

Subperiosteal implants for full-arch reconstruction of a severely atrophied mandible: a case report.

Lauren Kim | Yotom Rabinowitz | Mohammed Obeid | Chaninun Jadsadakraisorn | Gustavo Mendonca | Sandra Al-Tarawneh
School of Dentistry Department of Prosthodontics, Virginia Commonwealth University, Richmond, VA, USA

Overview

This case report describes the management of a patient presenting with severely atrophied mandible, previous failed grafting and failed endosseous implants, highlighting the diagnostic considerations, clinical decision-making, and patient-specific factors that necessitated the use of a custom subperiosteal implant.

Introduction

Fixed complete prostheses can offer a substantial improvement to quality of life for patients with one or more edentulous arches, but traditional endosseous implants have bone volume requirements that not all patients can meet (1, 2).

Subperiosteal implants offered an alternative for patients who did not meet the requirements for endosseous implants. However, with a survival rate reported as low as 50%, subperiosteal implants have demonstrated inconsistent outcomes (2, 3). Advances in digital technology, biomaterials, and fabrication methods address earlier challenges. The development of customized subperiosteal implants offers a viable alternative for oral rehabilitation in cases of severe jaw atrophy (2, 3).

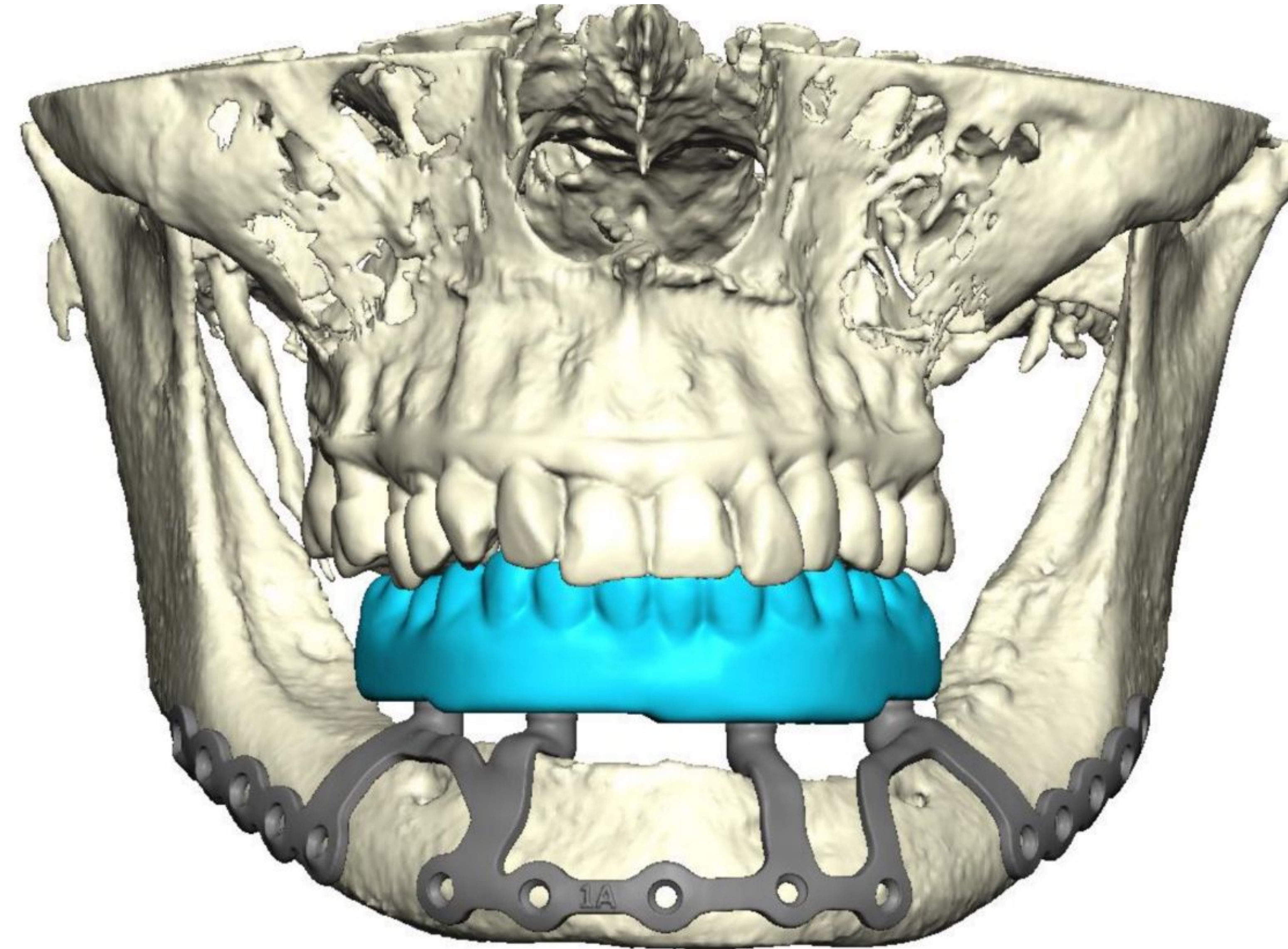


Figure 1. Preoperative planning showing the extension and positioning of the subperiosteal implant



