

An emerging protocol using 100% Digital Workflow for Immediate Full-Arch Implant Rehabilitation in 24 hours.

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Introduction:

This novel protocol represents a fully digital, biologically guided workflow for the immediate screw-retained full-arch rehabilitation. The protocol integrates advanced three-dimensional imaging, photogrammetry, virtual design, and in-house manufacturing to deliver a natural-appearing FP1-type fixed prosthesis within 24 hours of surgery.

Methods:

This fully digital protocol was utilized in twelve patients integrating seven key digital steps a) digital data acquisition; b) facial-driven smile design; c) prosthetically driven implant planning and surgical guide design; d) guided surgical placement; e) photogrammetry records; f) CAD design and production; and g) next-day delivery of the full-arch FP1 implant screw-retained immediate prosthesis. Passive seating, esthetic integration, and occlusal precision of the delivered prosthesis were verified using digital verification scans. Definitive FP1 implant-supported, screw-retained monolithic zirconia prostheses were inserted after three months

Results:

This protocol achieved a 24 hour delivery of the fixed prostheses for all the patients. Qualitative digital comparison of post-operative intraoral scans with the planned CAD prosthesis demonstrated consistency within the fully digital workflow.

Conclusion: The goal of this novel fully digital workflow is to preserve the patient's natural anatomy, bone and soft tissue harmony. This workflow maintains true digital continuity from diagnosis, implant planning and prosthesis delivery with patient comfort without the need for analog steps that could introduce inaccuracies.

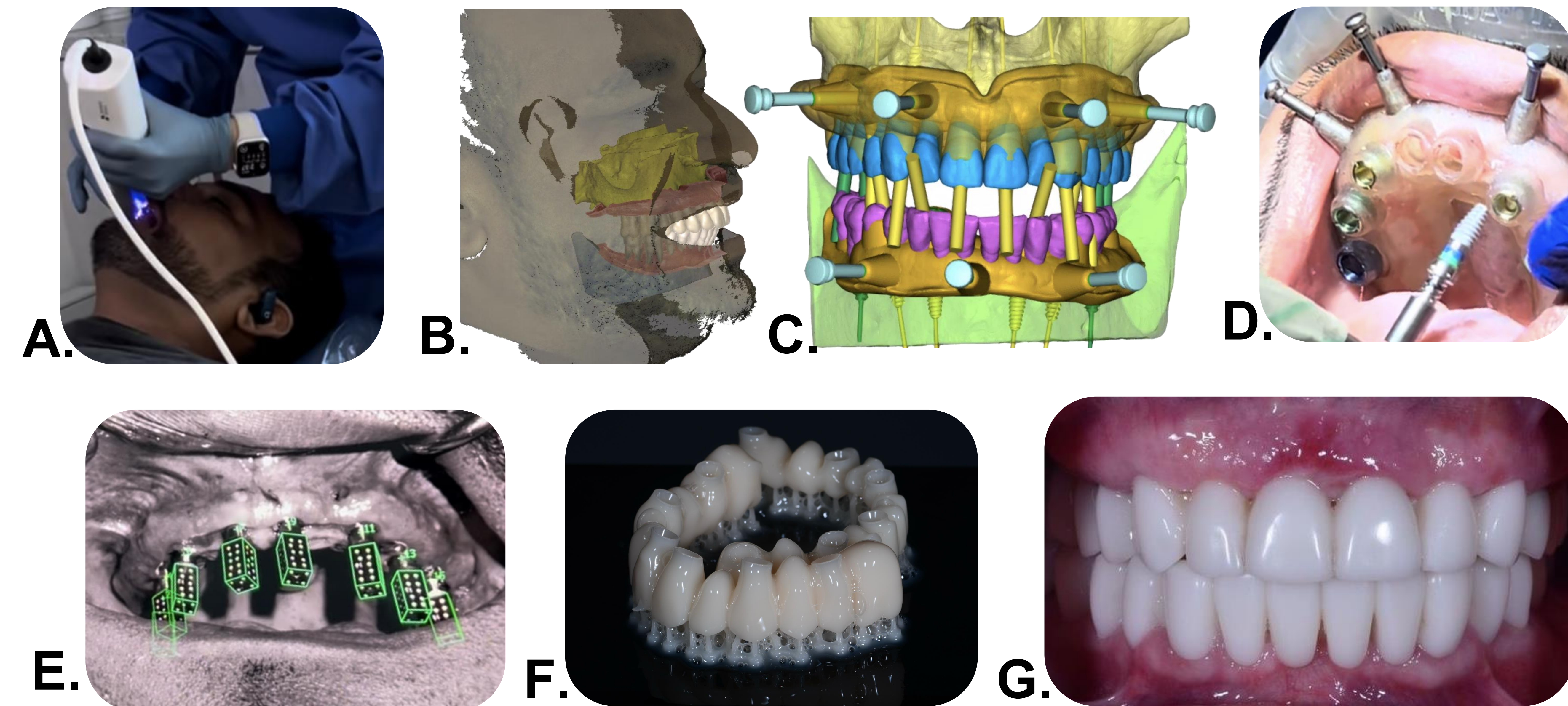


Figure 1. Seven Key Steps: A. Digital Acquisition, B. Smile Design, C. Implant Planning and Surgical Guide Design, D. Guided Surgical Placement, E. Photogrammetry, F. CAD Design and 3D Printing of the interim prosthesis, G. 24 Hour Delivery

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Figure 2. Implant planning and the fully-guided surgical guide design was done with implant planning software RealGUIDE®. After implant placement, an intraoral scan was done with Primescan® and photogrammetry (iCam4D®) was also utilized to register the implant positions. All the files were imported into exocad DentalCAD® software including the facial scan to design the FP1 prosthesis.

