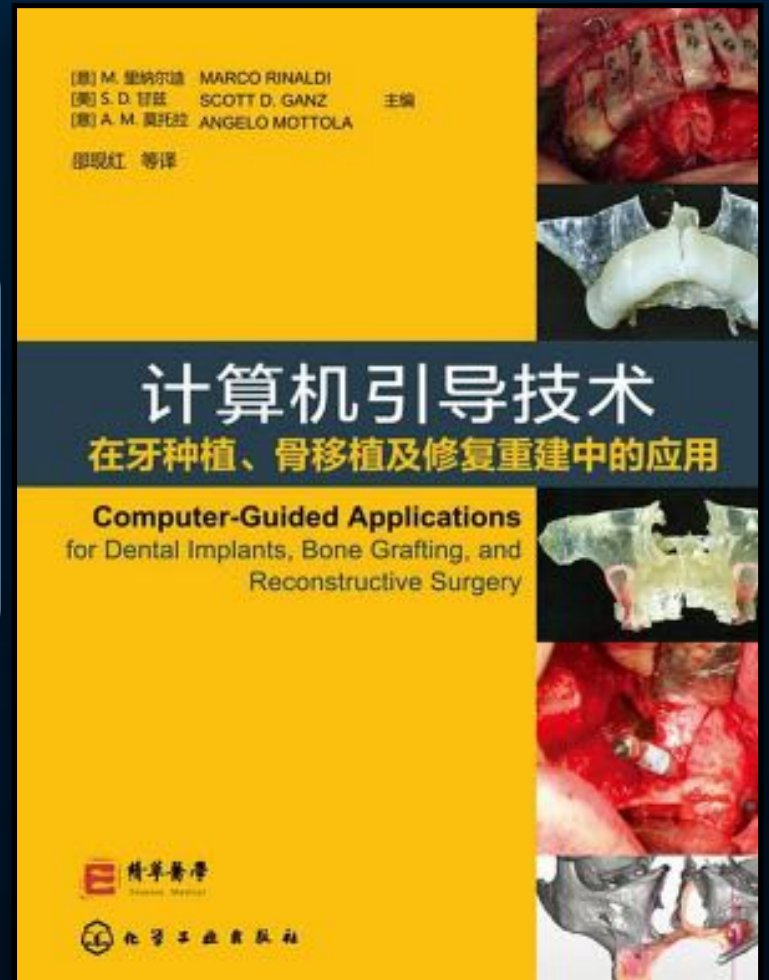
CT-derived Surgical Template Fabrication

DATA-MERGE

Use of Interactive Treatment Planning Software

Study Cast / Optical Scan

Intra Extra-Oral Optical Scan



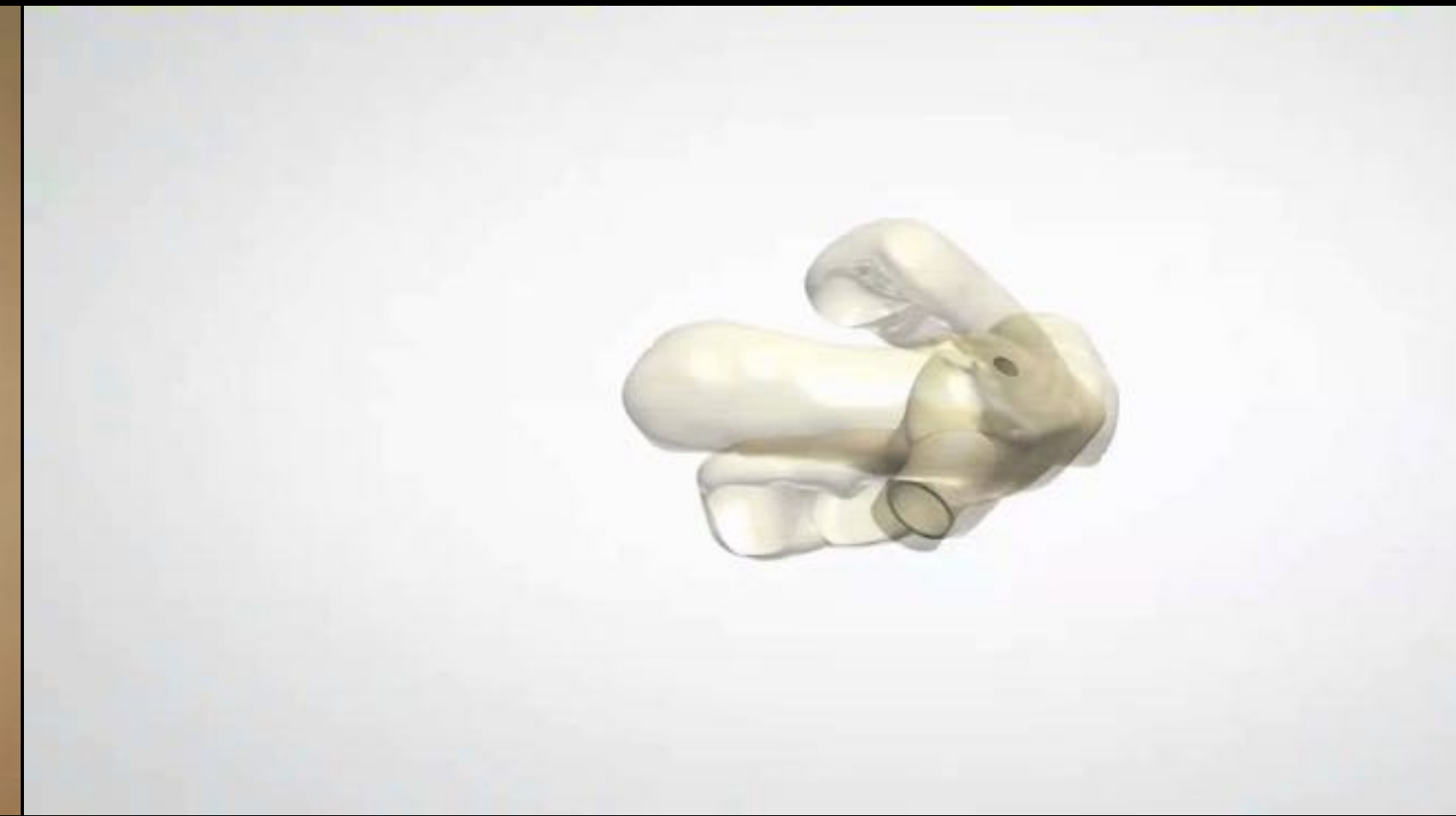
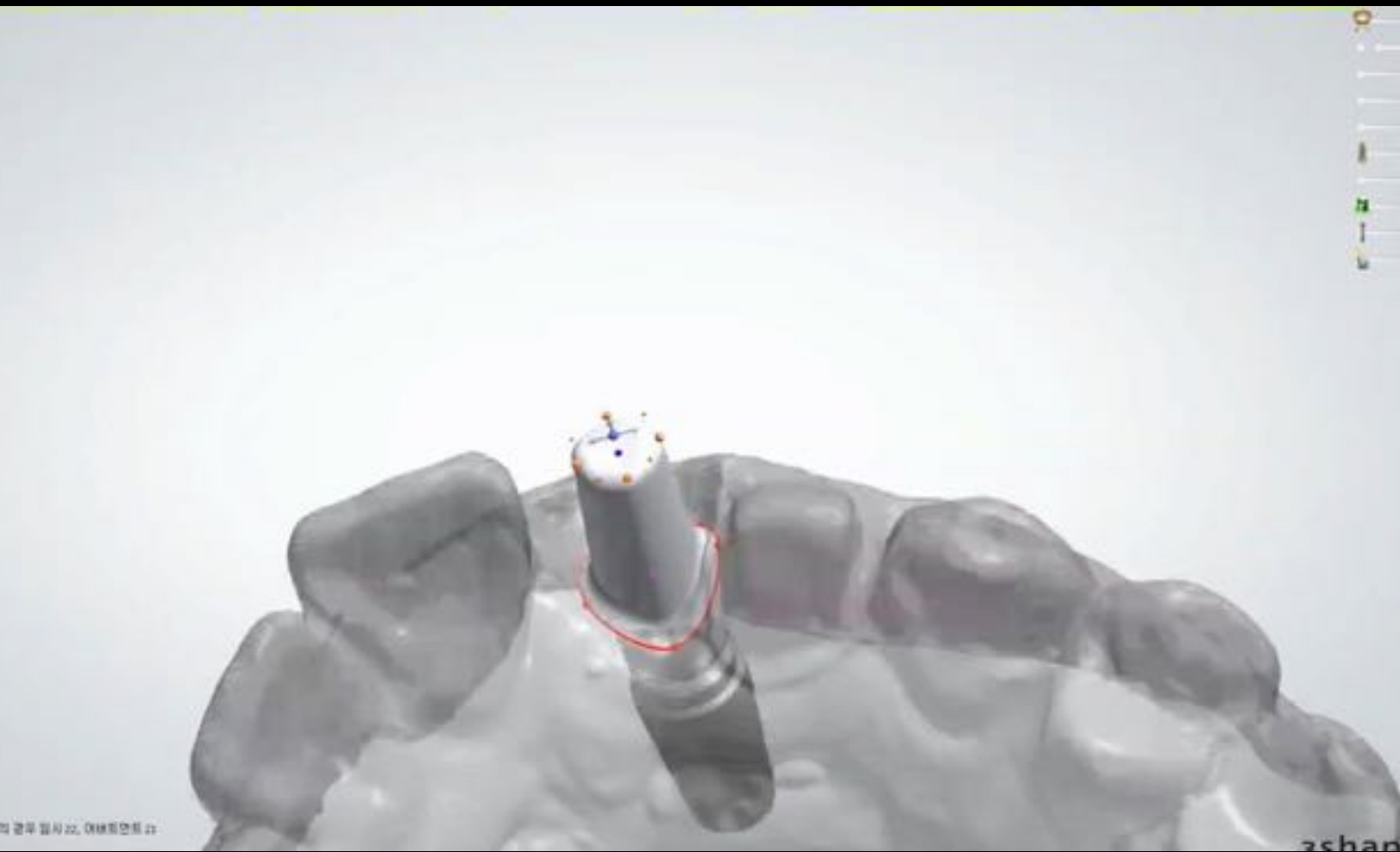
R2 GATE

CAD/CAM TECHNOLOGY

DESIGN

PRINT

MILL





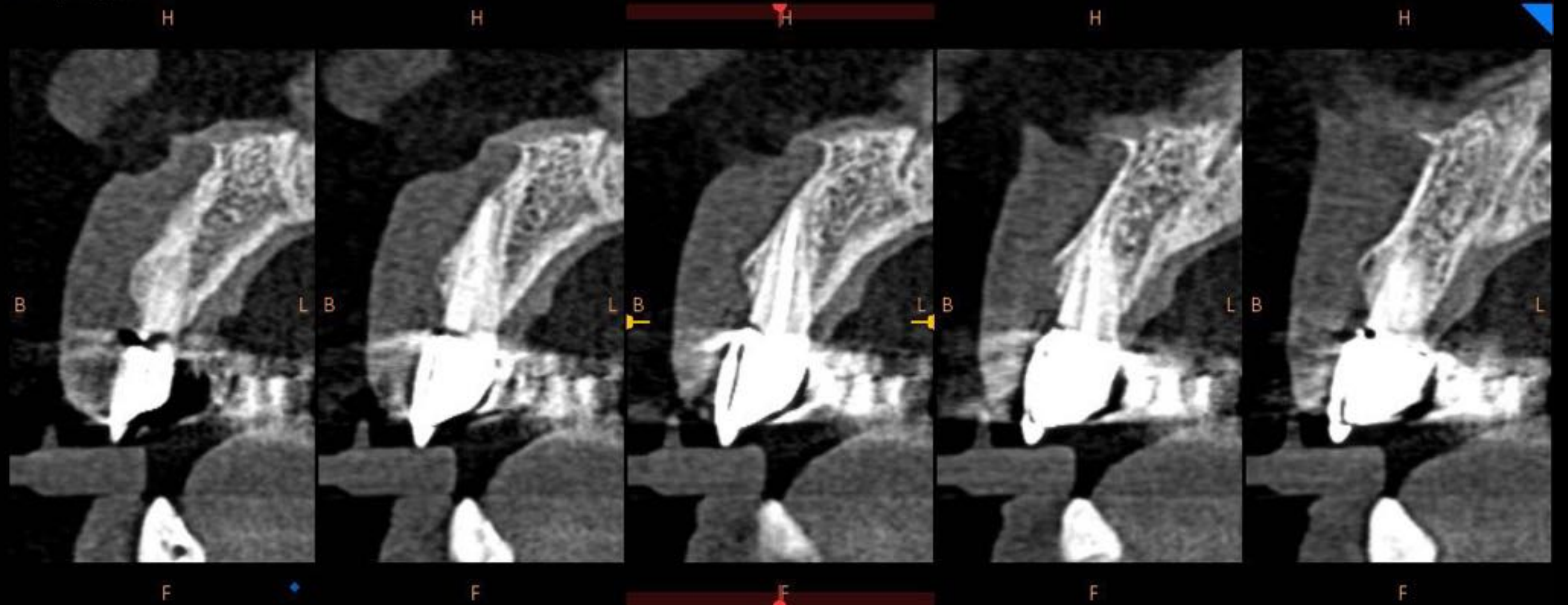
Integration mode: AVG. Slice thickness: 180 µm.



Integration mode: AVG. Slice thickness: 40.1 mm.



Slice spacing: 1.1 mm.



Slice spacing: 1.1 mm.



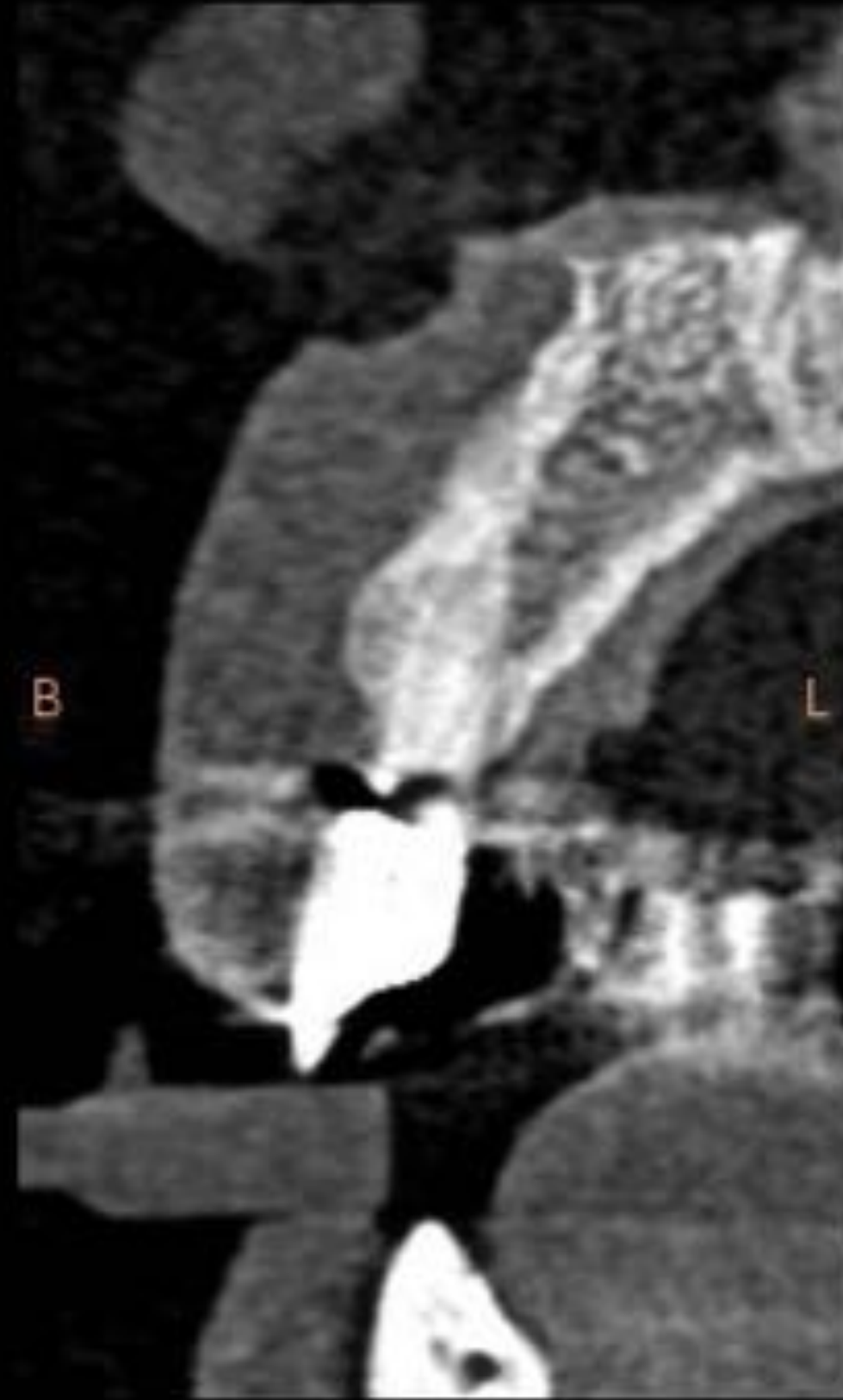
H

H

H

H

H



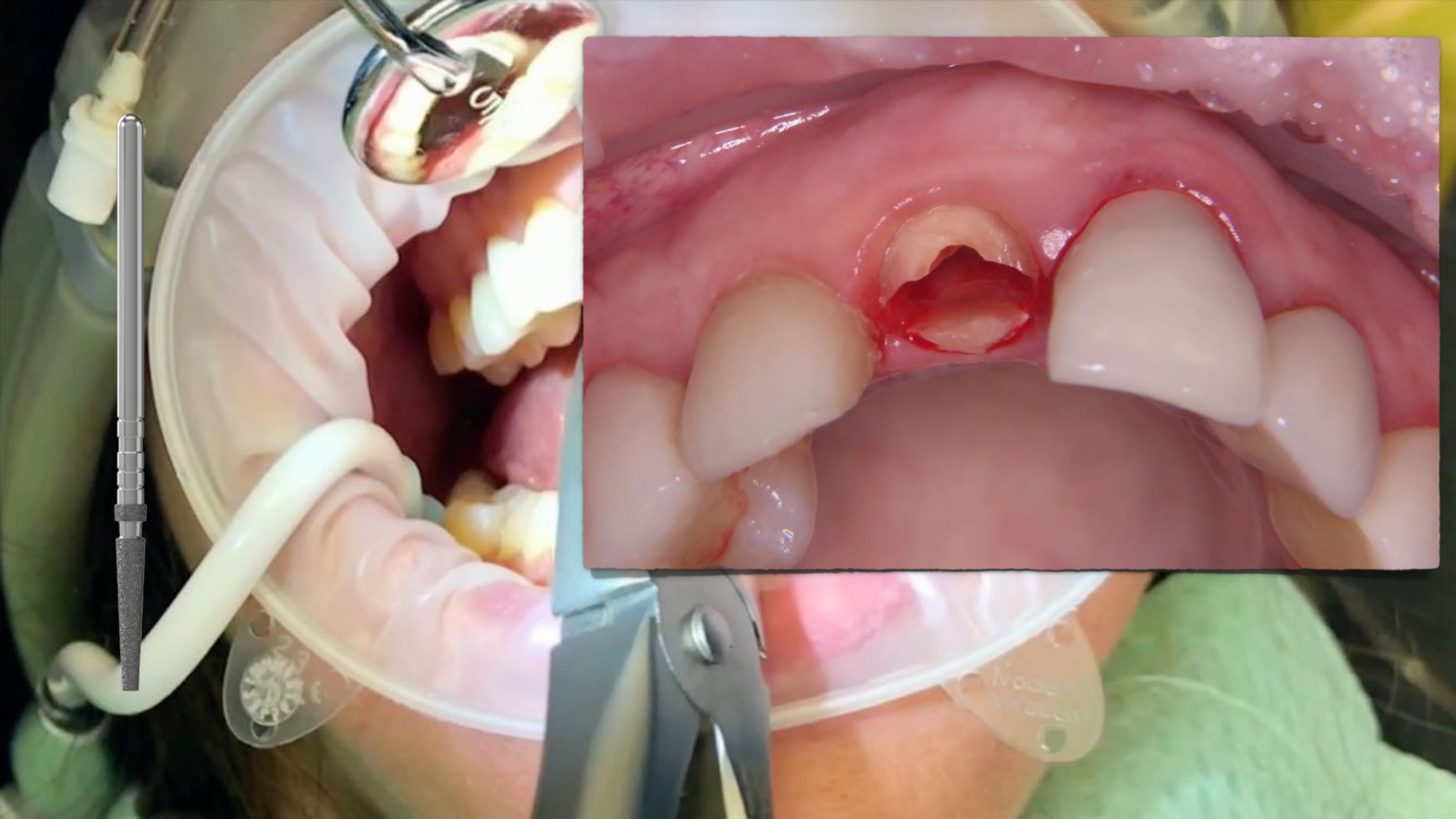
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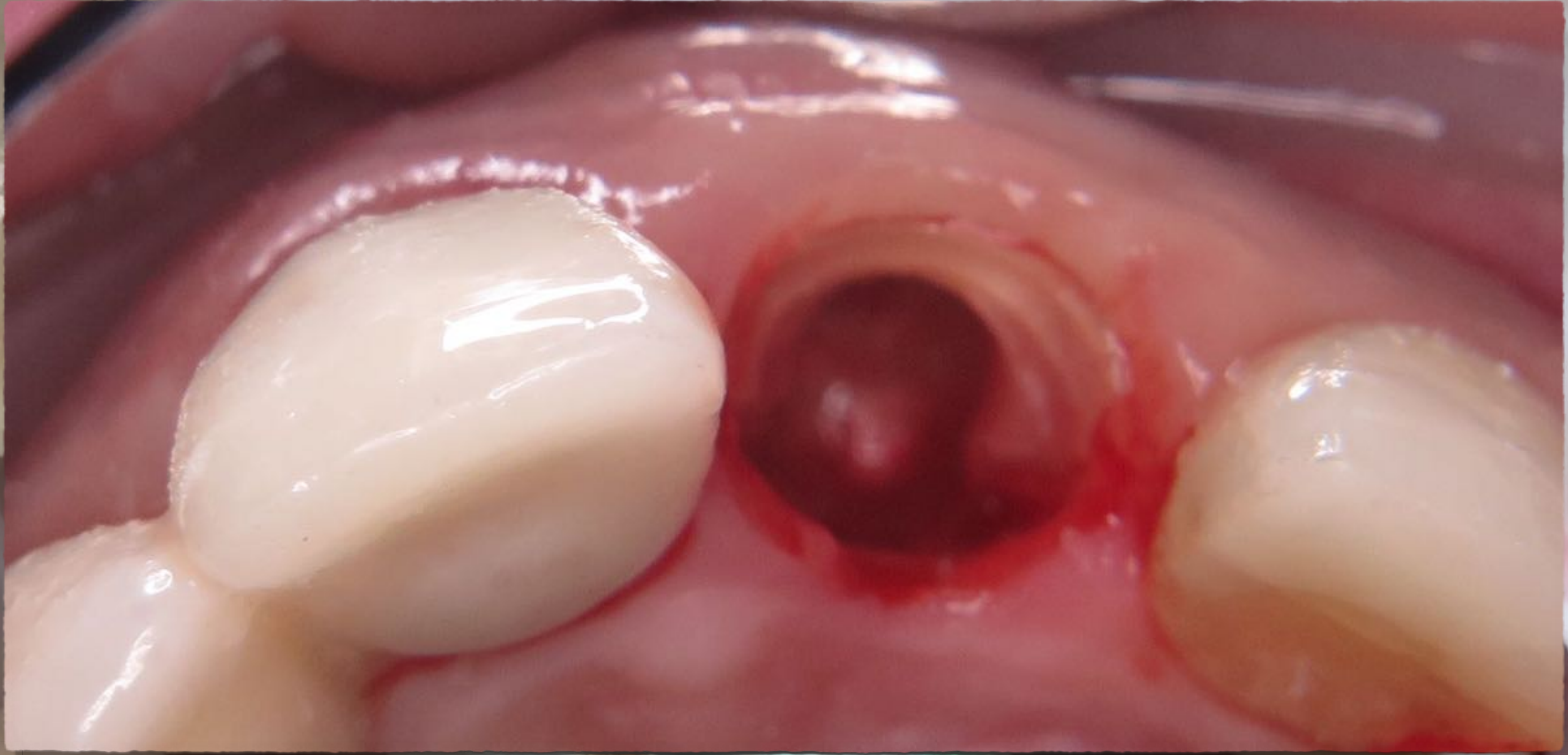
F

