

POSTOPERATIVE CBCT TO ENHANCE PREOPERATIVE PLANNING INTEGRATION IN COMPLETE ARCH IMPLANT REHABILITATION



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BACKGROUND AND GOALS

IN PATIENTS WITH TERMINAL DENTITION, accurately correlating preoperative prosthetic planning with postoperative outcomes is particularly challenging due to the absence of stable reference landmarks for data registration following tooth extraction. Reliance on soft-tissue or fiducial-based alignment methods is associated with cumulative inaccuracies, which may lead to dataset misalignment, prosthetic discrepancies, and an increased need for chairside adjustments. This novel technique introduces an additional cone-beam computed tomography (CBCT) scan after implant placement to improve data alignment, prosthetic rehabilitation accuracy, and occlusal registration in complete arch immediate loading of dental implants.

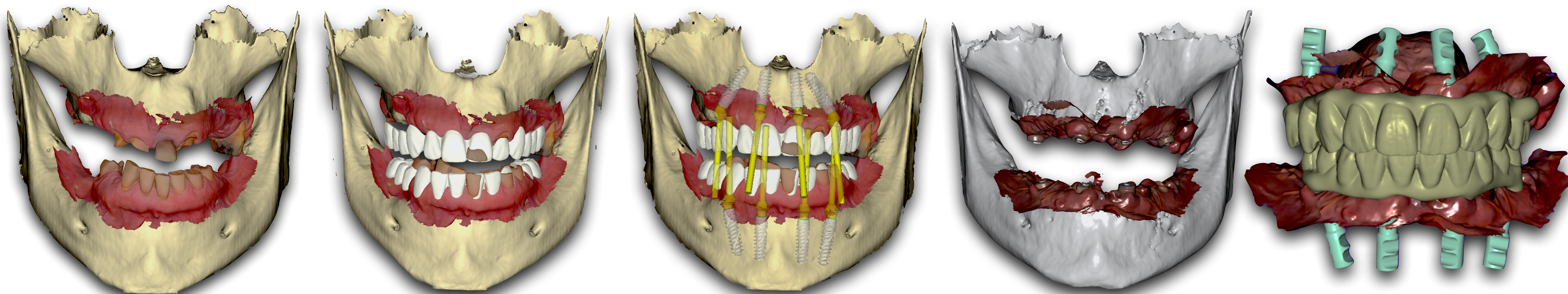
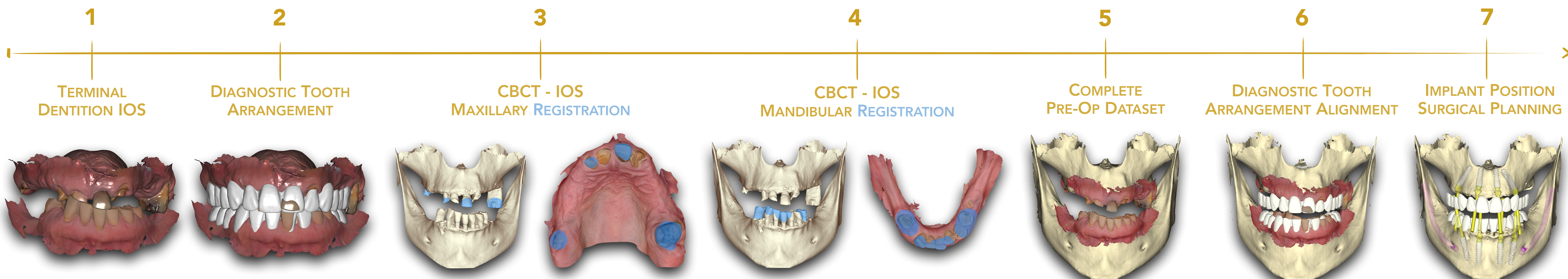


Fig. 1. Technique overview. Pre-op CT/CB and IOS registration; Diagnostic tooth arrangement alignment; Implant position surgical planning; Registered pre- and postoperative CBCT aligned with postoperative IOS; Interim prosthesis designed by CAD system.

