Hemisection: A Conservative Approach to save a Tooth Doomed for Extraction

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ABSTRACT

Hemisection denotes removal or separation of root with its accompanying crown portion of mandibular molars. This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible. This case report describes the management of left mandibular first molar with subgingival caries involving mesial root and carious exposed 35. In this case, mesial root of 36 was removed and endodontic treatment was completed in 35 and in distal root of 36. Prosthetic rehabilitation was completed by metal ceramic fixed partial denture using 35 and distal root of 36 as abutment.

Keywords: Fixed partial dentures, Hemisection, Subgingival caries.

INTRODUCTION

Therapeutic measures that are taken to preserve a molar vary in complexity. In case of low edentulous interspersed area, bordered by multirooted teeth that are undergoing periodontal problems the root amputation is a viable solution to solve the issue, so that these teeth can be used as abutment teeth in a future dental bridge.

A terminal abutment molar with extensive decay may be unsuitable for restoration. In such cases, the treatment options are limited and may include a removable partial denture or a dental implant to replace the missing tooth. Alternatively, if the decay is limited to one root, a hemisection procedure may be possible. This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible.

Hemisection (removal of one root) involves removing significantly compromised root structure and the associated coronal structure through deliberate excision. There are various periodontal, endodontic and restorative indications for hemisection.

Periodontal indications include severe vertical bone loss involving only one root of multirooted teeth, when there is through and through furcation destruction, in cases unfavorable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas in teeth with severe root exposure due to dehiscence.

Endodontic and restorative indications include—mandibular molar with periodontal involvement within a fixed bridge, instead of removing the entire bridge, if the remaining abutment support is sufficient, the root of the involved tooth is extracted. In management of the roots of an endodontically involved tooth which cannot be instrumented, in cases of vertical fracture which involves one root while the other root is unaffected, the offending root may be amputated, tooth with severe destructive process due to furcation involvement or subgingival caries, traumatic injury and large root perforation during endodontic therapy.

The results of hemisection are predictable, and success rates are high if certain basic considerations are taken into account.

Apart from various indications, there are some limitations to this procedure like—poorly-shaped roots or fused roots, poor endodontic candidates or inoperable endodontic roots patient unwilling to undergo surgical and endodontic treatments and undertake the care or the resulting restoration.

The following clinical case will describe the management of left mandibular first molar with subgingival caries involving mesial root, by resecting the involved root and prosthetic management of the retained distal root.

CASE REPORT

A 35-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics at Institute of Dental Sciences, Bareilly. Patient presented with pain in her left lower back tooth region since 2 weeks. Extraoral examination did not show any
abnormality. Intraorally, all the teeth were present. Oral hygiene was very poor and significant amount of plaque and calculus were present. Tooth #35 and 36 were tender on percussion. Tooth #35 had deep dentinal caries and tooth #36 had subgingival caries wrt mesial root. When cold test was done, tooth #35 showed a lingering response and tooth #36 did not respond to the test.

Intraoral periapical radiograph revealed that the tooth #35 had caries approximating pulp chamber and tooth #36 with deep carious lesion involving mesial root and furcation (Fig. 1).

According to the clinical and radiographic findings, the treatment was divided into endodontic phase, periodontic phase and prosthetic phase.

Endodontic Phase
The root canal treatment was initiated by giving an inferior alveolar nerve block and placing a rubber dam. The access opening was done using around and a straight fissure diamond point (Mani) for both tooth #35 and #36. Root canal of tooth #35 and only distal canal of tooth #36 was negotiated by using a 10 no. K file (Dentsply). A working length radiograph was taken (Fig. 2) and canal preparation was completed using protaper files (Dentsply) according to the manufacturer’s instructions in tooth #35 and distal root of tooth #36 up to F3. A radiograph was taken to check the master cone fit (Fig. 3). Obturation of canals was completed by F3 cones using single cone obturation technique with AH plus sealer (Dentsply) (Fig. 4). Post space was prepared using peeso reamers (Dentsply) up to number 3 (Fig. 5) leaving 5 mm of gutta percha (GP) at the apex. Fiber post number 3 (Dentsply) was placed using multilink (Ivoclar Vivadent) and a core was built with luxa core Z dental milestones guaranteed (DMG), simultaneously a guide prep was prepared that indicated the area of furcation (Fig. 6). Patient was recalled after 1 week to perform periodontal phase.

