

Introduction

Computer-aided design (CAD) and Computer-aided manufacturing (CAM) technology has become an integral component of contemporary dental practice. These advancements have been used for different types of dental prosthesis, including inlays, onlays, fixed, and removable dental prostheses. The conventional method of removable denture fabrication has been clinically applied for nearly a century. However, this method necessitates multiple appointments, intricate laboratory procedures and increased cost for both the patient and clinician. CAD/CAM fabricated digital dentures offer many advantages which include reduced clinical visits, reduced cost for patient and clinician, enhanced predictability and easily reproducible. This report describes a new digital workflow for the fabrication of a mandibular immediate denture opposing a maxillary fixed dental prosthesis.

Objective

The objective of this clinical study is to assess the clinical feasibility of fabricating an immediate denture through the utilization of an innovative digital workflow.

Patient Presentation

80-year-old male patient presented at the prosthodontics clinic of Columbia University, with a chief complaint of impaired masticatory function due to fractured mandibular dentition. Clinical evaluation and radiographic assessment revealed multiple retained roots on the mandible opposing a maxillary fixed dental prosthesis. Patient presented with a collapsed bite. All retained dental roots on the mandible were planned for extraction and delivery of immediate denture. A digital workflow was implemented for the fabrication of the mandibular immediate denture and delivery in three clinical visits.

Fig. 1.
Patient Initial
Presentation



Technique

1ST CLINICAL VISIT

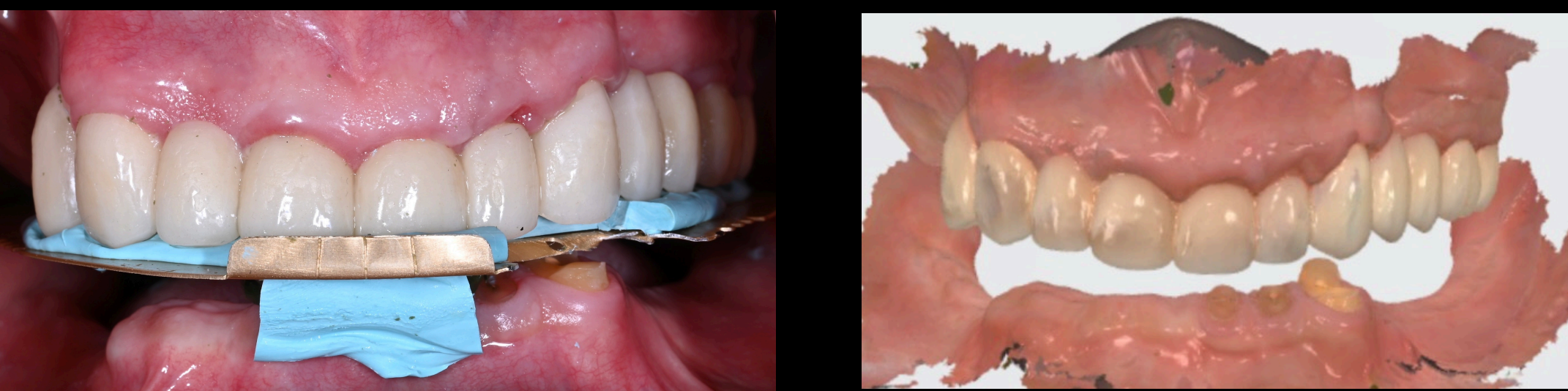


Fig. 2. Scanned maxillary and mandibular arches using IOS(3Shape Trios4). Evaluated VDO preliminarily. Used the Panadent tray to hold a patient's preliminary VDO in CR position. Recorded preliminary MMR in CR position using the IOS.

