Digital versus Analogue Implant Reconstructions

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September 30, 2022

Objectives:

1. Discover digital workflow in a treatment planning, surgical and prosthetic reconstructions of implants.
2. Demonstrate the development of a digital, analogue or a combined workflow in practice.
3. Identify the limitations and knowing which pathway would lead to the best results.

Different Levels of Guided Surgery

Least Complex

Most Complex

<u>Single fixed edentulous sites:</u>

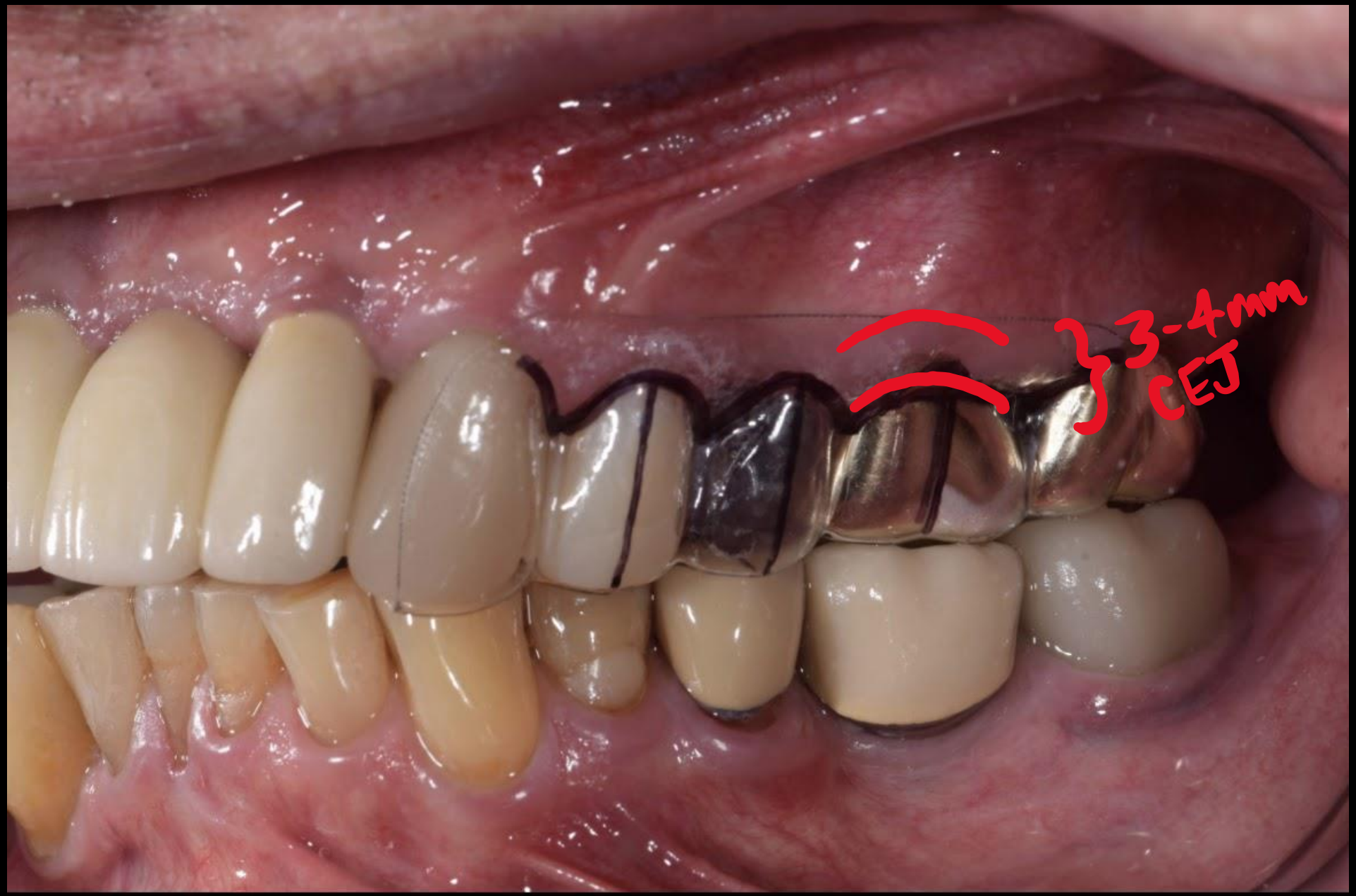
- Analog:
  - Vacuum-form matrix pilot guide
- Digital:
  - Pilot guide
  - Fully-guided

<u>Full arch cases:</u>

- Analog → Duplicated dentures (surgical template and conversion prosthesis
- Digital → Dual Scan Protocols
  - Tissue-supported guides (pilot or fully guided)
  - Bone supported guides (pilot or fully guided)
  - Stackable bone supported guides (fully guided)

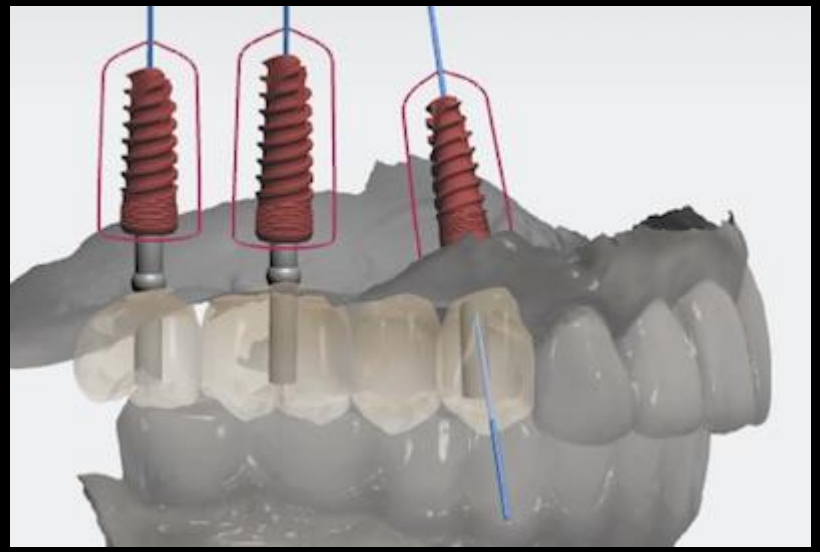
Surgical Guides for Single Edentulous Spaces

Analog Guide: Vacuum-form pilot guide


3-4mm
CEJ

A *prosthetically-driven treatment plan* is created by placing the implants in an ideal relationship to the planned dental restorations and the associated supporting bone.

The virtual treatment plan is then electronically transferred to the manufacturer for the construction of a stereolithographic surgical drilling guide.



Digital workflow for Fabrication of Printed Surgical Guides

CBCT

"Segmentation"

Export DICOM

Generates 3D image of Jaw Bone/Teeth (STL)

Intraoral Scan

Export STL

Stone model

Export STL

Stone model w/ Removable wax-up

Lab scanner

Export STL

Implant Planning Software

Plan implant positions

Design Surgical Guide

Generate CADCAM Files

Export STL

3D Print Surgical Guides

Post-processing steps

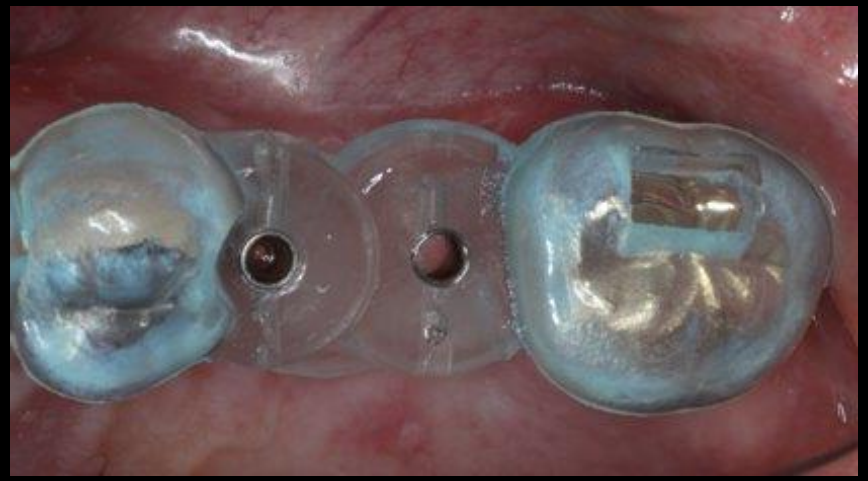
Lute guide sleeves with cyanoacrylate **"Liability step"**

Types of printed resin surgical guides:

Pilot drill guide:

- ✓ 2mm sleeves
- ✓ Guides the initial osteotomy ("pilot drill")
- ✓ Guided kit not required

Picture courtesy: Anatomage

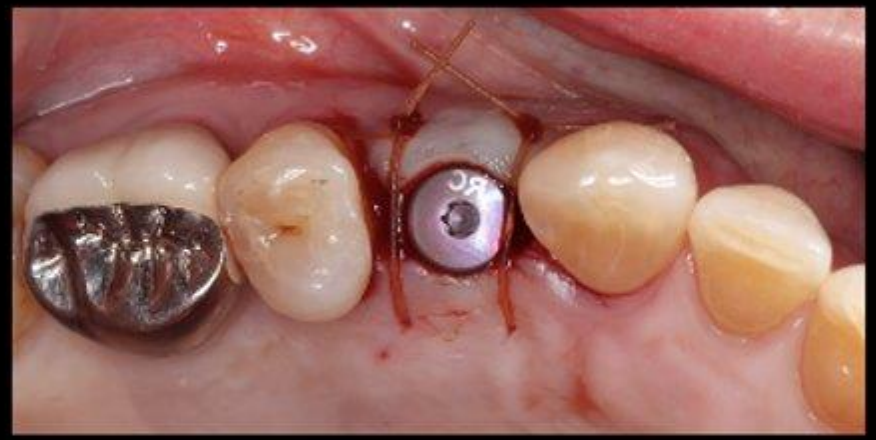


Surgeon: Dr. Alzaibak, W

Tooth supported guide:

- ✓Guide rests over existing teeth
- ✓Can be used for long span and short span partially edentulous arches.

