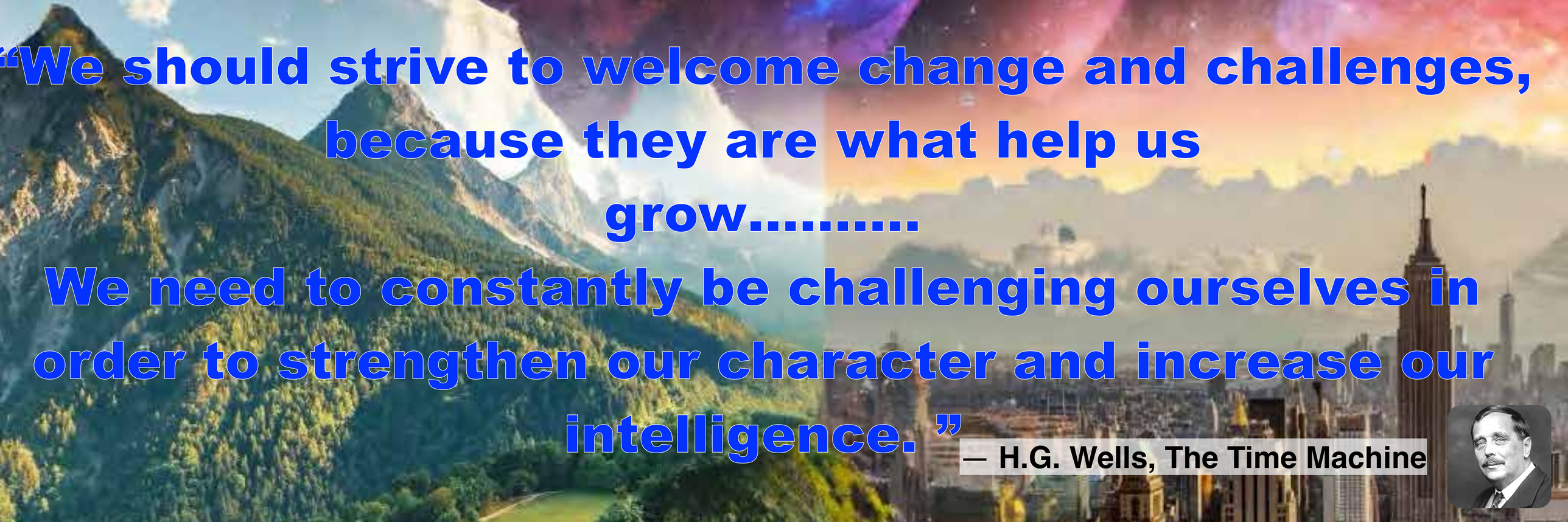
NYU COLLEGE OF DENTISTRY
NEW YORK UNIVERSITY

Application of the Dental Avatar

Isaac D Tawil
DDS MS

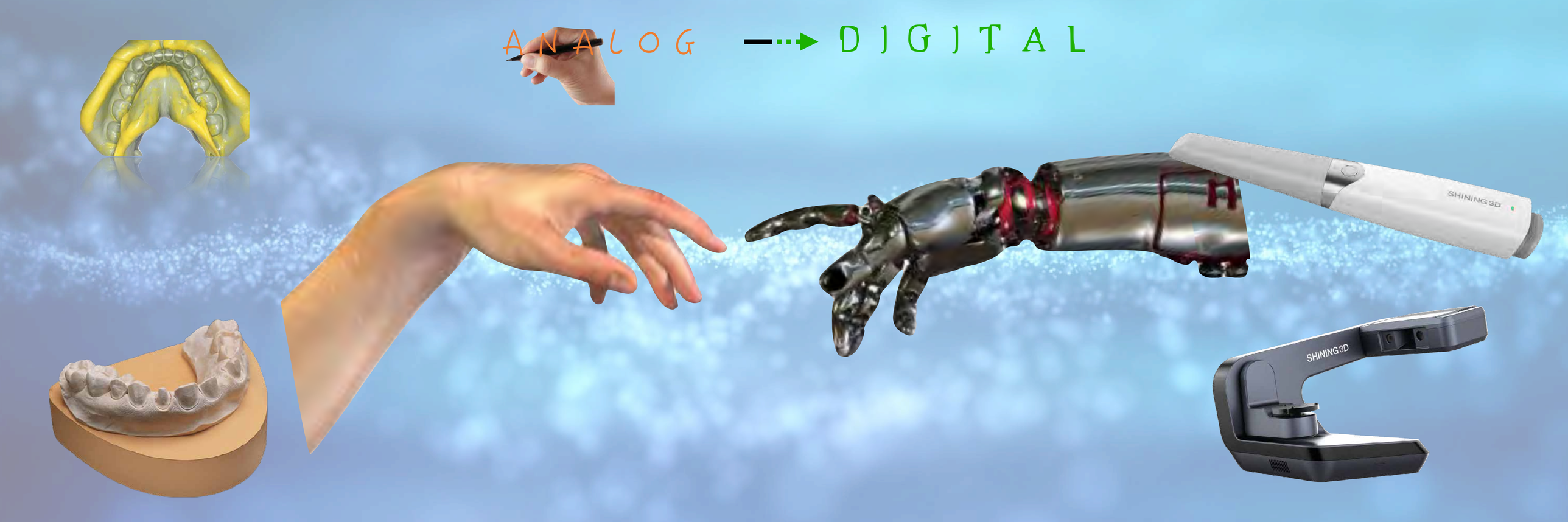
Everything changes and somewhere along the line we need to change with it or fall behind

—George Bernard Shaw


“We should strive to welcome change and challenges, because they are what help us grow.....
We need to constantly be challenging ourselves in order to strengthen our character and increase our intelligence. ”
— H.G. Wells, The Time Machine


ANALOG
DIGITAL


SHINING 3D
SHINING 3D
SHINING 3D
SHINING 3D
GITAL
RUPTION
AI
BIG
DATA


ANALOG
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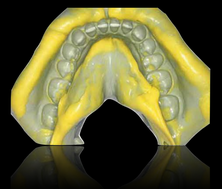
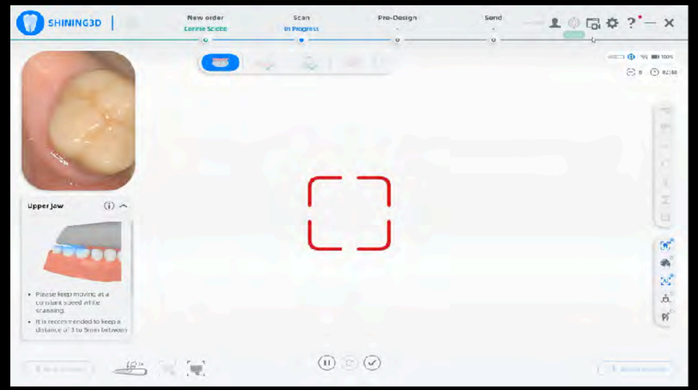
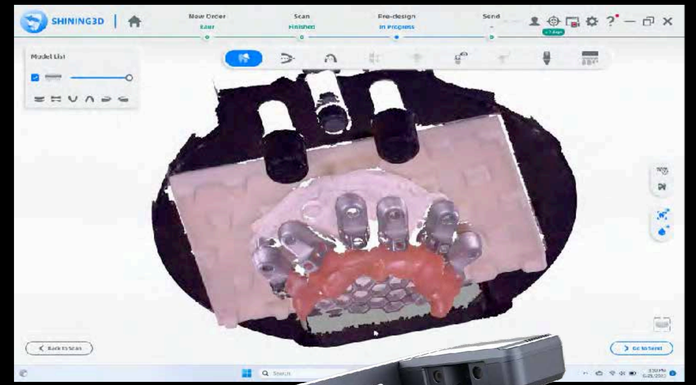


ANALOG ···▸ DIGITAL

The digital Handshake





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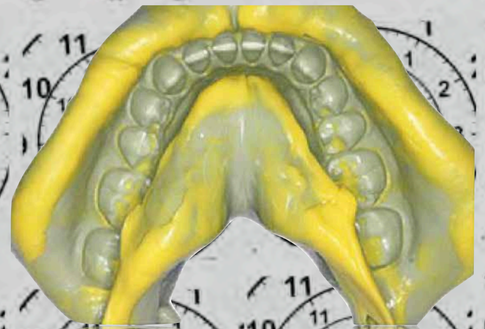

VS

DIGITAL

Pre-Op Data Collection - IOS

ACCURACY

Trueness and Precision of Three-Dimensional Digitizing Intraoral Devices

Hindawi

Hussam Mutwalli,[1] Michael Braian,[1] Deyar Mahmood,[1] and Christel Larsson[2]

[1]Department of Prosthodontics, Faculty of Odontology, Malmö University, Smedjegatan 16, 214 21 Malmö, Sweden
[2]Department of Materials Science and Technology, Faculty of Odontology, Malmö University, Smedjegatan 16, 214 21 Malmö, Sweden

Published in final edited form as:
Clin Oral Implants Res. 2015 June ; 26(6): 715–719. doi:10.1111/clr.12375.

Accuracy of Digital vs. Conventional Implant Impressions

Sang J. Lee, DMD, MMSc[1], **Rebecca A. Betensky, Ph.D.**[2], **Grace E. Gianneschi, DMD Candidate.**[1], and **German O. Gallucci, DMD, Dr. Med. Dent. Ph.D.**[1]

Eur J Oral Implantol. 2017;10 Suppl 1:101-120.

Accuracy of digital implant impressions with intraoral scanners. A systematic review.

Rutkūnas V, Gečiauskaitė A, Jegelevičius D, Vaitiekūnas M.

Abstract

AIM: The use of intraoral scanners (IOS) for making digital implant impressions is increasing. However, there is a lack of evidence on the accuracy of IOS compared with conventional techniques. Therefore, the aim of this systematic review was to collect evidence on the accuracy of digital implant impression techniques, as well as to identify the main factors influencing the accuracy outcomes.

MATERIALS AND METHODS: Two reviewers searched electronic databases in November, 2016. Controlled vocabulary, free-text terms, and defined inclusion and exclusion criteria were used. Publications in English language evaluating the accuracy outcomes of digital implant impressions were identified. Pooled data were analysed qualitatively and pertinent data extracted.

Imburgia et al. BMC Oral Health (2017) 17:92
DOI 10.1186/s12903-017-0383-4

BMC Oral Health

RESEARCH ARTICLE Open Access

Accuracy of four intraoral scanners in oral implantology: a comparative in vitro study

Mario Imburgia[1], Silvia Logozzo[2,3], Ulli Hauschild[4], Giovanni Veronesi[5], Carlo Mangano[6] and Francesco Guido Mangano[5,7]

Original Article | Published: 17 November 2013

Accuracy of full-arch scans using intraoral scanners

Sebastian B. M. Patzelt ✉, Archontia Emmanouilidi, Susanne Stampf, Joerg R. Strub & Wael Att

Clinical Oral Investigations **18**, 1687–1694(2014) | Cite this article

4456 Accesses | **162** Citations | **1** Altmetric | Metrics

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journal homepage: www.elsevier.com/locate/jdent

Accuracy and precision of 3 intraoral scanners and accuracy of conventional impressions: A novel in vivo analysis method

R. Nedelcu[a,*], P. Olsson[b], I. Nyström[b], J. Rydén[c], A. Thor[a]

[a] Department of Surgical Sciences, Plastic & Oral and Maxillofacial Surgery, Uppsala University, 751 85, Uppsala, Sweden
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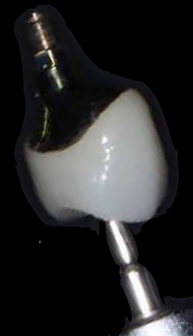
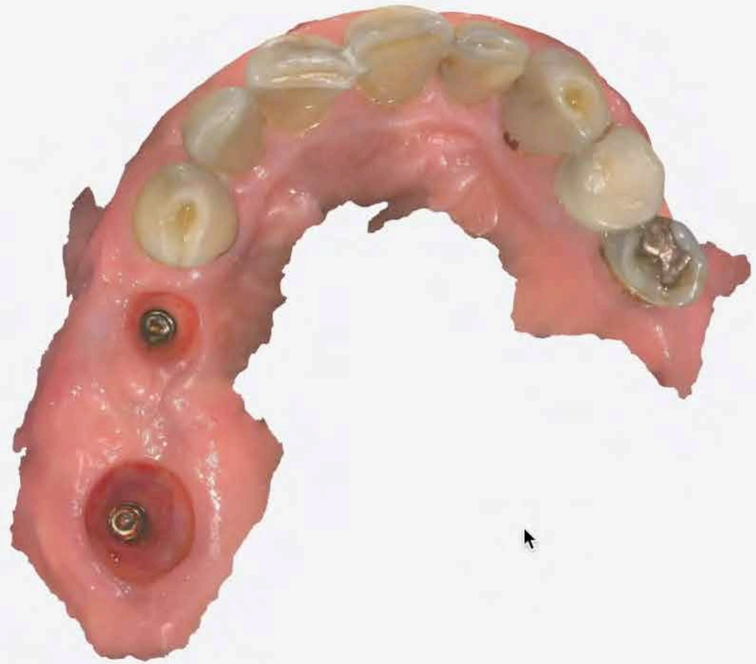
[c] Department of Mathematics, Uppsala University, Box 480, 751 06, Uppsala, Sweden

PROSTHETIC OPTIONS

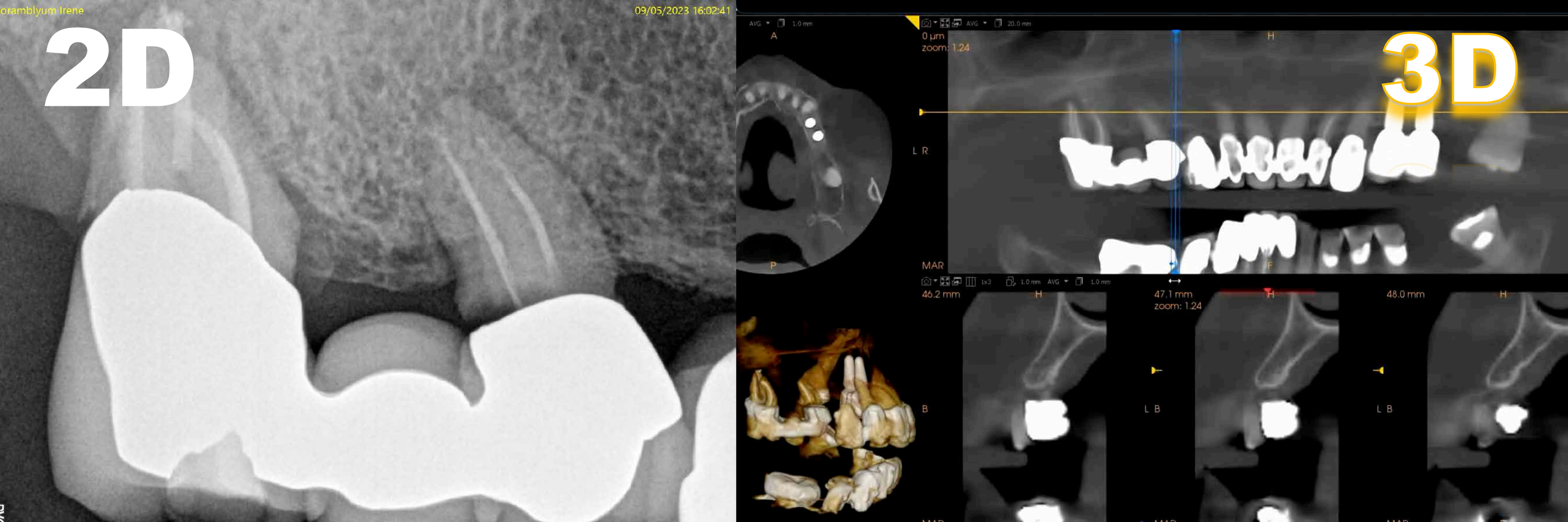
Cemented Retained
TEETH

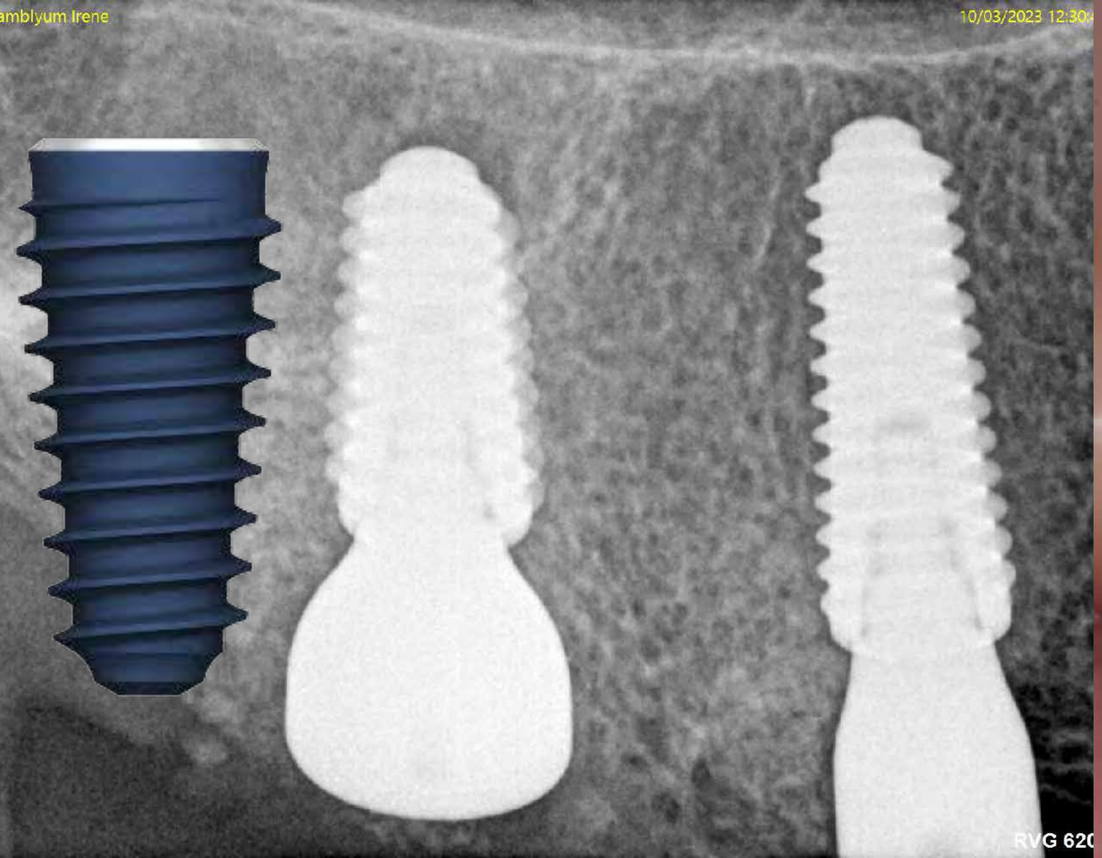


Screw Retained
TEETH



Lab Communication


oramblyum Irene
09/05/2023 16:02:41
2D
3D
A
P
L R
MAR
0 µm
zoom: 1.24
46.2 mm
47.1 mm
zoom: 1.24
48.0 mm
B
L B
L B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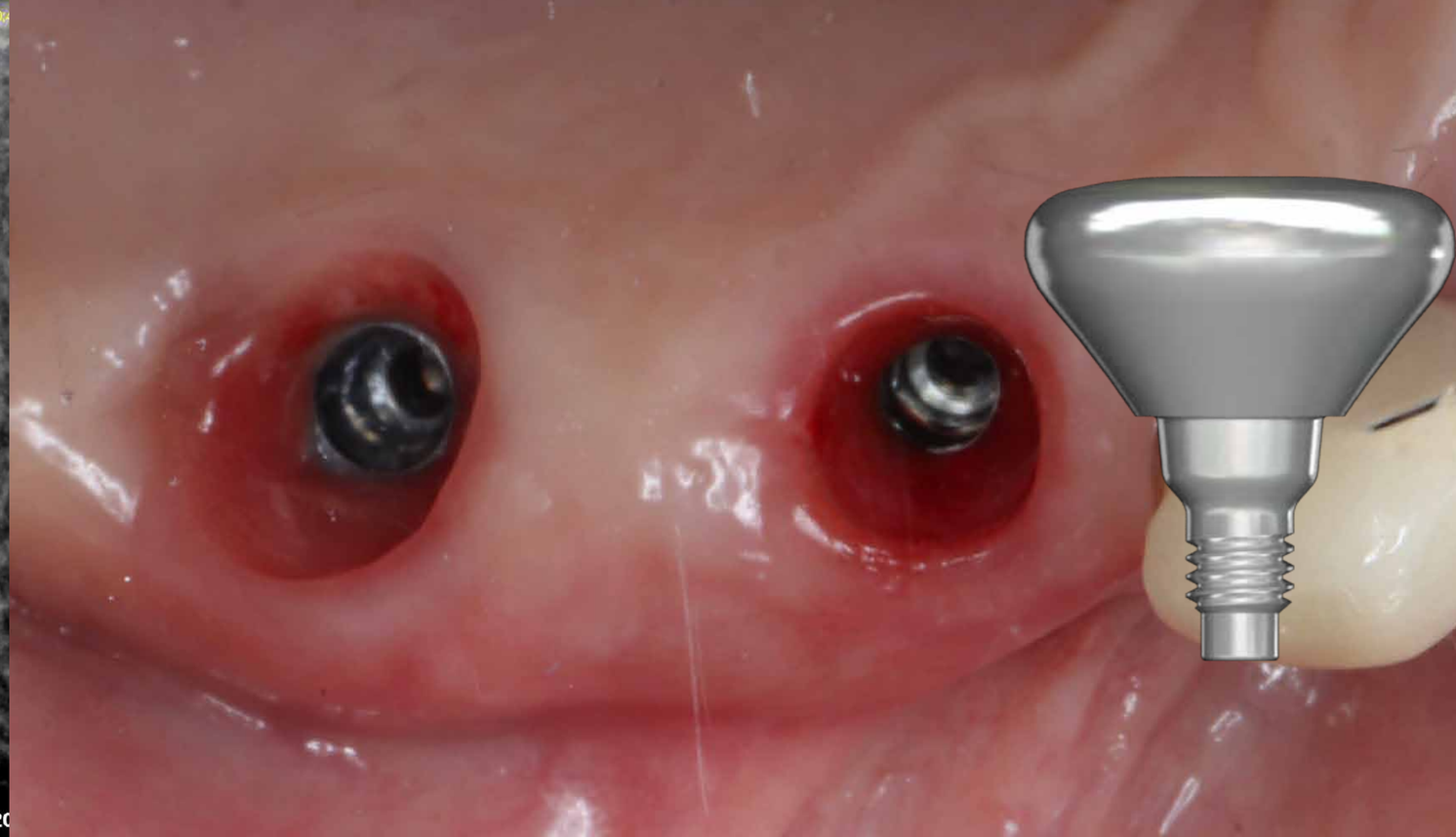
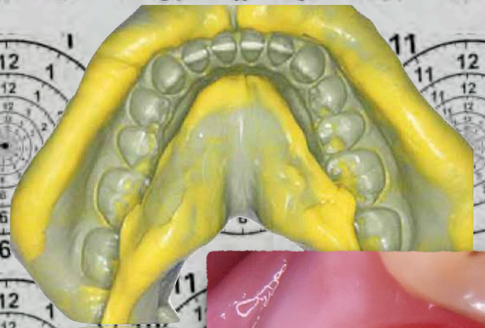
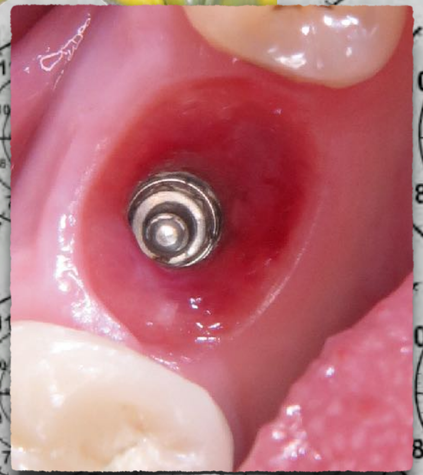
RVG 620



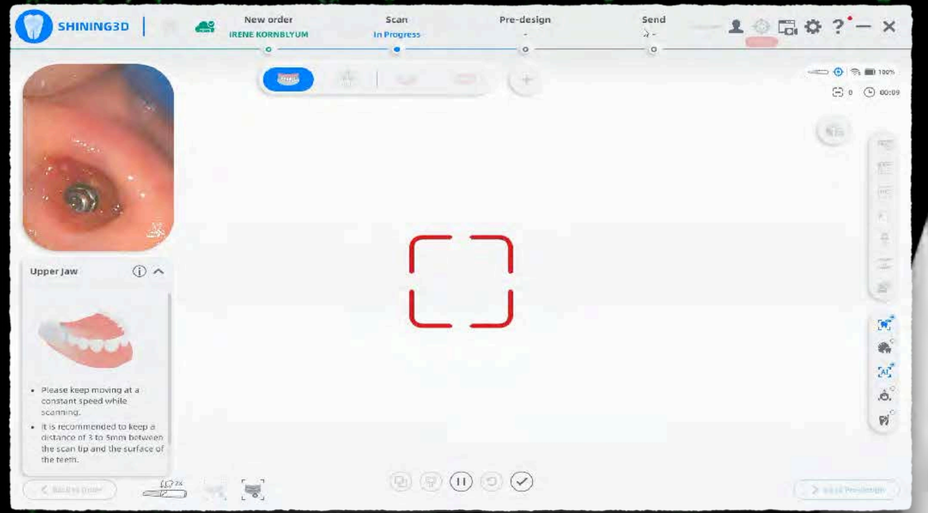
ANALOG



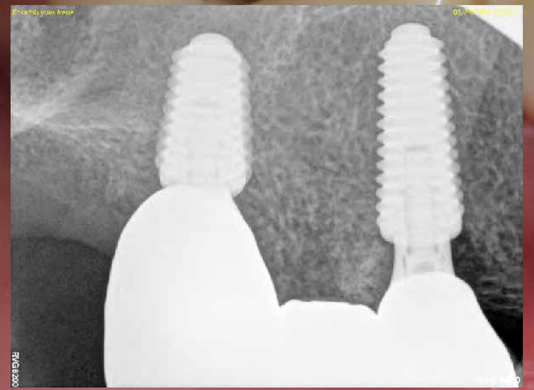


VS

DIGITAL



DIGITAL



FULL ARCH PROSTHETIC OPTIONS

► FP 1 (No PINK)

► FP 2 (LONG TEETH)

► FP 3 (Artificial PINK)

Fully Digital Full Arch

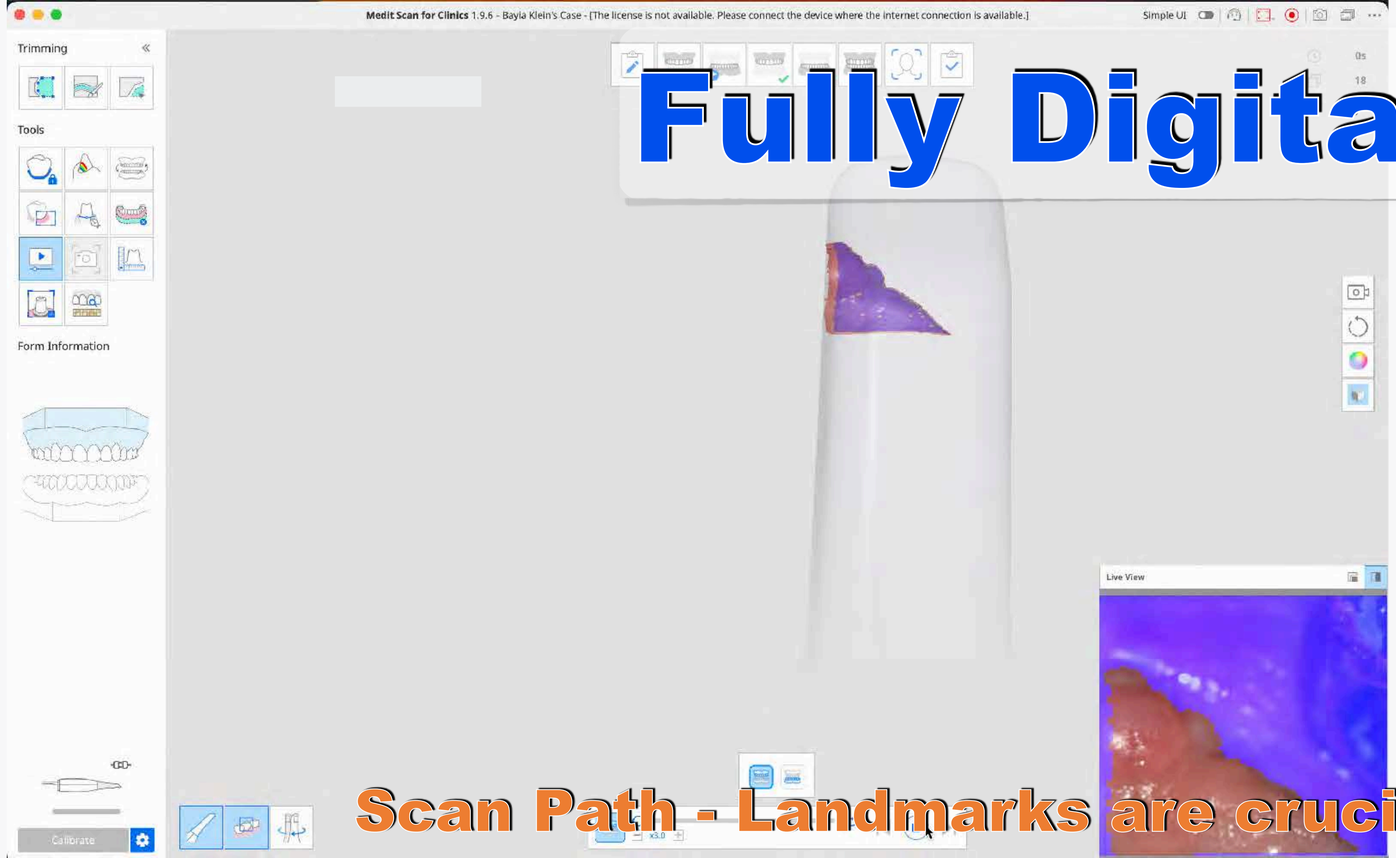
Keys to Success 🔑

Scan Path - Landmarks are crucial to the Accuracy of Unit

Teeth available?

Maxilla > Mandible Palatal Rugae

File Types (STL,PLY,OBJ)



Fully Digital Full Arch

Edentulous

Maxilla > Mandible

Keratinized tissue - Palatal Rugae

Scan Path - Landmarks are crucial to the Accuracy of Unit

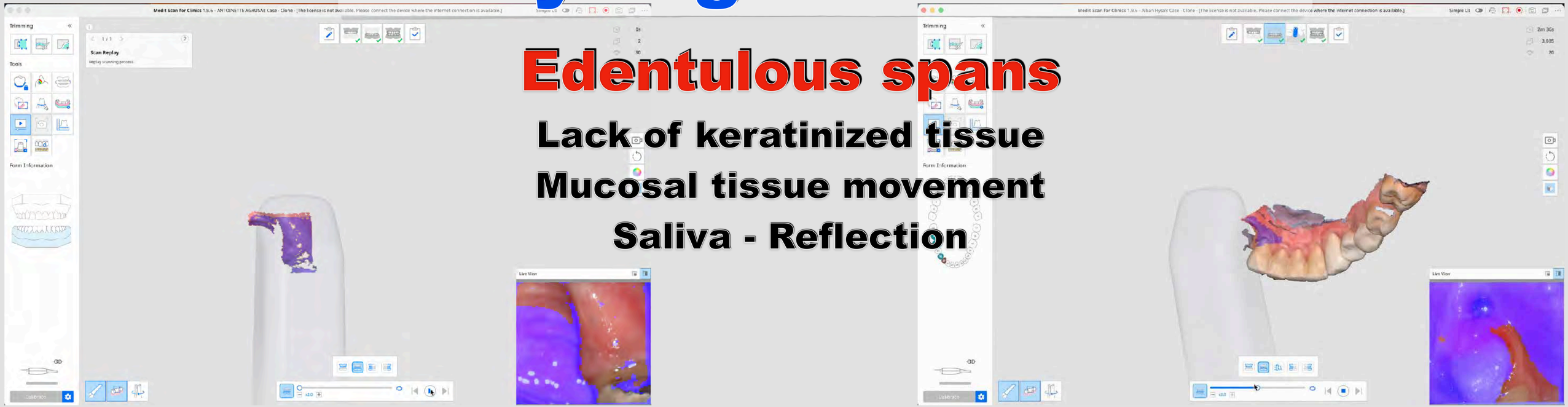
Fully Digital Full Arch

Edentulous spans

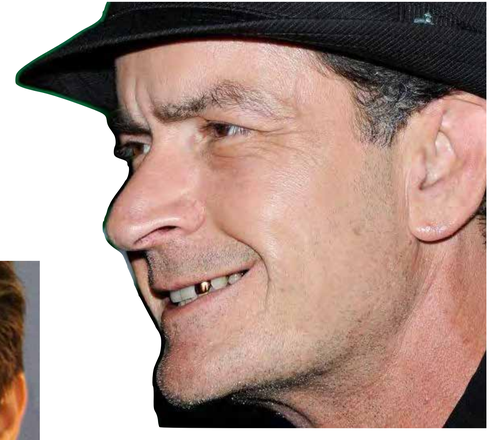
Lack of keratinized tissue

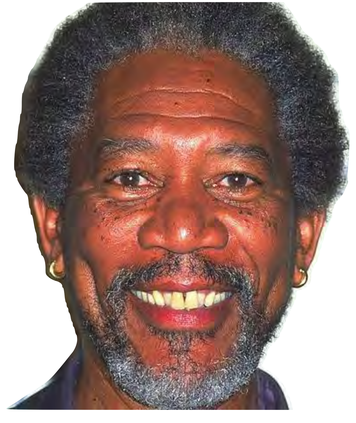
Mucosal tissue movement

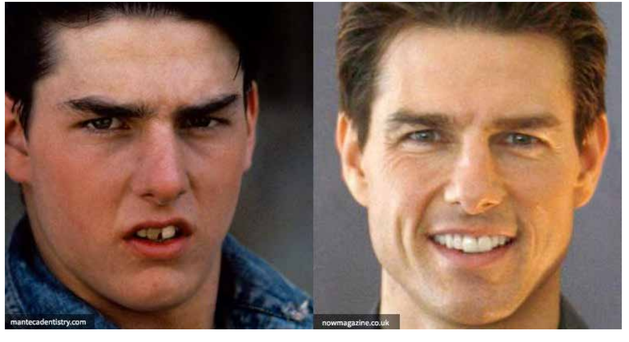
Saliva - Reflection



Who's that Hollywood smile?

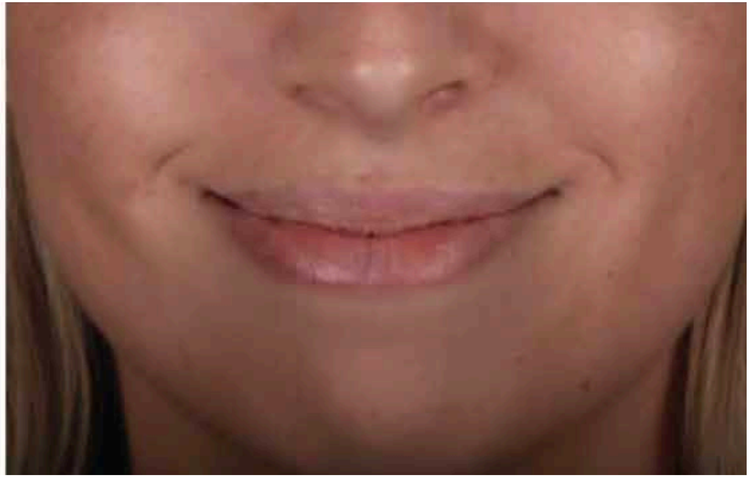





mantecadentistry.com
nowmagazine.co.uk

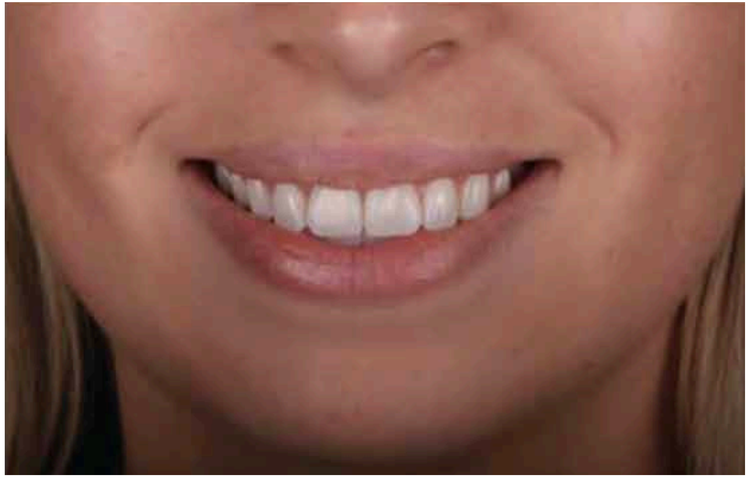

THE SMILE IS OUR SIGNATURE

Three smile types have been shown in the literature



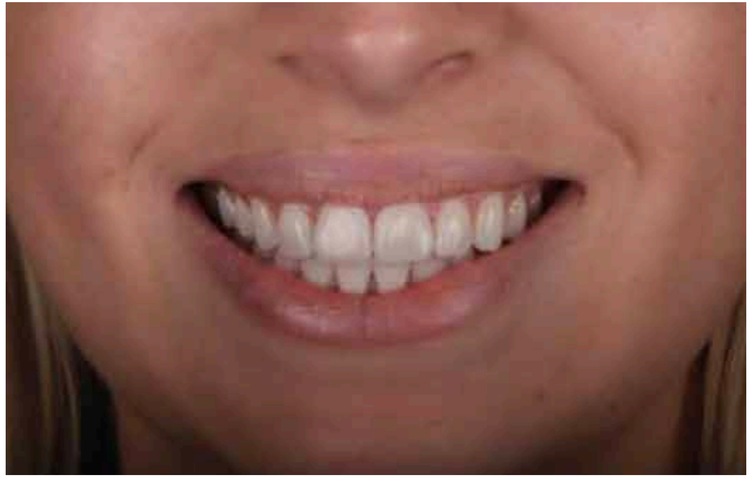
Commissure smile

(Mona Lisa smile)



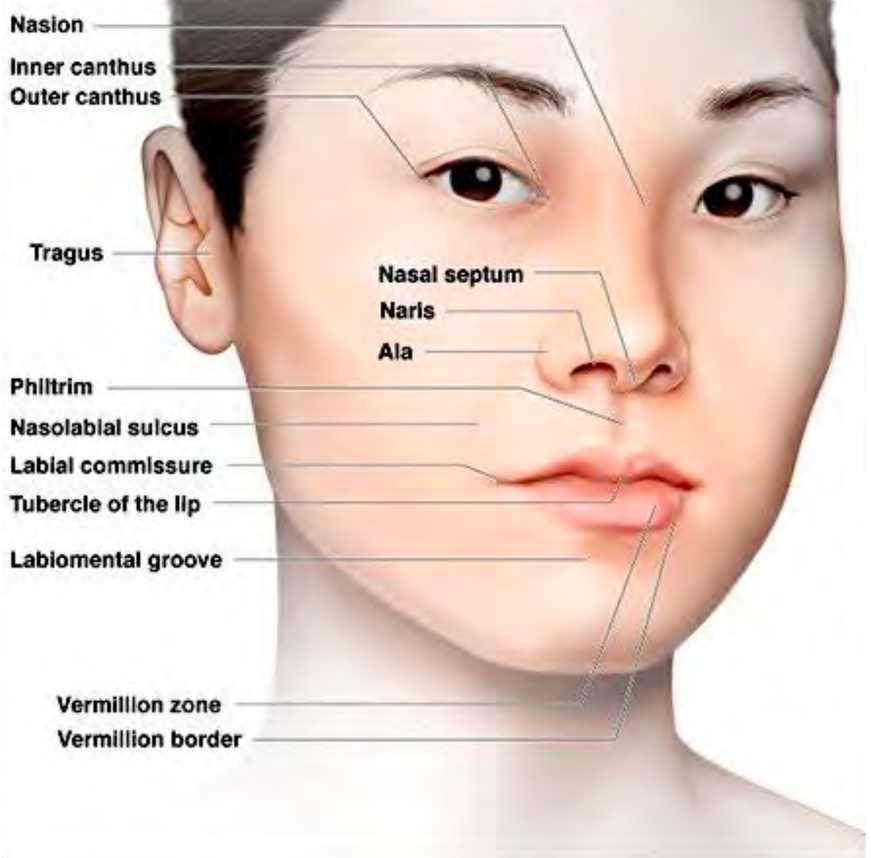
Social smile

(cuspid smile)

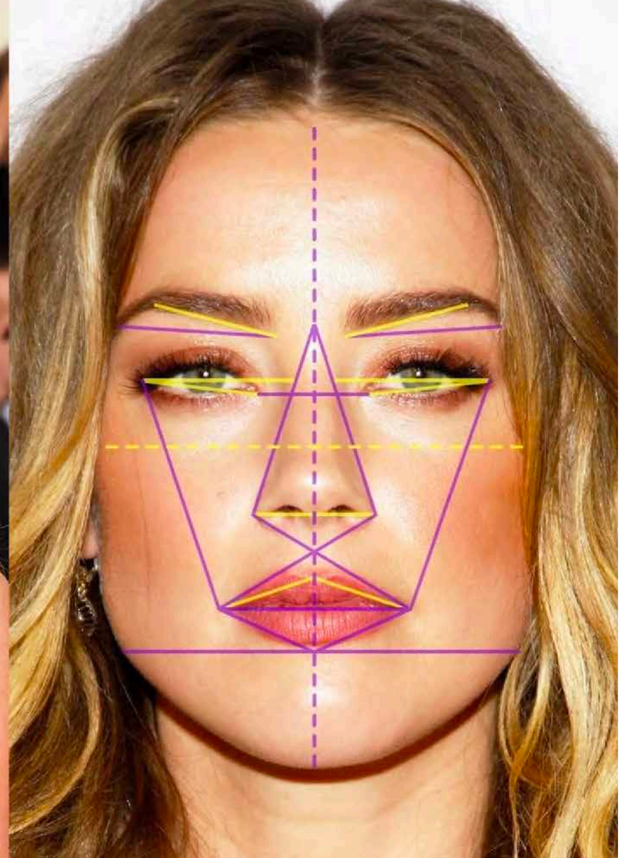


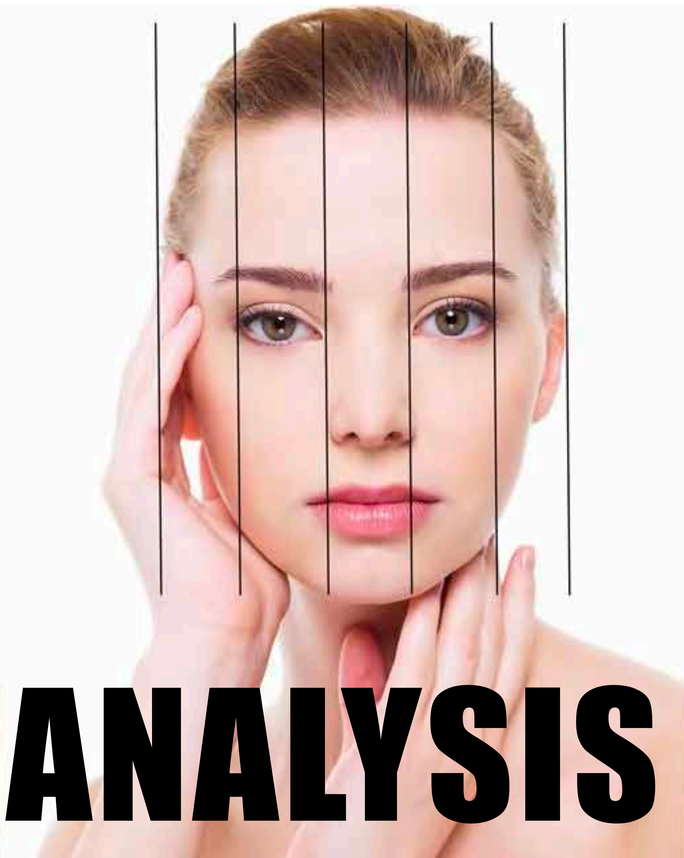
Spontaneous smile

(complex smile)



What about the FACE?





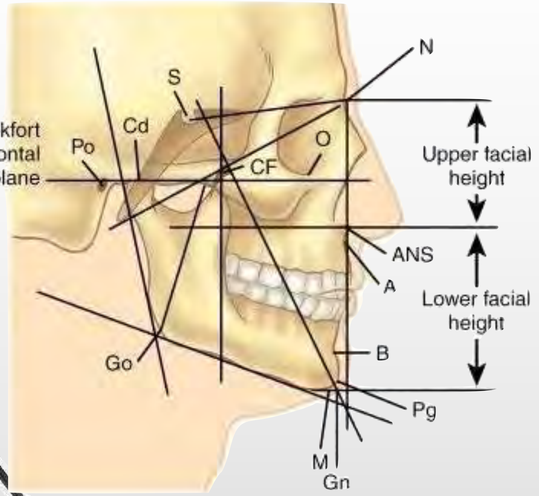
ESTHETIC ANALYSIS

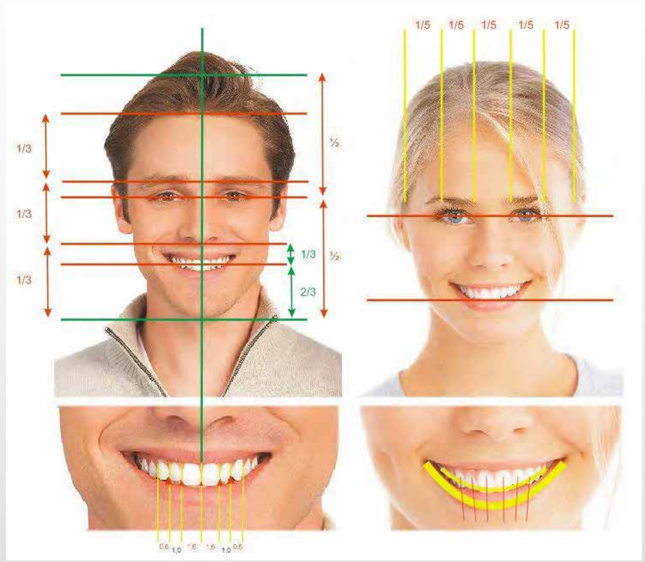

2D
PHOTOGRAPHY

Dental Photography

GOALS

Facial measurements

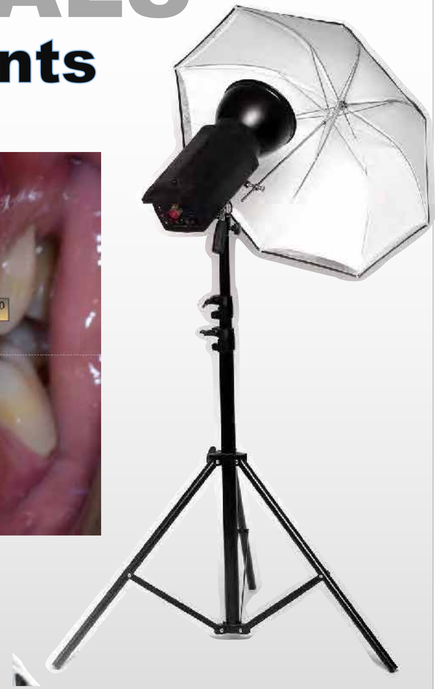


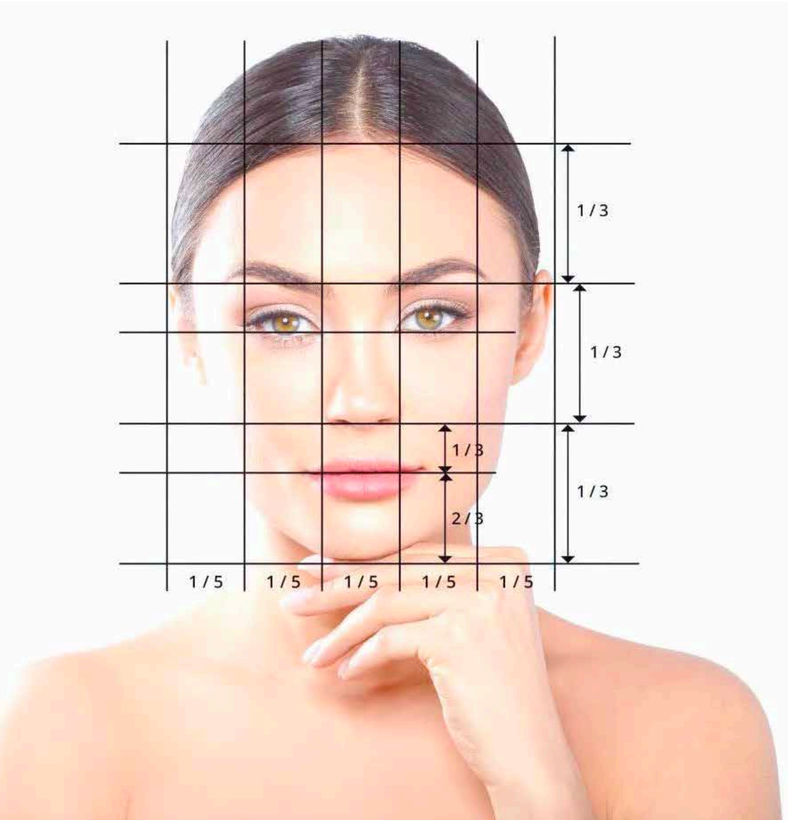


Importance of facial height in Orthodontic treatment

Kian Fazeli Nilaki DMD, MClin Pros, PGC Orth,
Academic Director at the LSTC
Published Jun 6, 2015

Tooth measurements





FACIAL ANALYSIS

Horizontal Lines (Ophriac Line/Bipupillary Line/Commissural Line)
Vertical Lines/Facial Midline/Facial Proportions/Reference Planes
E-Line/Naso-Labial Angle

DENTO-LABIAL ANALYSIS

Dental exposure at rest/Incisal edges Vs lower lip /Smile line /
Amplitude of tne smile /Lateral spaces/Interincisal line Vs midline/
Occlusal plane
commissural line/Occlusal plane Vs horizon

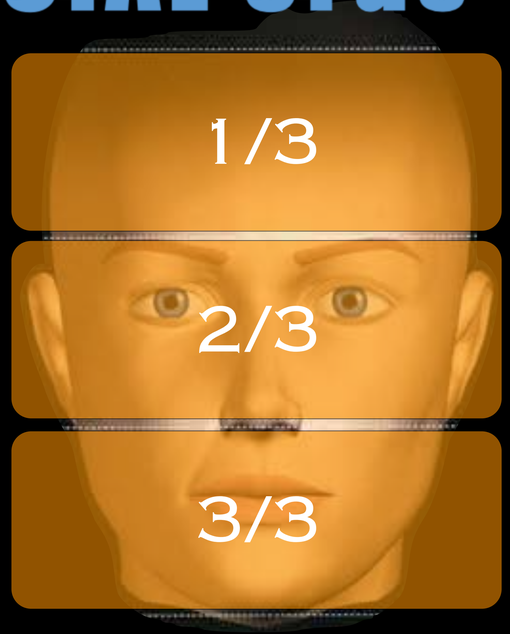
PHONETIC ANALYSIS

Phoneme"M'/Phoneme"E"/Phoneme "F/V"/Phoneme "S"

Dental Analysis

Typology/Color/Texture/Size/Proportions/Incisal edge/Dental composition

FACIAL 3rds



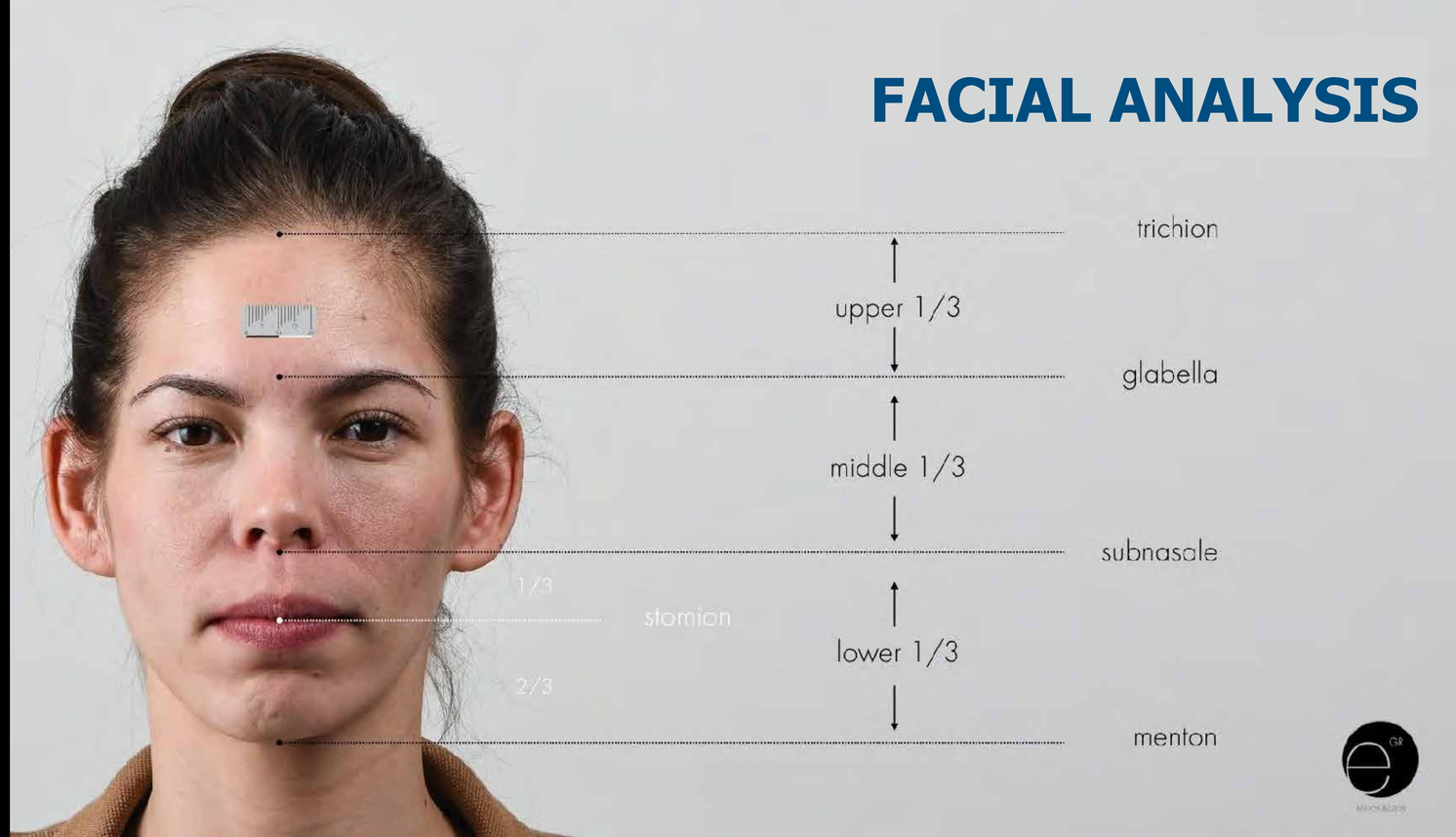
HAIR LINE

OPHRIAC LINE

NASAL LINE

CHIN

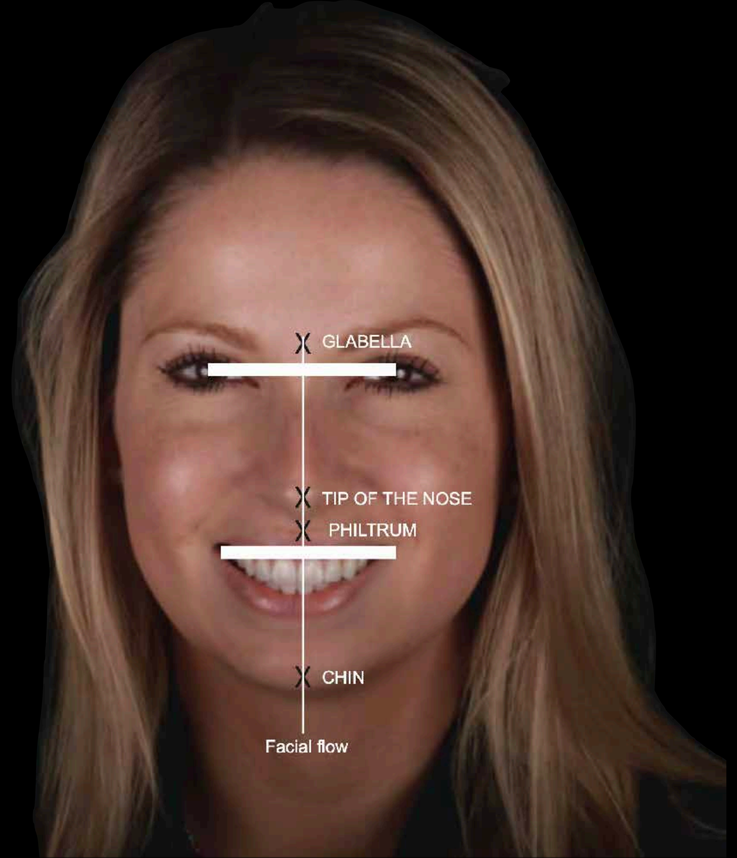
FACIAL ANALYSIS



MIDLINE

FACIAL ANALYSIS

Facial midline is a straight line drawn through the glabella, the tip of the nose, philtrum, and the tip of the chin



Reference Lines

FRONTAL VIEW

A longer lower third is diag- nosed as VME

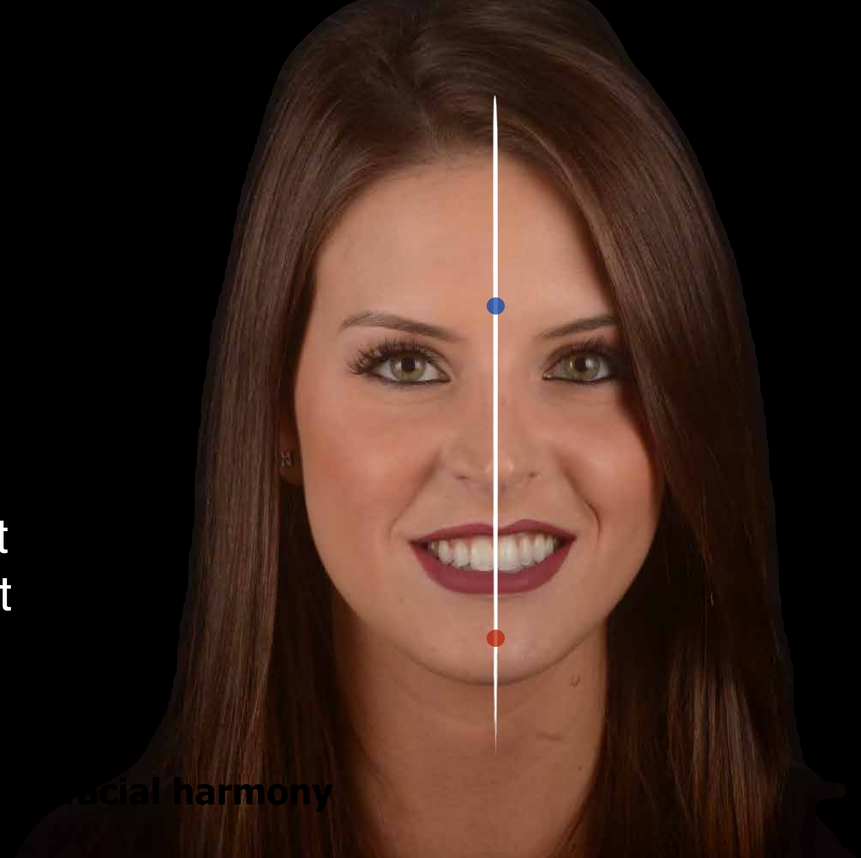
This patient's middle third measures at 64 mm and lower third is 74 mm.

SYMMETRY

FACIAL ANALYSIS

FACIAL FLOW

Facial FLOW: concept that states that due to the natural asymmetry of the human face, it is impossible to define a straight line as the midline. Rather, a curved line connecting facial landmarks is more acceptable.



Reference Lines

FRONTAL VIEW

F-D 70% match

75% max-mand discrepancy

Bodden, Miller, Jamison A study of the relationship of the dental midline to the facial median line

J Prosthet Dent 1979Jun;41(6):657-60. doi: 10.1016/0022-3913(79)90065-9.e

PLANES

FACIAL ANALYSIS

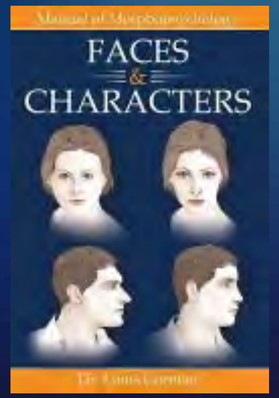
Frankfort horizontal:
Straight line from the highest point on the margin of the auditory meatus to the lowest point of the orbit, Should be parallel to the horizon when the patient is in NHP

Reference Lines

PROFILE VIEW

Camper's plane or Ala-Tragus line: A line running from the inferior border of the ala to the superior border of the tragus of the ear, determines the maxillary occlusal plane.

2D



Louis Corman PhD

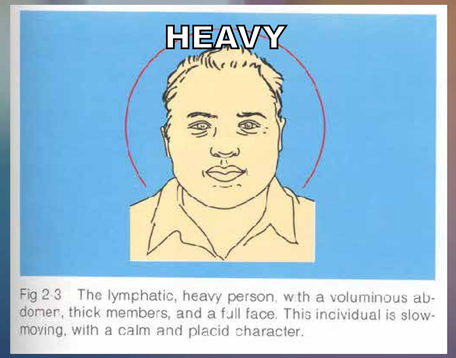


Fig 2-3 The lymphatic, heavy person, with a voluminous abdomen, thick members, and a full face. This individual is slow-moving, with a calm and placid character.

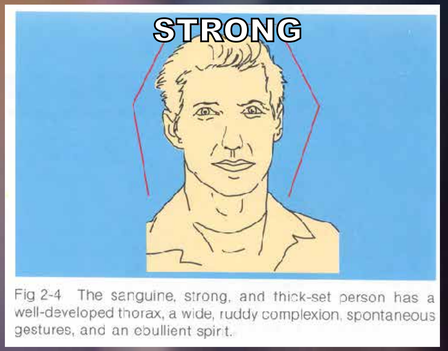


Fig 2-4 The sanguine, strong, and thick-set person has a well-developed thorax, a wide, ruddy complexion, spontaneous gestures, and an ebullient spirit.