F

F

F







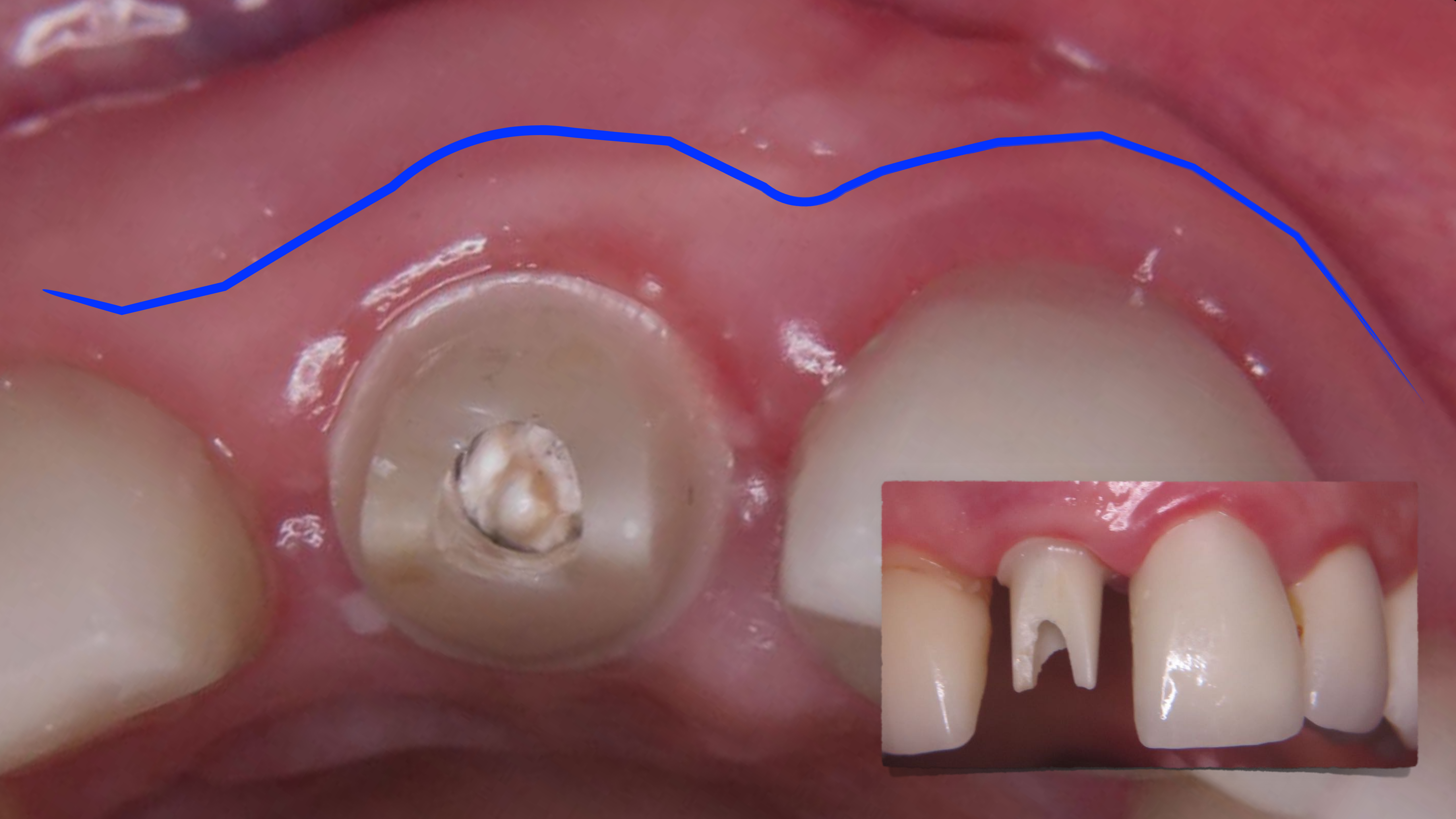






IMMEDIATE POST OP







6 MONTHS POST OP



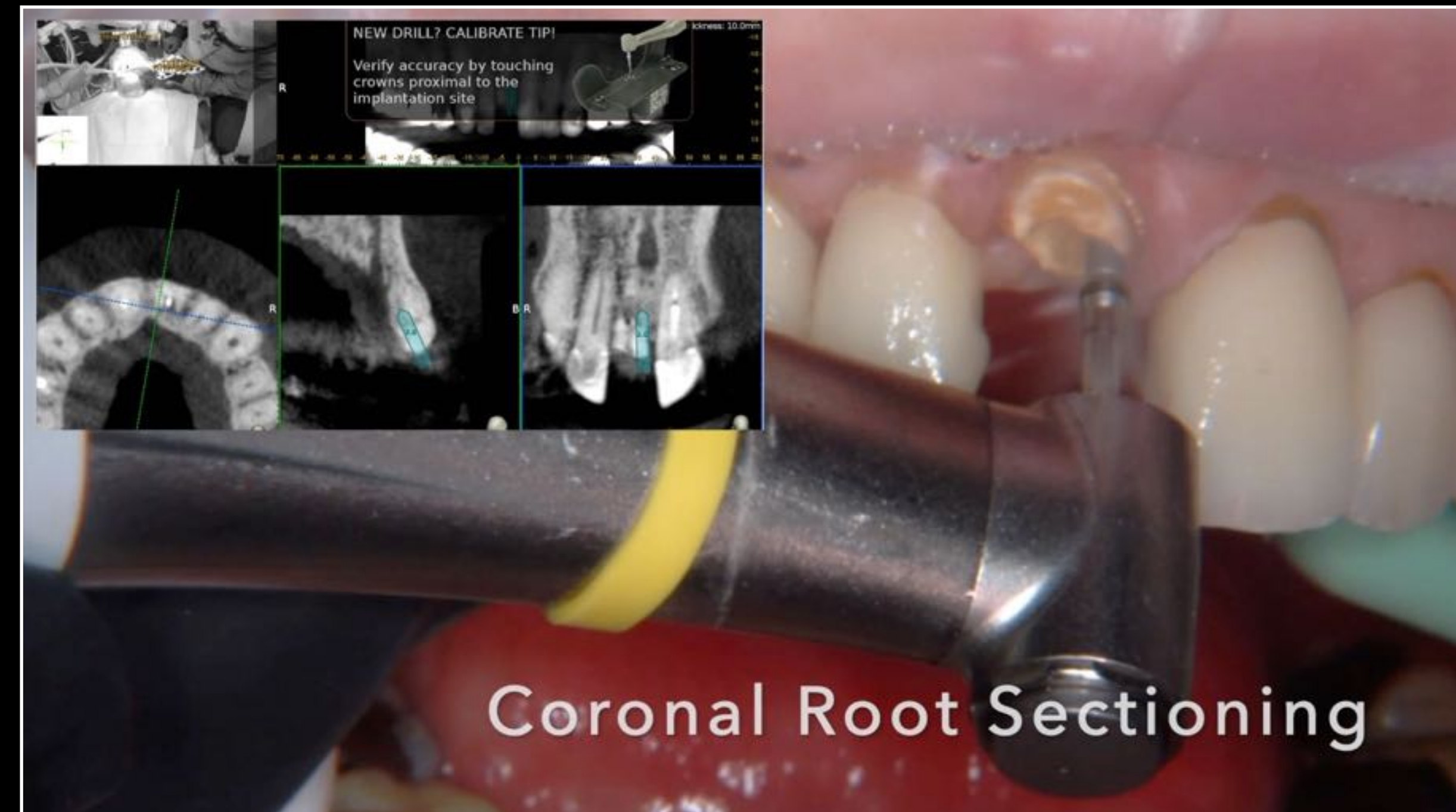
DSS

- Full template-Guidance

DDS

**Digital
Static
Shield**

**Dynamic
Dynamic
Shield**





Digital Static Shield



**Partial Extraction
Therapy**



**Apex
Stack**



**Surgical Guide
Stack**



**Full Template
Surgical Guidance**

Digital Static Shield



**Apex
Stack**



**Surgical Guide
Stack**



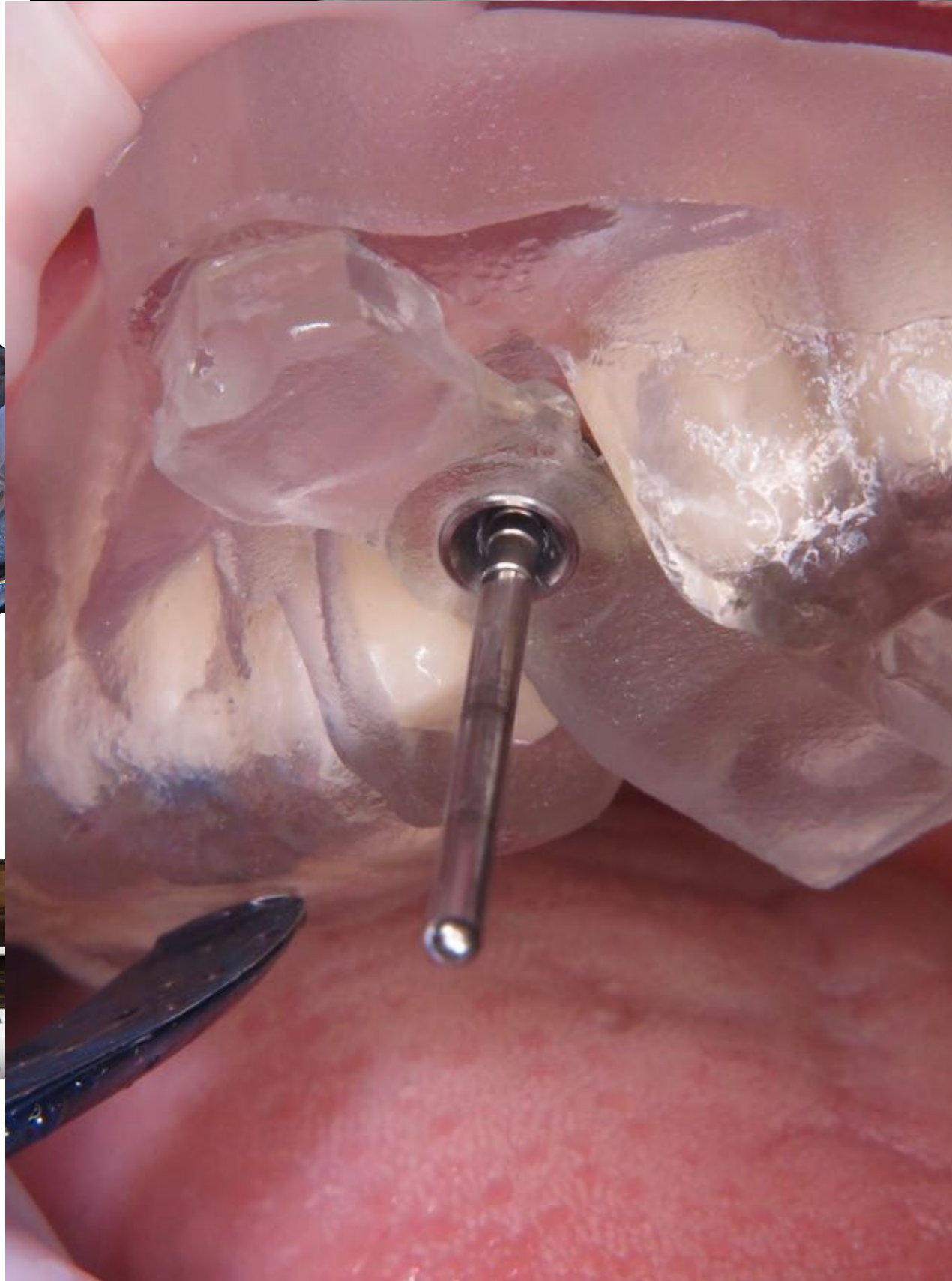
**Full Template
Surgical Guidance**



**Prefabricated
Final abutment
& Provisional**



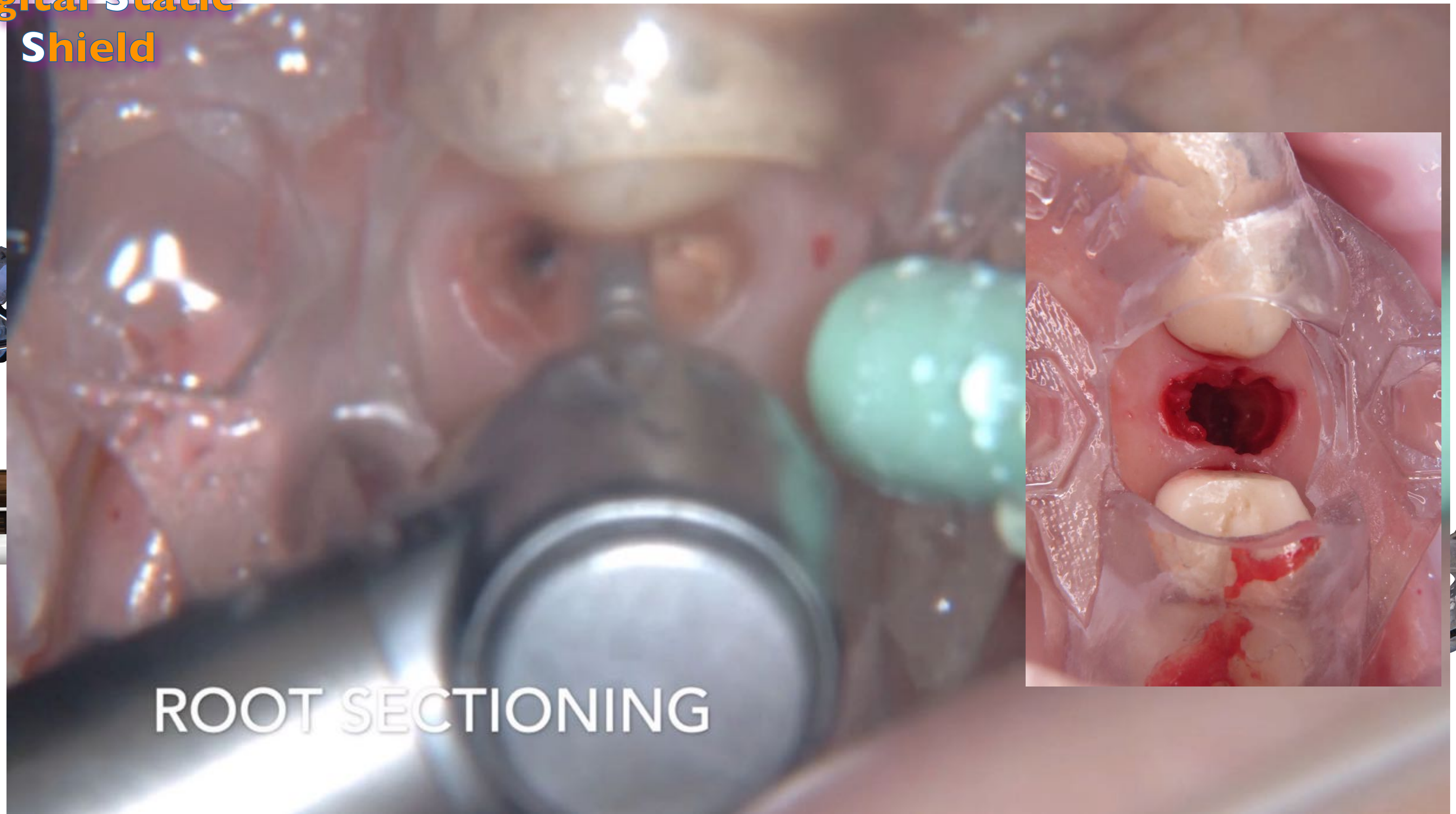
Digital Static Shield



RVG 8100

PET

Digital Static Shield

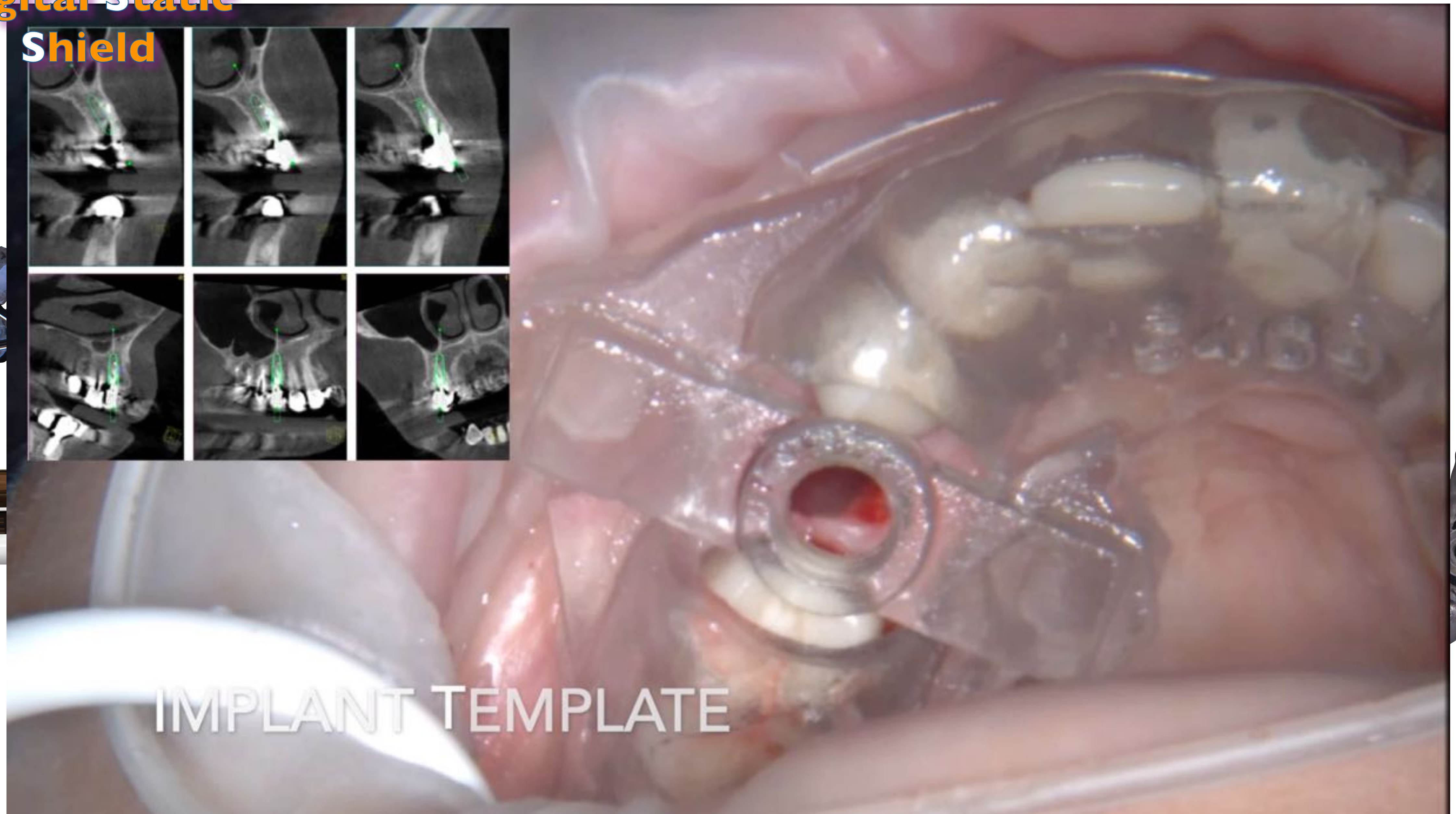
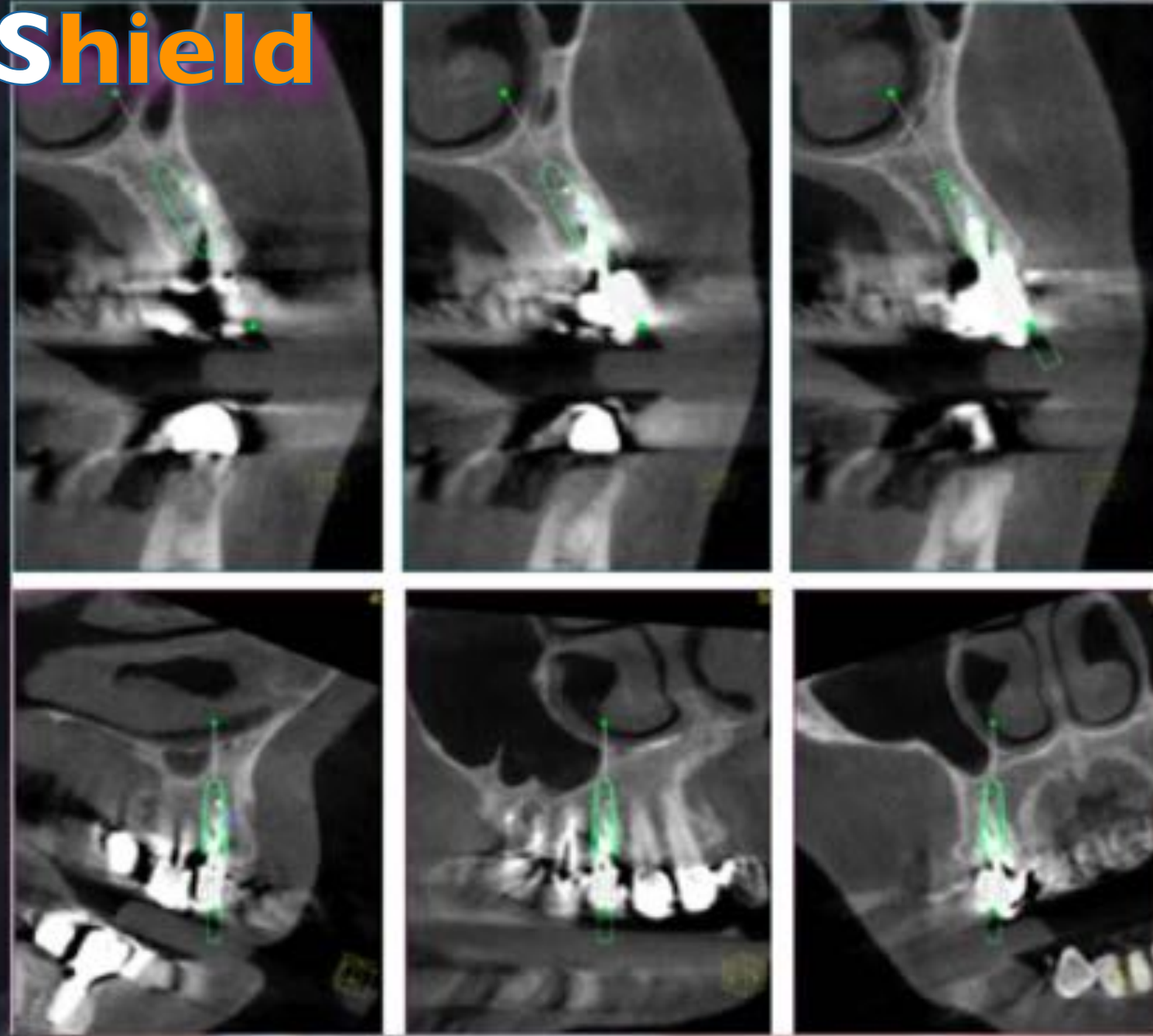


ROOT SECTIONING

PET

Digital Static

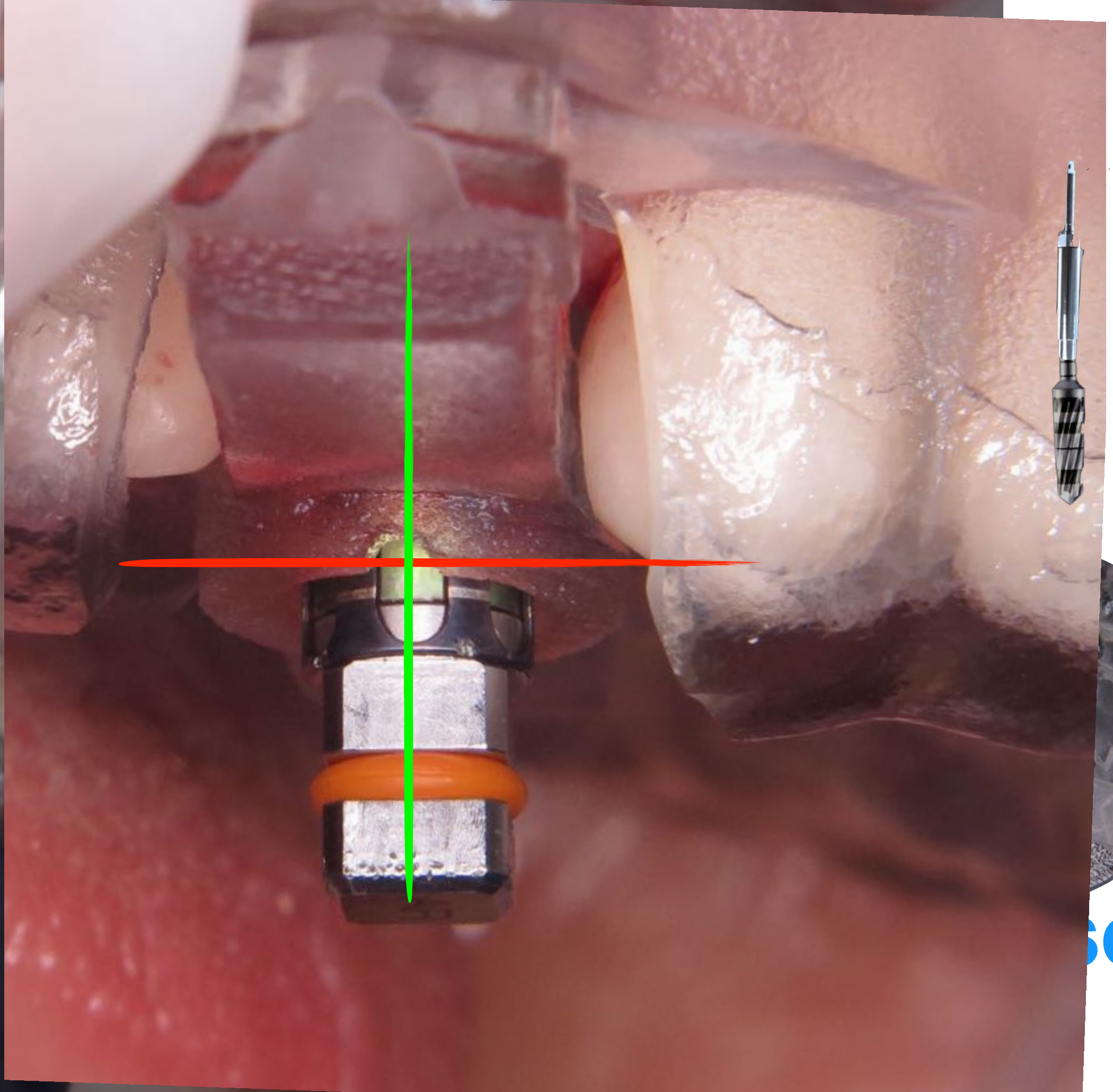
Shield



SG

Digital Static Shield

R2 GATE



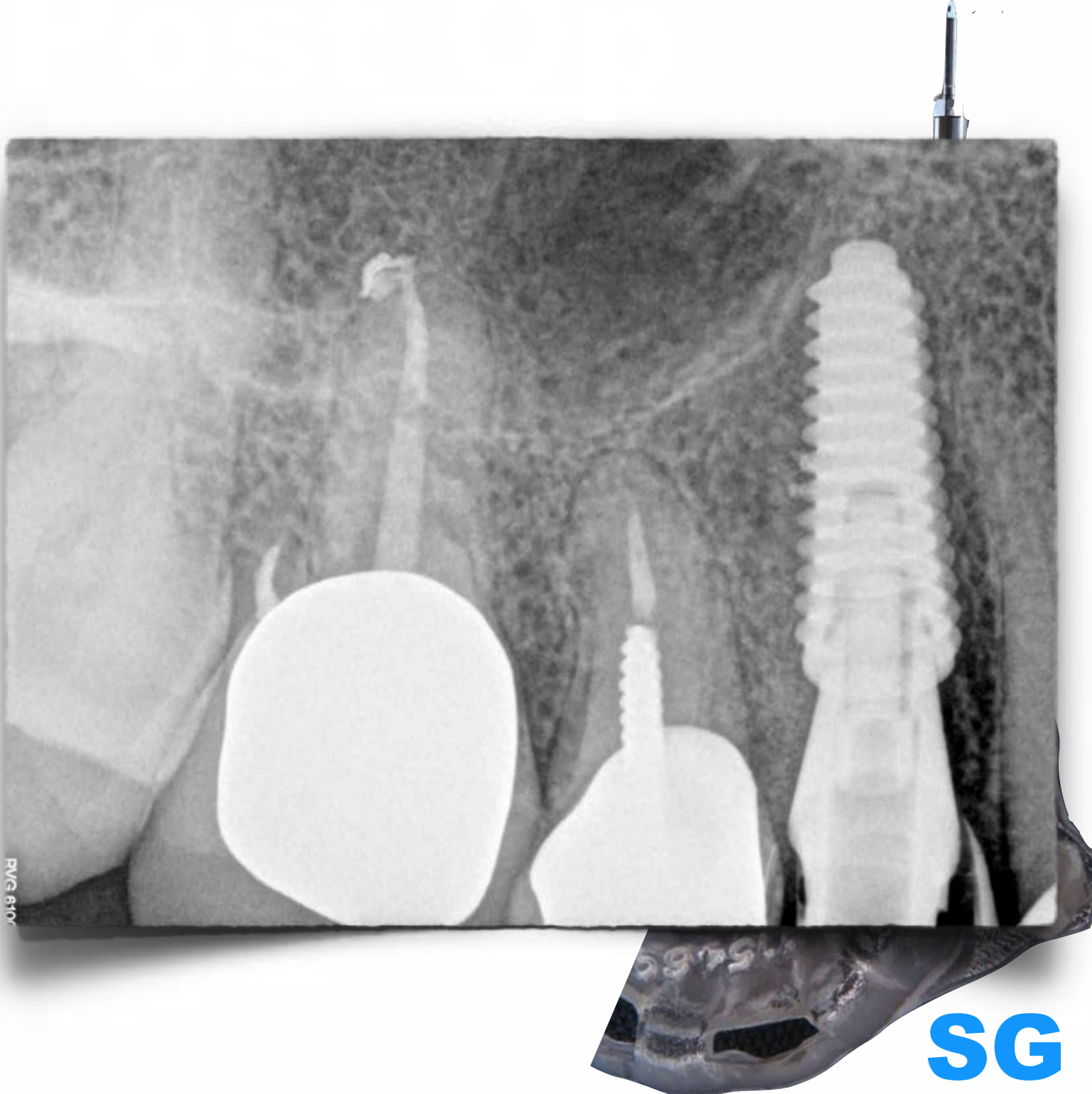
SG

Digital Static Shield



SG

Digital Static Shield



**2 month
Post op**



**2 month
Post op**



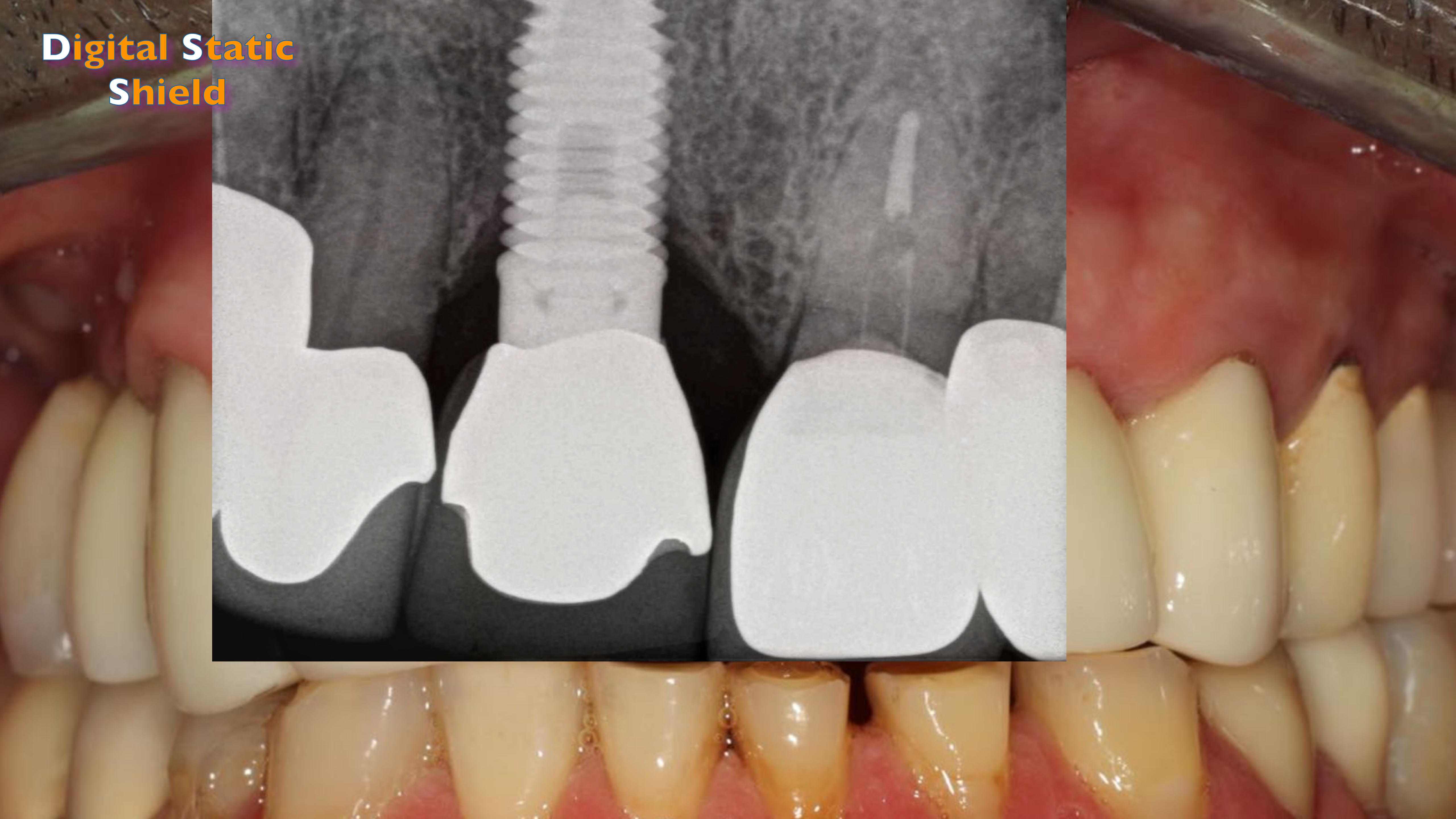




Final Crown



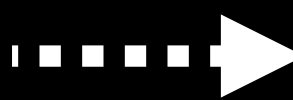
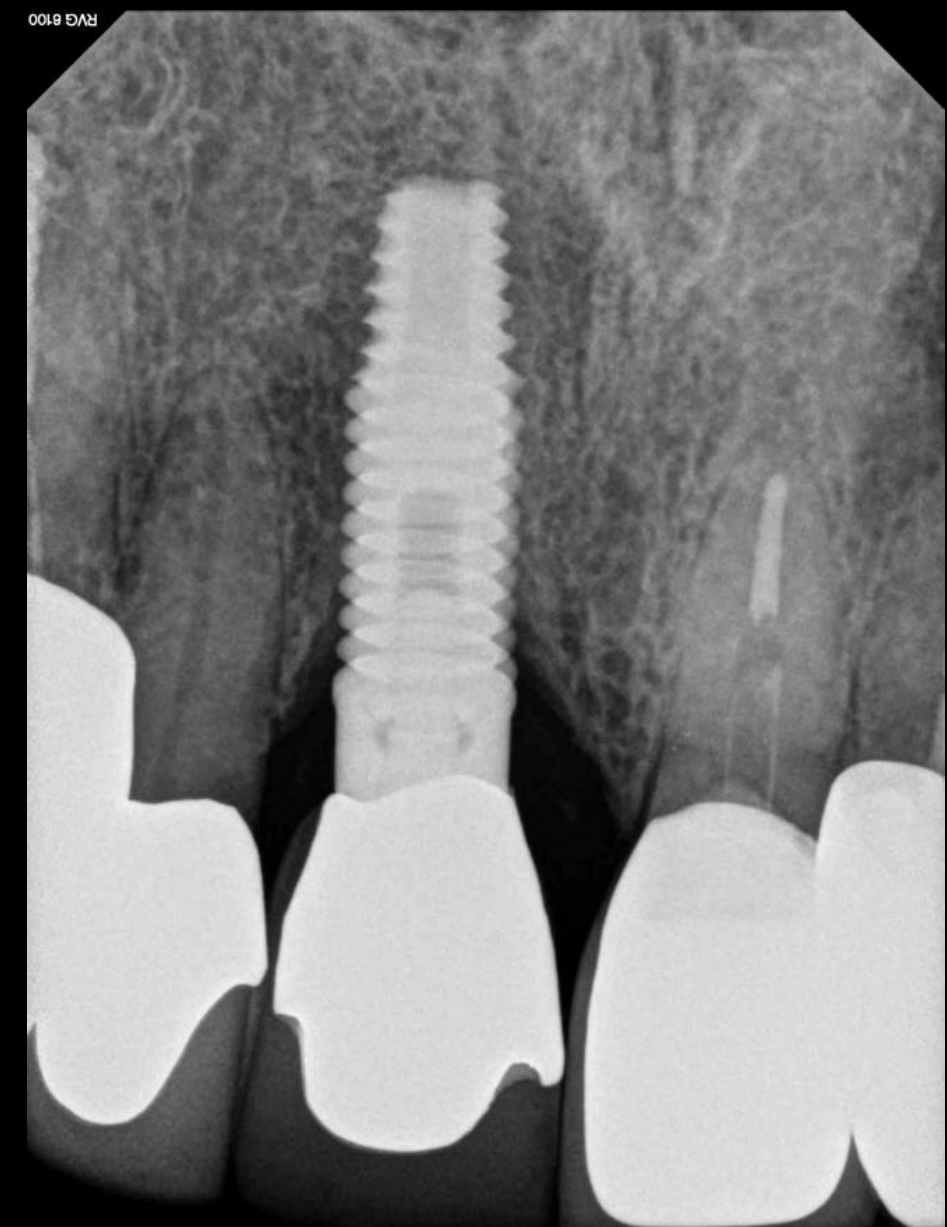
Digital Static Shield



