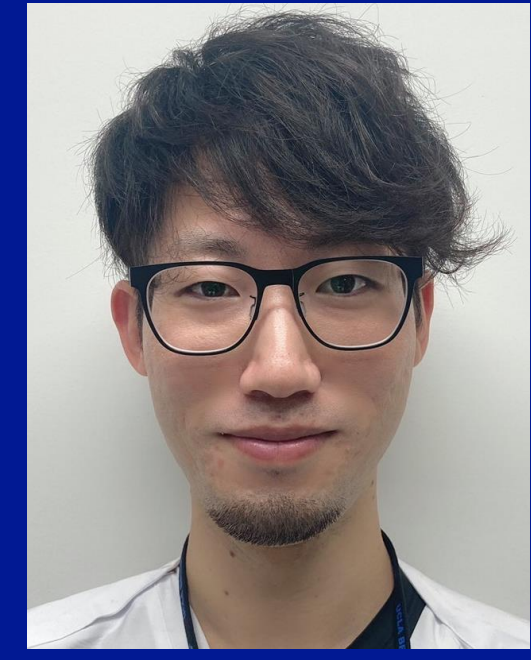




I . Introduction

Advantages and Disadvantages of the Double Scan Technique.

Advantages

Allows implant simulations to be performed without being affected by metal artifacts.

Disadvantages

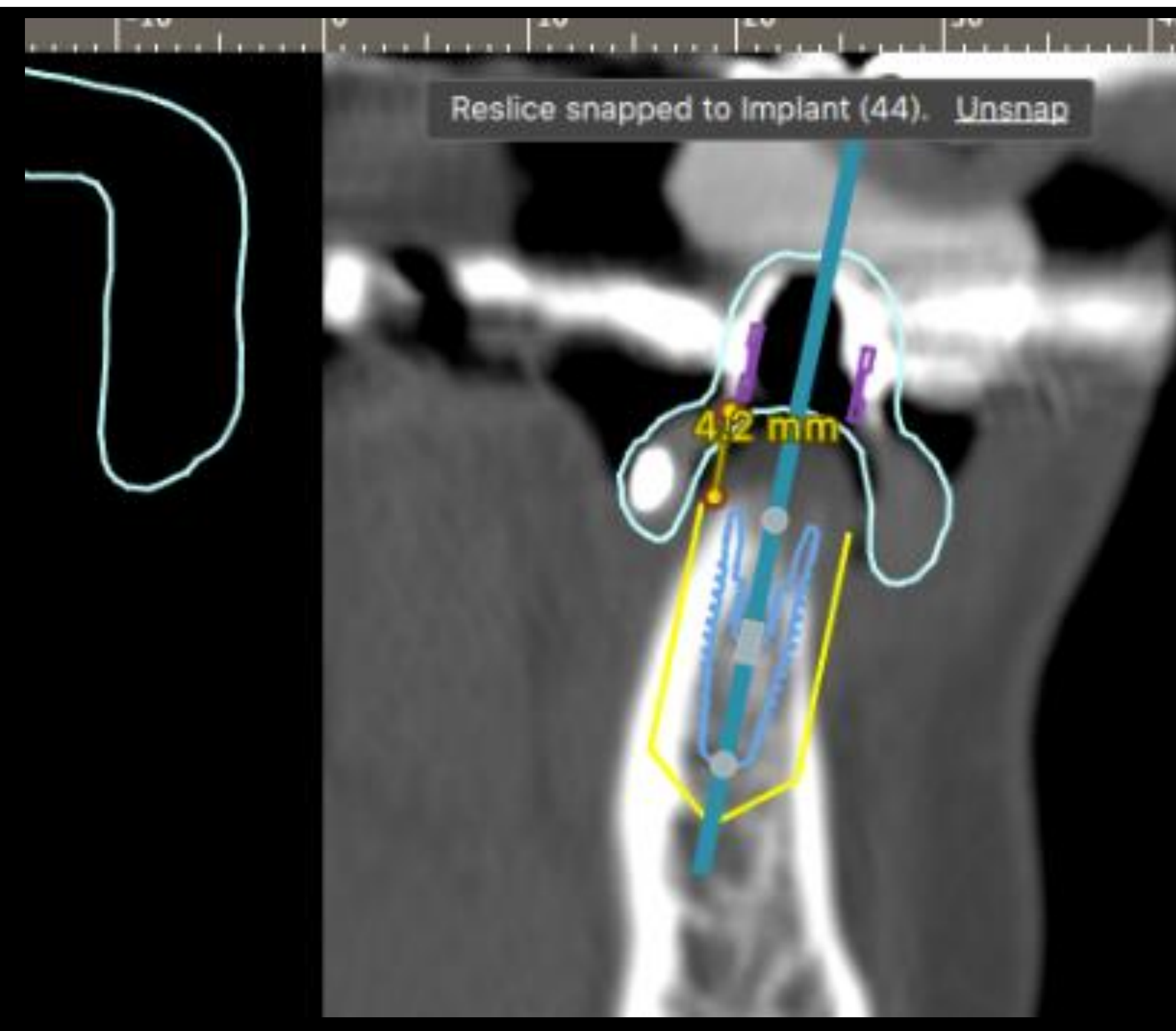
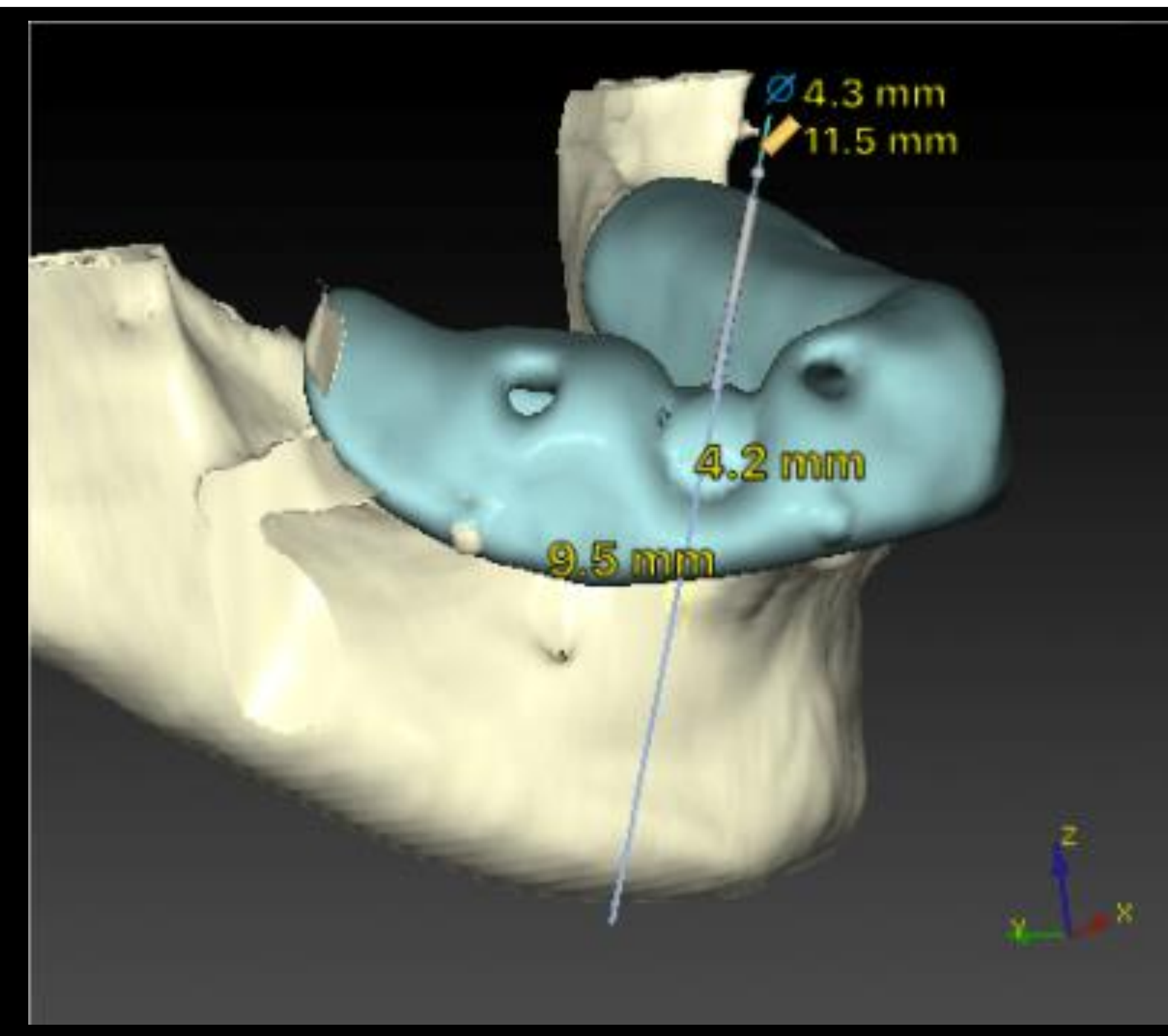
- 1)Generating CAD/CAM provisional restoration data reflecting the implant simulation is difficult.
- 2)Without an intraoral scan or STL data, the surgical guide relies on the stent's DICOM data, which leads to poor fit.
- 3)Wax-up morphology is unclear, and subgingival contours are limited in representation.
- 4)Modifying the wax-up to accommodate treatment plan changes is also problematic.

