



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2024; 10(2): 18-20
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www.oraljournal.com
Received: 02-02-2024
Accepted: 10-03-2024

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Orthodontic-endodontic treatment planning of traumatized tooth: A review

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DOI: <https://doi.org/10.22271/oral.2024.v10.i2a.1918>

Abstract

An orthodontic patient is prone to accidentally traumatizing a maxillary anterior teeth during treatment. Sometime trauma is so severe it can cause pulpal necrosis, avulsion, nonvitality, ankylosis etc. of teeth. If tooth become nonvital and the root not fully developed and there is open apex, Apexification is indicated to close the apex. Avulsed tooth that has been replanted undergoes sometimes undergo resorption or may be ankylosed. Ankylosed tooth may further hamper growth of alveolar process and sometimes hamper facial growth. So the purpose of this article is to evaluate the interdisciplinary approach of endodontics and orthodontics for the treatment of traumatized anterior teeth. Root canal treated teeth can undergo orthodontic treatment as readily as teeth with vital pulps. If root canal treatment of immature tooth is required during orthodontic treatment, it is advocated that the root canals be prepared and an interim dressing is placed and Root Canal Obturation is done on completion of orthodontic treatment.

Keywords: Trauma, ankylosis, alveolar process

Introduction

Trauma in early adolescent age group is a common occurrence^[1, 2]. It poses challenging task for orthodontist to manage these type of patients, as during this age group apexes of certain teeth have not been completely formed^[3]. Trauma to teeth also poses problems like ankylosis of teeth, external resorption, non-vitality of teeth, injury to periodontium etc.^[4-8].

Children are more prone to experience traumatic dental injuries between age group of 8 to 12 years of age^[9-11]. Frequency of dental injuries among boys is 2 times as compared to girls. The high incidence of dental injury occurs between the age group of 8 to 10 years. The prevalence and increased incidences of dental injuries to children often overlap with the ideal age group for initiating orthodontic treatment, therefore orthodontic treatment planning must keep in consideration the effect of trauma on the growing dentoalveolar region and the success of endodontic treatment for teeth which are undergoing orthodontic treatment^[12].

Facial trauma can lead to various types of injuries to the teeth and the surrounding alveolar bone. Most common dental injuries to tooth are avulsion and pulpal necrosis. In this article interdisciplinary approach of endodontics and orthodontics for treatment of ankylosed replanted teeth and apexification will be discussed. So this article is trying to make complete review of management of such type of cases with the role of endodontics in management of traumatized teeth undergoing orthodontic treatment.

Ankylosed replanted teeth treatment

Reimplanted avulsed tooth becomes sometimes ankylosed and poses a problem for orthodontic tooth movement. An ankylosed tooth may cause a large alveolar ridge defect or minimal effect on growth of alveolar bone. It is possible for a clinician to predictably intervene I and augment formation of alveolar ridge defect. An avulsed teeth faces a problem of ankylosis after replantation. There is restricted development of the alveolar process with respect to ankylosed tooth. The alveolar process may not be well developed in that area^[12].

The amount of alveolar process defect varies on the amount of growth left after ankylosis. It is challenging job for an orthodontist to determine the right age for removal of reimplanted ankylosed tooth, to maximize alveolar process formation and also allow the tooth to function as a space maintainer for prevention of space loss. Best time for extraction of an ankylosed tooth is the beginning of the accelerating phase of adolescent growth spurt that help maintaining alveolar process height and also allows the tooth to act as a space maintainer.

Determining the best time for extraction of the ankylosed tooth is also important to be understood. Timing of growth spurts in males and females vary. The timing of adolescent growth spurt is 8 to 13 years of age in girls and 10 to 15 years in boys [13]. Therefore, as the child attains adolescent age groups, investigation such as Lateral Cephalogram and Hand wrist Xray should be taken to find out growth status of patients. The Information gathered from these investigation can provide information about the timing of onset of acceleration phase of adolescent growth spurt is and amount of growth to left. After knowing the growth status, an orthodontist can determine the exact timing for tooth extraction or the tooth should be retained [14].

