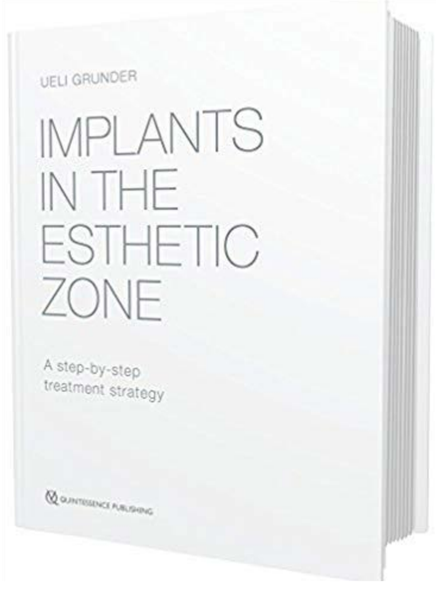
Surgical Considerations for Implants in the Aesthetic Zone

Part 1

joan | pi-anfruns

the bibles of esthetic implant dentistry



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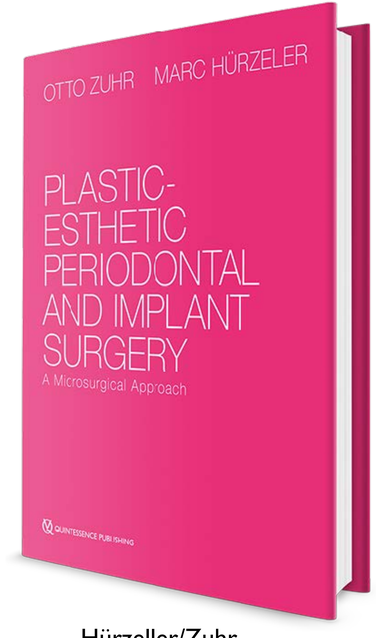

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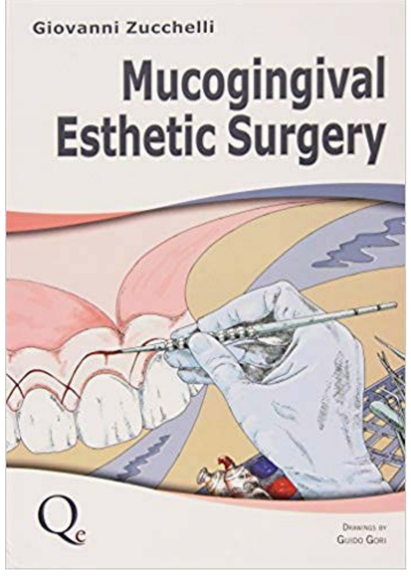

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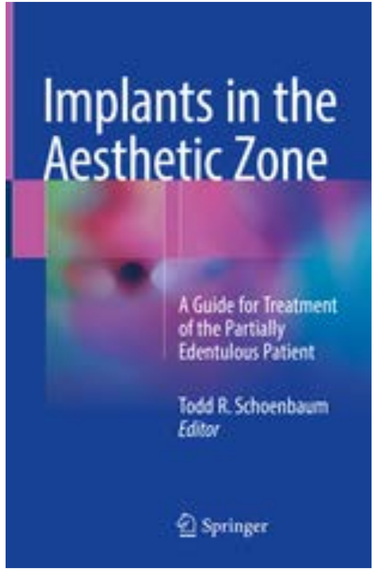


Schoenbaum


patient anatomy smile biotype site timing soft tissue management provisional final

what is esthetic?

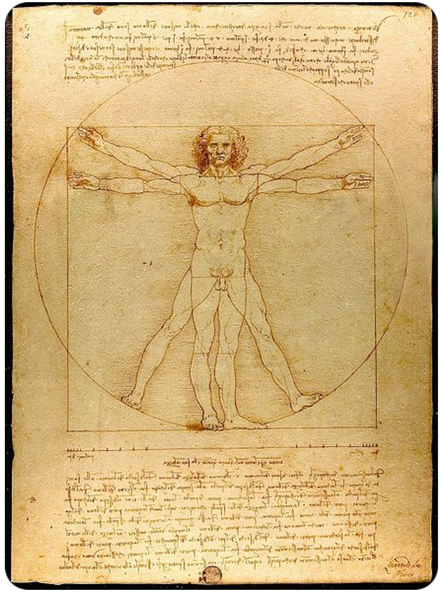
Aesthetic or esthetic

n. the branch of philosophy concerned with the study of the concepts of beauty and taste

beauty the qualities that give pleasure to the senses

taste the faculty of discerning what is aesthetically excellent or appropriate


luis | vega



can esthetics be objective?

Divina
proportione

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DSD
Digital Smile Design


SARIDENT
SWISS MADE

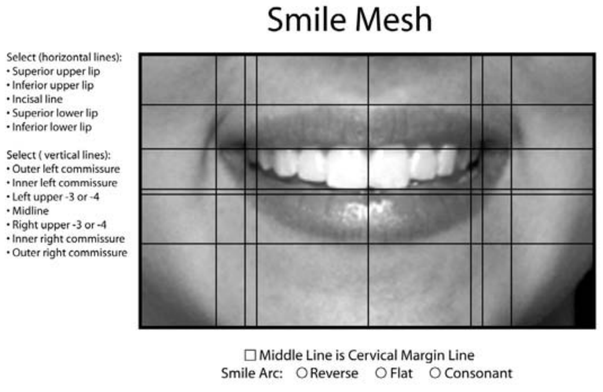

DSD
Digital Smile Design


SARIDENT
SWISS MADE

subjective evaluations of postreatment smiles captured with clinical photography

vs.

objective evaluations of the same smiles from the Smile Mesh program



ORIGINAL ARTICLE

Subjective vs objective evaluations of smile esthetics

Brian J. Schabel,[a] Lorenzo Franchi,[b] Tiziano Baccetti,[b] and James A. McNamara, Jr[c]
Ann Arbor, Mich, Santa Cruz, Calif, and Florence, Italy

Introduction: The aim of the study was to analyze the relationships between subjective evaluations of posttreatment smiles captured with clinical photography and rated by a panel of orthodontists and parents of orthodontic patients, and objective evaluations of the same smiles from the Smile Mesh program (TDG Computing, Philadelphia, Pa). **Methods:** The clinical photographs of 48 orthodontically treated patients were rated by a panel of 25 experienced orthodontists and 20 parents of patients. Independent samples *t* tests were used to test whether objective measurements were significantly different between subjects with "attractive" and "unattractive" smiles, and those with the "most attractive" and "least attractive" smiles. Additionally, logistic regression was performed to evaluate whether the measurements could predict whether a smile captured with clinical photography would be attractive or unattractive. **Results:** The comparison between groups showed no significant differences for any measurement. Subjects with the "most unattractive" smiles had a significantly greater distance between the incisal edge of the maxillary central incisors and the lower lip during smiling, and a significantly smaller smile index than did those with the "most attractive" smiles. As shown by the coefficients of logistic regression, smile attractiveness could not be predicted by any objectively gathered measurement. **Conclusions:** No objective measure of the smile could predict attractive or unattractive smiles as judged subjectively. (Am J Orthod Dentofacial Orthop 2009;135:372-9)

The subjectivity of beauty makes it difficult to establish clear-cut esthetic goals for diagnosis and treatment planning. This observation contradicts the historical framework regarding treatment decisions, whereby occlusal relationships and cephalometric measurements were regarded as scientific laws. Although rules that define esthetics rigidly might be difficult to determine, it is possible to formulate general guidelines to optimize dentofacial esthetics (with special regard to the smile) while satisfying other treatment goals.[1,2]

These guidelines must consider both subjective and objective methods of evaluation.

In terms of subjective evaluation, esthetic preferences typically are measured by ordinal and interval scales because they represent a rank order of judgment from least preferred to most preferred.[3] Historically, interval scales (eg, visual analog scale), rank-order scales, rating scales, and categorical rating scales (eg, Q-sort) have been used to measure dentofacial attractiveness.[4-6]

One method used to quantify the variables associated with the smile is the Smile Mesh (TDG Computing, Philadelphia, Pa). This program was introduced to the orthodontic community by Ackerman et al[7] to quantify smile characteristics from photographs in a clinical orthodontic setting that capture the so-called "posed social smile." This morphometric tool was created to measure the lip-tooth characteristics of anterior tooth display at 1 time. The Smile Mesh program uses an adjustable grid consisting of vertical and horizontal lines that overlay a smile image that are used to measure various lip-tooth relationships associated with anterior tooth display.

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The authors report no commercial, proprietary, or financial interest in the products or companies described in this article.
Reprint requests to: Lorenzo Franchi, Department of Orthodontics, Università degli Studi di Firenze, Via del Forte di Mezzo, 46-48, 50127, Firenze, Italy; e-mail, lorenzo.franchi@unifi.it.
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0889-5406/$34.00

doi:10.1016/j.ajodo.2007.10.030

Schabel et al. 2009

- 48 orthodontically treated patients rated by a panel of 25 orthodontists and 20 parents
- test whether objective measurements were significantly different between attractive and unattractive smiles
- evaluate whether the measurements could predict if the smile captured would be attractive or unattractive

RESULTS comparison between groups showed no significant differences for any measurement


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CONCLUSIONS no objective measure of the smile could predict attractive / unattractive smiles as judged subjectively

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s u b j e c t i v e

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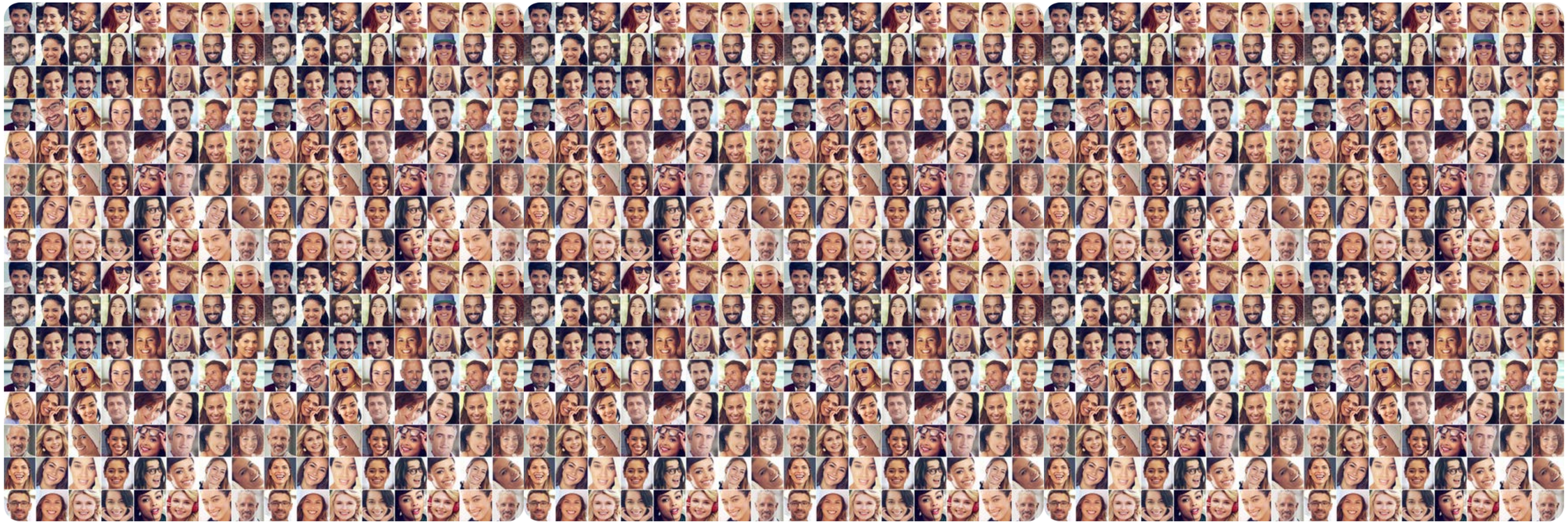
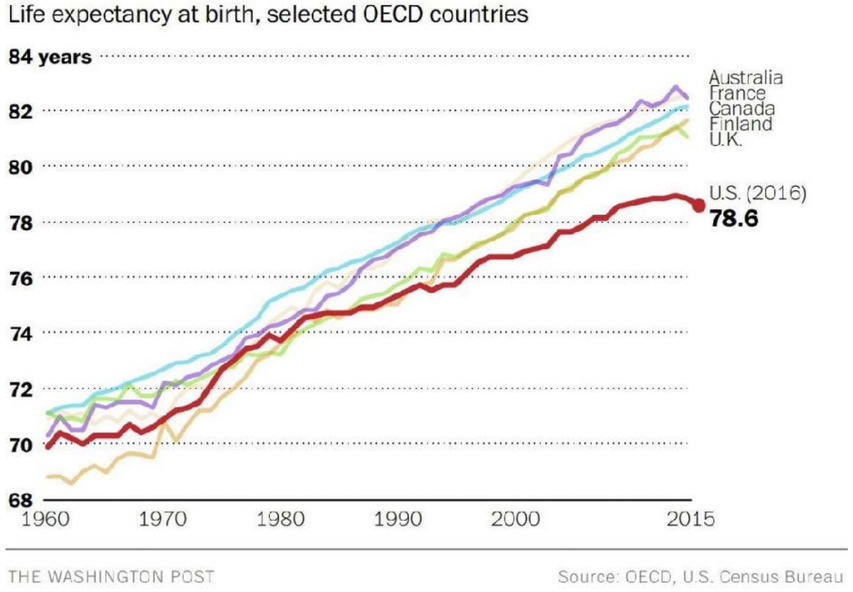
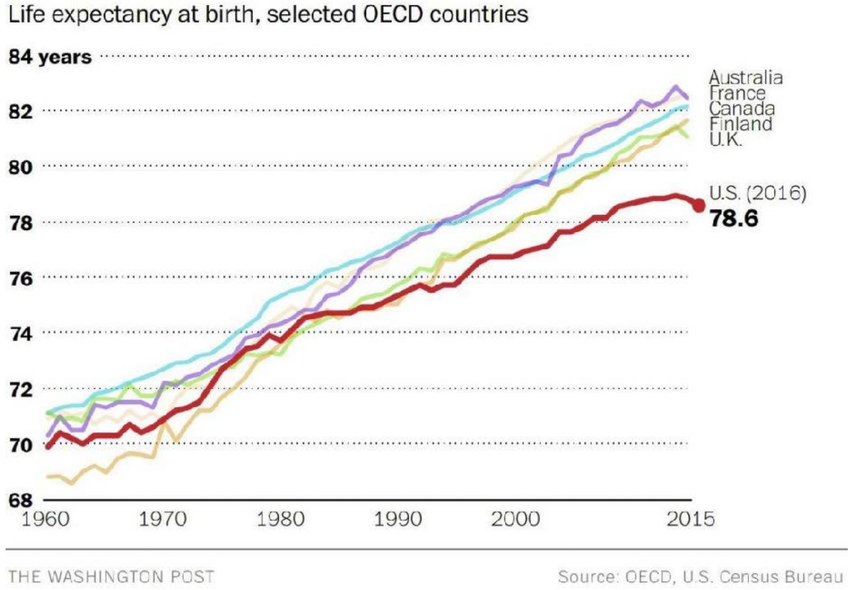



Life expectancy at birth, selected OECD countries
84 years
82
80
78
76
74
72
70
68
1960
1970
1980
1990
2000
2015
Australia
France
Canada
Finland
U.K.
U.S. (2016)
78.6
THE WASHINGTON POST
Source: OECD, U.S. Census Bureau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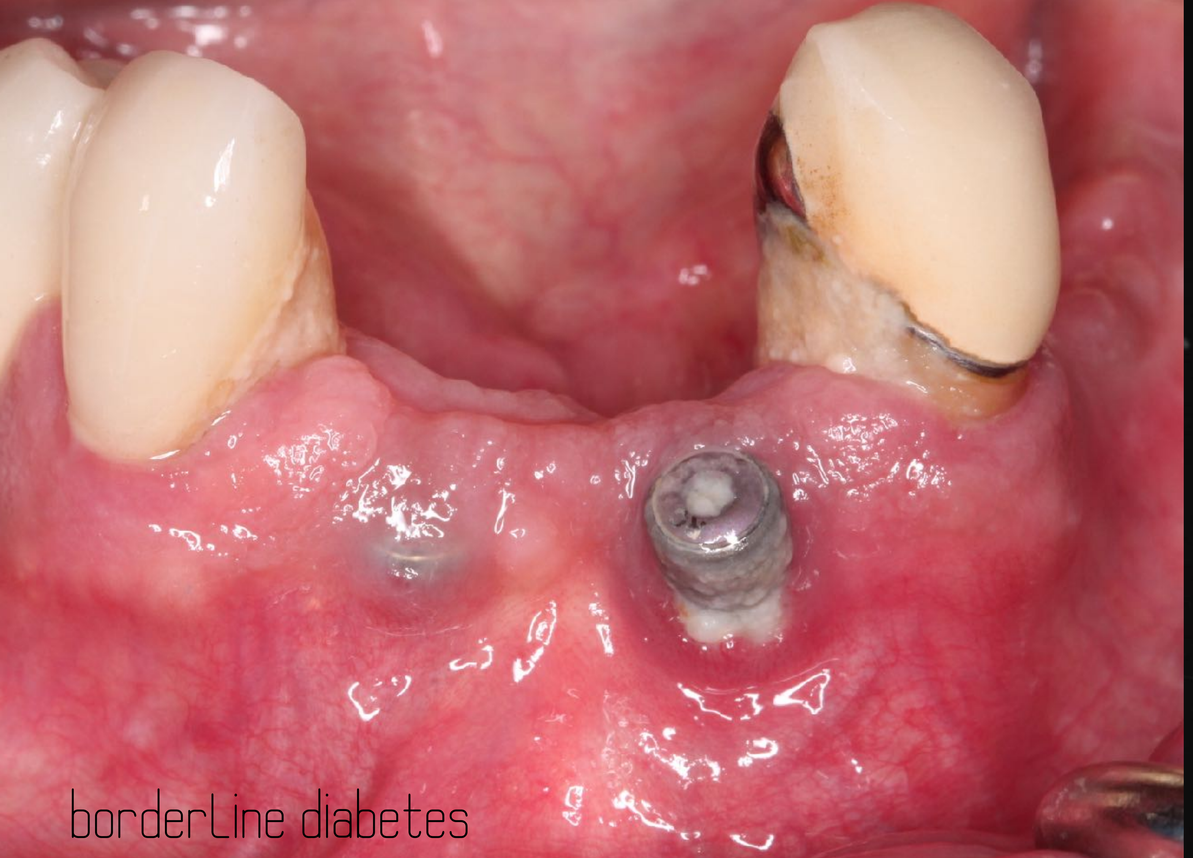

borderLine diabetes

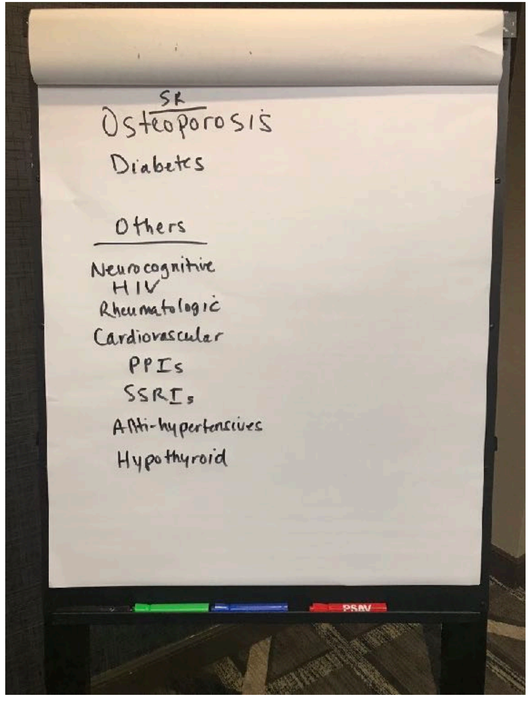

bisphosphonates


aLcohoL


smoKing


vaping

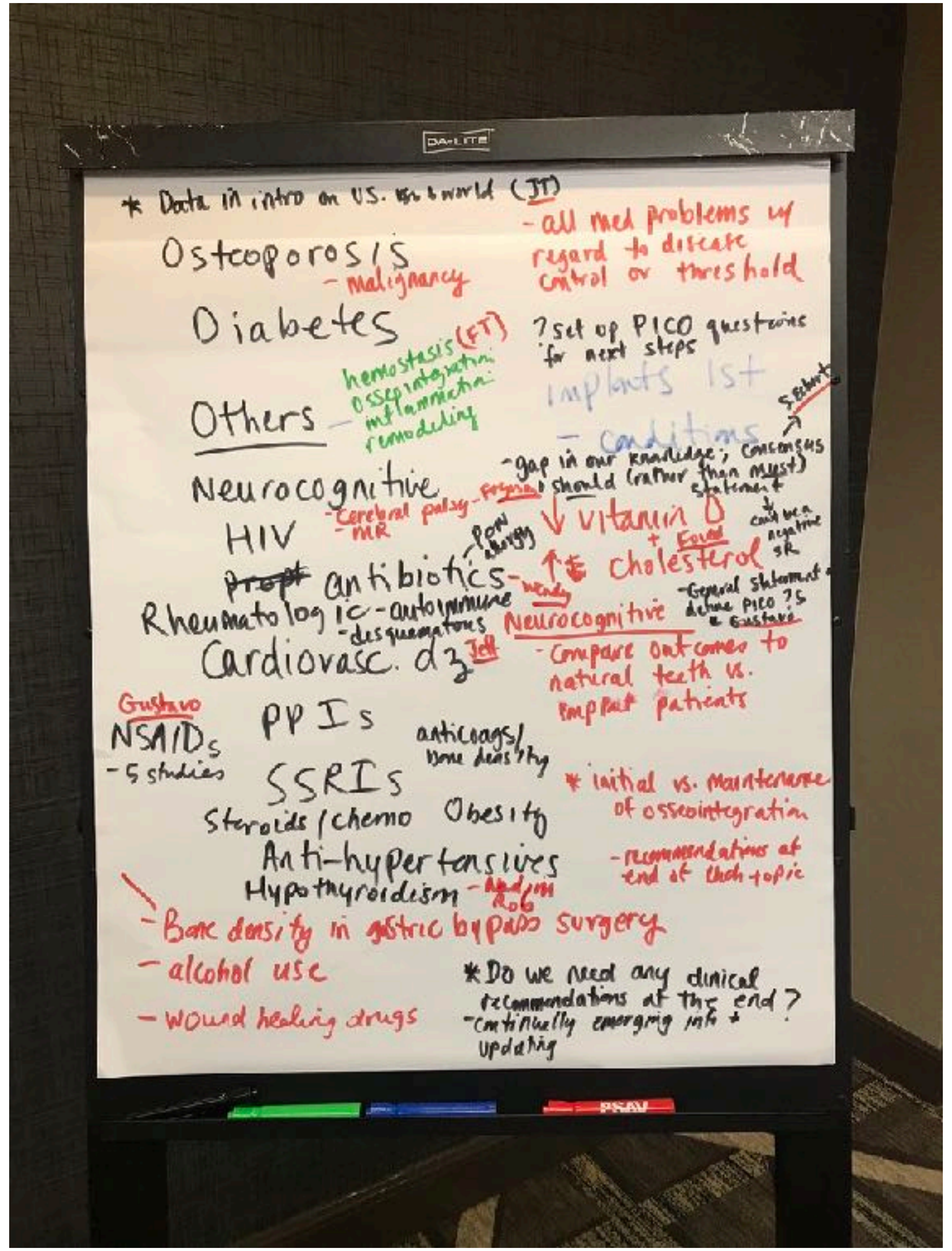
Systemic health, medications and osseointegration

