Simple Technique to Fabricate a Crown for Abutment of an Existing Cast Partial Removable Denture

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Abstract

The requirement of full crown restoration for abutments of existing Cast partial removable denture is common. Retrofitting a crown to existing cast partial denture (CPD) clasps and guiding planes is a challenging task. Literature describes various direct, indirect, and direct-indirect techniques to overcome this dilemma. All these involve elaborate steps, necessitating refabrication of CPD or extended clinical adjustment time for ensuring a proper fit that is elusive in most cases and also patient has to do without CPD during laboratory procedure. The recent use of computer-aided design-computer-aided manufacture technology for this purpose is proving to be a promising but expensive option. A simple technique is presented here to generate a blueprint of required final contours to facilitate a fully contoured metal crown to fit under an existing CPD.

Keywords: Cast partial denture, rest seat, retrofitting crown

INTRODUCTION

The need of restoration in an existing abutment tooth in a cast partial removable denture is a common occurrence. If the restoration is extensive, endodontic treatment followed by crown is necessary. In such situations, the recreation of occlusal rest seat and axially contouring the crown in accordance with clasps and minor connector of an existing partial denture is a challenging job. Fitting the removable partial denture on newly made crown may require considerable time for chairside adjustments and cause inconvenience to the patients. Literature describes various techniques for retrofitting a new crown to an existing cast partial removable denture as direct, indirect, and direct-indirect. However, there are chances of error being introduced by clinician/technician during the elaborate steps, necessitating refabrication of cast partial denture (CPD) or extended clinical adjustment time for ensuring a proper fit that is elusive in most cases and also patient has to do without CPD during the laboratory procedure. The recent use of computer-aided design-computer-aided manufacture technology for this purpose is proving to be a promising but expensive option. A simple technique is presented here to fabricate a fully contoured metal crown to fit under an existing CPD.

CASE REPORT

A 66-year-old male patient reported to the department of prosthodontics and crown and bridge at our institute for fabrication of crown for an endodontically treated 17 which served as a principle abutment for a Kennedy’s Class III modification 2 CPD with a mesioocclusal rest in relation to 17, fabricated 5 years ago. The patient was satisfied with the functioning of the denture. Owing to decay, the amount of residual coronal tooth structure in 17 was not enough to support a crown. Hence, a post and core restoration followed by crown fabrication was planned. After taking consent from the patient, the post space was prepared followed by fabrication of custom made cast post and core which was cemented with glass ionomer luting cement (GC Fuji I, GC Europe N. V.) [Figure 1a and b]. On a subsequent appointment, after tooth preparation for metal-ceramic crown, denture was placed intraorally to check adequate axial clearance for...
crown fabrication [Figure 2]. The impression was made in polyvinyl siloxane material (3M ESPE Soft Putty and Express Ultralight Body, 3M India) and a provisional restoration in tooth-colored acrylic (DPI Self cure Tooth Moulding powder, DPI India) was fabricated on the cast using the indirect technique of provisionalization. While fabricating the provisional restoration, when the resin was still in dough stage, the CPD was seated on the cast so as to obtain negative impression of the rest seat and contour the axial surfaces according to clasp. To achieve accurate fit, the rest seat in the temporary crown was relined intraorally by seating of CPD and patient’s mouth closed in occlusion [Figure 3a]. Before cementing the provisional crown using zinc oxide eugenol cement (Temp-Bond, Kerr, America), a putty index [3M ESPE Soft putty Figure 3b] of this restoration was made and was utilized for making full contoured wax pattern (Crown wax, Bego, Germany) for fabrication of definitive metal crown for 17. The wax pattern was placed on the cast and denture was seated on to it [Figure 4a]. After ensuring the proper adaptation of wax pattern of crown to the rest seat and clasps of CPD, it was invested and cast, followed by finishing and polishing of the crown [Figure 4b]. The full metal crown was placed on the abutment tooth to check for fit with the existing CPD intraorally [Figure 5]. Necessary occlusal adjustments were performed followed by polishing of the restoration and final cementation using glass ionomer luting cement (GC Fuji I, GC Europe N. V). On the follow-up visit, the patient was satisfied with the functioning of the crown and previous denture.

**DISCUSSION**

Literature describes various techniques [Table 1][2-18] for retrofitting of a crown to existing CPD. The direct technique involves extended chairside time while forming the wax pattern for a crown directly in the patient’s mouth without requiring working cast or CPD analog. The potential discrepancies that may occur during indirect procedures are avoided, but at the same time, the technique is limited to all metal crowns. Expertise and availability of laboratory personal cannot be utilized. Indirect techniques enable the formation of pattern for full metal crown or coping for ceramometal crown in the laboratory utilizing a working cast and either the actual partial denture or clasp replica/analog to contour the pattern.[10-13] Either the CPD has to be retained, or extensive procedure for analog formation is required, and also risk of potential errors during indirect procedures is there.

