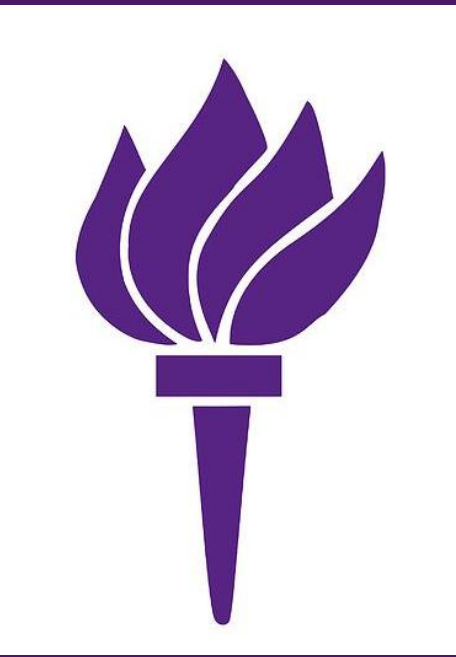




Custom Socket Seal Abutment for Guided Emergence Profile Contouring: A Novel Presurgical Digital Design Technique

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Introduction

Immediate implant placement is a well-established approach that allows implant insertion directly into a fresh extraction socket, reducing treatment time and surgical interventions compared to a staged protocol.¹ Beyond efficiency, this protocol offers biological advantages by preserving alveolar bone and maintaining gingival contours, which are otherwise prone to resorption and collapse after tooth loss.²

A critical determinant of long-term success in the esthetic zone is the stability of peri-implant soft tissues. Following extraction, dimensional changes in both hard and soft tissues can impair emergence profiles and esthetic outcomes if not properly managed.³ Custom healing or socket seal abutments have been introduced to support the peri-implant mucosa and seal the socket, guiding soft tissue maturation in harmony with the planned prosthesis.⁴ By providing immediate support and conditioning of the gingival architecture, these abutments enhance soft tissue stability, reduce the need for secondary procedures, and improve predictability in prosthetically driven implant therapy.⁵

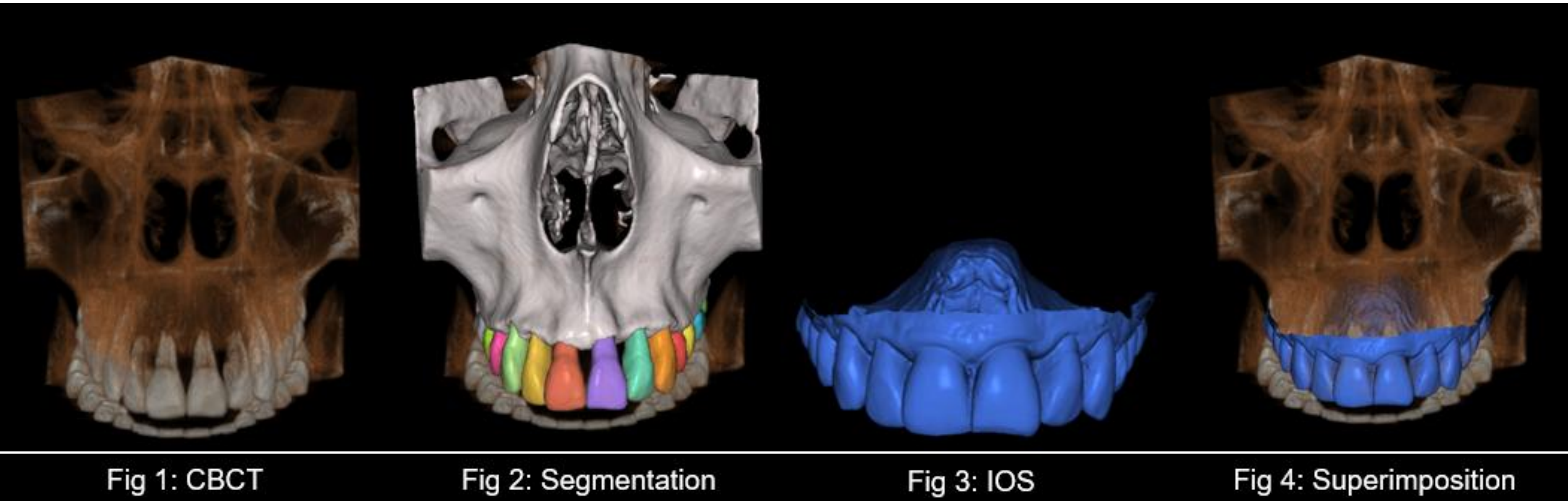
Purpose

Immediate implant placement in the esthetic zone requires precise control of implant position, emergence profile, and soft tissue contours.⁶ This report details a fully digital, prosthetically driven workflow for presurgical planning and the fabrication of a *custom socket sealing abutment* to support immediate implant placement.

