Digital Workflow Improves Efficiency in Maxillary Obturator Rehabilitation: A Case Report

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Background: Digital workflows can streamline obturator fabrication by incorporating functional molding from an existing prosthesis while reducing conventional clinical steps. CAD-CAM RPD frameworks fabricated with Selective Laser Melting (SLM) may improve framework accuracy, and milled acrylic resins provide favorable material properties. However, few reports describe definitive prosthetics that integrate both technologies. This case report presents a fully digital workflow utilizing an existing obturator prosthesis for fabrication of the new definitive prosthesis.

Initial Presentation

Chief Complaint: A 68-year-old Caucasian female presented with a complaint of fractured clasp and loose obturator prosthesis fabricated three months earlier. Patient reported difficulty with retention, phonetics, and esthetics.

Fig.1a – Initial Presentation

Fig.1b – Maximum mouth opening

Fig. 1c – Existing obturator prosthesis, seated intraorally

Fig. 1d – Existing obturator prosthesis, cameo surface

Clinical Findings:

- Okay Class II right maxillary defect
- Limited mouth opening (~14mm)
- Compromised prosthesis stability

HPI: Right Maxillary Adenoid Cystic Carcinoma treated with surgical resection involving greater than 50% of the hard and soft palate and post-operative photon radiation therapy (6600 cGy).

Treatment Plan Summary: Intraoral scans of the maxillary arch, defect, existing obturator, mandibular arch, and interocclusal relationship were obtained using **Trios 5 scanner (3Shape)**. The datasets were aligned in **Blu Sky Plan 5 (Blue Sky Bio)** and merged in **Meshmixer** to generate a master model incorporating the defect and prepared abutments. The obturator bulb was digitally reproduced in 3Shape from the existing prosthesis, eliminating the need for additional impressions or transfer procedures. The cobalt–chromium framework was designed digitally and fabricated using **SLM technique. Prosthetic teeth (Ivotion Dent Multidisc, Ivoclar), gingival base and the obturator bulb (Ivotion Base disc, Ivoclar)** were milled using the Ivotion oversized protocol and subtractive CAD-CAM technology**. A luting alignment jig was fabricated in Blue Sky Bio software** and was used to stabilize the milled teeth segment relative to the master model and framework to ensure accurate, reproducible seating during assembly. The components were bonded under pressure with auto-polymerizing **PMMA (Unifast Trad Pink, GC)**, then finished and polished. The definitive prosthesis was inserted and demonstrated accurate fit, stability, and adaptation.

