



Customized Subperiosteal Implant Treatment for a Patient with Severe Maxillary Ridge Resorption: a Case Presentation

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Abstract

Dental implants are a key solution for rehabilitating completely edentulous patients. However, severely atrophic ridges, due to trauma, disease, malformations, or aging processes, can make traditional endosseous implants impractical. In such cases, bone grafting is often necessary, but it can extend treatment time and success is not guaranteed. Zygomatic implants are a viable alternative for maxillary rehabilitation due to their strong load-bearing capacity but can present with complications and management challenges such as sinusitis, difficult screw accesses, and zygoma fracture. Advances in technology have introduced customized subperiosteal implants (CSIs) which are tailored to the patient's specific anatomy and optimize anchorage areas. This approach allows for precise positioning of the prosthetic connection, enhancing force distribution and enabling immediate loading protocol. CSIs generally have a high survival rate, with the main complication being soft tissue dehiscence leading to substructure exposure.

Patient Presentation

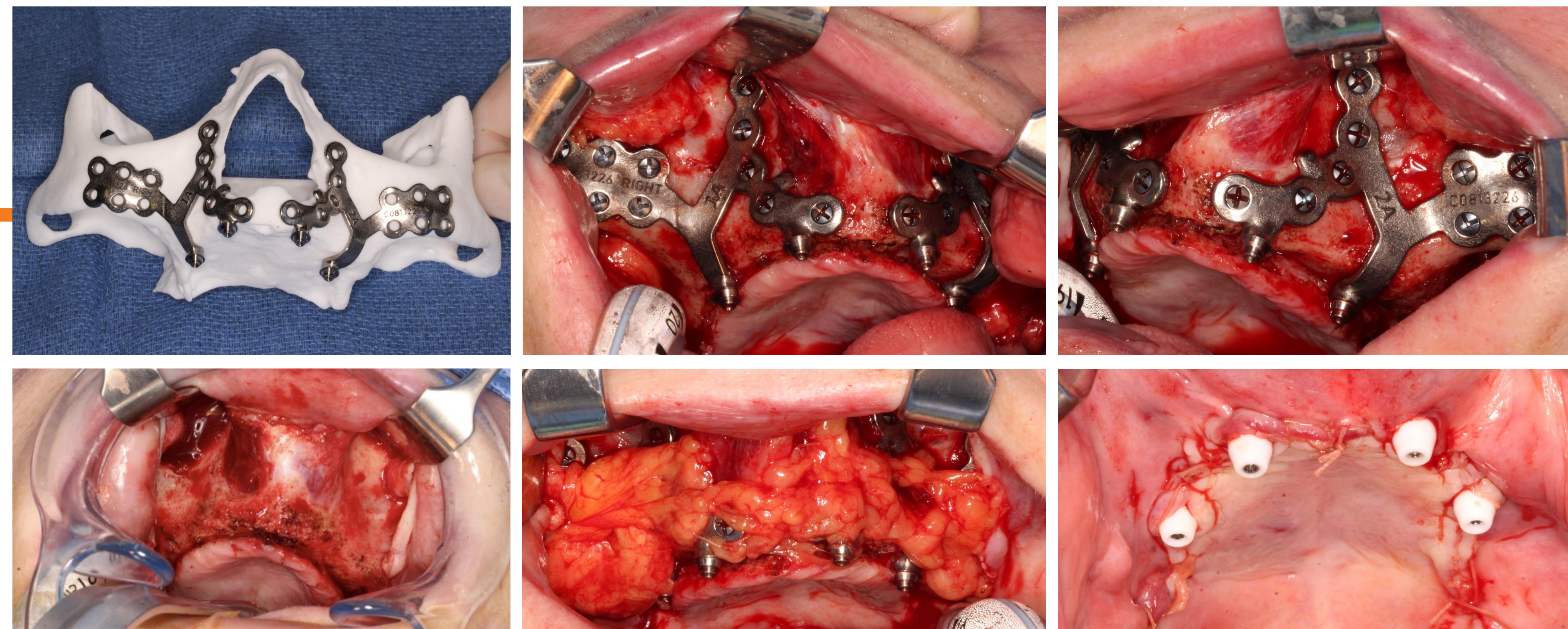
