

Hybridization of Cast Partial Denture Fabrication: A Case Series

Dr. Varun Jaiswar¹, Dr. Anuradha Mohite², Dr. Jyoti Nadgere³, Dr. Janani Iyer⁴

¹Post-graduate student

²Associate Professor

³Professor & Head of Department

⁴Professor

*Department of Prosthodontics and Crown & Bridge,
Mahatma Gandhi Mission's Dental College and Hospital, Navi Mumbai*

ABSTRACT

Rehabilitation of partially edentulous patient can be challenging in Kennedys Class I and Class II situations. Dental Implant and removable partial denture can be planned in such cases. In case of excessive bone loss and uncontrolled systemic conditions, implants are contraindicated. Cast partial denture (CPD) is the treatment of choice for such patients. Cast partial dentures (CPD) can also be fabricated using a Hybrid technique to speed up procedure. This case series presents, case reports of patients in which a Hybrid technique was used for fabrication of cast partial dentures.

Key Words - Digital Dentistry, Aesthetic clasp, Cast partial Denture, Hybridization.

Citations: Jaiswar V, Moite A, Nadere J and Iyer J. Hybridization of Cast Partial Denture fabrication: A Case series. J Prosthodont Dent Mater 2023;4(1):77-.84.

INTRODUCTION

The partial edentulism affects the remaining teeth and the musculature around. The muscles of mastication loose tonicity which affects speech, facial expression and mastication. Cast partial denture (CPD) is the treatment of choice for such patients.¹ CPD fabrication is divided into three phases: the planning phase (diagnosis), mouth preparations, and designing of the partial denture.^{2,3} Fabrication of CPD is costly, time-consuming. CPD can be also fabricated using a Hybrid method by incorporating digital technology. Hybrid method not only speed up the procedure but also patient compliance and satisfaction⁴.

CASE REPORT 1:

A twenty-six-year-old male patient reported to the Department of Prosthodontics and Crown & Bridge, with chief complaint of an unpleasant smile due to missing teeth in the upper anterior region. Patient gave history of trauma 10 years back and extraction of the anterior teeth. On examination, teeth missing 11, 12, 13, 21, 22 in maxilla and in mandible teeth missing 42 and rotation seen with 41,43. Radiographic examination revealed that remaining teeth were sound and no pathology. Various treatment options were discussed with patient including implants. Patient opted Cast partial denture. Cast partial replacing 11, 12, 13, 21, 22 was planned with aesthetic clasps on 14 and 23. Primary impression were made with Condensation silicone (Zhermack, Zetaplus) for maxillary arch and alginate (Zhermack, Tropicalgin) for mandibular arch.

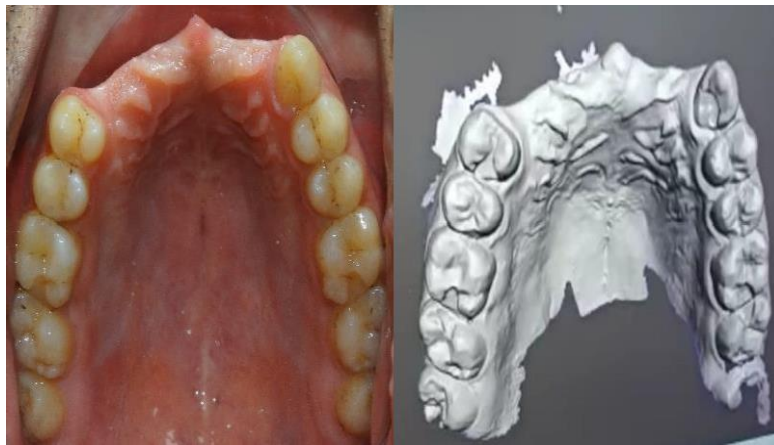


Figure 1: Mouth Preparation and Intraoral Scan

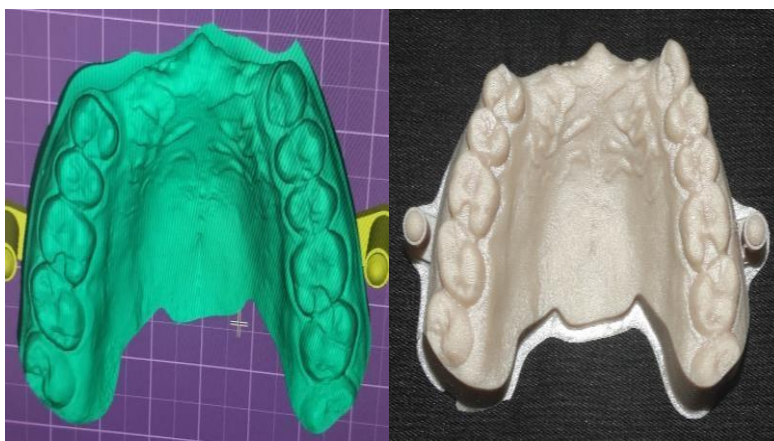


Figure 2: Evaluation of Scan and 3D printed model



Figure 3: Metal Framework trial with Esthetic clasps and Try-in

Intraoral scans of the teeth and other oral tissues were obtained and 3D models were printed utilizing the intraoral scans after mouth preparation on these models CPD was fabricated according to the design and aesthetic clasps were added in the anterior region on 14 and 23(fig 2 & 3).