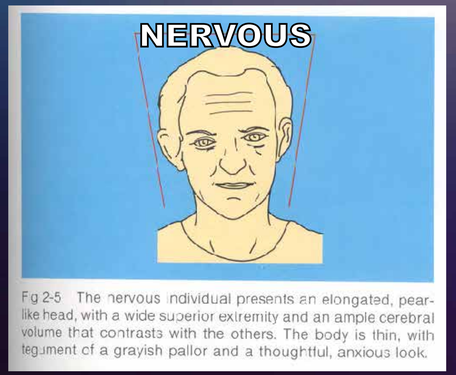


Fig 2-5 The nervous individual presents an elongated, pear-like head, with a wide superior extremity and an ample cerebral volume that contrasts with the others. The body is thin, with tegument of a grayish pallor and a thoughtful, anxious look.

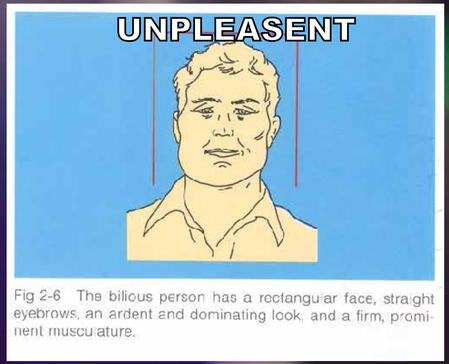
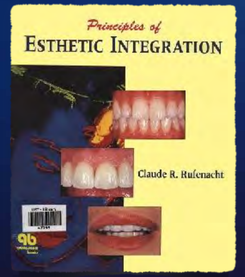


Fig 2-6 The bilious person has a rectangular face, straight eyebrows, an ardent and dominating look, and a firm, prominent musculature.

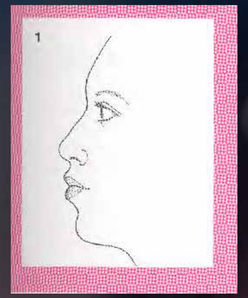
“Facial Shapes = reflection of the individual”

Perception

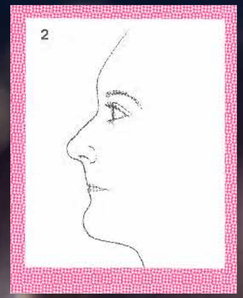
2D Perception Subjective



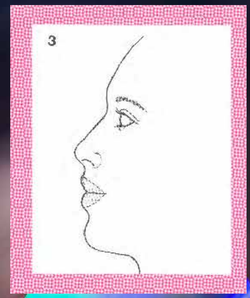
Claude R. Rufenacht



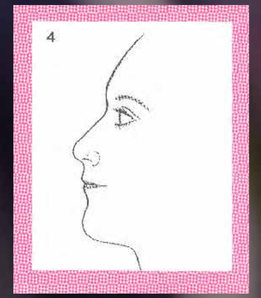
Ambitious Dominant



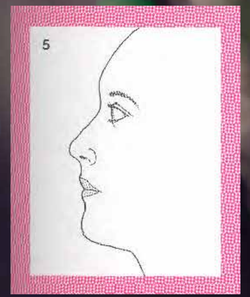
Follower Ambitionless



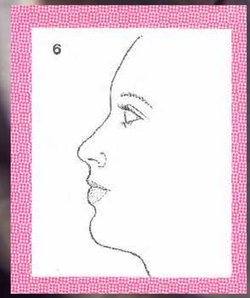
Subjective Materialist



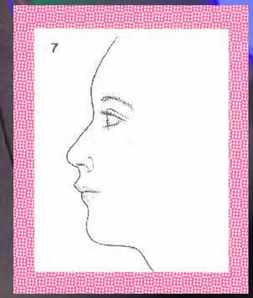
Self Control Interiorization



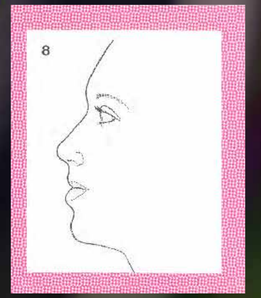
Goodness Courage



Ingenious Sensuality



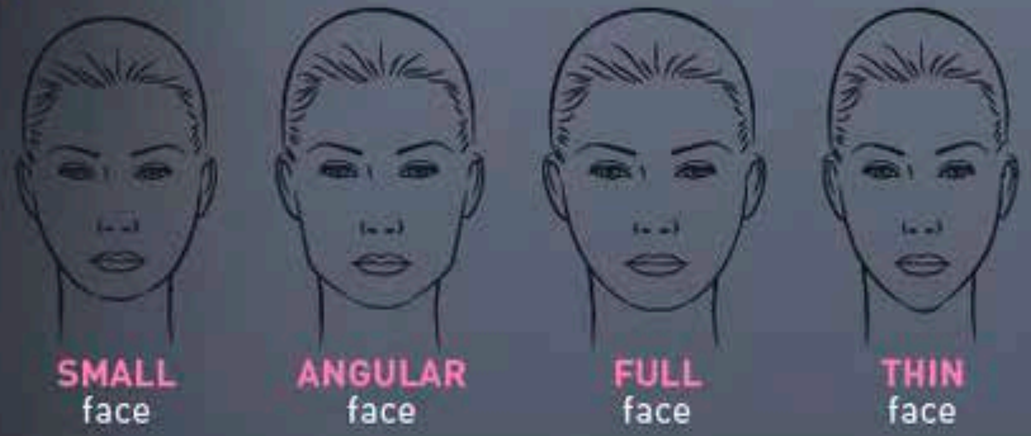
Dominant Scruples



Cannot Hide Pride

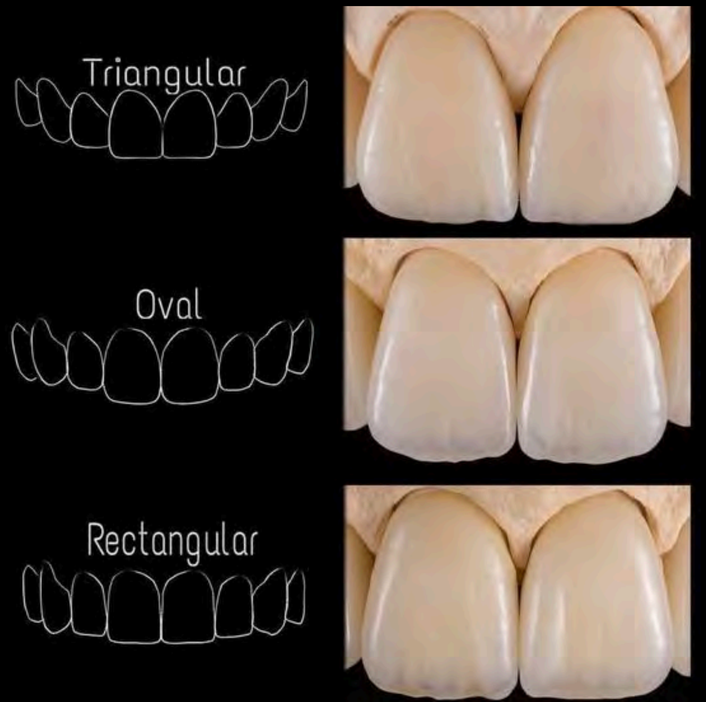
Facial shapes

"The law of harmony" suggested a correlation between facial shape and contours of upper permanent incisors.

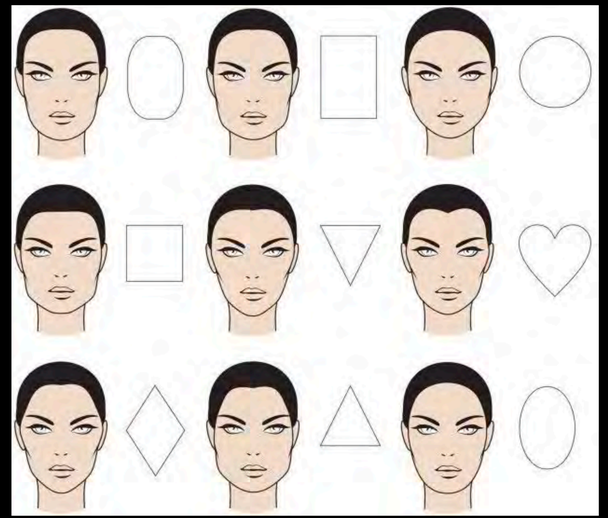


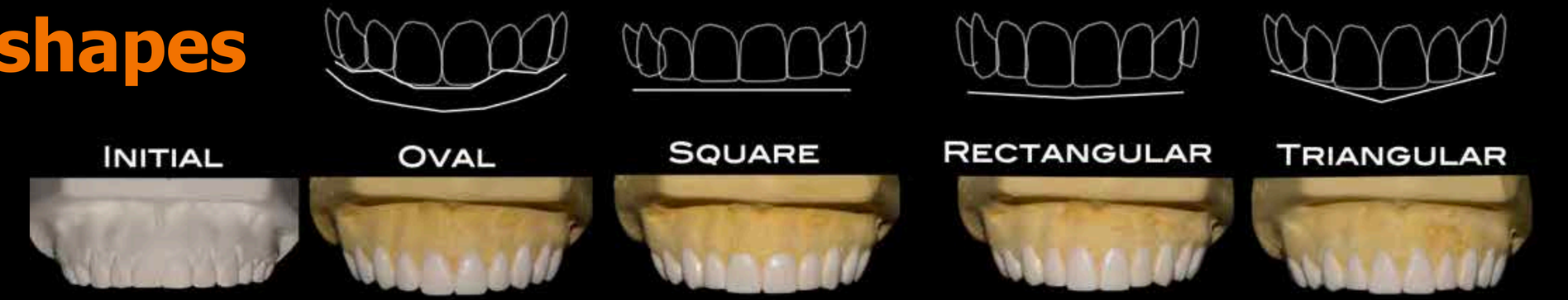
The facial shapes described are oval, triangle, and square

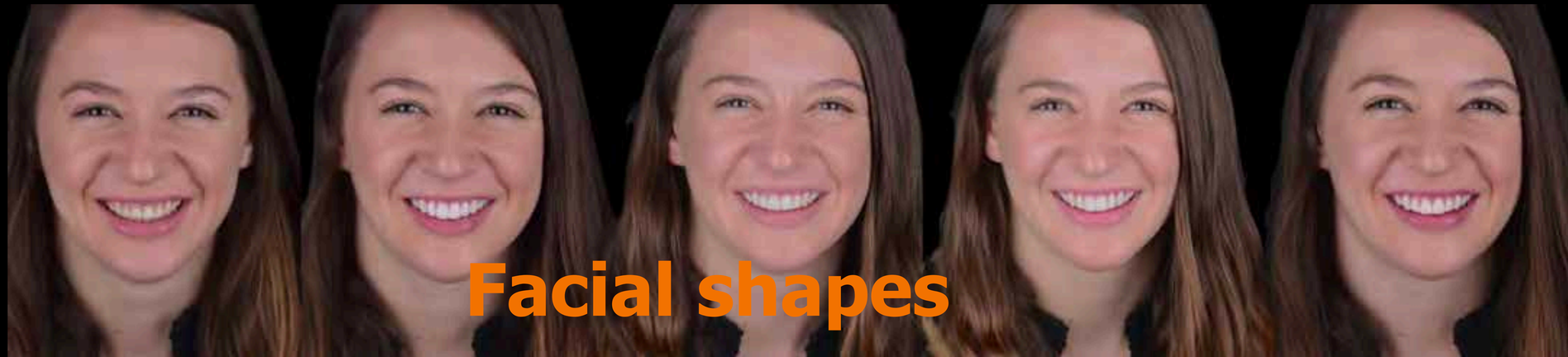
Dental shapes



Dental shapes







Facial shapes

Visagism: The Art of Dental Composition

Braulio Paolucci, DDS[1]
Marcelo Calamita, DDS, MS, PhD[2]
Christian Coachman, DDS, CDT[3]
Galip Gürel, DDS, MS[4]
Adriano Shayder, CDT[5]
Philip Hallawell[6]

MAKES IT POSSIBLE FOR THE PATIENTS TO EXPRESS THE DESIRABLE EMOTIONS AND PERSONALITY TRAITS, THROUGH THEIR SMILE

MORPHO PSYCHOLOGY - VISAGISM

EXPRESSING THE DESIRABLE EMOTIONS AND PERSONALITY TRAITS, THROUGH THEIR SMILE

Dental shapes

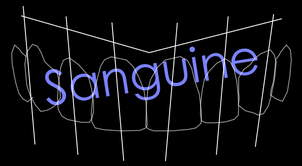
Dental shapes

Sensible

Oval

Organized
Perfectionist
Artistic
Abstractive
Timid
Reserved

Dynamic



Triangular

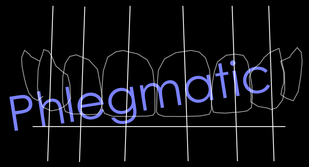
Extroverted
Communicative
enthusiastic
Dynamic
Impulsive

Strong

Rectangular

Determined
Objective
Explosive
Intense
entrepreneur
Passionate

Calm



Square

Diplomatic
Pacific
Mystic
spiritualized
Conformist
Discreet

Braulio Paolucci, DDS[1]
Marcelo Calamita, DDS, MS, PhD[2]
Christian Coachman, DDS, CDT[3]
Galip Gürel, DDS, MS[4]
Adriano Shayder, CDT[5]
Philip Hallawell[6]

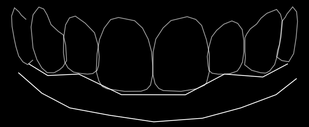
MORPHO PSYCHOLOGY - VISAGISM

EXPRESSING THE DESIRABLE EMOTIONS AND PERSONALITY TRAITS, THROUGH THEIR SMILE

Dental shapes

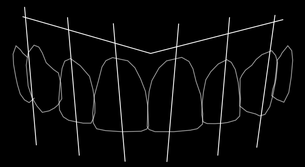
Dental shapes

Oval



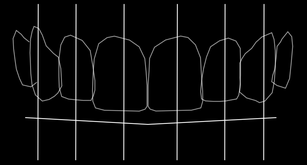
Dominant Centrals
Rounded cusps
Delicate laterals
Round Arch

Triangular



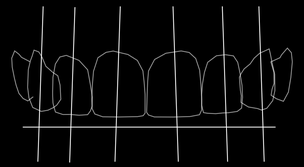
Ascendant Smile Line
Converging Axis
Incline cusps

Rectangular



Dominant Centrals
Flat incisal edge
Aggressive Cusps Vertical Axis

Square



Lack of Dominance
Diverging Axis
Horizontal arrangement

2D PHOTOGRAPHY

Can we capture all these details?

Dental Photography GOALS

Documentation

Case Acceptance

Communication

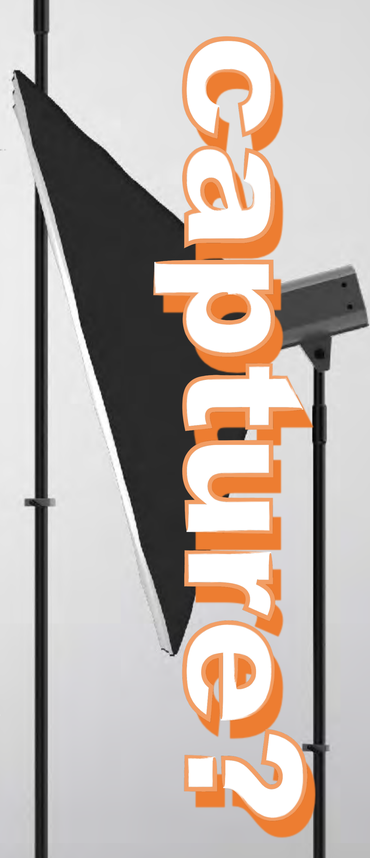
Diagnosis/Planning

Monitoring Progress

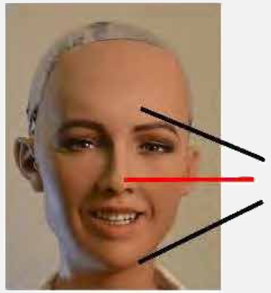
Common errors in extraoral photographs

- **The absence of a plain, non-distractive backdrop**
- **An incongruous, asymmetrical frame with too much background, or over-trimmed areas of interest, including cropped head or smile**
- **An incorrect distance between the patient and operator**
- **Capturing images that are too bright or too dark**
- **Portraying patients wearing excessive jewelry and accessories; hair disguising the patient's face; ears with no visible landmarks**
- **Allowing patients to tilt the head, or to look away, up, or to the side of the camera causing unreliable measurements**

The American Board of Orthodontics (ABO) https:// www.americanboardortho.com/orthodontic-professionals/about-board-certification/ clinical-examination/case-record-preparation/photograph-requirements/. Accessed March 10, 2017



2D



Place camera lens directly in front of the nose to capture the plane of occlusion. If possible, use an f-stop of 22 or higher so that the back teeth are in focus.

Full face full smile for the SmileSIM and prosthetic work up

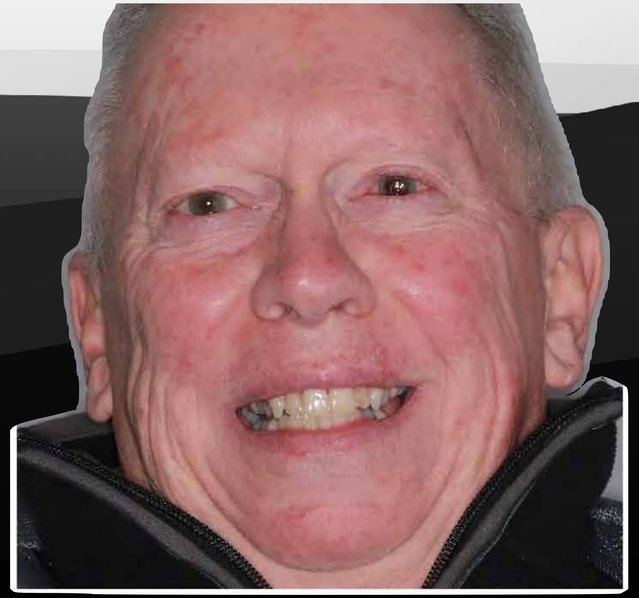
Full Face Patient photographs

Maxillary prognathism

Mandibular prognathism

2D

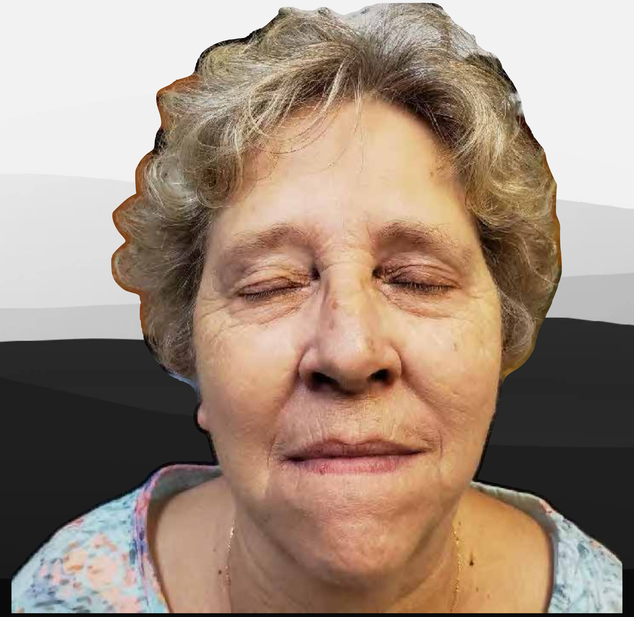
Shoulder shrug



Wash out (Flash)

2D

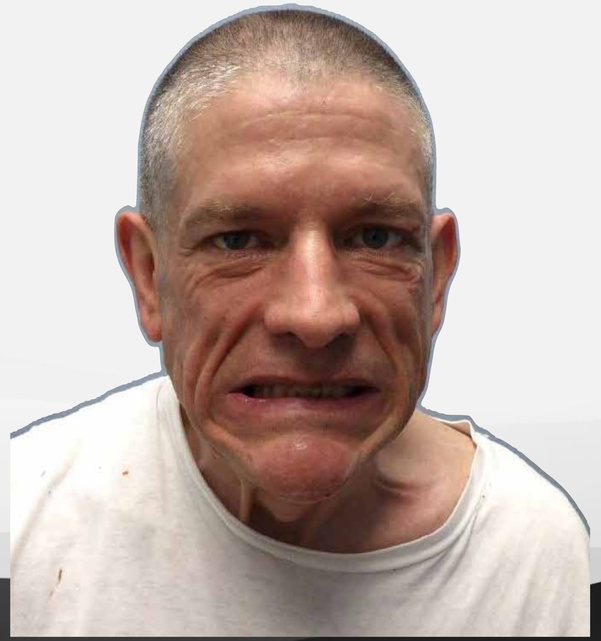
Eyes closed

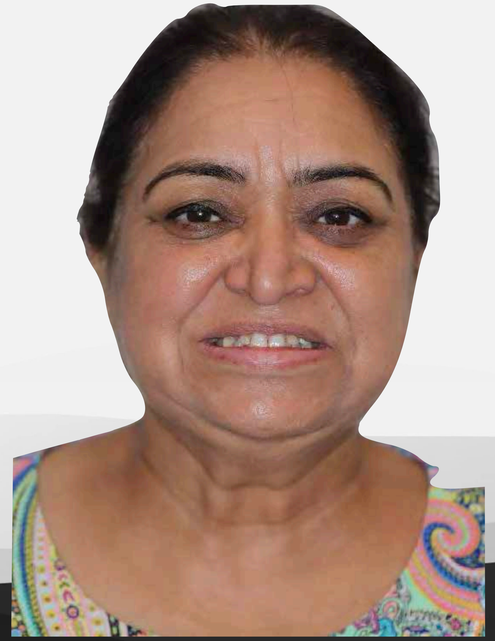


Too far away

2D

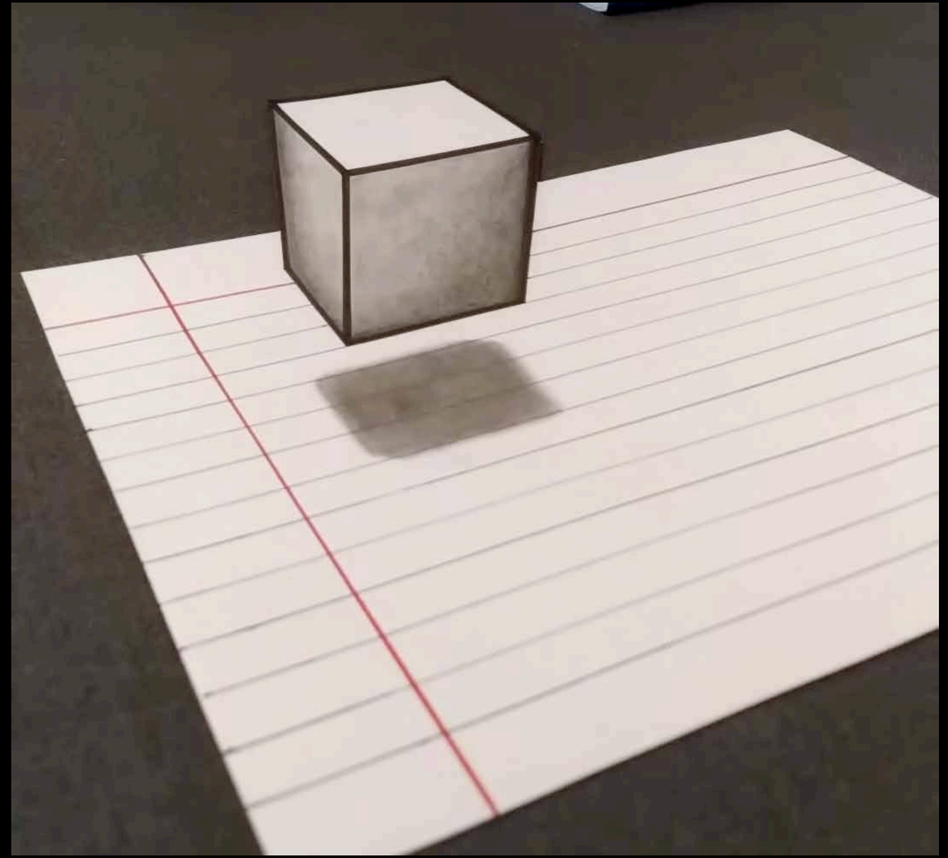
Can I get a smile?

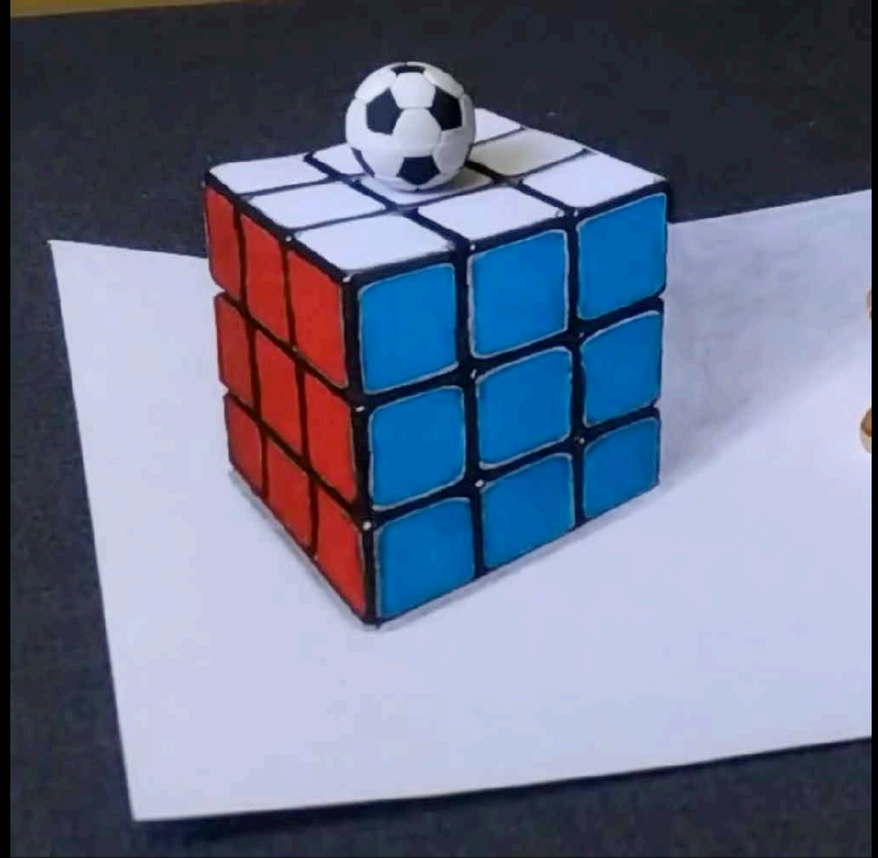




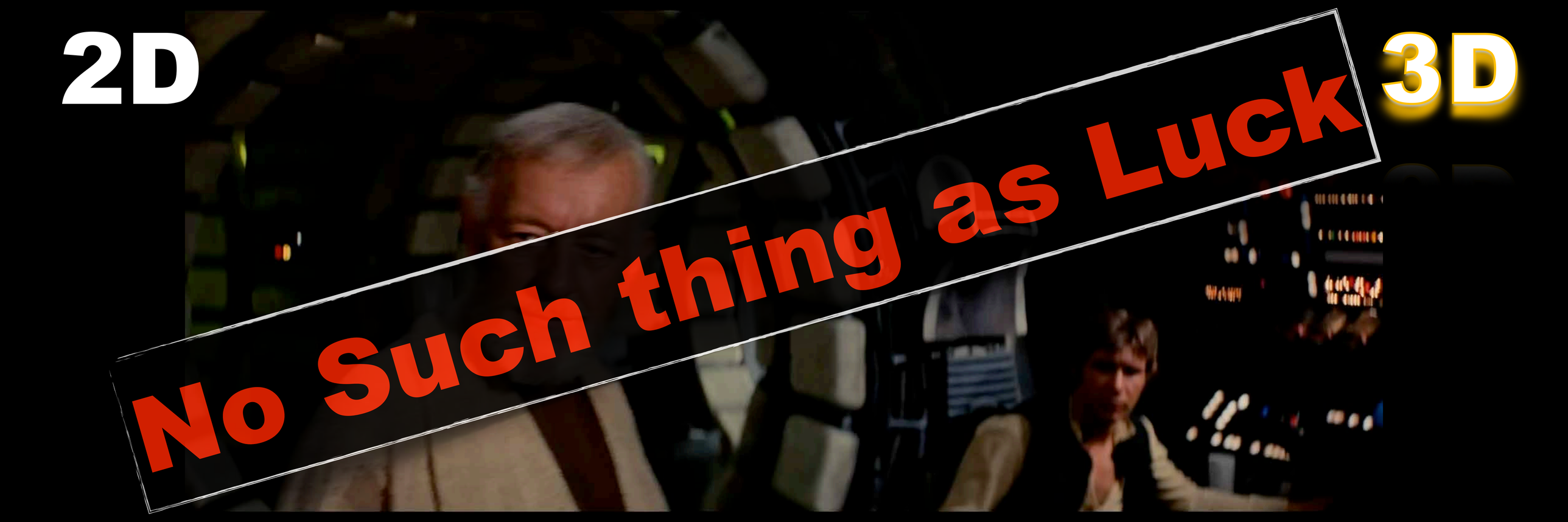
FLAT

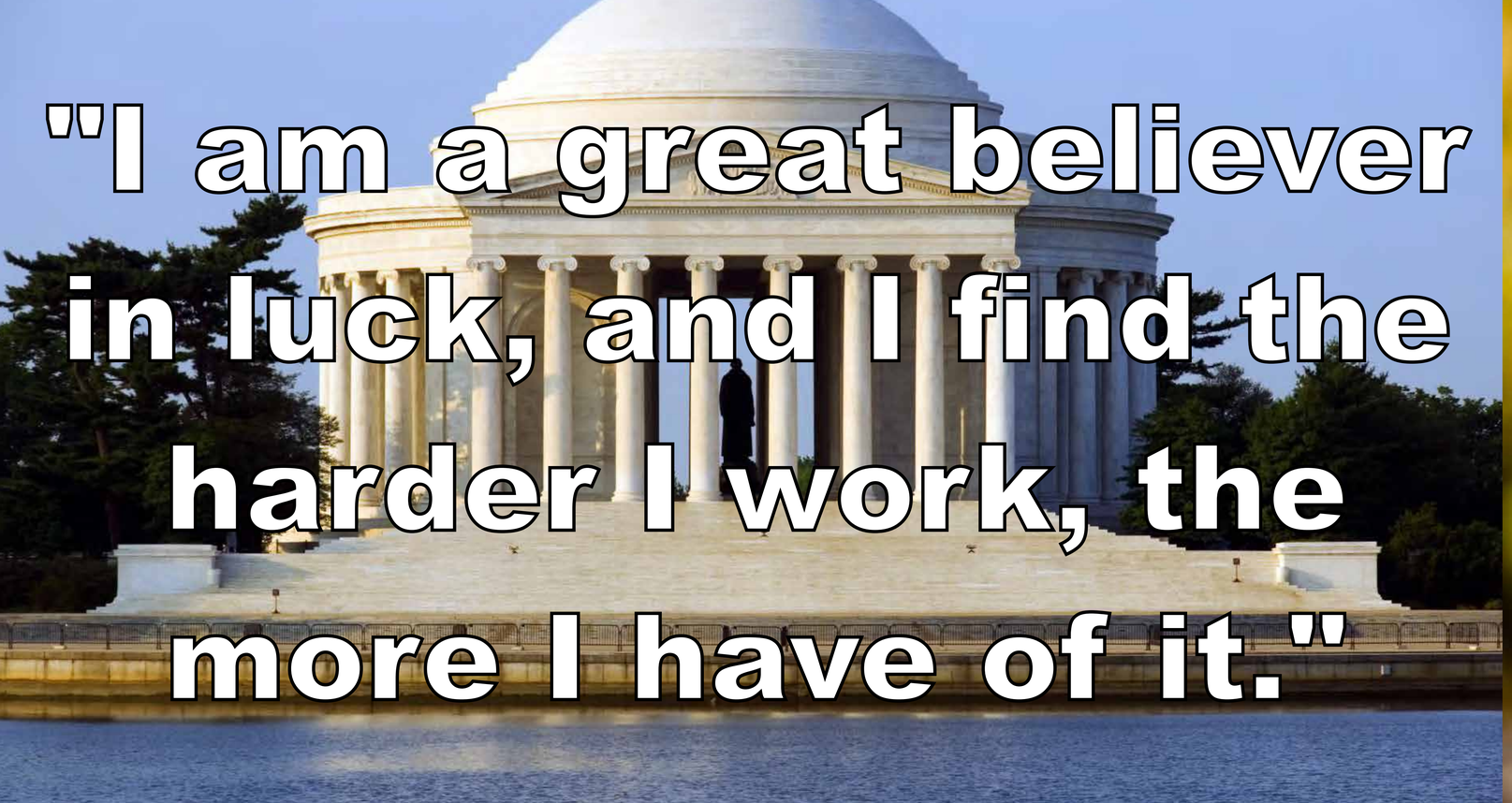
2D





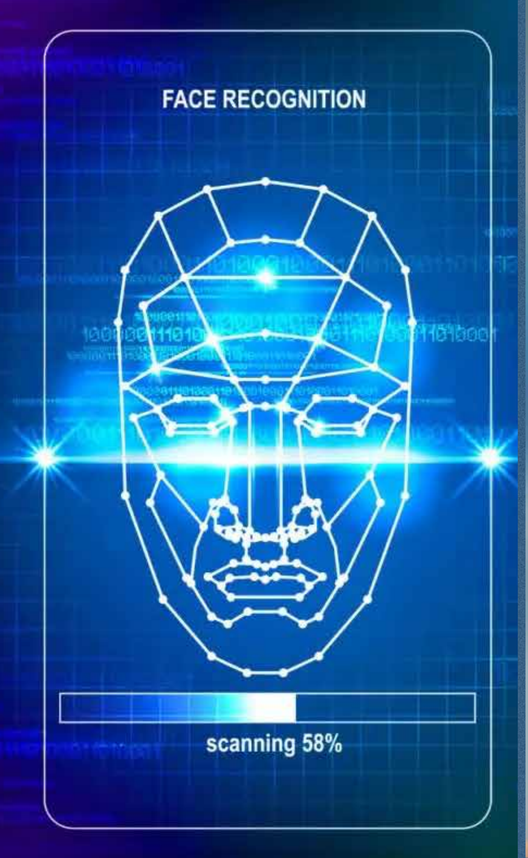
3D


2D
3D
No Such thing as Luck

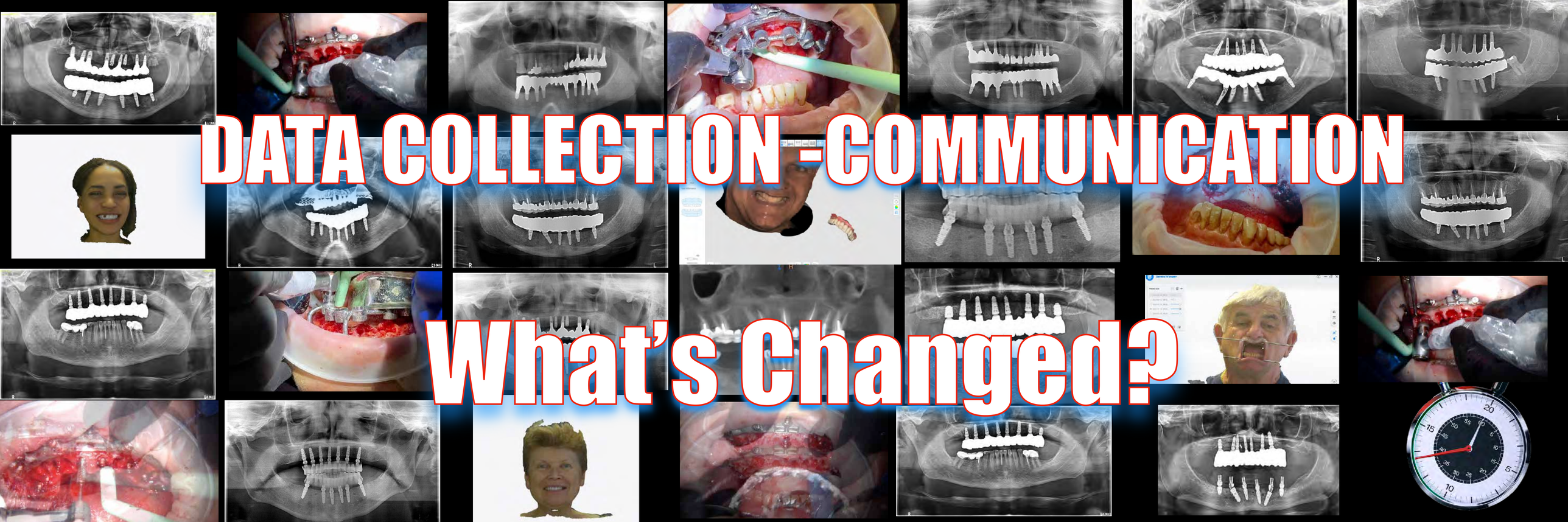

"I am a great believer in luck, and I find the harder I work, the more I have of it."


Thomas Jefferson

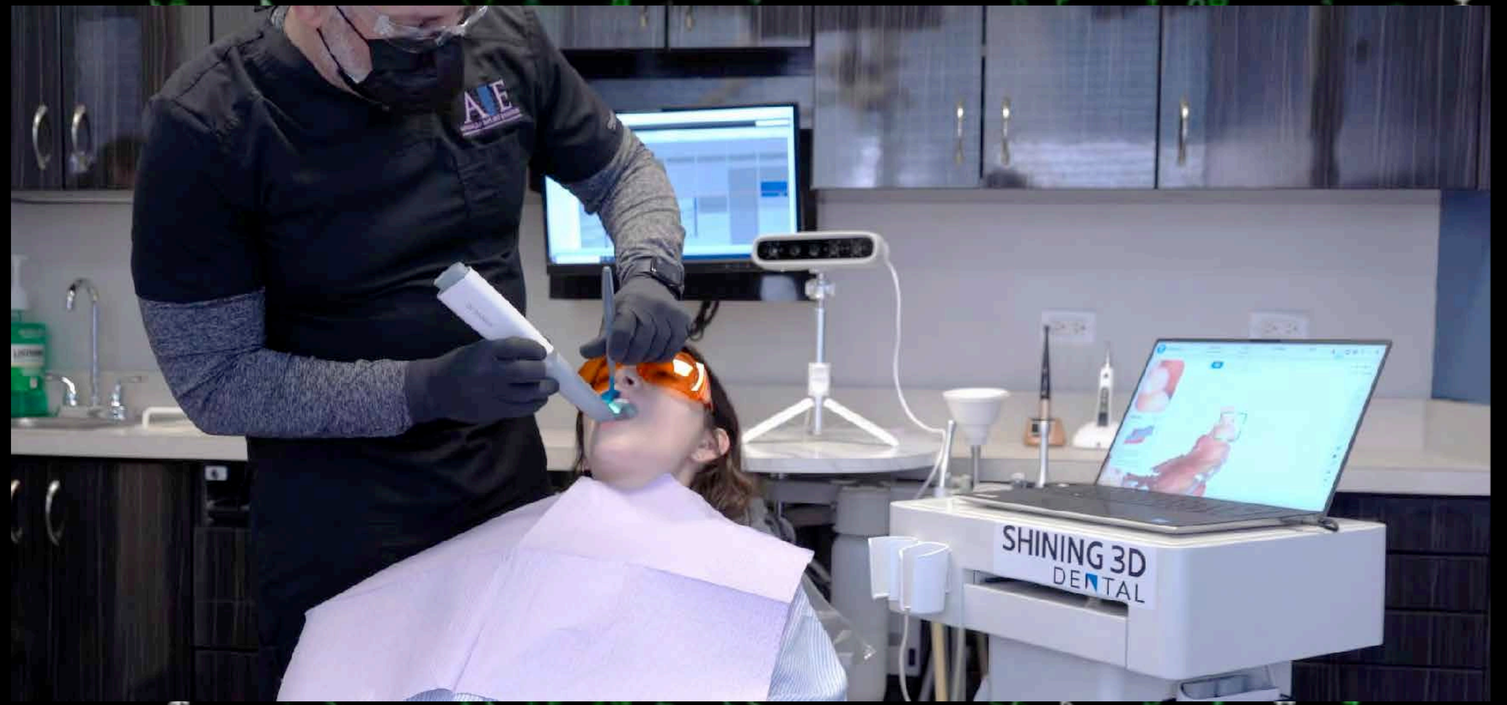

Computer Aided Design
3D


FACE RECOGNITION
scanning 58%


3D


DATA COLLECTION -COMMUNICATION
What's Changed?

FACIAL SCANNING

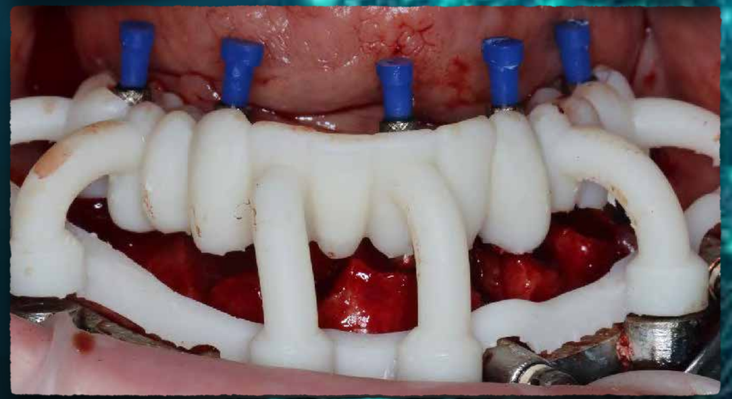


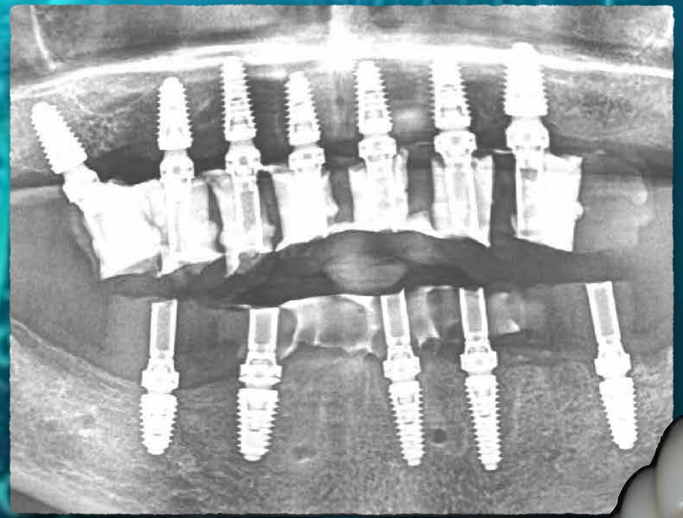
DATA

UNSTABLE RECORDS

COLLECTION

Provisional






SHINING 3D
SHINING 3D
SHINING 3D
SHINING 3D
GITAL
RUPTION
AI
BIG
DATA
SHINING 3D

STABLE DATA COLLECTION

SHINING3D

New order
marylin gindi

Scan
In Progress

Pre-design
-

Send
-

Screen Record
Screenshot
Find Screenshot

36.5°C

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Please connect to laptop power supply!

Please connect to laptop power supply!

Back to orders

Go to pre-design

64°F
Heavy rain

Search

3:00 PM
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Facial Values

CAD

FOV 1°

Show / Hide

Jaw scans

Abutments

Screw channels

2023-10-20_100_119-Face Smile.obj (3-...-14,19-...-3

Pre-op scans

Merged parts

2D Images

Bottom of designs

Show All

DESIGN

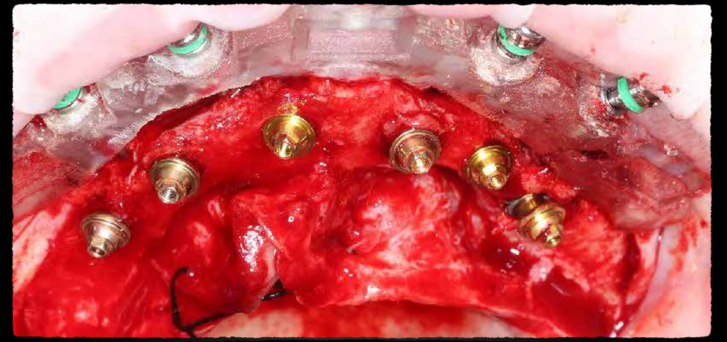

SHINING 3D
PRINTED TEMPORARIES

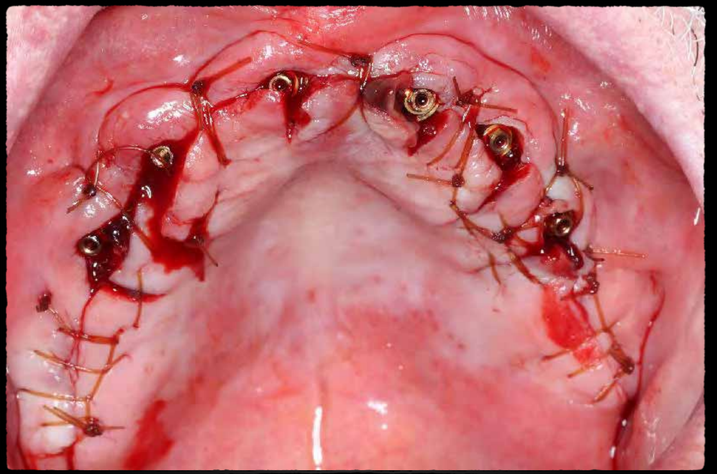

Changing lives one smile at a time


SHINING3D
New order
Mark Hoffman
Scan
In Progress
Pre-design
Send
3 seconds later automatically start scanning
Suitable
Back to orders
UNSTABLE RECORDS
LOST DENTURE

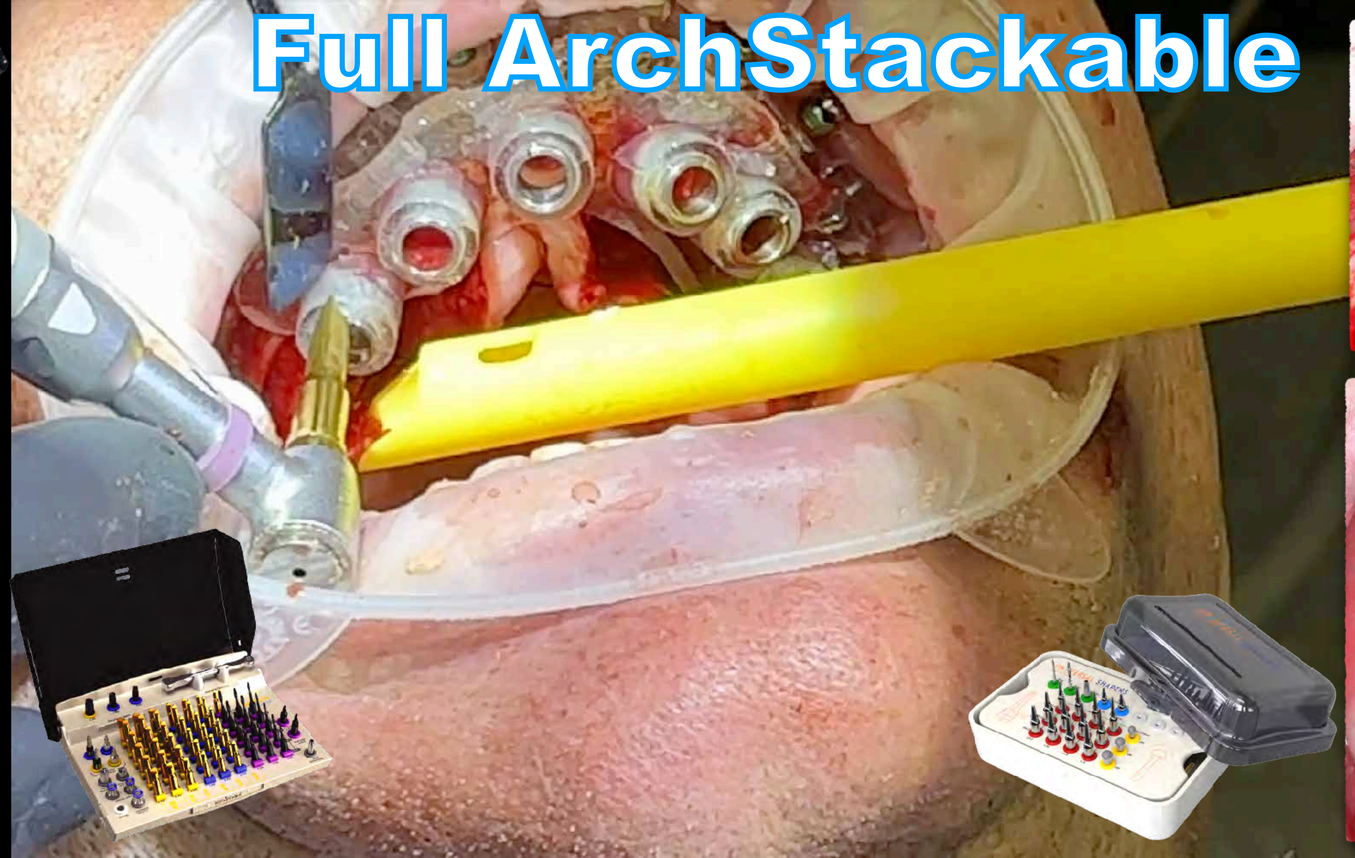

R
MAR
0 µm
zoom: 0.47
MAR

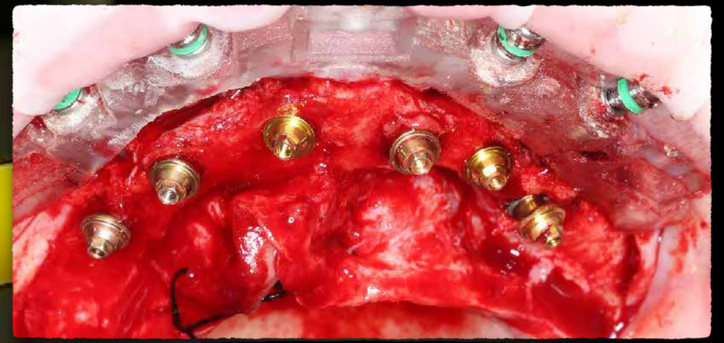
Full ArchStackable

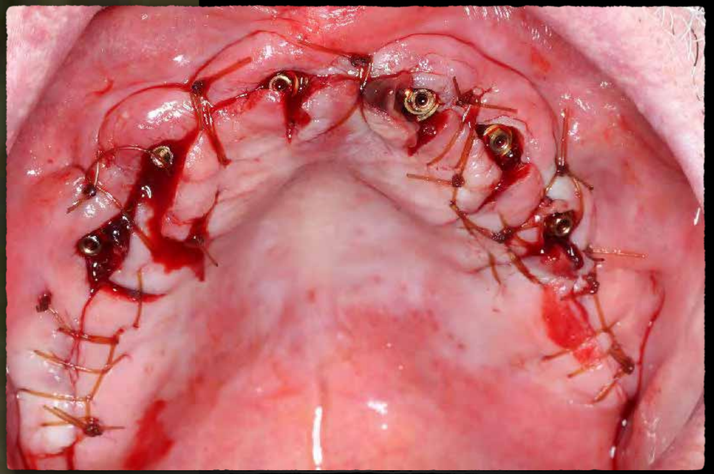




Full ArchStackable







Scott D. Ganz, DMD

Isaac Tawil, DDS

Full-Arch Implant Surgical and Restorative Considerations

Utilizing a Full Template Guidance Technique

INTRODUCTION

Full-arch dental implant reconstruction requires proper diagnosis and treatment planning to assess the existing patient anatomy, any pathologies, occlusion, soft tissue volume, lip support, and aesthetics, and gain understanding of the desired outcome.[1] A decision tree can be established based upon sound prosthodontics and surgical protocols to maximize success when a full-arch, implant-supported reconstruction is contemplated. Technological innovations can only enhance the diagnostic, treatment planning, communication, surgical, and restorative aspects for each patient. Three dimensional imaging modalities afforded by current cone beam computed tomography (CBCT) provides the foundation for all that follows[2,3] (Figure 1). The native DICOM (Digital Imaging and Communications in Medicine) data, once imported into an interactive treatment planning software application, allows for careful inspection of the existing anatomical presentation to identify potential implant receptor sites that will aid in realistic implant placement simulations and avoid potential complications (R2Gate Software [MegaGen]) (Figure 2).[4] Regardless of the eventual surgical protocol, the authors believe that the diagnostic phase must be based on a complete and thorough review of the CBCT scan data.[5]

CASE REPORT

A failing maxillary and mandibular dentition exhibited mobile teeth, a poor bite, mal-aligned teeth, and bone loss (Figure 3). The CBCT data were analyzed to determine the most appropriate treatment alternatives based upon bone quality, bone density, and an appreciation of the patient's desires. Utilizing advanced software applications (Blue Sky Plan [Blue Sky Bio]), the diagnostic information for implant planning can be fully appreciated in all of the necessary views, including cross sectional, coronal, sagittal and axial, and in 3D reconstructed surface models. Implant receptor sites can be identified, and virtual implants can be positioned with each of the previously mentioned views, as no single view can provide all of the necessary information to achieve success (Figure 4a). Placing an implant into a cross-sectional slice is only the beginning of the process of helping to visualize the thickness and opacity of the buccal and palatal cortical plates and the quality of the intermedullary bone to determine whether an implant can be placed that has an appropriate length and diameter to fit the remaining alveolus, based upon the "Triangle of Bone" protocol.[6] (Figures 4b and 4c). Additionally, virtual implant simulation plays a significant role in managing the desired restorative outcomes based upon tooth position and the choice of screw or cement retention (Blue Sky Bio). In the authors' opinion the most efficient manner to facilitate the pro

continued on page

Figure 1. Three-dimensional imaging modalities afforded by current cone beam computed tomography (CBCT) are essential for proper diagnosis and treatment planning.

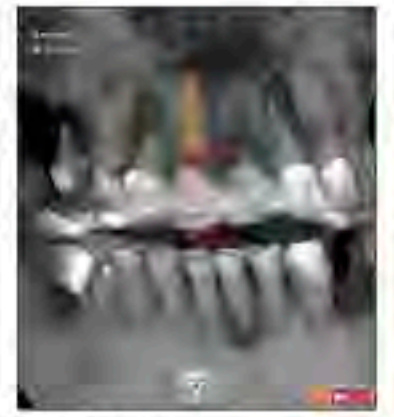
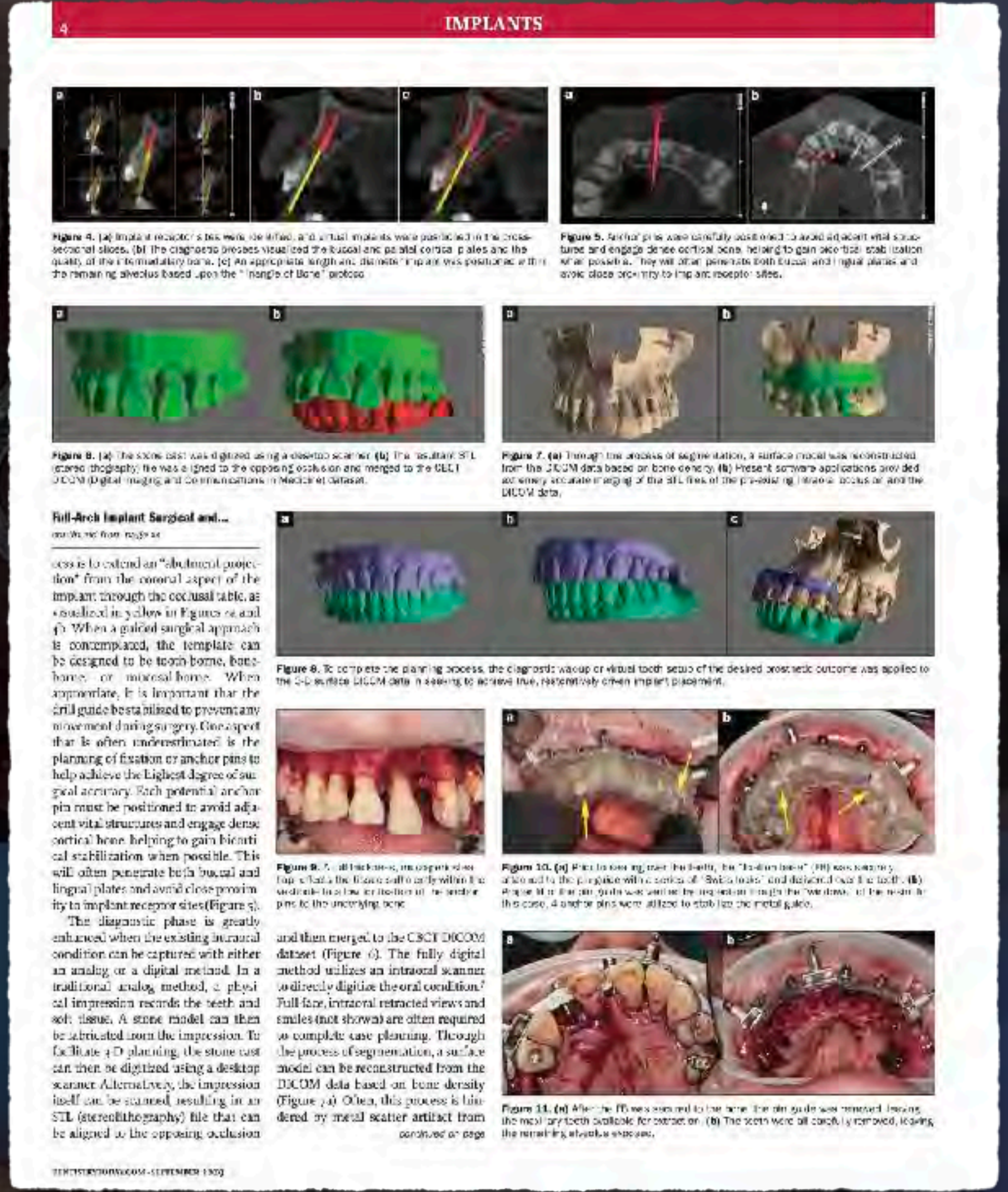


Figure 2. Interactive treatment planning software, such as the R2Gate Software (MegaGen), helps clinicians identify potential implant receptor sites to aid in realistic implant placement simulations.

Figure 3. A failing maxillary and mandibular dentition exhibited mobile teeth, a poor bite, mal-aligned teeth, and bone loss.



Digital Occlusion

Digital management of functional occlusion

Isaac Tawil, Scott Ganz and Michael Erdos investigate the digital mar
of functional occlusion utilising digital pressure-sensing registration.

Abstract

The primary goal in the treatment of patients with full-arch restorations is to ensure a comfortable, functional occlusion with a structurally sound restorative prosthesis. While prosthetic failure is a multifactorial issue, occlusal overload is an important potential contributing factor.

Until recently, intraoral occlusal measurement has been confined to the use of articulation paper. However, occlusal measurement technologies have now advanced to include the use of digital occlusal-pressure articulation, which allows the recording of masticatory forces over a designated time period. OccluSense (Bausch – Köln, Germany), a wireless digital device for occlusal pressure measurement, combines traditional carbon articulation with digital pressure-sensing registration to enable clinicians to view occlusal pressure patterns and evaluate premature or hyperocclusal contacts for potential reduction.

This article provides a case study comparing traditional articulation versus digital occlusal-pressure articulation using the OccluSense digital device, both of which were used in a patient who required full-mouth rehabilitation.

Introduction

The use of full-arch implant-supported fixed restorations in clinical practice has increased dramatically over the past several decades.

At the same time, patients today have a greater awareness of the various full-arch implant options that are available, as well as the potential financing and payment plans for treatment, and thus are better empowered to enhance their quality of life through the improved function and aesthetics of restored dentition.

As a result, dental occlusion has once again become a highly relevant and important topic in dentistry, as ensuring a functional occlusion is central to successful full-arch rehabilitations with a structurally sound prosthesis.

Advancements in occlusal measurement technologies

Dental occlusion has been studied for decades, resulting in various schools of thought regarding optimal treatment. While the 3D relationship of the jaws is clearly defined by the VDO, horizontal centric relation, and envelope of function, theories regarding occlusion may conflict as to whether occlusal function is tooth-borne, neuromuscular, skeletal, static, dynamic, based on centric relation, or based on centric occlusion.

Regardless of differing opinions, the common goal in the treatment of patients with full-arch restorations is to ensure a comfortable, functional occlusion with a structurally sound restorative prosthesis, which will ultimately result in improved patient satisfaction.

While dental technology has progressed dramatically over the past several years, until recently traditional measurements of occlusal contacts and balance have undergone very little change.

Although extraoral articulation is extremely valuable and has been enhanced through the use of digital technology, conventional measurements of intraoral occlusion have remained limited to the use of articulation paper (Figure 2), the clinician's observations of carbon paper markings, and the patient's awareness of pressure.

Role of occlusion in prosthetic failure

For decades, conventional crown and bridge dentistry for both natural teeth and dental implants has been achieved with ceramo-metal restorations. While metal has always served as a reliable substructure that is highly resistant to fracture, the secondary ceramic layers have been prone to chipping or fracturing as a result of misdirected or excessive occlusal forces.

Improvements in ceramic materials (eg, zirconia) and production capabilities (eg, 3D printing, milling units) have been helpful in enabling laboratories and dental technicians to fabricate stronger, longer-lasting solutions.

In addition, improved synergies between ancillary technologies such as intraoral scanning, photogrammetry, and virtual articulation have reduced the production time and increased the accuracy of ceramo-metal restorations.

However, even with stronger and more precise ceramic materials, prosthetic fracture and implant failure due to occlusal overload remain a valid concern.

Prosthetic failure is a multifactorial problem that goes beyond issues of ceramic strength. One factor that contributes to potential restorative failure is increased stress due to lack or appreciation of the proper vertical dimension or occlusion (VDO). Another is reduced height and thickness of material, or poor reduction of substructures. Also, increased cantilever or pontic lengths due to poor anterior-posterior spread (A-P spread), or an unbalanced occlusion.

An occlusal high spot on a screw-retained prosthetic in the location of a titanium base (Ti-base) often results in fracture propagation, as it is a point of weakness (Figure 1).

