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HEMISECTION"- A VIABLE WEAPON IN THE EFFECTIVE MANAGEMENT OF INTERDISCIPLINARY CASES FOR THE DENTAL SURGEON

Dental Science

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ABSTRACT

Advances in dentistry, as well as the increased desire of patients to maintain the longevity of their dentition, have lead to treatment of teeth that once would have been removed. This article describes about the successful management of hemisection of a mandibular molar and its subsequent restoration. It is a conservative approach aiming to retain as much original tooth structure as possible against the option of extraction of the natural tooth. In addition, this case report sheds little light on the significance of mini implants in orthodontic anchorage in interdisciplinary cases.

KEYWORDS

endodontic failure, hemisection, interdisciplinary approach, mini implants, resective procedure

Introduction:

The various interventional, therapeutic measures performed in order to retain tooth structure on the whole or partly, are complex in nature and may involve an interdisciplinary approach combining various aspects of restorative dentistry, endodontics, orthodontics and periodontics. Such teeth can function as independent units of mastication or as abutments in simple fixed bridges [1].

The term 'tooth resection' refers to the excision and removal of any segment of the tooth or a root with or without its accompanying crown portion. This procedure provides an opportunity to remove the infected part, thereby preserving the relatively healthy tooth portion, while maintaining the dental integrity within the socket [2]. Various methods of resection described are: root amputation, hemisection, radisection and bisection. Root amputation involves the removal of one or more roots of multirooted teeth whilst the other roots are kept intact. Hemisection (splitting into two) denotes removal or separation of root with its accompanying crown portion of lower molars. Radisection is a terminology used to denote the removal of the roots of maxillary molars. Bicuspidization/bisection is the separation of distal and mesial roots of mandibular molars along with its adjoining crown portion, where both segments are later retained individually [3].

Weine listed the following indications for tooth resection [3]:

Endodontic and restorative indications:

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

2) Vertical fracture of one root: The prognosis of vertical fracture is poor. If vertical fracture involves a root in the absence of other roots being affected, the offending root may be removed.

3) Severe destructive process: This may be a result of subgingival caries or furcation, traumatic injury, and large root perforations during endodontic therapy.

4) Prosthetic failure of abutments within a splint: If the periodontium of a single or multirooted tooth within a fixed bridge is compromised, then the root of the involved tooth is extracted, instead of removing the entire bridge, provided that the remaining abutment support is sufficient.

Periodontal indications:

1) Severe vertical bone loss involving only a single root of multi-rooted teeth.
2) Unfavourable proximity of roots of adjacent teeth, compromising adequate oral hygiene maintenance in proximal areas.
3) Through and through furcal destruction.
4) Severe root exposure due to dehiscence/fenestration.

Contraindications:

1. Improperly shaped roots or fused roots.
2. Inoperable endodontic roots with poor prognosis.
3. Patient apprehensive to undergo surgical and endodontic treatments.

With recent refinements in endodontics, periodontics and restorative dentistry, hemisection has received a universal acceptance as a conservative dental treatment for a tooth with poor prognosis [4]. Here, we report an interesting case, highlighting the ideal indication for hemisection of a lower right mandibular molar, thereby simplifying future orthodontic therapy with the use of mini implants for deriving anchorage.

Case Report:

A 32 year old female patient was referred to the Department of Conservative Dentistry and Endodontics with the chief complaint of occasional pain and sensitivity in her right lower back tooth region. Additionally, the patient was also concerned with the unesthetic

appearance of her proclined upper front teeth associated with spacing (Figure 1). Her past dental history suggested previous history of root canal treatment and few uneventful extractions (Figure 2). Her medical history was noncontributory. On intraoral examination, 46 was tender on percussion and showed grade I mobility. Intra oral periapical radiograph (IOPA) in relation to 46 revealed a periradicular radiolucency surrounding the mesial root associated with the over extrusion of previous root canal filling material (Figure 3). Obturation in distal root was satisfactory with no evidence of periapical rarefaction. Thus, it was diagnosed as persistent symptomatic periapical periodontitis associated with the previously root canal treated lower right molar. Radiographic investigations including, orthopantamogram and lateral cephalogram revealed a class I malocclusion with bimaxillary protrusion associated with maxillary anterior spacing (Figure 2 and Figure 4). Treatment options included extraction of 46, followed by placement of implant, a fixed partial denture or a removable partial denture. As the patient did not wish to have the tooth removed and was also concerned with the correction of malocclusion, a conservative treatment was formulated, which included hemisection of the mesial root of 46, followed by prosthetic replacement and orthodontic fixed mechanotherapy using micro implants to derive anchorage for correction of the malocclusion. Under local anesthesia, a mucoperiosteal flap was reflected after giving a crevicular incision from first premolar to the distal aspect of first molar to expose the area of interest (Figure 5). A simple vertical cut method was used to resect the crown (Figure 6). A long shank tapered fissure carbide bur was used to make a vertical cut towards the bifurcation area. A fine probe was passed through the cut to ensure separation. The mesial root was then atraumatically extracted and the socket was irrigated adequately with sterile saline to remove the bony chips and amalgam debris (Figure 7). The furcation area was then trimmed to ensure that no spicules were present to cause further periodontal irritation. Scaling and root planning of the root surfaces was also done, which became easily accessible on removal of mesial root (Figure 8). The extraction site was then irrigated and debrided and the flap was then repositioned and sutured with 3-0 black silk sutures (Figure 9) and a periodontal dressing was placed. Antibiotics and analgesics were prescribed for a week. The immediate post-operative IOPA is shown in Figure 10. The sutures were removed later following 10 days. The patient was monitored on a weekly schedule, postoperatively, to ensure good oral hygiene in the surgical area (Figure 11). Orthodontic therapy was then initiated with the placement of micro implants following a month follow up (Figure 12). Crown preparation followed by fabrication of acrylic temporary crowns were done in relation to 36 and hemi-sectioned 46 (Figure 13). The permanent crowns were planned after the end of the orthodontic treatment and the patient was advised frequent follow ups.

