



Easy strategy of Implant for elderly patients.

Sung Tae Kim, DDS, PhD

Seoul National University



CK Institute



SNUDH
서울대학교치과병원

Professor

Dept. of Periodontology, Seoul National University School of Dentistry

Seoul National University Dental Hospital

Director

Ck institute

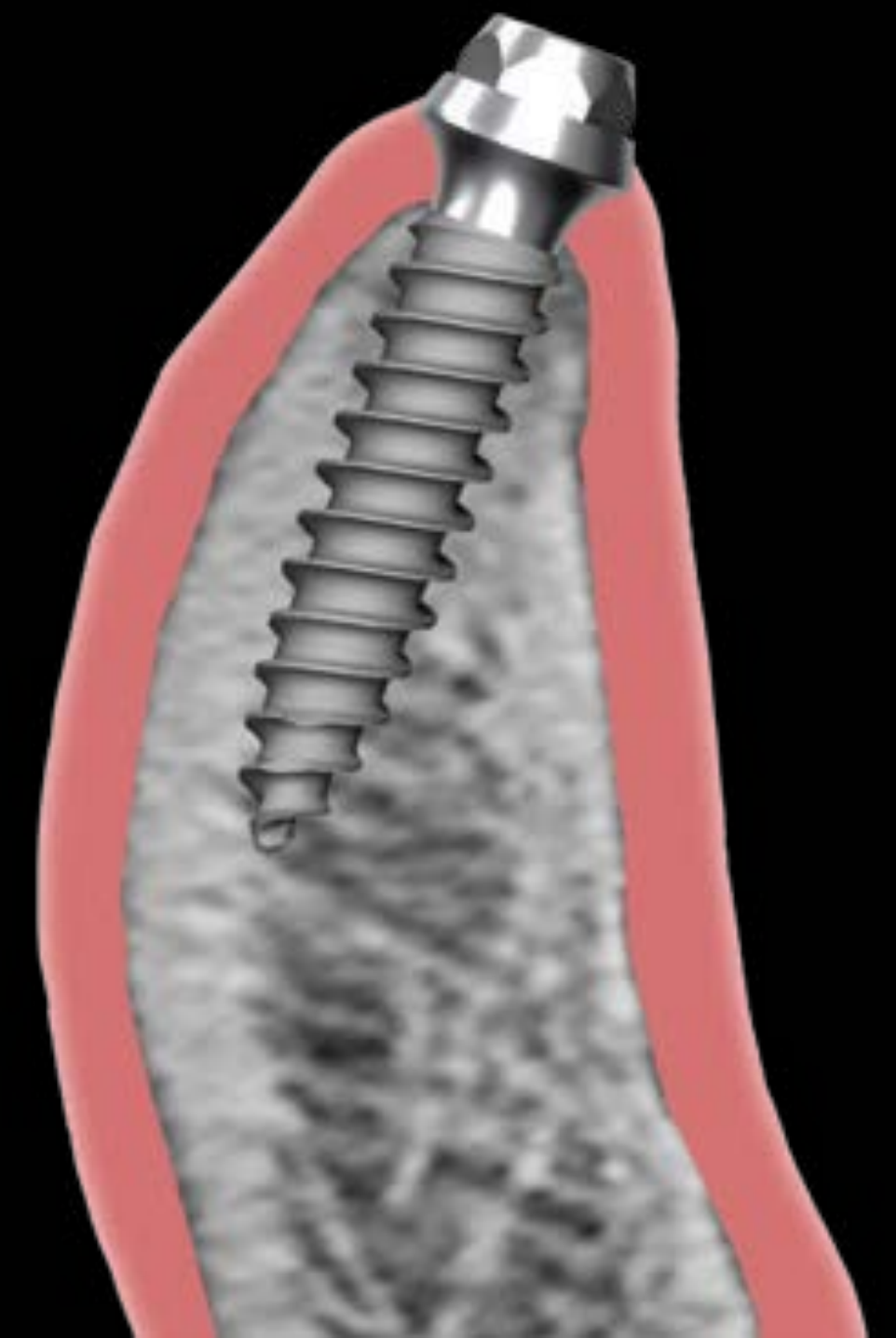
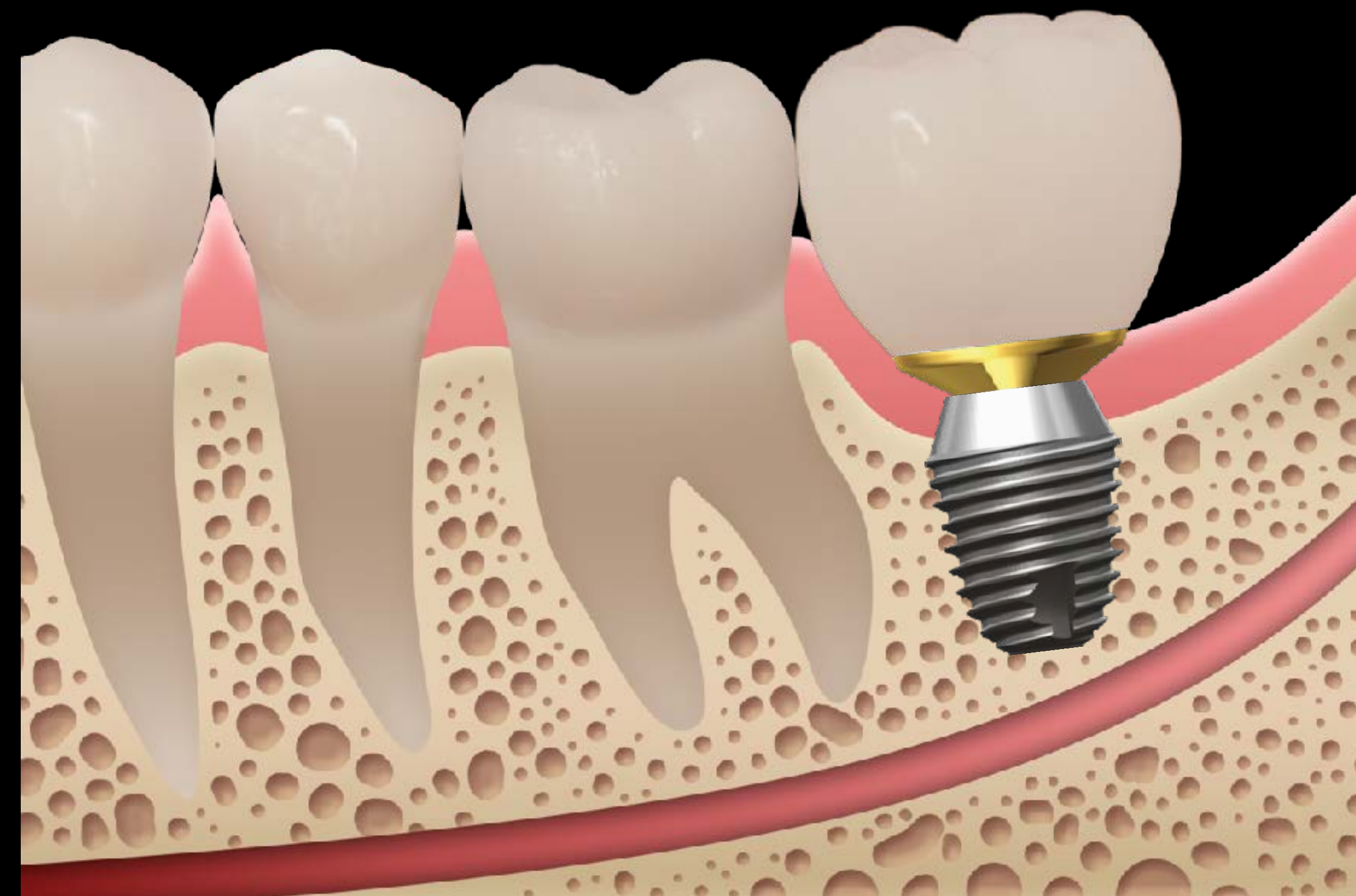
From When?

All on 4 with NobelGuide

“The **All-on-4** concept (**Nobel Biocare**) pioneered by **Paulo Malo** (1998) laid the foundation for full-arch immediate loading with **tilted** implants, which Straumann further refined into the **Pro Arch concept**, integrating Roxolid implants, SLActive surfaces, and a fully digital workflow.”

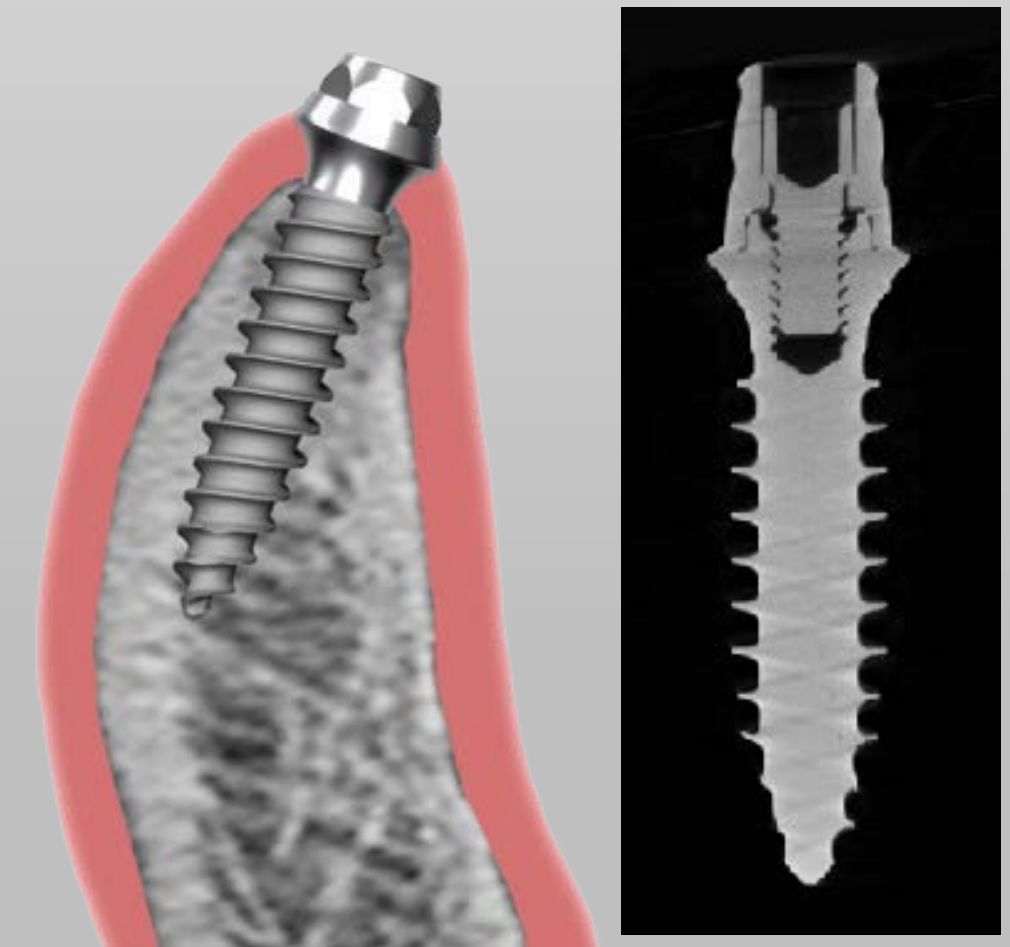
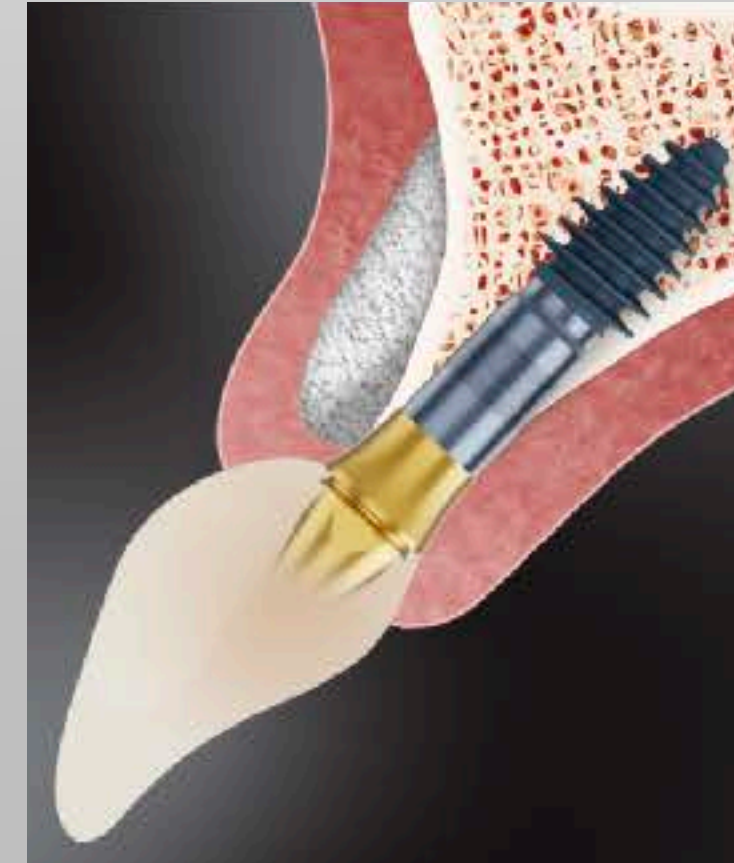
Why is this **All on 4** concept becoming more and more popular **again** now?

I. Long term predictability of **short** and **narrow** implant



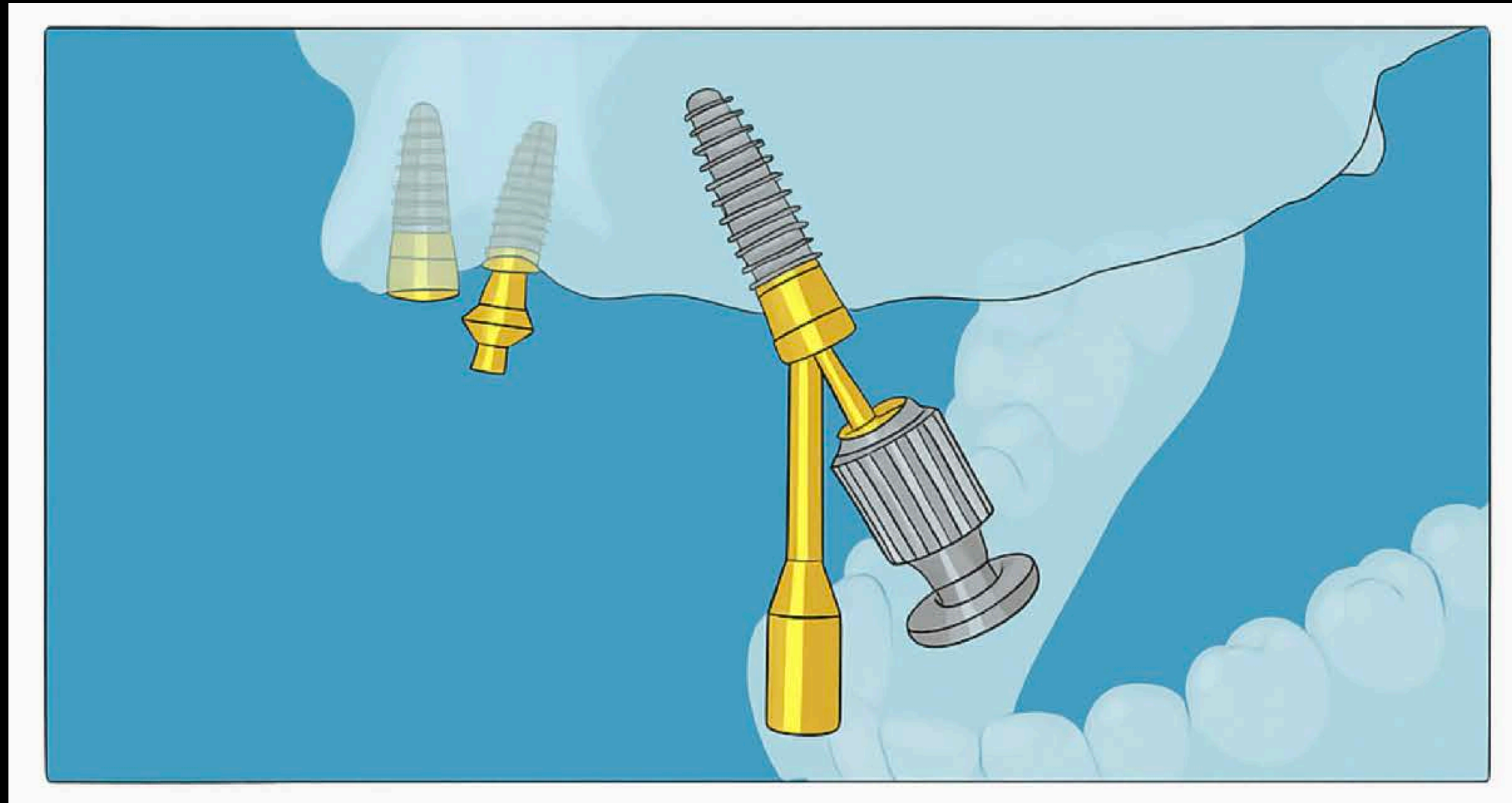
2. Reinforced short and narrow implant fixture could be used with minimal bone graft

- Material reinforcement
 - Cold worked Titanium (Grade 4)
 - Ti-Zr Alloy
- Design reinforcement



Why is this **All on 4** concept becoming more and more popular **again** now?

3. Long term predictability of **angled** implant restored with an **angled** or **multi-unit** abutment





OPEN ACCESS

EDITED BY
Huihua Yuan,
Nantong University, China

REVIEWED BY
Mahmoud Ebrahimi,
University of Maragheh, Iran
Sun Miao,
Nantong Institute of Technology (NIT), China

*CORRESPONDENCE
Runheng Liu,
✉ liurh28@mail.sysu.edu.cn

[†]These authors have contributed equally to this work

RECEIVED 17 December 2024

ACCEPTED 11 February 2025

PUBLISHED 25 February 2025

CITATION

Liu G, Deng S, Chen X, Lin J and Liu R (2025) Biomechanical analysis of maxillary posterior three unit bridge supported misial straight implant and distal tilted implant. *Front. Bioeng. Biotechnol.* 13:1546656. doi: 10.3389/fbioe.2025.1546656

COPYRIGHT

© 2025 Liu, Deng, Chen, Lin and Liu. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Biomechanical analysis of maxillary posterior three unit bridge supported misial straight implant and distal tilted implant

Guanqi Liu[†], Shudan Deng[†], Xiaoyan Chen, Jiahui Lin and Runheng Liu*

Hospital of Stomatology, Guanghua School of Stomatology, Sun Yat-Sen University and Guangdong Provincial Clinical Research Center of Oral Diseases, Guangzhou, China

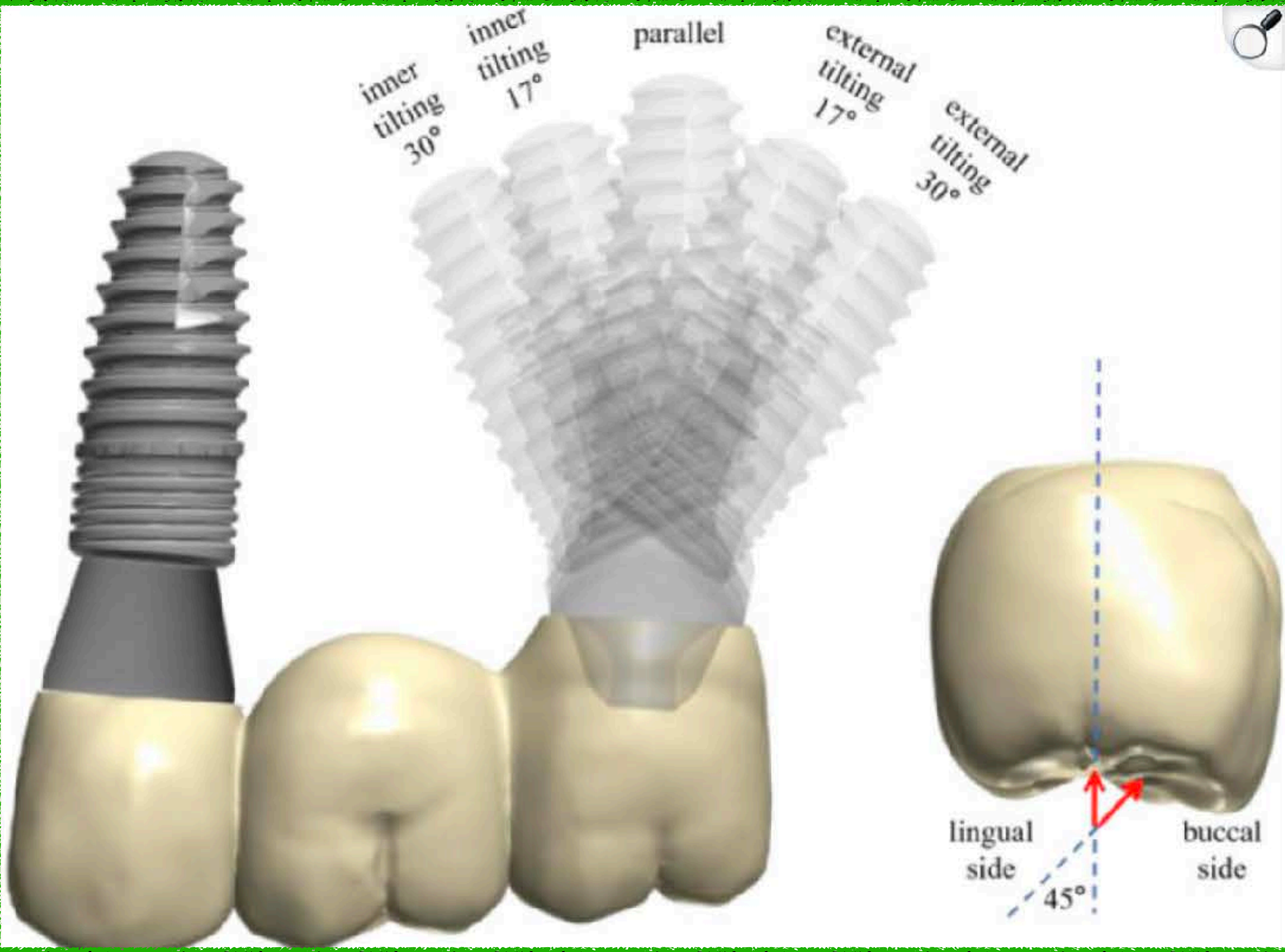
Purpose: This study aims to investigate the stress distribution in bone tissue, implant, abutment, screw, and bridge restoration when the mesial implant is placed axially and the distal implant is inserted at varying angles in the posterior maxillary region with free-end partial dentition defects, using three-dimensional finite element analysis.

Materials and methods: Cone-beam computed-tomography were utilized to create 3D reconstruction models of the maxilla. Stereolithography data of dental implants and accessories were used to design a three-unit full zirconia bridge for the maxillary model. The 3D models were imported into ANSYS Workbench 23.0 software for mesh generation and material property definition. Five different distal implant implantation directions were designed: Inner Tilting 30° group, Inner Tilting 17° group, Parallel group, External Tilting 17° group, and External Tilting 30° group. The models consisted of cortical bone, trabecular bone, implants, abutments, central screws, prosthesis screws, and prostheses. Material properties were assumed to be isotropic, homogeneous, and linearly elastic. The maxillary models were subjected to strict fixation restrictions, and the implants were considered fully osseointegrated. Two loading types were set in ANSYS Workbench 23.0: a vertical load of 300N and a lateral load of 300N at a 45°angle to the implant.

Results: Under vertical loading, the parallel group exhibited the lowest maximum stress across all implants, crowns, abutments and screws. Greater tilt angles increased abutment stress, with the external tilting 30° group reaching 1,426 MPa (close to titanium alloy's yield strength). Smaller angles of both external tilting and inner tilting shifted stress to implants from abutment and screw. During lateral loading, the external tilting 30° group showed catastrophic stress escalation (abutment: 8,612 MPa), exceeding titanium's yield limit. Bone stress remained physiological except for the internal tilting 30° group under lateral loading (142 MPa).

Conclusion: The parallel group demonstrated the least stress accumulation in all components and bone tissues. Internal tilting of the distal implant is biomechanically preferable to external tilting, and a smaller tilt angle is recommended when external tilting is necessary. This study provides valuable

Conclusion: The parallel group demonstrated the least stress accumulation in all components and bone tissues. Internal tilting of the distal implant is biomechanically preferable to external tilting, and a smaller tilt angle is recommended when external tilting is necessary. This study provides valuable



Implant Failure and Marginal Bone Loss Between Axial and Tilted Implants: An Umbrella Review with Meta-analysis

Ahmad Al Malak, DDS¹/Yasmina El Masri, MS¹/Jad El Masri, MD¹/Hassan Al Issawi, DDS¹/Pascale Salameh, PhD²/
Georges Aoun, PhD¹

Purpose: To summarize and analyze all the evidence available concerning marginal bone loss (MBL) and implant failure between tilted and axial implants. **Materials and Methods:** An electronic literature search was conducted without any language restrictions, and only systematic reviews with meta-analysis or meta-analysis studies were included. Relative risks (RRs) and the differences in mean (MD) were calculated with 95% confidence intervals (CIs) for the assessed outcomes (in mm) of implant failure and MBL. **Results:** In total, eight studies were included. Based on the short-term results, a nonsignificant mean difference (MD = 0.00; 95% CI; -0.01–0.02; *P* value = .75) was recorded between tilted and axial implants supporting full-arch dentures. A significant mean difference was recorded at 3-year follow-up (MD = 0.08 95% CI = 0.05–0.11; *P* value < .00001) and at long-term follow-up (MD = 0.18; 95% CI = 0.15–0.20; *P* value < .00001). A nonsignificant difference was observed between tilted and axial implants regarding implant failure (RR = 1.02; 95% CI = 0.85–1.23; *P* value = .81). **Conclusions:** Based on the high- and moderate-quality studies with low risk of bias included in this review, no significant difference in outcome regarding implant failure was observed between tilted and axial implants supporting full-arch or fixed partial dentures. *Int J Oral Maxillofac Implants* 2024;39:875–883. doi: 10.11607/jomi.10885

Keywords: axial implant, dental implant, implant failure, marginal bone loss, tilted implant

Why is this **All on 4** concept becoming more and more popular **again** now?