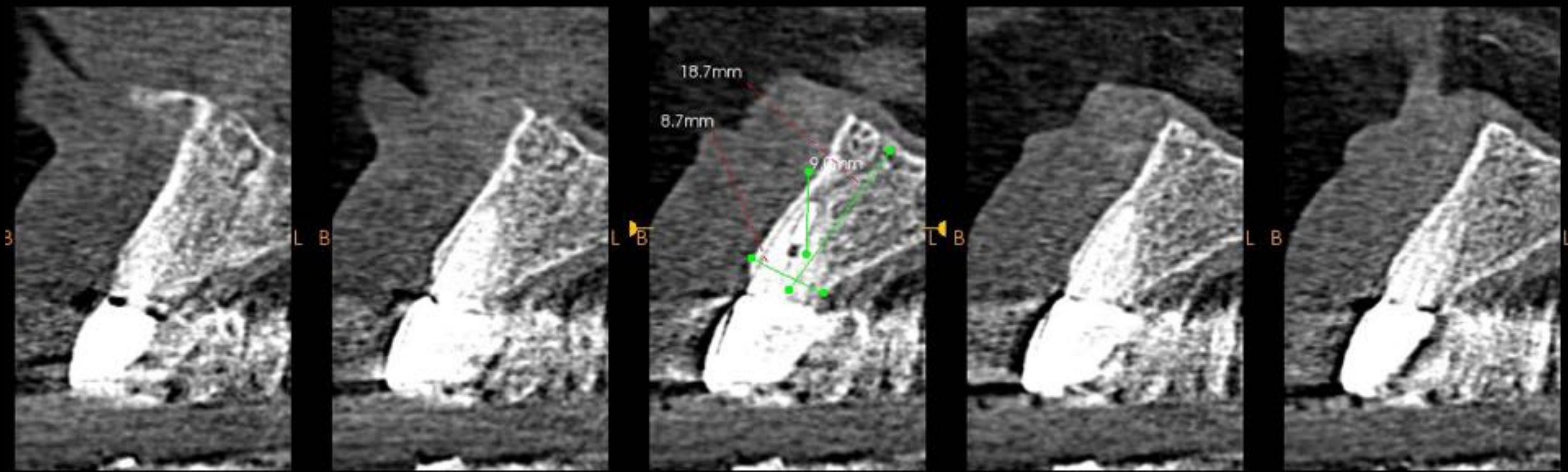
Digital Static Shield



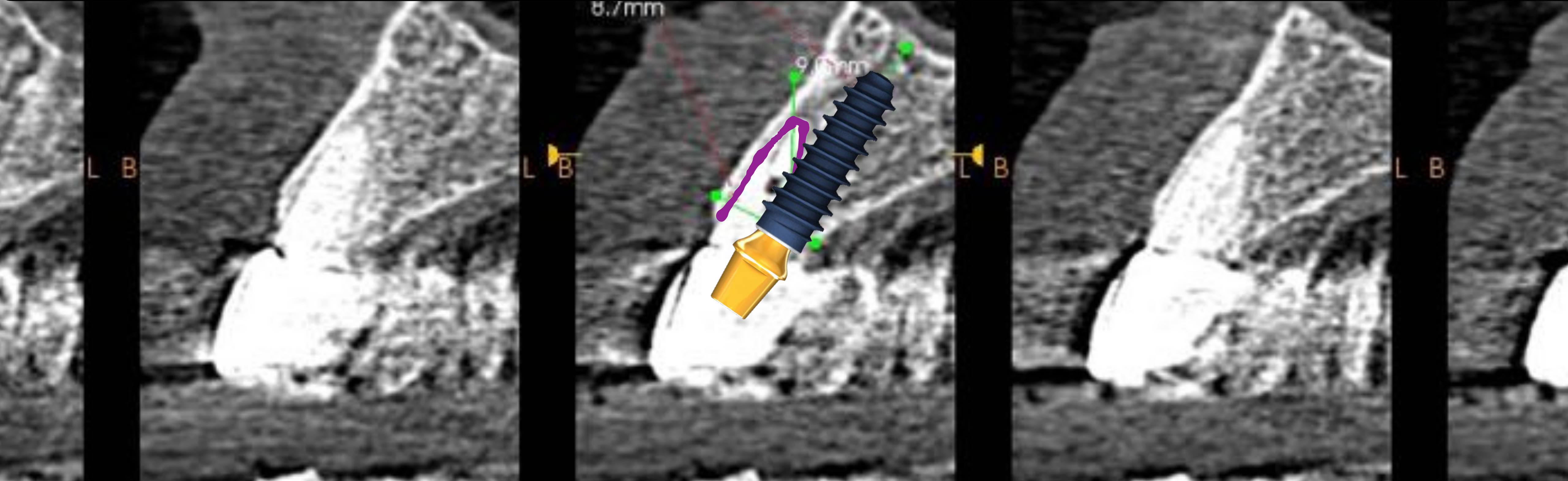
Digital Static Shield

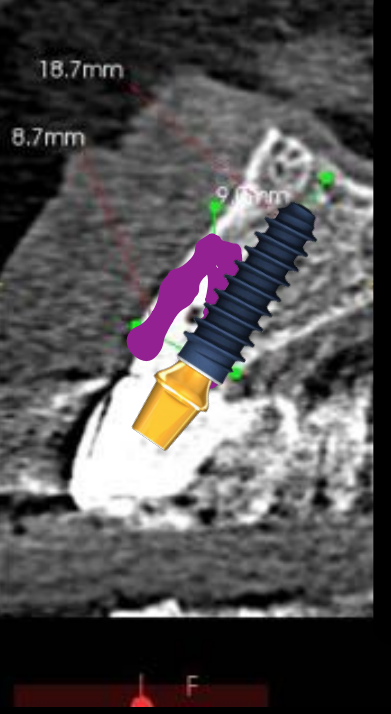


Slice spacing: 1.1 mm.



Digital Static Shield





Isaac Tawil DDS MS
Scott Ganz DMD



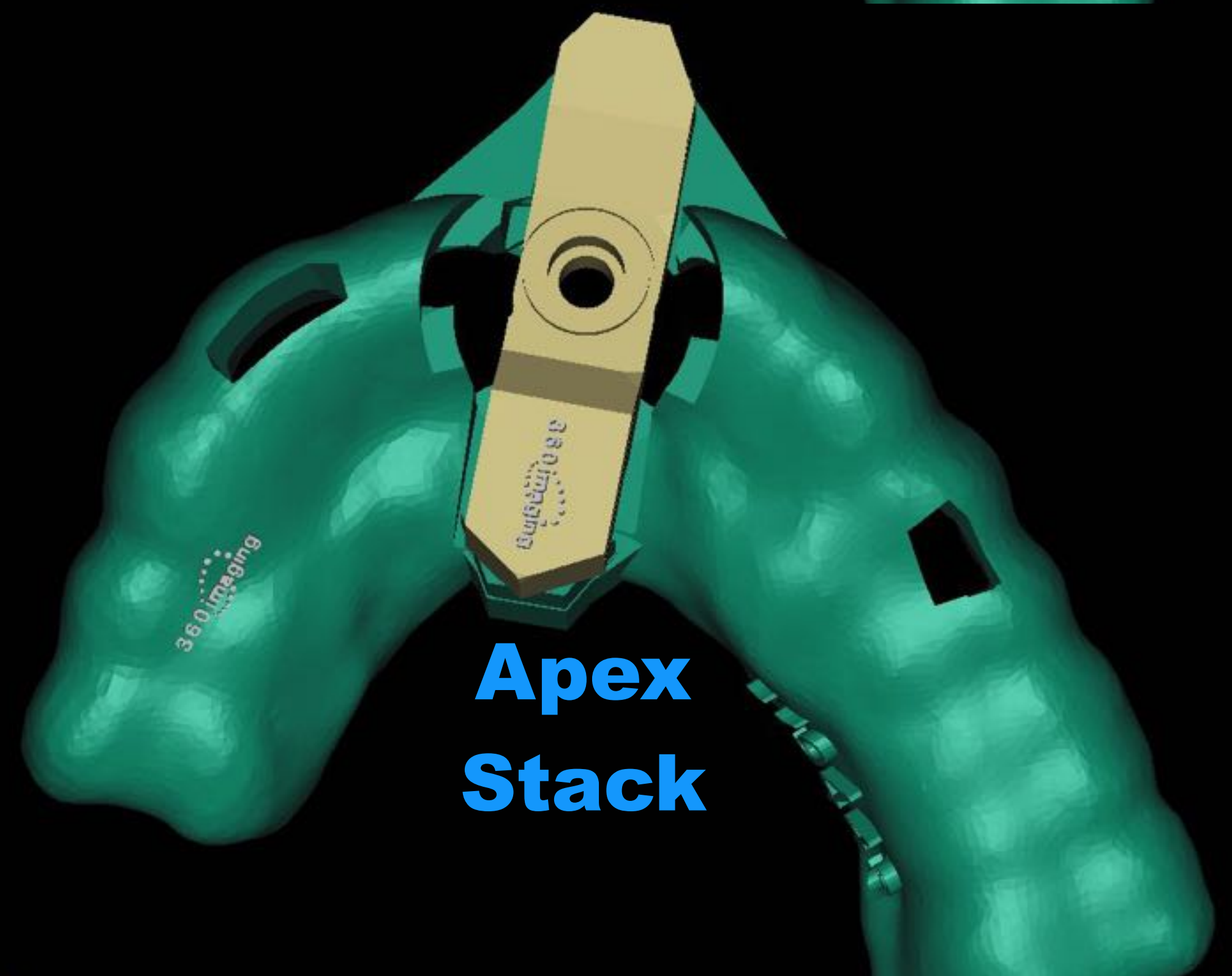
**Full Template
Surgical Guidance**



**PET Shaper
Stack**



**Surgical Guide
Stack**



**Apex
Stack**

**Digital Static
Shield**

**Full Template
Surgical Guidance**

**PET Shaper
Stack**



**Surgical Guide
Stack**



**Apex
Stack**



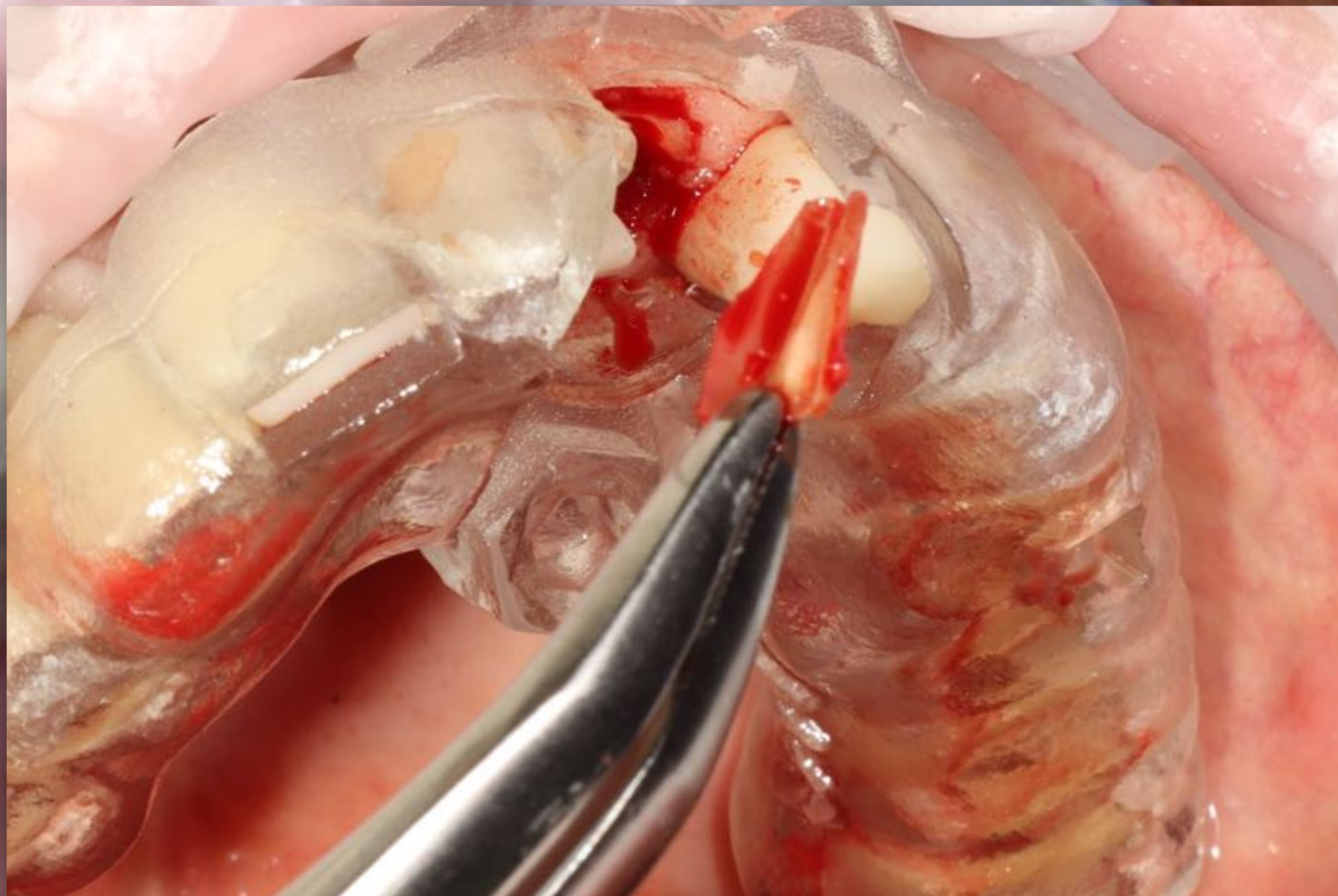
**Digital Static
Shield**



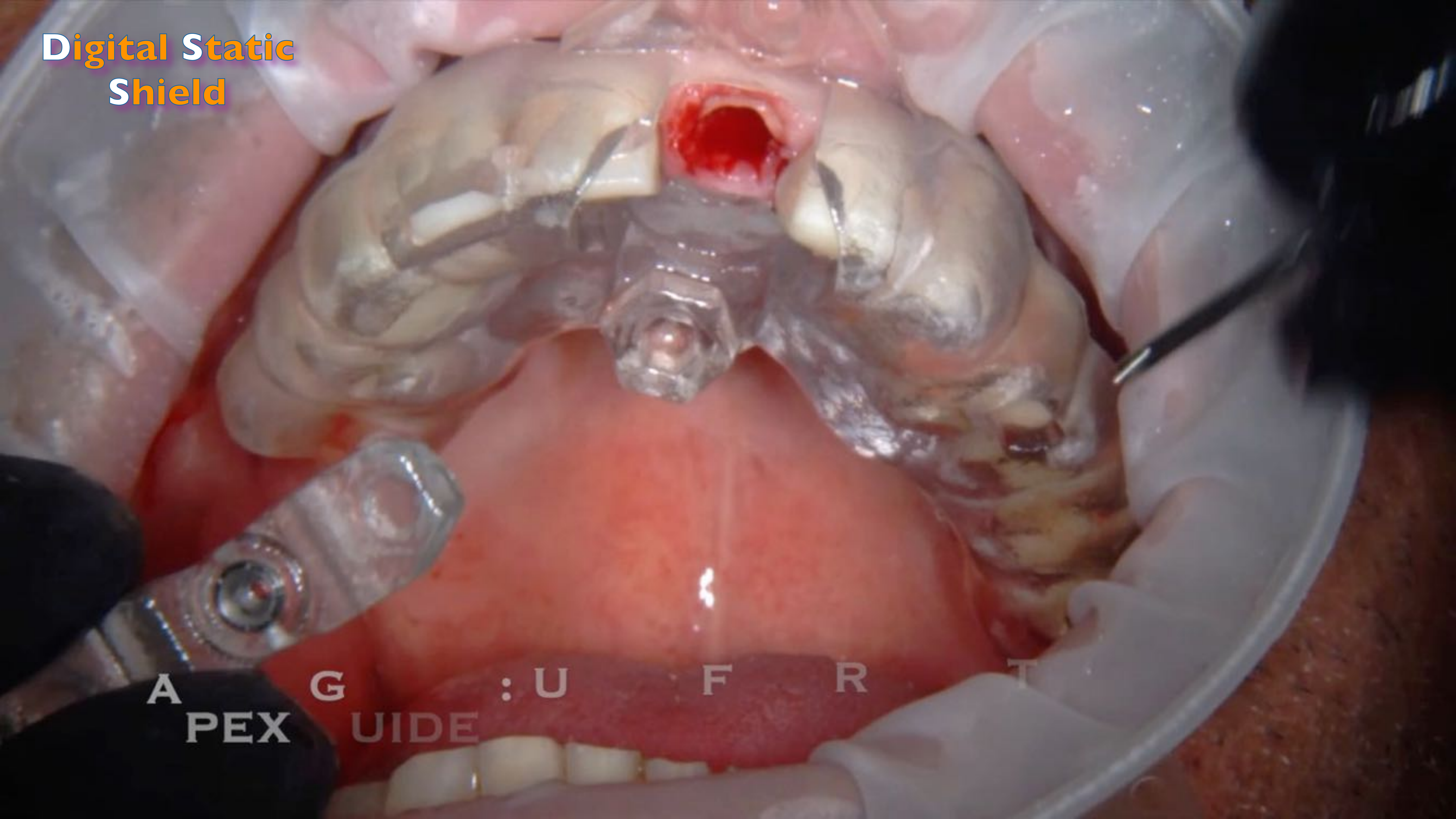
**Digital Static
Shield**



Digital Static Shield



**Digital Static
Shield**



**A
PEX**

**G
UIDE**

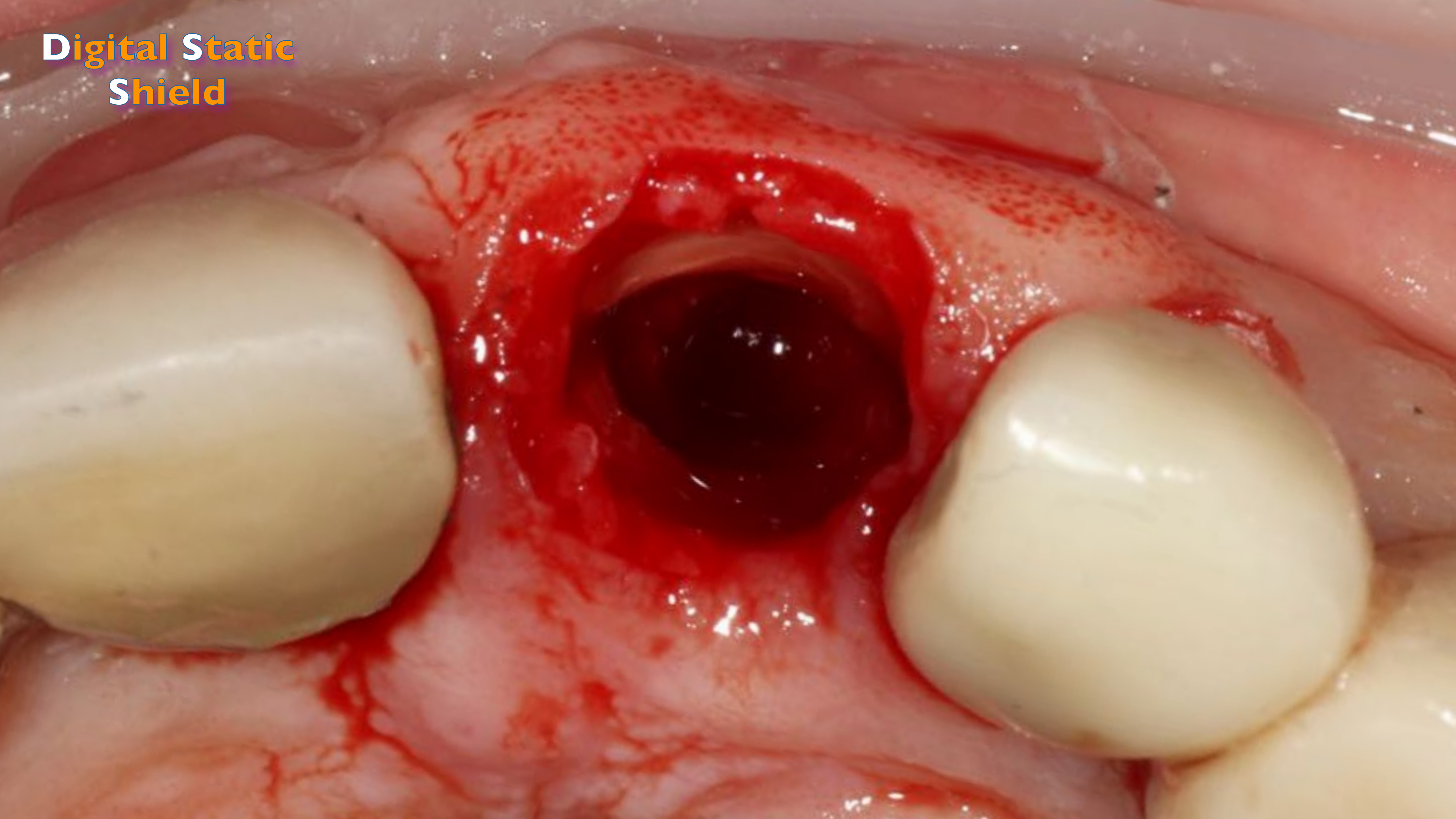
: U

F

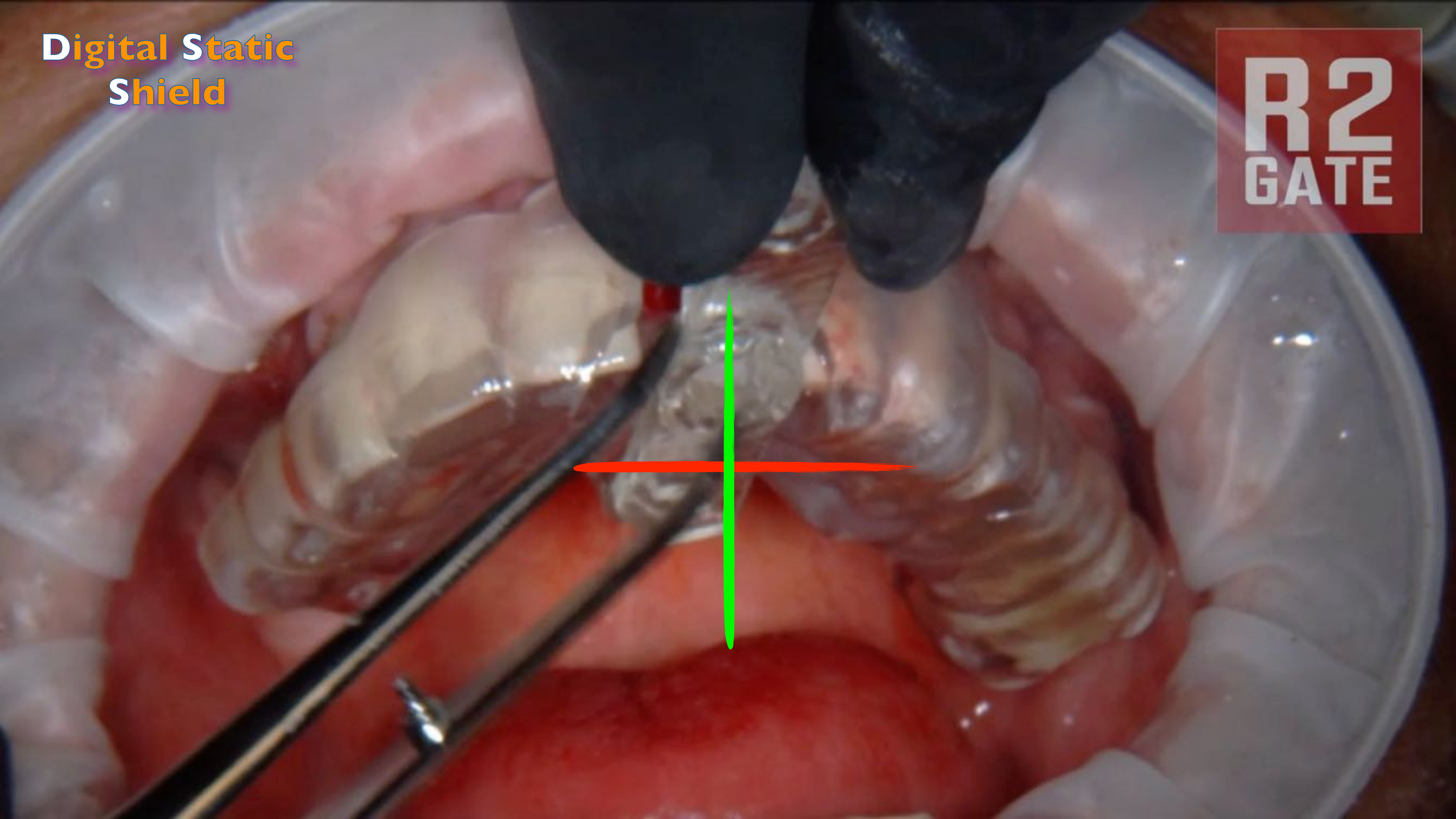
R

T

**Digital Static
Shield**

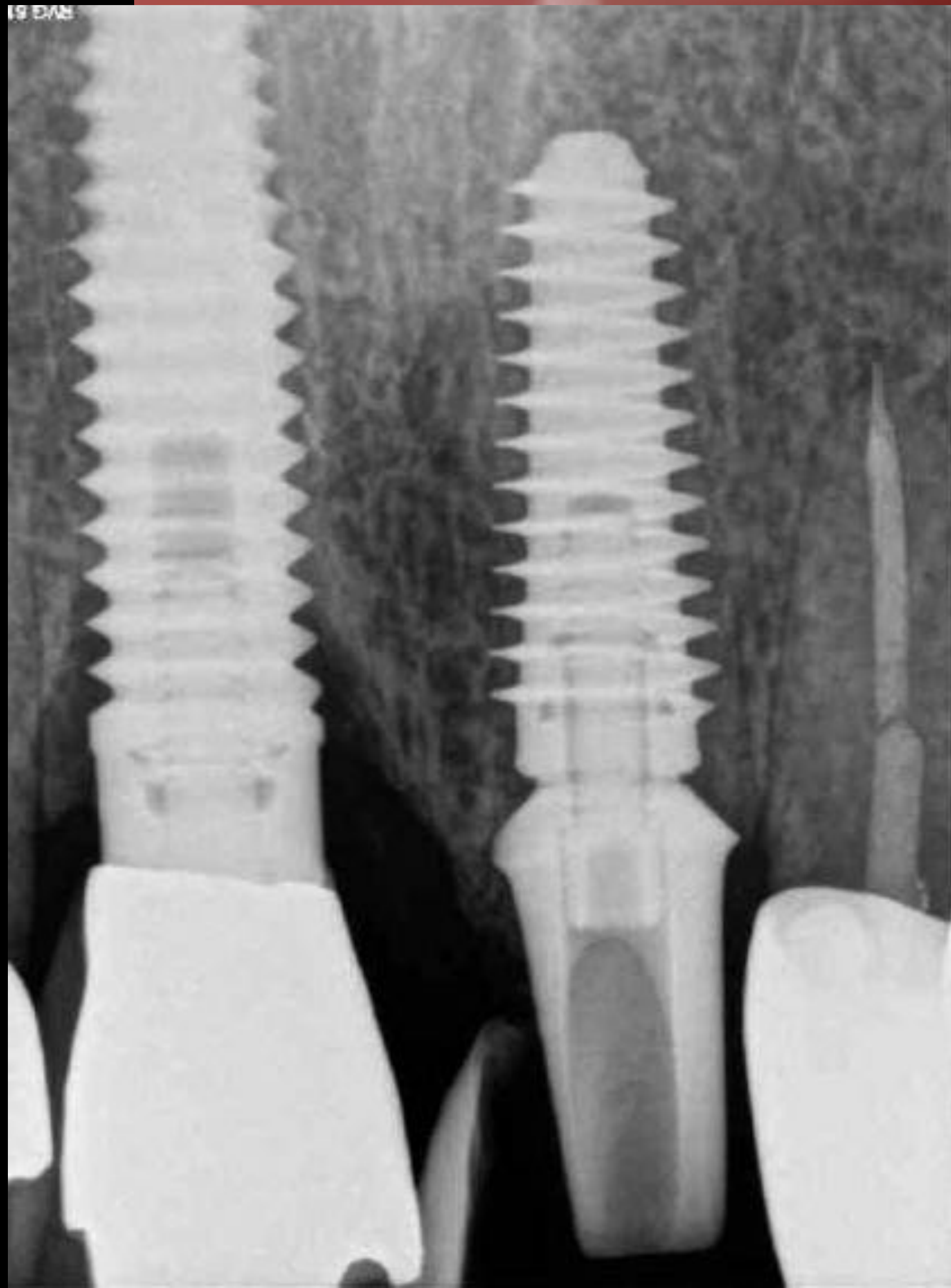


**Digital Static
Shield**



**Digital Static
Shield**





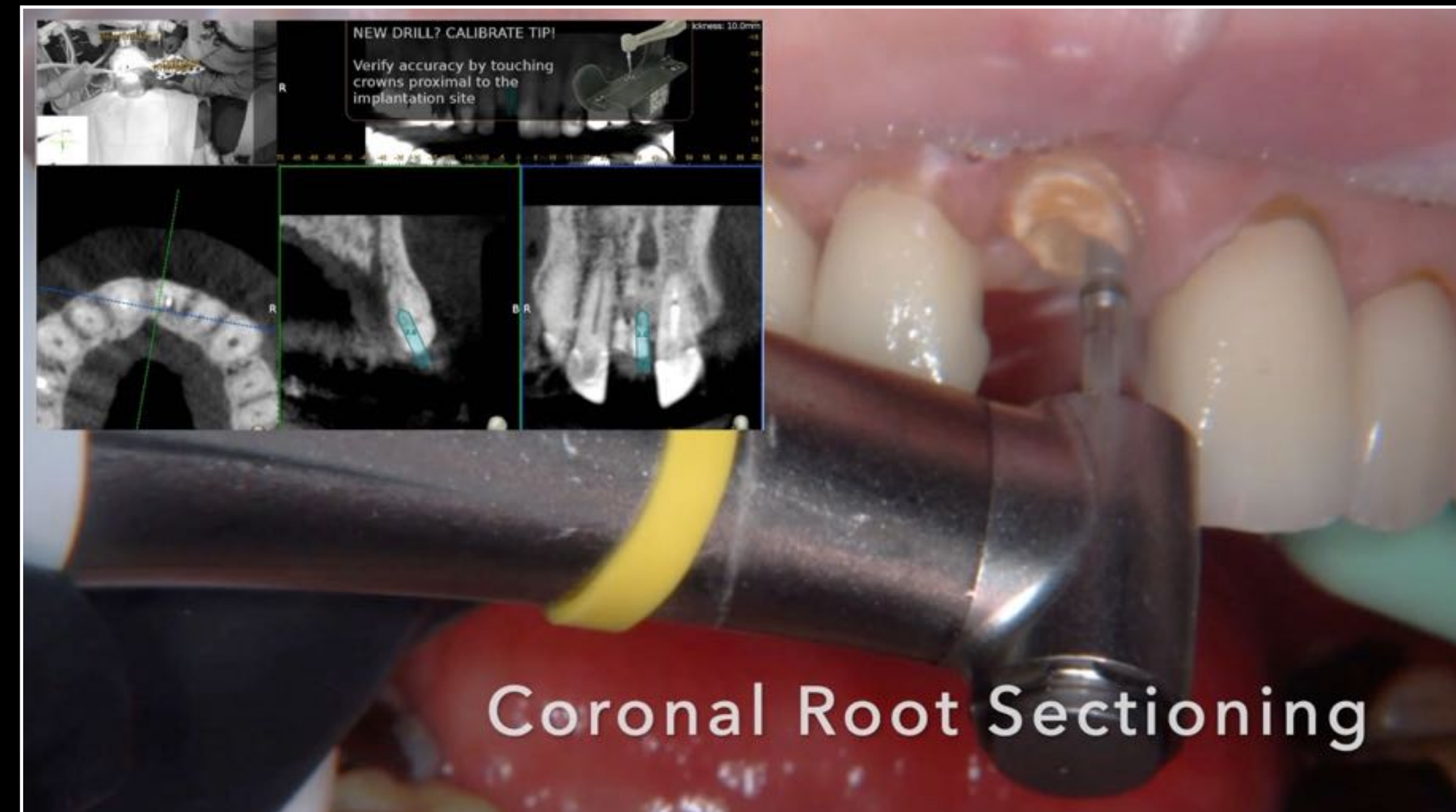
DSS

- Full template-Guidance

DDS

**Digital
Static
Shield**

**Dynamic
Dynamic
Shield**



**Dynamic Dynamic
Shield**

• **Full template-Guidance**

DDS





**Dynamic Dynamic
Shield**



The Scalloped Guide



Surfaces

STL Surfaces

Name	Visible	Hint	
8050-lower new-m...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	■
8050-upper new-m...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	■
Bridge Design	<input type="checkbox"/>	<input type="checkbox"/>	■
flat wafer	<input type="checkbox"/>	<input type="checkbox"/>	■
flat wafer13mm	<input type="checkbox"/>	<input type="checkbox"/>	■
Bone Model	<input checked="" type="checkbox"/>	<input type="checkbox"/>	■

Duplicate

CT Surfaces

Name	Visible	Hint	Color
Original	<input checked="" type="checkbox"/>	<input type="checkbox"/>	■

Add Duplicate

Reset to Defaults

Create Model

Material

Transparency

Surface Culling

Cut Cut All Isolate

Surface cannot be cut with when it is not visible.