Discussion:

Dentistry in today's era is based on conservation. The aim of any treatment modality is to preserve the natural dentition, provided adequate periodontic, prosthetic, and endodontic assessment for appropriate selection of cases are taken into consideration. Loss of the posterior teeth, especially mandibular first molars is eventful and undesirable often leading to problems like teeth drifting, loss of masticatory function and decrease in arch length, which requires prevention and maintenance measures [5].

The root resection procedures are beneficial in preserving as much tooth structure as possible, in a tooth involving peri-furcation infection as opposed to a conventional endodontic therapy that has delayed and/or questionable prognosis in such teeth. Other treatment options include extraction and subsequent prosthetic rehabilitation. Hemisection is an alternative, effective, and conservative treatment modality over conventional procedure or extraction of periodontally and/or endodontically affected teeth.

Six biological factors that lead to asymptomatic periapical radiolucencies following root canal therapy include: i) Persistent intraradicular infection in the complex apical root canal system; (ii) extraradicular infection, generally in the form of periapical actinomycosis; (iii) extrusion of root canal filling or other exogenous materials that cause a foreign body reaction; (iv) accumulation of endogenous cholesterol crystals that irritate periapical tissues; (v) true cystic lesions, and (vi) scar tissue healing of the lesion [6]. In the present study, hemisection was preferred due to the presence of persistent periapical periodontitis affecting the mesial root of 46 due to failed root canal therapy associated with the over extruded filling. However, the distal root canal obturation was satisfactory without any periapical rarefaction. In addition, inadvertent extraction of the mandibular first premolar is also avoided which was in due for the correction of malocclusion by orthodontic therapy that is to be followed later.

A careful literature review reveals that the distal root resection is quite limited as compared to that of its mesial counterpart in mandibular molars because of its anatomical structure [7,8]. It is also better to retain the distal root in cases of lower molar hemisection due to the following factors [9]: a) large distal root endowed with a large surface area, provides a greater mass of dentin to resist root fracture; b) wide distal canal may favour post placement, if necessary; c) when resected molar is a terminal abutment, retention of distal root might facilitate the maintenance of a longer dental arch. Nevertheless, hemisection is a viable option to be considered before the extraction of molars specially in the presence of conditions such as severe vertical bone loss (one root of a multi-rooted tooth), unfavorable proximity of roots of adjacent teeth, preventing adequate hygiene in maintenance of proximal areas, furcation destruction and severe root exposure due to dehiscence [3]. Endodontic/restorative conditions which requires hemisection are endodontic failures, prosthetic failure of piers or abutments within a splint, non-restorable portion and vertical fracture of a single root in a multi-rooted tooth [3].

It has been reported in a systematic review that the success rates of surgical resective procedures including amputations and hemisections range from 62-100% with an observation period of 5–13 years [11]. However, the long term prognosis for teeth with hemisections may depend upon the quality of root canal therapy in retained root, final contouring and quality of post endodontic restoration and the ability of the patient to maintain adequate periodontal health. Also, the hemisection procedure comes with its own disadvantages: a) As with any surgical procedure, it can cause pain and anxiety to the patient; b) 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 following treatment. c) Unfortunately, a restoration can contribute to periodontal destruction, if the margins are defective or if, non-occlusal surfaces do not have adequate physiologic form; d) 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.

In the current case, post endodontic restoration was done followed by fabrication of acrylic crown w.r.t hemisectioned 46. Later, orthodontic therapy was initiated with the placement of mini implants for the management of bimaxillary protrusion and the treatment is still under progress.