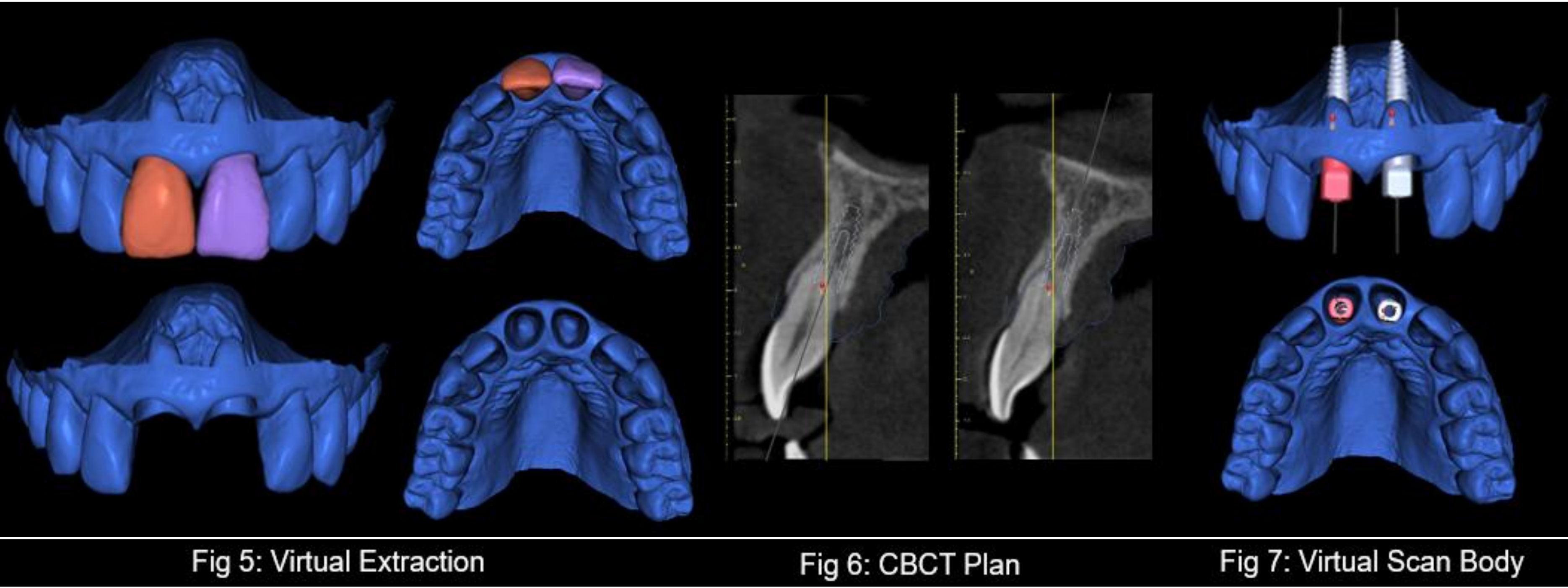
Methods

A CBCT and an intraoral scan data are acquired and aligned using BlueSky Bio software. Automated segmentation of bone and dentition is performed to generate STL models (Figures 1-4). Teeth #8 and #9 are virtually extracted by digitally dissecting the tooth STL from the intraoral scan, while preserving the soft tissue architecture (Figure 5). A diagnostic wax-up is superimposed to guide prosthetic implant planning (Figure 6). A virtual scan body is attached to the planned implant (Figure 7), and the modified scan (Figure 8) is exported to CAD software (Exocad), where a screw-retained anatomic crown is designed and digitally reduced to serve as a custom healing abutment (Figures 9-12), following the Esthetic Biologic Contour (EBC) principles.⁷ The final design (Figures 13,14) is 3D printed using On-X Tough resin. During surgery, the implant is placed with a fully guided protocol (Figure 15). The prefabricated abutment is luted to an indexed titanium base and delivered immediately. In cases of positional deviation, the internal index is hollowed and relined chairside.