4. Improved accuracy of **guided** surgery and **prefabricated** restoration

1. Error during guide manufacturing (Up to **0.7mm**)

- CT scan
- Data segmentation
- Rapid prototyping (**<0.25mm**)

2. Positioning error

3. Error during surgical procedure

Entrance point: 0.29-**2.45** mm

Angle deviation: 0.16-**8.86**

Apical deviation: 0.32-**3.01**mm

Jan D'haese (2012)

Applications of PROCERA® Picolo System



Picolo

Applications of PROCERA® Forte System



All on X

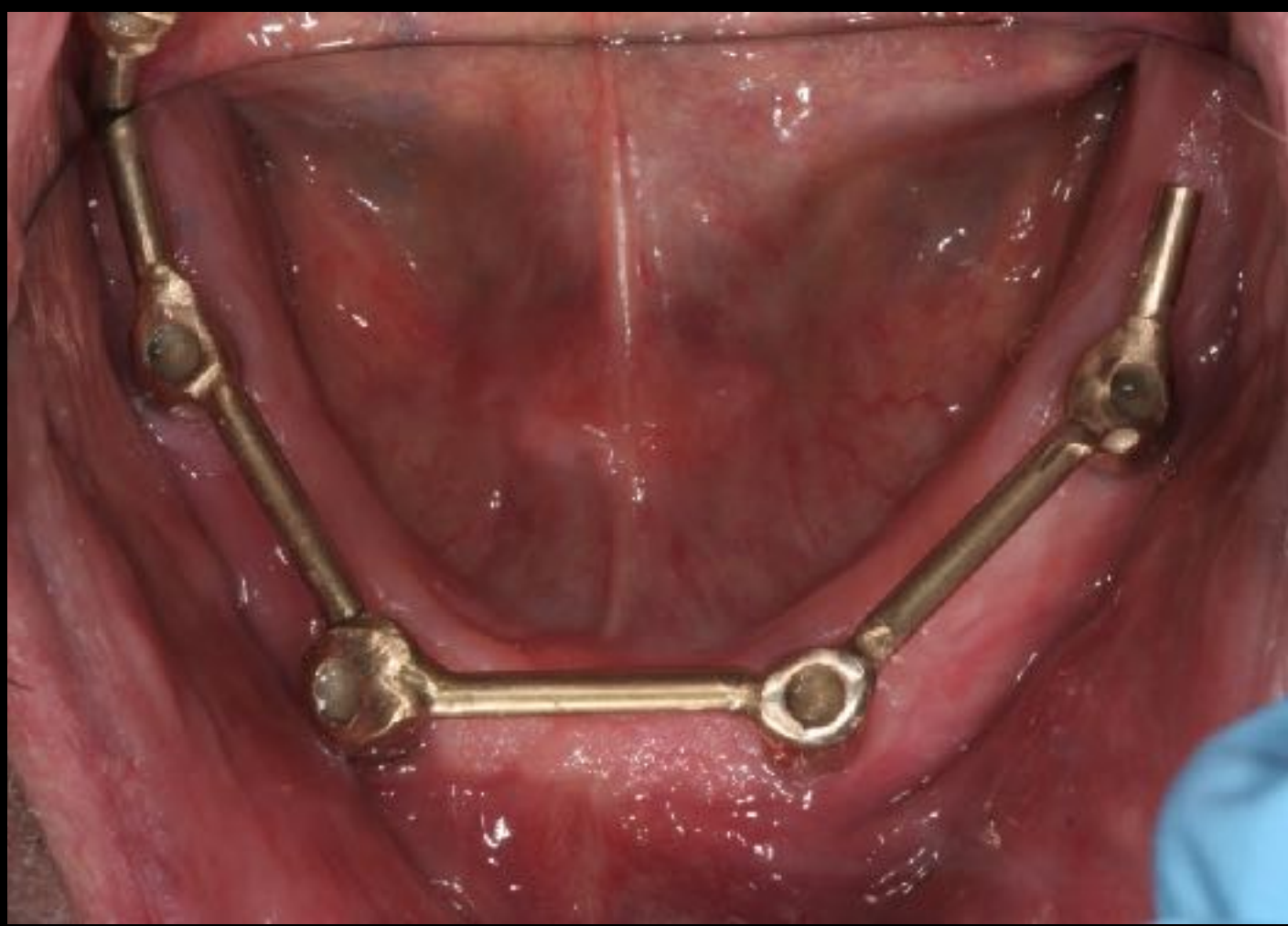
Maxilla: All on **many** as possible with simple sinus augmentation

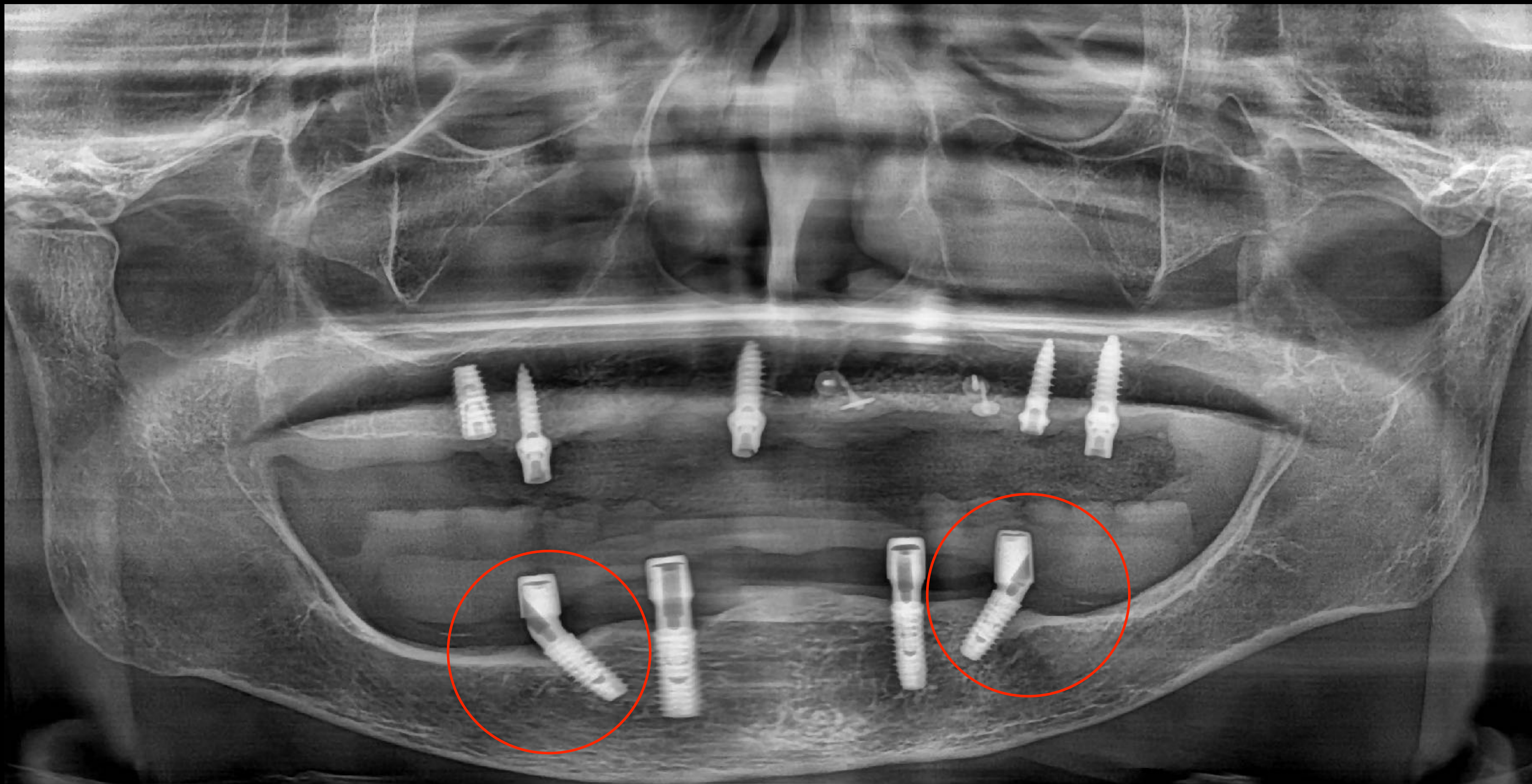
Mandible: All on **4-5**

Table 1. Treatment Options for the Completely Edentulous Mandible

	<i>Implant-retained Overdenture</i>	<i>Implant-supported Overdenture</i>	<i>Fixed Hybrid Prosthesis</i>	<i>Fixed PFM Prosthesis</i>
No. of implants	1-4	4-6	4-6	6-10
Implant position	Distribution over the arch anterior to mental foramina	Distribution over the arch anterior to mental foramina	Distribution over the arch anterior to mental foramina	Meticulous distribution in optimal position according to diagnostic wax-up
Oral hygiene	Easier	Easy	Easy	Demanding
Phonation	Fewer problems	Fewer problems	More problems	More problems
Esthetics	Predictable	Predictable	Demanding	Demanding
Bone loss	Moderate-severe	Moderate-severe	Moderate-severe	Minimal
Cost	Least expensive	Less expensive	Less expensive	Most expensive

Abbreviation: PFM, porcelain fused to metal.





Implant Failure and Marginal Bone Loss Between Axial and Tilted Implants: An Umbrella Review with Meta-analysis

Ahmad Al Malak, DDS¹/Yasmina El Masri, MS¹/Jad El Masri, MD¹/Hassan Al Issawi, DDS¹/Pascale Salameh, PhD²/
Georges Aoun, PhD¹

Purpose: To summarize and analyze all the evidence available concerning marginal bone loss (MBL) and implant failure between tilted and axial implants. **Materials and Methods:** An electronic literature search was conducted without any language restrictions, and only systematic reviews with meta-analysis or meta-analysis studies were included. Relative risks (RRs) and the differences in mean (MD) were calculated with 95% confidence intervals (CIs) for the assessed outcomes (in mm) of implant failure and MBL. **Results:** In total, eight studies were included. Based on the short-term results, a nonsignificant mean difference (MD = 0.00; 95% CI; -0.01–0.02; *P* value = .75) was recorded between tilted and axial implants supporting full-arch dentures. A significant mean difference was recorded at 3-year follow-up (MD = 0.08 95% CI = 0.05–0.11; *P* value < .00001) and at long-term follow-up (MD = 0.18; 95% CI = 0.15–0.20; *P* value < .00001). A nonsignificant difference was observed between tilted and axial implants regarding implant failure (RR = 1.02; 95% CI = 0.85–1.23; *P* value = .81). **Conclusions:** Based on the high- and moderate-quality studies with low risk of bias included in this review, no significant difference in outcome regarding implant failure was observed between tilted and axial implants supporting full-arch or fixed partial dentures. *Int J Oral Maxillofac Implants* 2024;39:875–883. doi: 10.11607/jomi.10885

Keywords: axial implant, dental implant, implant failure, marginal bone loss, tilted implant





Implant necks should be enlarged. Implants with narrow or constricted necks should be avoided.^{15,16}

Maxillary Implant Overdenture or Fixed hybrid prosthesis

Implant Supported Overdenture

6 -8 implants

- Cross Arch Splinting Milled bar
- 2 Separate Milled bar

Tissue Supported Overdenture

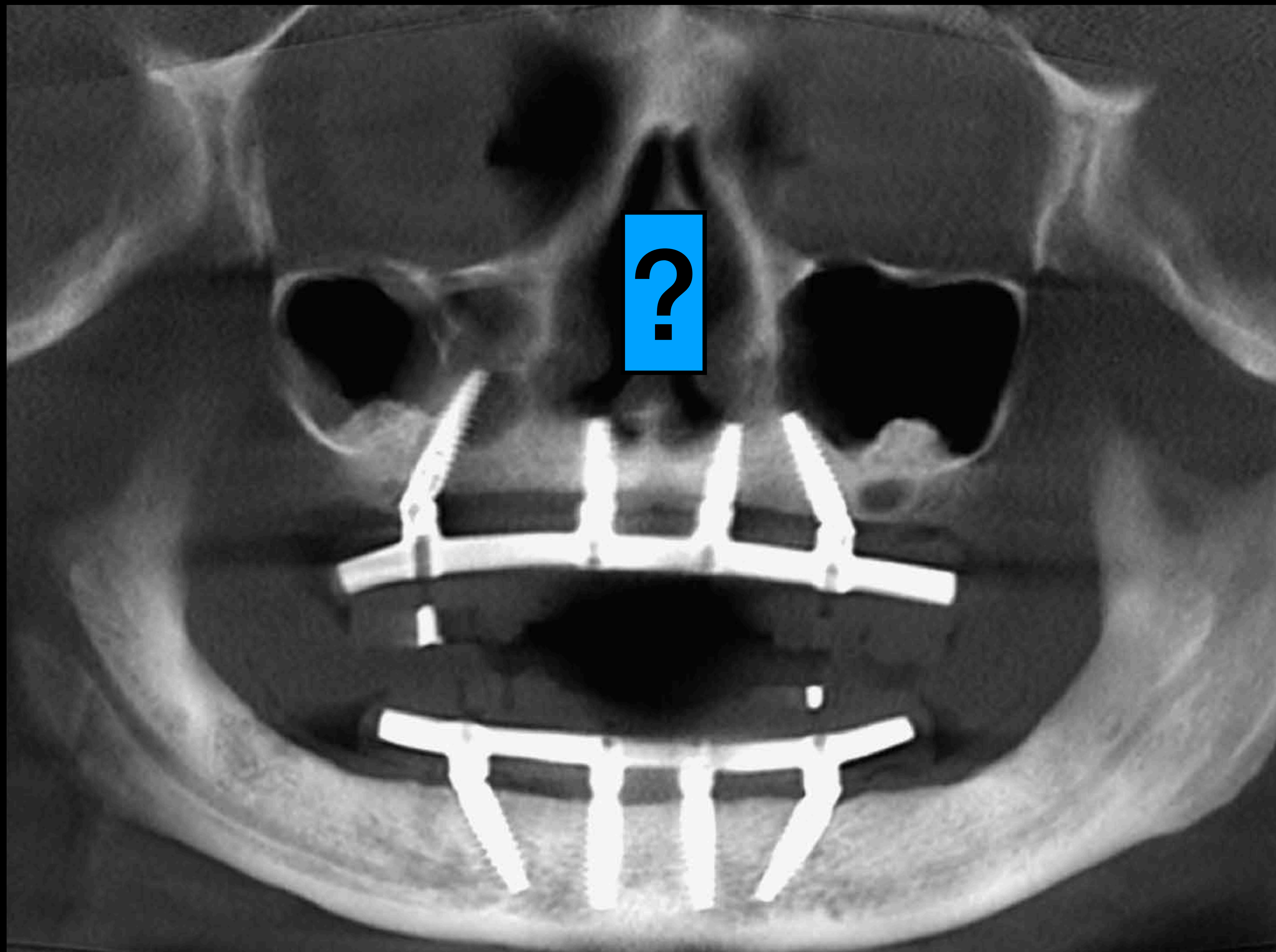
4 implants

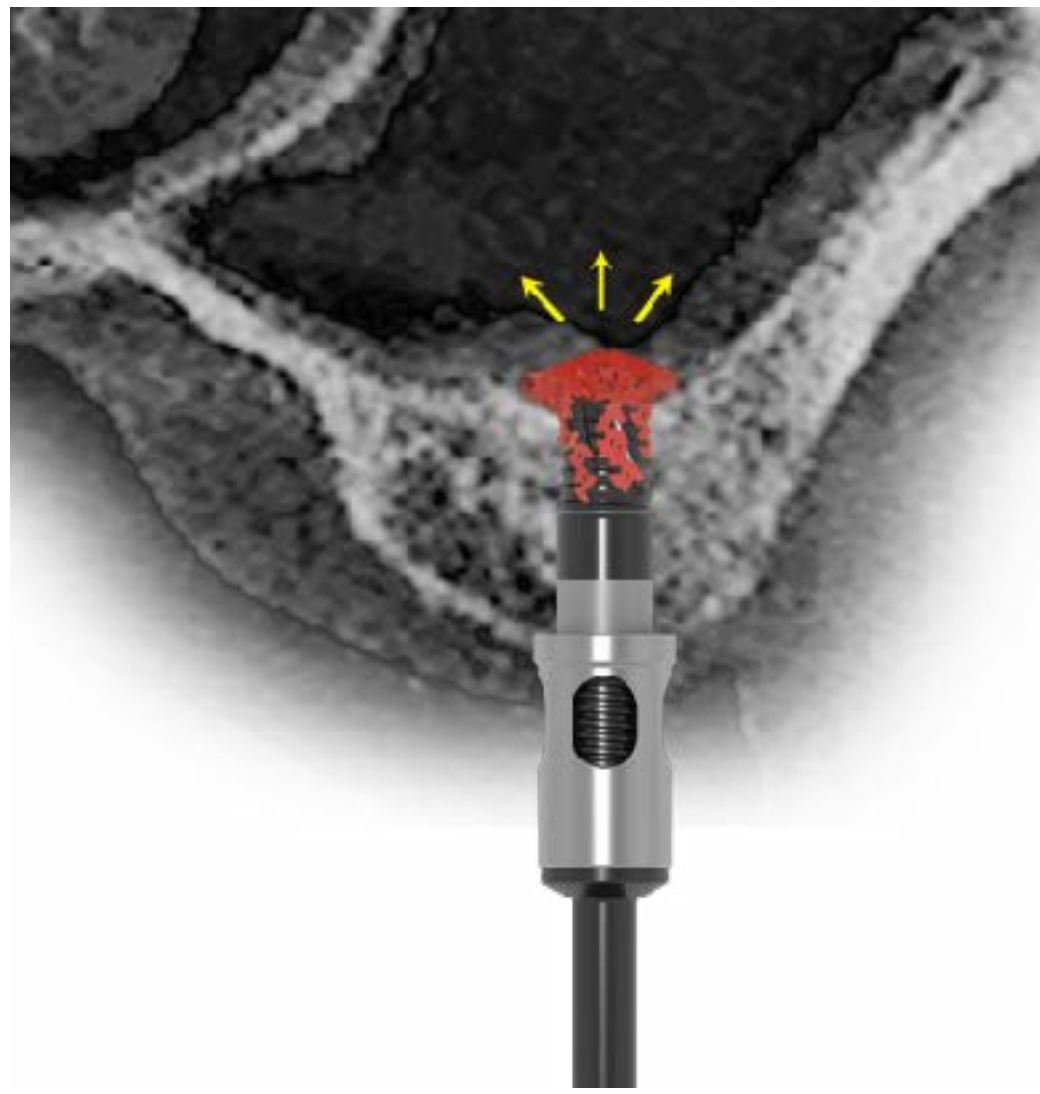
- Solitary attachment
- ✗ Bar and clip

Problem in Peripheral Seal

Adrian E. J Prosthet Dent. 1992;67:219–222.

Wismeijer D. J Prosthet Dent. 1995;74:380–384.

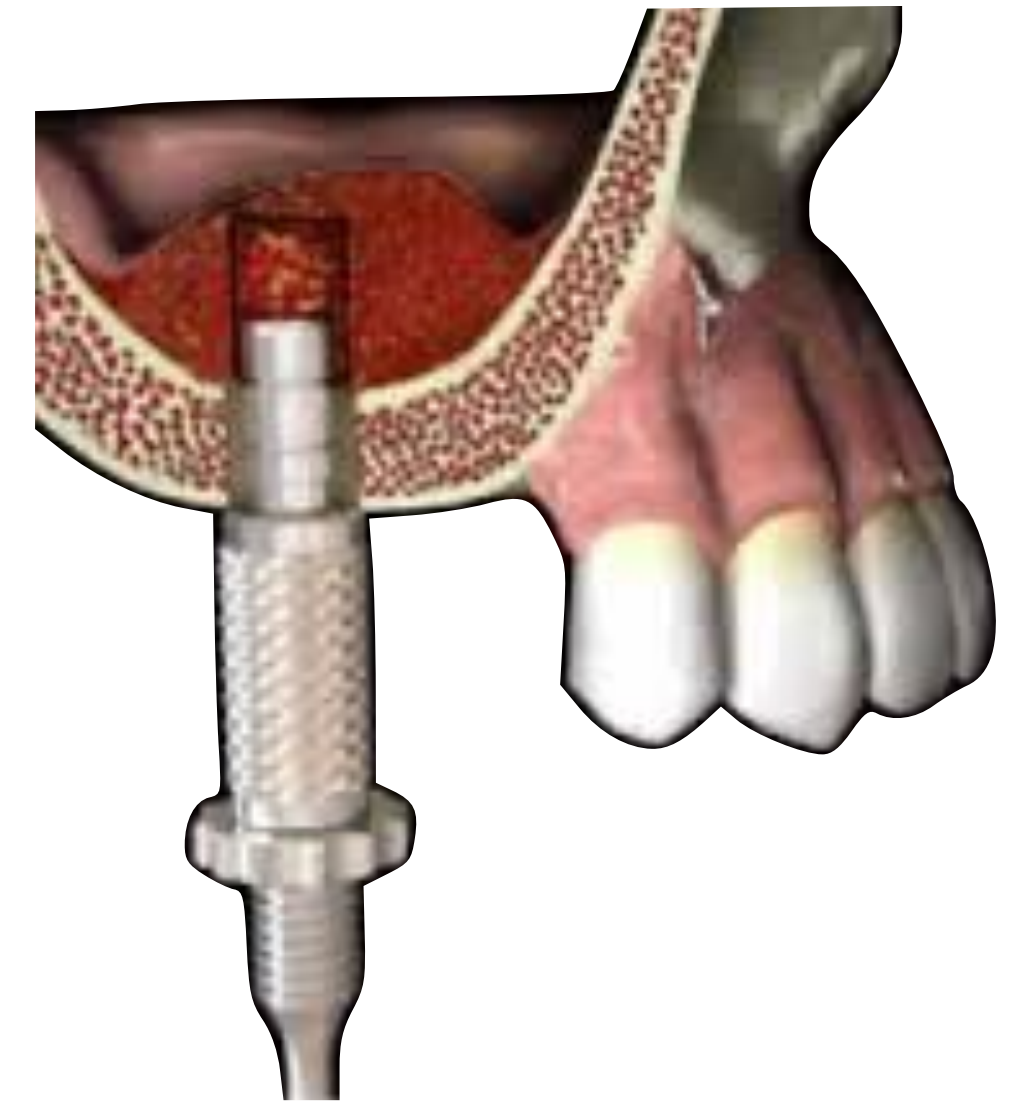




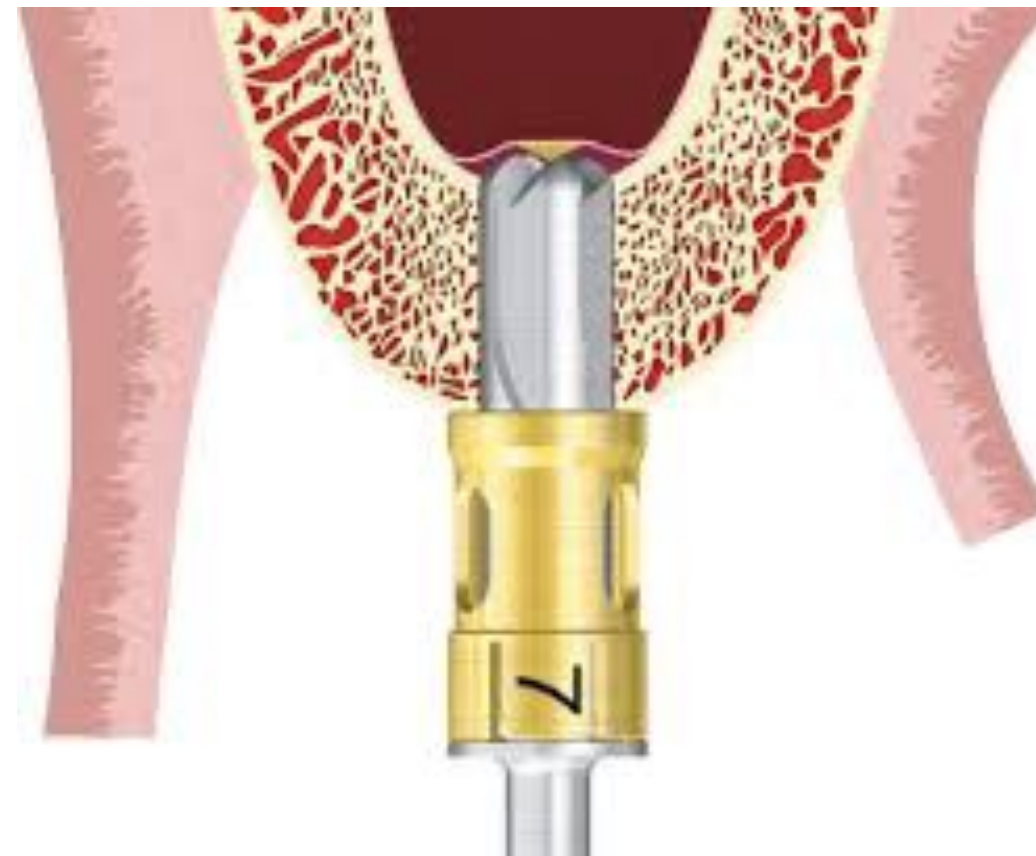
Dentium



Versah LLC



Neobiotech

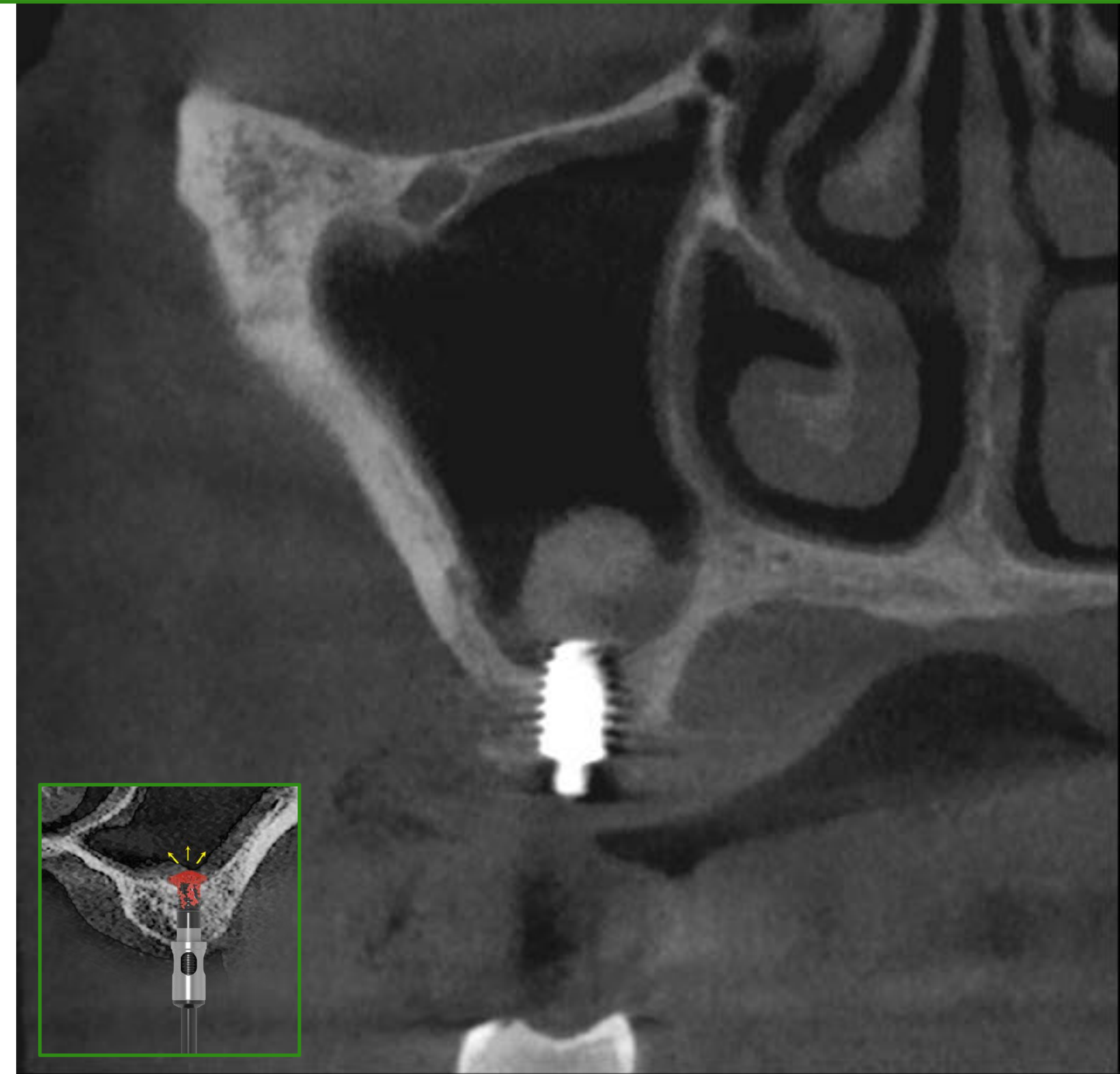
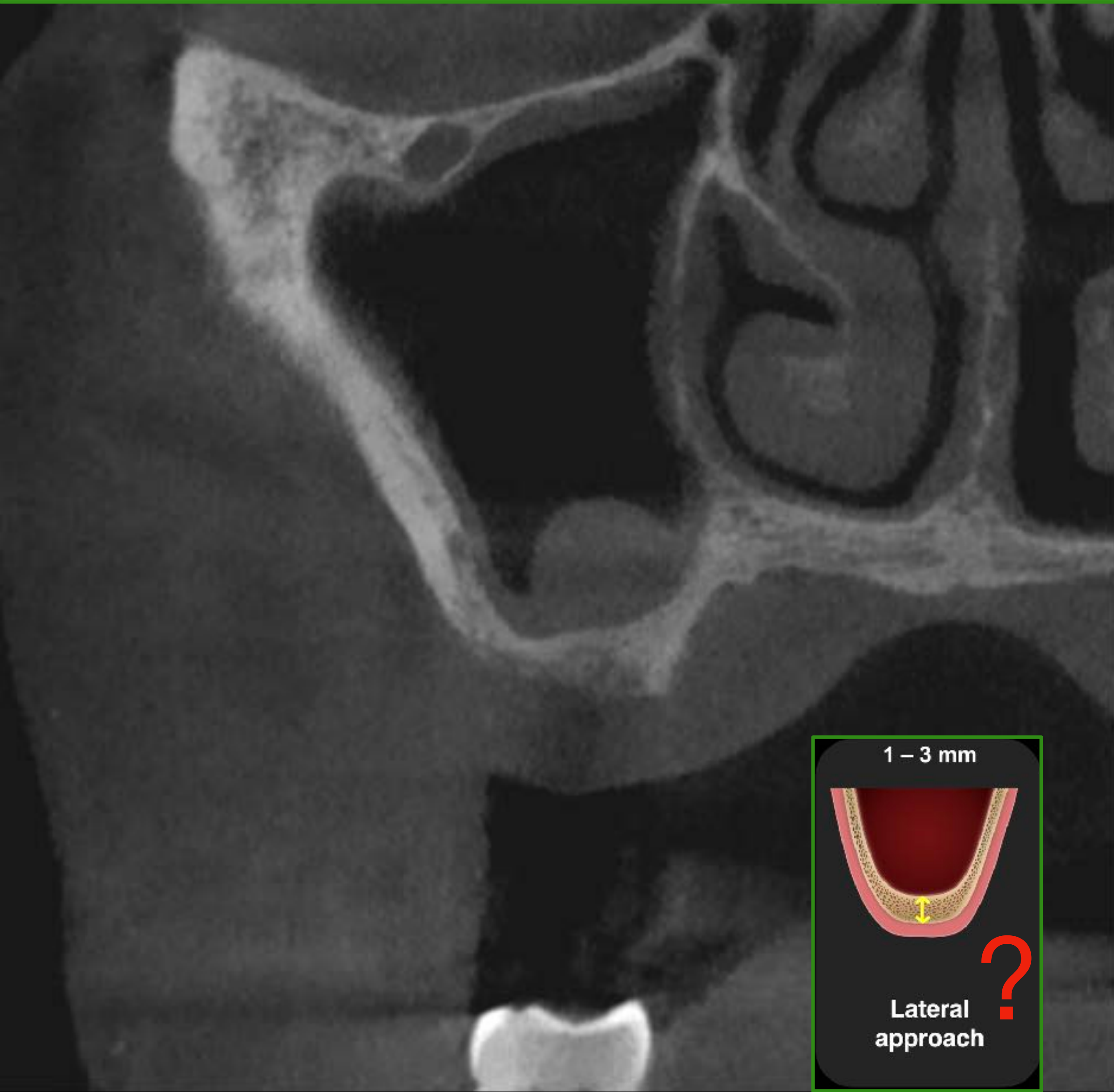