TECHNIQUE

PRIOR TO SURGERY, an intraoral scan (IOS) of the terminal dentition is obtained and used to design an ideal tooth arrangement that incorporates vertical dimension, soft tissue contours, bone anatomy, facial aesthetics, and occlusion. A CBCT scan is acquired with the teeth slightly apart to reduce scatter and allow accurate registration. The initial IOS, diagnostic tooth arrangement, and CBCT are imported into implant surgical planning software, and each jaw is individually aligned using the remaining teeth as landmarks, allowing for prosthetically driven implant position planning. **IMMEDIATELY AFTER SURGERY**, a new IOS captures the edentulous soft tissue situation, followed by a new CBCT scan. Pre- and postoperative CBCT scans are aligned using stable bony landmarks as references, and each jaw is separately exported and aligned with the postoperative IOS and the diagnostic tooth arrangement. Here, the postoperative IOS and diagnostic tooth arrangement are aligned with the preoperative occlusal registration to restore the intended vertical dimension of occlusion (VDO). A photogrammetry system is used to record implant positions, verifying registration accuracy with the postoperative IOS for interim prosthesis design using a computer-aided design (CAD) system. **FINALLY**, provisional prostheses are fabricated and delivered, ensuring passive fit and proper occlusion.

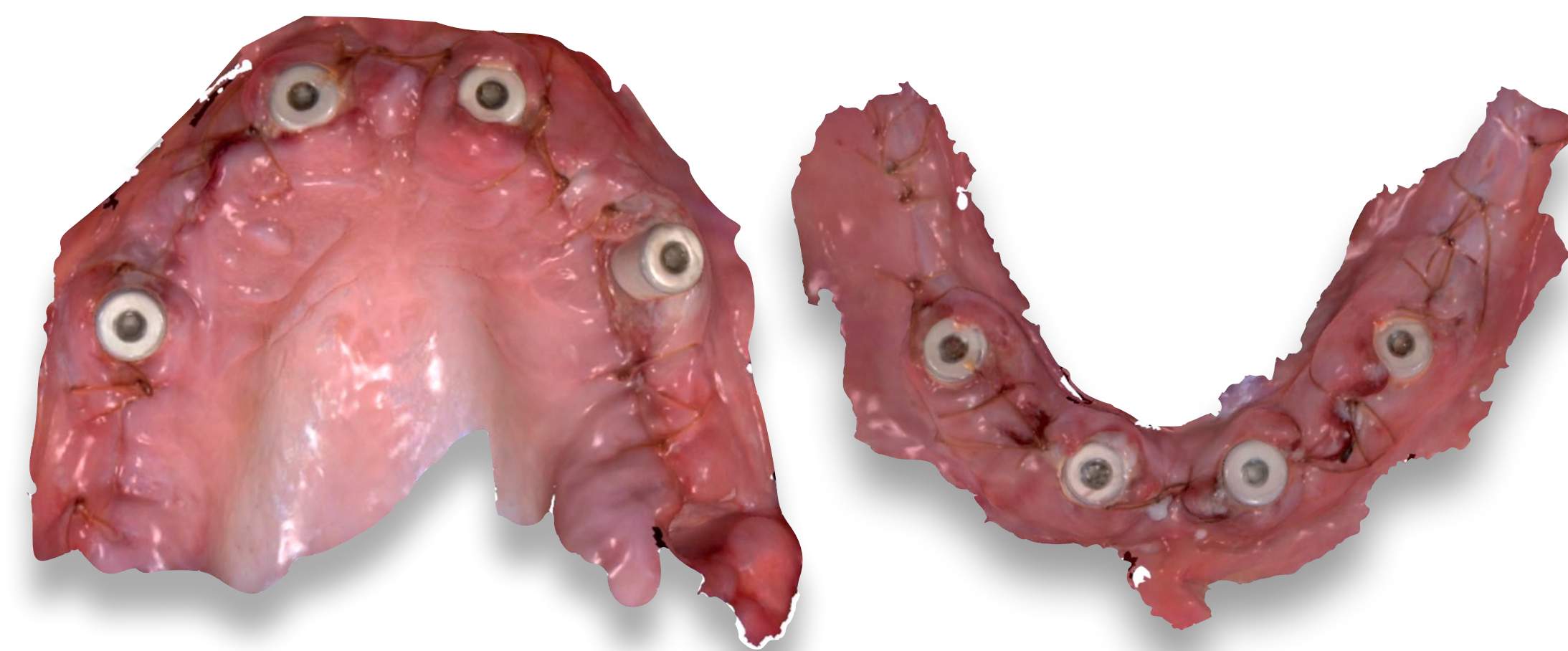
PRE OPERATIVE STEPS



POST OPERATIVE STEPS

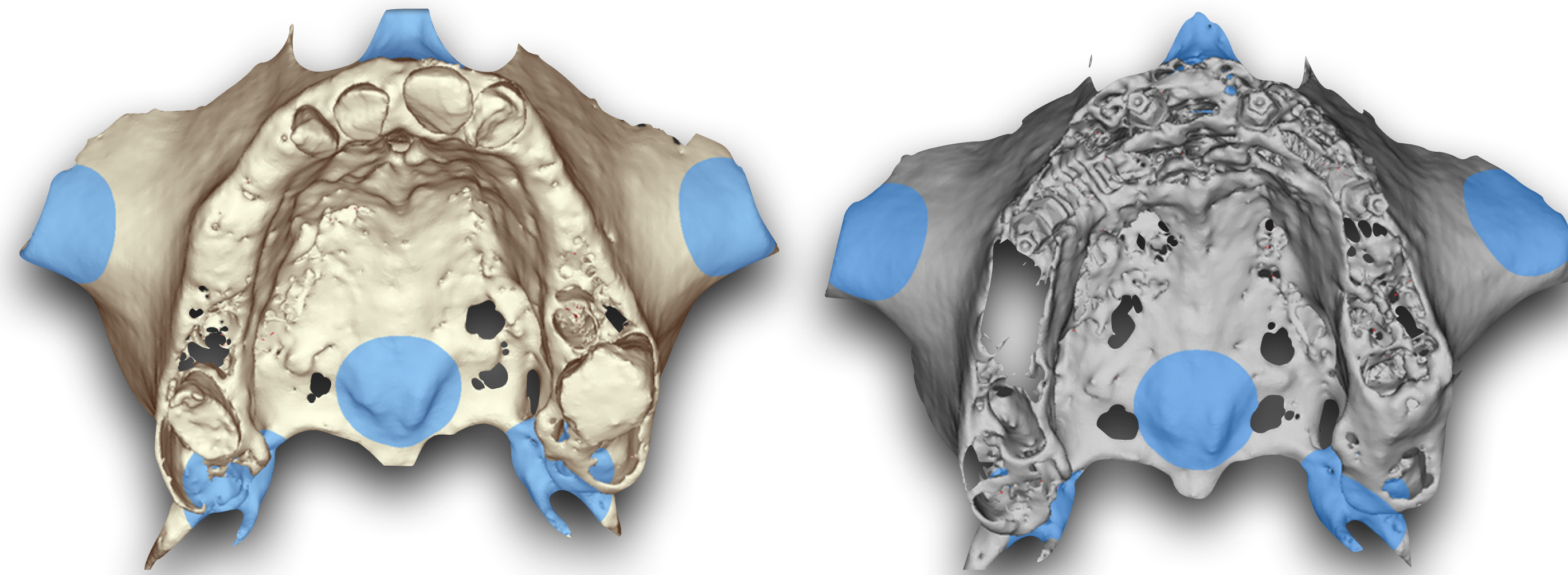
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IMMEDIATE
POST-OP IOS