Fig 4: Final Cast Partial Denture Insertion



Fig 5: Pre - Operative and Post – Operative

CASE REPORT 2 :

A seventy-three-year-old male patient, reported to Department of Prosthodontics and Crown & Bridge, with chief complain of difficulty in chewing due to multiple missing teeth in both upper and lower jaws. Patient gave history of multiple extractions due to caries and mobility. On examination, completely edentulous maxillary arch and missing teeth 31, 32, 36, 37, 41, 42, 47 in the mandibular arch. On Radiographic examination, all the other remaining teeth were sound and no pathology was present. Various treatment plans were discussed with patient including dental implants for fixed prosthesis. Patient gave history of diabetes and was under medication. Considering the patients age and systemic condition and financial constraints of the patient, option of implants was ruled out. An upper arch complete denture and lower arch cast partial denture was planned.



Figure 6: Digital Designing of the Cast Partial Denture

Primary impression was made impression compound (DPI,India) of maxillary arch and alginate(Zhermack , Tropicalgin) for mandibular arch. Mouth preparations were done as per designing. CPD was designed accordingly (fig 6).



Figure 7: Metal Framework trial and Jaw Relation

Border molding was done using low fusing impression compound and final impression was made using zinc oxide eugenol (DPI, India) for impression of maxilla and condensation silicon for mandible.



Figure 8: Try - in of upper Complete Denture and lower Cast Partial Denture



Figure 9: Processed maxillary complete denture and mandibular cast partial denture



Figure 10: Pre-operative and Post – operative

DISCUSSION

Innovative techniques like CAD-CAM, 3D Printing, newer impression materials, presents precise prosthesis to the patients. Incorporation of these digital techniques have improved and fasten the manufacturing of CPD, over conventional fabrication¹⁰

Digital technology have certain drawbacks like it cannot record tissues in function, hence using a hybrid technique for certain steps of conventional fabrication and certain steps of digital fabrication can be used, to fasten fabrication of CPD .¹⁰ The digital workflow of a CPD fabrication helps in surveying, designing the CPD, and manufacturing by 3D printing or milling. The final impressions can be made conventionally,

recording the tissues in a functional state and then scanning the impression and transferring it to digital workflow^{11,12}

Direct metal production system improves the productivity, reducing the workflow load and manufacturing costs of the CPD. Digital production is environment friendly as it decreases the wastage of wax, metal alloy, and the investment materials. The remaining uncured metal powder after sintering can be recycled for reuse. Digital designs can be saved in database. Saving digital designs facilitates their transfer between dentists and technicians and also useful if new denture to be made for patient¹².

Hybrid technique not only speed up the fabrication process but also improves the fit of the prosthesis, which improves the aesthetics and masticatory efficiency

REFERENCES

1. F. Tamimi, H. Hirayama (eds.), Digital Restorative Dentistry, https://doi.org/10.1007/978-3-030-15974-0_5 3D-Printed Removable Partial Dentures.
2. Ohkubo C, Sato Y, Nishiyama Y, Suzuki Y (2017) Titanium removable denture based on a one metal rehabilitation concept. *Dent Mater J* 36(5):517–523.
3. Barazanchi A, Li KC, Al-Amleh B, Lyons K, Waddell JN (2017) Additive technology: update on current materials and applications in dentistry. *J Prosthodont* 26(2):156–163.
4. Alageel O, Abdallah MN, Alsheghri A, Song J, Caron E, Tamimi F (2018) Removable partial denture alloys processed by laser-sintering technique. *J Biomed Mater Res B Appl Biomater* 106(3):1174–1185.
5. Torii M, Nakata T, Takahashi K, Kawamura N, Shimpo H, Ohkubo C (2018) Fitness and retentive force of cobalt-chromium alloy clasps fabricated with repeated laser sintering and milling. *J Prosthodont Res* 62(3):342–346.
6. Chen J, Ahmad R, Suenaga H, Li W, Sasaki K, Swain M et al (2015) Shape optimization for additive manufacturing of removable partial dentures—a new paradigm for prosthetic CAD/CAM. *PLoS ONE* 10(7):e0132552.
7. Spijker AV, Kreulen CM, Creugers NH. Attrition, occlusion, dysfunction, and intervention: A systematic review. *Clinical Oral Implants Res* 2007; 18:117–126.
8. Cheung GSP, Lai SCN. Fate of vital pulps beneath a metal-ceramic crown or a bridge retainer. *Int Endod J* 2005; 38:521–530.
9. King PA, Foster LV, Yates RJ, et al. Survival characteristics of 771 resin-retained bridges provided at a UK dental teaching hospital. *Br Dent J* 2015; 218:423–428.

10. Katase H, Kanazawa M, Inokoshi M, Minakuchi S. Face simulation system for complete dentures by applying rapid prototyping. *J Prosthet Dent* 2013;109:353–60.
11. Sun Y, Lü P, Wang Y. Study on CAD&RP for removable complete denture. *Comput Methods Programs Biomed* 2009;93:266–72.
12. Kattadiyil MT, Goodacre CJ, Baba NZ. CAD/CAM complete dentures: a review of two commercial fabrication systems. *J Calif Dent Assoc* 2013;41:407–16.