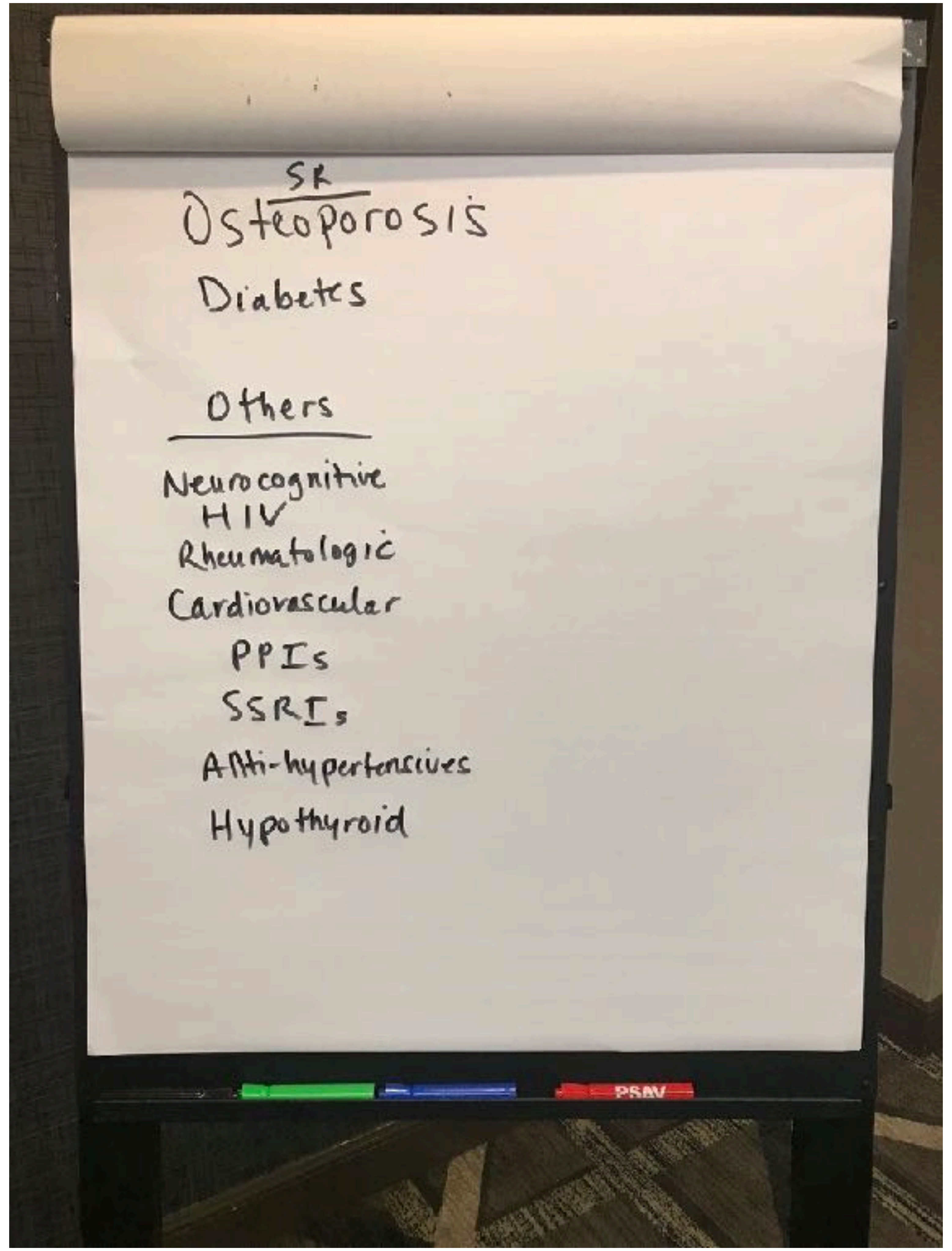


Academy of Osseointegration

2018 SUMMIT

OPTIMIZED PATIENT CARE:
Converting *Osseo*integration
to *Patient*integration


Osteoporosis
- malignancy
Diabetes
Others
Neurocognitive
HIV
antibiotics
Cardiovasc. dz
NSAIDs
PPIs
SSRIs
Steroids/chemo
Obesity
Anti-hypertensives
Hypothyroidism
- Bone density in gastric bypass surgery
- alcohol use
- wound healing drugs
vitamin D
cholesterol
Neurocognitive
implants 1st
- conditions
* initial vs. maintenance of osseointegration
* Do we need any clinical recommendations at the end?



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Aghaloo T, Pi-Anfruns J, Moshaverinia A, Sim D, Grogan T, Hadaya D. The effects of systemic diseases and medications on implant osseointegration: A systematic review. Int J Oral Maxillofac Impl, 2019 Suppl;34:s35-s49

The Effects of Systemic Diseases and Medications on Implant Osseointegration: A Systematic Review

Tara Aghaloo, DDS, MD, PhD[1]/Joan Pi-Anfruns, DMD[2]/Alireza Moshaverinia, DDS, PhD[3]/Danielle Sim, BS[4]/Tristan Grogan, MS[5]/Danny Hadaya, DDS[6]

Since their development, dental implants have become one of the most common procedures to rehabilitate patients with single missing teeth or fully edentulous jaws. As implants become more mainstream, determining the factors that affect osseointegration is extremely important. Medical risk factors identified to negatively affect osseointegration include diabetes and osteoporosis. However, other systemic conditions and medications that interfere with wound healing have not been as widely investigated. The aim of this systematic review was to evaluate the effect of systemic disorders including diabetes and osteoporosis on implant osseointegration. The aim was also to evaluate the effect of other diseases, such as neurocognitive diseases, cardiovascular disease, human immunodeficiency virus (HIV), hypothyroidism, rheumatoid arthritis, and medications, such as selective serotonin reuptake inhibitors (SSRIs), proton pump inhibitors (PPIs), and antihypertensives. Although the literature does not demonstrate that diabetes negatively affects implant osseointegration, most studies focus on well-controlled diabetics and the use of prophylactic antibiotics. In addition, studies have shown increased long-term bone and soft tissue complications. For osteoporosis, recent studies and reviews also fail to demonstrate a lower osseointegration rate. However, caution must be exercised in these patients due to the risk for osteonecrosis of the jaws (ONJ), especially in patients with bone malignancies. There is also no direct evidence that patients with HIV, cardiovascular disease, neurologic disorders, hypothyroidism, or rheumatoid arthritis have a decreased rate of implant osseointegration. However, some preliminary evidence suggests that medications such as SSRIs or PPIs may have a negative effect on implant osseointegration. These studies are fairly recent and must be validated with continuous research. Moreover, disease control, concomitant medications, and other comorbidities complicate implant osseointegration and must guide our treatment approaches and clinical guidelines. Int J Oral Maxillofac Implants 2019;34(suppl):s35–s49. doi: 10.11607/jomi.19suppl.g3

Keywords: *diabetes, medical risk factors, osseointegration, osteoporosis*

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[3]Assistant Professor, Division of Advanced Prosthodontics, Section of Prosthodontics, UCLA School of Dentistry, Los Angeles, California, USA.
[4]Research Associate, Department of Medicine Statistics Core, David Geffen School of Medicine at UCLA, Los Angeles, California, USA.
[5]Principal Statistician, Department of Medicine Statistics Core, David Geffen School of Medicine at UCLA, Los Angeles, California, USA.
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According to the National Center for Health Statistics (NCHS), more than 36 million Americans are edentulous, and 90% of them have dentures.[1] An additional 120 million are missing at least one tooth, and it is estimated that in the next 15 years, tooth loss will affect more than 200 million individuals. Tooth loss can be a result of decay, periodontal disease, wear, trauma, or cancer, and it can lead to additional dental problems, nutritional changes, and social and personal self-esteem issues. Although complete and partial dentures and tooth-borne prostheses are still options to replace missing teeth, dentists and patients often demand a more advanced and integrated solution.

Osseointegration is a direct contact between living bone and a titanium implant.[2] Although initially a complex interaction between living tissue and metal to replace missing teeth and facilitate comprehensive dental and craniofacial rehabilitation, implants are now one of the most common procedures performed in dentistry today. Multiple short- and long-term studies demonstrate that dental implants are safe and

- diabetes
- osteoporosis

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According to the National Center for Health Statistics (NCHS), more than 36 million Americans are edentulous, and 90% of them have dentures.[1] An additional 120 million are missing at least one tooth, and it is estimated that in the next 15 years, tooth loss will affect more than 200 million individuals. Tooth loss can be a result of decay, periodontal disease, wear, trauma, or cancer, and it can lead to additional dental problems, nutritional changes, and social and personal self-esteem issues. Although complete and partial dentures and tooth-borne prostheses are still options to replace missing teeth, dentists and patients often demand a more advanced and integrated solution.

Osseointegration is a direct contact between living bone and a titanium implant.[2] Although initially a complex interaction between living tissue and metal to replace missing teeth and facilitate comprehensive dental and craniofacial rehabilitation, implants are now one of the most common procedures performed in dentistry today. Multiple short- and long-term studies demonstrate that dental implants are safe and

- diabetes
- osteoporosis
- neurocognitive diseases
- cardiovascular diseases
- HIV
- hypothyroidism
- RA

Aghaloo T, Pi-Anfruns J, Moshaverinia A, Sim D, Grogan T, Hadaya D. The effects of systemic diseases and medications on implant osseointegration: A systematic review. Int J Oral Maxillofac Impl, 2019 Suppl;34:s35-s49

The Effects of Systemic Diseases and Medications on Implant Osseointegration: A Systematic Review

Tara Aghaloo, DDS, MD, PhD[1]/Joan Pi-Anfruns, DMD[2]/Alireza Moshaverinia, DDS, PhD[3]/Danielle Sim, BS[4]/Tristan Grogan, MS[5]/Danny Hadaya, DDS[6]

Since their development, dental implants have become one of the most common procedures to rehabilitate patients with single missing teeth or fully edentulous jaws. As implants become more mainstream, determining the factors that affect osseointegration is extremely important. Medical risk factors identified to negatively affect osseointegration include diabetes and osteoporosis. However, other systemic conditions and medications that interfere with wound healing have not been as widely investigated. The aim of this systematic review was to evaluate the effect of systemic disorders including diabetes and osteoporosis on implant osseointegration. The aim was also to evaluate the effect of other diseases, such as neurocognitive diseases, cardiovascular disease, human immunodeficiency virus (HIV), hypothyroidism, rheumatoid arthritis, and medications, such as selective serotonin reuptake inhibitors (SSRIs), proton pump inhibitors (PPIs), and antihypertensives. Although the literature does not demonstrate that diabetes negatively affects implant osseointegration, most studies focus on well-controlled diabetics and the use of prophylactic antibiotics. In addition, studies have shown increased long-term bone and soft tissue complications. For osteoporosis, recent studies and reviews also fail to demonstrate a lower osseointegration rate. However, caution must be exercised in these patients due to the risk for osteonecrosis of the jaws (ONJ), especially in patients with bone malignancies. There is also no direct evidence that patients with HIV, cardiovascular disease, neurologic disorders, hypothyroidism, or rheumatoid arthritis have a decreased rate of implant osseointegration. However, some preliminary evidence suggests that medications such as SSRIs or PPIs may have a negative effect on implant osseointegration. These studies are fairly recent and must be validated with continuous research. Moreover, disease control, concomitant medications, and other comorbidities complicate implant osseointegration and must guide our treatment approaches and clinical guidelines. Int J Oral Maxillofac Implants 2019;34(suppl):s35–s49. doi: 10.11607/jomi.19suppl.g3

Keywords: *diabetes, medical risk factors, osseointegration, osteoporosis*

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[4]Research Associate, Department of Medicine Statistics Core, David Geffen School of Medicine at UCLA, Los Angeles, California, USA.
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Hello Joan,
I would like to refer another patient to your care. His name is . He is in AxiUm. In short, tooth #14 and 15 has very poor prognosis. He is also in pain. He has agreed to have them removed followed by implant care (#14 only). Can you please have your office call him up to schedule an appointment for consult and removal of #14 and 15. He is relatively healthy by my standards (only 6 medications).
Thanks.
Eric


DIAGNOSI

- consultation appointment plays a key role in proper patient selection

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- thorough review of medical questionnaire, medications and social habits

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- unrealistic expectations or denial to accept a problem may be a warning sign for future complications


DIAGNOSI


DIAGNOSI


anatomy

The main esthetic objectives of implant therapy from a surgical standpoint are:

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✓ the achievement of a harmonious gingival margin with out abrupt changes in tissue height


patient
anatomy
smile
biotype
site
timing
soft tissue management
provisional
final
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✓ the achievement of a harmonious gingival margin with out abrupt changes in tissue height
✓ maintaining intact papillae

anatomy

The main esthetic objectives of implant therapy from a surgical standpoint are:

- ✓ the achievement of a harmonious gingival margin with out abrupt changes in tissue height
- ✓ maintaining intact papillae
- ✓ obtaining or preserving a convex contour of the alveolar crest

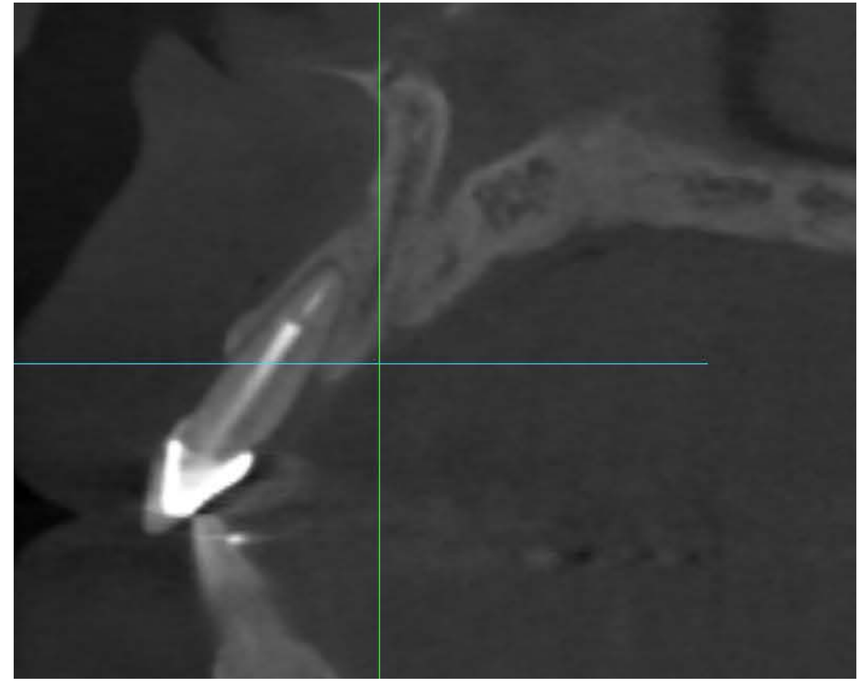
	conditions	remarks
anatomic	narrow alveolar crest facial undercut	congenitally missing teeth
pathologic	dental trauma post traumatic conditions acute chronic infections	tooth avulsion +alveolar fracture ankylosis/root resorption/root fracture
disuse bone atrophy	vertical/horizontal defficiency	Long-standing tooth loss

Buser et al. 2004

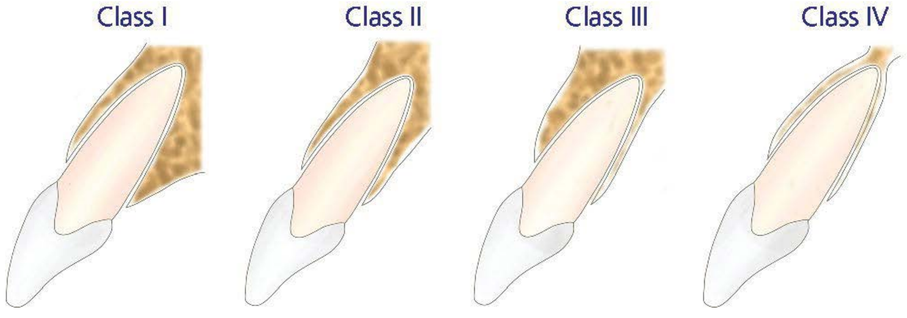
CLINICAL ORAL IMPLANTS RESEARCH

Guy Huynh Ba
Bjarni E. Pjetursson
Mariano Sanz
Denis Cecchinato
Jorge Ferrus
Jan Lindhe
Niklaus P. Lang

Analysis of the socket bone wall dimensions in the upper maxilla in relation to immediate implant placement



➡ in anterior sites 87.2**%** buccal bony walls **<**1mm



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

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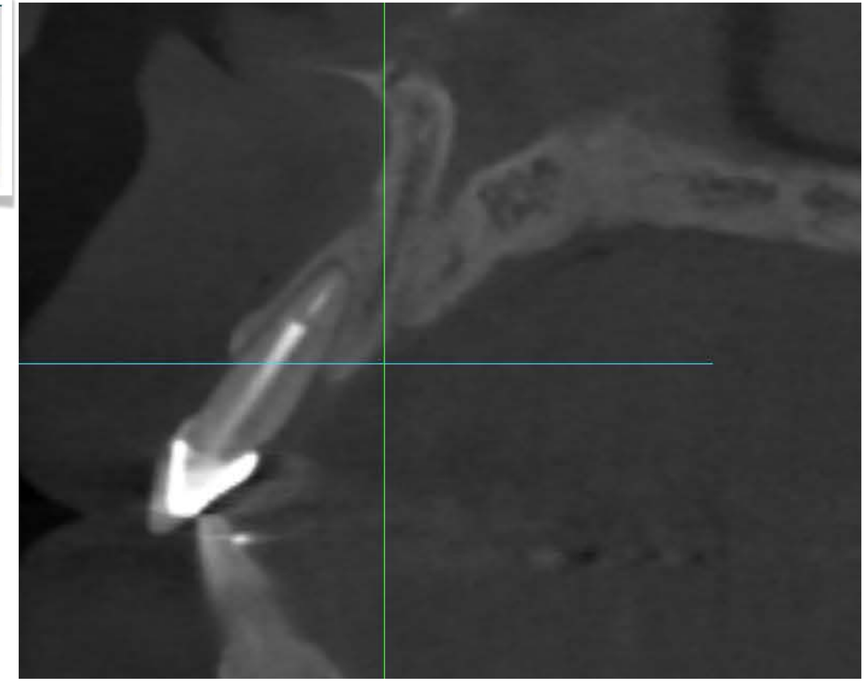

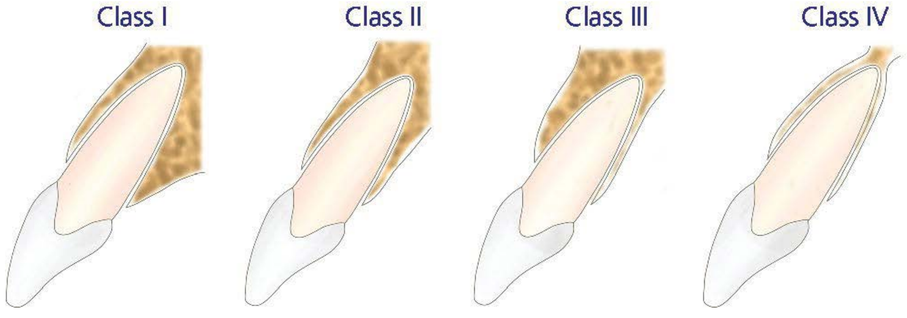

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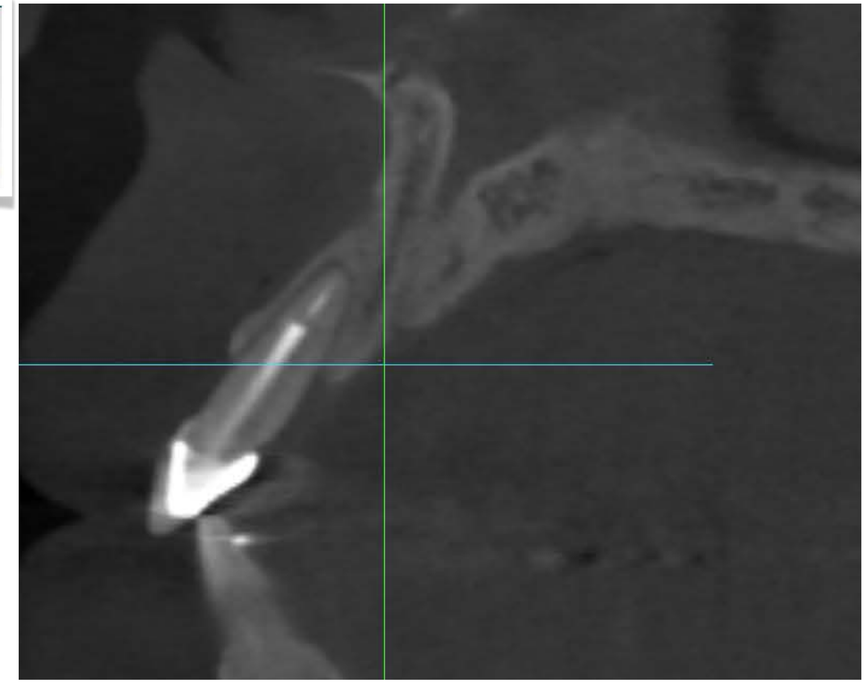
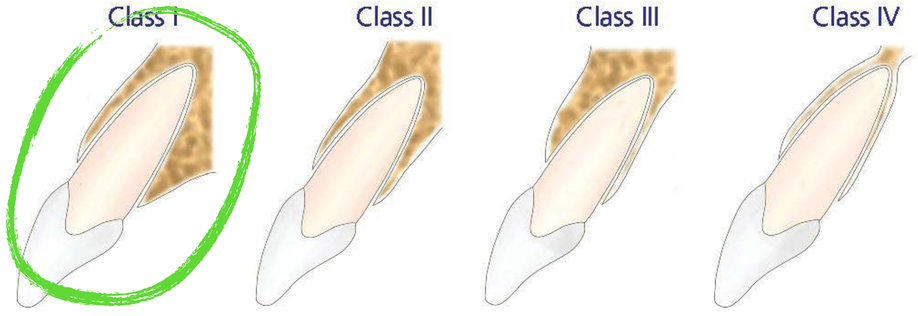
Table 1 Frequency Distribution of Sagittal Root Position Classification

	Percentage (no.)			
SRP	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)





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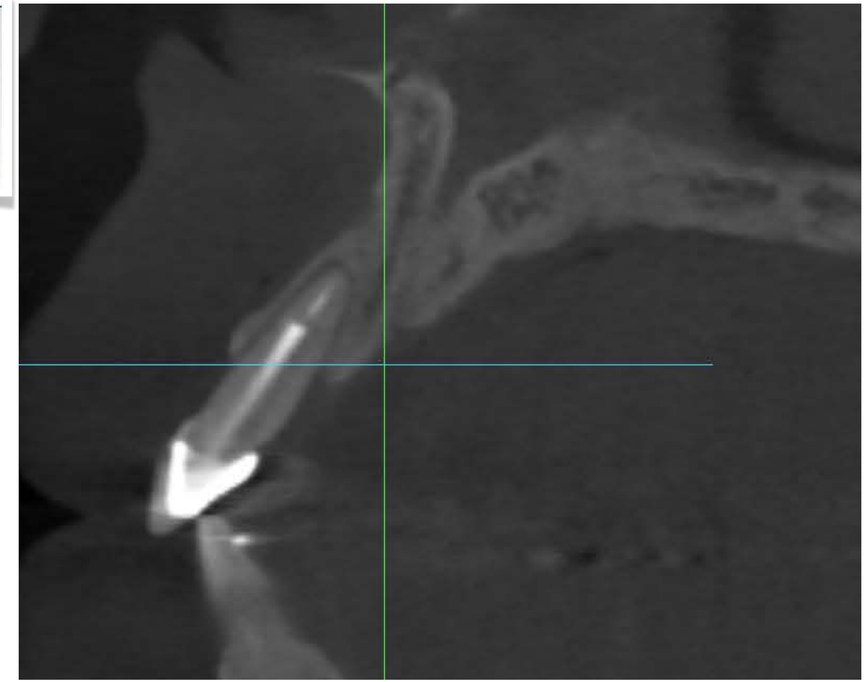