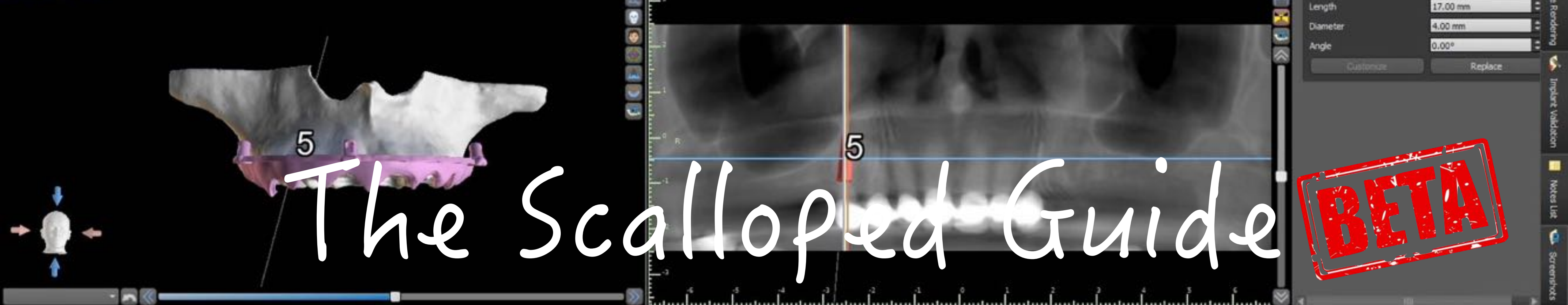
The Scalloped Guide

BETA



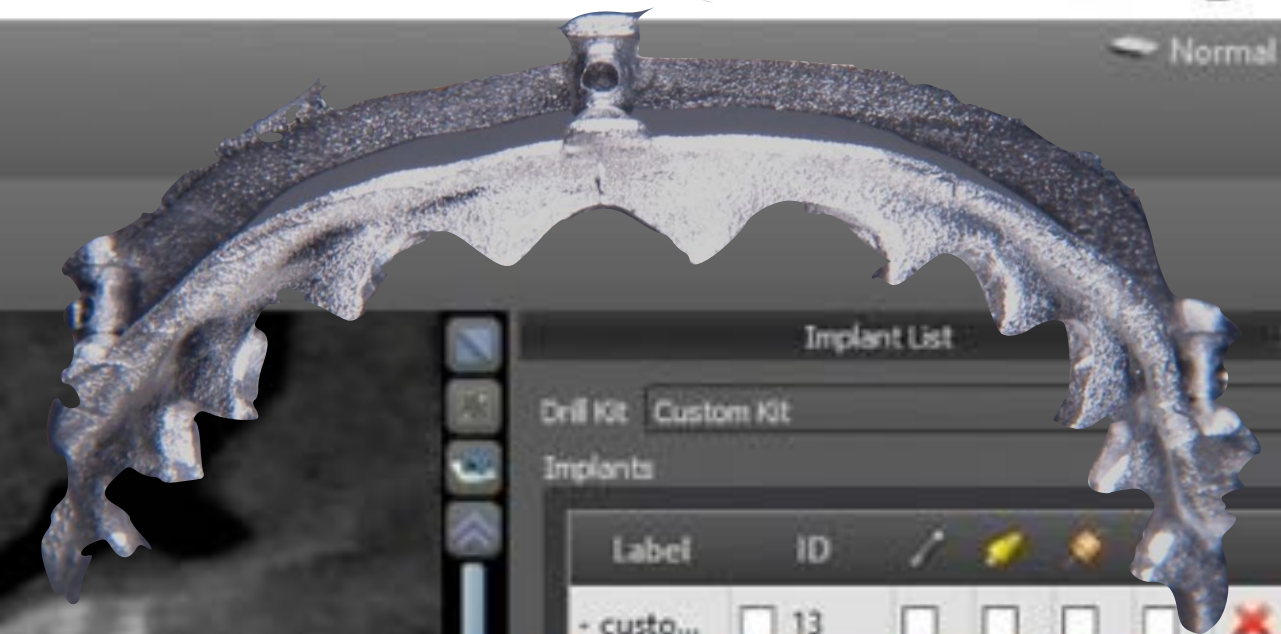


CT, Mazzone Rose
393
20180628, 155606



The Scalloped Guide

BETA



Implant List

Drill Kit: Custom Kit

Implants

Label	ID					
- custo...	13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- custo...	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
- custo...	9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- custo...	6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- custo...	8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- custo...	A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Visibility Settings

Transparency: 0.15

Implant outline:

Implant: - custom -

Length: 10.00 mm

Apical Diameter: 2.70 mm

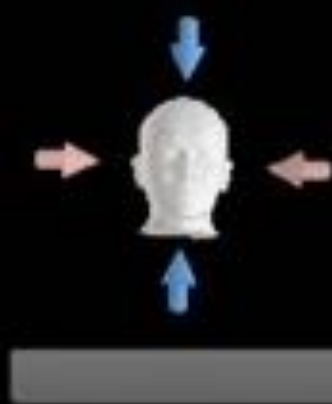
Occlusal Diameter: 3.50 mm

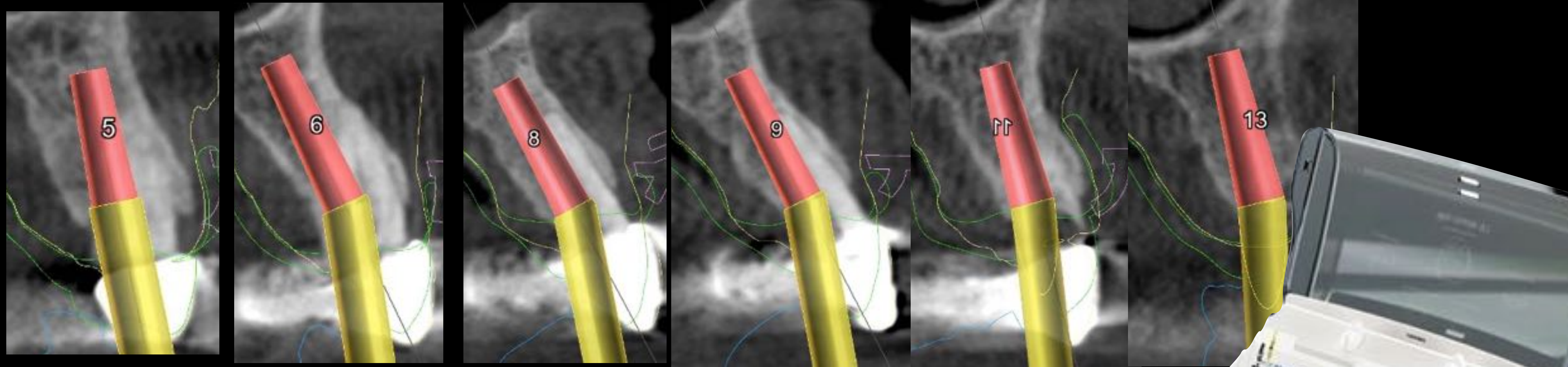
Abutment: - custom -

Length: 17.00 mm

Diameter: 4.00 mm

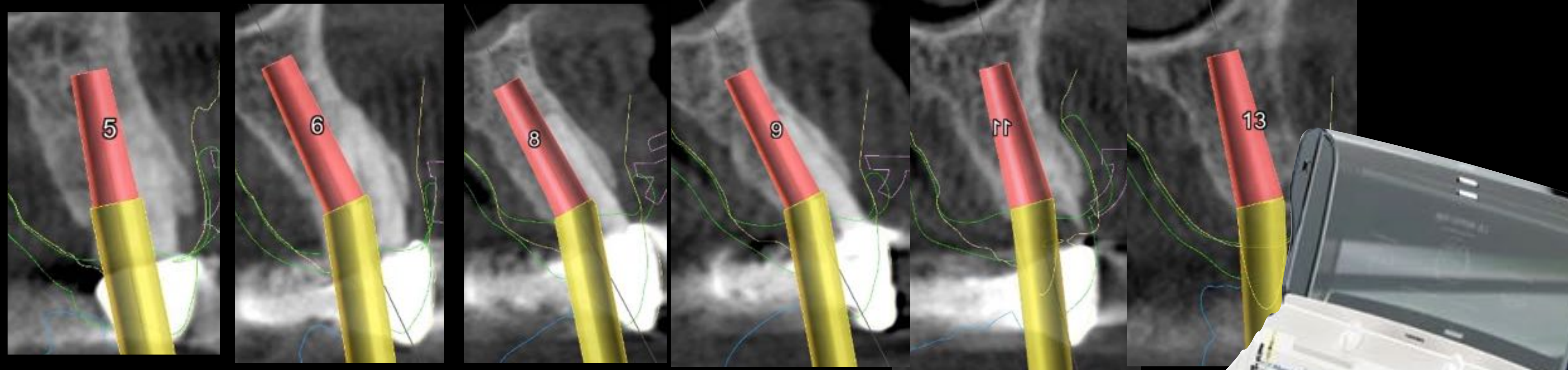
Angle: 0.00°





PET-Root membrane

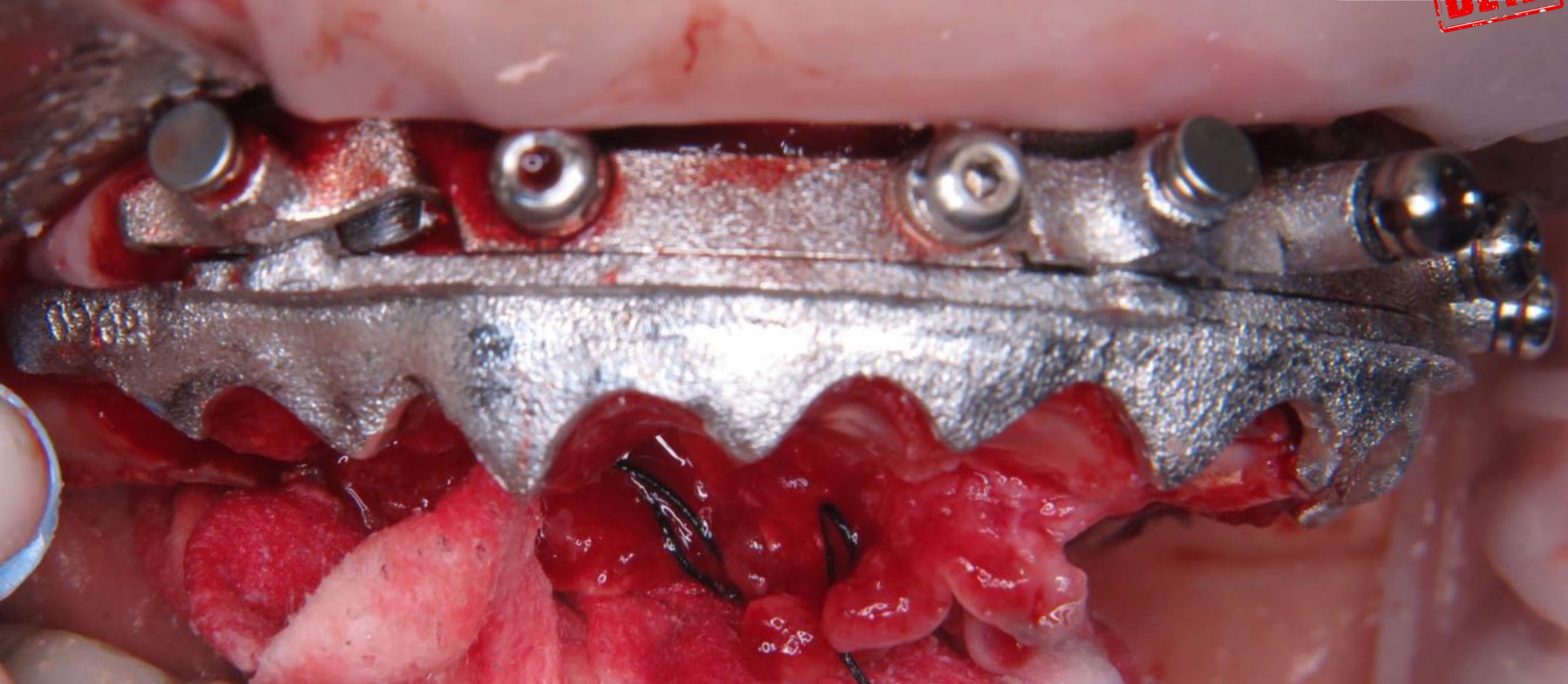




PET-Root membrane



BETA



SCALLOPED ARCHITECTURE



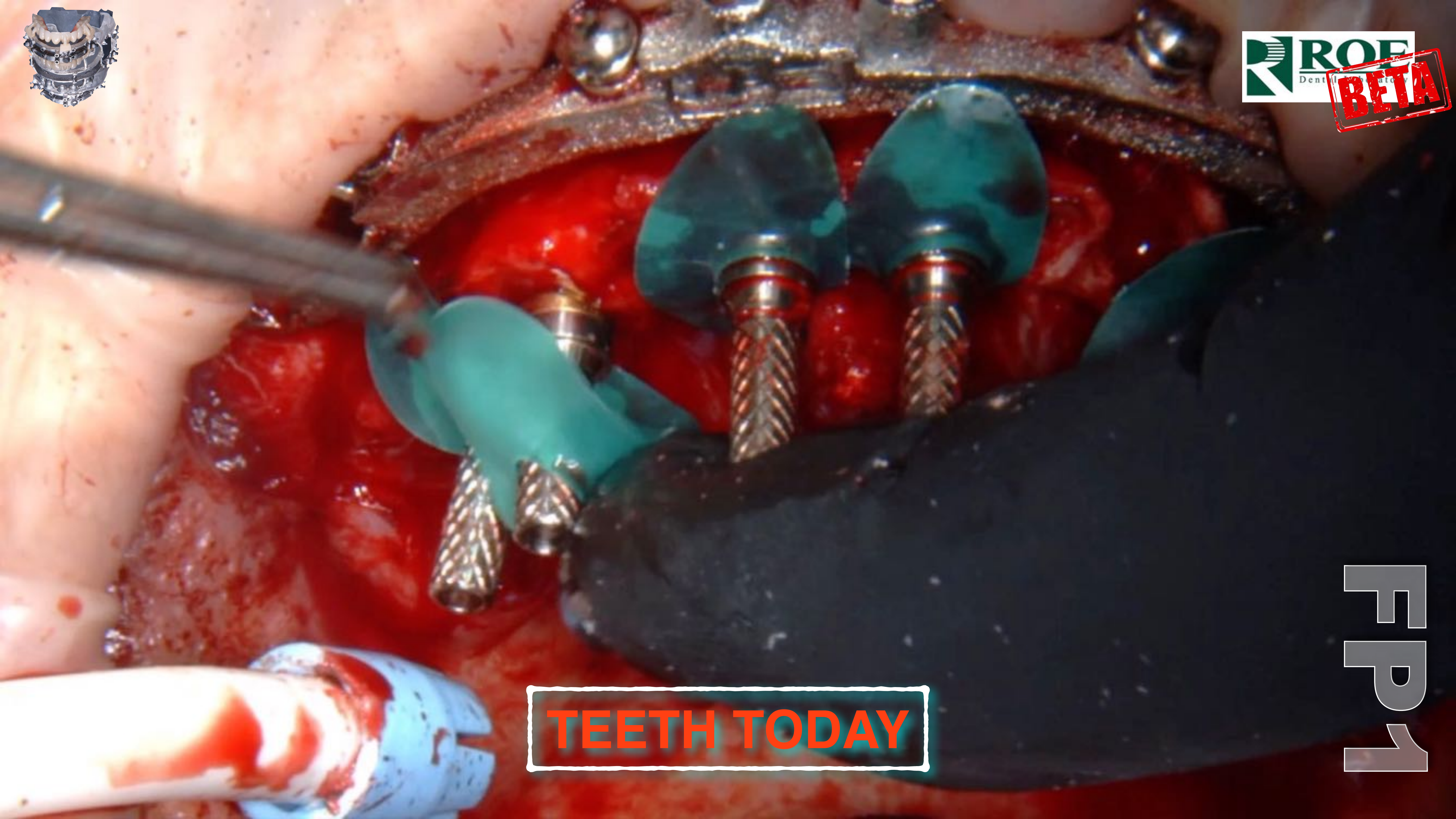
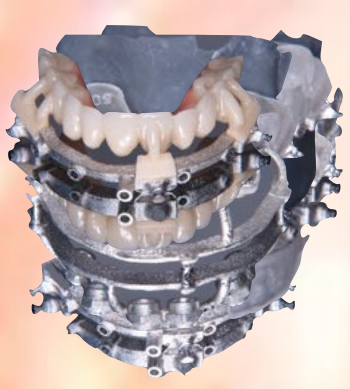
PSI

FRP

Partial extraction therapy
Scalloped Guide
Immediate Implant
Salama, Tawil, Tadros 2018

Partial Extraction Therapy





TEETH TODAY

FRP1



FRP1



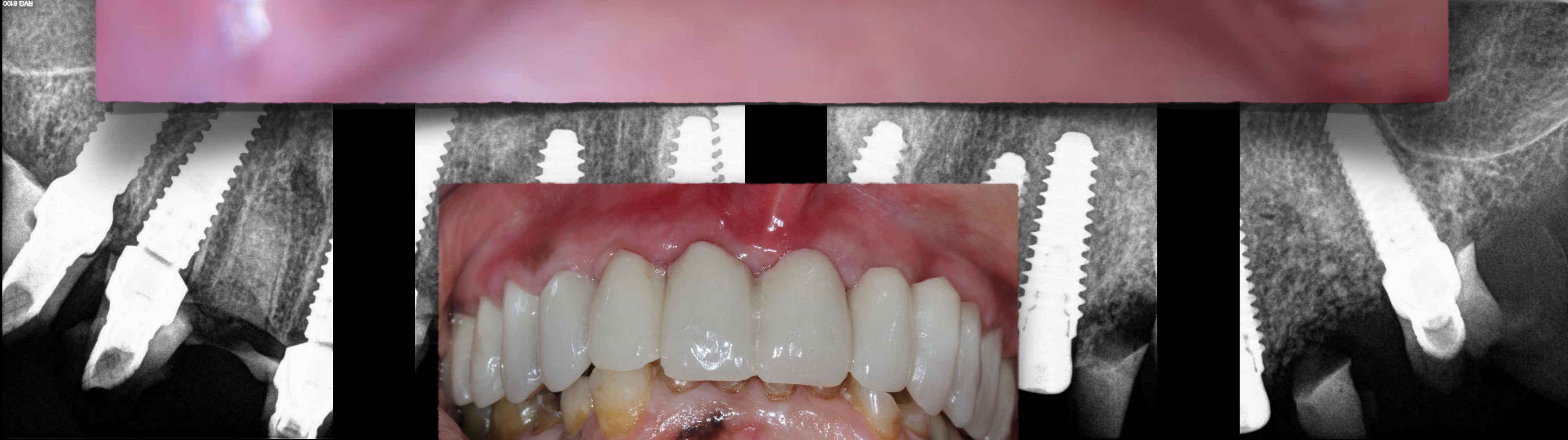
FPD1



RVG 910

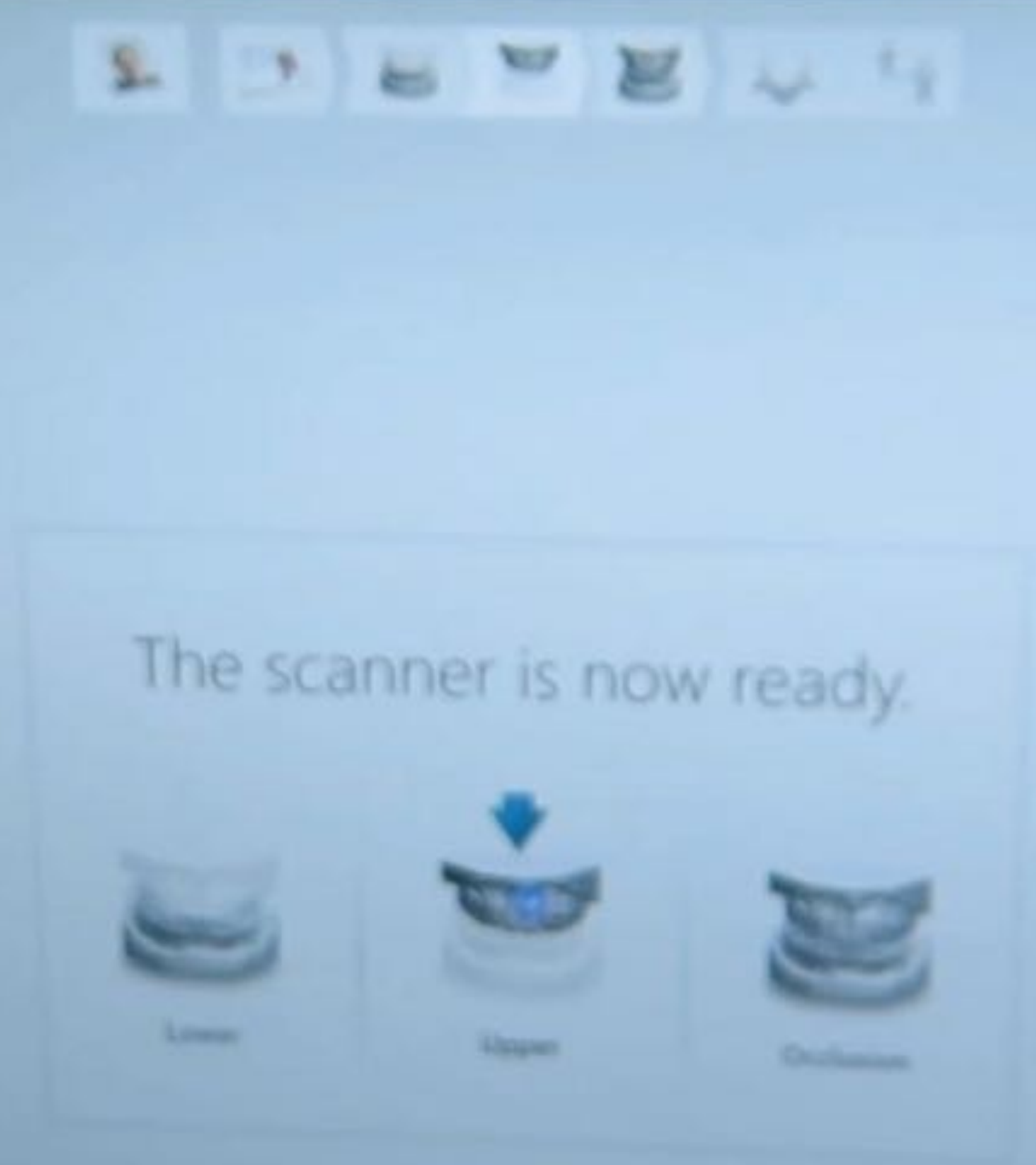


FP1



RVG 6100

3D
Ji



Ji
G

Finals

FRP 1



Finals

FRP1





Finals

FRP1



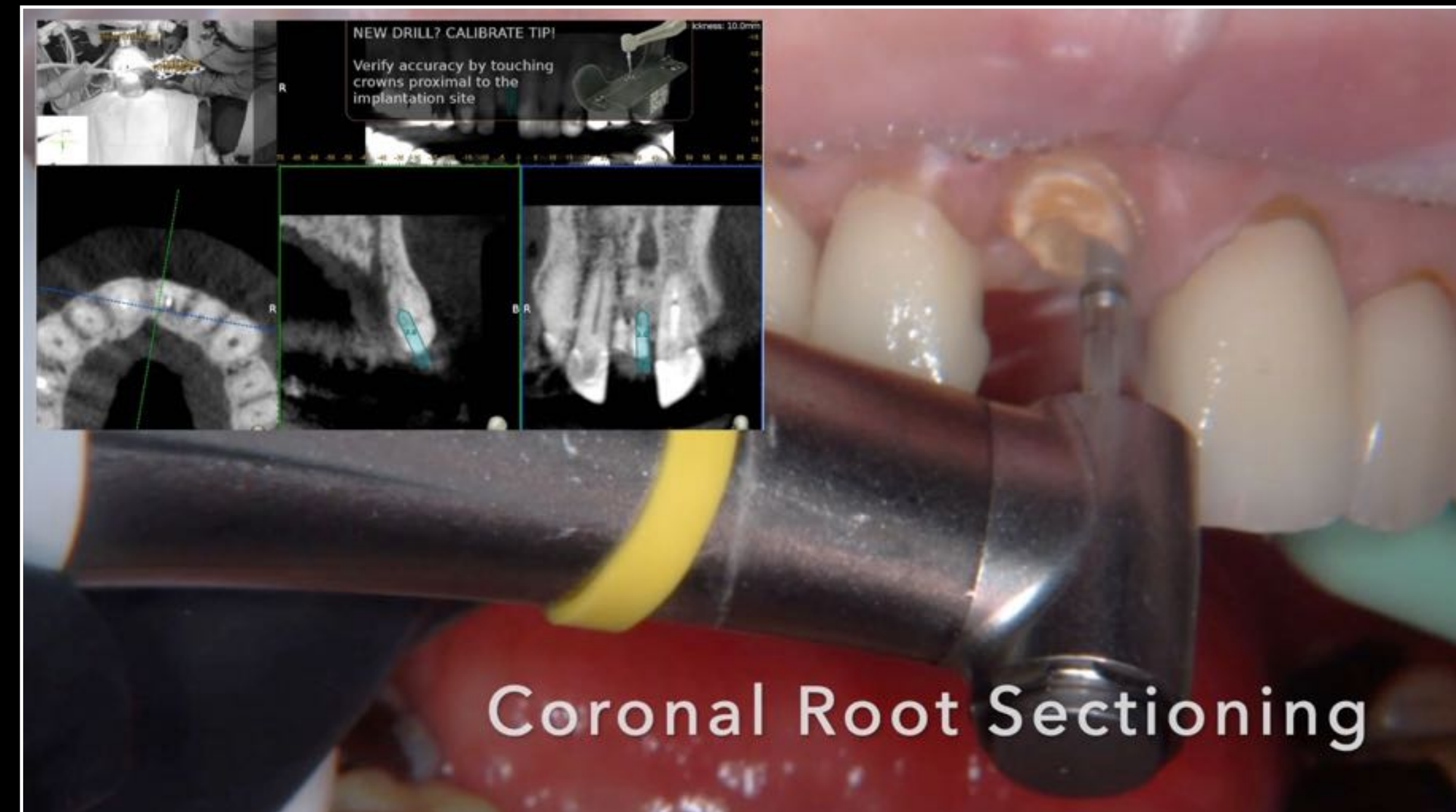
DSS

- Full template-Guidance

DDS

**Digital
Static
Shield**

**Dynamic
Dynamic
Shield**



Dynamic Virtual Template

- Full template-Guidance



Accuracy of a Dynamic Dental Implant Navigation System

CONCLUSION: Dynamic navigation can achieve accuracy of implant placement similar to static guides and is an improvement over freehand implant placement. In addition, there was a learning curve to achieve proficiency.