Picture courtesy: Anatomage



Surgeon: Dr. Alzaibak, W

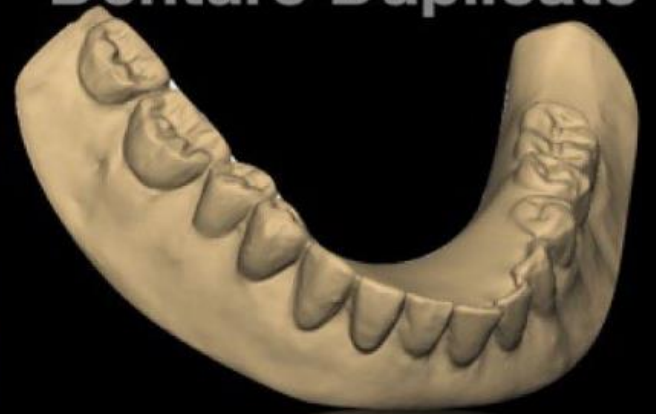
Surgical Guides for Full Arch Cases

DR. ARMAND BEDROSSIAN
PROSTHODONTIST

@Dr_Bedrossian

in-house printed

Denture Duplicate



DR. ARMAND BEDROSSIAN

PROSTHODONTIST

@Dr_Bedrossian

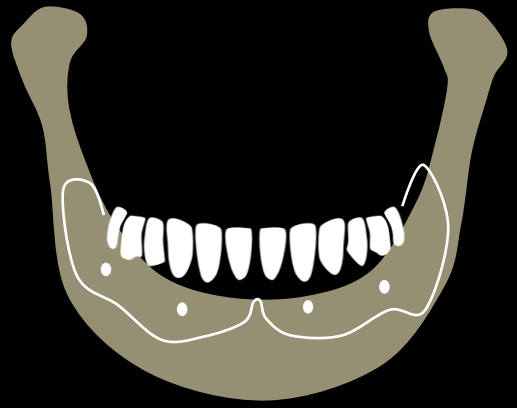
Radiographic guide : Dual Scan Technique

Picture courtesy: Dr. Hongseok An, DDS, MS, FACP

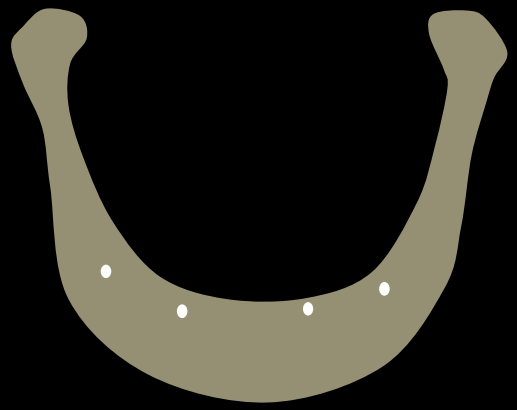

suremark
SL-10


suremark
CTMARK
PRECISION SKIN MARKING SYSTEMS


suremark
SL-10



1st CT scan
: Patient jaw with
a radiographic guide



1st CT scan
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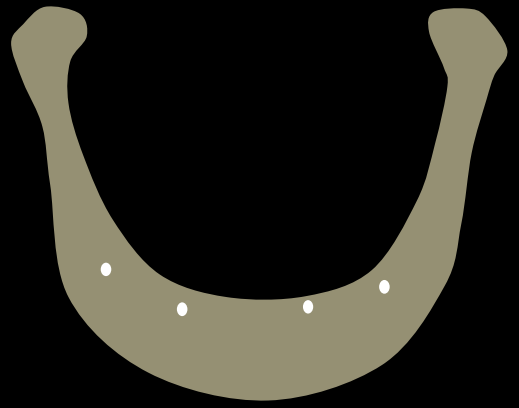
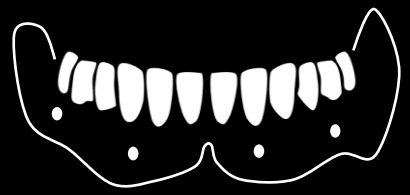
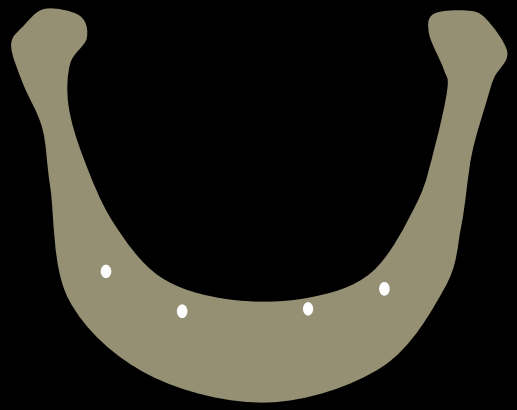




1st scan
: Patient jaw with
a radiographic guide

2nd CT scan
: Radiographic guide
only



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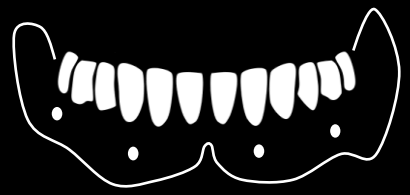

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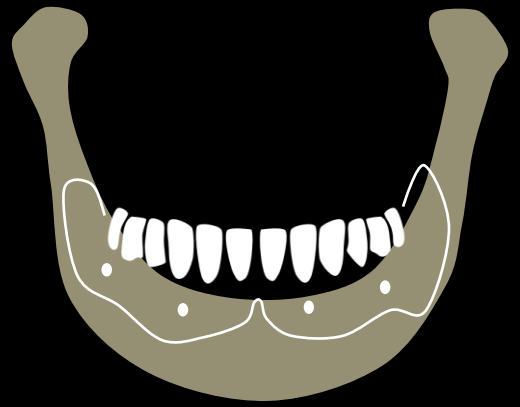
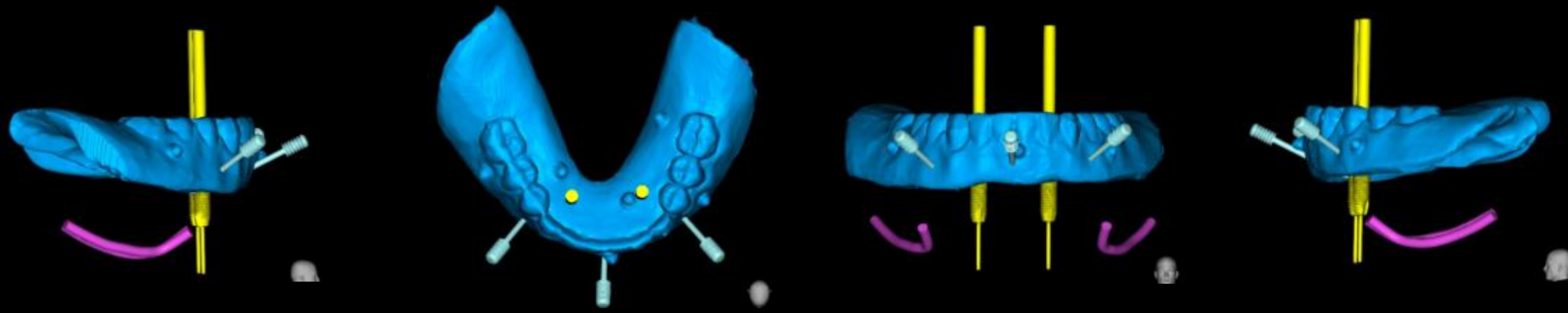
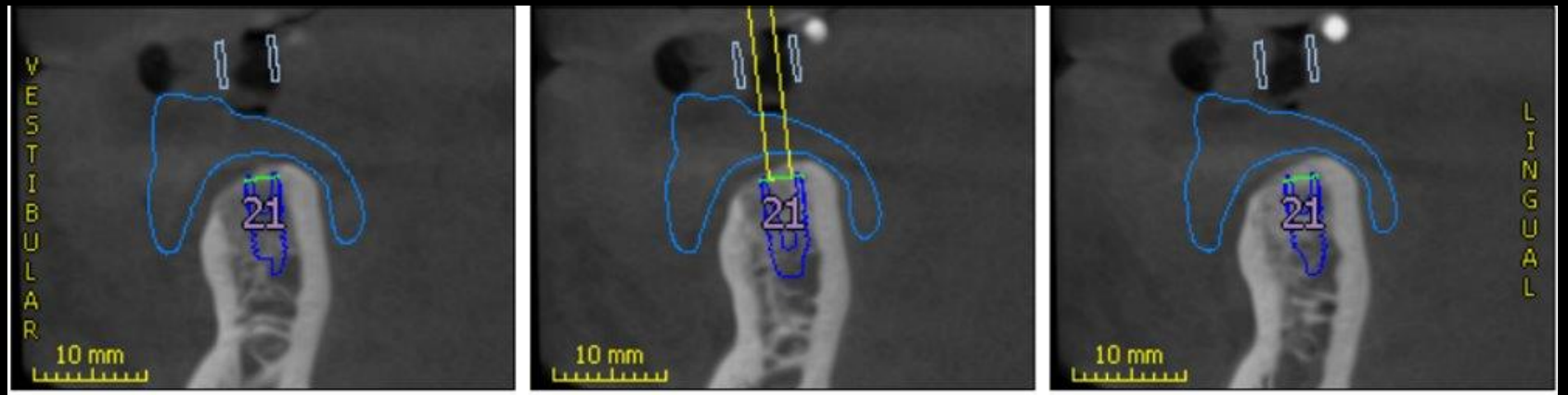