Figure 2. Photogrammetry scan bodies



Figure 3. Photogrammetry scan flags

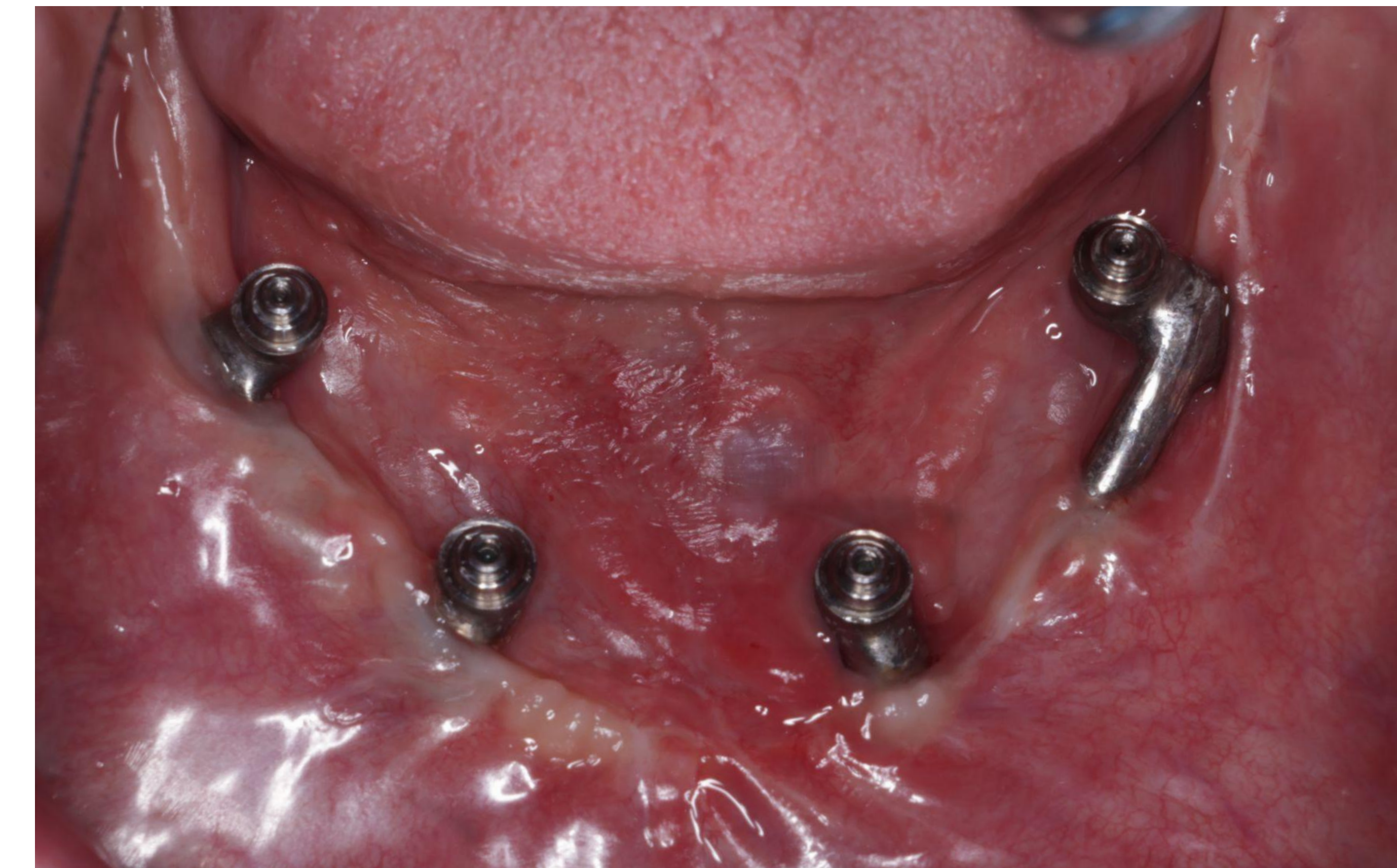


Figure 4. Integrated multi unit abutments on the lower KLS implant



