

## Hemisection For The Management Of Periodontically Compromised Mandibular Molar (Advanced Grade-III Furcation Involvement)

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**Abstract:** Advances in dentistry, as well as the increased desire of patients to maintain their dentition, have lead to treatment of teeth that once would have been removed. The treatment, management and long-term retention of mandibular molar teeth exhibiting furcation involvement always have been a challenge, especially when the furcation involvement has progressed to a class III furcation. Hemi-section of the affected tooth helps preserve the tooth structure. This case report describes a simple procedure for hemisection in mandibular molar having advance grade III furcation involvement by vertical cut method and its subsequent restoration. [Joshi S et al NJIRM 2013; 4(1) : 147-153]

**Key Words:** Grade III furcation involvement, hemisection, mandibular molar

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**Introduction:** Advances in dentistry have provided the opportunity to maintain a functional dentition for a lifetime. Hemisection involves removing significantly compromised root structure particularly in multirouted teeth and the associated coronal structure through deliberate excision.<sup>1</sup> It is indicated where one of the root of molar is unsalvageable due to caries, periodontitis, or iatrogenic mishaps. It is thus a conservative option with acceptable prognosis.<sup>2</sup> This treatment may include endodontic therapy, periodontal therapy, tooth reconstruction, and prosthetic coverage so that the teeth are retained in whole or in part for longer time. Continued periodontal breakdown may lead to total loss of tooth unless these defects are repaired or eliminated and health of the tissues restored. Thus post treatment these teeth can be used as individual unit or can be used as an abutment for fix prosthesis which can restore the masticatory function. So this is a kind of conservative procedure which preserves tooth structure as much as possible and retains at least a part the tooth rather than extraction of the whole tooth.<sup>3</sup>

**Case Report:** A 30 years old male reported to the department of periodontics with the chief complaint of mobility and migration of lower anteriors since 7 months, with pain and swelling in lower left mandibular 1<sup>st</sup> molar since 4 months.

On clinical examination, it was diagnosed as chronic generalized periodontitis, particularly the mandibular left 1<sup>st</sup> molar was sensitive to percussion, and revealed grade II mobility. On

probing the area, there was a 13 mm deep periodontal pocket on distobuccal aspect of the tooth measured with UNC 15 periodontal probe, with grade III furcation involvement according to Glickman measured with Nabers probe.

On radiographic examination, severe vertical bone loss was evident surrounding the distal root involving the furcation area. (Figure 2 & 13)

The probing pocket depth around the mesial root was 6 mm. So after phase I therapy (Figure 2) followed by extraction of upper left central incisor, and lower both central incisors and assessing all the parameters for hemisection like root divergence, root form, location of furcation, remaining root attachment<sup>3,4</sup>, it was planned to hemisect the distal root along with its crown after completion of endodontic treatment.

The canals were obturated with lateral condensation method and the chamber was filled with composite to maintain a good seal and allow interproximal area to be properly contoured during surgical separation.

Under local anesthesia, full thickness flap was reflected after giving a crevicular incision from mesial of 1<sup>st</sup> premolar to distal of 2<sup>nd</sup> molar (Figure 4). Upon reflection of the flap, the crater like bony defect along the distal root became quite evident (Figure 4). All granulation tissue was removed with Gracey curettes to assess positive bony defect around the root. The vertical cut



Figure 1- showing clinical condition before phase I



Figure 2-OPG



Figure 3-post scaling excluding upper left and lower right and left central incisor



Figure 4-bony defect upon flap reflection



Figure 5-after sectioning periodontal probe placed at that site.



Figure 6-distal half of the molar extracted.



Figure 7-extracted half of the molar



Figure 8-flap sutured at desired position.





Figure 9-after healing.



Figure 10-after preparation of teeth for prosthesis.



Figure 11-after cementation of prosthesis.



Figure 12-prosthesis in occlusion.

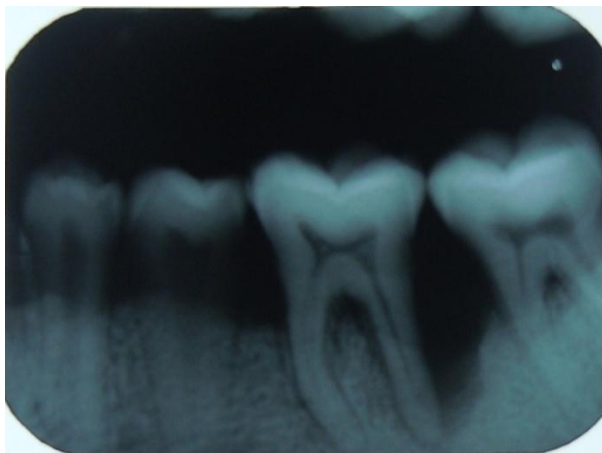


Figure 13-preoperative IOPA for tooth planned for hemisection.