1st CT scan
: Patient jaw with
a radiographic guide

2nd CT scan
: Radiographic guide
only

Superimposition
: Merge 1st and 2nd scan

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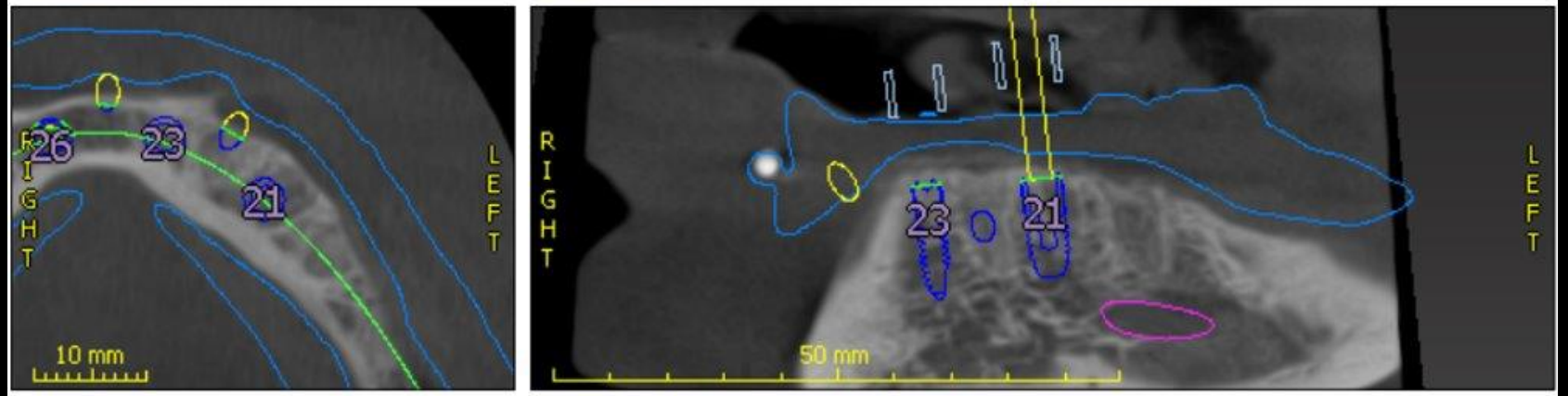
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LEFT
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RIGHT
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LEFT
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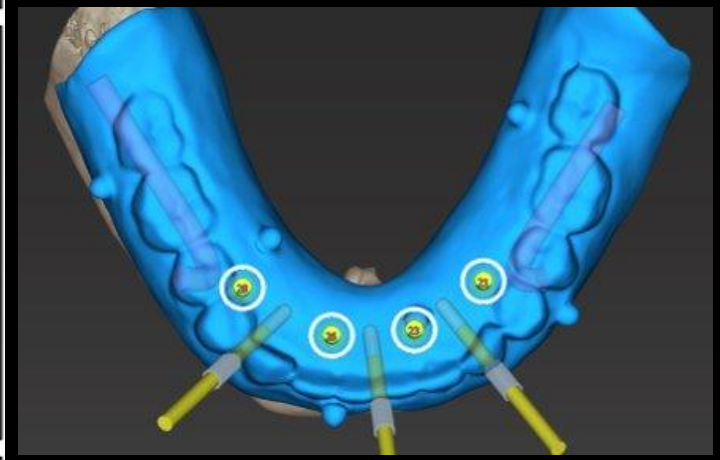

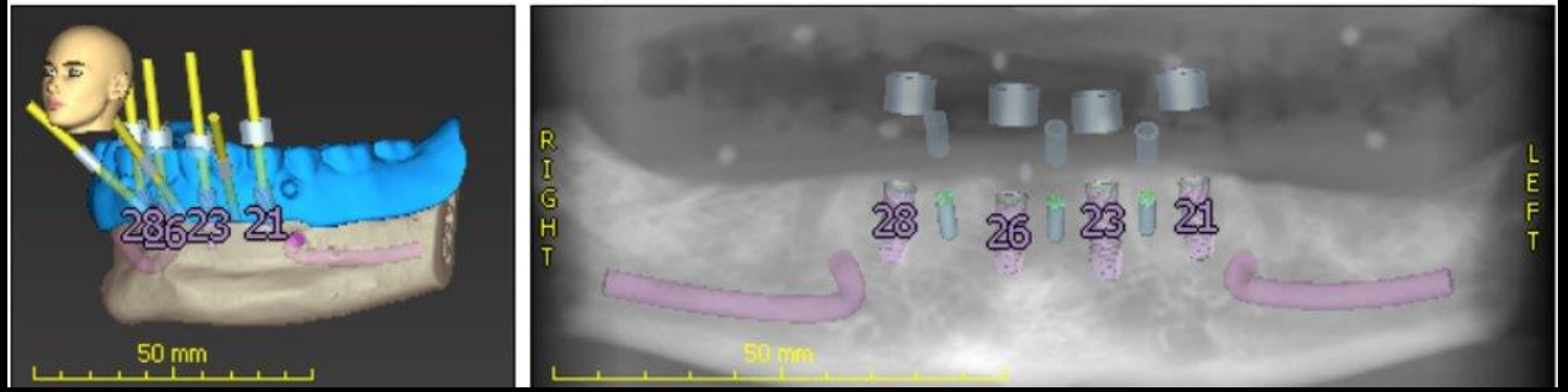
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LEFT
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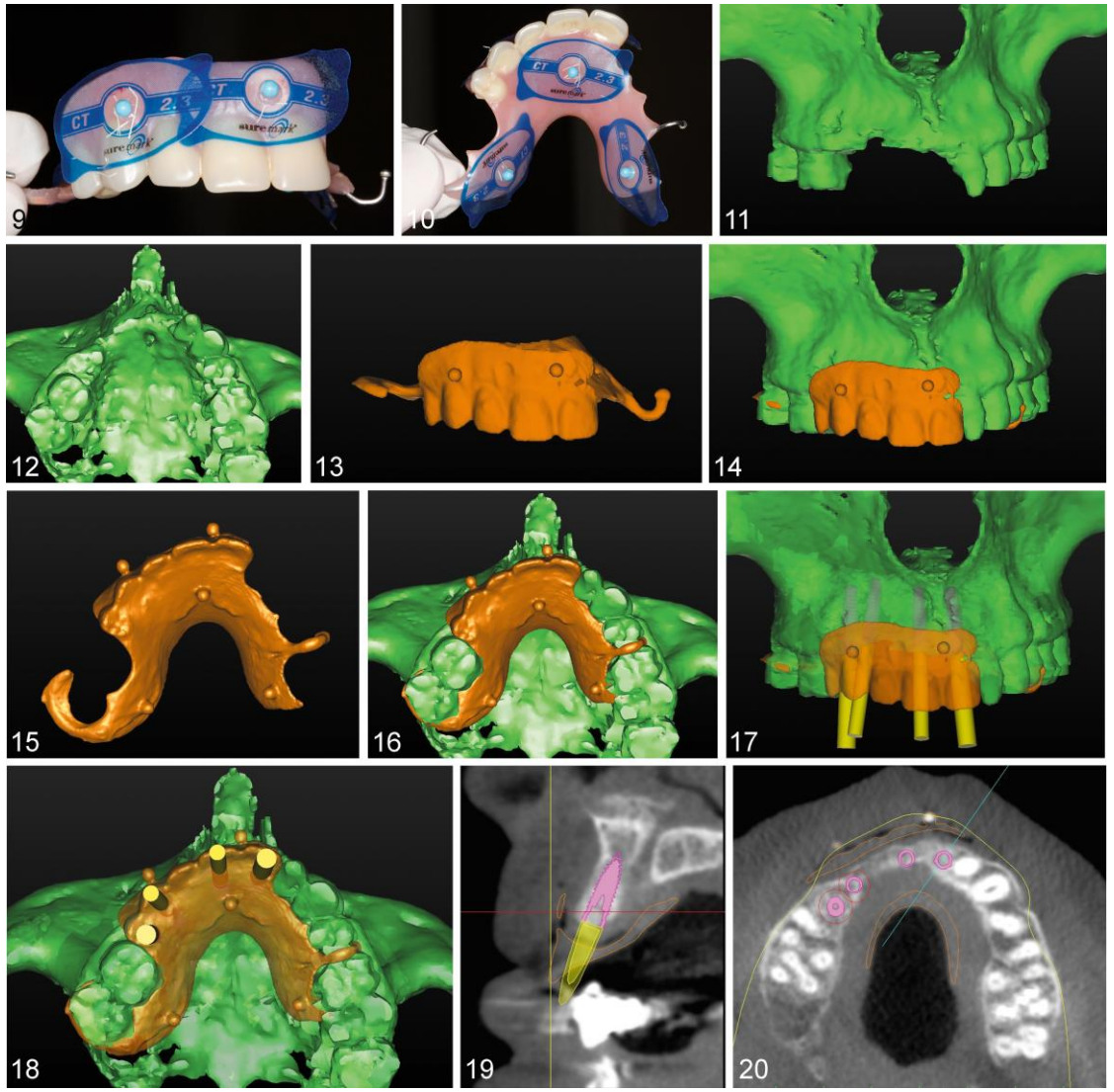
Dual Scan Protocol with Interim Removable Partial Denture

