

Butterfly Graft: Optimizing Soft Tissue Outcomes in Adjacent Maxillary Implants Using a Digital Approach

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Presenter: **Alex Rubinov DMD, PGY3, University of Iowa**



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Introduction:

Implant treatment for cases with two adjacent missing teeth in the maxillary esthetic region is often unpredictable in terms of achieving a satisfactory esthetic result, due to the lack of connective tissue attachment to support the papilla between the implants. This novel approach utilized a “butterfly” soft tissue graft as well as segmentation of teeth and roots to make individualized 3D printed healing abutments.

Methods:

This case included a patient undergoing full-mouth reconstruction with failing maxillary central incisors. Immediate implant placement with butterfly connective tissue graft, harvested from posterior palate, was used to optimize soft tissue. Healing abutments were designed and printed by segmenting the teeth and roots digitally to reproduce the exact dimensions of the extracted teeth.

Results: At 12 months post-op, the soft tissue dimensions around both implants remained stable, with adequate papillary height and soft tissue contour achieved, reflecting natural gingival architecture. The customized digital healing abutments allowed for precise adaptation. There was no significant recession or loss of tissue volume, and the emergence profiles of the implants closely matched the original tooth anatomy. Patient reported satisfaction was high with favorable esthetic outcomes.

Conclusions: The combination of butterfly connective tissue graft and digitally prepared healing abutments provide a unique solution to one of the most demanding and unpredictable scenarios in the esthetic zone.