Aim

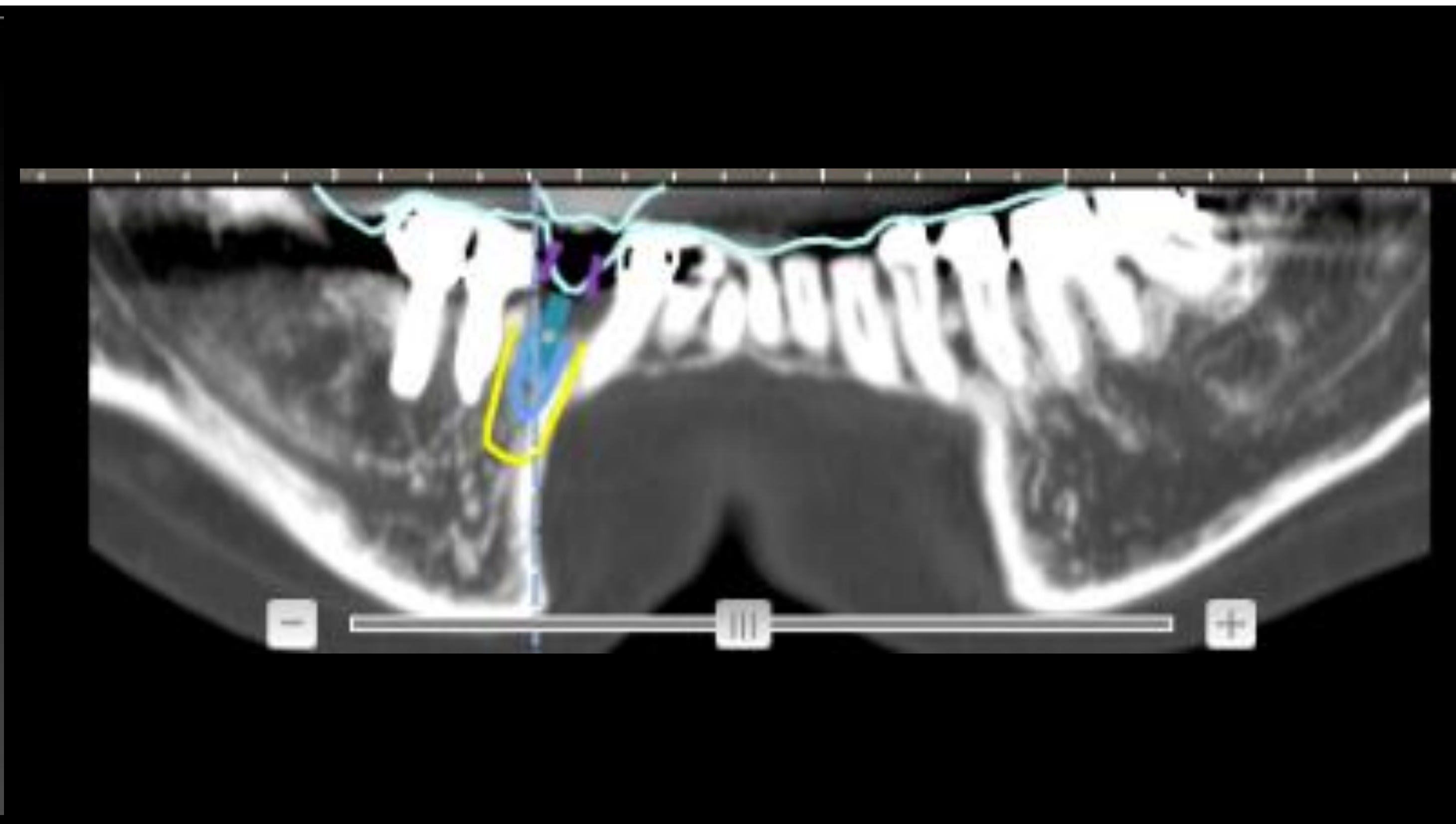
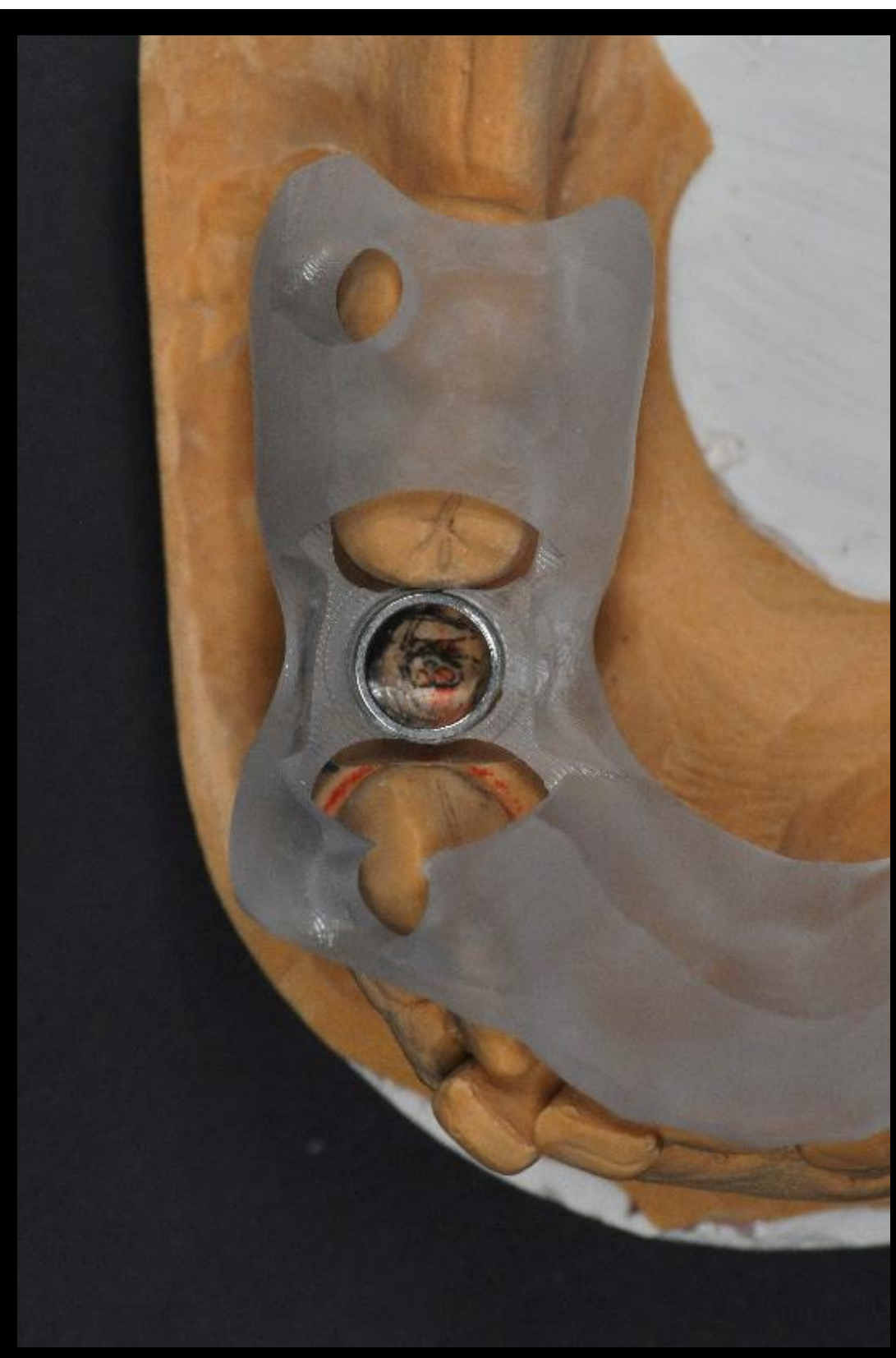
The superimposition, aligning DICOM and STL data, addresses the limitations of the double scan technique.
This study aimed to combine both methods for better implant simulation.