LABROTORY

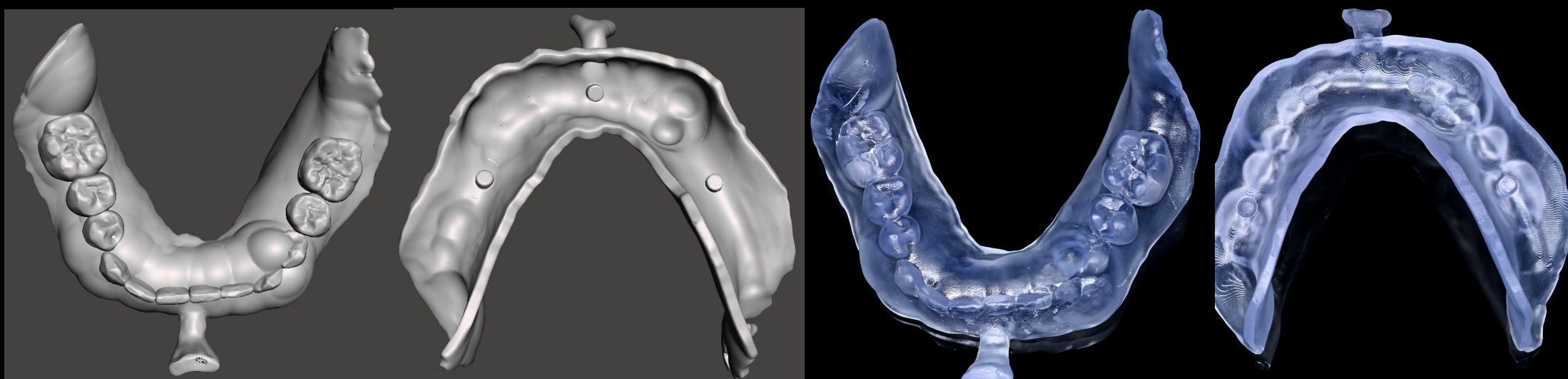


Fig. 3. Designed and 3D-printed (CAD/CAM) mandibular custom tray with tooth setup according to the scans.