Figure 5. Prototype for lower fixed complete dental prosthesis

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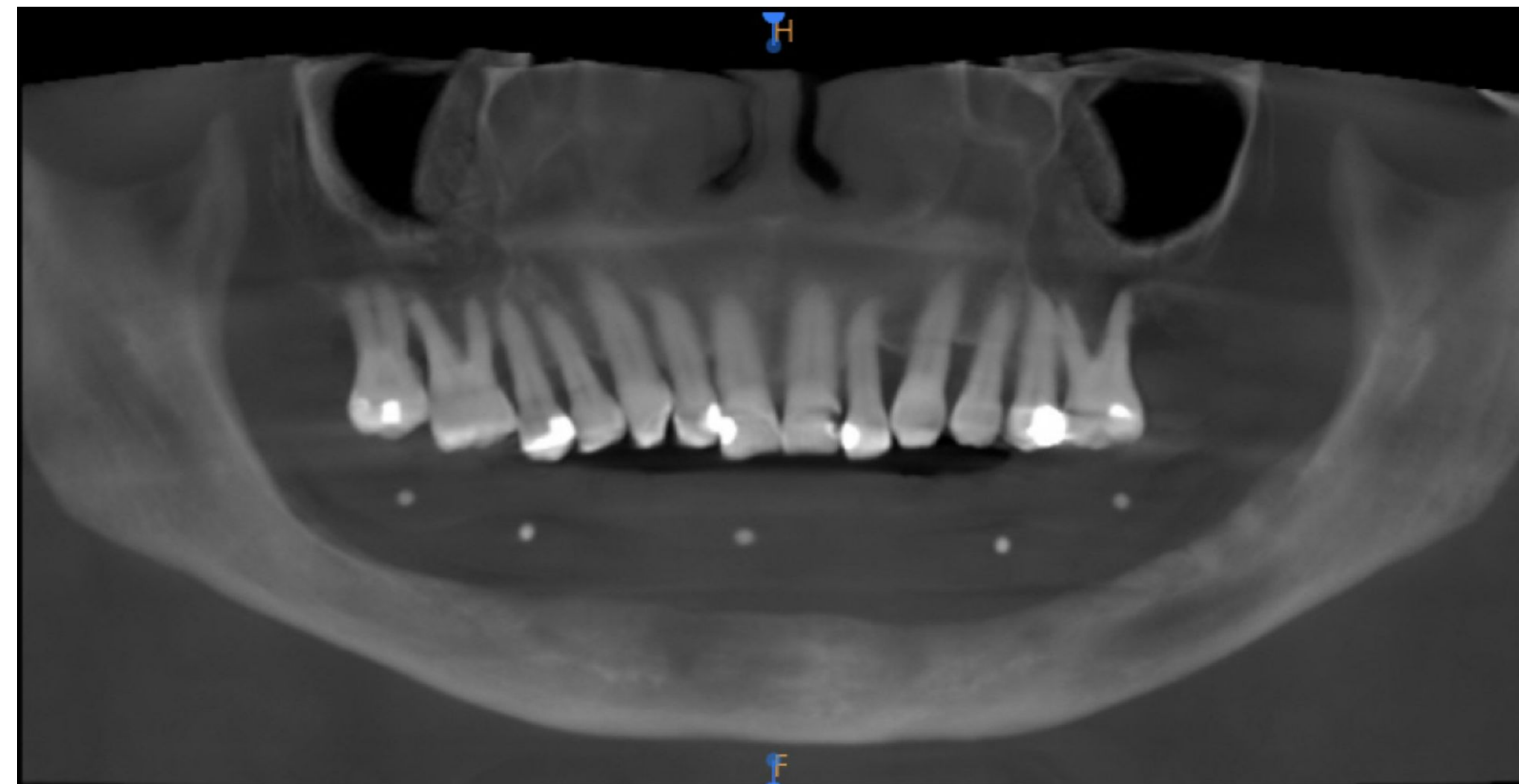