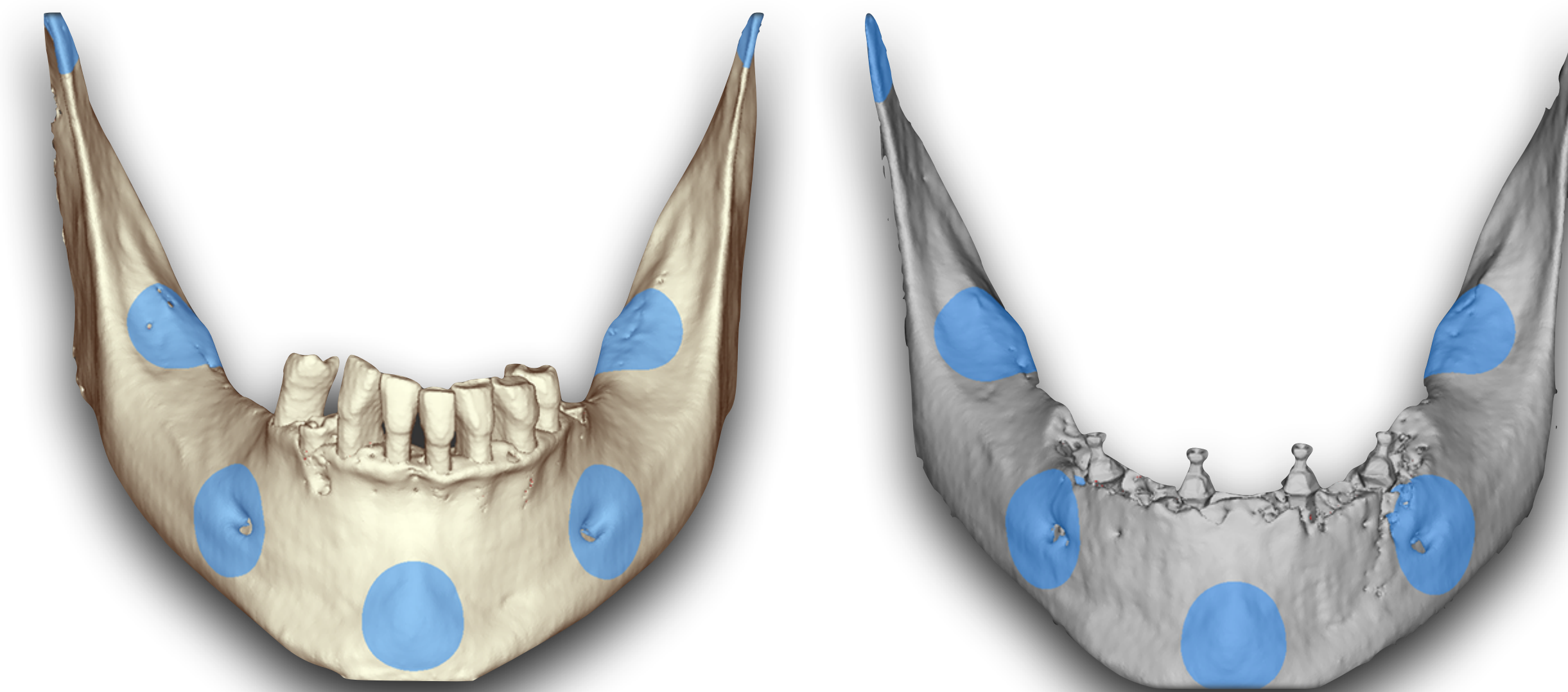
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PRE AND POST-OP CBCT MAXILLARY
REGISTRATION