Osstem



MegaGen

Sinus augmentation with crestal approach



00592856

2020-06-19

11:23:45

Acc:4001810750

Srs:1001

Img:1001

R

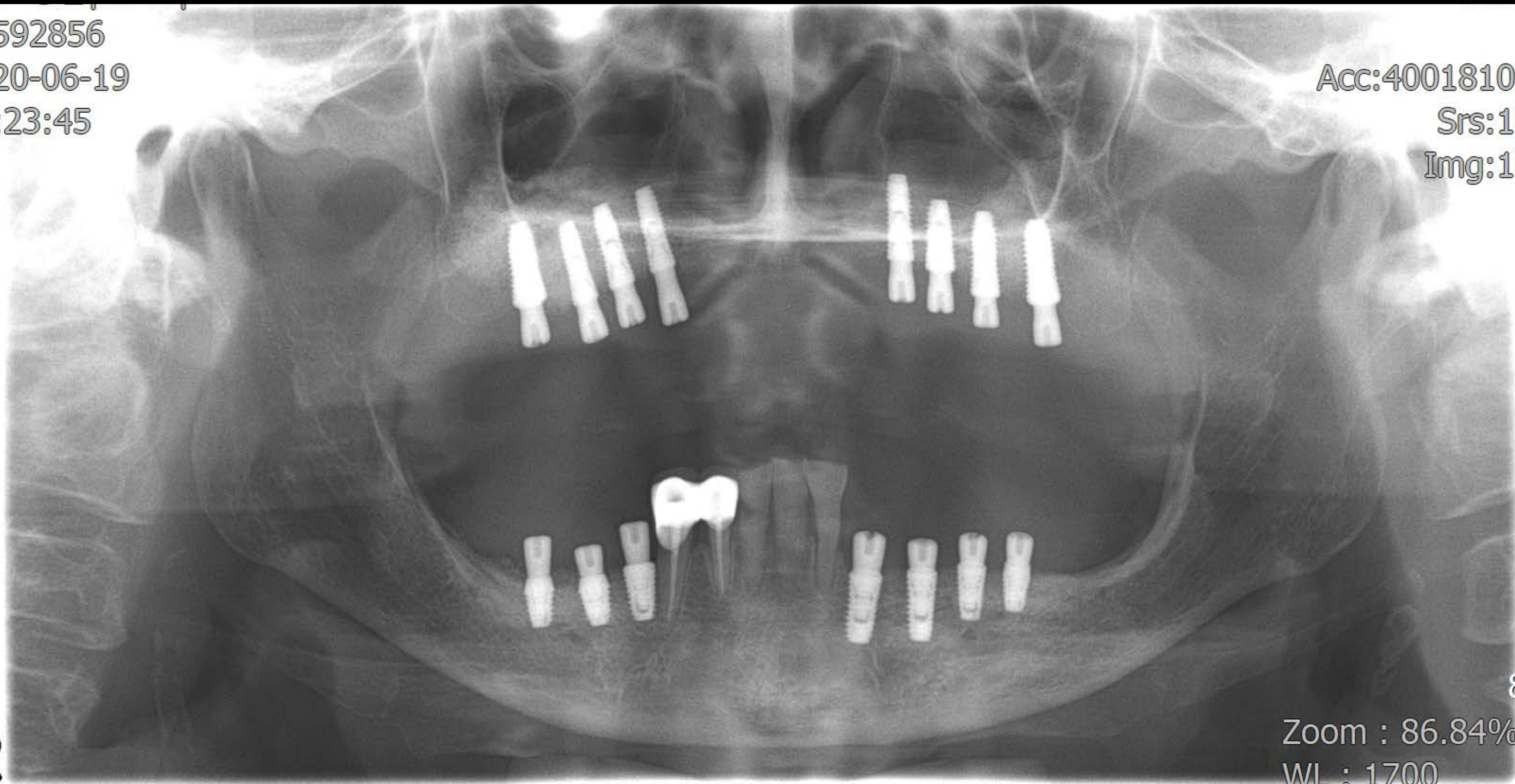
Sens:365.000000

Zoom : 86.84%

WL : 1700

WW : 2000

8cm







Before



After





Tx. Strategy for elderly
population

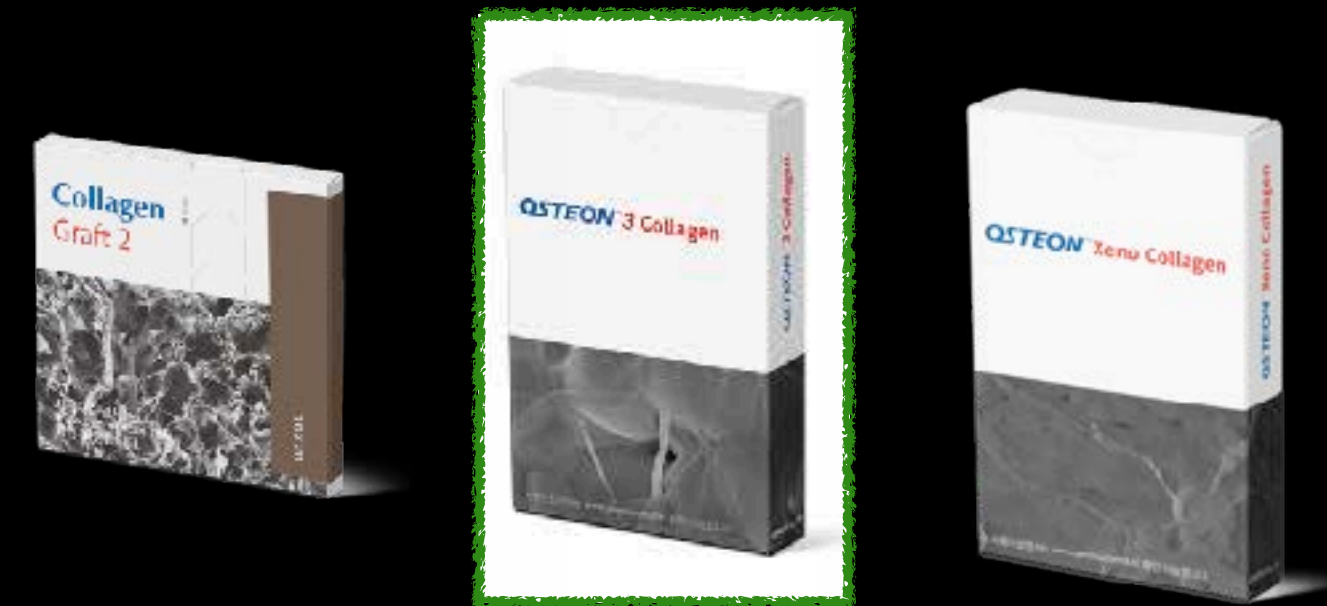
Short imp.



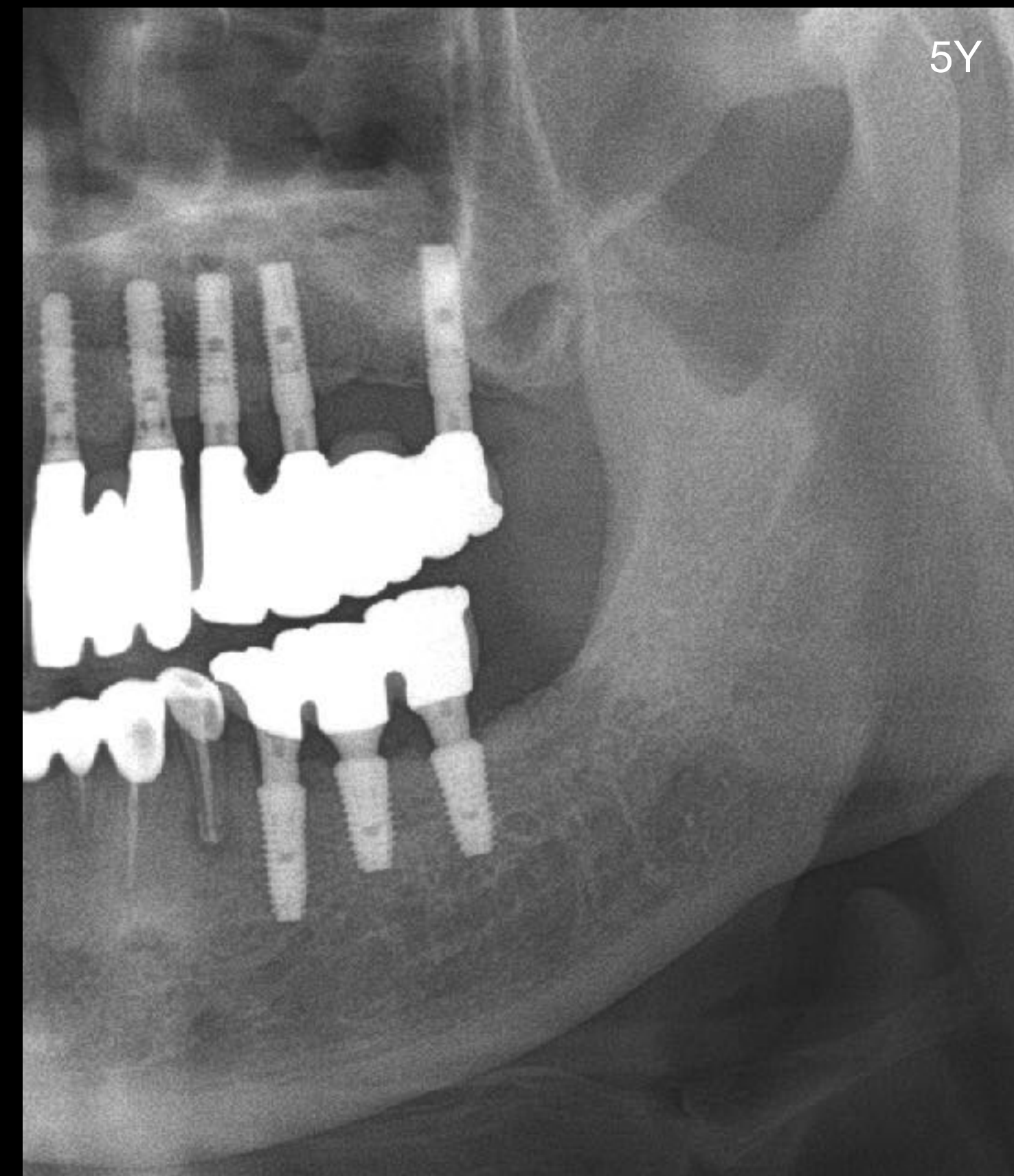
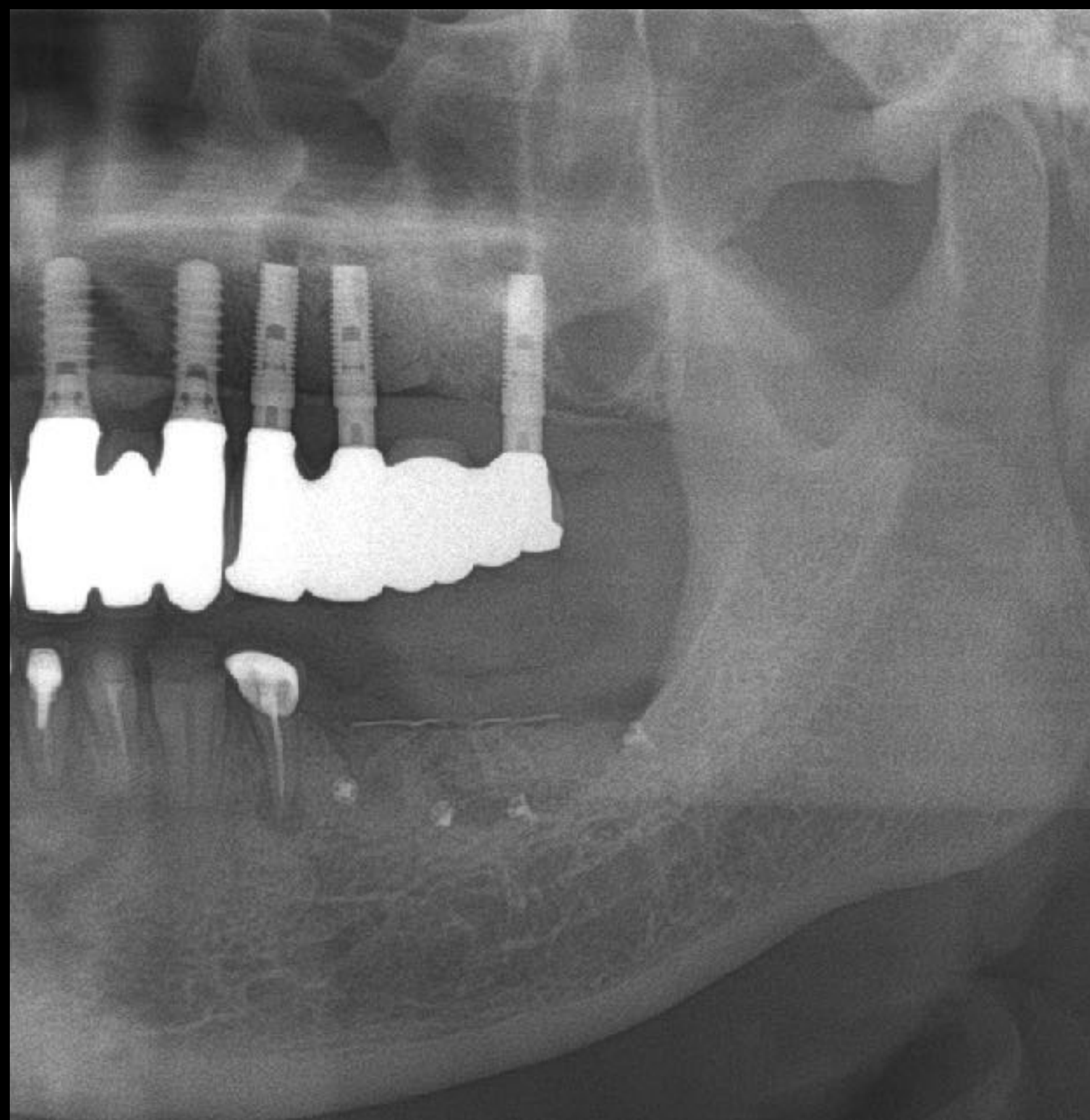
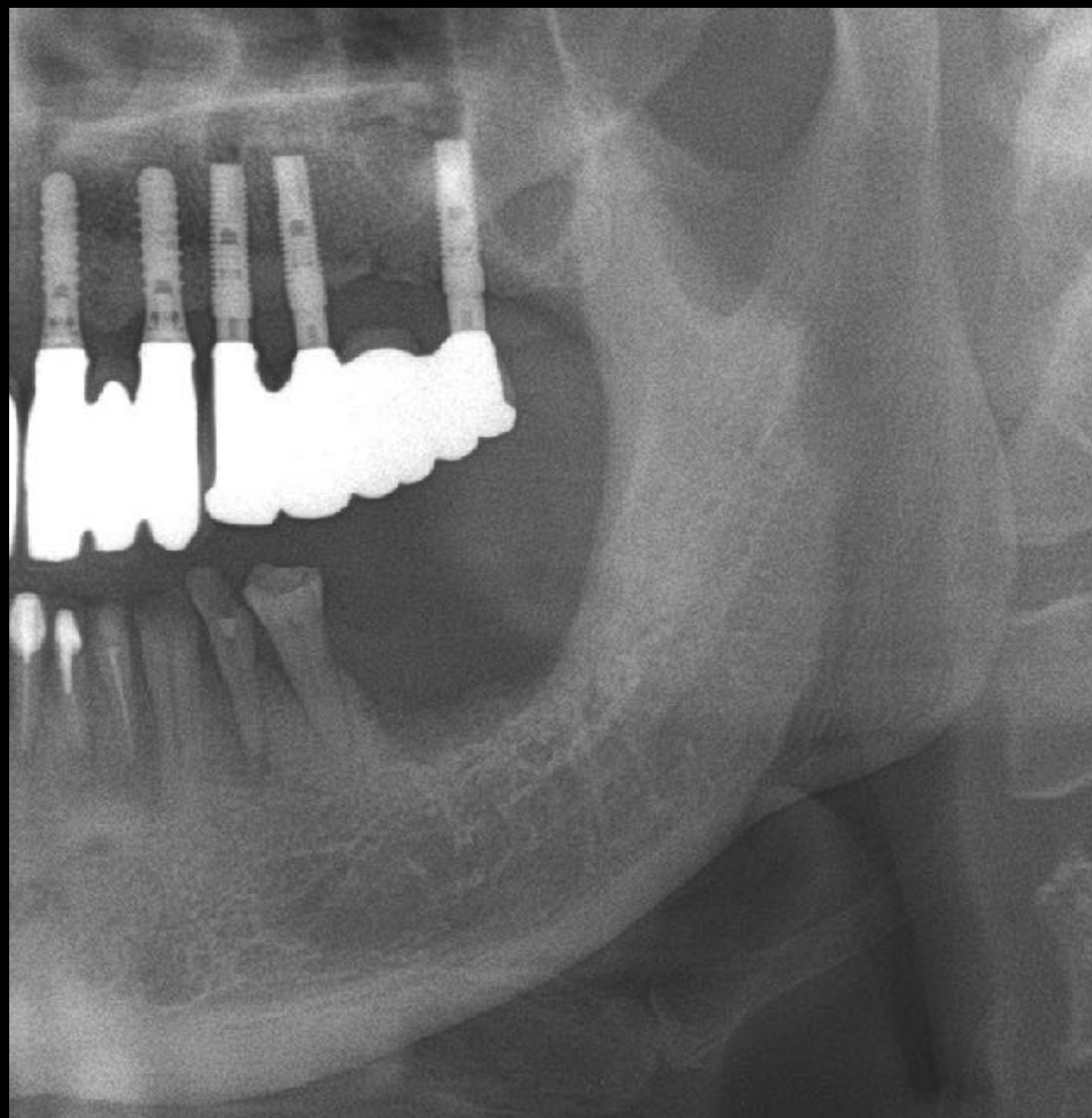
Narrow imp.

Simplified Vertical Augmentation
Simplified Sinus Augmentation

With Collagenated bone and collagen matrix



Simplified Horizontal Augmentation



Ridge preservation with collagenated bone successfully maintain bone height and volume.

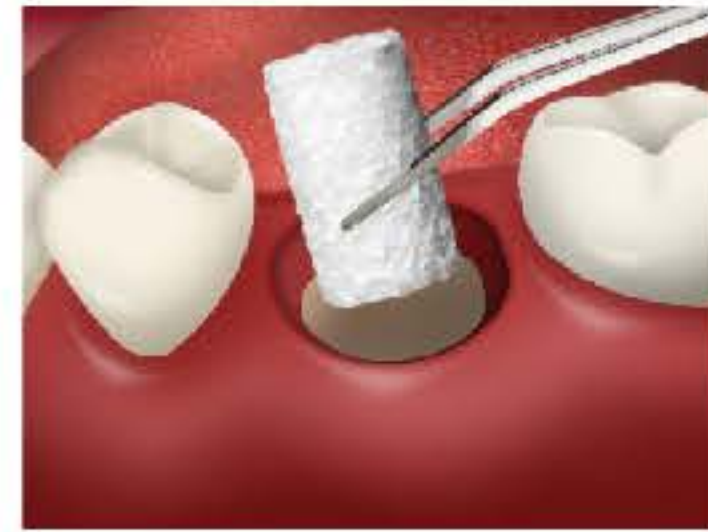


Big Time Game Changer

- **Socket sealing for ridge preservation**



Pre-OP



Application of
graft material



Application of
Collagen Graft x2D



Suture

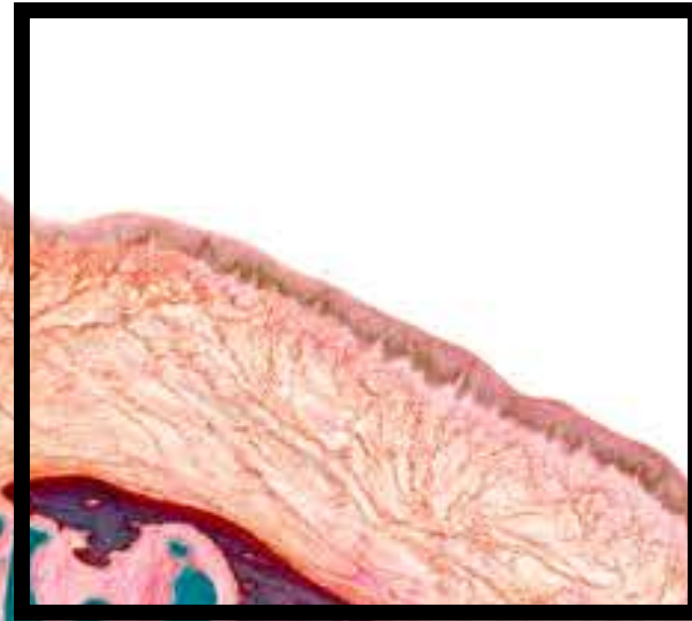


Healing



Dentium
For Dentists By Dentists

Sealing effect in extraction socket with missing buccal wall



Non cross-linked collagen membrane

Cross-linked collagen membrane

Alveolar ridge preservation in the posterior maxilla reduces vertical dimensional change: A randomized controlled clinical trial

Jae-Kook Cha¹ | Young W
Ui-Won Jung¹ | Daniel S.

¹Department of Periodontology,
Research Institute for Periodontal
Regeneration, Yonsei University College of
Dentistry, Seoul, South Korea

Collagenated bone was effective on maintaining bone height.

Abstract

Objectives: To test whether or not alveolar ridge preservation reduces vertical changes in the posterior maxilla compared to spontaneous healing following tooth

(a)

Mid.

(b)

Conclusion: Alveolar ridge preservation in the posterior maxilla maintained the vertical bone height more efficiently and resulted in less need for sinus augmentation procedures at 6 months compared to spontaneous healing.

height than the control group at 6 months (7.00 mm [0.00; 8.20] vs. 4.00 mm [0.74; 5.76], respectively, $p < 0.05$). Implant placement without any additional sinus augmentation procedure was performed in 42.9% of test group cases, whereas in all of the subjects in the control group an additional augmentation procedure was needed (100% of the cases).

Conclusion: Alveolar ridge preservation in the posterior maxilla maintained the vertical bone height more efficiently and resulted in less need for sinus augmentation procedures at 6 months compared to spontaneous healing.

KEYWORDS

alveolar ridge preservation, cone-beam CT, maxillary sinus, pneumatization, sinus augmentation, superimposition, vertical dimension

Scientific Research Report

Alveolar Ridge Preservation Using a Collagenated Xenograft: A Randomized Clinical Trial



Hyunjae Kim^a, Hee-seung Han^b, Shahram Ghanaati^c, Homayoun H. Zadeh^d,
Sungtae Kim^a, Young-Dan Cho^{a*}

^a Department of Periodontology, School of Dentistry, National University Dental Hospital, Seoul, Korea

^b Department of Periodontology, Korea University, Seoul, Korea

^c Clinic of Oro-Maxillofacial and Plastic Surgery, Frankfurt, Germany

^d VISTA Institute for Therapeutic Innovations, Woodland Hills, California, USA

Collagenated bone was effective on maintaining bone volume.

Clinical Relevance: The use of DBBM-C for ARP seems to aid in volume maintenance as compared with spontaneous healing. Gingival sealing with an FGG can help maintain the width of the alveolar ridge. This clinical trial was not registered prior to participant recruitment and randomization. This study was registered at WHO ICTRP (<https://trialsearch.who.int/Trial2.aspx?TrialID=KCT0008266>).

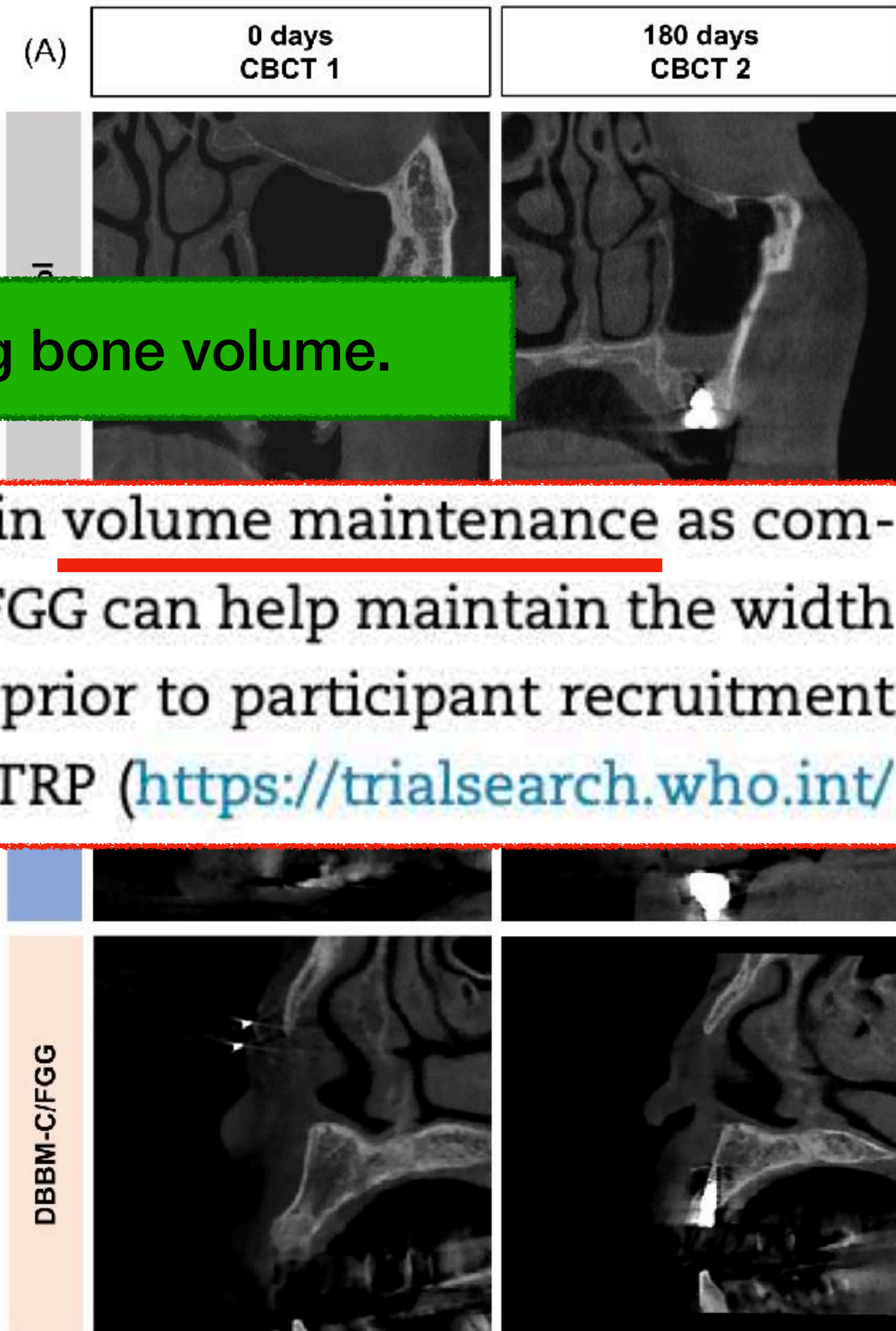
Tooth socket
Wound healing
Xenograft

failure. The changes in alveolar bone during follow-up were not significantly different. Between 84- and 180-day postextraction, the volume of the DBBM-C and DBBM-C/FGG groups was maintained at 3 mm below the alveolar ridge crest (0.72 ± 0.80 mm, $6.05 \pm 6.69\%$), whereas the volume in the control group decreased (-0.37 ± 1.31 mm, $-2.10\% \pm 8.37\%$) ($P = .026$). The DBBM-C/FGG group exhibited less horizontal ridge resorption at 1 mm below the alveolar crest (-9.19 ± 5.09 mm, $-73.67\% \pm 32.53\%$) between preextraction and 84 days postextraction ($P = .049$). In all groups, the implant stability quotient remained above 70. **Conclusions:** Within the limitations of this study, both ARP using DBBM-C with and without socket sealing effectively preserved the width dimension of the alveolar ridge, with no significant difference in alveolar bone resorption. However, socket sealing appeared to enhance the stability of the bone graft and bone quality.

Clinical Relevance: The use of DBBM-C for ARP seems to aid in volume maintenance as compared with spontaneous healing. Gingival sealing with an FGG can help maintain the width of the alveolar ridge. This clinical trial was not registered prior to participant recruitment and randomization. This study was registered at WHO ICTRP (<https://trialsearch.who.int/Trial2.aspx?TrialID=KCT0008266>).

© 2024 The Authors. Published by Elsevier Inc. on behalf of FDI World Dental Federation.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



SYSTEMATIC REVIEW

Short (≤ 6 mm) compared with ≥ 10 -mm dental implants in different clinical scenarios: A systematic review of randomized clinical trials with meta-analysis, trial sequential analysis and quality of evidence grading

Andrea Ravidà¹ | Matteo Serroni^{1,2} | Wenche S. Borgnakke^{1,3} |
Mario Romandini⁴ | I-Ching (Izzie) Wang⁵ | Claudia Arena⁶ |
Marco Annunziata⁷ | Gennaro Cecoro⁷ | Muhammad H. A. Saleh³

¹Department of Periodontics and Preventive Dentistry, School of Dental Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

²Department of Innovative Technologies in Medicine and Dentistry, 'G. D'Annunzio' University of Chieti-Pescara, Chieti, Italy

³Department of Periodontics and Oral Medicine, School of Dentistry, University of Michigan, Ann Arbor, Michigan, USA

⁴Department of Periodontology, Faculty of Dentistry, University of Oslo, Oslo, Norway

⁵Department of Periodontics, College of Dentistry and Dental Clinics, University of Iowa, Iowa City, Iowa, USA

⁶Department of Mental and Physical Health and Preventive Medicine, University of Campania 'Luigi Vanvitelli', Naples, Italy

⁷Multidisciplinary Department of Medical-Surgical and Dental Specialties, University of Campania 'L. Vanvitelli', Napoli, Italy

Correspondence

Wenche S. Borgnakke, Department of Periodontics and Preventive Dentistry, School of Dental Medicine University of Pittsburgh, 3501 Terrace St Rm B22, Pittsburgh PA 15213, USA.
Email: wsb@umich.edu

Abstract

Aim: To systematically identify, synthesize and critically summarize the available scientific evidence from randomized controlled trials (RCTs) regarding whether short (≤ 6 mm) perform as well as long (≥ 10 mm) implants regarding implant survival, marginal bone loss, and biologic and prosthetic complications in different clinical scenarios.