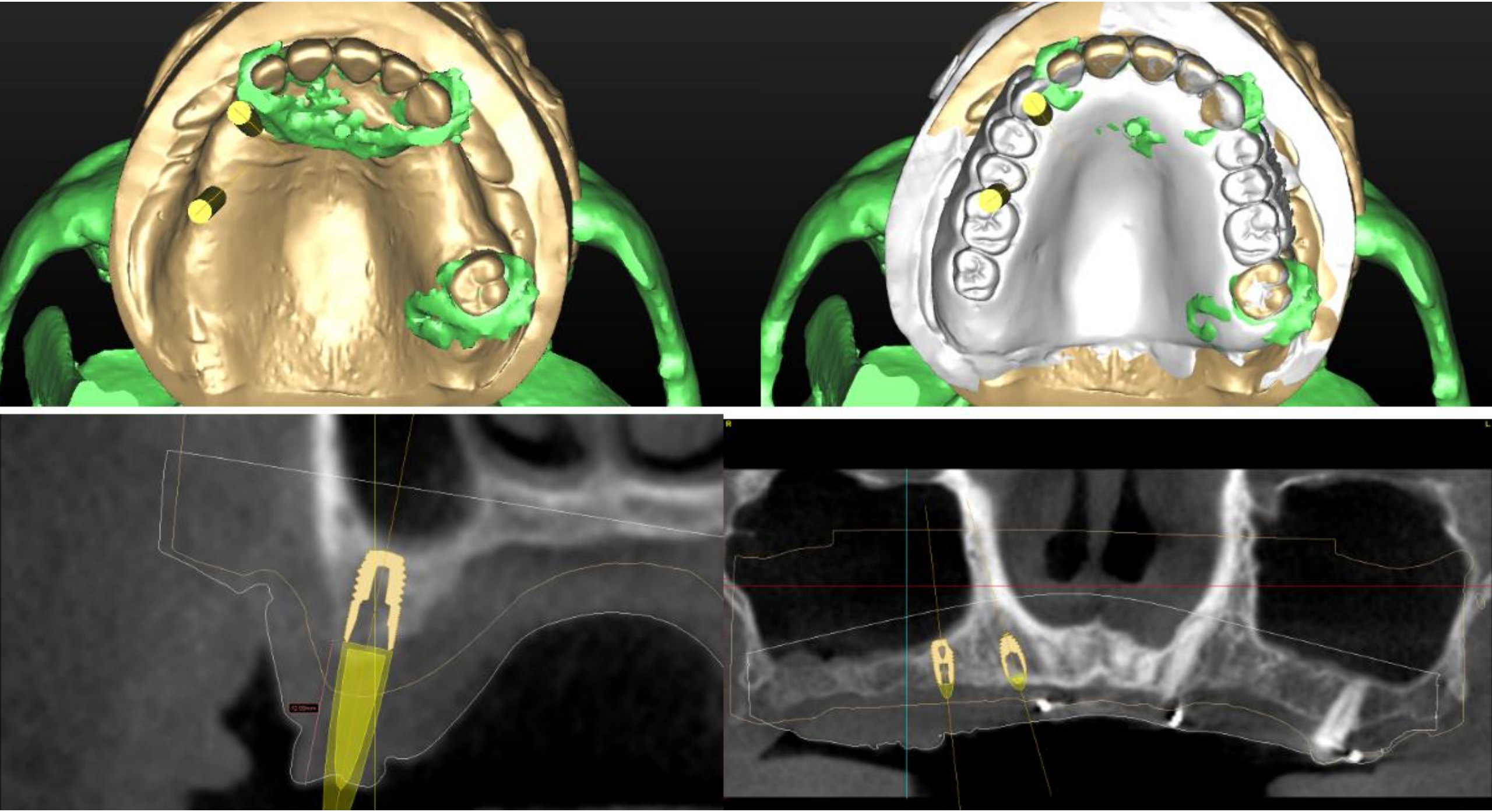


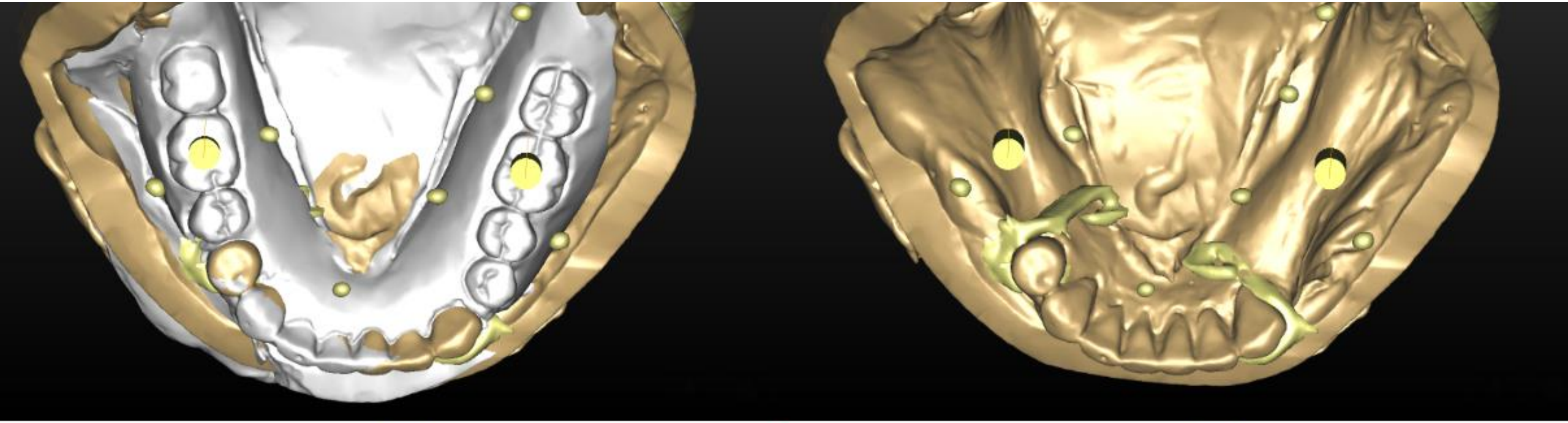
1st scan:
Patient head scan with the radiographic guide

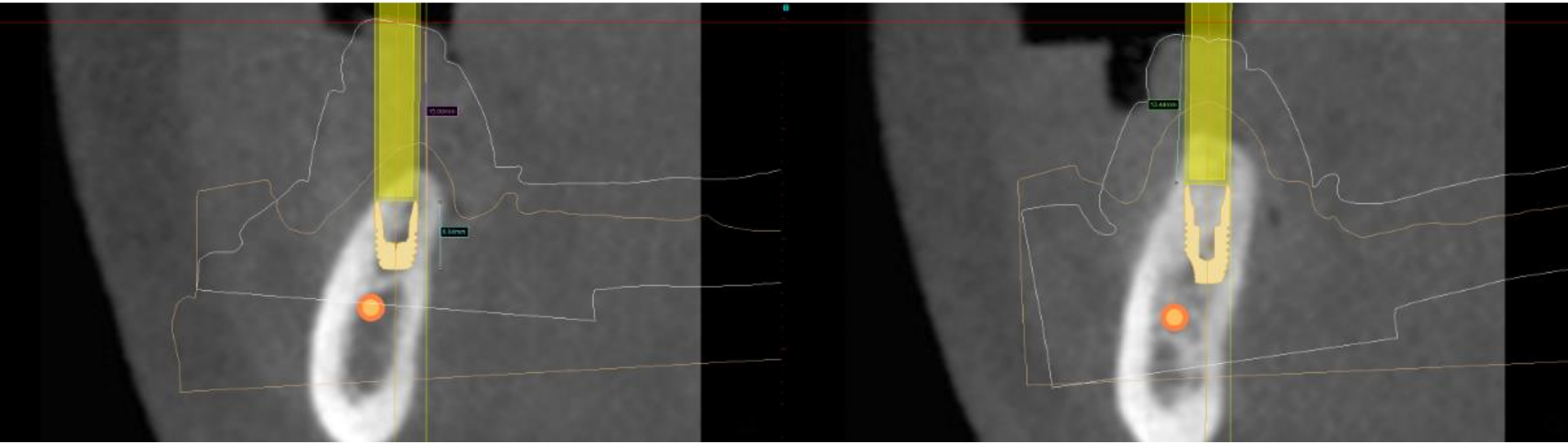
2nd scan: Radiographic guide only

Merging all scans for
treatment planning

J Oral Implantol. 2017;43(5):381-386. doi:10.1563/aaid-joi-D-16-00138







Mucosa supported guide:

- ✓ Rests on patient's soft tissue
- ✓ Used in fully edentulous cases.

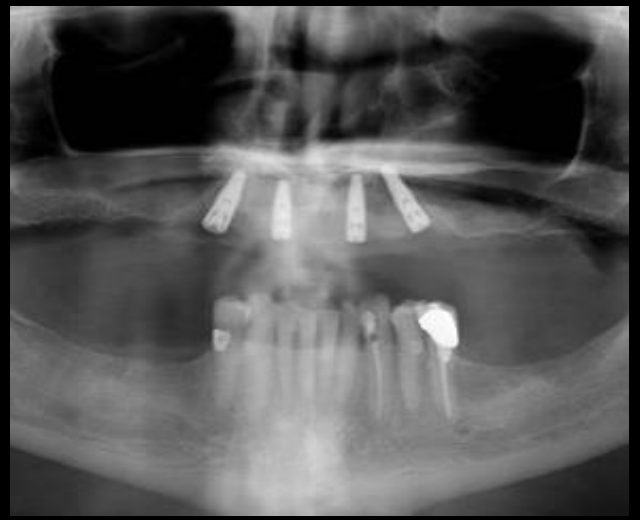
Advantages:

- ✓ Minimally invasive

Disadvantages:

- ✓ Requires anchor pin fixation

Picture courtesy: Anatomage



Surgeon: Dr. Sinha,N

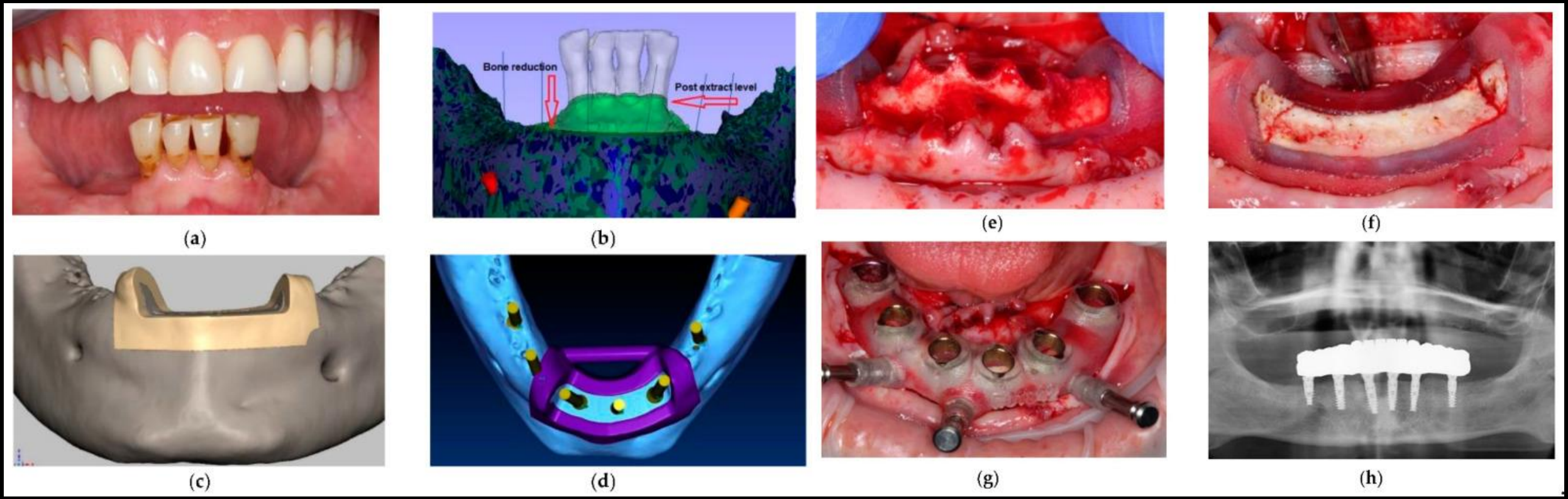
Bone supported guide:

- ✓ Rests on patient's bone
- ✓ Used in fully edentulous cases.