Radiographic Guide



Double Scan Technique implant simulation



Surgical Guide

Innovations in the Double Scan Technique for Optimizing Digital Workflow

II. Materials and Methods: A Technique Using DTX Studio™ Implant

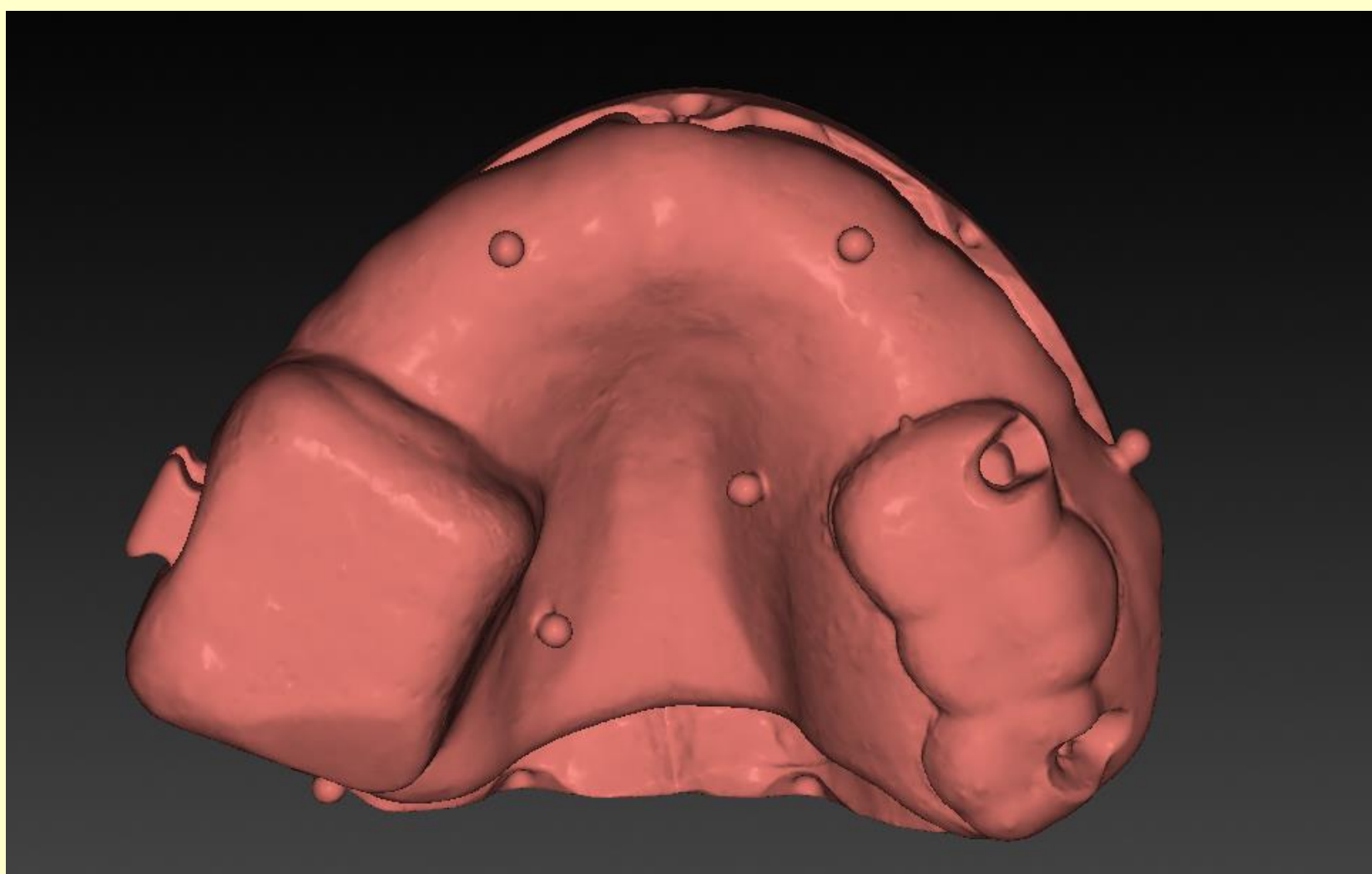
An intraoral impression was made, and a radiographic guide was fabricated. STL datasets were acquired:

1) Current model with the radiographic guide attached (Stent model), 2) Current model STL, and 3) Wax-up STL.

