

Utilizing a Pin-supported Static Computer-aided Implant Surgery (sCAIS) Guide for Immediate Implant Placement in a Mandibular Two-Implant-supported Overdenture: A Case Report

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Introduction

Immediate implant placement in terminal dentition requires precise surgical control and prosthetically driven planning. Recent advances in static computer-aided implant surgery (sCAIS) have improved the accuracy of implant positioning; however, conventional tooth- or mucosa-supported guides often present limitations once extractions are performed^{1,2}. This case report describes the clinical application of a novel pin-supported sCAIS guide for immediate implant placement in a terminal mandibular dentition case, highlighting its role in maintaining surgical accuracy while allowing intraoperative flexibility³.

Case report

A 78-year-old male with a terminal mandibular dentition was planned for full-arch extraction and immediate placement of two endosseous implants to retain a mandibular overdenture. Pin-supported static surgical guides were digitally fabricated using cone-beam computed tomography (CBCT) and intraoral scan records. The initial guide was designed to fit on the remaining teeth and establish fixation pin sites before extractions. Following extraction, incision and elevation of full-thickness flaps, a second guide, stabilized by the same pin locations, was then used to perform guided osteotomies and implant placement in prosthetically driven positions. The rigid pin fixation ensures a stable positioning and allowed for controlled intraoperative modifications based on clinical judgment without compromising accuracy. Four months post-surgery, both implants demonstrated successful osseointegration and were connected to locator abutments. Definitive prosthetic rehabilitation was completed with a maxillary complete denture opposing a mandibular two-implant-supported overdenture. No surgical or prosthetic complications were observed at the 1-week, 1-month, or 3-month follow-up visits.