<u>Disadvantages:</u>

- ✓ Requires anchor pin fixation.
- ✓ Invasive surgery as the guide is fixed after the elevation of the mucosa

Picture courtesy: Anatomage



Mijiritsky E, Ben Zaken H, Shacham M, Cinar IC, Tore C, Nagy K, Ganz SD. Variety of Surgical Guides and Protocols for Bone Reduction Prior to Implant Placement: A Narrative Review. Int J Environ Res Public Health. 2021 Feb 27;18(5):2341. doi: 10.3390/ijerph18052341. PMID: 33673563; PMCID: PMC7956849.

Bone reduction guide:

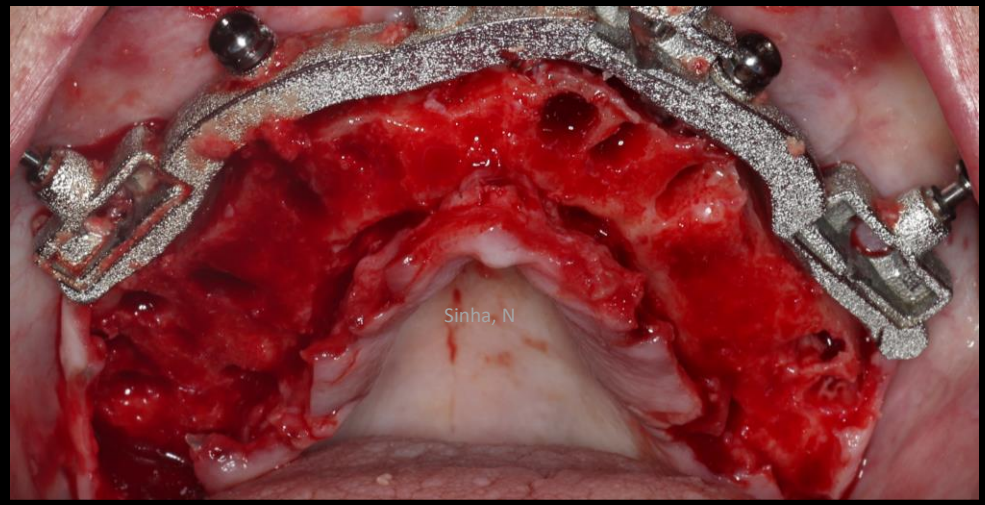
- ✓Rests on bone after flap elevation
- ✓Window in the guide guides the level of bone reduction
- ✓Anatomage- offers for mandibular cases only.
- ✓Other systems like ROE and N-sequence offer for Maxilla as well.

<u>Disadvantages:</u>

- ✓Anchor pins need fixation, hence is invasive

Picture courtesy: Anatomage


Sinha, N


Sinha, N

Extraction guide:

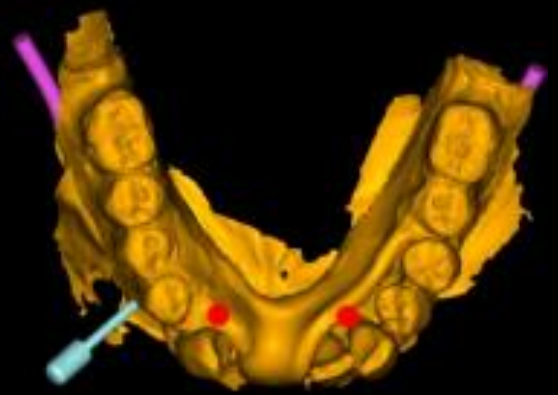
✓Can virtually extract the teeth.

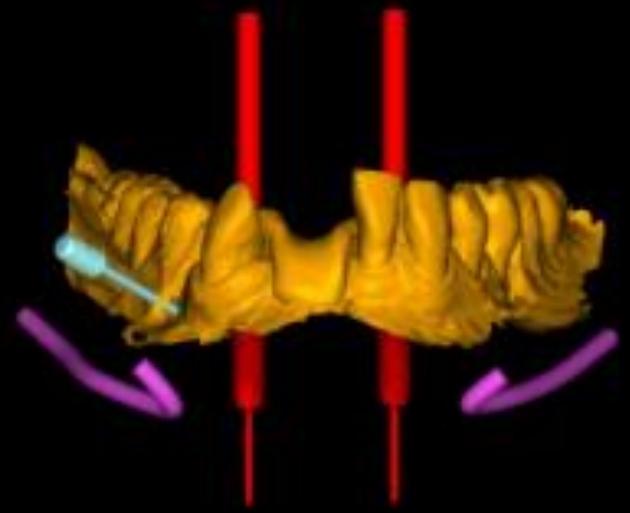
Advantages:

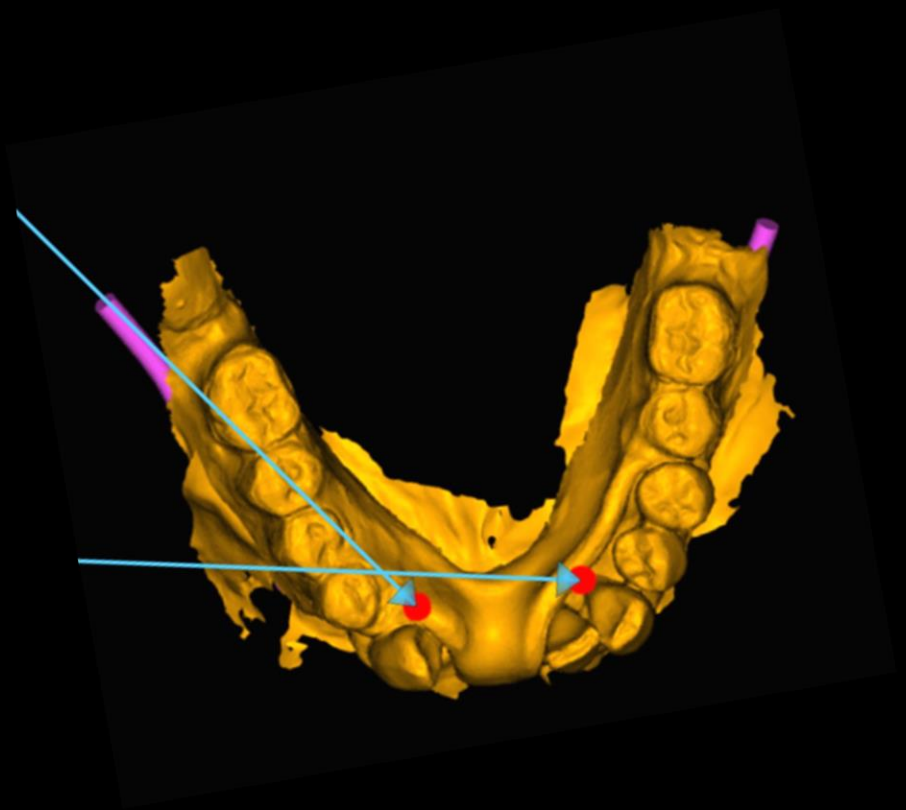
✓ Immediate extraction and Implant placement cases

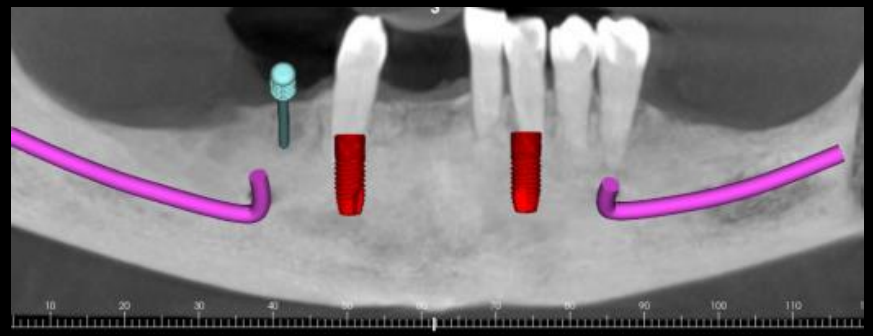
✓Extraction or FDP removal accompanied with Implant placement.

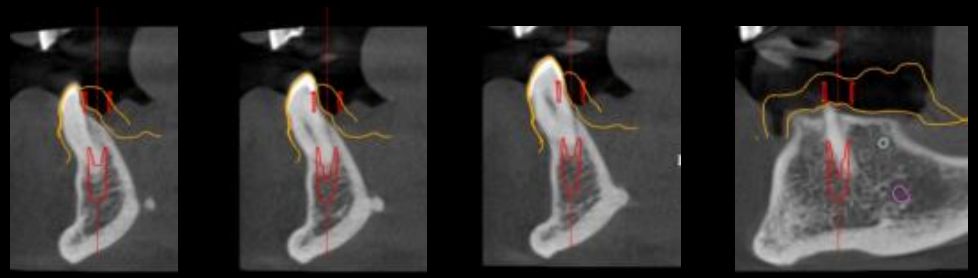
Picture courtesy: Anatomage

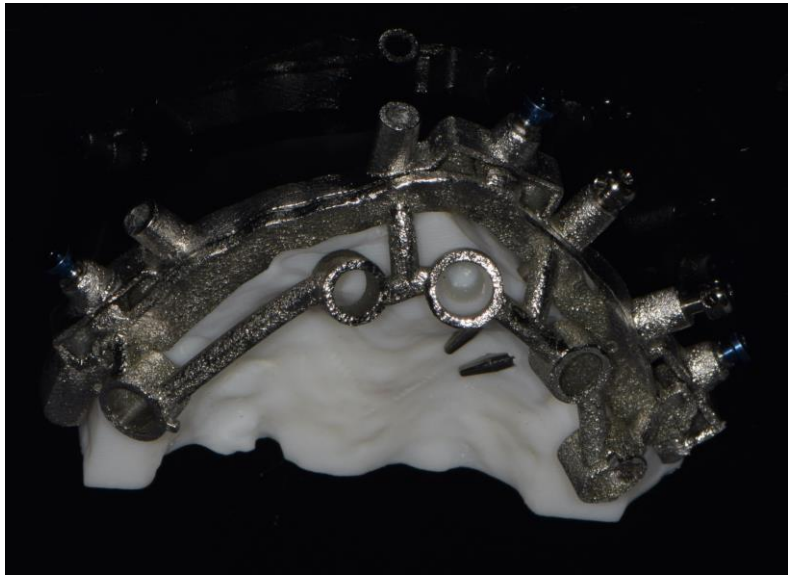












Stackable Guides:

- ✓ Has base fixation guide
- ✓ All other guides fit on fixation guide for sequential extractions and implant placement
- ✓ Requires anchor pin fixation

Advantages:

- ✓ Fully guided surgery
- ✓ Fully guided prosthetic reconstructions
- ✓ Used in DSD (Digital smile designing)

Dentsply Sirona Simplant

- **Affiliated with Astra System**
- Submit CBCT and digital scans/models to company
  - Can't merge STL files of digital scans/models on own
- Technician proposes plan that you modify and approve.
- Company designs and fabricates the surgical guide.
- 3 guide options:
  - Pilot guide
  - Universal guide --> fully guided with Simplant brand universal keys and long stop drills
  - SAFE guide--> fully guided sleeves
- Works with multiple implant systems
- Can make bone-supported guides with reduction guides

3Shape **Implant Studio**

- 3Shape product for implant planning and designing of surgical guides
- Works best with TRIOS intraoral Scanner
- Works with multiple implant systems
- User Friendly
- Allows digital wax-ups to aid in prosthetic planning
- Can design tooth-supported, mucosa-supported or bone-supported guides
- Design your own surgical guide
  - Option to submit case to laboratory for fabrication
  - Or generate STL file to print case on own

3shape

Blue Sky Bio

- Online implant planning program
- Import CBCT and Scan STLs to merge case
- Can design tooth-supported, mucosa-supported and bone-supported guides
- Can be used to make bone reduction guides
- Pay to generate STL design file for guide fabrication
  - Option to send to dental laboratory for fabrication

coDiagnostix (Dental Wings)

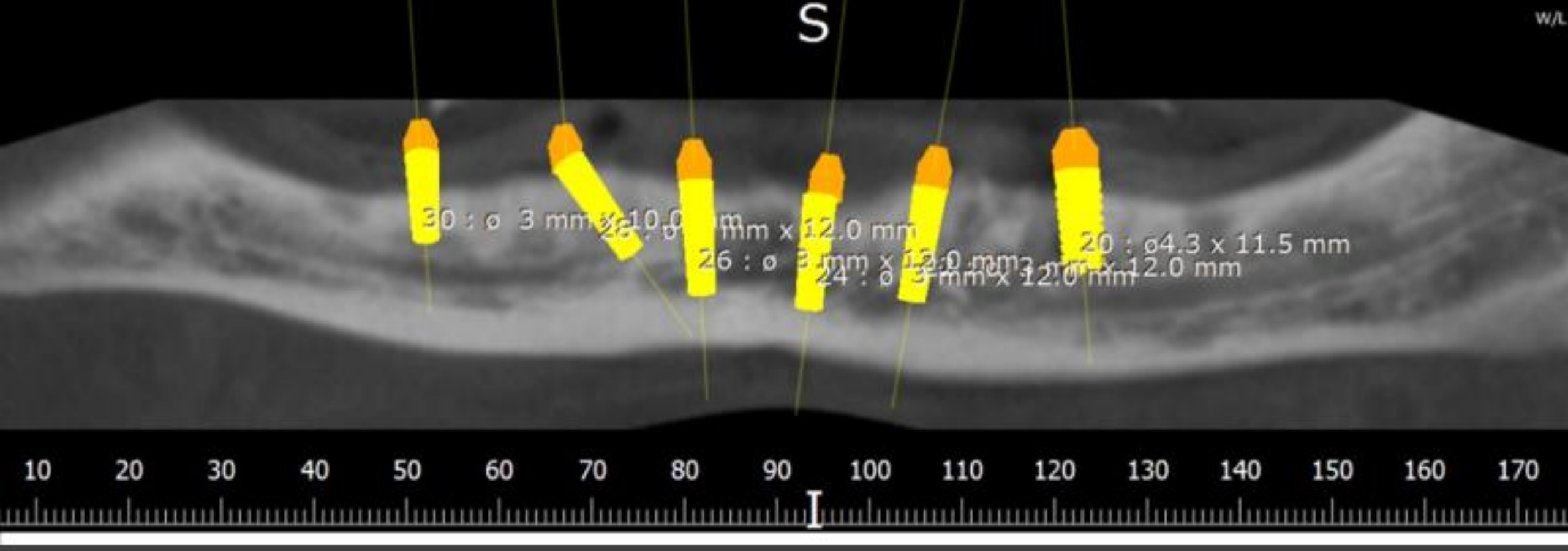
- Affiliated with Straumann
- Can be operated with Easy or Standard (Expert mode)
- Works with multiple implant systems
- Can import CBCT DICOM files and STL scan files and merge easily
- Allows design of guide and will generate STL file to print or mill the surgical guide
- Allows design of sophisticated stackable bone guides for full arch cases
- Professional labs use for designing sophisicated stackable guides
- caseXchange™ available to communicate between specialists/referring dentist/lab

Implant Concierge

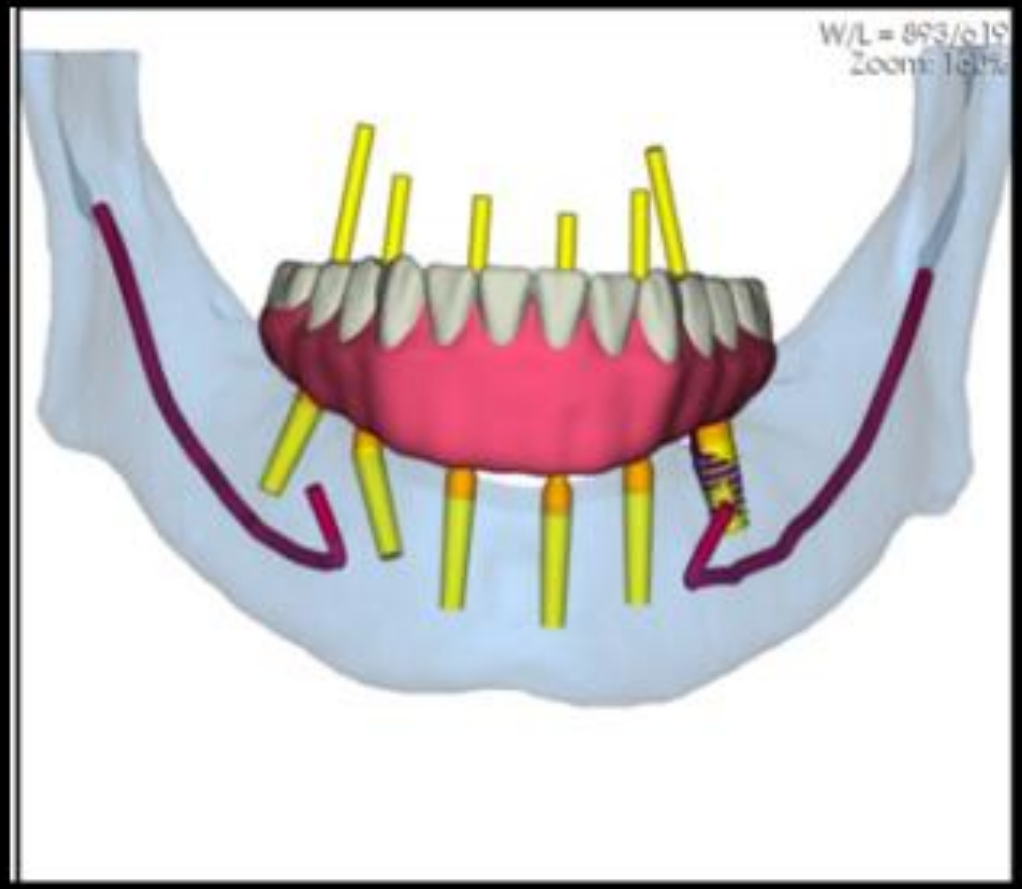
- Submit CBCT and scan stl files online
- Schedule VIP meeting
  - Meet technican virtually to discuss implant planning and agree on surgical guide designs
  - Case designed with RealGuide program
  - Company fabricates and prints surgical guide
- ***Workflow used by CUSOD***