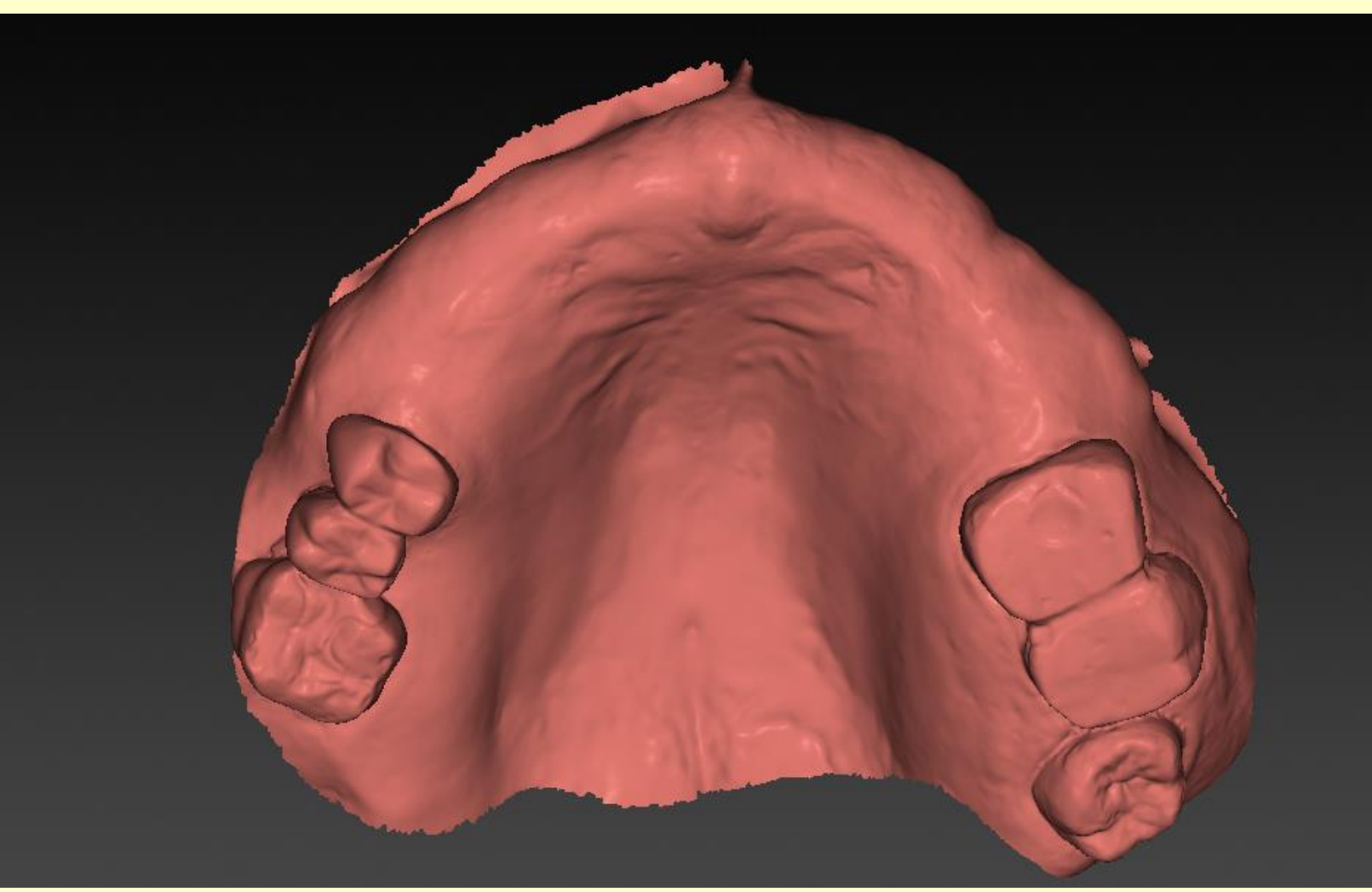
Prior superimpose of the following STL data(The coordinate axes of the data are superimposed using Exocad™).



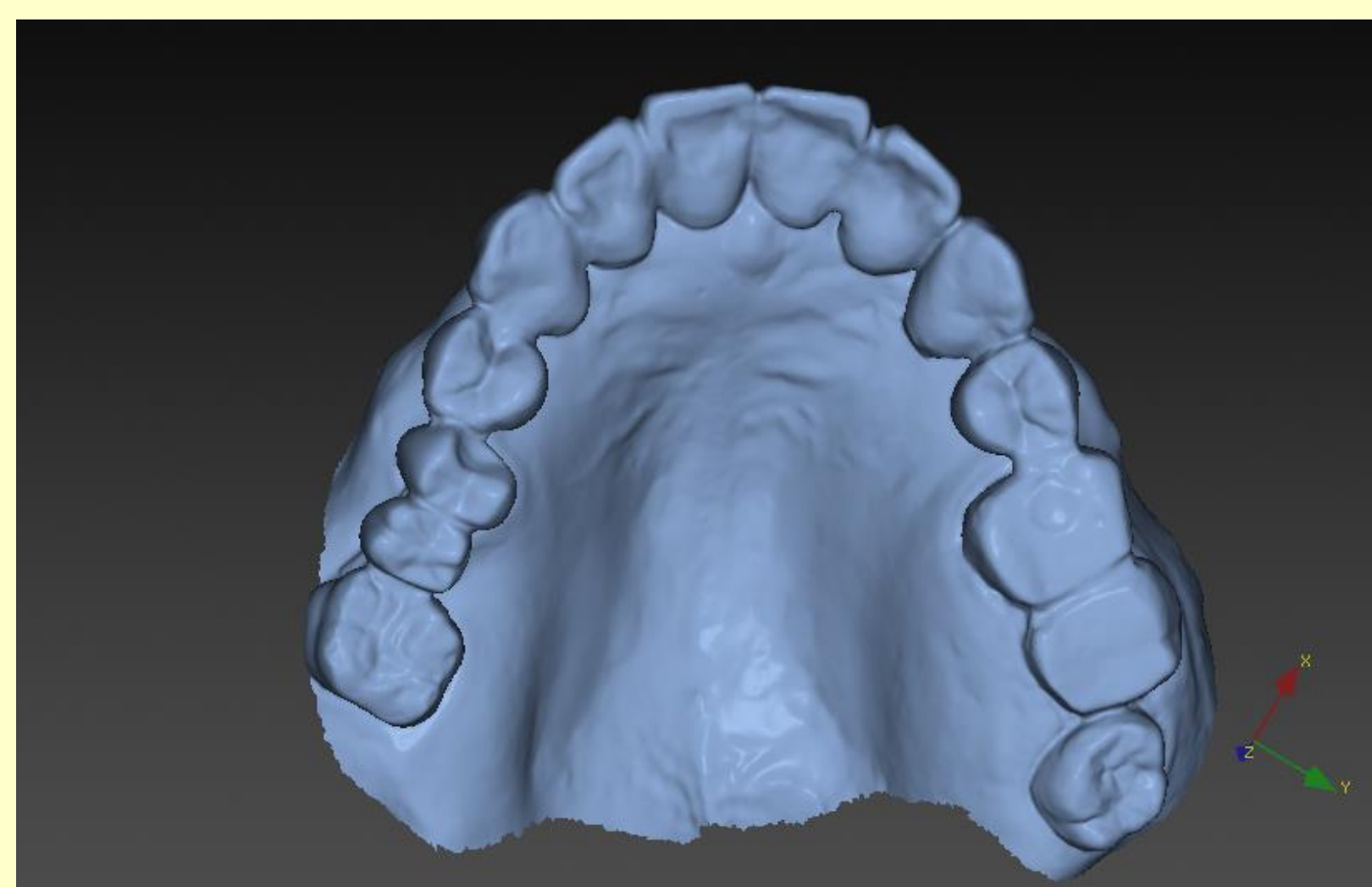
Radiographic Guide



1) The current model with the radiographic guide is attached (Stent model).



2) Current model STL.