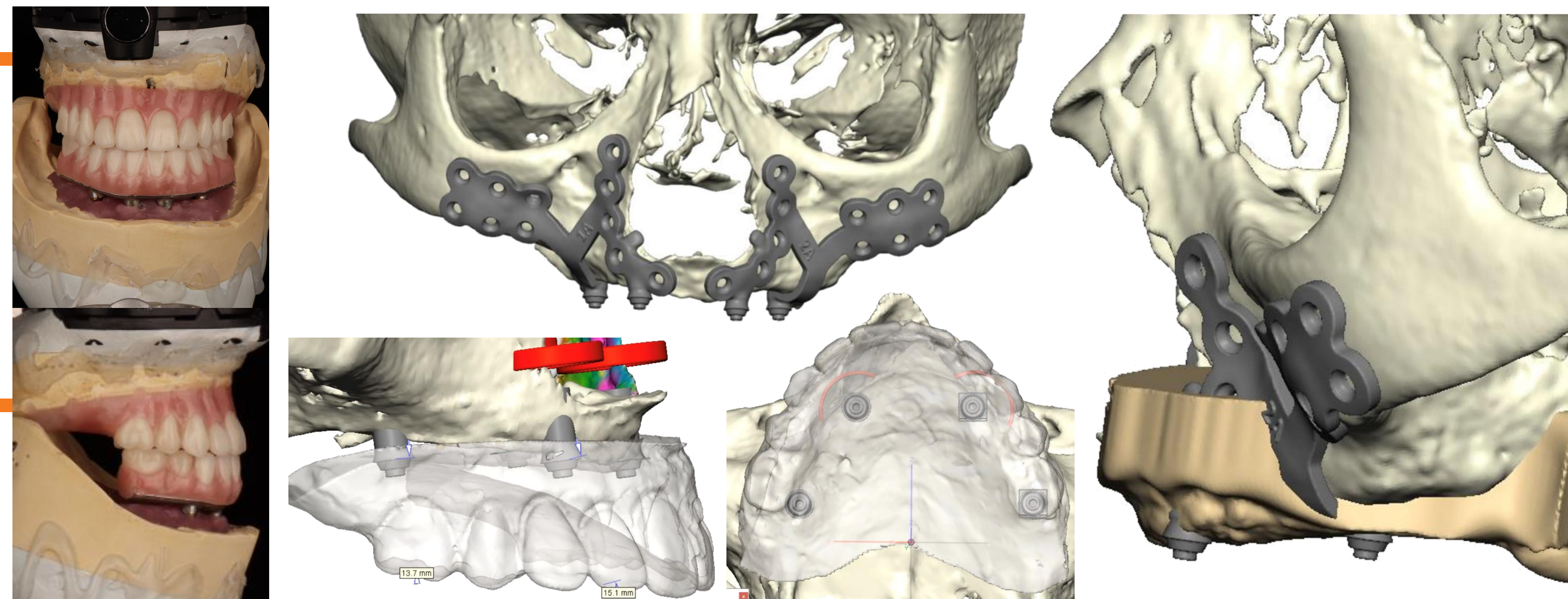
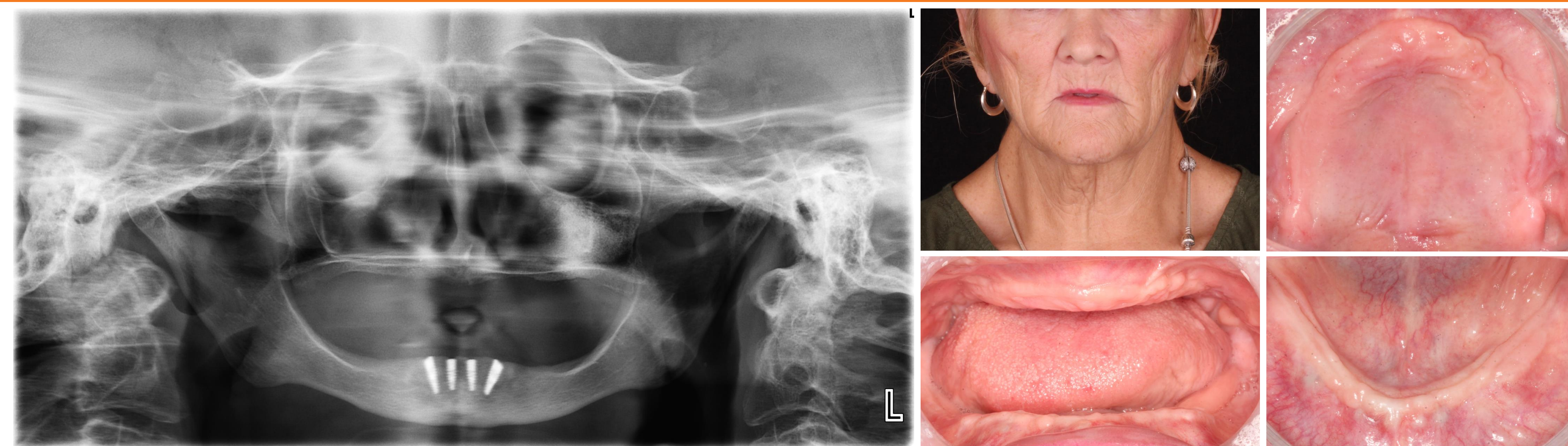
A 70-year-old edentulous female presented with the chief concern of "I want to eat salad again." Dental history includes multiple extractions and periodontal disease that eventually led to edentulism. Prior to patient presentation at the UT Health San Antonio Graduate Prosthodontics clinic, she was treated for implant placement and bone grafting. However, treatment failure of bilateral maxillary sinus lifts and bone grafting left the patient feeling hopeless and discouraged about the possibility for a successful rehabilitative treatment.