The direct-indirect technique involves the formation of pattern initially on die and then relined/corrected in the mouth at an additional intermediate appointment, before casting. This technique allows a ceramic coverage, but areas contacting clasp were retained in metal. The present technique is a direct/indirect technique where a provisional restoration formed on working cast.

The above-presented procedure describes a simple technique for fabrication of a new metal crown with axial contours and occlusal rest seat accurately fitting to an existing CPD. Adjustments for clasp assembly were performed on the provisional crown, whose index was used to fabricate definitive full contoured metal crown. The crown was checked on cast...
Singla, et al.: Retrofabrication of crown for existing CPD

Table 1: Techniques discussed in literature

| Author               | Years | Method           | Technique                                                                 |
|----------------------|-------|------------------|---------------------------------------------------------------------------|
| Killebrew[2]         | 1961  | Direct           | Formed resin crown and relined it intra orally with inlay wax and then cast it |
| Ewing[3]             | 1965  | Direct           | Used prefabricated low fusing cadmium crown shells adapted and contoured according to clasp form on the prepared tooth with inlay wax. This pattern was used to create mold for final casting |
| Barrett and Pillirig[4] | 1965  | Indirect         | Used indirect technique where crown pattern is prepared and fit to contour of RPD on a cast. |
| Hill[5]              | 1977  |                  | Patient has to do without RPD while crown is being fabricated |
| McArthur[6]          | 1984  |                  | Needed more clinical time |
| Goldberg and Jones[7] | 1976  | Indirect         | Used a polysulphide impression matrix of unprepared tooth to form a pattern for prepared tooth on cast in wax or resin |
| Lubovich and Peterson[8] | 1977  | Direct-indirect  | Adapted on acetate coping on die and made the full contour resin pattern over it intra orally with RPD fully seated |
| Loft et al.[9]       | 1977  | Direct-indirect  | Used a cast coping to which resin was added to recordcast and rest assembly. This outer contour in resin was cast and soldered to coping |
| Raskin[10]           | 1983  | Indirect         | First thickened the clasp with sticky wax, then took a pickup impression with RPD seated in mouth and poured it with low fusing metal after removing RPD, so that clasp assembly was duplicated on cast and could be used while contouring of final crown |
| Schneider[11]        | 1983  | Direct-indirect  | Made two full contour resin patterns intraorally. One to be used as provisional and other reduced and adapted with wax at margins on cast before casting |
| Sigaroudi[12]        | 1985  | Direct-indirect  | Used vacuum formed template for fabrication of resin pattern intraorally, which was then cast |
| Silberman[13]        | 1993  | Indirect         | Made impression of metal clasp assembly to generate an analog which was transferred to working cast for fabricating pattern for crown under existing partial denture |
| Hansen and Russell[14] | 1994  | Indirect         | Used small pattern resin attached to occlusal rest of a clasp assembly to ensure stability of RPD while making impression for new crown |
| Livaditis[15]        | 1997  | Indirect         | Made an analog impression with RPD fully seated in mouth, to generate a pattern of clasp assembly to be used while developing contour of ceramic crown |
| Fujisawa et al.[16]  | 2004  | Direct-indirect  | Used acrylic resin coping made on definitive cast, fit directly to patients RPD intraorally and new FPD subsequently finished on cast |
| Marchack et al.[17]  | 2007  | CAD-CAM          | Used CAD-CAM to generate a resin pattern which fitted precisely to critical parts such as guiding planes, rest seats, clasp locators |
| Paek et al.[18]      | 2016  | CAD-CAM          | Used pattern resin intraorally to fabricate a full contoured wax pattern well-fitting to existing RPD. This was used to generate CAD-CAM full contour monolithic Zirconia Crowns |
| Patel[19]            | 2016  | CAD-CAM          | Used CAD-CAM “Biogeneric Copy” technique to replicate the pre-existing size, shape and form of a tooth chairside |

RPD: Removable partial denture, CAD-CAM: Computer-aided design-computer-aided manufacture, FPD: Fixed partial denture

with existing CPD of the patient in occlusion before fitting it intraorally thus minimizing the chairside time for adjustments. Patient’s CPD is required to be kept for 1 day to reduce chairside time, but if the patient does not want to leave his
denture, then provisional restoration can be fabricated and contoured to fit the CPD using direct technique and its putty index for making wax pattern can be taken before cementation.
If the abutment is in esthetic zone and porcelain fused to metal crown is required then full contoured wax pattern can be cut back, except from rest seat area, for application of ceramic, using putty index to check axial contouring.

Conclusion

Simple technique described above can be recommended for retrofitting of new crown for an abutment to an existing CPD without requiring keeping denture in the laboratory for extended time. Since a blueprint of required final contours and rest seat is formed, chances of error are virtually eliminated, and minimal chairside adjustment is required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

Figure 5: Intraoral mirror image of cast metal crown with cast partial denture seated in maxillary arch

Figure 5: Intraoral mirror image of cast metal crown with cast partial denture seated in maxillary arch
understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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