Pre-treatment

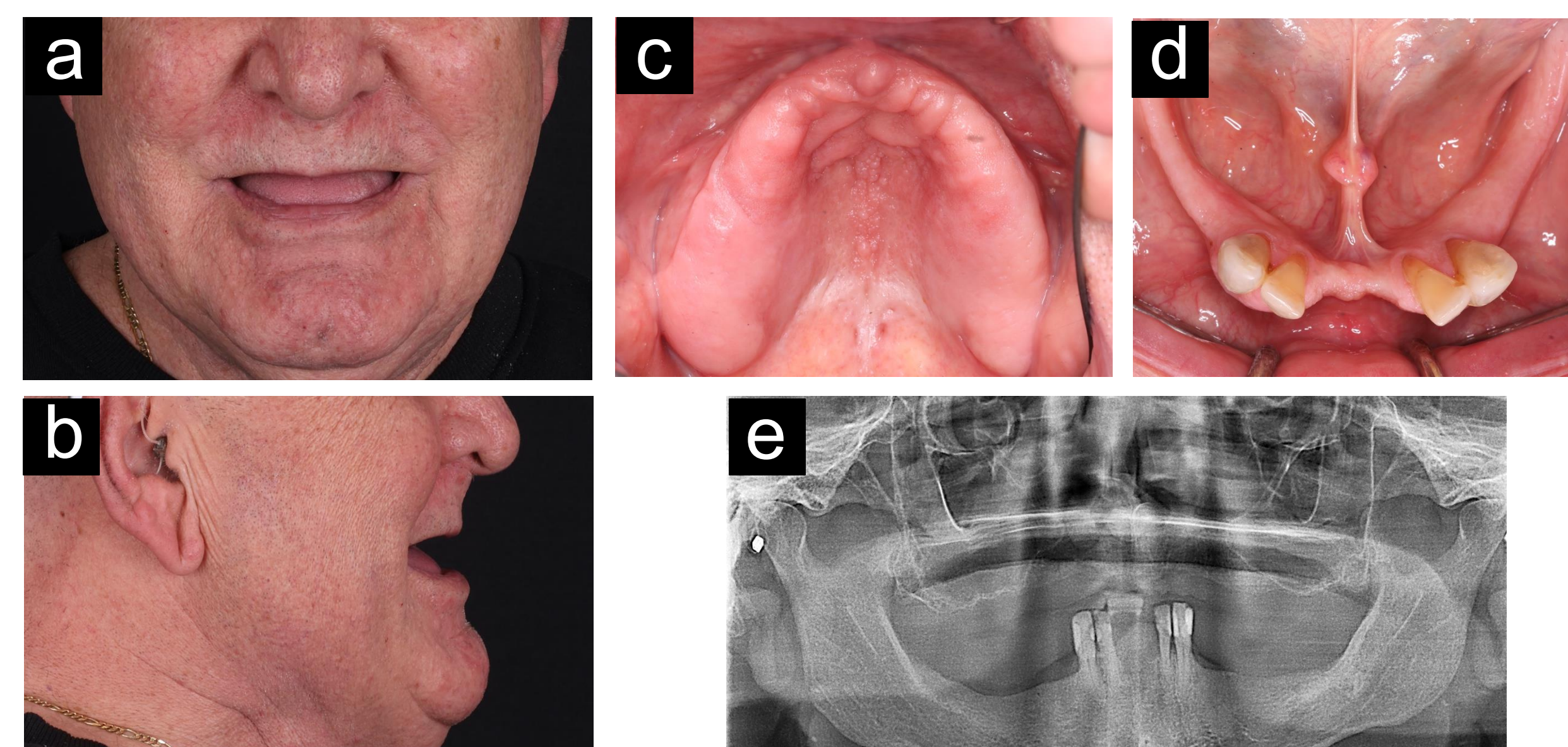


Figure 1. Pre-treatment records. a) Frontal and b) profile facial views in smile, c) maxillary arch occlusal view, d) mandibular arch occlusal view, e) pre-treatment panoramic radiograph.

Surgical Procedure

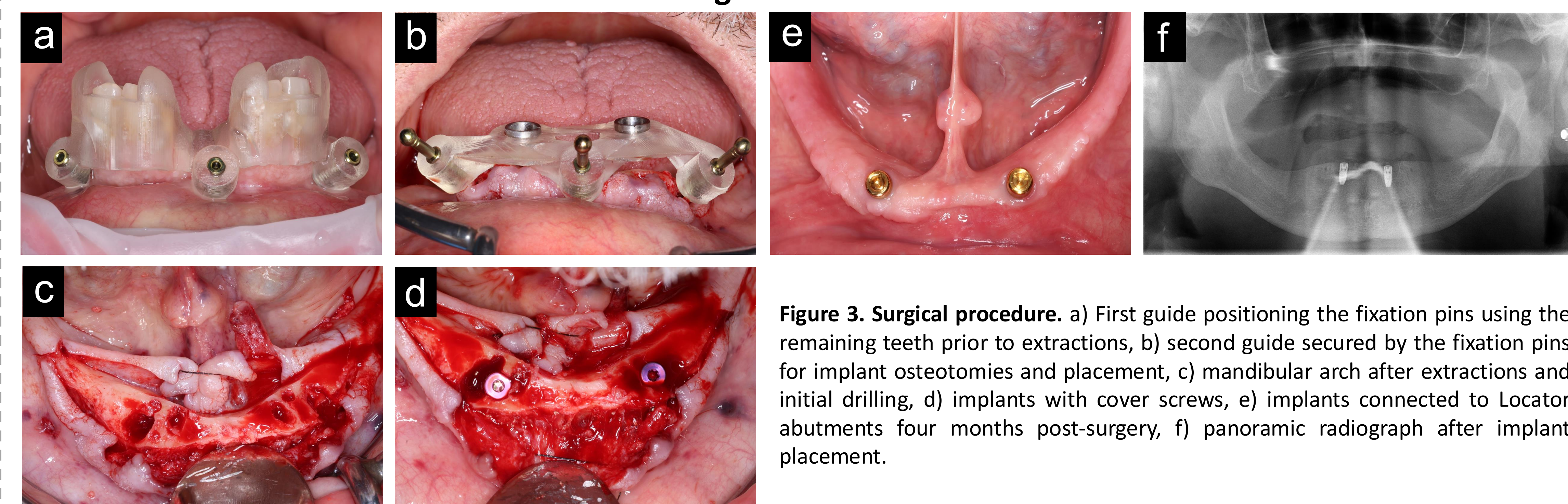


Figure 3. Surgical procedure. a) First guide positioning the fixation pins using the remaining teeth prior to extractions, b) second guide secured by the fixation pins for implant osteotomies and placement, c) mandibular arch after extractions and initial drilling, d) implants with cover screws, e) implants connected to Locator abutments four months post-surgery, f) panoramic radiograph after implant placement.