Materials and Methods: Cochrane Collaboration's risk of bias tool and the GRADE approach were applied. Results were synthesized using random-effects meta-analyses assessed by trial sequential analyses.

Results: Forty reports on 19 RCTs comprising 2214 (1097 short; 1117 long) implants were included. Moderate/high certainty/quality evidence demonstrated similar 5-year survival rates for ≤ 6 -mm and ≥ 10 -mm implants in non-augmented bone and full-mouth rehabilitation in either jaw, and for 6-mm implants in the maxilla instead of sinus lift. Nevertheless, the evidence for 5-year survival rates remains inconclusive or insufficient for the remaining combinations of implant lengths and clinical scenarios. They include 4-mm and 5-mm implants as alternatives to sinus lift as well as placing all implant lengths ≤ 6 mm instead of vertical ridge augmentation with long implants. Marginal bone level and short- and long-term biologic or prosthetic complications were similar.

Conclusions: Based on moderate/high certainty/quality evidence from 5-year RCTs, implants ≤ 6 mm may be viable alternatives to ≥ 10 -mm implants in either jaw in native bone and full-arch rehabilitation, and 6-mm implants may be used as an alternative to sinus lift. Trial registration: PROSPERO ID: CRD42021254365.

KEYWORDS

dental implantation, endosseous; health care costs; practice patterns, dentists'; randomized controlled trial; survival rate

RESEARCH

Open Access



Clinical and radiographic outcomes of extra-short implants (≤ 6 mm) in the posterior atrophic jaws: a retrospective cohort study

Stefano Sivolella^{1*}, Stefano Giovannini², Joana Berber², Michele Stocchero³ and Giulia Brunello^{1,4,5}

Abstract

Objective This study aimed at investigating implant survival rate and marginal bone loss (MBL) around extra-short implants. The impact of the loading protocol and of the use of an intermediate abutment was also evaluated, to explore possible differences in terms of the outcome measures.

Materials and methods Patients with single or multiple mandibular or maxillary posterior edentulism rehabilitated using extra-short 5–6 mm long implants were included. Different prosthetic protocols were used. Clinical and radiological follow-up was 5 years. The outcomes measures were implant survival and MBL.

Results The analysis included 56 implants placed in 34 adults (12 males and 22 females; mean age 60 years, SD 11). Six implants failed during a median follow-up of 5 years and 4 of them were recorded in one patient at 2-year follow-up. The 5-year implant survival was 89% overall (87% in conventional and 94% in immediate loading). At univariate analysis, during follow-up immediate loading was associated with higher MBL (mean variation 0.21 mm, 95%CI 0.01 to 0.40; $p=0.02$), while intermediate abutment was associated with lower MBL (mean variation -0.23 mm, 95%CI -0.39 to -0.09; $p=0.003$). Multivariable analysis confirmed that immediate loading was associated with higher MBL.

Conclusion Within its limitations, this study showed that extra-short implants under immediate loading conditions can be a reliable solution. The application of horizontal and vertical platform switching with the use of intermediate abutments seems to be able to contribute to the reduction of MBL.

Subcrestal implant placement

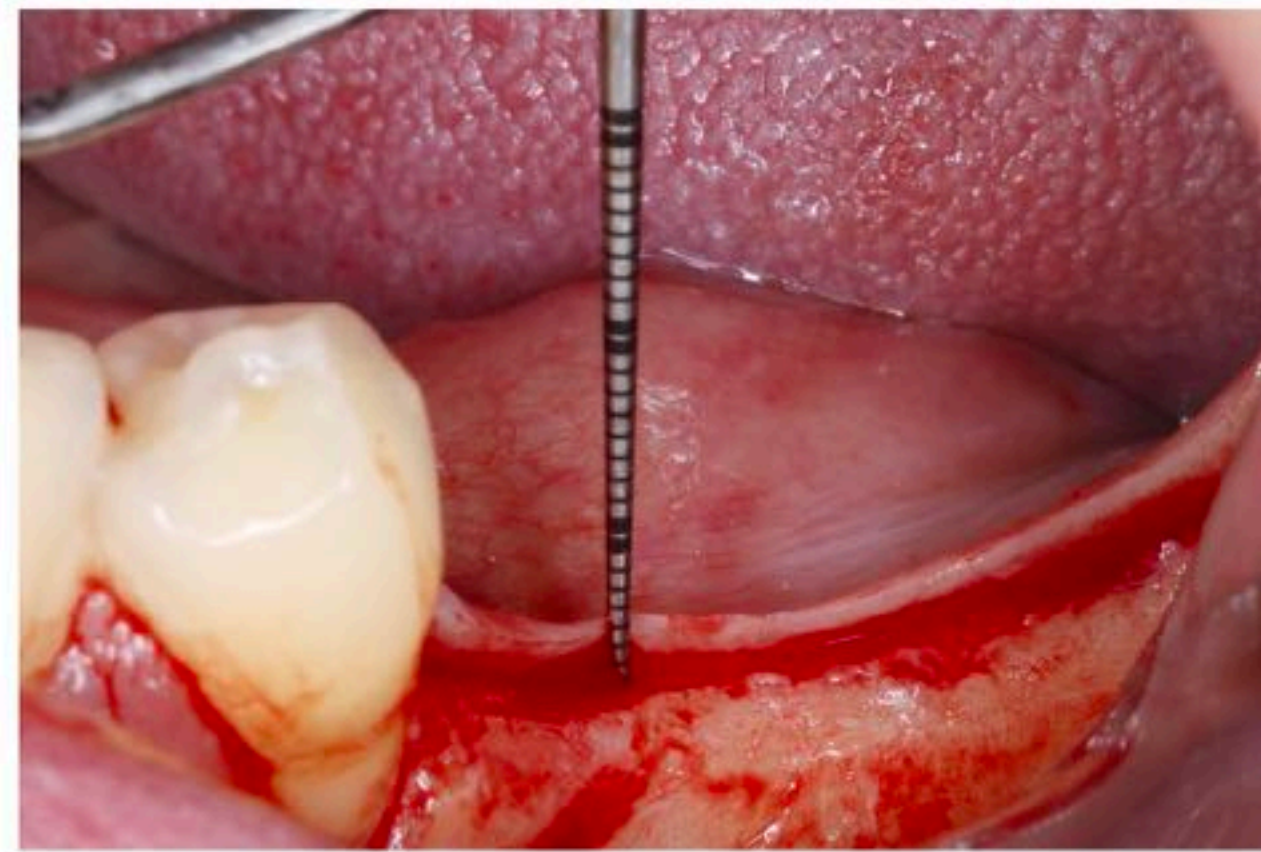


FIGURE 1 Initial measurement of vertical soft tissue thickness with 0.5 mm graded periodontal probe had to be ≤ 2 mm to be included into the study

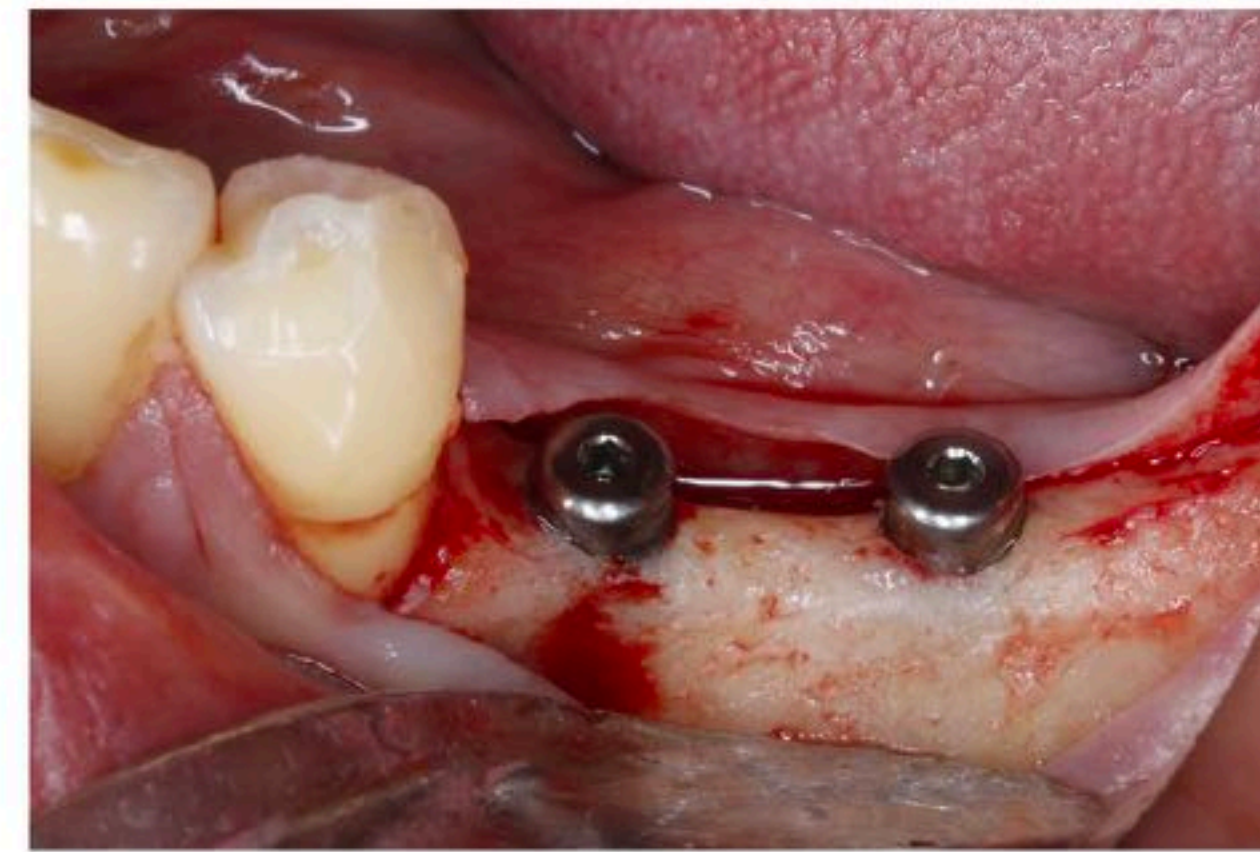


FIGURE 3 Epicrestally placed implants with 2 mm height healing abutments to be tented with released mucoperiosteal flaps

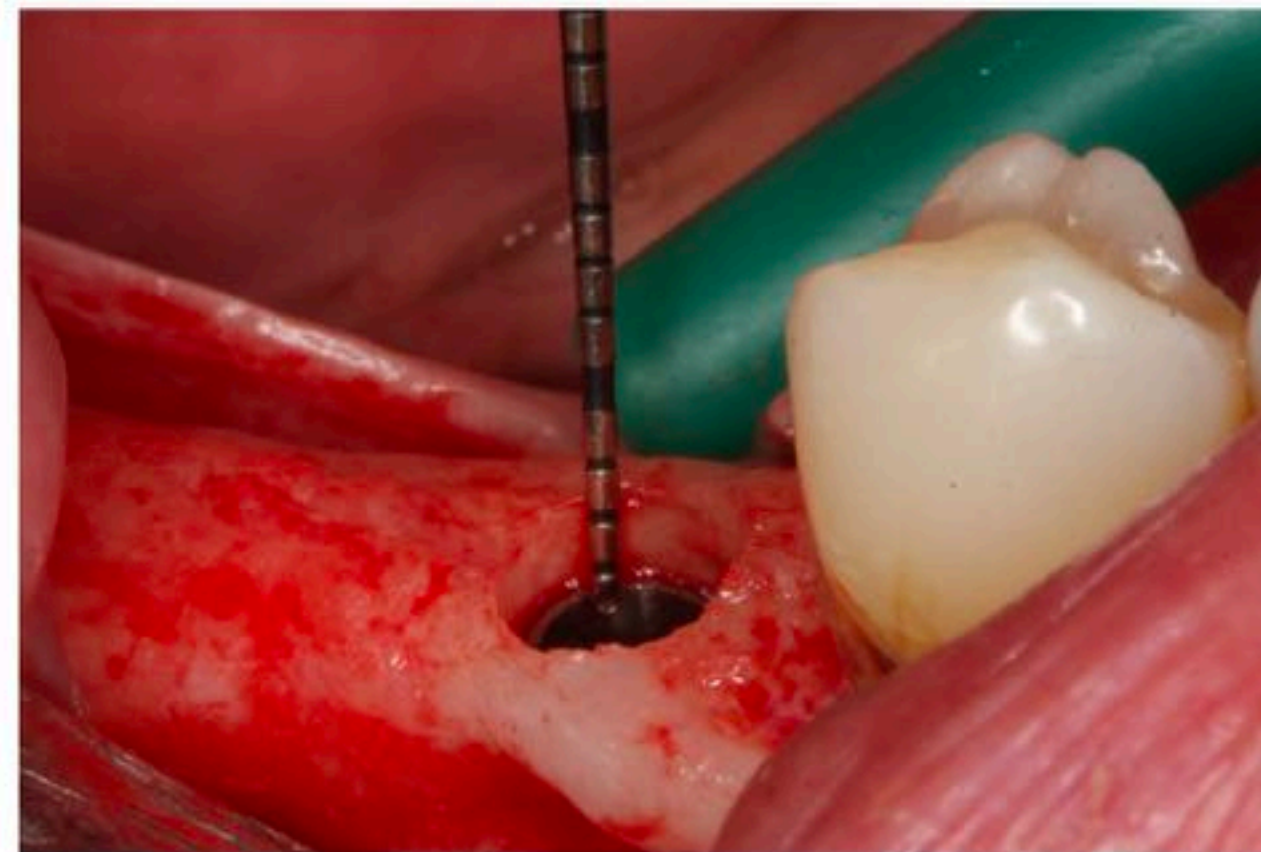


FIGURE 2 Subcrestal implant position 1.5 mm below the bone level in Group 1

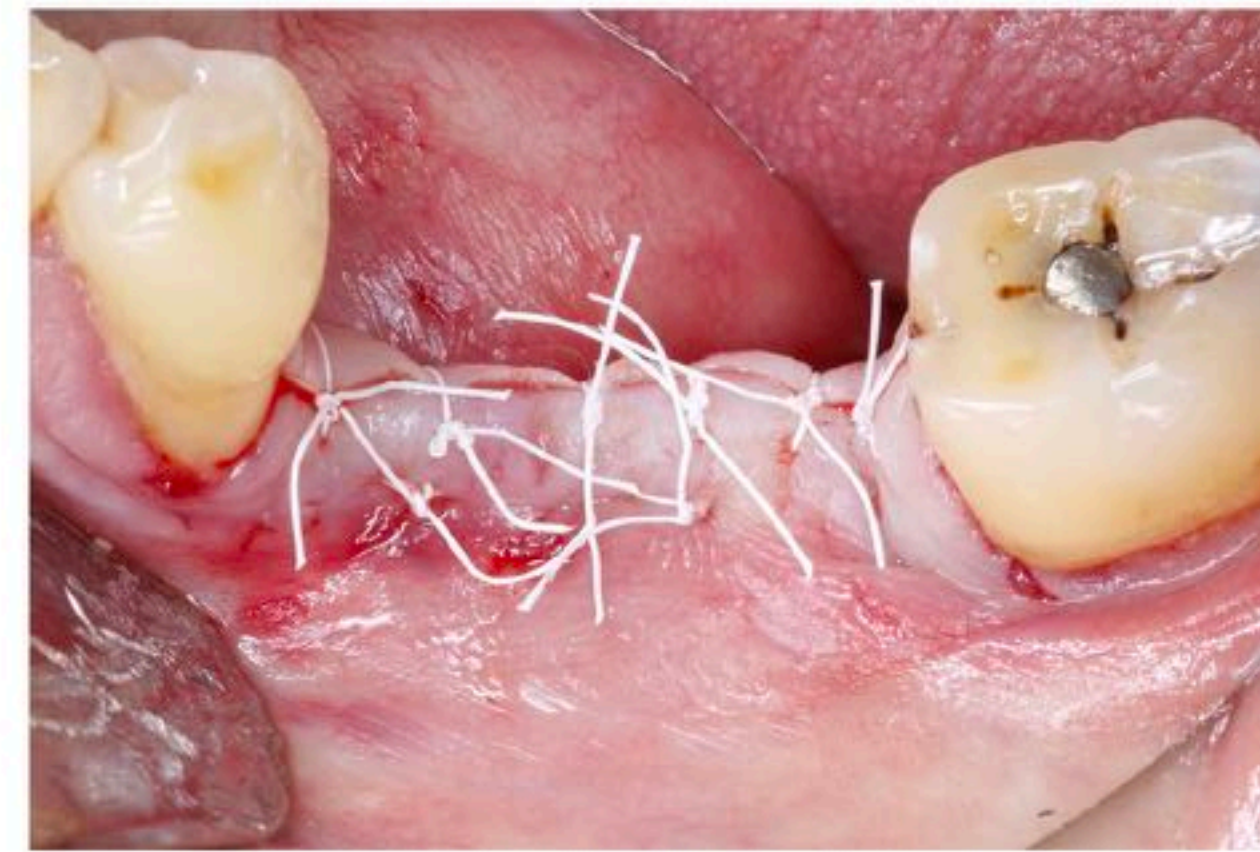


FIGURE 4 Two-layer suturing technique of the tenting method in Group 2. Note deep matrix sutures for tissue elevation and simple interrupted sutures

2021-10-13
14:58:07

ACC:4002033372
Srs:1
Img:1



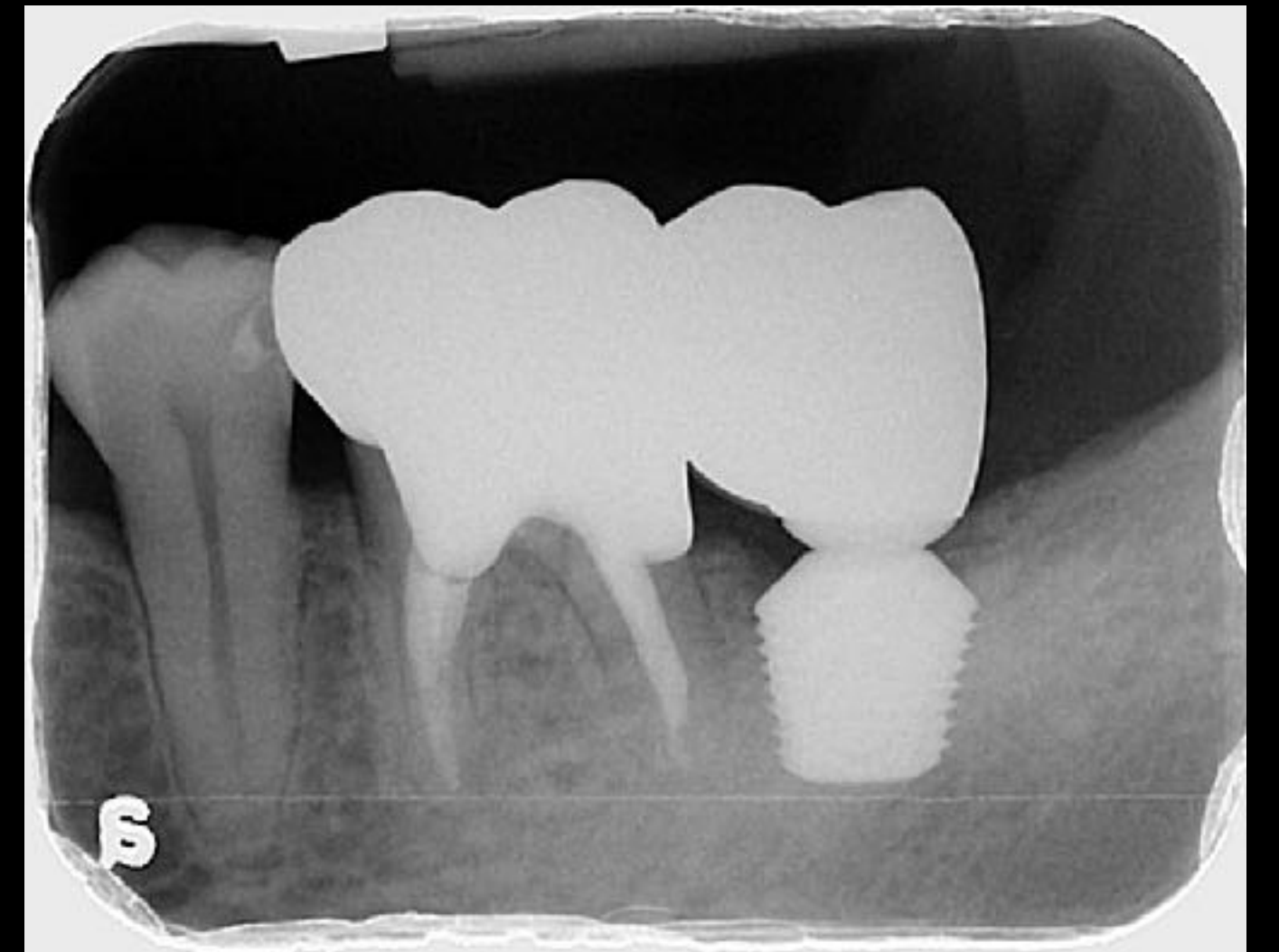
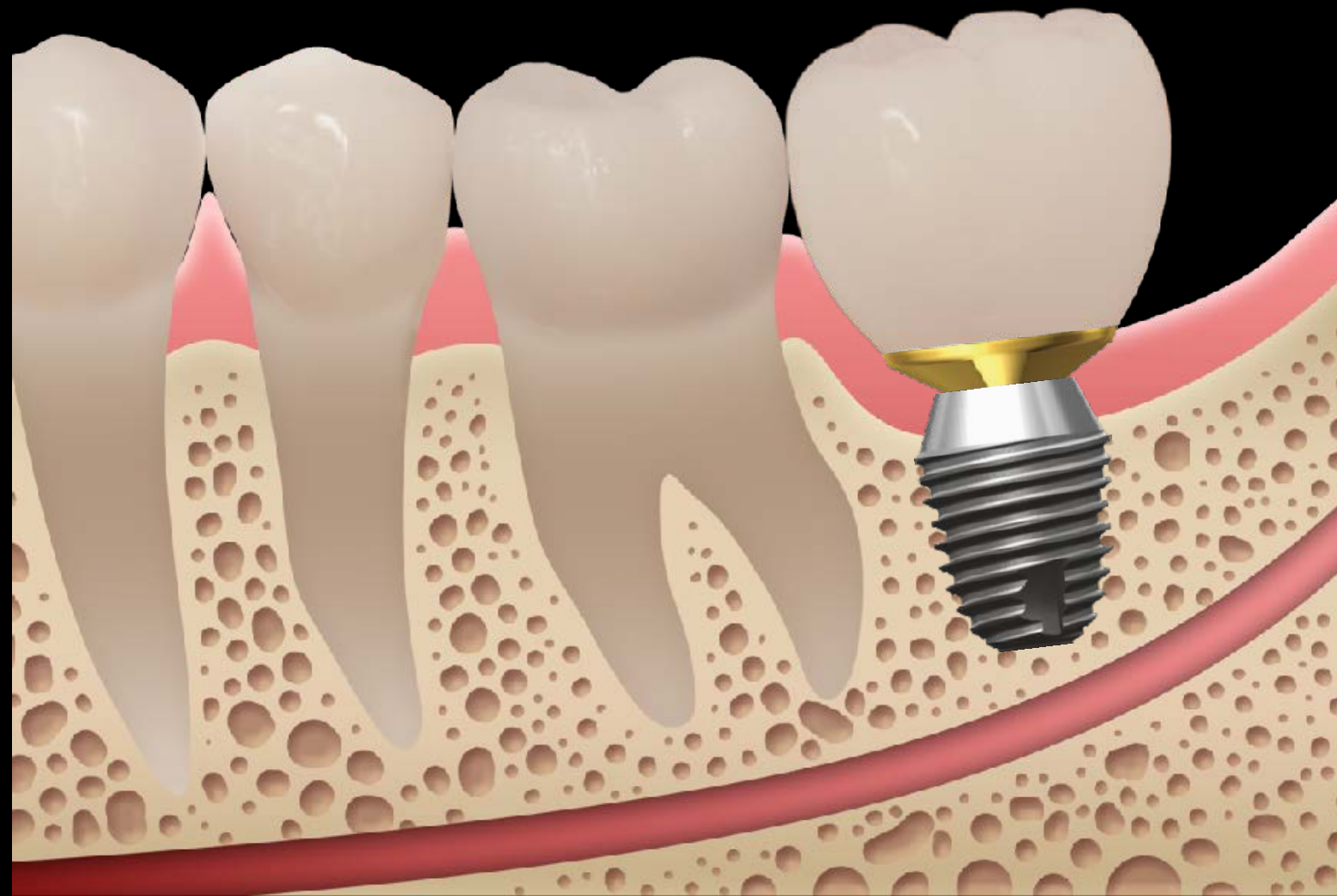
[L]

6cm

R

Zoom: 57 200%

Collagenated bone, ridge preservation, short implant for elderly patients



Tx. Strategy for elderly
population

Short imp.



Narrow imp.

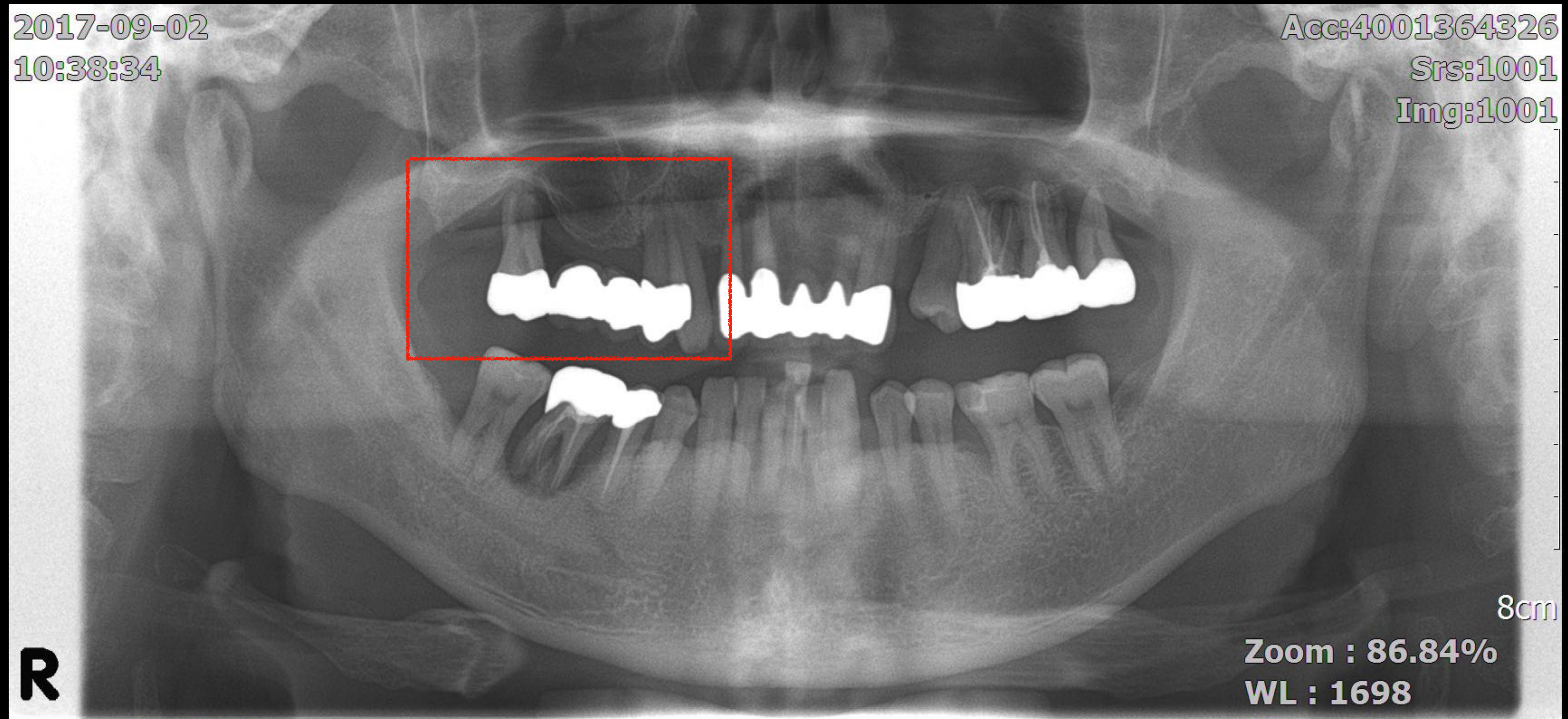
Simplified Vertical Augmentation
Simplified Sinus Augmentation