Benefits of occlusal measurement technologies

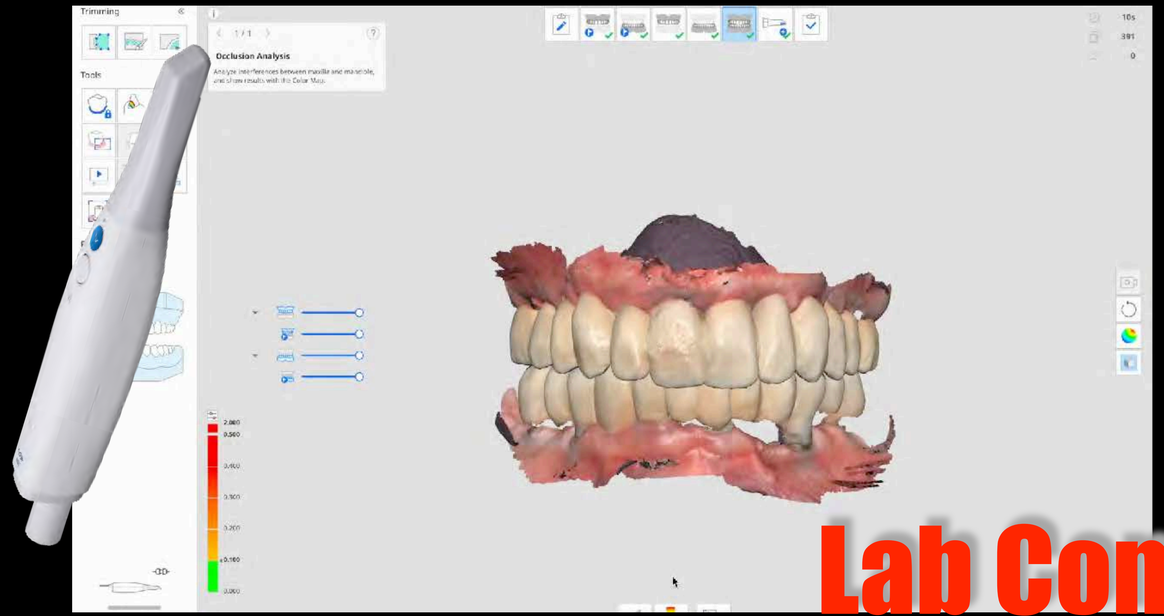
Unfortunately, patient perception becomes increasingly difficult to utilise when proprioception is absent or diminished, as is the case with patients who have dental implants. In patients with full-arch and full-mouth implant rehabilitation, a broader awareness of the patient is required, with muscular and skeletal sensations utilised to convey potential occlusal imbalances that are otherwise often unnoticed.

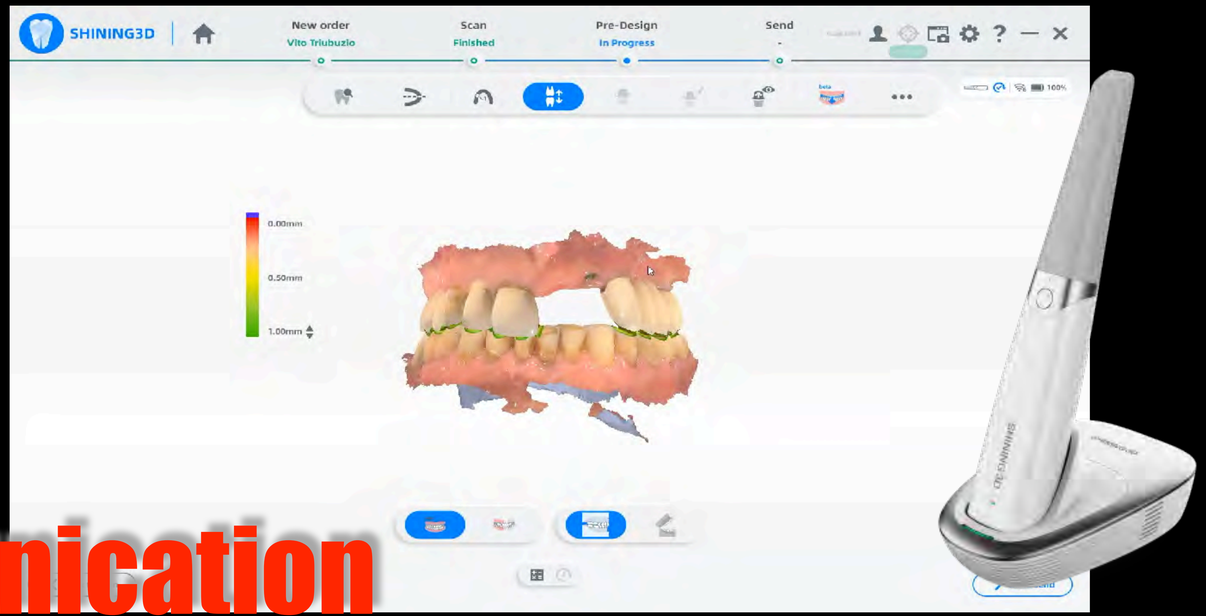
Initially, intraoral occlusal measurement technologies could be used only to measure static pressure points through the use of gauges. Over the past few years, however, these technologies have advanced to include digital devices that can capture pressure and movement over time, thus greatly enhancing diagnostic competencies.

By incorporating these innovative technologies with traditional methods, clinicians can achieve an ideal measurable outcome, which in turn will improve the functionality and resiliency of both temporary and final restorative materials.

An innovative wireless device called OccluSense (Bausch – Köln, Germany) combines traditional carbon articulation with digital pressure-sensing registration, allowing the recording of masticatory forces over a designated time period (Figure 3).

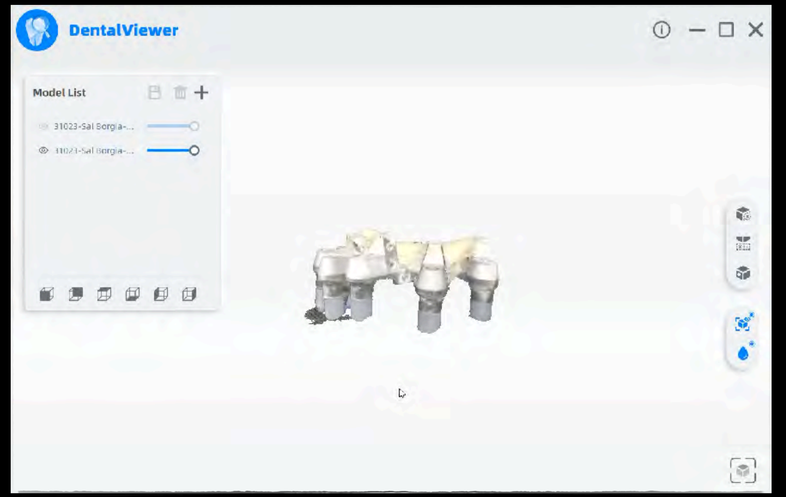
Occlusal Digital Occlusion Analysis



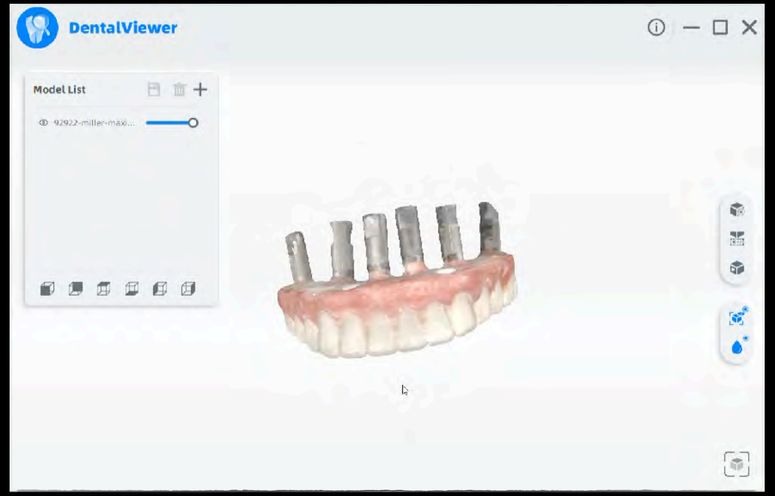


Lab Communication

Finalization



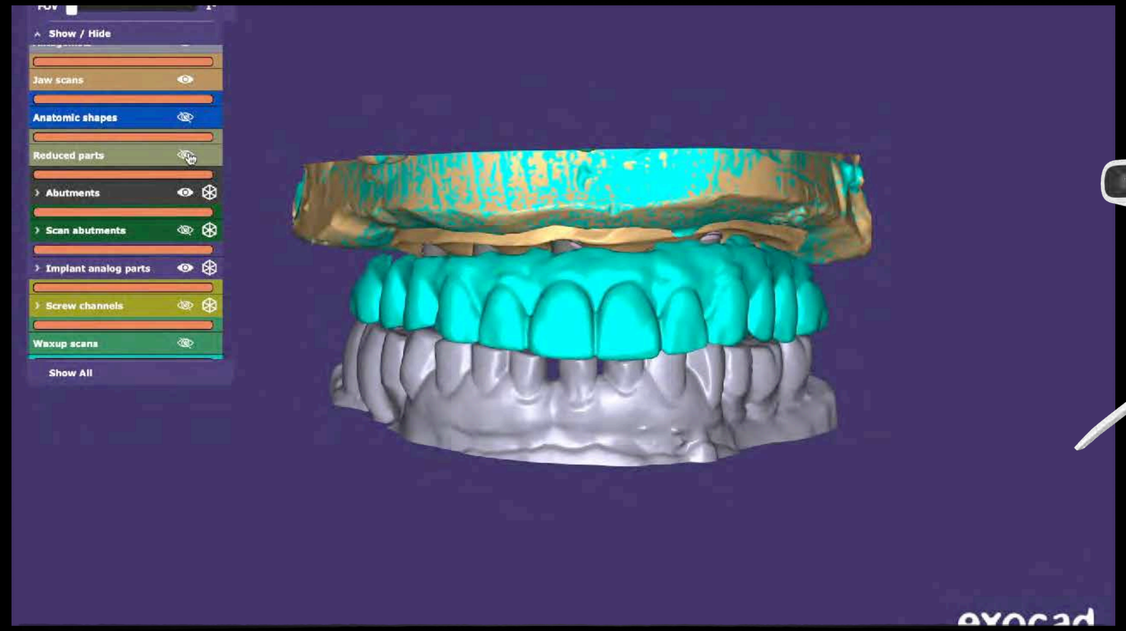
Grammetry

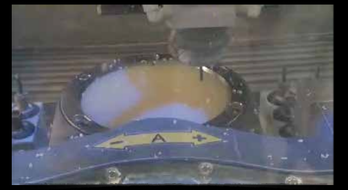


iJig

Cad-Cam

Design





MILL

Metal-Free

Changing lives one smile at a time

WHY? Metal-Free

- FP1 (NO PINK)
- FP2 (LONG TEETH)
- FP3 (ARTIFICIAL PINK)

Metal-Free

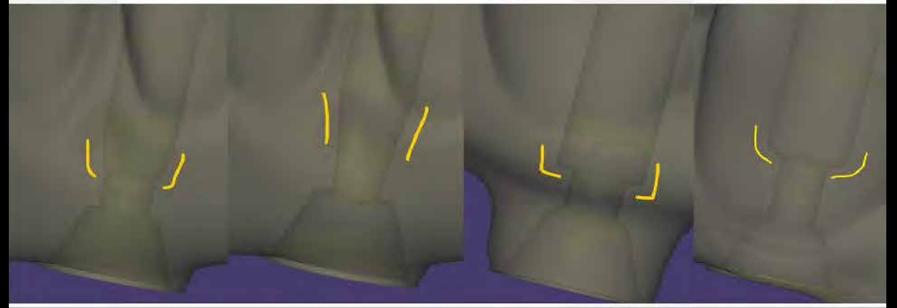
Model

La Vis Grammetry
Direct to MUA, ti-base or ti-bar
Angled screw channel
Downward and outward pressure
Variable height setting for materials
Wide channel milling
T5 torx Driver 15ncm (Breakaway safety feature)

Rosen screw
Direct to MUA
Angled screw channel
Outward pressure
Wedge channel milling
Hand torque .050 hex driver

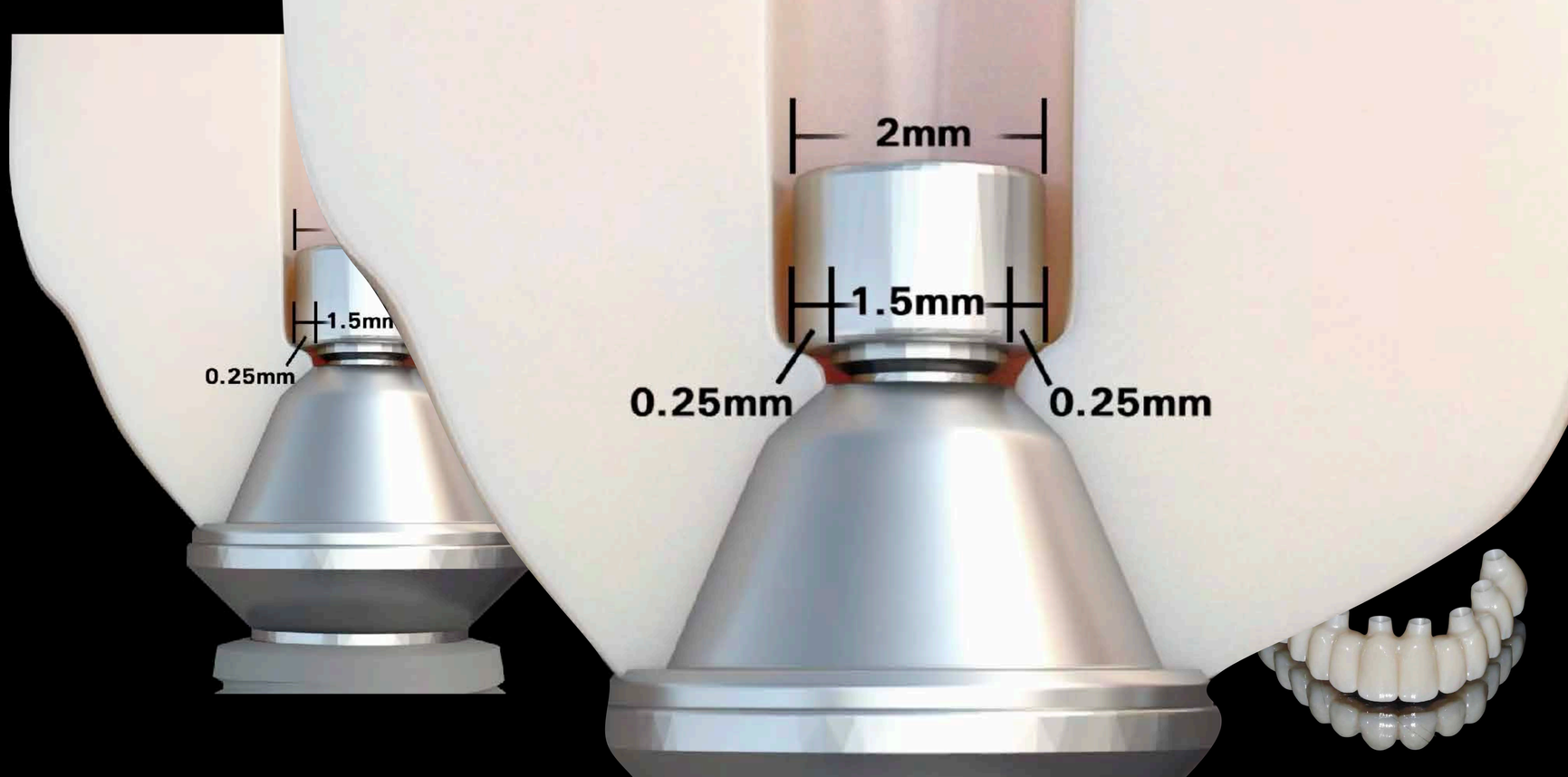
Dess screw 19.018-P10
Direct to MUA or ti-base
Downward pressure
Right angle seating
15ncm .050 hex driver

Powerball
Direct to MUA
Angled screw channel
Downward and outward pressure
Biaxial driver 15ncm

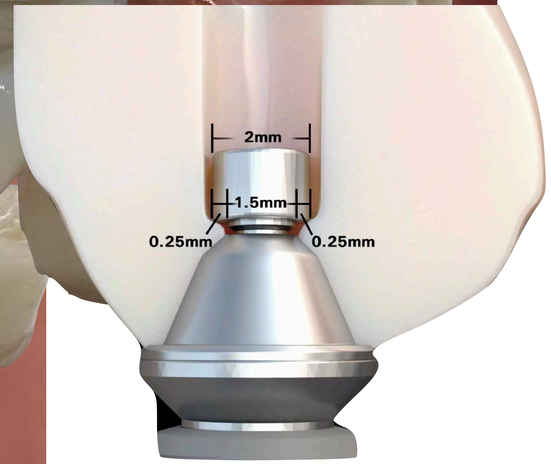


Finals

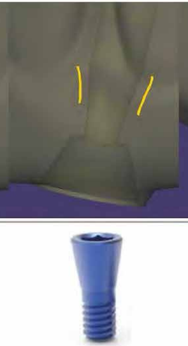
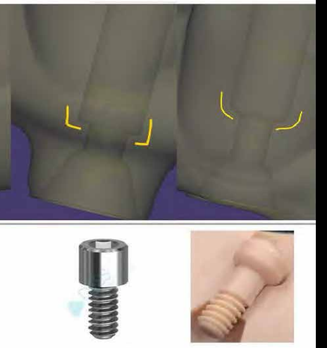
Metal-Free



PROSTHETIC FAILURE



Metal-Free

La Vis Grammetry Direct to MUA, ti-base or ti-bar Angled screw channel Downward and outward pressure Variable height setting for	**Rosen screw** Direct to MUA Angled screw channel Outward pressure Wedge channel milling	**Dess screw** **19.018-P10** Direct to MUA or ti-base	**Powerball** Direct to MUA Angled screw channel Downward and outward pressure
			

Only screw that can be milled with **ALL THREE**

Finals

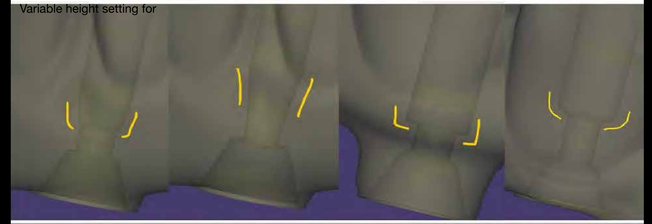
Metal-Free

La Vis Grammetry
Direct to MUA, ti-base or ti-bar
Angled screw channel
Downward and outward pressure
Variable height setting for

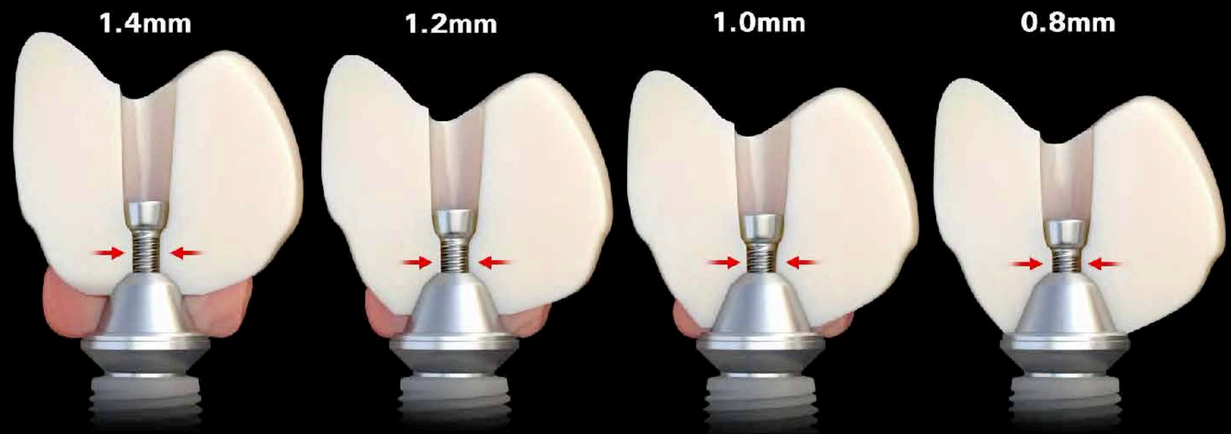
Rosen screw
Direct to MUA
Angled screw channel
Outward pressure
Wedge channel milling

Dess screw
19.018-P10
Direct to MUA or ti-base

Powerball
Direct to MUA
Angled screw channel
Downward and outward pressure



Different Prosthesis Types

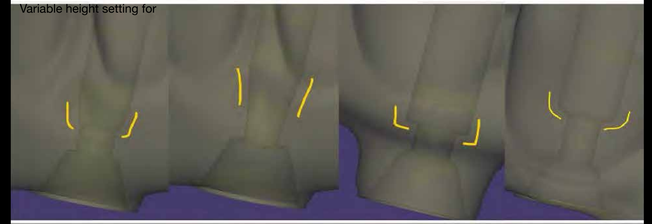


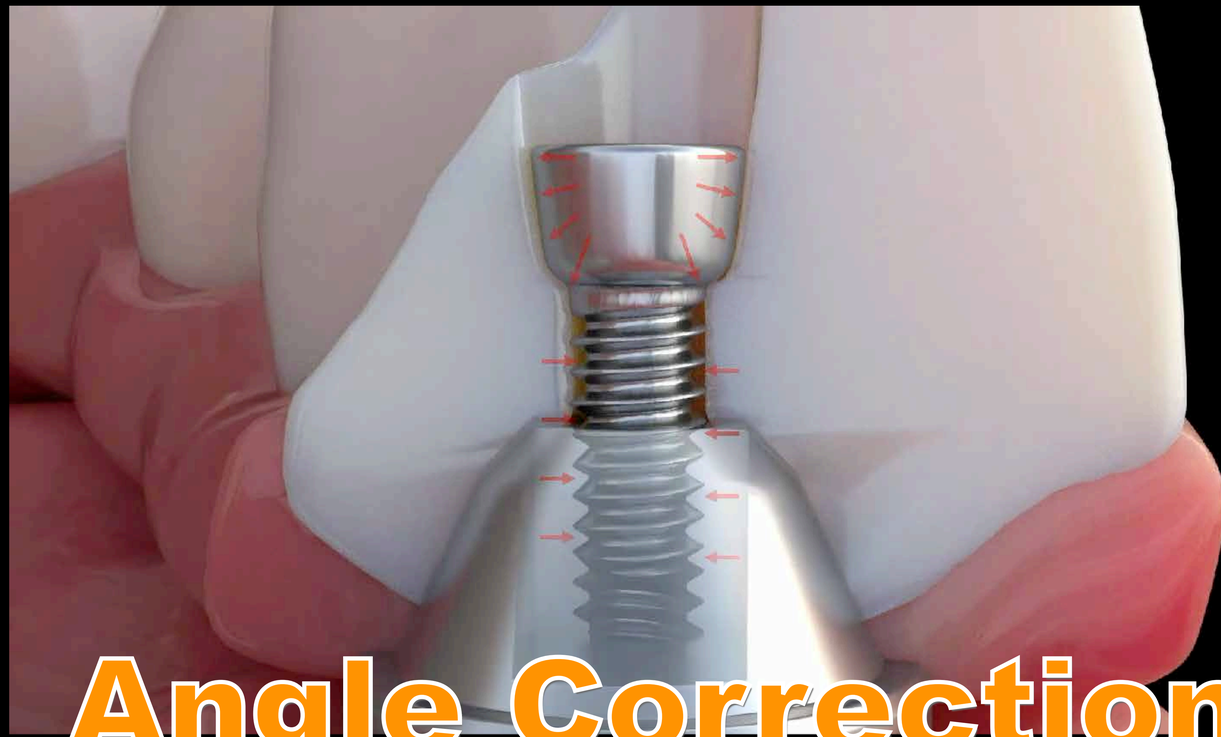
Holds down by lateral walls and apical direction with zirconia under the screw head

Finals

Metal-Free

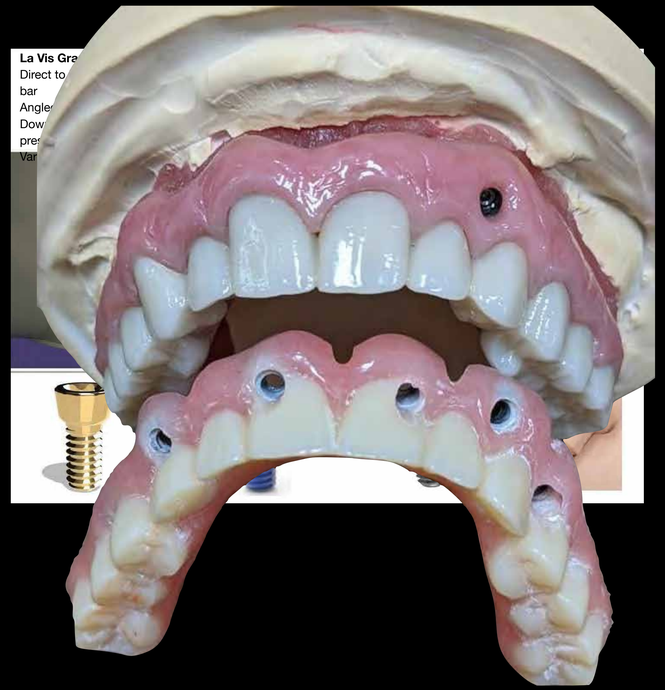
La Vis Grammetry	**Rosen screw**	**Dess screw**	**Powerball**
Direct to MUA, ti-base or ti-bar Angled screw channel Downward and outward pressure Variable height setting for	Direct to MUA Angled screw channel Outward pressure Wedge channel milling	**19.018-P10** Direct to MUA or ti-base	Direct to MUA Angled screw channel Downward and outward pressure



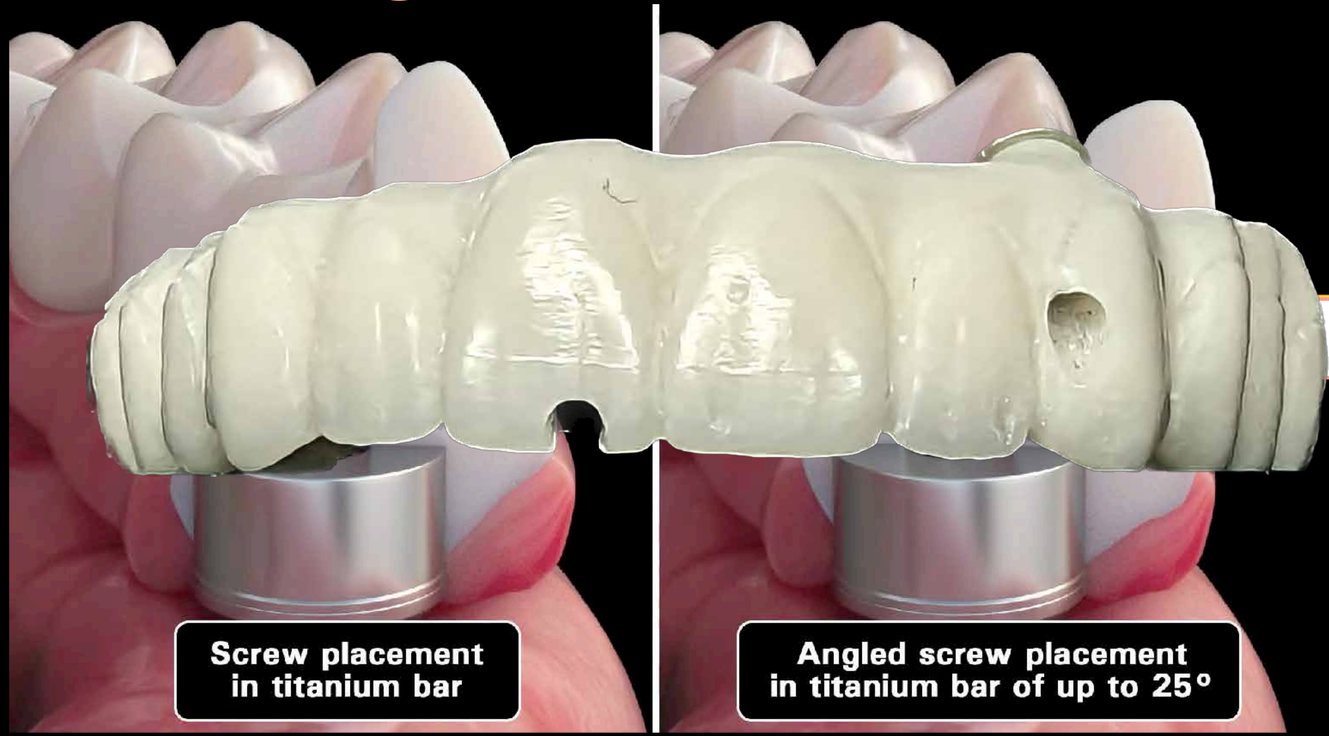


Angle Correction

Metal-Free



Angled Screw Channel



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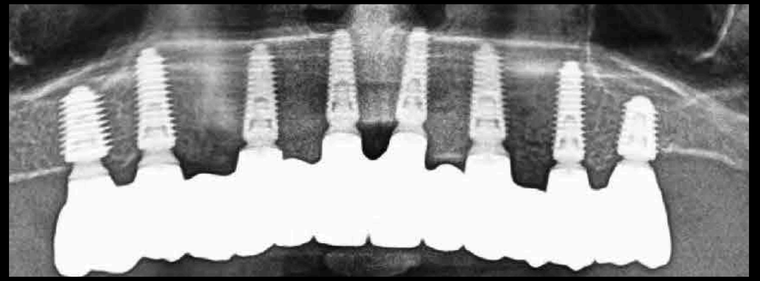
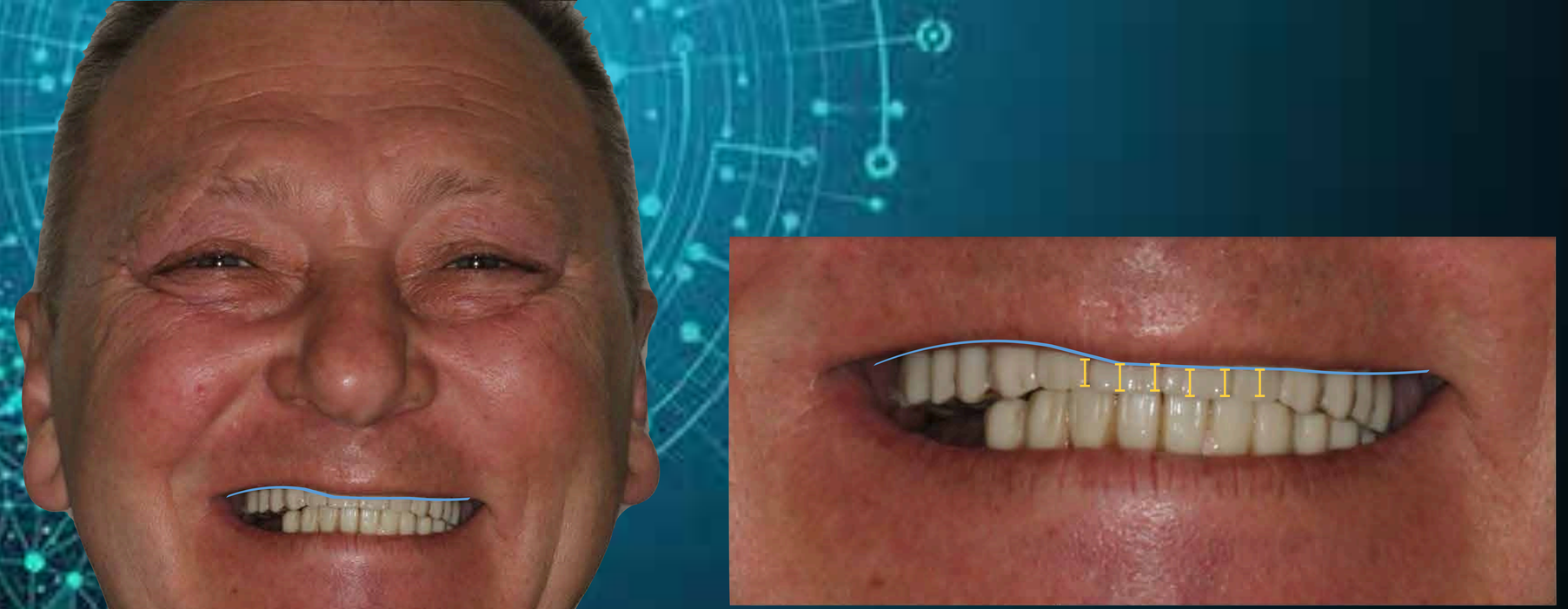
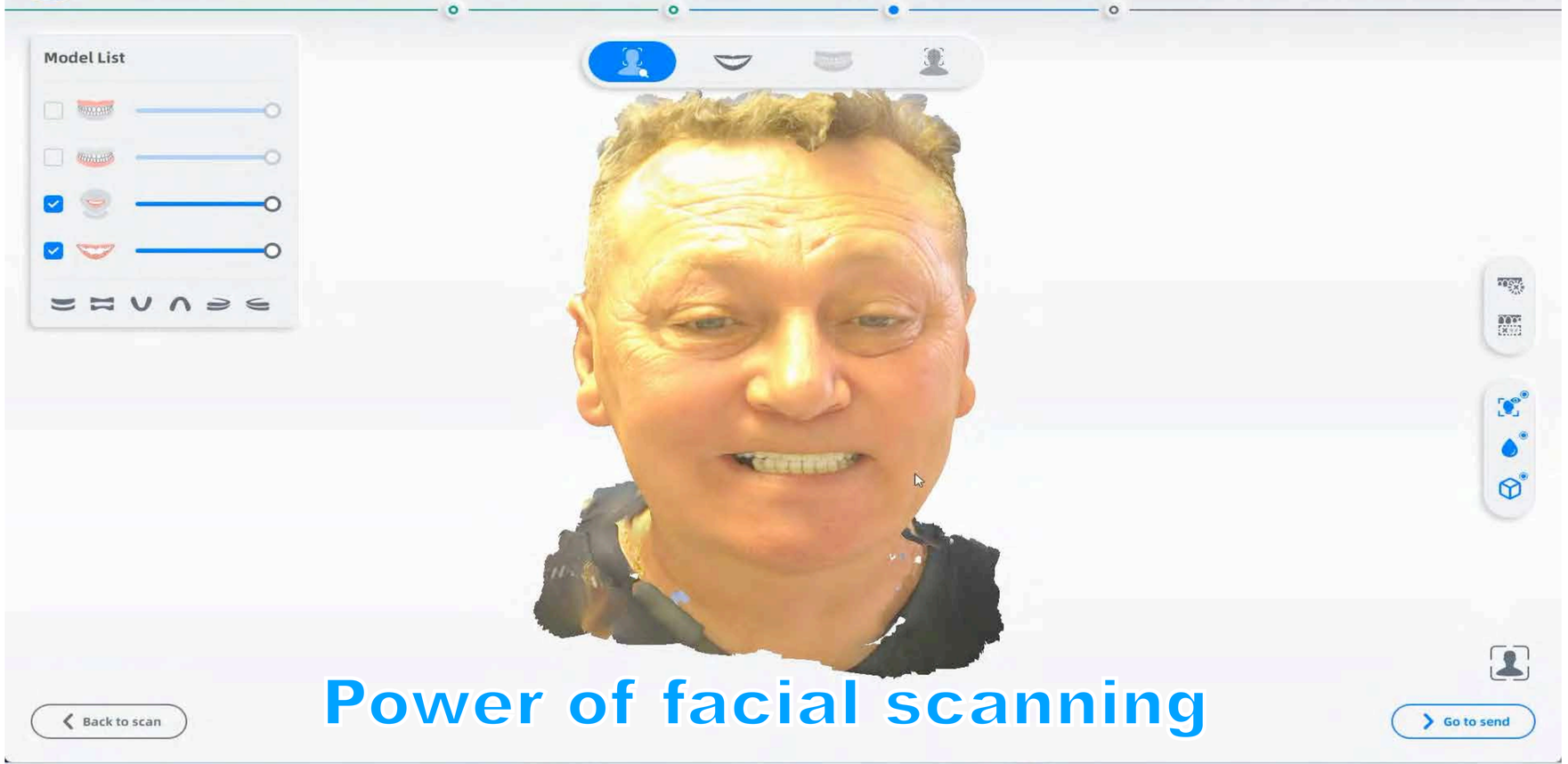


Finals

Changing lives one smile at a time

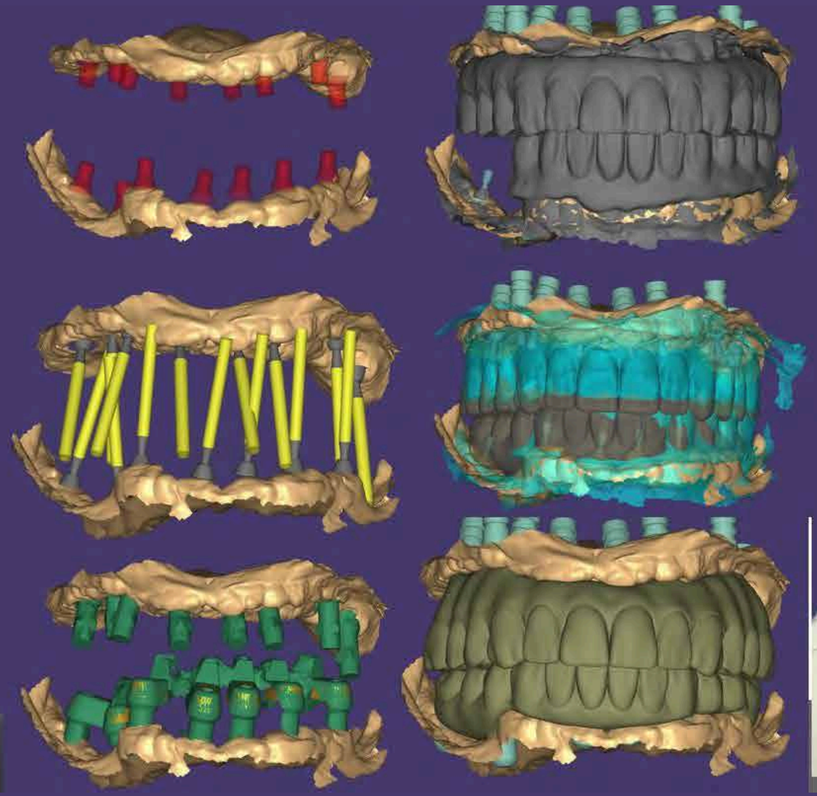




Power of facial scanning

Capture & Design

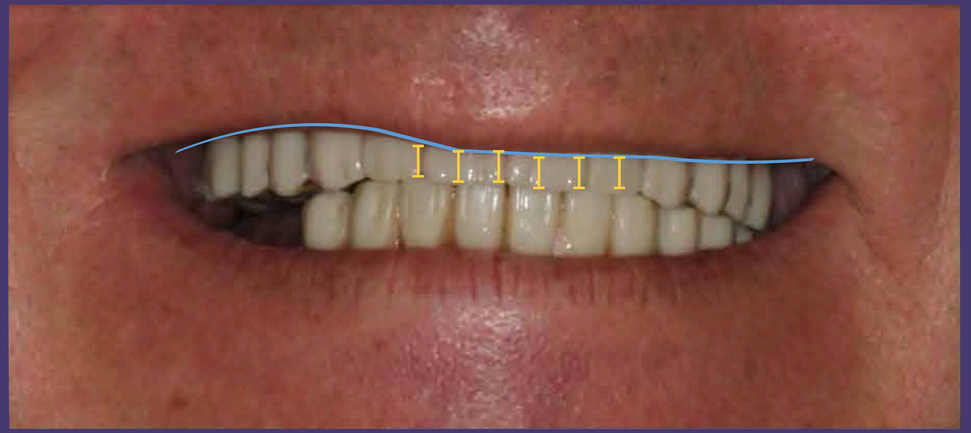
Redesign

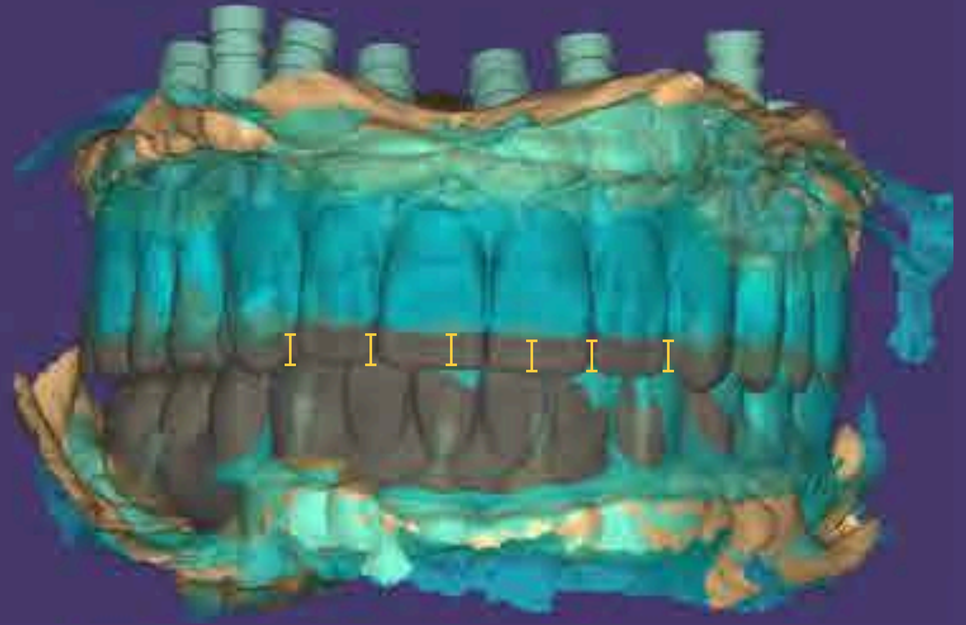


Redesign

Fully Digital Reallocation

Redesign



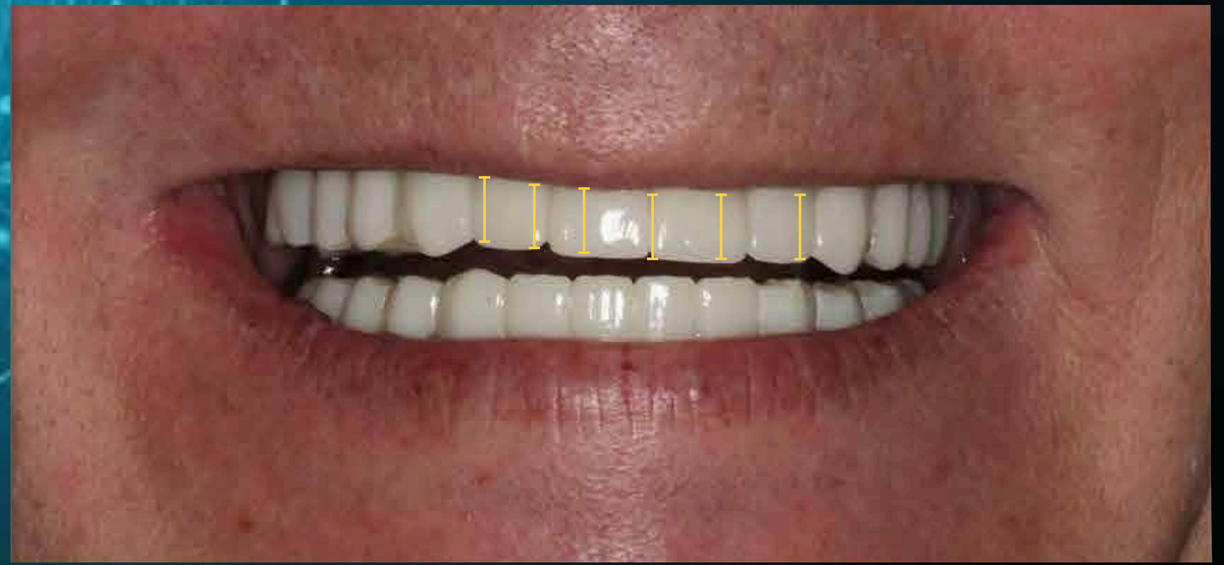


Redesign

PRE

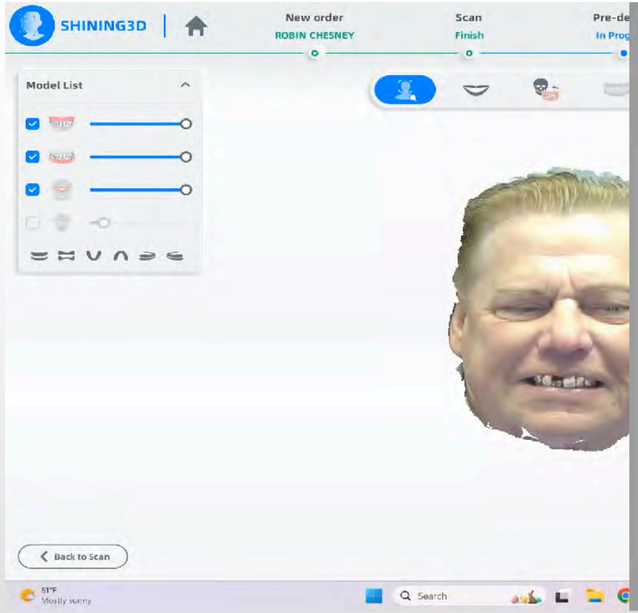
POST

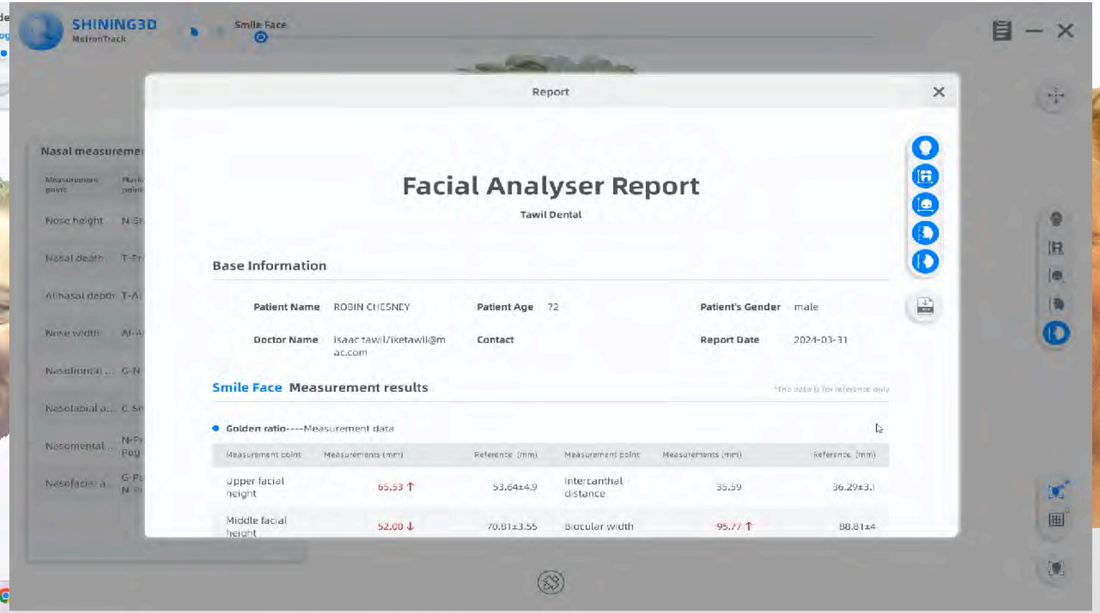

Transformation

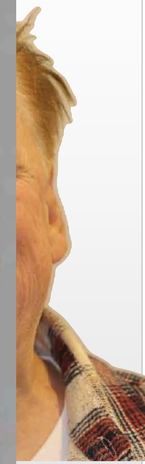


DATA MERGE

CBCT







PLANNING

FEATURES

SMILE LINE

SYMMETRY

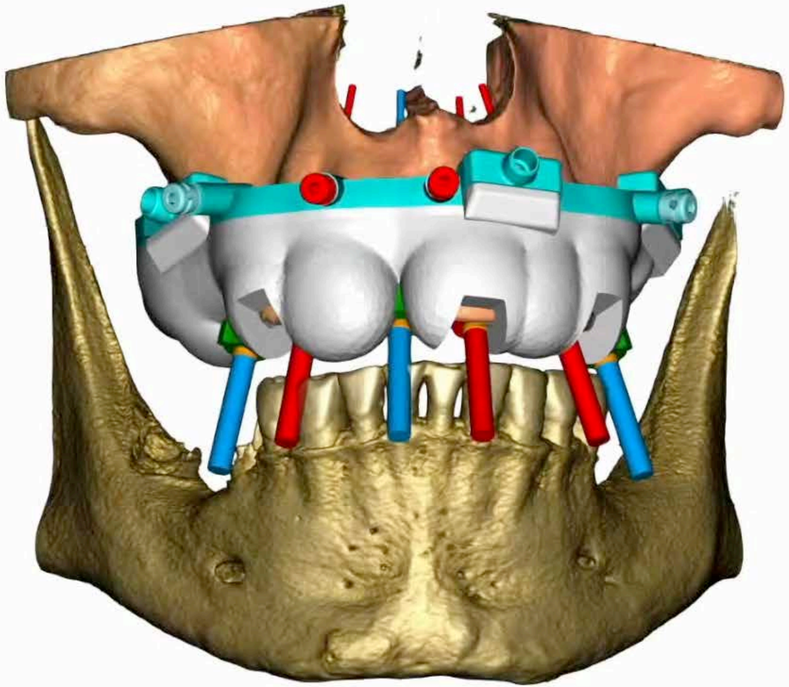
GUIDANCE

SCALLOP

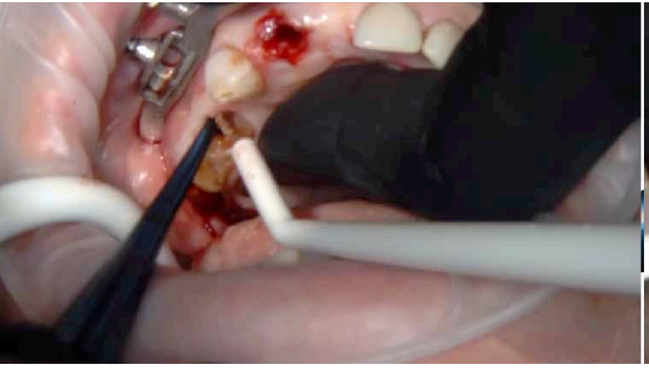
PRECISION

SURGICAL GUIDANCE

SURGICAL GUIDANCE



MINIMALY-TRAMATIC



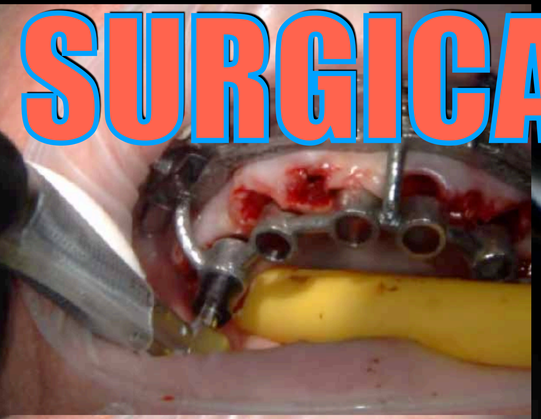
TBS DENTAL

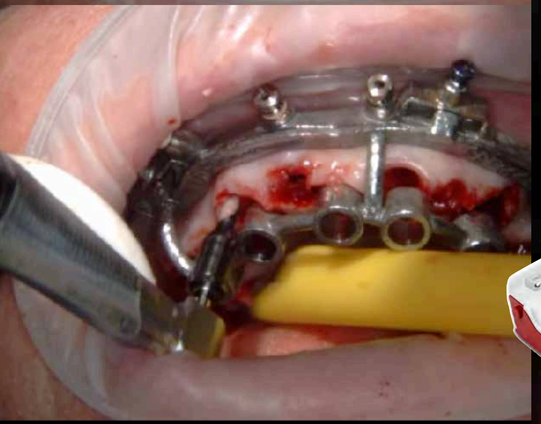
PET

PET

TAWIL

SURGICAL GUIDANCE

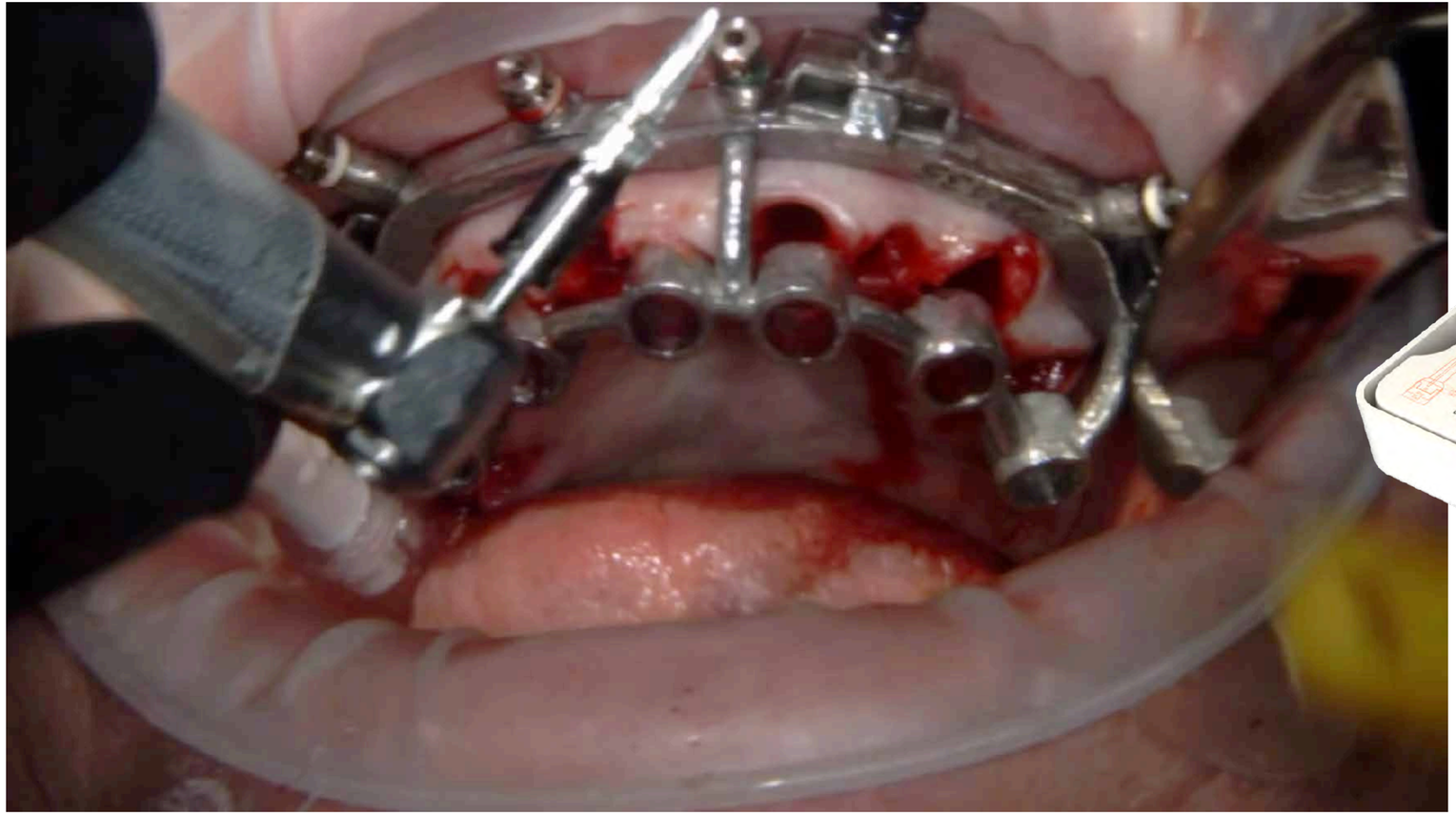




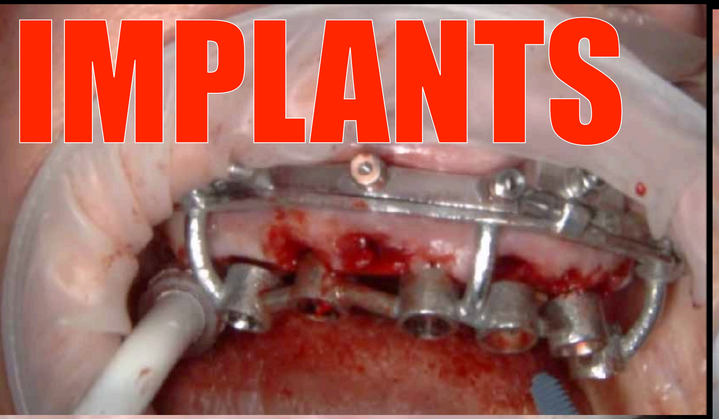
ANYRIDGE®
by MEGAGEN

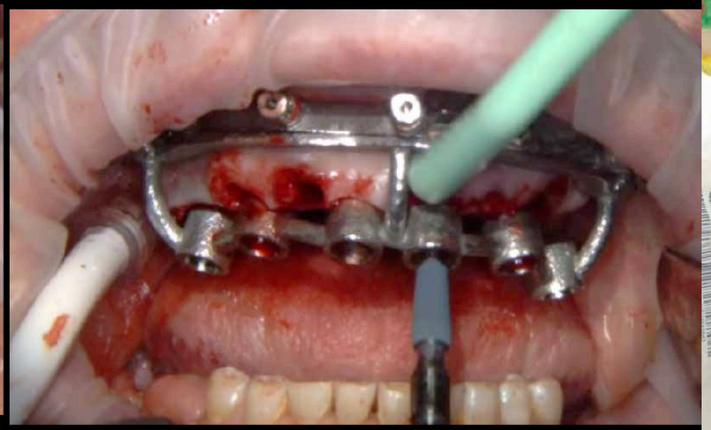
UNIVERSAL SHAPERS

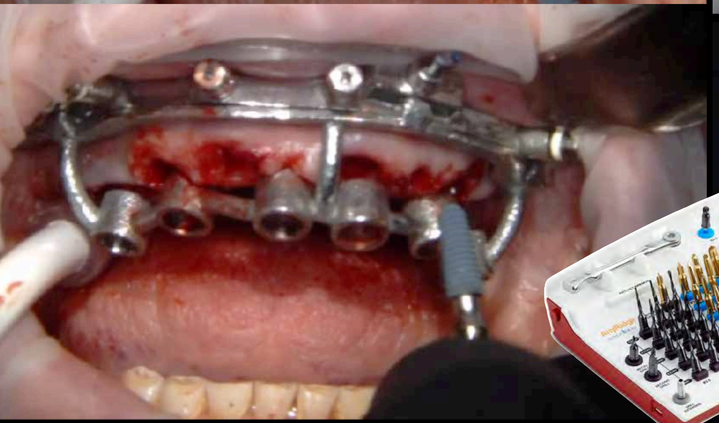
PROFILE, SCULPT AND SCALLOP WITH PRECISION



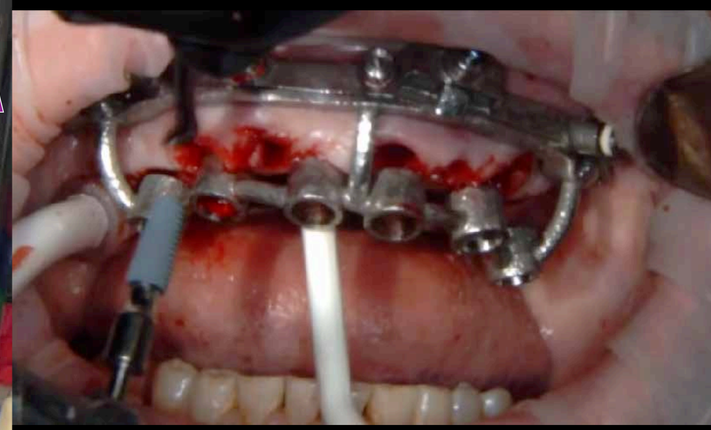
IMPLANTS







PLASMA-X



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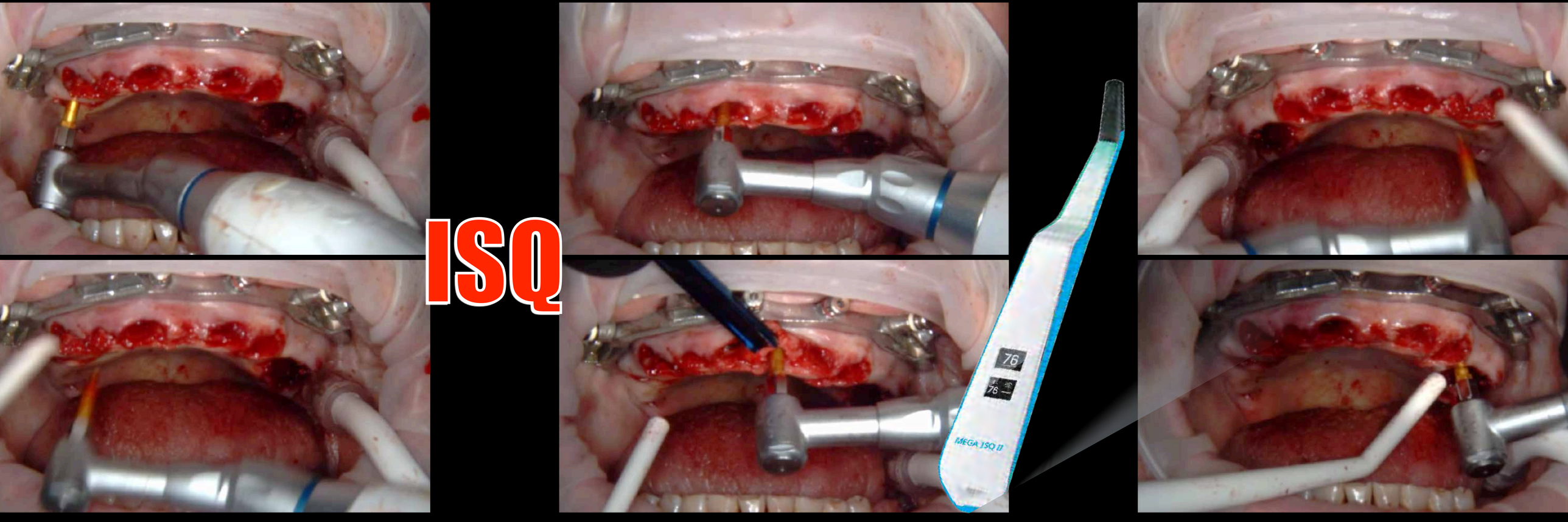
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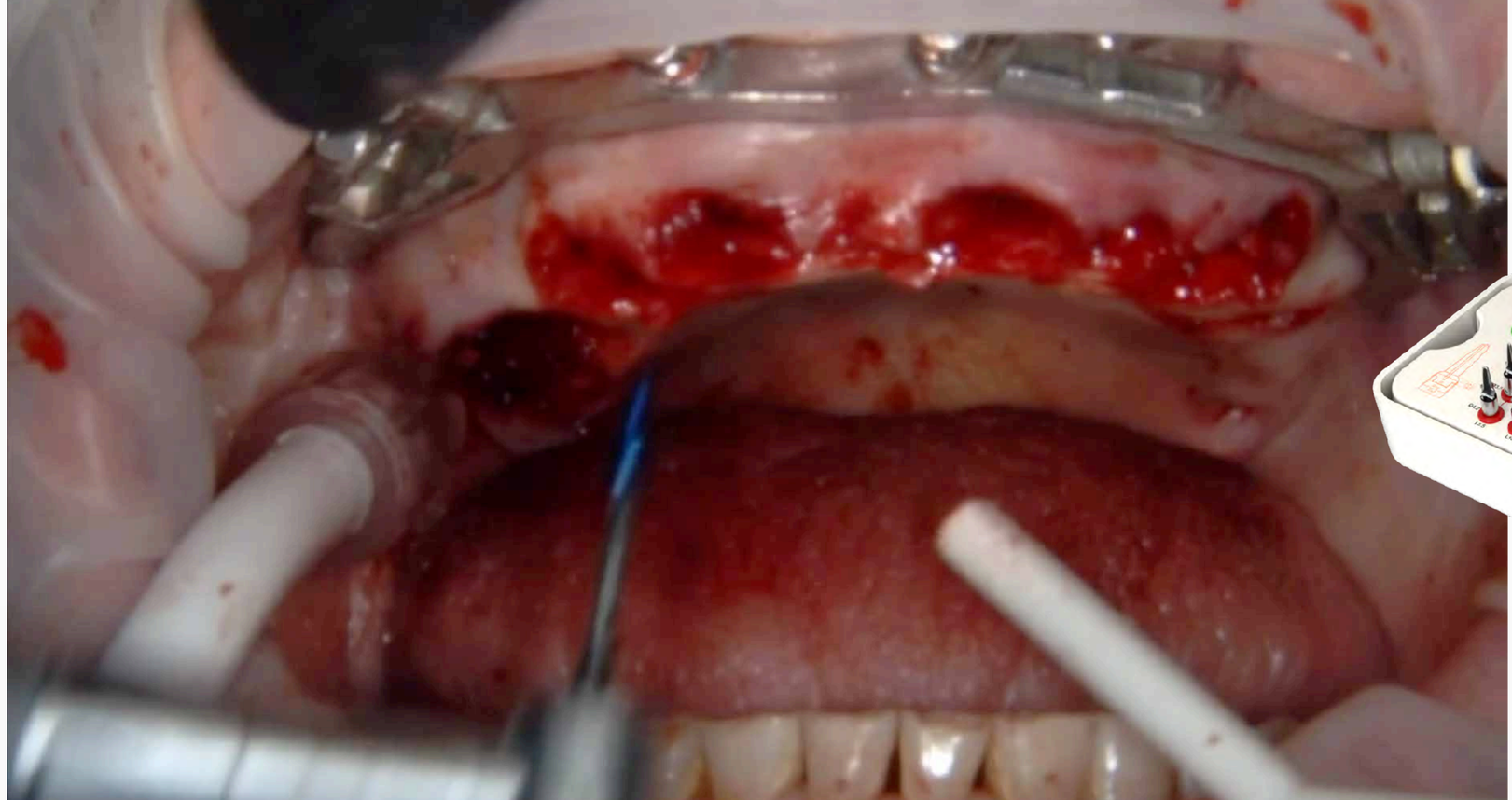
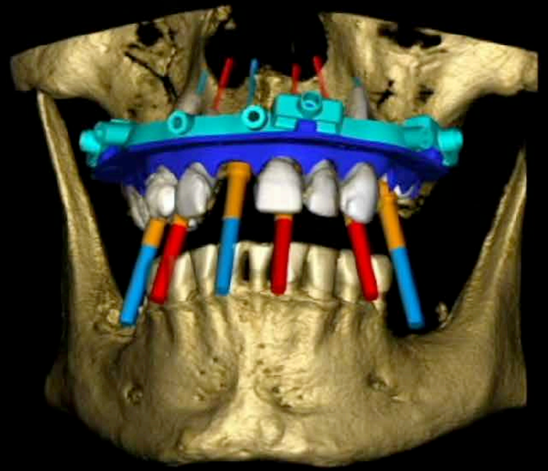
UNIVERSAL SHAPERS

PROFILE, SCULPT AND SCALLOP WITH PRECISION



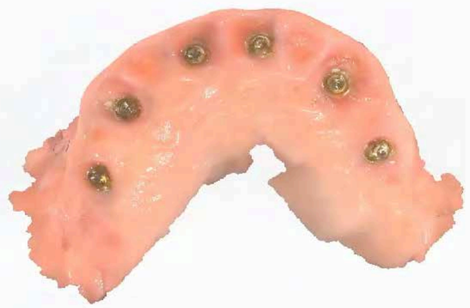



How can we repair
Quickly & Accurately?