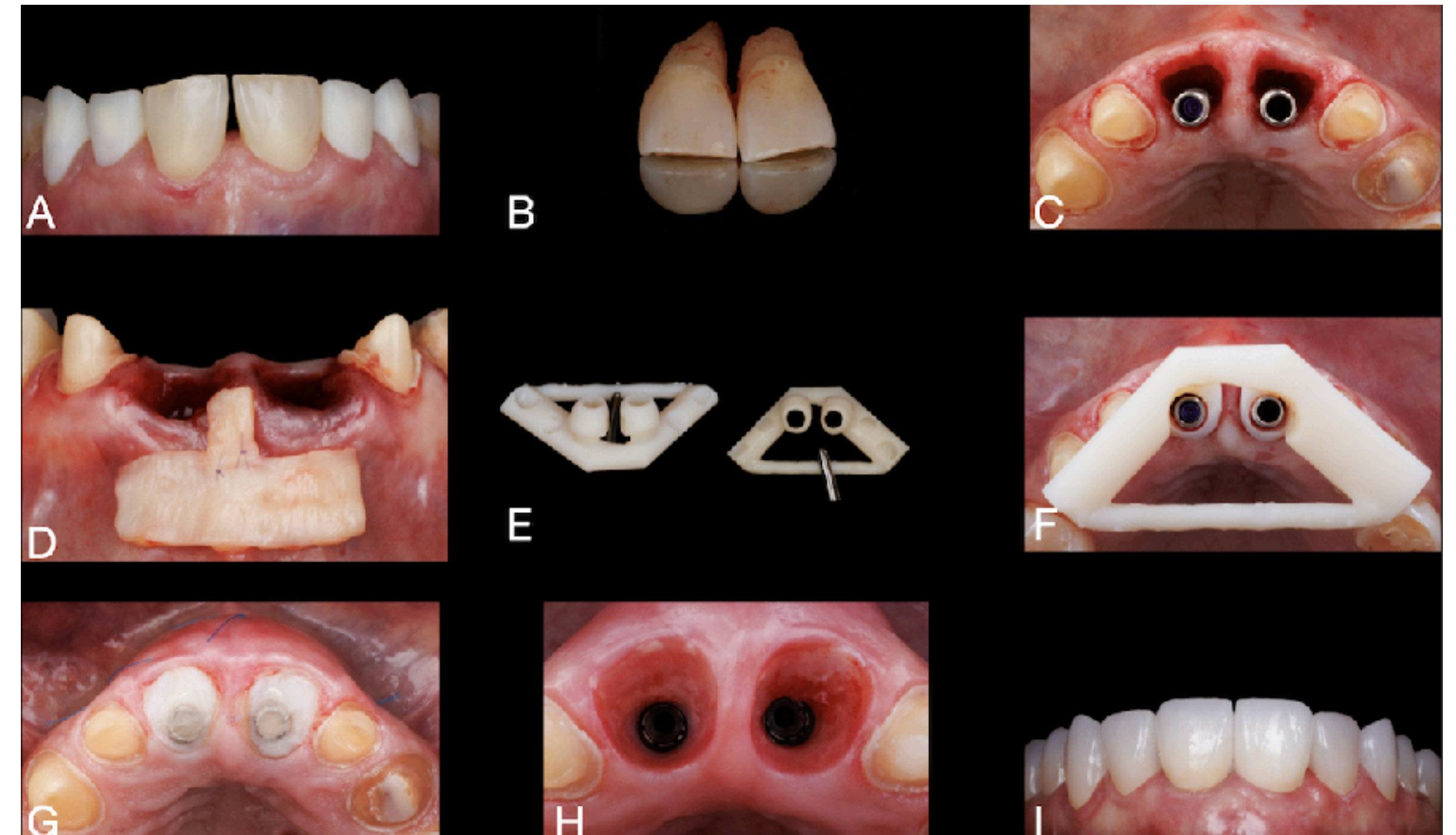


Figure 1. (A) Frontal View - Before Extraction, (B) Extracted #8,9, (C) Immediate Implant Placement, (D) Butterfly Graft, (E) 3D Printed Provisionals with Seating Framework, (F) Provisional Framework Placed Intraorally, (G) 3D Printed Provisionals Seated, (H) Removal of Provisionals at 6-Months, (I) Final Restorations at 12-Months.

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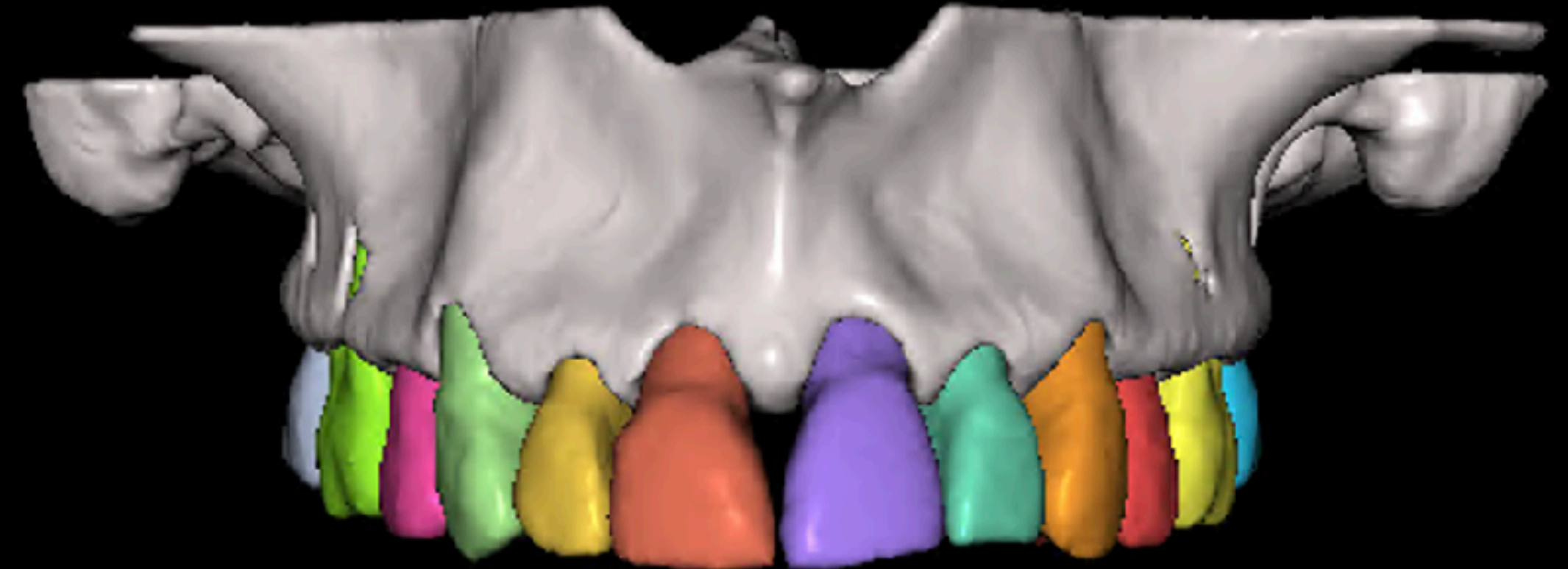
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3D Printed Provisionals with Seating Framework



AI Segmentation of Maxilla and Teeth



Digital tooth Segmentation Was Performed Using [BlueSkyBio©](#) Enabling Precise Replication of the Extracted Teeth Profile



