

Implant-Supported Fixed Complete Denture Utilizing Digital workflow combined with Customized Multi-Unit Abutments

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Introduction:

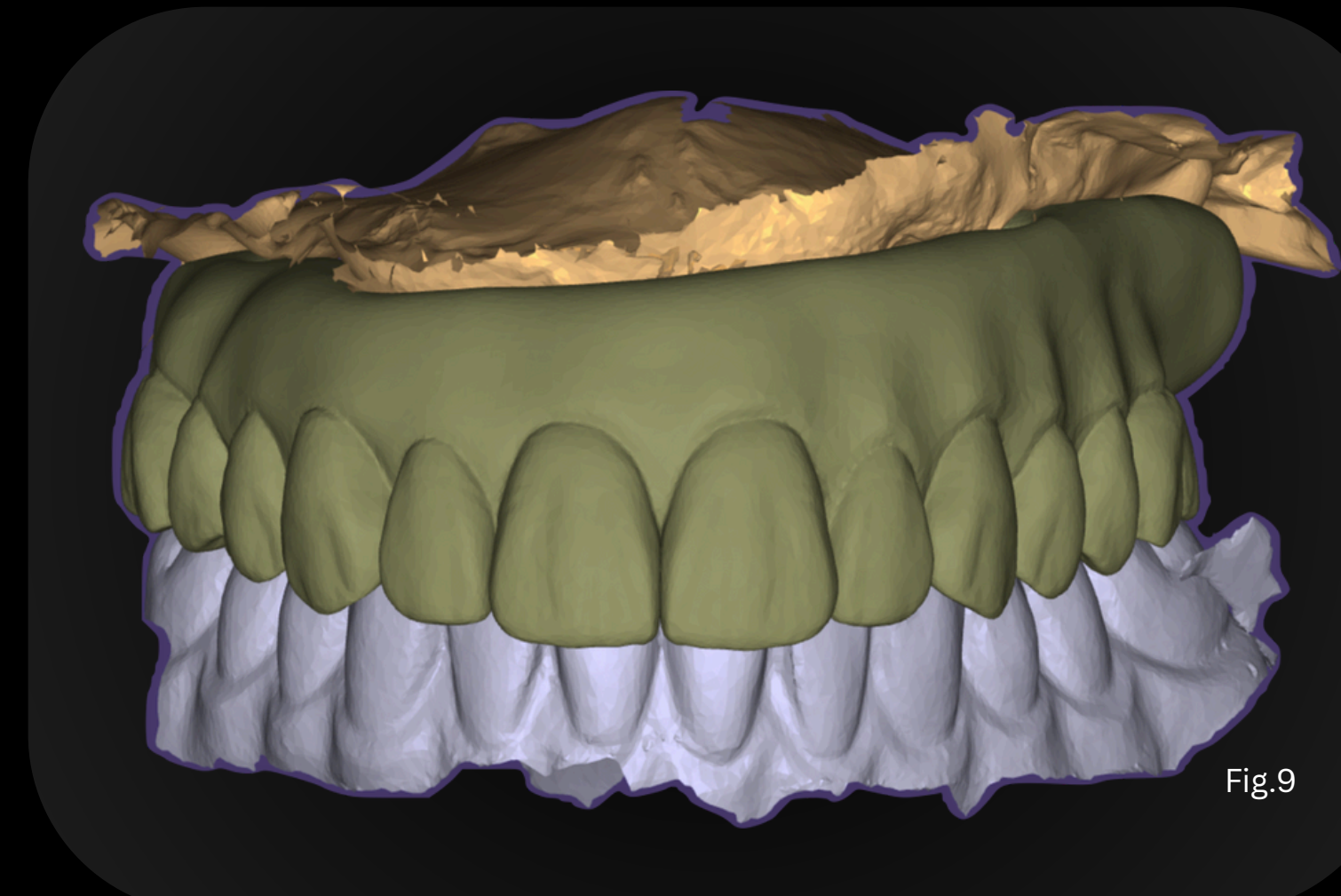
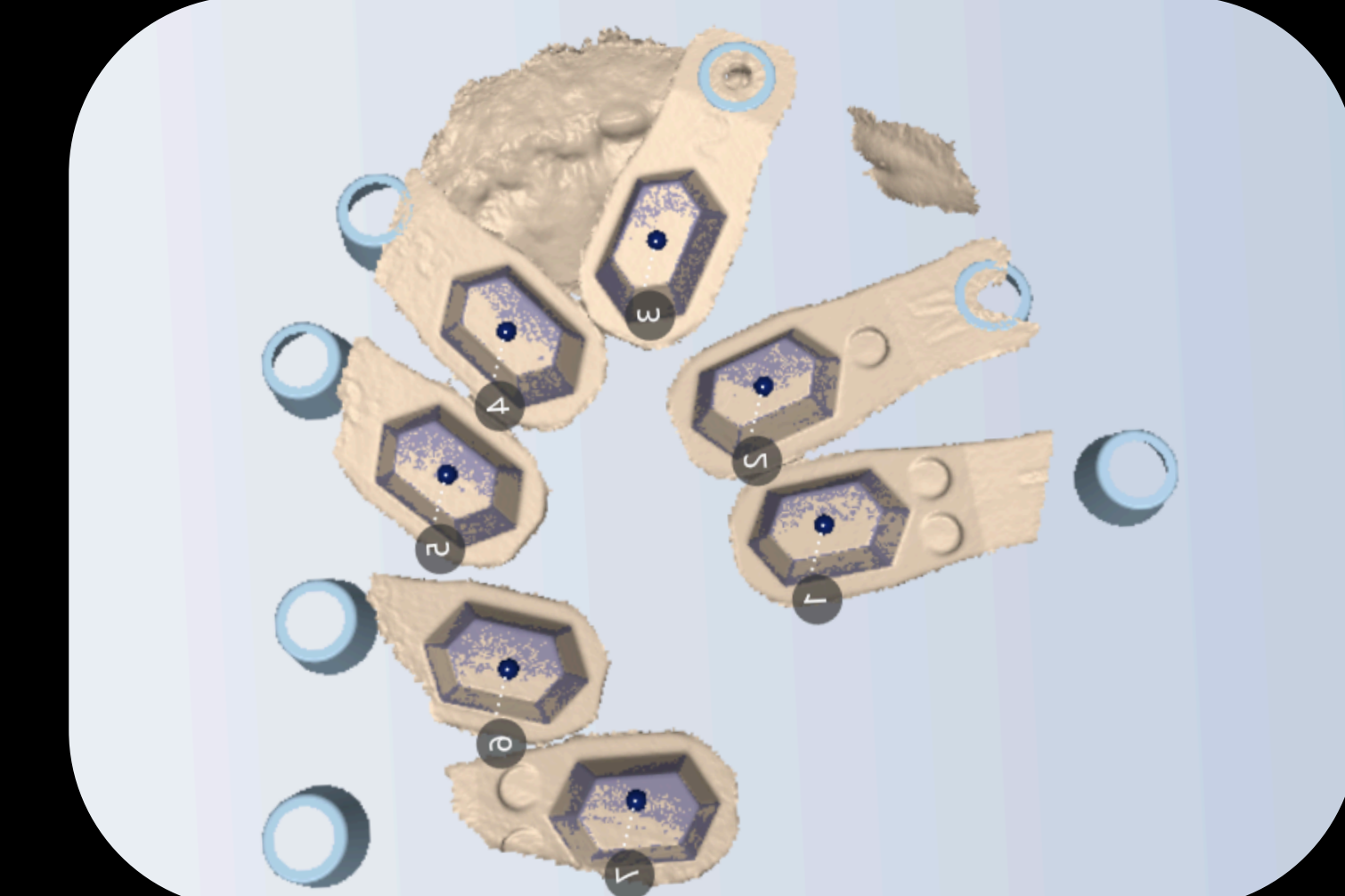
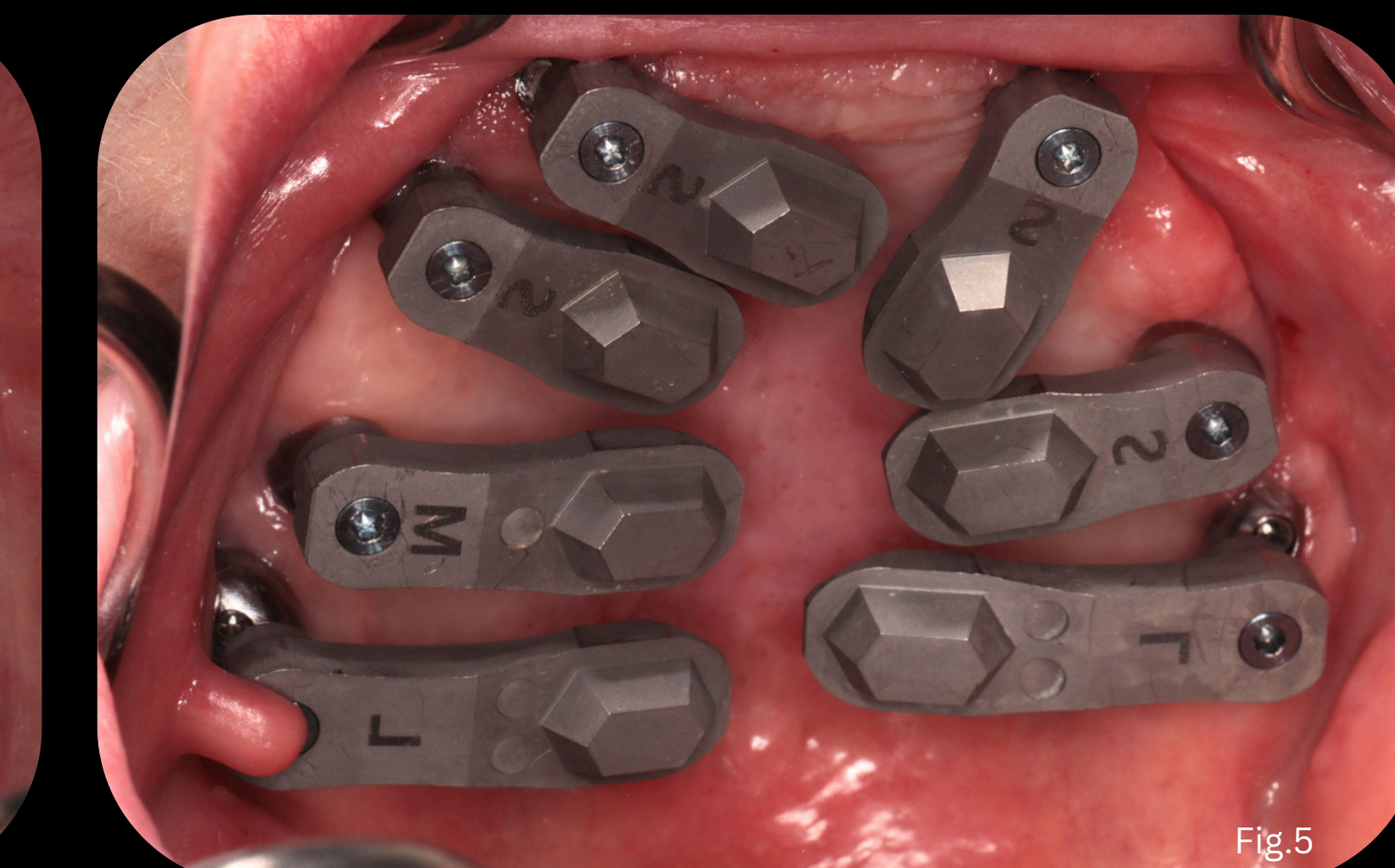
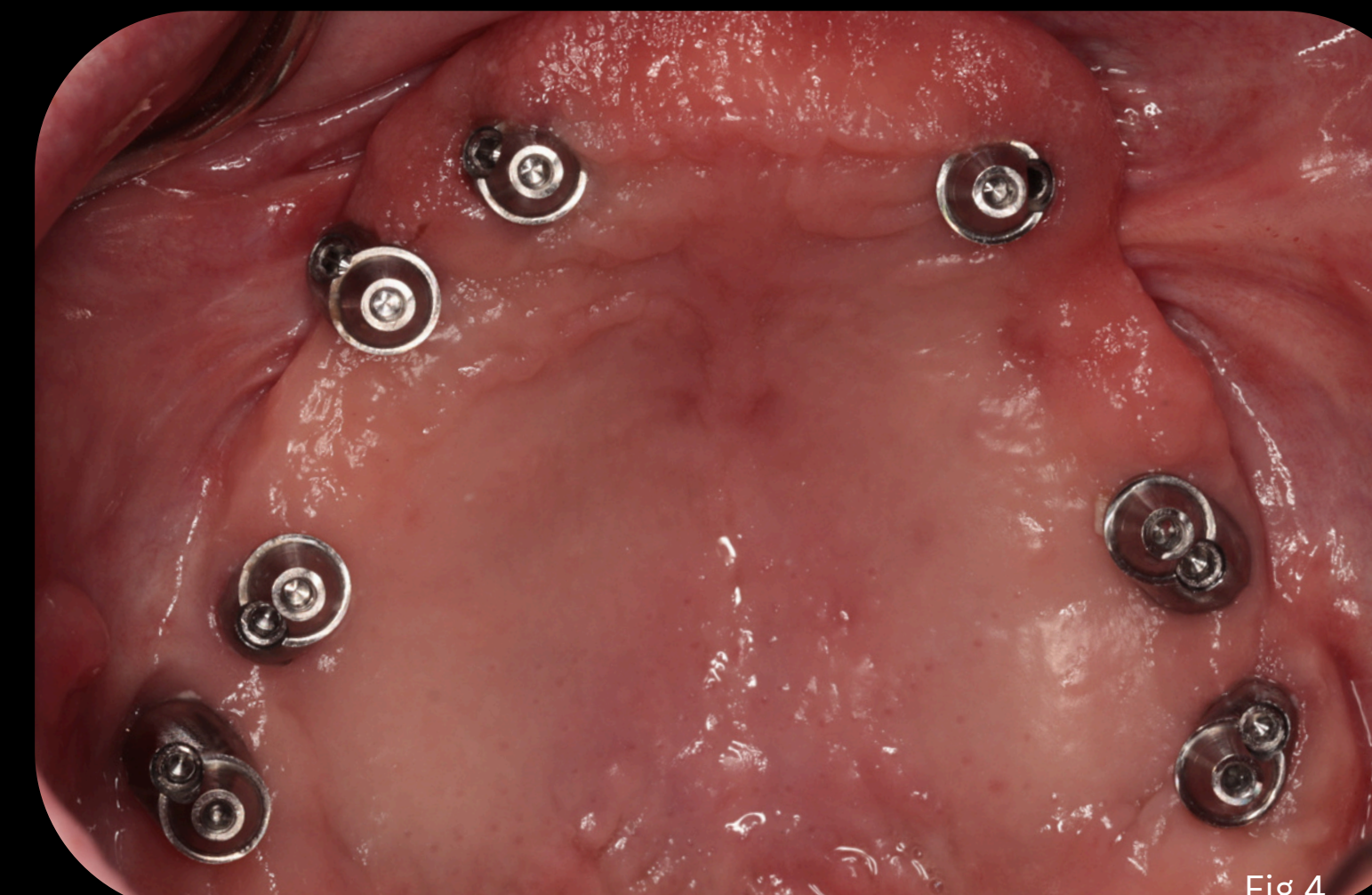