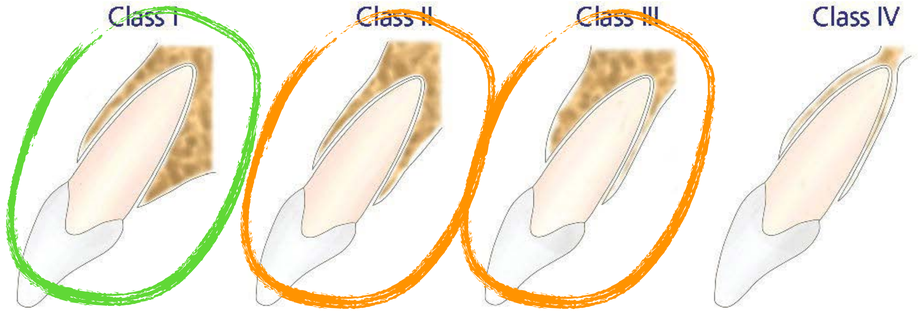

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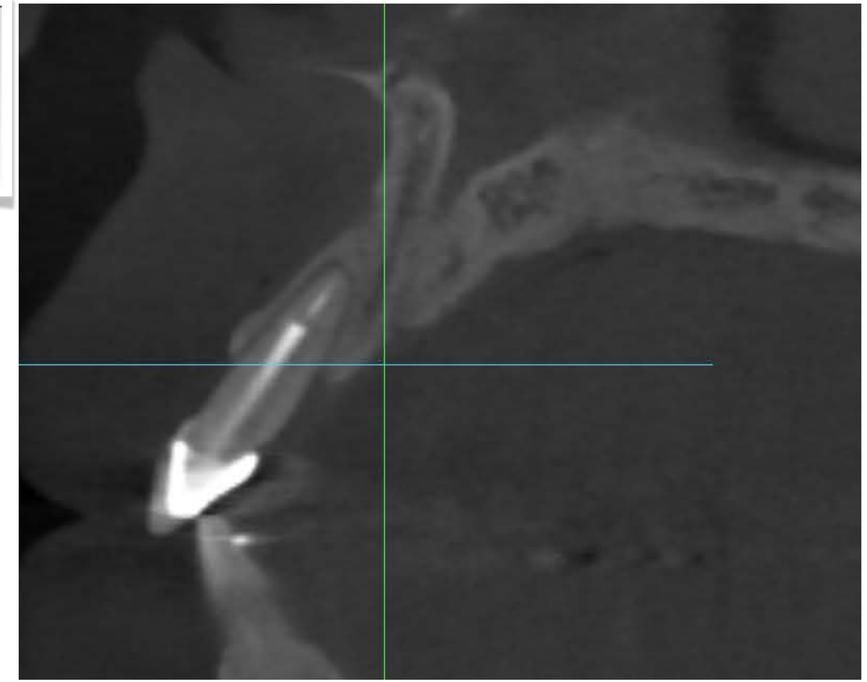

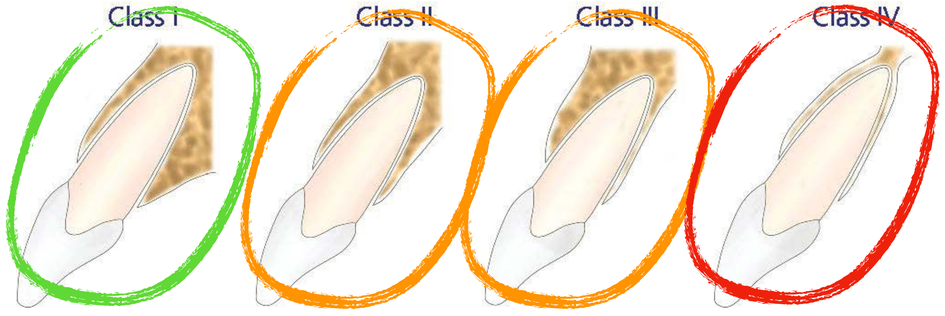

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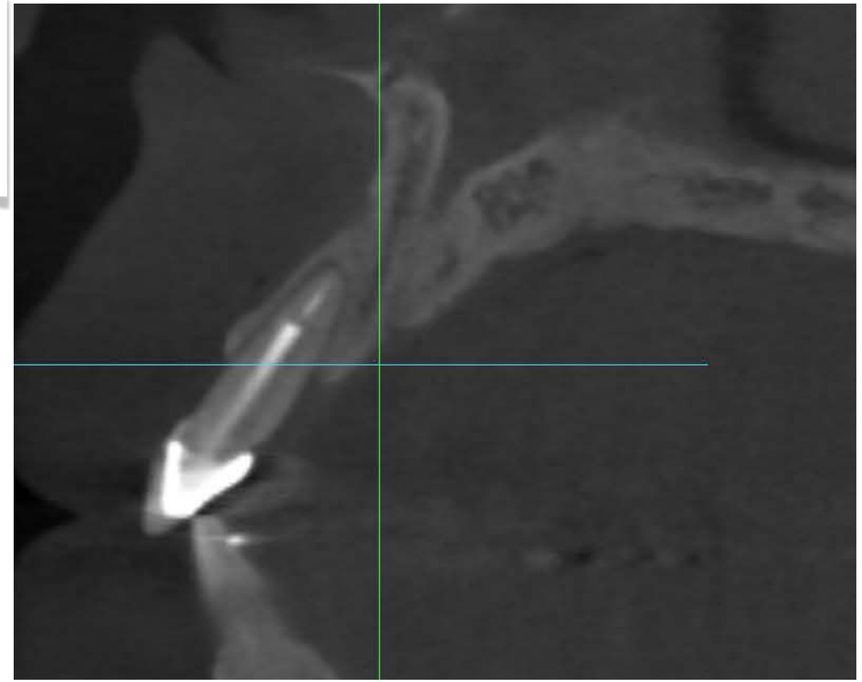
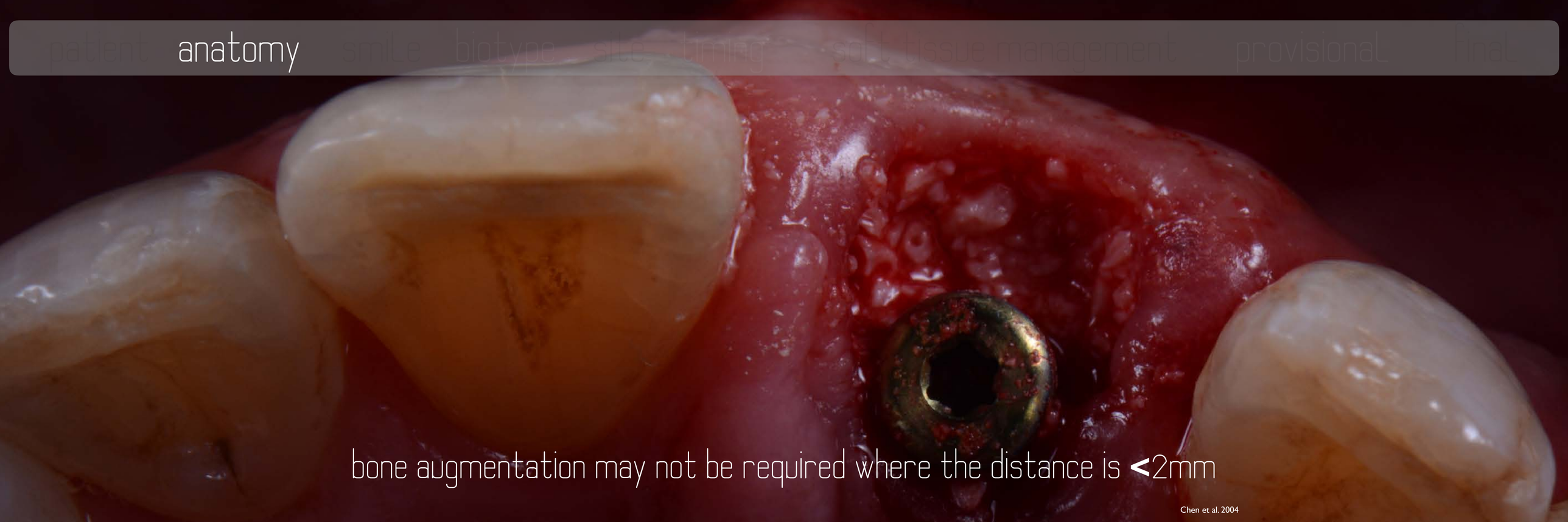
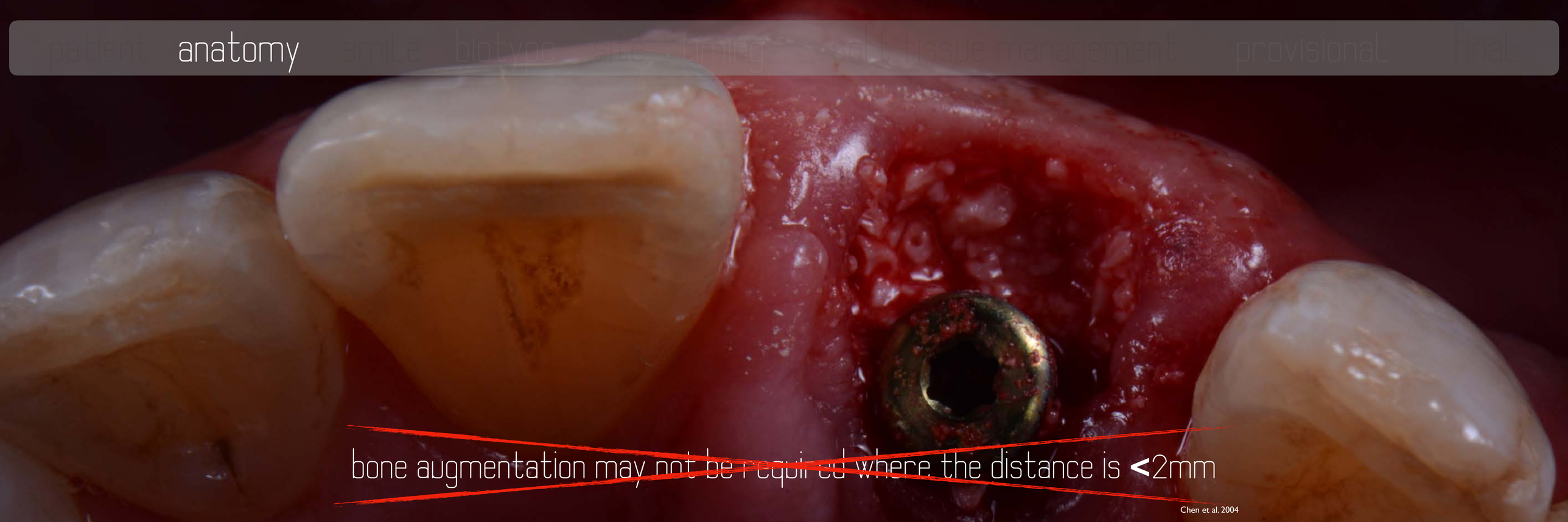




bone augmentation may not be required where the distance is <2mm

Chen et al. 2004



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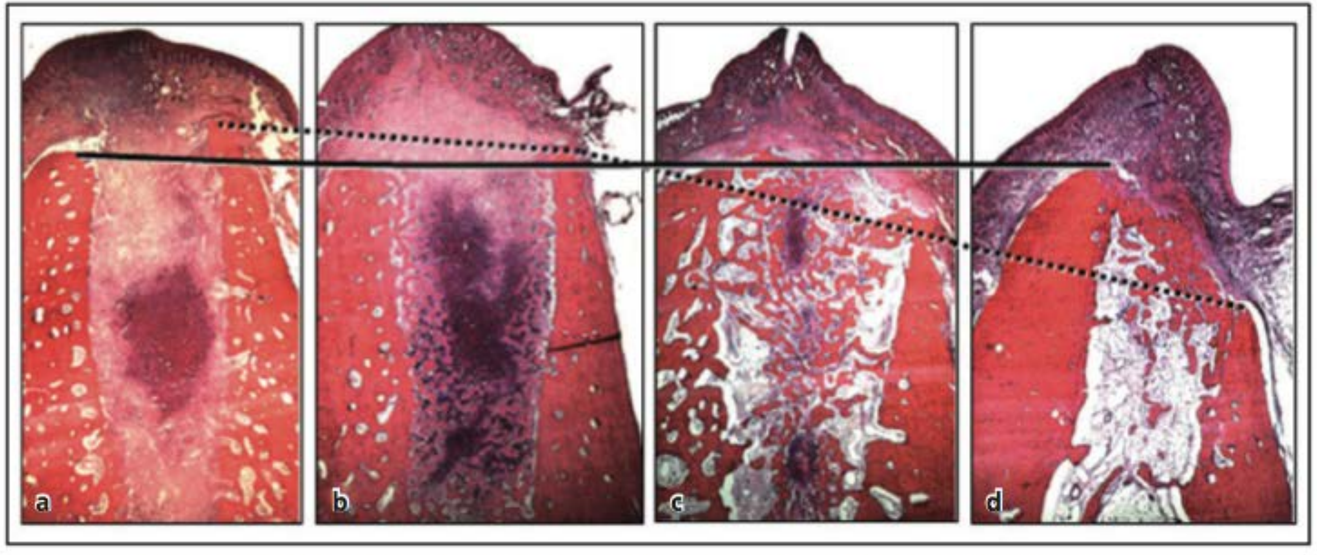

Fig. 2-31 Histologic sections (buccal–lingual aspects) describing the profile of the edentulous region in the dog after (a) 1, (b) 2, (c) 4, and (d) 8 weeks of healing following tooth extraction. While the marginal level of the lingual wall was maintained during the process of healing (solid line), the crest of the buccal wall was replaced >2 mm in the apical direction (dotted line).

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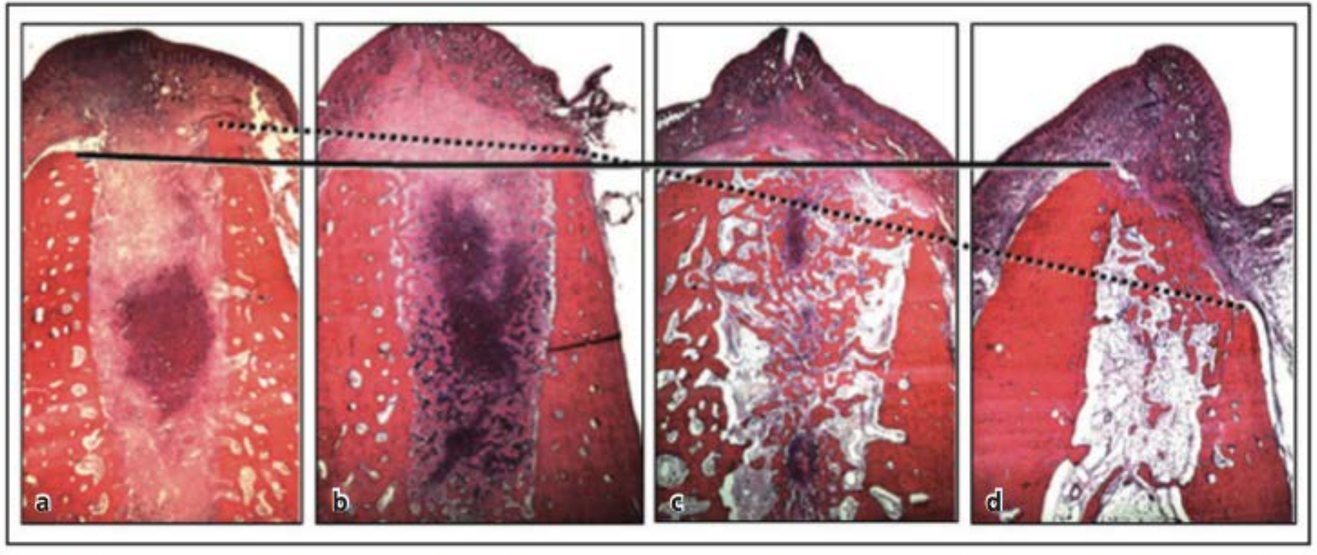

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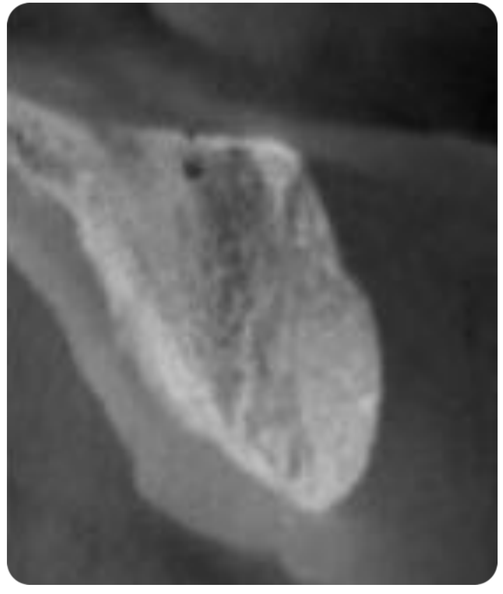

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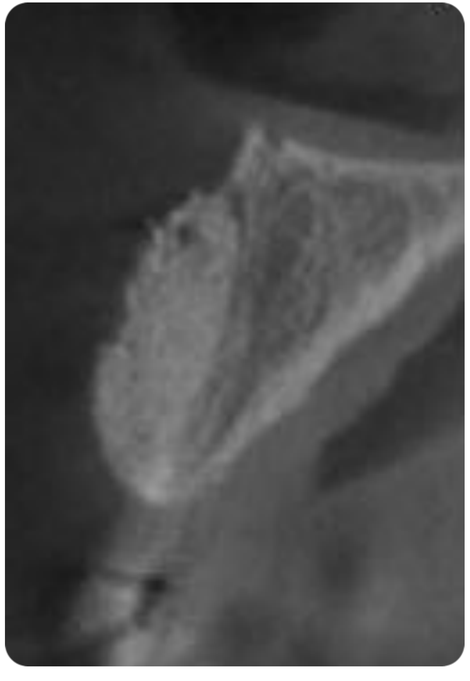
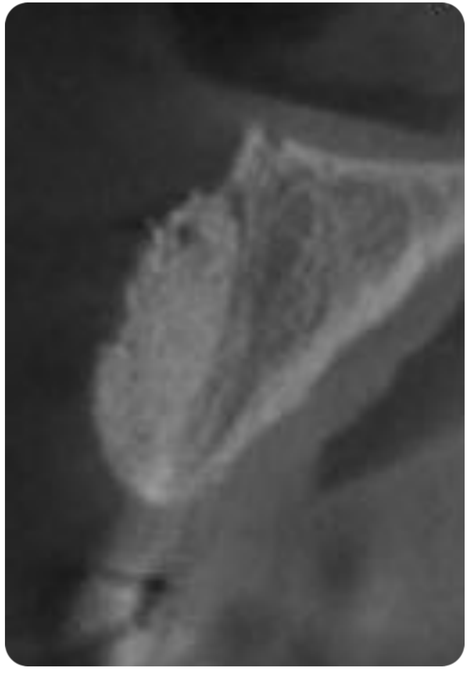
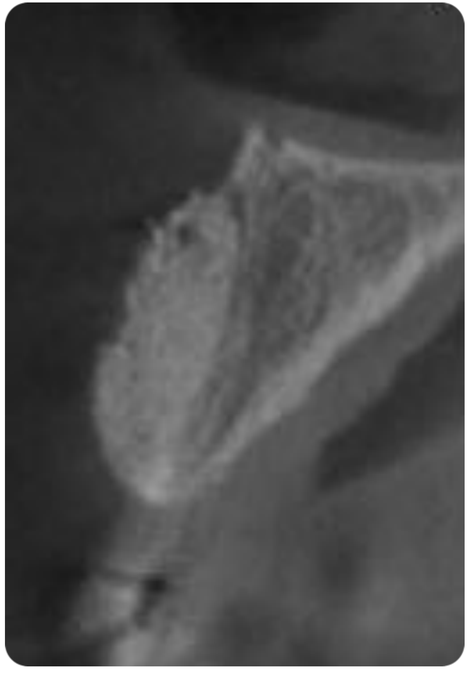
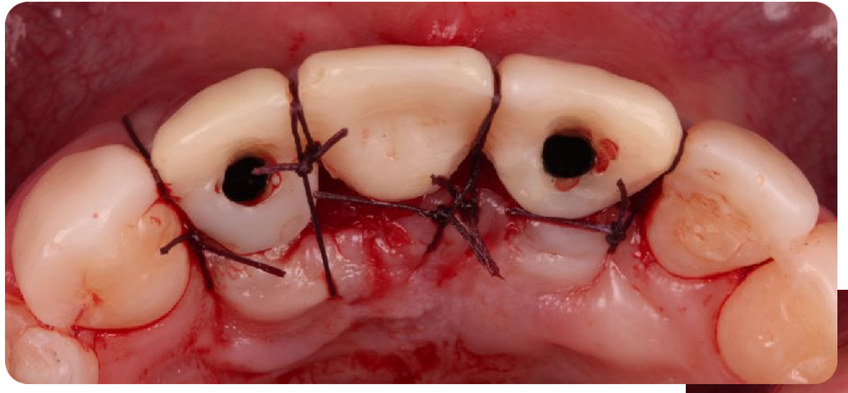
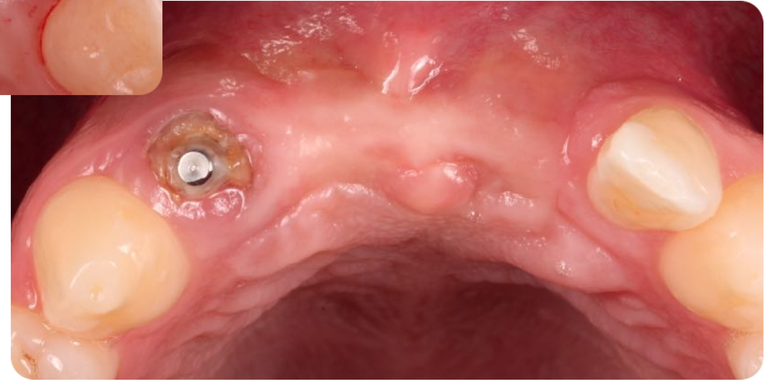
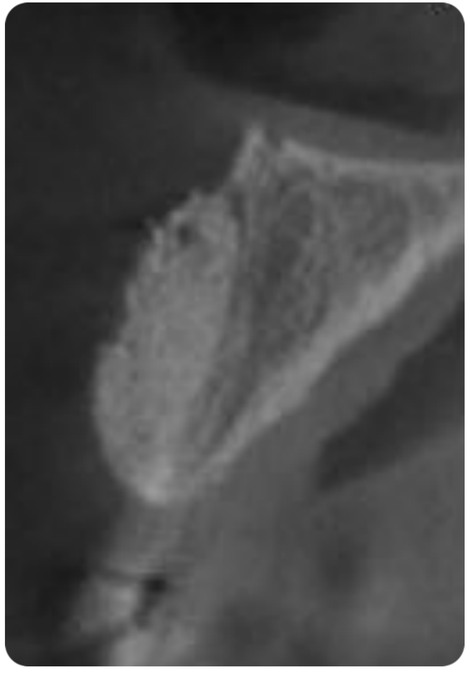


