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Research Article

PRESERVATION OVER REPLACEMENT WITH INLAY-RETAINED PROSTHESIS

Patel Parth P., Pisal Nidhi S., Shah Nimisha C and Gandhi Namita N

Department of Conservative Dentistry and Endodontics, K. M. Shah Dental College,
Sumandeep Vidyapeeth, Vadodara, Gujarat

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ABSTRACT

Breakthroughs in dentistry offer the opportunity for patients to retain functional dentition for their lifetime. We owe a variety of treatment choices to our patients depending on the latest clinical evidence of efficient treatment modality. Hemisection is a treatment option that refers to a surgical detachment of a multi-rooted tooth with the removal of one root along with the overhanging crown. Once chosen for this procedure, the tooth must undergo root canal treatment. Removal of the selected root improves access for maintenance and management of plaque, resulting in increased bone formation and pocket-depth reduction. Traditionally full coverage fixed dental prostheses (FDPs) and implant prostheses are advocated in such cases. However, this case report describes hemisection of an extensively decayed mandibular molar followed by conservative rehabilitation with an Inlay-retained prosthesis.

INTRODUCTION

Bacterial infections cause a vast majority of pulpal and periodontal diseases. The cross-infections between the root canal and the periodontal ligament have been proposed to occur via anatomical and non-physiological pathways. Endodontic lesions destroy bone in an apical-to-coronal direction while periodontal disease is from coronal to the apical region.[1] But when there is severe bone loss and furcation involvement, conservation of such teeth becomes difficult. Thus, extraction followed by fixed dental prosthesis or a dental implant is the conventional treatment option for an abutment molar with substantial decay.[2]

Since the current dental practice is conservation-based, the goal of any treatment is to conserve the original, but an appropriate selection of cases is important. If caries extensively involves a single root in molars, hemisection can be utilized to conserve as much tooth structure as possible. Hemisection is the sectioning of a mandibular molar into two halves followed by the removal of the diseased root and its coronal portion. This procedure acts as a more satisfactory abutment by allowing physiological mobility of the remaining root. It is essential to restore these teeth appropriately by an extra coronal restoration to avoid failures.[3] Thus, traditionally full coverage fixed dental prostheses (FDPs) are advocated.[4,5] However, an inlay-retained fixed prosthesis (IRFDP) is a minimally invasive procedure that can reduce the removal of tooth structure and provide retention to the prosthesis, transforming it into an ultraconservative alternative.[6,7] Thus, this case describes a conservative treatment modality that involves hemisection of a mandibular molar followed by restoration with a hybrid-retained fixed dental prosthesis with an inlay and a full crown as abutments.

Case History

A 44-year-old healthy male patient reported a complaint of food lodgement in the lower right back tooth region. Clinical examination showed a deep proximal lesion with 46 extending sub-gingivally with furcation involvement, inflamed papillary gingival distally and periodontal probing depth of four mm, and Class II caries with 47 (Figure1-A). Radiographic examination showed disto-proximal radiolucency involving pulp with the widening of periodontal ligament space and ill-defined radiolucency in furcation area with 46 (Figure1-B). Cold and electric pulp tests showed no response with 46 and early response with 47 and 45. Hence, the diagnosis formulated for 46 was pulp necrosis with asymptomatic apical periodontitis along with Glickman's Grade II furcation. The lesion showed primary endodontic and secondary periodontal involvement; thus, root canal treatment was initiated. The distal half of 46 was damaged but the periodontal support of the mesial root was good and thus, a conservative approach of hemisection was considered. As 47 had a MO Class II lesion, a hybrid-retained fixed dental prosthesis was planned.

Corresponding author:* **Patel Parth P
Department of Conservative Dentistry and Endodontics, K. M. Shah Dental College,
Sumandeep Vidyapeeth, Vadodara, Gujarat

Routine endodontic treatment (Phase 1- Endodontics) of the mesial root of 46 was carried out under rubber dam isolation. Post endodontic composite restoration was done in the mesial half (Figure1-C). In the second phase (Surgical), the periosteal elevator was utilised for flap reflection. A long-tapered fissure bur was used to section the distal root at the furcation level, and it was extracted atraumatically (Figure1-D). After two months, IOPA revealed a healing lesion and clinically good soft tissue healing (Figure1-E, 1-F).

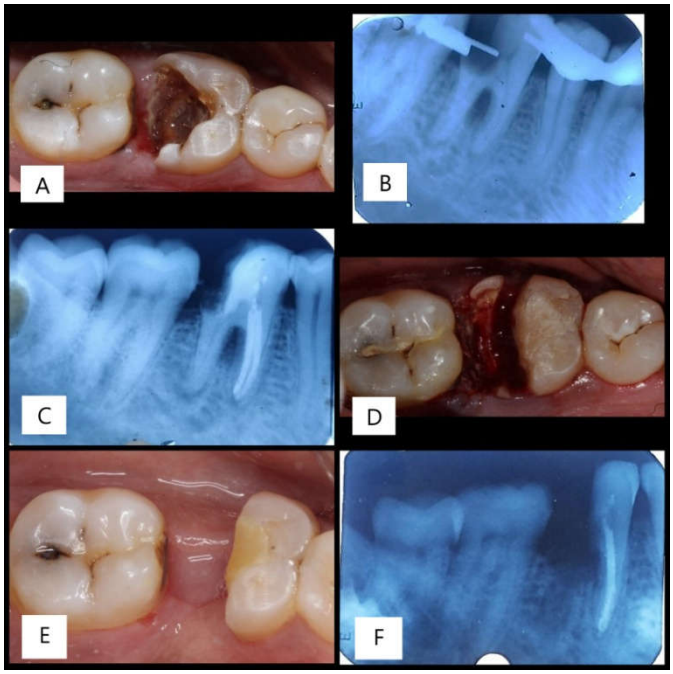

Figure 1 A – Pre-operative Clinical Photograph, B – Pre-operative radiographic view C – Post-obturation of mesial canals, D – Hemisection, E – Healing after 2 months, F – Radiograph after 2 months