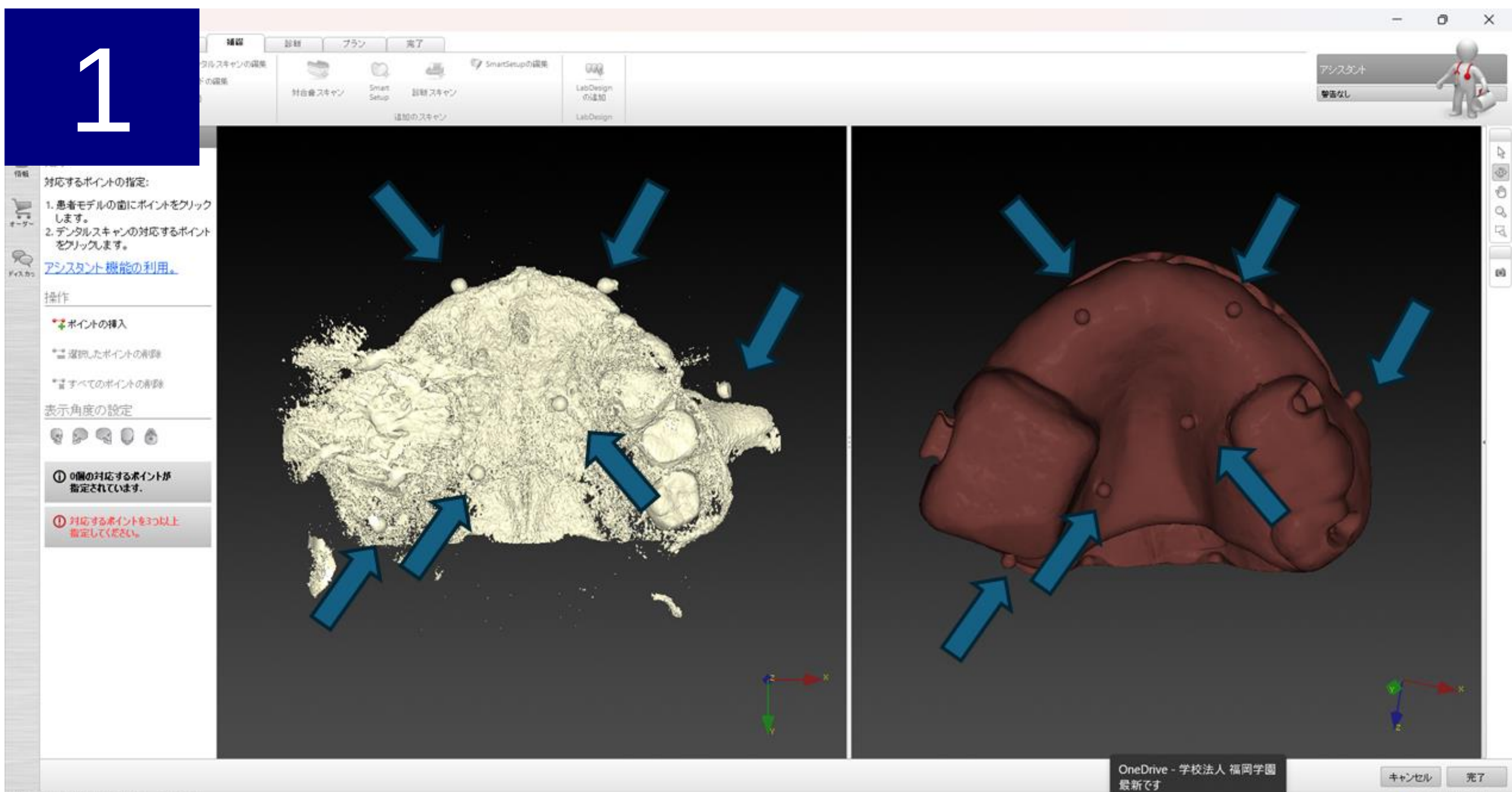


3) Wax-up STL.

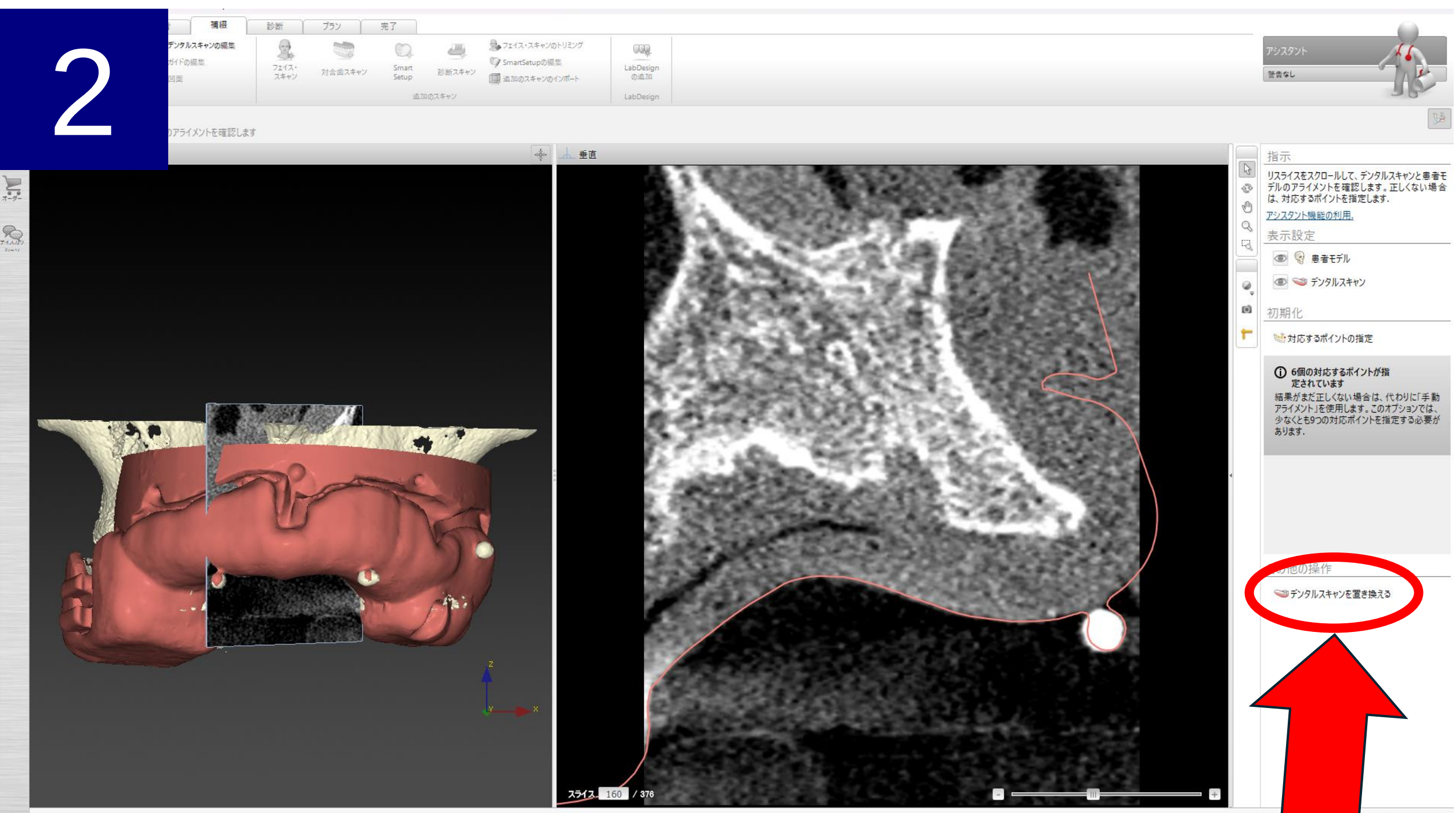
Perform CBCT imaging with the radiographic guide in place (If using X-Guide, attach the X-Clip as well).