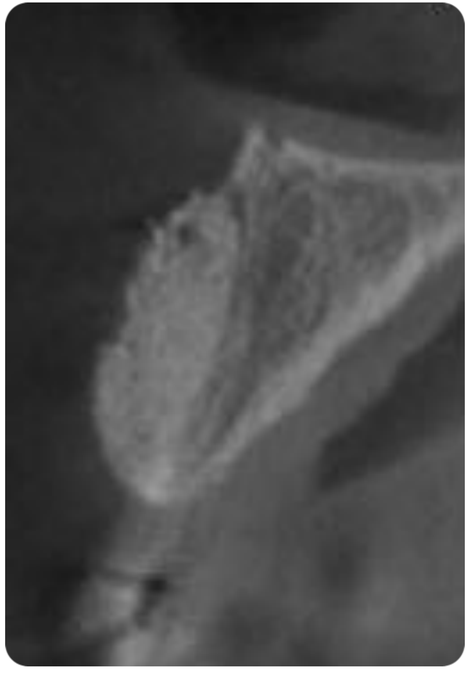






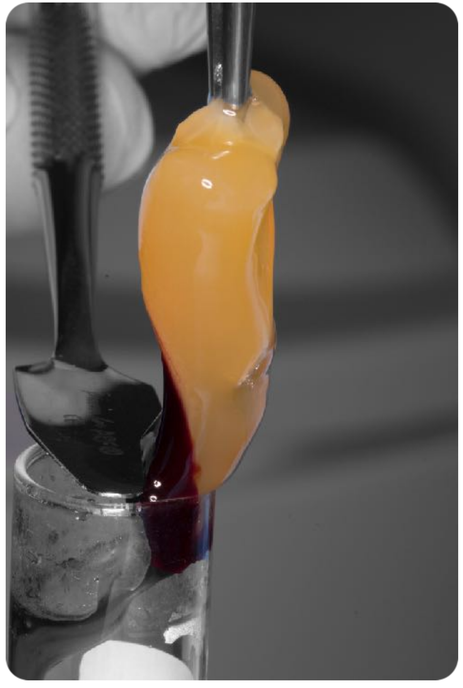


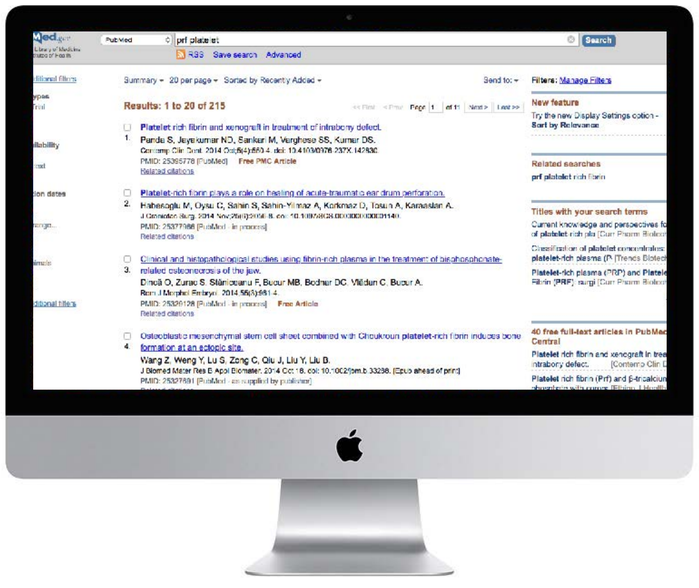




Guided Bone Regeneration Protocol

PLateLet Rich Fibrin **“sticky bone”**





PRF

- Extraction sockets
- Periodontal defects
- Implant dehiscences
- Guided bone regeneration
- Sinus augmentation
- Sinus communication
- Immediate placement
- Ridge expansion
- Distraction osteogenesis
- 3rd molar
- Perimplantitis

bLeeding

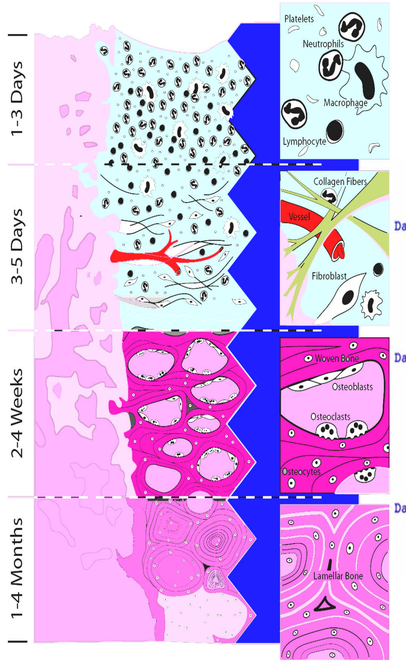
coaguLation

fibrin cLot

growth factor reLease

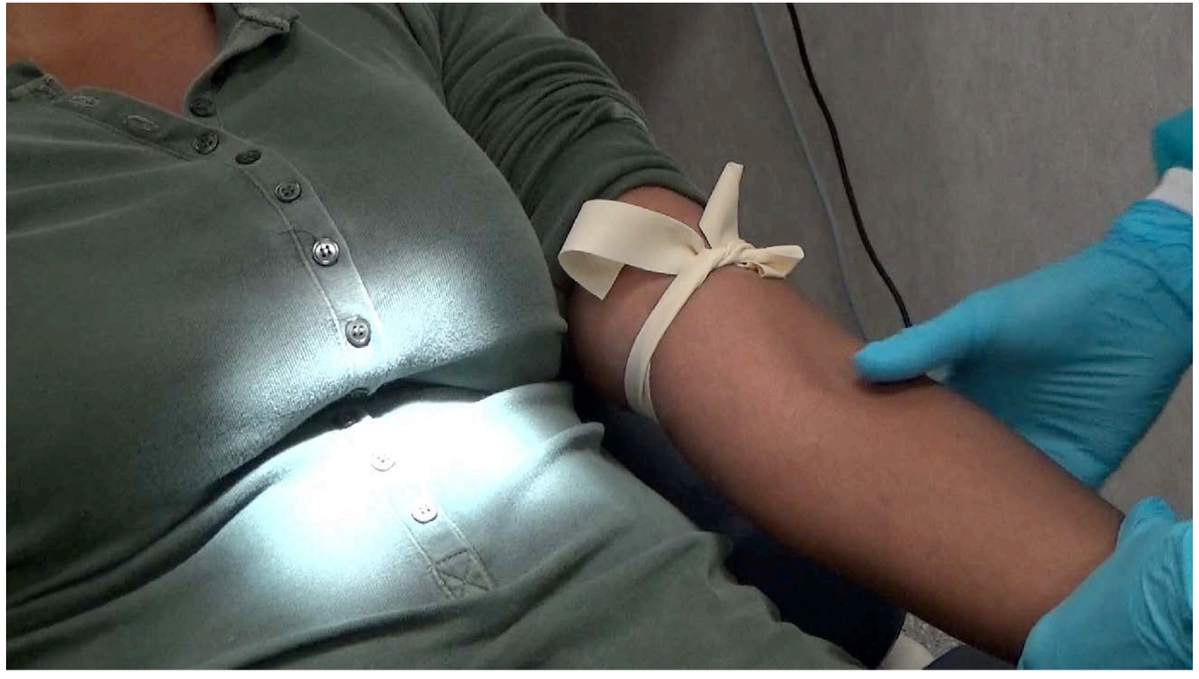
angiogenesis

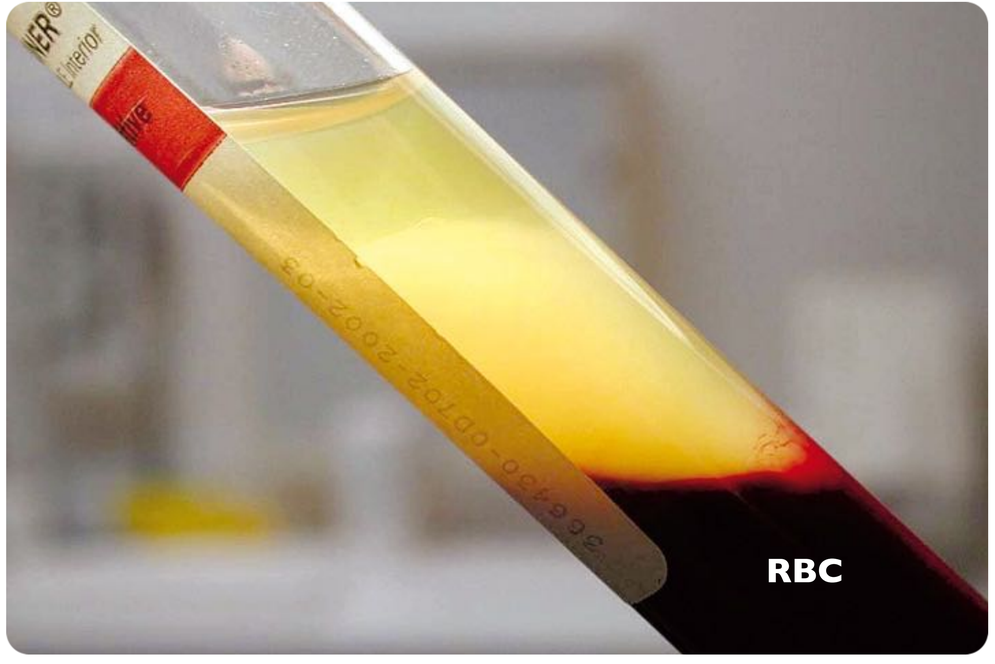
cell proLiferation

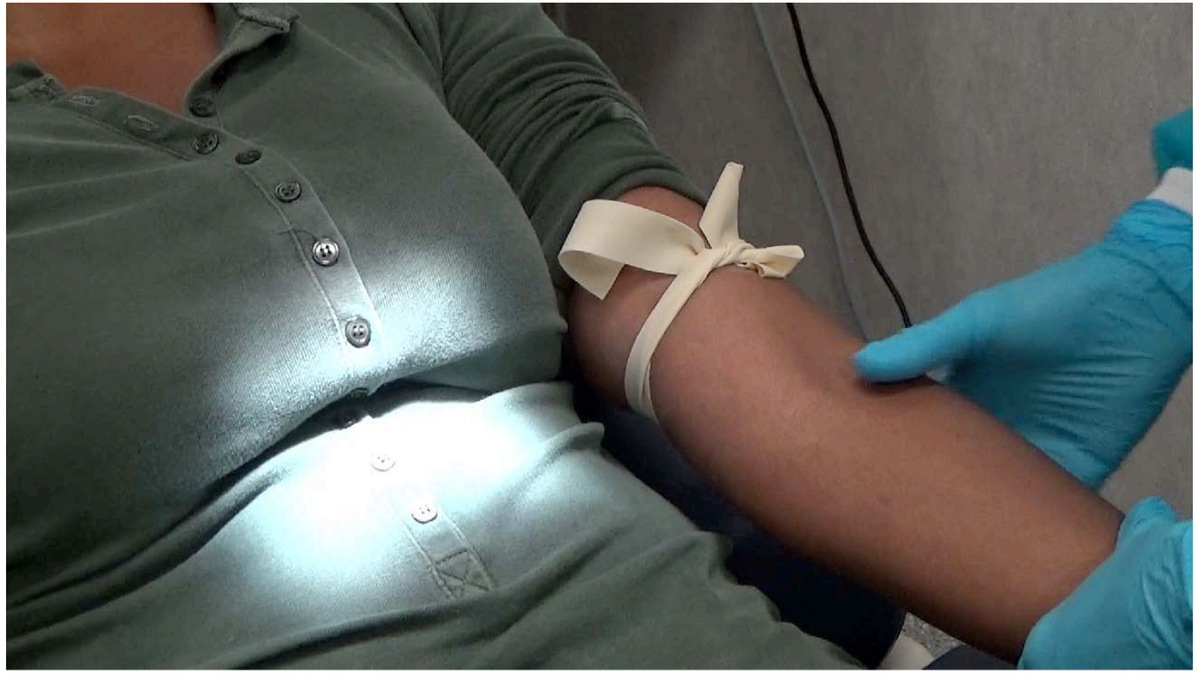


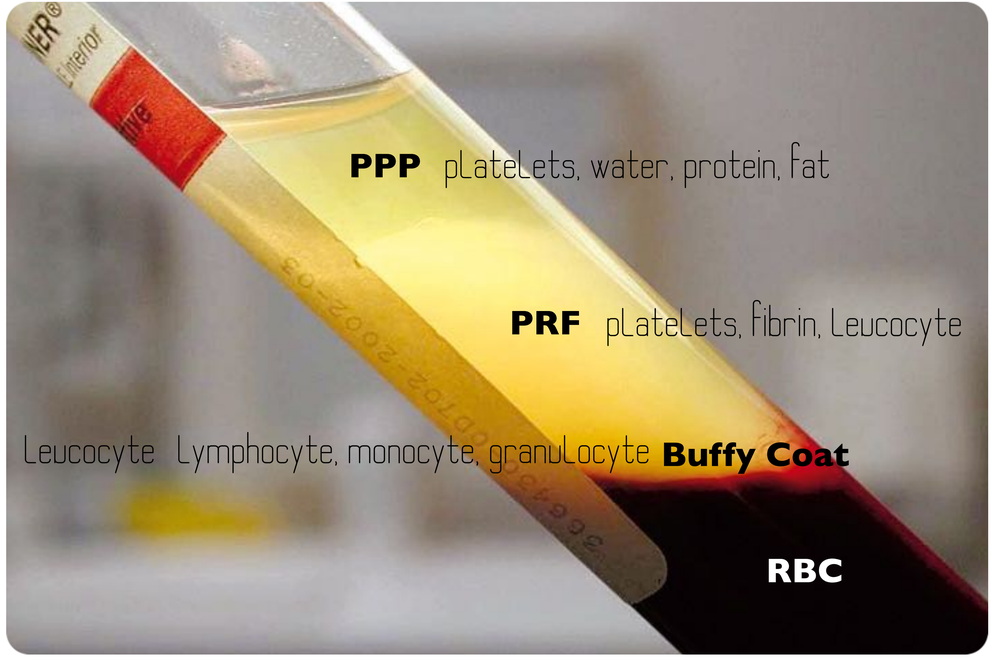
	Cells	Growth Factors	Matrix
Day 1	Platelets WBCs/RBCs Osteoblasts Osteocytes	PDGF TGF-β VEGF IGF	Blood Clot Fibrin
Day 3-5	Macrophages Osteoblasts Platelets	PDGF bFGF IGF TGF-β VEGF MDAF/MDGF	Fibrin Capillary budding
Day 14-17	Osteoblasts Osteoclasts	PDGF TGF-β BMP IGF	Fibrin Woven bone Capillary permeation

Aghaloo and Le. OMS Clinics NA, 2004.




RBC

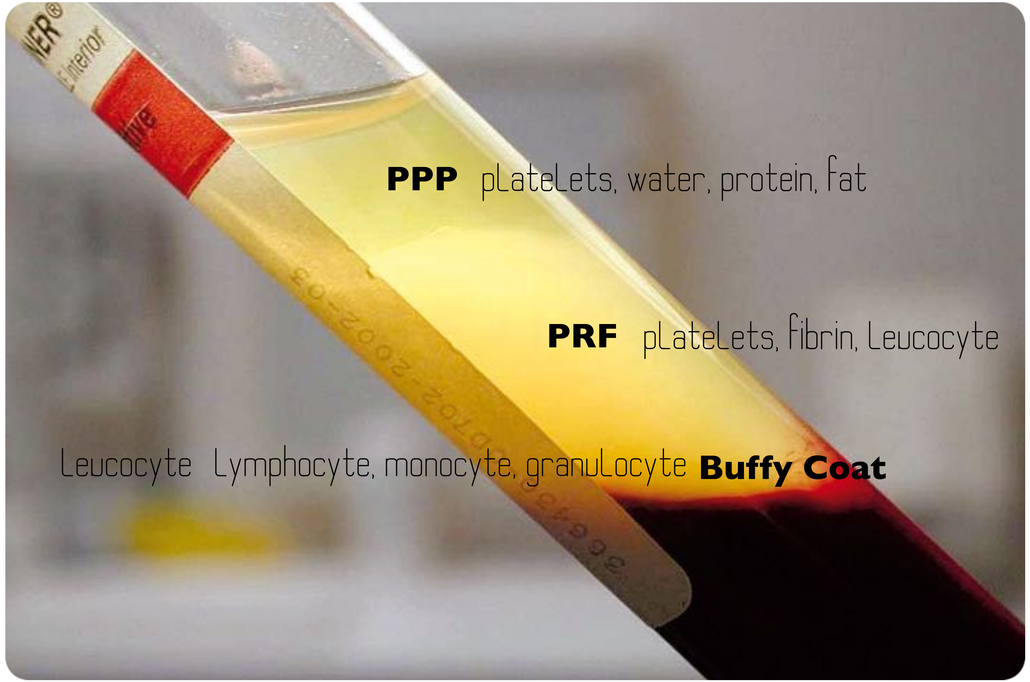



PPP platelets, water, protein, fat
PRF platelets, fibrin, Leucocyte
Leucocyte Lymphocyte, monocyte, granulocyte Buffy Coat
RBC