With Collagenated bone

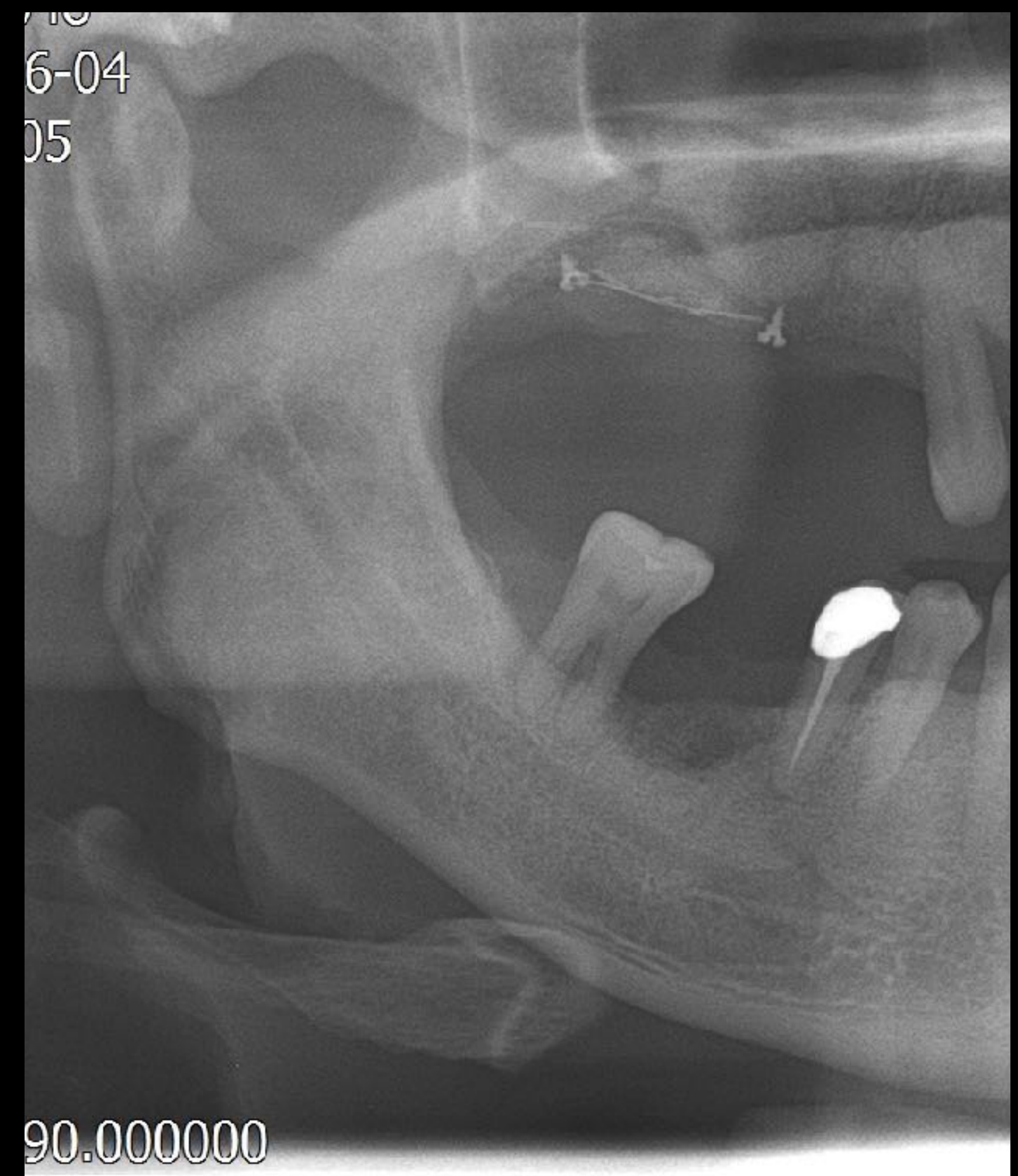
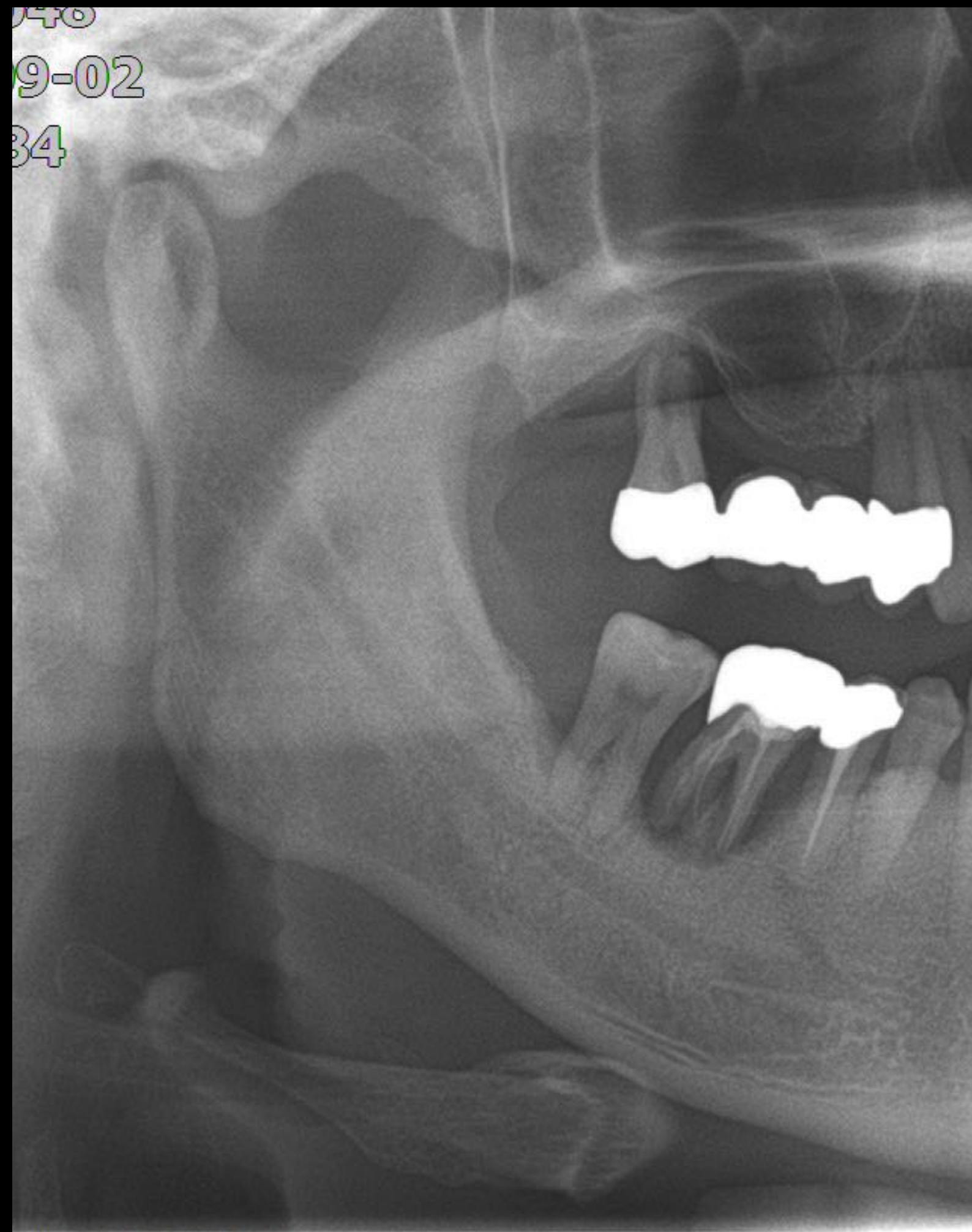
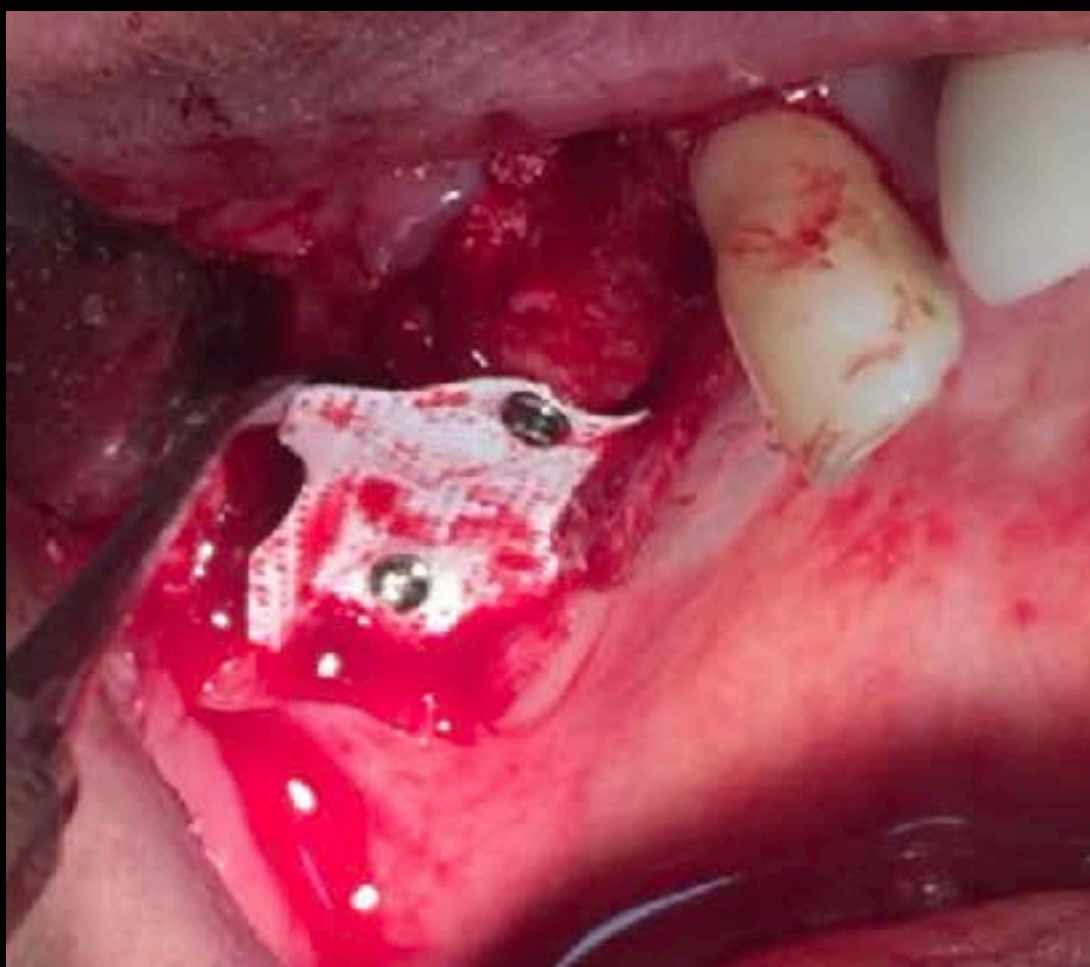


Simplified Horizontal Augmentation

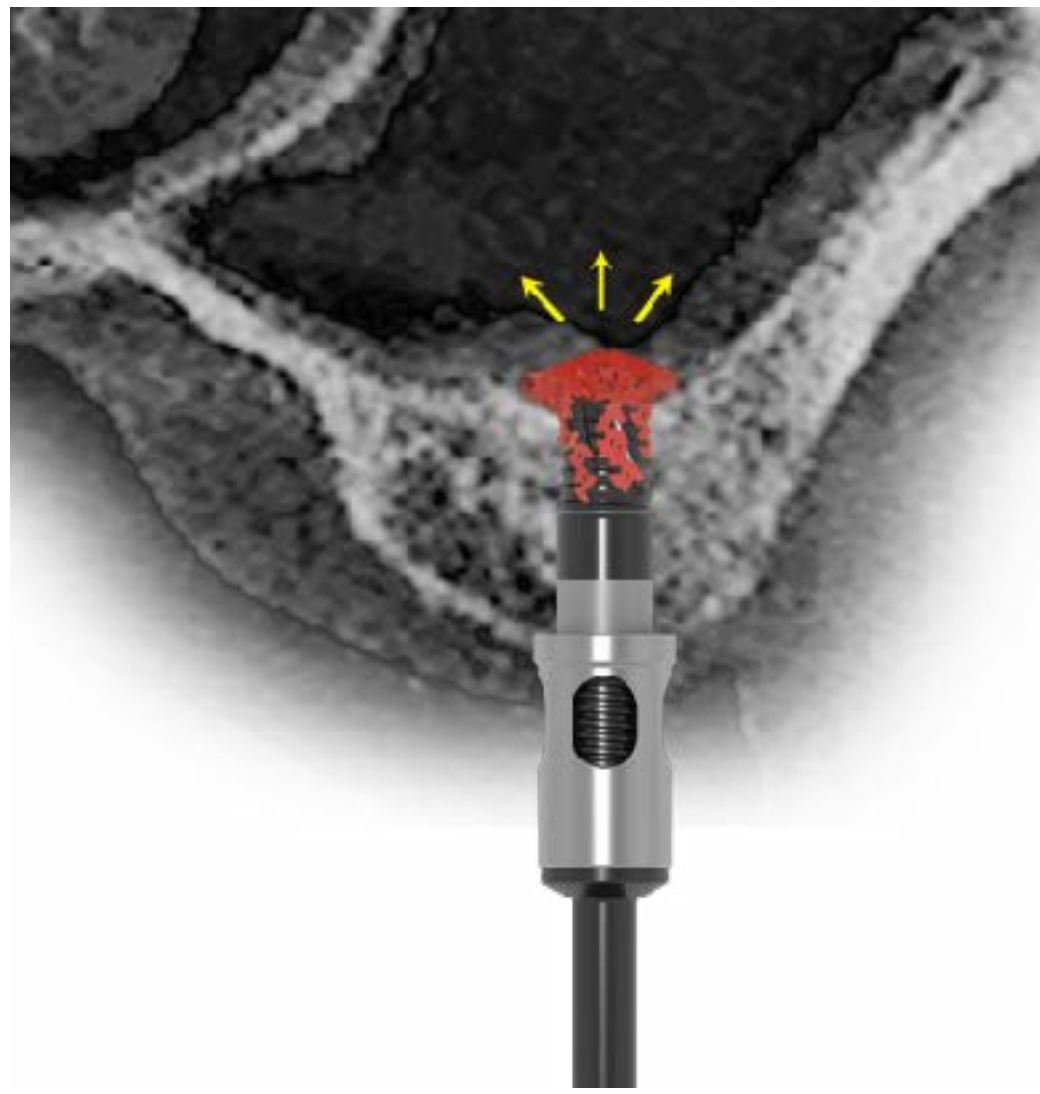
Sinus augmentation with lateral approach



