



SLS TECHNIQUE FOR FABRICATION OF CAST PARTIAL DENTURE

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ABSTRACT

One of the ancient and common method for rehabilitation of Bilateral end saddle cases is by Removable Partial Denture (RPD)-The framework of cast partial denture (CPD) made by lost wax technique can have many manual/lab errors. To minimize the errors and save time selective laser sintering (SLS) can be used as a method for framework fabrication and designing can be done by computer assisted designing (CAD) method. This a case report of 38 year old female with Kennedy's class 2 CPD was planned for the rehabilitation and framework was fabricated using SLS method. The framework fabricated had clinically better fit.

KEYWORDS : cast partial denture, selective laser sintering, computer assisted designing.

INTRODUCTION-

Missing teeth can be replaced by various Prosthodontic treatment options. It can be removable or fixed in nature. For distal extension cases, RPD serves as a conservative, non-surgical and low cost option. A cast partial denture for rehabilitation of missing teeth consists of a metal framework and acrylic denture base with teeth.

The framework of CPD should be rigid enough to dissipate forces without getting distorted. It should have accurate and delicate design to fit in the desired position intra-orally. The design of the framework can be designed by conventional means or digital means by CAD^[1,2]. The conventional way of fabricating CPD framework requires designing by using pattern waxes and then casting it using lost wax method. This technique includes various laboratory steps which are prone to human errors like casting shrinkage, defects, etc.^[3-5]

CAD designing on the other hand has an advantage over conventional technique of correctly designing and fabricating the framework by 3D printing^[1].

Selective laser sintering (SLS) technique allows fabrication of 3D objects in successive cross sections. Its precision reduces the errors we face in conventional technique. Added the laser sintered Co-Cr alloy powder is harder and denser with better microstructure organization and higher yield strength as well as tensile strength compared to cast alloy^[6,7]. These superior mechanical properties along with better precision may improve clasp retention and stability which will increase patient's overall satisfaction and comfort.

In this case report, we have done rehabilitation of a 38 year old female with unilateral missing molars in mandibular arch with a CPD. The framework of CPD is fabricated by SLS method to save lab errors and time for adjustment of framework.

CASE REPORT-

A 38 year old female reported to the Department of

Prosthodontics in Maulana Azad Institute of Dental Sciences for replacement of missing teeth. On intra-oral examination the patient had missing unilateral posterior mandibular arch. Diagnostic impression was made with irreversible hydrocolloid impression material for treatment planning. Patient demanded a low cost and a non surgical approach for rehabilitation of missing teeth.

After examination of casts and patient's existing tooth conditions a cast partial denture was considered as a treatment modality. The diagnostic cast was surveyed using Ney surveyor (Fig.1). After surveying the diagnostic cast mouth preparation was done on the abutment teeth after careful examination of tooth, OPG X-Ray and cast. Post-operative RVG X-Ray was made of the abutment tooth. The mouth preparation was complete and final impression was made using regular bodied addition silicon impression material in a custom tray.(Fig. 2)

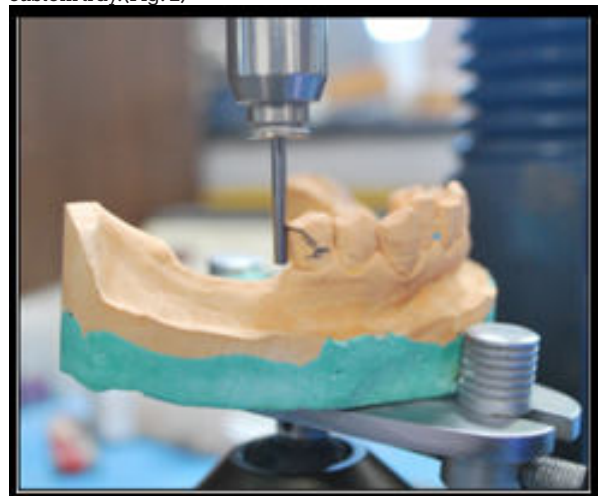


Fig.1- Surveying Of Diagnostic Impression Cast



Fig. 2- Final Impression After Mouth Preparation

The face bow records were recorded and transferred to the Hanau wide view articulator. Both the upper and lower impressions were sent to lab for fabrication of framework in lower master cast. The master cast was scanned and framework was digitally designed.(fig.3) After the framework design was finalised the STL file of the framework was formed and metal framework was fabricated by SLS method.(fig.4) After finishing and polishing of the framework, it was visually inspected on master cast for any visible gap, distortion, porosity, passive fit.

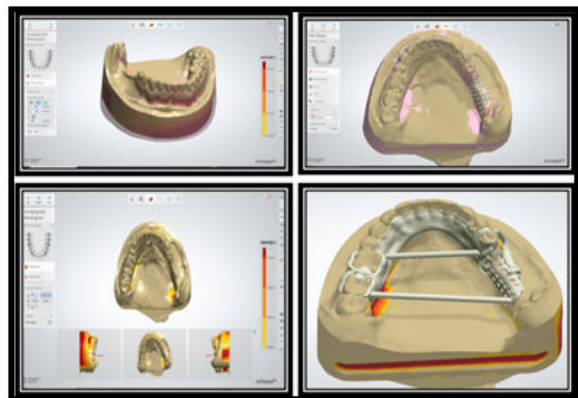


Fig.3- Digital Designing Of Cast Partial Farme Work



Fig.4- Framework After Laser Sintering Of Cobalt Chrome Alloy Powder

The framework was then tried intra-orally for any adjustment if required. Then the final impression was made with framework by doing border-moulding with low fusing impression compound. Altered cast was formed.

Jaw relation was done in conventional method. Teeth setting was done after shade matching with existing dentition and trial was done. Acrylisation was done in conventional method. The denture was finished and polished (Fig.5a). The cast partial denture was delivered and all the oral hygiene instructions and maintenance means was instructed to the patient. Patient was overall satisfied with treatment modality (Fig.5b).



Fig.5a- Cast Partial Denture At The Time Of Denture Delivery



Fig.5b- Cast Partial Denture Appearance Intra-orally

Patient was recalled for follow up for 1 month for adaptation and adjustment of CPD if needed. The abutments were examined there was no mobility, no specific gingival inflammation and the clasp arm and rest seat were seating fine. The subjective operational opinion of the practitioner about wearing and detaching after the denture was also reported as good.

DISCUSSION-

Laser Sintering is relatively new technology in dentistry and has been mainly assessed through observational studies in fixed and implant dentistry. To the best of authors knowledge, very few in-vivo studies and case reports has been reported in literature for cast partial framework fabrication. Since decades, a conventional "lost wax" technique, a manual and laborious process had been in use for framework fabrication, owing for various possible errors^[3-5]. With advancement in technology, various digital methods have been introduced to be used for metal framework fabrication for partial dentures^[1,2]. It is important to assess the new method clinically before accepting it universally. In this case report, a partial denture metal framework was fabricated using one of the digital method "selective laser sintering" with cobalt chromium alloy powder^[2].

Framework resulted from this technique was clinically acceptable with good fit, light weight and negligible defects. Further procedure of prosthesis fabrication was done in conventional way. Patient was satisfied with the denture.

CONCLUSION-

Framework fabricated using selective laser sintering had clinically better result in terms of fit, time taken to adjust framework intraorally and weight. Patient was comfortable with final prosthesis. Selective laser sintering can be a viable alternative for conventional cast partial denture.

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