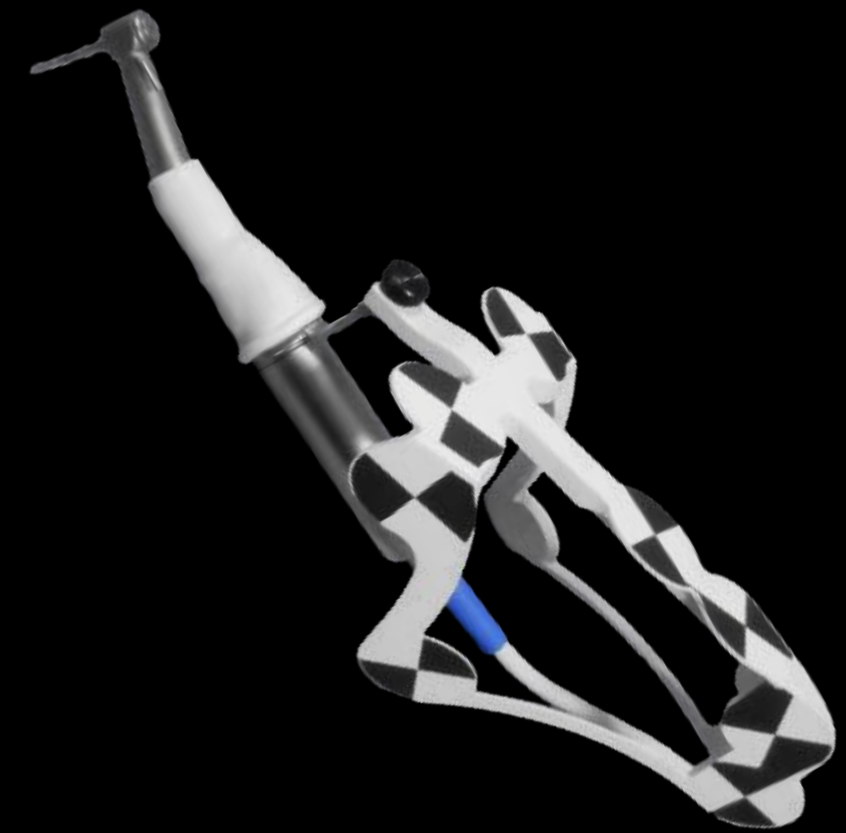
Table 2 Key Deviation Statistics of All

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.

Estimated 95% placement confidence margin in dentate jaws - dynamically guided vs. unguided

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0



Dynamic Virtual Template

- Full template-Guidance

Calibrate any Handpiece
Any Drill



Navigation System in Socket Shield Technique



CASE LETTER

A Novel Application of Dynamic Navigation System in Socket Shield Technique

Joey T. Chen, DDS

Introduction

Achieving osseointegration 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 alveolar bone resorption after tooth extractions, 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 overcome the tissue resorption process.⁵ 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 esthetic result can be achieved.

The socket shield technique, however, is technique-sensitive. Preparing the socket shield to the correct shape, thickness, and length without damaging the surrounding tissue 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 surgical procedures. This type of system has advantages in placing implants in a pre-planned, prosthetically driven position, 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 implant placement.

Case: Case Report

Part 1—The dynamic navigation workflow

A 25-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 computed tomography (CBCT) scan were taken (Nusara-wepco 3D R100, J Morita Mfg Corp, Kyoto, Japan) (Figures 1 and 2), and a preliminary impression was made with polyvinyl siloxane material. 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 tessellation language (STL) files. Both the DICOM dataset (CBCT scan) and the STL files were imported into the Navident software (Navident R2.0.1, ClarioNav Inc, Toronto, Canada) for case analysis and treatment planning. The two files were merged and mapped together on the software to obtain an accurate image of the bone, teeth, roots, and soft tissue.

On the Navident 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 (Figure 3). The osteotomy was planned buccal to the root apex and passed the periapical lesion area. This osteotomy would indicate the apico-coronal direction of the mesiodistal cut and ensure the complete removal of the root apex and any periapical pathology.

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 portion of the Jaw Tracker, which was a tag used for real-time tracking of the patient's jaw, was bent and fixed onto the occlusal surfaces of the maxillary right premolar and molars. Then the Jaw Tracker was attached to the maxillary right premolar and molars with flowable composite resin (Figure 4). The system's tracking camera (MicroN Tracker, ClarioNav 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 trace registration procedure. The Tracer Tool with a TracerTag attached was calibrated on the Calibrator (Figure 5a and 5b). The tracking camera tracked both parts, the Calibrator and the TracerTag, so when the Tracer Tool was placed in the dimple of the Calibrator, the computer calibrates 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 (Figure 6). This virtual 3D mesh was then matched by the software to the outer surfaces 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 non-restorable due to severe caries. Figure 2, Pre-operative cone-beam computed 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 Navident software. The osteotomy was placed in a buccally inclined position. Figure 4, The JawTag was attached to the patient's maxillary right posterior teeth with flowable composite.

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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 7, A 3.6x13 mm implant was planned on the Navident software for a screw-retained restoration.

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

Stefanelli et al studied the positional and angulation accuracy using the same dynamic navigation system (Navident, ClarioNav Inc, Toronto, Canada) as that of the present study.¹⁴ The discrepancies between the actual and planned implant positions were 0.71 (0.40) mm at the entry point and 1.00 (0.49) mm at the apex. The mean angular discrepancy was 2.26 degrees (1.62). Studies using different navigation systems also showed similar positional and angular accuracies.¹⁵⁻¹⁹ These studies indicated that the dynamic navigation system had comparable accuracy to the static computer-generated surgical

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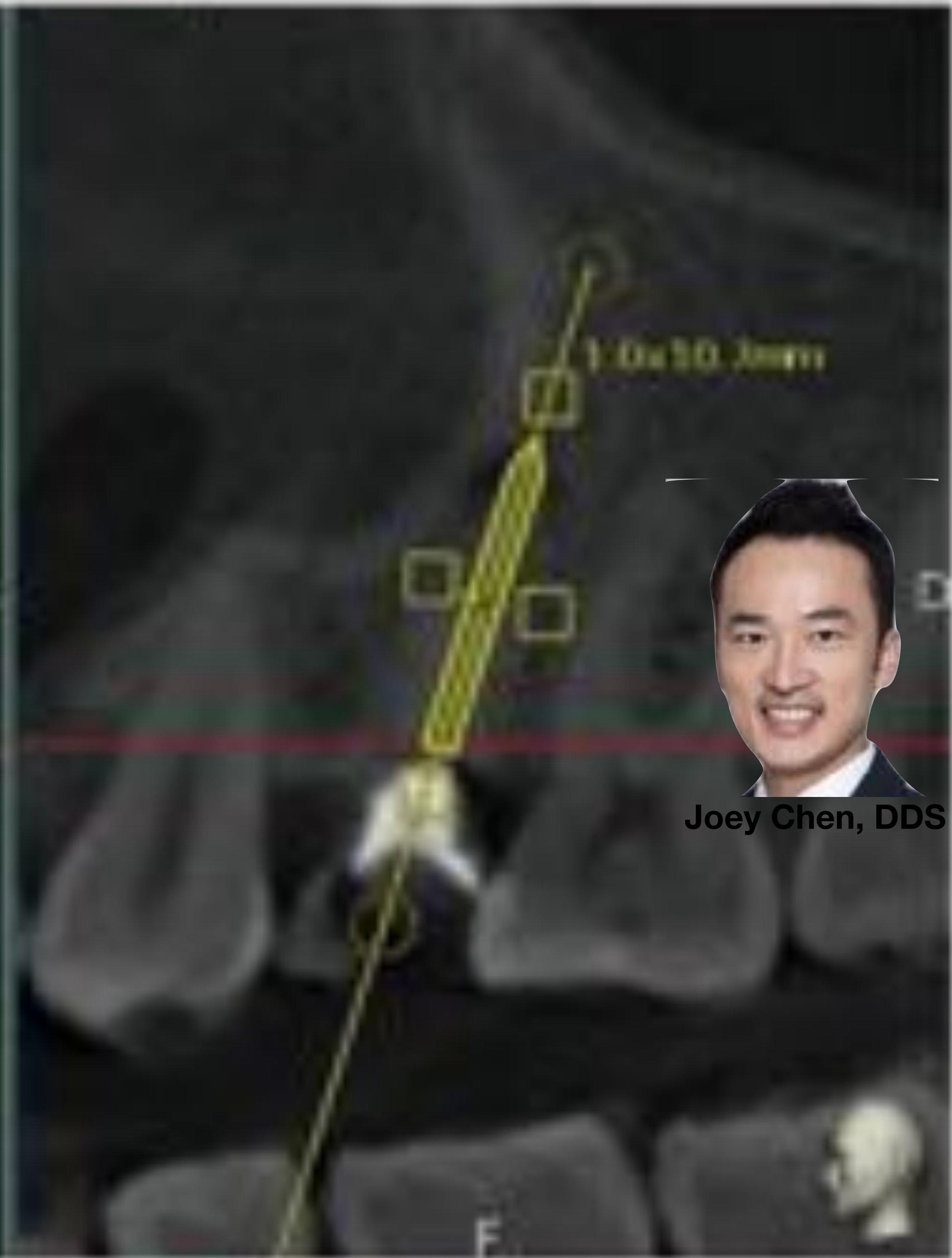
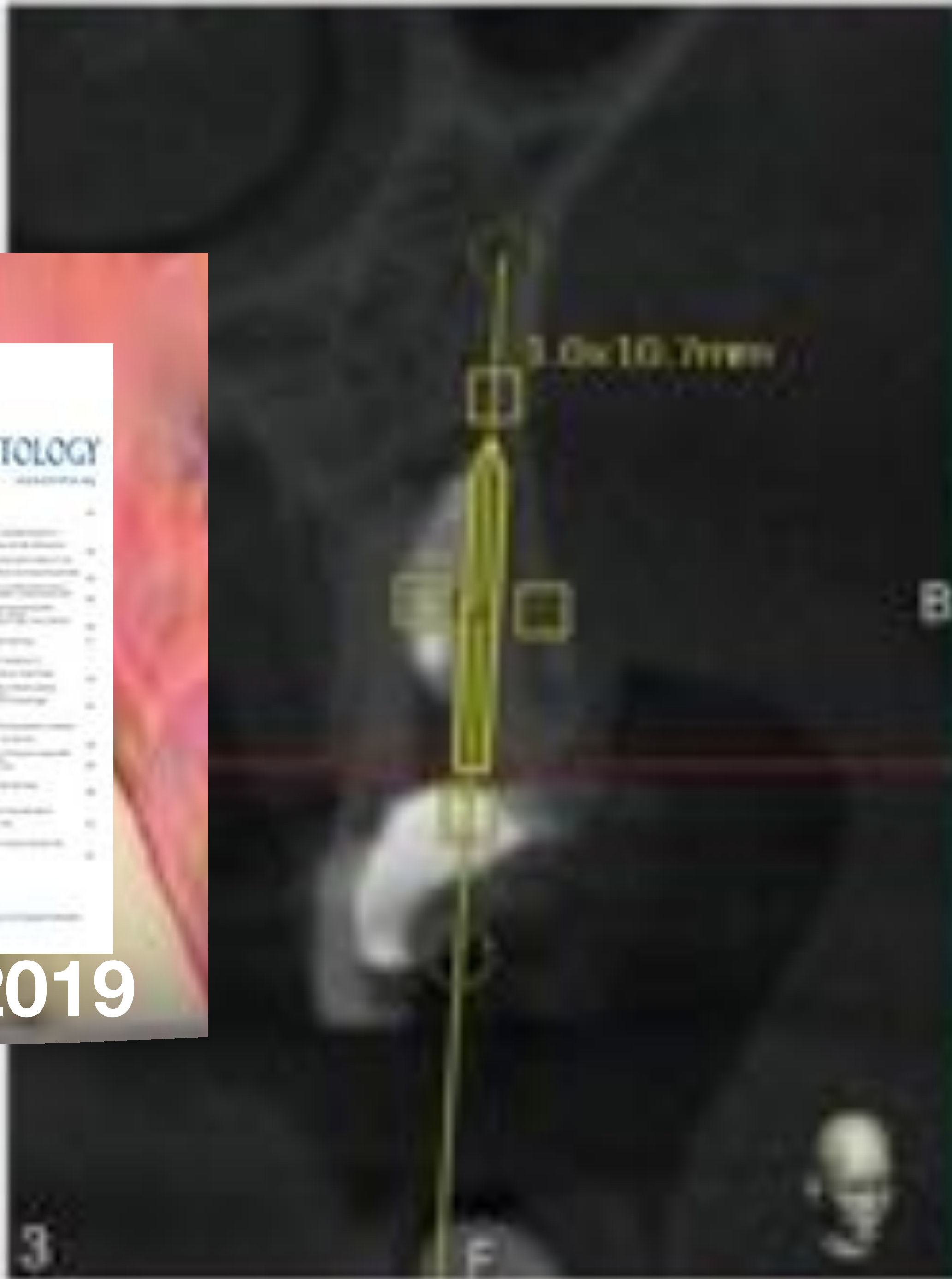


Joey Chen, DDS

October 2019

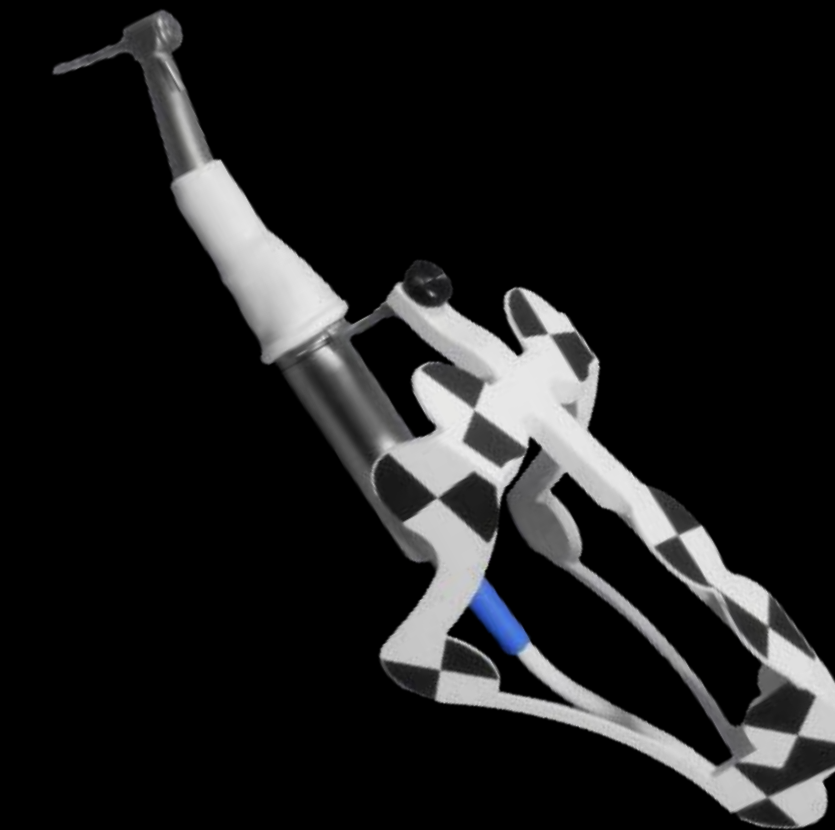


October 2019



Dynamic Virtual Template

- Full template-Guidance



Partial Extraction Therapy

Digital Dynamic
Shield



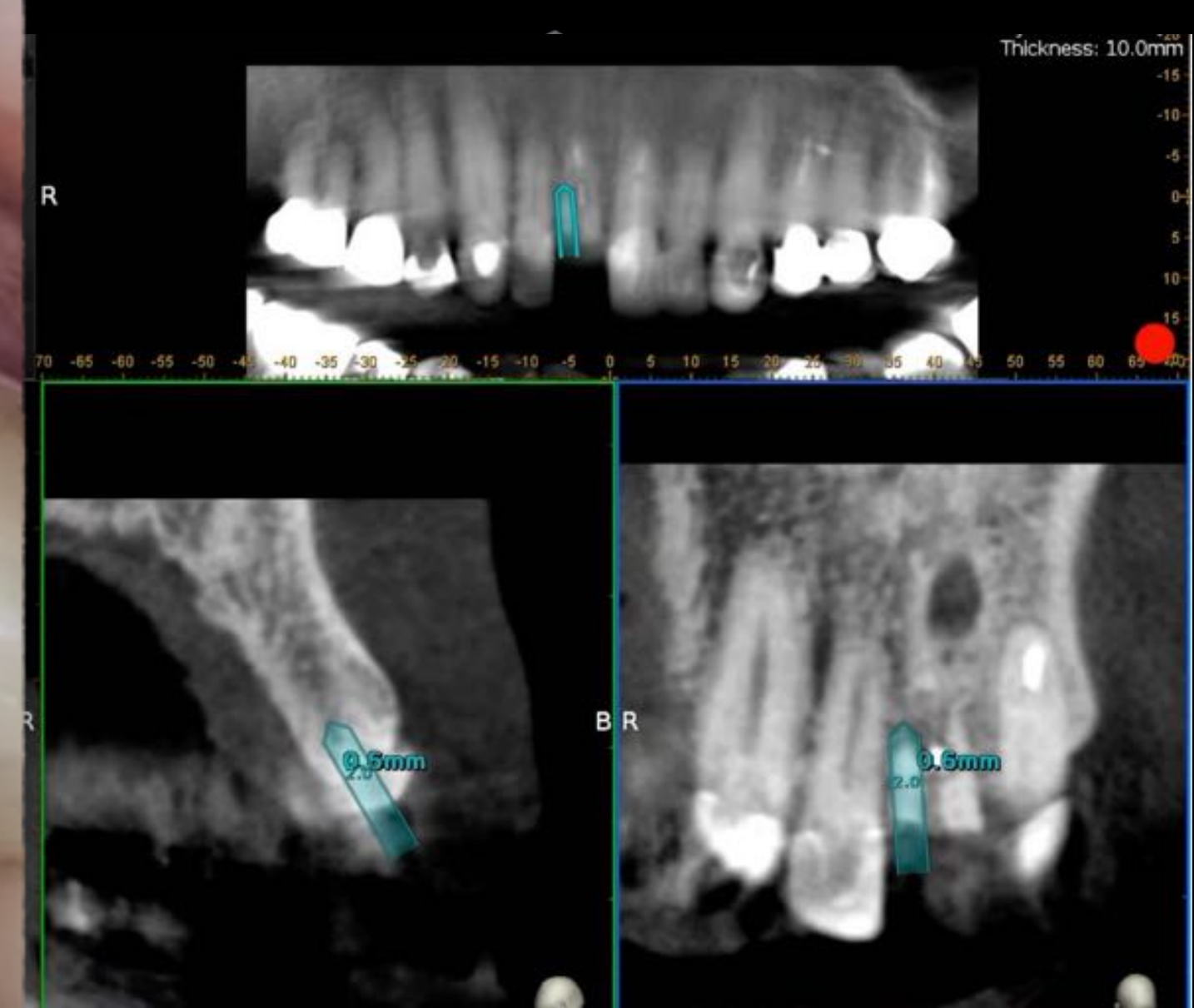
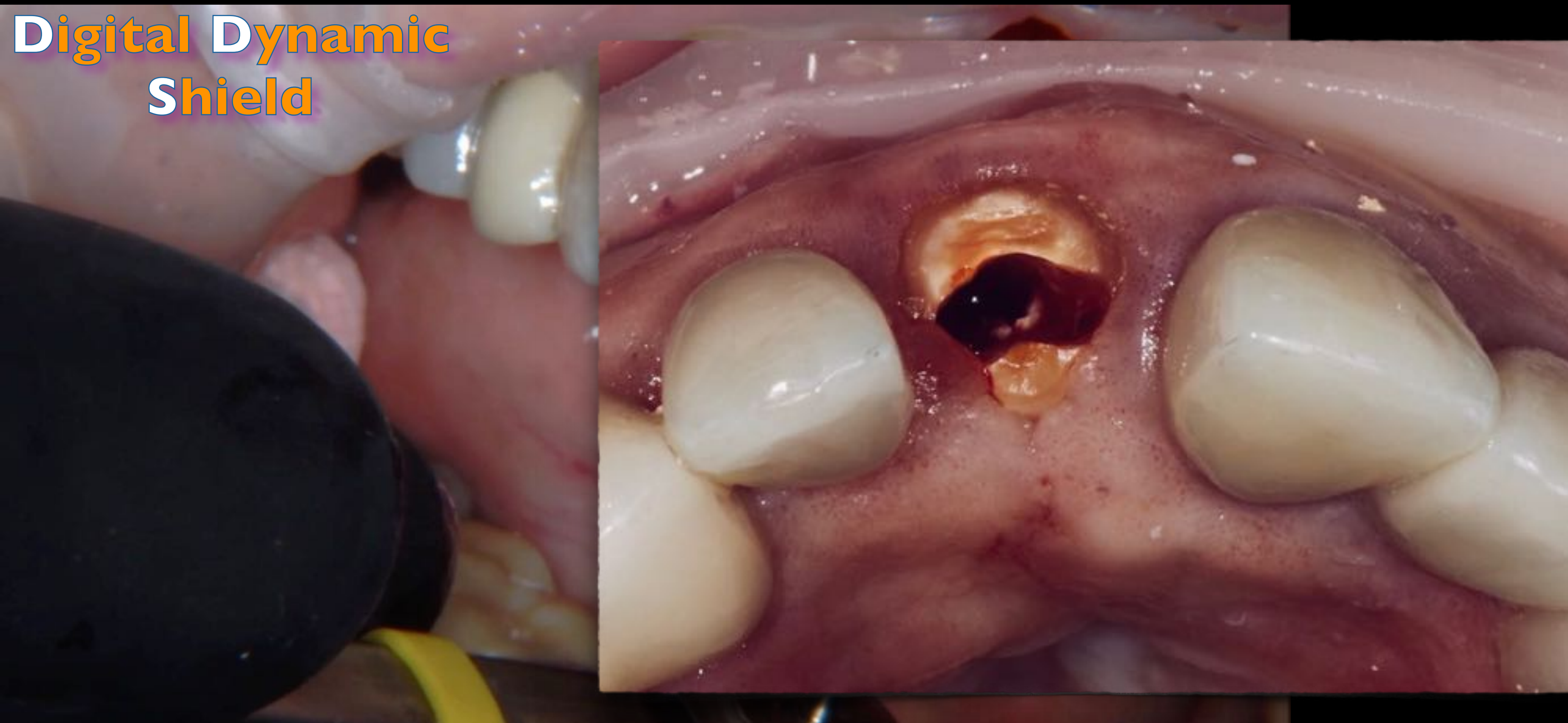
NEW DRILL? CALIBRATE TIP!

Verify accuracy by touching
crowns proximal to the
implantation site



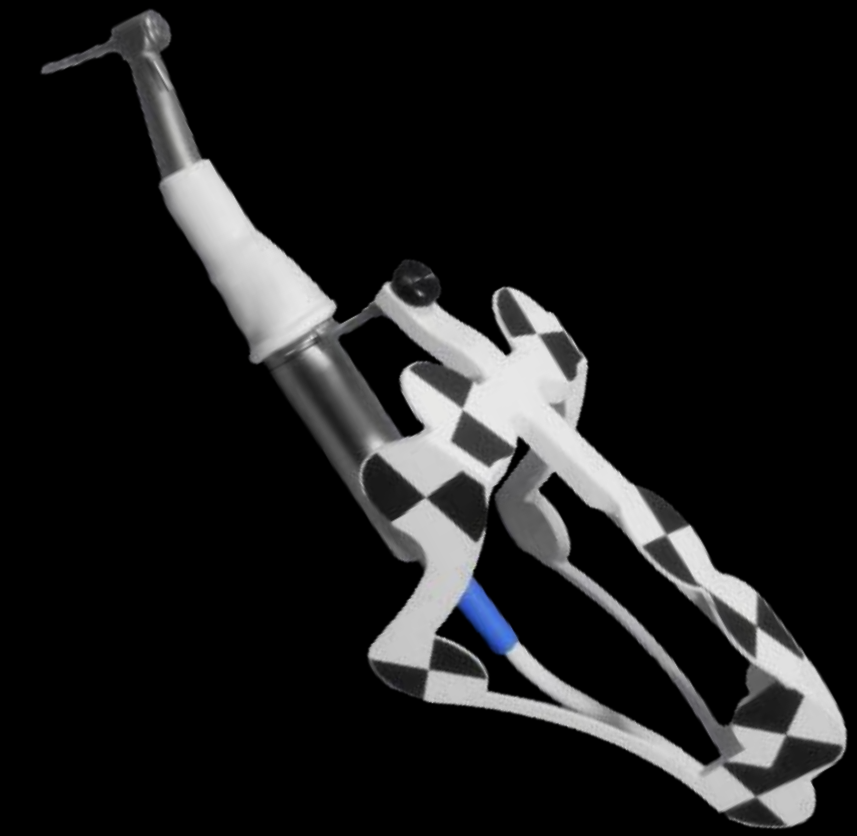
Partial **E**xtraction **T**herapy

**Digital Dynamic
Shield**



Partial **E**xtraction **T**herapy

**Digital Dynamic
Shield**



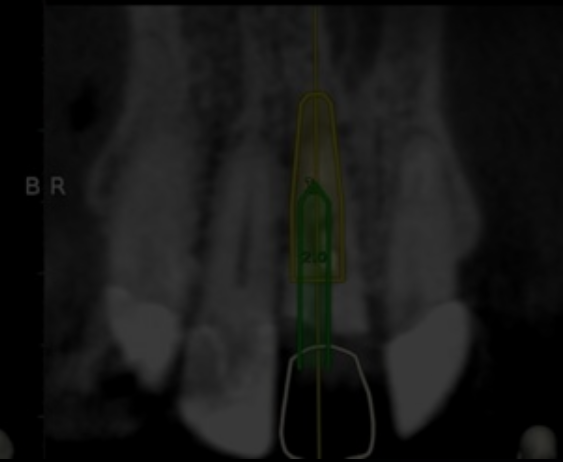
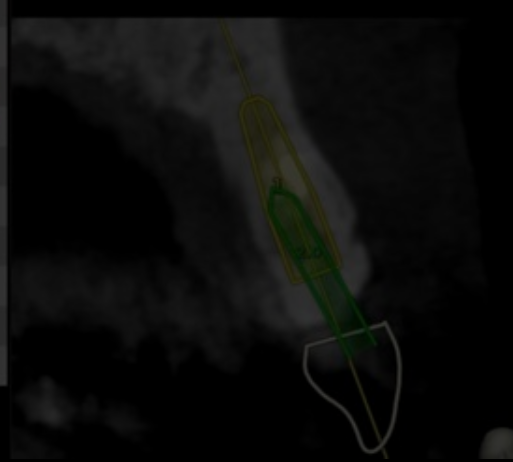
Partial **E**xtraction **T**herapy

Digital Dynamic Shield



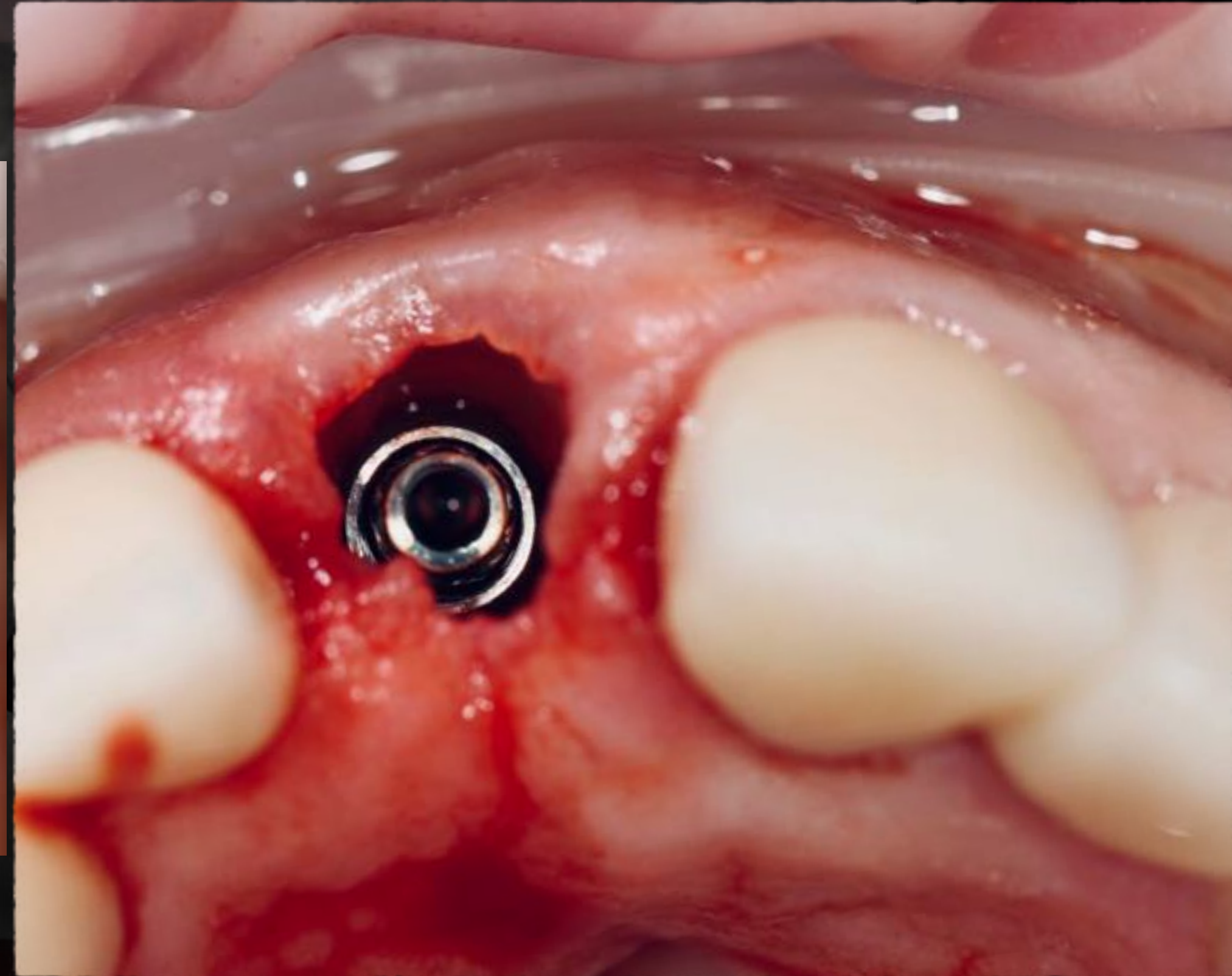
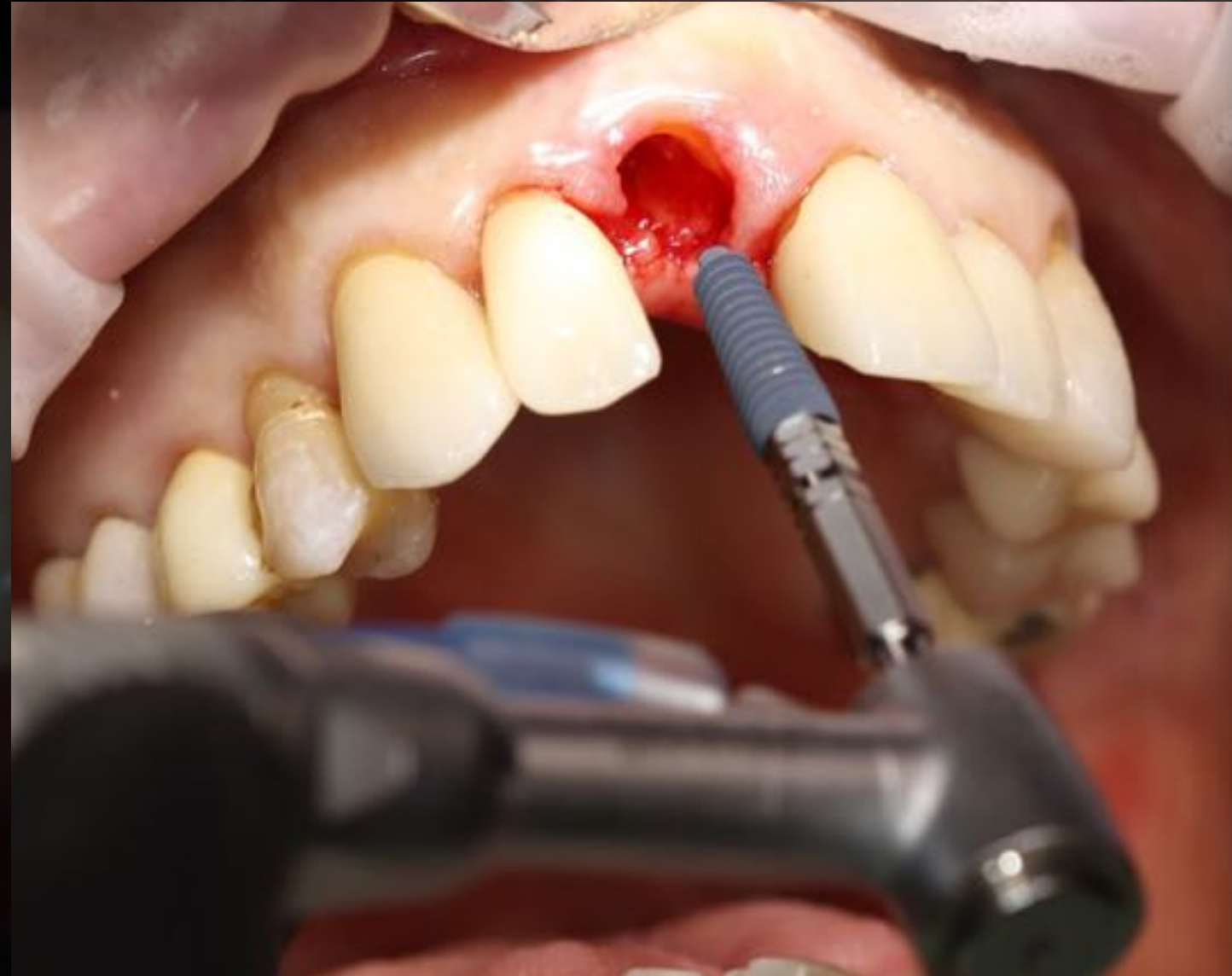
NEW DRILL? CALIBRATE TIP!