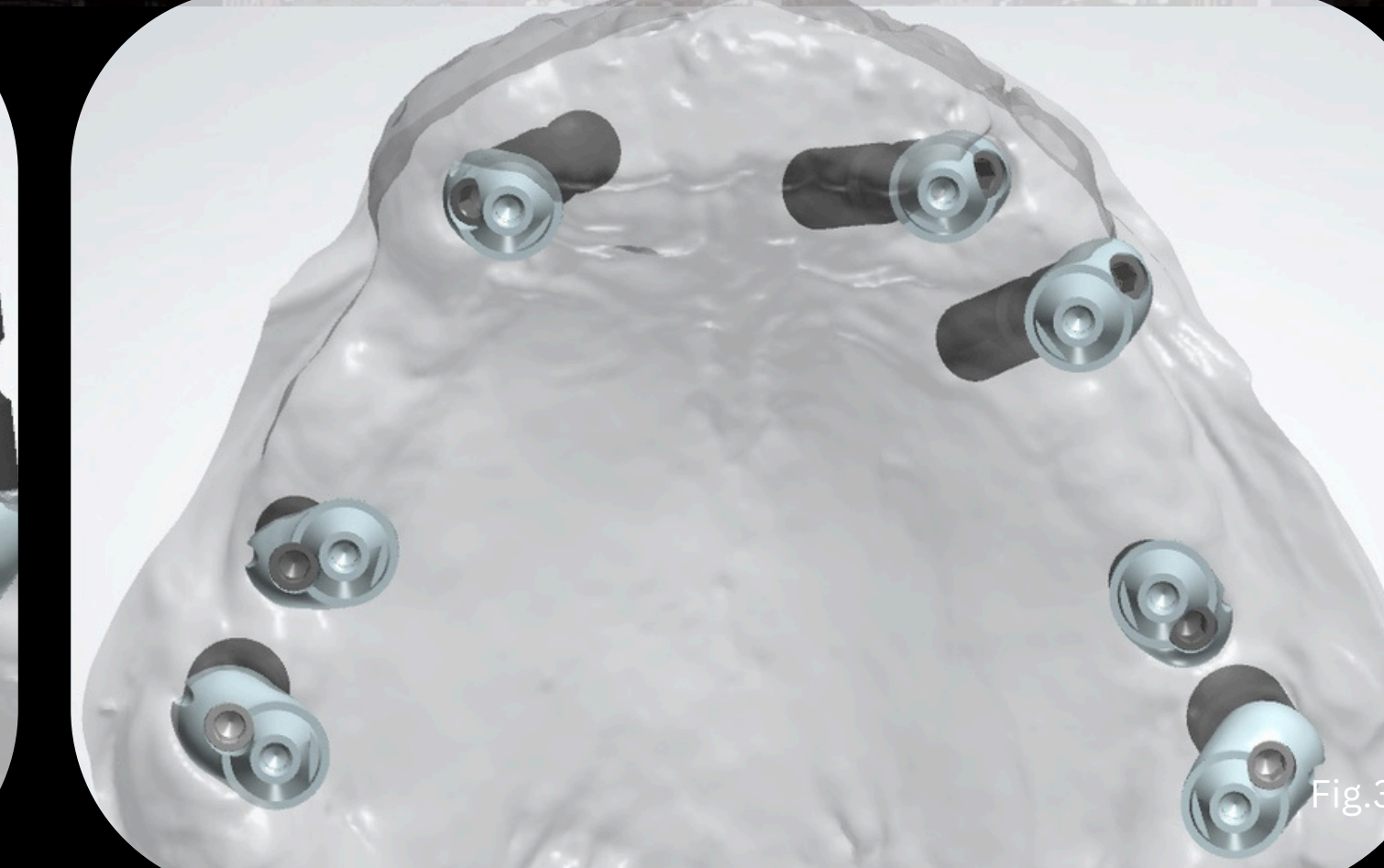
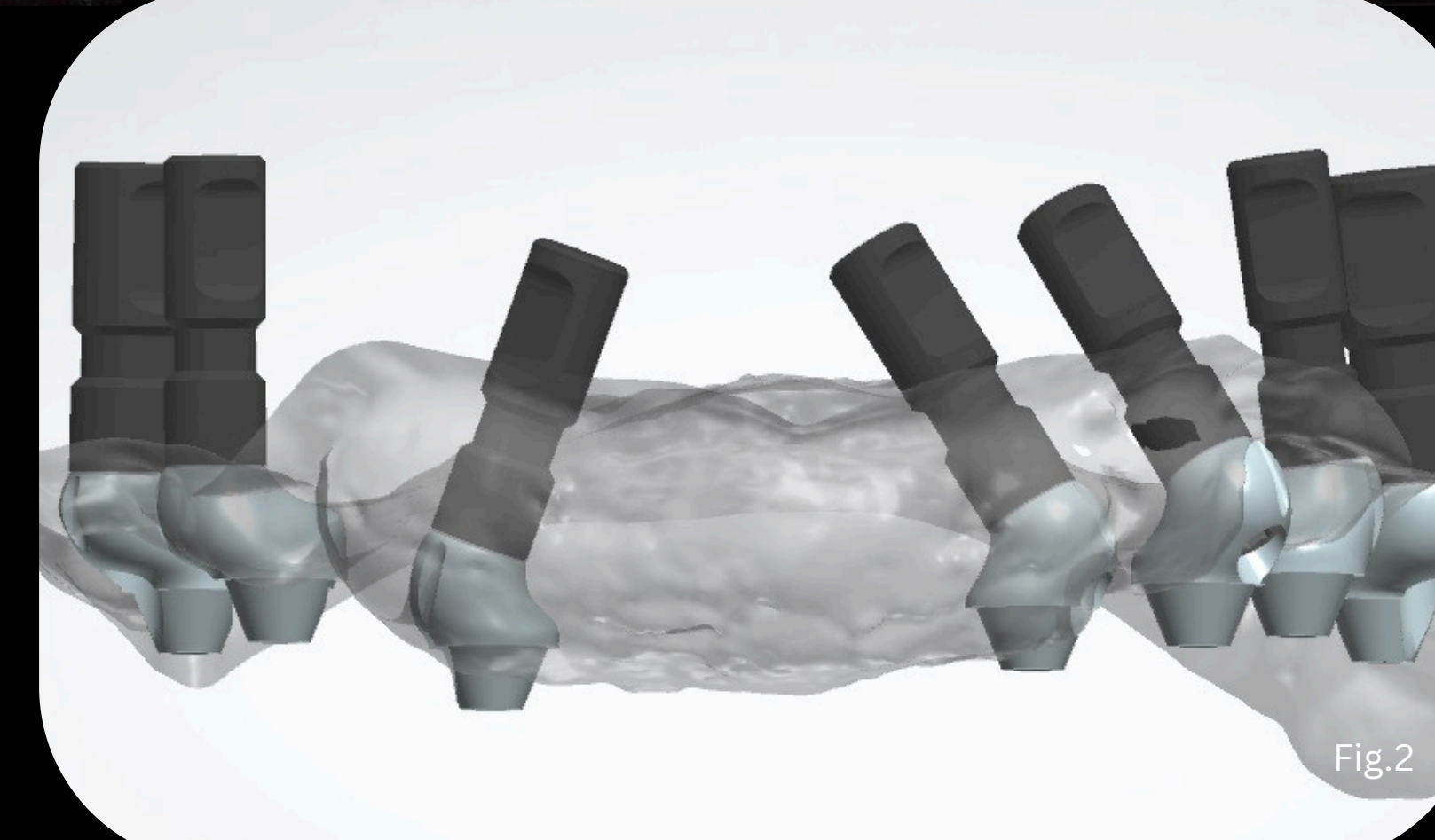
Prosthetic rehabilitation in patients with limited mouth opening and complex medical histories presents significant challenges. This case report describes a novel technique that combines customized multi-unit abutments (MUAs) to correct severe implant angulation with an intraoral grammetry Verification workflow to achieve a passive fit of the Implant Supported Fixed Complete Denture (ISFCD) and reduce the chairside time.