Surgical guide design

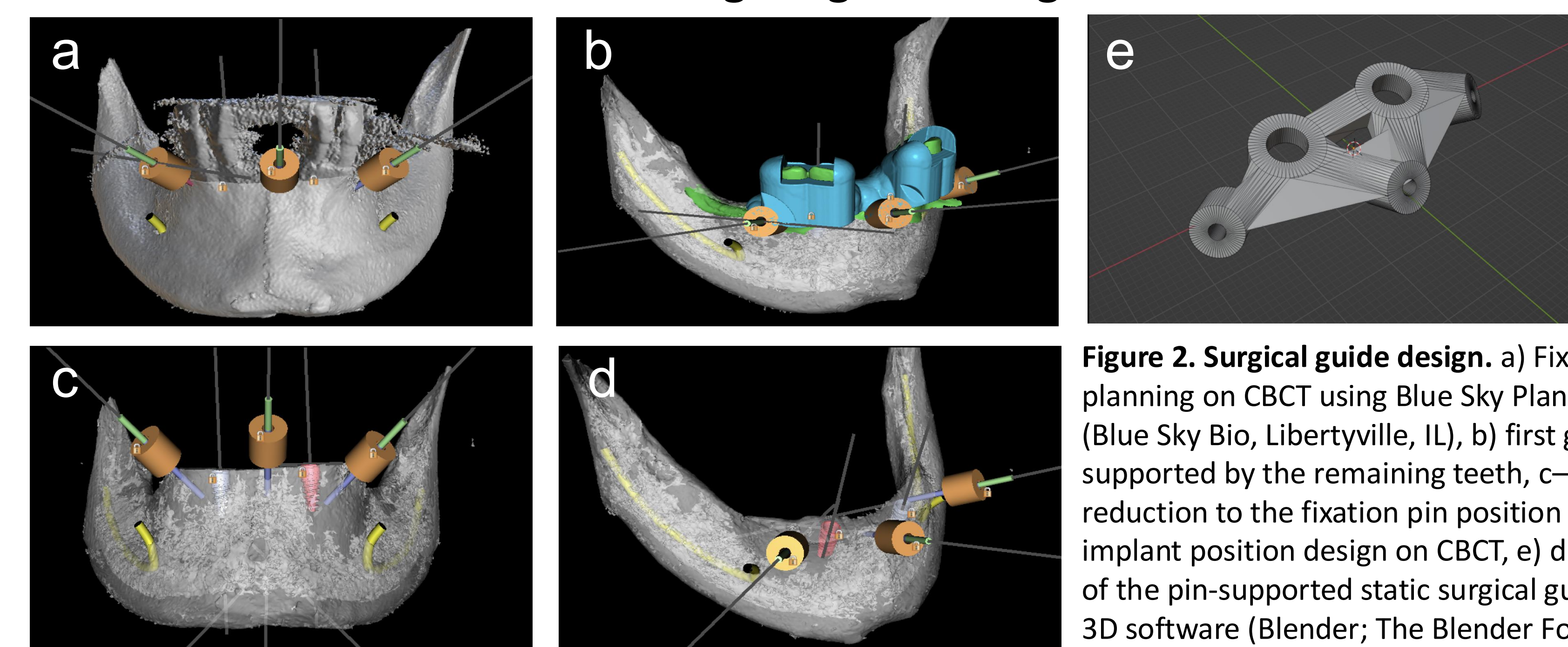


Figure 2. Surgical guide design. a) Fixation pin planning on CBCT using Blue Sky Plan 4 (Blue Sky Bio, Libertyville, IL), b) first guide supported by the remaining teeth, c-d) bone reduction to the fixation pin position and implant position design on CBCT, e) digital design of the pin-supported static surgical guide using 3D software (Blender; The Blender Foundation, Amsterdam, Netherlands).

