

# A New Dental Technique for Full-arch Implant Rehabilitation Using a Digital Facebow

## INTRODUCTION

Establishing the occlusal plane is a key step in the rehabilitation of completely edentulous patients, as it affects esthetics, function, and long-term stability. This case report describes a fully digital technique for recording the Camper plane using a novel digital facebow device, enabling the maxillary arch to be positioned accurately in relation to craniofacial landmarks within CAD software.

## TECHNIQUE

### Patient data acquisition

**1.** Acquire CBCT scans to capture skeletal structures for prosthetic and surgical planning. (Fig. 1).

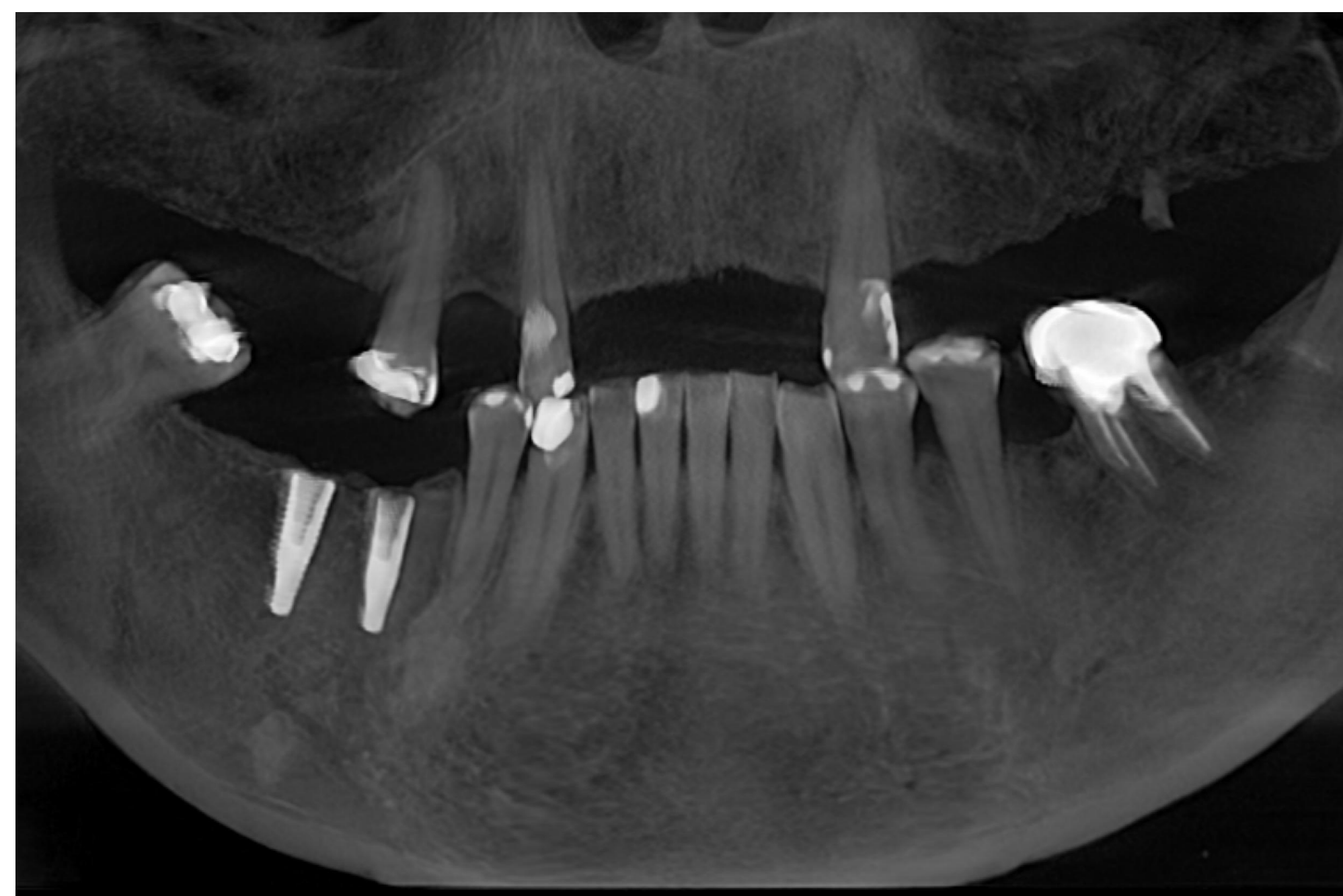


Figure 1

**2.** Capture extraoral photographs with the patient at rest (lips relaxed), in a natural smile, and in a maximum smile with a digital camera (Fig. 2A, B, C).

