CASE REPORT

Removable Partial Denture Design using Milled Surface as a Precision Attachment: An Esthetic Alternative

Krishna D Prasad, Chethan Hegde, Namrata G Shah-Naidu, Manoj Shetty

ABSTRACT

This case report describes the combined use of fixed partial denture prosthesis (FPD) and removable partial denture prosthesis (RPD) for a patient with partially edentulous arches and few remaining teeth. The RPD was designed such that it would take advantage of the benefits from milled palatal surfaces of the FPD to enhance stability and retention of the RPD and allow maintenance of optimum oral hygiene.

Keywords: Removable partial denture, Fixed partial denture, Milled guide plane.

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INTRODUCTION

It is not uncommon to encounter complex, partially edentulous patients in our day-to-day practice. Apart from implant supported prosthesis as a primary treatment option, literature suggests treatment of such situations using combination of fixed partial denture (FPD) and removable partial denture (RPD) along with precision attachments as retentive elements to be the most sophisticated form of care.[1]

However, the data on the survival of these fixed-removable restorations report evidence of a high rate of failure and complication.[1,2] The failures primarily were encountered with the fixed component of the assembly and the major reasons associated with them were periodontal disease of the abutment tooth, cementation failure of endodontic posts, root fracture.[1]

Stewart and Rudd[3] have stated that broad distribution of stress through the use of rigid major and minor connectors and multiple rests or guiding planes is of primary importance in RPD design as also stabilization of all compromised teeth. The use of parallel guide planes on the proximal and palatal aspects of the abutment teeth or pontics significantly enhances the stability and retention of the RPD.[1]

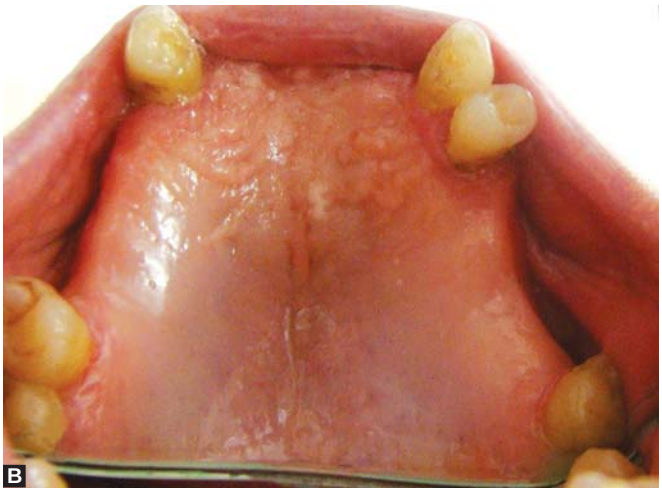
This case report describes the treatment of a partially edentulous patient using a combination fixed and removable prostheses with milled palatal surfaces of the FPD.

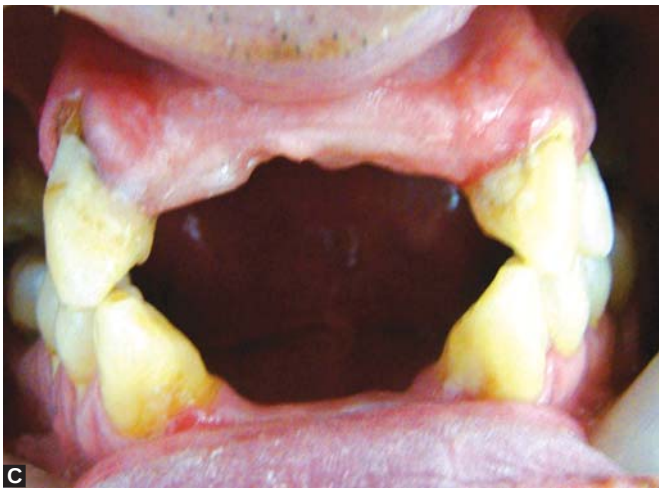
CASE REPORT

A male patient 62-year-old reported for the complete rehabilitation of his missing dentition following an accident 10 years back. He was wearing an acrylic RPD since then, which were ill-fitting and caused him difficulty in speech and mastication. The dental examination revealed absence of maxillary and mandibular incisors with a considerable amount loss of bone and also missing maxillary second premolars and first molars bilaterally (Figs 1A to C). The treatment options included fabrication of new cast partial denture (CPD) for maxillary teeth and FPD for the mandibular teeth, or implant supported FPD which required both hard and soft tissue augmentation. The patient was not convinced with either treatment options and was reluctant to undergo surgery.