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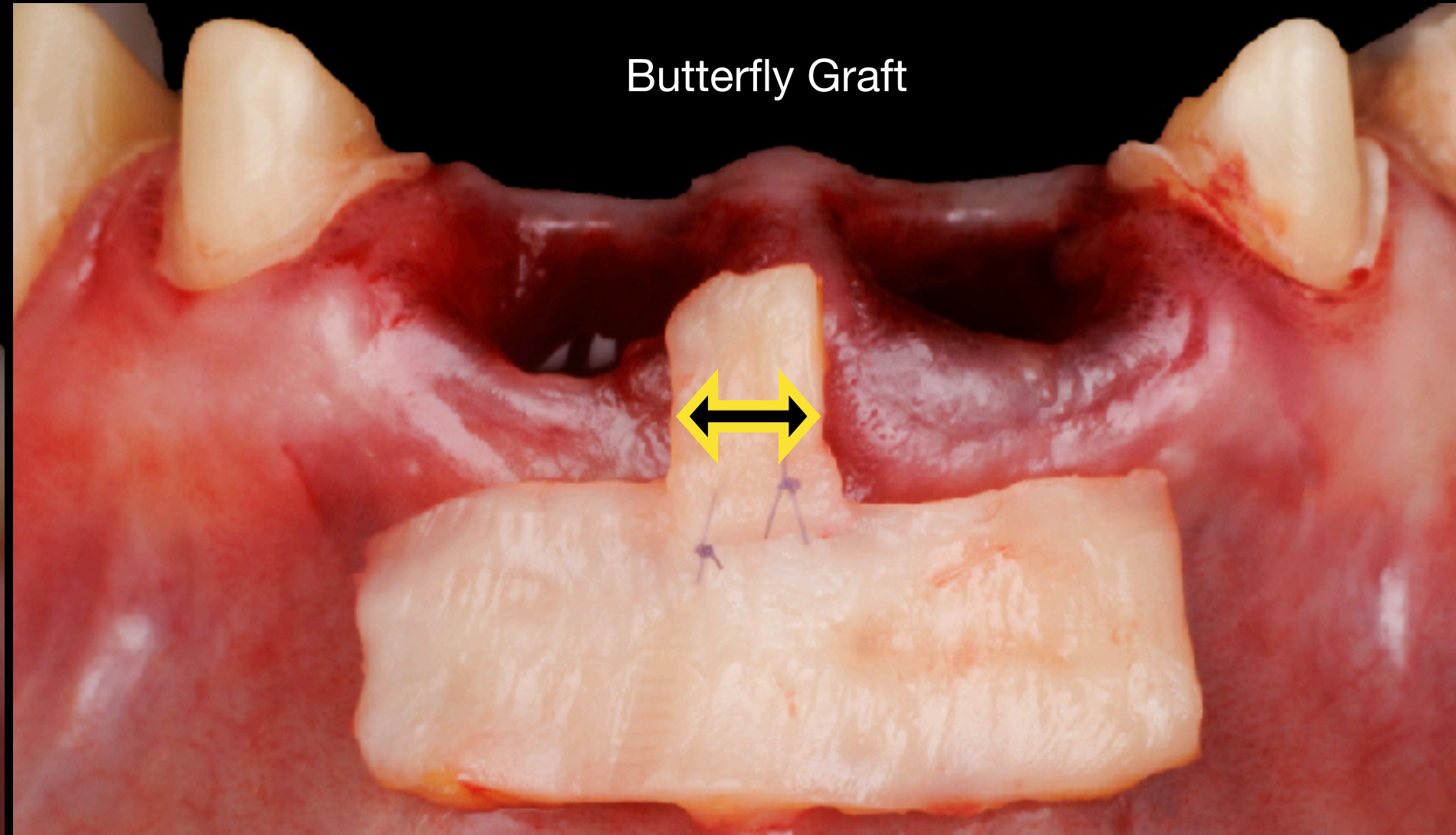
Frontal View - Before Extraction