Operations in DTX Studio™ Implant

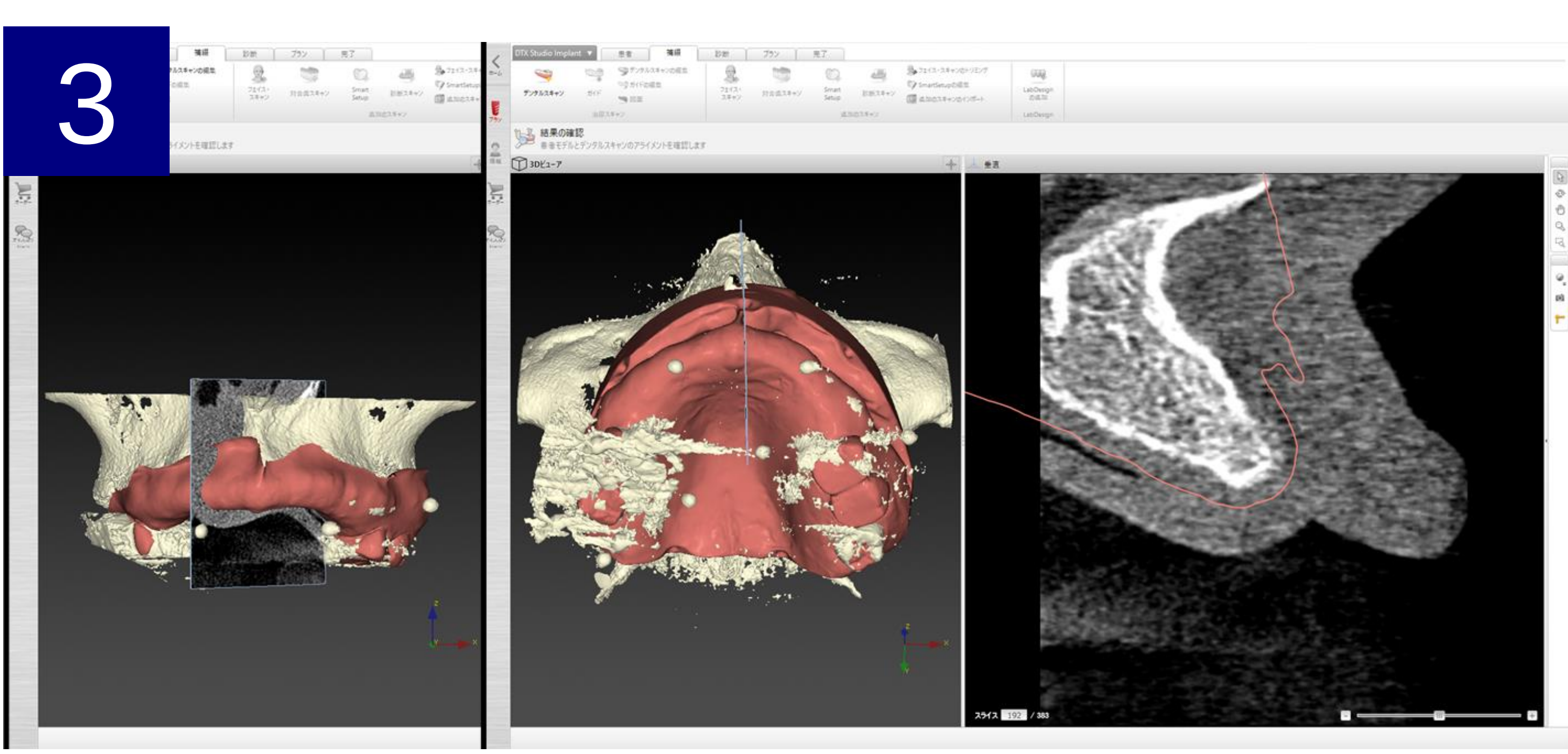
Replace the dental scan DTX Studio™ Implant ver. 3.6.4.2



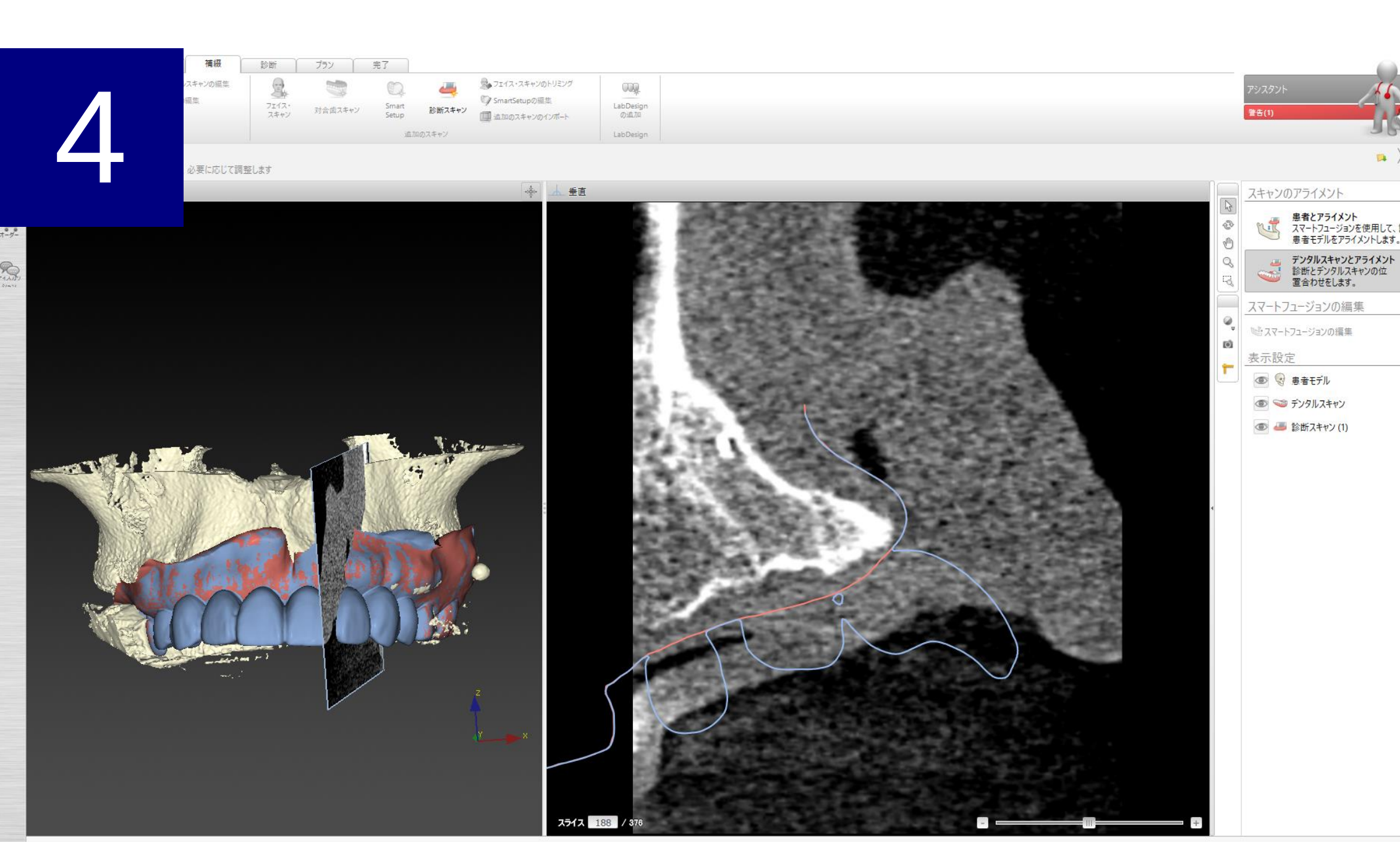
① Using markers on the radiographic guide, utilize the SmartFusion™ matching function to superimpose DICOM and STL data.
(1. Stent model)



② After the matching process, verify that the markers in the DICOM and STL data are correctly aligned, then replace the dental scan data.
(2. Current model STL.)



③ Since the coordinate axes have been pre-aligned; the stent model can be substituted for the current model seamlessly.