Sinus augmentation with lateral approach



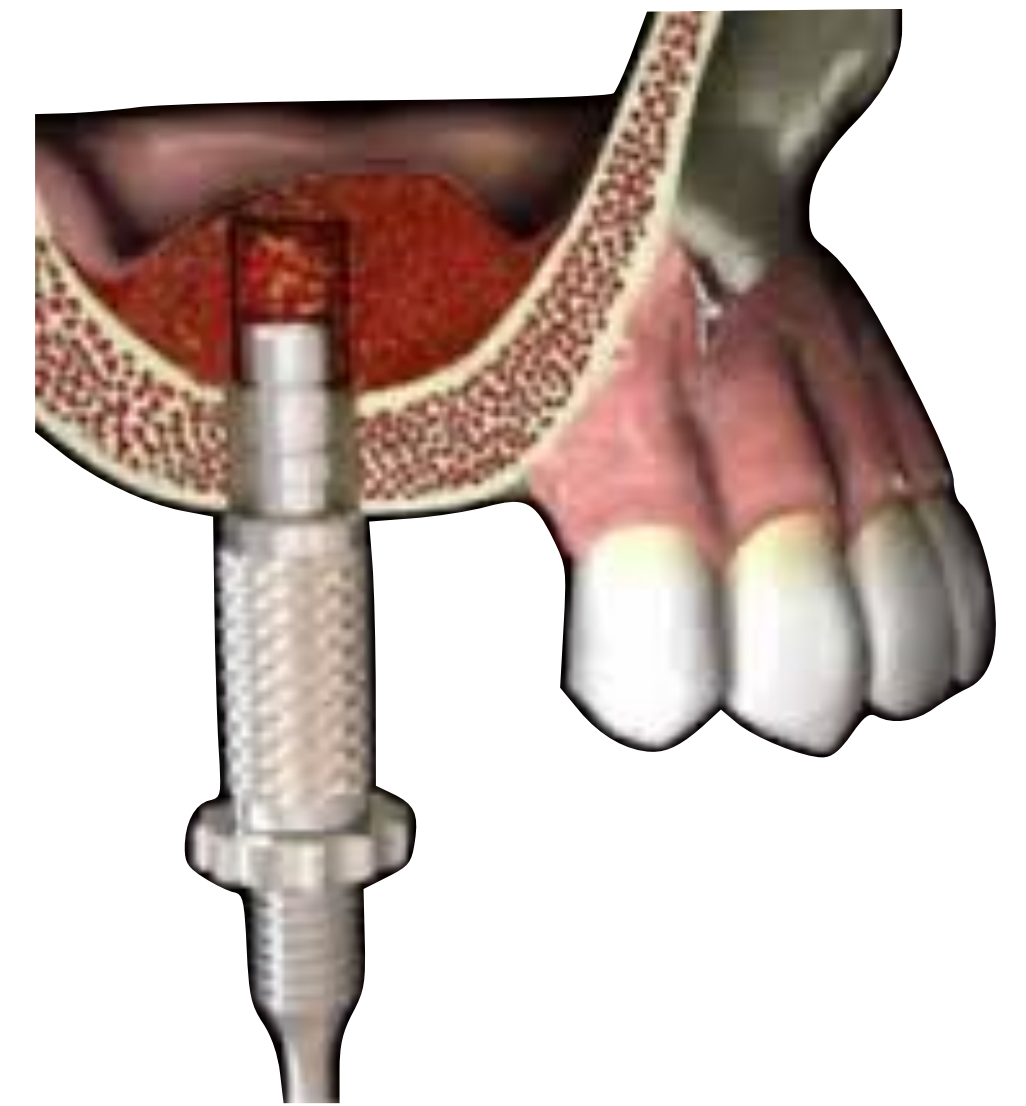
Vertical ridge augmentation



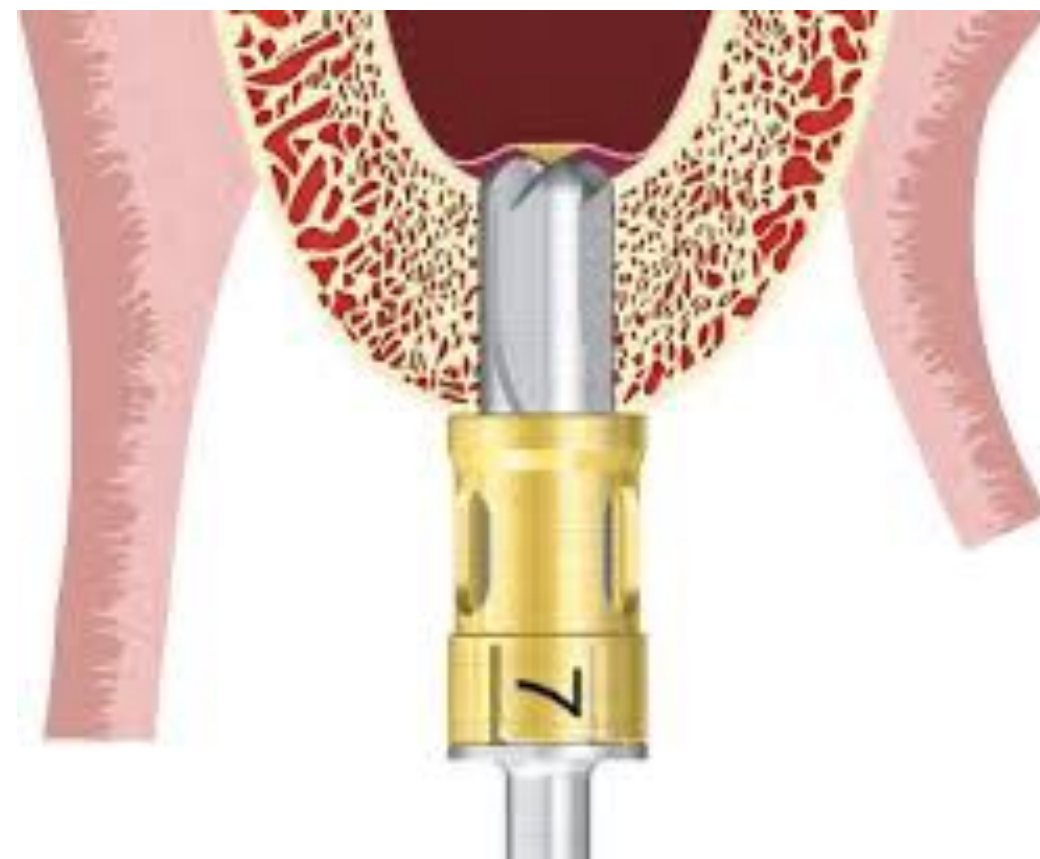
Dentium



Versah LLC



Neobiotech

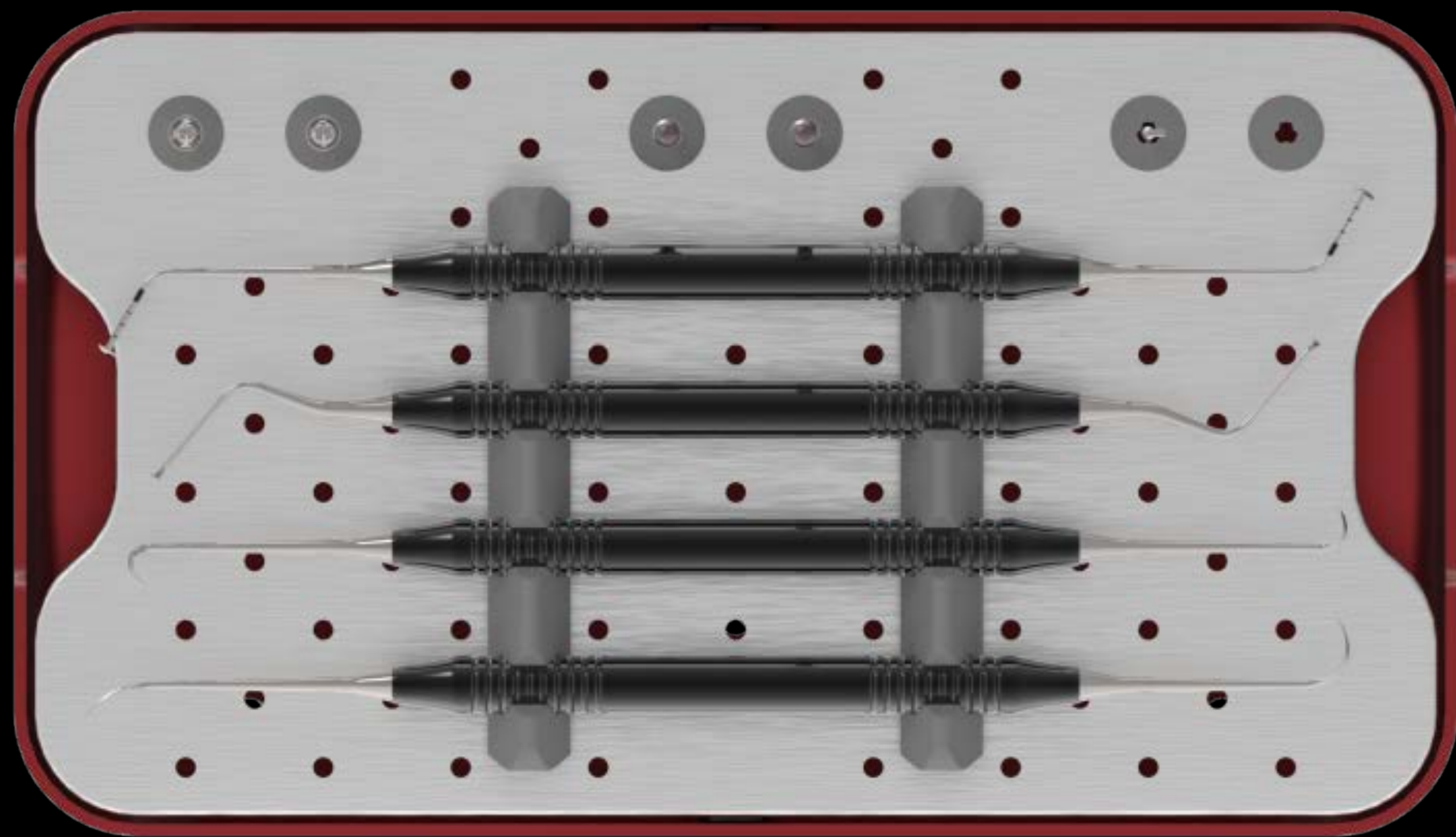


Osstem

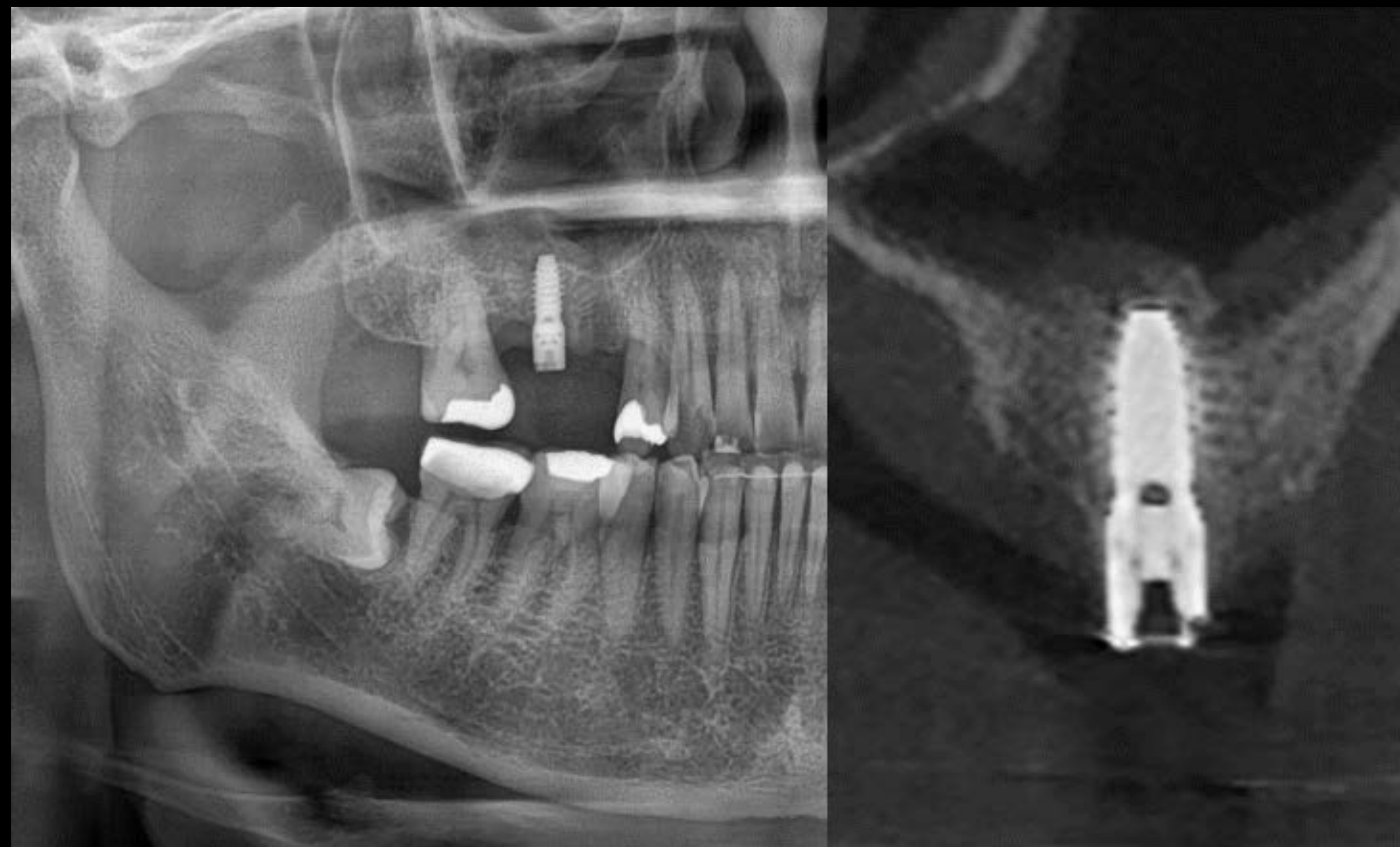


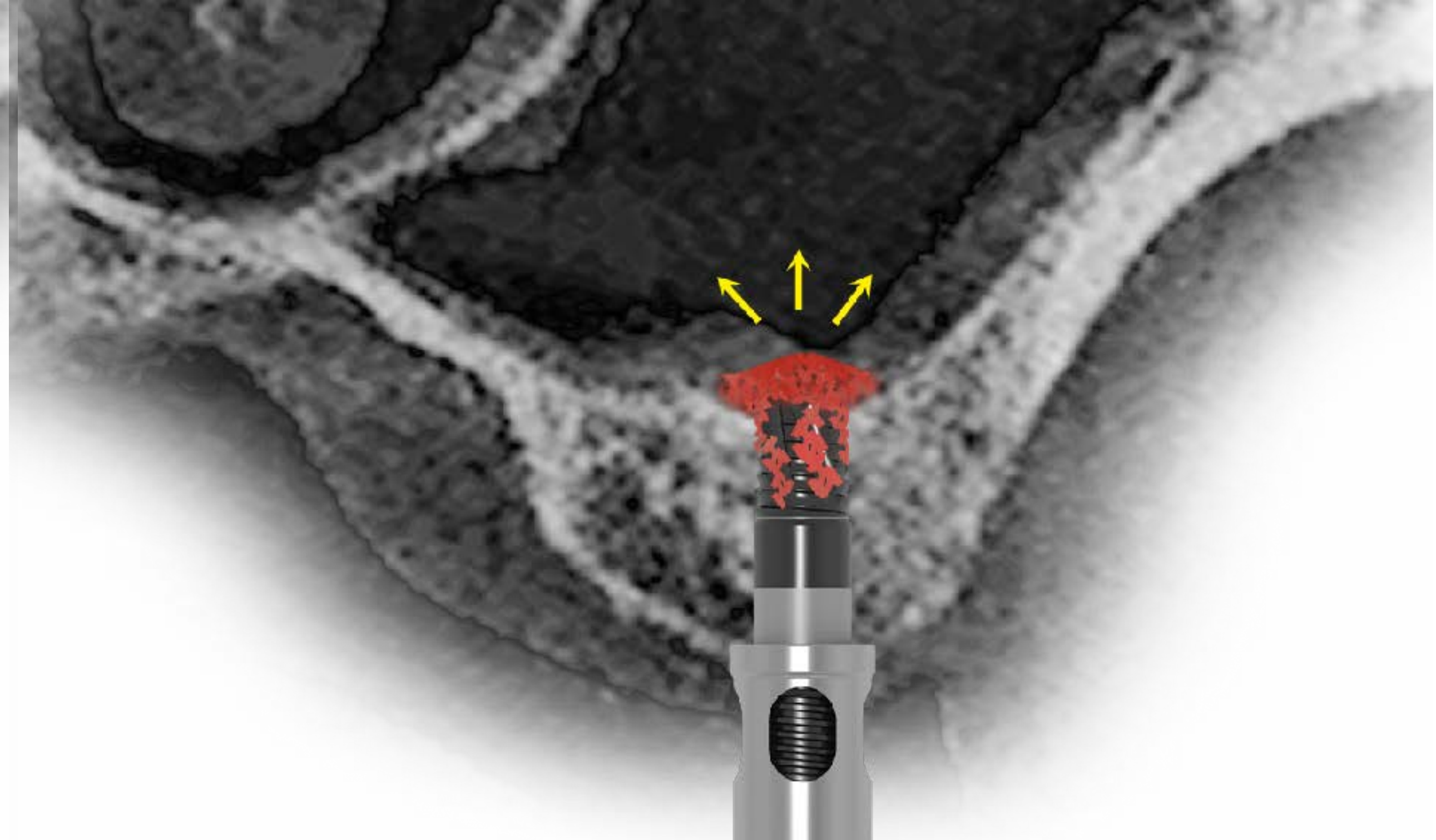
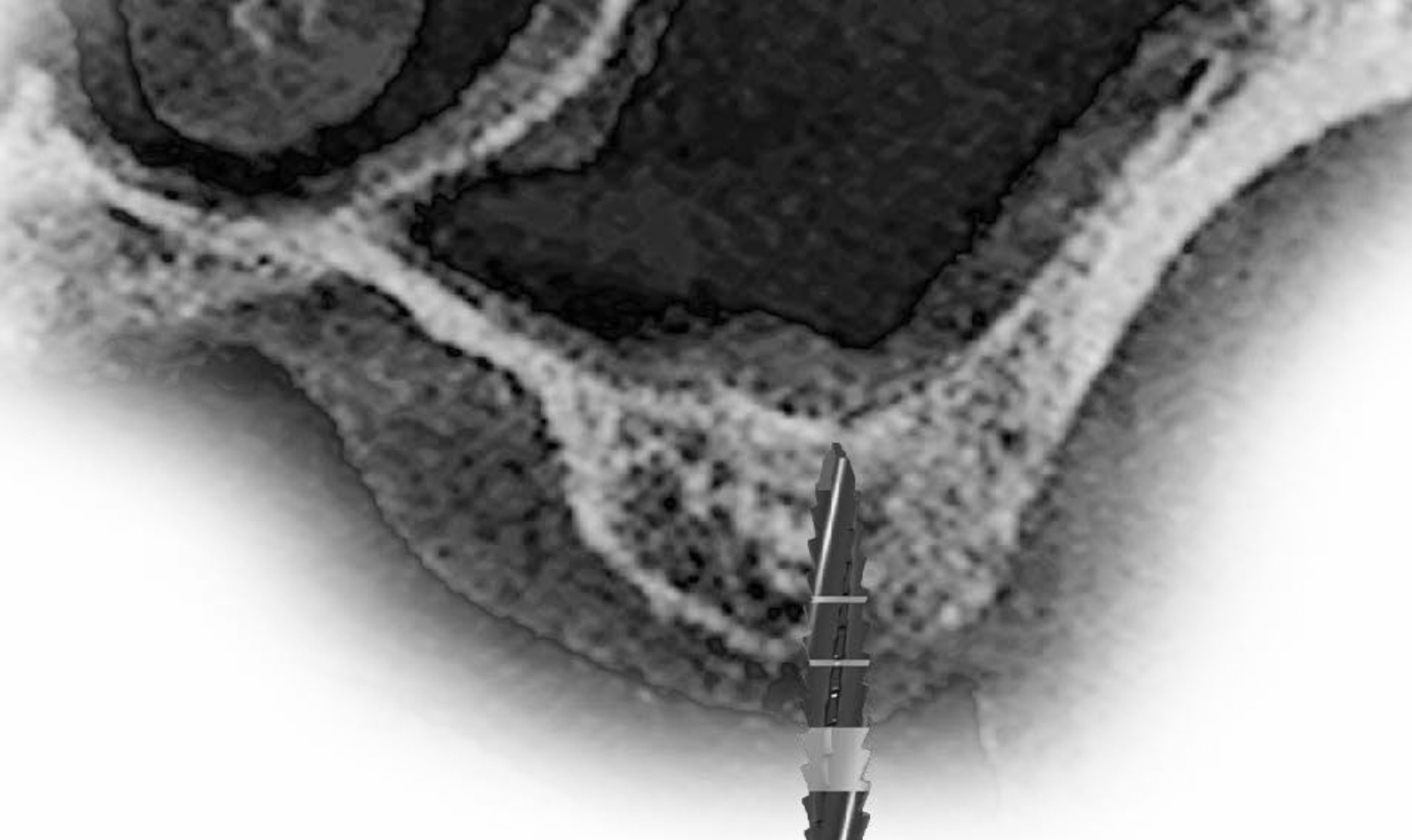
MegaGen

Minimalism in Sinus



DASK *Simple*

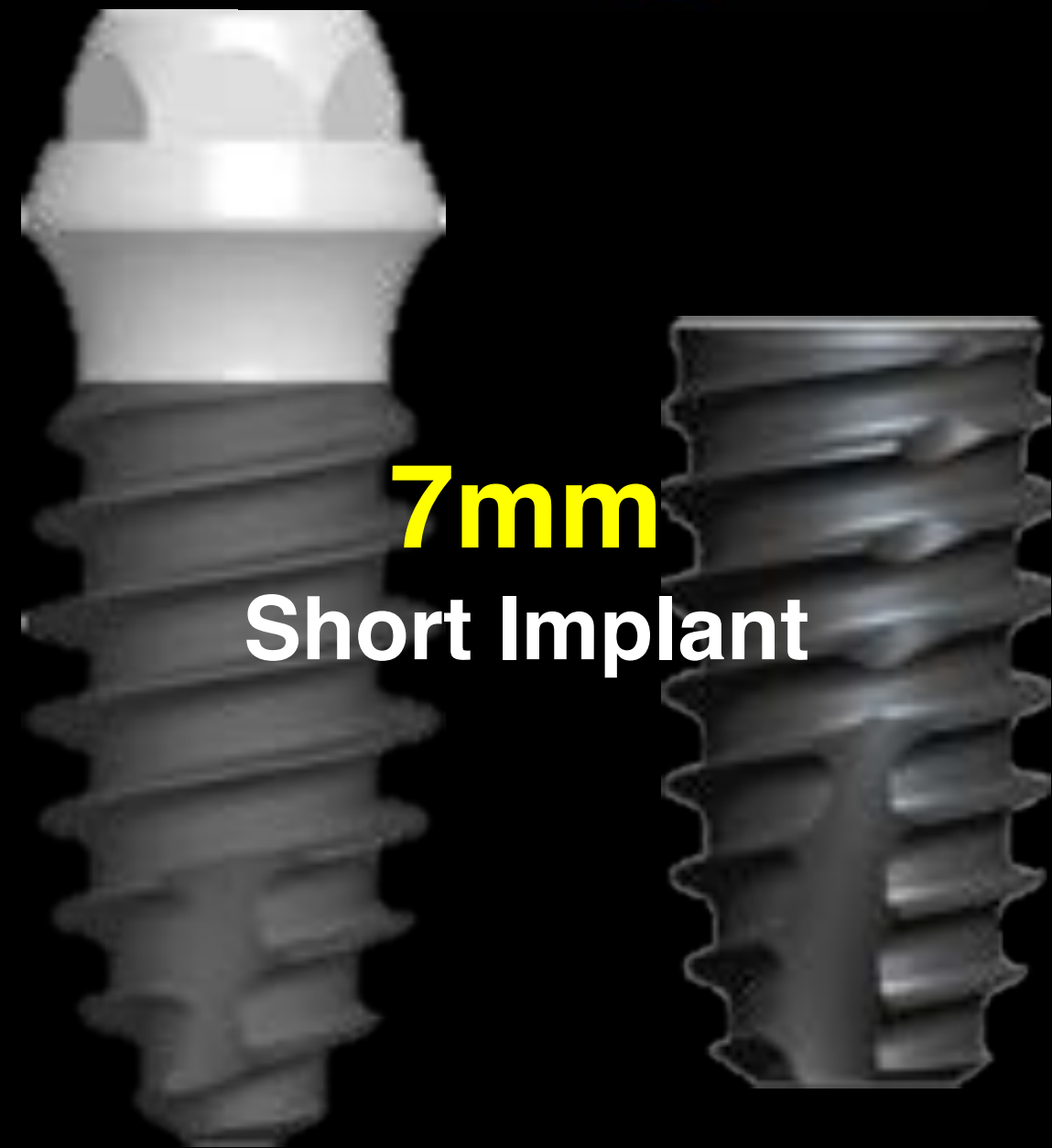




DASK *Simple*

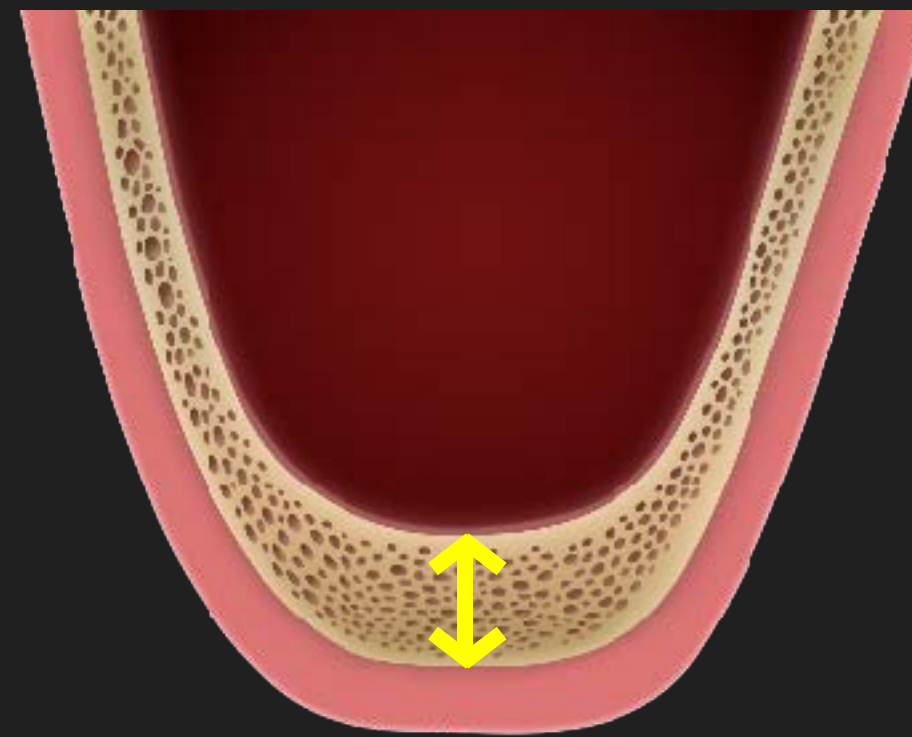
Sinus Minimalism Concept

bright



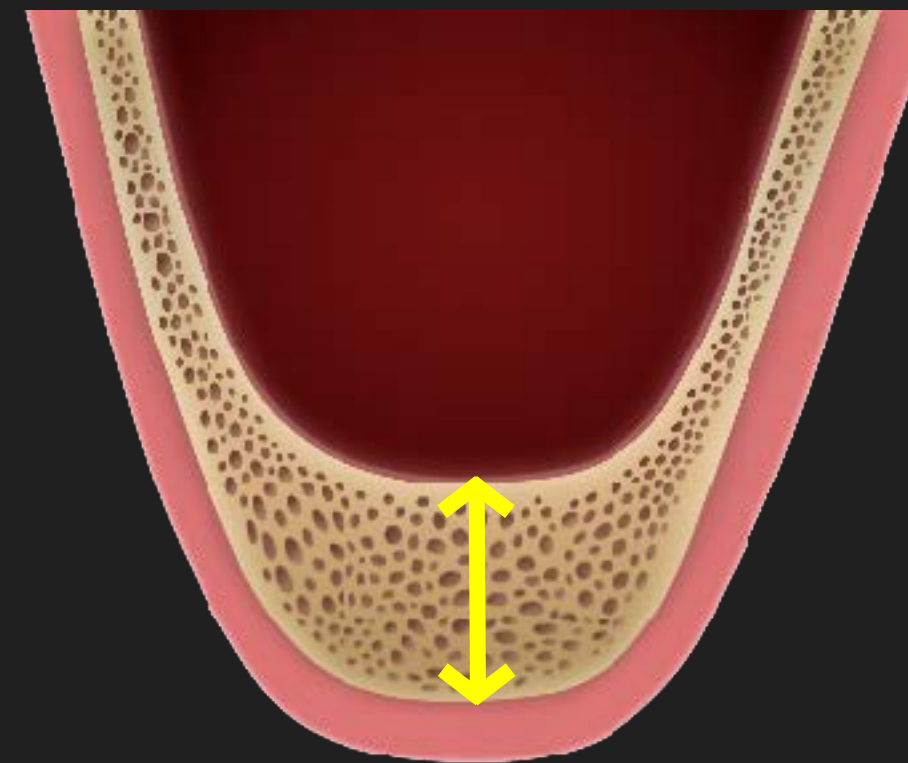
Tissue Level Bone Level

1 – 3 mm



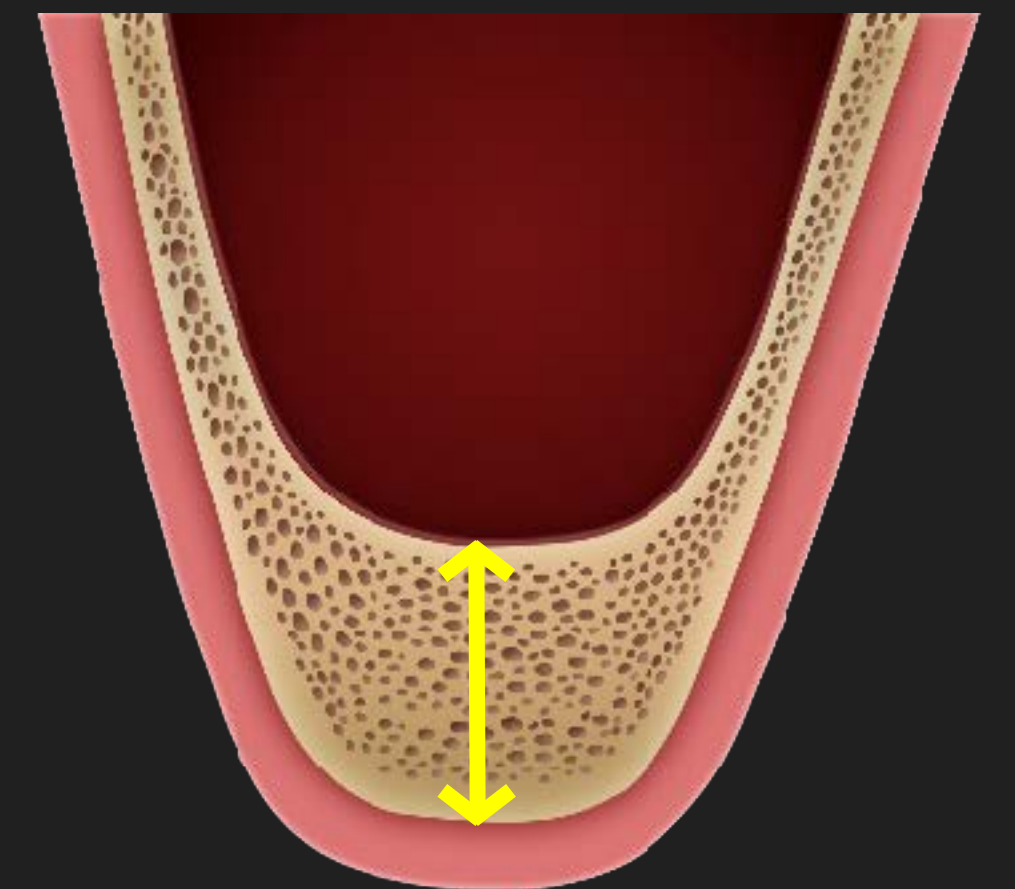
Lateral
approach

3 – 5 mm



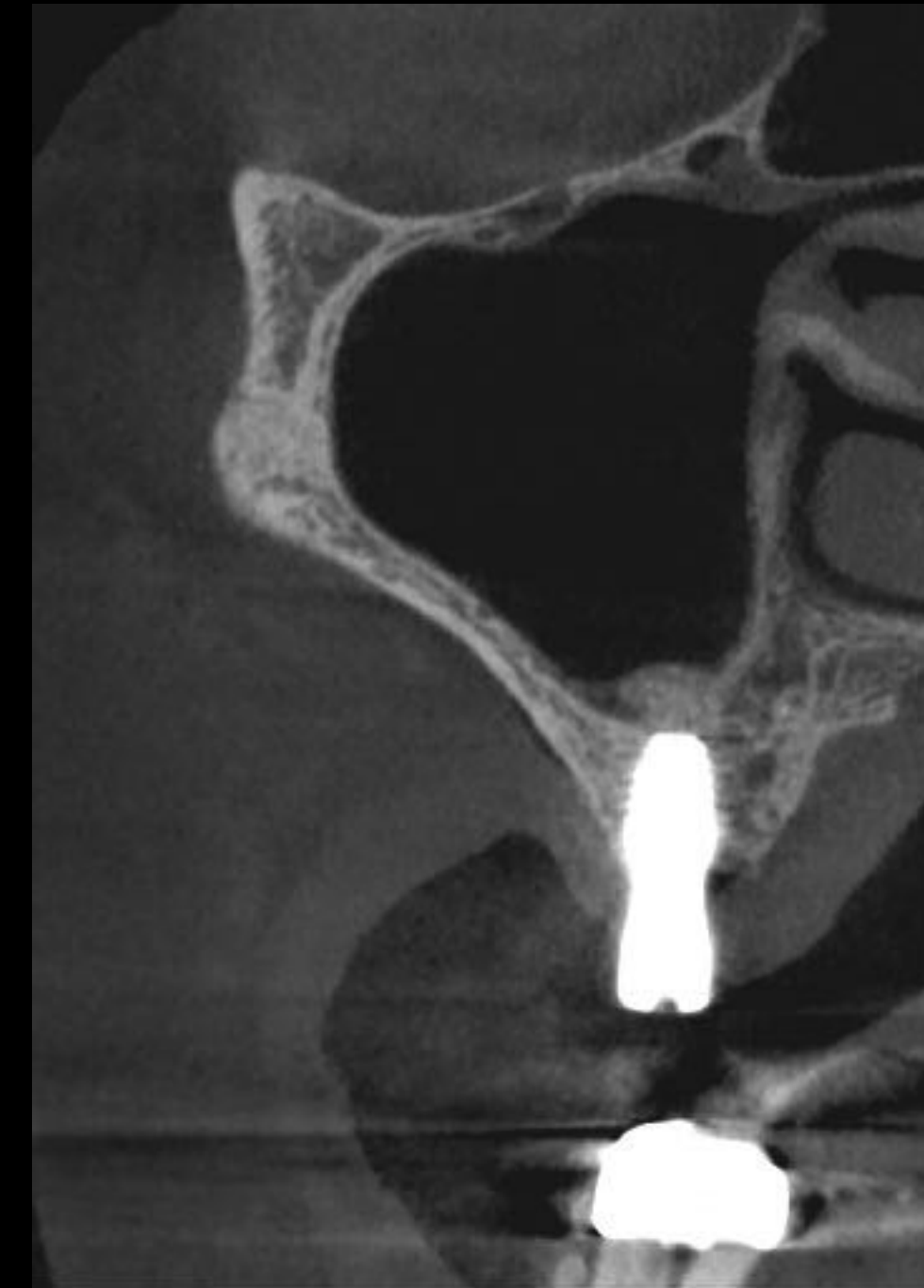
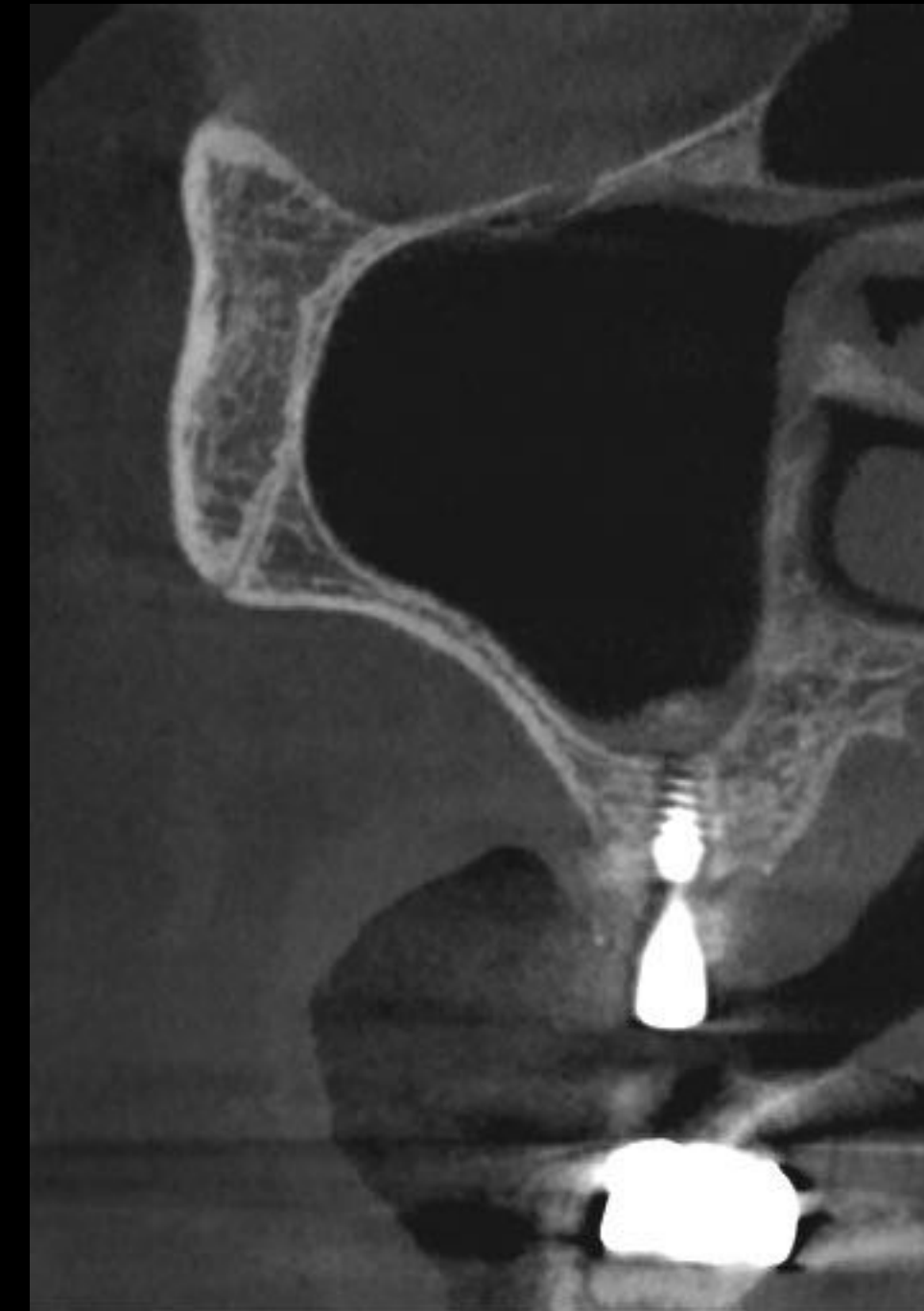
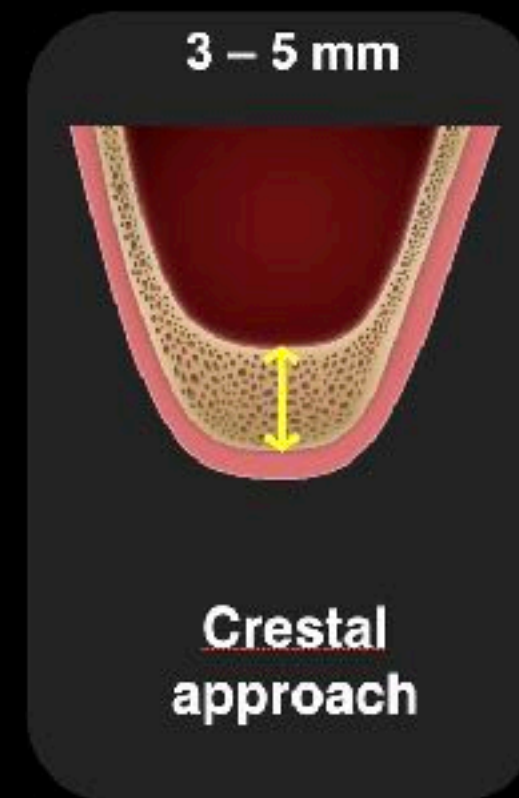
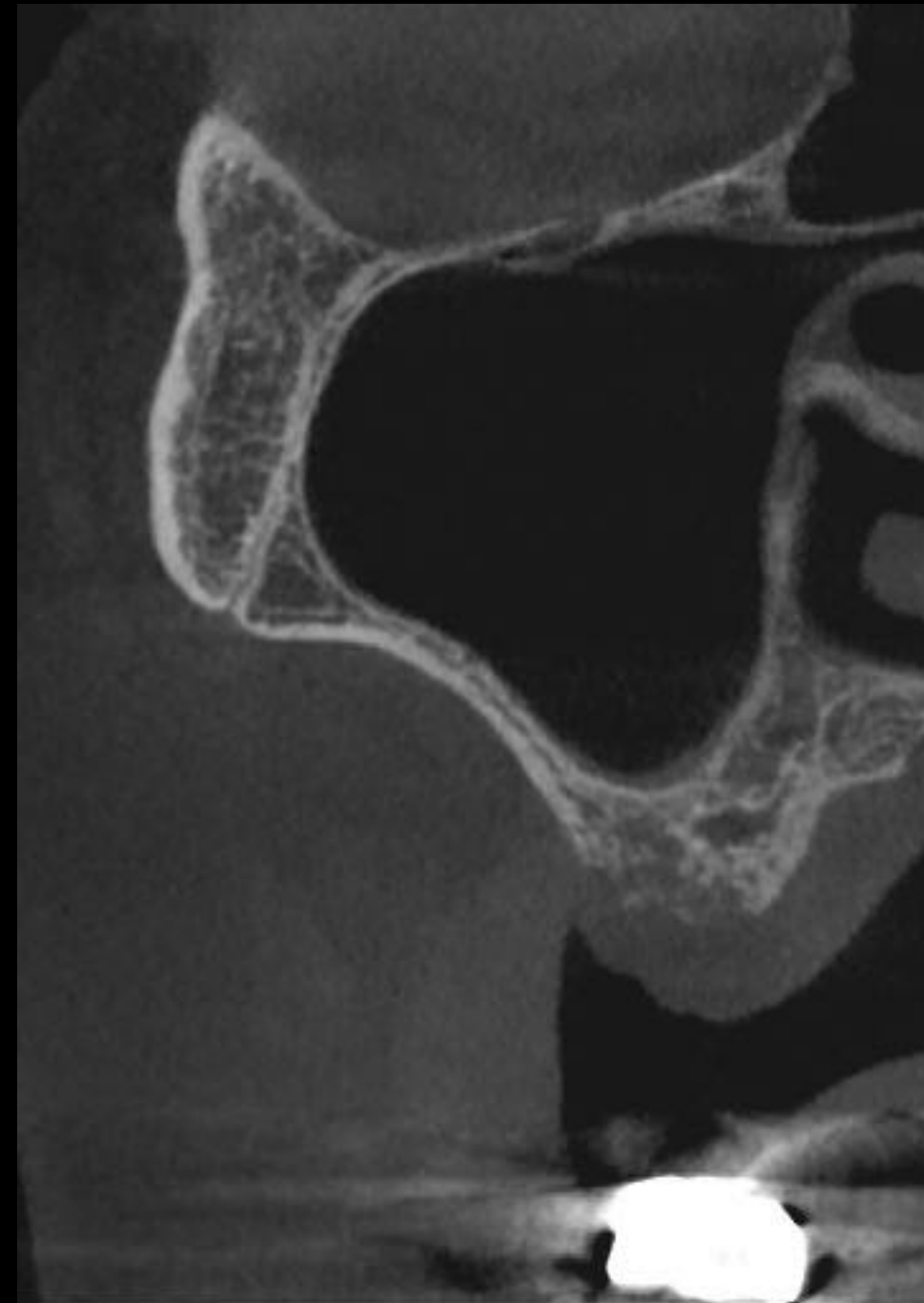
Crestal
approach