Osseointegrated implants are considered reliable sources of anchorage for orthodontists [12,13]. However, the large size of these implants limits their extensive usage. To overcome this problem, mini-implants were developed [14]. Their advantages, in addition to size, include minimal anatomic limitations, minor surgery, increased patient comfort, immediate loading, and lower costs [12,15]. Hence, mini implants were employed to derive anchorage in the current case study.

Conclusion:

The key to long term success appears to be thorough diagnosis followed by interdisciplinary approach with endodontic, surgical and prosthetic procedures. Preservation of a hopeless tooth is possible by selecting patients with good oral hygiene, and careful surgical and restorative management. Hence, hemisection procedure should be considered as a viable weapon for the dental surgeon, determined to retain and not to remove the natural teeth.

Figure 1

Figure 2

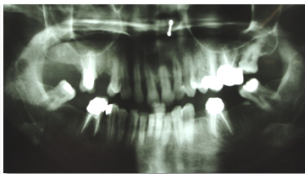

Figure 3

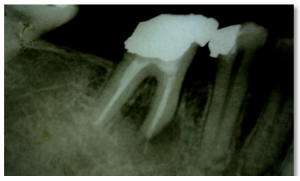

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

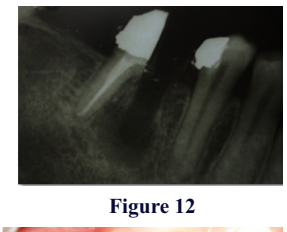

Figure 11

Figure 12

Figure 13

Figure Legends:
Figure 1: Preoperative
Figure 2: Orthopantamogram
Figure 3: Preoperative IOPA depicting persistent periapical radiolucency in the mesial root of 46 associated with extruded guttapercha
Figure 4: Lateral Cephalogram revealing bimaxillary protrusion
Figure 5: Surgical incision and full mucoperiosteal flap elevation
Figure 6: Vertical cut placement
Figure 7: Atraumatic extraction of mesial root following complete splitting of 46
Figure 8: Removal of bony chips followed by socket cleaning
Figure 9: Flap approximation
Figure 10: Immediate postoperative IOPA
Figure 11: Healing after a week
Figure 12: Initiation of orthodontic therapy with anchorage derived from mini implants in place
Figure 13: Postoperative with acrylic crown placement in 46

References:

1. Basaraba N. Root Amputation and tooth hemisection. Dent Clin of N Amer 1969;13:121.
2. Shah N, Gupta YK. Endodontic miscellany: Hemisection and full coverage to relieve crowding and lingual displacement of pulpo-periodontally involved mandibular first molar. Endodontol 2000;12:1283-1285.
3. Weine FS. Endodontic Therapy, 5th ed. ST. Louis: Mosby;1996
4. Kost WJ, Stakiw JE. Root amputation and hemisection. J Can Dent Assoc 1991;57:42-45.
5. Behl AB. Hemisection of a multirooted tooth - A case report. Open Access Sci Rep 2012;1:1–3.
6. Nair PN. On the causes of persistent apical periodontitis: a review. Int Endod J 2006;39:249-281.
7. Saad MN, Moreno J, Crawford C. Hemisection as an alternative treatment for decayed multirooted terminal abutment: A case report. J Can Dent Assoc 2009;75:387–90.
8. Shafiq MK, Javaid A, Asaad S. Hemisection: an option to treat apically fractured and dislodged part of a mesial root of a molar. J Pak Dent Assoc 2011;20:183–186.
9. Langer B, Stein SD, Wagenberg B. An evaluation of root resections. A ten year study. J Periodontol 1981;52:719-722.
10. Shah S, Modi B, Desai K, Duseja S. Hemisection – A conservative approach for a periodontally compromised tooth – A case report. J Adv Oral Res 2012;3:31–35. Huynh-Ba G
11. Kuonen P, Hofer D, Schmid J, Lang NP, Salvi GE. The effect of periodontal therapy on the survival rate and incidence of complications of multirooted teeth with furcation involvement after an observation period of at least 5 years: a systematic review. J Clin Periodontol 2009;36:164-176.
12. Roberts WE, Helm FR, Marshall KJ, Gongloff RK. Rigid endosseous implants for orthodontic and orthopedic anchorage. Angle Orthod 1989 Winter;59:247-256.
13. Odman J, Lekholm U, Jemt T, Branemark PI, Thilander B. Osseointegrated titanium implants – a new approach in orthodontic treatment. Eur J Orthod 1988;10:98-105.
14. Kanomi R. Mini-implant for orthodontic anchorage. J Clin Orthod 1997;31:763-767.
15. Fritz U, Ehmer A, Diedrich P. Clinical suitability of titanium microscrews for orthodontic anchorage – preliminary experiences. J Orofac Orthop 2004;65:410-418.