Figure 6. Preoperative panoramic

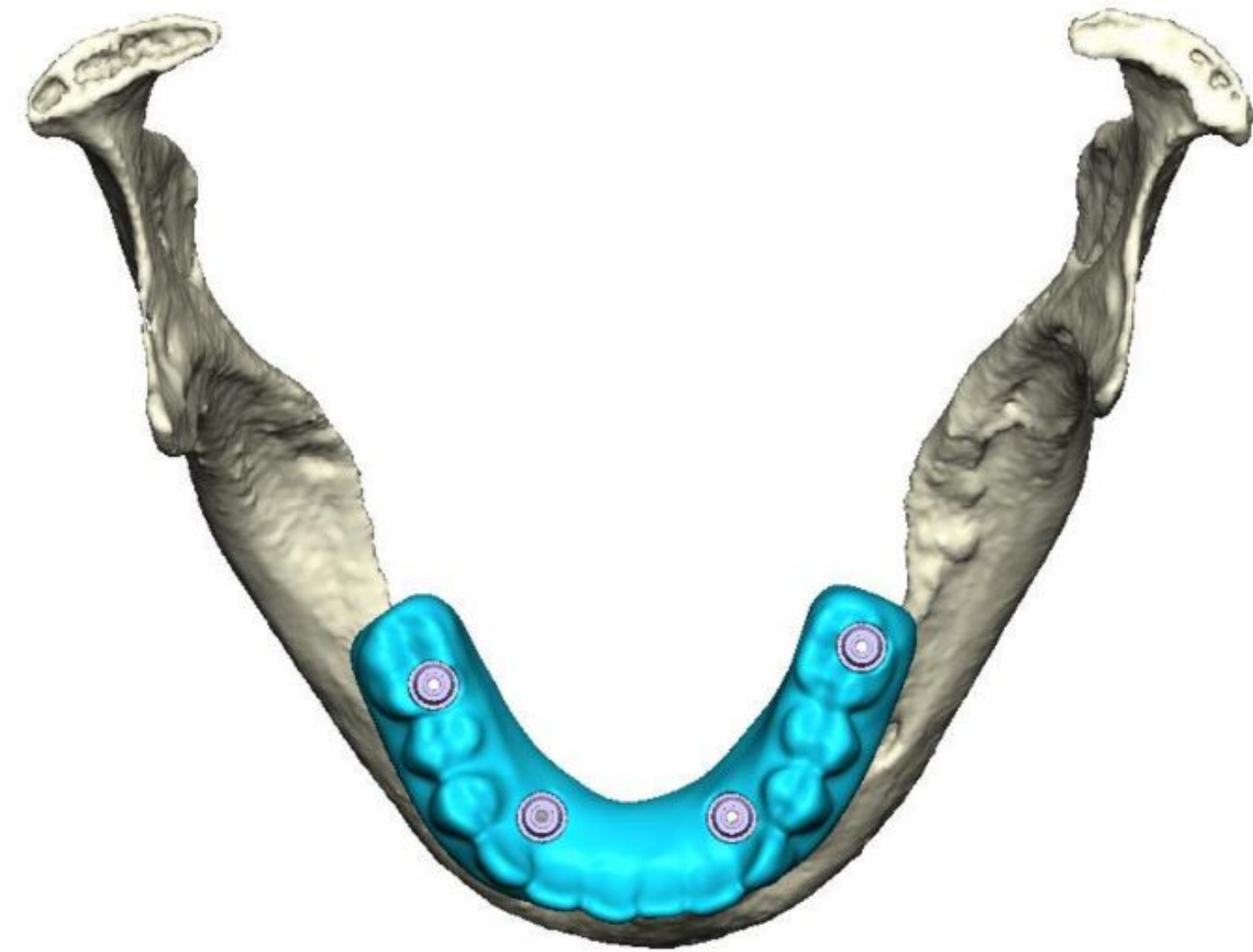


Figure 7. Render of plan for implants and interim prosthesis

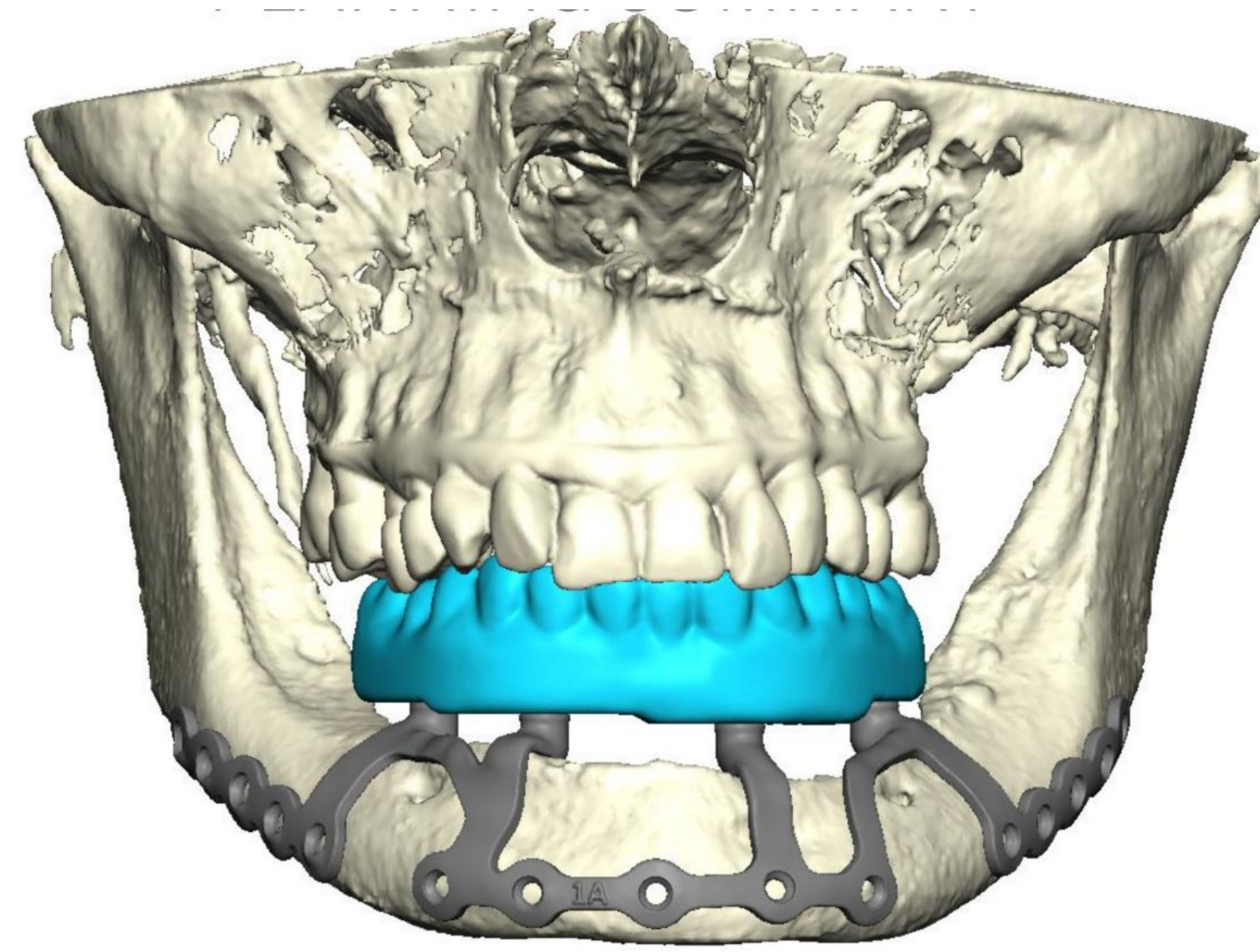


Figure 8. Render of plan for implants with prosthesis in MIP

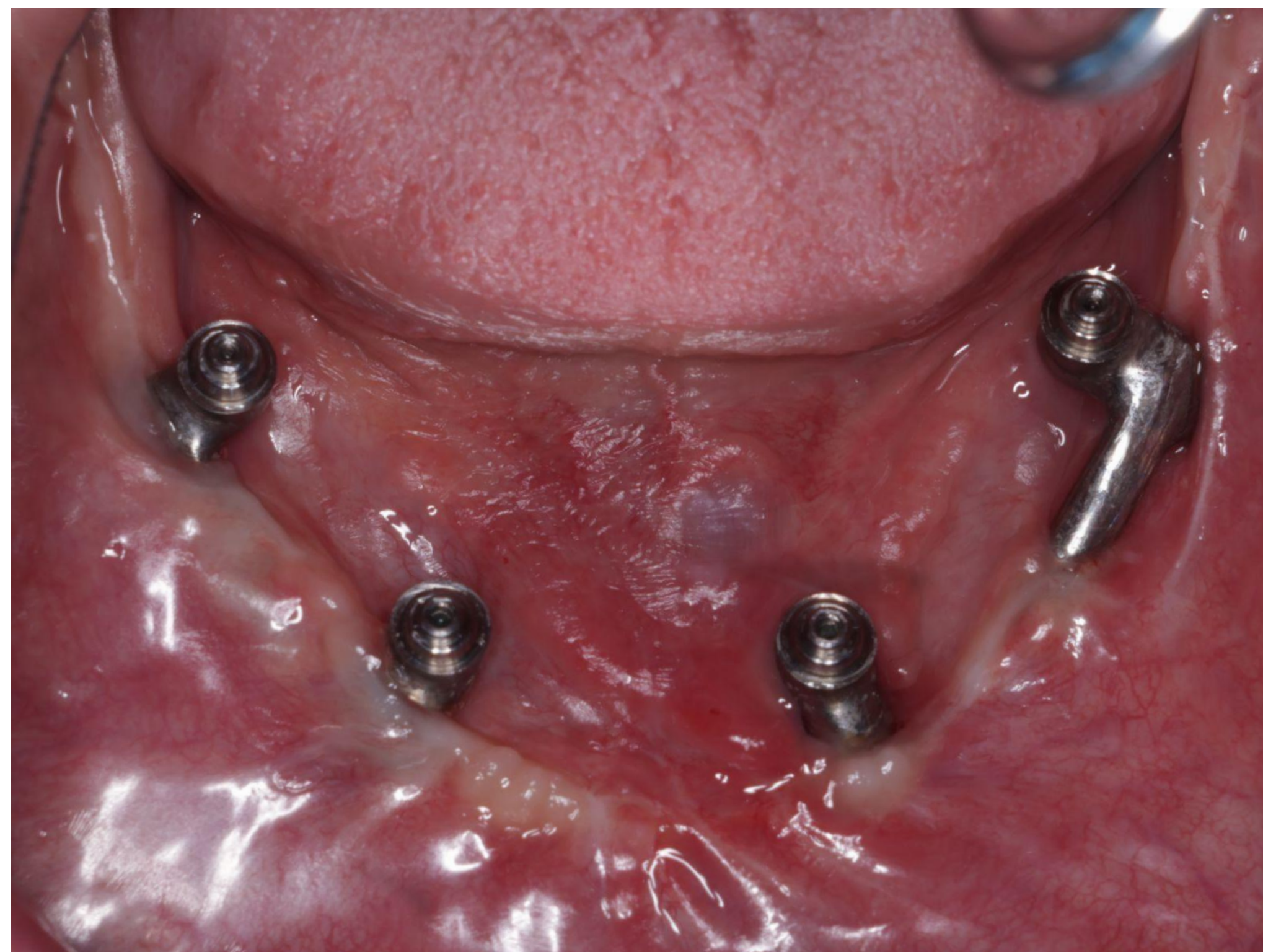


Figure 4. Integrated multi unit abutments on the lower KLS implant



Figure 9. Interim prosthesis, occlusal



Figure 10. Interim prosthesis, MIP

Case report

A 59 year-old female presented to the clinic with a chief concern of being unable to wear her mandibular denture due to atrophic mandible. Diagnostic wax-up was created digitally and merged with CBCT to plan implant positioning. The patient had already had previous attempts of bone grafting failed as well as failed endosseous implants. Due to limited residual ridge, subperiosteal implants were planned on the mandibular arch. Surgical placement of the subperiosteal implants was completed, and an interim fixed implant supported prosthesis delivered at the same time. The patient was allowed to heal for 5 months with continuous follow-ups.

The patient has a history of stage III grade C periodontitis. She is periodontally stable after undergoing treatment and continuous maintenance, with a goal of maintaining her dentition for as long as possible.

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Figure 2. Photogrammetry scan bodies



Figure 3. Photogrammetry scan flags

Case report

After 5 months of healing, the patient returned to the prosthodontic clinic for creation of the final prosthesis. Due to a lack of keratinized tissue, a physical impression was made in addition to intraoral scan with scan bodies, existing prosthesis, and photogrammetry capture. The tissue scan was insufficient for alignment with the photogrammetry scan, but the alignment was possible with a combination of the physical and existing prostheses. A prototype was designed with improved occlusion, esthetics, and soft tissue contours.

