Replicating Denture Esthetics in Immediate Loading of a Maxillary Implant-Supported Fixed Prosthesis Using Photogrammetry

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Objective

To meet patient's requirements for aesthetics and function, a digital workflow using photogrammetry technology was selected for this maxillary full-arch rehabilitation case with immediate loading.

Case Report

- A 70-year-old completely edentulous male patient presented for full-arch implant rehabilitation. He was satisfied with the esthetics and function of his interim complete denture and expressed a desire for the definitive prosthesis to replicate its arrangement.
- Six maxillary implants were placed using a digitally guided approach. Before the implant surgery, the denture occlusion was transitioned from bilateral balanced articulation to an occlusion scheme suitable for a fixed implant prosthesis with anterior coupling and canine guidance. The denture was then scanned to replicate the teeth arrangement and occlusion.
- Following surgery, a photogrammetry-based digital impression was obtained to capture implant positions with high precision. An interim full-arch prosthesis mimicking the denture setup was then 3D-printed and delivered in 48 hours.

Outcome & Follow-up

The interim prosthesis was delivered without complication. At the one-week and one-month follow-ups, the patient reported satisfaction with comfort, esthetics, and function. Neither biological nor prosthetic complications were noted.

Fig 1. Extra-oral photos of patient with interim dentures, smile

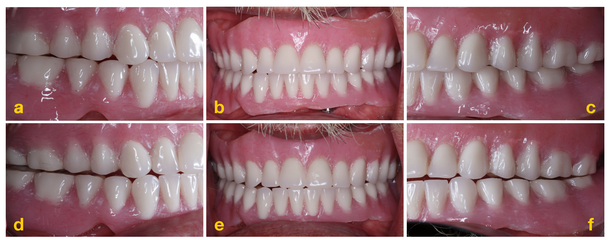

Fig 2. Intra-oral photos
(a) centric relation, right; (b) centric relation, frontal; (c) centric relation, left; (d) laterotrusion, right; (e) protrusion, frontal; (f) laterotrusion, left

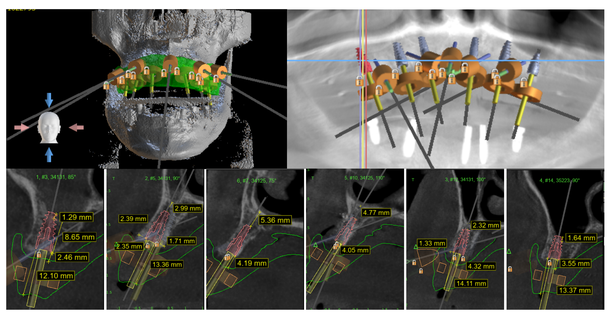

Fig 3. Prosthetically driven dental implant planning for maxillary arch

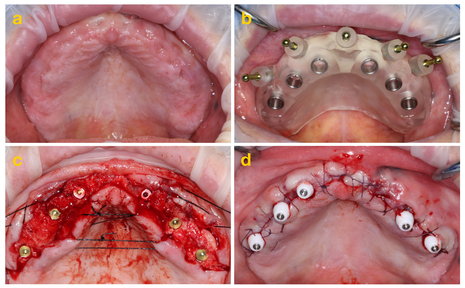

Fig 4. Maxillary implant surgery with surgical guide
(a) pre-treatment intra-oral occlusal view; (b) surgical guide in place with fixation pins; (c) six implants placed with cover screws; (d) post-surgery intra-oral occlusal view with healing caps

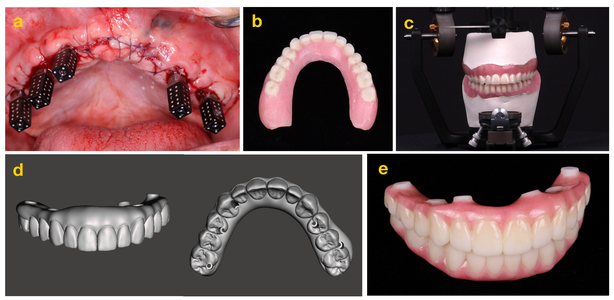

Fig 5. Photogrammetry and digital fabrication of interim implant-supported fixed protheses
(a) scan bodies for photogrammetry attached to implants;
(b) adjusted interim denture; (c) clinical remount of the adjusted interim denture; (d) digital scan of adjusted interim denture;
(e) 3D-printed interim implant-supported fixed protheses

Fig 6. Post-treatment full-head, smile

Discussion

- Immediate loading of cross-arch implant-supported prostheses is an evidence-based approach. Predictable outcomes depend on surgical and prosthetic factors, particularly primary implant stability.
- The replication technique of dentures enables fabrication of new dentures from an existing prosthesis, preserving the patient-approved tooth position and avoiding unnecessary remakes after implant placement. Digital fabrication further enhances efficiency and accuracy, and provides modifiable STL files for future use.
- In terms of digital impressions for complete-arch implant-supported fixed dental prostheses, photogrammetry is shown to be a more reliable technology than intraoral scanning, exhibiting significantly greater trueness and precision.

Conclusion

This case highlighted the clinical value of aligning patient expectations with modern digital workflows. Maintaining the esthetic and occlusal continuity from denture to fixed prosthesis enhanced the patient's satisfaction. The use of photogrammetry enabled efficient fabrication and precise delivery of an immediate-loading maxillary fixed complete denture, demonstrating a reliable and patient-centered full-arch treatment protocol.

Reference
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