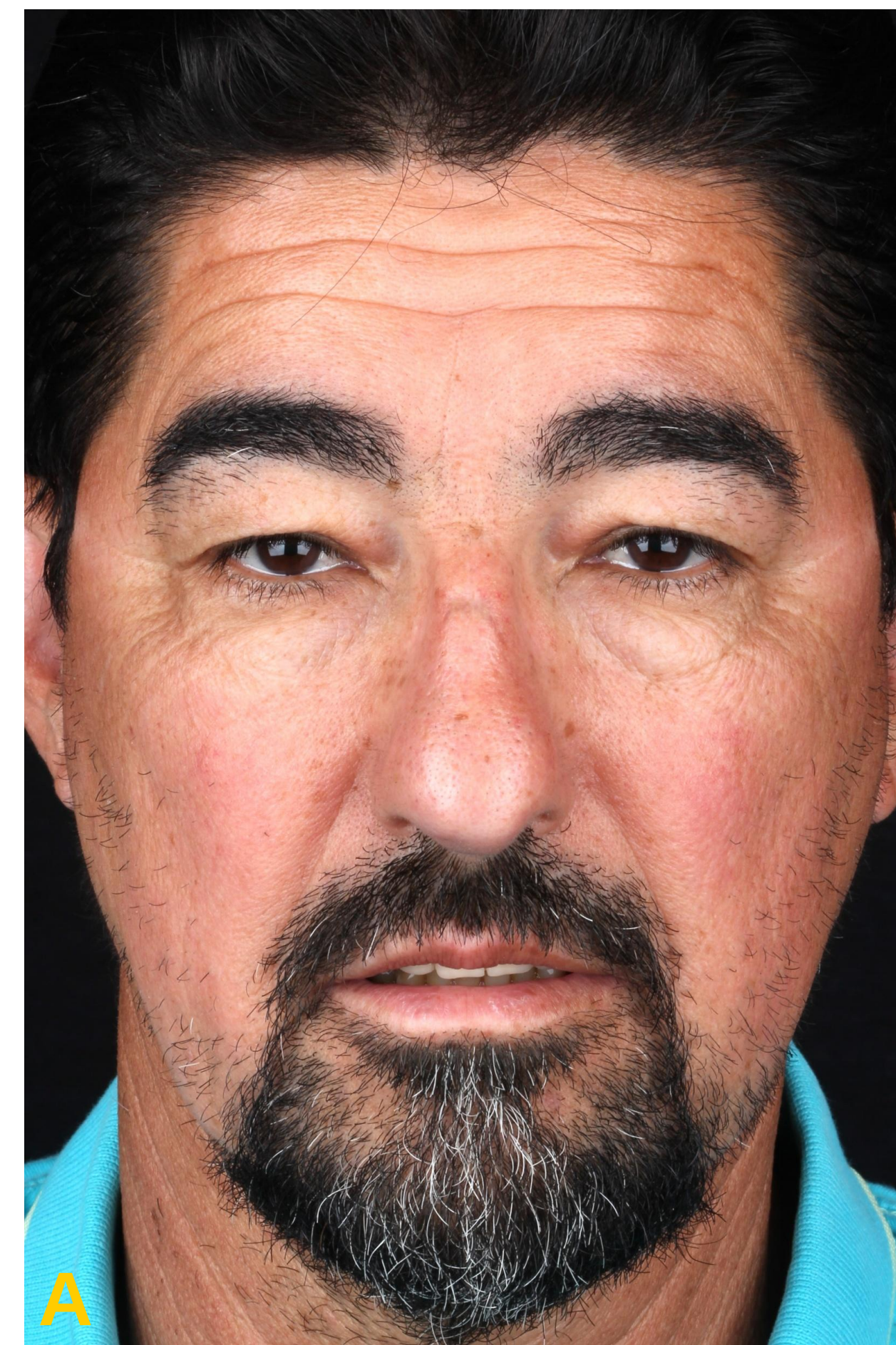


Figure 2



**3.** Perform intraoral scanning of the maxillary and mandibular arches using an intraoral scanner (IOS). (Fig. 3).

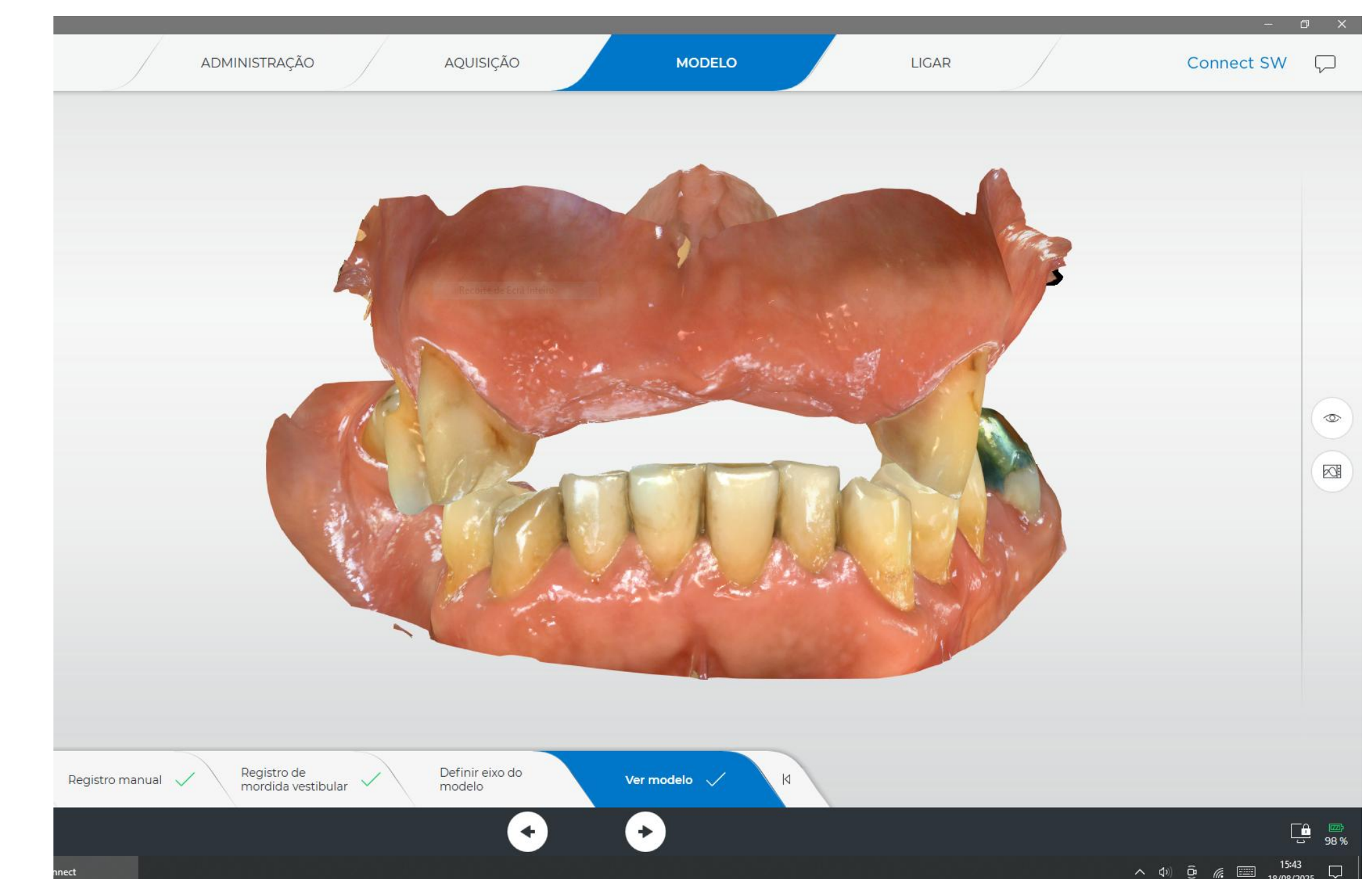


Figure 3

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## TECHNIQUE

### Facebow positioning and scanning

**4.** Scan the base of the digital facebow extra orally using the same IOS (Fig. 4).



Figure 4

**5.** Install the digital facebow on the patient following the same principles as a conventional facebow. Insert the ear pins into the right and left external acoustic meatus, ensuring symmetry by referencing the numerical scale on the lateral stems. Gently press the device's body toward the base of the nose to approximate the Anterior Nasal Spine (ANS) position. Ensure the vertical stem is positioned upright (Fig. 5).



Figure 5

**6.** With the patient seated and the operator positioned in front, ensure that the body of the device is parallel to the pupillary plane and perpendicular to the patient's midline, with the vertical stem aligned accordingly (Fig. 6).



Figure 6

**7.** Using the left hand, stabilize the device against the patient's face. With the right hand, position the IOS toward the palate and move it in a posterior-to-anterior direction until reaching the digital facebow scanning base. Confirm on the display that the maxillary scan has successfully merged with the facebow base (Fig. 7A, B).