Post-treatment

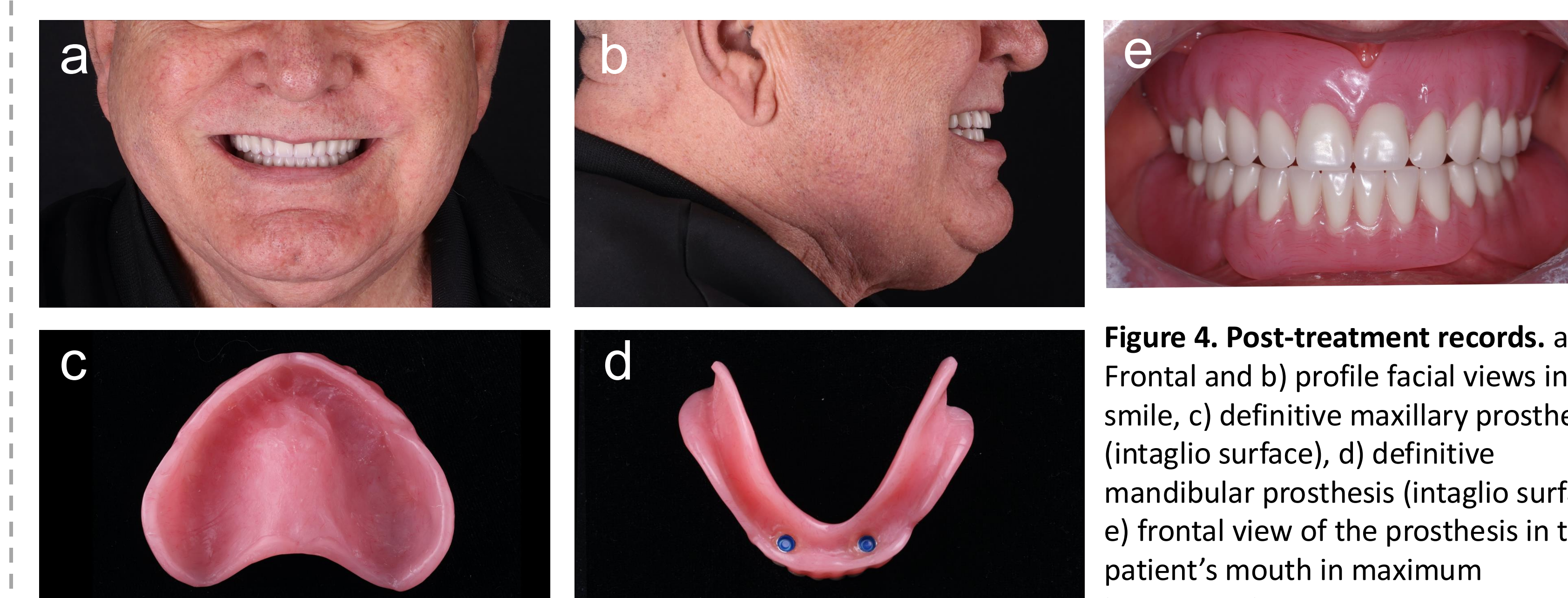


Figure 4. Post-treatment records. a) Frontal and b) profile facial views in smile, c) definitive maxillary prosthesis (intaglio surface), d) definitive mandibular prosthesis (intaglio surface), e) frontal view of the prosthesis in the patient's mouth in maximum intercuspation.

Discussion and Conclusion

The use of a pin-supported sCAIS guide in this terminal dentition case facilitated immediate implant placement with high primary stability and precise surgical control. The pre-extraction guide fixation of the guide ensured intraoperative surgical predictability while supporting real time-controlled adjustments without deviating from the prosthetically-driven plan. This approach offers a predictable and efficient solution for immediate placement protocols in full-arch implant rehabilitation.

References

1. Zhou et al., *J Evid Based Dent Pract.* 2018;18(1):28-40.
2. Arisan et al., *Clin Oral Implants Res.* 2010;21(9):980-988.
3. Chen et al., *J Prosthet Dent*, 2025 (Under review).