Case Report

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An Approach Towards Minimally Invasive Prosthodontics: A Case Report

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ABSTRACT

Background: Minimally invasive treatment options have become increasingly feasible in restorative dentistry due to the introduction of restorative materials featuring translucent properties similar to those of natural teeth. The partial-coverage retainer fulfils all the requirements of a restoration; maximal retention with minimum sacrifice of tooth structure, no encroachment on pulp, aesthetically acceptable and it is used especially in cases of mesially tilted second molar abutments. This article presents a case report of a male patient with mesially tilted second molars, who was successfully rehabilitated with a fixed prosthesis having partial-coverage retainers.

Keywords: Conservation, partial-coverage retainer, mesially tilted molars, occlusal guide.

INTRODUCTION

Conservation of natural tooth structure continues to be an important aspect of minimally invasive prosthodontics. Advent of implant supported prosthesis has significantly eliminated using two abutments to support a pontic. However, since many patients cannot opt for implant supported prosthesis, an important conservative aspect of fixed partial dentures is definitely the use of partial-coverage retainers.[1] According to the Glossary of Prosthodontic Terms, partial-coverage retainer is defined as "the component for a fixed partial denture that is an artificial replacement that restores missing tooth structure by surrounding part of the remaining structure with a material such as cast metal alloy, ceramics, or resin; it is retained by mechanical or adhesive means." – GPT 9. They may be used on anterior or posterior teeth of either arch where parallel proximal grooves of an adequate length and retentive walls and planes can be obtained to resist displacing forces and ensure stability of the prosthesis. The retention attained with this type of retainer is comparable to that of a complete cast crown provided that there is sufficient natural tooth structure remaining and the preparation is appropriately done.[2]

CASE REPORT

A 20 year old male patient reported to the Department of Prosthodontics, D.Y. Patil Deemed To Be University, School Of Dentistry, Nerul, Navi Mumbai with a chief complaint of missing teeth in the upper and lower, right and left, front and back regions since 4-5 months and requested for replacement of the same. The teeth were lost due to caries. The patient had no relevant medical history. On intraoral examination, teeth missing were 26, 33, 36, 45 and 46. The second molars i.e. 27, 37 and 47 were mesially tilted. 32 was distally rotated (Figs. 1-3). All the teeth were periodontally sound. On radiographic examination, all the teeth were vital except 32 which was root canal treated and 33 was impacted. The orthopantomogram also showed mesially tilted second molars and adequate bone

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Fig 1: Pre-operative maxillary and mandibular arches.

Fig 2: Pre-operative right and left lateral view in occlusion.

Fig 3: Pre-operative frontal view in occlusion.

Fig 4: Orthopantomogram.

Fig 5: Tooth preparation.

Fig 6: Final impressions.

Fig 7: Occlusal view of casts mounted on the articulator.

Fig 8: Right and left lateral view of casts in occlusion.

support around the abutments (Fig. 4). All treatment options were presented and discussed with the patient. The patient showed reluctance towards implants due to fear of surgery. Hence, considering the patient's age and other factors such as low caries index and mesially tilted molars, fixed

Fig 9: Extraoral view of the bisque trial.

Fig 10: Extraoral view of the bisque trial in occlusion.

Fig 11: Post-operative occlusal view of maxillary and mandibular arches.

Fig 12: Post-operative right and left lateral view in occlusion.