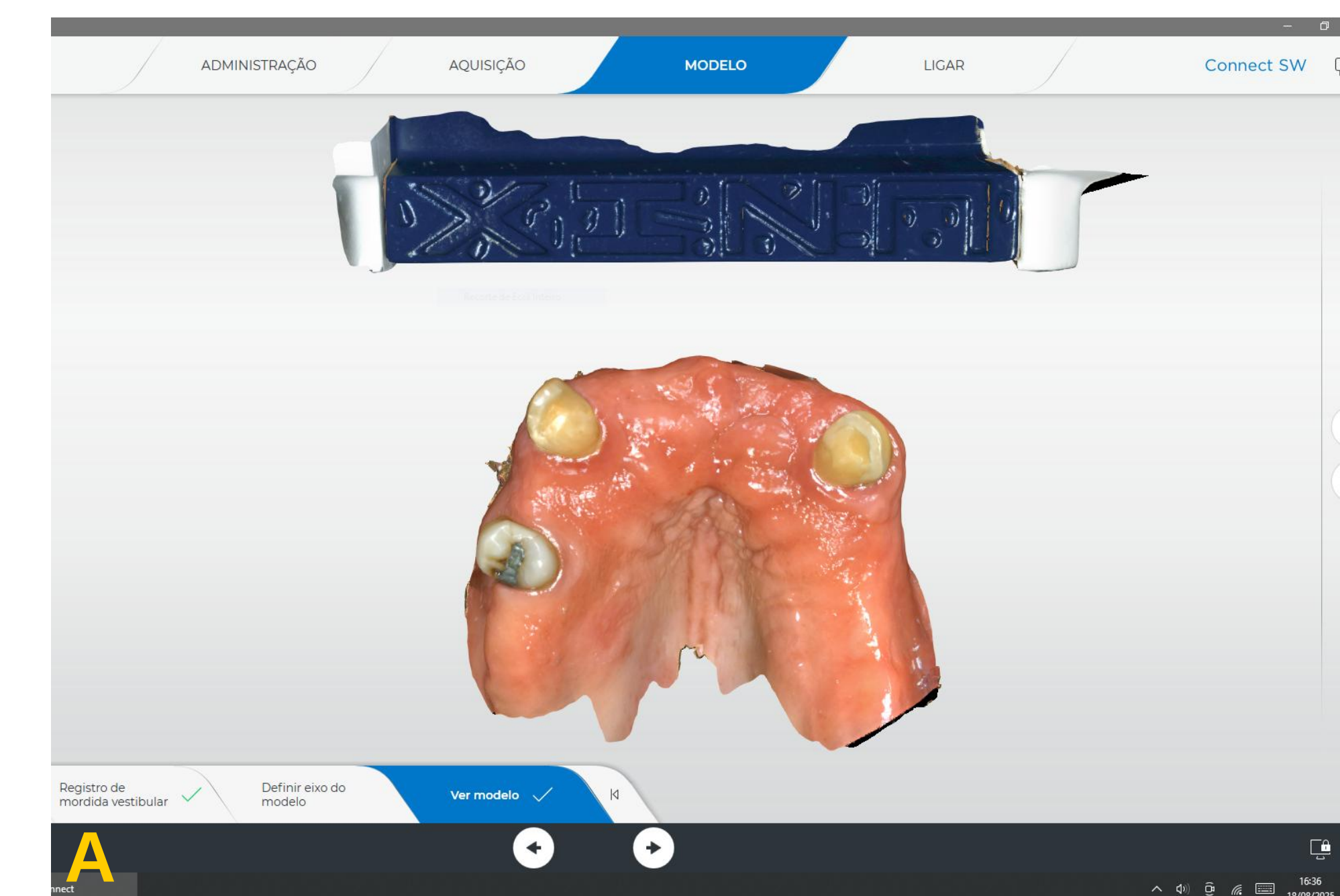
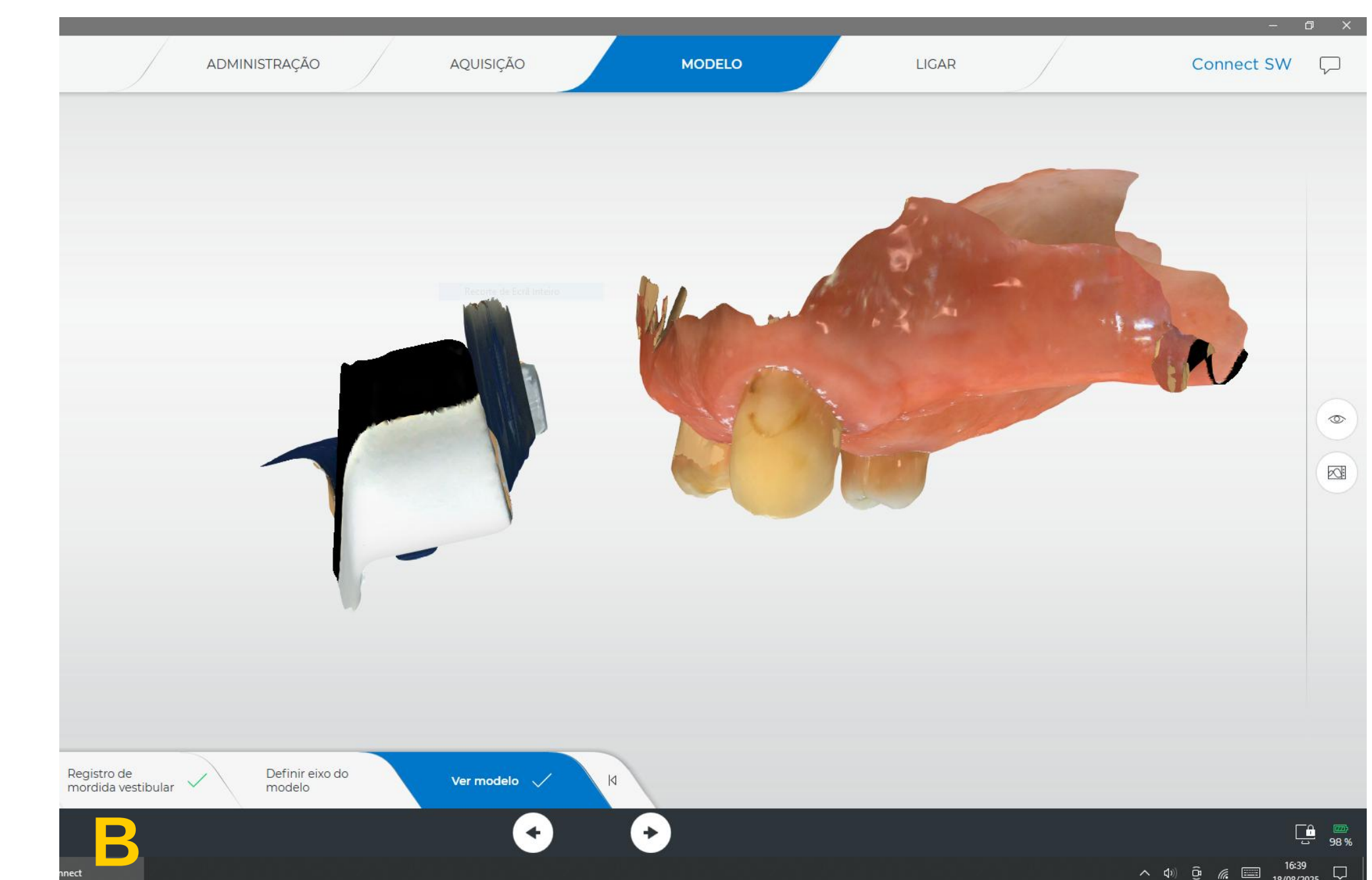


Figure 7



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## TECHNIQUE

### Digital integration and aesthetic planning

**8.** Import all digital data into a single project within the CAD software to create the virtual patient (Fig. 8A) – and superimpose the extraoral frontal photograph with a natural smile on the intraoral scan by aligning key landmarks (Fig. 8B).