L PRF **2700rpm/12min**

A PRF **1500rpm/14min**

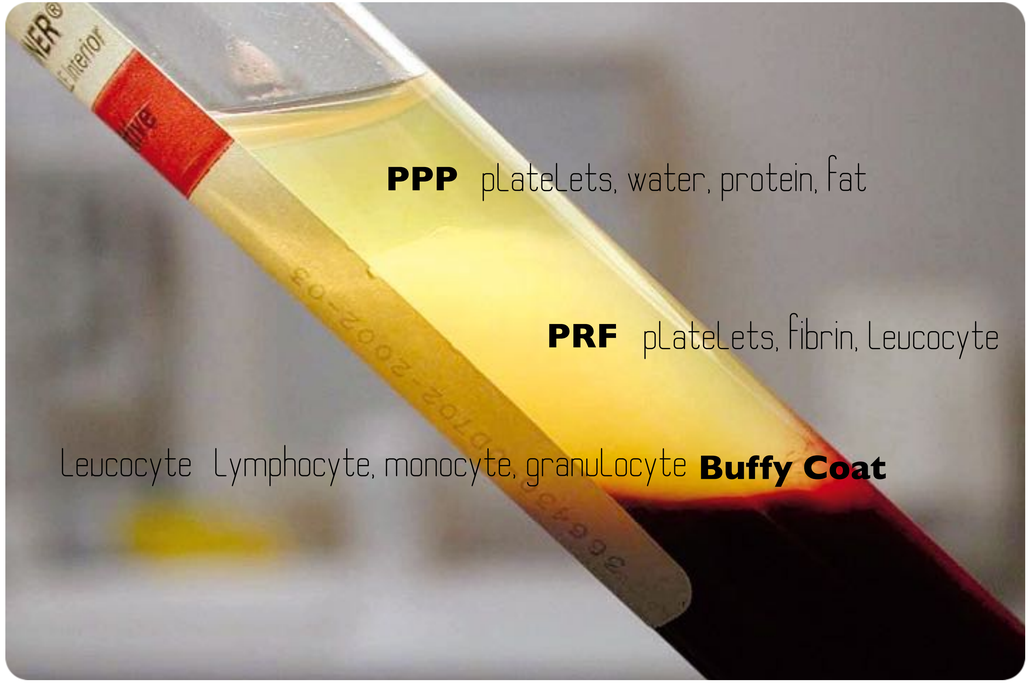
i PRF **800rpm/3min**



L PRF **2700rpm/12min**

A PRF **1500rpm/14min**

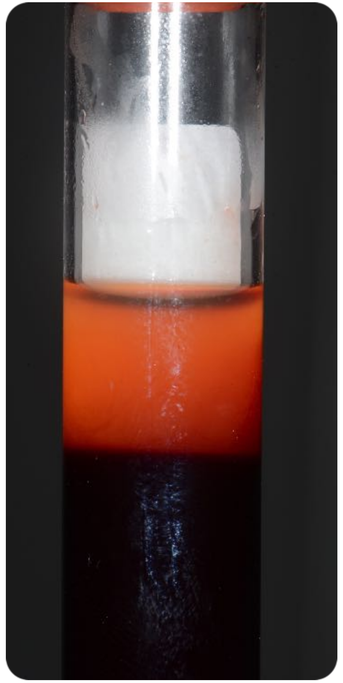
i PRF **800rpm/3min**

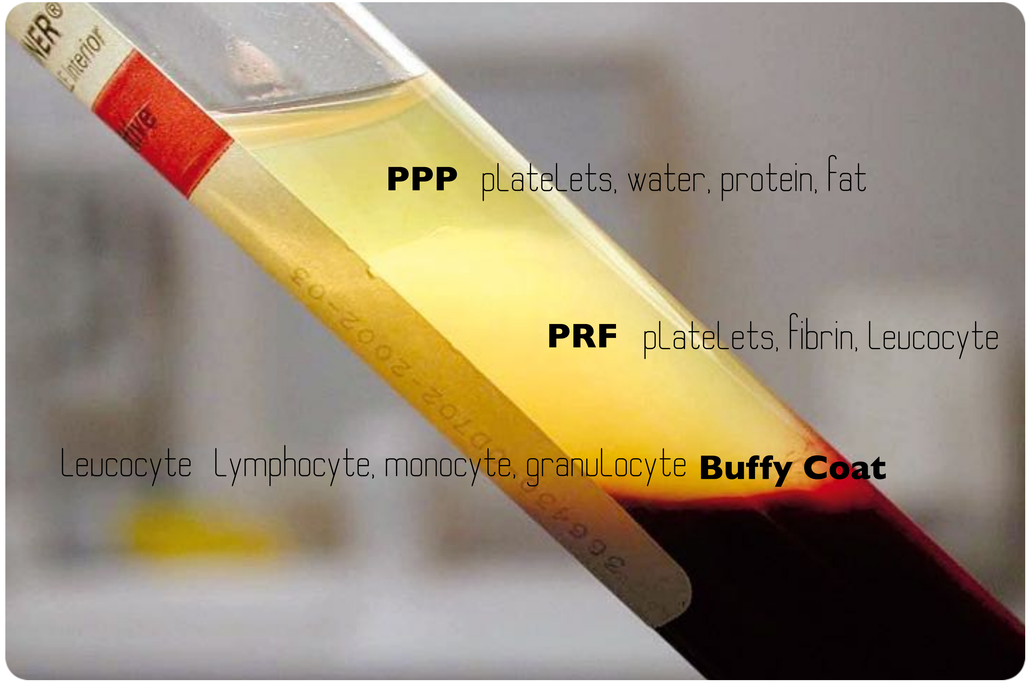


L PRF **2700rpm/12min**

A PRF **1500rpm/14min**

i PRF **800rpm/3min**

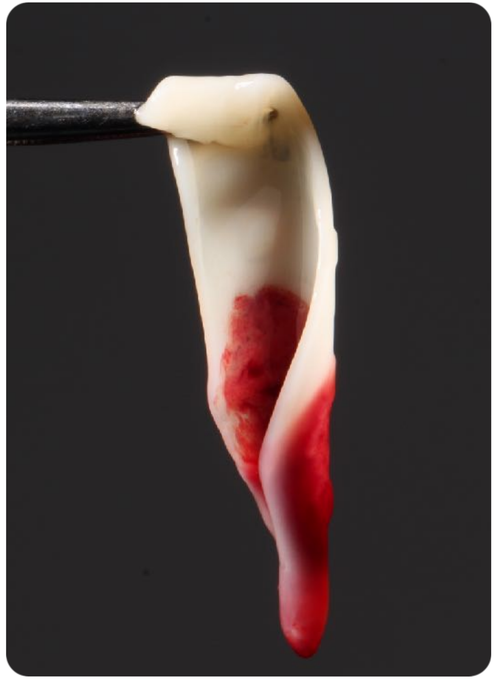


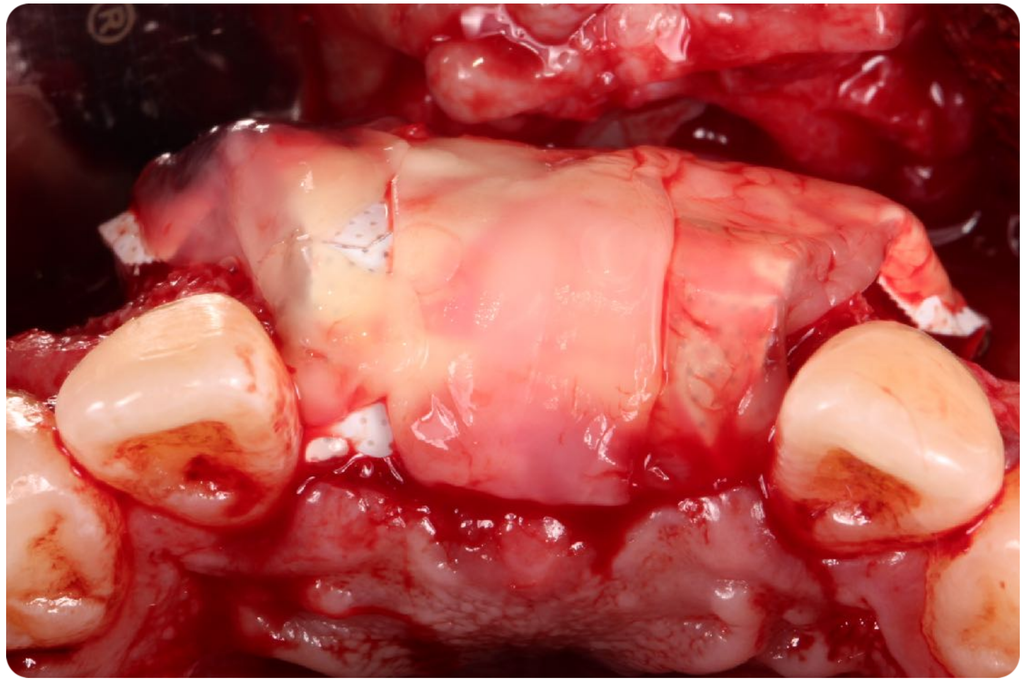


L PRF

A PRF

i PRF





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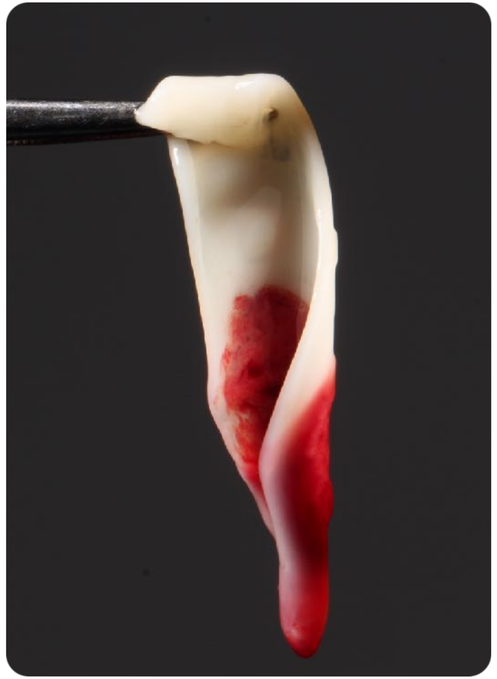

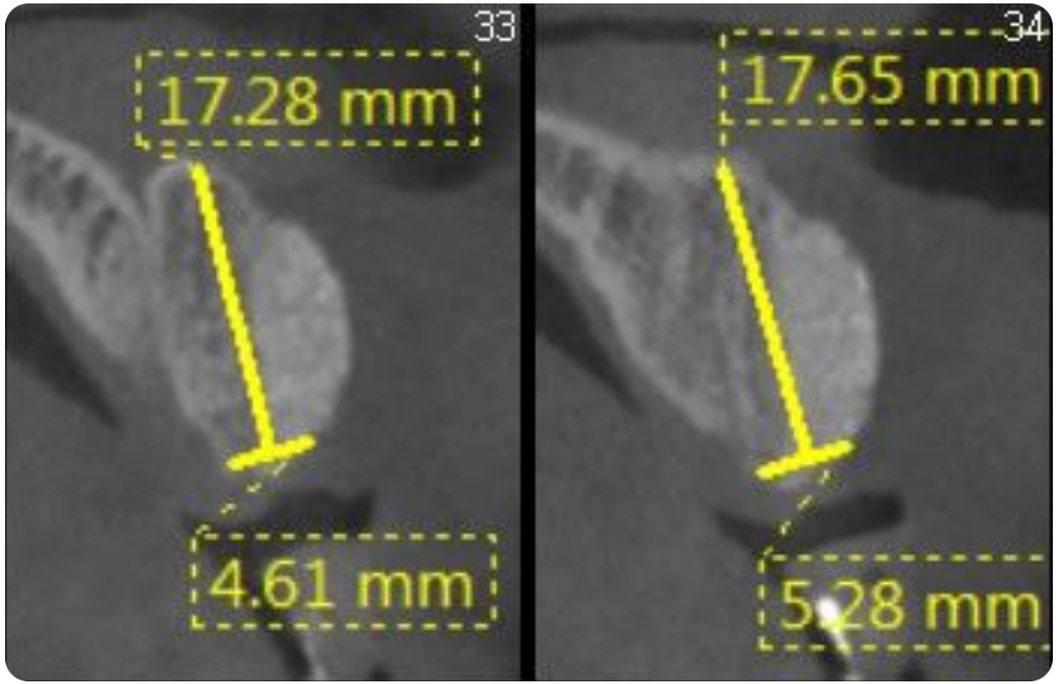

L PRF

A PRF

i PRF

L PRF

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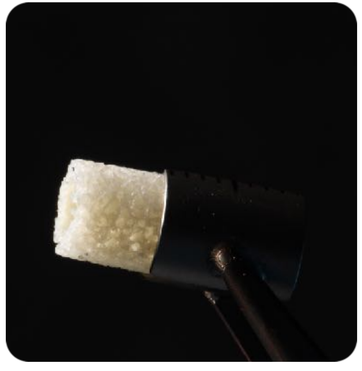

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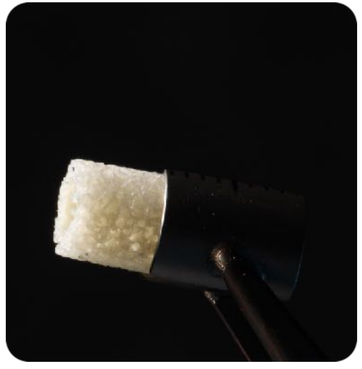

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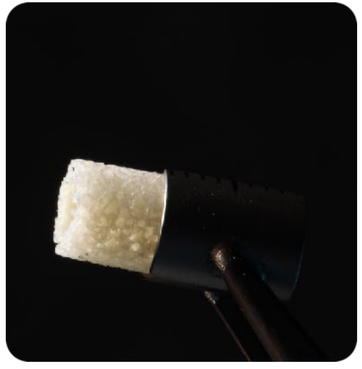

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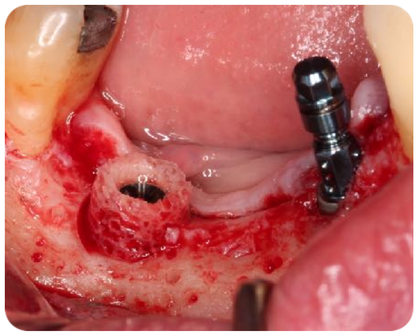

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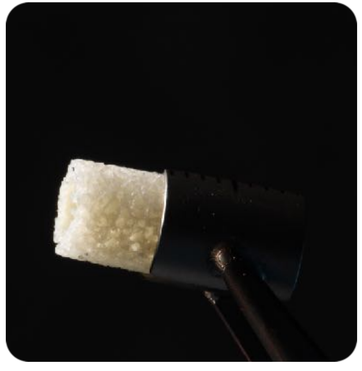


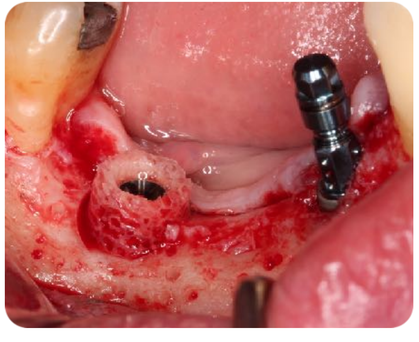
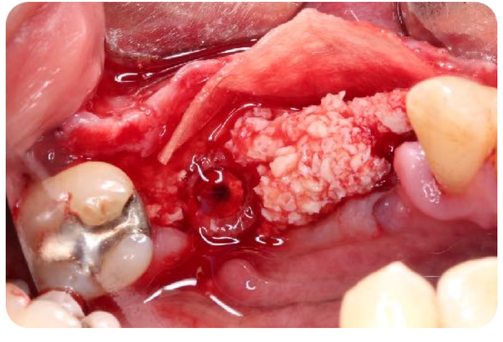

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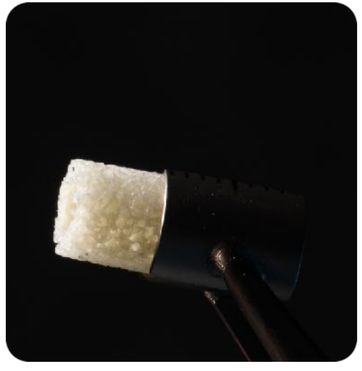


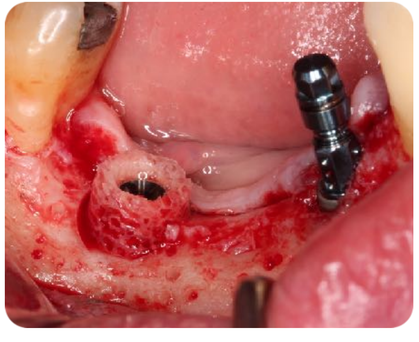
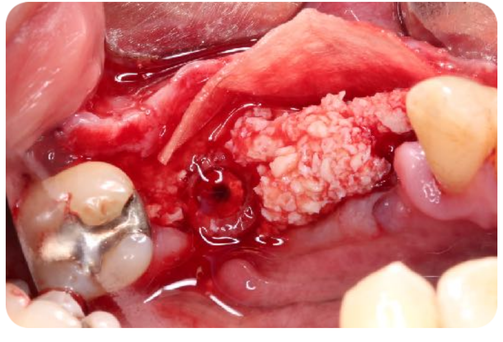
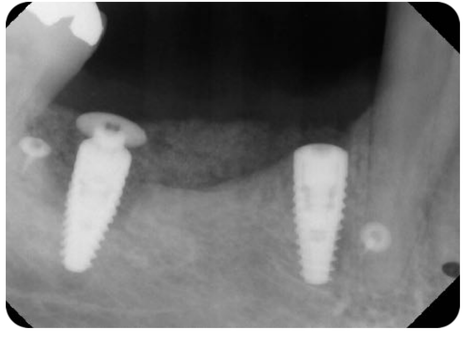

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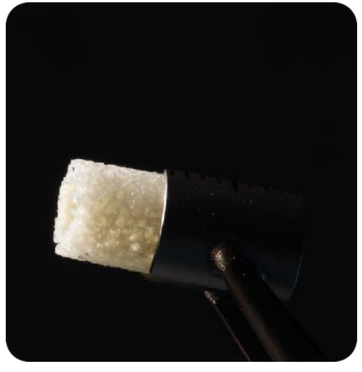


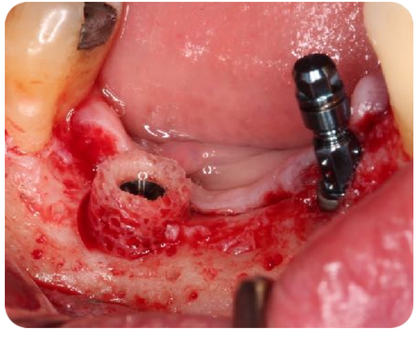
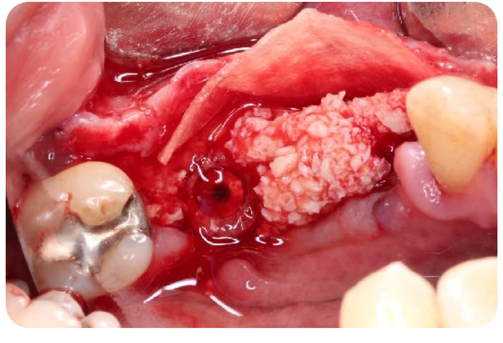
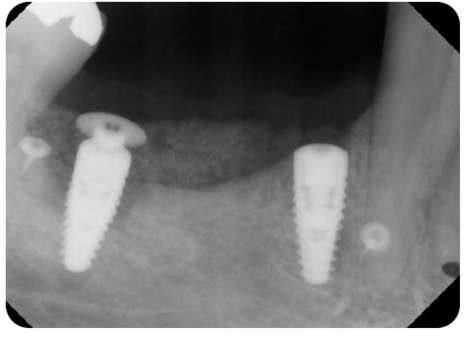
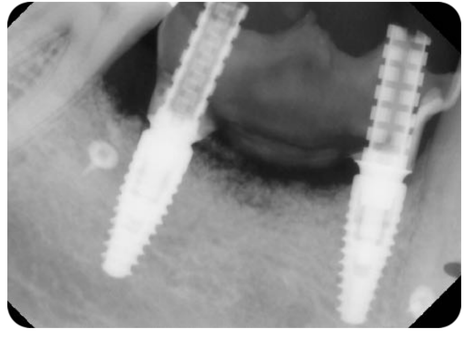

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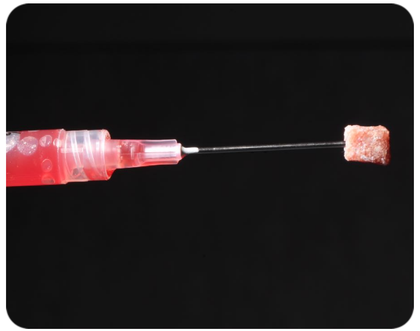
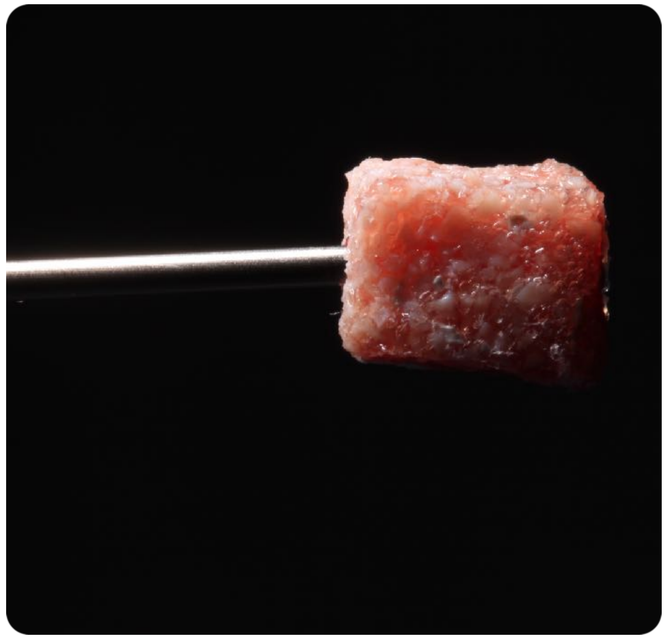




L PRF

A PRF

i PRF

top 10 reasons to smile

makes us attractive
relives stress
elevates our mood
its contagious
boosts immune system
Lowers blood pressure
makes us feel good
makes you look younger
makes you seem succesful
helps you stay positive

low

low

high

low

high

OMG!

an esthetic implant supported prosthesis is one that is in harmony with the dentofacial structures of the patient

Belser et al. 2004

Peri-Implant Tissues

health
height
volume
contour
color

Prosthesis

color
form
texture
size
optical properties

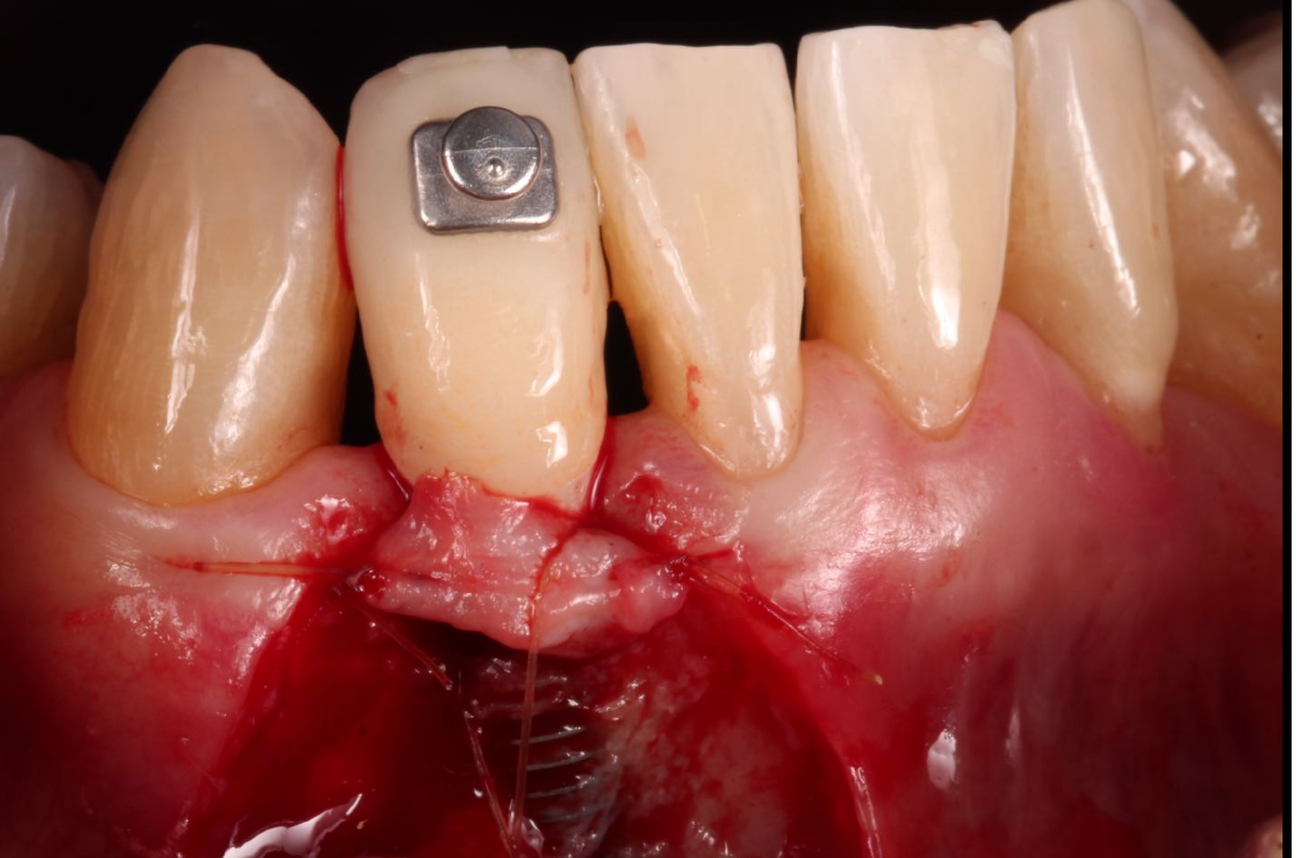
Belser et al. 2004

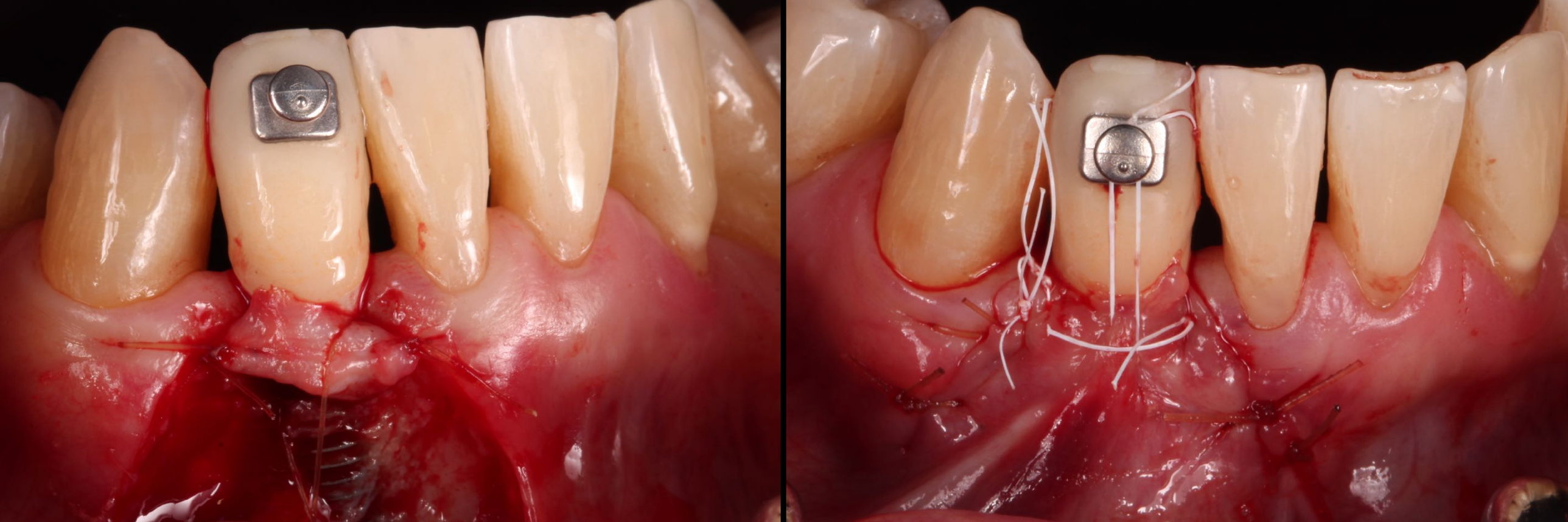

patient anatomy smile biotype site timing soft tissue management provisional final