10

PRE AND POST-OP CBCT MANDIBULAR
REGISTRATION



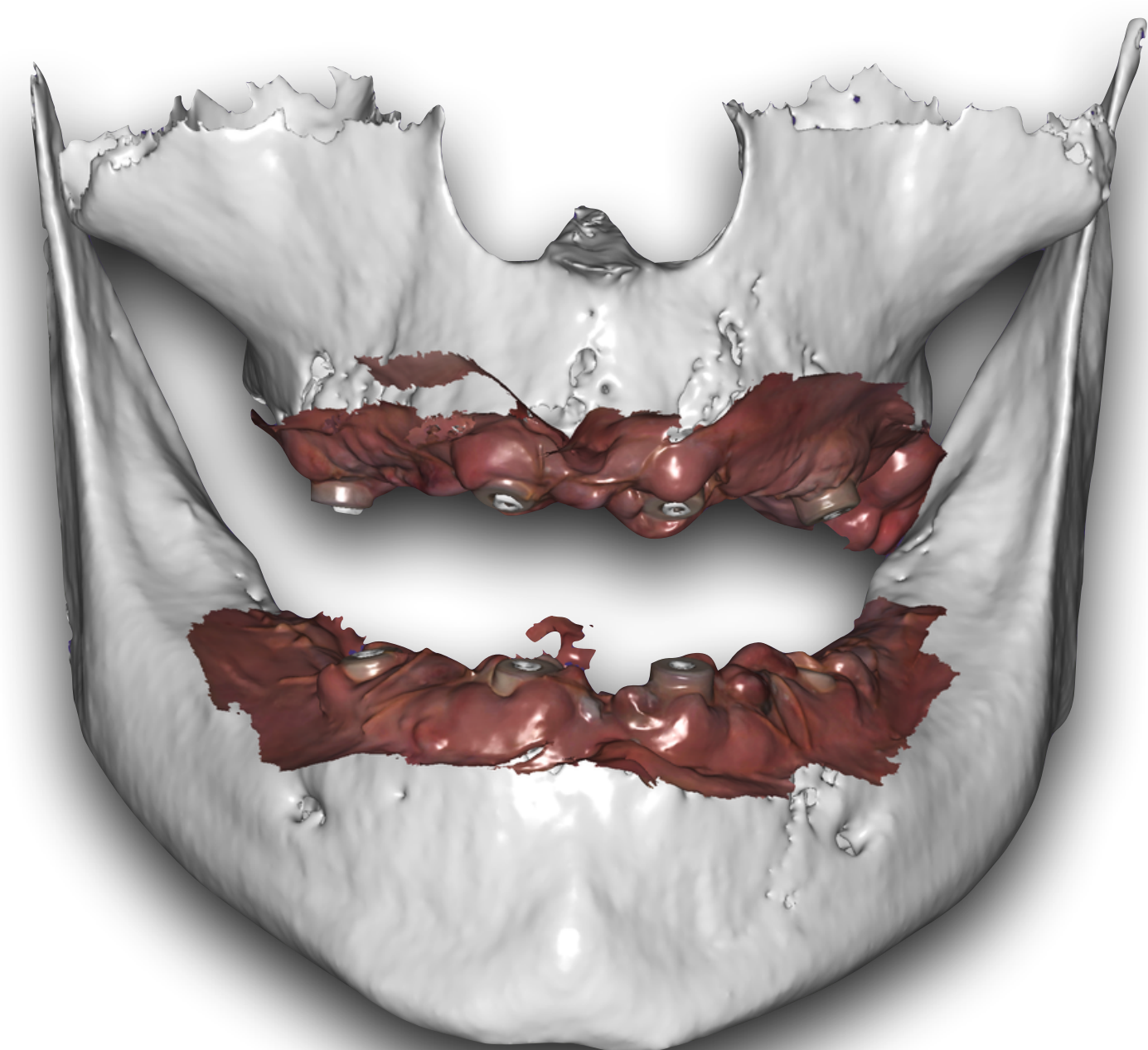
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POST-OP CBCT REGISTRATION BROUGHT
INTO INTENDED OCCLUSION