Based on the above concerns, the definitive treatment plan thus was to give a fixed restoration replacing both the maxillary and mandibular missing anterior teeth while the maxillary posterior teeth received a CPD. The maxillary canines and left first premolar were prepared to receive full coverage restorations. A full-contour waxing (GEO Milling wax; Renfert, Germany) with parallel and milled guide planes on the palatal aspect was completed. These provide guidance for prosthesis and reciprocation for the abutment teeth during placement and removal of the RPD and also have the potential to create frictional resistance to dislodgement.[4] The vertical height and width of the guide planes was 3 to 4 mm and 1 to 2 mm respectively. Proximal parallel guide planes were incorporated on the distal aspect of the distal abutments of the FPD and the mesial aspect of both the second molars combined with occlusal rests (Fig. 2).

All the laboratory procedures were carried out in the prosthodontic laboratory of our institution. The wax pattern was casted and verified intraorally. Provisional cement (RelyXTM Temp NE; 3M ESPE, Germany) was placed in small amount on the margins of the restoration before the final impression was made (ExpressTM XT Putty Soft and light body; 3M ESPE, Germany) which was poured in type IV dental stone (Kalrock; Kalabhai, India). This was done in accordance to Brudvik's[5] advice to include all fixed components on the definitive cast for the RPD to obtain a solid cast for final milling, thus reduce errors in the reproduction of crown contours. After obtaining the definitive cast final metal milling was accomplished using an electrical milling machine (Paraskop; Bego, Germany) with milling bur (Paraskop-Fras-Satz; Bego, Germany) (Fig. 3). Porcelain build-up was finished. Gingival porcelain was also veneered to the porcelain build-up to camouflage the prosthesis with the adjacent soft tissue and to avoid the elongated appearance of porcelain teeth.





Figs 1A to C: Pretreatment intraoral photographs: (A) Missing mandibular incisors, (B) missing maxillary incisors, billateral second premolars and molars and right first premolar, (C) frontal view of missing maxillary and mandibular incisors

The fabrication of the cast partial denture began with block out of the definitive cast which then was duplicated using agar (Wirogel M; Bego, Germany) and poured in phosphate bonded investment (Wirovest; Bego, Germany). The major connector used was anteroposterior palatal strap (Smooth casting wax; Bego, Germany). A cast clasp was placed into a 0.010 inch undercut on the mesiobuccal of the right and left second molars

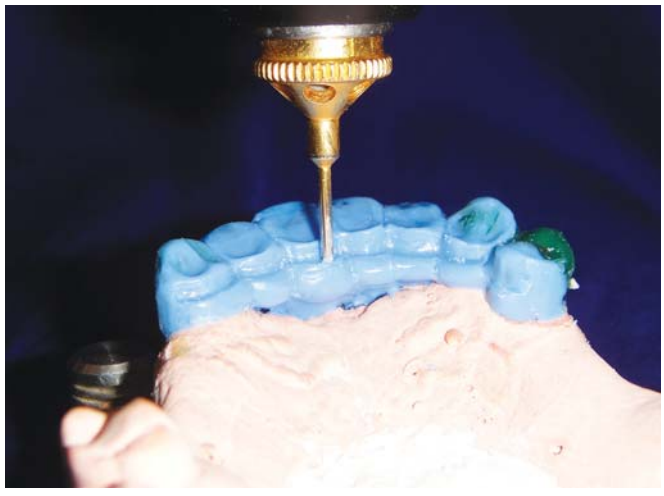


Fig. 2: Wax contour FPD and milled in wax on the palatal surface and in cingulum areas to create a positive rest and guide plane components