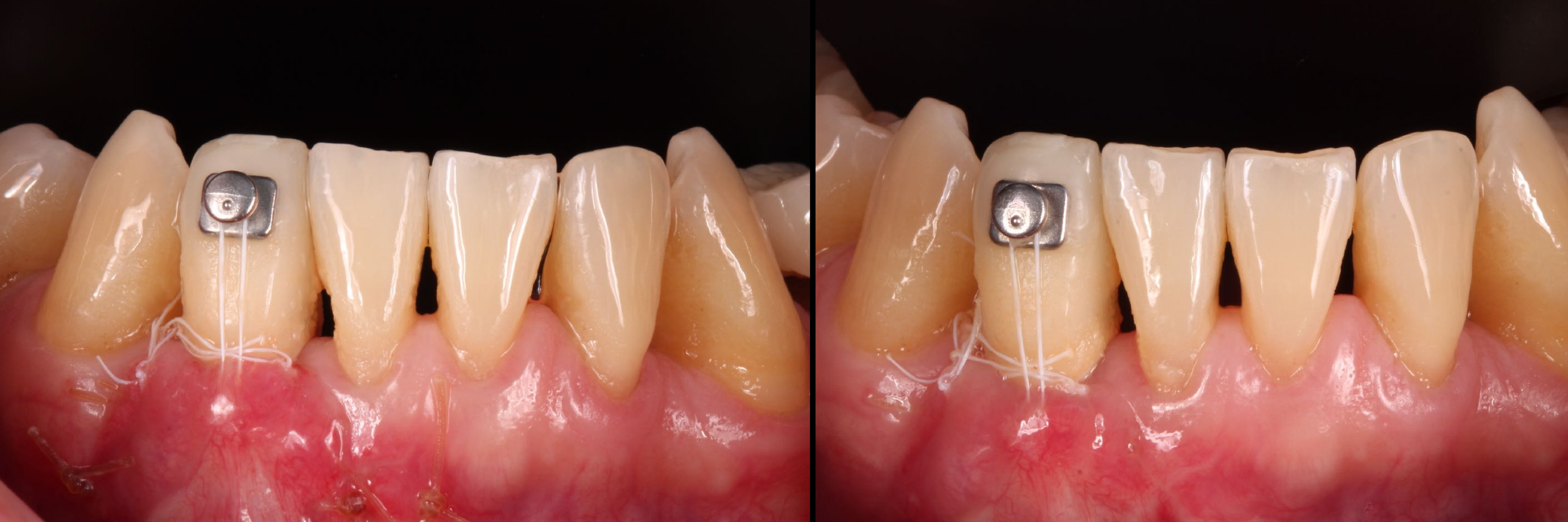
- is indicative of the propensity for facial gingival tissue recession after surgical and restorative procedures

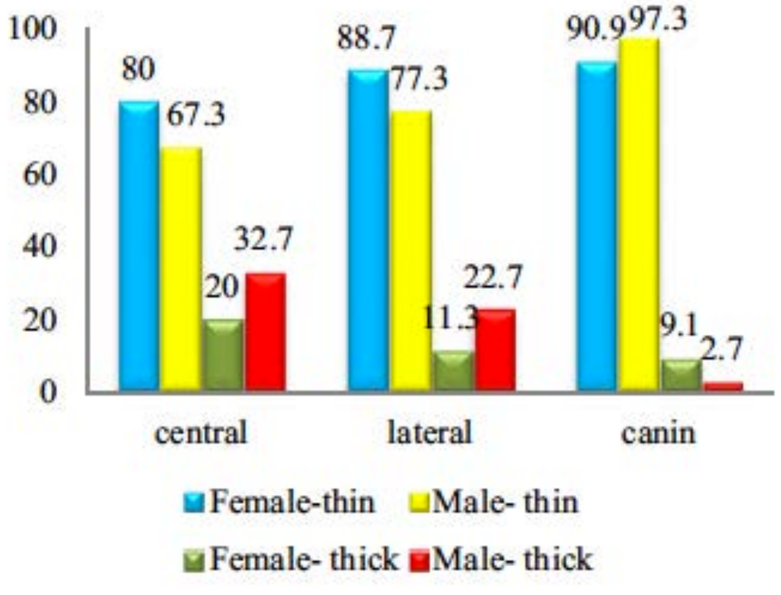
- is indicative of the propensity for facial gingival tissue recession after surgical and restorative procedures

- is indicative of the propensity for facial gingival tissue recession after surgical and restorative procedures
- Gingival tissue thickness determines the soft tissue's ability to conceal the underlying restorative material





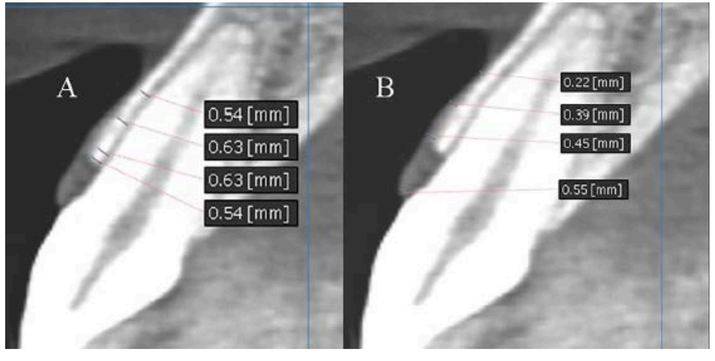


Assessment of gingival biotype and facial hard/soft tissue dimensions in the maxillary anterior teeth region using cone beam computed tomography

Reza Amid[a], Mahdieh Mirakhori[*,b], Yaser Safi[c], Mahdi Kadkhodazadeh[a], Mahshid Namdari[d]

[a] Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[b] DDS, Dental Research Center, Research Institute of Dental Sciences, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[c] Department of Oral & Maxillofacial Radiology, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[d] Department of Community Oral Health, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran



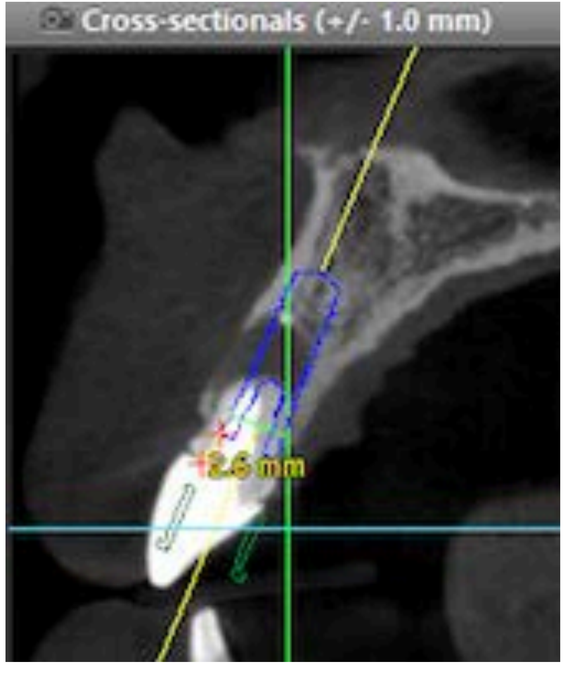
- ✓ soft tissue quality, quantity, and morphology

- ✓ soft tissue quality, quantity, and morphology
- ✓ bone quality, quantity, and morphology

- ✓ soft tissue quality, quantity, and morphology
- ✓ bone quality, quantity, and morphology
- ✓ presence of pathology

- ✓ soft tissue quality, quantity, and morphology
- ✓ bone quality, quantity, and morphology
- ✓ presence of pathology
- ✓ condition of adjacent teeth and supporting structures


Cross-sectionals (+/- 1.0 mm)
VESTIBULAR
2.6 mm
10 mm
10 mm

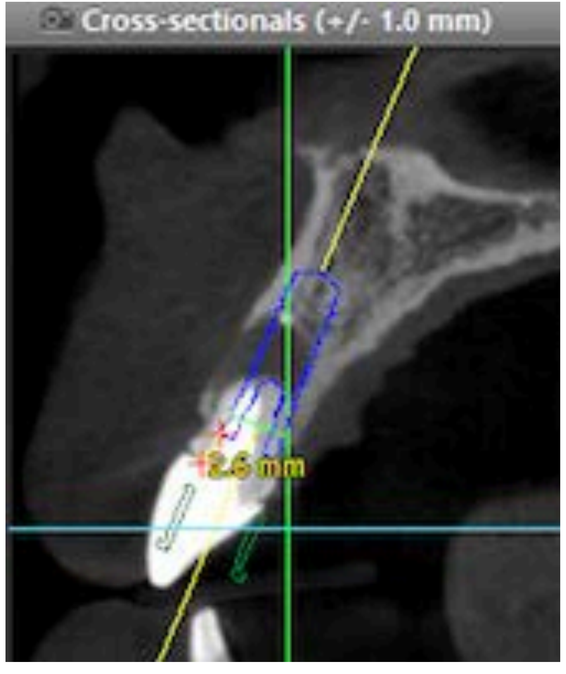


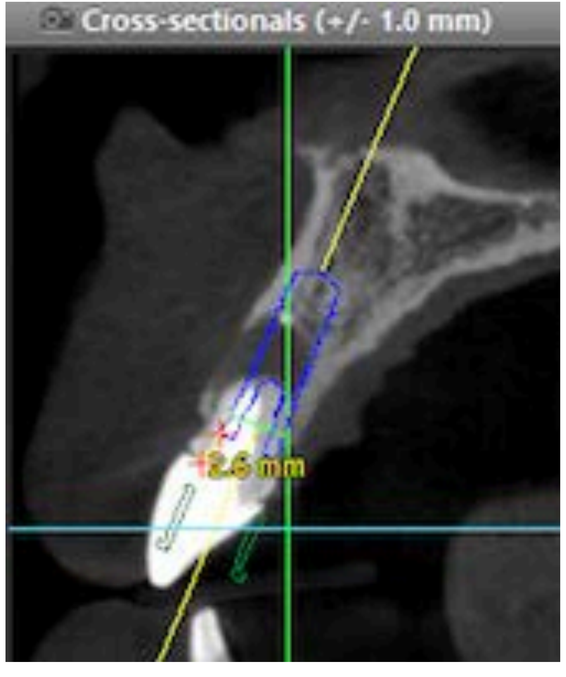
Immediate Placement of Implants into Infected Sites: A Systematic Review

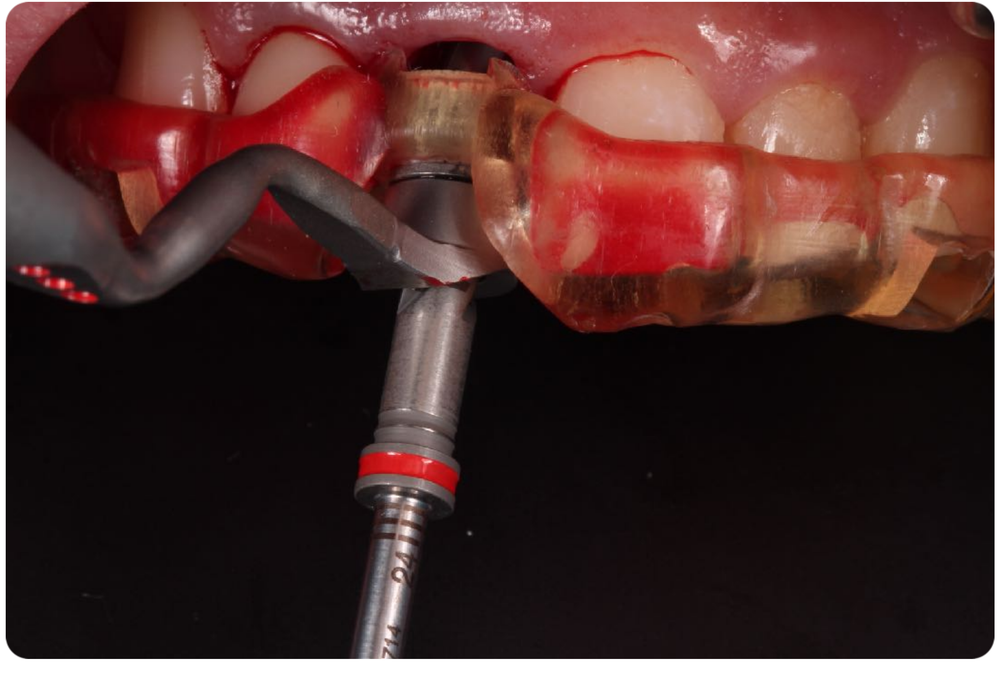
Bruno Ramos Chrcanovic, DDS, MSc;* Maximiliano Delany Martins, PhD;† Ann Wennerberg, DDS, PhD‡

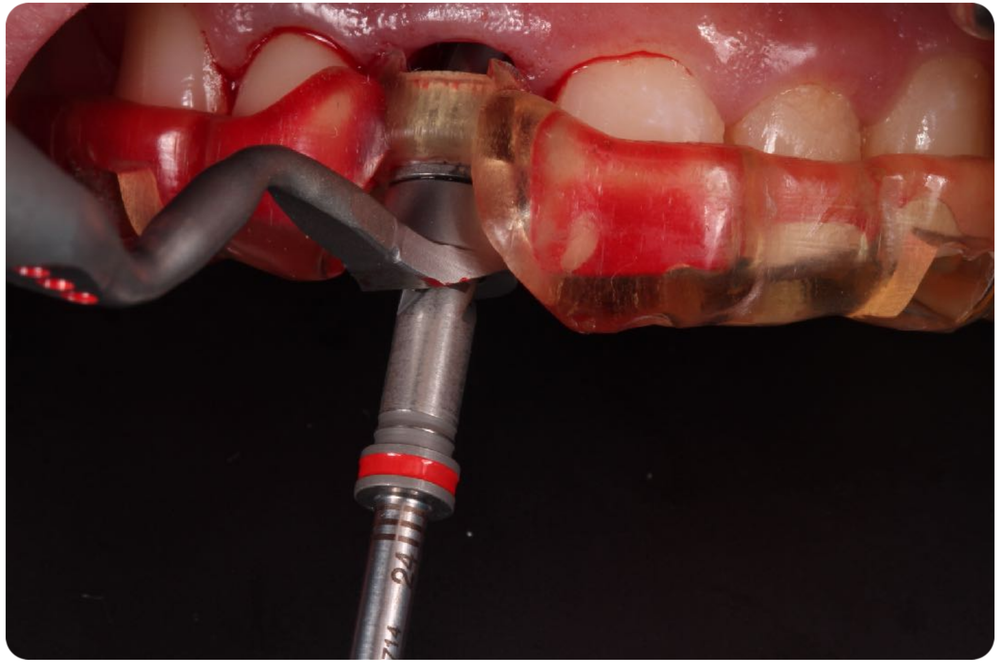
- implants may be successfully osseointegrated when placed immediately after extraction of teeth presenting endodontic and periodontal lesions.

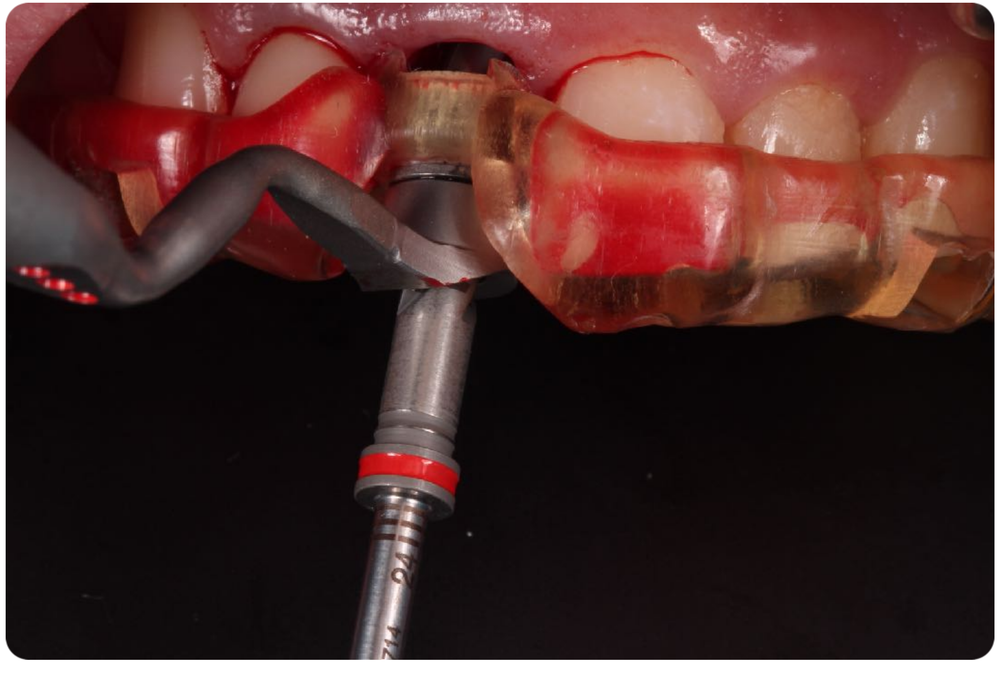
- appropriate clinical procedures are performed before the implant surgical procedure

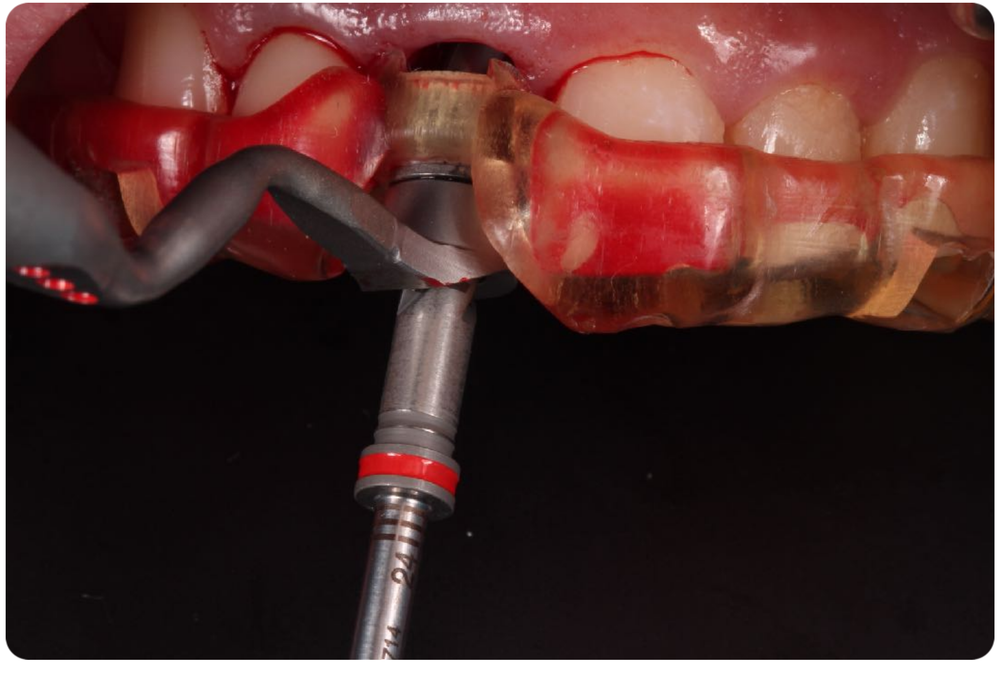

Cross-sectionals (+/- 1.0 mm)
+2.6 mm


Cross-sectionals (+/- 1.0 mm)
+2.6 mm










shirin|bahadurji
yair|whiteman

Clinical and Esthetic Outcomes of Implants Placed in Postextraction Sites

Stephen T. Chen, BDS, MDSc, PhD[1]/Daniel Buser, DMD, Prof Dr Med Dent[2]

Purpose: *The aim of this review was to evaluate the clinical outcomes for the different time points of implant placement following tooth extraction.* ***Materials and Methods:*** *A PubMed search and a hand search of selected journals were performed to identify clinical studies published in English that reported on outcomes of implants in postextraction sites. Only studies that included 10 or more patients were accepted. For implant success/survival outcomes, only studies with a mean follow-up period of at least 12 months from the time of implant placement were included. The following outcomes were identified: (1) change in peri-implant defect dimension, (2) implant survival and success, and (3) esthetic outcomes.* ***Results and Conclusions:*** *Of 1,107 abstracts and 170 full-text articles considered, 91 studies met the inclusion criteria for this review. Bone augmentation procedures are effective in promoting bone fill and defect resolution at implants in postextraction sites, and are more successful with immediate (type 1) and early placement (type 2 and type 3) than with late placement (type 4). The majority of studies reported survival rates of over 95%. Similar survival rates were observed for immediate (type 1) and early (type 2) placement. Recession of the facial mucosal margin is common with immediate (type 1) placement. Risk indicators included a thin tissue biotype, a facial malposition of the implant, and a thin or damaged facial bone wall. Early implant placement (type 2 and type 3) is associated with a lower frequency of mucosal recession compared to immediate placement (type 1).* Int J Oral Maxillofac Implants 2009;24(suppl):186–217

Key words: *bone grafts, early implant placement, esthetics, immediate implant, implant survival*

Group 1 Consensus Statement

Consensus Statements and Recommended Clinical Procedures Regarding the Placement of Implants in Extraction Sockets

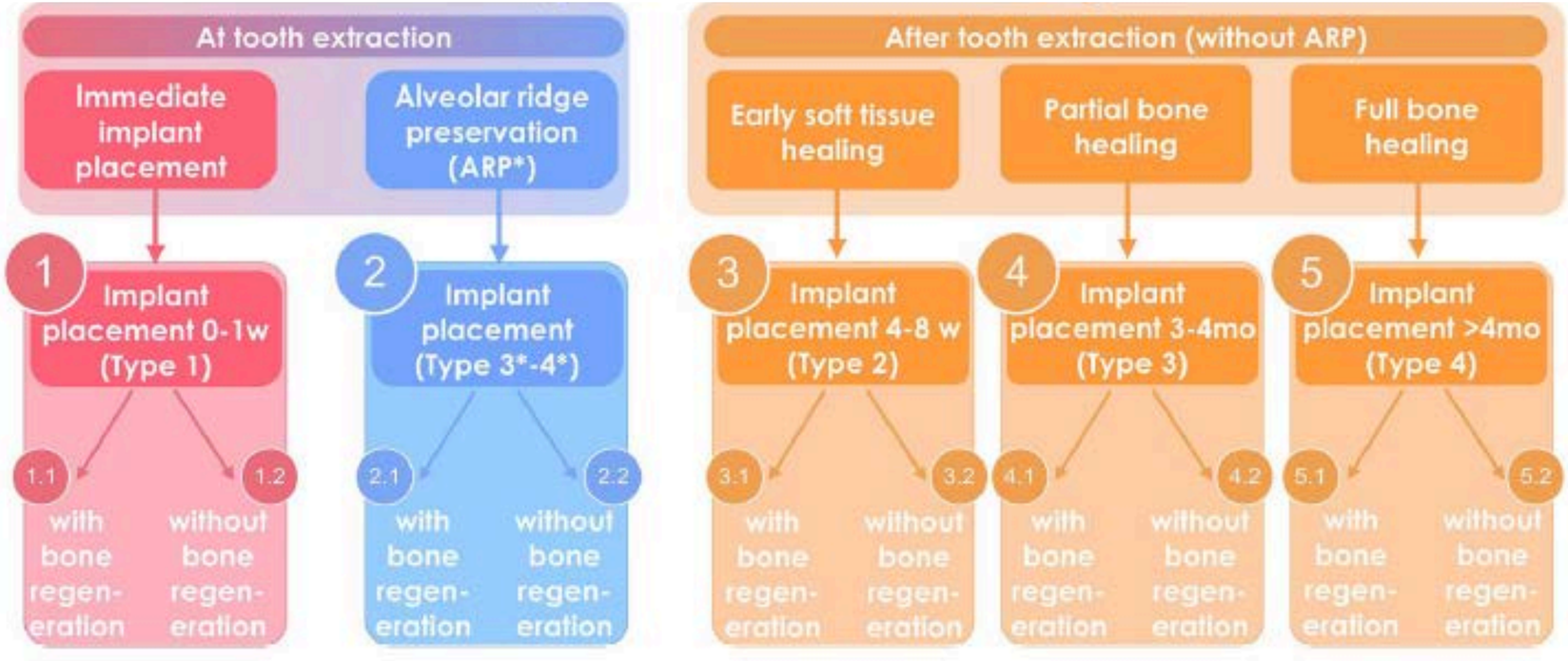
Primary authors: Christoph H. F. Hämmerle, Stephen T. Chen, Thomas G. Wilson Jr