SHINING3D
MetronTrack

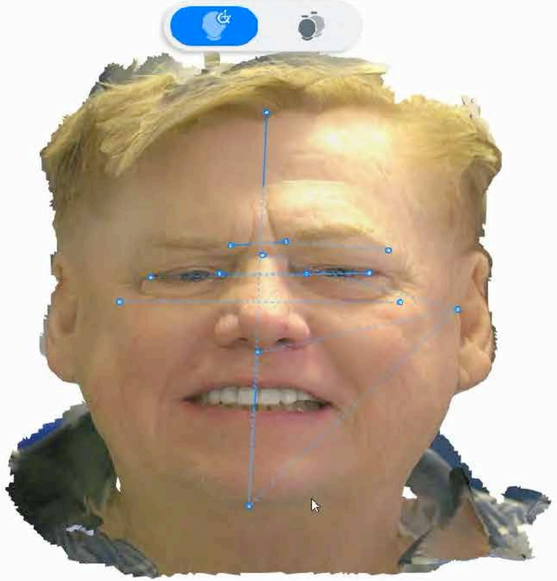
Smile Face

TISSUE



Golden ratio

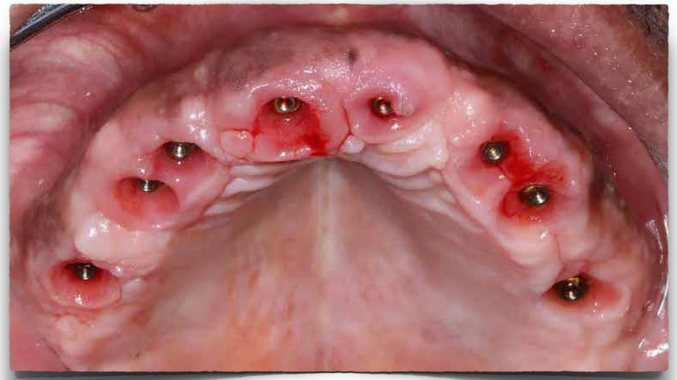
Measurement point	Marking points	Measurements (mm)	Reference (mm)
Upper facial ...	Tr-M-M	53.56 ↑	53.64±4.9
Middle facial...	Sn-M-M	52.59 ↓	70.81±3.55
Total facial h...	Tr-Me	186.92	187.05±8.2
Lower facial ...	Sn-Me	71.23 ↑	62.60±4.27
Space betwe...	M-M	23.39	-
Bizygomatic ...	Zy-Zy	119.35 ↓	136.9±0
Horizontal le...	M-M'	42.02	-
Intercanthal ...	En-En	36.79	36.29±3.1
Biocular width	Ec-Ec	92.82 ↑	88.81±4
Horizontal le...	En-Ec	26.29	26.26±1.5

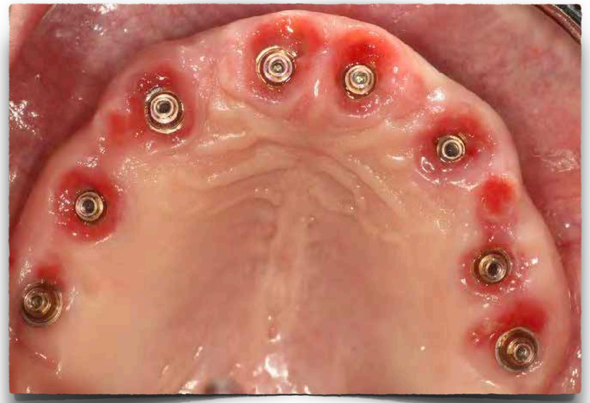


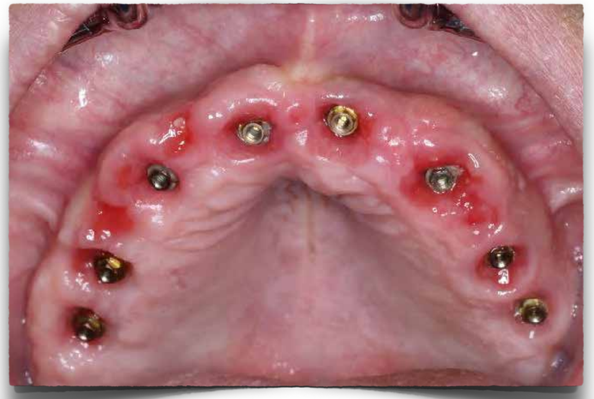
MEASUREMENTS

FACIAL SCAN

How do we capture/finish?
Full arch implants?







2023

Research


Journal of Dentistry

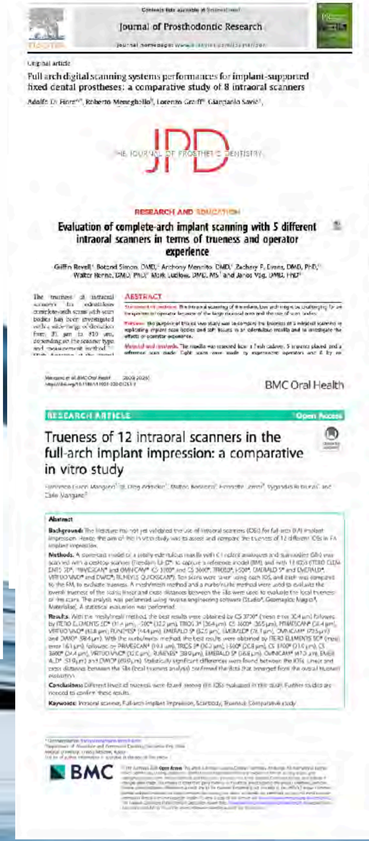
In vivo trueness and precision of full-arch implant scans using intraoral scanners with three different acquisition protocols

Robert Nedelcu, Pontus Olsson, Måns Thaim, Ingela Nyström, Andreas Thor

ARTICLE INFO

ABSTRACT

1. Introduction


Journal of Prosthodontic Research

Original article

Full arch digital scanning systems performances for implant-supported fixed dental prostheses: a comparative study of 8 intraoral scanners

JPD

THE JOURNAL OF PROSTHETIC DENTISTRY

RESEARCH AND SCIENCE

Evaluation of complete-arch implant scanning with 5 different intraoral scanners in terms of trueness and operator experience

ABSTRACT

BMC Oral Health

RESEARCH ARTICLE

Open Access

Trueness of 12 intraoral scanners in the full-arch implant impression: a comparative in vitro study

Abstract

BMC

UNSTABLE SCAN PATHS

otocol in

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te to an

may show varying results *in vivo*. A completed scan does not necessarily equate to an accurate scan.

2022

International Journal of Environmental Research and Public Health

MDPI

Article

In Vivo Complete-Arch Implant Digital Impressions: Comparison of the Precision of Three Optical Impression Systems

5. Conclusions

Within the limitations of the present in vivo study, the following conclusi

1. The system that obtained better precision was PIC, followed by TD, and then T.
2. The precision of T and TD decreased as the distance between the implants increased; however, this variable did not affect the PIC system.
3. The arch did not affect PIC precision, but the T and TD systems performed worse in the mandibular arch.

Re

The Journal of Prosthetic Dentistry

Volume 119, Issue 4, April 2018, Pages 574-579

Research and Education

Digital versus co impressions for An evaluation of

Amin Marghalani BDS, MS, Hans-
Yukio Kudara CDT, MDT, Khaled E

CLINICAL ORAL IMPLANTS RESEARCH WILEY

Photogrammetric measurements of implant positions. Description of a technique to determine the fit between implants and sup

A. Lie, T. Jemt

First published: March 1994

Torsten Jemt, The Branem Sweden

The Journal of Prosthetic Dentistry

Volume 125, Issue 3, March 2021, Pages 470-473

Research and Education

Comparison of conventional, photogrammetry, and intraoral scanning accuracy of complete-impression procedure coordinate measuring

Marta Revilla-León DDS, MSD
Mutlu Özcan DDS, DMD, PhD, Jeffrey Rubens

The Journal of Prosthetic Dentistry

Volume 129, Issue 1, January 2023, Pages 160-165

Research and Education

Trueness and precision of complete-arch photogrammetry implant scanning assessed with a coordinate measuring machine

Marta Revilla-León
Mohammed M. Meth
Mutlu Özcan DDS, D

CASE REPORTS | OCTOBER 01 2019

Photogrammetric and Intraoral Digital Impression Technique for the Rehabilitation of Multiple Unfavorably Positioned Dental Implants: A Clinical Report

Pedro Molinero-Mourelle, DDS, MDS; Walter Lam, BDS, MDS; Rocio Cascos-Sánchez, DDS, MDS; Luis Azevedo, DDS; Miguel Gómez-Polo, DDS, PhD

J Oral Implantol (2019) 45 (5): 398–402.

https://doi.org/10.1563/aaid-joi-D-19-00140

PHOTOGRAMMETRY

Imetric4D

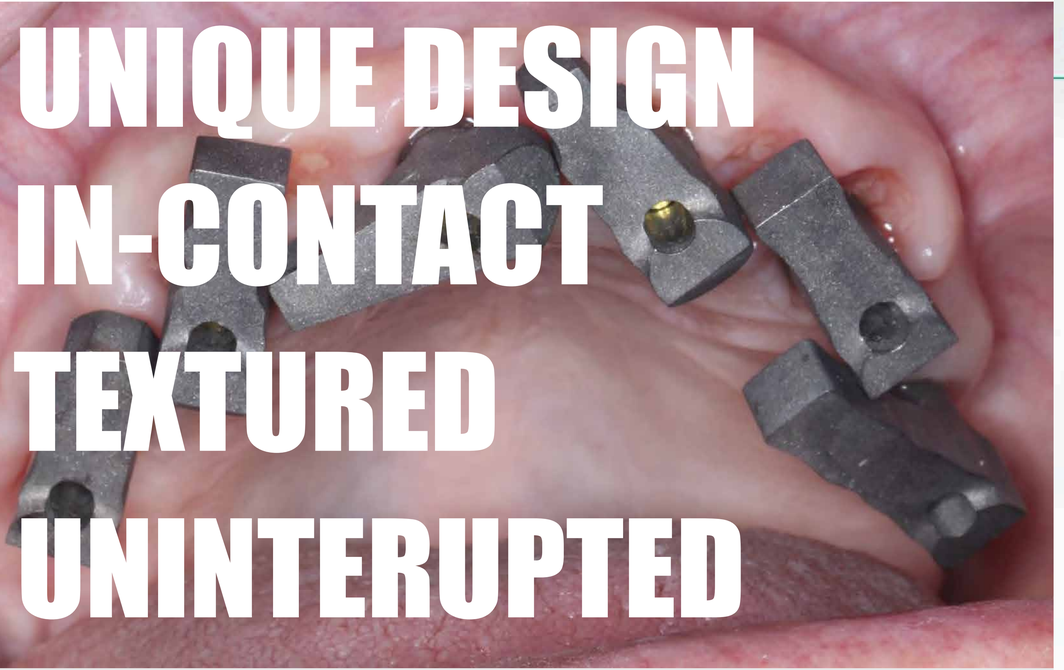
PHOTOGRAMMETRY

MICRONMAPPER

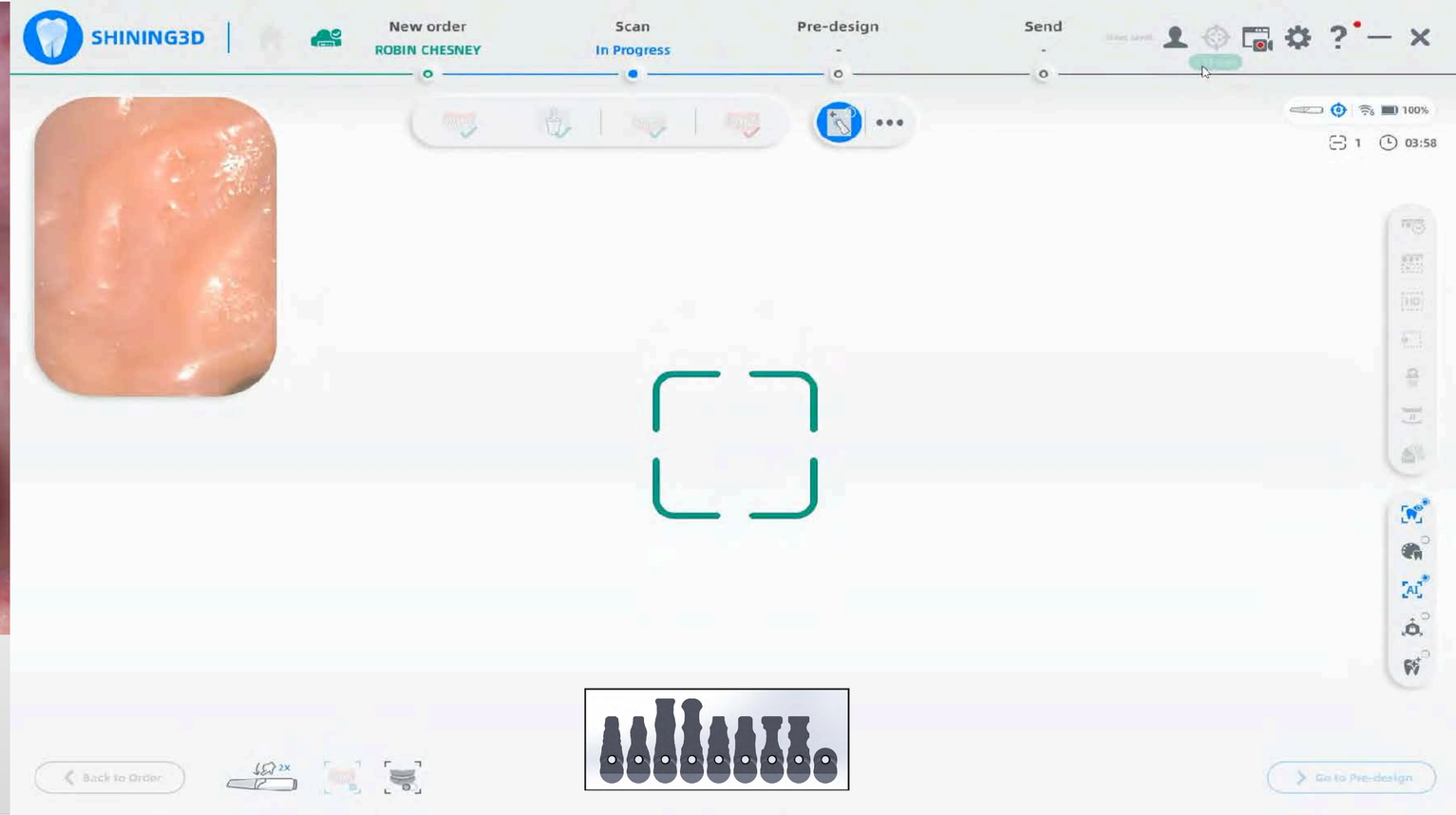

ALTERNATIVES
ArchBridge™
ALTERNATIVES

ArchBridge™

ArchBridge™

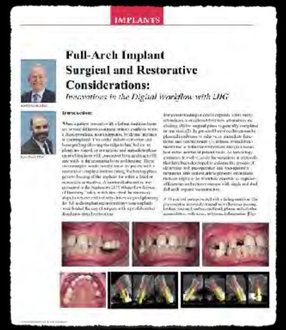

UNIQUE DESIGN
IN-CONTACT
TEXTURED
UNINTERUPTED

ArchBridge™


SHINING3D
New order
ROBIN CHESNEY
Scan
In Progress
Pre-design
-
Send
-
100%
1
03:58
Back to Order
Go to Pre-design

REPAIR

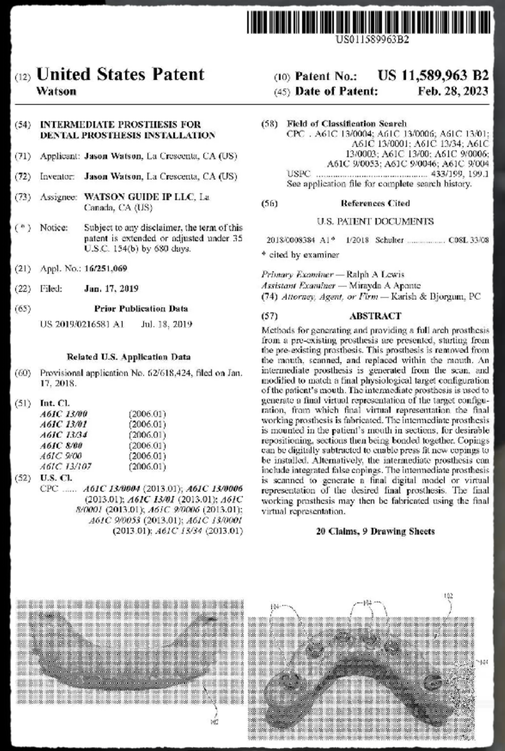
iJig


IMPLANTS

Full-Arch Implant Surgical and Restorative Considerations:

Preconvictions in the Digital Workflow with iJig

captures tooth position in relation to implant and tissue



US011589963B2

(12) **United States Patent**
Watson

(10) **Patent No.: US 11,589,963 B2**
(45) **Date of Patent: Feb. 28, 2023**

(54) **INTERMEDIATE PROSTHESIS FOR DENTAL PROSTHESIS INSTALLATION**

(71) Applicant: **Jason Watson**, La Crescenta, CA (US)

(72) Inventor: **Jason Watson**, La Crescenta, CA (US)

(73) Assignee: **WATSON GUIDE IP LLC**, La Canada, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 680 days.

(21) Appl. No.: **16/251,069**

(22) Filed: **Jan. 17, 2019**

(65) **Prior Publication Data**

US 2019/0216581 A1 Jul. 18, 2019

Related U.S. Application Data

(60) Provisional application No. 62/618,424, filed on Jan. 17, 2018.

(51) **Int. Cl.**

A61C 13/00	(2006.01)
A61C 13/01	(2006.01)
A61C 13/34	(2006.01)
A61C 8/00	(2006.01)
A61C 9/00	(2006.01)
A61C 13/107	(2006.01)

(52) **U.S. Cl.**

CPC ***A61C 13/0004*** (2013.01); ***A61C 13/0006*** (2013.01); ***A61C 13/01*** (2013.01); *A61C 8/0001* (2013.01); *A61C 9/0006* (2013.01); *A61C 9/0053* (2013.01); *A61C 13/0001* (2013.01); *A61C 13/34* (2013.01)

(58) **Field of Classification Search**

CPC . A61C 13/0004; A61C 13/0006; A61C 13/01; A61C 13/0001; A61C 13/34; A61C 13/0002; A61C 13/00; A61C 9/0006; A61C 9/0053; A61C 9/0046; A61C 9/004

USPC 433/169, 199.1

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2018/0000384 A1* 1/2018 Schulter C08L 33/08

* cited by examiner

Primary Examiner — Ralph A Lewis
Assistant Examiner — Mirayda A Aponte
(74) *Attorney, Agent, or Firm* — Karish & Bjorgum, PC

(57) **ABSTRACT**

Methods for generating and providing a full arch prosthesis from a pre-existing prosthesis are presented, starting from the pre-existing prosthesis. This prosthesis is removed from the mouth, scanned, and replaced within the mouth. An intermediate prosthesis is generated from the scan, and modified to match a final physiological target configuration of the patient's mouth. The intermediate prosthesis is used to generate a final virtual representation of the target configuration, from which final virtual representation the final working prosthesis is fabricated. The intermediate prosthesis is mounted in the patient's mouth in sections, for desirable repositioning, sections then being bonded together. Copings can be digitally subtracted to enable press fit new copings to be installed. Alternatively, the intermediate prosthesis can include integrated false copings. The intermediate prosthesis is scanned to generate a final digital model or virtual representation of the desired final prosthesis. The final working prosthesis may then be fabricated using the final virtual representation.

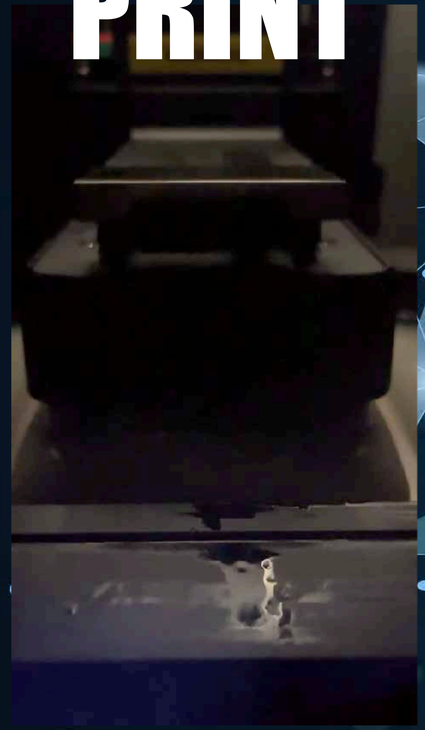
20 Claims, 9 Drawing Sheets

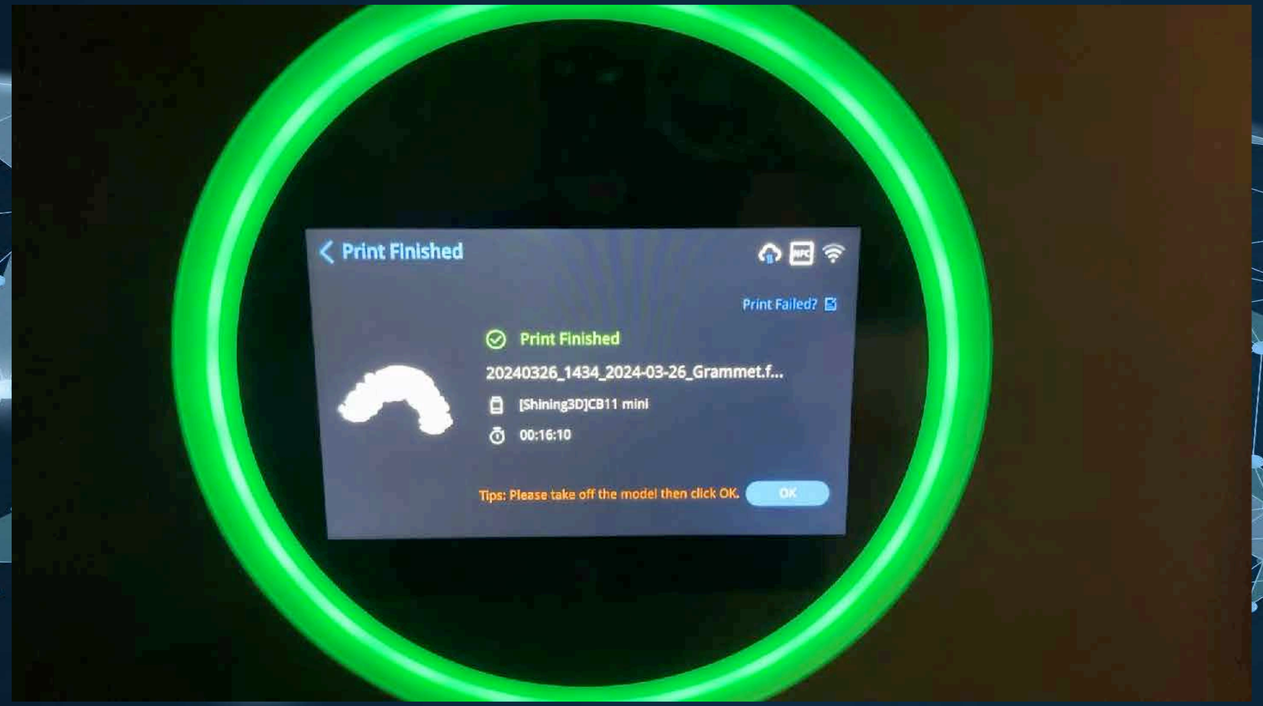
Methods for generating and providing a full arch prosthesis from a pre-existing prosthesis are presented, starting from the pre-existing prosthesis.

This prosthesis is removed from the mouth, scanned, and replaced within the mouth. The intermediate prosthesis is scanned to generate a final digital model or virtual representation of the desired final prosthesis

iJIG

PRINT

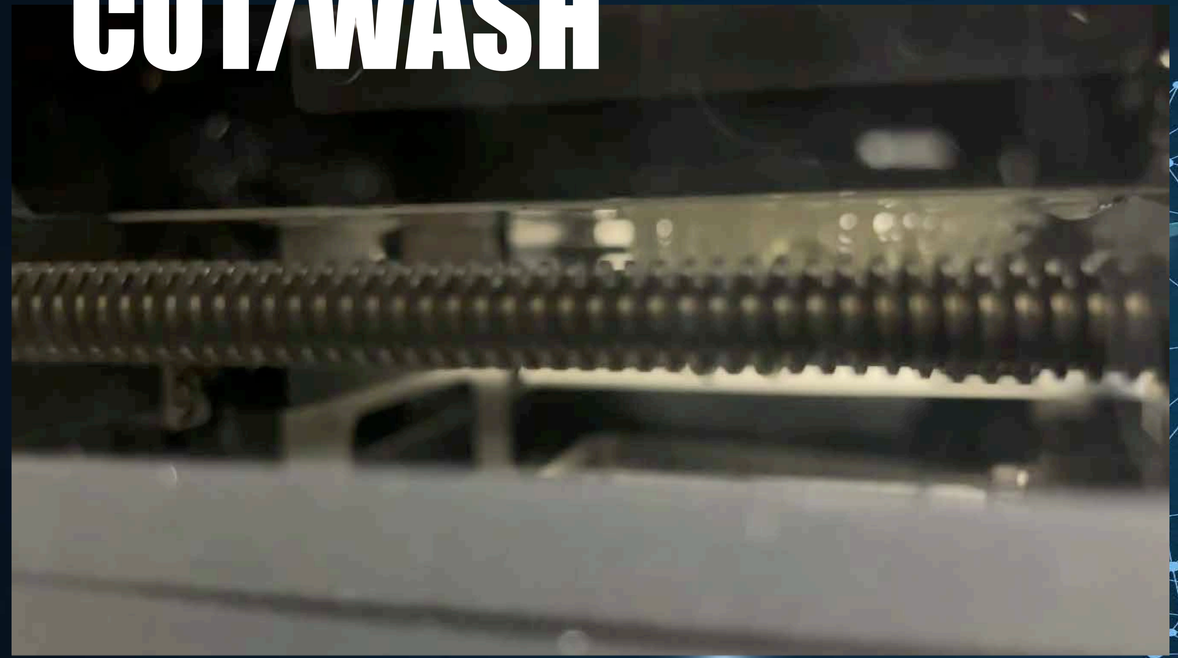




AccuFab-CEL

SHINING 3D
DENTAL

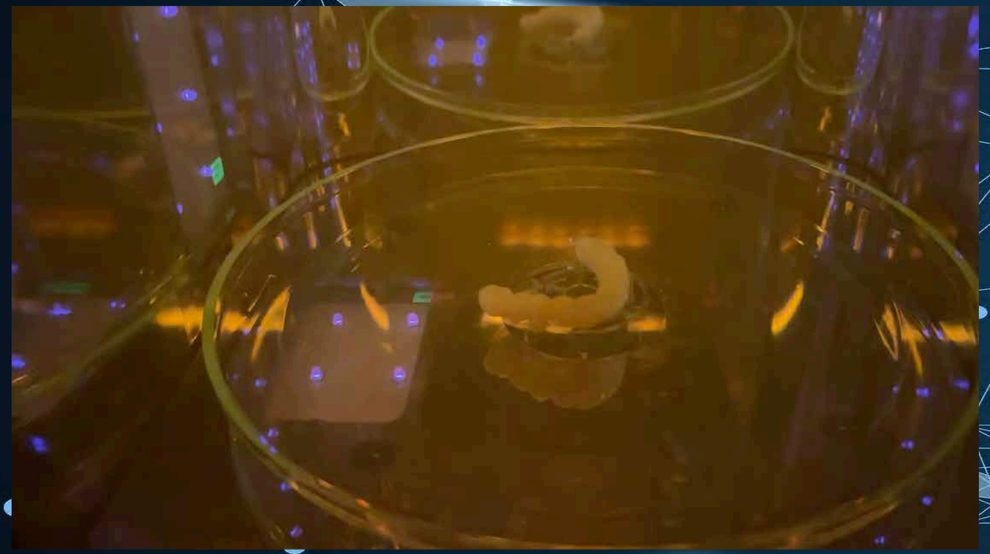
CUT/WASH



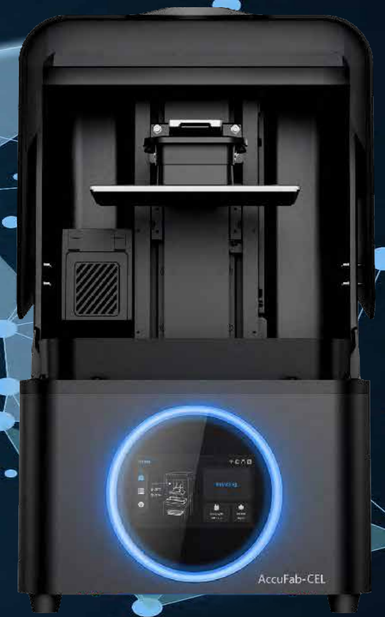
AccuFab-CEL

SHINING 3D
DENTAL

CURE

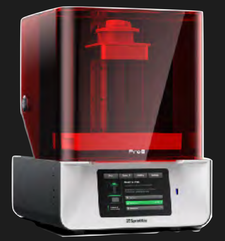


AccuFab-CEL

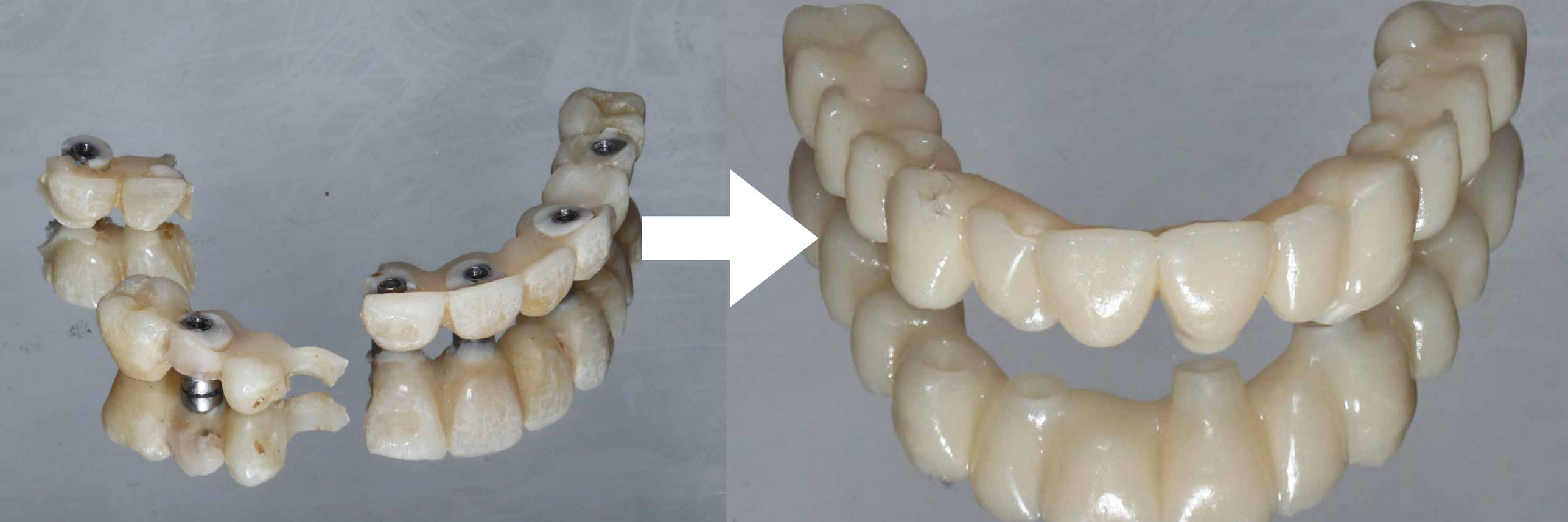


SHINING 3D
DENTAL

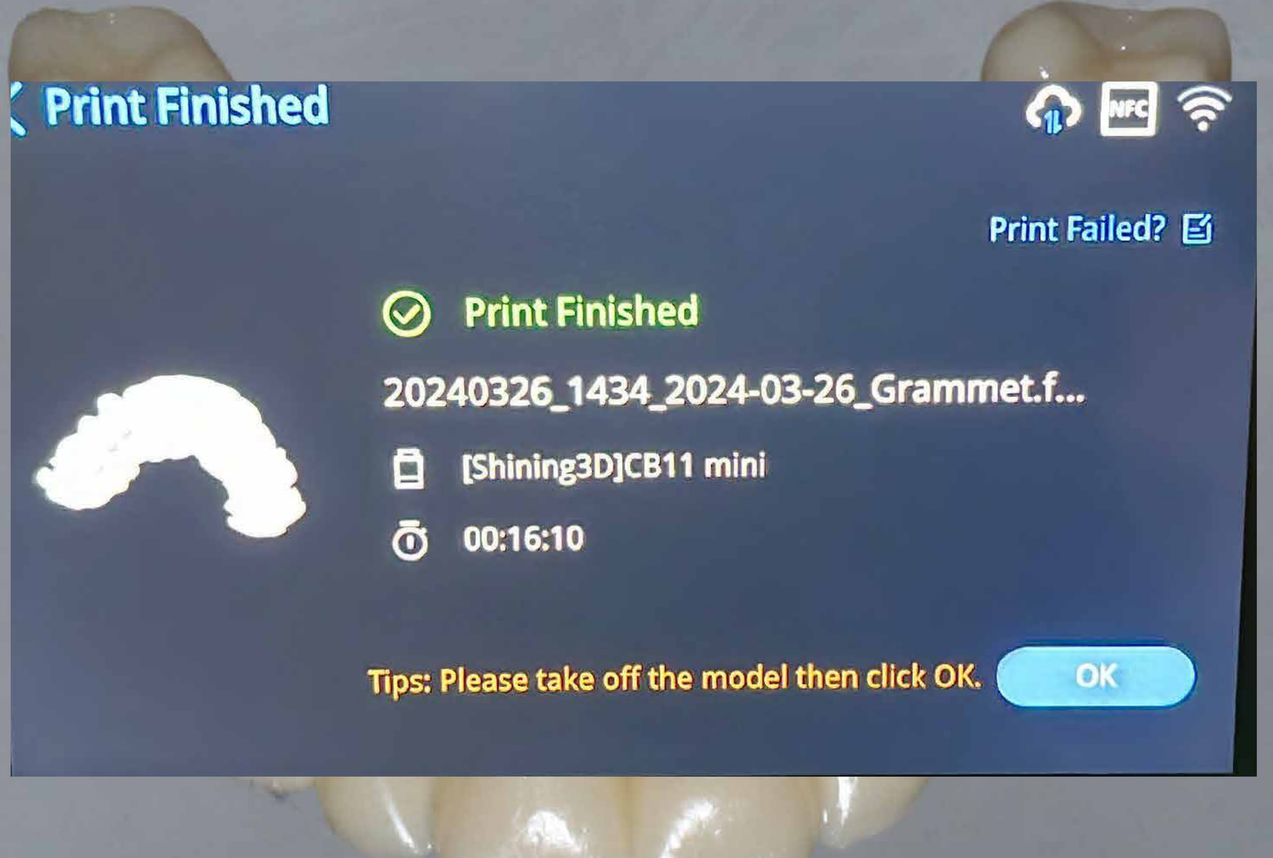
Printer Comparison

Printer	AccuFab CEL	AccuFab L4D	Pro 55S	Pro 95S	Max	SOL
Brand	Shining3D	Shining3D	Sprint Ray	Sprint Ray	Asiga	Ackuretta
Image						
Technology	LCD	LCD	DLP	DLP	DLP	LCD
Print Volume (mm)	**194 x 120 x 180**	192 x 120 x 180	105 x 59 x 200	182 x 102 x 200	119 x 67 x 75	128 x 80 x 120
Resolution	**6K**	4K	1080p	1080p	1080p	4K
Accuracy	**35 Microns**	50 Microns	55 Microns	95 Microns	62 Microns	49 Microns
Speed	**~100 mm/h**	~10-50 mm/h	~50 mm/h	~50 mm/h	~60 mm//h	~45 mm/h
Verified Resin Brands	21	21	6	6	49	20
Estimated Print Time (ortho model)	**12 min**	42 min	44 min	35 min	N/A	48 min
Price (USD)	Affordable	Affordable	Expensive	Expensive	Expensive	Expensive

*Data gathered from manufacturer websites and designated slicing software estimations



16min PRINT


Print Finished
Print Failed?
Print Finished
20240326_1434_2024-03-26_Grammet.f...
[Shining3D]CB11 mini
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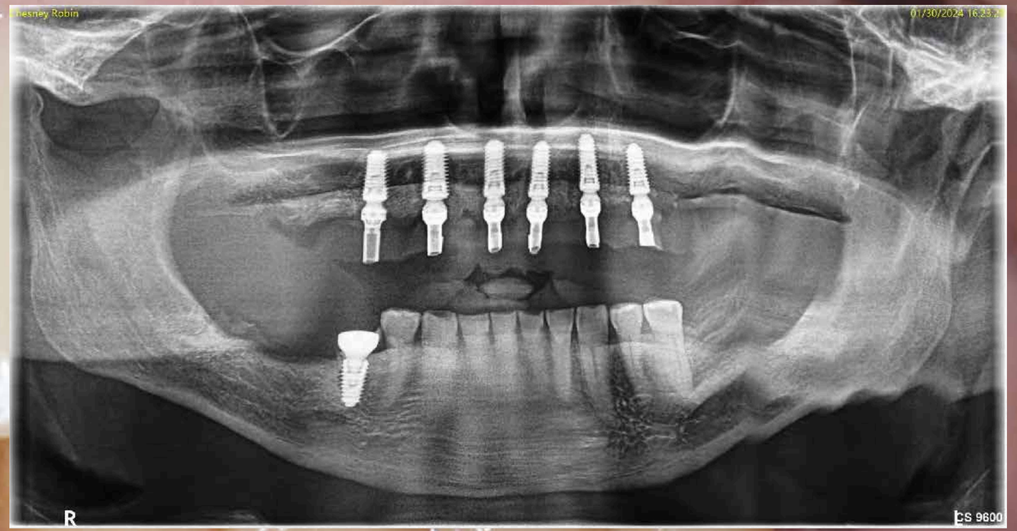
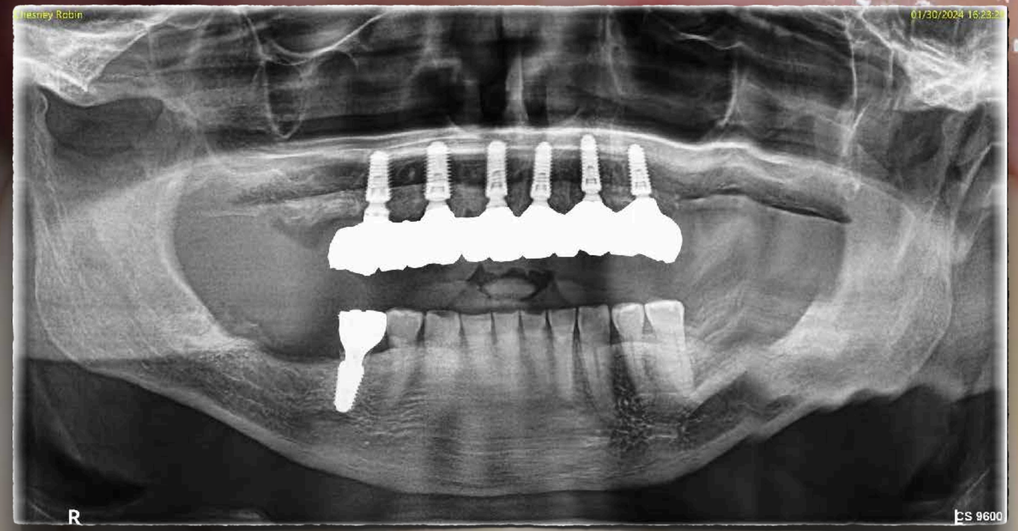
Tips: Please take off the model then click OK.
OK

INSERTION



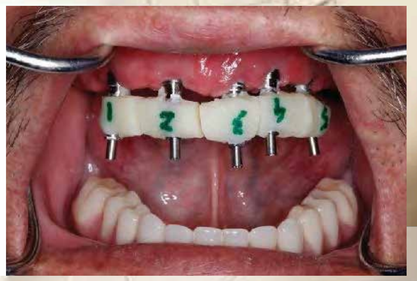


Changing lives one smile at a time

Traditional Method is 7 appointments over 2 ½ – 3 ½ Months

Appt 1 Stock Tray

Appt 2 Implant Impression



Appt 3 Fit Gig & Bite Block

TRADITIONAL

Appt 4 Screw Down Set-up

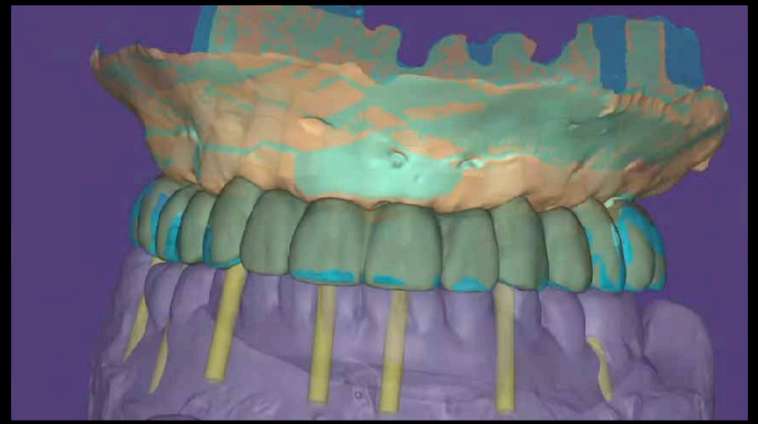
Appt 5 Screw Down Set-up on Ti Bar

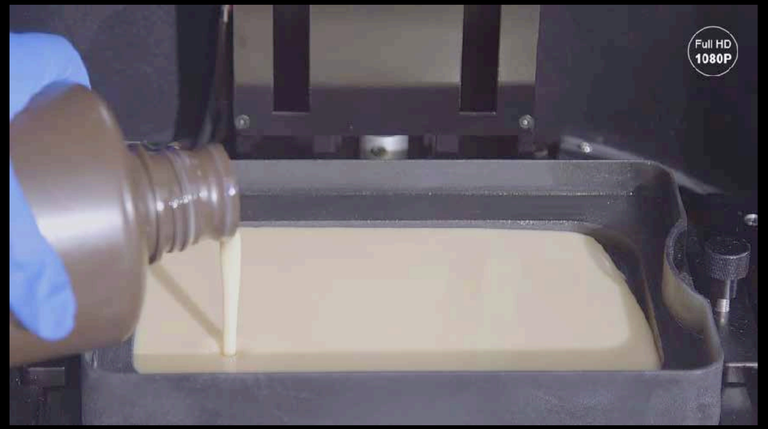
Appt 6 Reset

Appt 7 Final Seating

Cad-Cam

2-3 Visits

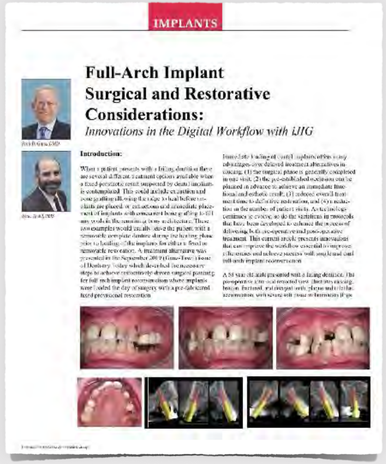




Design

Print

Mill



IMPLANTS

Full-Arch Implant Surgical and Restorative Considerations:

Innovations in the Digital Workflow with iJIG

Introduction:

Jan 2020

iJig

Reverse scanning of patients temps

Grammetry

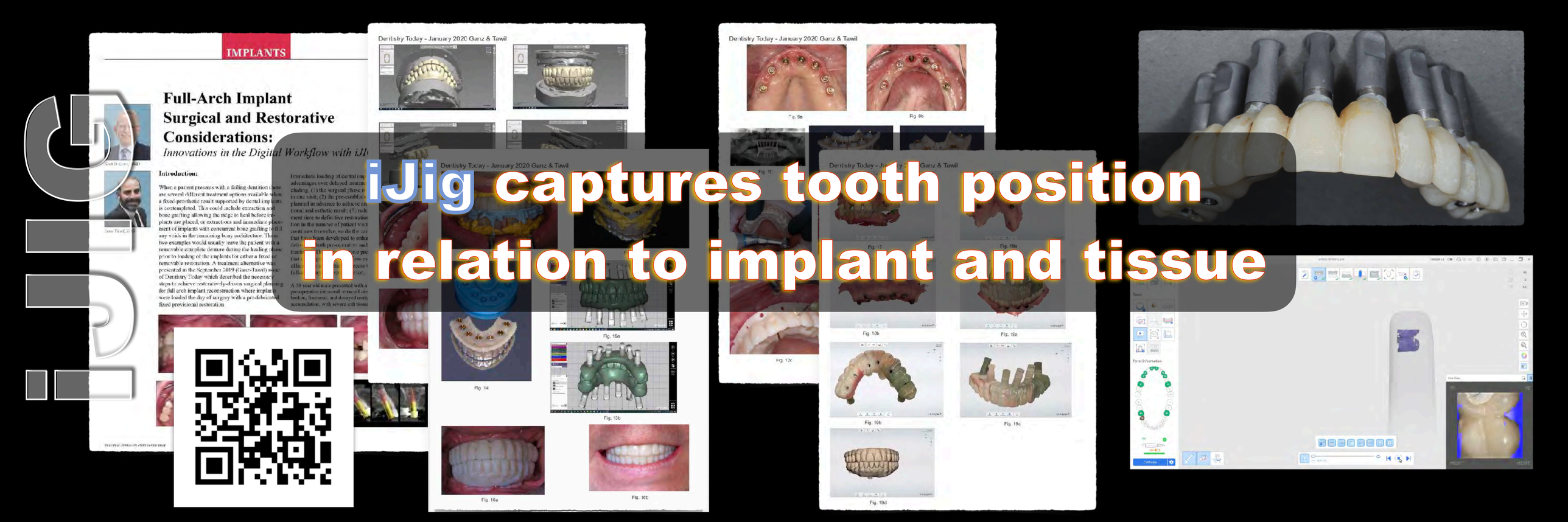
Contacting scan bodies to provide stable scan path

IMPLANTS

Fully Digital Full Arch?

Continued Advancements in Full-Arch Implant Restorations

May 2023


iJig
IMPLANTS
Full-Arch Implant
Surgical and Restorative
Considerations:
Innovations in the Digital Workflow with iJ
Introduction:
Dentistry Today - January 2020 Ganz & Tawil
Fig. 14
Fig. 15a
Fig. 15b
Fig. 16a
Fig. 16b
Fig. 9a
Fig. 9b
Fig. 10a
Fig. 10b
Fig. 10c
Fig. 19b
Fig. 19c
Fig. 19d
iJig captures tooth position
in relation to implant and tissue

Fully Digital Full Arch?

Continued Advancements in Full-Arch Implant Restorations

Isaac D. Troxel, DMD

Scott D. Ganz, DMD

INTRODUCTION

Full-arch, implant-supported reconstruction continues to provide viable solutions to restore and improve function, enhance aesthetics, and change the quality of life for our patients. All-on-X implant reconstruction has benefitted from new advancements and technical innovations. In this current edition, the authors continue the journey, navigating through new developments that impact the full-arch analog and digital workflows. Our previous articles introduced several elements to aid the clinician in both the surgical and restorative phases of full-arch replacement, including the use of CBCT guided surgical applications[1] and how they have greatly improved the assessment for implant placements relative to the desired restorative positions for preliminary and definitive restorations while also reducing implant complications. The authors have previously described an ancillary surgical protocol that utilizes extracted teeth as an autologous solution[2] to bone grafting. This has greatly enhanced healing and long-term alveolar stability and provided ample graft volume while significantly reducing biomaterial costs. Subsequent publications also reported on improving the restorative time and treatment outcomes utilizing digital technology and employing small-hole technology (CAP) to enhance the physical integrity and anatomy of milled or 3D printed provisional restorations[3] and improving inter-arch alignment and occlusion. The goal of these articles has been to improve time, efficiency, costs, and long-term results for the betterment of clinicians, laboratory technicians, and patients. This latest article endeavors to provide updates in the acquisition of data necessary to complete the restorations with an emphasis on addressing improvements in screw-retained full arches for monolithic restorations that incorporate multi-unit abutments.

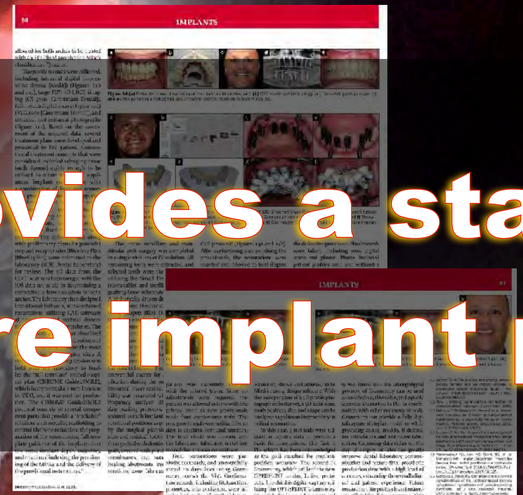
Data Acquisition

As the dental industry continues to strive for fully digital solutions, the development and improvement of intraoral data devices and acquisition technology has continued to evolve. Intraoral scanning (IOS) presents and accuracies have become a viable solution for replacing direct analog impressions. Native IOS software applications now provide several impressive features that enhance and streamline complete digital protocols. However, due to inherent logistical limitations, the difficulty and accuracy of IOS technology used for full-arch dental implant restorations has presented major obstacles requiring additional applications to achieve fully digital solutions.

All-on-X, fixed surgical and restorative protocols require [illegible] of 4 or more implants with a fixed [illegible] to provide enough [illegible] the necessary [illegible] oral [illegible] one of the [illegible] laboratory technicians to overcome. IOS technology requires a stable environment for data to be stitched and captured accurately. Several techniques have emerged to aid the clinician in scanning these difficult environments, including proper retraction; saliva; vary flow; lack of stable, keratinized soft tissues; limited distances between [illegible] use of splinting [illegible] sure;[4] has facilitated a scan without [illegible] for data capture.[5] [illegible] five techniques, such as the sigma composite [illegible] for surgical intervention of fiducial markers fixated to the bone), have also helped improve scanning flow.[6] While these processes work for some and not for others, developers have created alternative workflows to aid in acquiring accurate intraoral data.

Photogrammetry (PG) in dentistry is a relatively new development that has revolutionized capture and positional analysis.[7] PG is a diagnostic and research method using an extraoral capture device with specific photogrammetric scanning abutments to acquire measurements from 2D digital images (Figures 2a and 2b). PG scans allow dental clinicians to acquire precise measurements of individual scan bodies (Figure 2c) secured to dental implants as they are in their natural state[8] either at the time of surgical placement or after the implants are uncovered. While extremely accurate for recording the spatial positioning of the implants, PG does not acquire the topography of the soft tissue. Therefore, a second scan is required with an intraoral scanner. The IOS data can then be used to fabricate a virtual 3D model used to measure various parameters of the implant analogs.[9] The software correlation of these measurements can be used to assess and validate the correct positioning of implants and the alignment of a patient's occlusion, size, distance, and angle. The combination of IOS and PG data provides the CAD software designer with all of the necessary information to virtually create a provisional prosthesis or a final restoration to be 3D printed or CAM-milled. The advanced capability of this highly accurate tech-

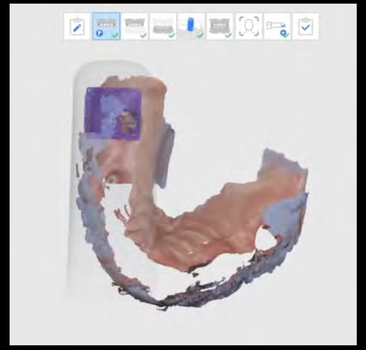
continued on page 52



Grammetry provides a stable scan path to capture implant position

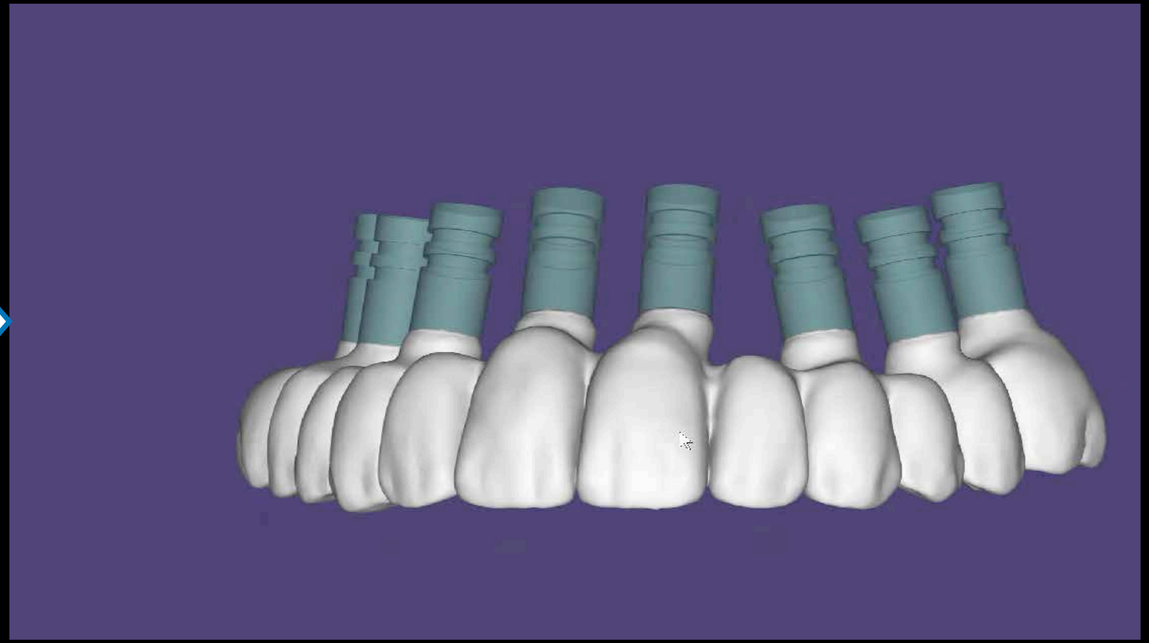
Grammetry

Grammetry



Capture

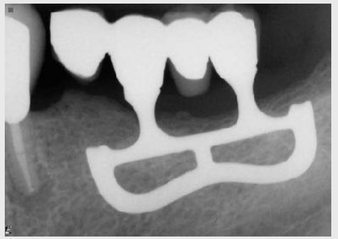
Design

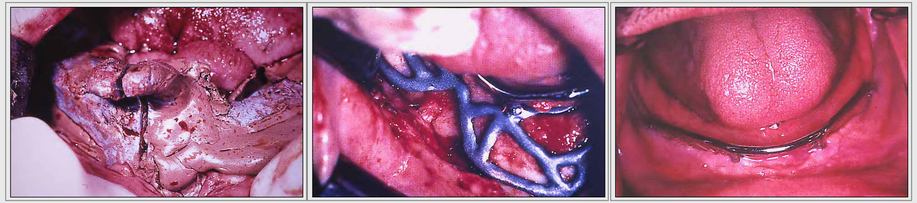


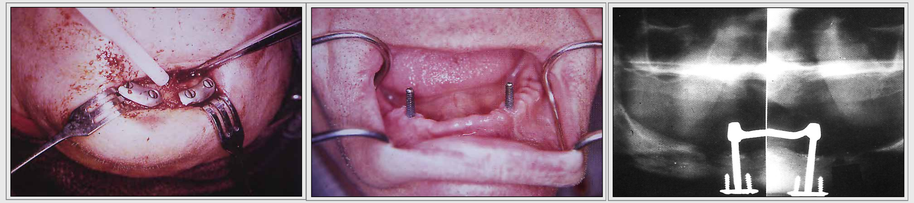
PRINT/MILL

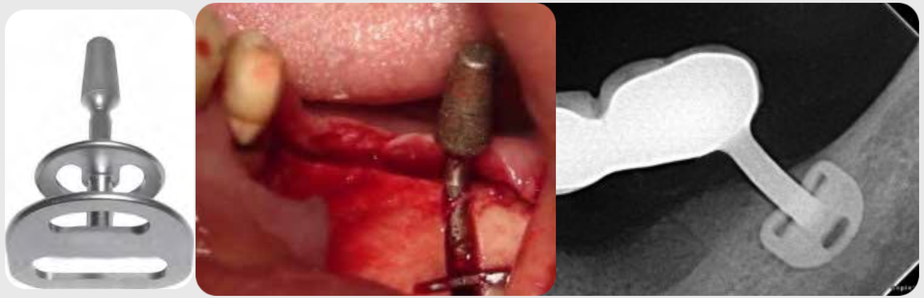
PROPER IMPLANT PLACEMENT

Where we started

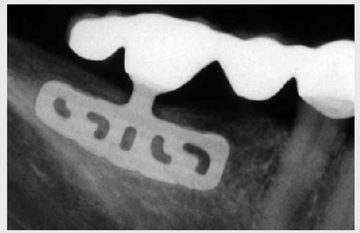








- Subperiosteal
- Transosteal
- Blade
- Disc

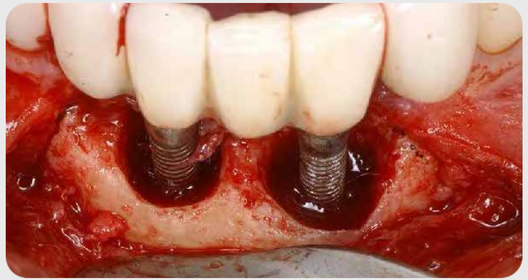


Older Designs

Root Form

Peri-Implantitis

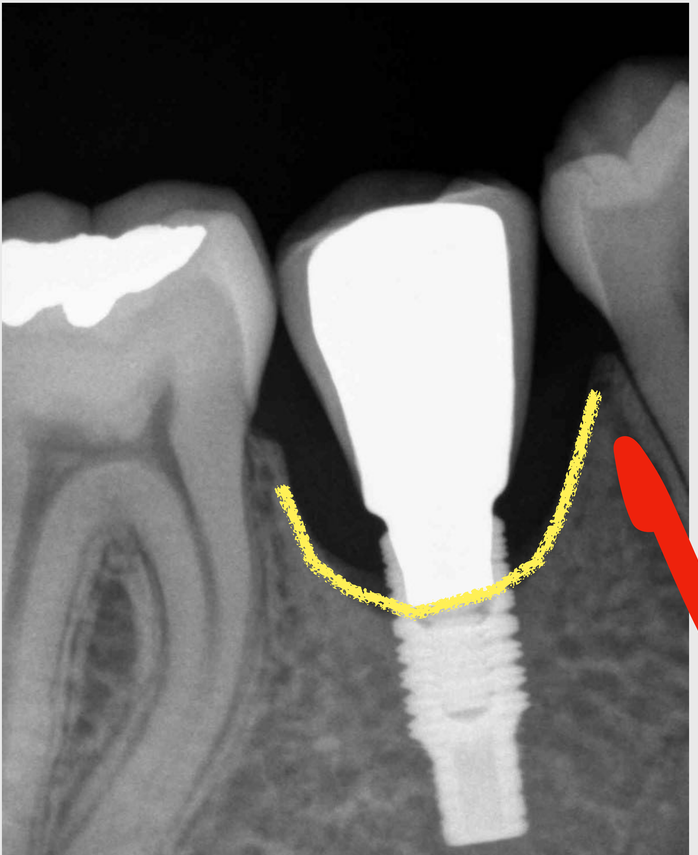
had some form of inflammatory response and a prevalence of peri-implantitis from 28% to 51%

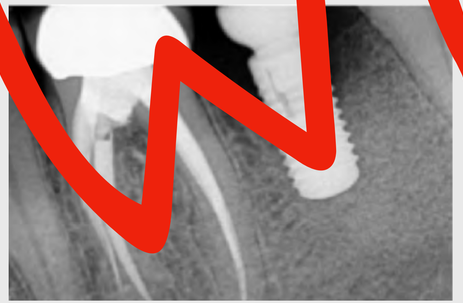


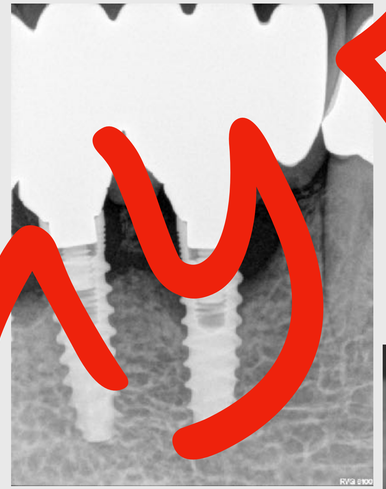
Risks Of Peri-Implantitis

History of periodontitis
Poor oral hygiene
Residual peridontal pockets with BOP
Lack of maintenance
Tobacco/Alcohol use
Malocclusion, Malpositioned
Previous Contamination Of The Implant Site
Implant Surface Contamination
Inadequate restorations

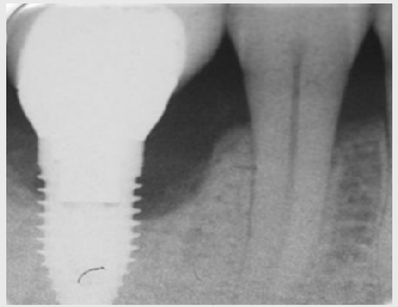
Peri-Implantitis



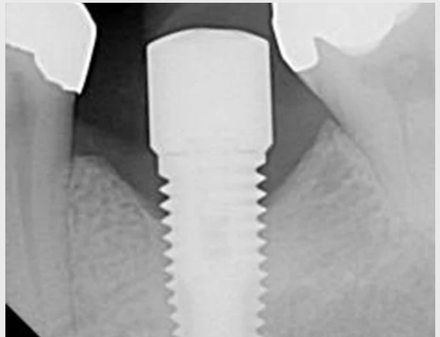




Why?