Verify accuracy by touching
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implantation site



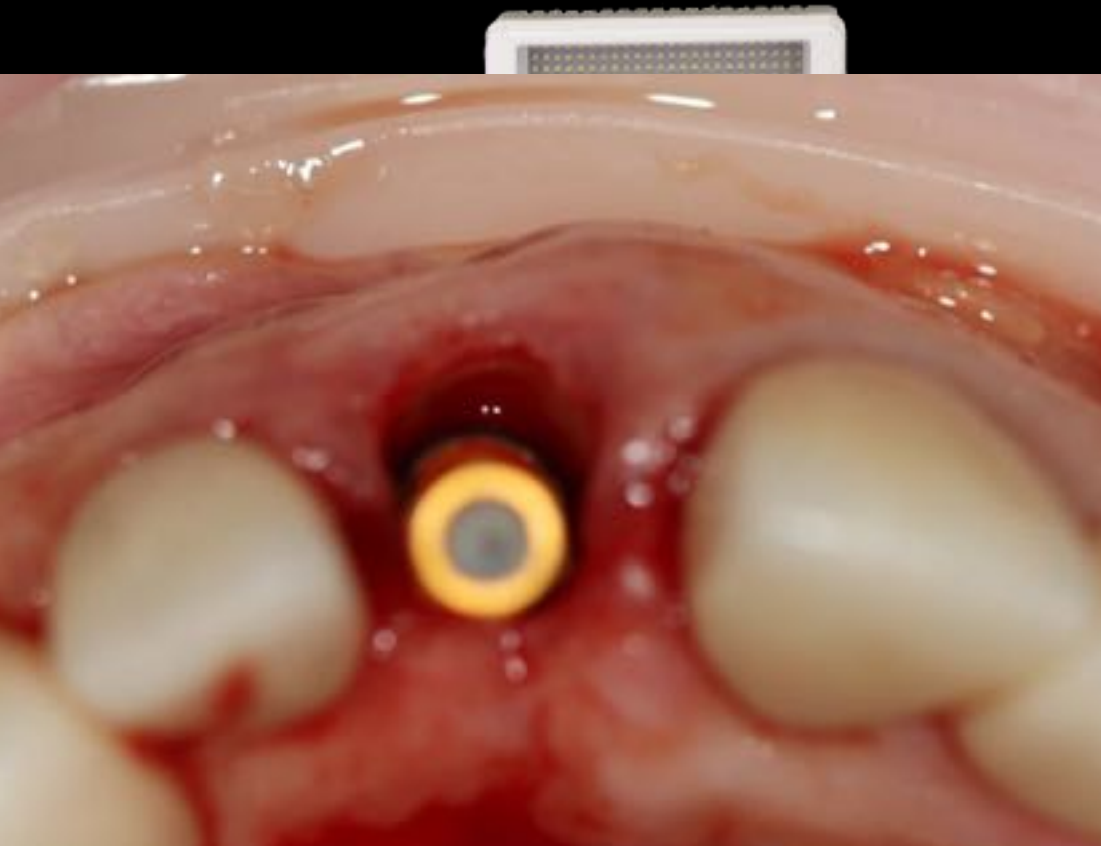
Partial Extraction Therapy

Digital Dynamic
Shield



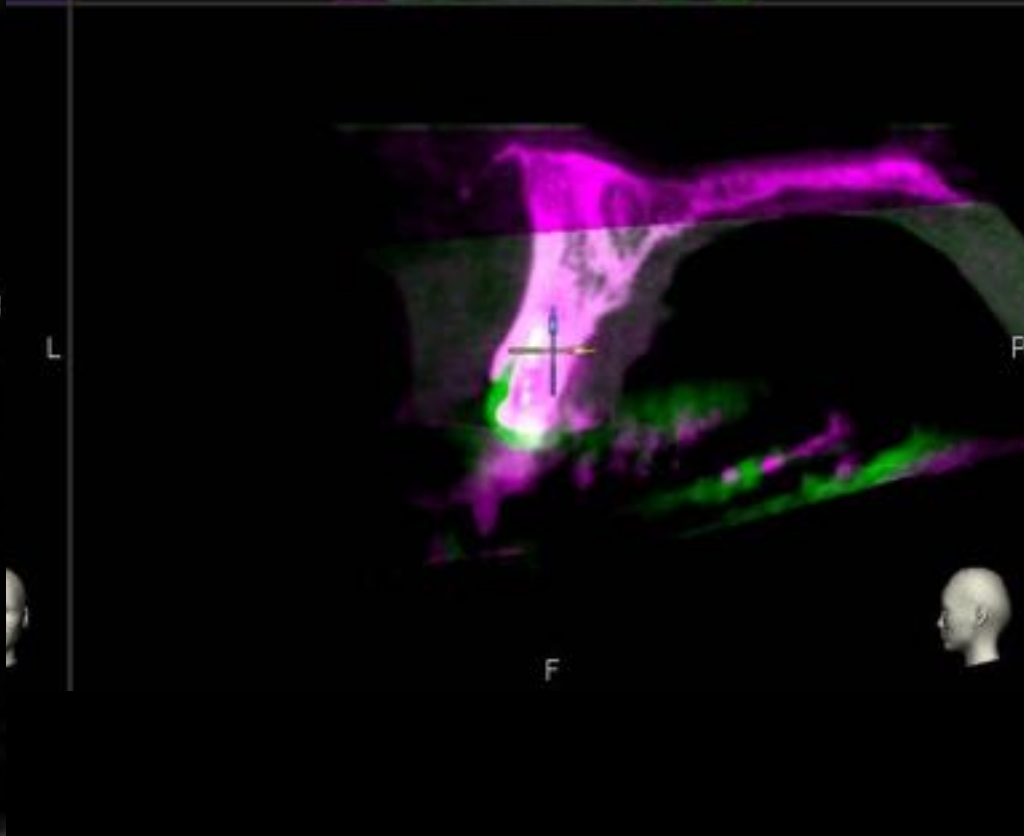
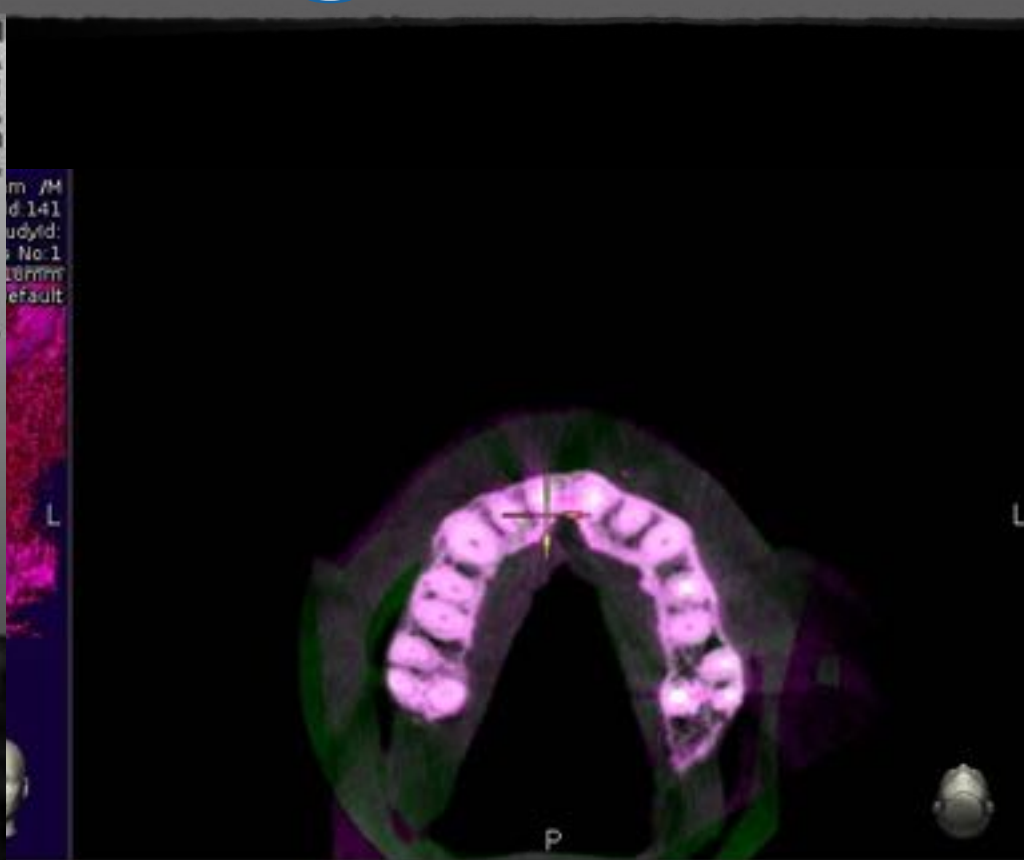
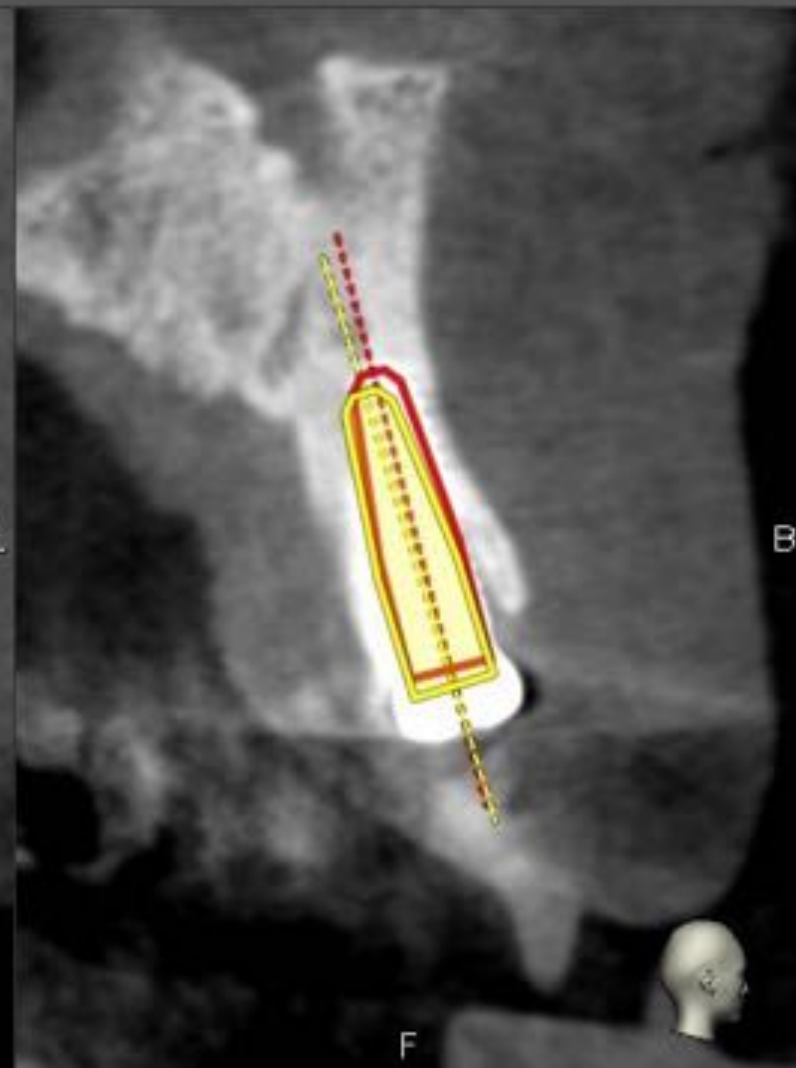
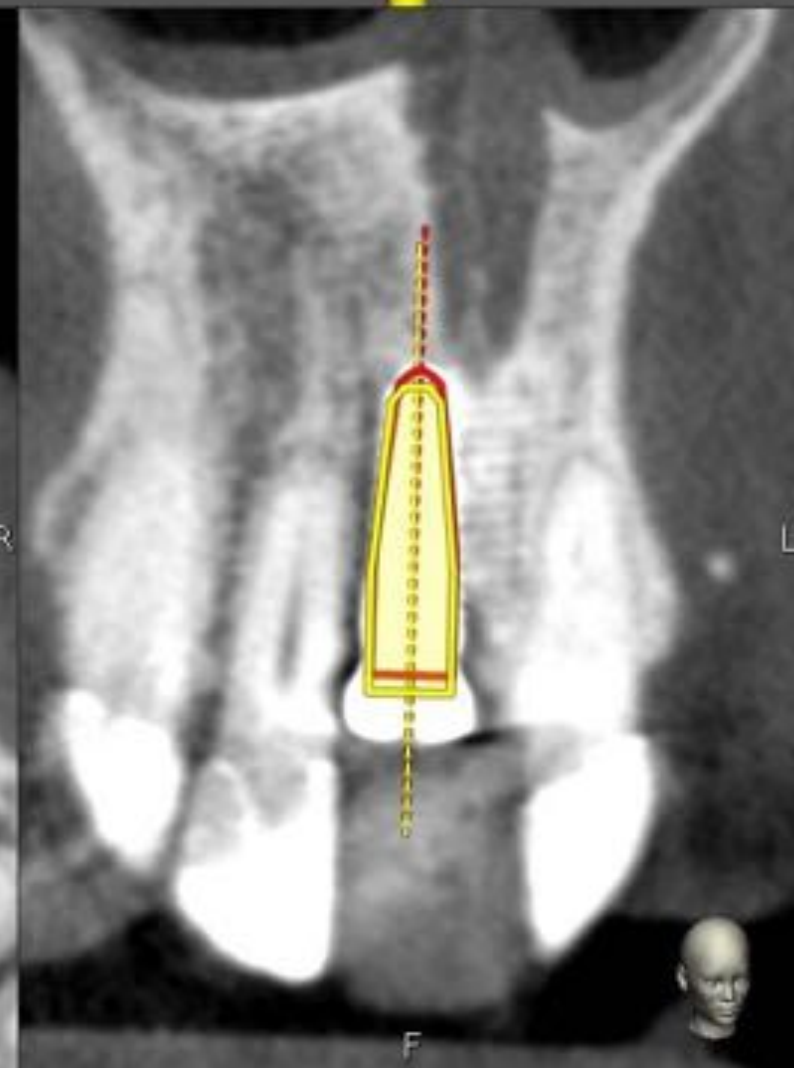
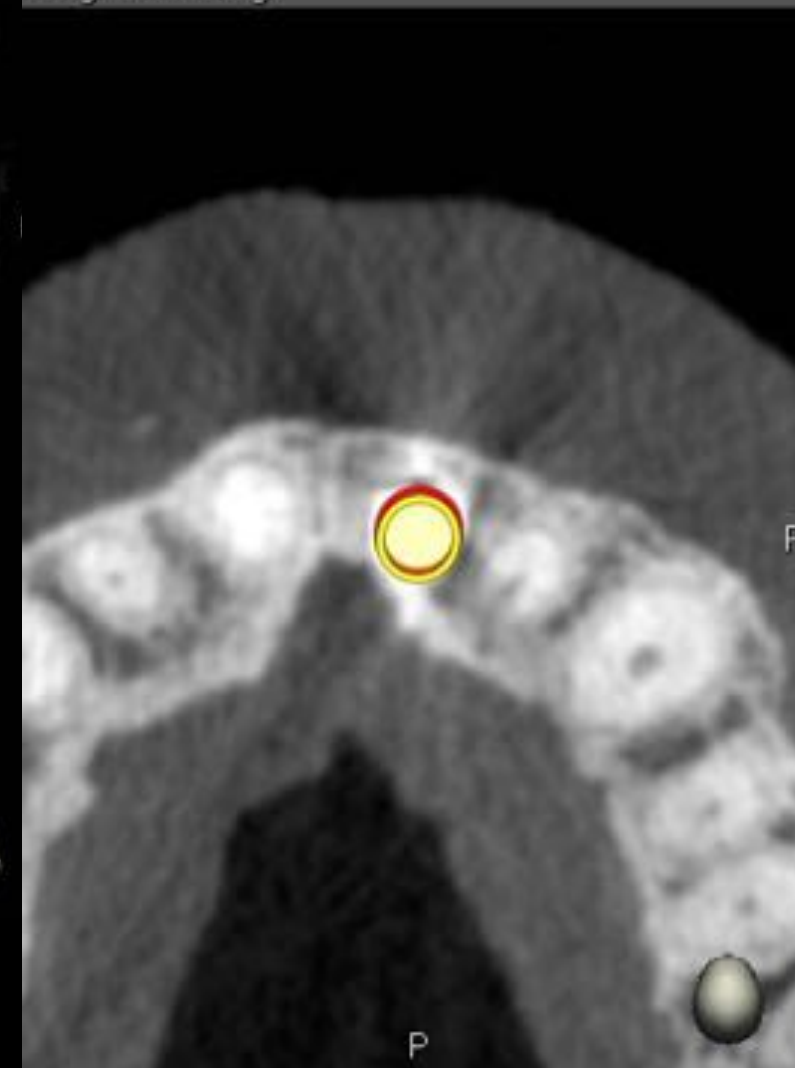
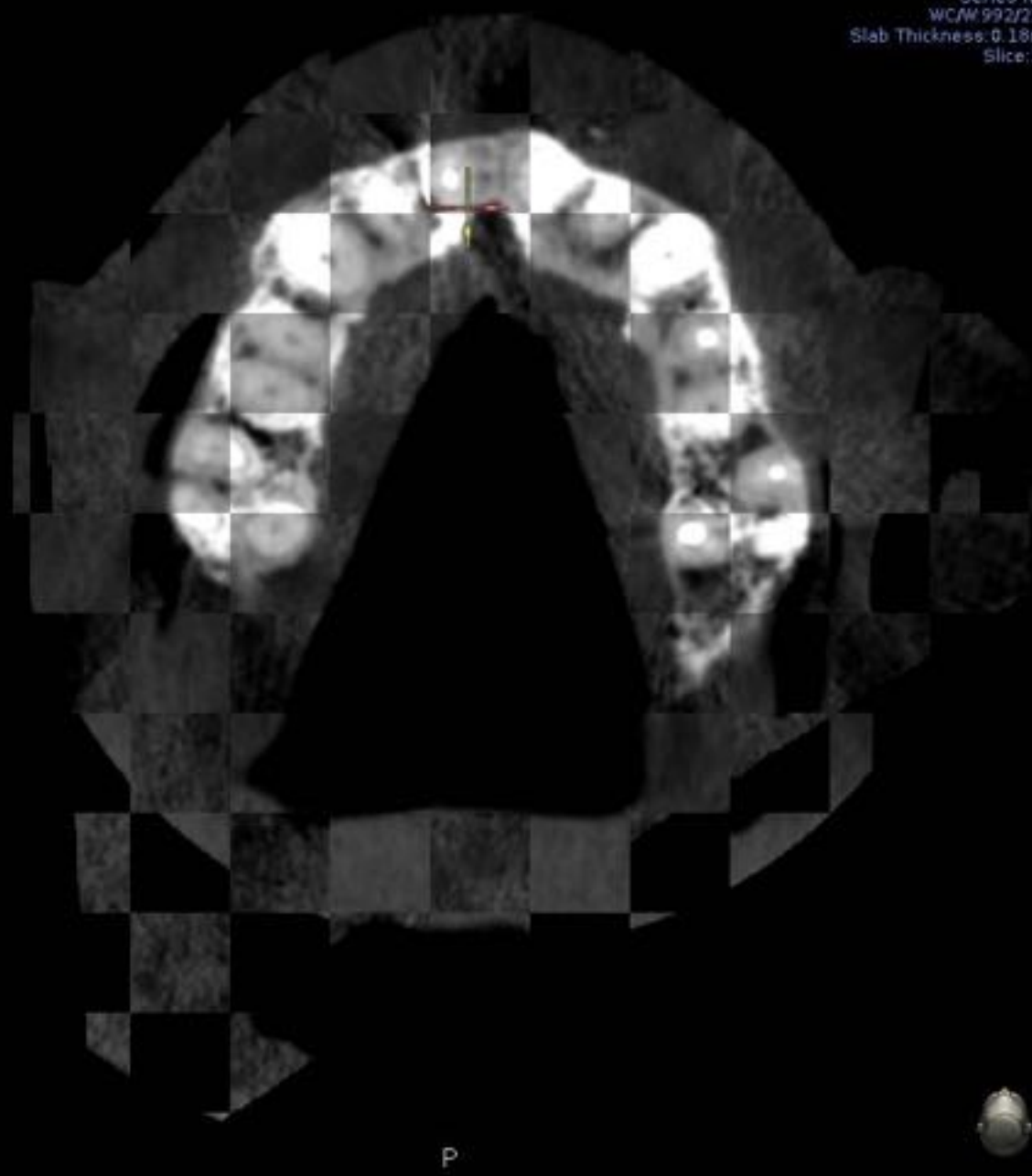
Partial **E**xtraction **T**herapy