SUPPLEMENT ARTICLE

Journal of Clinical Periodontology WILEY

Management of the extraction socket and timing of implant placement: Consensus report and clinical recommendations of group 3 of the XV European Workshop in Periodontology

Maurizio S. Tonetti[1,2] | Ronald E. Jung[3] | Gustavo Avila-Ortiz[4] | Juan Blanco[5] | Jan Cosyn[6] | Stefan Fickl[7] | Elena Figuero[8] | Moshe Goldstein[9] | Filippo Graziani[10] | Phoebus Madianos[11] | Ana Molina[8] | Jose Nart[12] | Giovanni E. Salvi[13] | Ignacio Sanz-Martin[8] | Daniel Thoma[3] | Nele Van Assche[14] | Fabio Vignoletti[8]



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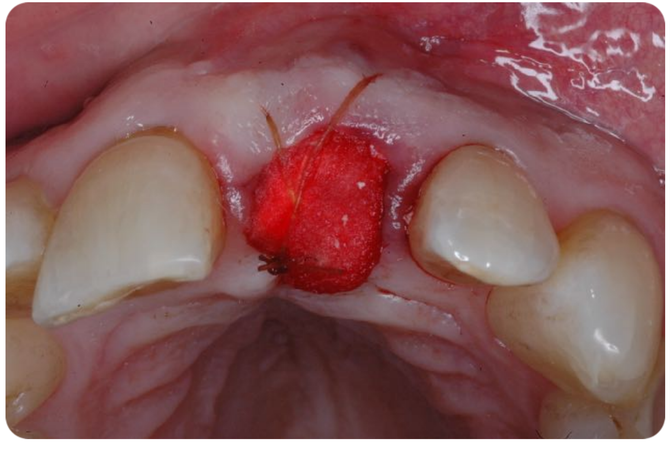
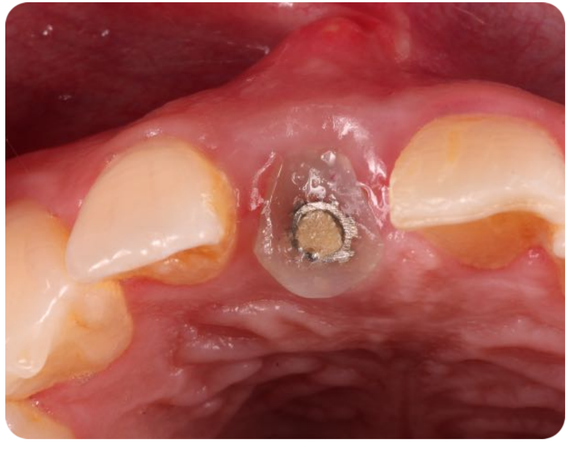
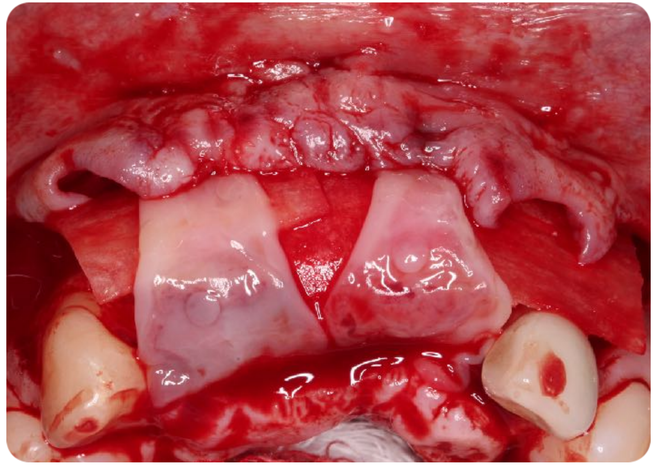
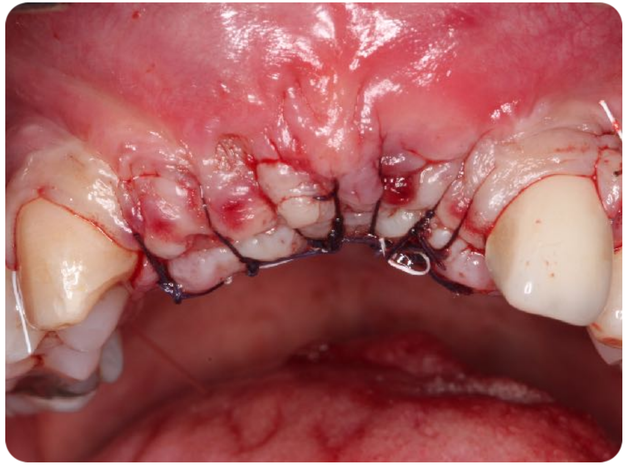
At Tooth Extraction






After Tooth Extraction (4-6 weeks)



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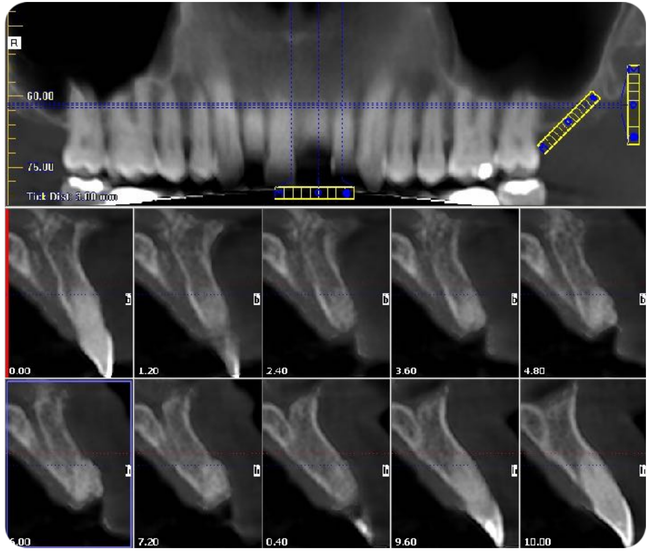
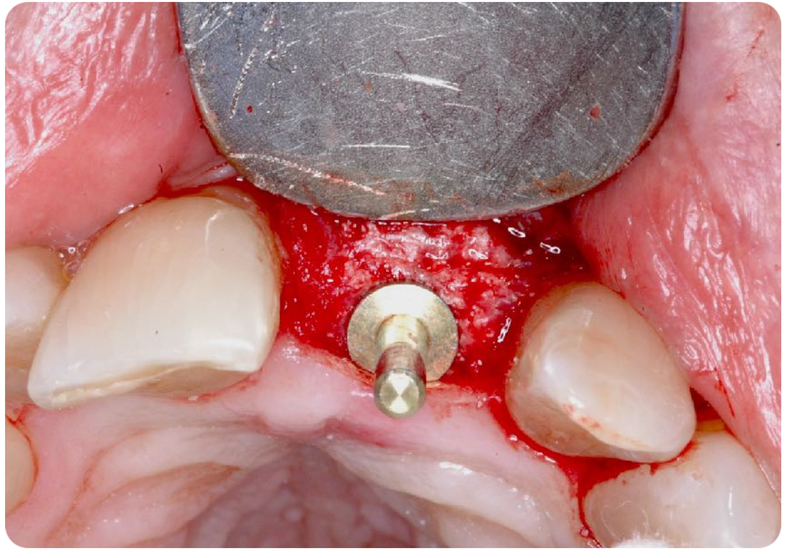
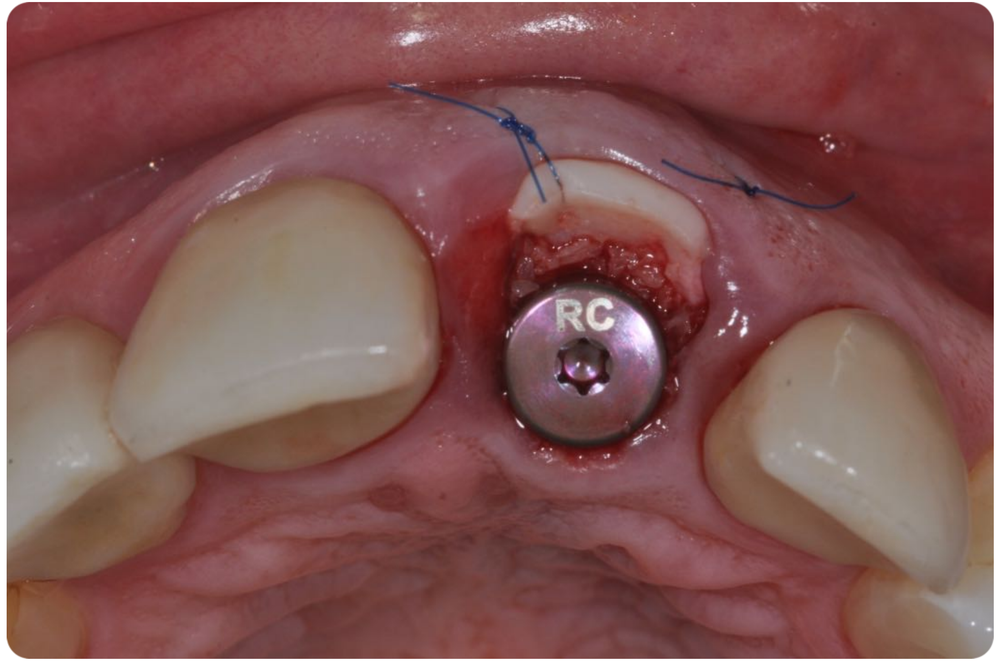




soft tissue management



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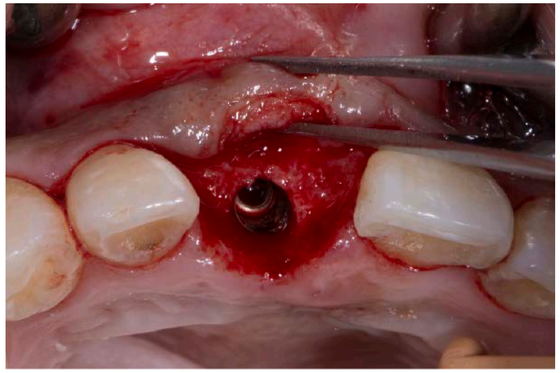
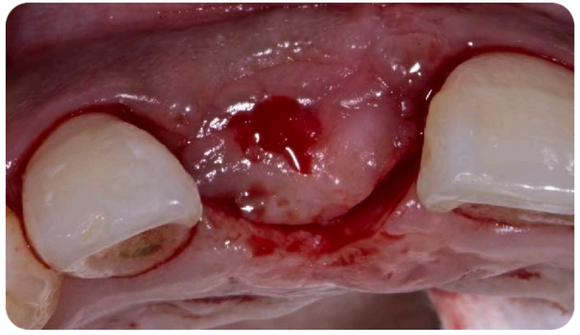
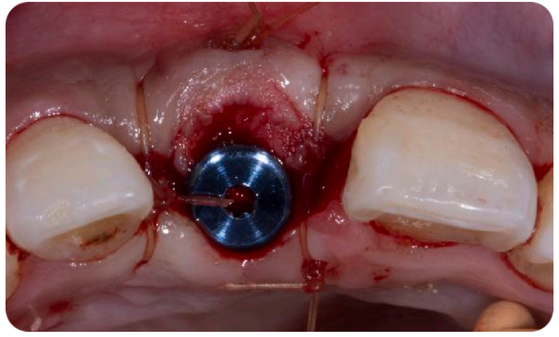
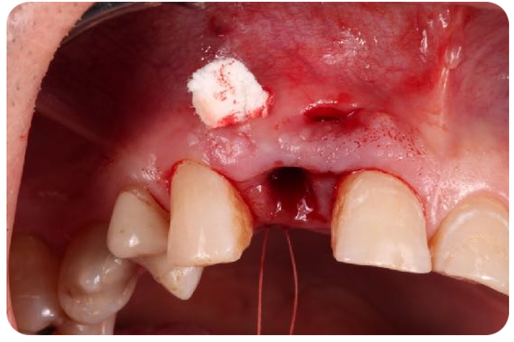
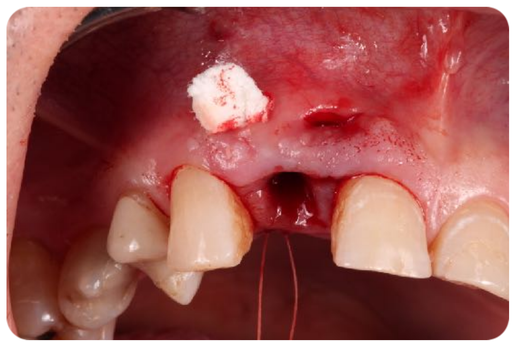
soft tissue management











- ✓ simultaneous bone augmentation
- ✓ provisional restoration

➡ incesase in vertical and horizontal dimension by Ø.5-1mm

Flapless Postextraction Socket Implant Placement, Part 2: The Effects of Bone Grafting and Provisional Restoration on Peri-implant Soft Tissue Height and Thickness—A Retrospective Study

Stephen J. Chu, DMD, MSD, CDT/Maurice A. Salama, DMD[2]
David A. Garber, DDS, DDS[2]/Henry Salama, DMD[3]
Guido C. Sanmartino, DDS[4]/Evangelina Sanmartino[4]
Sergio Luis Gotta[5]/Mark A. Reynolds, DDS, MS, PhD[6]
Hanae Saito, DDS, MS[7]/Dennis P. Tarnow, DDS[8]

This article presents the results of evaluating the changes in peri-implant soft tissue dimensions associated with immediate implant placement into anterior postextraction sockets for four treatment groups: no BGPR (no bone graft, no provisional restoration), PR (no bone graft, provisional restoration), BG (bone graft, no provisional restoration), and BGPR (bone graft, provisional restoration). The vertical distance of the peri-implant soft tissue was greater for grafted sites than for nongrafted ones (2.72 mm vs 2.29 mm, P < .06). The facial soft tissue thickness at the gingival third also was greater for grafted than for nongrafted sites (2.90 mm vs 2.28 mm, P < .008) and for sites with provisional restorations compared to sites without them (2.81 mm vs 2.37 mm, P < .05), respectively. The net gain in soft tissue height and thickness was about 1 mm. The increases in vertical and horizontal dimensions for grafted sites were between 0.5 and 1.0 mm, as compared to sites with no bone graft and no provisional restoration.
(Int J Periodontics Restorative Dent 2015;35:803–809. doi: 10.11607/prd.2178)

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Implant placement into postextraction sockets with a provisional restoration in nonfunctional occlusion in the maxillary anterior region has increased in use and clinical relevance since its introduction in the late 1980s.[1] Treatment procedures are condensed into fewer patient appointments, reducing overall treatment time and increasing patient comfort.[2,3] Survival rates reported for immediate implant protocols are comparable to those for delayed procedures with or without provisional restoration and bone grafting.[4–6] In addition, positive esthetic outcomes have been reported regarding midfacial recession depending on implant position, immediate provisional restoration, and bone grafting.[4,5,7–10]

Peri-implant soft tissue thickness, abutment material, and gingival color all must be in harmony to achieve predictable esthetic and restorative outcomes. Several authors have researched the correlation between peri-implant soft tissue thickness and its color-masking ability.[11–17] Even though a consensus does not exist on how much horizontal peri-implant soft tissue thickness is required, there is agreement that it has an important effect on esthetics. This ultimately affects implant-abutment selection from a standpoint of restorative material strength.

Flapless Postextraction Socket Implant Placement, Part 2: The Effects of Bone Grafting and Provisional Restoration on Peri-implant Soft Tissue Height and Thickness—A Retrospective Study

Stephen J. Chu, DMD, MSD, CDT[1]/Maurice A. Salama, DMD[2]
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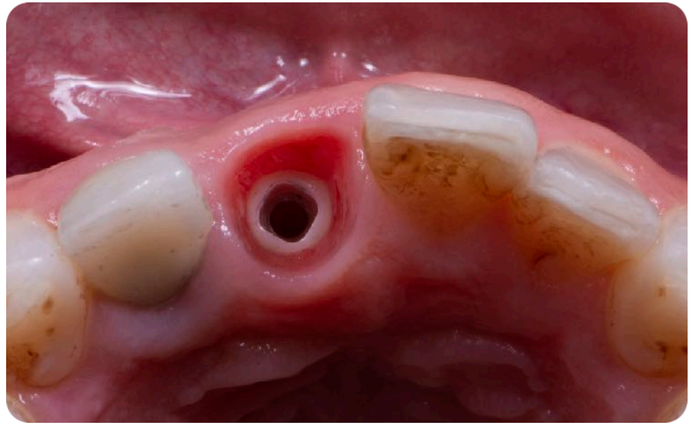

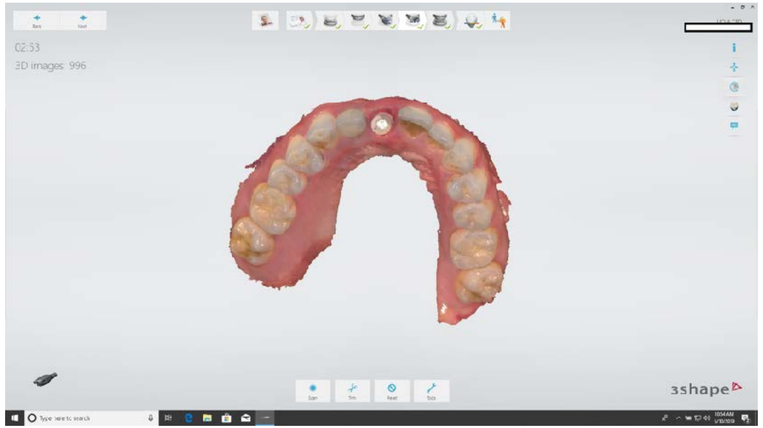
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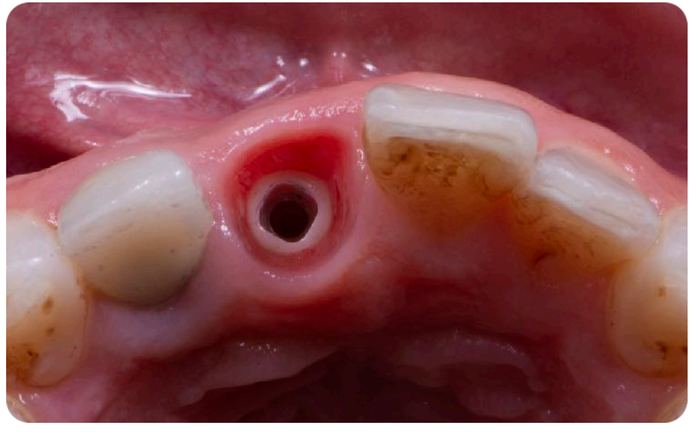

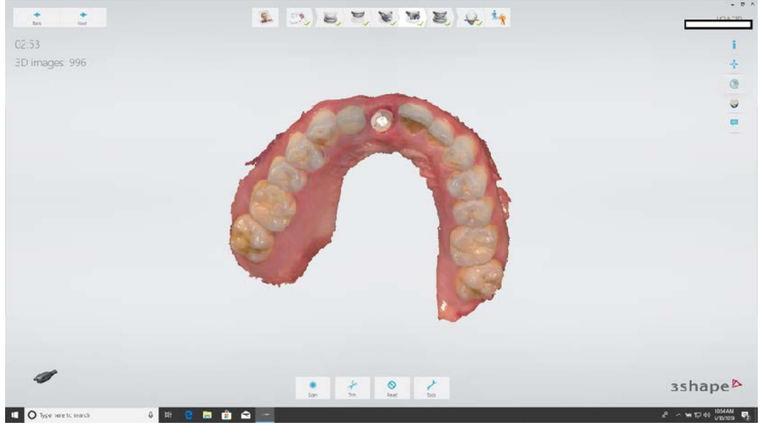
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patient anatomy smile biotype site timing soft tissue management provisional final

Table 2 Surgical SAC Classification* of Implant Sites With or Without Bone Deficiencies

	Simple	Advanced	Complex
Sites without bone defects	• Edentulous mandible with 2 implants for a removable denture (ball attachment or bar) • Distal-extension situation maxilla/mandible • Extended edentulous gap in posterior maxilla/ mandible • Extended edentulous gap in anterior mandible • Single-tooth gap in posterior area • Single-tooth gap in anterior mandible	• Edentulous mandible with 4 to 6 implants for a bar-supported prosthesis or full-arch prosthesis • Edentulous maxilla for removable denture • Single-tooth gap in anterior maxilla • Extended edentulous gap in anterior maxilla	• Edentulous maxilla for a fixed full-arch prosthesis
Sites with bone defects	• None	• Implants with simultaneous membrane application • Implants placed with osteotome technique • Implants combined with "bone splitting" of the alveolar crest	• All 2-stage bone augmentation procedures • Sinus floor elevation with the window technique • Combined bone and soft tissue augmentation procedures

*Classification of the Swiss Society of Oral Implantology (1999).