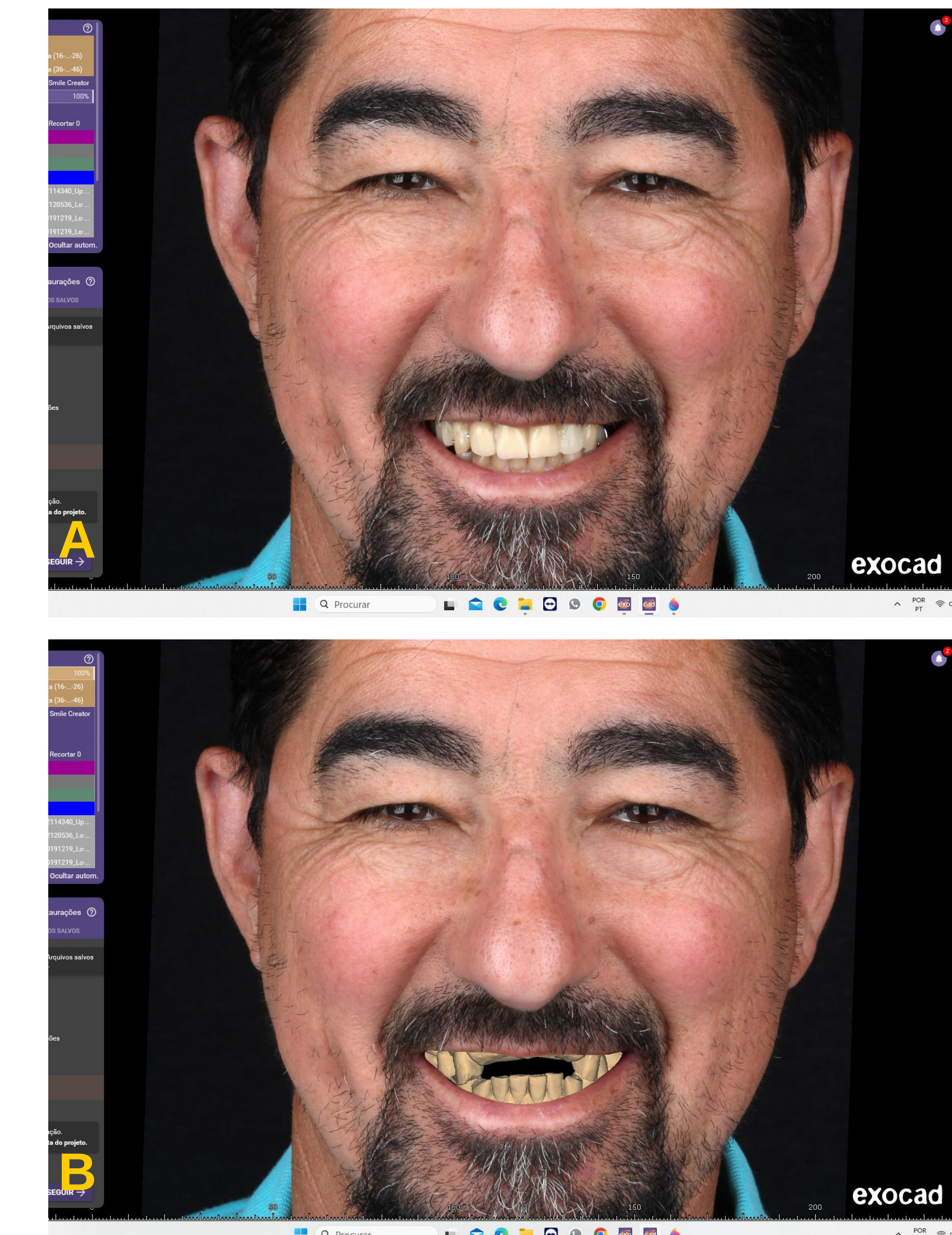


Figure 8

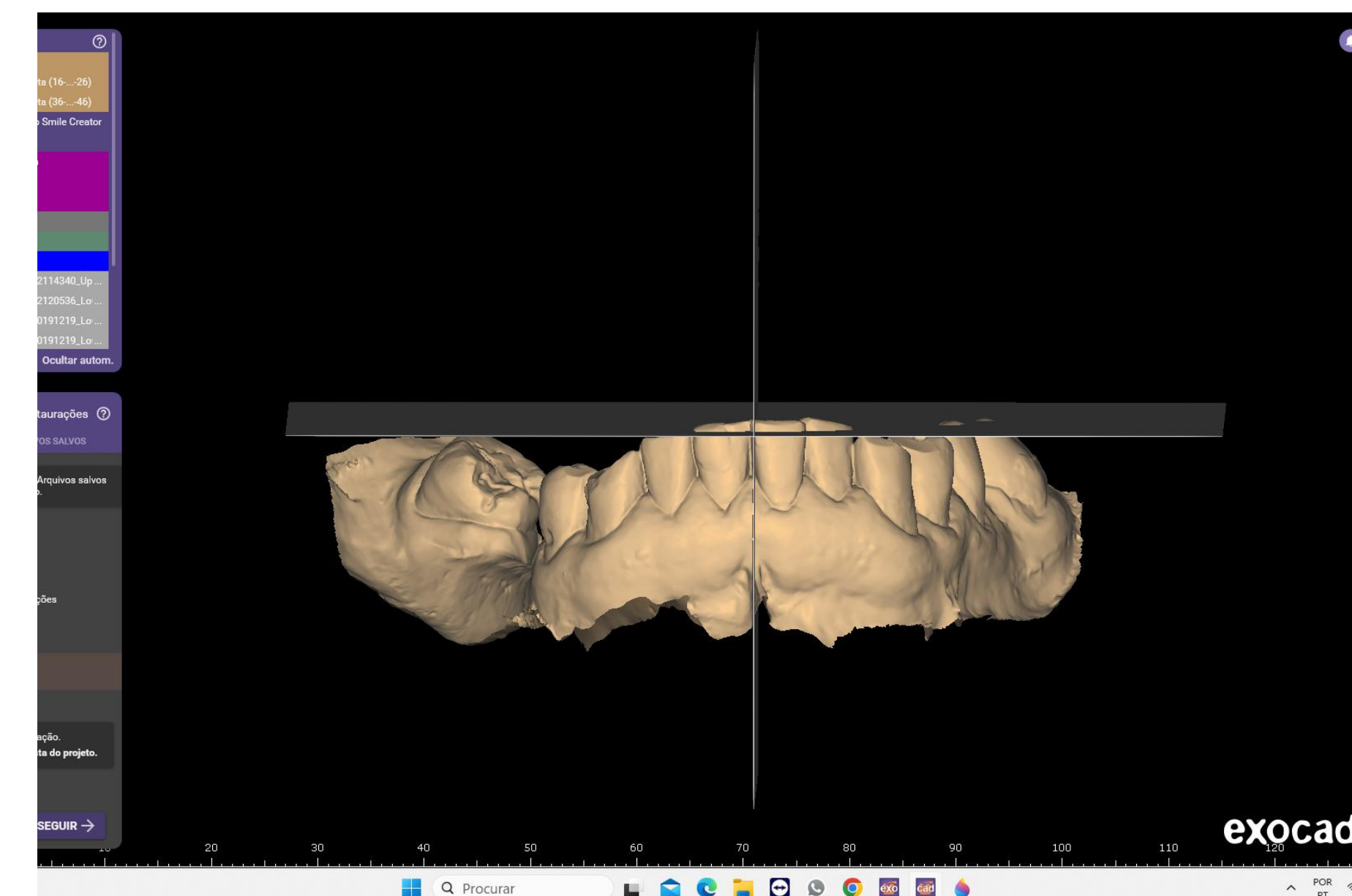


Figure 9

**9.** Use the positioning of the virtual occlusal plane provided by the digital facebow in the mandibular arch as a reference for digital wax-up of the future restorations (Fig. 9).

