



A Comparison of Digitally Designed and Conventionally Fabricated RPDs: A Case Report

Sangeeta Kumar BDS, Thomas Giugliano DDS, Mijin Choi DDS MS MBA FACP

Jonathan and Maxine Ferencz Advanced Education Program in Prosthodontics, New York University College of Dentistry

INTRODUCTION

3D printing has gained immense popularity in various aspects of dentistry, including in removable partial denture (RPD) fabrication^{1,2,3}. 3D printing or rapid prototyping, direct selective laser melting, and indirect selective deposition techniques can be utilized to fabricate the RPD metal framework. RPDs fabricated by rapid prototyping have been shown to have a clinically acceptable fit^{1,3,4}. Indirect rapid prototyping works primarily on the fabrication of printed wax or resin framework that is subsequently converted into cast metal frameworks by conventional lost wax technique (LWT). The use of rapid prototyping and LWT have been proven to be more economical than the subtractive methods of CAD/CAM technology due to the elimination of milling machine wear and maintenance^{3,5,6}.

OBJECTIVE

The objective of this case report is to compare the digitally designed RPD and the conventionally designed RPD by patient-reported outcomes.

METHODS

A 60-year-old male presented to the Department of Prosthodontics with the complaint of replacing his missing teeth (Fig. 1). The initial phase of the treatment plan included a maxillary immediate interim RPD and a cast metal RPD for replacing the mandibular posterior teeth. Two cast metal RPDs were fabricated for the mandibular arch using two different RPD fabrication methods: 1) conventional analog and 2) fully digital workflows. Teeth #18, #21, and #28 were selected as the abutment teeth. After the rest seats and guide planes were prepared, a final impression was made conventionally and a stone master cast was poured (Fig. 2). An intraoral scan was completed using a TRIOS 3 intraoral scanner (3Shape North America, Warren, NJ). The framework was then digitally designed using 3Shape removable partial denture design software (Fig. 3) and fabricated from a printed-wax framework pattern (Castable Wax 40, Formlabs, Somerville, MA). The second framework was fabricated using a conventional hand-waxed pattern. Both frameworks were fabricated using the LWT (Fig. 4 and Fig. 5). The frameworks were evaluated for their fit in the patient's mouth, and interocclusal records were obtained. The completed RPDs were delivered at the same time (Fig. 6 and Fig. 7). The fit and patient satisfaction were evaluated.



Fig. 1 Initial patient presentation

Conventional Workflow



Fig. 2 Mandibular stone model



Fig. 4 Metal framework from hand waxed pattern

Digital Workflow

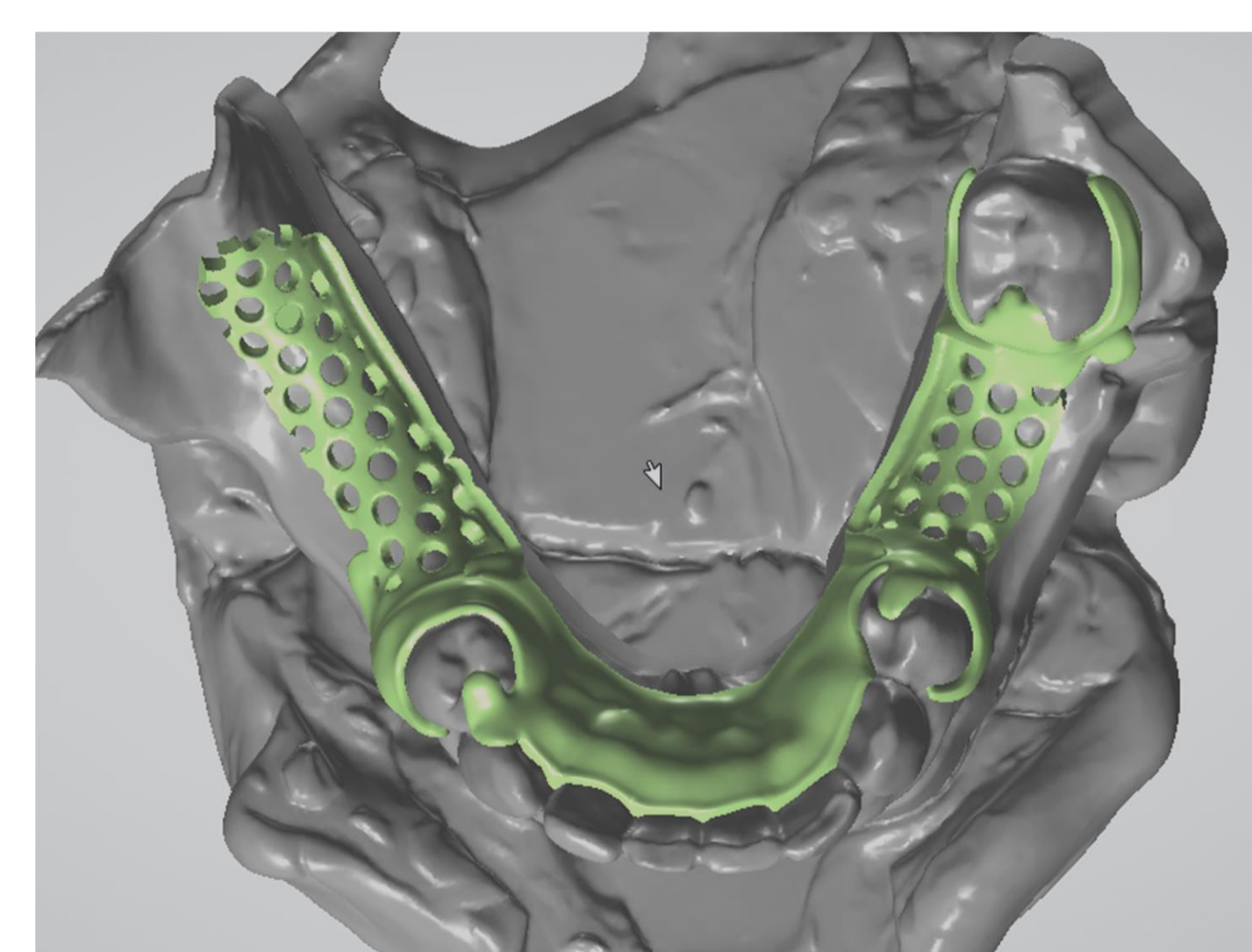


Fig. 3 Intra oral Scan and digital design



Fig. 5 Metal framework from printed wax pattern



Fig. 6 Conventionally fabricated cast RPD



Fig. 7 Digitally designed RPD

RESULTS

The digitally designed RPD and conventionally fabricated RPD were evaluated in the patient's mouth for retention, stability and occlusion. Both the RPDs were clinically acceptable, requiring minimal adjustments. The conventional RPD showed more overextended borders in the edentulous area. The patient was satisfied with both the RPDs and reported no significant differences.

CONCLUSION

Intra-oral scanning and digital designing may reduce clinical chair time and can simplify the laboratory procedures. Digital designs can be saved and utilized to provide patients with replacement prostheses of the same or modified design. No significant clinical difference was observed between the conventionally fabricated and digitally designed RPD. This case report demonstrates that digitally designed RPDs can be used as an acceptable clinical fabrication technique.

REFERENCES