5 mm over

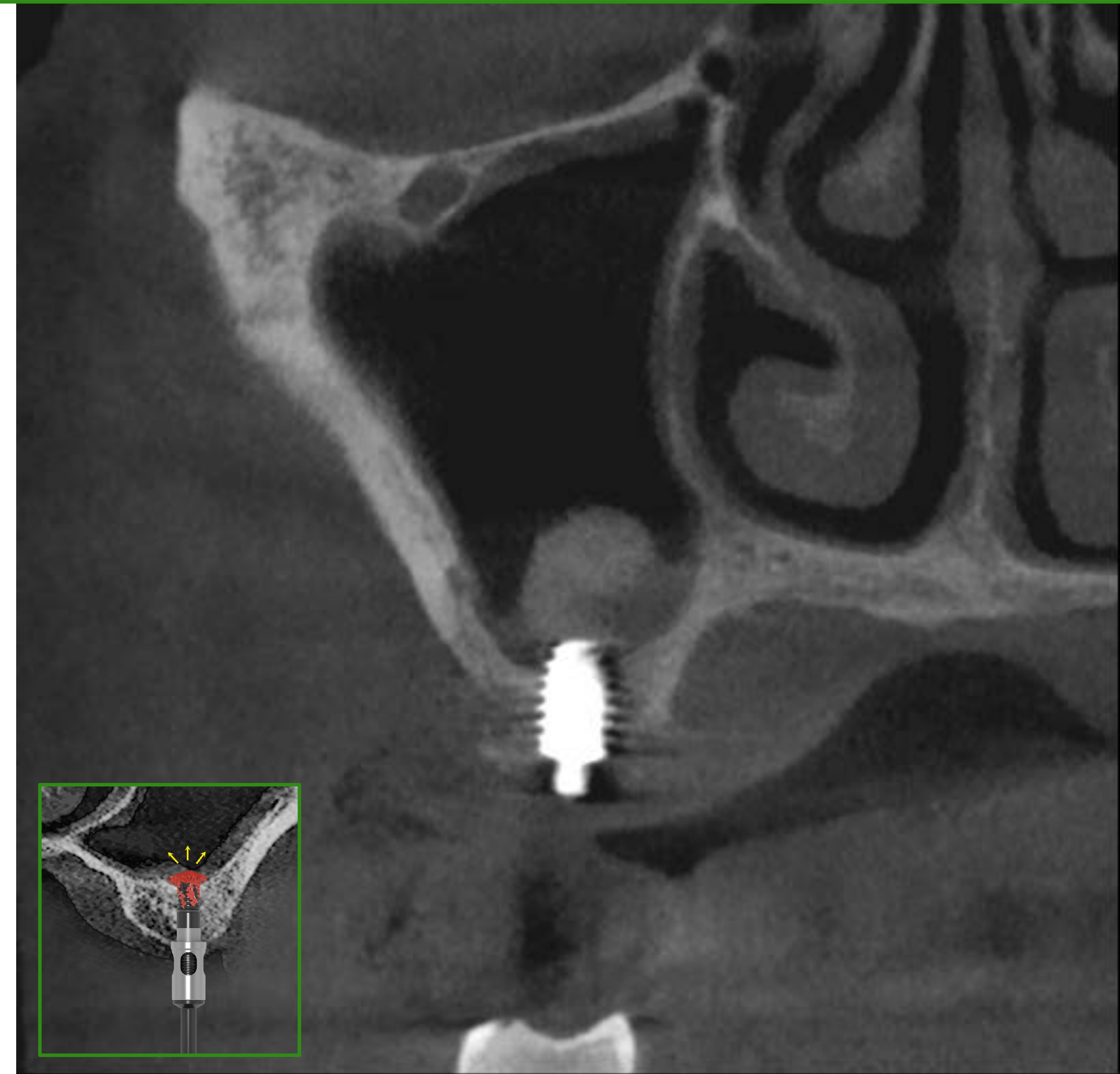
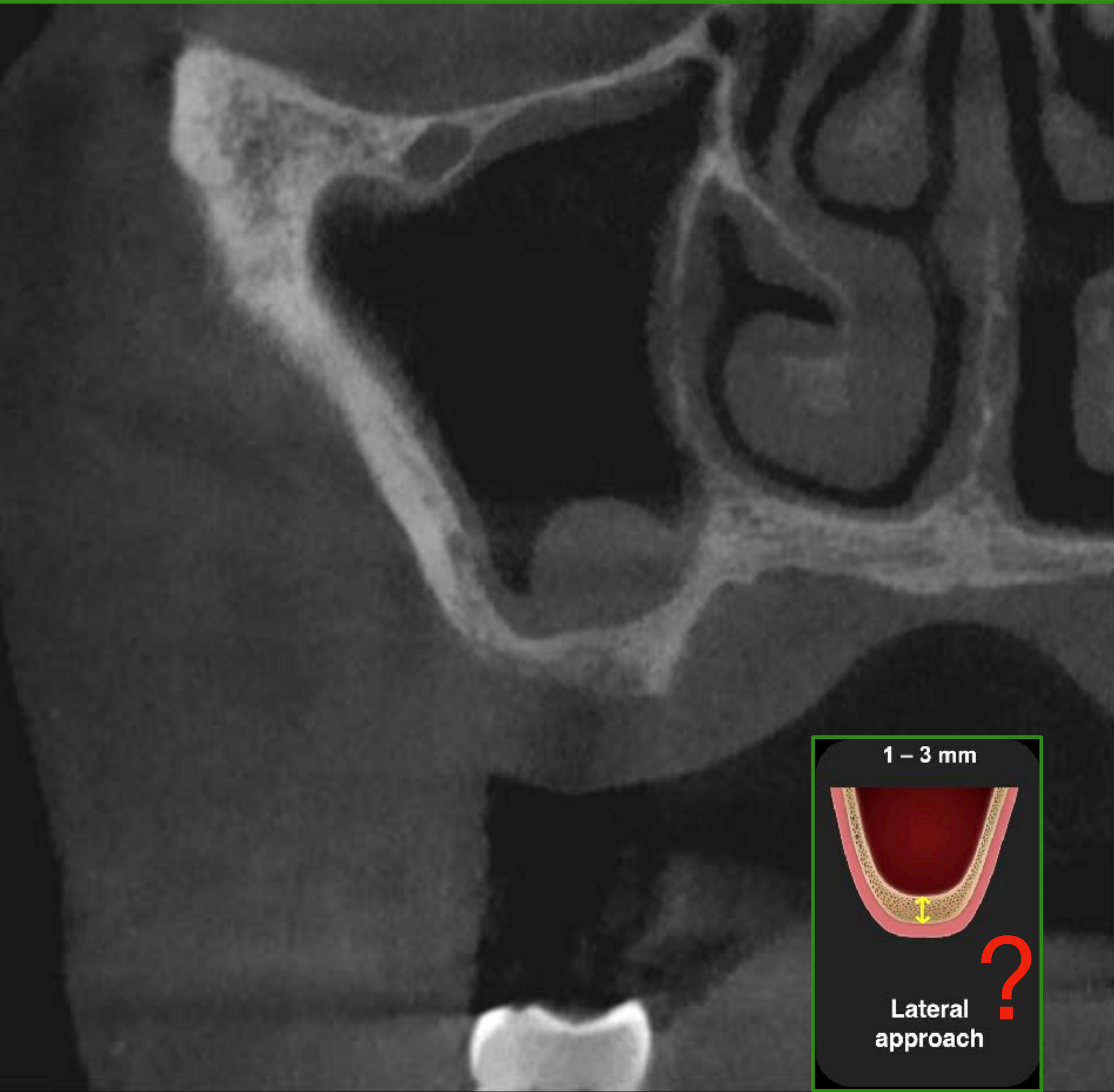


Bicortical
Fixation

Sinus augmentation with crestal approach

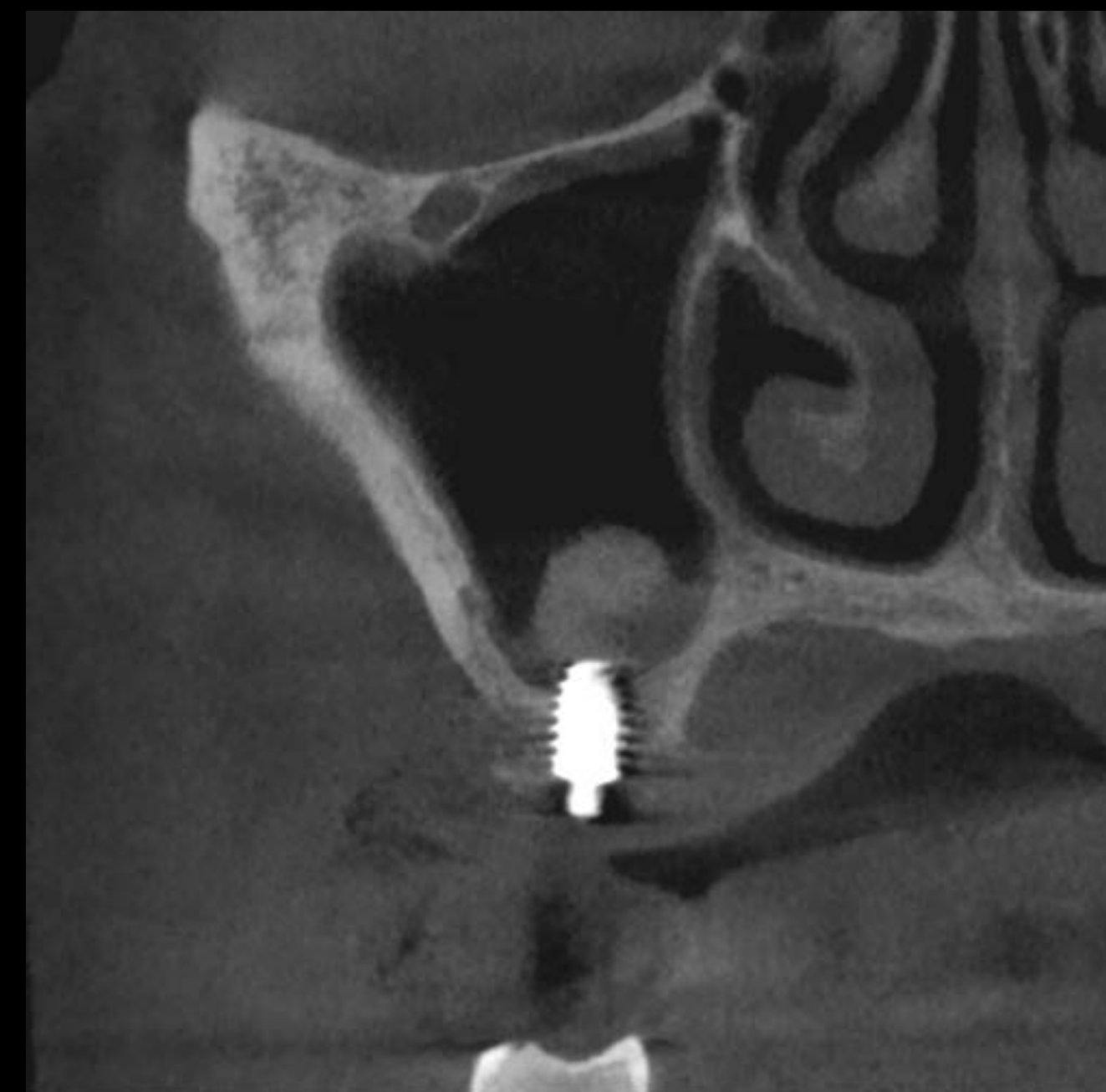
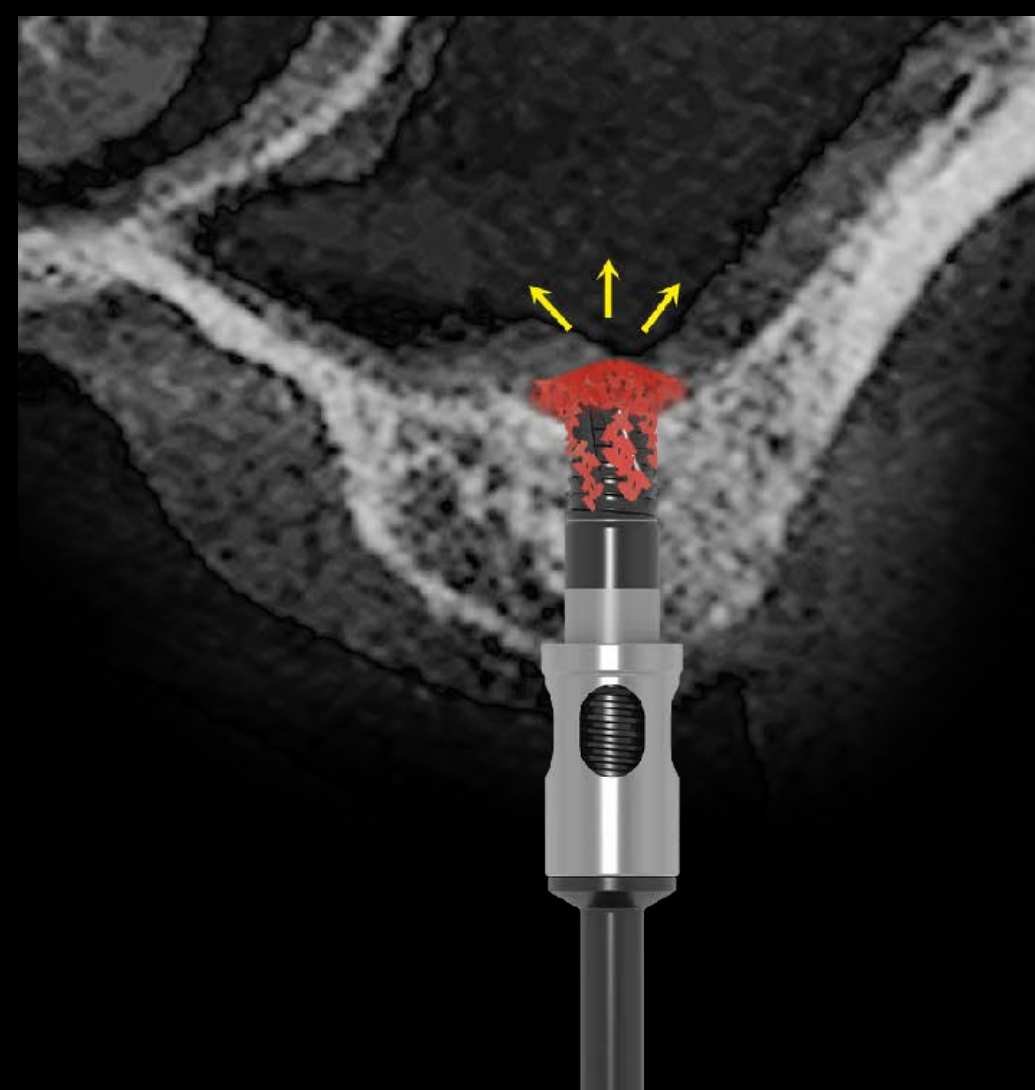


Sinus augmentation with crestal approach



Collagenated bone, simplified sinus augmentation, short implant

for elderly patients



Tx. Strategy for elderly
population

Short imp.



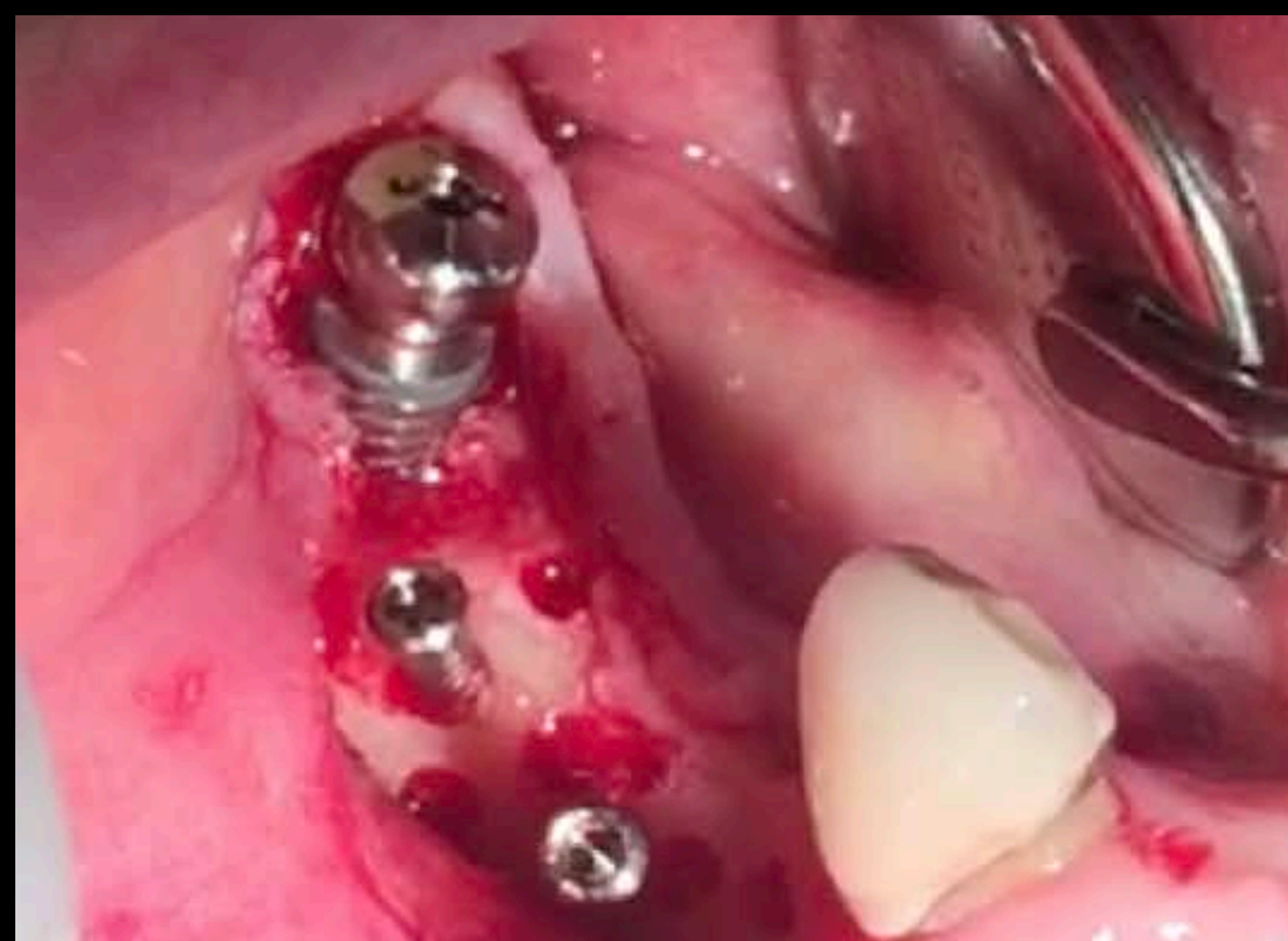
Narrow imp.

Simplified Vertical Augmentation
Simplified Sinus Augmentation

With Collagenated bone and collagen matrix



Simplified Horizontal Augmentation



Prevalence of peri-implantitis and peri-mucositis in pristine and augmented bone in periodontally compromised patients. A literature review

Nomeda Basevičienė¹, Austė Bendoraitytė-Antipovienė², Ugnė Mikelionytė²

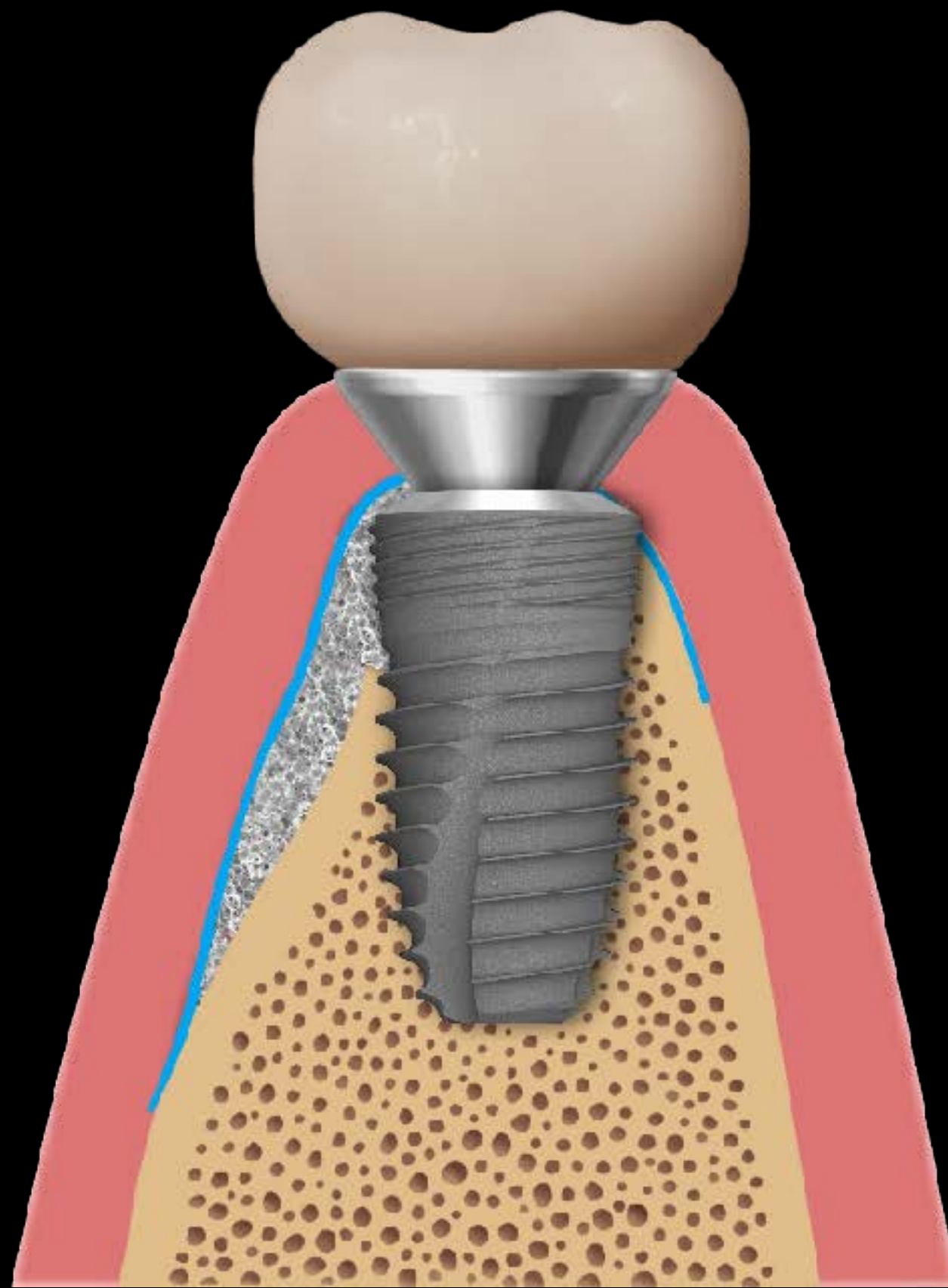
SUMMARY

Aim. The aim of this systematic literature review is to analyze the literature about the prevalence of peri-implantitis and peri-implant mucositis in patients with periodontal diseases and compare their prevalence in pristine and augmented sites.

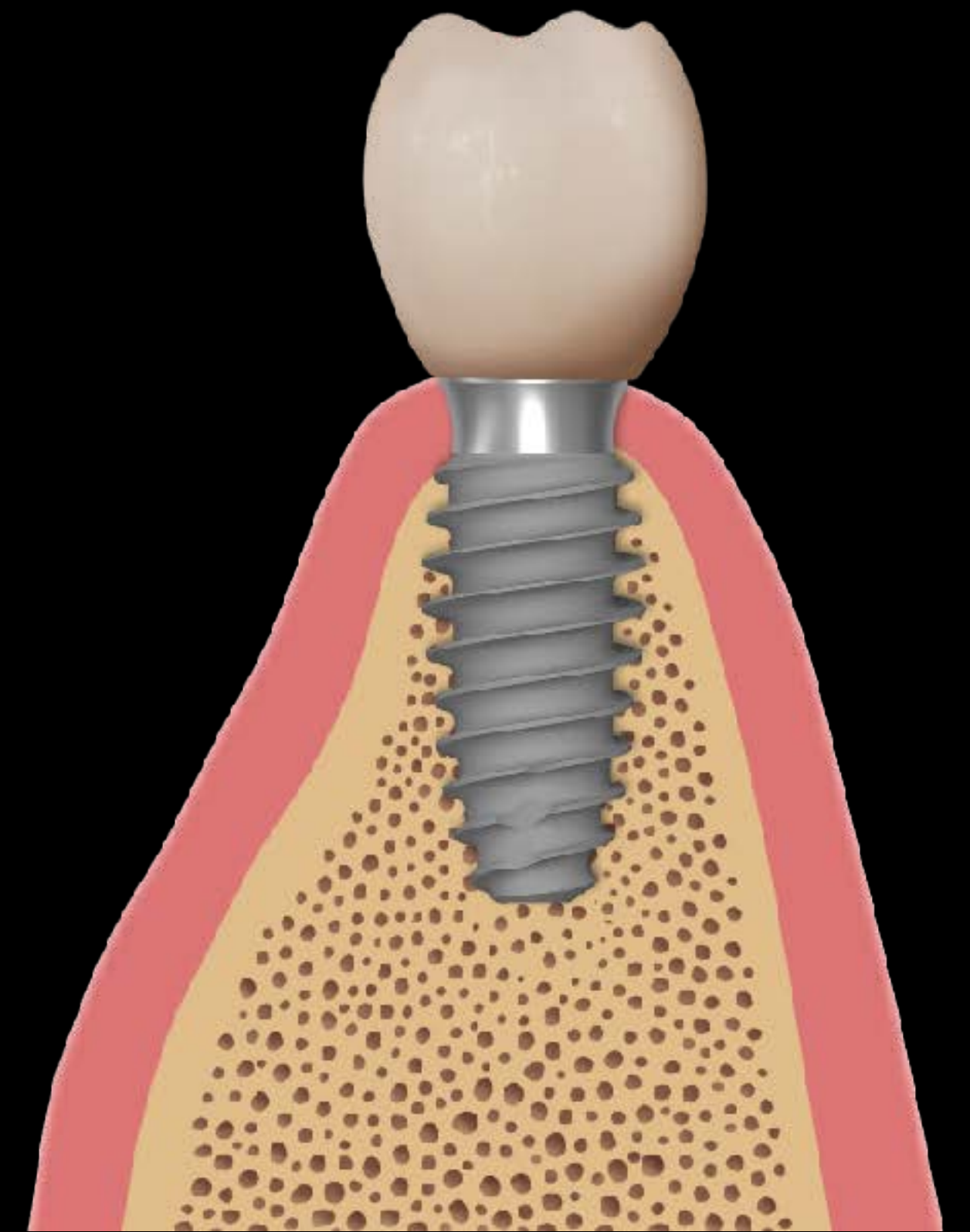
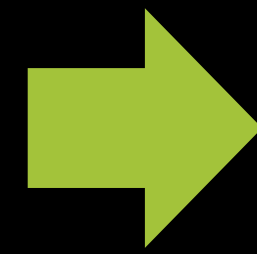
Material and methods. A systematic literature review was performed of clinical trials, controlled clinical trials, comparative studies, and clinical studies. In the studies, patients who have periodontal diseases and need a dental implant with or without bone grafts were selected. Records about peri-implantitis and peri-implant mucositis, implant survival and success rates were extracted.

Results. 19 studies with 3049 patients were selected. X had a periodontal disease. After analysis, peri-implant mucositis was more prevalent in augmented sites (19% – 74.0% on patient level, 10.2% – 62,5% on implant level). Prevalence of peri-implantitis was not apparent because of missing data and heterogeneity of records. Implant survival and success rates were lower in augmented sites.

Conclusion. When alveolar ridge augmentation is needed for dental implant in patients with periodontal diseases, dentists must evaluate the risk of long term biological complications.



Past



Present

Particulate Versus Cross-Linked Collagenated Bone Substitutes for Guided Bone Regeneration: A Randomized Controlled Trial

Ji-Young Jung¹ | Seung-Hyun Park¹ | Kwan-Jung Kim² | Kyung-A Ko¹ | Dong-Woon Lee³ | Jung-Seok Lee¹

¹Department of Periodontology, Research Institute for Periodontal Regeneration, College of Dentistry, Yonsei University, Seoul, South Korea | ²Department of Periodontology, Dental Hospital, Veterans Health Service Medical Center, Seoul, South Korea | ³Department of Periodontology, College of Dentistry, Wonkwang University, Iksan, South Korea

Correspondence: Dong-Woon Lee (dongden@daum.net) | Jung-Seok Lee (cooldds@yuhs.ac)

Received: 17 June 2024 | **Revised:** 18 February 2025 | **Accepted:** 26 February 2025

Funding: This study was supported by a grant from the Korea government (the Ministry of Science and ICT, the Ministry of Trade, Industry and Energy, the Ministry of Health & Welfare, the Ministry of Food and Drug Safety) (KMDF_PR_20200901_0238).

Keywords: dental implant | guided bone regeneration (GBR) | particulate bone substitute | cross-linked collagenated bone substitute

Over-augmentation with collagenated bone is necessary.

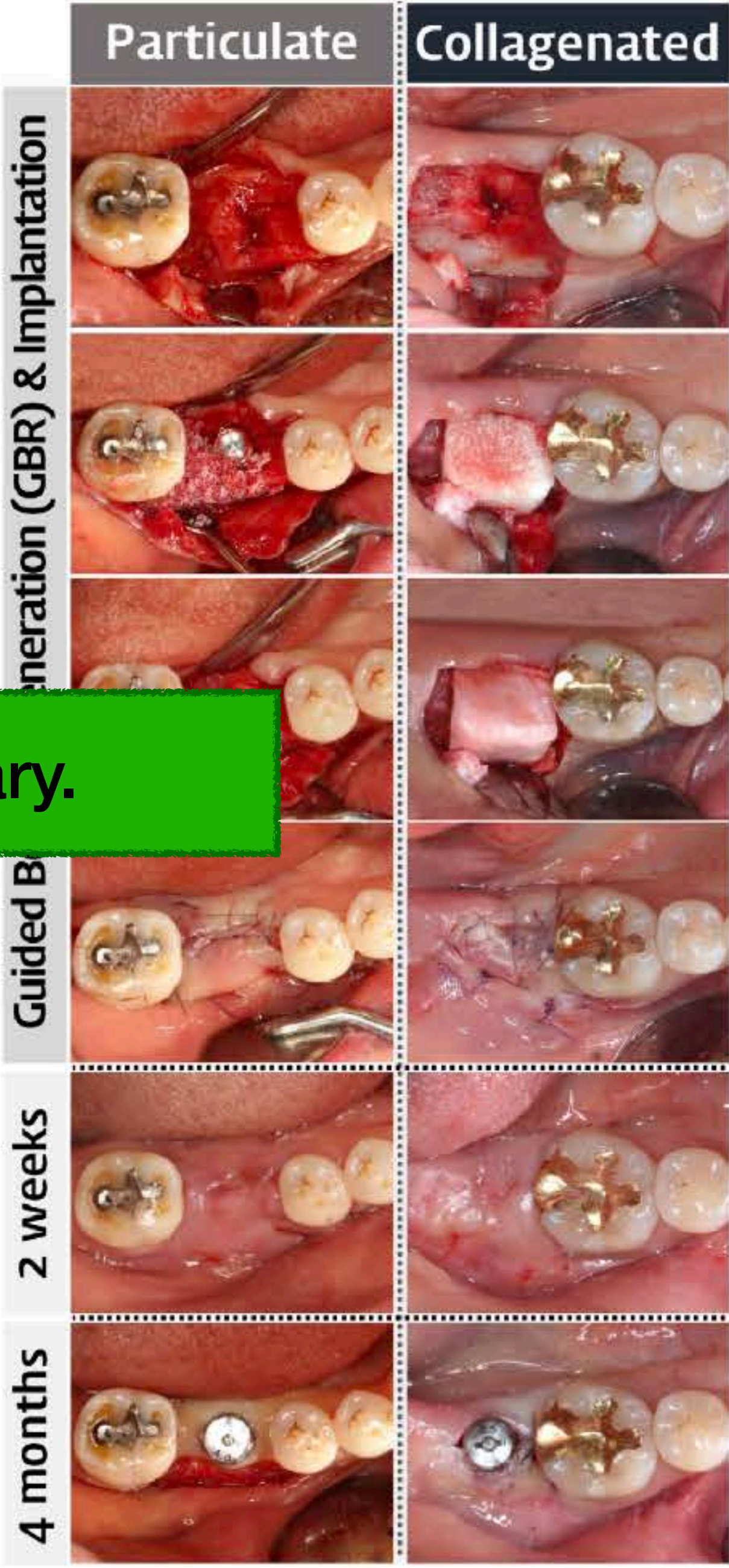
ABSTRACT

Aim: To compare the dimensional outcomes of horizontal augmentation with the retentive-flap technique using particulate and cross-linked collagenated bone substitutes.