12

POST-OP CBCT REGISTRATION
ALIGNED WITH POST-OP IOS



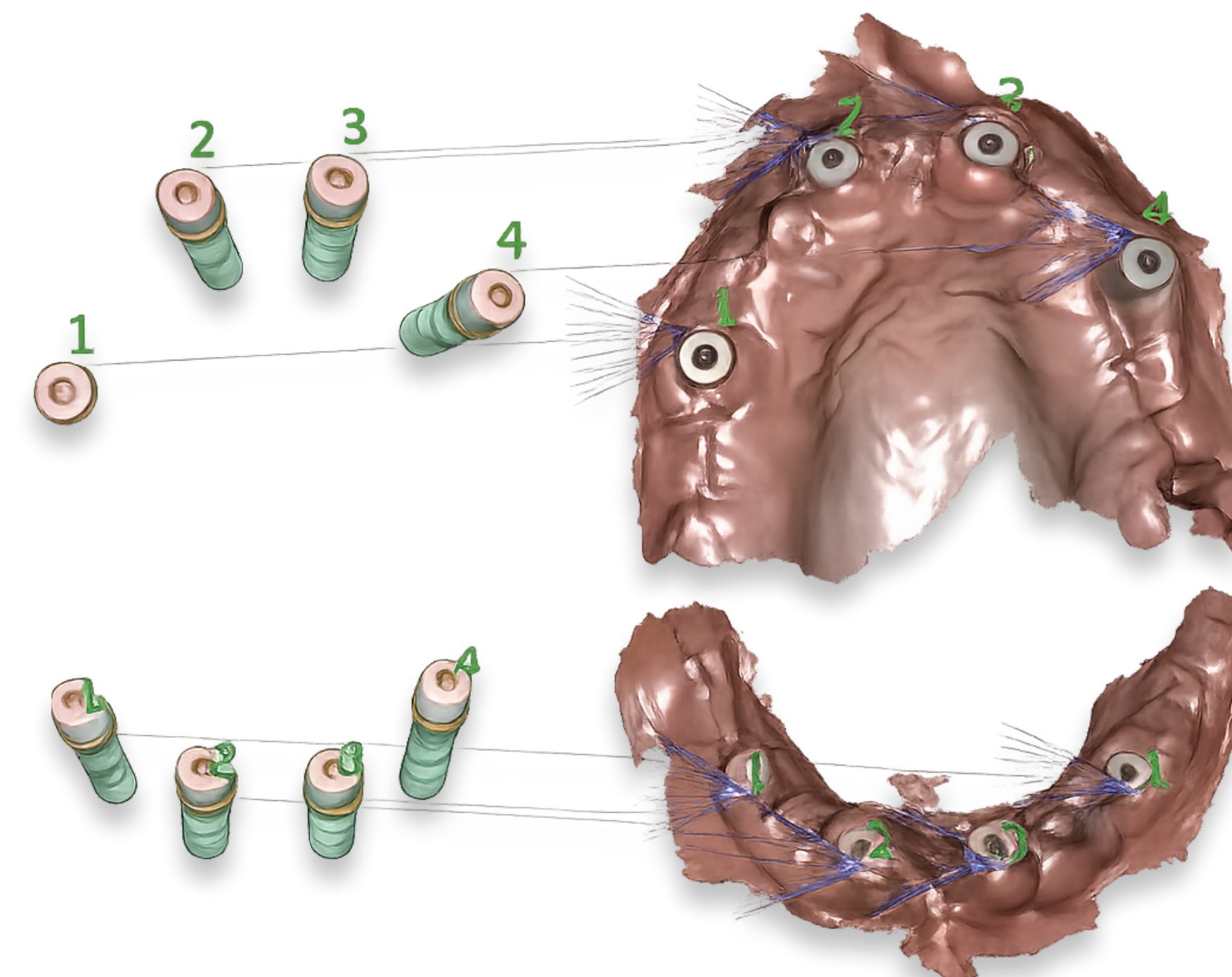
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COMPLETE POST-OP DATASET