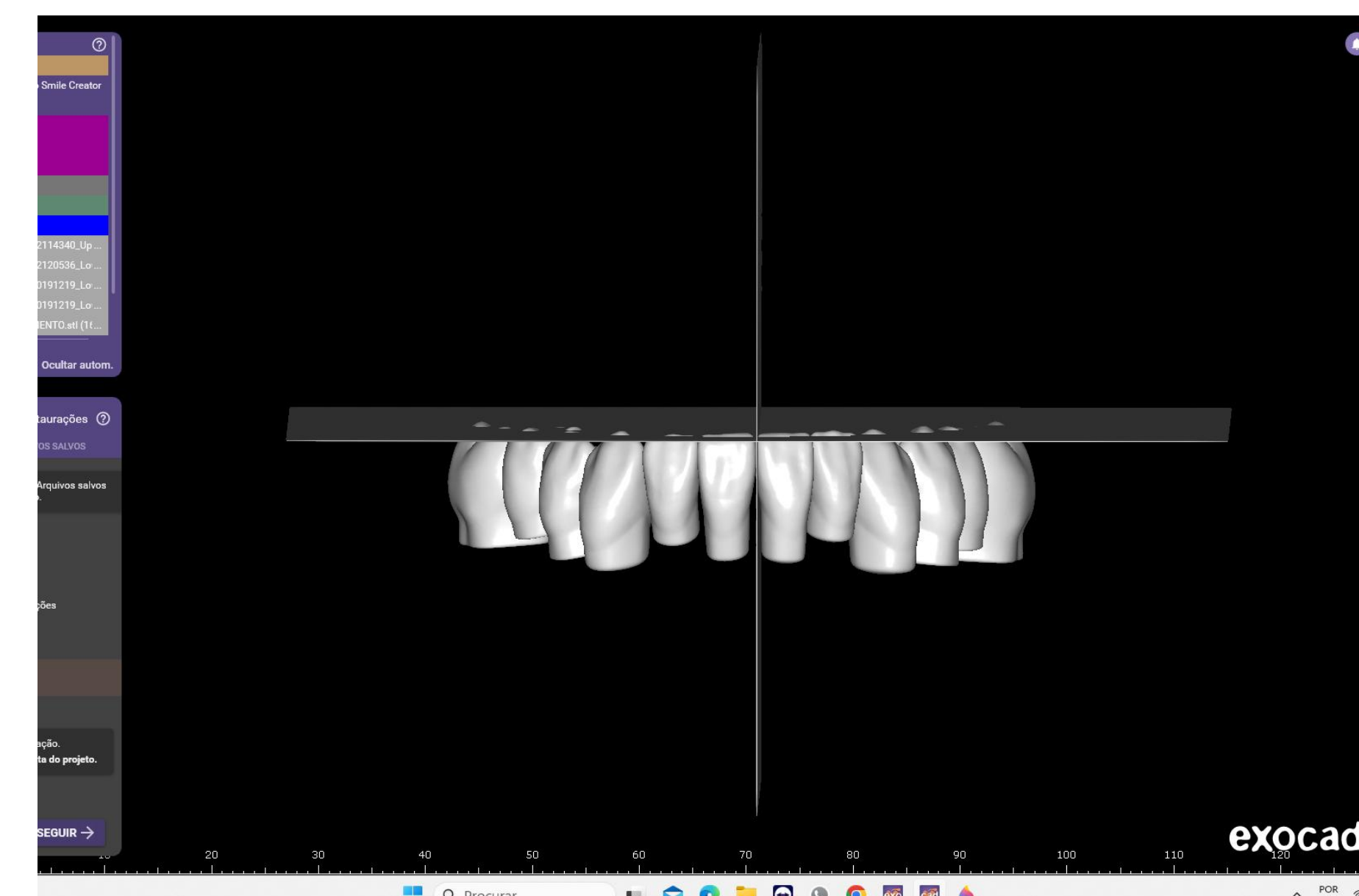


Figure 10

**10.** Create digital wax-ups of the mandibular teeth, aligning it with the established occlusal plane and vertically positioning it at the incisal edge of the mandibular anterior teeth, ensuring appropriate lip exposure at rest of approximately 2 mm<sup>11</sup> (Fig. 10).

**11.** Position the digital cast of the maxillary arch in relation to the digital wax-up of the mandibular arch (Fig. 11A) – and superimpose the frontal photograph onto the mandibular wax-up, checking occlusal alignment in relation to the facial aesthetics (Fig. 11B).

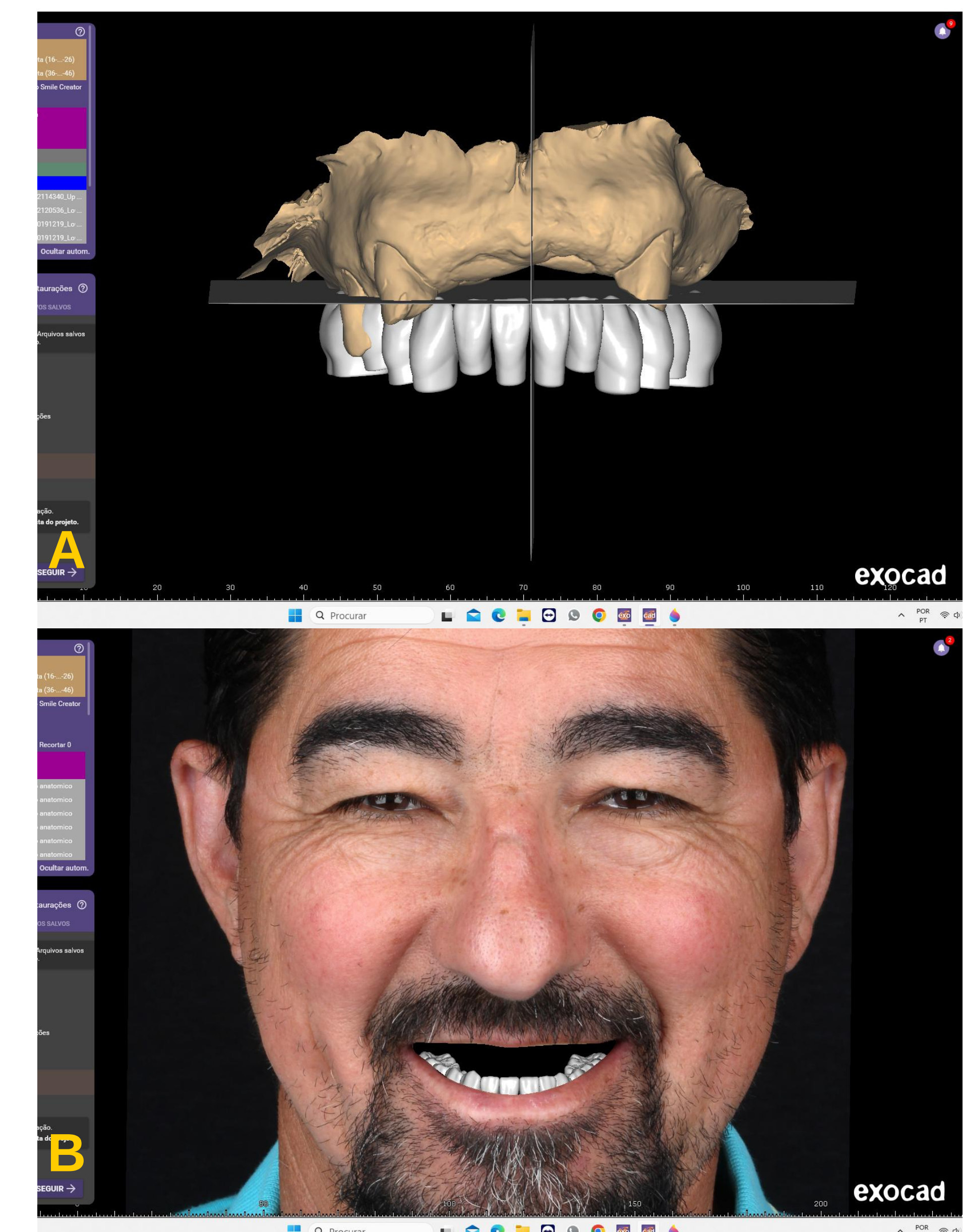


Figure 11

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## TECHNIQUE

### Digital integration and aesthetic planning

**12.** Create digital wax-ups of the maxillary arch (Fig. 12).



Figure 12

**13.** Use the digital project as a reference. Prepare the mandibular teeth and place temporary crowns in printed resin to align the occlusal plane. Establish the occlusal plane before performing maxillary arch surgery to ensure successful rehabilitation (Fig. 13A, B, C).