Case Summary:

A 72-year-old female presented to the Division of Prosthodontics at Boston University Henry M. Goldman School of Dental Medicine with a fractured Maxillary Hybrid prosthesis (Fig. 1). Her medical history included previous head and neck cancer and restricted mouth opening. Clinical and radiographic examination was conducted. Seven Biomet Implants were placed 15 years earlier, each restored with straight MUAs.

Digital Workflow

- Intra-oral scans for the exisiting failed prosthesis, opposing and the implants with scan bodies were taken.
- A Customized Parallel MUA's were fabricated (Fig 2,3&4).
- Abutment level Intra-Oral Scan and grammetry for the MUA's (Fig 5&6).
- Fabrication of Printed Verification Jig And Printed Prototype using OnX Tough2 (Fig .7&8).
- Design and production (CAD-CAM) of the final Titanium Substructure and 3y Zr Suprastructure for ISFCD. (Fig.9,10,11&12)



Materials and Methods:

Due to poor angulation and limited intraoral access, a set of customized MUA's were designed to allow having all the implants as parallel as possible. These custom MUA's allows angle corrections up to 45°. Intraoral scan with scan bodies and grammetry with flags was used for the final impression and verification. A printed verification Jig and prototype with OnX tough 2 was fabricated followed by Titanium substructure and Monolithic 3Y Zirconia suprastructure (ISFCD) for the final prosthesis.

Discussion:

Despite Medical and Prosthetic challenges, the Definitive restoration demonstrated excellent fit and passivity. The fully digital workflow, aided by custom parallelized MUAs, significantly minimized chairside adjustments, reduced the total number of clinical appointments and provided smooth delivery of ISFCD.

Conclusions:

This case illustrates a digital approach to rehabilitating complex full-arch cases involving severely angulated implants and limited mouth opening. The integration of custom MUAs with intraoral grammetry enabled the efficient and predictable delivery of a high-quality ISFCD, offering a replicable model for similar complex cases.

References:

Revilla-León M, Cascos R, Barmak AB, Kois JC, Gómez-Polo M. Accuracy of a complete arch noncalibrated splinting implant scanning technique with a palatal orientation recorded by using different intraoral scanners. J Prosthet Dent. 2025 Mar 15:S0022-3913(25)00113-1. doi: 10.1016/j.prosdent.2025.02.020. Epub ahead of print. PMID: 40090801.