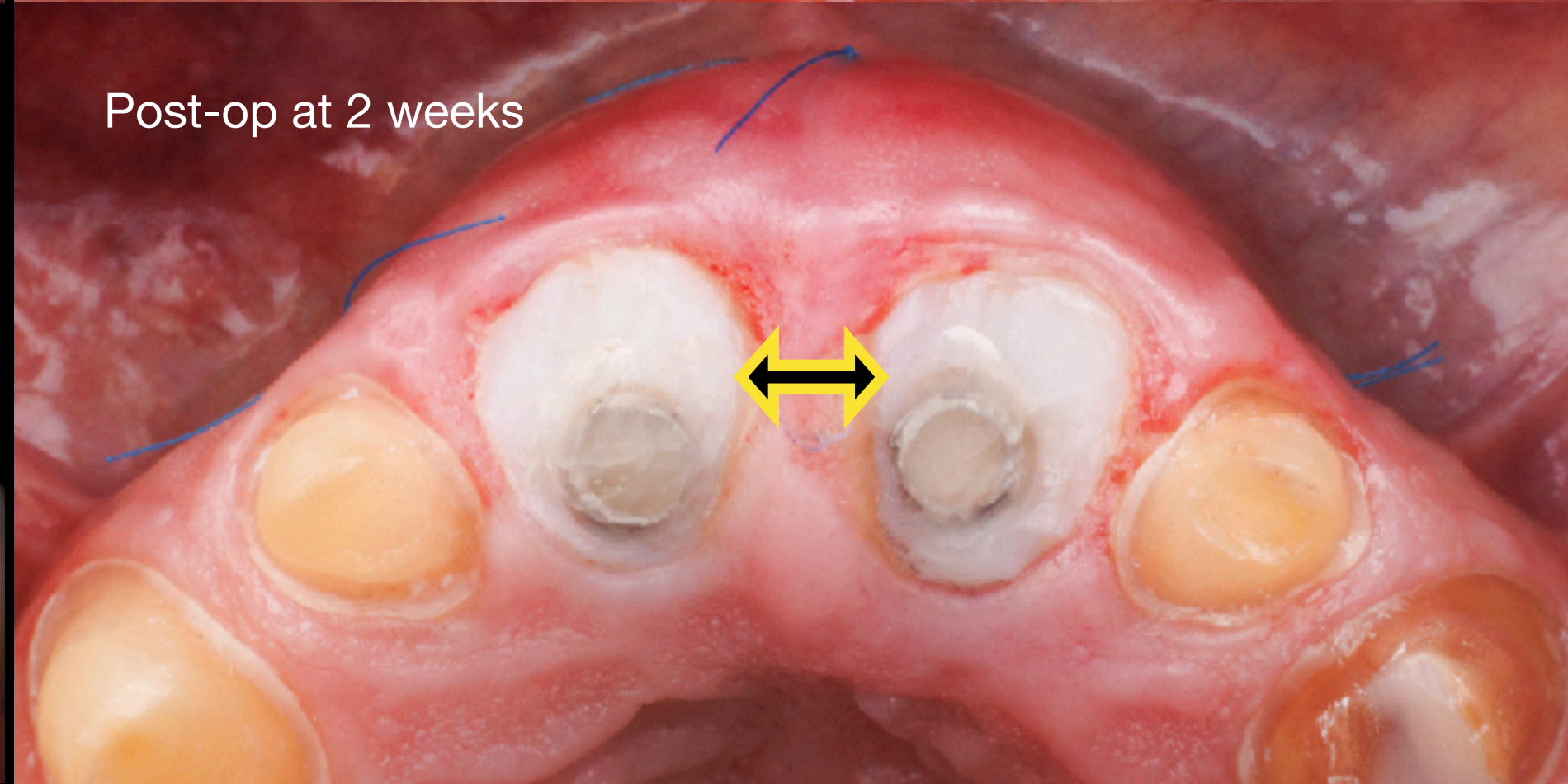
Final Restorations at 12-Months



Butterfly Graft



Post-op at 2 weeks



AI-Driven Segmentation
Enabled Precise Pre-
Surgical Planning of
Butterfly Graft
Dimensions



Radiographs at 12-Months

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Recent advancements in AI-driven segmentation in dentistry hold significant potential for optimizing workflows in implantology, especially in the creation of implant provisionals. However, **no studies** specifically address “provisionals utilizing AI segmentation,” highlighting a notable gap in the existing literature.

This case illustrates how AI applications enhance provisional design through accurate anatomical segmentation and seamless digital integration.

OPEN **Deep learning-based approach for 3D bone segmentation and prediction of missing tooth region for dental implant planning**
Mohammed Al-Asali¹, Ahmed Yaseen Alqutaibi^{2,3}, Mohammed Al-Sarem^{1,4} & Faisal Saeed⁵

ARTICLE **OPEN**
Fully automatic AI segmentation of oral surgery-related tissues based on cone beam computed tomography images
Yu Liu^{1,2}, Rui Xie³, Lifeng Wang^{1,2}, Hongpeng Liu^{1,2}, Chen Liu³, Yimin Zhao³, Shizhu Bai³ and Wenyong Liu⁴

AI-driven segmentation provided precise measurements of the butterfly graft during the surgical planning phase.
The integration of digital techniques contributed to an optimal outcome in the complex clinical scenario of adjacent anterior implants in the esthetic zone.