Figure 14-post operative IOPA of only mesial half of tooth with bone graft on distal root socket.

method was used to resect the crown with distal root. A long shank tapered fissure carbide bur was used to make vertical cut toward the bifurcation

area. A fine probe was passed through the cut to ensure separation (Figure 5). The distal half was extracted (Figure 6, 7) and the socket was irrigated

adequately with sterile saline . Scaling and root planning of the root surfaces, which became accessible on removal of distal root was done. The extraction site was irrigated and debrided . The bony defect was grafted with hydroxyapatite bone graft having particle size 0.25 to 1mm (ossifi). Then the flap was repositioned and sutured with 3/0 black silk sutures(Figure 8). The occlusal table was minimized to redirect the forces along the long axis of the mesial root.

After 3 months healing of the tissues, and assessing probable probing depth, mobility and distal socket bone fill , fixed bridge involving retained mesial half and mandibular second molar with sanitary pontic was given(Figure 11).

**PROSTHETIC PHASE :** Teeth with a resected root or roots may be restored in a variety of ways<sup>5,6</sup>. They may be involved in a treatment plan as single units, as fixed or removable dental prosthesis abutments, or as vertical stops for an overdenture. The most common types of restorations for teeth with resected roots involve the following:

- The remaining root restored as an individual tooth
- The tooth used as an abutment for a fixed or removable partial denture.

Premolarization: Individual roots of a molar restored with premolar morphology.

Minimum treatment: amalgam placed in the root or roots and occlusion adjusted.<sup>7</sup> Tooth preparation was done in relation to mesial root of mandibular left 1<sup>st</sup> molar and mandibular left 2<sup>st</sup> molar to receive a 3 unit metal bridge (Figure 10).<sup>8</sup> The Tooth preparation margins were chamfer finish line and placed supragingivally to help in maintenance of gingiva by making it self-cleansable.<sup>5,9,10</sup> Final impression was made using putty-reline technique and master cast was obtained. Final prosthesis was cemented using Glass ionomer cement. Post cementation instructions regarding periodontal maintenance were given. Recall was done periodically to assure the healing and success of the restoration.

Few tips for construction a prosthesis over hemisectioned tooth: When a root has been removed from the tooth, both the tooth preparation and the contours of the crown will be different because of the altered tooth shape.<sup>10-12</sup> Occlusal interferences should be corrected first otherwise destructive masticatory forces will ultimate lead to abutment failure whose periodontal support is already compromised by furcation defects.<sup>8</sup> Occlusal table is reduced in size in order to decrease the forces on the retained hemisected root. Cuspal inclines are made less steep to reduce laterally directed forces and eliminate the non-working contacts.<sup>1,13</sup> Retained root is restored as premolar which helped to reduce the masticatory load. Preparation margins should be placed supragingivally or equigingivally to maintain the healthy gingiva. Proximal contact points should be placed comperatively more occlusally to creat wide embressures so that they will be easily clean by Proxabrush.<sup>1,14,15</sup> Gingival contact of restoration should be minimal and pontic design ideally should be sanitary in nonesthetic regions or else conical pontic should be used to reduce the contact area. The open interproximal areas and flat emergence profiles from the gingival area allows optimum oral hygiene and assist in the preservation of gingival health.<sup>5,10</sup>

Discussion: Furcation involvement is defined as-invasion of bifurcation and trifurcation of multirooted teeth by peridontal disease.

Glossary of periodontal terms (AAP 1992) defines- Furcation invasion as the "pathologic resorption of bone within a Furcation".

Glickman in 1953 classified furcation involvement into four grades<sup>16</sup>

Grade I: A grade I furcation involvement is the incipient or early stage furcation involvement. The pocket is only suprabony and primarily affects the soft tissue. Early bone loss may have occurred with an increase in probing depth, but radiographic changes are not usually found.

Grade-II: Affects one or more of the furcation of the same tooth. Furcation lesion essentially is a cul-de-sac. Loss of inter radicular bone & pocket

formation of varying depths into the furcation but not completely through the opposite side of the tooth. This is radiographic evidence of involvement.

Grade-III: Complete loss of inter-radicular bone with radiographic evidence presenting a small triangular radiolucency at the furcation area. There is a pocket formation that is completely probable to the opposite side of the tooth. However, the furcation is not visible clinically.