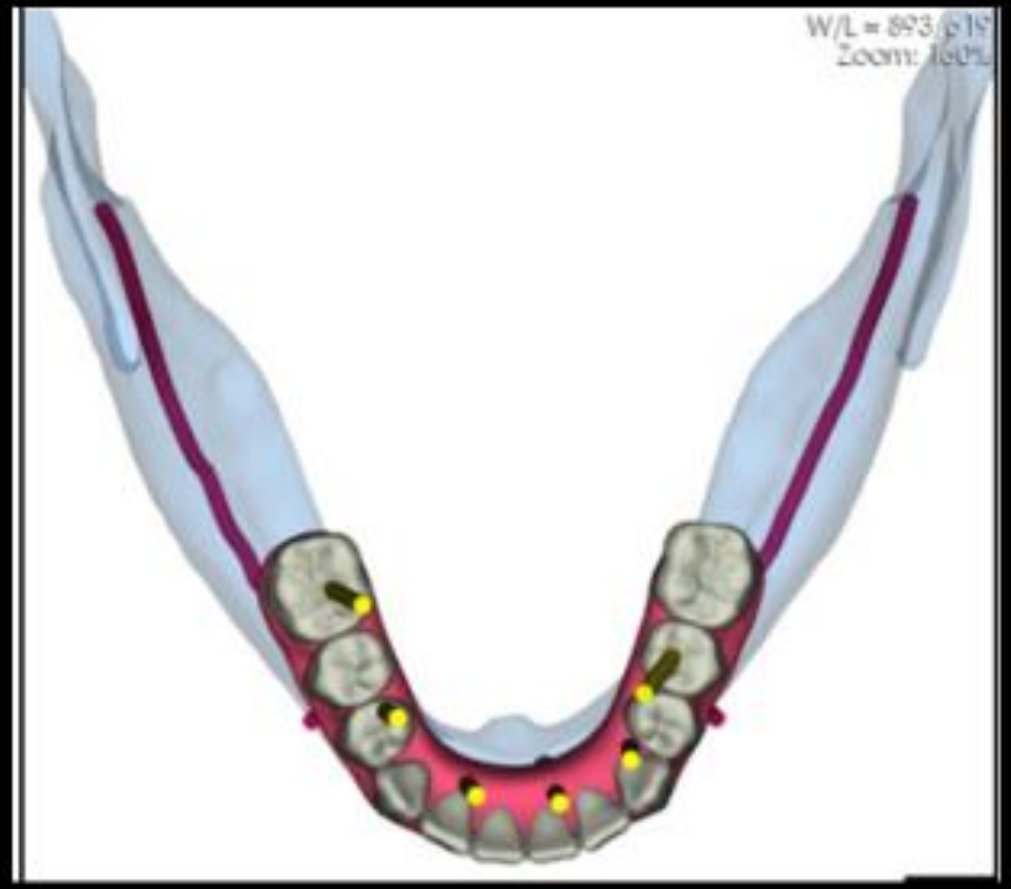
NSequence

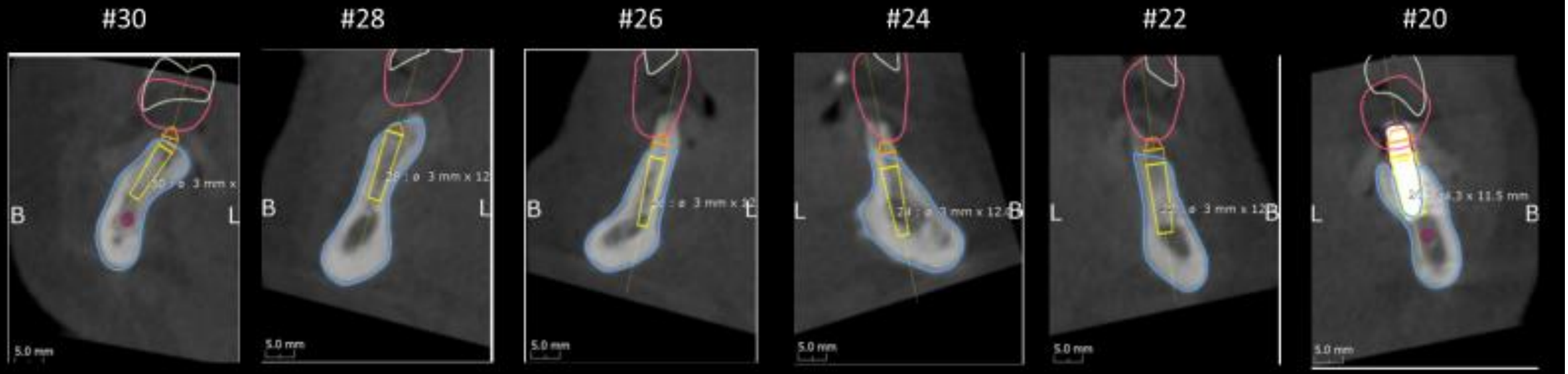
- Design stackable fully-guided surgical guides for All-on-X and simplified conversion prosthesis
- Submit preoperative photo records, CBCT scans, scans/impressions of exisiting dentition or denture
- Meet virtually with technician to plan case
- **Stackable guide includes**: bone reduction guide, guided implant placement, angulated multiunit abutment positioning, pre-trimmed titanium temporary cylinders, tissue gasket, and long-term conversion prosthesis.
- Cost $3,300 for entire service
- Representative can visit on day of surgery to ensure surgical guide and conversion runs smoothly



nSequence Digital Planning



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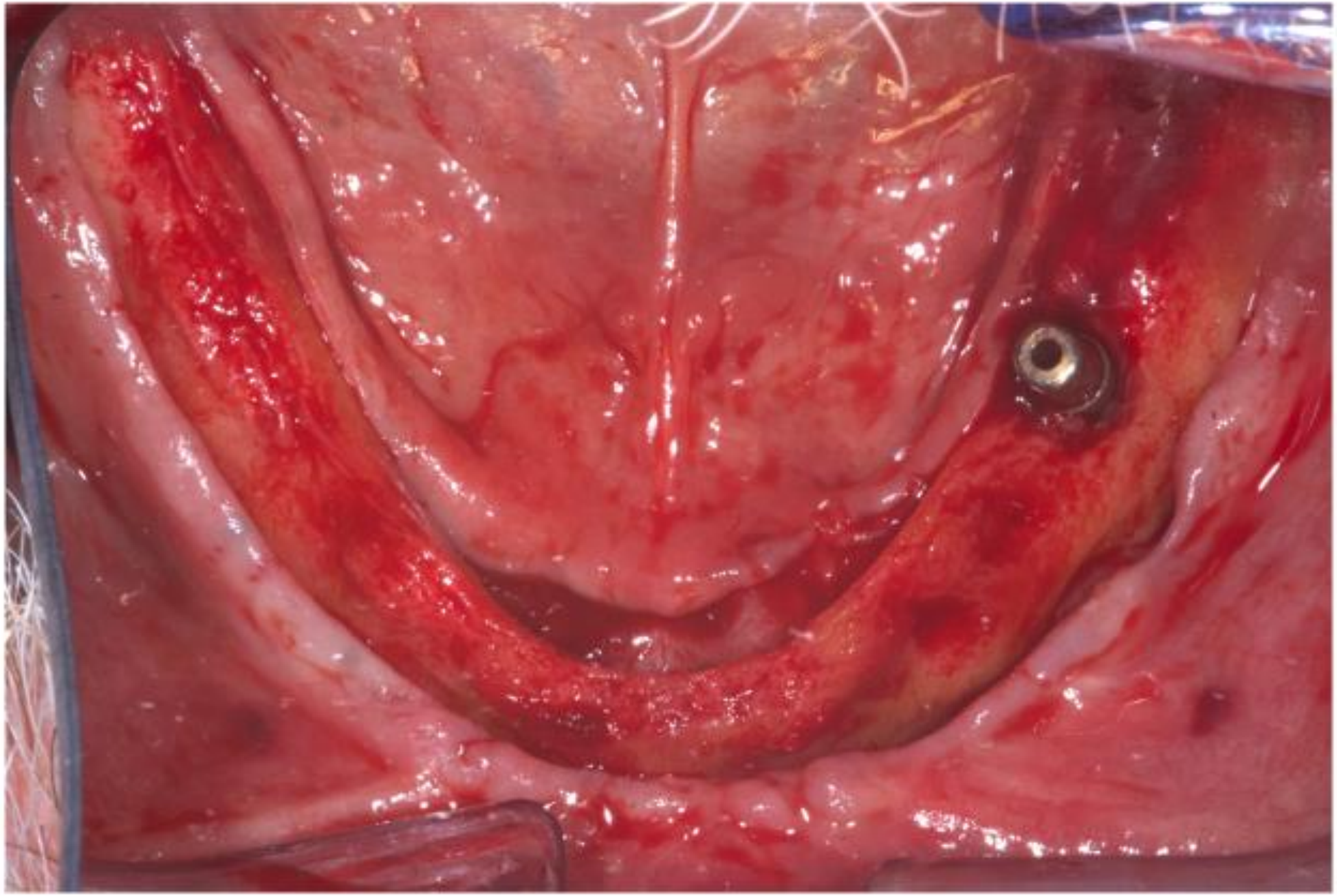
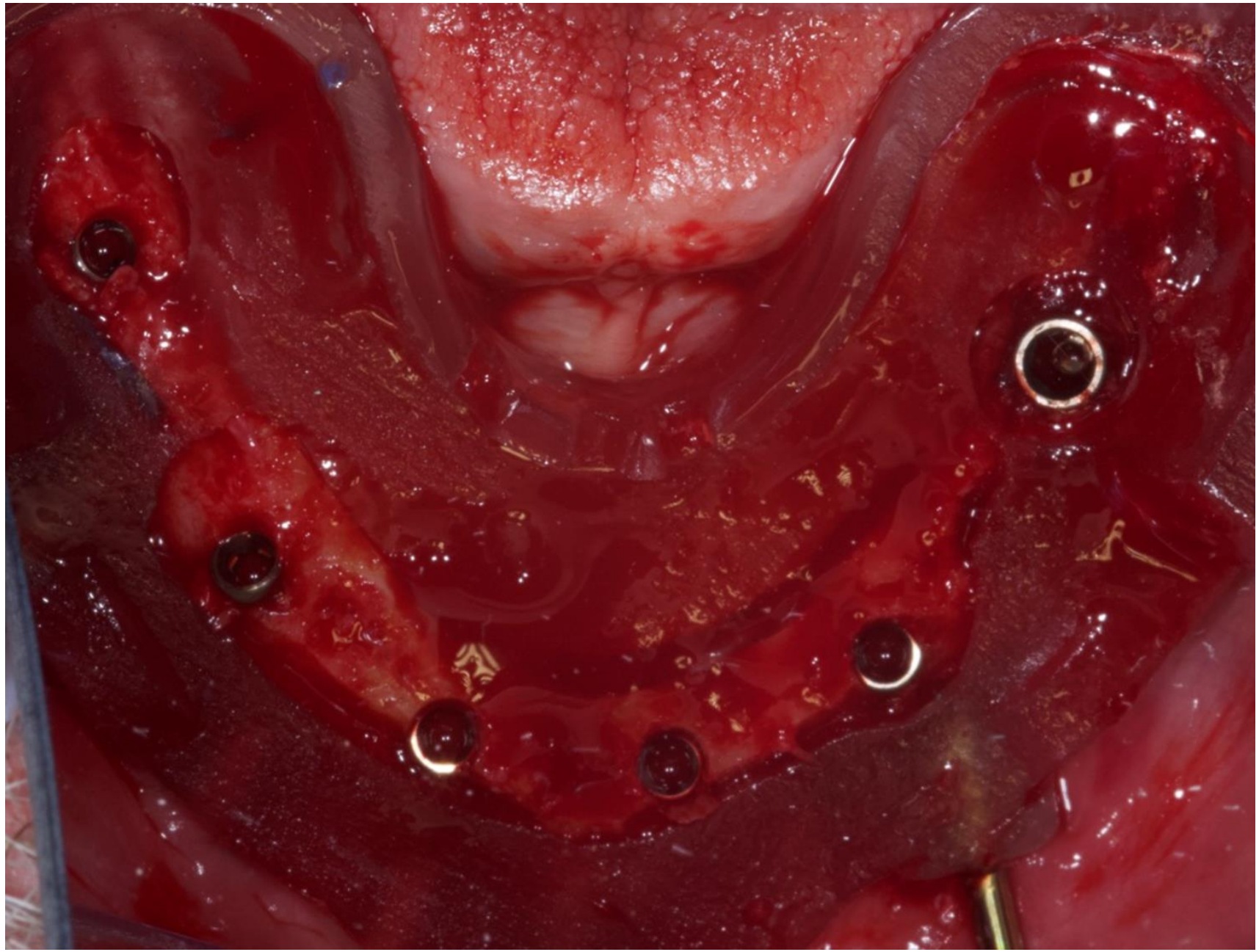
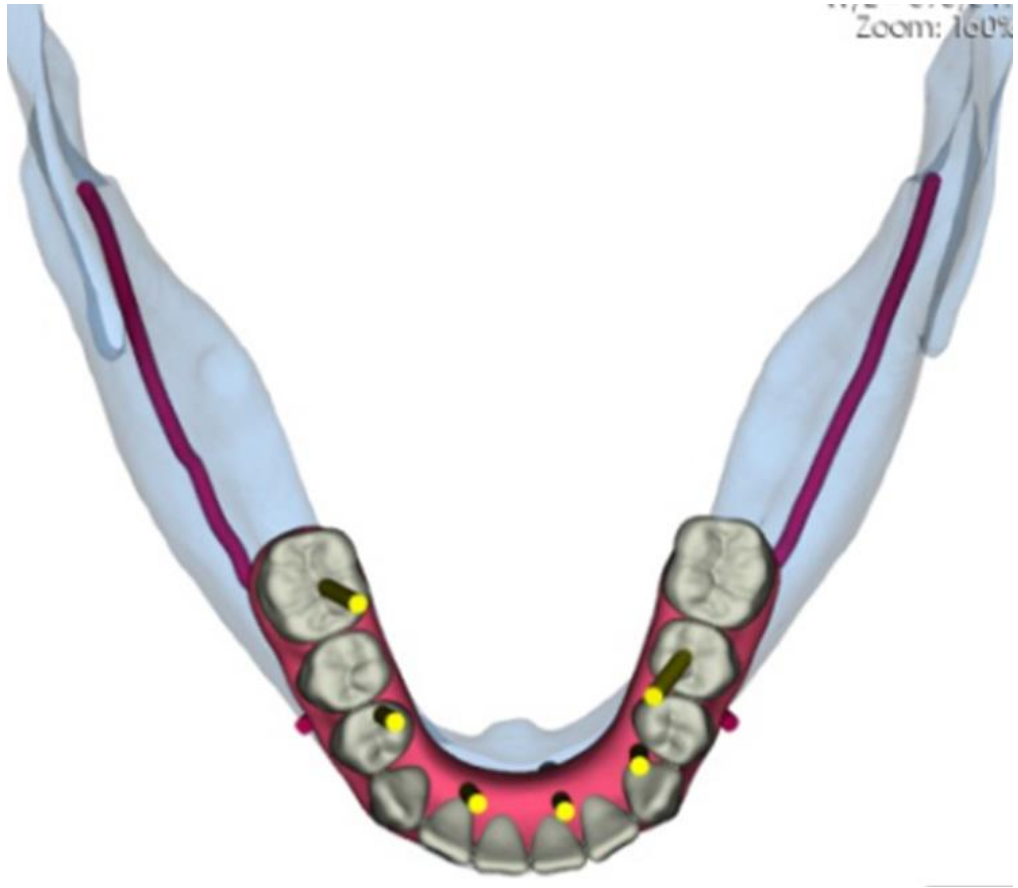
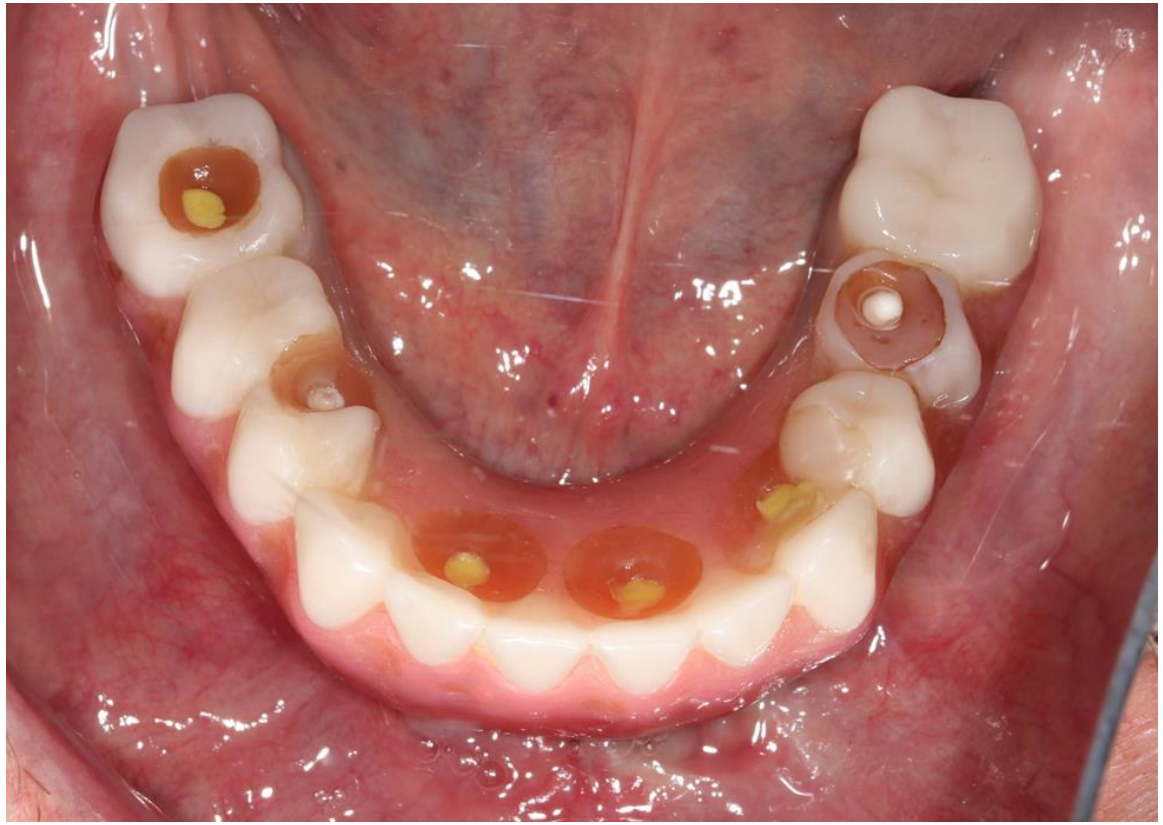
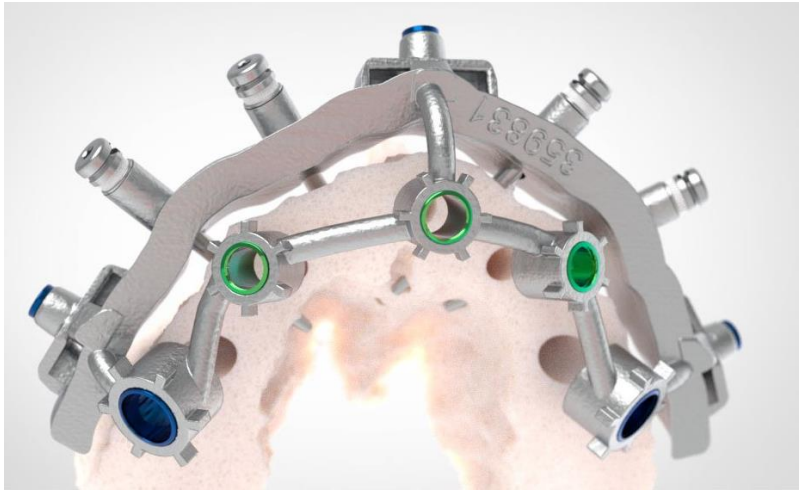