Esthetic Risk Analysis for Implant Dentistry

Fig. 3

ESTHETIC RISK FACTOR	LOW RISK	MODERATE RISK	HIGH RISK
Medical Status	Healthy, cooperative patient with an intact immune system		Reduced immune system
Smoking habit	Non-Smoker	Light smoker (< 10 cigs/day)	Heavy smoker (> 10 cigs/day)
Patient's Esthetic Expectations	Low	Medium	High
Lip Line	Low	Medium	High
Gingival Biotype	Low scalloped, thick	Medium scalloped, medium thick	High scalloped, thin
Shape of Tooth Crowns	Rectangular		Triangular
Infection at Implant Site	None	Chronic	Acute
Bone Level at Adjacent Teeth	< 5mm to contact point	5.5mm to 6.5mm to contact point	> 7mm to contact point
Restorative Status of Neighboring Teeth	Virgin		Restored
Width of Edentulous Span	1 tooth (> 7mm)	1 tooth (< 7mm)	2 teeth or more
Soft-Tissue Anatomy	Intact soft tissue		Soft-tissue defects
Bone Anatomy of Alveolar Crest	Alveolar Crest without bone deficiency	Horizontal bone deficiency	Vertical bone deficiency

ESTHETIC RISK FACTOR
Medical Status
Smoking habit
Patient's Esthetic Expectations
Lip Line
Gingival Biotype
Shape of Tooth Crowns
Infection at Implant Site
Bone Level at Adjacent Teeth
Restorative Status of Neighboring Teeth
Width of Edentulous Span
Soft-Tissue Anatomy
Bone Anatomy of Alveolar Crest

ESTHETIC RISK FACTOR	LOW RISK
Medical Status	Healthy, cooperative patient with an intact immune system
Smoking habit	Non-Smoker
Patient's Esthetic Expectations	Low
Lip Line	Low
Gingival Biotype	Low scalloped, thick
Shape of Tooth Crowns	Rectangular
Infection at Implant Site	None
Bone Level at Adjacent Teeth	< 5mm to contact point
Restorative Status of Neighboring Teeth	Virgin
Width of Edentulous Span	1 tooth (> 7mm)
Soft-Tissue Anatomy	Intact soft tissue
Bone Anatomy of Alveolar Crest	Alveolar Crest without bone deficiency

ESTHETIC RISK FACTOR	LOW RISK	MODERATE RISK
Medical Status	Healthy, cooperative patient with an intact immune system	
Smoking habit	Non-Smoker	Light smoker (< 10 cigs/day)
Patient's Esthetic Expectations	Low	Medium
Lip Line	Low	Medium
Gingival Biotype	Low scalloped, thick	Medium scalloped, medium thick
Shape of Tooth Crowns	Rectangular	
Infection at Implant Site	None	Chronic
Bone Level at Adjacent Teeth	< 5mm to contact point	5.5mm to 6.5mm to contact point
Restorative Status of Neighboring Teeth	Virgin	
Width of Edentulous Span	1 tooth (> 7mm)	1 tooth (< 7mm)
Soft-Tissue Anatomy	Intact soft tissue	
Bone Anatomy of Alveolar Crest	Alveolar Crest without bone deficiency	Horizontal bone deficiency

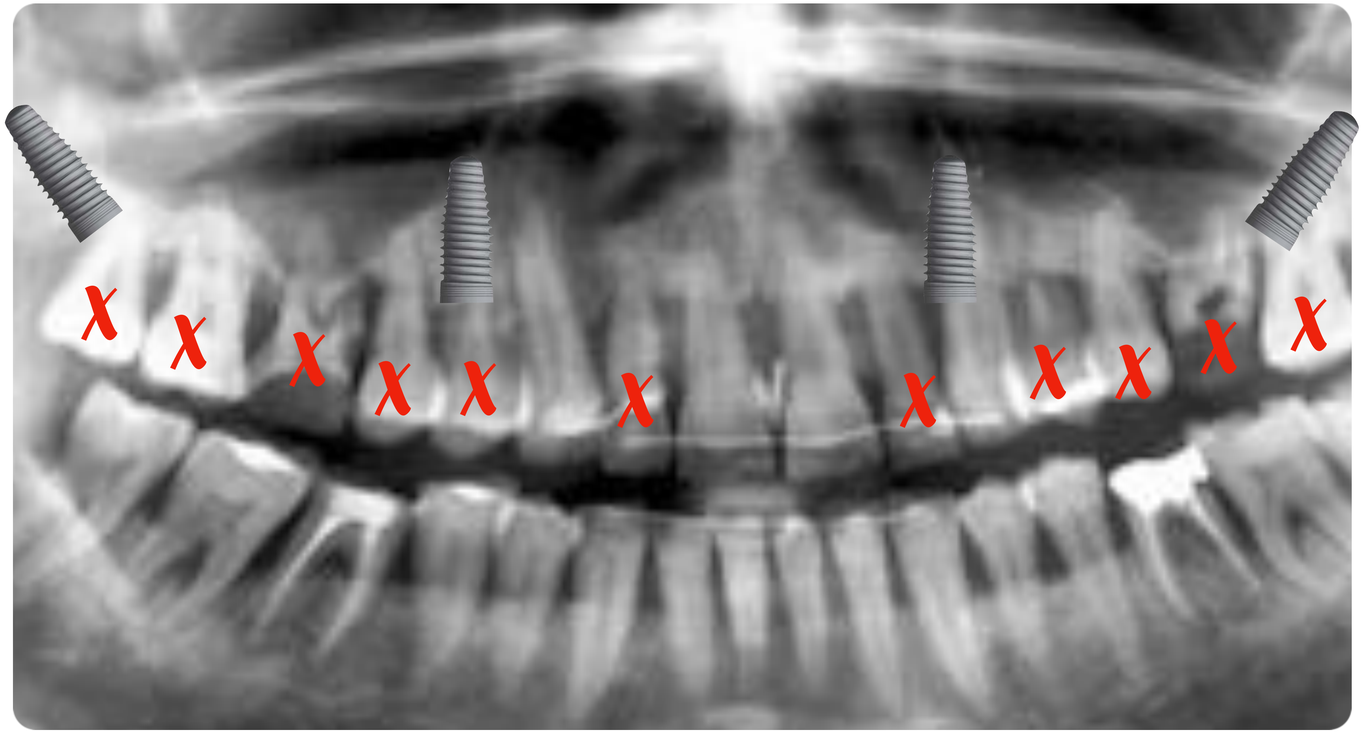
ESTHETIC RISK FACTOR	LOW RISK	MODERATE RISK	HIGH RISK
Medical Status	Healthy, cooperative patient with an intact immune system		Reduced immune system
Smoking habit	Non-Smoker	Light smoker (< 10 cigs/day)	Heavy smoker (> 10 cigs/day)
Patient's Esthetic Expectations	Low	Medium	High
Lip Line	Low	Medium	High
Gingival Biotype	Low scalloped, thick	Medium scalloped, medium thick	High scalloped, thin
Shape of Tooth Crowns	Rectangular		Triangular
Infection at Implant Site	None	Chronic	Acute
Bone Level at Adjacent Teeth	< 5mm to contact point	5.5mm to 6.5mm to contact point	> 7mm to contact point
Restorative Status of Neighboring Teeth	Virgin		Restored
Width of Edentulous Span	1 tooth (> 7mm)	1 tooth (< 7mm)	2 teeth or more
Soft-Tissue Anatomy	Intact soft tissue		Soft-tissue defects
Bone Anatomy of Alveolar Crest	Alveolar Crest without bone deficiency	Horizontal bone deficiency	Vertical bone deficiency

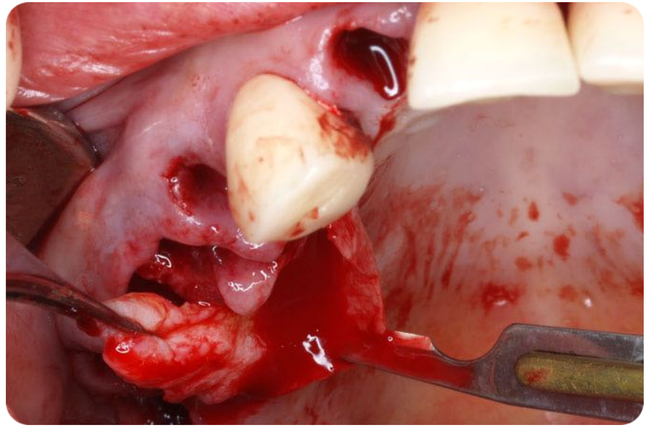
ESTHETIC RISK FACTOR	LOW RISK	MODERATE RISK	HIGH RISK
Medical Status	Healthy, cooperative patient with an intact immune system		Reduced immune system
Smoking habit	Non-Smoker	Light smoker (< 10 cigs/day)	Heavy smoker (> 10 cigs/day)
Patient's Esthetic Expectations	Low	Medium	High
Lip Line	Low	Medium	High
Gingival Biotype	Low scalloped, thick	Medium scalloped, medium thick	High scalloped, thin
Shape of Tooth Crowns	Rectangular		Triangular
Infection at Implant Site	None	Chronic	Acute
Bone Level at Adjacent Teeth	< 5mm to contact point	5.5mm to 6.5mm to contact point	> 7mm to contact point
Restorative Status of Neighboring Teeth	Virgin		Restored
Width of Edentulous Span	1 tooth (> 7mm)	1 tooth (< 7mm)	2 teeth or more
Soft-Tissue Anatomy	Intact soft tissue		Soft-tissue defects
Bone Anatomy of Alveolar Crest	Alveolar Crest without bone deficiency	Horizontal bone deficiency	Vertical bone deficiency

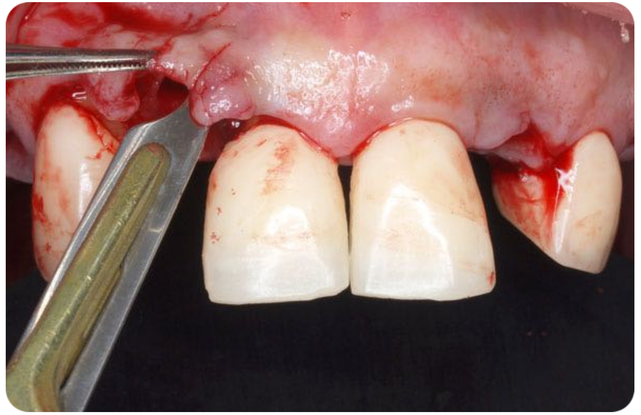
FIGURE 2

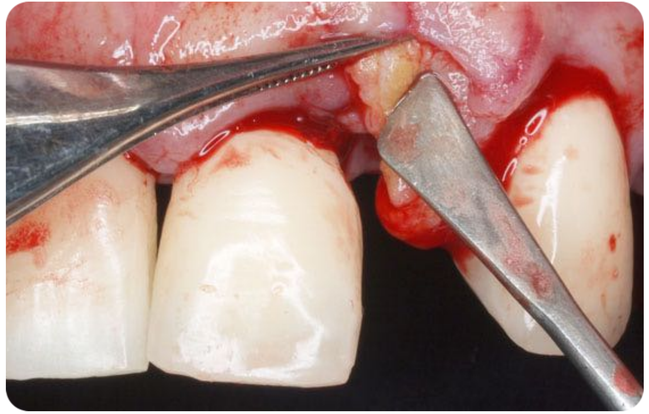
Patient Name _____ **Implant Esthetic Risk Profile**

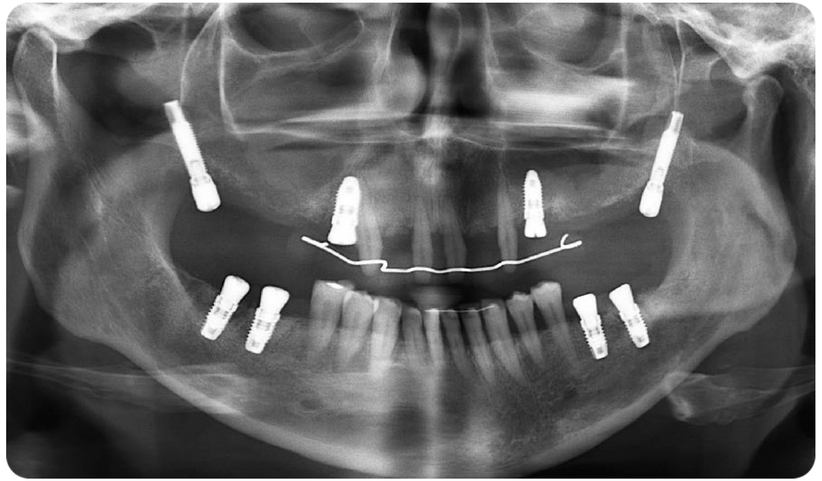
Esthetic Risk Factors	Low	Medium	High
Medical status	Healthy patient and intact immune system		Reduced immune system
Smoking status	Nonsmoker	Light smoker <10 cigarettes a day	Heavy smoker >10 cigarettes a day
Patient's esthetic expectations	Low	Medium	High
Lip line	Low	Medium	High
Gingival biotype	Low scalloped Thick	Medium scalloped Medium thick	High scalloped Thin
Shape of tooth crowns	Rectangular	Slightly triangular	Triangular
Infection at implant site	None	Chronic	Acute
Bone level at adjacent teeth	<5 mm to contact point	5.5 mm to 6.5 mm to contact point	7 mm to contact point
Restoration status of neighboring teeth	Virgin		Restored
Width of edentulous span	1 tooth ≥7 mm	1 tooth ≤ 7 mm	2 teeth or more
Soft-tissue anatomy	Intact soft tissue		Soft-tissue defects
Bone anatomy of alveolar crest	No bone deficiency	Horizontal bone deficiency	Vertical bone deficiency

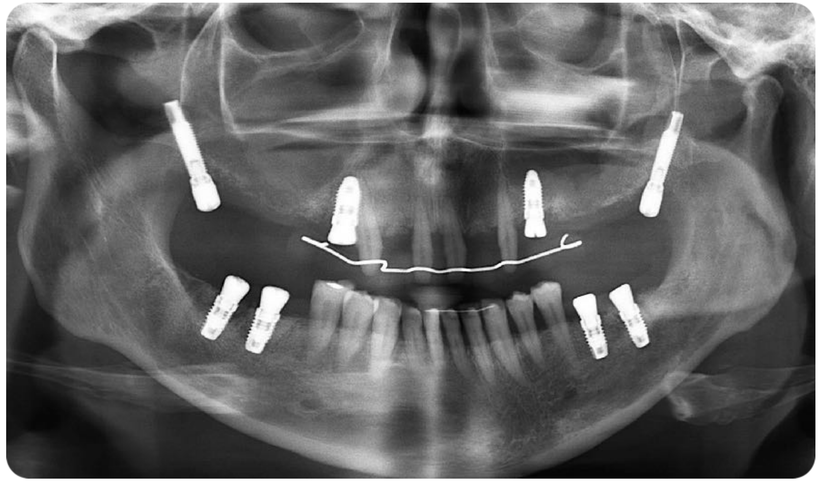


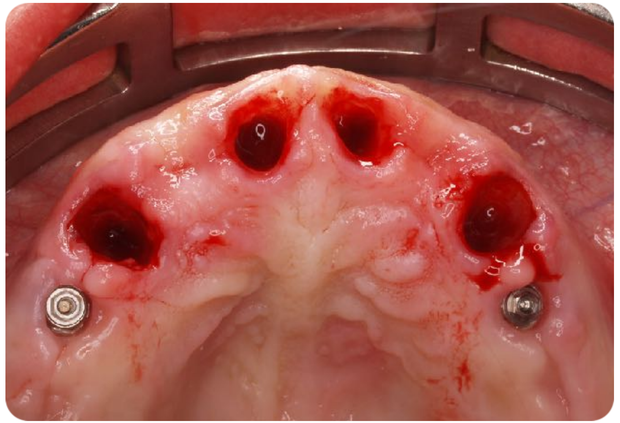


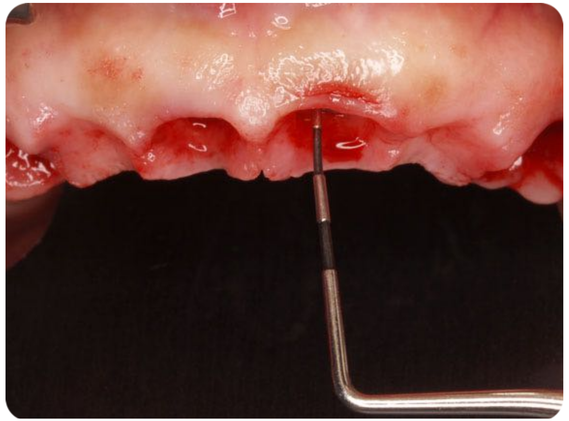


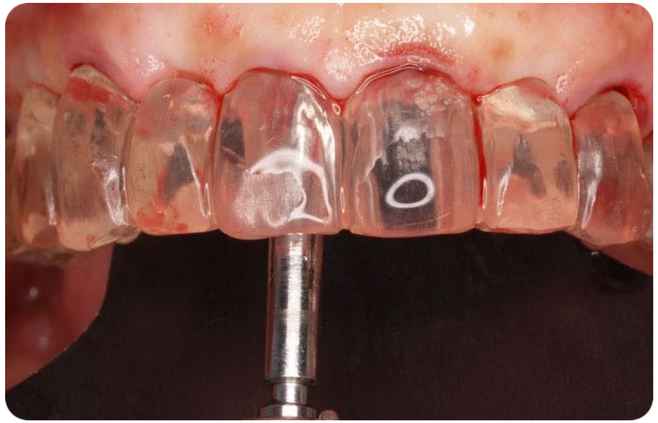


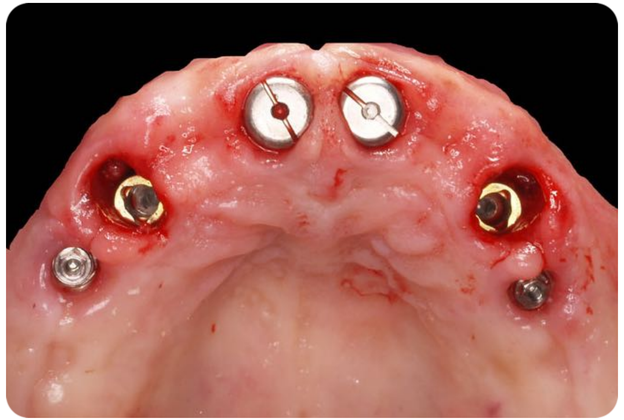


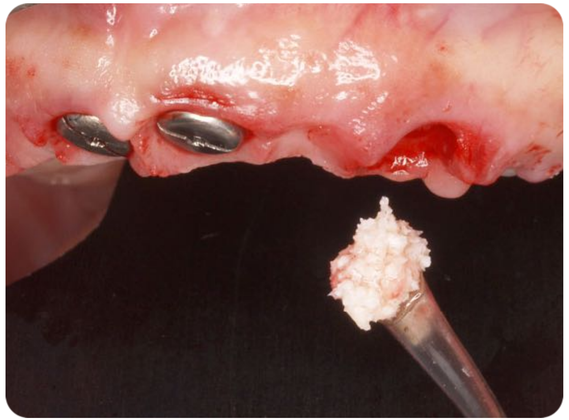


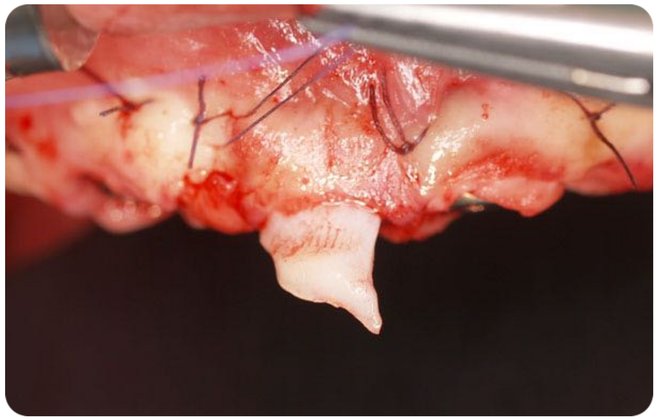


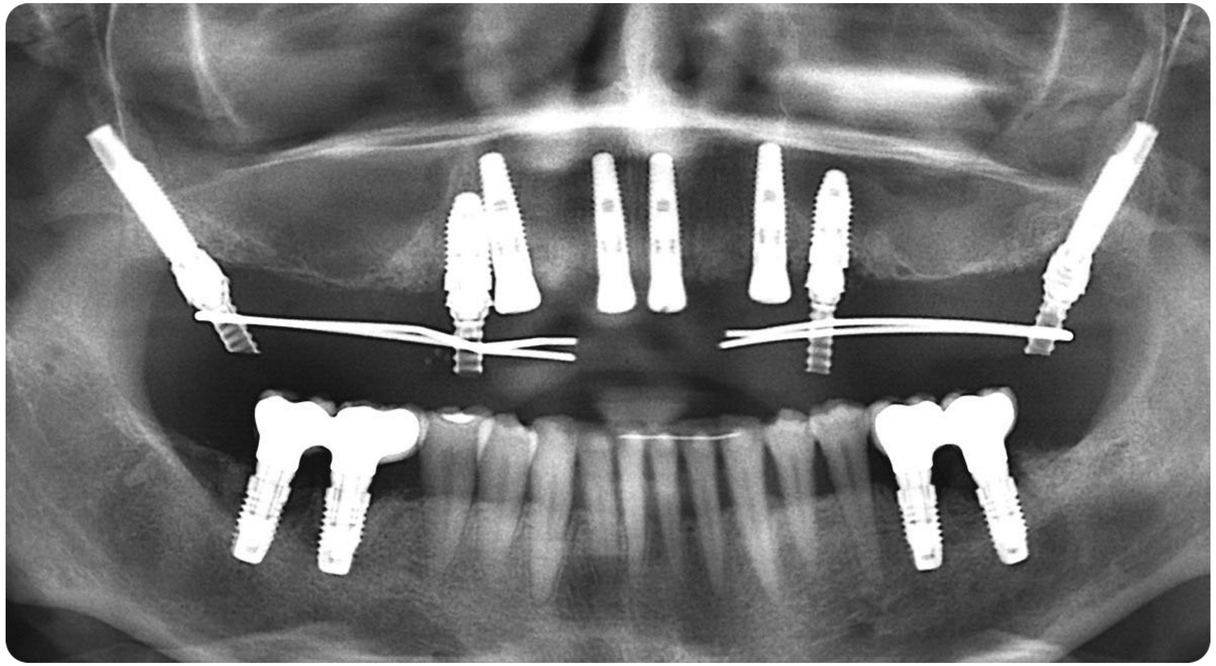


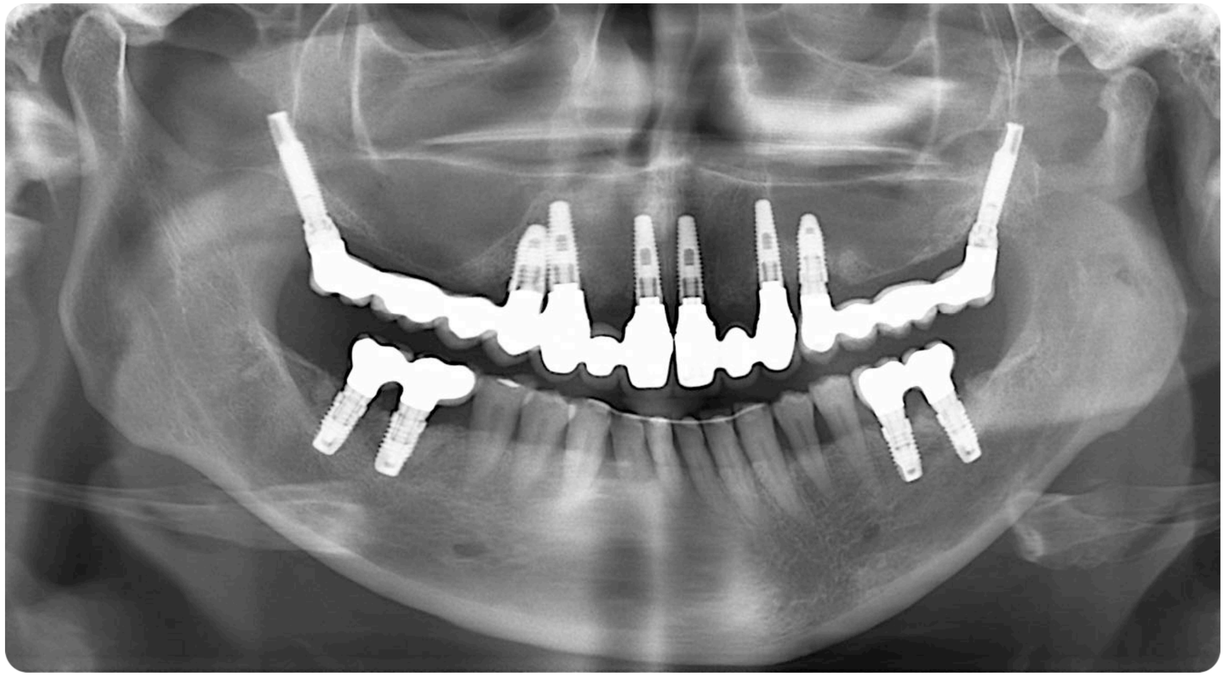












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5 years


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