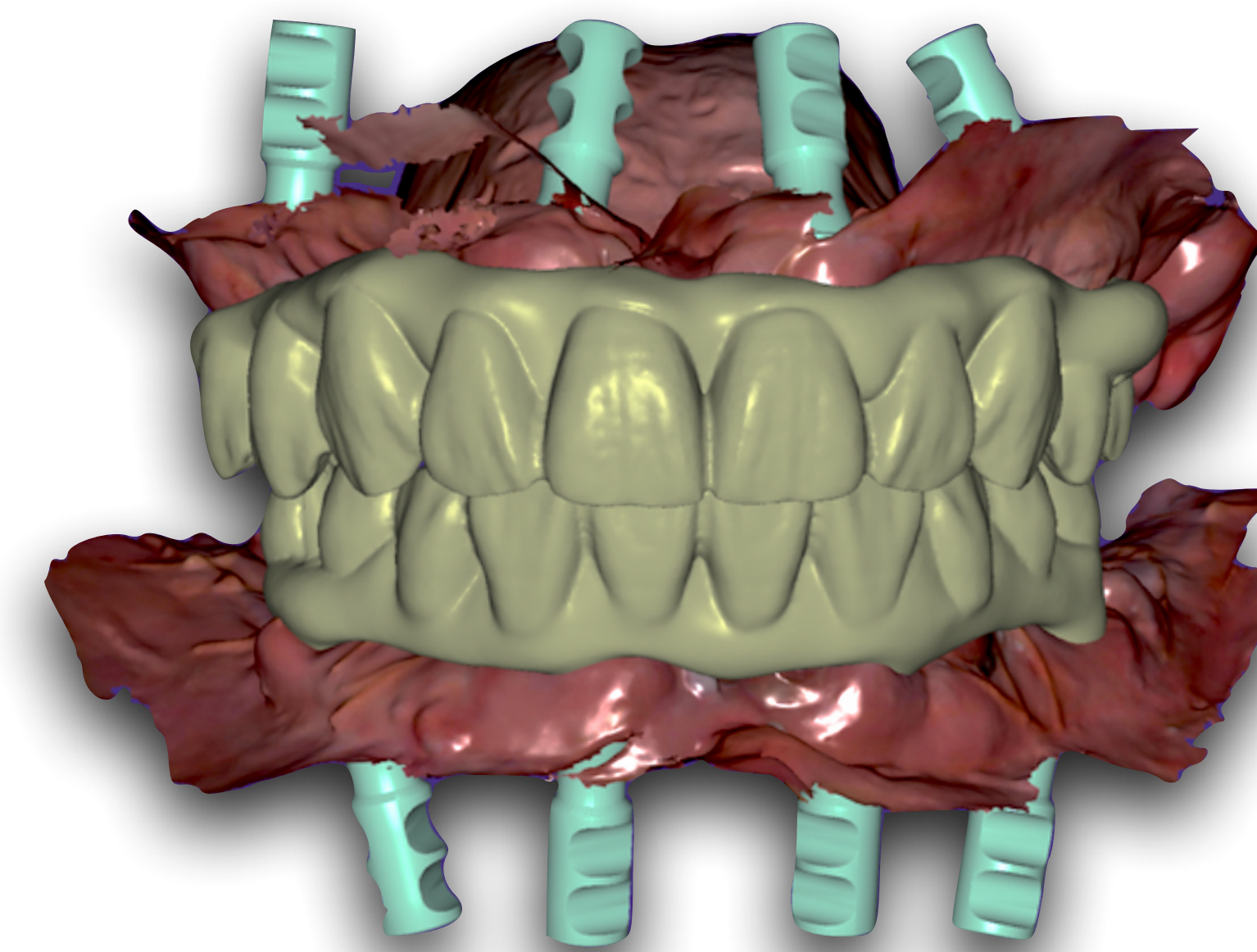
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PHOTOGRAMMETRY IMPLANT
POSITION RECORD



15

INTERIM PROSTHESIS
DESIGNED BY CAD SYSTEM



16

IMMEDIATE PROVISIONAL
PROSTHESIS DELIVERY



CONSIDERATIONS

THIS TECHNIQUE ENABLES accurate dataset registration and reliable transfer of the preoperatively planned prosthetic position to the postoperative situation. By aligning prosthetic planning with surgical outcome throughout the workflow, it **reduces the risk of misalignment** after implant placement, allowing maxillary and mandibular prostheses to be delivered with **minimal need for occlusal adjustment**. Limitations include the need for an additional postoperative CBCT scan and increased workflow complexity. The additional CBCT scan also increases radiation exposure; however, it provides the independent benefit of radiographic verification of implant positioning relative to anatomic structures.

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DENTAL TECHNIQUE

**Using postoperative CBCT to enhance preoperative planning
integration in complete arch implant rehabilitation**

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Fig. 2. From patient's initial situation to immediate postoperative outcome. Terminal dentition; Facial analysis of the diagnostic tooth arrangement; Interim prosthesis delivery; Interim prosthesis in occlusion.