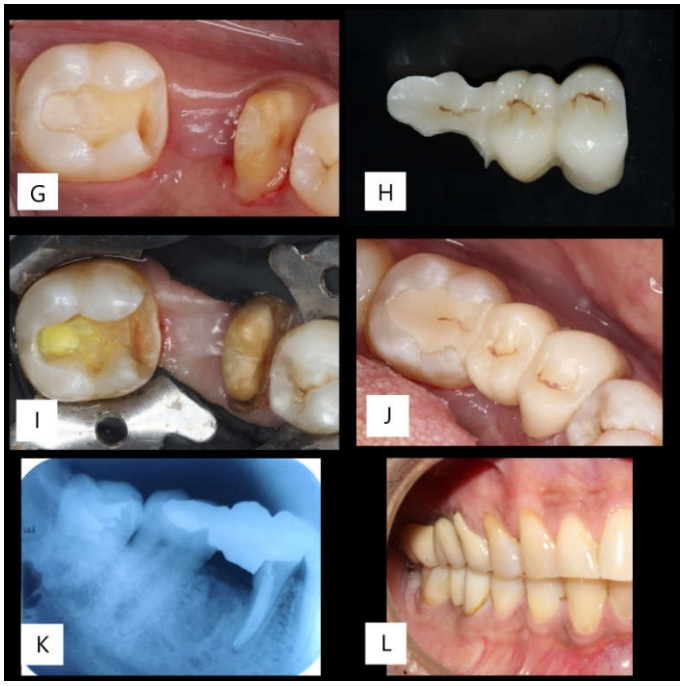

Figure 2 G – Tooth preparation, H – Hybrid-retained prosthesis, I – Isolation with split dam technique, J – Post-cementation, K – 6 months follow-up radiograph, L – Follow-up lateral view

In the third phase (Restorative), mesio-occlusal zirconia inlay preparation was designed with 47 with rounded internal line angles and point angles, occlusally divergent buccal and lingual walls, isthmus width, and occlusal clearance of 2-mm. Full-coverage crown preparation for the mesial half of 46 was carried out with shoulder finish margins (Figure2-G). Shade was selected using the vita 3D master guide. One-step putty-light body impression was made for the lower arch using an addition silicone material (gcflexceed, India). Cool Temp Natural (coltenewhaledent, Japan) was utilised for temporization. The inlay-retained prosthesis was fabricated with monolithic zirconia (Figure2-H). In the next appointment initially, a try-in of the prosthesis was done and occlusal high points were checked and corrected followed by glazing. Then, a split dam isolation technique was utilized with a heavy thickness rubber dam sheet (nictone, sanctuary, Malaysia) (Figure2-I). A universal bonding agent (solare, GC India) was applied followed by the application of universal self-adhesive resin cement (calibra, dentsplysirona, Canada) on the internal surface of the prosthesis and cemented on the teeth (Figure2-J). Follow-up after six months showed good aesthetic and functional integration of the monolithic inlay-supported fixed dental prosthesis (Figure2-K, 2-L).

DISCUSSION

Various treatment modalities for the management of furcation involvement include open flap debridement, osseous resection, regenerative procedure, and root resection (hemisection). Buhler advocated that hemisection should be taken into consideration before extraction of each molar as it issues a biological economical substitute with a long-term prognosis.[8] The main advantage is the conversion of furcation involved multirooted tooth into the non-furcated single-root tooth, which provides a favourable environment for oral hygiene maintenance.[9] Park established that hemisection can retain the teeth without a noticeable bone loss for a long period, if the patient has optimal oral hygiene.[10] Root canal therapy was performed first in this case, since, if the tooth was not endodontically treatable, the case would not have been indicated for hemisection.

In cases where abutment teeth have proximal caries, minimally invasive IRFDPs based on an adhesive approach may offer an alternative to the conventional prosthesis.[11] Conserving the tooth structure, preserving the pulpal health of abutment, more favourable margins for isolation, less susceptibility for gingival irritation are the advantages of IRFDPs.[12] The Kaplan-Meier survival rate for inlay-retained FDPs was 57% after five years and 38% after eight years, while for hybrid-retained FDPs it was 100% after five and 60% after eight years.[13] However, the usual causes of failure are debonding of the adhesive interface, inadequate bond strength values, framework fracture, and secondary caries on the abutment. Thus, zirconia was the material of choice for the fabrication of prosthesis, in this case, to avoid chipping and framework fracture. This material was chosen for an IRFDP rehabilitation owing to its stiffness and high fracture resistance. Zirconia-based materials utilised for IRFDPs exhibited superior mechanical than lithium disilicate glass-ceramic.[6]

CONCLUSION

The present case report demonstrates that hemisection coupled with an inlay-retained prosthesis may be a conservative treatment alternative in teeth with extensive decay and periodontal involvement.

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