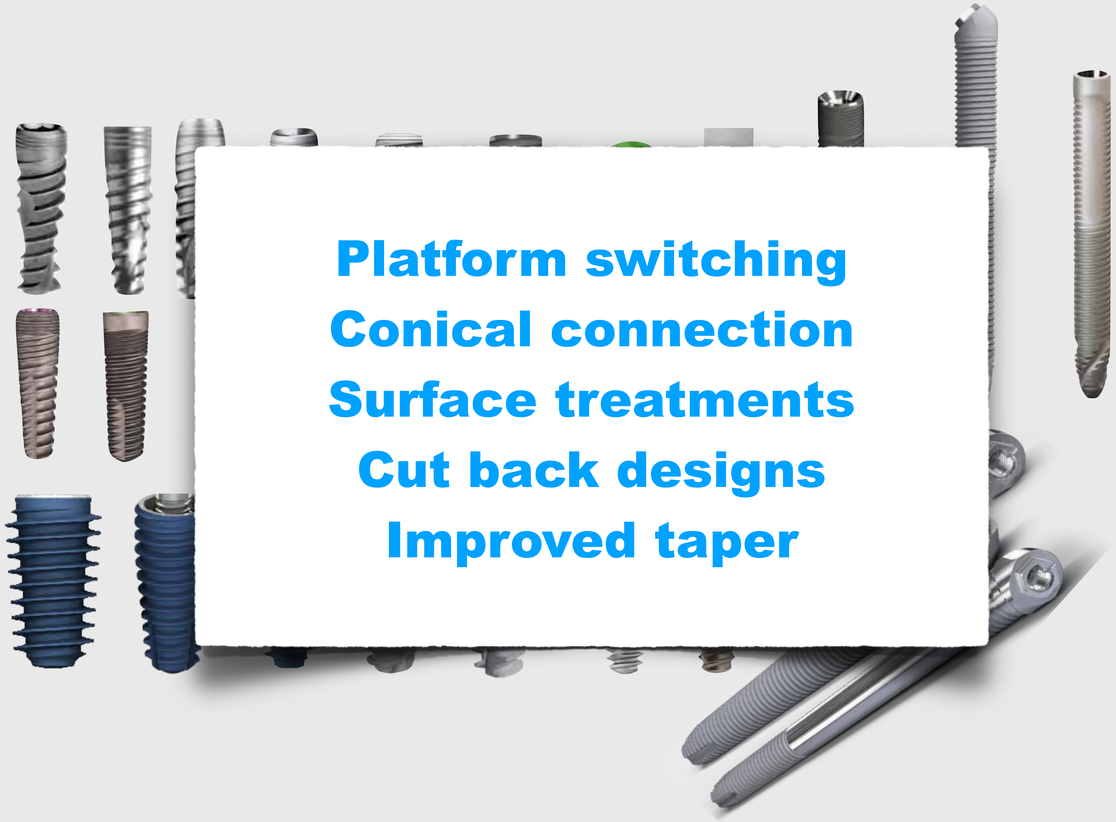


Die Back = Bone Loss



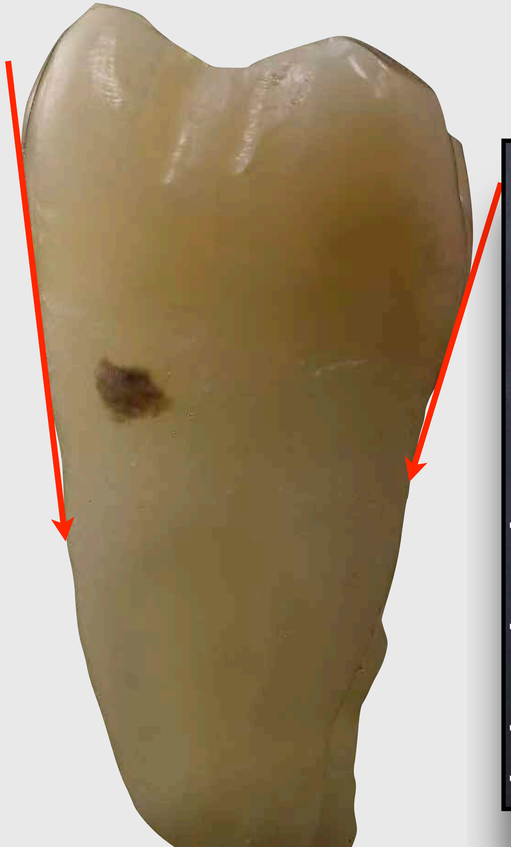
Older Designs

Newer Designs



Platform switching
Conical connection
Surface treatments
Cut back designs
Improved taper

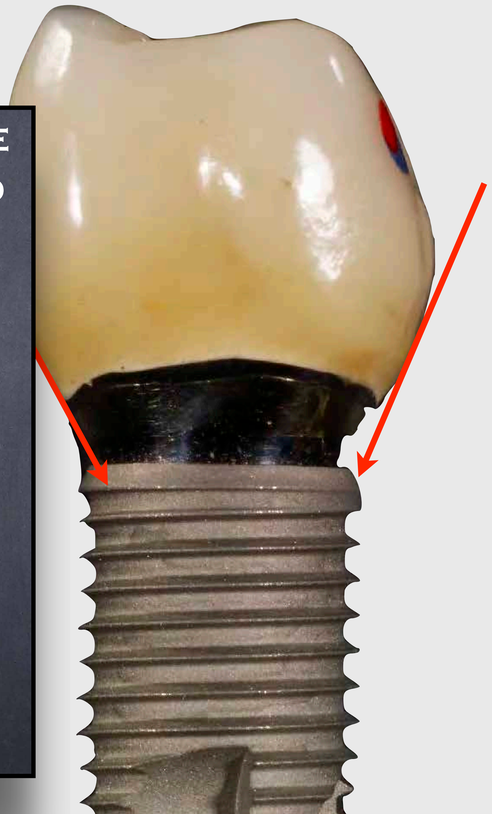
Conceptual Changes



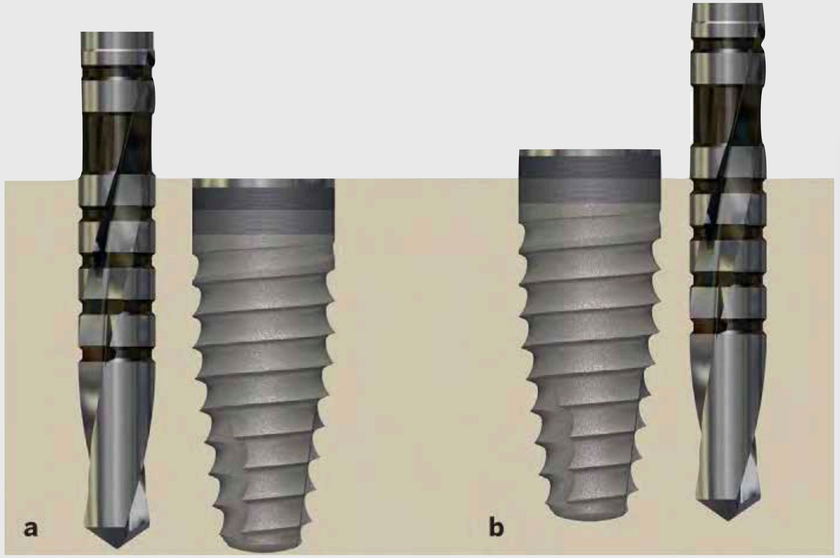
RESULTED FROM A MISTAKE WHEN WIDE IMPLANTS WERE USED AND MIS-MATCHING ABUTMENTS WHERE PROVIDED TO THE CLINICIANS.

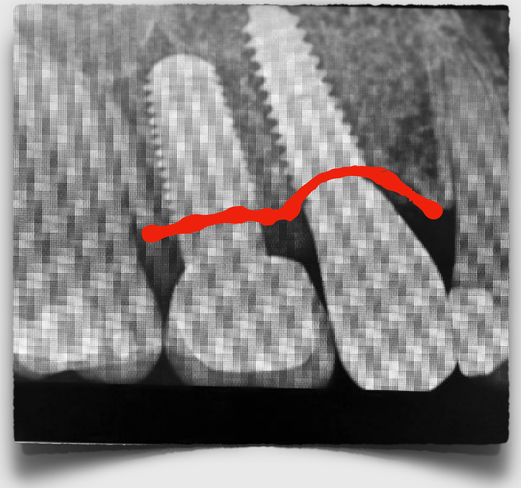
AFTER THESE ABUTMENTS WHERE DELIVERED, DURING THE OBSERVATIONALLY PERIOD, THE MARGINAL BONE LOSS WAS NOT PRESENT IN ALMOST EVERY CASES (LAZZARA & PORTER 2006).

- SHIFTS THE INFLAMMATORY CELL INFILTRATE INWARD & AWAY FROM CRESTAL BONE
- DECREASES INFLUENCE OF MICRO GAP ON CRESTAL BONE
- MAINTENANCE OF BIOLOGIC WIDTH
- DECREASES STRESS LEVEL IN PERI IMPLANT BONE



Conceptual Changes

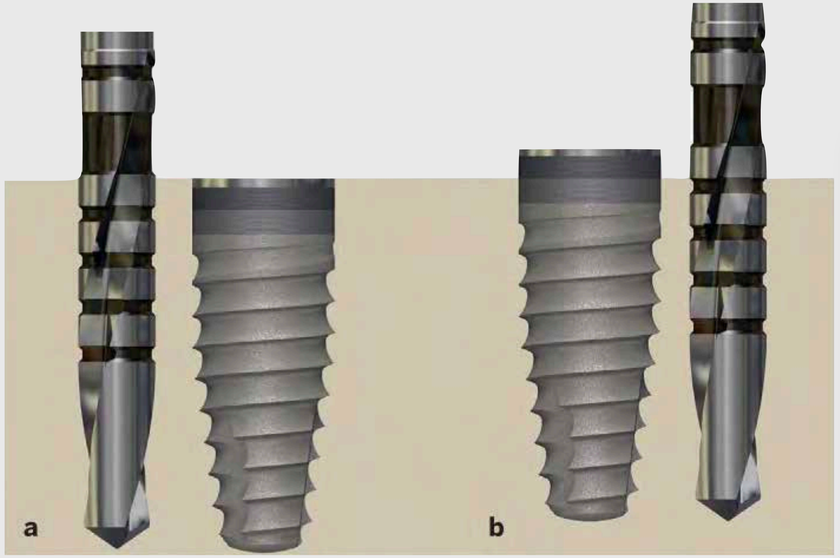


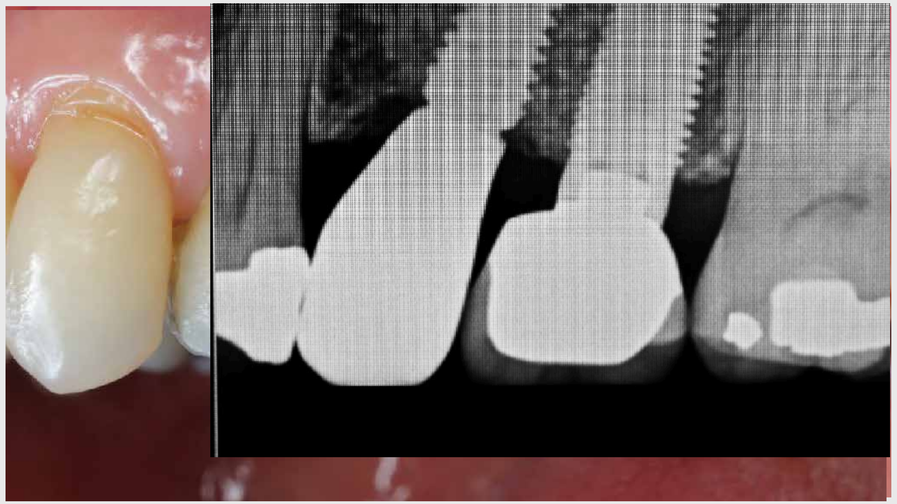


2011

Implant Depth

Conceptual Changes





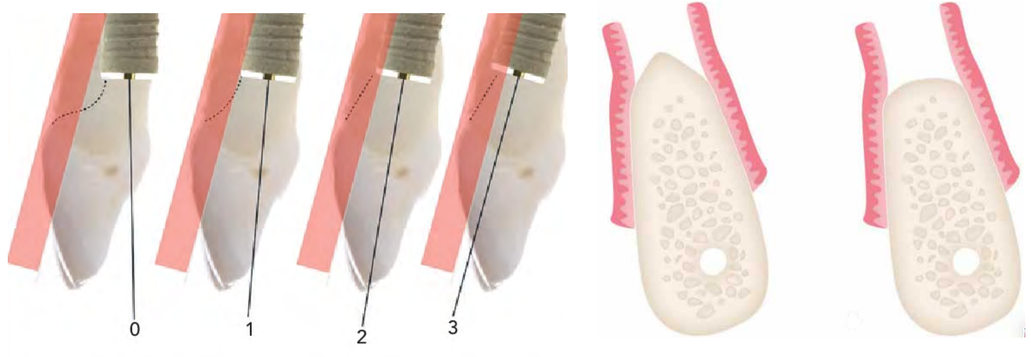
2021

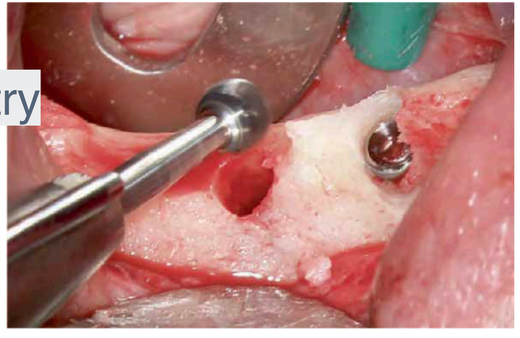
Implant Depth

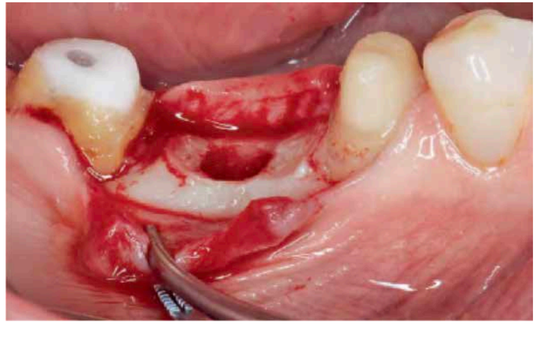
The Impact of 3D Implant Position on Emergence Profile Design.

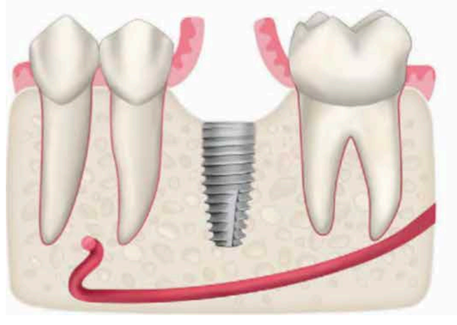
, , January 2021
The International journal of periodontics & restorative dentistry

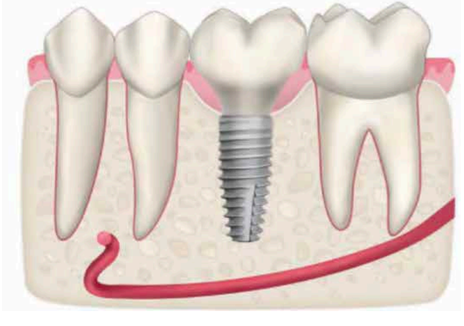
Preparation











3D Postion

Check for updates

Received: 16 March 2023 | Revised: 28 April 2023 | Accepted: 5 May 2023

DOI: 10.1002/cre2.750

ORIGINAL ARTICLE

Clinical and Experimental Dental Research Open Access WILEY

Association of prosthetic angles of the Implant Supracrestal Complex with peri-implant tissue mucositis

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[3]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

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Email: nikos@mattheos.net

Funding information
Faculty of Dentistry and the 2nd Century Fund, Chulalongkorn University, Bangkok, Thailand

Abstract

Objectives: The aim of this study was to investigate the association of the Mucosal Emergence Angle (MEA) with peri-implant tissue mucositis.

Material and Methods: Forty-seven patients with 103 posterior bone level implants underwent clinical and radiographic examination. Three-dimensional data from Cone Bean Computer Tomography and Optica Scan were transposed. Three angles were defined: MEA, Deep Angle (DA) and Total Angle (TA) and measured at six sites for each implant.

Results: There was a significant correlation between MEA and Bleeding on Probing for all sites with an overall odds ratio of odd ratio 1.07 (95% confidence interval [CI] 1.05–1.09, $p < 0.001$). Sites with MEA ≥ 30°, 40°, 50°, 60°, and 70° had a higher risk for bleeding with an odds ratio of 3.1, 5, 7.5, 11.4 and 33.55, respectively. When all 6 sites of an implant prostheses had MEA ≥ 40°, the risk of having bleeding at all 6 sites was 9.5 times higher (95% CI 1.70–52.97, $p = 0.010$).

Conclusions: Maintaining MEA no wider than 30°–40° is advisable, while the aim should be to keep this angle as narrow as clinically feasible. Registered in Thai Clinical Trials Registry: http://www.thaiclinicaltrials.org/show/TCTR20220204002.

KEYWORDS
dental implants, emergence angle, Implant Supracrestal Complex, peri-implant tissue

1 | INTRODUCTION

There is an emerging body of evidence pointing towards significant interrelations between the condition of the peri-implant tissue and the design of the prosthetic elements (Mattheos, Janda, et al., 2021). Three cross-sectional studies (Katafuchi et al., 2018; Majzoub et al., 2021; Yi et al., 2020) have suggested that prosthesis contour of more than 30° as it appears in periapical radiographs, is correlated with increased risk for peri-implantitis in bone level implants. Two cross sectional studies which followed similar methodology did not confirm the correlation of wide contour with peri-implantitis (Inoue et al., 2020, Lops et al., 2022). Furthermore, convexity of the prosthesis profile has been correlated with increased recession (Siegenthaler et al., 2022), marginal bone loss (Valente et al., 2020) and peri-implantitis when combined with overcontouring of the prosthesis (Yi et al., 2020). At the same time, defining the complex three-dimensional (3D) structure of the prosthesis contour solely by means of the 2-dimensional interproximal projection on periapical

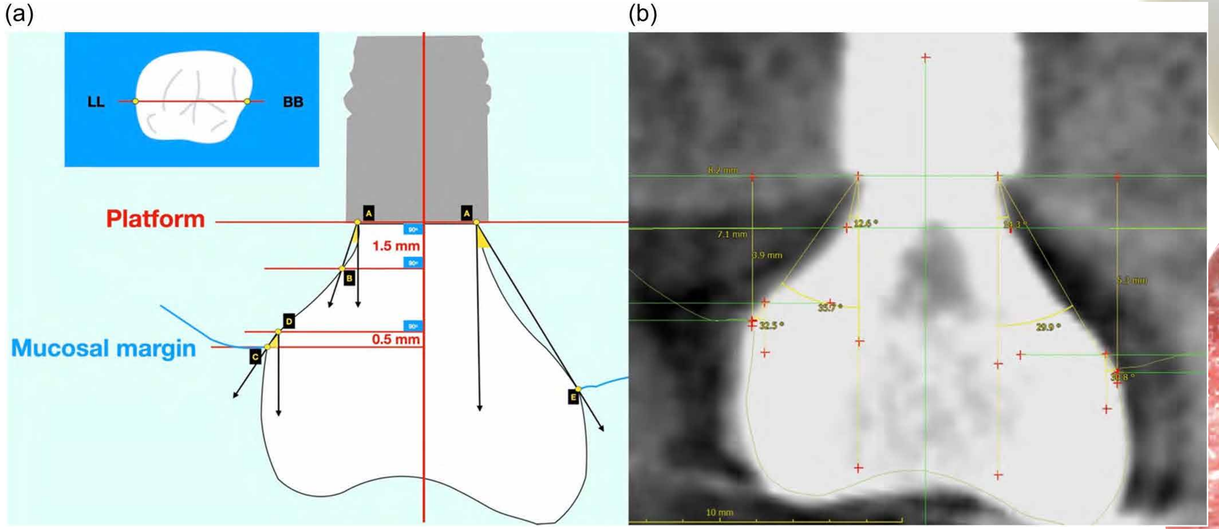
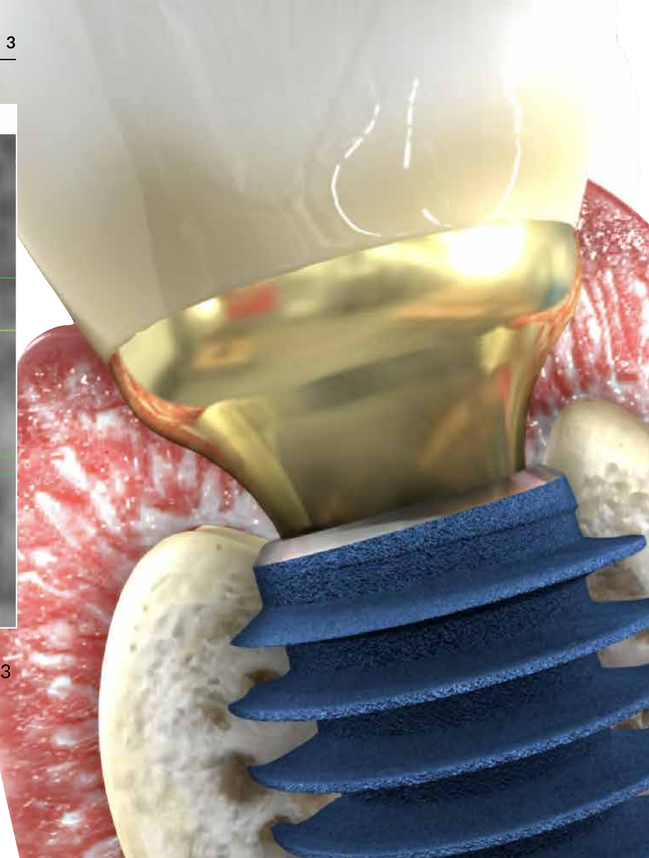


FIGURE 2 (a) Buccal—Palatal slice and definition of 4 horizontal planes perpendicular to implant axis, 5-points (A-E) and the respective 3 angles measured on each side (six sites per implant). (b) sample of actual radiographic measurement screen.

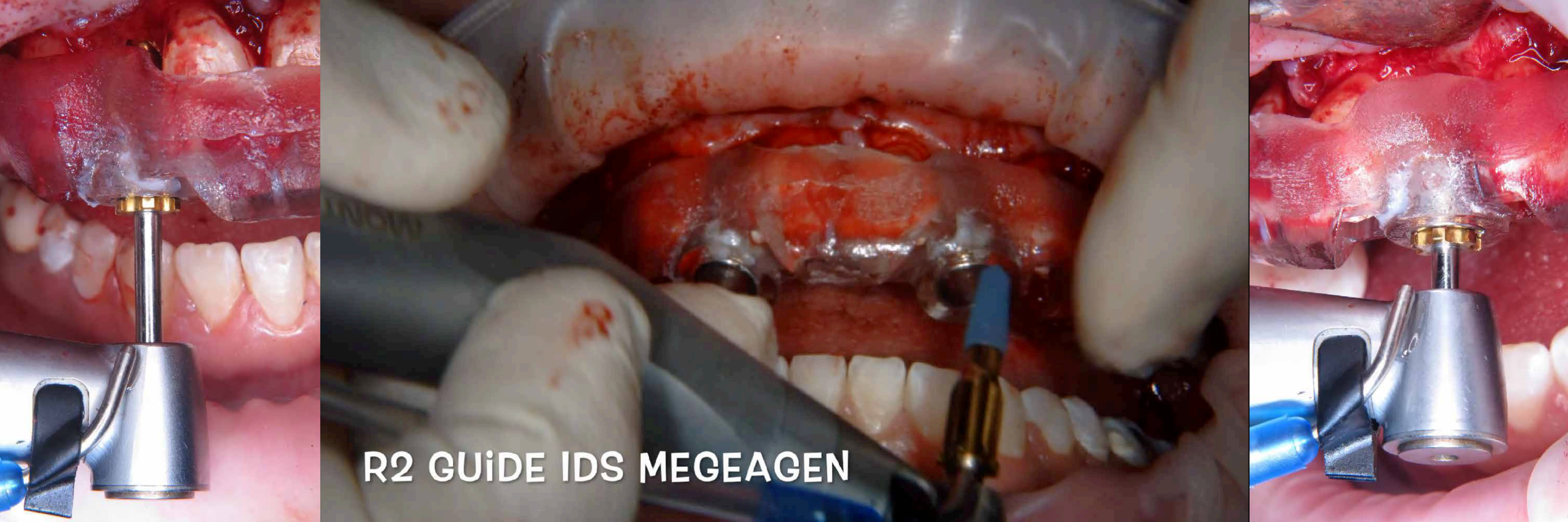
Conclusions: Maintaining MEA no wider than 30°–40° is advisable, while the aim should be to keep this angle as narrow as clinically feasible.



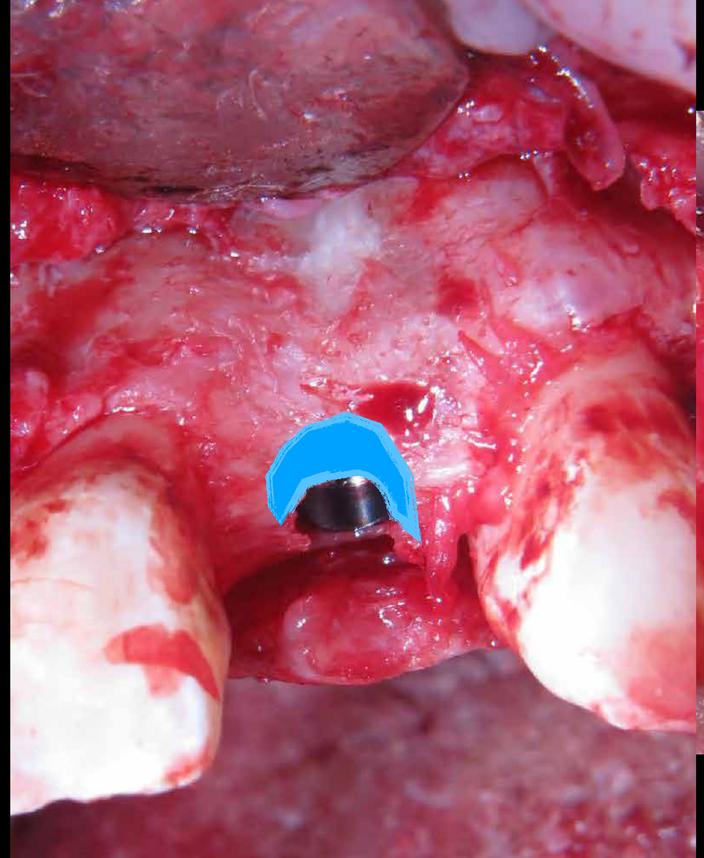

What has changed in
osteotomy preparation?

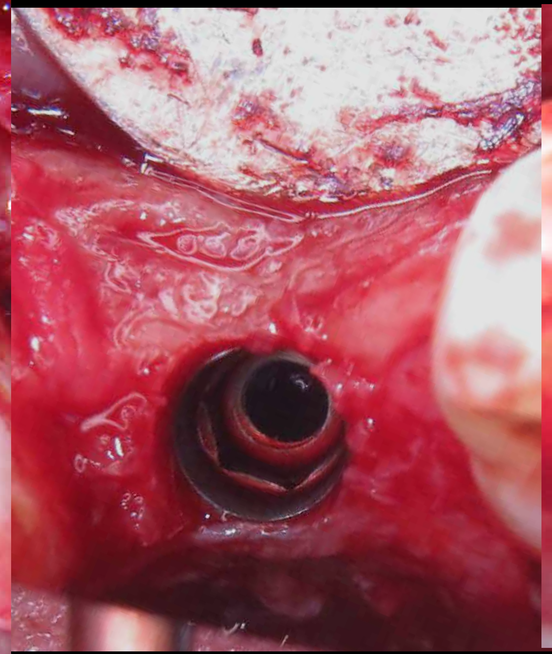
What has changed in osteotomy preparation?

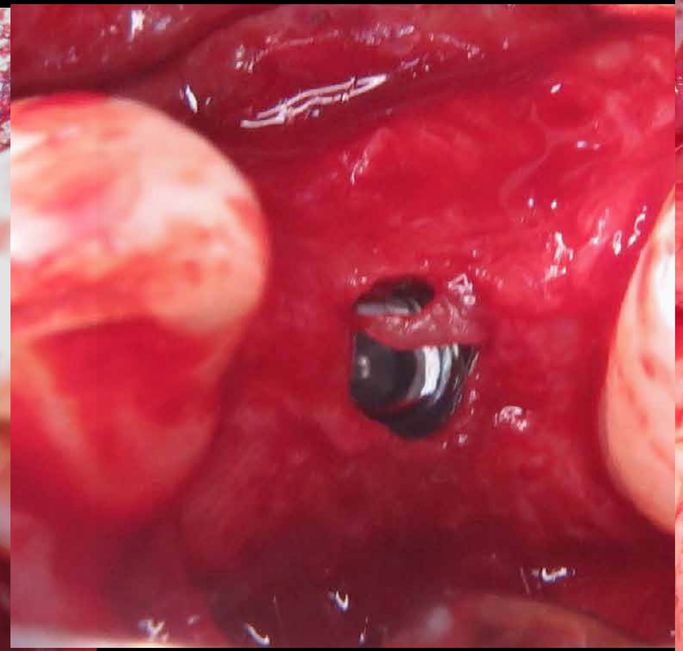
Not much has changed

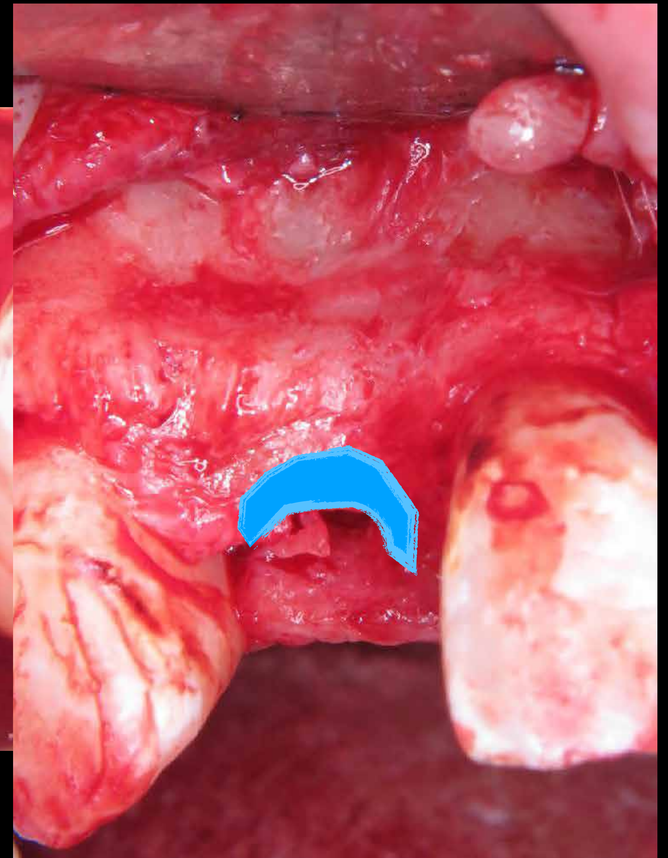

R2 GUIDE IDS MEGEAGEN

Lack of Profile

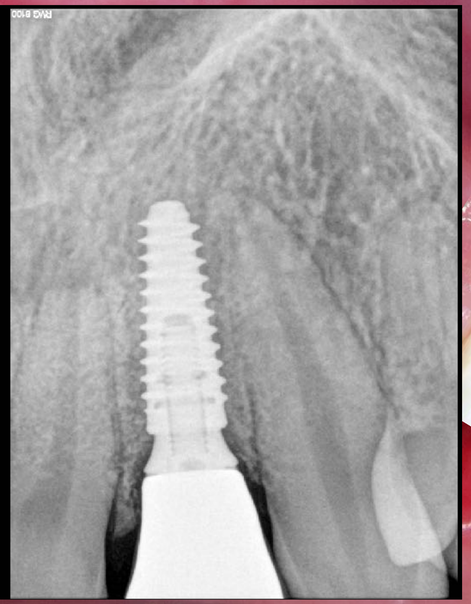






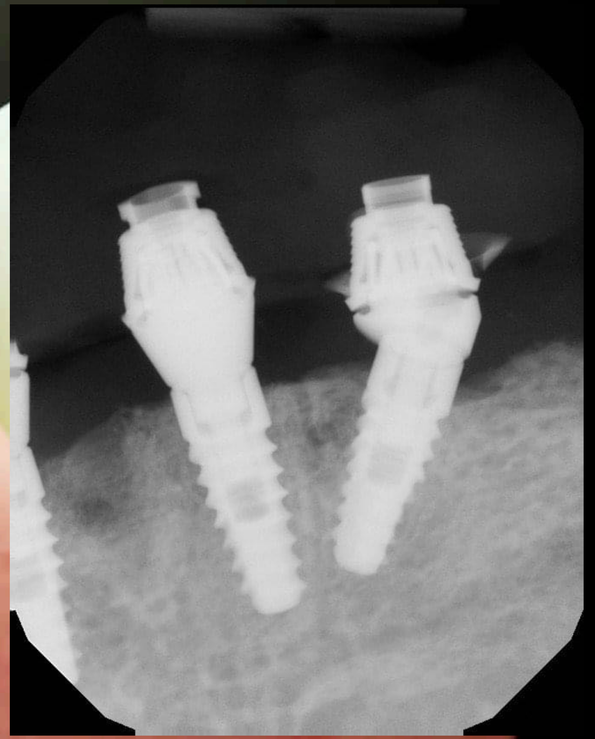


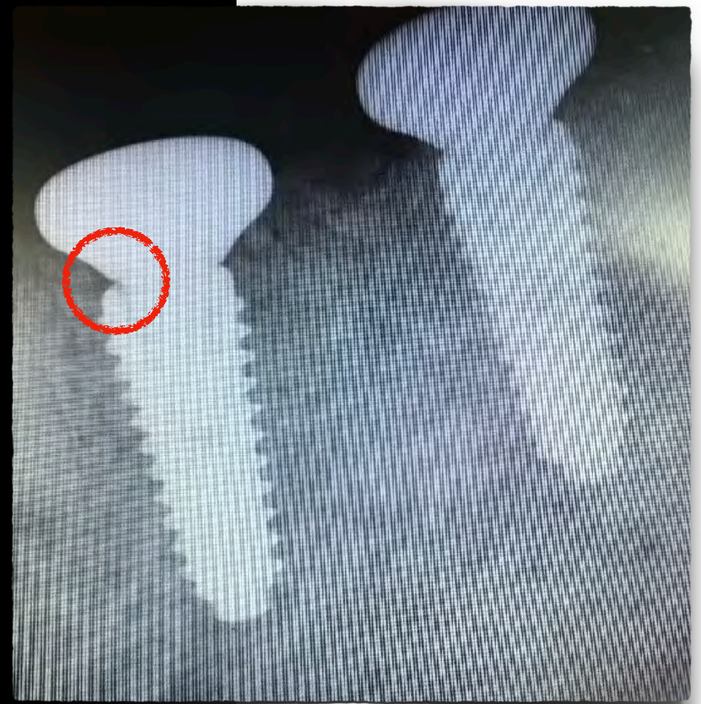

BONE PROFILE



7 YEAR POST OP

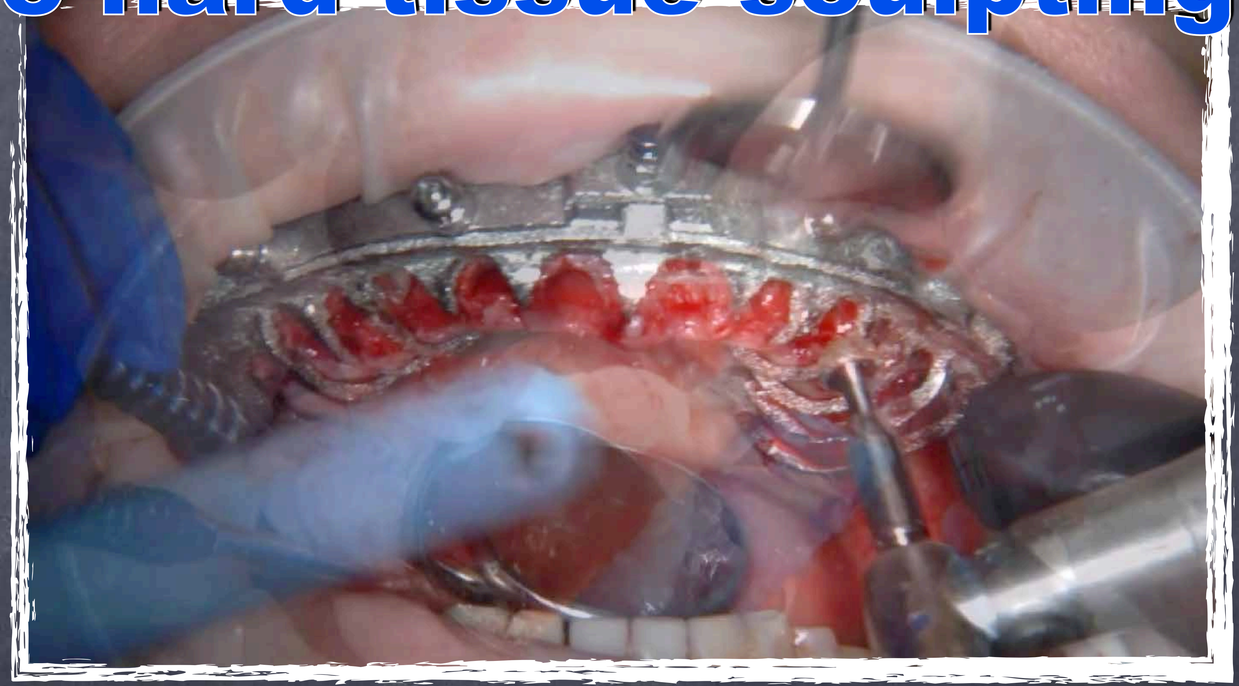
PSA regarding Smile Loc. These MUA's are very technique sensitive. I have been using Biohorizons forever and am profiling the same was I always did. If you look at x-ray # 1 the MUA at the day of surgery appears seated. The next pa is at 3 months post op. Notice the distal bone loss. The prosthesis w... See more





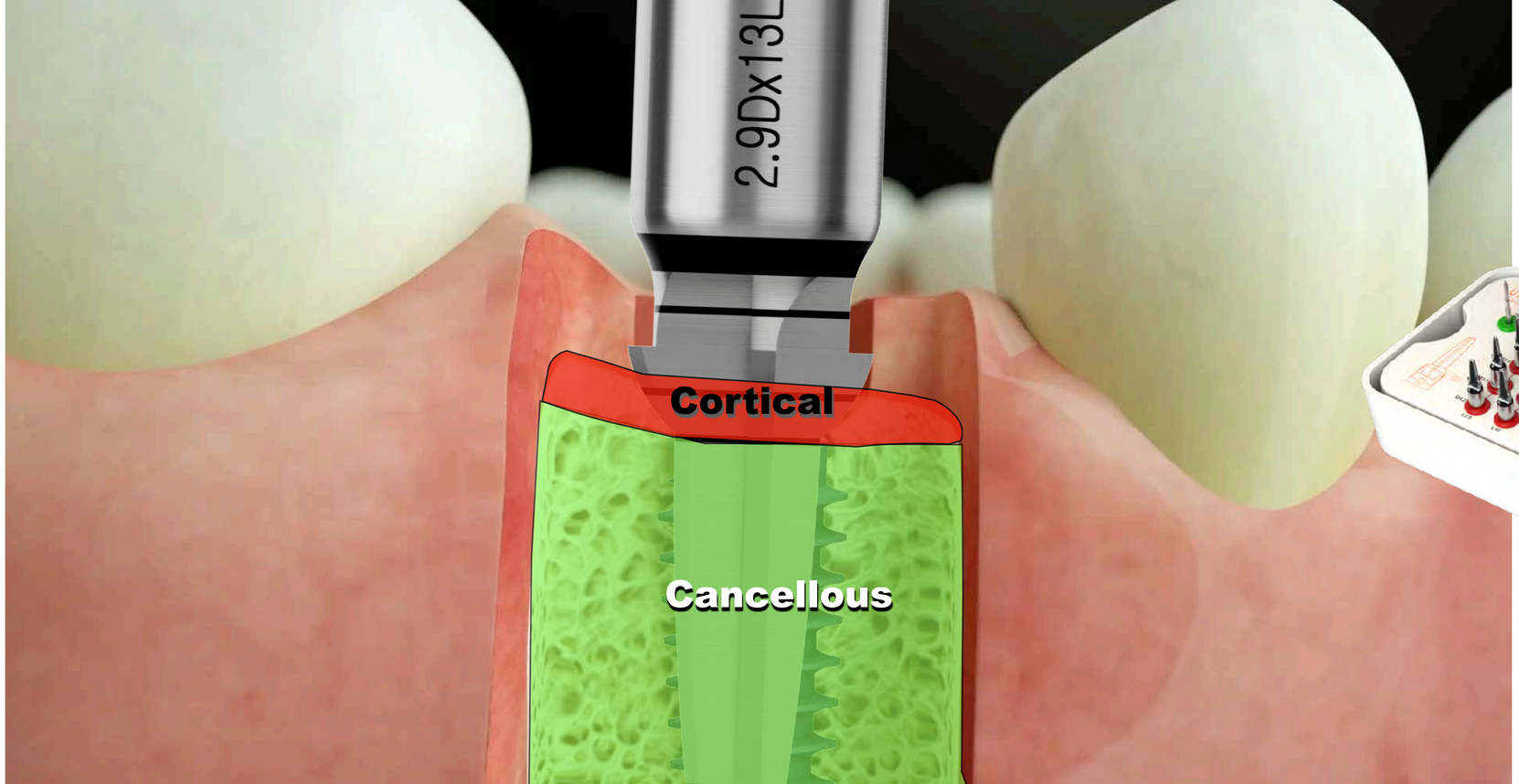
Lack of Bone Profiling - Incomplete Seating

New Concept - Anatomic hard tissue sculpting




2.9Dx11.5L
UNIVERSAL SHAPERS
PROFILE, SCULPT AND SCALLOP WITH PRECISION
UNIVERSAL SHAPERS
PROFILE, SCULPT AND SCALLOP WITH PRECISION
Cancellous


UNIVERSAL
SHAPERS
PROFILE, SCULPT AND SCALLOP WITH PRECISION
2.9Dx13L


2.9Dx13L
Cortical
Cancellous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Releasing Zone

Soft Tissue Outcome

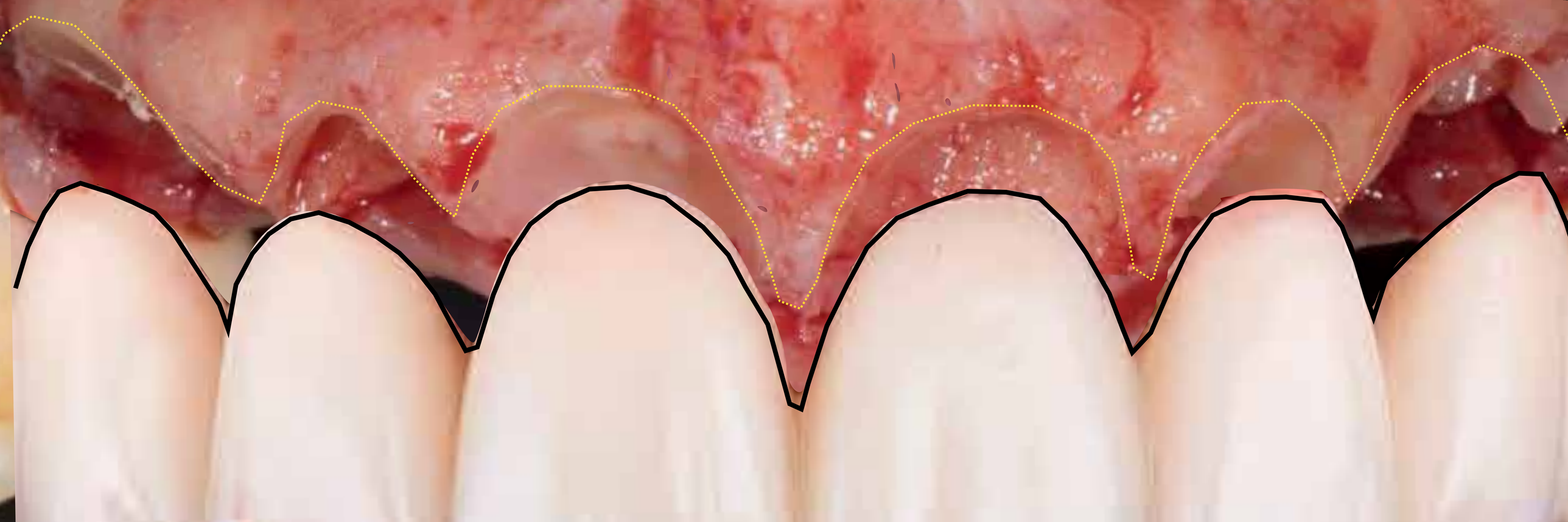

Ø7
Ø6
Ø5
BONE PROFILE


UNIVERSAL SHAPERS
Ø7

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

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

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

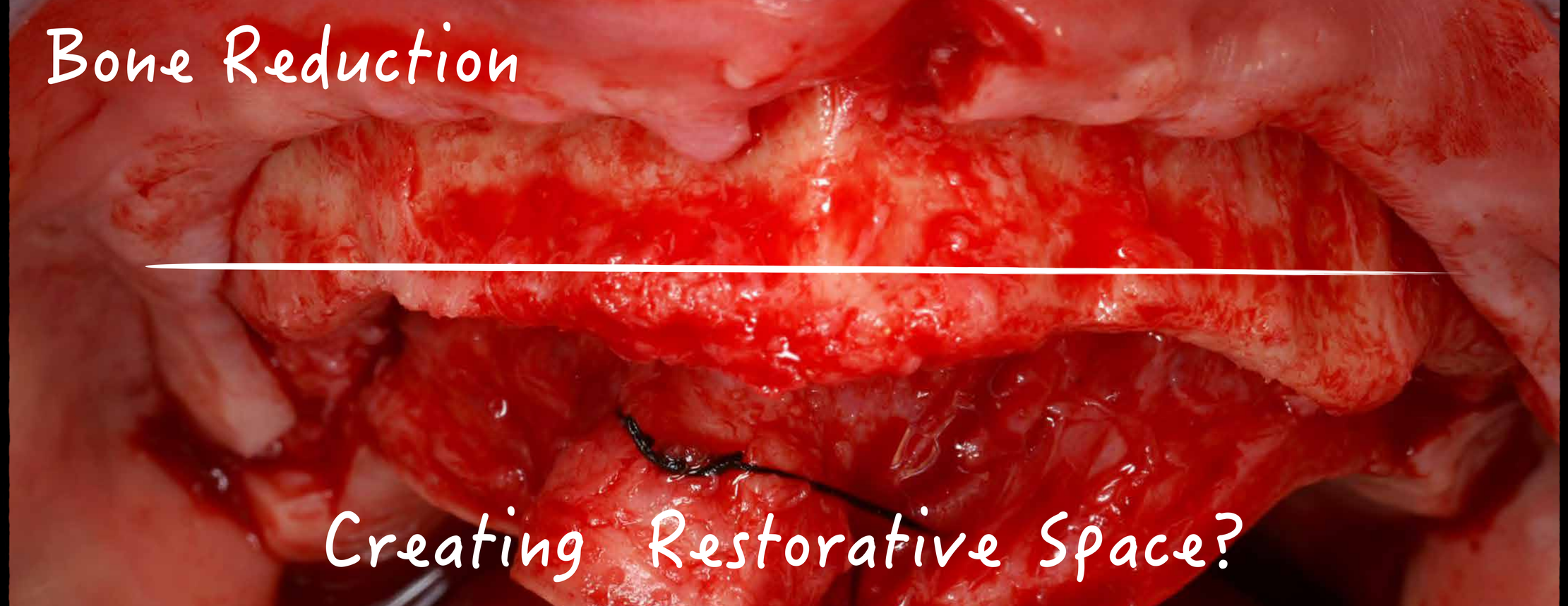



3.6 mm
2.5 mm
2.0 mm


TM

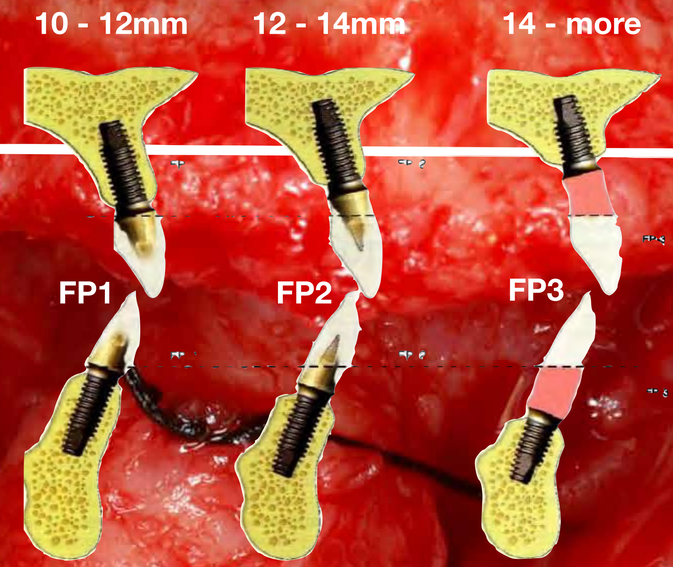
Bone Reduction

Creating Restorative Space?



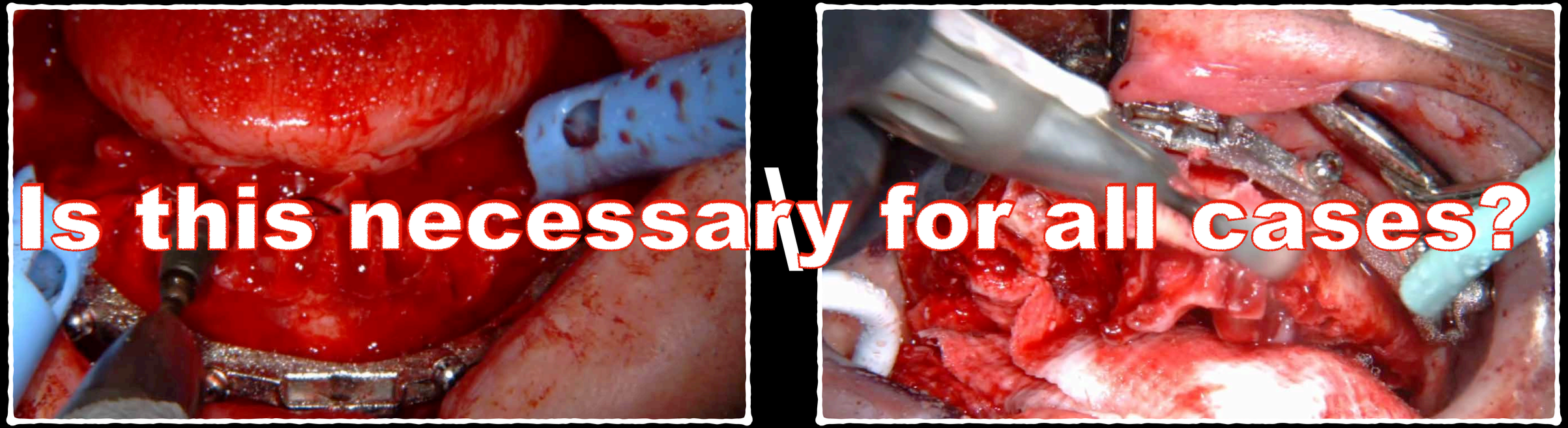
Bone Reduction

How much to reduce???



Creating Restorative Space?

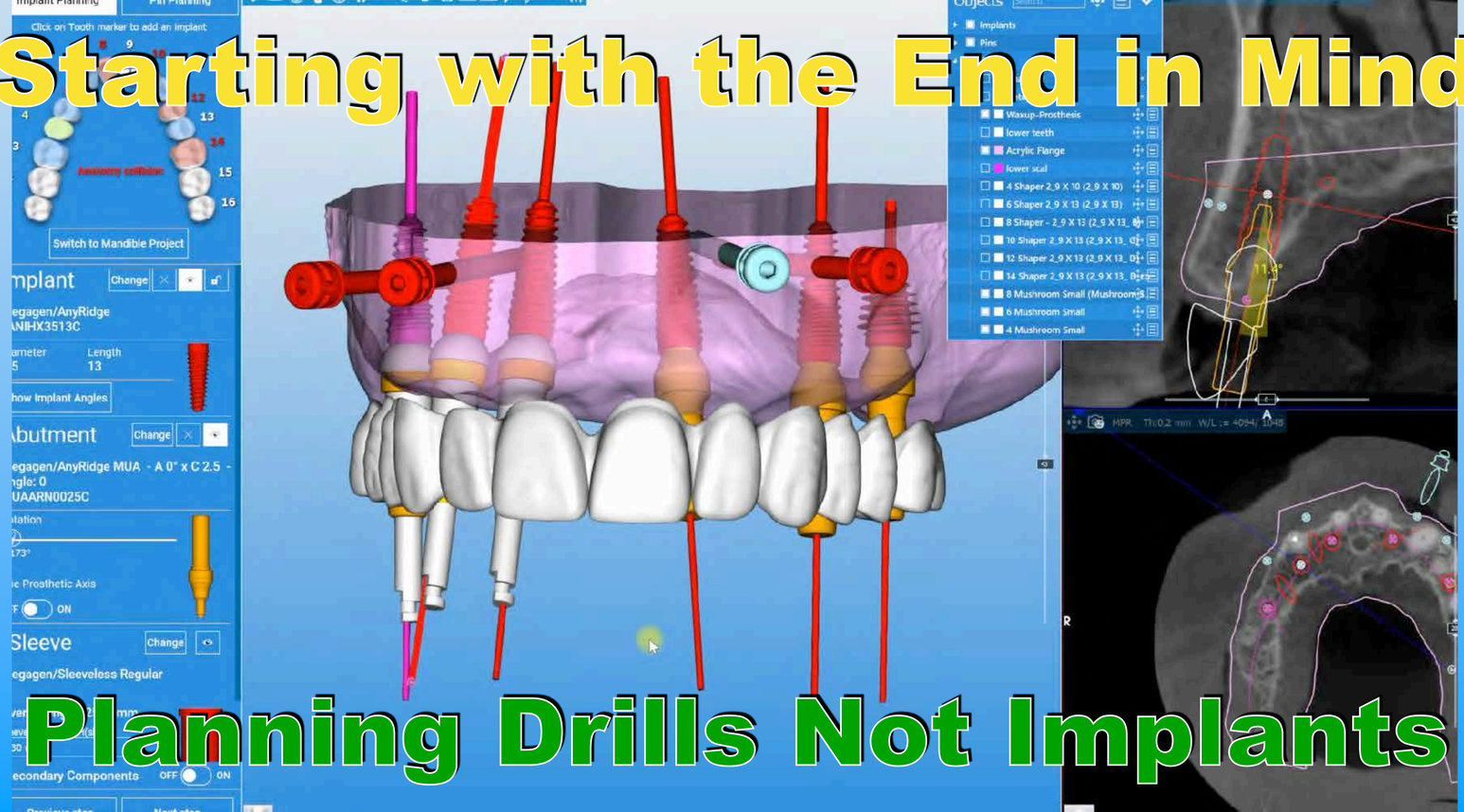
Or Biological width?


Is this necessary for all cases?