Methods

An interdisciplinary approach is essential for evaluating, diagnosing, and addressing functional and esthetic concerns through surgical and prosthodontic methods. Initially, determining precise tooth positioning is crucial for implant placement in the maxillary arch. An interim maxillary denture and mandibular hybrid prosthesis were fabricated to identify proper positioning of teeth and implant screw accesses. After insertion and adjustments, a dual-scan CBCT was taken to plan for zygomatic implants.

Clinical findings

- No existing prostheses
- Edentulous for 5 years
- Skeletal class III
- Patient presented with existing osseointegrated mandibular endosteal implants
- Severe Max/Man ridge resorption
- Zygomatic bones cannot support zygomatic implants

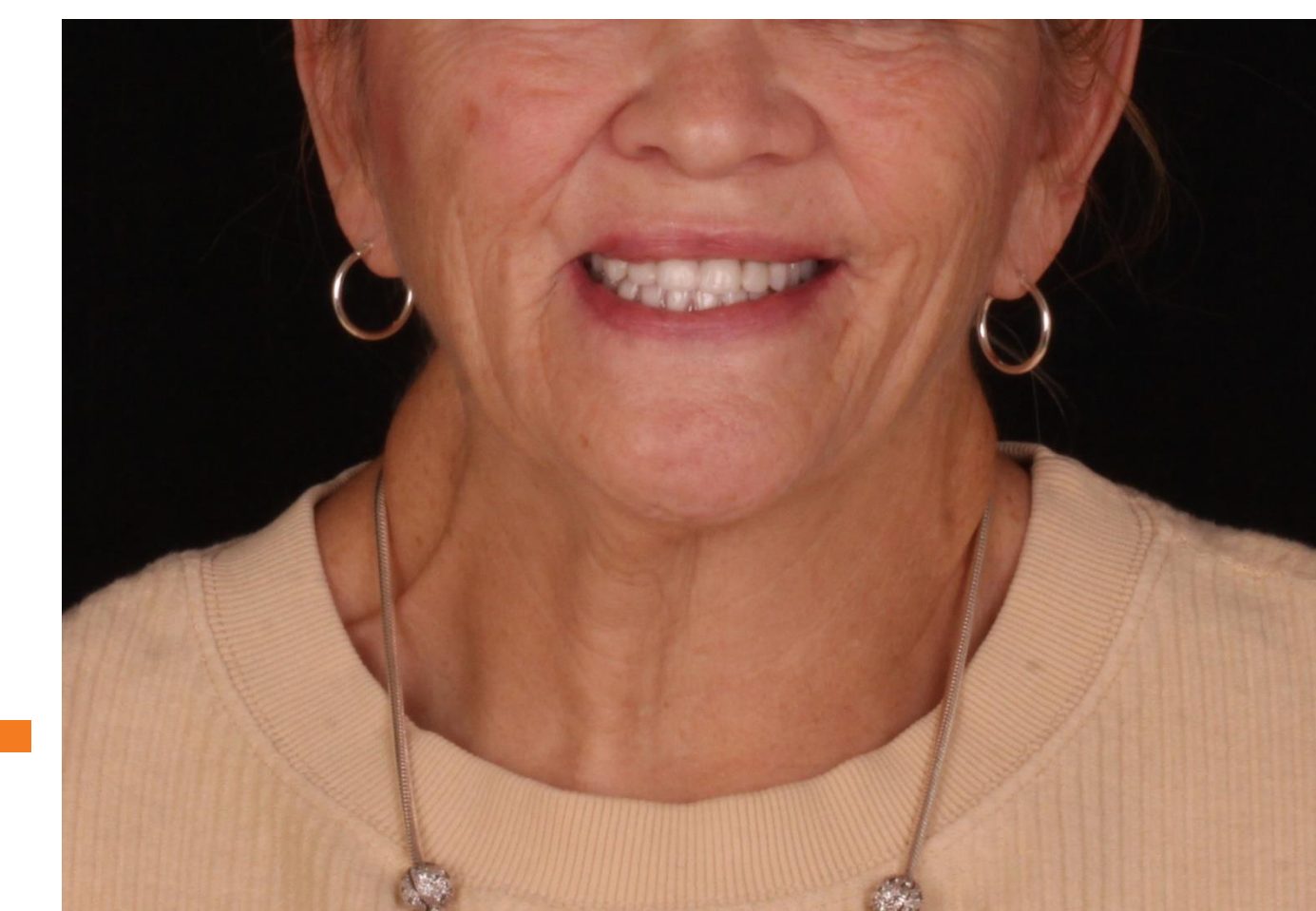


However, the radiographic exam indicated that the patient's zygomatic bones were insufficient to support four zygomatic implants, and the patient had minimal residual ridge bone for endosseous implants.

Due to these limitations, an alternative fixed approach, the CSI, was pursued. Collaboration between Oral and Maxillofacial Surgery (OMS) and Prosthodontics facilitated the design, fabrication, and placement of the CSI, restoring the patient's function. The design was completed with the KLS Martin Group LLC team, ensuring proper screw access positioning and framework design. Following the framework's milling and surgical delivery, the maxillary denture was successfully converted to an interim hybrid after several weeks of soft tissue healing.

Conclusion

For the presented patient, a maxillary complete denture has no hope of meaningful function, particularly when opposing a mandibular fixed hybrid prosthesis. Without a viable zygomatic implant alternative due to anatomic limitations, the only remaining alternatives are significant bilateral sinus and lateral ridge augmentations with questionable to poor prognoses, or CSIs. The CSI provides an innovative solution for patients with hopeless or unfavorable restorative prognoses.



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References

Herce-López, J. et al. Customized Subperiosteal Implants for the Rehabilitation of Atrophic Jaws: A Consensus Report and Literature Review. *Biomimetics* **2024**, *9*, 61.