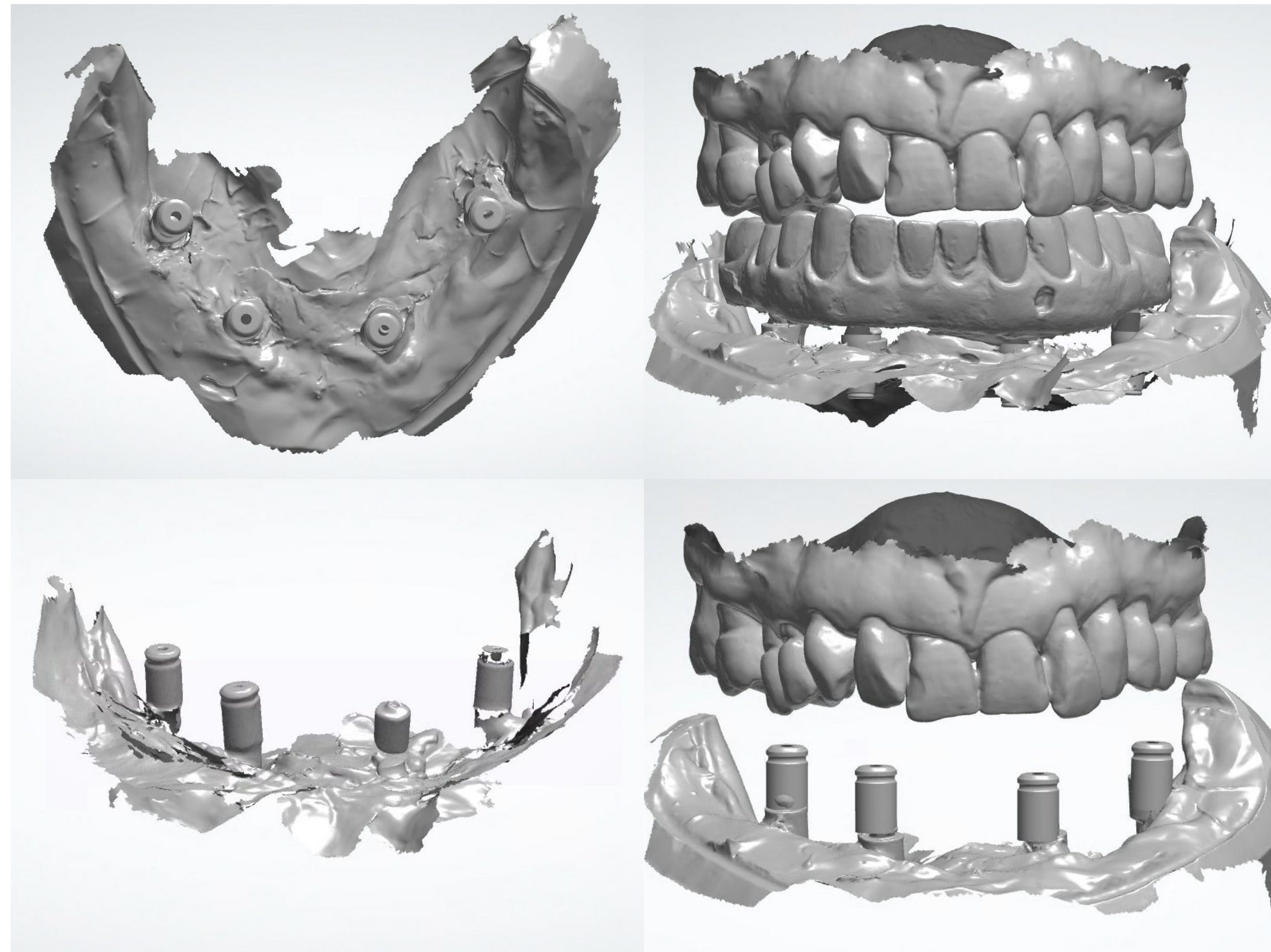


Figure 5. Scan of physical model. IOS of interim prosthesis. Distorted IOS of scan bodies. Patient's occlusal relationship as determined by existing prosthesis, verified with photogrammetry.