Starting with the End in Mind

Planning Drills

UNIVERSAL SHAPERS



Planning Drills Not Implants

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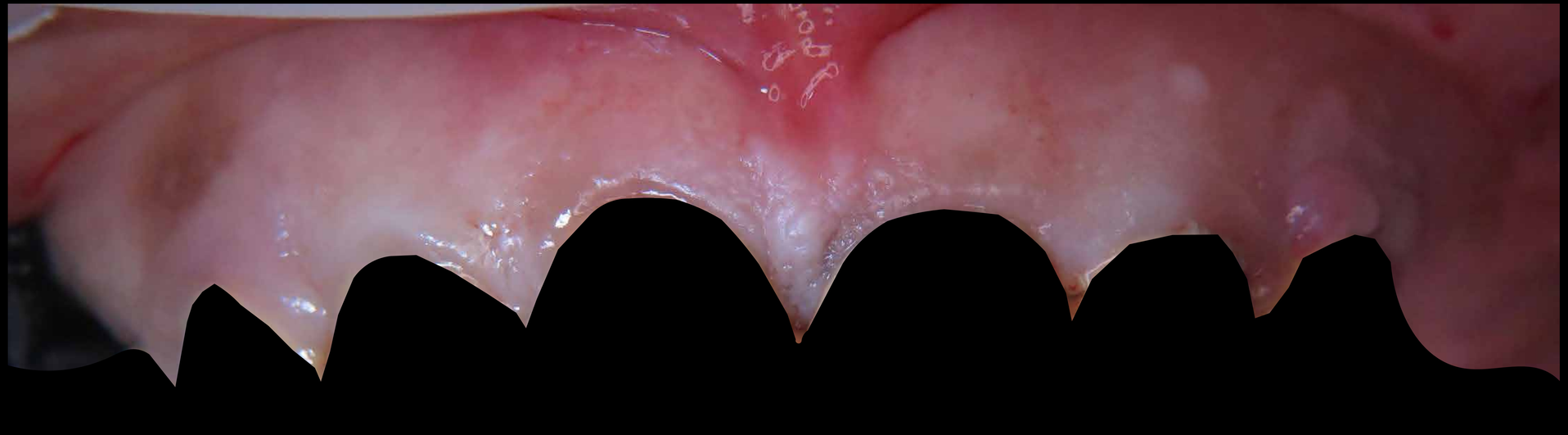
Scalloped suggested rules follow Tarnow's 5mm rule

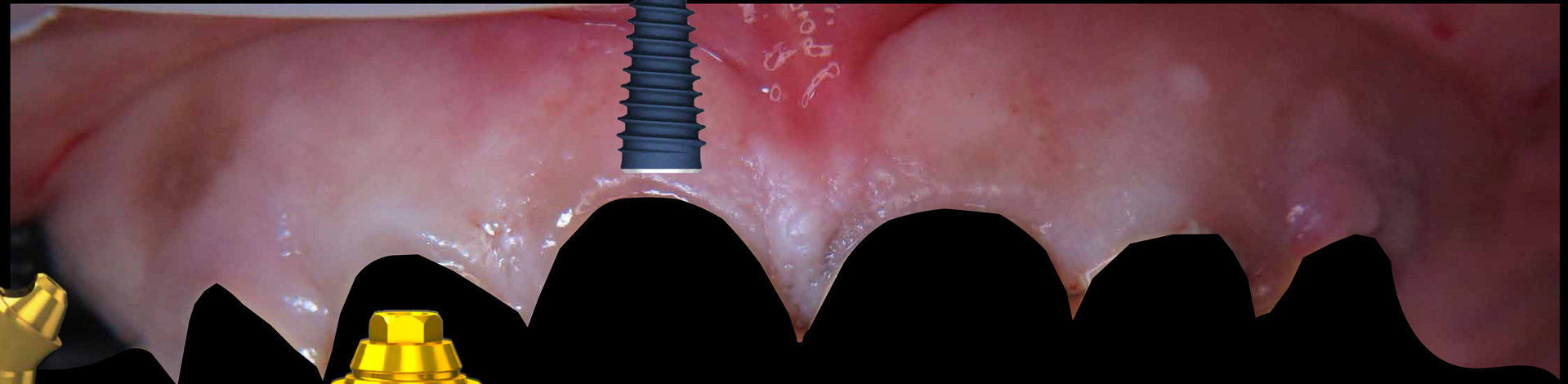
2-3 mm soft tissue height

MUA height

Prosthetic space

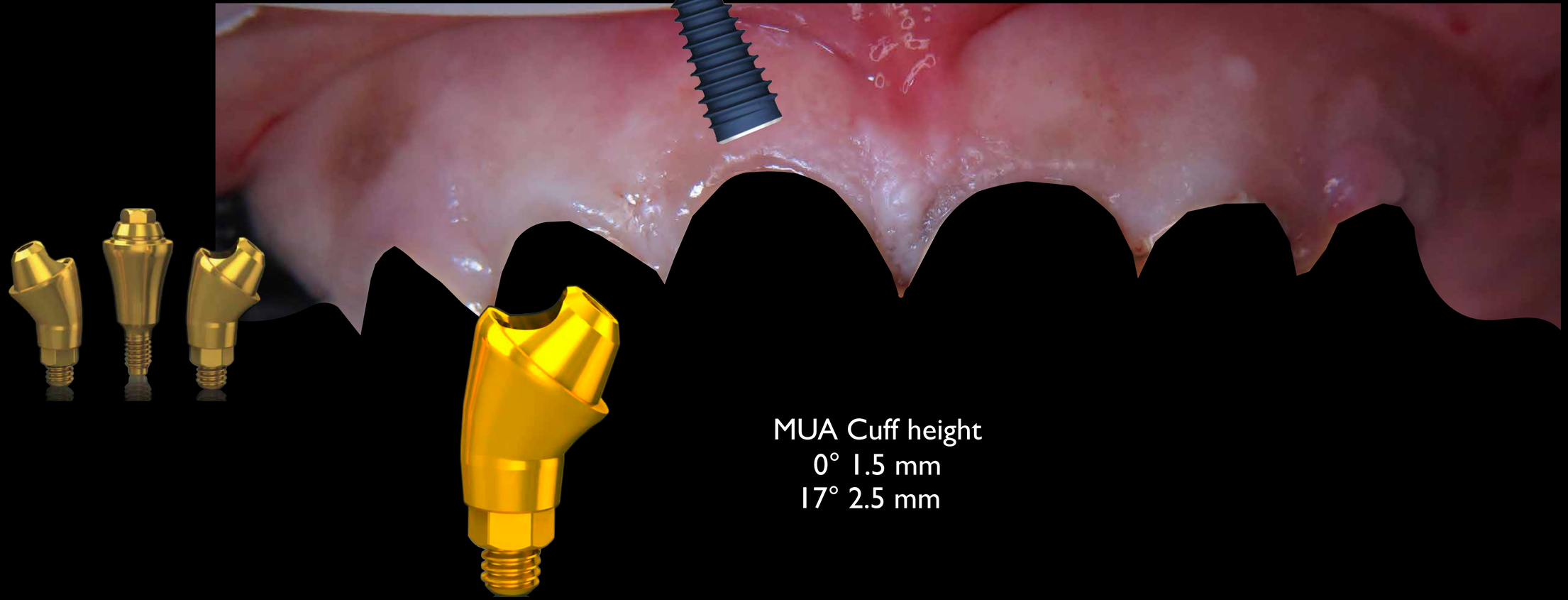


Create Scalloped Model 1-2mm?
dependent on smile line and esthetic concerns

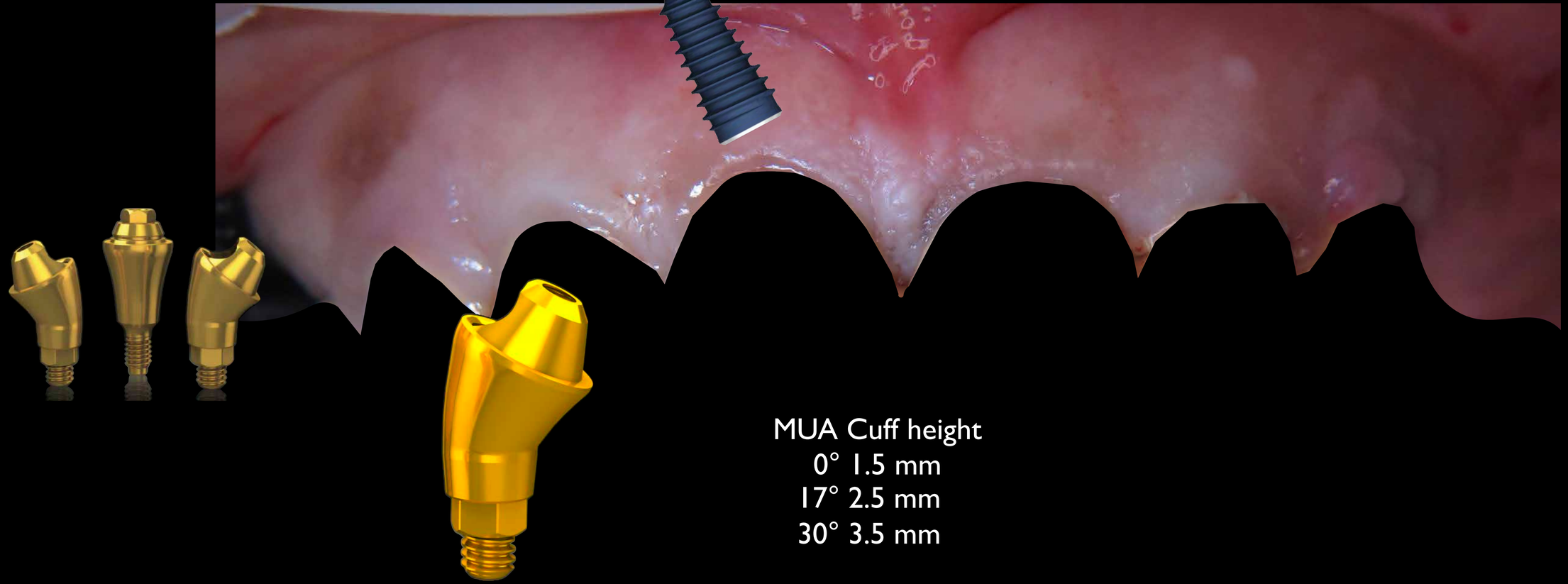


MUA Cuff height
0° 1.5mm

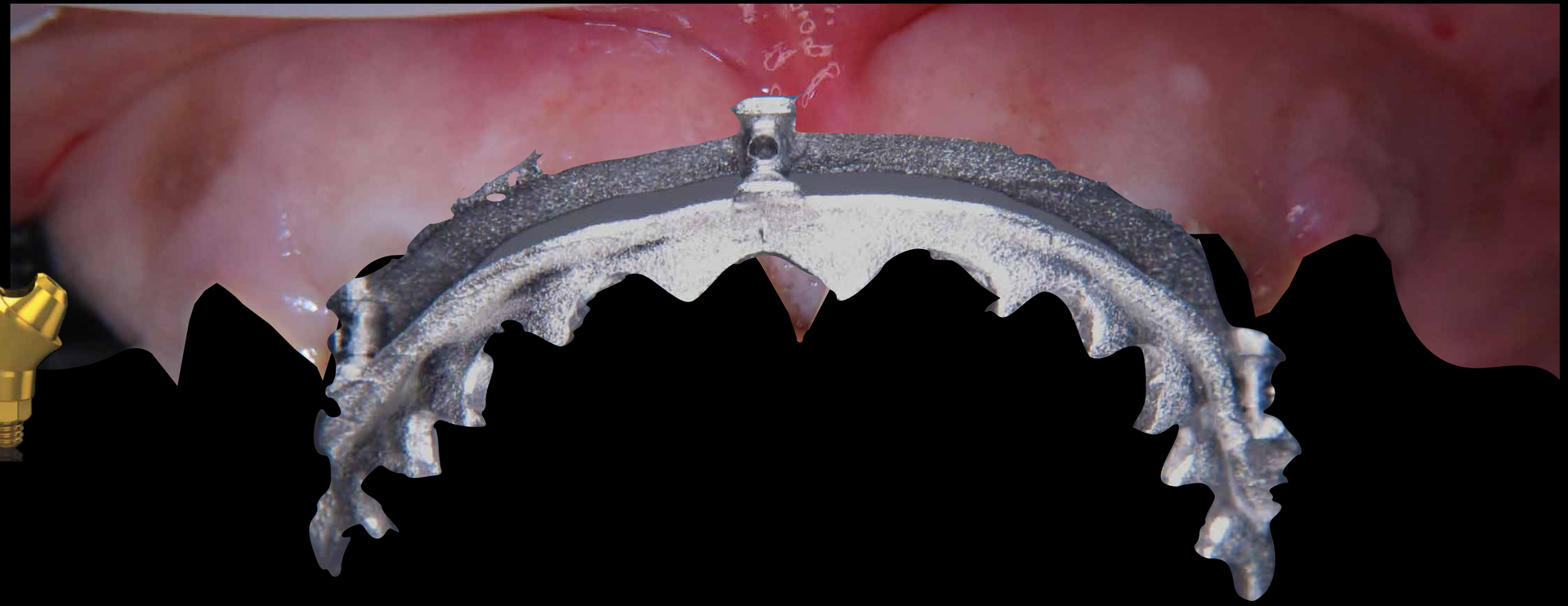
*implant company specific



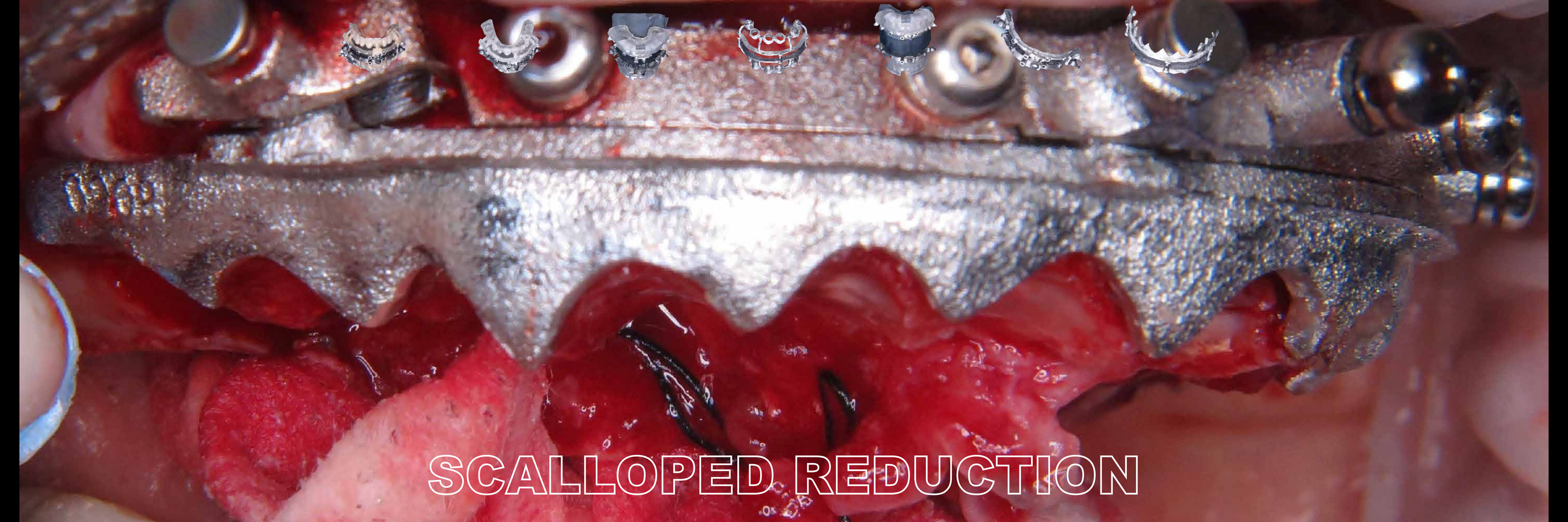
MUA Cuff height
0° 1.5 mm
17° 2.5 mm



MUA Cuff height
0° 1.5 mm
17° 2.5 mm
30° 3.5 mm

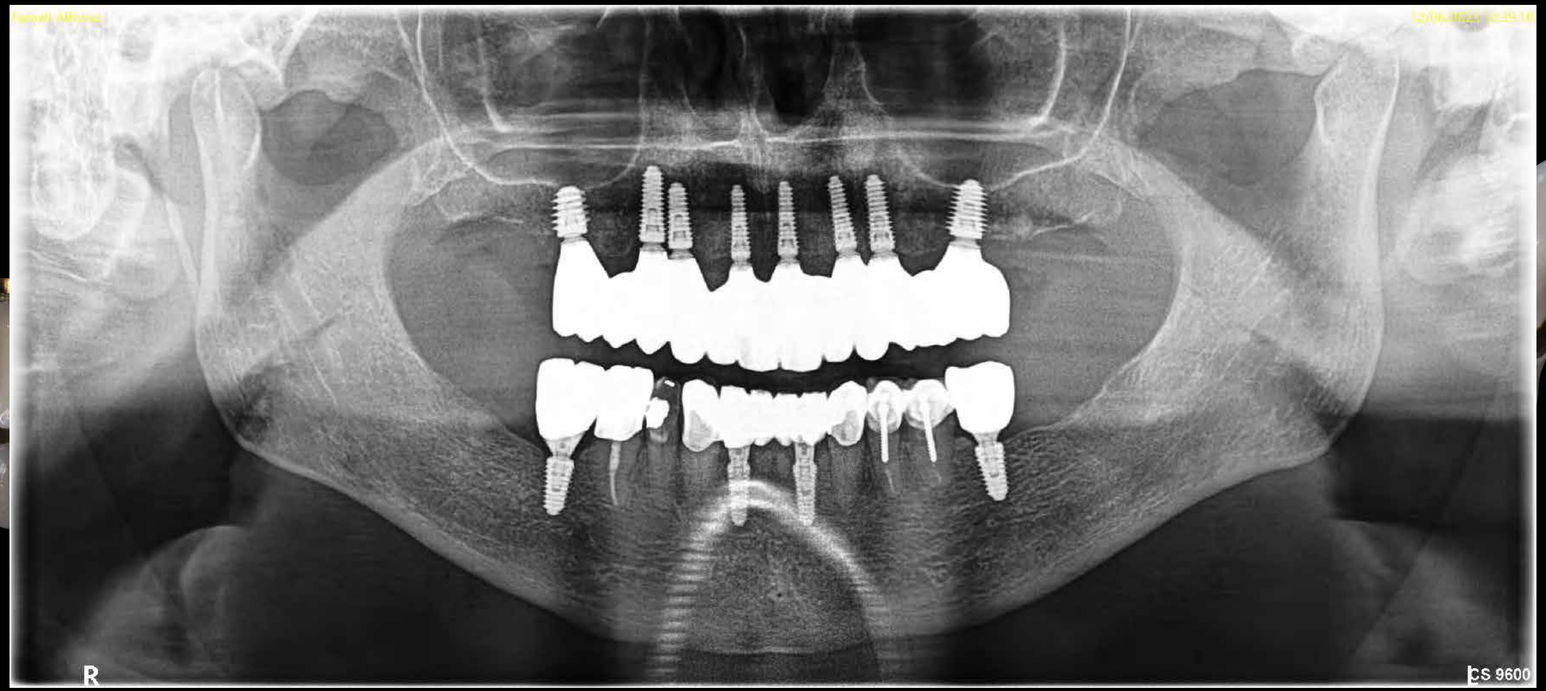


SCALLOPED REDUCTION

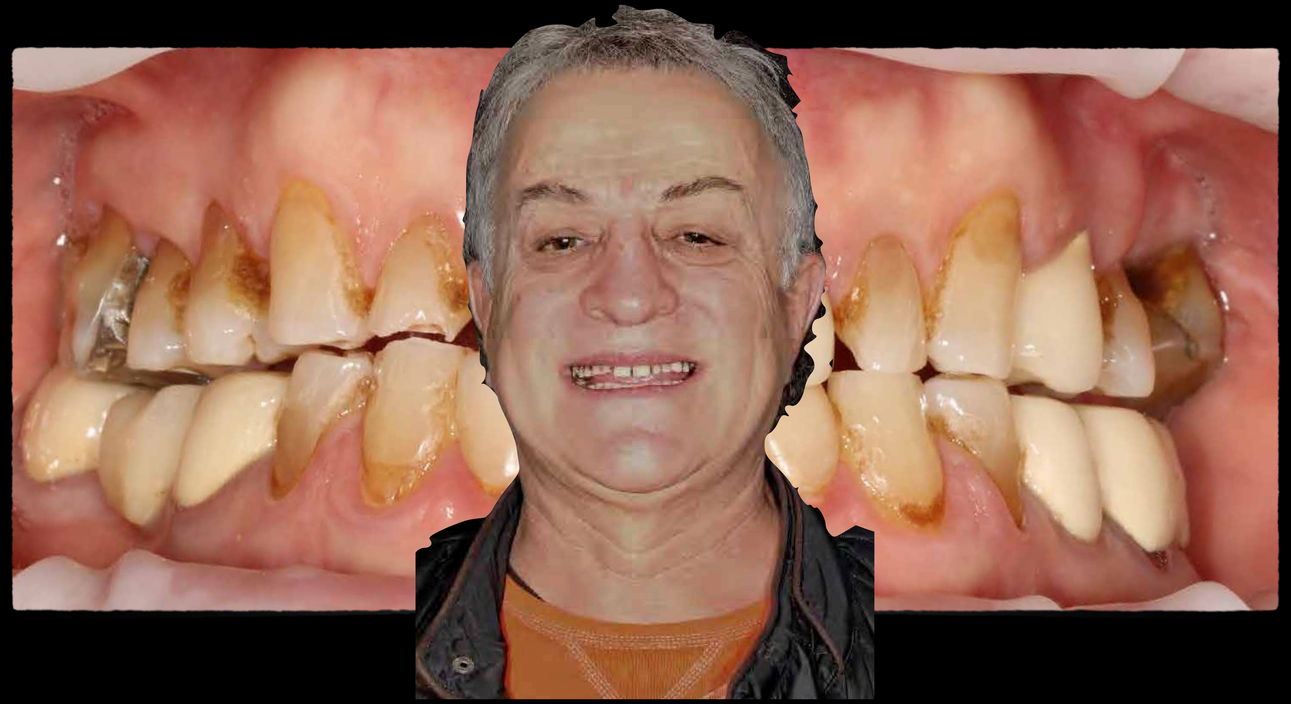

SCALLOPED REDUCTION

Finals

Finals



Partial Extraction Therapy



Extraction - Guide through tissue

Full Arch Stackable Surgical Guidance

US011576755B2

(12) **United States Patent**
Watson

(10) **Patent No.: US 11,576,755 B2**
(45) **Date of Patent: *Feb. 14, 2023**

(54) **FIXATION BASE AND GUIDES FOR DENTAL PROSTHESIS INSTALLATION**

(71) Applicant: **Jason Watson**, La Canada, CA (US)

(72) Inventor: **Jason Watson**, La Canada, CA (US)

(73) Assignee: **Watson Guide IP LLC**, Pasadena, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **17/670,362**

(22) Filed: **Feb. 11, 2022**

(65) **Prior Publication Data**

US 2022/0160473 A1 May 26, 2022

Related U.S. Application Data

(63) Continuation of application No. 17/503,359, filed on Oct. 18, 2021, which is a continuation of application (Continued)

(51) **Int. Cl.**
A61C 8/00 (2006.01)
A61C 13/225 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61C 8/0053*** (2013.01); ***A61C 13/04*** (2013.01); ***A61C 8/0048*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC ... A61C 8/0055; A61C 8/0048; A61C 8/0068; A61C 8/0087; A61C 8/0095;
(Continued)

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(Continued)

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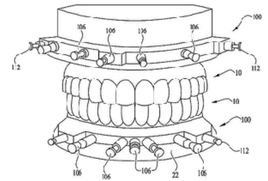
Zehat et al., WO 2010/01124 A1, Jan. 3, 2010 (Year: 2010).*
(Continued)

Primary Examiner — Ralph A Lewis
Assistant Examiner — Mirayda A Aponte
(74) *Attorney, Agent, or Firm* — James A. Italia; Italia IP

(57) **ABSTRACT**

Apparatus and method for installing a multi-tooth dental prosthesis in one session are shown and described. A first tool attaches to the jawbone, and serves as a foundation for subsequently used guides. Existing teeth and dental fixtures are removed, and the bone tissue is removed to accommodate the prosthesis. Subsequently, a drill guide is used to drill implant holes. An abutment guide is then used to place abutments. Copings are then installed. Next, the prosthesis may be installed and cemented to the copings. A resinous filler material may be applied to fill gaps and holes in and between the copings and the prosthesis, and is sanded smooth.

17 Claims, 19 Drawing Sheets



Partial Extraction Therapy

Flap to reduce to bone level

Extraction - Guide through tissue

Extractions due to mobility

Partial Extraction Therapy


CONTINUING EDUCATION

dentaltoday.com

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

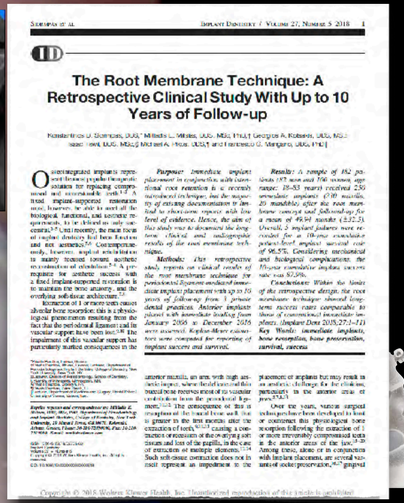
Effective Date: 10/01/17 Expiration Date: 10/31/20

About the Author

INTRODUCTION

DENTISTRY TODAY

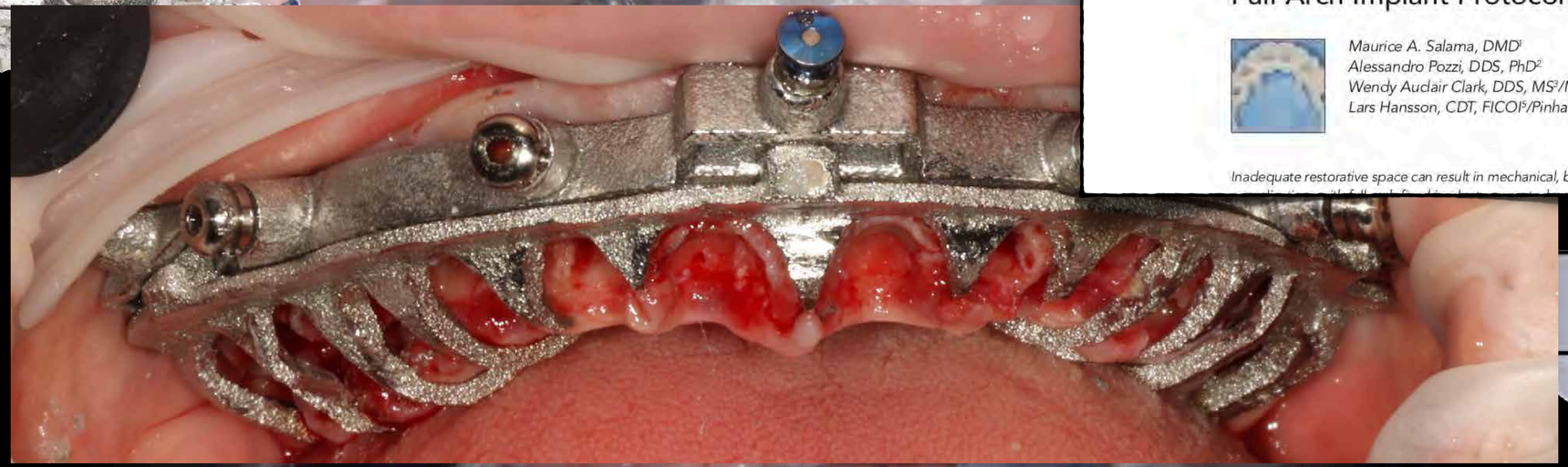
Treating Facial Trauma


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

Flap to reduce to bone level

Scalloping with guide

Scalloping Freehanded



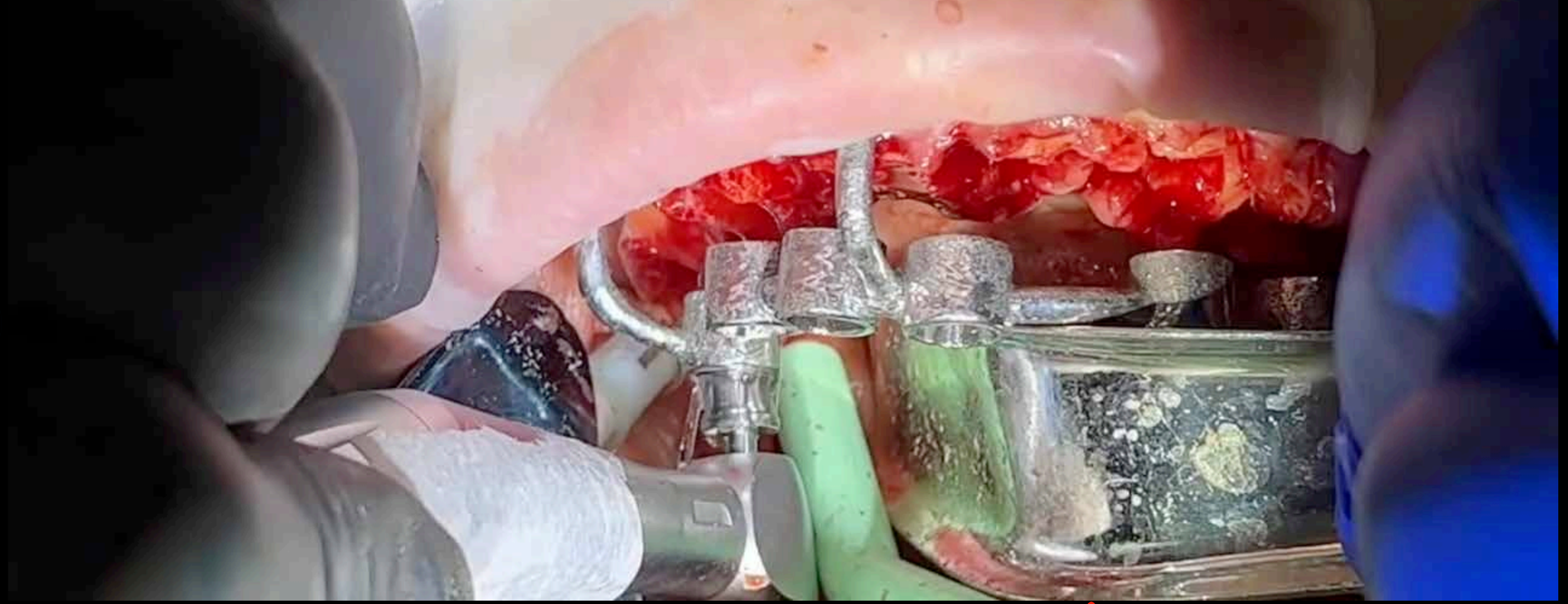
The "Scalloped Guide":
A Proof-of-Concept Technique for a Digitally Streamlined, Pink-Free Full-Arch Implant Protocol

Maurice A. Salama, DMD[1]
Alessandro Pozzi, DDS, PhD[2]
Wendy Auclair Clark, DDS, MS[3]/Marko Tadros, DMD[4]
Lars Hansson, CDT, FICOI[5]/Pinhas Adar, MDT, CDT[6]

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

Scalloping

Surgical



Guidance

UNIVERSAL SHAPERS Alveolar Sculpting--Emergence Profile

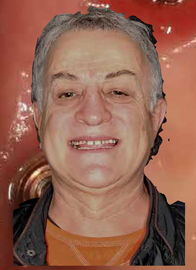
FP1

2 week post op

Scalloped

FP1

PET



Extraction


Deliver


FP1


Changing lives one smile at a time

SURGERY AND SAME DAY PRINT?

SHINING3D | New order | Scan | Pre-design | Send

Screen Record
Screenshot
Find Screenshot

Order Information

ID: 014
Create Time: 1/15/24 12:51 PM

Patient Name*: Marsed Dickerson

Doctor: isaac tawil/iketawil@

Type: FirstVisit / FollowUp

Dentistry Type: Aesthetics / Maxillofacial / Orthodontics

Notes:
Shade: None.
Additional comment: None.

Functional module

Face Scan

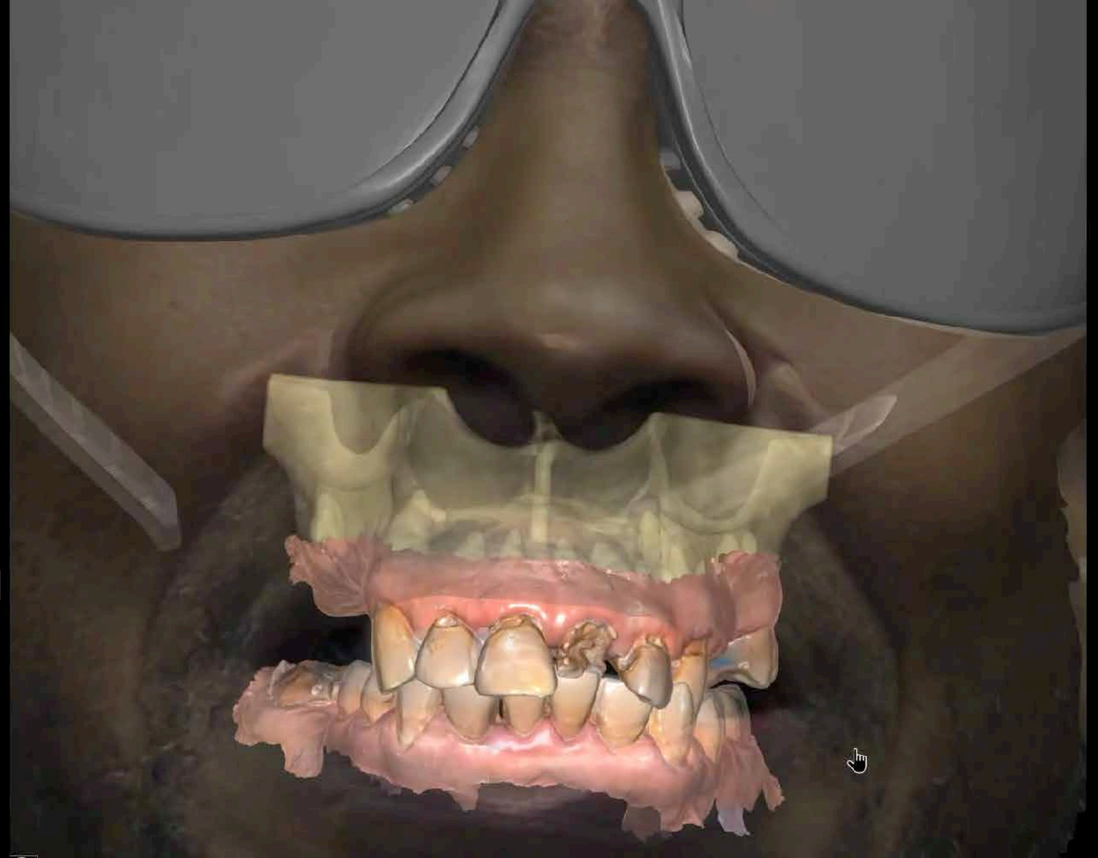
Data

import Intraoral data

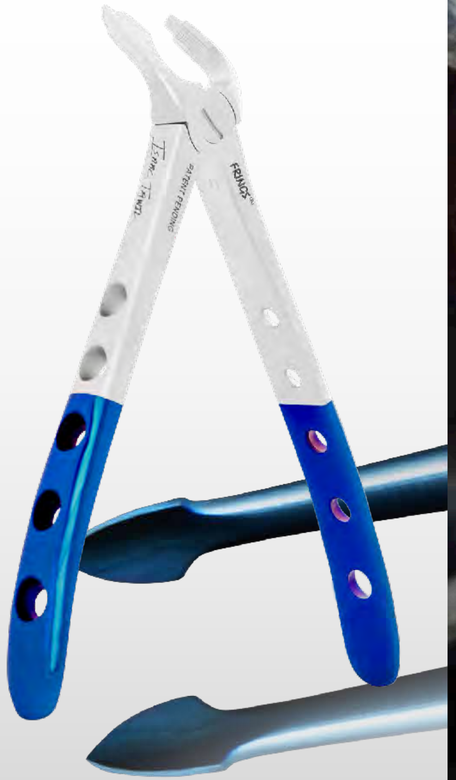
+ Import DICOM data

Back | Explore | Save | Scan

IMPORT
FS/CBCT
SEGMENT



PLAN
DESIGN
IOS/SG



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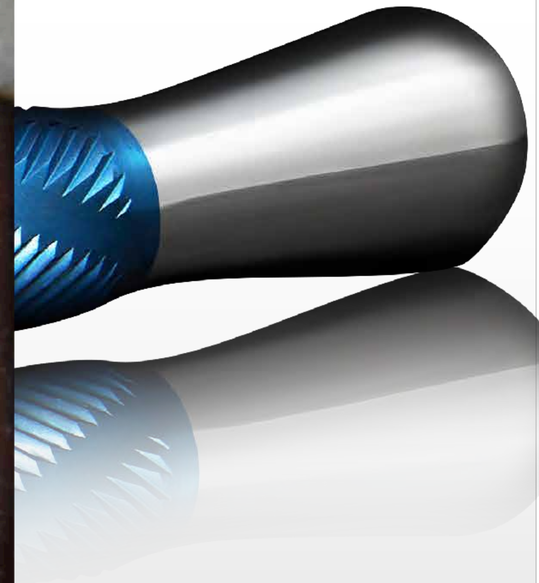

TBS DENTAL

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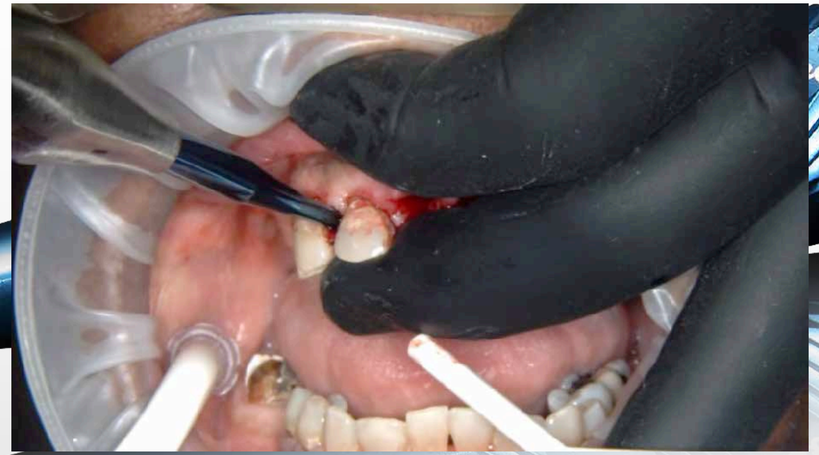
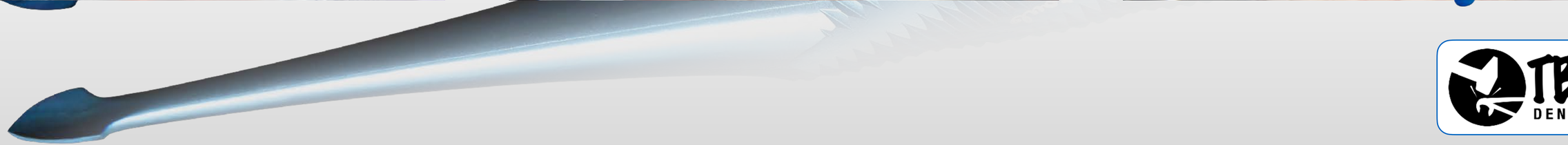
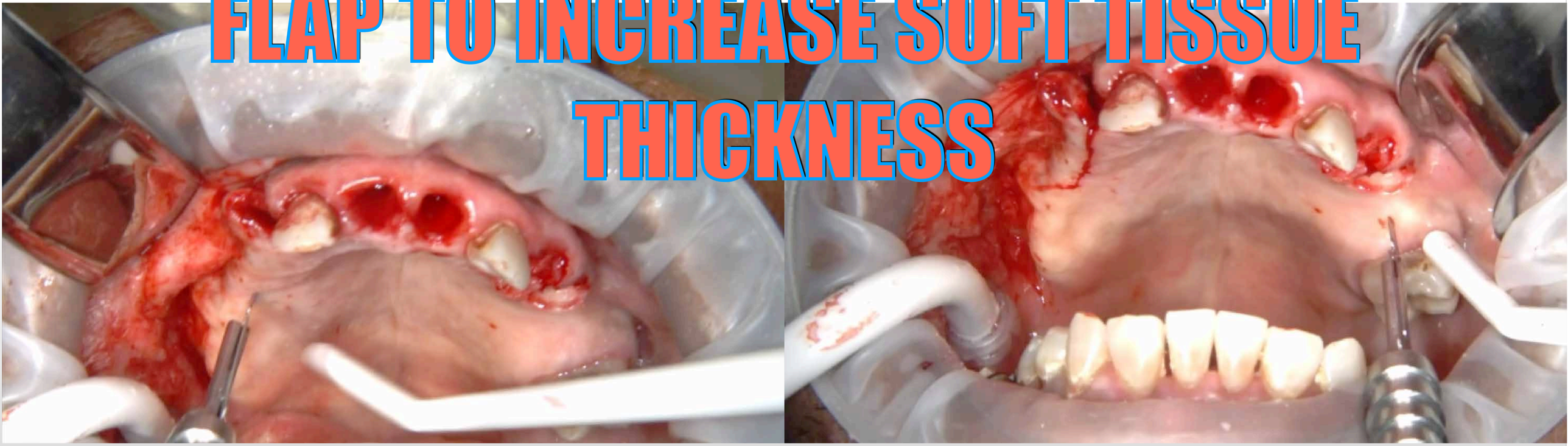




TBS DENTAL

FLAP TO INCREASE SOFT TISSUE THICKNESS

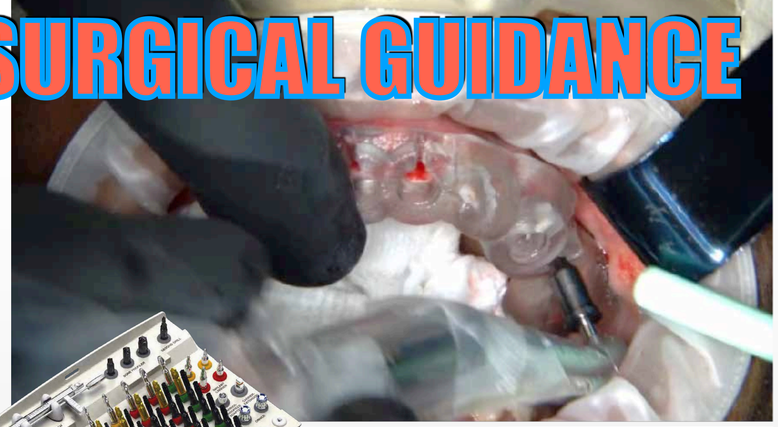


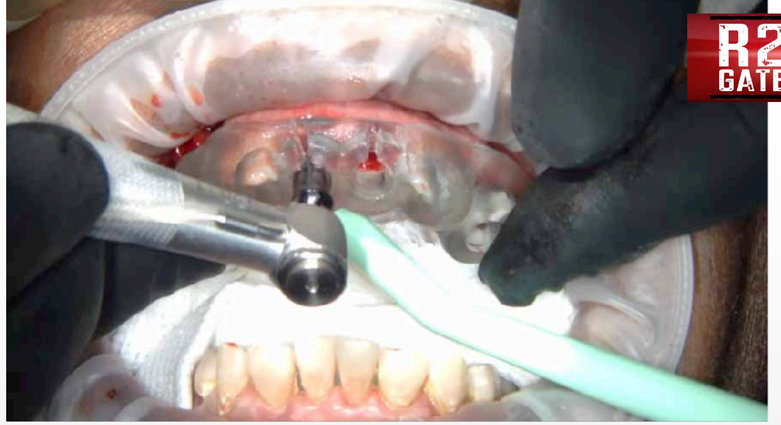
SURGICAL GUIDANCE

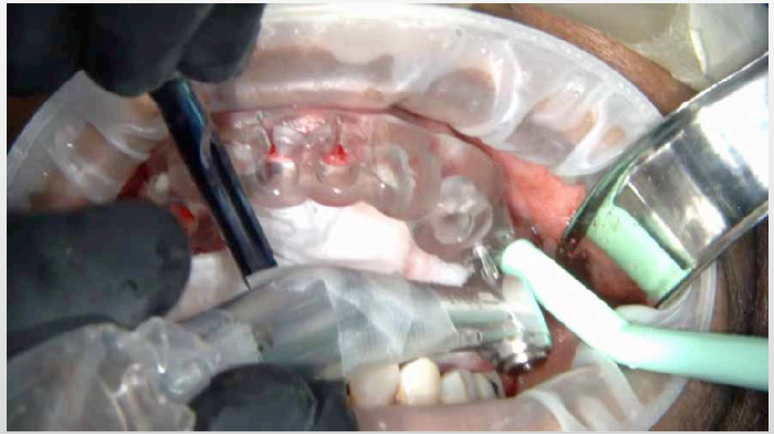
BLUEDIAMOND
IMPLANT

R2 GATE

SURGICAL GUIDANCE



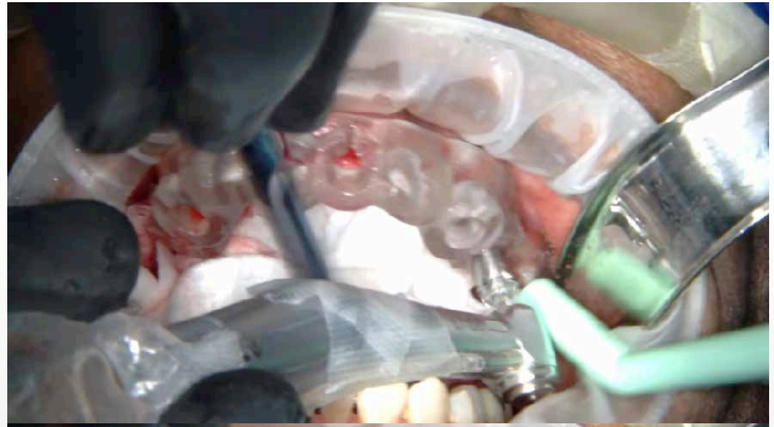


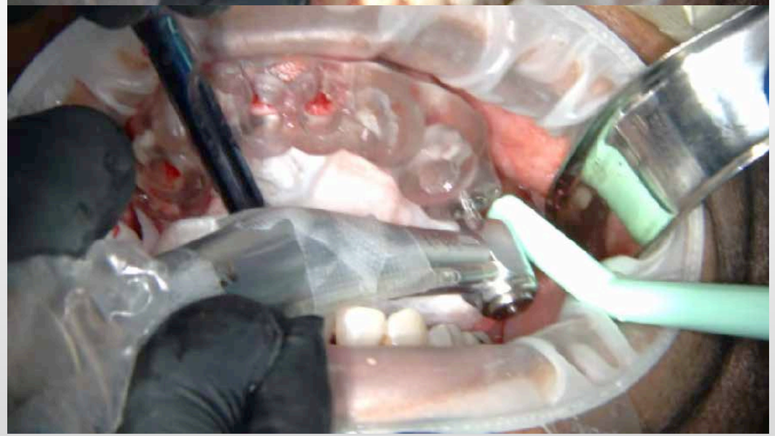


R2 GATE

BLUEDIAMOND

IMPLANT



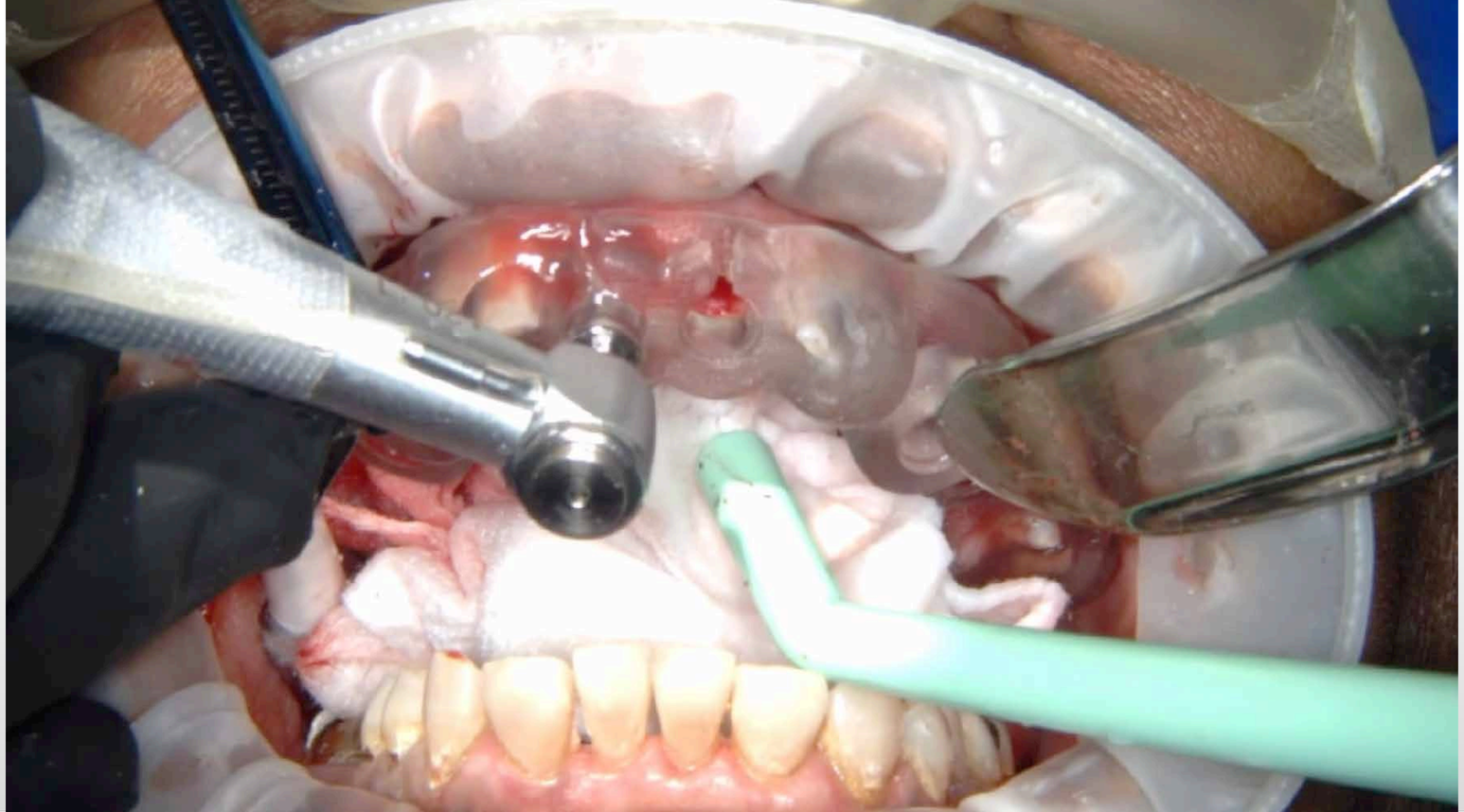


UNIVERSAL SHAPERS

PROFILE, SCULPT AND SCALLOP WITH PRECISION

UNIVERSAL SHAPERS

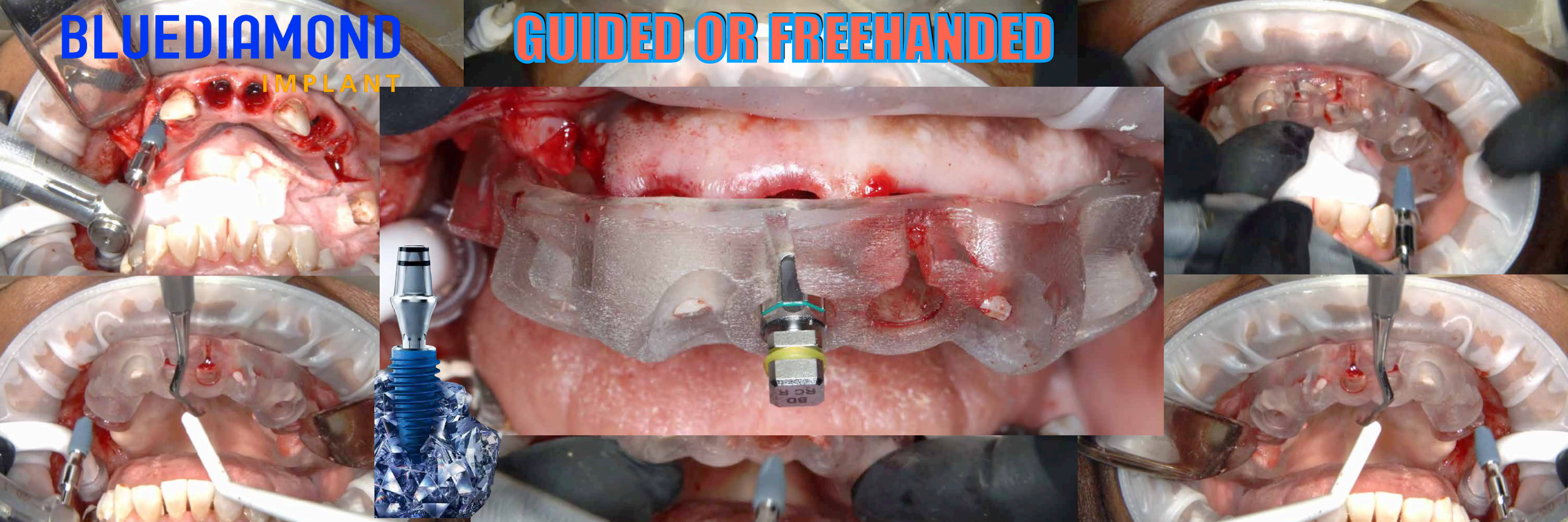
PROFILE, SCULPT AND SCALLOP WITH PRECISION



BLUEDIAMOND

IMPLANT

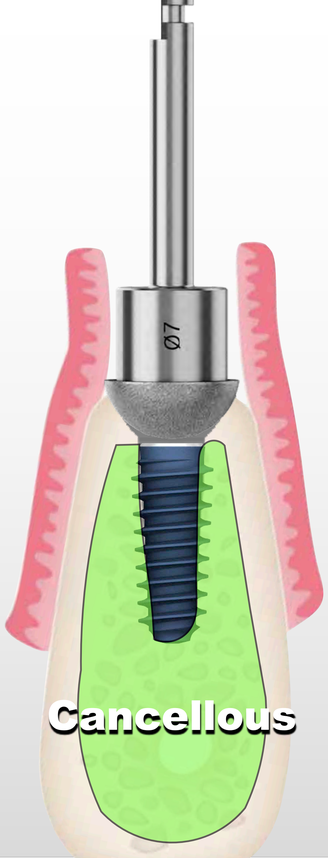
GUIDED OR FREEHANDED



UNIVERSAL SHAPERS

PROFILE, SCULPT AND SCALLOP WITH PRECISION

SCALLOPPING



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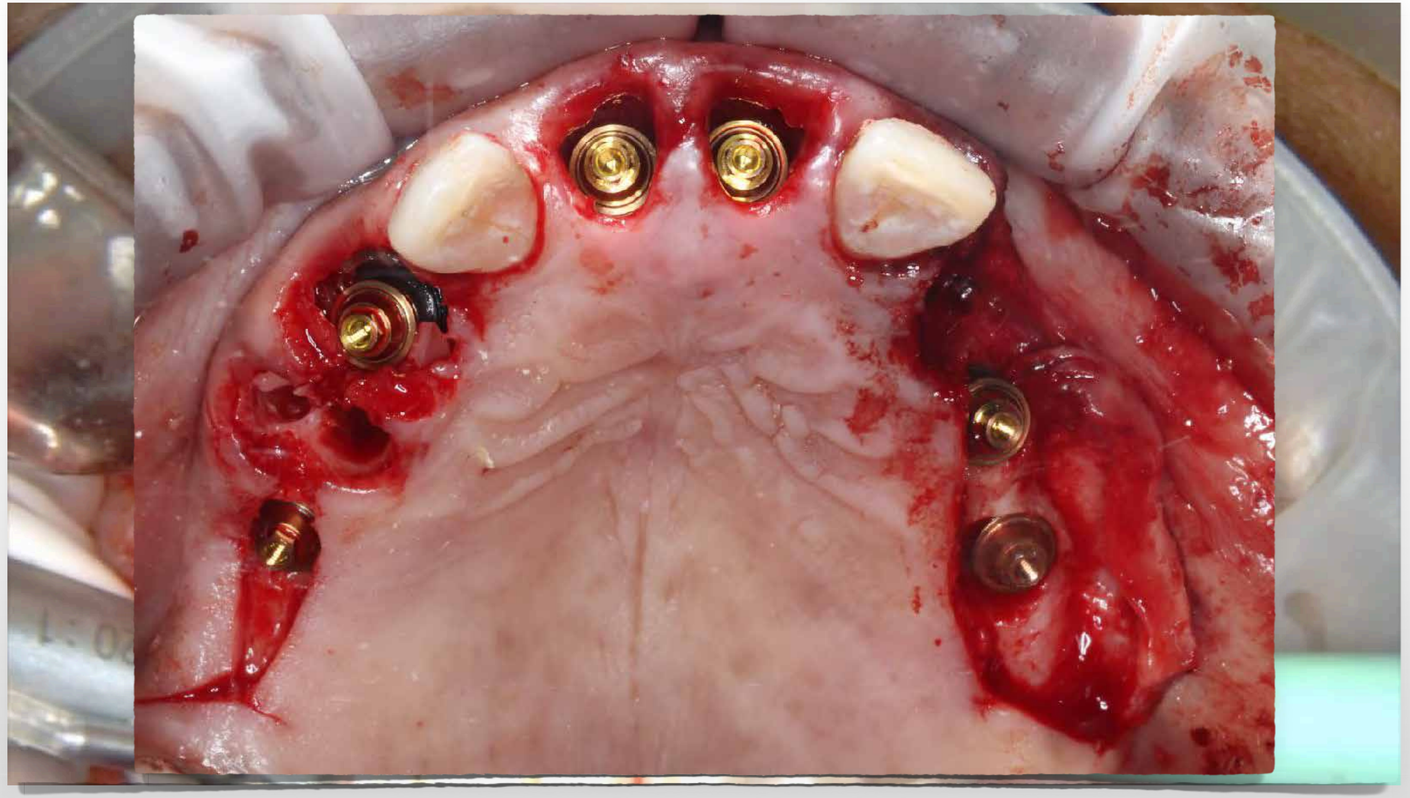


ArchBridge™

SHINING3D

New order
Marsed Dickerson

Scan
In Progress

Pre-design
-

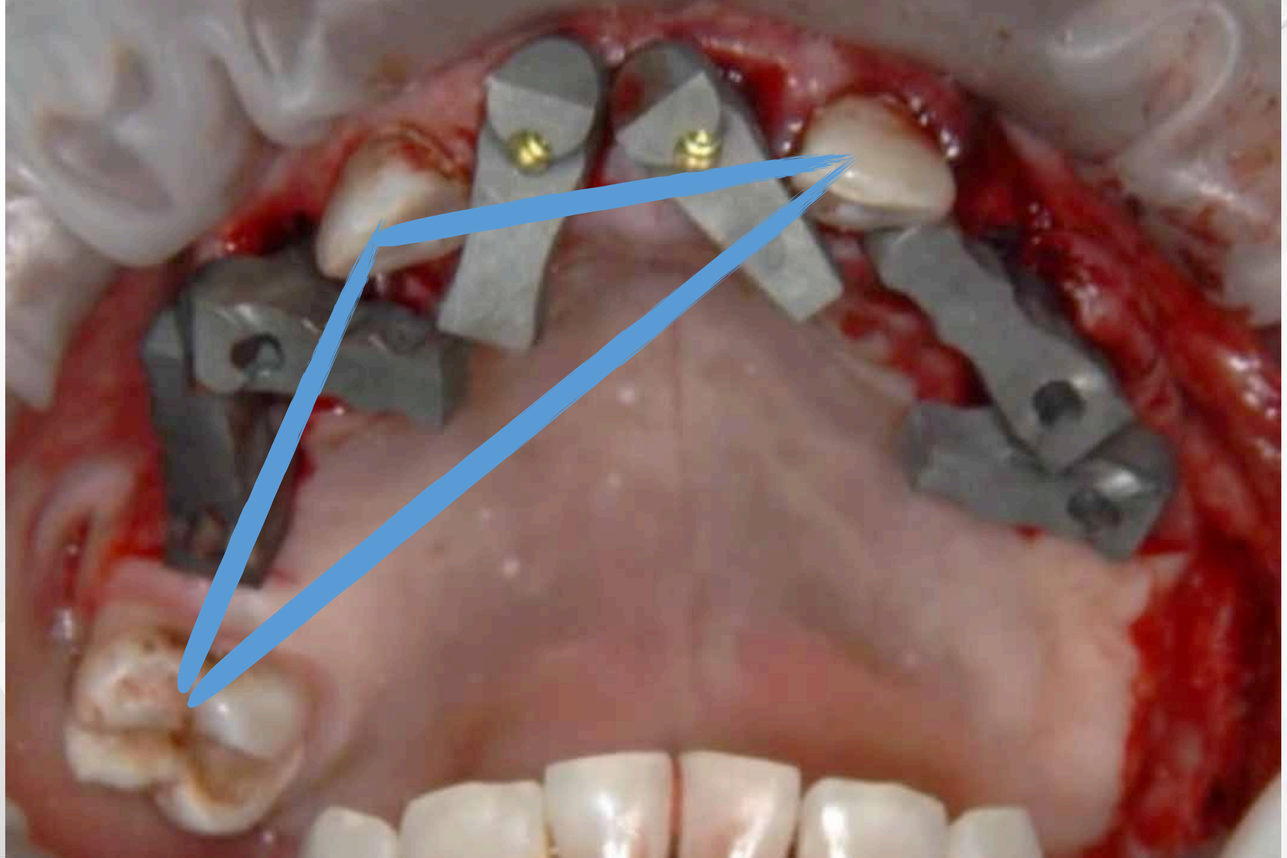
Send
-

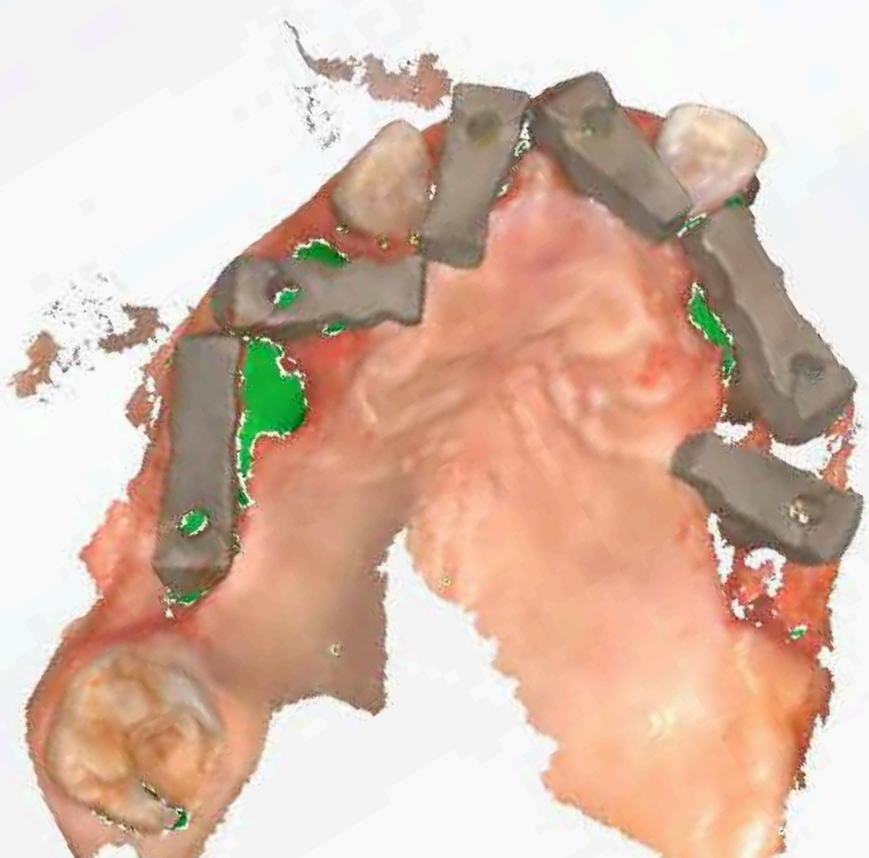
Upper Jaw

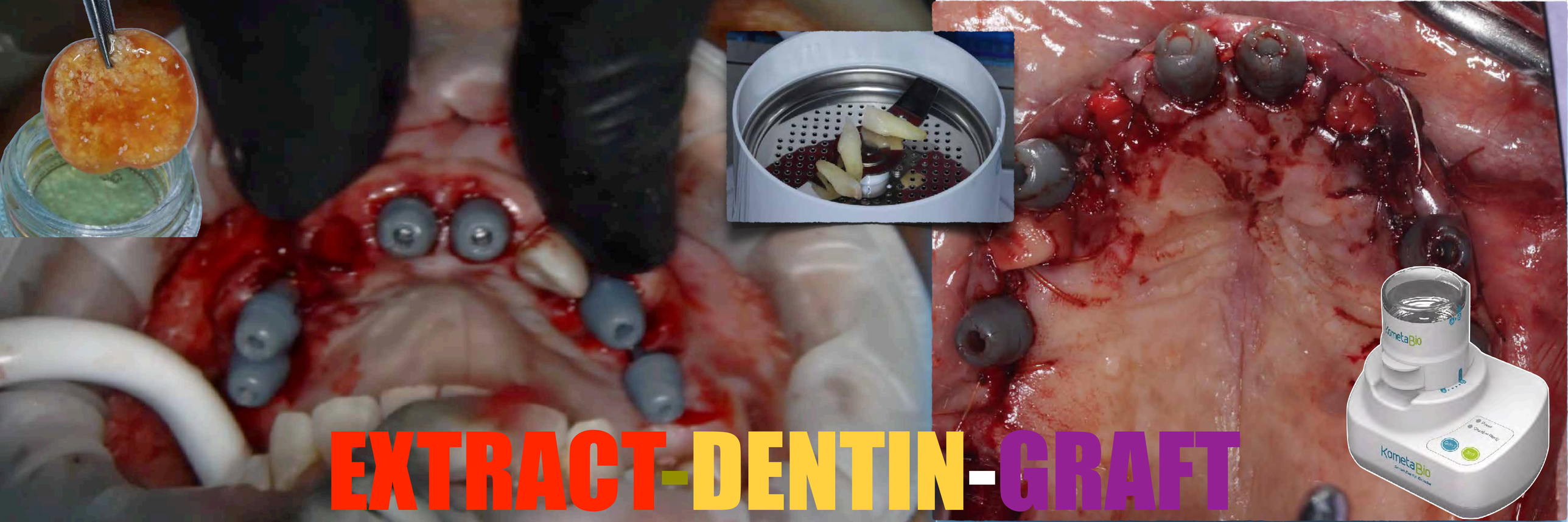
- Please keep moving at a constant speed while scanning.
- It is recommended to keep a distance of 3 to 5mm between the scan tip and the surface of the teeth.