Periodontal Phase
After appropriate local anesthesia, a crevicular incision was made from 1st premolar to 2nd molar region (Fig. 7). A full thickness mucoperiosteal flap was reflected to provide adequate access for visualization, instrumentation and to minimize surgical trauma.
Hemisection of the mesial root and crown was done with a vertical cut method faciolingually toward the bifurcation area (Fig. 8) with a long shank, tapered fissure carbide bur using guide prep as the starting point. Once the separation was complete, the mesial half was extracted using a straight elevator (Figs 9, 11 and 12). The socket was curetted and thoroughly irrigated along with root planning of distal root (Fig. 10). Odontoplasty was done to remove the developmental ridges and mesial aspect of distal root was contoured in such a way so as to facilitate oral hygiene measures, flap was reapproximated and sutured back into its position, the distal half of the tooth was ground out of occlusion which allowed the surgical site to heal with no occlusal stresses. Patient was then recalled for follow-up after 3 weeks and prosthetic phase was performed.

Prosthodontic Phase
After the complete healing of the extraction socket, tooth preparation was done in relation to 35 and distal root of 36 to receive a porcelain fused to metal restoration and the final impression was made using putty reline technique and master cast was obtained. A premolar-shaped ridge lap pontic was designed for esthetic reasons. Coping trial was done and fabrication of fixed partial denture (FPD) was completed (Fig. 13). Final prosthesis was cemented using glass ionomer cement type I (Fuji GC) (Figs 14 and 15) and postoperative instructions were given to maintain the
hygiene of that area. Occlusion was checked, radiographs were taken and patient was recalled for follow-up after 3 months.

**DISCUSSION**

The case discussed above had multiple factors that raised questions on the prognosis of tooth #36 and in addition as tooth #35 had to undergo prosthetic rehabilitation. Performing a hemisection procedure was considered as an appropriate treatment option as tooth #36 that could be offered to the patient.

Hemisection of multirooted teeth may be a viable treatment option when wide spread periapical lesion and bone loss reaching furcation has occurred at one root and
the other root is healthy. Bühler stated that hemisection should be considered before every molar extraction, because it provides a good, absolute and biologic cost saving alternative with good long-term success.\textsuperscript{10,11} Before selecting a tooth for hemisection, patient’s oral hygiene status, caries index and medical status should be considered. Also, the accessibility of root furcation for ease of operation as well as good bone support for the remaining roots should be assessed. The furcation region is carefully smoothed, to allow proper cleansing, and thus to prevent accumulation of plaque.\textsuperscript{12}

It is important to consider the following factors before deciding to undertake any of the resection procedures:

- Advanced bone loss around one root with acceptable level of bone around the remaining roots.
- Angulation and position of the tooth in the arch. A molar that is buccally, lingually, mesially or distally tilted, cannot be resected.
- Divergence of the roots—teeth with divergent roots are easier to resect. Closely approximated or fused roots are poor candidates.
- Length and curvature of roots—long and straight roots are more favorable for resection than short, conical roots.

By performing hemisection procedure, distal root and crown portion of 36 was preserved, secondly it was conservative approach toward tooth #37 by saving it from undergoing unnecessary tooth reduction for use as an abutment.

CONCLUSION

Hemisection is a conservative approach to remove the diseased part and to leave the healthy part of tooth instead of its extraction. It also provides good crown root ratio and protects the adjacent tooth from being used as an abutment. If the case selection is ideal, the prognosis depends upon the success of all endodontic, periodontal and prosthetic treatment.

REFERENCES

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