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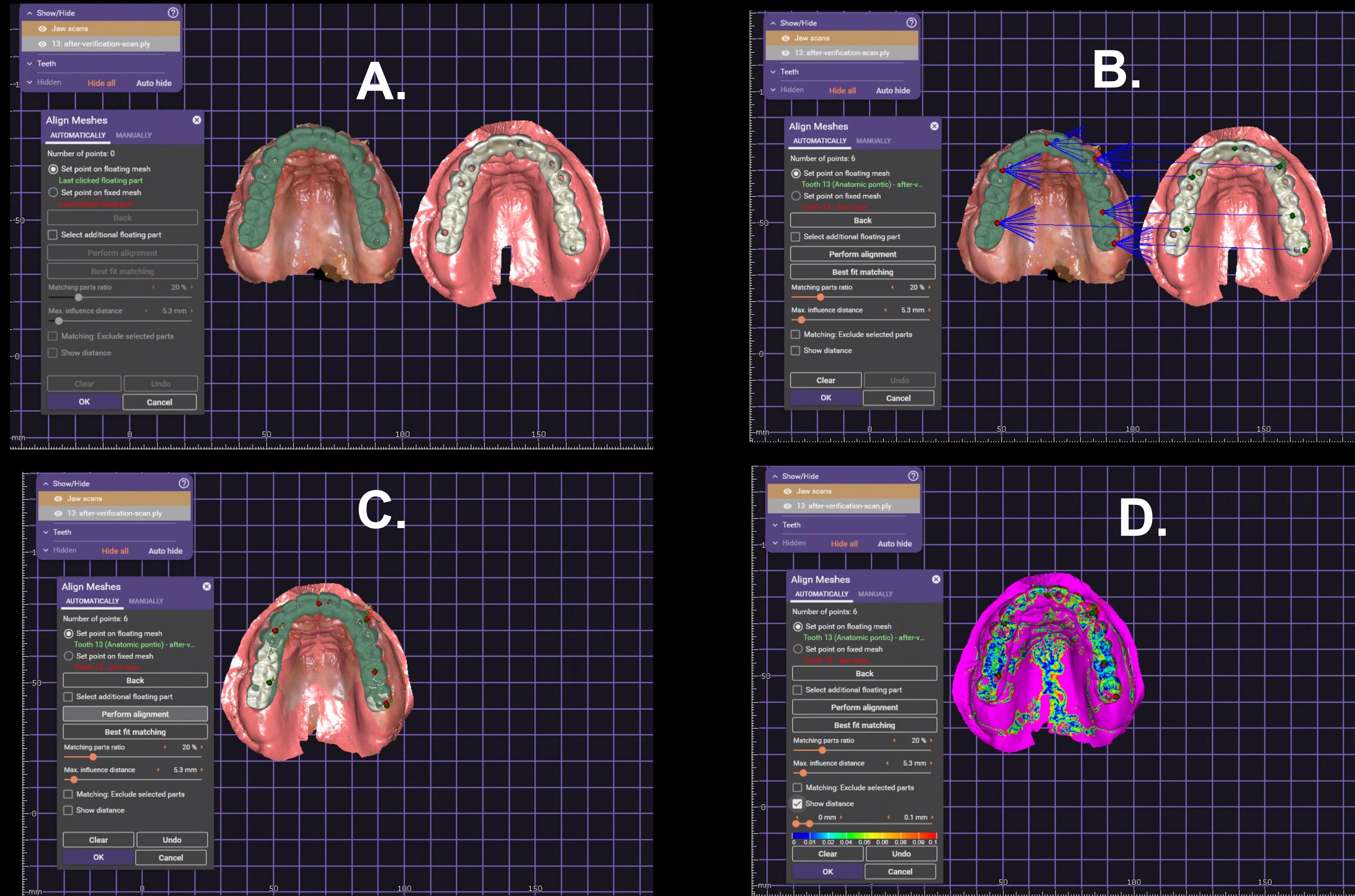


Figure 3. Maintaining Surgical and Prosthetic Precision. Digital scans in exocad software: (a) post-operative intraoral verification scan and planned study model generated in exocad; (b) reference points used for the tripod procedure; (c) superimposed digital models; and (d) color scale illustrating qualitative differences between the digital scans.

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This fully digital protocol was utilized in twelve patients integrating seven key digital steps. Sixteen arches involved restoring partially edentulous arches, and eight arches were fully edentulous.

The patients were satisfied with the final esthetic and functional outcome as it achieved immediate fixed function and natural esthetics.

The digital workflow eliminated multiple analog impressions and added patient comfort during the clinical steps.

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