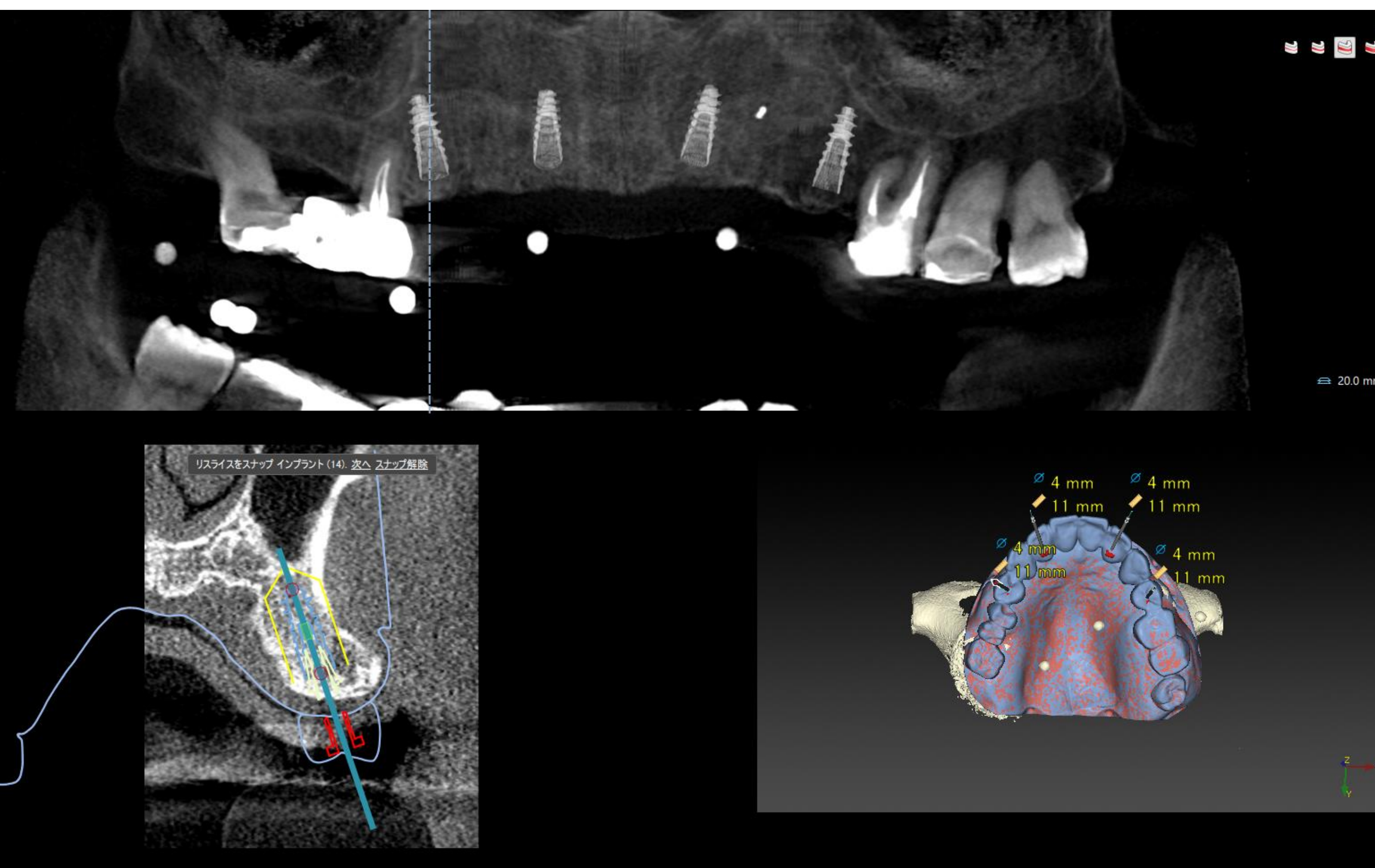


④ We can precisely plan the implant placement position by superimposing the wax-up model.
(3. Wax-up STL.)

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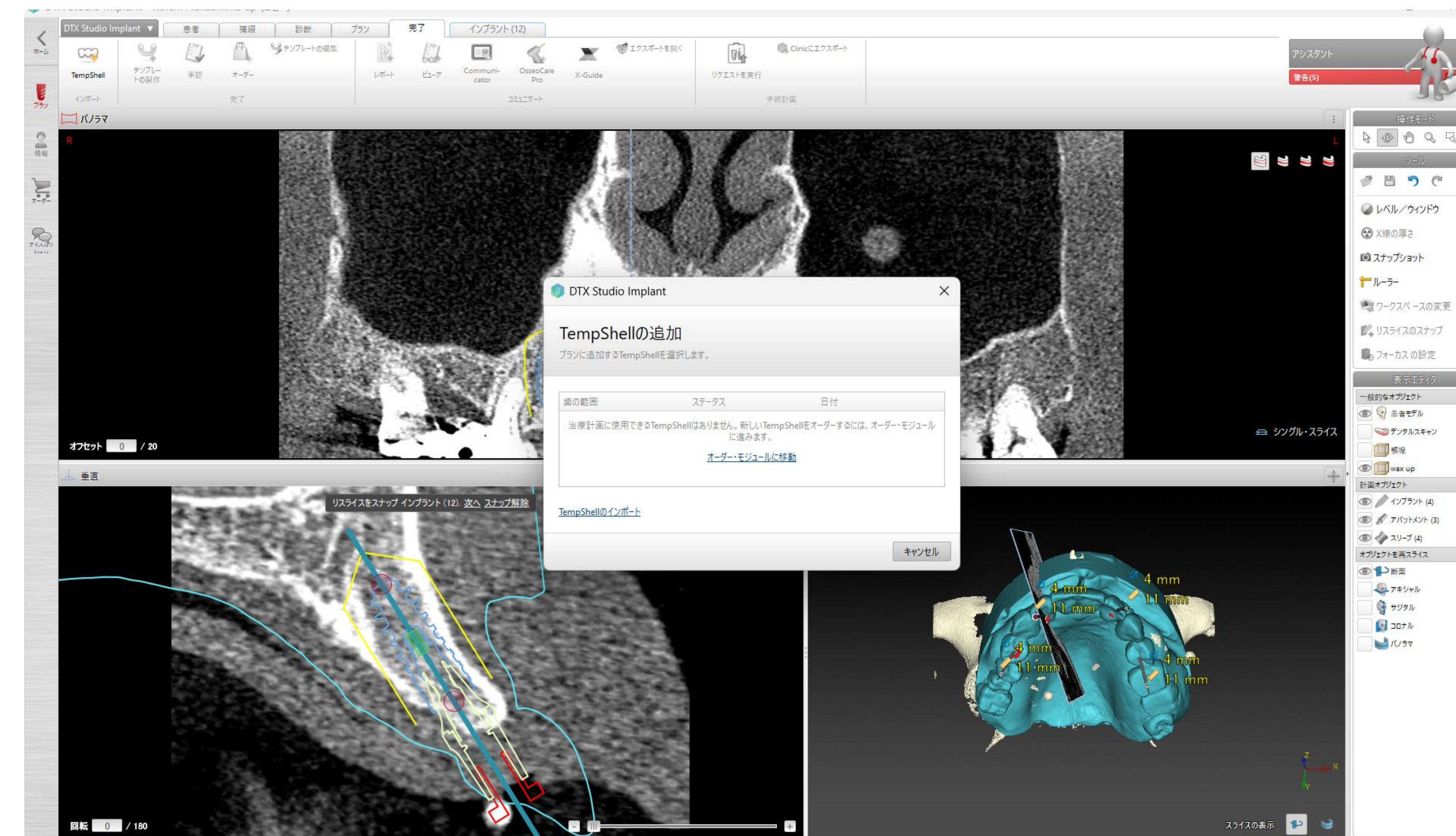
Ⅲ. Result

Pre-superimposing the data's coordinate axes made it possible to perform superimpose regardless of the edentulous state or metal artifacts, which cannot be aligned using SmartFusion™ alone.