2ND CLINICAL VISIT

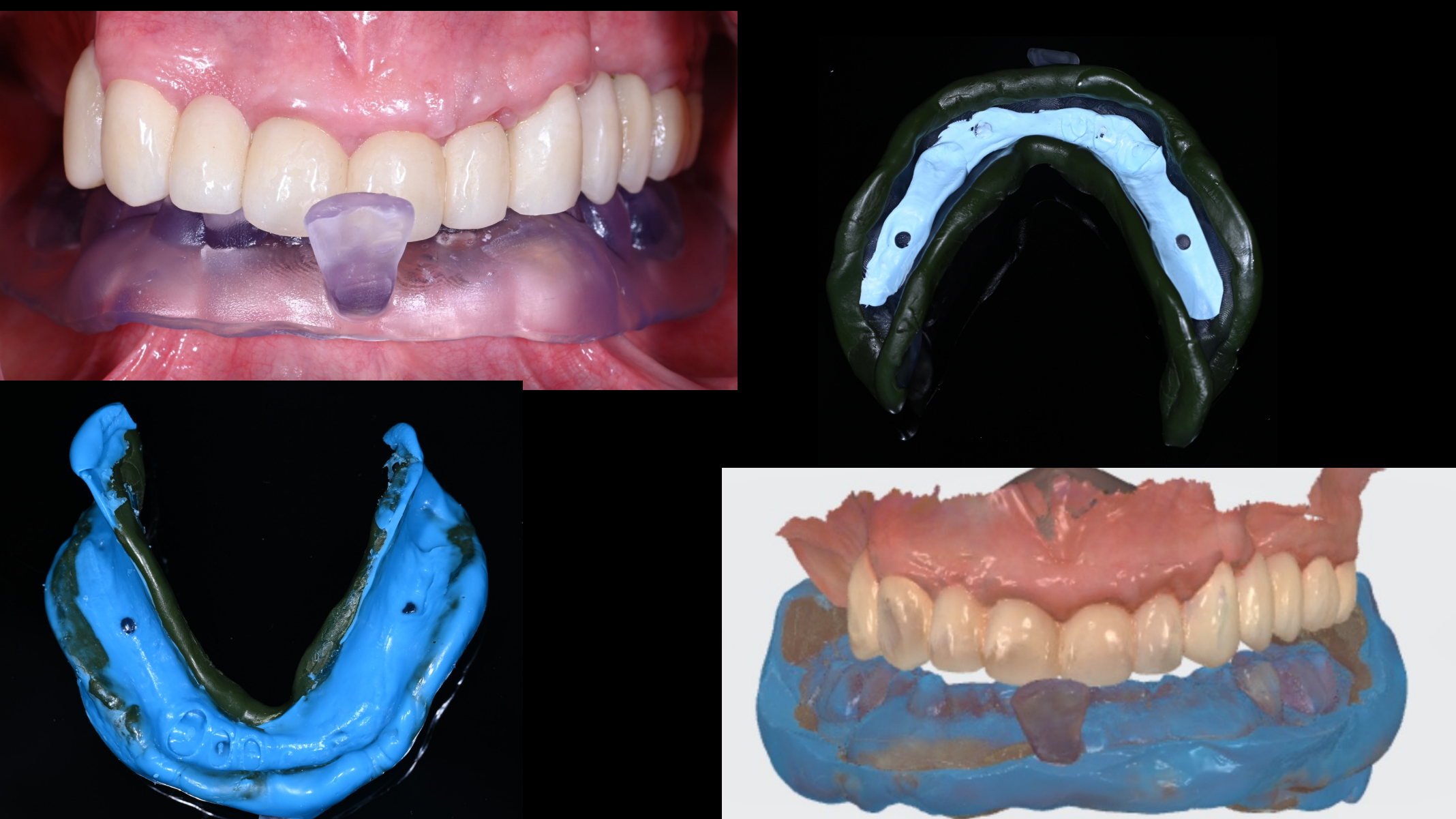


Fig. 4. Completed border molding and final impression. Confirmed occlusal plane, re-evaluated MMR, esthetics and phonetics. Scanned the impression with tooth-on custom tray and re-evaluated the verified VD in CR position.