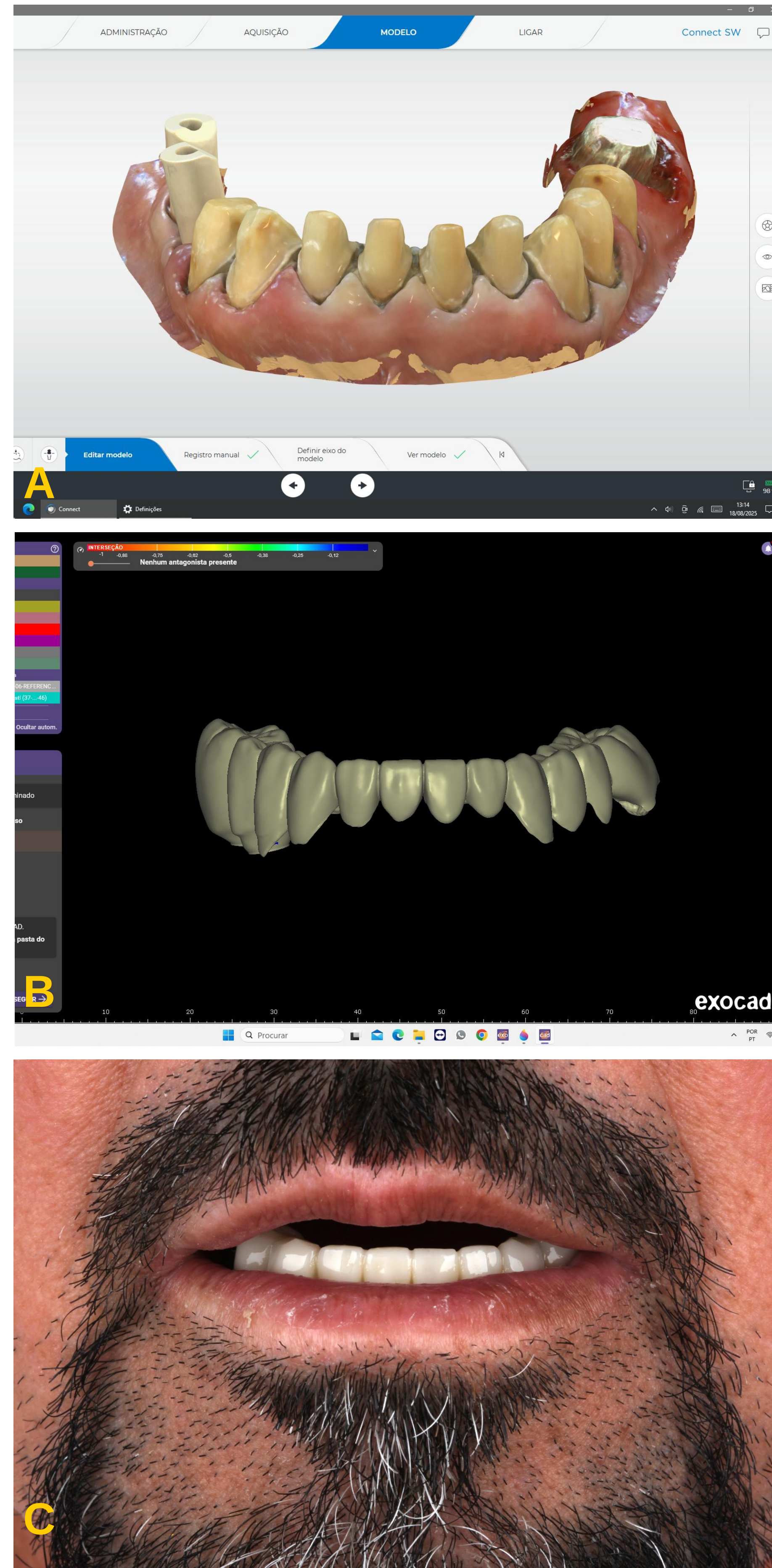


Figure 13

### Surgical planning

**14.** Import CBCT data into 3Shape Implant Studio software for surgical planning of maxillary implant placement.

**15.** Print the surgical guide and the prosthetic impression guide using a 3D printer (Fig. 14).



Figure 14

**16.** Perform the surgical procedure to install the dental implants (Fig. 15).

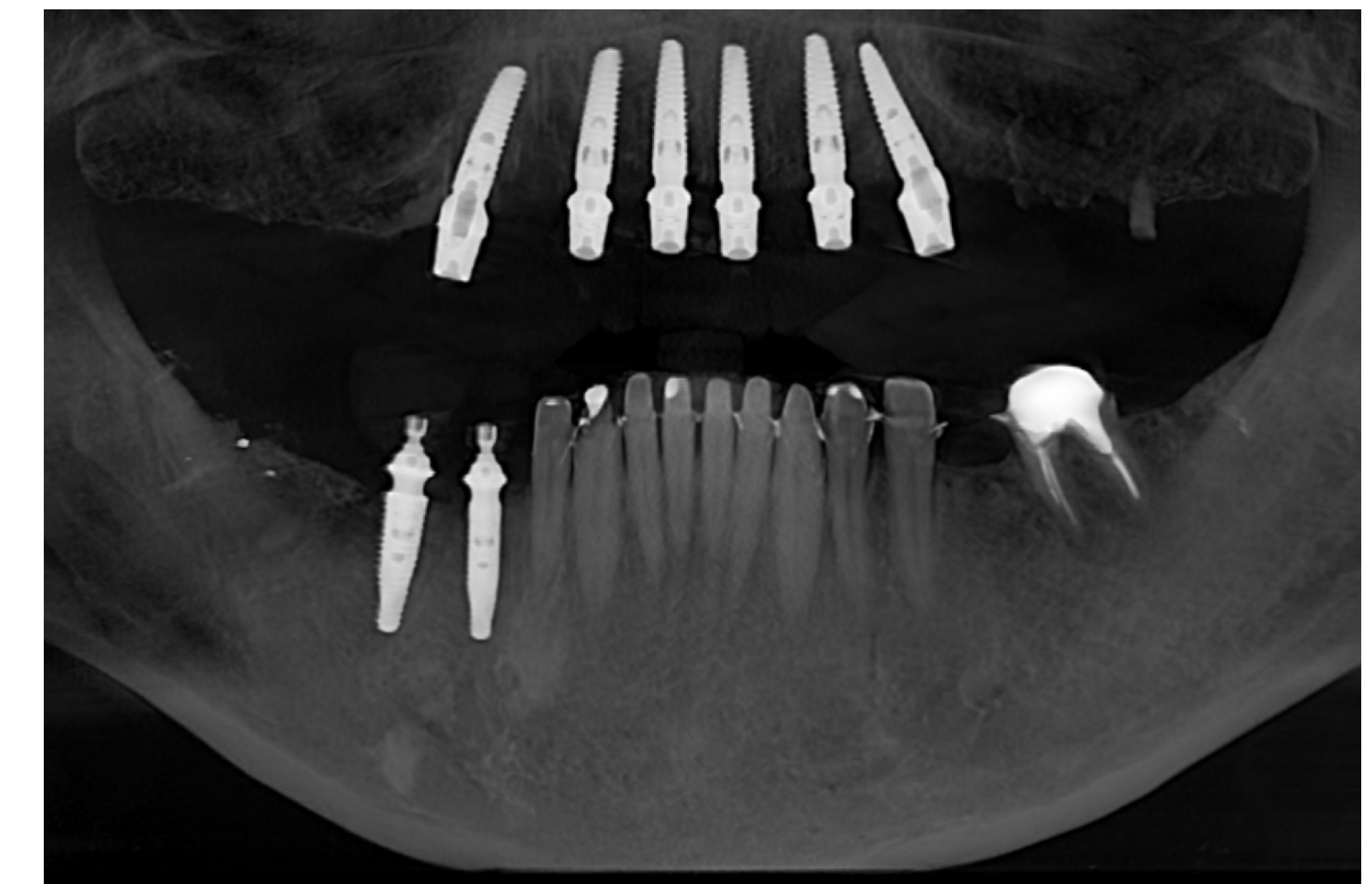