Back to Order

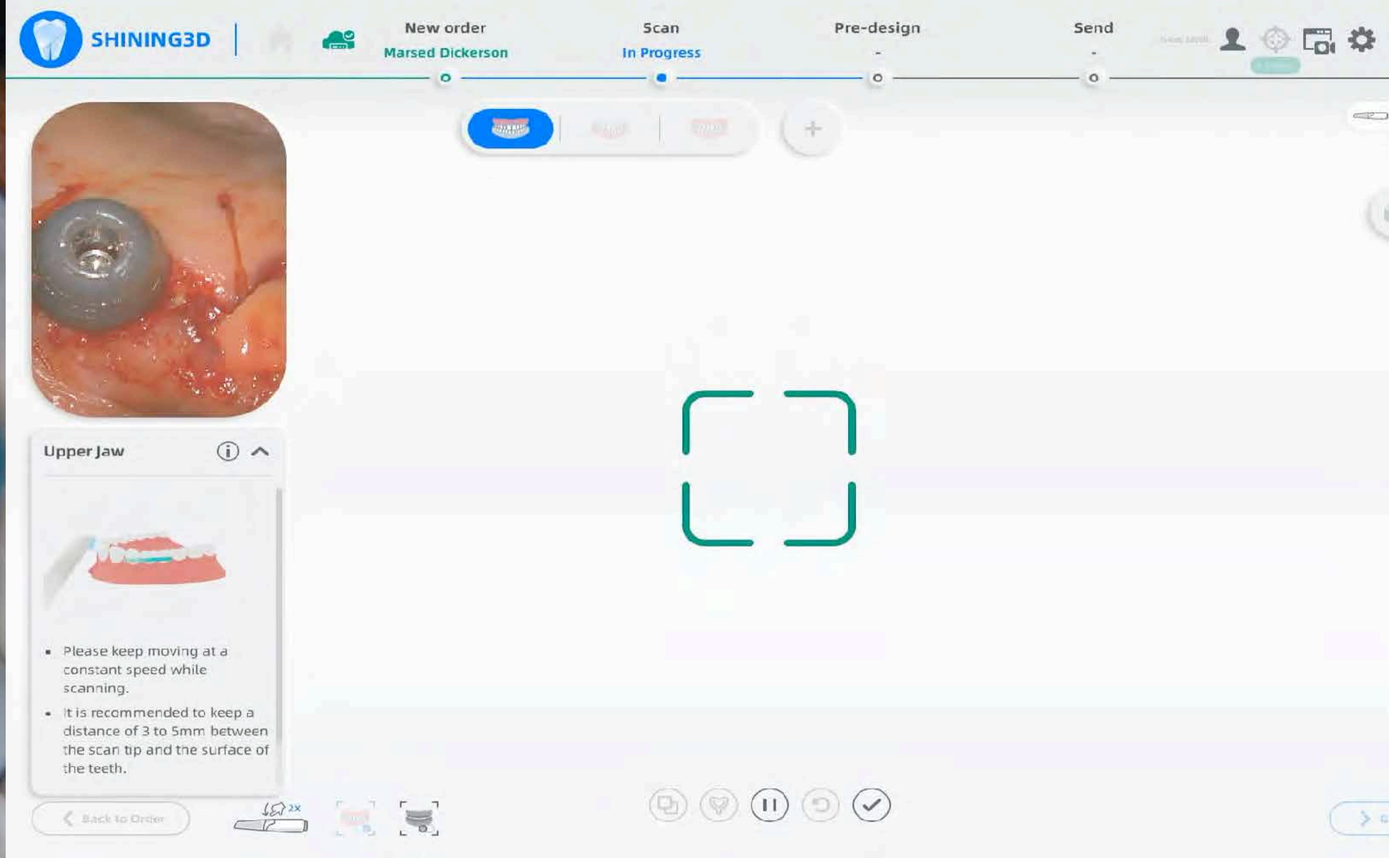
T R I A D






EXTRACT-DENTIN-GRAFT
KometaBio
KometaBio


SCAN


SHINING3D
New order
Marsed Dickerson
Scan
In Progress
Pre-design
-
Send
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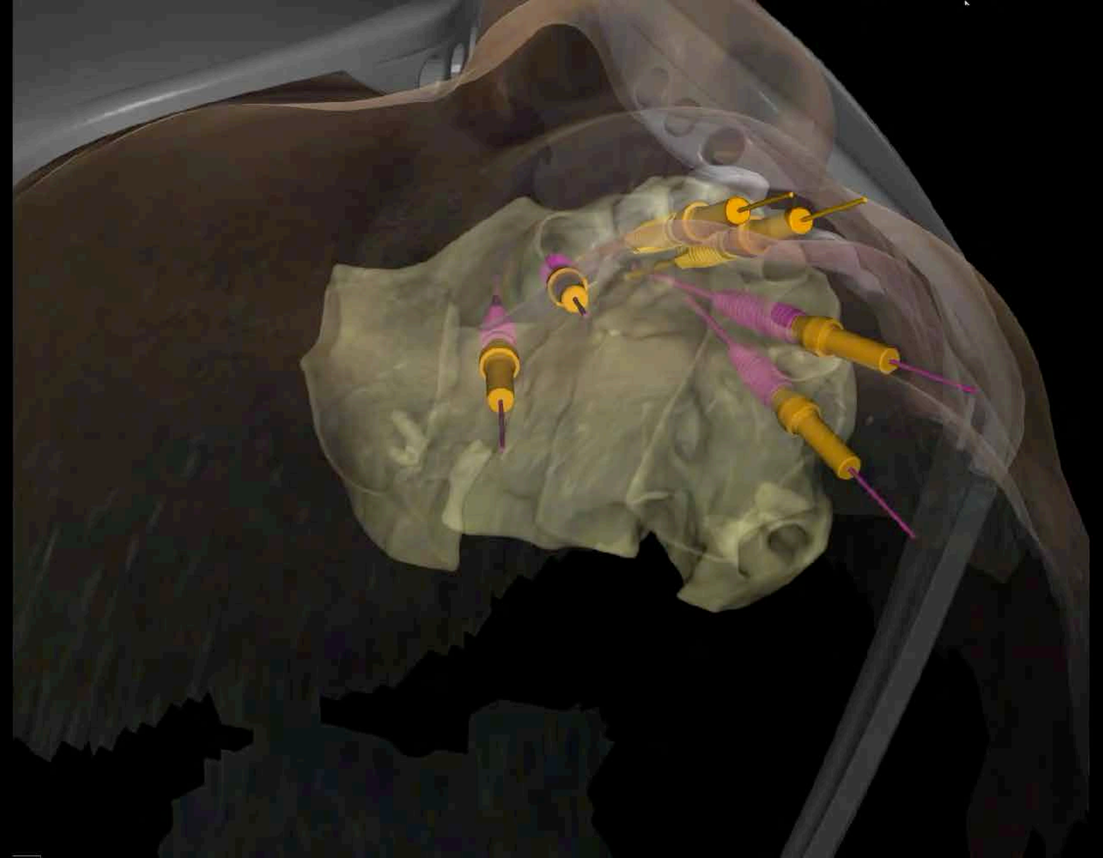
Upper Jaw
Please keep moving at a constant speed while scanning.
It is recommended to keep a distance of 3 to 5mm between the scan tip and the surface of the teeth.
Back to Order

IMPORT

ArchBridge™

TISSUE



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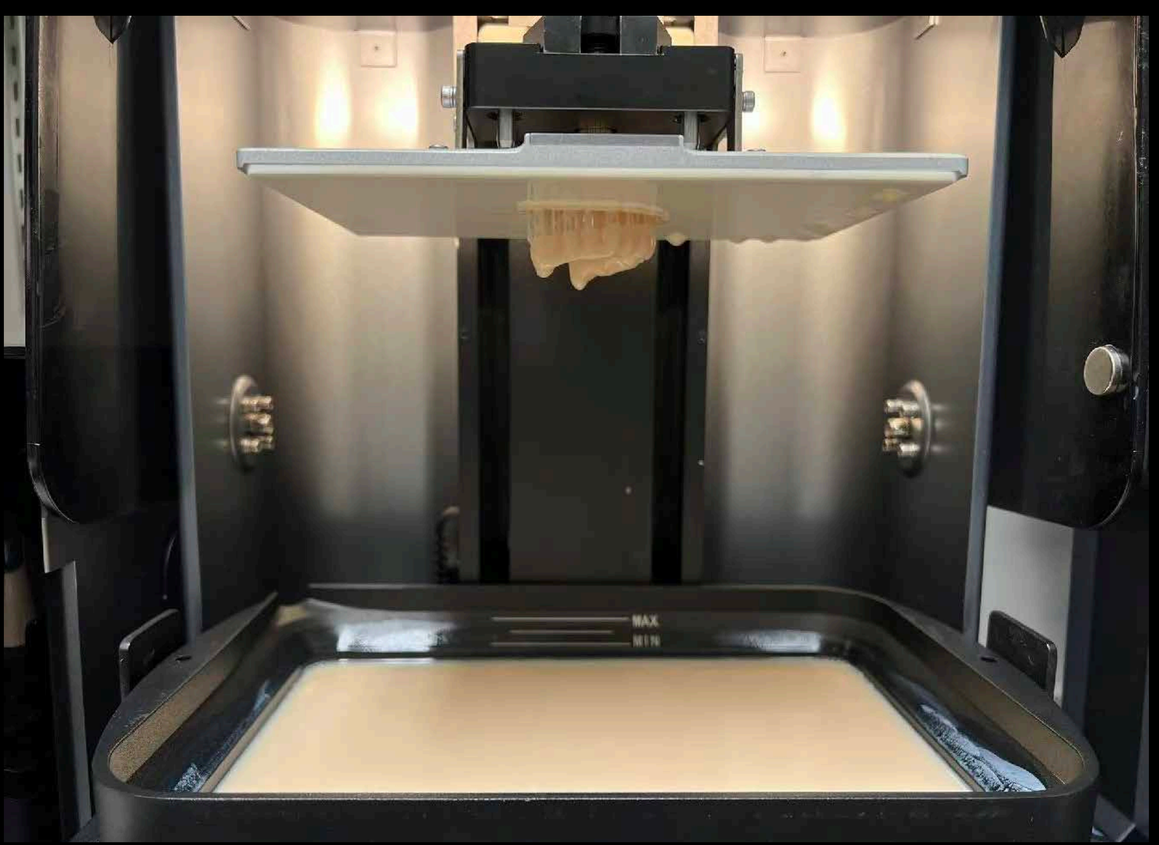

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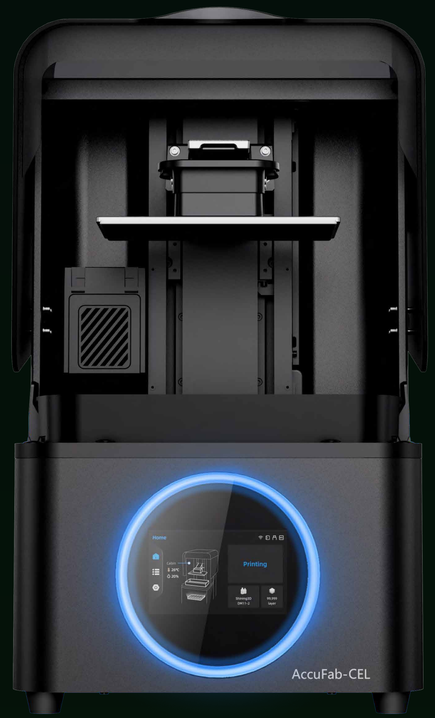
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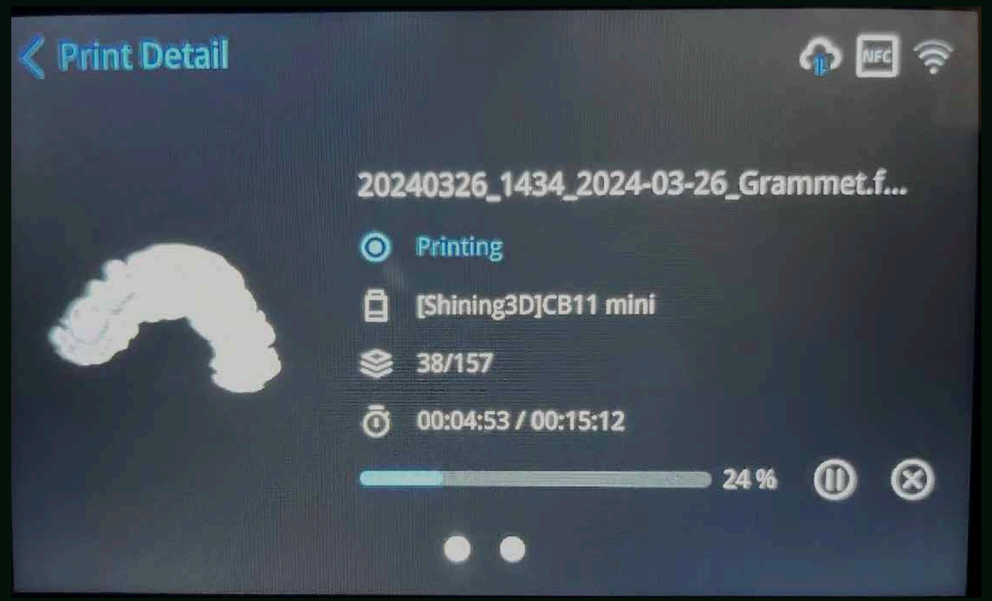
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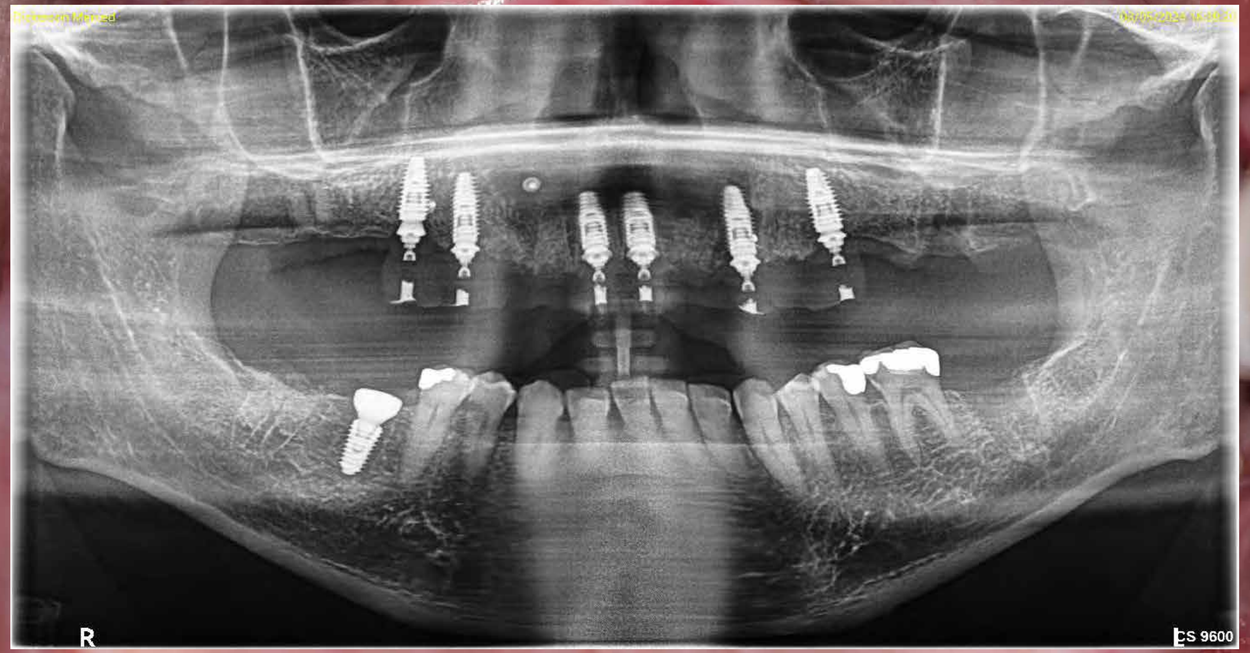
15min Print



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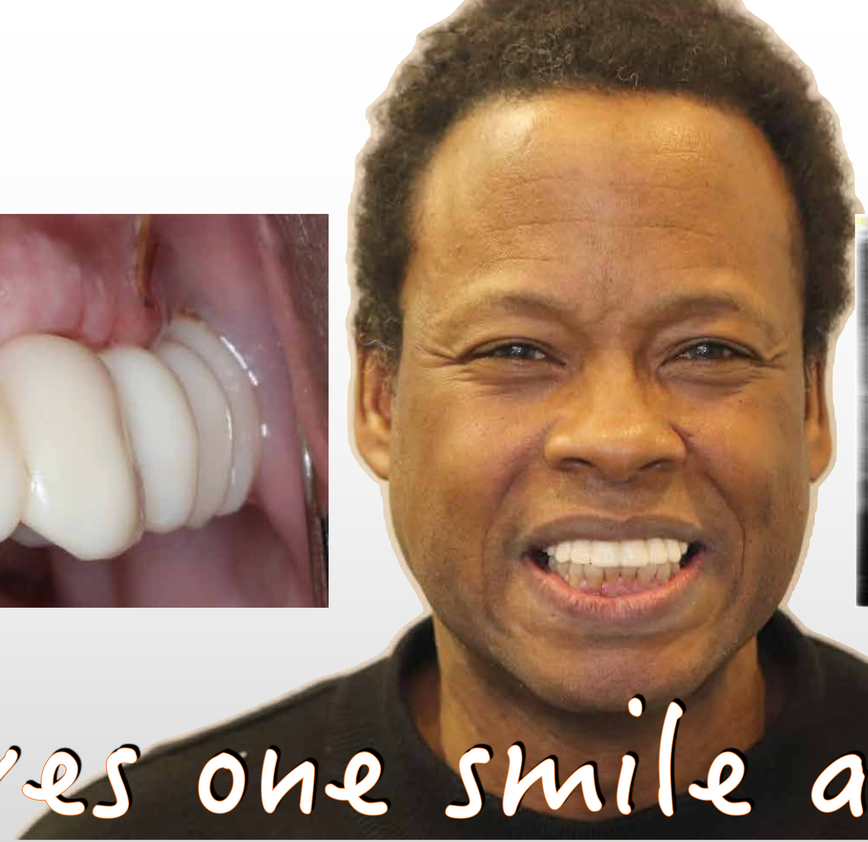

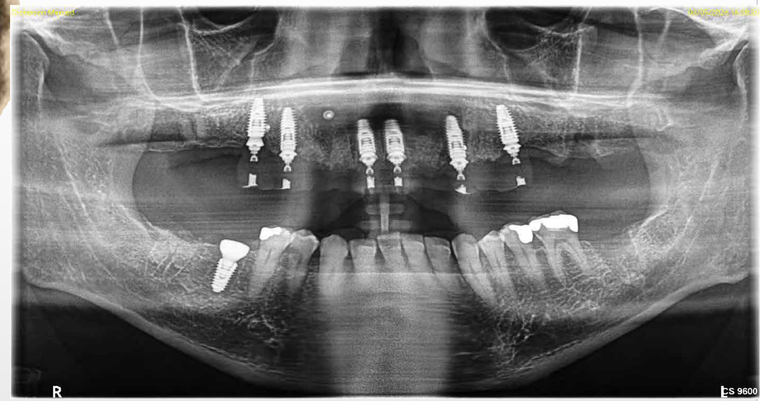

Changing lives one smile at a time

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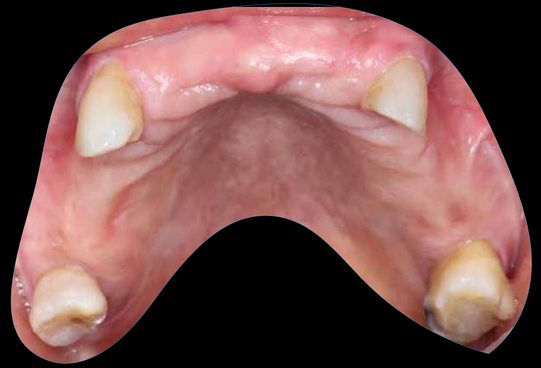

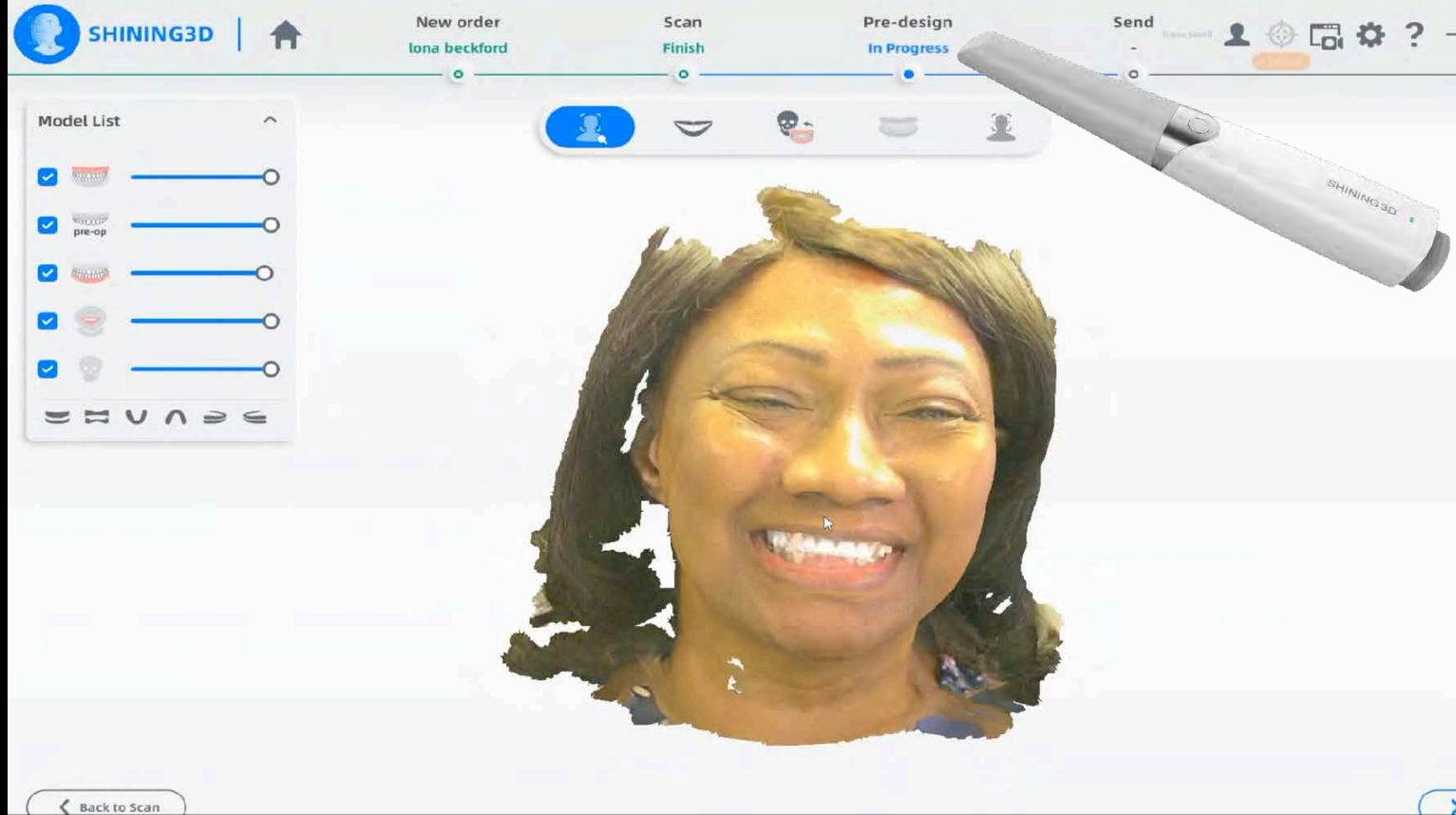

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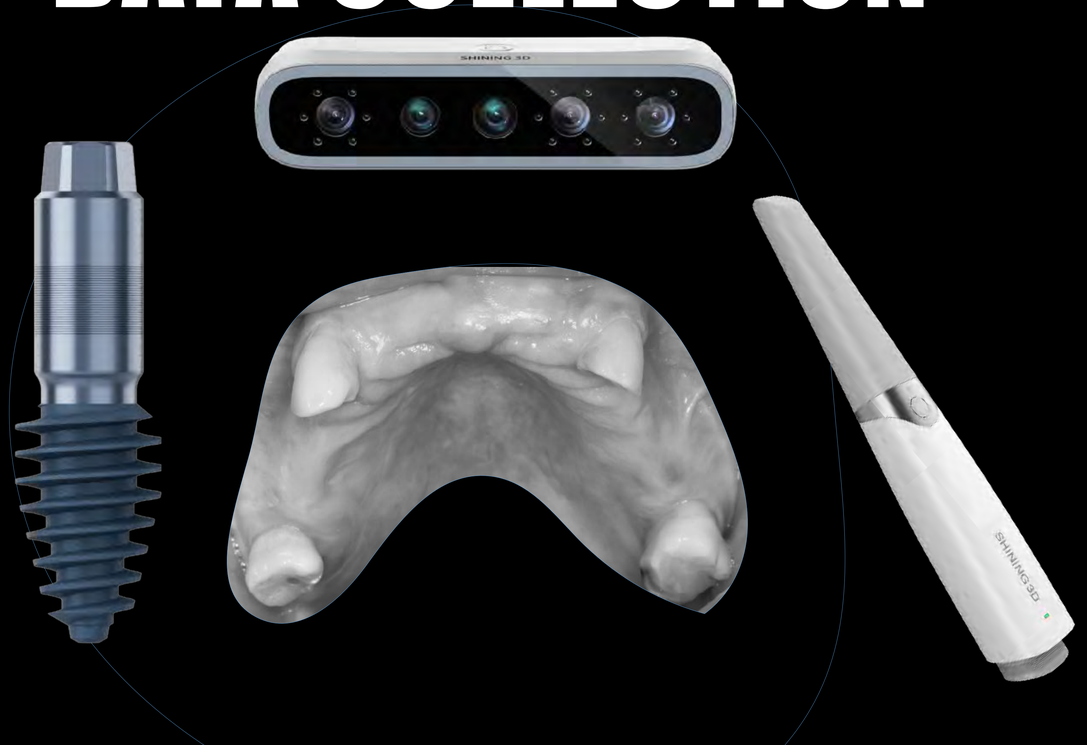
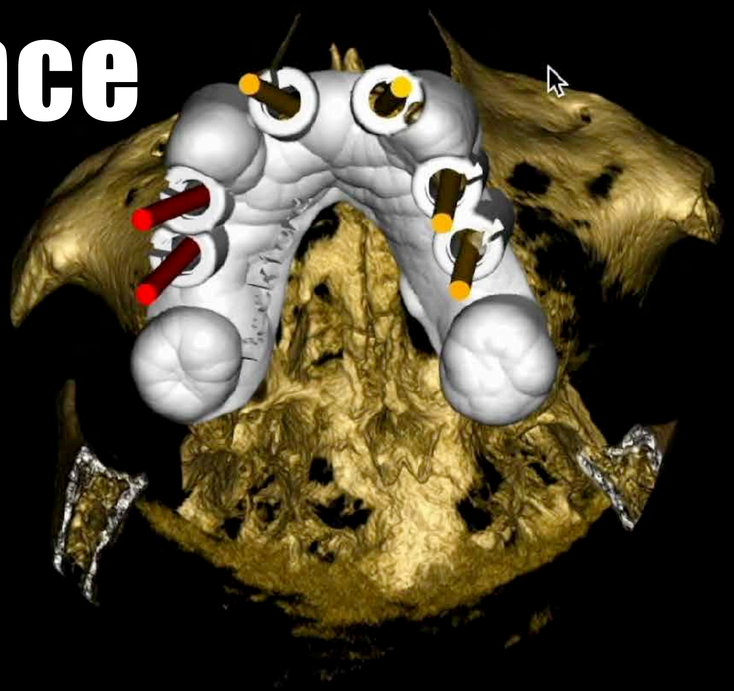


PLAN

Surgical Guidance



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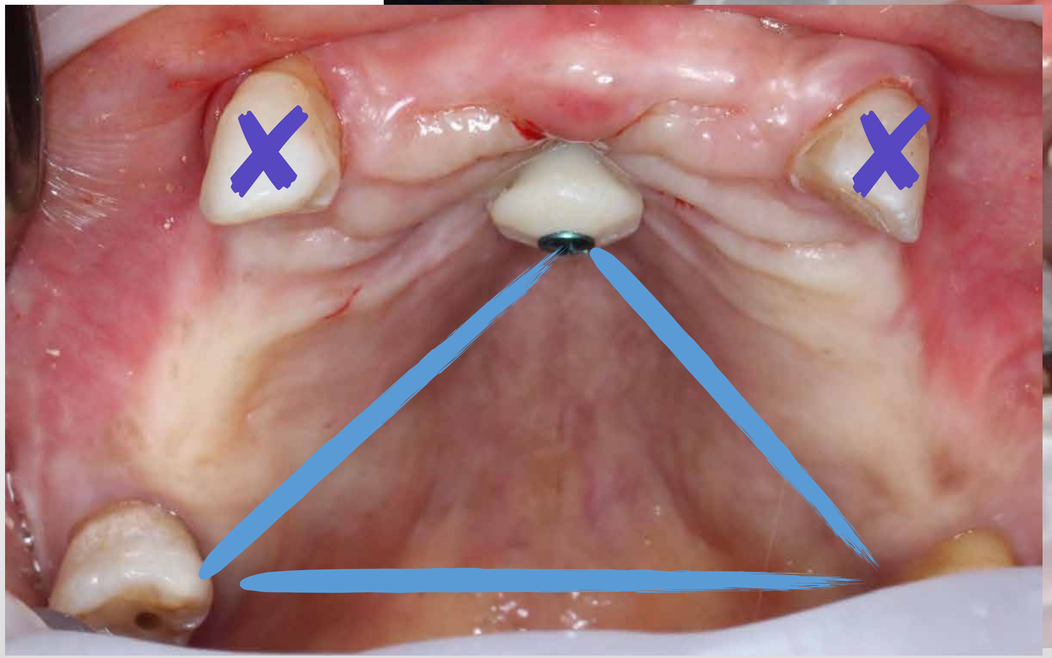
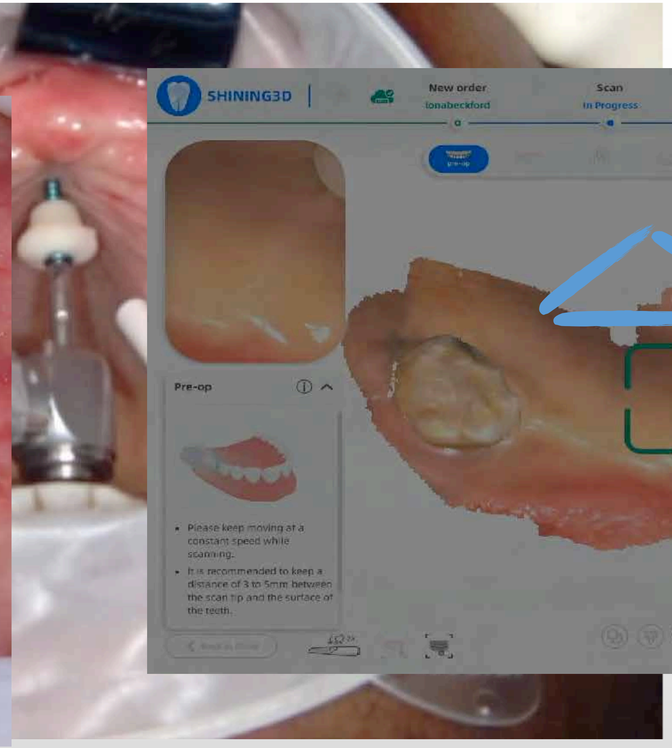
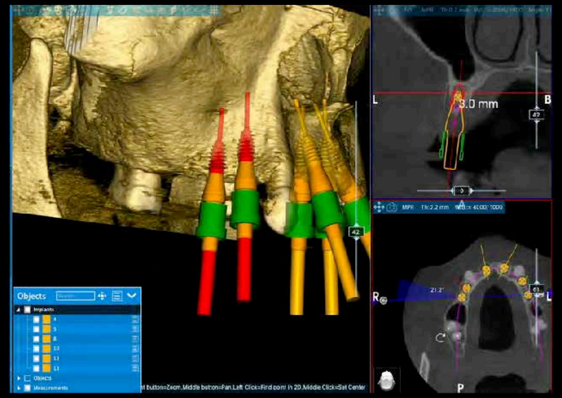




SHINING3D
New order
lonabeckford
Scan
In Progress
Pre-design
Send
Pre-op
Please keep moving at a constant speed while scanning.
It is recommended to keep a distance of 3 to 5mm between the scan tip and the surface of the teeth.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Implants
Objects
Measurements
3.0 mm
L
B
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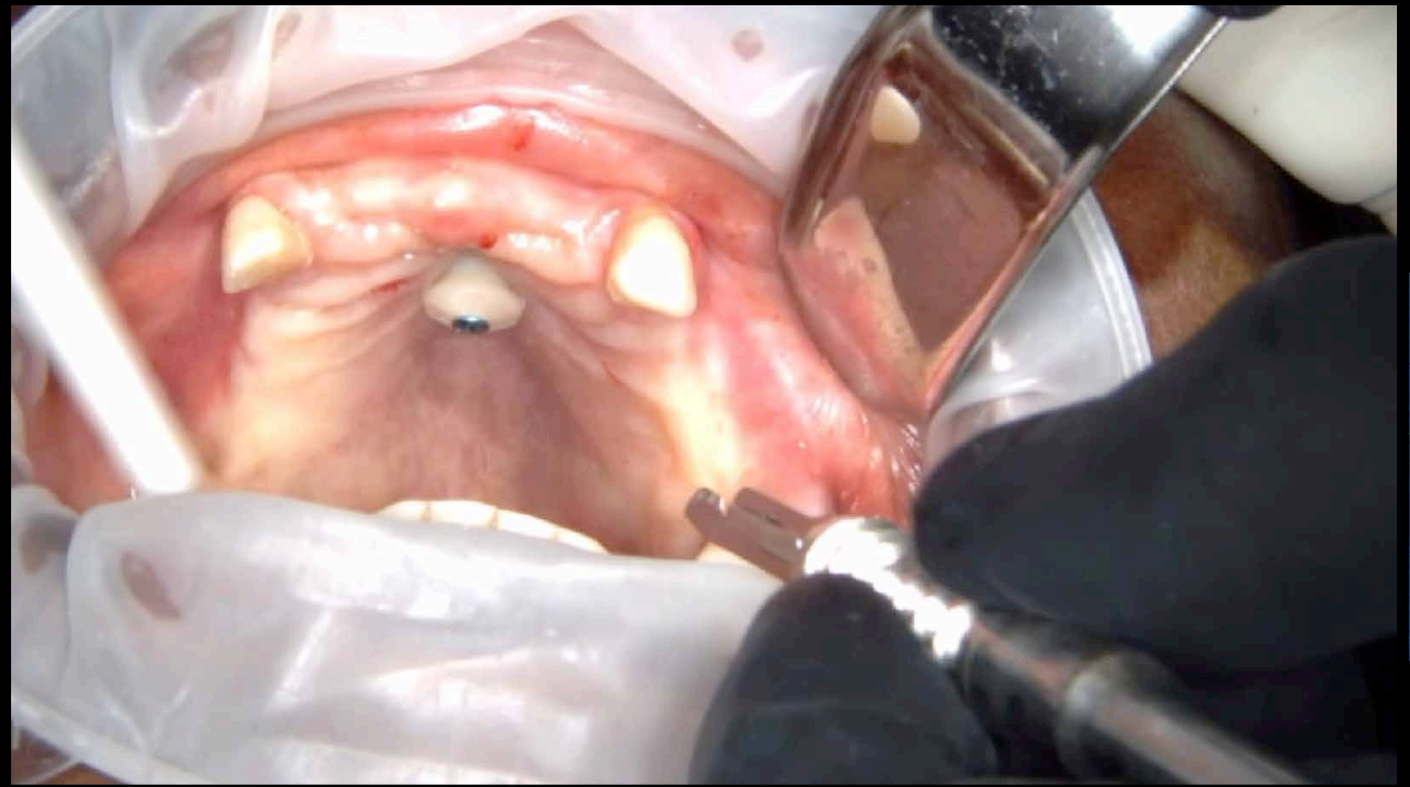

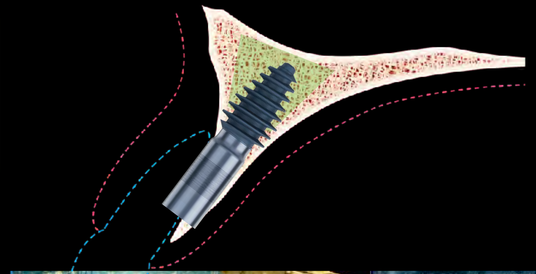

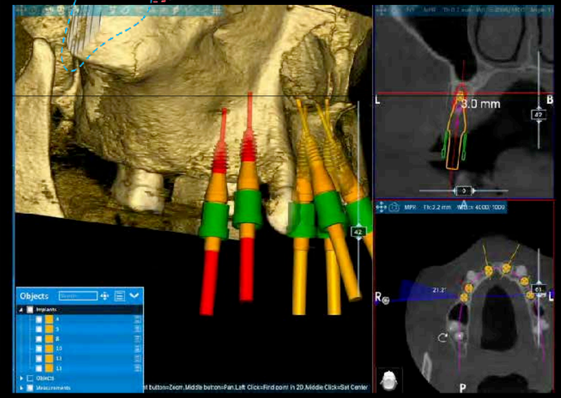
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Implants
Objects
Measurements
3.0 mm
L
B
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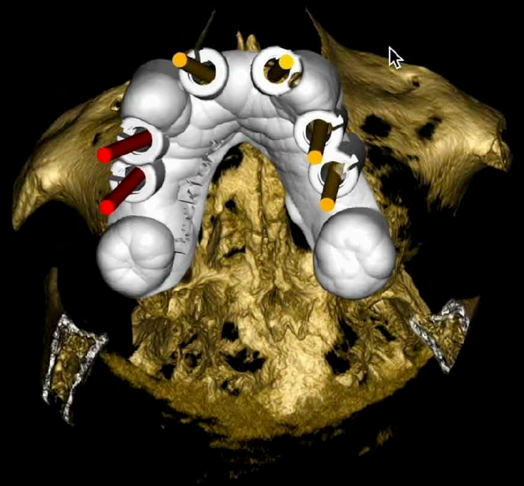
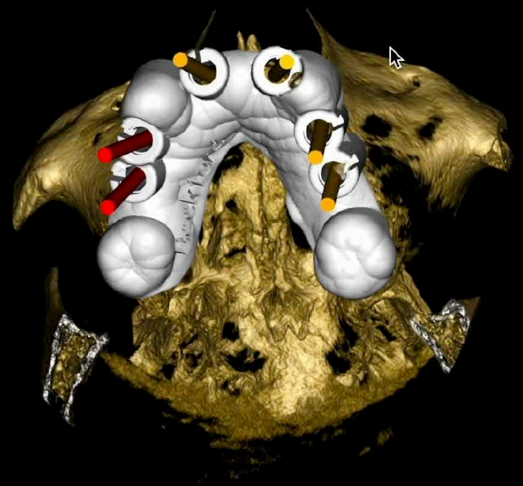



R2
GATE



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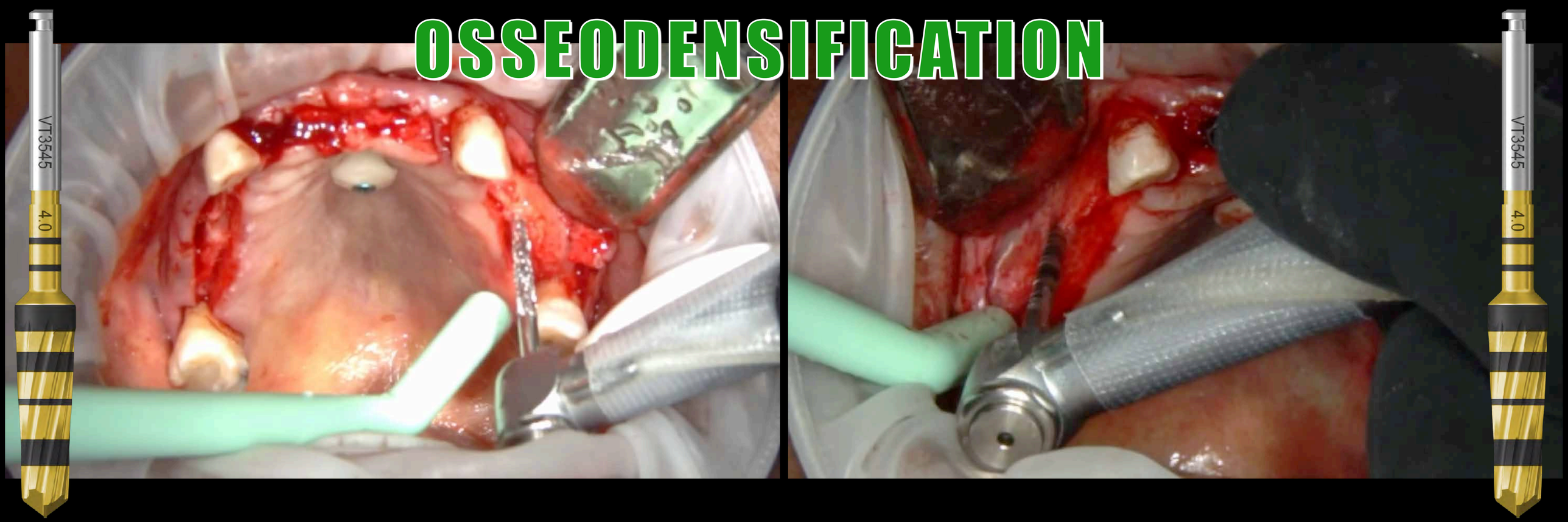
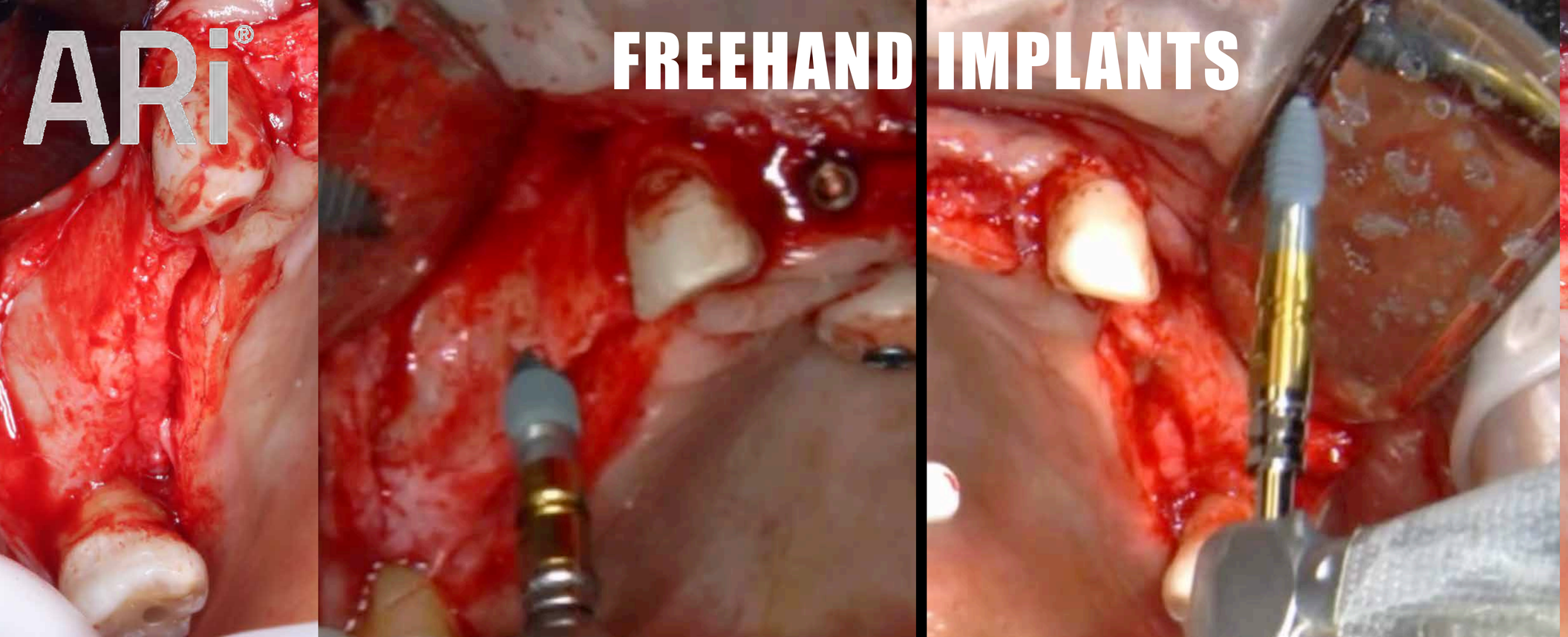
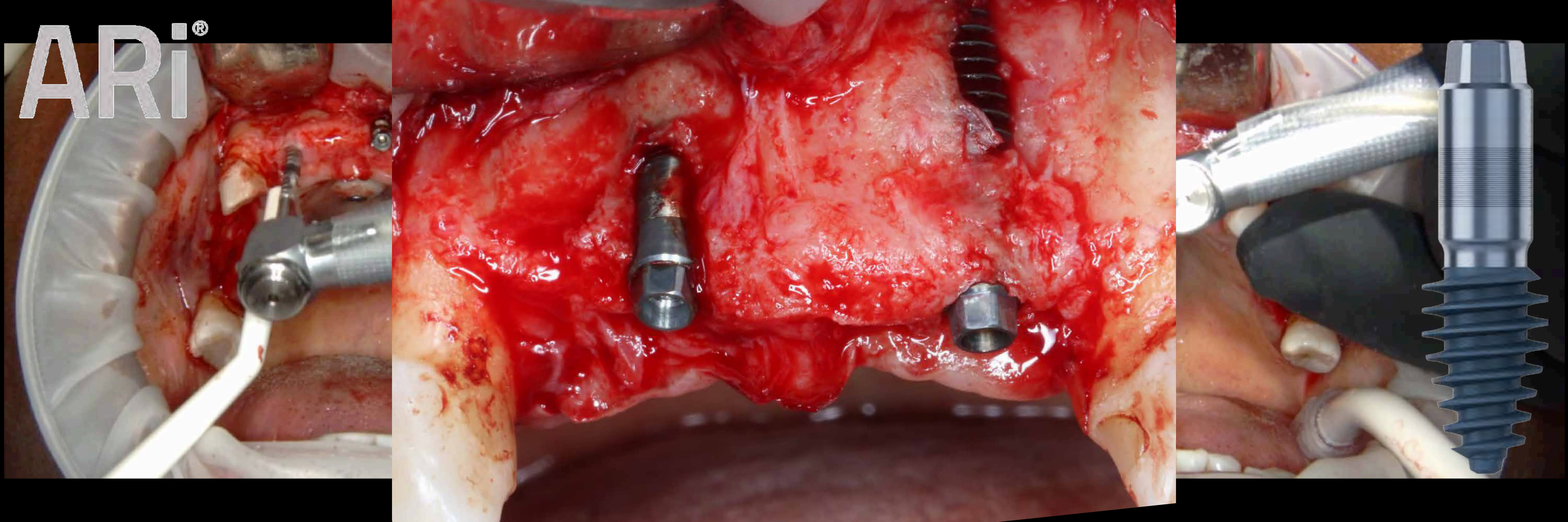


ARi®

FREEHAND IMPLANTS

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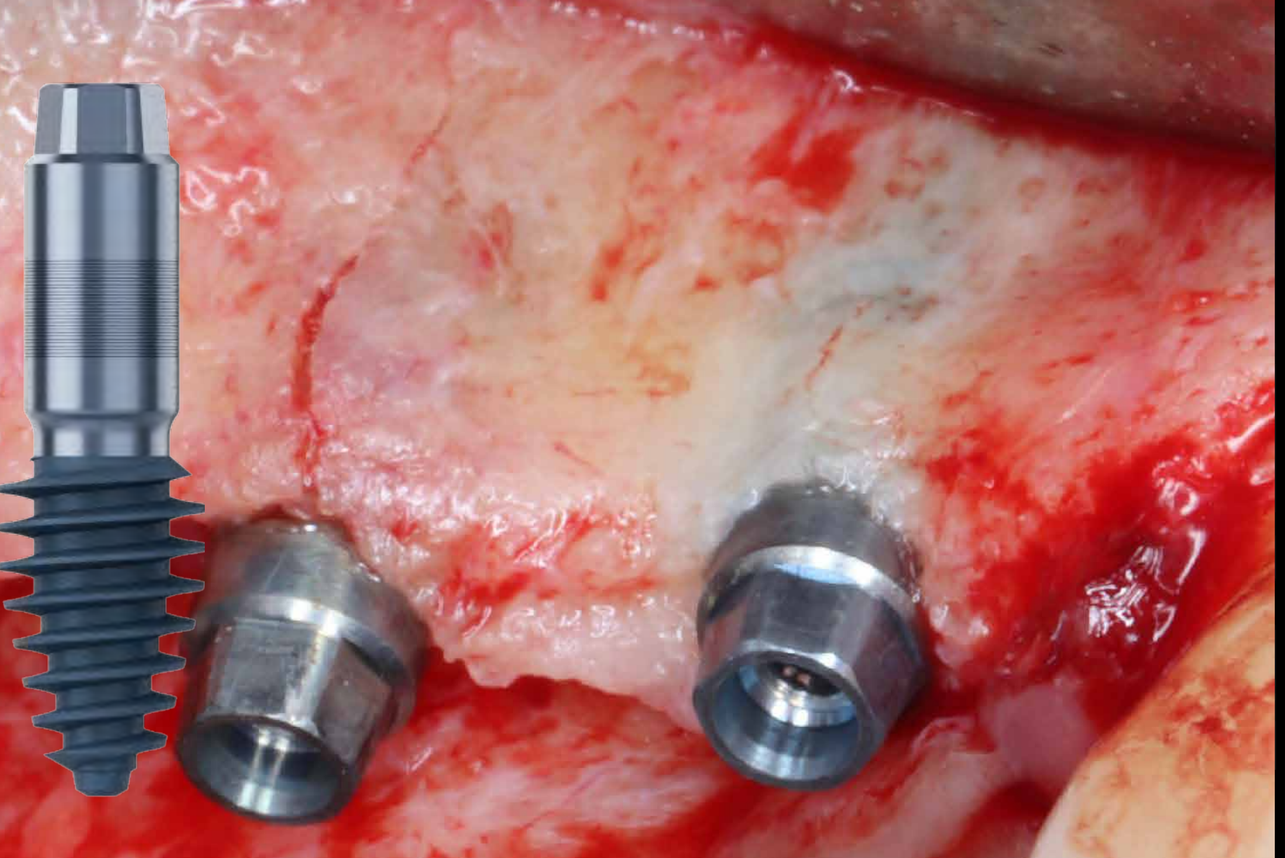

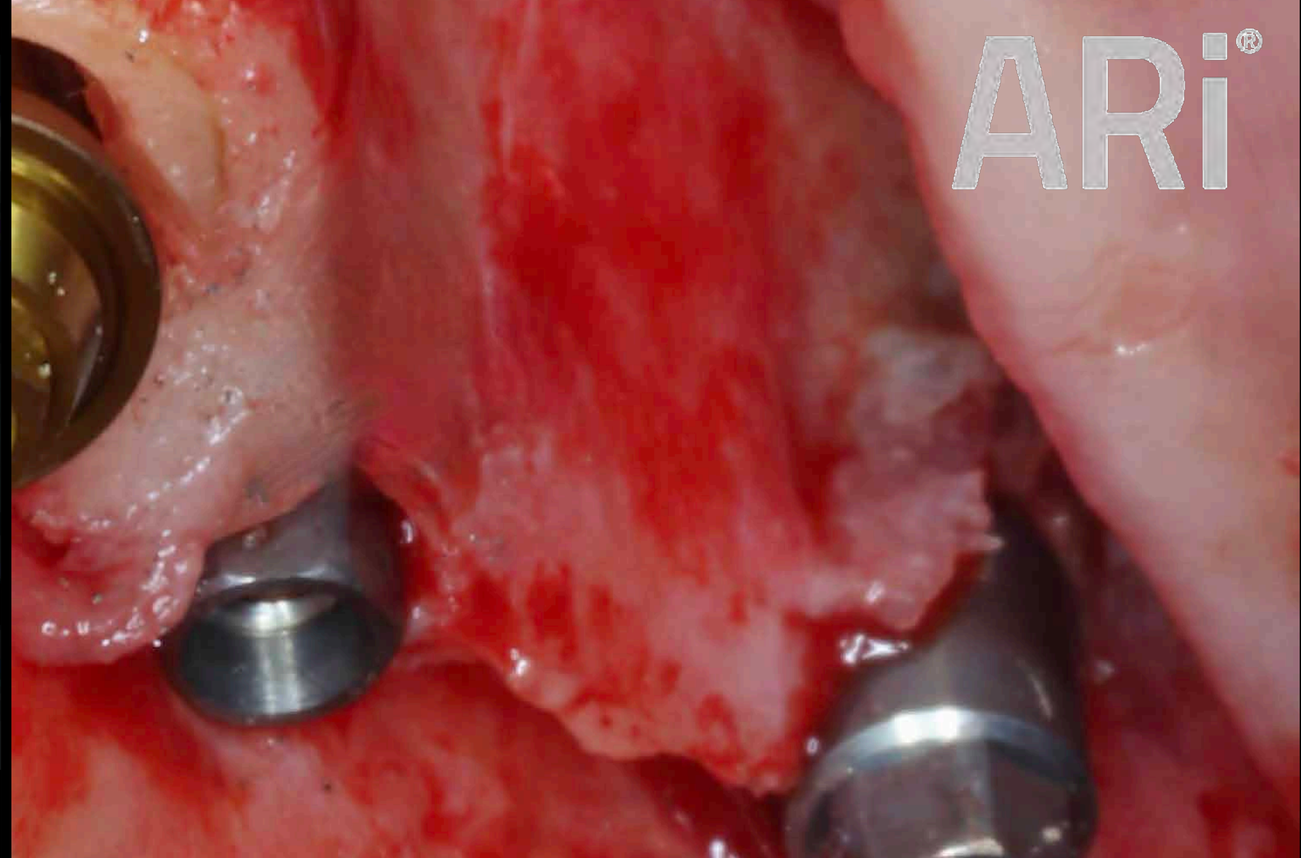
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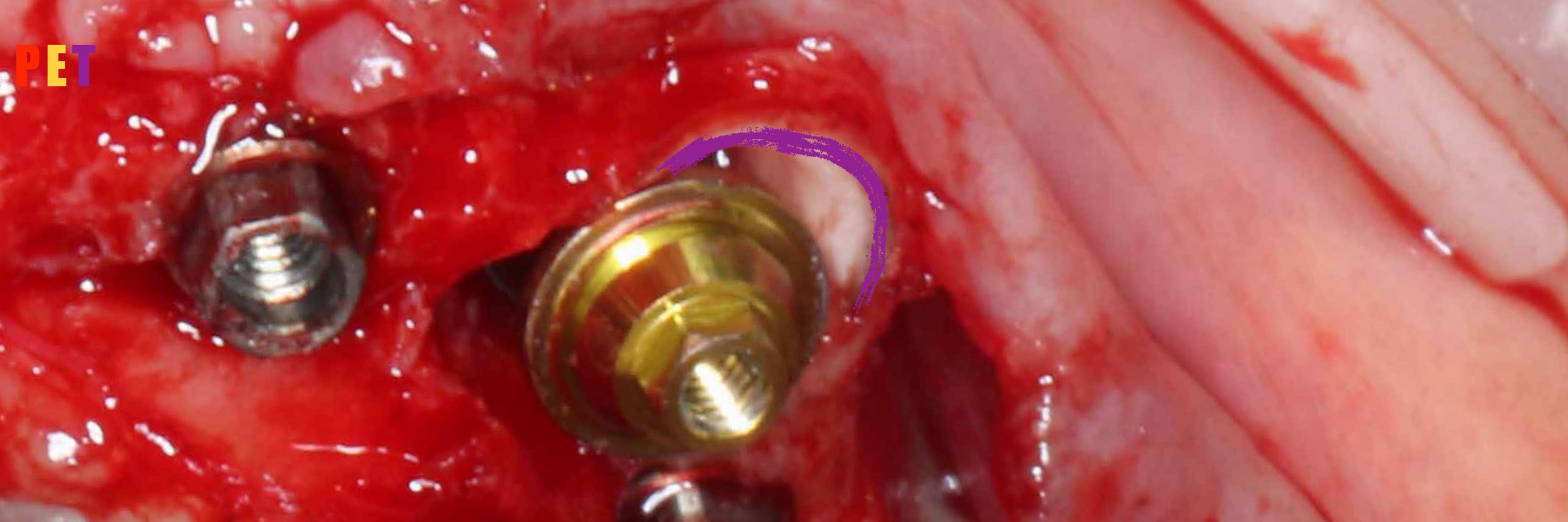
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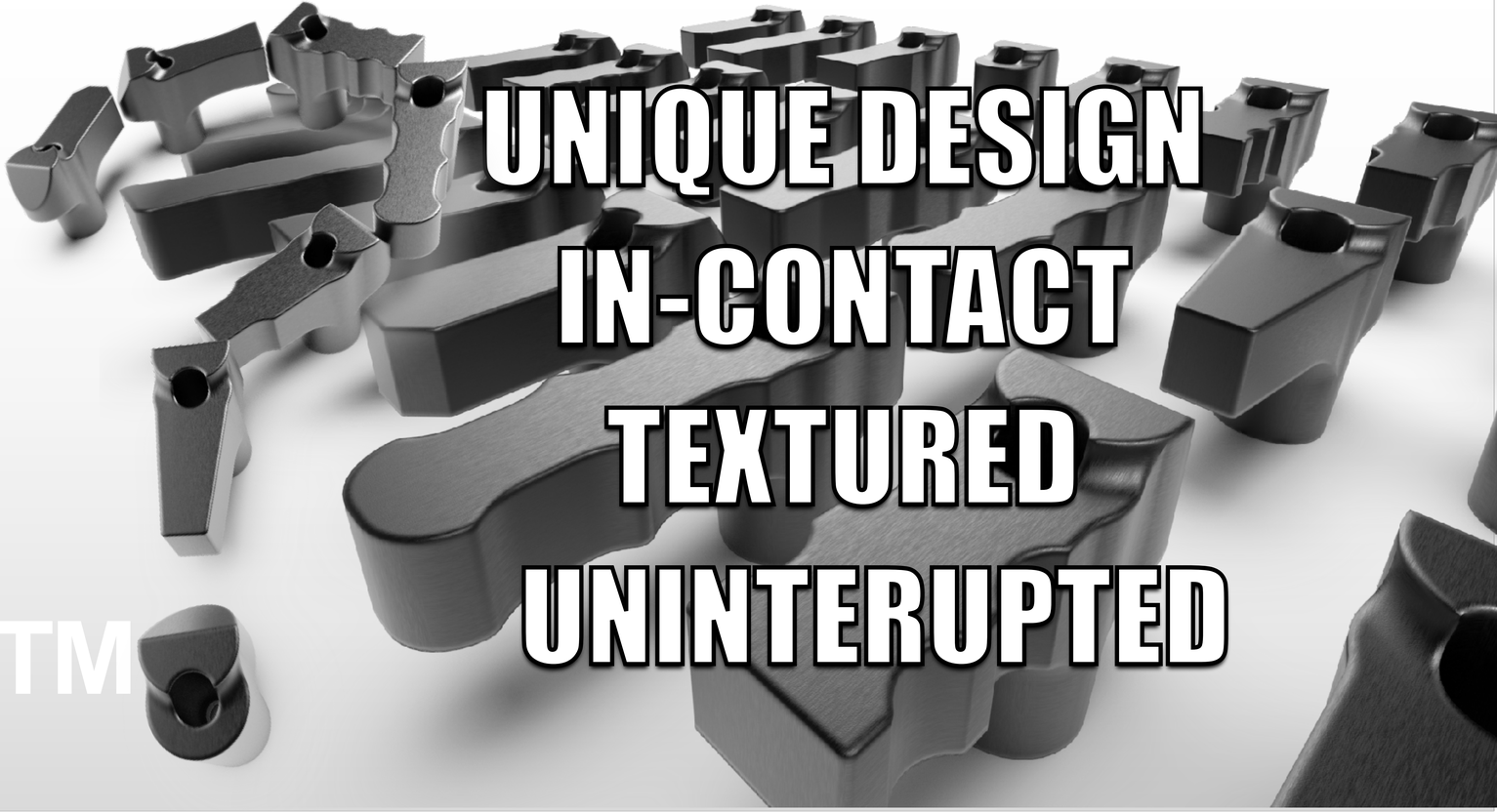
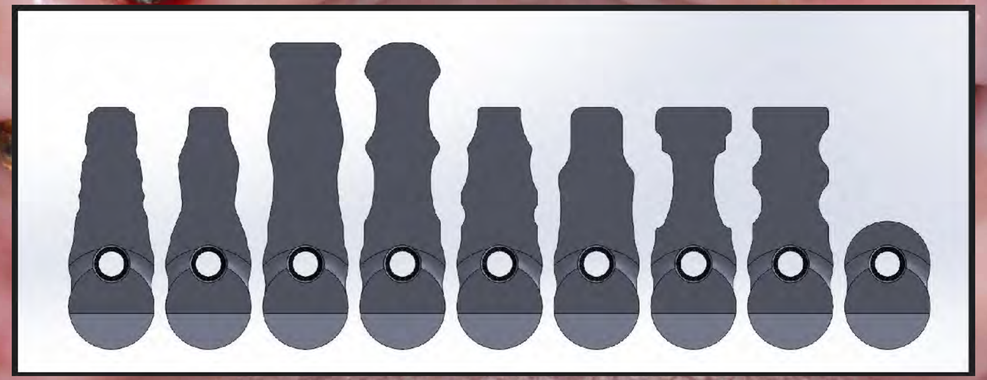
ArchBridge™

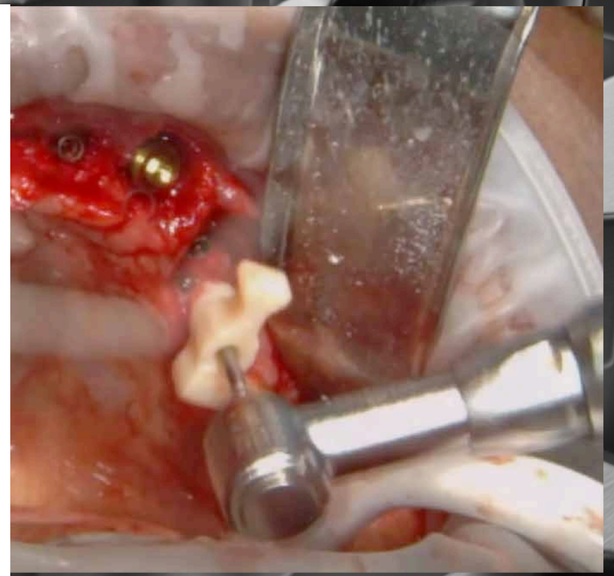


UNIQUE DESIGN
IN-CONTACT
TEXTURED
UNINTERUPTED

Inside Dentistry June 2024



ArchBridge™



ArchBridge™

Autologous Tooth Structure as an Adjunct Grafting Modality

INTRODUCTION

Full-arch dental implant reconstruction is a viable treatment choice for patients who are edentulous or who have teeth that are compromised and in need of extraction. Regardless of a free-hand or fully guided surgical protocol, treatment outcomes for full-arch, implant-supported restorations have helped patients regain proper function, aesthetics, and quality of life.[1-3] Additionally, the ability to place implants immediately after tooth extraction has become a viable treatment modality that can often reduce the time needed to deliver functional restorations.[4] However, the residual alveolar ridge may require grafting to fill defects left by extraction sockets or preexisting concavities.[5] It is well understood that substantial bone resorption and loss of bone volume can occur when extraction sites are not grafted.[6] Avila-Ortiz et al concluded that "alveolar ridge preservation is an effective therapy to attenuate the dimensional reduction of the alveolar ridge that normally takes place after tooth extraction."[7] The gold standard has always been autologous bone harvested from the patient, which is not always easy or really accessible. Therefore, most clinicians currently utilize bone and membranes available through tissue banks. Current innovations, however, have fortunately provided a new, previously untapped source for this autologous tissue: the extracted tooth, which is often readily available when full-arch implant reconstruction is planned. This current article will demonstrate that it is possible to provide enough grafting material volume to fill all residual sockets and concavities from alveolar ridge harvested during immediate implant placement for a dual-arch surgical procedure.