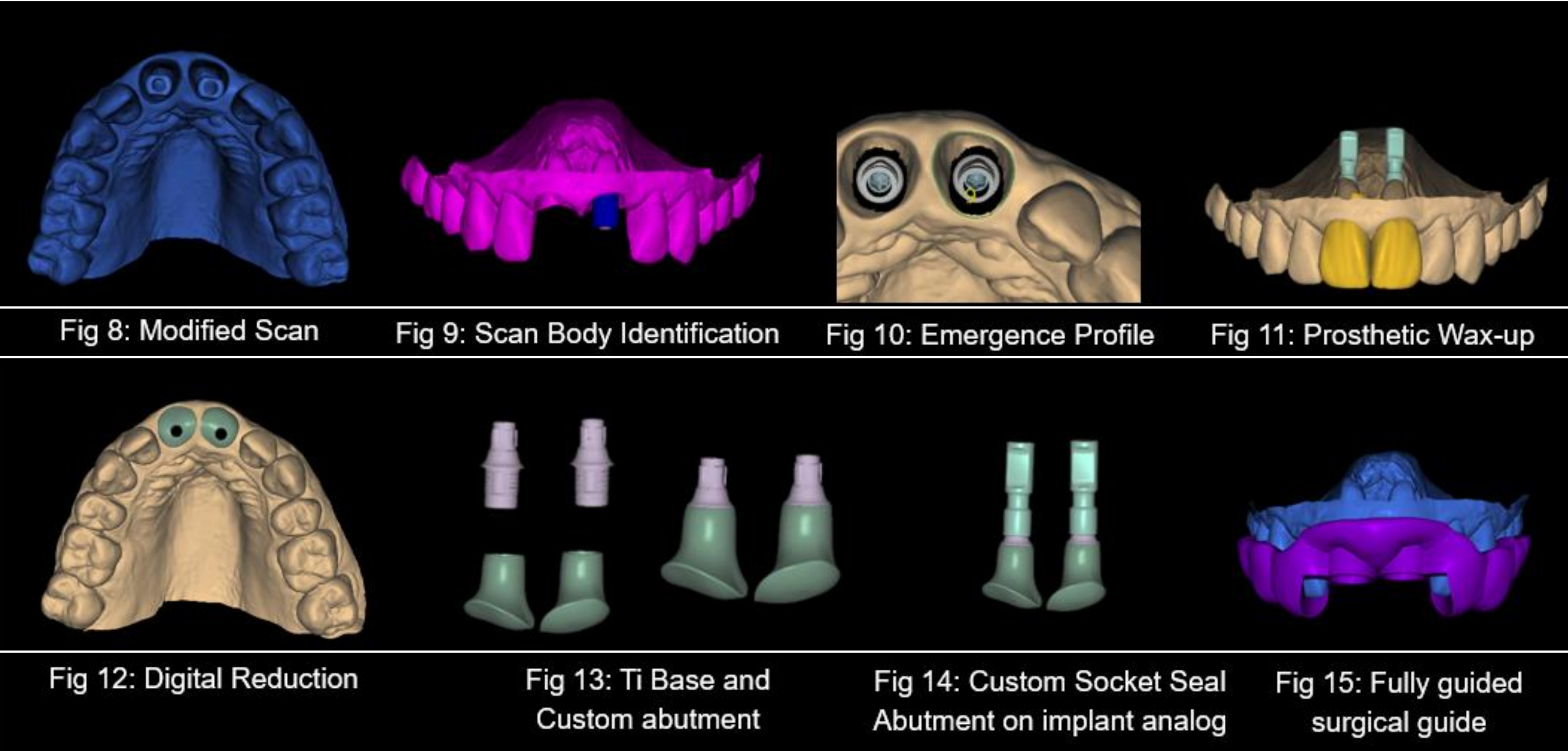
Data Acquisition



Pre-Surgical Planning



Digital Laboratory Steps



Results

The workflow facilitates successful prefabrication and immediate delivery of a custom healing abutment with precise soft tissue support and prosthetic alignment. This approach reduces chairside time and maintains the gingival architecture through controlled emergence profile design.

Conclusion

This technique provides a reproducible, prosthetically driven, and time-efficient approach for immediate implant placement, combining guided surgery with digitally fabricated socket-sealing abutments for soft tissue contouring

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