Grade-IV: Same features as those of Grade III except that loss of periodontal attachment & gingival recession has made the furcation clearly visible to a clinical examination.

A guiding principle should be to try and maintain what is present.<sup>17</sup> Weine<sup>18</sup> has listed the following indications and contraindications for tooth resection

#### Indications

Periodontal Indications:

1. Severe vertical bone loss involving only one root of multi-rooted teeth.
2. Through and through furcation destruction.
3. Unfavourable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas.
4. Severe root exposure due to dehiscence.

Endodontic and Restorative Indications:

Prosthetic failure of abutments within a splint: If a single or multirooted tooth is periodontally involved 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.

Endodontic failure: Hemisection is useful in cases in which there is perforation through the floor of the pulp chamber, or pulp canal of one of the roots of an endodontically involved tooth which cannot be instrumented.

Vertical fracture of one root: The prognosis of vertical fracture is hopeless. If vertical fracture traverses one root while the other roots are unaffected, the offending root may be amputated.

Severe destructive process: This may occur as a result of furcation or subgingival caries, traumatic

injury, and large root perforation during endodontic therapy.

#### Contra indications

- a. Strong adjacent teeth available for bridge abutments as alternatives to hemisection.
- b. Inoperable canals in root to be retained.
- c. Root fusion-making separation impossible.

The clinician's decision to choose one treatment plan over another when confronted with a Class III furcation of a mandibular molar is influenced by many factors. These may be enumerated in three areas:<sup>19</sup>

- a) Local factors-tooth anatomy, tooth mobility, crown:root ratio, severity of attachment loss, interarch and intra-arch occlusal relationship, strategic dental value for retention or removal;
- b) Patient factors-systemic health/host resistance, emotional value of the tooth to the patient, involvement and commitment in time and money;
- c) Clinician factors-diagnostic and treatment planning skills, awareness of therapeutic options and clinical acumen or skill in providing service.

According to Newell<sup>9</sup>, the advantage of the amputation, hemisection or bisection is the retention of some or all of the tooth. However, the disadvantage is that the remaining root or roots must undergo endodontic therapy and the crown must undergo restorative management. Hemisection has been used successfully to retain teeth with furcation involvement. However, there are few disadvantages associated with it. As with any surgical procedure, it can cause pain and anxiety. Root surfaces that are reshaped by grinding in the furcation or at the site of hemisection are more susceptible to caries. Often a favorable result may be negated by decay after treatment. Failure of endodontic therapy due to any reason will cause failure of the procedure. In addition, when the tooth has lost part of its root support, it will require a restoration to permit it to function independently or to serve as an abutment

for a splint or bridge. Unfortunately, a restoration can contribute to periodontal destruction, if the margins are defective or if non-occlusal surfaces do not have physiologic form. Also, an improperly shaped occlusal contact area may convert acceptable forces into destructive forces and predispose the tooth to trauma from occlusion and ultimate failure of hemisection.

Often a favourable result may be abolished by decay after treatment. Failure of endodontic therapy due to any reason can lead to failure of the procedure. In addition, when the tooth has lost part of its root support, it will require a restoration to permit it to function independently or to serve as an abutment for a splint or bridge. Since hemisection teeth fail by root fracture, it is important to treat them adequately by an extracoronary restoration.<sup>20</sup>

Buhler<sup>21</sup> reported a 32% failure rate at 10 years on 34 resected molars. Again, the main causes of failure were endodontic pathology and root fracture, while only one tooth was extracted due to periodontal breakdown. The same failure rate was found by Blomlof et al.<sup>22</sup> in a follow-up three to 10 years later.

Park et al.<sup>19</sup> have suggested molars that are having questionable prognosis can maintain the teeth without detectable bone loss for a long-term period by hemisection but patient should maintain a good oral hygiene.

Bühler<sup>21</sup> stated that hemisection should be considered before every molar extraction, because this procedure can provide a good absolute biological cost savings with good long term success.

**Conclusion:** If furcation involvement has advanced to grade II or grade III, possible therapeutic strategies should include resective treatment. The case report shows the treatment of a periodontally compromised tooth by multidisciplinary treatment approach. The success of the tooth with hemisection depends on the supporting bone, the restorative treatment plan, and the oral hygiene of

the patient. Regular periodontal maintenance and sufficient coronal restoration of the root resected teeth are important precondition for long term survival. Hemisection is an important treatment in the field of dentistry which will help in increasing desire to retain natural teeth.

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