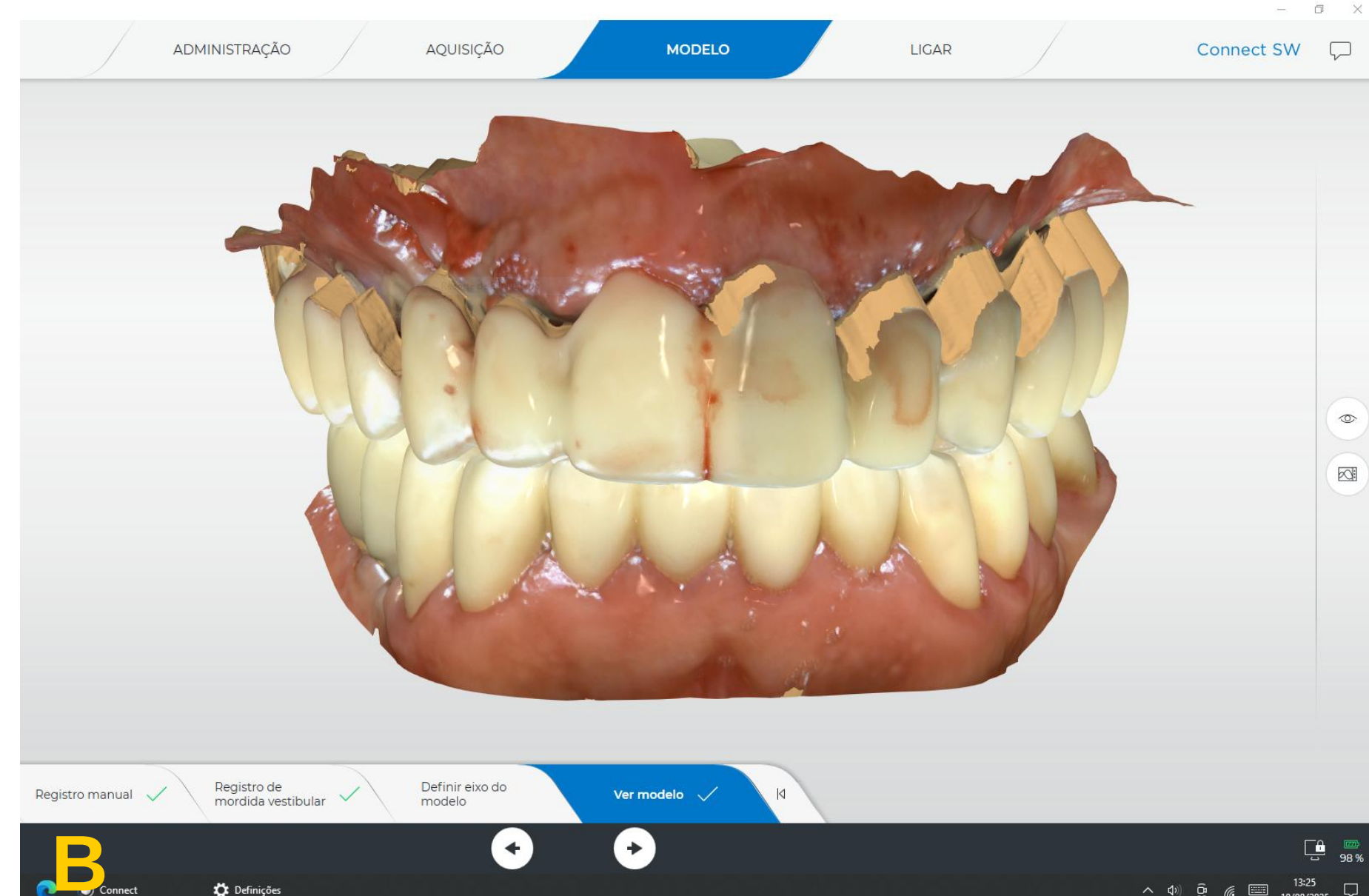
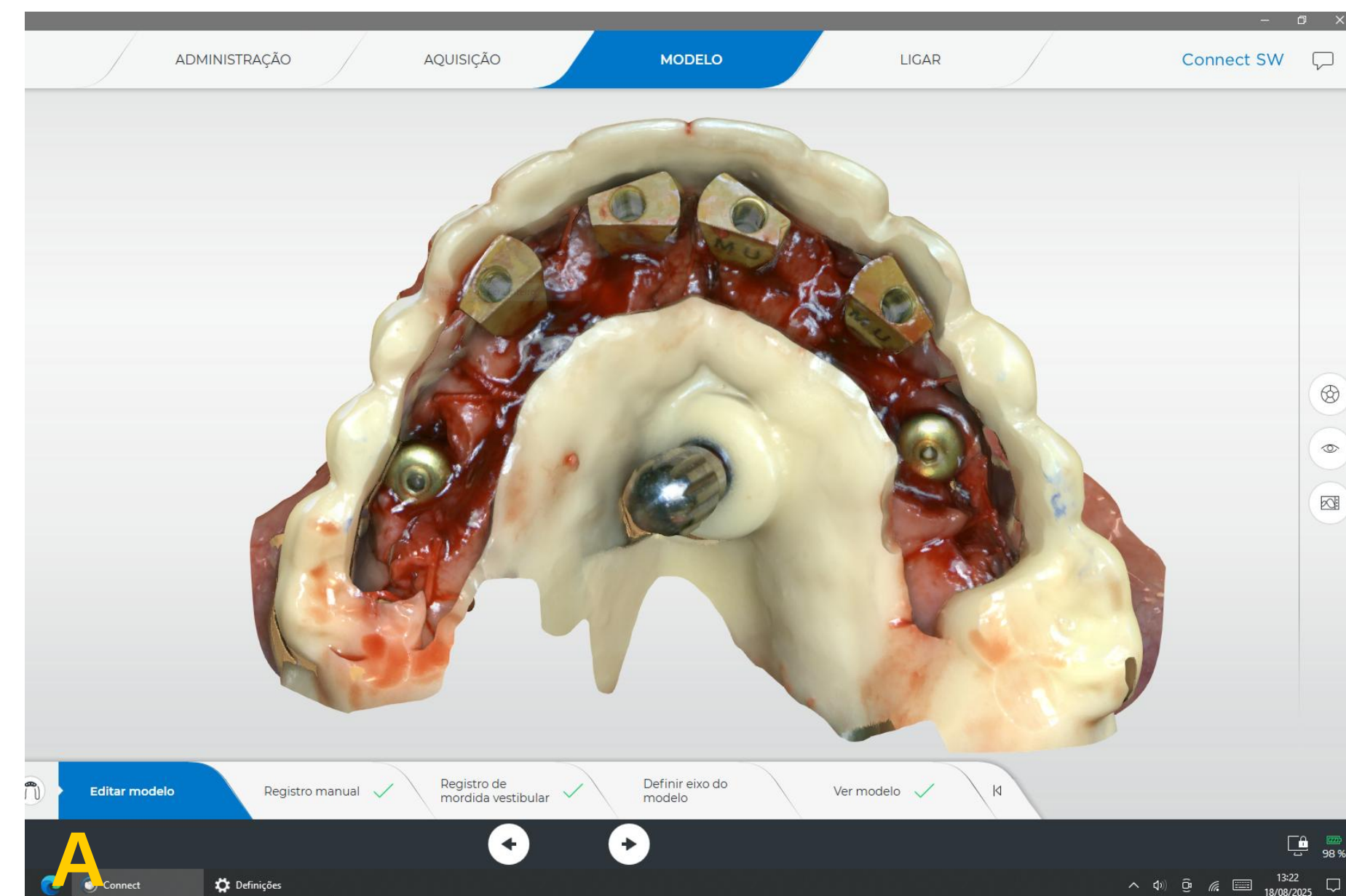
Figure 15

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## TECHNIQUE

### Immediate interim prosthetic rehabilitation and definitive prosthesis

**17.** Install the scan bodies and perform the immediate post-surgical digital scanning, using the prosthetic impression guide as a reference for the dental implants positioning and vertical dimension transfer (Fig. 16A, B).