LABROTORY

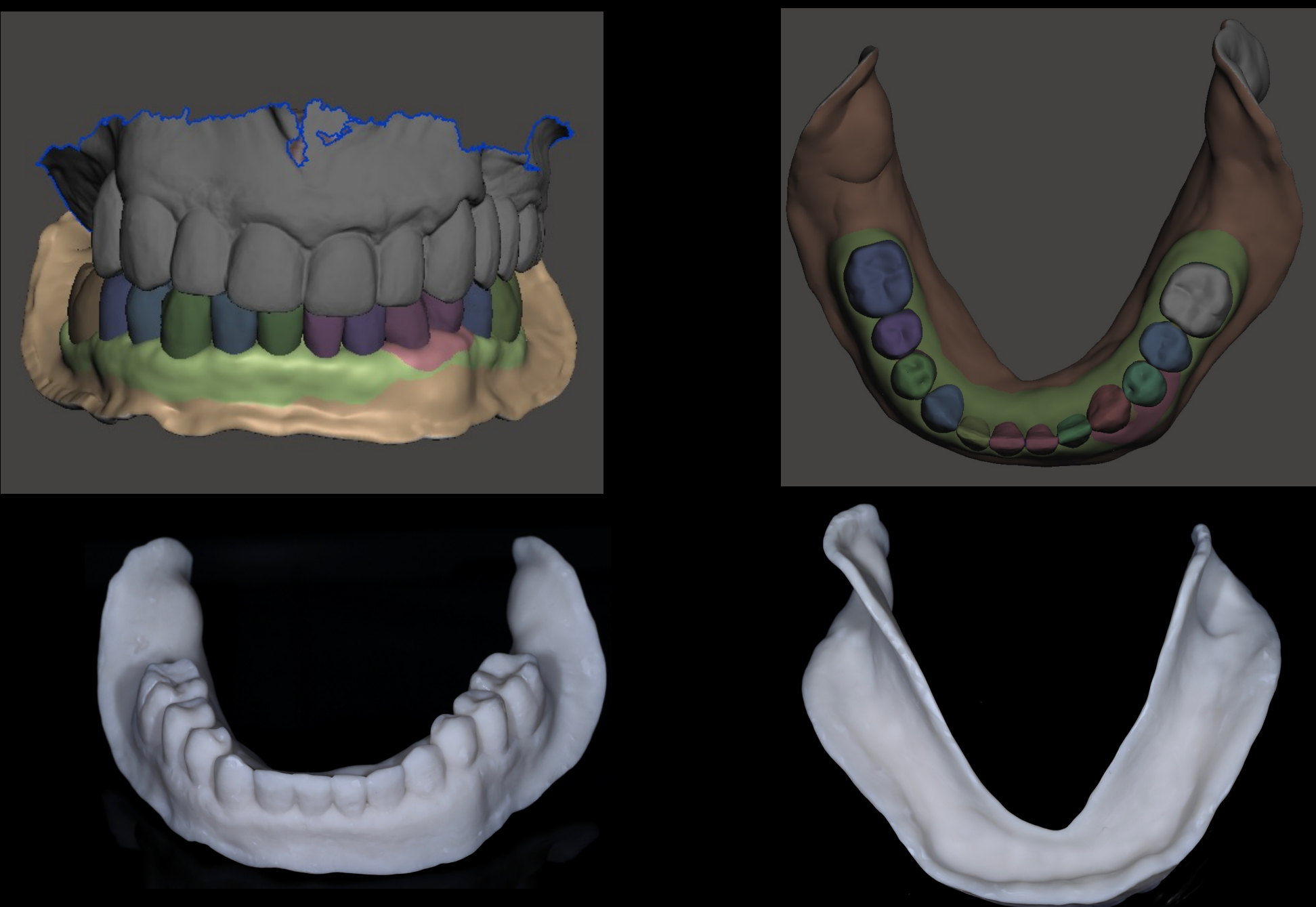


Fig. 5. Designed immediate denture according to the scans, and fabricated mandibular immediate denture digitally.

3RD CLINICAL VISIT



Fig. 6. Delivery of immediate denture

Conclusion

In this report, the 3-clinical appointments digital technique used for fabrication of a mandibular immediate denture opposing maxillary fixed dental prosthesis was described. This technique combined border molding and final impressions with recording of maxillomandibular relations in a single visit. The digital workflow provided a clinically successful outcome with few adjustments, fewer clinical appointments while achieving optimal fit and retention with denture. The digital technique used has several advantages 1) only three clinical appointments was required (optional wax try-in); 2) can be duplicated for fabrication of radiographic or surgical guide for future surgical implant placement 3) modifications can be readily implemented, such as altering teeth mould or shade 4) simplified refabrication in instances of denture loss or fracture due to the history of digital record.