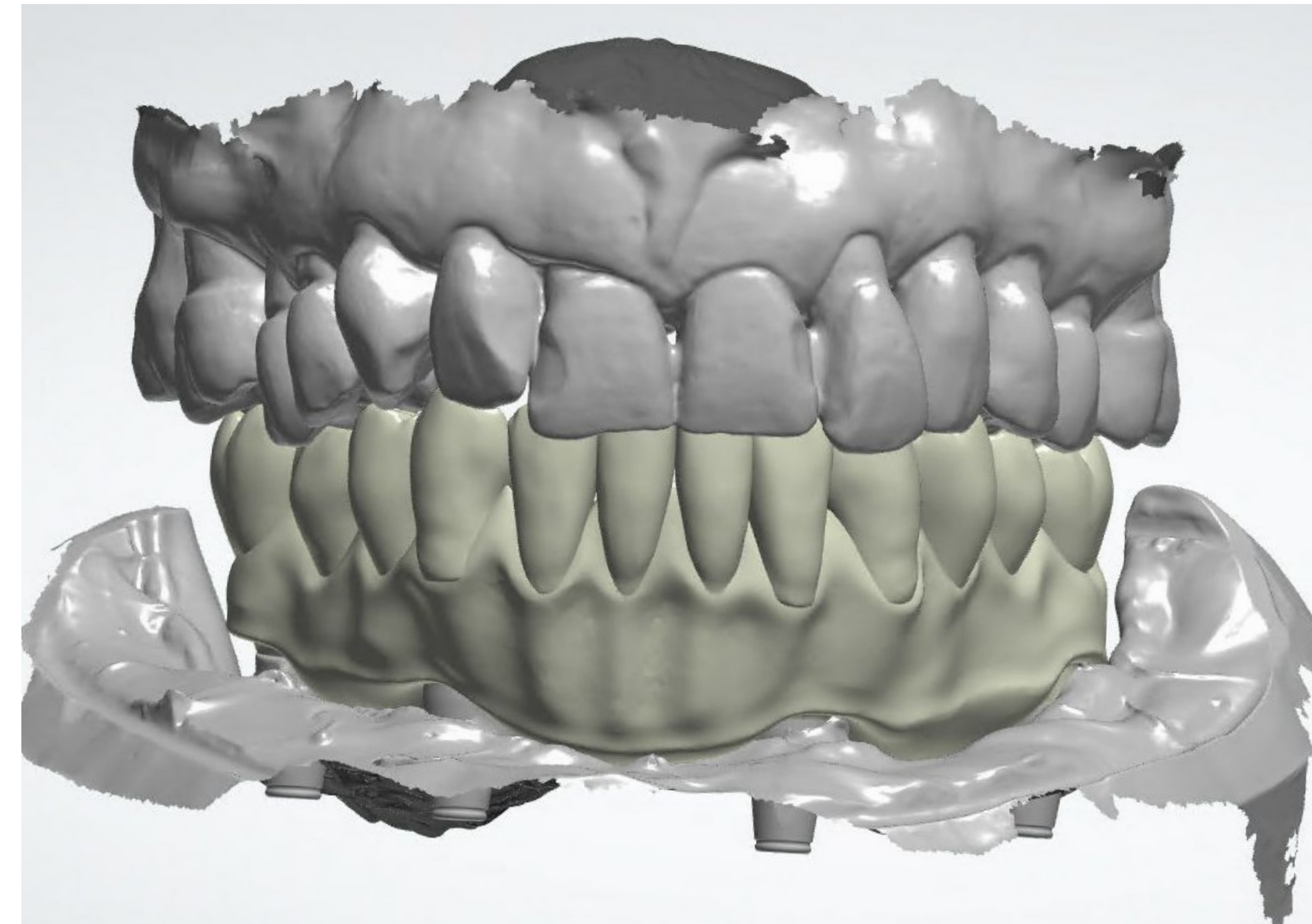


Figure 6. Design for new prototype for fixed complete dental prosthesis, with improved occlusion and soft tissue contours



Figure 5. Prototype for lower fixed complete dental prosthesis

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Results

After 5 months, subperiosteal implants appear stable with no sign of peri-implant radiolucency or bone loss radiographically. Soft tissues surrounding the implants are absent of signs of inflammation. The prototype prosthesis is satisfactory both functionally and esthetically for the patient. Photogrammetry approach was utilized for fabrication of the definitive prosthesis.

Discussion and Conclusion

With careful case selection, this case report demonstrates a viable and promising treatment option for management of severe atrophic jaws using custom subperiosteal implants.

Current literature on customized subperiosteal implants remains limited. Continuous evaluation of clinical outcomes and adherence to strict maintenance protocols are essential. Further studies are needed to establish long-term survival rates and validate predictability over time.



Figure 5. Prototype for lower fixed complete dental prosthesis

Resources

1. Preciado A, Jaime Del Río, Lynch CS, Castillo-Oyagüe R. A new, short, specific questionnaire (QoLIP-10) for evaluating the oral health-related quality of life of implant-retained overdenture and hybrid prosthesis wearers. *Journal of Dentistry*. 2013;41(9):753-763. doi:<https://doi.org/10.1016/j.jdent.2013.06.014>
2. Dantas TA, Vaz P, Samuel FS. Subperiosteal dental implants: Past or future? A critical review on clinical trials/case reports and future directions. *Journal of dental implants*. 2023;13(1):35-48. doi:10.4103/jdi.jdi_11_21
3. Gellrich NC, Korn P, Neuhaus M, Lentge F, Jehn P, Rahlf B. Long-Term Survival of Subperiosteal Implants: Meta-Analysis and Current Status of Subperiosteal Implants for Dental Rehabilitation. *Oral and maxillofacial surgery clinics of North America*. 2025;37(1):163. doi:10.1016/j.coms.2024.09.006