Scott D. Ganz, DMD

Amir Tabib, DDS

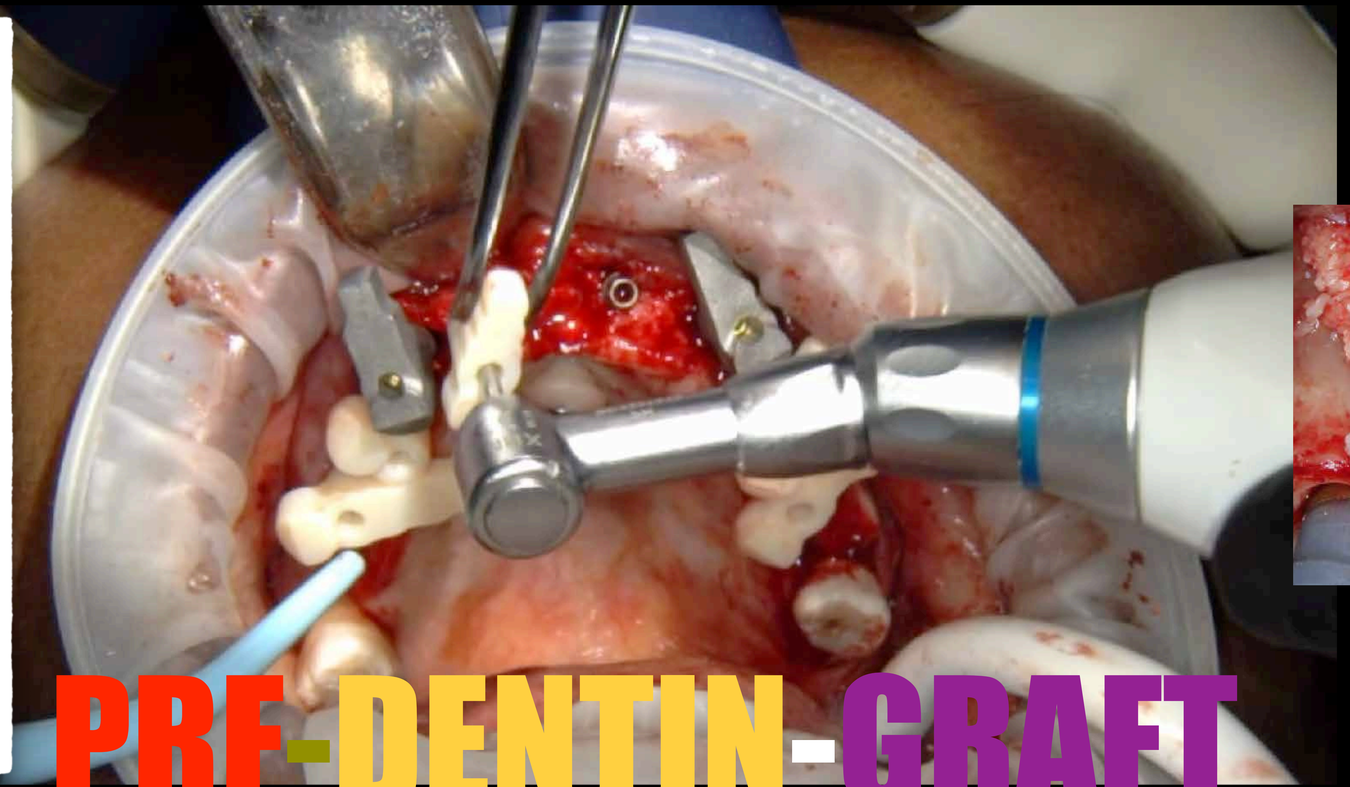
CASE REPORT

A 68-year-old female presented with failing dentition in the maxillary and mandibular arches due to years of neglect and patchwork dentistry. The patient was unhappy with the condition of her teeth and was embarrassed to go out in public. She had difficulty chewing due to missing and fractured teeth in the maxillary arch, did not have any posterior mandibular teeth, and did not have a repeatable bite position. The patient had been to several dentists who offered differing treatment plans and was very confused regarding potential options to correct the deficiencies to improve her quality of life. Options that were presented included, but were not limited to, (1) removable partial dentures (RPD); (2) a maxillary complete denture vs a mandibular RPD; and (3) implant-supported removable and fixed restorations for both arches. The patient wished to determine if a fixed-type full-arch restoration could be considered for both the maxilla and mandible. The patient's medical history revealed hyperthyroidism and hip replacement within the prior 5 years.

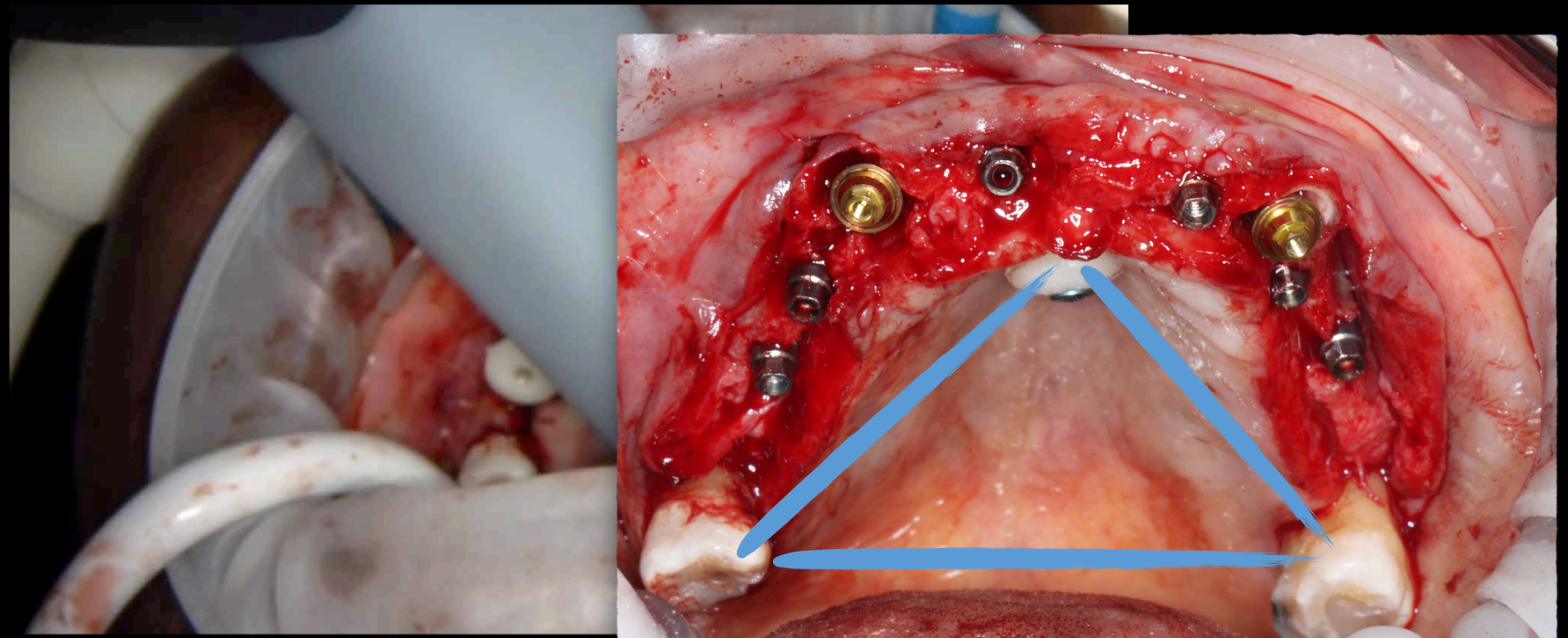
Clinical examination confirmed the diminished condition of the patient's dentition. The need for a thorough physical assessment of the patient's existing anatomical presentation, which could only be accomplished with CBCT, was explained to her. The CBCT allowed for the inspection of the anatomy in multiple views and utilizing the digital tools afforded by the software (CS 3D Imaging [Carestream Dental]) (Figure 1). The panoramic reconstruction served as a "scout" film to help visualize the present condition of the patient's dentition (Figure 2). The upper arch exhibited several fractured teeth, several with previous root canal treatment, one single crown, and a 4-unit posterior bridge on teeth Nos 12 to 15. Using the embedded ink, the original CBCT scan data was then exported from the Carestream 3D Imaging Software directly into Blue Sky Plan software (Blue Sky Bio). The Blue Sky plan offers additional planning and design tools for all in accurate diagnosis, treatment planning, and surgical guide fabrication.

The preliminary plan consisted of placing implants in strategic positions to support fixed, implant-supported restorations that would be accurately delivered with the implementation of static, sequential surgical guides (Figure 3). Each potential implant receptor site was designated by tooth number for the maxillary and mandibular arches. Manufacturer-specific simulated implants were then refined within the cross-sectional images, recording diameters and lengths in screenshots for the maxilla (Figure 4) and the mandible (Figure 5) that were utilized during the surgery as color printouts. When assessing the potential mandibular implant receptor sites, the buccal and lingual cortical plates appeared to be well defined. However, careful inspection revealed that a deficient density exhibited within the intermedullary bone. Yellow abutment "projections" represented simulated abutment trajectories helpful in the determination of screw-access channels within the transitional and final prostheses. It was also possible to place realistic, simulated abutments based on the desired angulation and tissue

continued on page 72



PRF-DENTIN-GRAFT

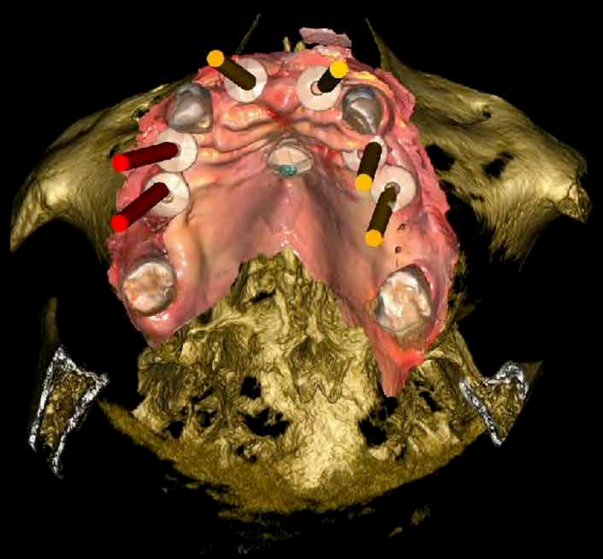


TRIAD

IMPORT

ArchBridge™

TISSUE



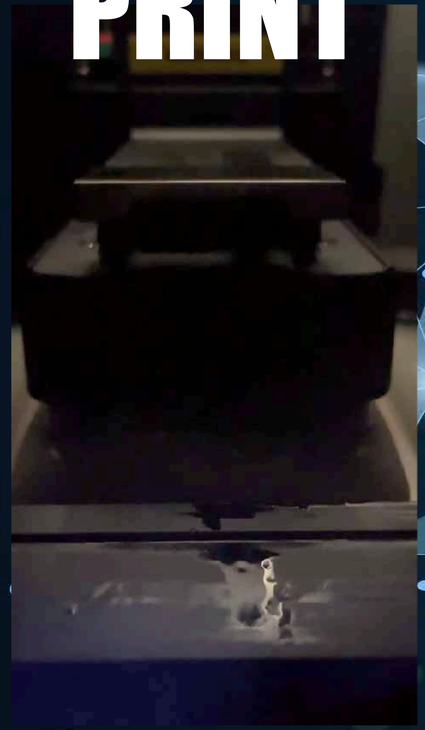
MATCH PRE-FAB DESIGN

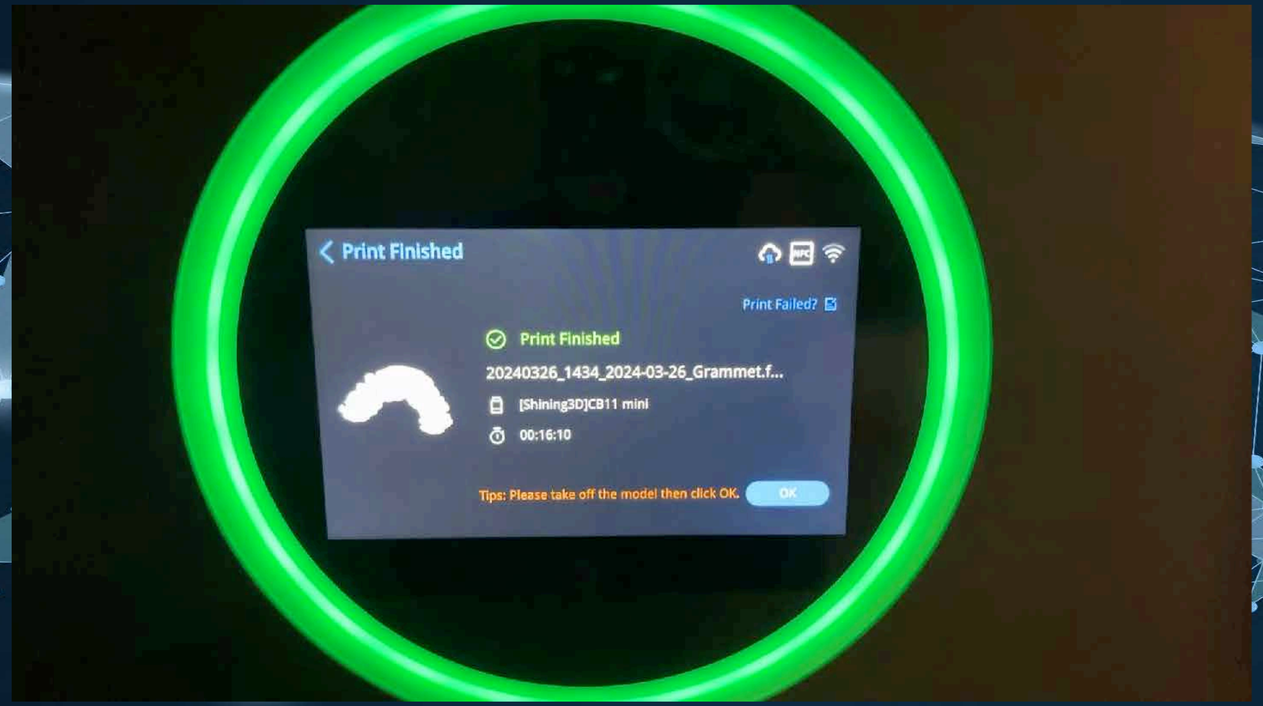
PRINT

WASH

CURE

PRINT

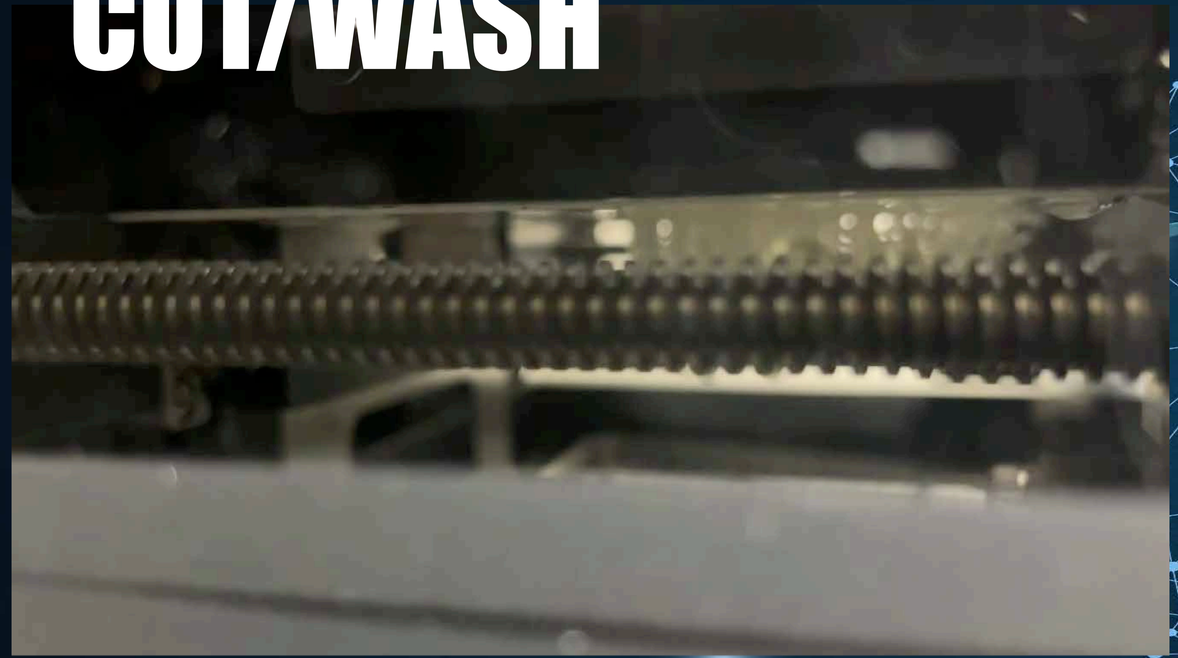




AccuFab-CEL

SHINING 3D
DENTAL

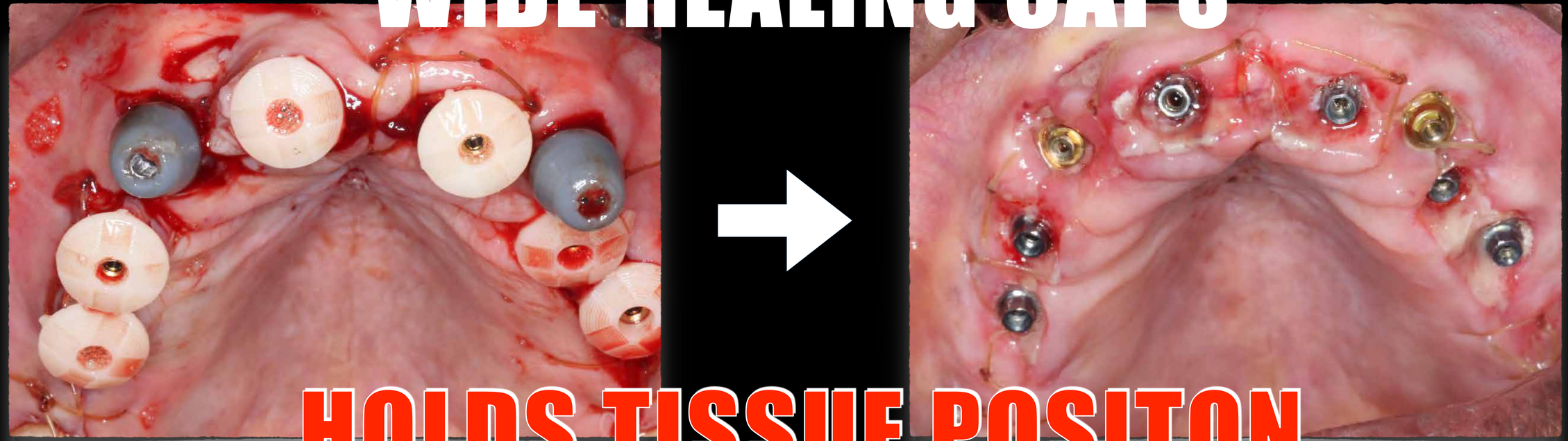
CUT/WASH



AccuFab-CEL

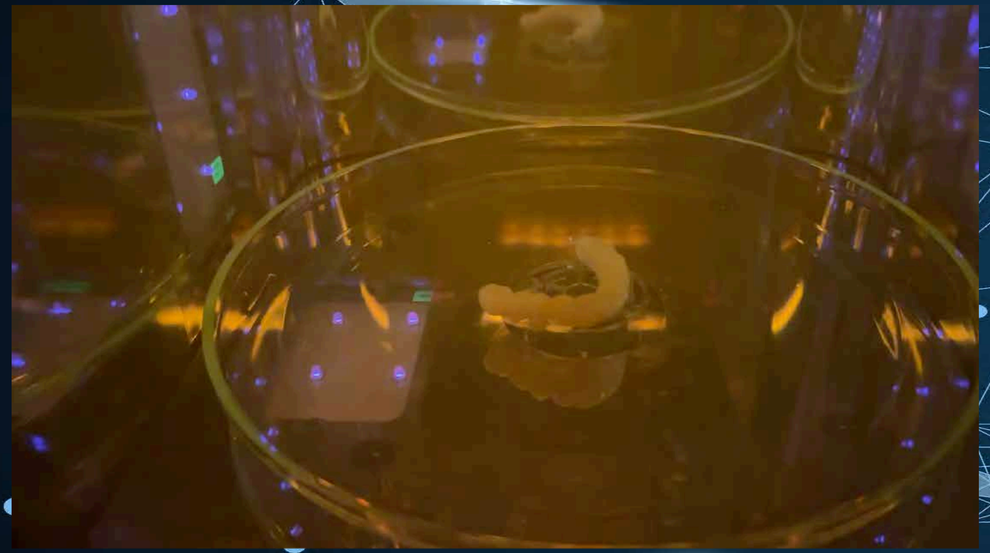
SHINING 3D
DENTAL

WIDE HEALING CAPS



HOLDS TISSUE POSITON

CURE



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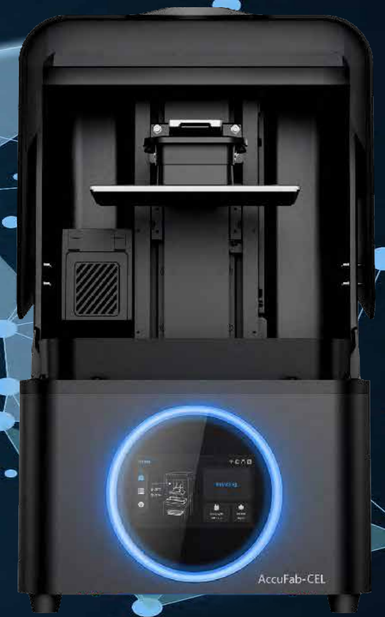
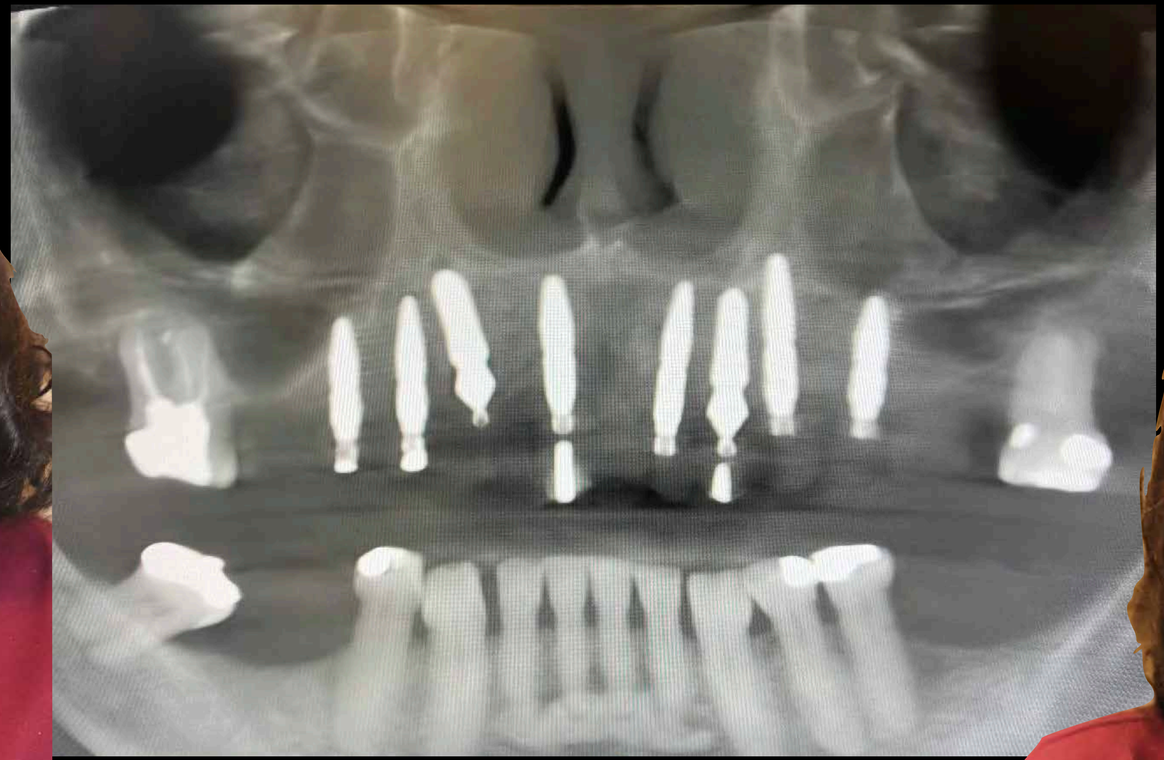
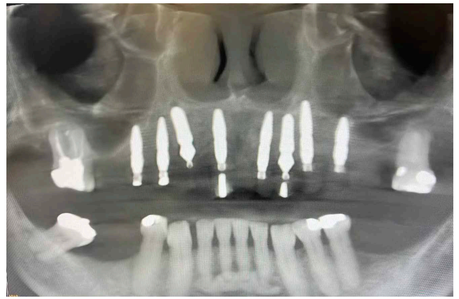
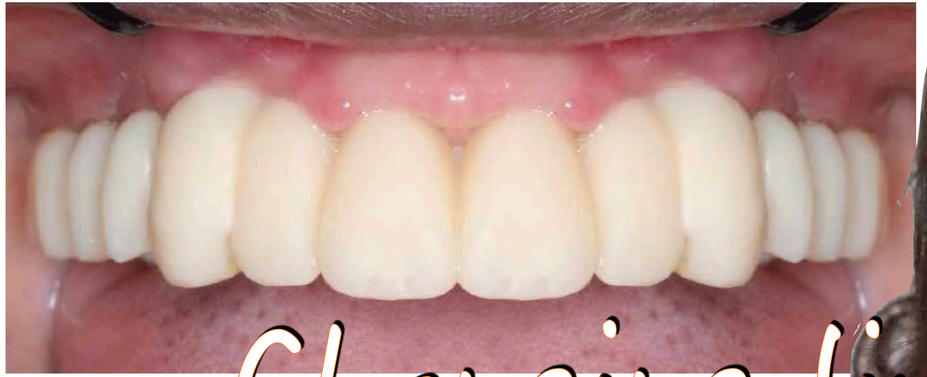


SHINING 3D
DENTAL

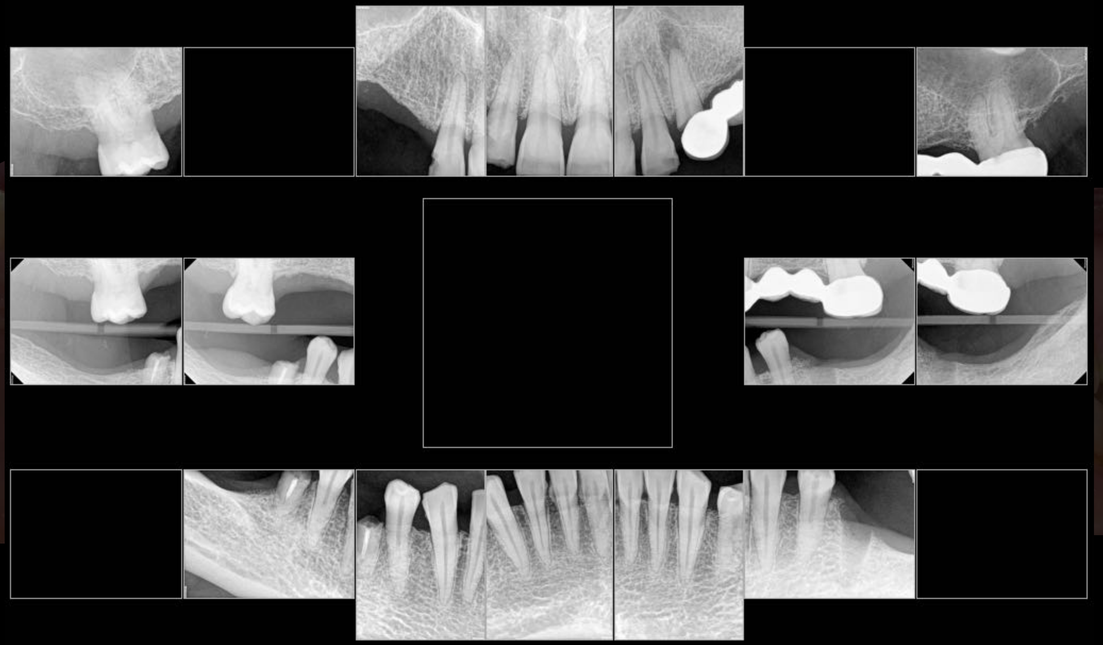
Printed Provisionals

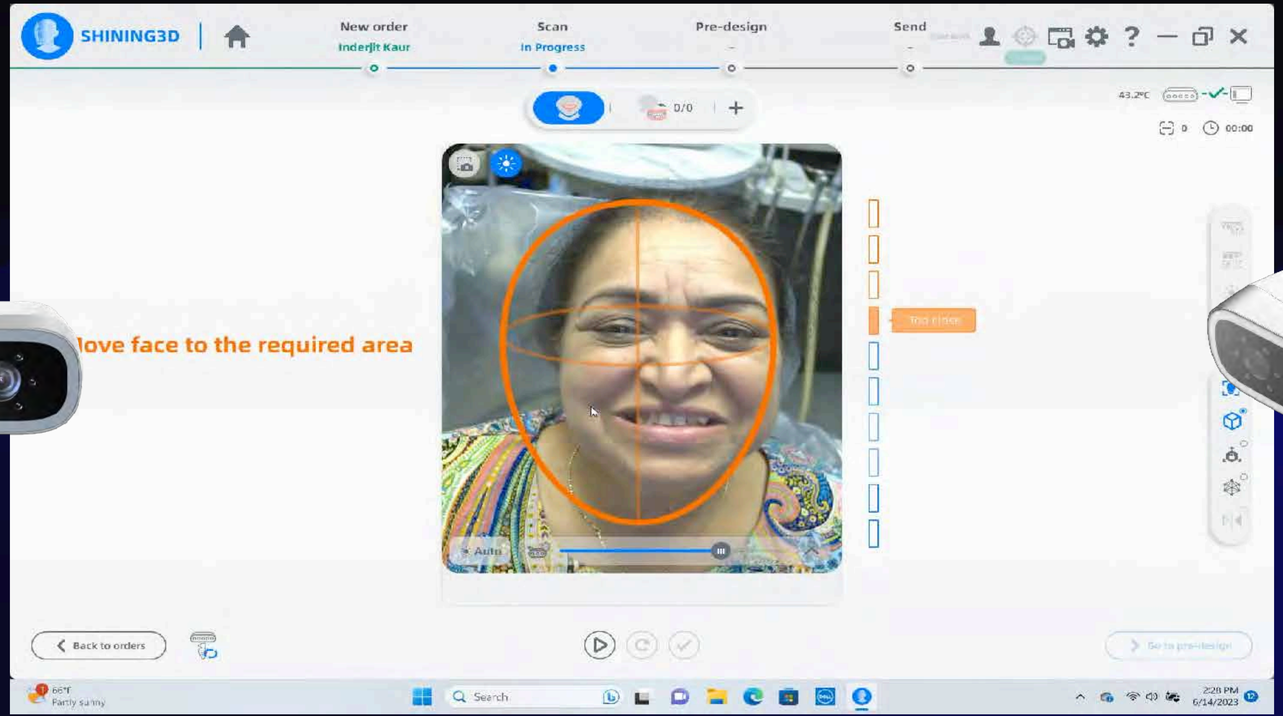






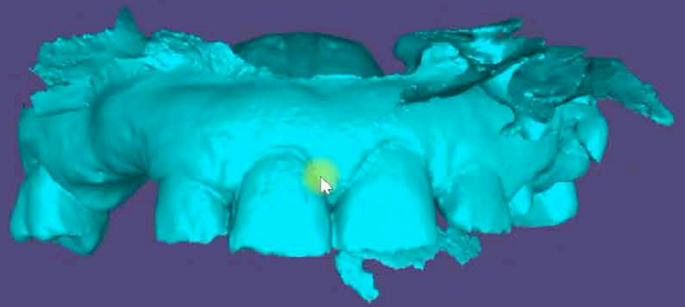
Changing lives one smile at a time

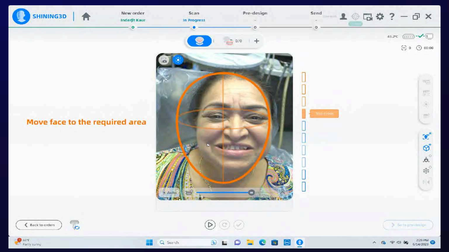



SHINING3D
New order
Inderjit Kaur
Scan
In Progress
Pre-design
Send
0/0
43.2°C
0
00:00
love face to the required area
Too close
Auto
Back to orders
Go to pre-design
66°F
Partly sunny
Search
2:28 PM
6/14/2023

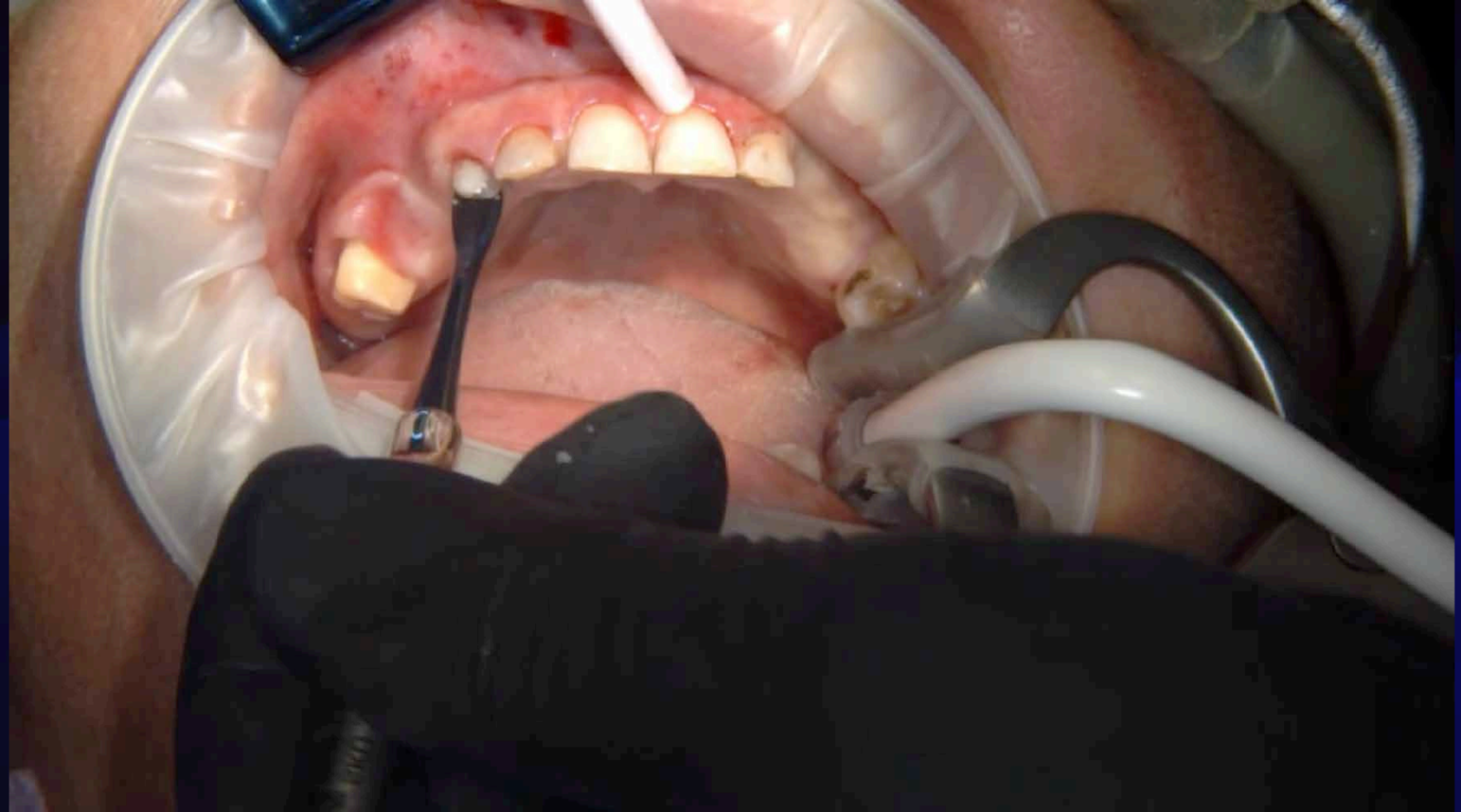

SHINING3D

DESIGN





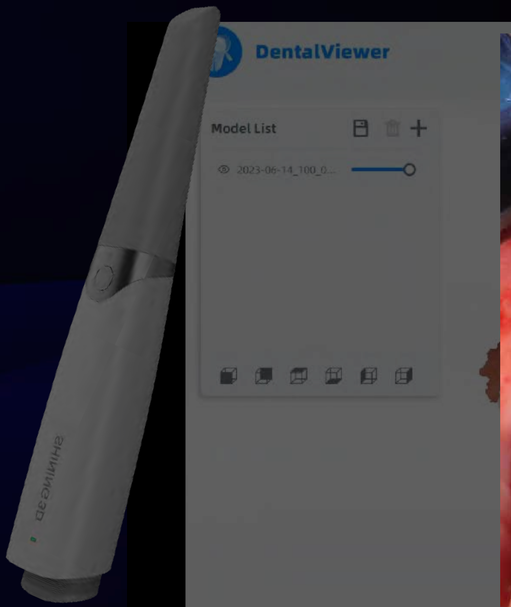
TBS DENTAL

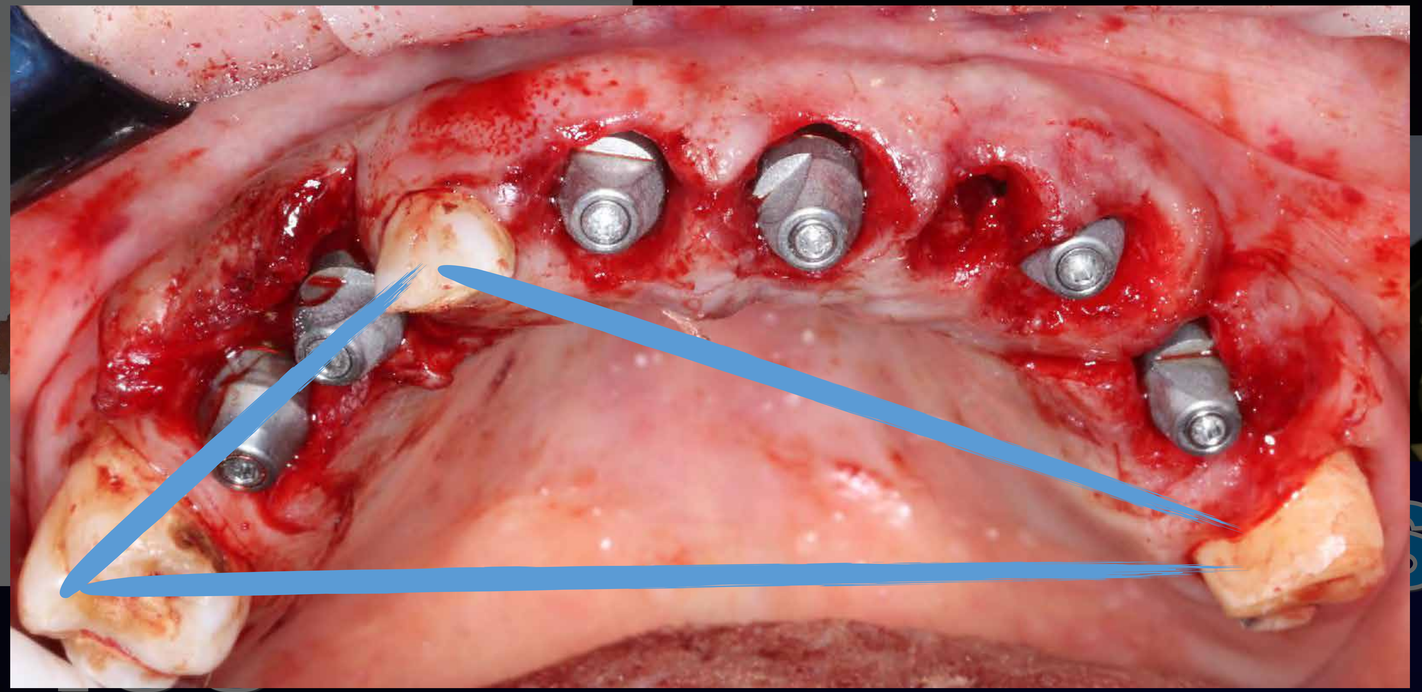


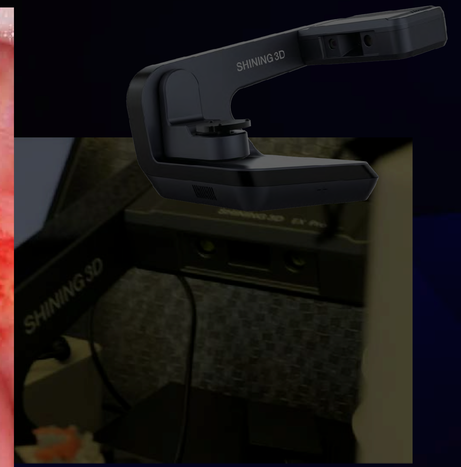
UNIVERSAL SHAPERS

PROFILE, SCULPT AND SCALLOP WITH PRECISION

Immediately Post Surgery



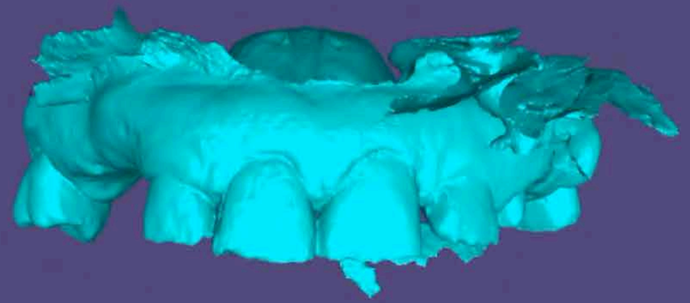


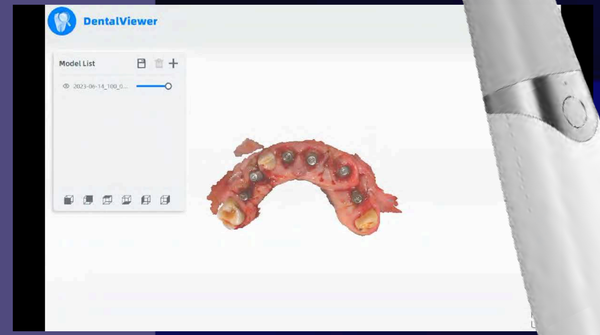


Scan

TRIAD

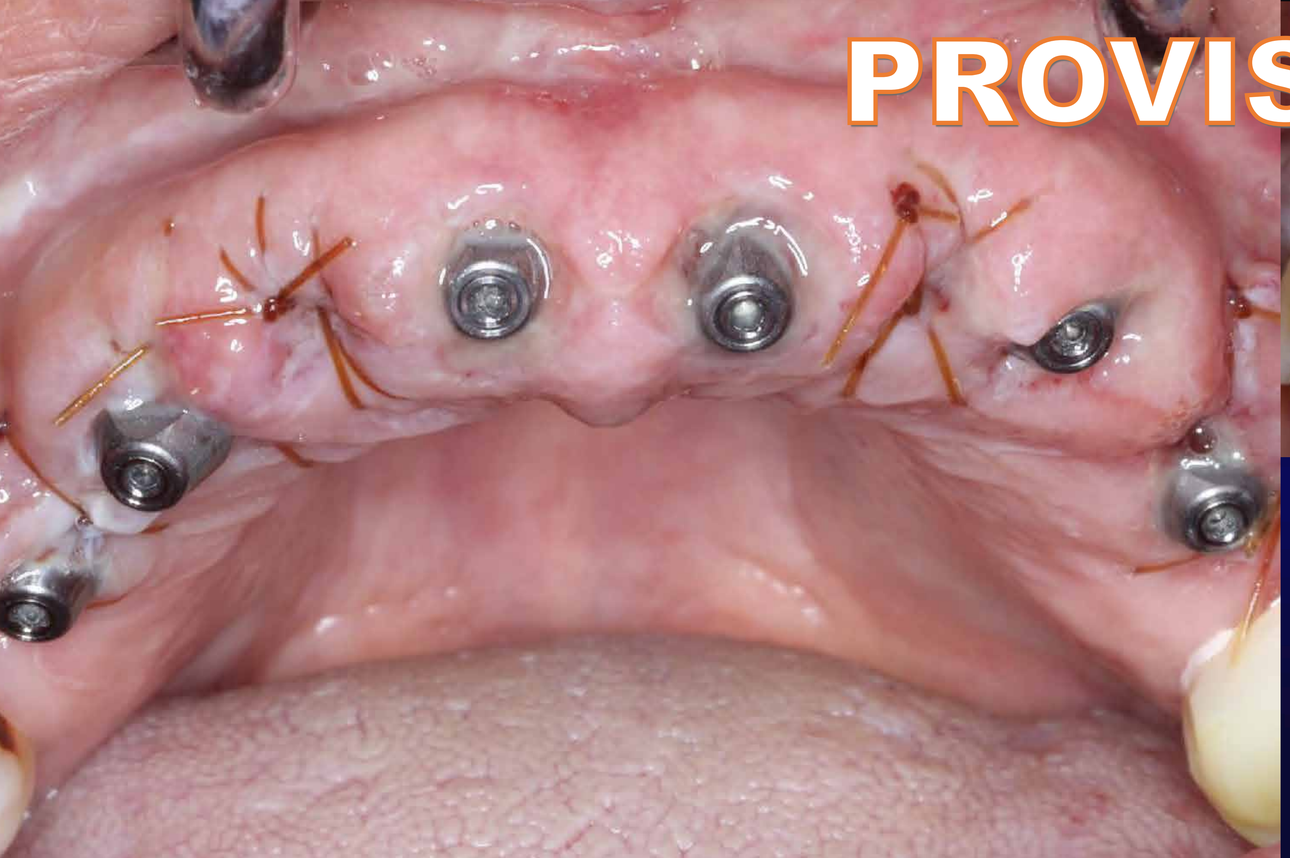
PRE OP MERGE - DESIGN






SHINING 3D
PRINTED TEMPORARIES

PROVISIONAL



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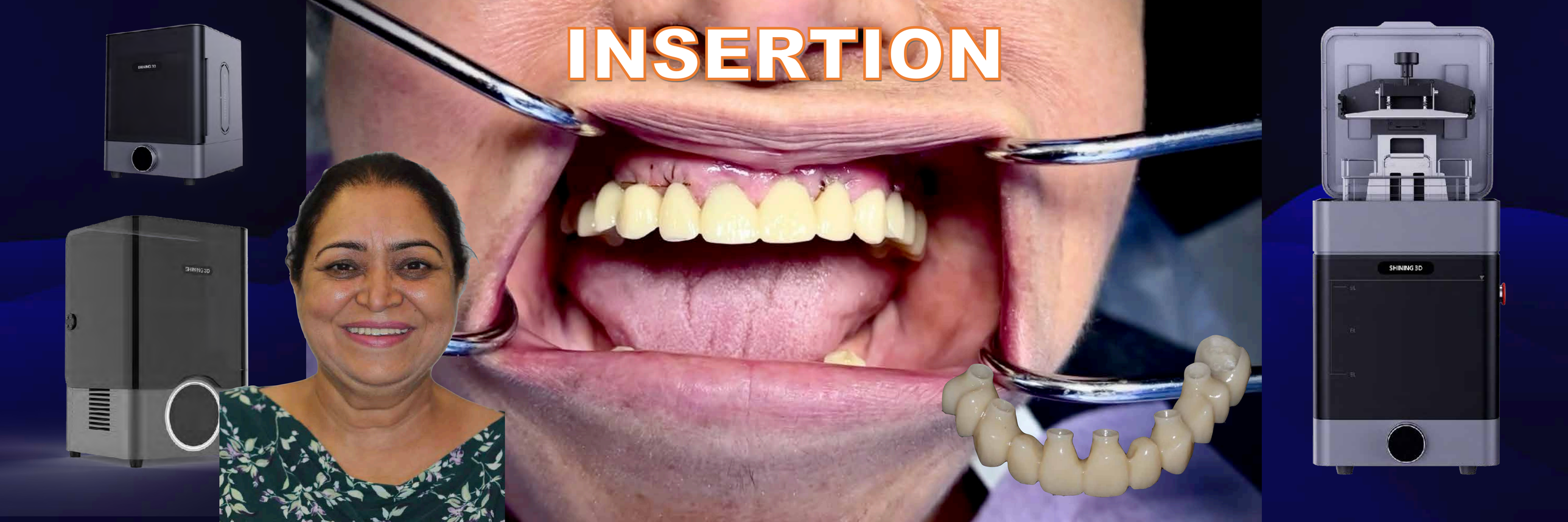
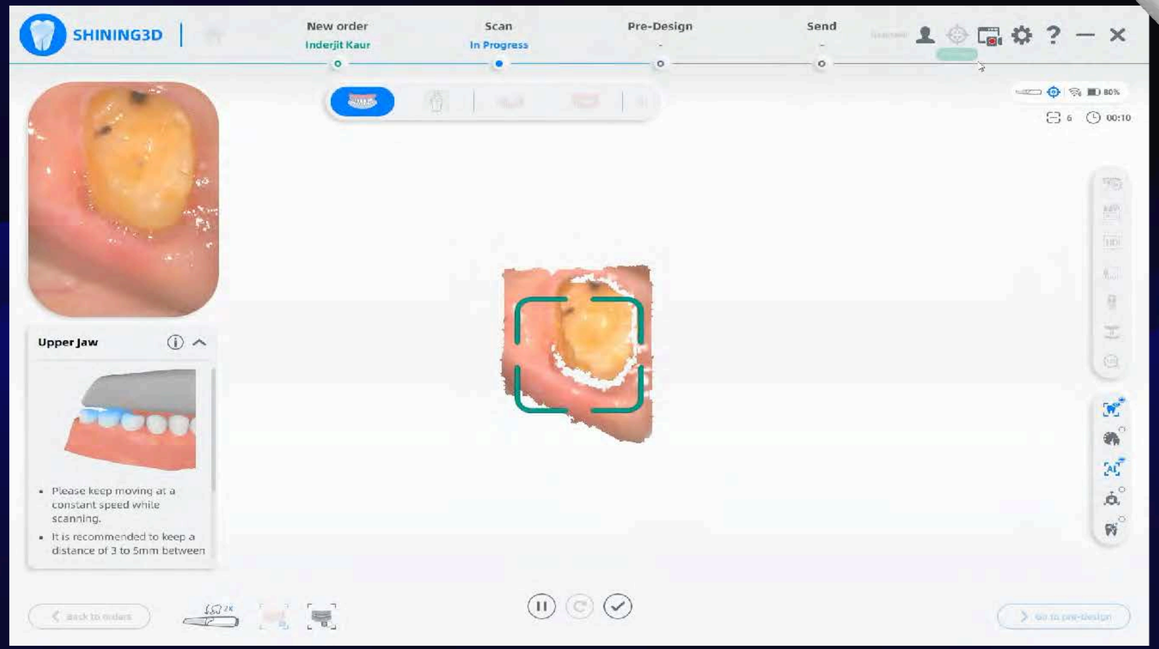
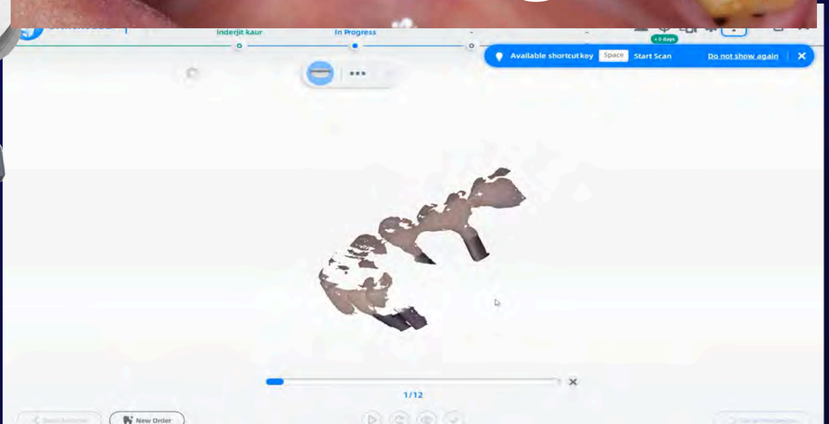
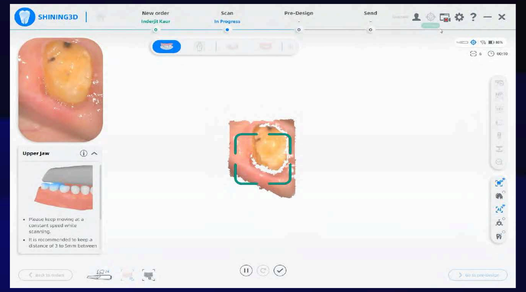


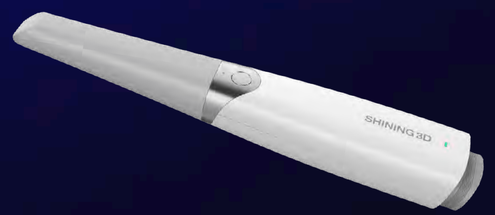
Final Impressions



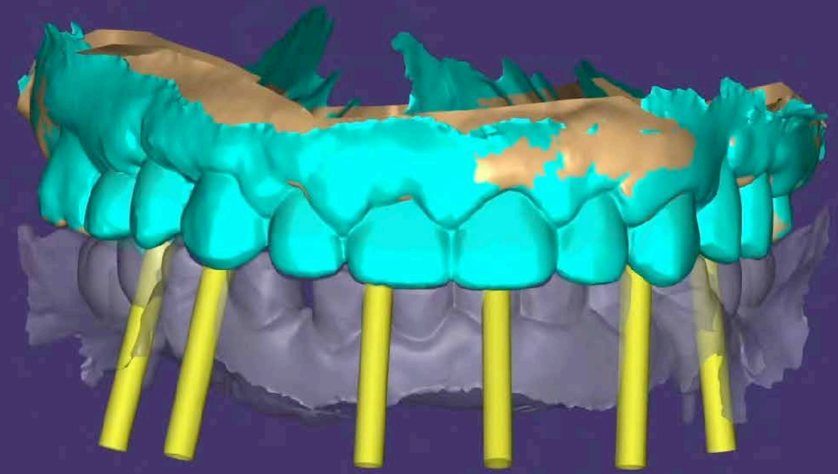


Tissue Scan





FINAL DESIGN



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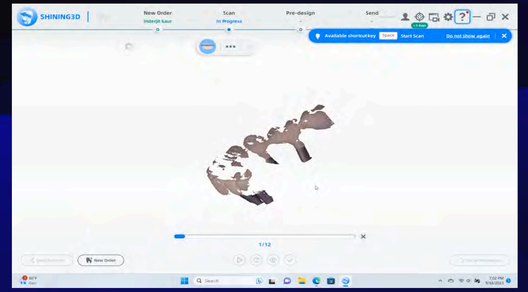

Finals -Metal Free


Changing lives one smile at a time

Fully Digital Full Arch?

Continued Advancements in Full-Arch Implant Restorations

Isaac D. Daniel, DMD

Scott D. Ganz, DMD

INTRODUCTION

Full-arch, implant-supported reconstruction continues to provide viable solutions to restore and improve function, enhance aesthetics, and change the quality of life for our patients. All-on-X implant reconstruction has benefitted from new advancements and technical innovations. In this current edition, the authors continue the journey, navigating through new developments that impact the full-arch analog and digital workflows. Our previous articles introduced several elements to aid the clinician in both the surgical and restorative phases of full-arch replacement, including the use of CBCT guided surgical applications[1] and how they have greatly improved the assessment for implant placements relative to the desired restorative positions for preliminary and definitive restorations while also reducing implant complications. The authors have previously described an ancillary surgical protocol that utilizes extracted teeth as an autologous solution[2] to bone grafting. This has greatly enhanced healing and long-term alveolar stability and provided ample graft volume while significantly reducing biomaterial costs. Subsequent publications also reported on improving the restorative time and treatment outcomes utilizing flig technology[3] and employing small-hole technology (CAT) to enhance the physical integrity and anatomy of milled or 3D printed provisional restorations[4] and improving inter-arch alignment and occlusion. The goal of these articles has been to improve time, efficiency, costs, and long-term results for the betterment of clinicians, laboratory technicians, and patients. This latest article endeavors to provide updates in the acquisition of data necessary to complete the restorations with an emphasis on addressing improvements in screw-retained full arches for monolithic restorations that incorporate multi-unit abutments.

Data Acquisition

As the dental industry continues to strive for fully digital solutions, the development and improvement of intraoral data devices and acquisition technology has continued to evolve. Intraoral scanning (IOS) speeds and accuracies have become a viable solution for replacing direct analog impressions. Native IOS software applications now provide several impressive features that enhance and streamline complete digital protocols. However, due to inherent logistical limitations, the difficulty and accuracy of IOS technology used for full-arch dental implant restorations has presented major obstacles requiring additional applications to achieve fully digital solutions.

All-on-X fixed surgical and restorative protocols require the placement of 4 or more implants with a favorable anterior posterior spread to achieve the necessary long term support. Capturing the positions of these implants with accurate cross arch intraoral scanning, especially in the mandible, has been one of the major struggles for clinicians and dental laboratory technicians to overcome. IOS technology requires a stable environment for data to be stitched and captured accurately. Several techniques have emerged to aid the clinician in scanning these difficult environments, including proper retraction, saliva flow lack of stable, keratinized soft tissues, large distances between scanning objects, and more. The use of splinting scan bodies with bands or wires (Figure 1) has facilitated the ability of scanners to continue a scan without interruption by creating a linear path for data capture.[5] Innovative techniques, such as the sigma composite curve for surgical intervention of labial soft tissues[6] related to the tissue, have also helped improve scanning flow.[7] While these processes work for some and not for others, developers have created alternative workflows to aid in acquiring accurate intraoral data.

Photogrammetry (PG)

Photogrammetry (PG) is a relatively new development that has revolutionized capture and positional analysis.[8] PG is a diagnostic and research method using an extraoral capture device with specific photogrammetric scanning abutments to acquire measurements from 3D digital images (Figures 2a and 2b). PG scans allow dental clinicians to acquire precise measurements of individual scan bodies (Figure 2c) secured to dental implants as they are in their natural state[9] either at the time of surgical placement or after the implants are uncovered. While extremely accurate for recording the spatial positioning of the implants, PG does not acquire the topography of the soft tissue. Therefore, a second scan is required with an intraoral scanner. The IOS data can then be used to fabricate a virtual 3D model used to measure various parameters of the implant analogs.[9] The software correlation of these measurements can be used to assess and validate the correct positioning of implants and the alignment of a patient's occlusion, size, distance, and angle. The combination of IOS and PG data provides the CAD software designer with all of the necessary information to virtually create a provisional prosthesis or a final restoration to be 3D printed or CAM-milled. The advanced capability of this highly accurate tech-

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SHINING 3D
SHINING 3D
SHINING 3D
SHINING 3D
SHINING 3D
GITAL
RUPTION
AI
BIG
DATA


TECHNOLOGY IS
CHANGING DENTISTRY
DONT BE LEFT BEHIND

WITH THE RIGHT INSTRUMENTATION

DIGITAL

CHANGE IS NOT

REVOLUTION

ONLY POSSIBLE

IT IS EXPECTED

NYU COLLEGE OF DENTISTRY
NEW YORK UNIVERSITY

BE A DREAMER
LIVING IN THE PRESENT

Isaac D Tawil DDS MS