**Digital Dynamic
Shield**



EvaluNav

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



Partial Extraction Therapy

Digital Dynamic
Shield



Root Membrane Technique

Digital Dynamic
Shield



Partial Extraction Therapy

Digital Dynamic
Shield



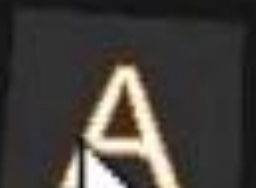
Partial Extraction Therapy

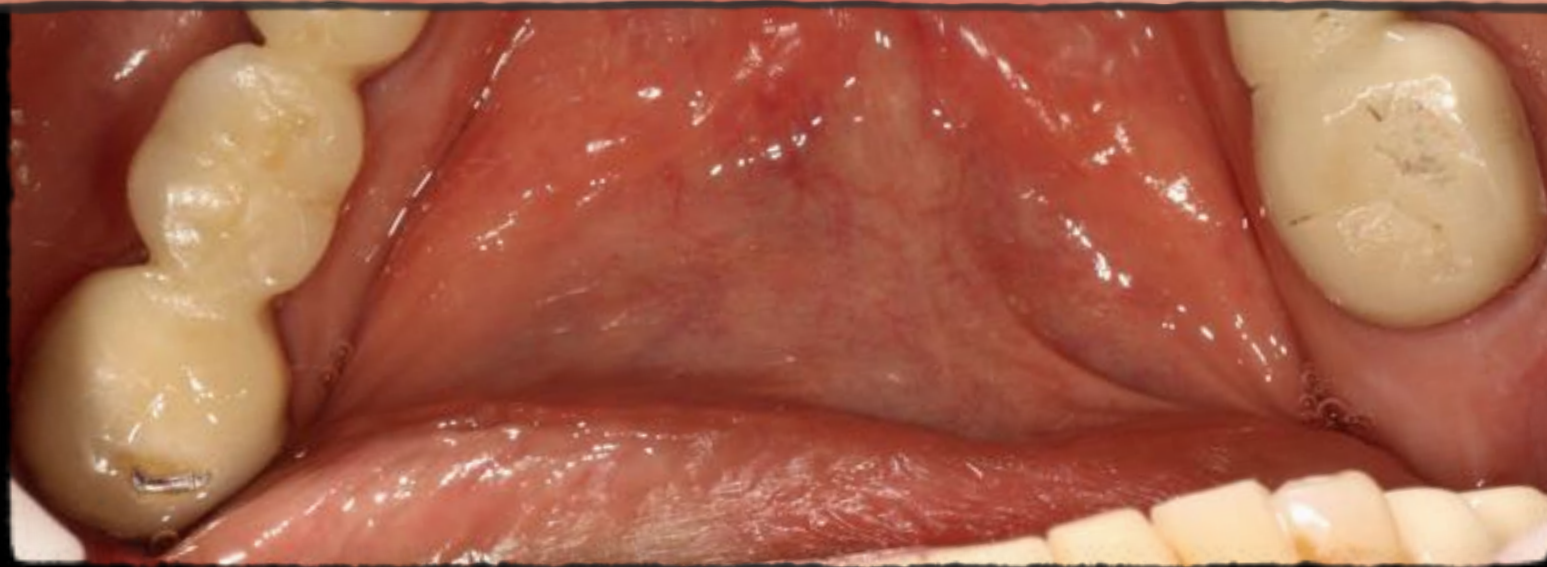
Digital Dynamic Shield



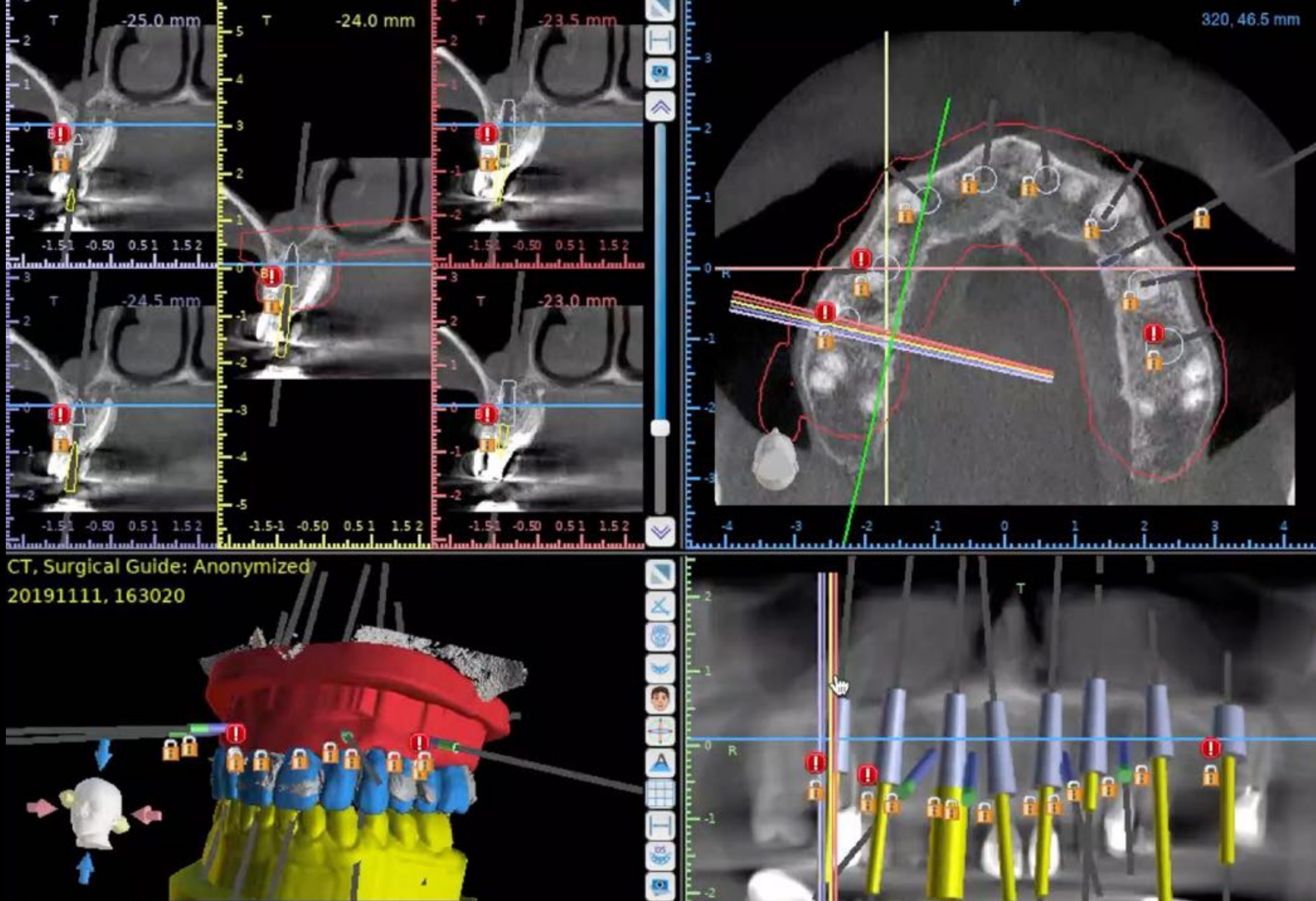
DIGITAL IMPLANTOLOGY

FULL ARCH

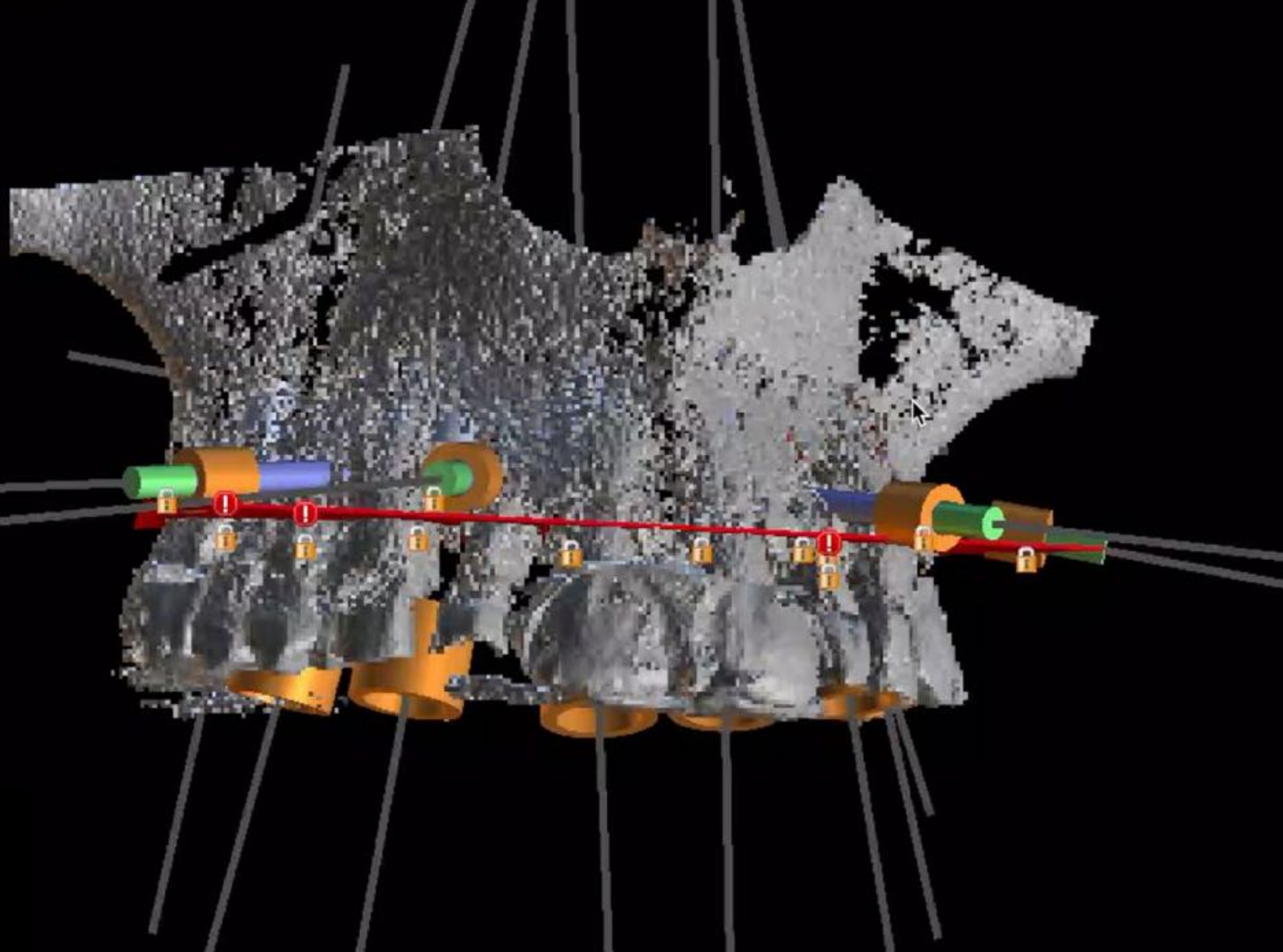




BSB PLAN

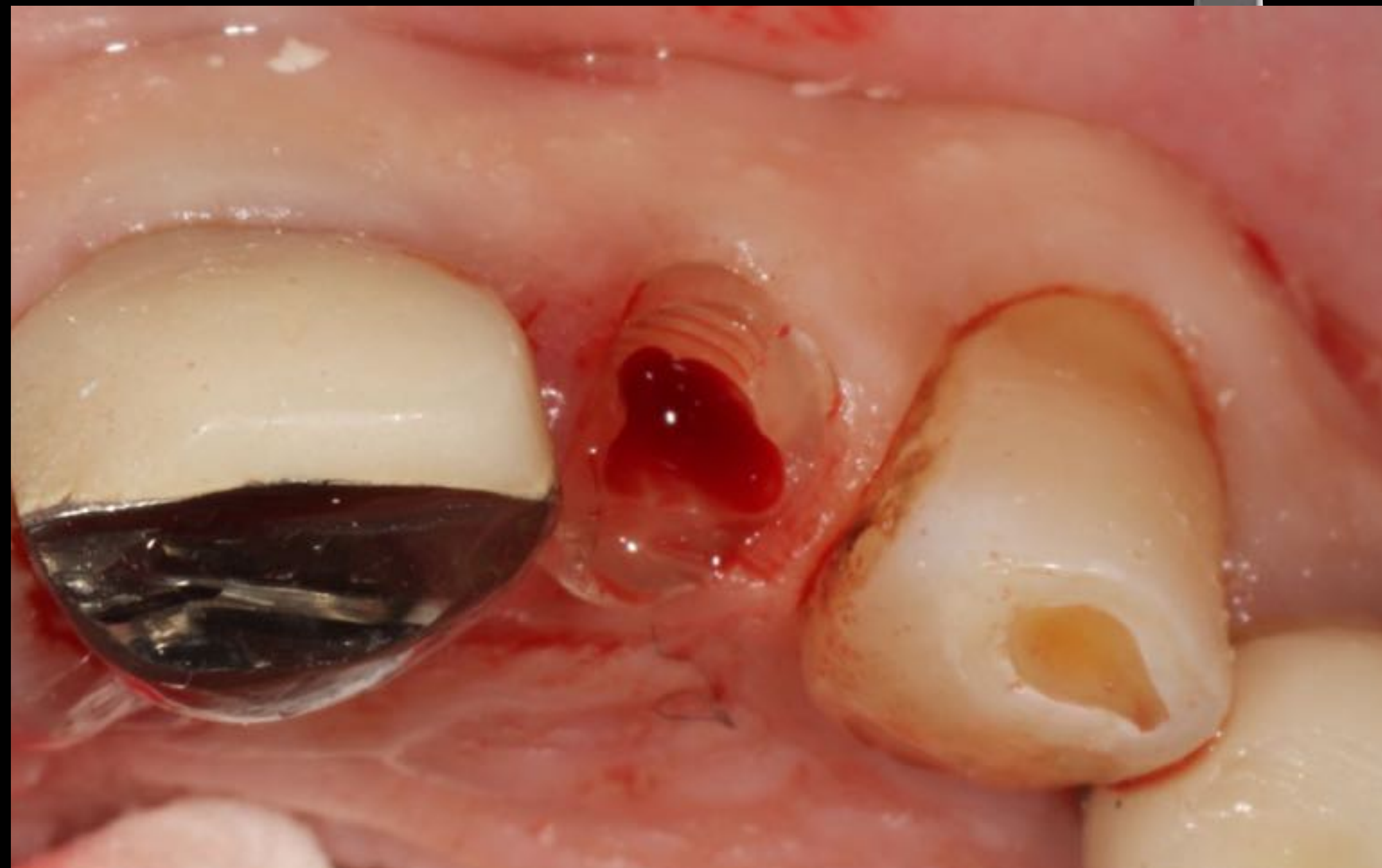
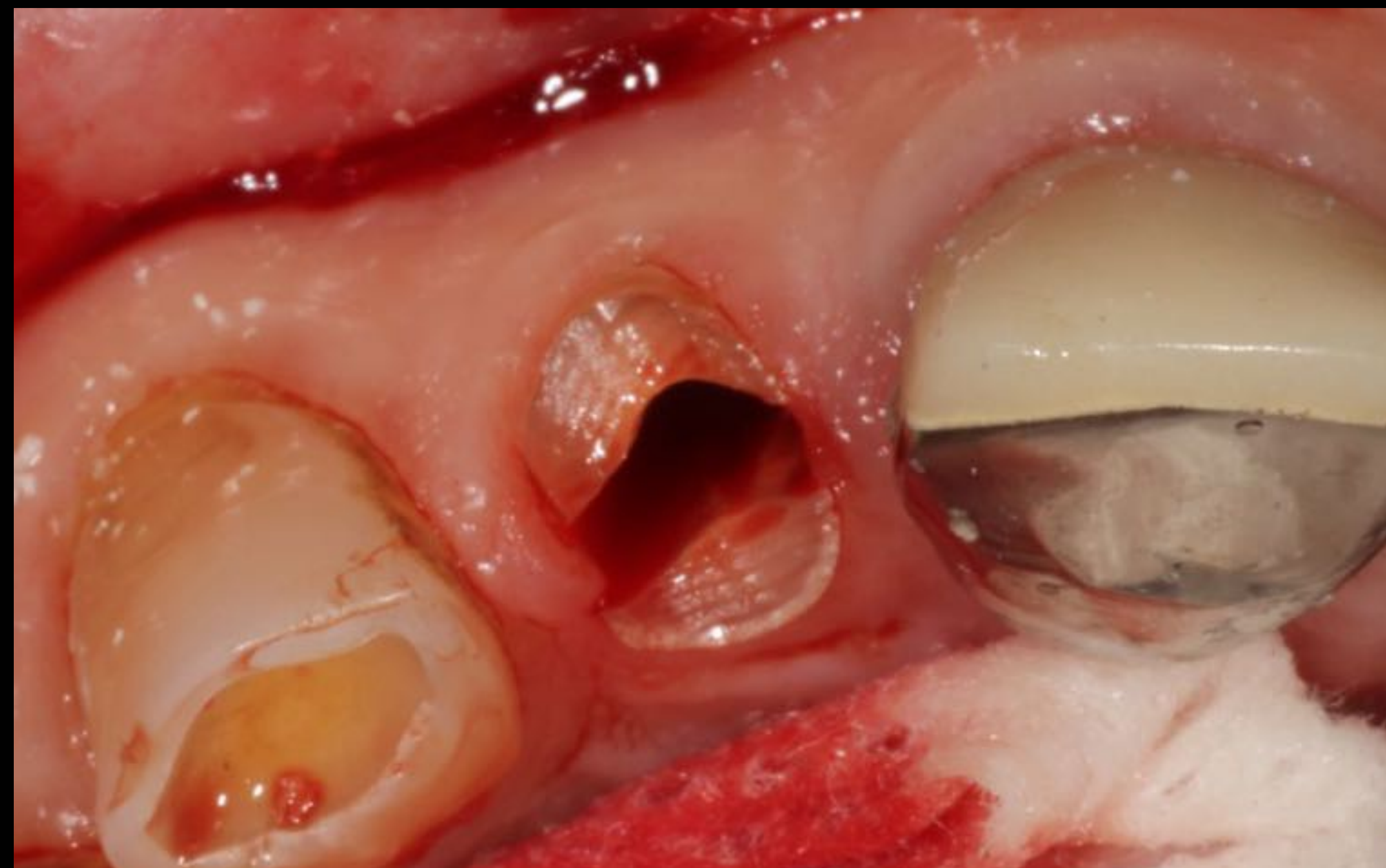


BSB PLAN



Surgical Guidance



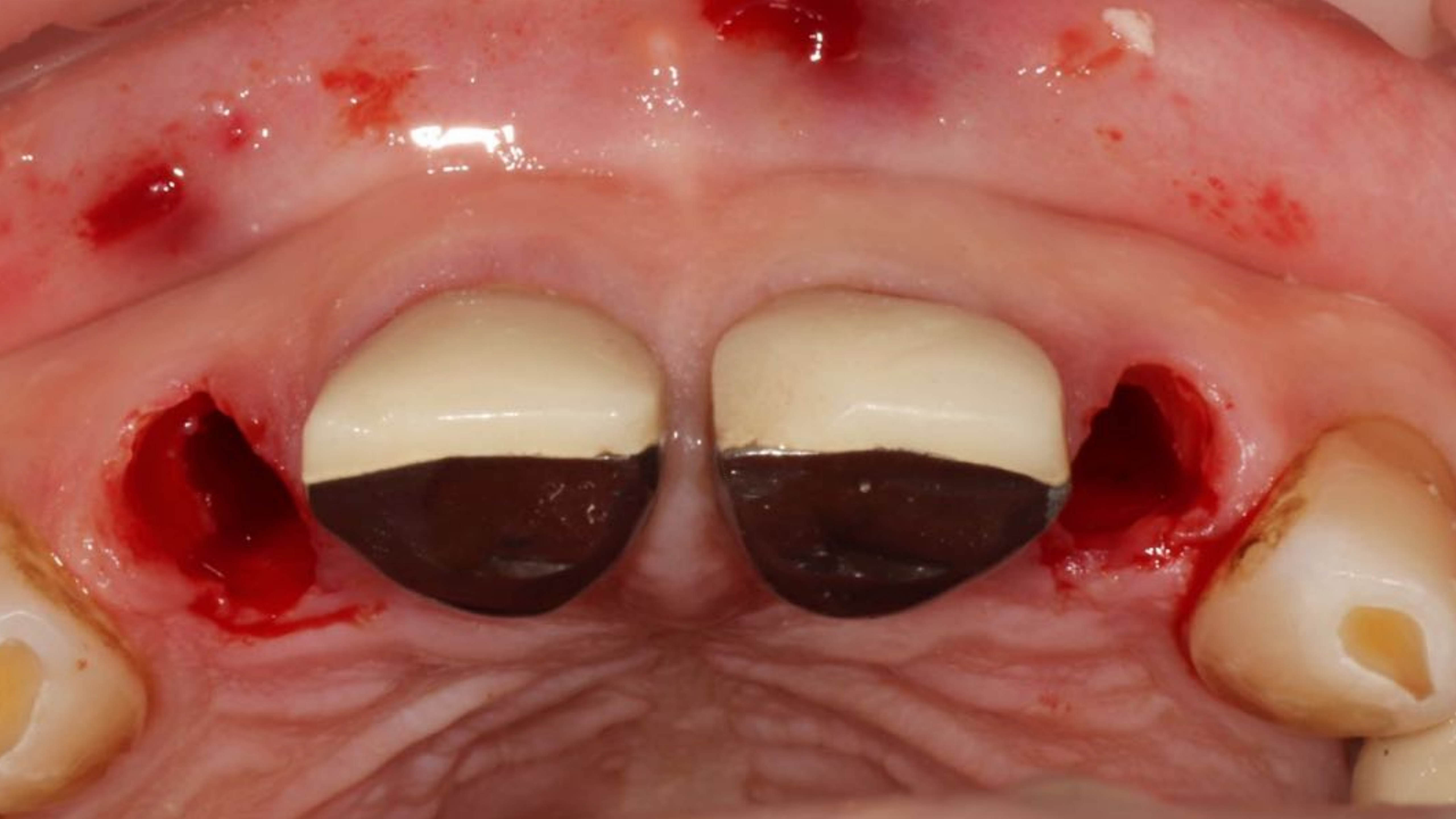




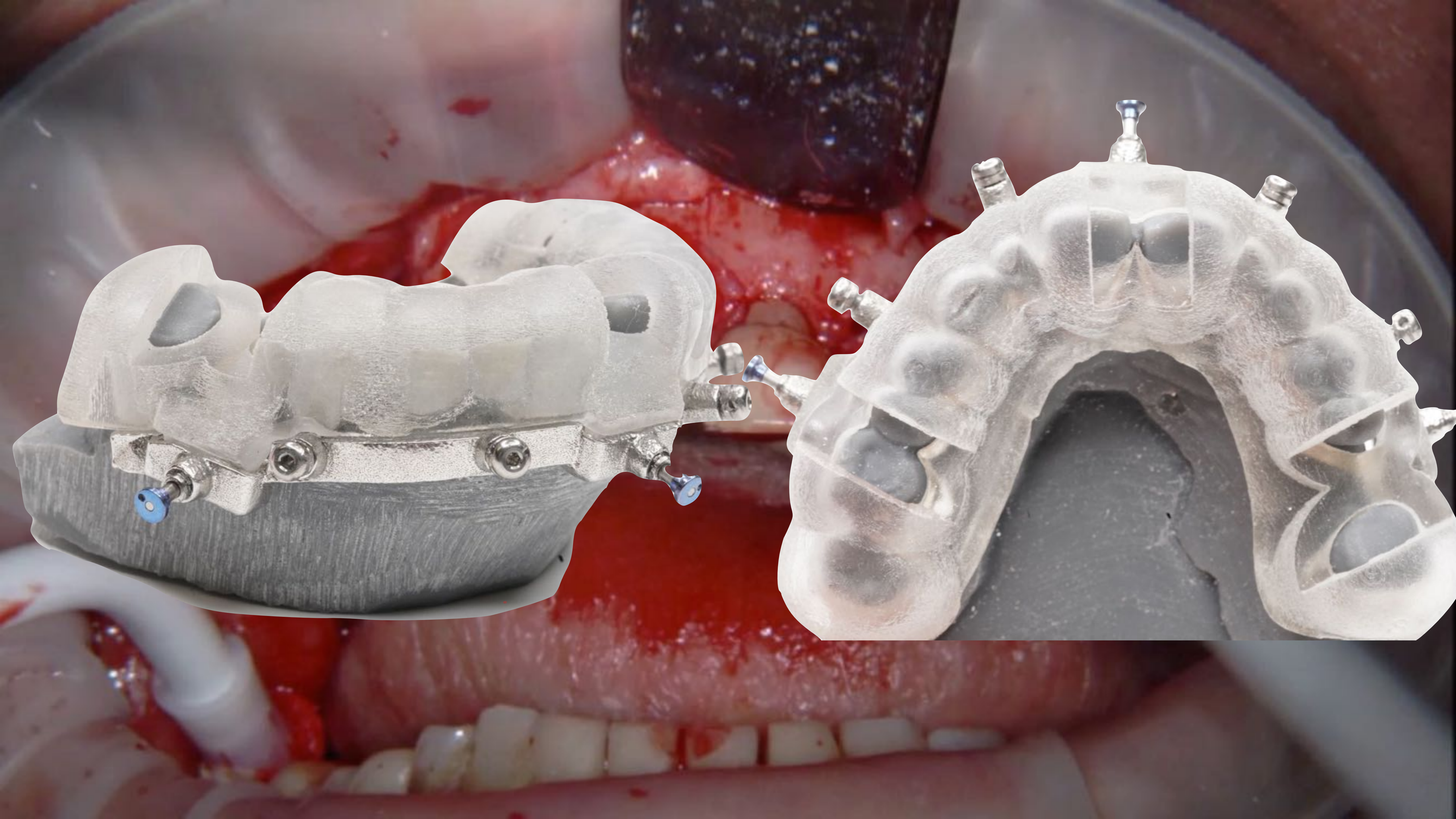
GANZ
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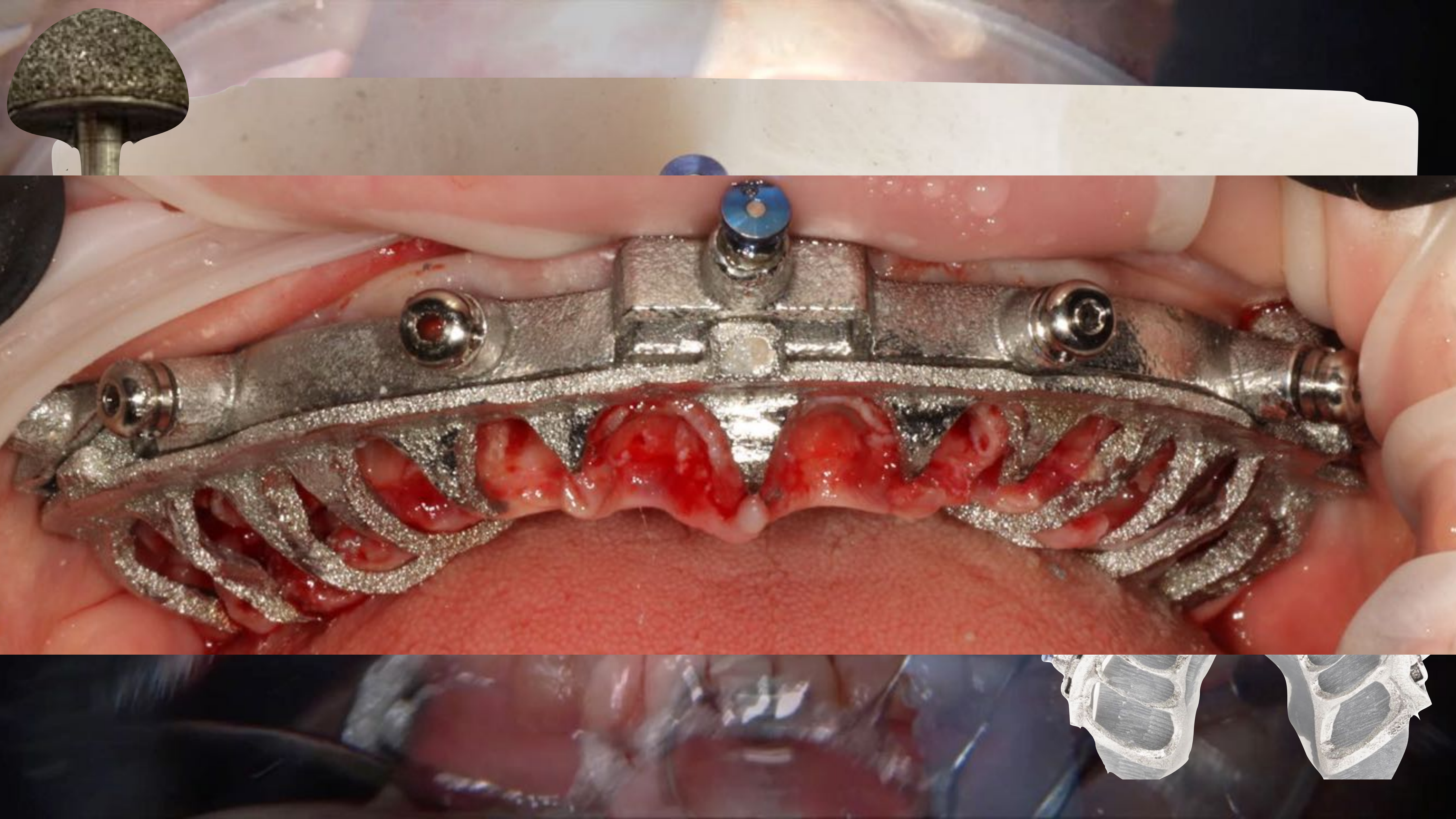












Surgical Guidance



Immediate Loading



ISQ

Immediate Loading





12 WEEKS

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Trimming



Tools



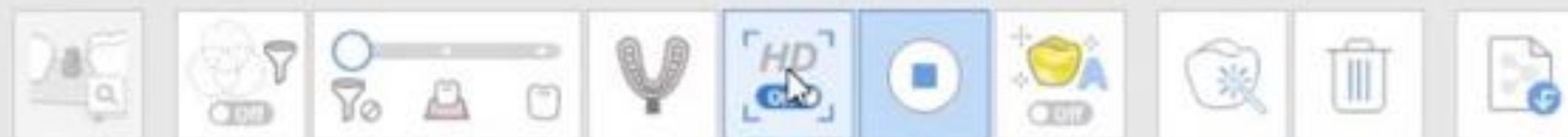
Arm Information



Calibrate



Live View



Full-Arch Implant Surgical and Restorative Considerations:

Innovations in the Digital Workflow with iJIG



Scott D. Ganz, DMD



Isaac Tawil, DDS

Introduction:

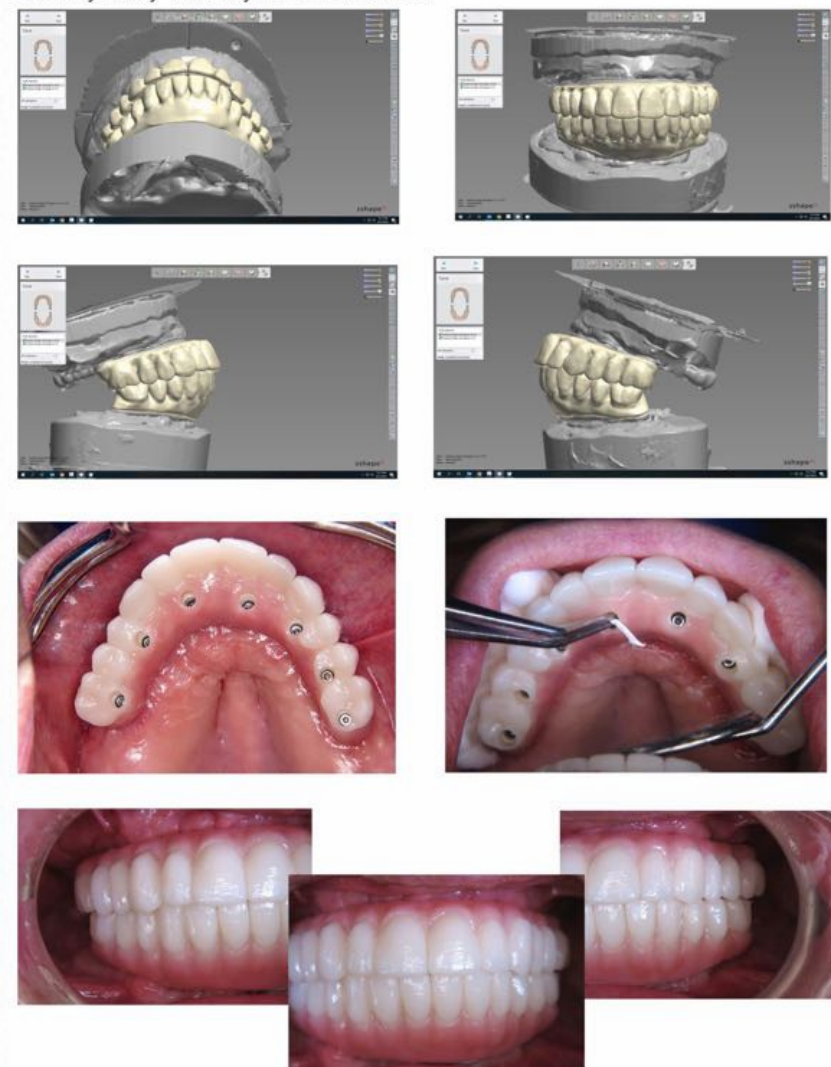
When a patient presents with a failing dentition there are several different treatment options available when a fixed-prosthetic result supported by dental implants is contemplated. This could include extraction and bone grafting allowing the ridge to heal before implants are placed, or extractions and 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 achieve success with single and dual full-arch implant reconstruction.