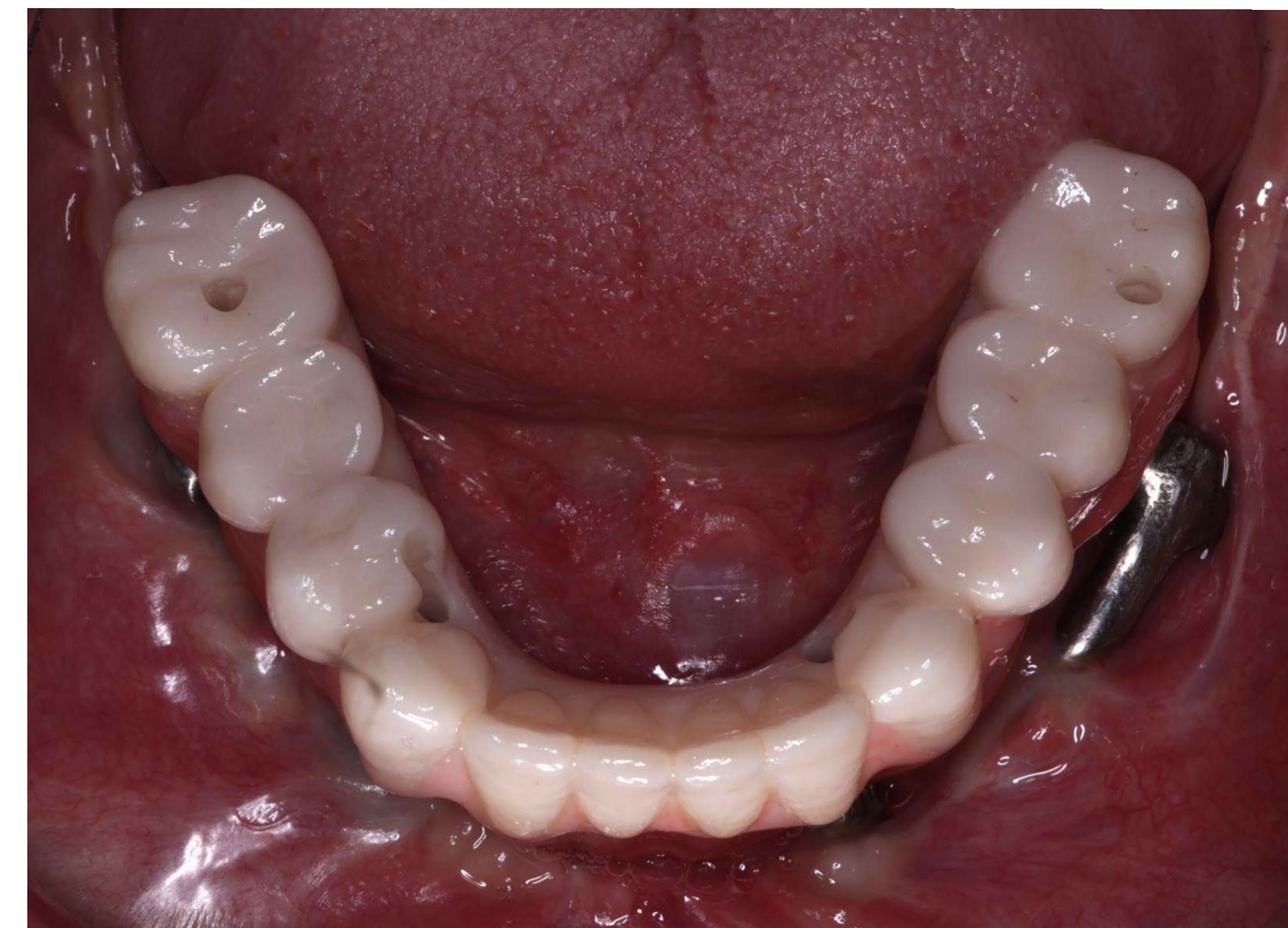


Figure 11. Prototype, occlusal

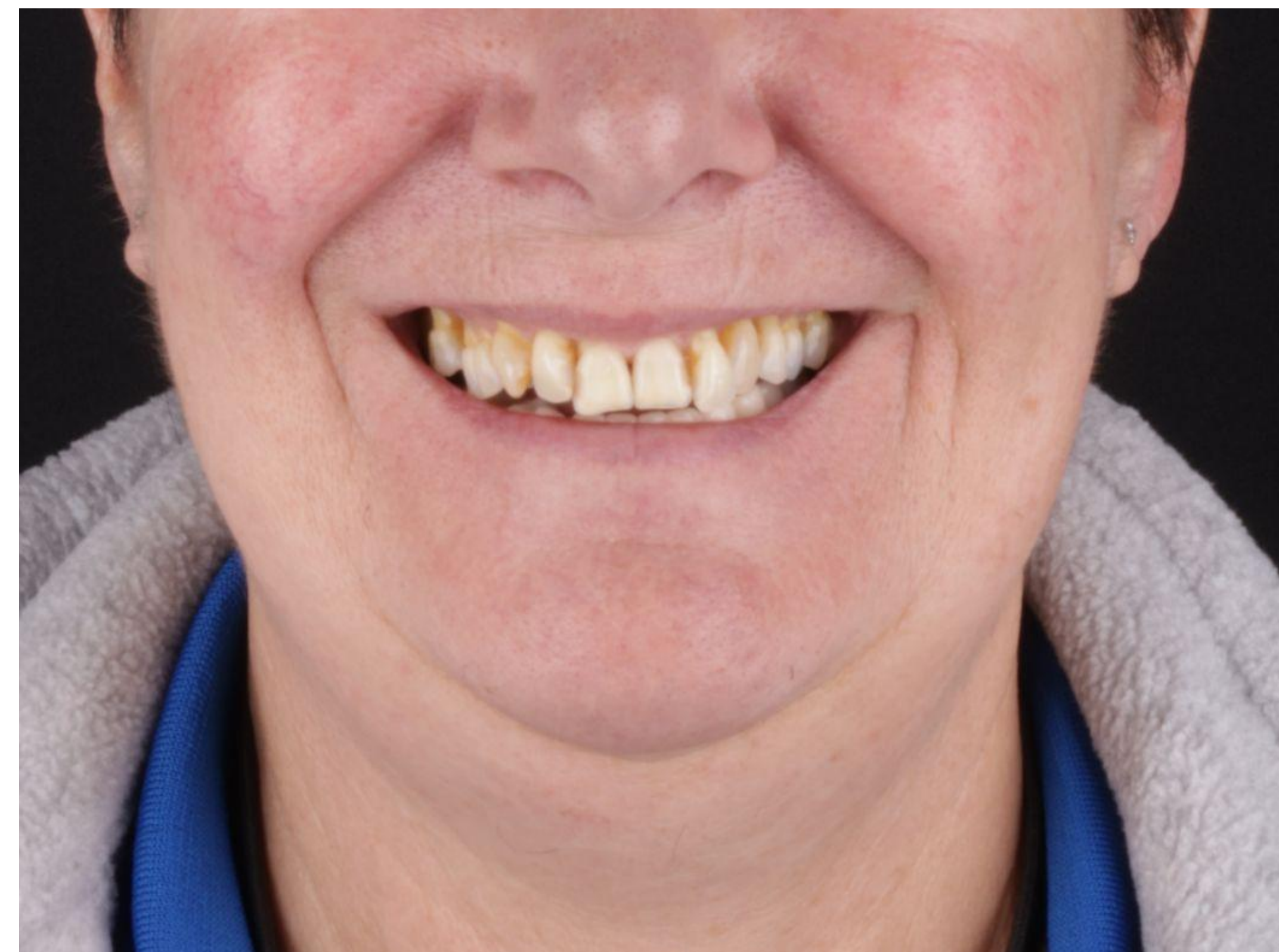


Figure 12. Prototype, smiling



Figure 13. Panoramic radiograph with prototype