I: Data Acquisition

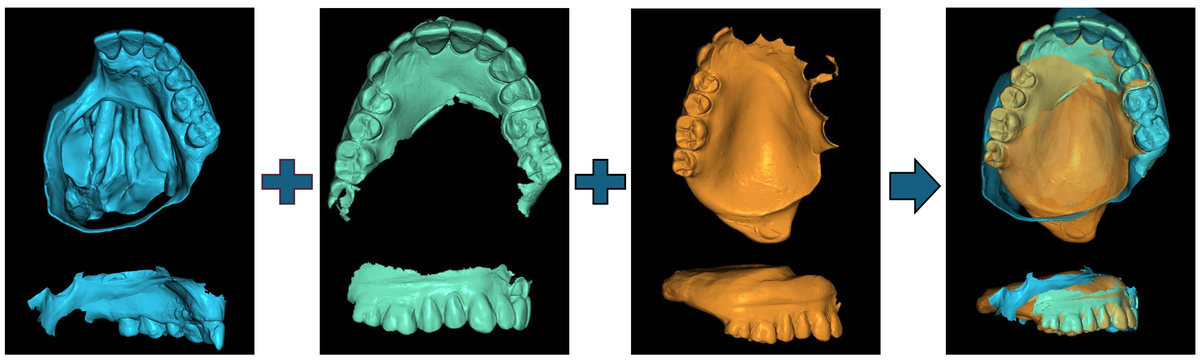

Fig. 2a – Intraoral scan of maxillary arch

Fig. 2b – Intraoral scan with existing obturator

Fig. 2c – Scan of existing obturator

Fig. 2d – Aligned Scans

II: Model Fabrication

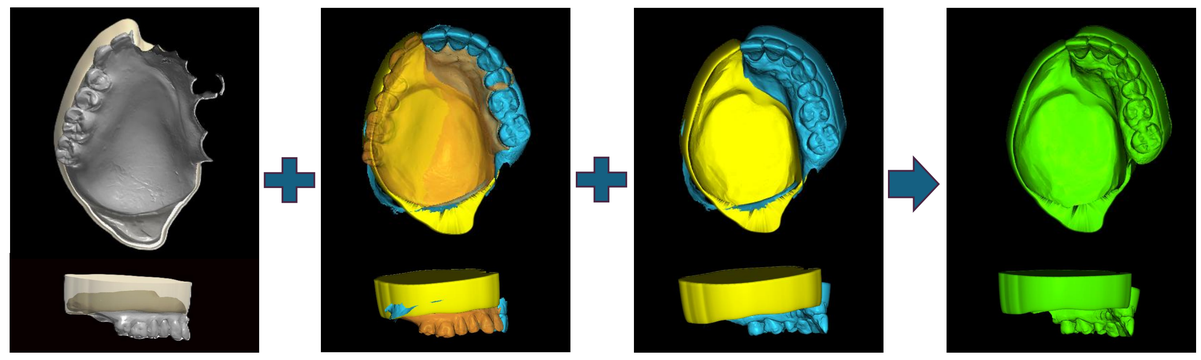

Fig. 3a – Generated positive replica from existing prosthesis

Fig. 3b – Generated positive replica of defect cropped & being aligned

Fig. 3c – Merging defect and arch scans to generate a master model

Fig. 3d – Generated master model

III: Framework Fabrication

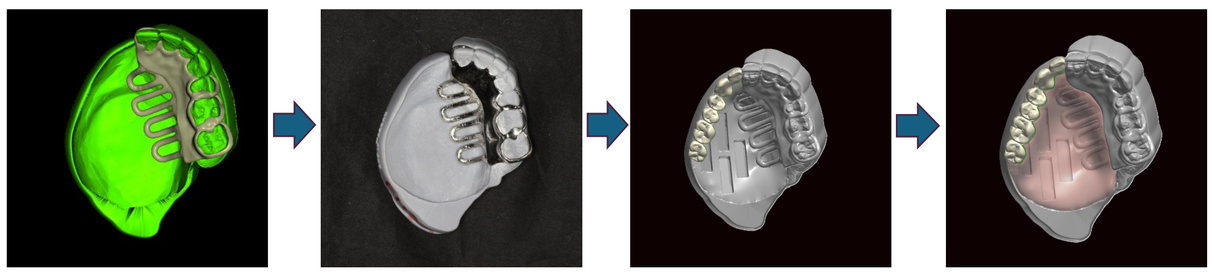

Fig. 4a – Digital RPD Design

Fig. 4b. – SLM printed framework on printed model

Fig. 4c – Teeth positioning with key design in the internal aspect of intaglio surface

Fig. 4d – Final design

IV: Milled Prosthetic Components

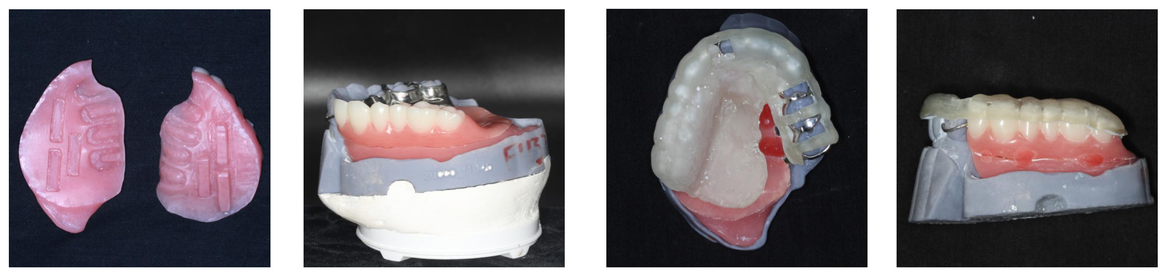

Fig. 5a – Milled internal prosthetic surface

Fig. 5b – Components adapted to cast with inferior and superior extension

Fig. 5c – Luting alignment jig for orientation, Occlusal view

Fig. 5d – Luting alignment jig for orientation, Lateral view

V: Definitive Prosthesis

Fig.6a – Definitive obturator, Cameo surface

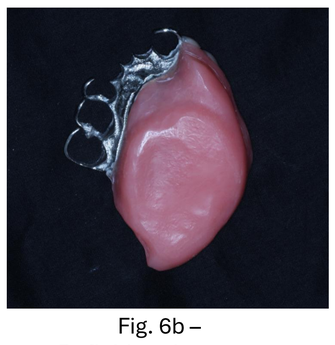

Fig. 6b – Definitive obturator, Intaglio surface

Fig. 6c – Definitive obturator, Lateral view

Fig. 6d – Definitive obturator, Occlusal view

Fig. 6e – Definitive obturator, Frontal view

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