Fig. 7. Pre-operative Photo

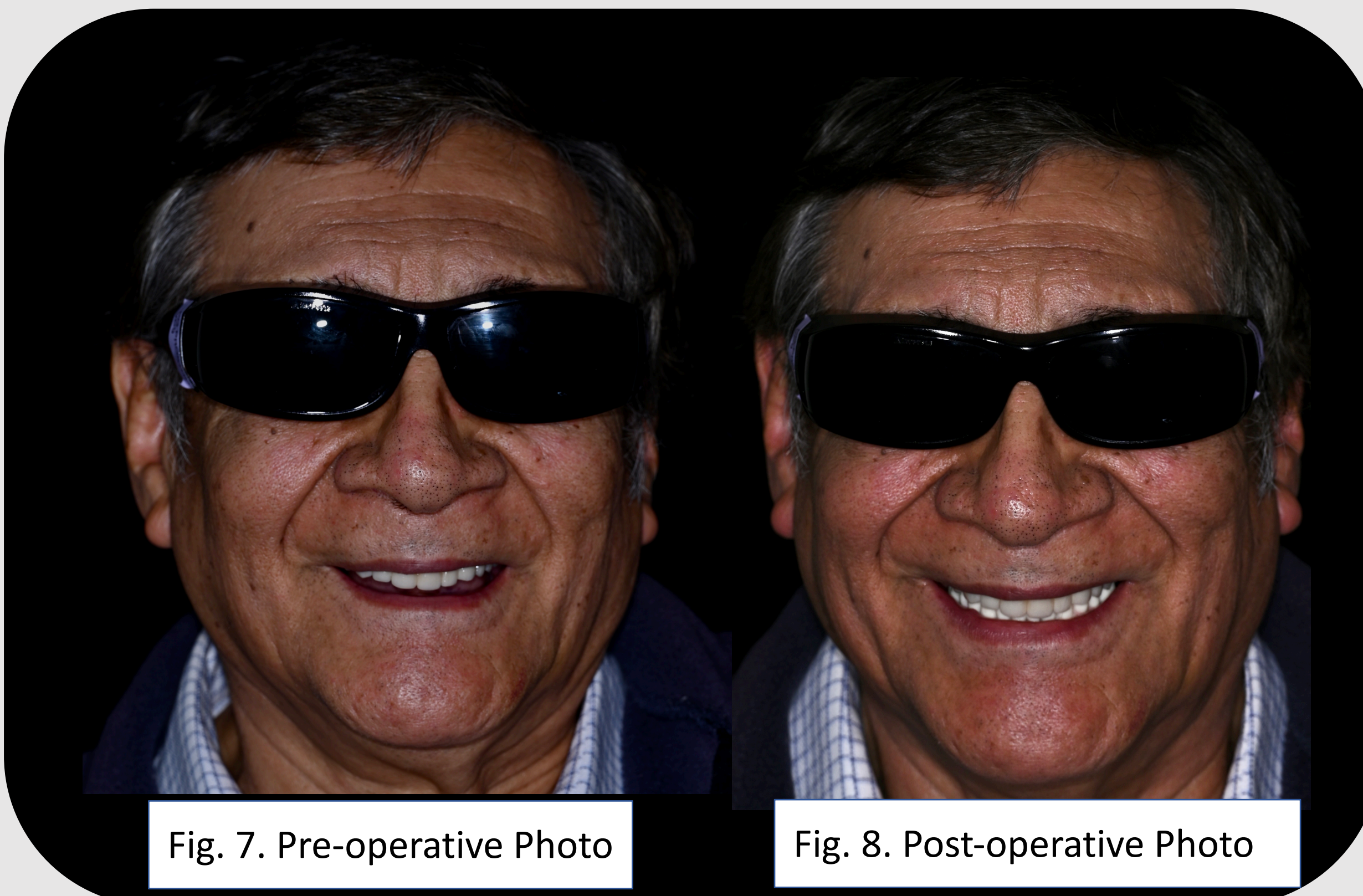
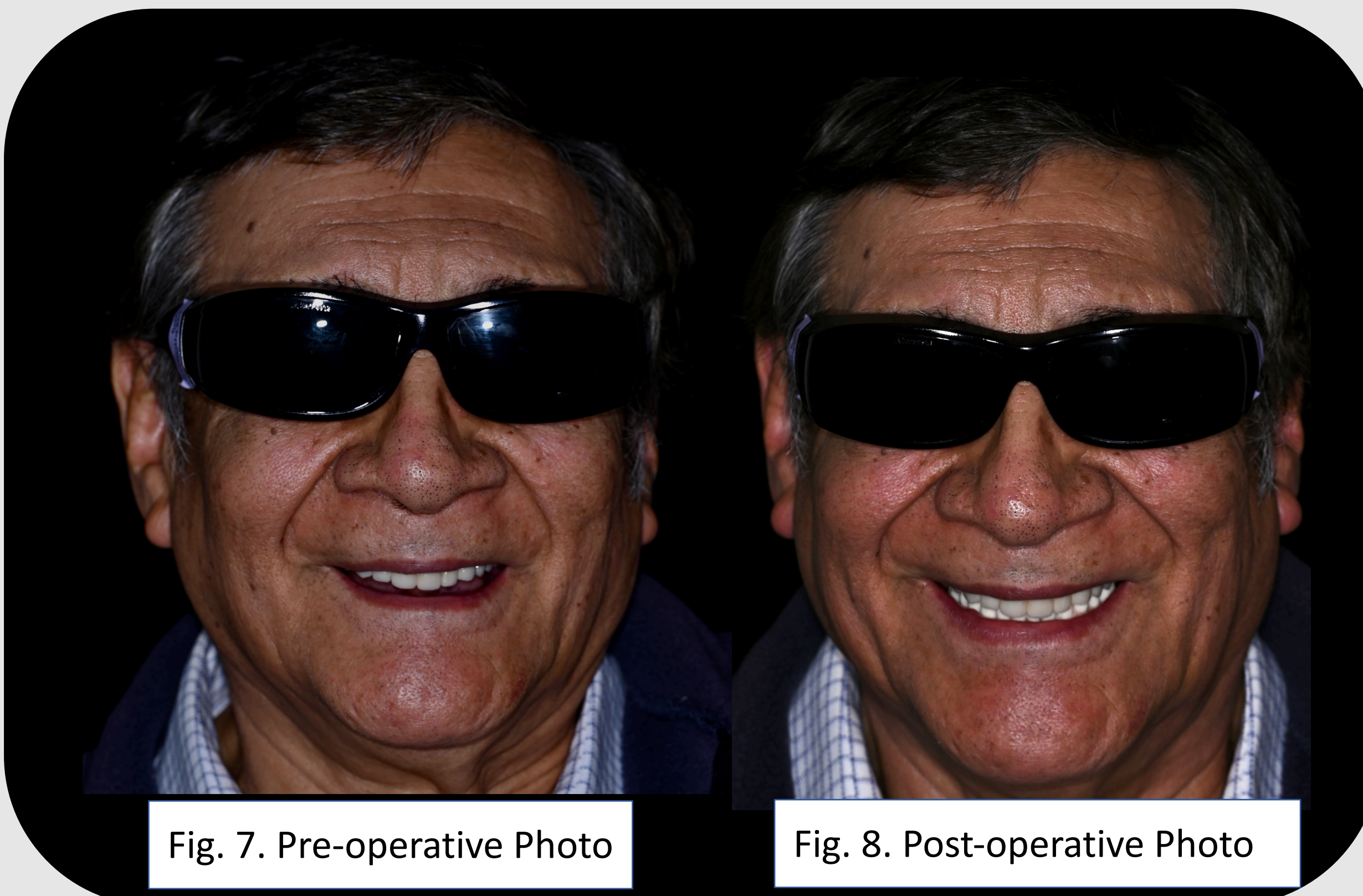


Fig. 8. Post-operative Photo



References

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- 2-Bidra, A.S., Taylor, T.D., & Agar, J.R. (2013). Computer-aided technology for fabricating complete dentures: Systematic review of historical background, current status, and future perspectives. *Journal of Prosthetic Dentistry*, 109(6), 361-366.
- 3-Kouveliotis, G., Tasopoulos, T., Karoussis, I., Silva, N.R., & Zoidis, P. (2022). Complete denture digital workflow: Combining basic principles with a CAD-CAM approach. *Dental Technique*, 127(4), 550-555.