Zoom: 160%



Chrome GuidedSMILE by ROE Laboratories



- Another stackable All-on-X surgical guide (but made from chromium cobalt) and simplified conversion prosthesis
- Resin printed surgical guides are flexible and lead to inaccurate surgeries
- Thin chrome design allows direct visualization of drilling and placement of implants through sleeves

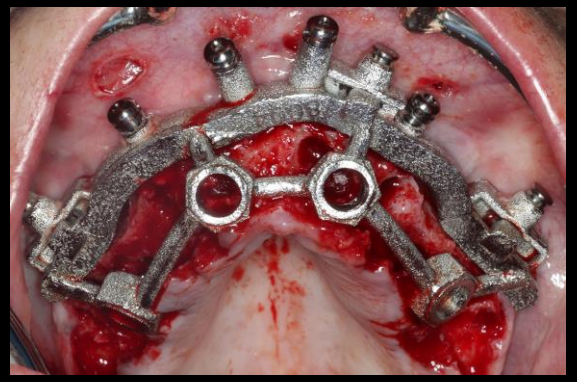
CHROME™
GuidedSMILE

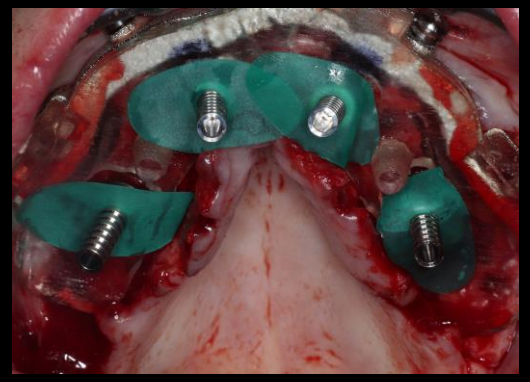
THE CHROME CASE

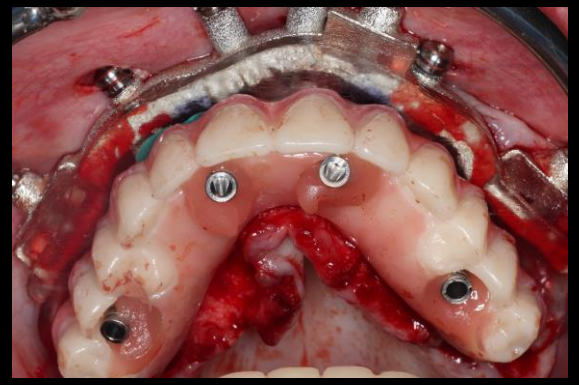
Case Contents

CHROME GuidedSMILE is the ultimate all-on-x guide on the market. It is the careful marriage of detailed surgical planning by a dedicated team of dental professionals, utilizing advanced dental design software, and the execution of modern high-quality digital manufacturing processes.

1. Bone Model
2. Reduced Bone Model
3. Tooth Model
4. Osteotomy Guide
5. Pin Guide
6. Fixation Base
7. Provisional Prosthetic
8. RAPID Appliance
9. Carrier Guide
10. CHROME Pouch:
    Includes blockout plugs, gaskets, models, misc.
11. CHROME Box:
    Contains all listed above







Thank you!

Questions @
ashleyhauger@creighton.edu