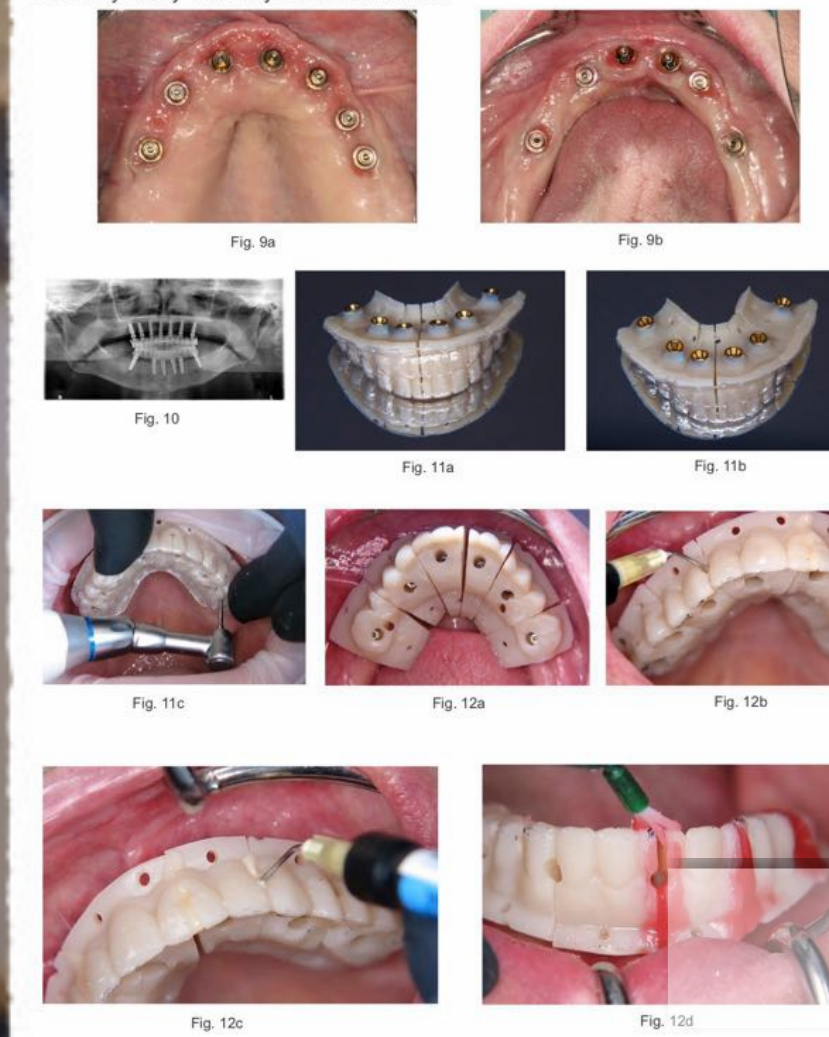
A 58 year old male presented with a failing dentition. The pre-operative intra-oral retracted view illustrates missing, broken, fractured, and decayed teeth, plaque and calculus accumulation, with severe soft tissue inflammation [Figs



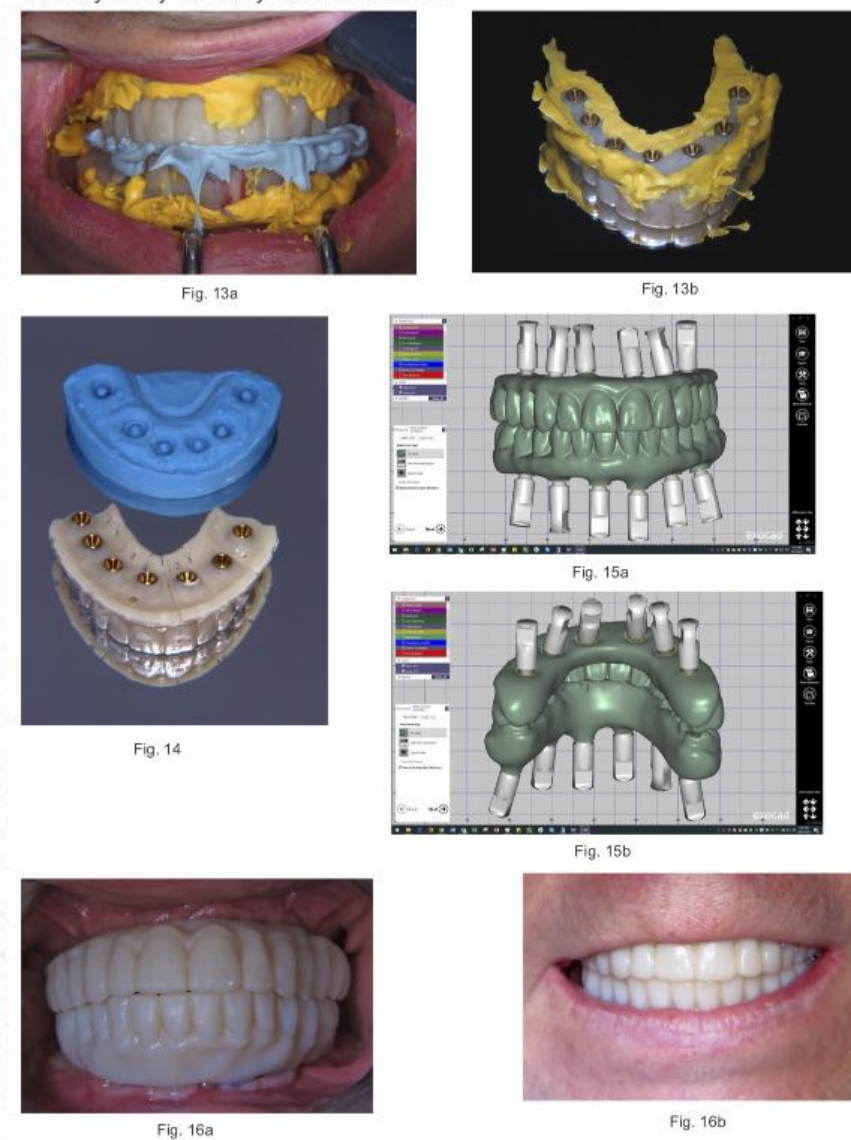
Dentistry Today - January 2020 Ganz & Tawil



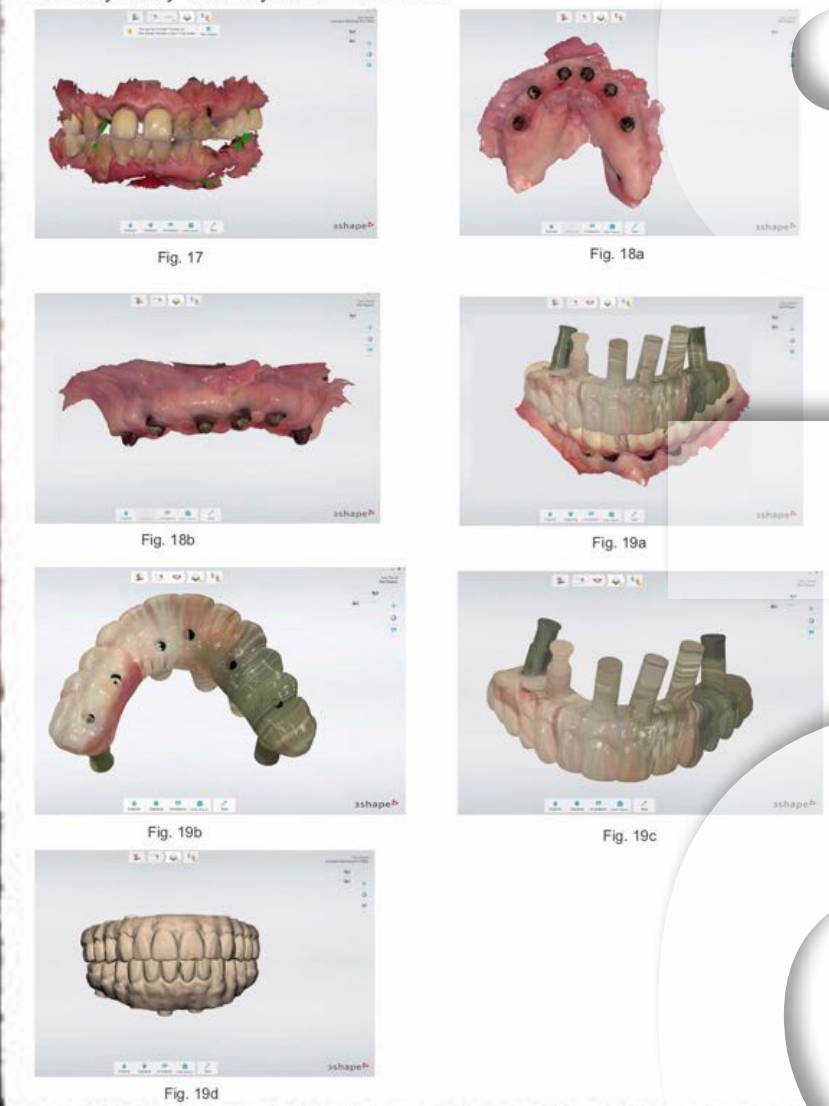
Dentistry Today - January 2020 Ganz & Tawil



Dentistry Today - January 2020 Ganz & Tawil



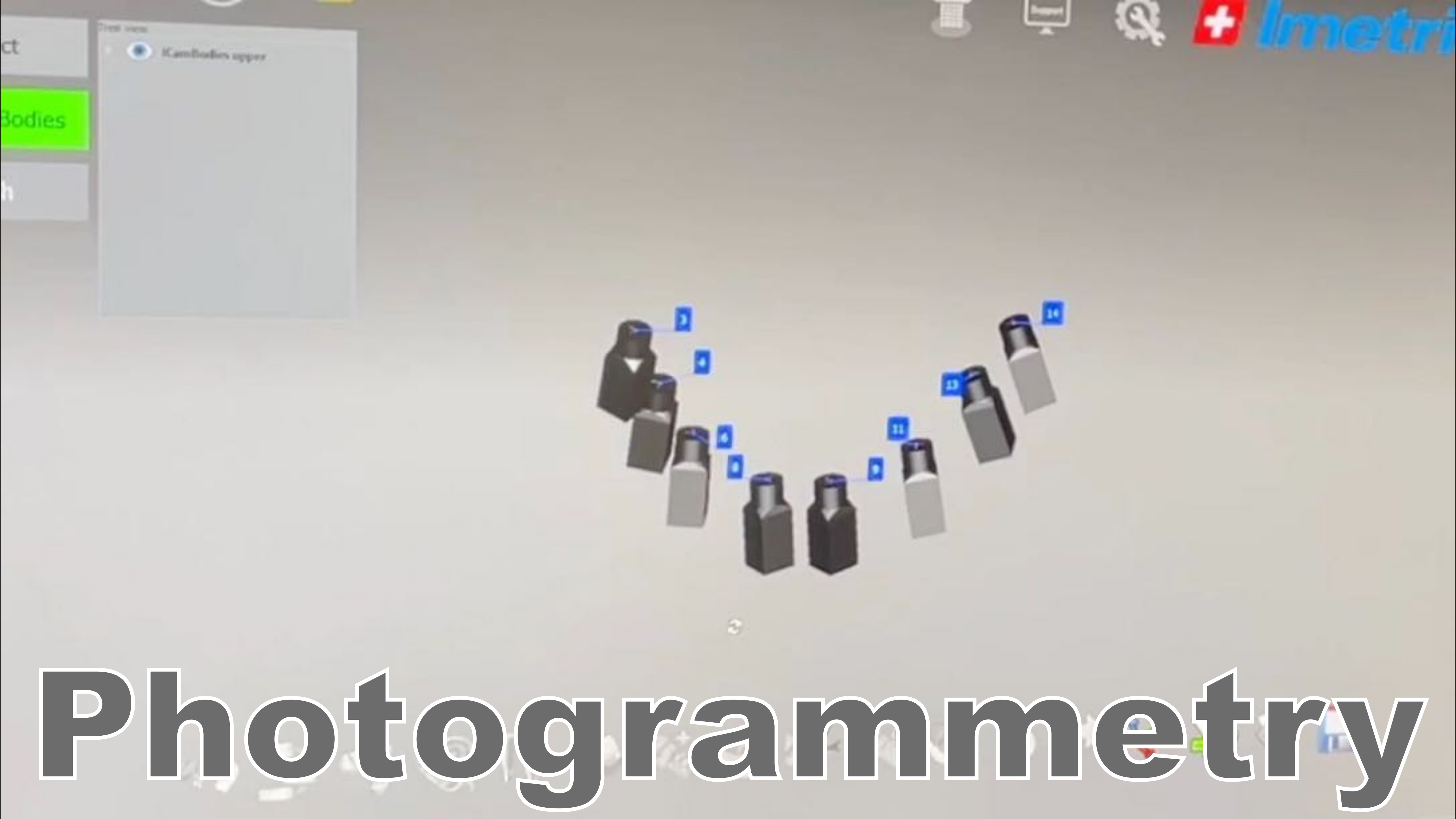
Dentistry Today - January 2020 Ganz & Tawil



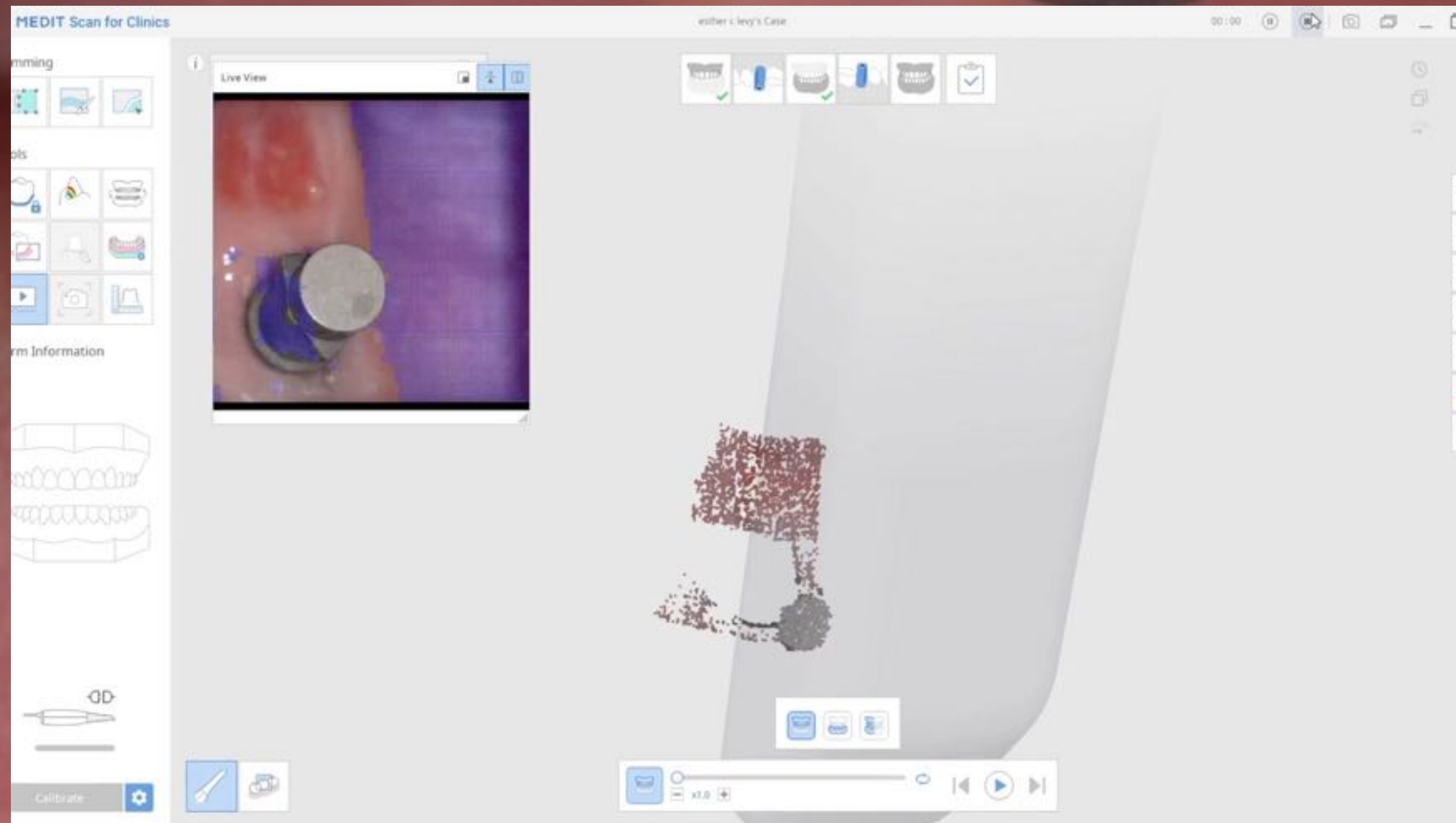
Photogrammetry



iCam



Photogrammetry

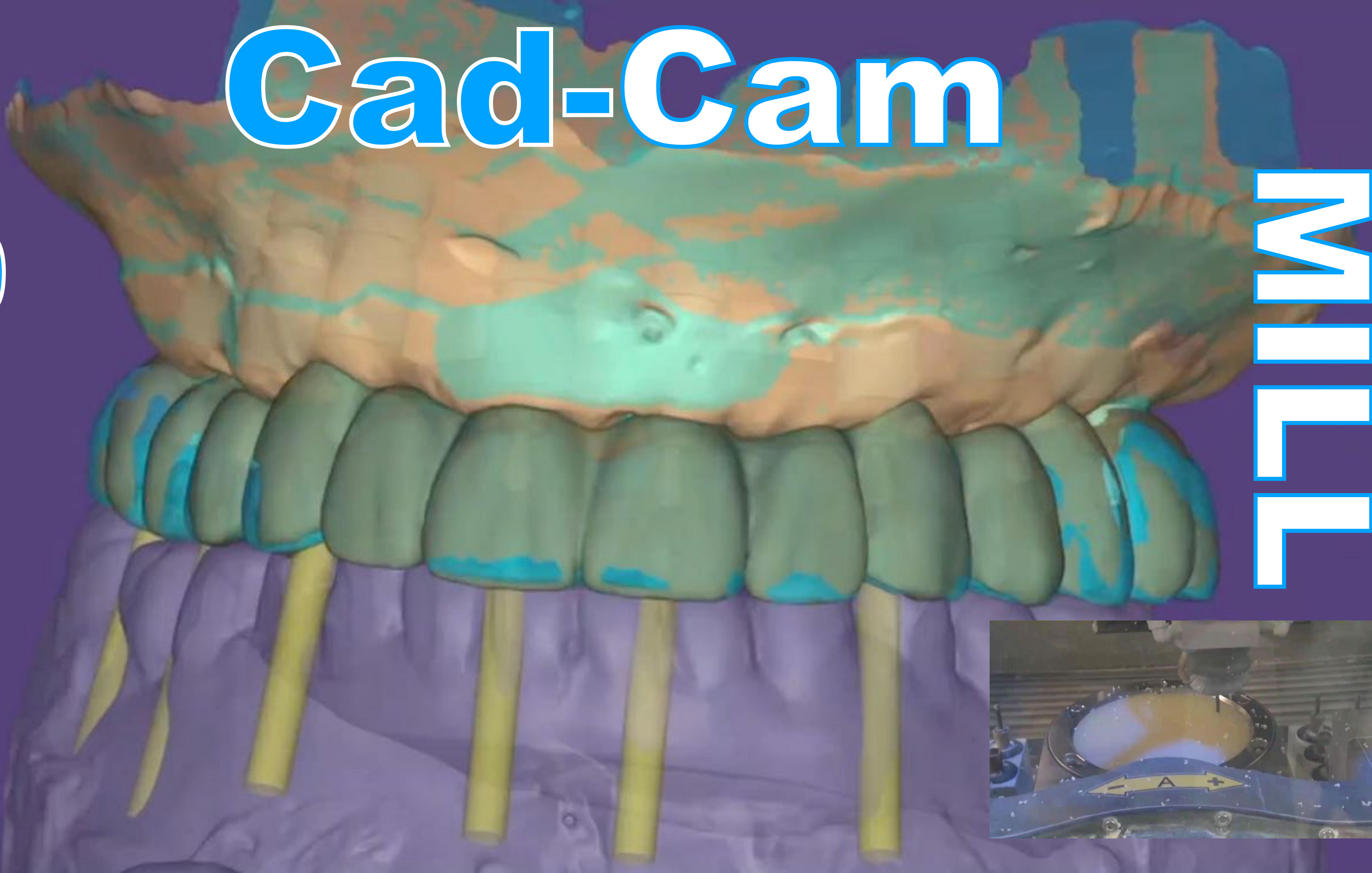


ios

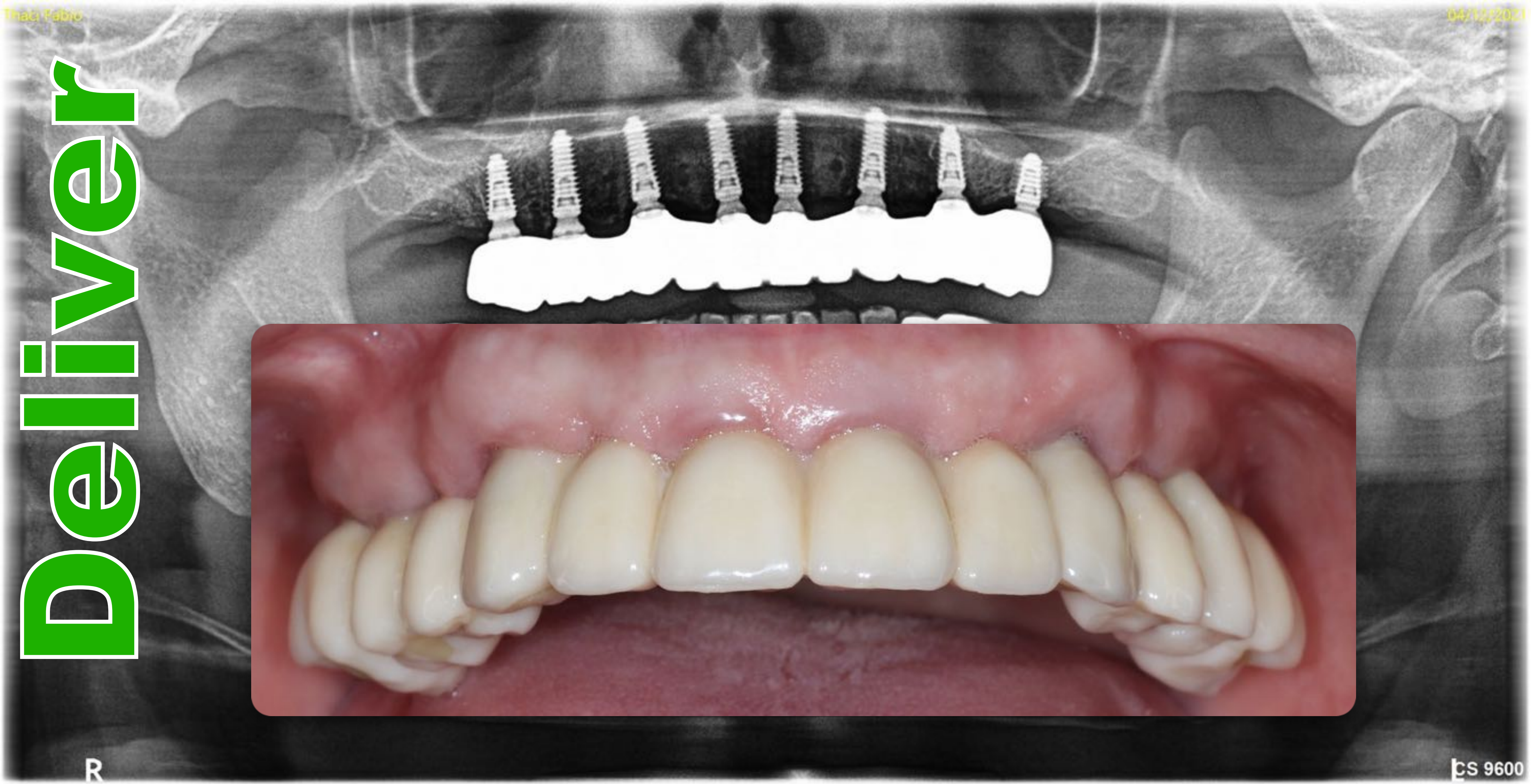
Design

Cad-Cam

MW



Deliver

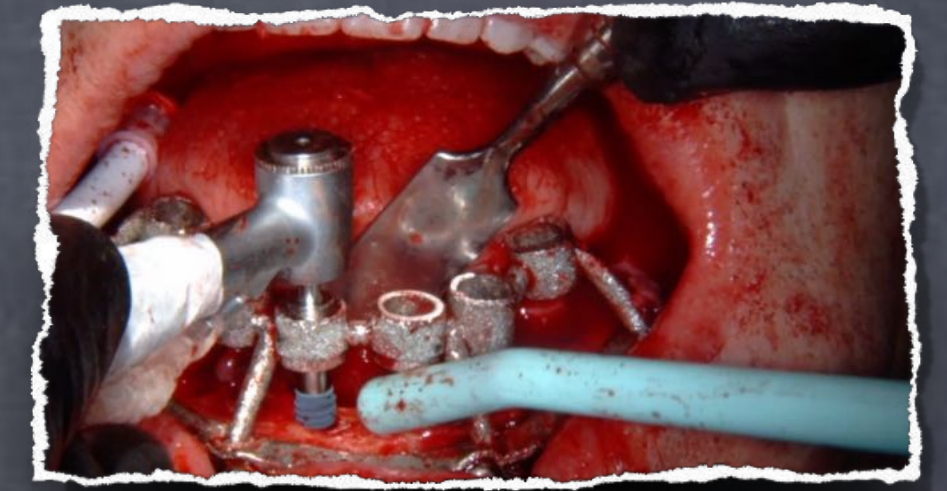




Changing lives one smile at a time

- **Full template-Guidance**

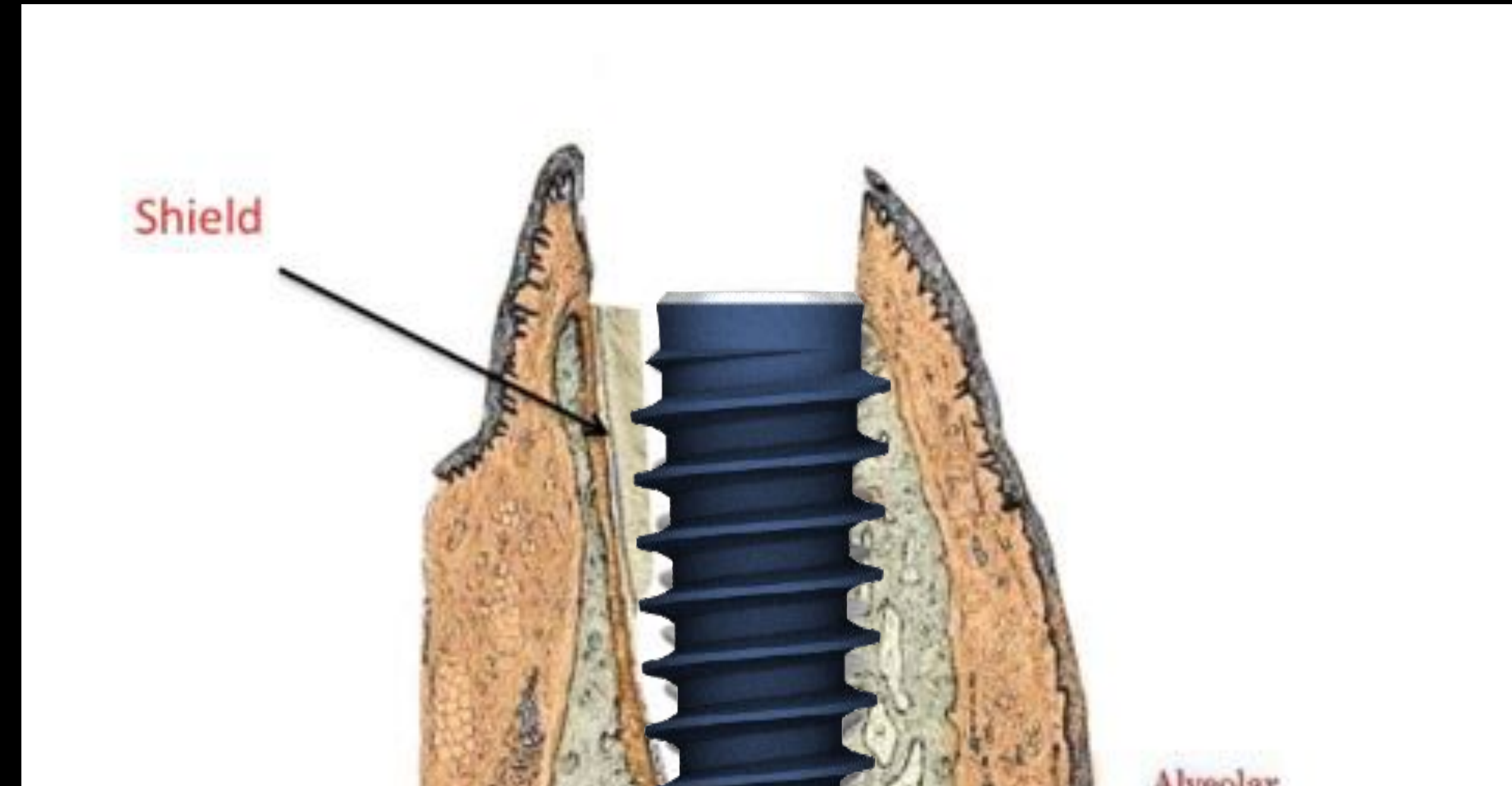
BENEFITS



- **Diagnosis CBCT/iOS**
- **Restoratively Driven Treatment Planning**
- **Communication (Universal language w/ Lab and/or Patient)**
- **Improved Surgical/Restorative Accuracy**
- **Predictability (Guide is subset of CBCT Planning)**
- **Avoiding complications (sinus, nerve, malposition)**
- **Cost? (how much does it cost to repair errors?)**
- **Teeth Today when applicable (Bone density, ISQ)**

Partial **E**xtraction Therapy

Root **M**embrane
Socket **S**hield
Pontic **S**hield

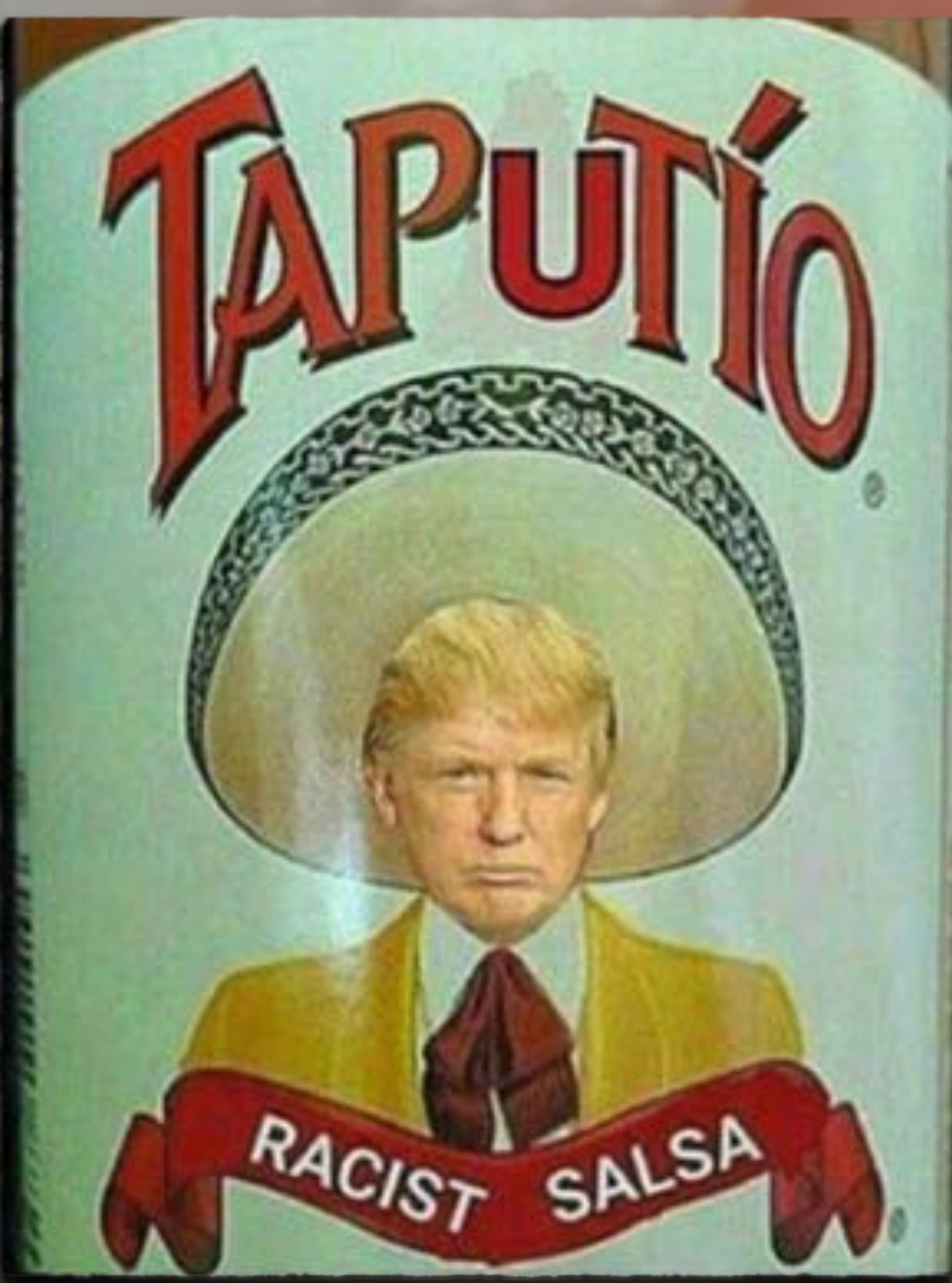


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