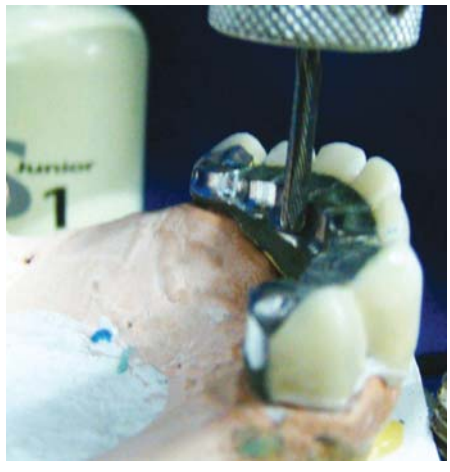


Fig. 3: Final milling of the metal surfaces of the guide planes

(Molar Clasps; Bego, Germany). The extended palatal rests were hand waxed to blend with the prefabricated pattern. The wax framework was sprued, invested and cast (Wironium Plus; Bego, Germany). The internal surface of the casting was left in the as-cast condition in the areas of milled surfaces, while all other surfaces were finished and polished. The cast framework was checked for the initial intraoral fit. After assuring the complete seating of the framework the FPD was cemented with permanent cement (GC Gold Label Luting and Lining Cement; GC Corporation, Japan) (Fig. 4).

After the final setting of the cement, an impression was made of the definitive FPD and was poured in type IV dental stone. Artificial teeth (Acryrock; Ruthinium Dental Products Pvt Ltd, India) were positioned providing canine-guided occlusion, and waxing and carving was completed, following which the CPD was processed, finished and polished (Figs 5A to C).

The patient was instructed regarding the insertion, removal, oral hygiene and home care for the prosthesis. The patient is on regular follow-up since 3 months with no complaints.

Fig. 4: Intraoral try-in of the metal framework

Figs 5A to C: Post-treatment intraoral photographs

DISCUSSION

Oral rehabilitation of complex, partially edentulous arches is one of the most challenging situations that a dentist could come across. Among the various treatments available implant supported prosthesis serves to be the optimum treatment because it saves the embarrassment of ill-fitting prosthesis. But there is a large population who do not opt for this treatment due to financial constraints.

A combination of fixed and removable partial denture prostheses with milled surfaces serves to be an acceptable option in these situations. Yada et al[6] stated that the philosophy of combined prosthesis is: (1) The major and minor connector should cover minimum amount of soft tissue while contacting the remaining teeth, (2) the milled palatal and proximal surfaces which are left in the as-cast state creates frictional retention and enhances stability.

The major drawback with a RPD is the continued loss of teeth after the restoration. Moreover, plaque retention, fracture of the component, periodontal breakdown of the abutment teeth or unacceptable esthetics adds to the failure of these prostheses.[6] Clinical studies report that the periodontal condition of surviving abutments is related to RPD design and good oral hygiene.[7]

Brudvik JS[8] states that construction of RPD with little, if any, frictional resistance to dislodgement at the tooth-frame interface causes it to rely majorly on clasp arms to supply the adequate retention. Further, class III partial dentures stand to benefit from as much frictional retention at the interface as can be preserved by controlling the loss of metal, as well as eliminate the need for unesthetic anterior clasp arm.

CONCLUSION

By incorporating the milled guide plane on the palatal aspect of the FPD, improvement in the stability of the RPD increased its resistance to rotational movements and most importantly eliminated the need for visible anterior clasping. Thus, achieving the basic principles of retention, stability and support along with patient compliance.

REFERENCES

1. Brudvik JS, Shor A. The milled surface as a precision attachment. Dent Clin North Am 2004;48:685-708.
2. Owall B. Precision attachment retained removable partial dentures. 1. Technical long-term study. Int J Prosthodont 1991;4:249-57.
3. Stewart KL, Rudd KD. Stabilizing periodontally weakened teeth with removable partial dentures. J Prosthet Dent 1968;19:475-82.
4. NaBadalung DP, Nicholls JI, Brudvik JS. Frictional resistance of removable partial dentures with retrofilled resin composite guide planes. Int J Prosthodont 1997;10:116-22.
5. Brudvik JS. Advanced removable partial dentures. Quintessence, Chicago 1999;65-73.

6. Chaiyabutr Y, Brudvik JS. Removable partial denture design using milled abutment surfaces and minimal soft tissue coverage for periodontally compromised teeth: A clinical report. J Prosthet Dent 2008;99:263-66.
7. Kern M, Wagner B. Periodontal findings in patients 10 years after insertion of removable partial dentures. J Oral Rehabil 2001; 28:991-97.
8. Brudvik JS, Reimers D. The tooth-removable partial denture interface. J Prosthet Dent 1992;68:924-27.

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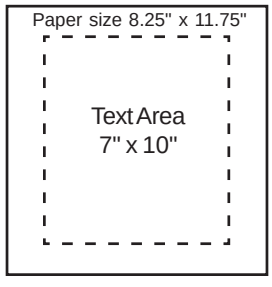

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