**Figure 16**



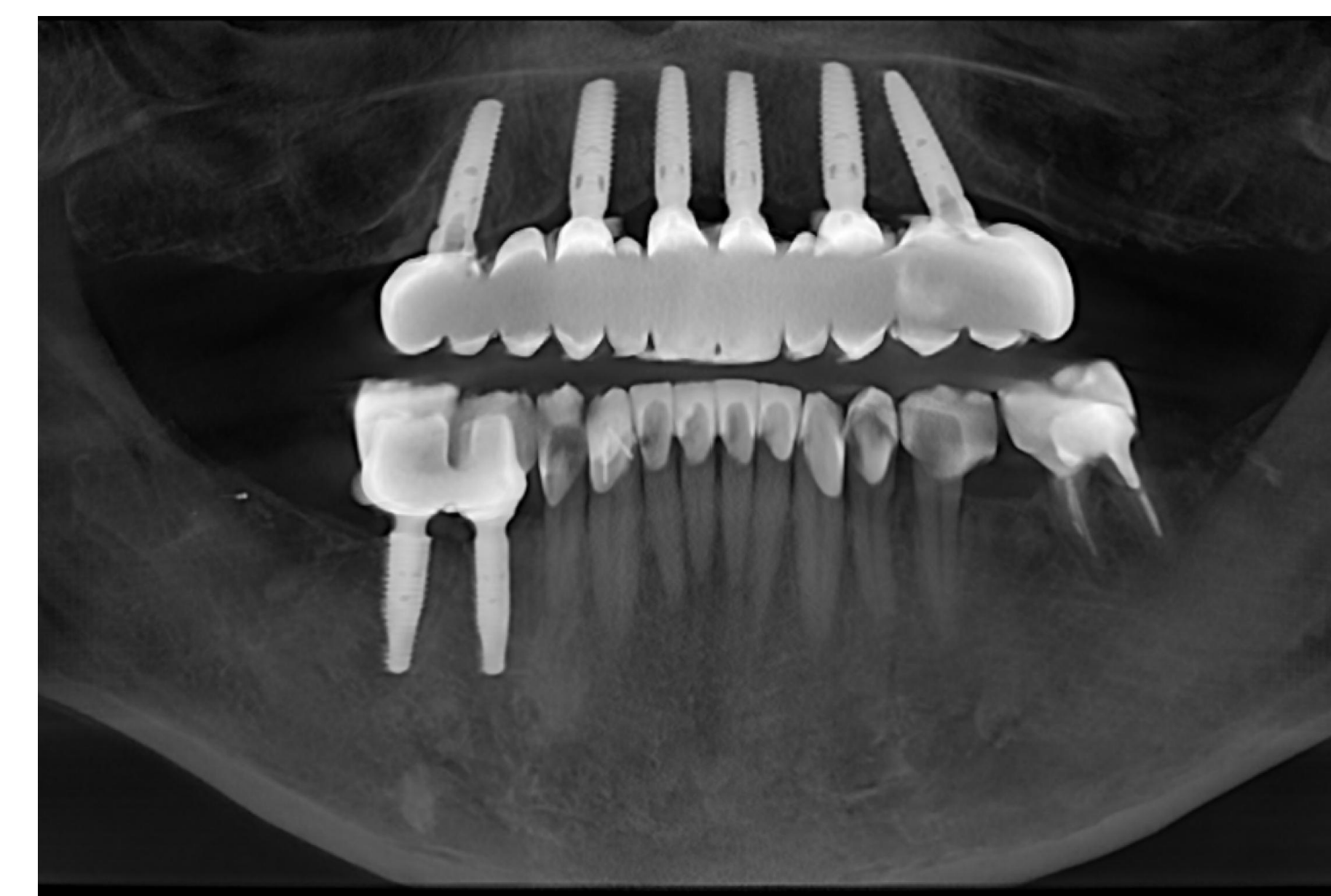
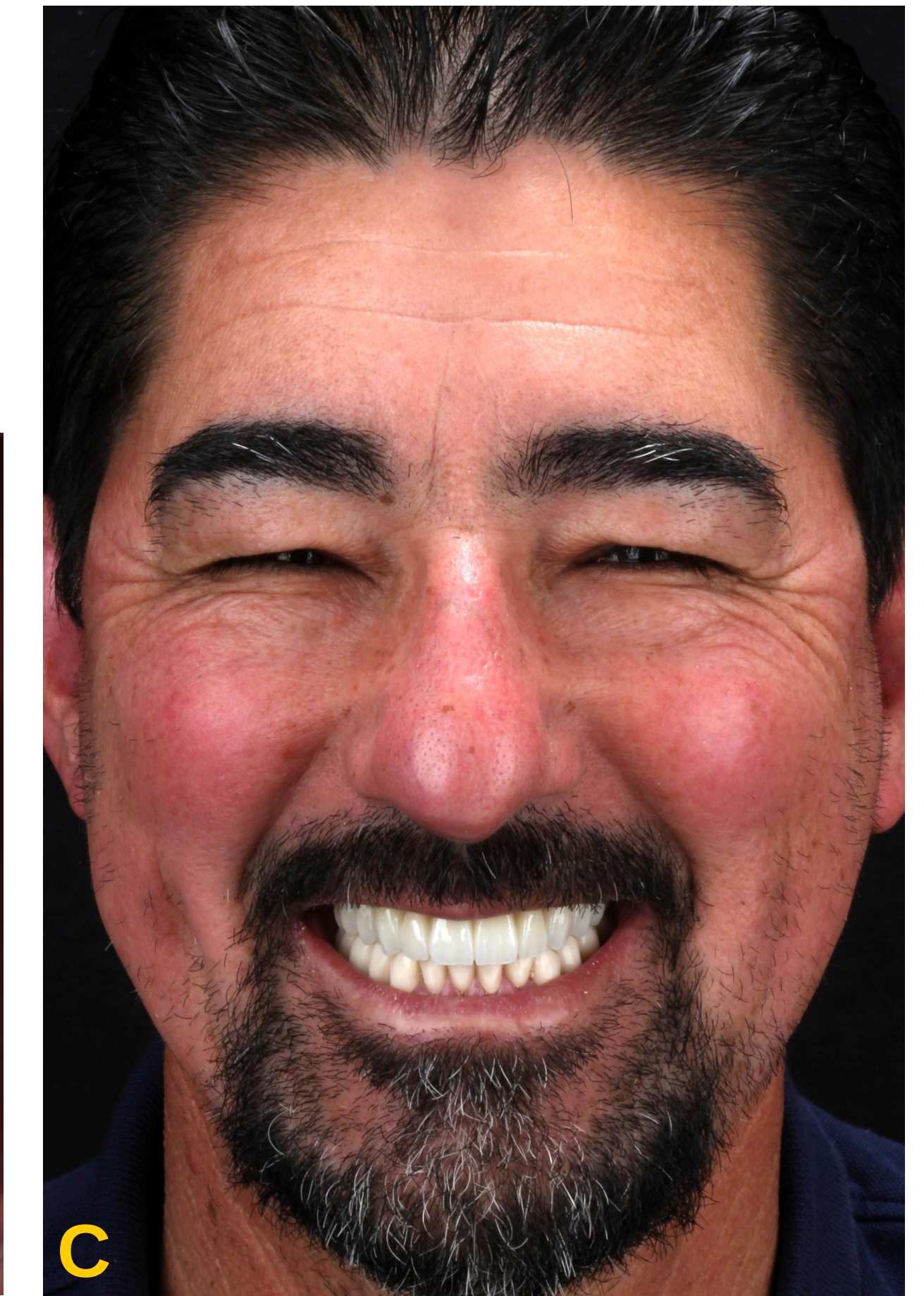
**Figure 17**

**18.** Print the temporary prosthesis using a 3D printer and install the temporary prosthesis over the implants (Fig. 17A, B).

**19.** After 6 months of healing, fabricate the definitive prosthesis in multilayer zirconia reinforced with a titanium bar and mandibular definitive crowns in milled composite (Fig. 18A, B, C).



**Figure 18**



**Figure 19**

Figure 19 shows panoramic reconstruction after 2 years of follow-up.