Materials and Methods: This two-centre, two-arm randomized clinical trial investigated 69 subjects: 34 in the particulate group and 35 in the collagenated group. Patients were randomly assigned to receive single implant placement with simultaneous guided bone regeneration (GBR) using either particulate deproteinized porcine bone material (DPBM) or cross-linked collagenated DPBM. Quantitative evaluations were conducted for horizontal width, augmented area, and augmented volume in both hard and soft tissue dimensions.

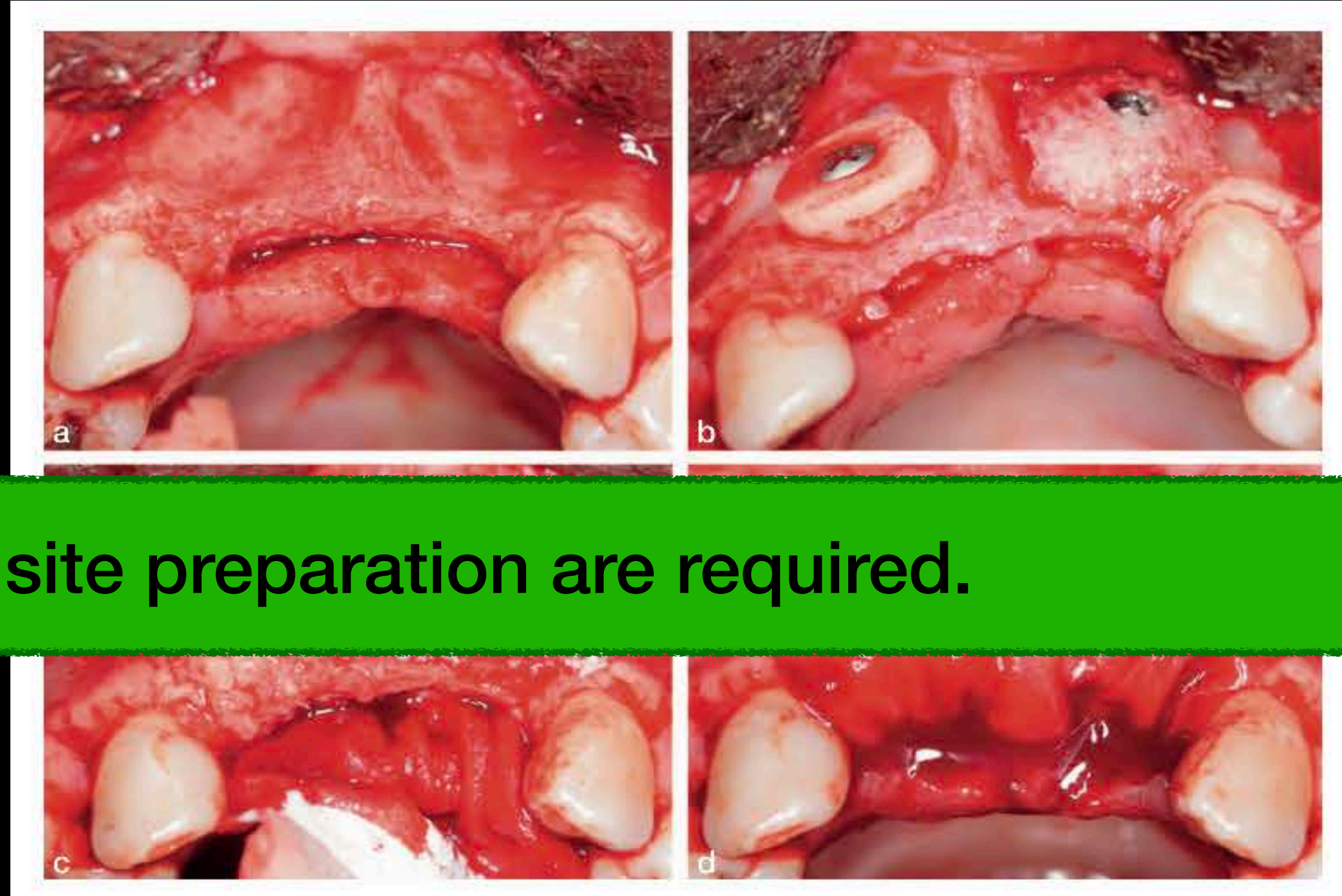
Results: Immediately after surgery, the collagenated group exhibited higher hard tissue dimensions in terms of horizontal width and augmented area. After 4 months, the difference between the two groups decreased to a non-significant level, mainly attributable to the high shrinkage rate of the collagenated group (32.32 [20.79] %) compared to the particulate group (19.90 [14.33] %). No significant difference was observed regarding the soft tissue contour analyses between the two groups after 4 months.

Conclusions: There were no significant differences between cross-linked collagenated and particulated DPBMs regarding the dimensional outcomes of horizontal augmentation with the retentive-flap technique. The high resorption rate of the collagenated bone substitute negates its initial superiority in both radiographic and soft tissue dimensions (no. KCT0005348).



Horizontal Bone Augmentation With Autogenous and Collagenated Xenogeneic Bone Blocks: A Split-Mouth Prospective Clinical, Tomographic, and Histological Pilot Study

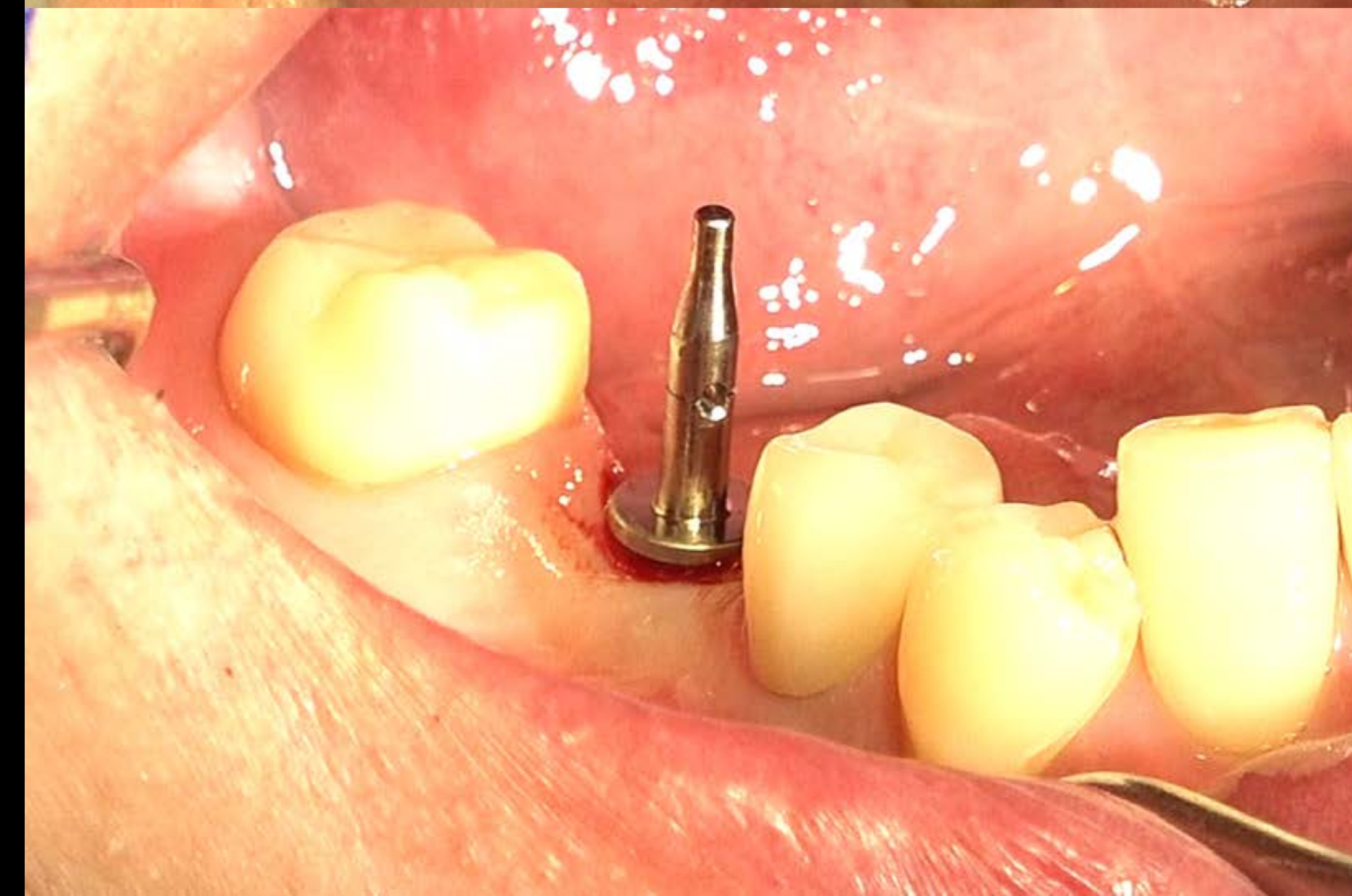
Evellyn Marques, DDS
Luiz Antonio Mazzuchelli Cosmo, DDS, MSc
Marcelo Lucchesi Teixeira, DDS, MSc, PhD



Extended healing time and undersized bony site preparation are required.

The aim of this study was to compare the clinical, tomographic, and histological performance of collagenated xenogeneic bone blocks (CXBB) in horizontal bone augmentations for implant placement. Five patients with an absence of the 4 upper incisors and an HAC 3 horizontal bone defect, with a remaining of 3 to 5 mm, underwent a bone-grafting procedure with CXBB (test group [TG], $n = 5$) and autogenous graft (control group [CG], $n = 5$), with one type of graft used on the right side and other type on the left side. Changes in bone thickness and density (tomographic evaluation), levels of complications (clinically), and distribution pattern between mineralized and nonmineralized tissue (histomorphometrically) were analyzed. Tomographic analysis showed a horizontal bone increase of 4.25 ± 0.78 mm in the TG and 3.08 ± 0.8 mm in the CG between baseline and 8 months postoperatively ($P < .05$). The horizontal loss between the day of installation of the blocks and 8 months postoperatively was 1.02 ± 0.39 mm for the TG and 1.10 ± 0.71 mm for the CG ($P > .05$). With regard to bone density, the TG blocks right after installation had 440.2 ± 89.15 HU, and after 8 months, the region reached 730.7 ± 130.98 HU, representing an increase of 29.05%. For the CG blocks, bone density increased from 1052.2 ± 398.35 HU to 1222.5 ± 453.28 HU, representing an increase of 17.03%. The increase in bone density was significantly higher in the TG ($P < .05$). Clinically, no cases of exposure of the bone blocks and no failure of incorporation were observed. Histomorphometrically, the percentage of mineralized tissue was lower in the TG than in the CG ($48.10\% \pm 2.88\%$ and $53.53\% \pm 1.05\%$, respectively), and the opposite was verified for the levels of nonmineralized tissue ($52.79\% \pm 2.88\%$ and $46.47\% \pm 1.05\%$, respectively; $P < .05$). The use of CXBB achieved higher levels of horizontal gain, with lower bone density and lower levels of mineralized tissue when compared with the use of autogenous blocks.

Key Words: horizontal bone augmentation, autogenous bone graft, collagenated xenogeneic bone blocks, dental implants



Best choice for
Posterior tooth area

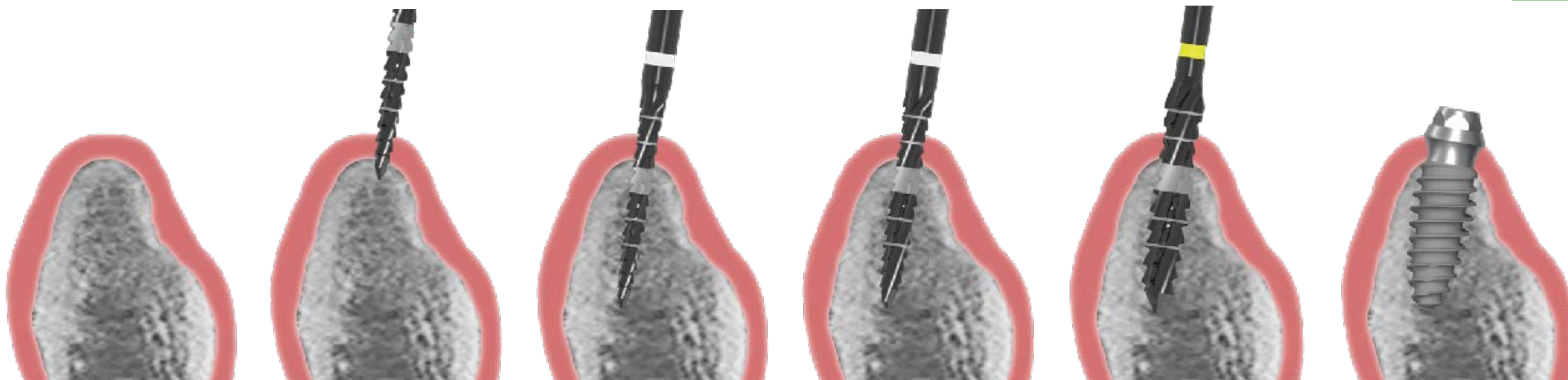
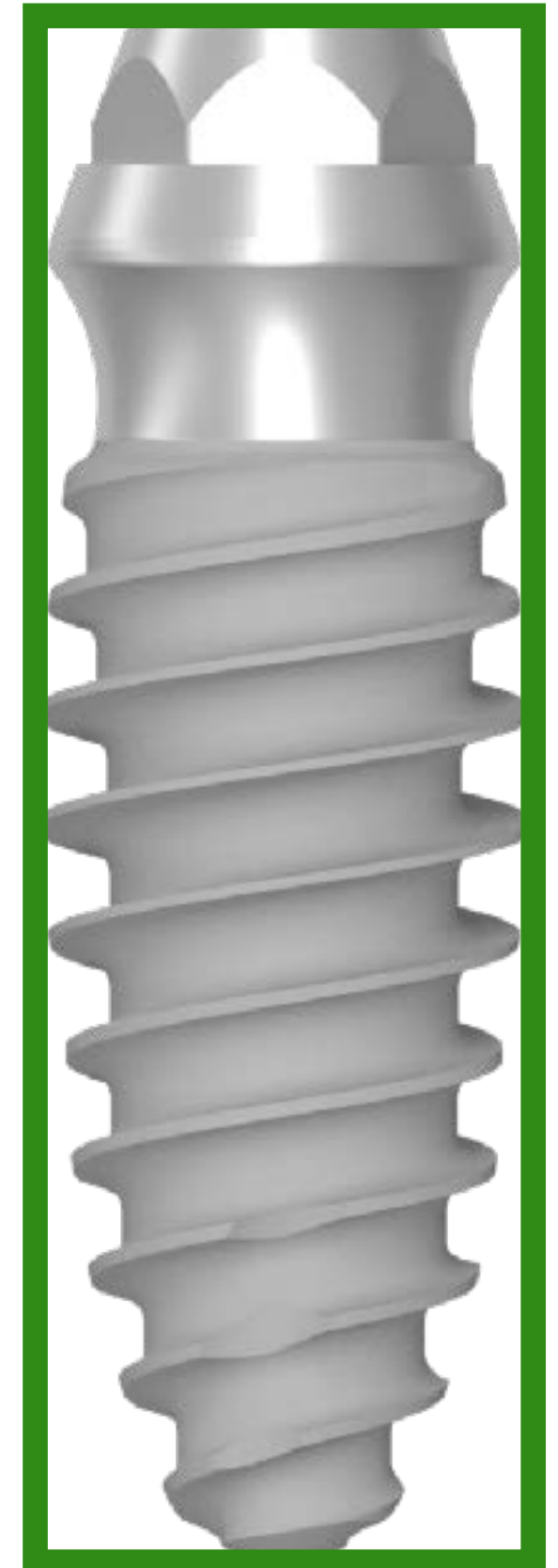


Cancellous bone
width **2.46mm**

Punching

Guide Drill
2.5mm

Fixture
2.5mm



Cancellous bone
width **3.55mm**

Punching

Guide Drill
2.5mm

Final Drill
3.0mm

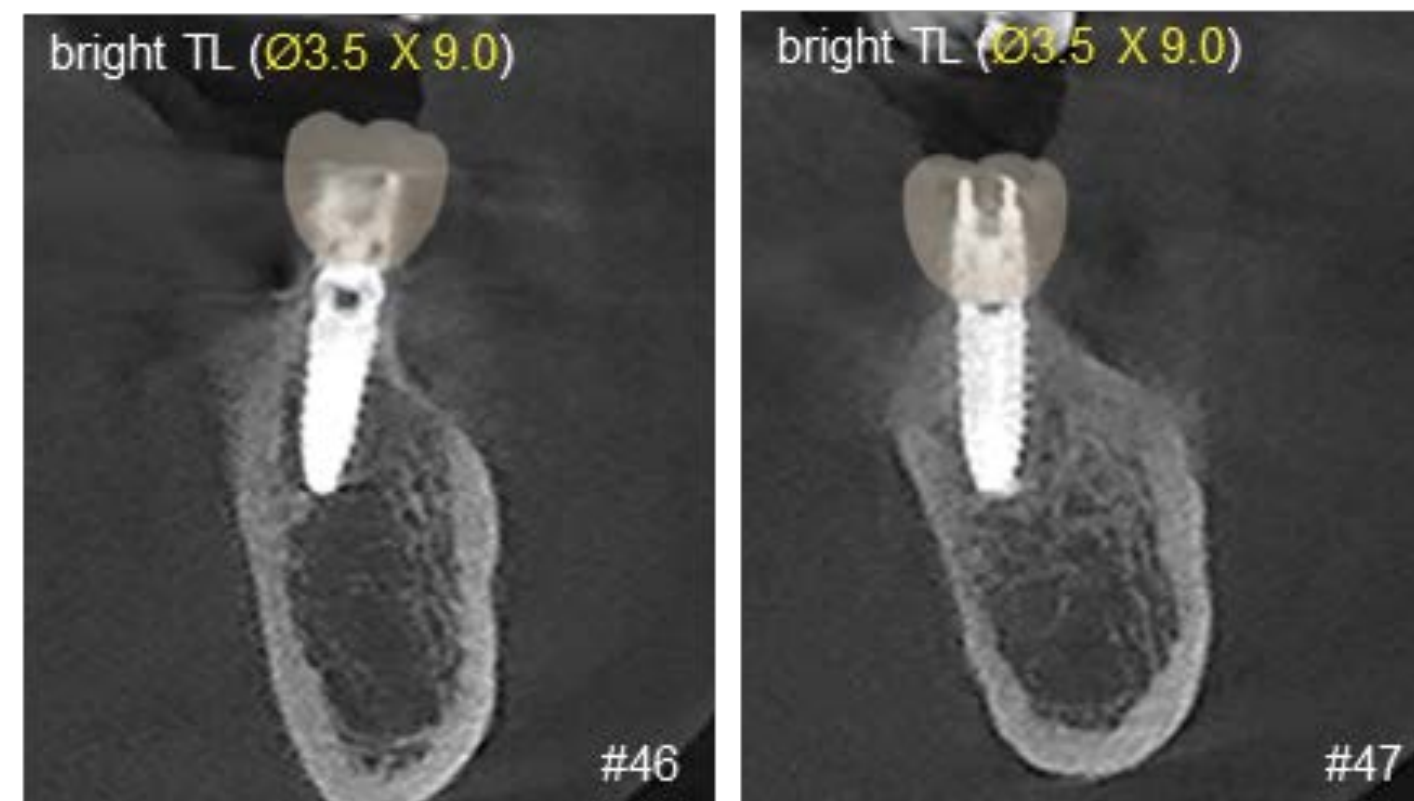
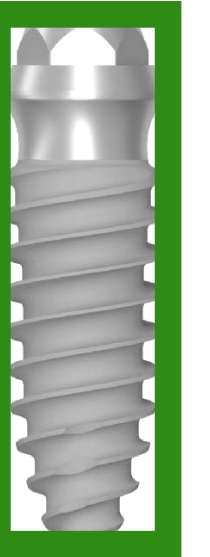
Final Drill
3.5mm

Final Drill
3.5mm

bright **Tissue** Level

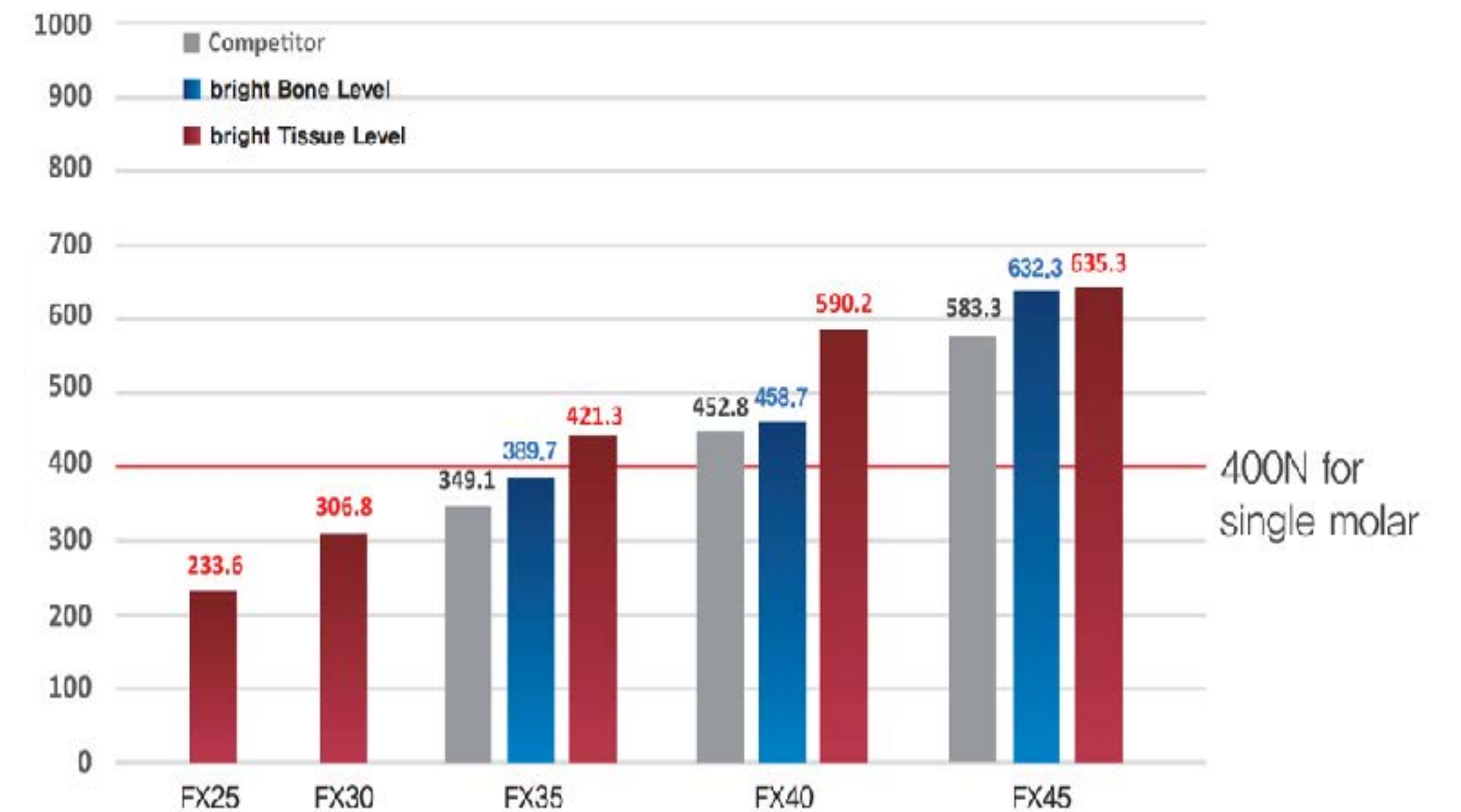
✓ **Narrow and Strong**

- Small diameter implants can be placed without concern for fracturing



Ø3.5 implant can be used to molar area

High Compressive Strength



※ Caution : heavy bruxer or hard food bite

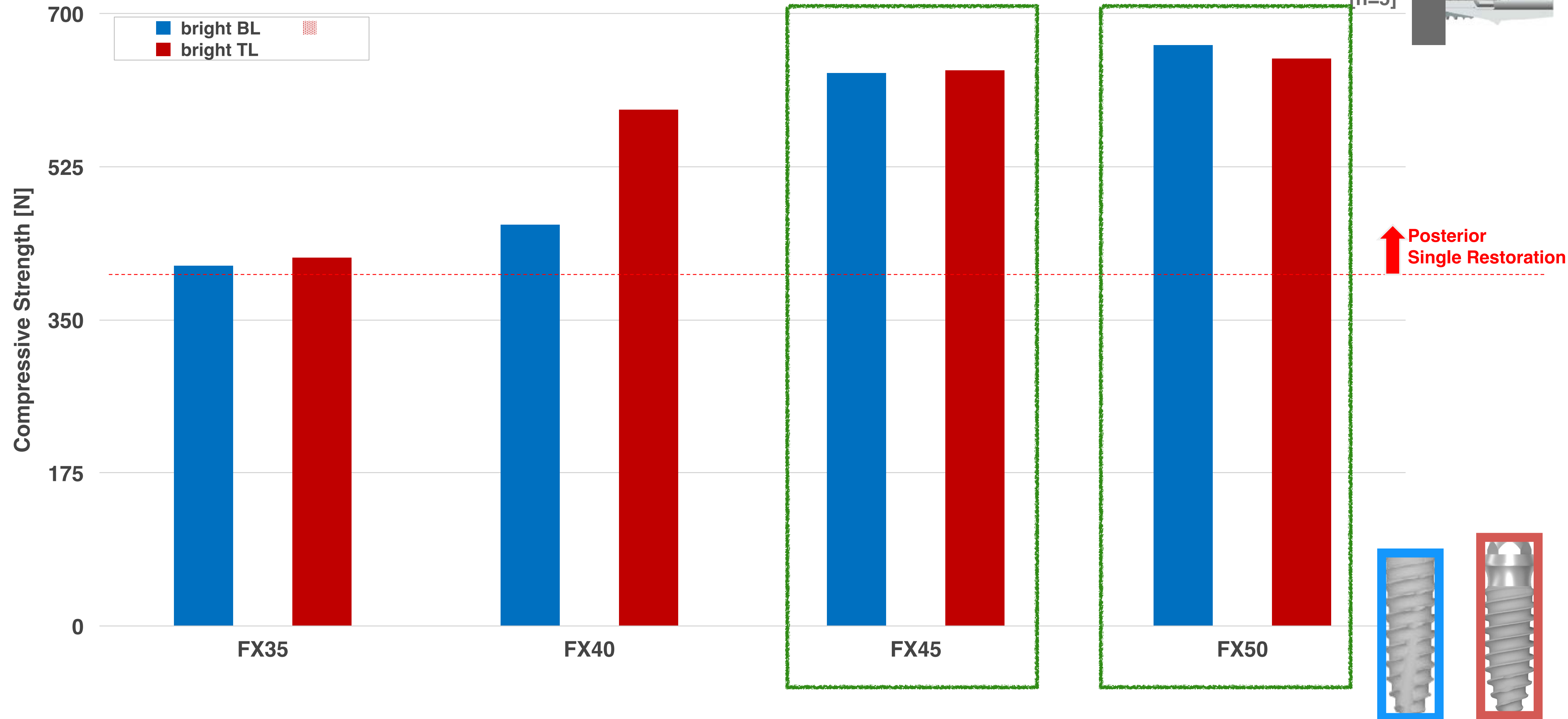
Bone level implant is also available for posterior



BL 5.0x9mm

Bone level implant

Lateral Compression Strength in Ø3.5 / 4.0 / 4.5 / 5.0



Tx. Strategy for elderly
population

Short imp.



Narrow imp.

Simplified Vertical Augmentation
Simplified Sinus Augmentation

With Collagenated bone



Simplified Horizontal Augmentation

Implant for elderly patients



**Simple and Easy,
yet highly predictable**



Thank you for attention

Sung Tae Kim, DDS, PhD

Seoul National University



CK Institute



SNUDH
서울대학교치과병원

Professor

Dept. of Periodontology, Seoul National University School of Dentistry

Seoul National University Dental Hospital

Director

Ck institute