An Analog-Digital Workflow for Bilateral Balanced Immediate Dentures Using Jaw Motion Data

Chu-Chi Huang, DDS, John Chang, DMD, MMSc, Jason D. Lee, DDS, MMSc

Department of Restorative Dentistry and Biomaterial Sciences, Harvard School of Dental Medicine, Boston, MA, USA

Poster ID: acp2024.0470103

Introduction

Incorporating digital technologies into the workflow for immediate dentures provides many benefits. However, concerns persist regarding compromised border extensions and the limited occlusion design. Moreover, in partially edentulous patients, capturing facial scans and jaw motion data can be difficult. To address these challenges, mutiple intraoral appliances were developed to streamline the workflow, and jaw motion data was used to achieve an optimized outcome.

Case Description

A 74-year-old female patient presented to our department, complaining of tooth mobility and poor esthetics. The remaining teeth showed hopeless prognoses, resulting in a treatment plan of full-mouth extractions with immediate dentures. The case was described as follows.

Discussion

The jaw motion data and the facial scan were captured using a multifunctional intraoral appliance and were utilized to achieve an optimized occlusion. Customized mounting bases facilitated visualization and verification of the digital designs.

The techniques presented suggest an optimized workflow for integrating jaw motion data into full mouth rehabilitation, also demonstrating a seamless transfer between virtual designs and physical models.

References

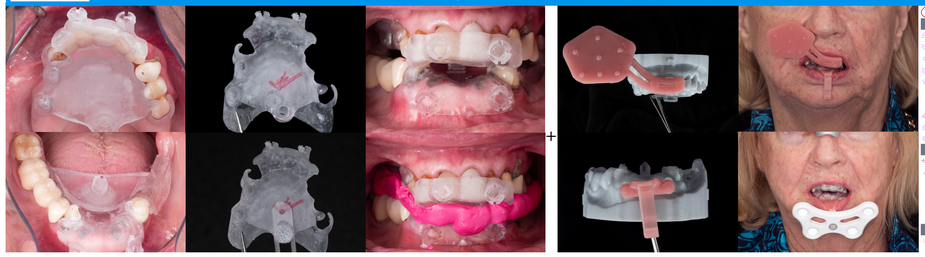
1. Alamri O, Lee SJ, Mwele C, Lee JD. An analog-digital hybrid technique for immediate dentures with idealized border extensions. J Prosthet Dent. Published online May 15, 2023.
2. Baba NZ, Goodacre BJ, Goodacre CJ, Müller F, Wagner S. CAD/CAM Complete Denture Systems and Physical Properties: A Review of the Literature. J Prosthodont. 2021;30(S2):113-124.
3. Bedrossian EA, Bedrossian E, Kois JC, Revilla-León M. Use of an optical jaw-tracking system to record mandibular motion for treatment planning and designing interim and definitive prostheses: A dental technique. J Prosthet Dent. 2024;132(4):659-674.
4. Inoue N, Scialabba R, Lee JD, Lee SJ. A comparison of virtually mounted dental casts from traditional facebow records, average values, and 3D facial scans. J Prosthet Dent. 2024;131(1):136-143.
5. Kanaparthi DB. A Technique for Obtaining Balanced and Functional Occlusion Through Modified Wax-Path Record. Cureus. 2023;15(8):e44149.
6. Revilla-León M, Zeitler JM, Kois JC. Implementing an optical jaw tracking system to locate centric occlusion: A dental technique. J Prosthet Dent. Published online January 6, 2024.

Acknowledgement

Special thanks to Shun-Cong Xu, Dr. Chan Wook Cheong, Dr. Osamah Alamri, and CDT Charles Mwele for their technical support..

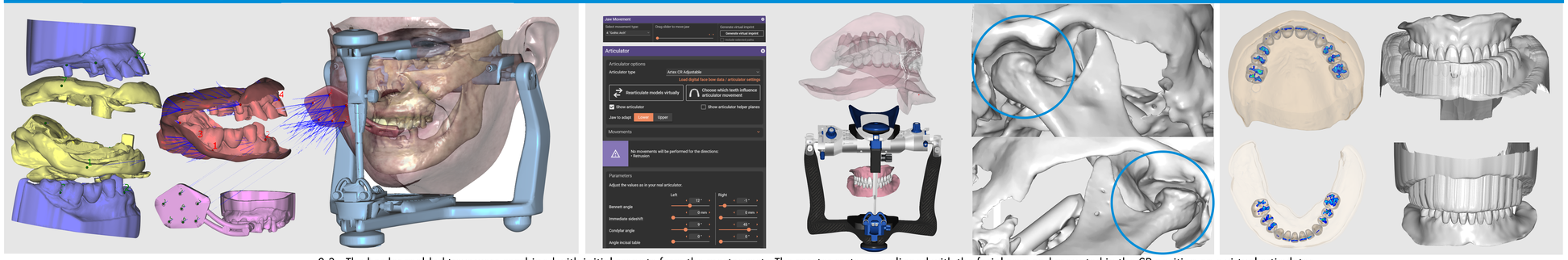
Visit. 1 Initial Visit

Visit. 2 Data Collection: Maxillomandibular relationship + Vertical Dimension + Facial Scan + Jaw Motion Data + Border Extension



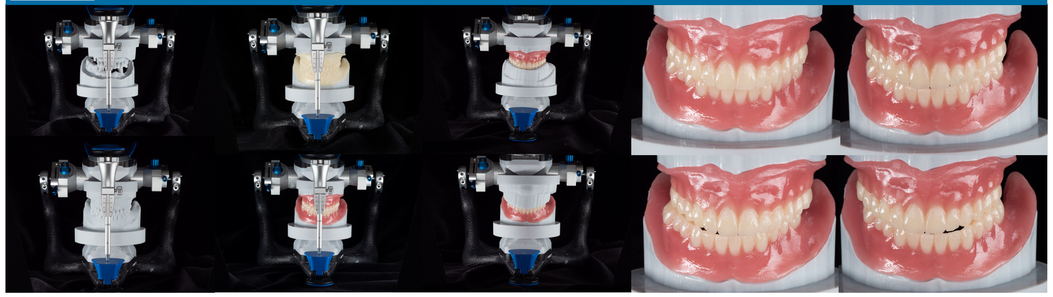
1. A set of intraoral scans and facial photos were obtained. 2-1. A CAD/CAM multifunctional intraoral appliance was designed to effectively obtain centric relation, a facial scan, and the jaw motion data.
2-2. A modified individual tray design, previously developed by our group, was applied to capture the idealized vestibular border extensions, which was then digitally merged with the initial intraoral scans.

Lab Computer aided design: Teeth setup+ Occlusal analysis + Jaw motion simulation



2-3. The border-molded trays were combined with initial scans to form the master casts. The master casts were aligned with the facial scan and mounted in the CR position on a virtual articulator.
2.4 The articulator parameters were set according to the jaw motion data. Glenoid fossa was examined on the computed tomography. Bilateral balanced occlusion was achieved, and virtual imprints of jaw motion were created for confirmation..

Lab Computer aided manufacturing: 3-dimensionally printed + Laboratory remount



2-5. Block-out models for digital dentures were created. Master casts., diagnostic wax up models, monolithic printed dentures, and base-teeth-cemented printed dentures were laboratory mounted with customized bases. Bilateral balanced occlusion was confirmed on the physical articulator using jaw motion data settings.

Visit 3 Surgery + Dentures Delivery

3. The dentures were 3-dimensionally printed and delivered after the extractions.
Bilateral balanced occlusion was achieved and recorded.