prostheses with partial-coverage retainers was decided as the treatment of choice. After oral prophylaxis was done, diagnostic impressions of the maxillary and mandibular arch were made in irreversible hydrocolloid (Alginate) and the casts were poured in Type III dental stone. The planned treatment outcome was defined in a wax-up before the treatment commenced and during tooth preparation, this wax-up was subsequently used as a reference. Tooth preparation was done on 27, 34 and 37 for partial-coverage retainers and on 44 and 47 for full-coverage retainers (Fig. 5). The margins were kept equigingival. Only the mesial surface and half of the buccal and lingual surfaces were prepared for 27 and 37 and a demarcation groove, extending from the buccal to the occlusal to the lingual surface, was made. For 34, only the lingual surface was prepared. Tray adhesive was applied and final impressions of the maxillary and mandibular arches were made using the double-mix, single-stage technique in addition silicone elastomeric impression material, putty and light body consistency (3M™ ESPE) (Fig. 6). The casts were poured in Type IV dental stone (Kalrock-Kalabhai Karson Pvt. Ltd. India) to obtain the working models which were then mounted on a mean value articulator (Figs. 7, 8). Temporization was done using the direct technique and the provisional restorations were cemented using a non-eugenol luting cement (Templute). A2 shade was selected and since the patient requested for a tooth-coloured restoration, monolithic zirconia was decided as the material of choice for the restorations. Bisque trial was done to verify the marginal accuracy and shade of the prostheses (Figs. 9, 10). A few stains were added to the prostheses and the final restorations were cemented using Type I Glass Ionomer cement (Figs. 11, 12). The patient was followed up at 1 week, 1 month, 3 months and then every 6 months for a period of 2 years. No problems were reported and the patient was highly satisfied with the outcome of the prostheses.

DISCUSSION

The use of partial-coverage retainers in fixed prosthodontics dates back to more than 9 decades. When placed on anterior and posterior natural teeth, they conserve the highly aesthetic facial surfaces along with the exact contour of the teeth involved.[3] Loss of a permanent mandibular first molar to caries early in life is still relatively common. If the space is ignored, the second molar may tilt mesially, especially with the eruption of the

third molar. This makes it difficult to fabricate a prosthesis as the positional relationship no longer allows for parallel paths of insertion without interference from the adjacent teeth. In such cases, a conservative approach would be the use of a modified partial-coverage retainer, where only the mesial proximal surface of the tilted molars is prepared, to acquire a vertical path of insertion. The mesial one-half crown preparation requires an unblemished distal surface on the molar abutment.

The partial-coverage retainers also help to establish an appropriate occlusal relationship with the opposing teeth and the vertical dimension is also maintained due to the remaining occlusal guide, unlike the complete-coverage retainers, where all occlusal guides are lost and occlusal establishment depends entirely upon the dentist and the laboratory technician.[4] Proper contouring and establishment of embrasures has a great impact on the periodontal aspect of the restoration. Improperly shaped and contoured crowns cause inevitable damage to the periodontium. Interdigitative relations of teeth are more difficult to establish because of the large element of guesswork concerning size and contour. If partial-coverage crowns were used, however, a uniform resemblance could more easily result because there would be more guides to aid in establishing proper form and contour. The partial-coverage casting has less margin in contact with the gingival tissue since such contact is only in the proximal regions, resulting in lesser gingival irritation than the complete-coverage crowns.[5]

More pulp problems are evident with full-coverage than with partial-coverage. Bender, Seltzer, and Kaufman[6] reported that the full crown preparation may open the way to bacterial infection of the pulp via the dentinal tubules. A study showed that pulpal death associated with full-coverage crowns is 2.4 times that of partial-coverage retainers.[7]

Seating of a partial-coverage retainer does not generate much hydraulic pressure during cementation because escapeways are already present. The buccal and lingual bevels reveal whether or not a proper seat has been obtained each time a casting is cemented. Hence, there is positive seating during cementation of partial-coverage crowns. Using partial-coverage retainers in this case was justified because it was possible to place parallel grooves of adequate length without compromising the bulk of the tooth. Other favourable aspects included vital abutments which were mesially tilted, low caries index and a suitable occlusion.

CONCLUSION

The conservation of tooth structure and the placement of a minimum amount of restorative material in contact with gingival tissues should be of utmost importance. It is through the use of partial-coverage crowns that these objectives may be accomplished especially in cases of mesially tilted second molar abutments. The biological concept in dentistry of preservation of tooth structure is also not violated when partial-coverage retainers are used.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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