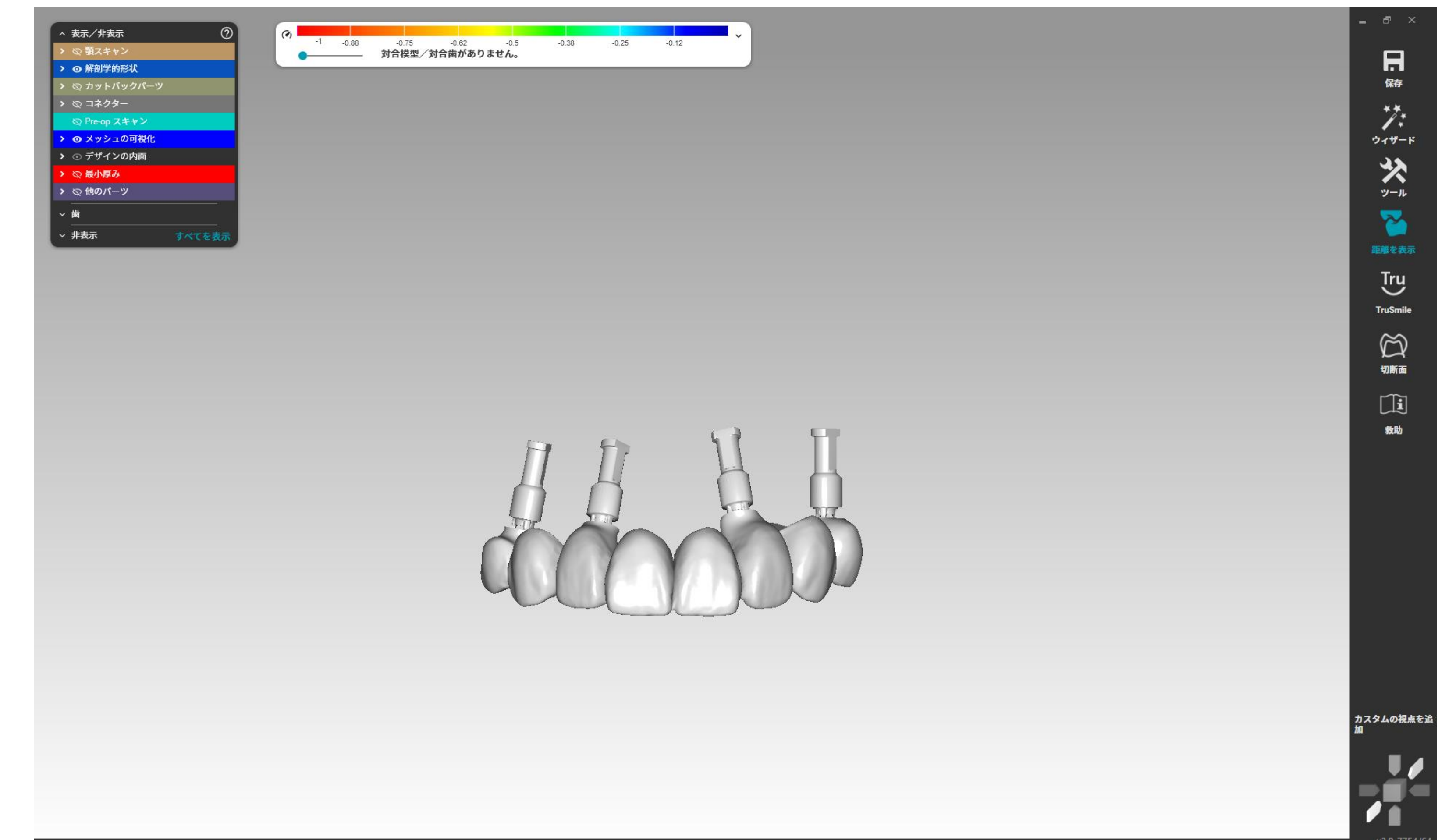


→Through the superimposition of DICOM and STL data, it became easier to recognize:

- The morphology of the wax-up and subgingival contours
- The thickness of the mucosa



→ The design of provisional restorations (TempShell) using CAD/CAM has become possible.

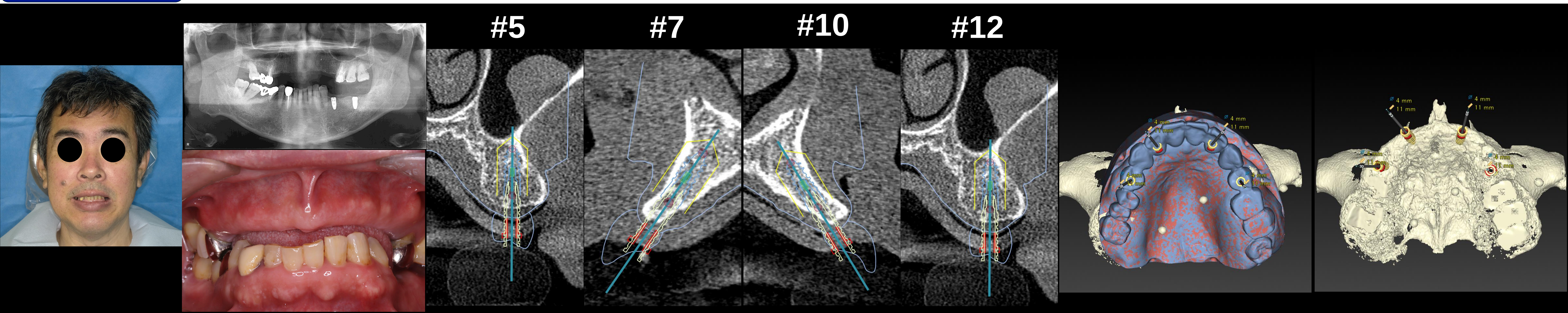


→ The final screen of the A CAD/CAM provisional restoration design in DTX Studio™ Lab.

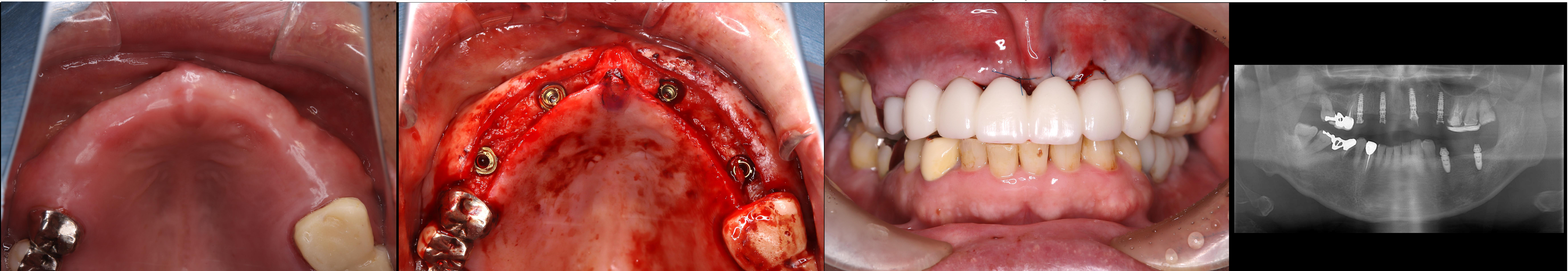
Innovations in the Double Scan Technique for Optimizing Digital Workflow

Case

- **Age / Gender:** 54/ Male • **Chief Complaint :** Uncomfortable partial denture in Maxilla
- **Medical History:** Hypertension, Myocardial Infarction (more than 10 years ago), Diabetes Mellitus • **Patients request:** Fixed prosthesis in the Maxilla



Using the DTX Studio™ Implant software, superimposition established the implant placement plan using the aforementioned method.



Four implants ($\phi 4.3 \times 11\text{mm}$, Trioval Implant, Nobel Biocare N1™) were placed precisely according to the preoperative plan using the X-Guide system. Immediate loading was performed following implant placement using a provisional restoration fabricated in advance with CAD/CAM technology.

IV. Discussion and Conclusion

However, an important point that must not be overlooked is that discrepancies between the simulation and implant placement may occur if the radiographic guide is not correctly positioned during CT imaging.

To reduce this risk, the following measures are crucial:

- **Use a best-fitting radiographic guide.**
- **Secure the guide during CT imaging using a bite index for stabilization.**

This approach allows for more precise implant placement simulations and actual placement in cases with significant metal artifacts or multiple missing teeth.