There are chances of replacement resorption in roots of ankylose teeth. There is progressive resorption of the root in replacement resorption which is then replaced by bone.

To maintain the height of alveolar process, Malmgren *et al.* [15] had described procedure in which only the crown portion of teeth is extracted and the ankylosed root is not extracted. The idea of doing this is to maintain the height and width of the alveolar bone intact as resorbed root is replaced by bone. Advantage of following this procedure is that as bone height and width are maintained it gives natural appearance to restored prosthesis. The incidence of replacement resorption is quite variable [16]. It has been reported in literature that about 50% of the ankylosed replanted teeth are retained for period of about 10 years [17-19].

Apexification and Orthodontic Tooth Movement

Necrotic pulp in an immature tooth can lead to incomplete formation of root. This leads to root with a wide-open apex and large root canal. The absence of apical stop makes root canal treatment and obturation impossible and less successful. Apexification is defined as procedure of inducing a calcified apical barrier in a pulp less tooth. It has now become now a common procedure in endodontics. In Apexification following materials can be used- calcium hydroxide, mineral trioxide aggregate, tricalcium phosphate, dentin chips, calcium phosphate ceramics and bone morphogenetic proteins to fill an open apex root canal and induce formation of root apex [20].

Time taken by Apexification to form apical barrier is about 6 to 24 months. Sometimes timing of Apexification overlap with that orthodontic treatment initiation. Therefore by delaying orthodontic treatment, orthodontist might not harness complete growth potential and may lead to compromised orthodontic treatment [21].

There is common question which is frequently asked, whether the orthodontic tooth movement hinders the formation of root apex in a tooth undergoing an apexification procedure. The teeth having wide open apices and periapical pathology had shown to have formed apical barrier after undergone Apexification treatment in patients undergoing orthodontic treatment [22]. The pre-orthodontic and post-orthodontic cephalometric superimposition and comparison had shown

that in the maxillary central incisors which had undergone the apexification process, the apical barrier was formed successfully [22-24].

Anthony *et al.* [24] reported a successful apexification procedure during orthodontic treatment. It was seen that inspite of ongoing resorption and apposition that takes place during orthodontic tooth movement a calcific barrier was formed at root apex. It was also concluded that, a tooth undergoing apexification and orthodontic movement simultaneously are not prone to apical resorption, which is similar to findings of Spurrier *et al.* [25] who concluded that root canal treated mature incisors resorbed significantly less than vital incisors.

Patients having open apex undergoing apexification are prone to fracture. According to Cvek *et al.* [26] frequency of cervical root fracture in teeth with a wide, open apex and completely formed root is about 28%. The frequency of cervical fracture is upto 77% Teeth in teeth having a divergent apical opening and half formed root. Even though the chances of cervical fracture in teeth which had undergone apexification is high, advantage is that it preserves the developing alveolar process and act as a space maintainer and help in preserving the natural appearance of the site.

Conclusions

There is no difference in orthodontic tooth movement in endodontically treated teeth and teeth having vital pulp. If immature teeth requires root canal treatment during orthodontic treatment, it is recommended that the root canals are prepared, canals cleaned, disinfected and an interim dressing placed. The tooth should be restored temporarily so that no bacterial leakage takes place. Root Canal Obturation is done on the completion of orthodontic tooth movement.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Karad A. Clinical orthodontics. Current concepts, goals, and mechanics. (ed. 2). India: Elsevier; c2014.
2. Kharbanda OP. Orthodontics. Diagnosis and Management of Malocclusion and dentofacial deformities. (ed. 3). India: Elsevier; c2019.
3. Roblee RD. Interdisciplinary dentofacial therapy. In: Roblee RD. Comprehensive approach to optimal patient care. Quintessence publishing; c1994. p. 17-43.
4. Proffit WR, Fields HW. Orthodontic treatment planning: from problem list to final plan. In: Proffit WR, ed. Contemporary orthodontics. 2nd Edition; c1992. p. 186-224.
5. Newman GM, Takei H, Klokkevold RP, Carranza AF. Carranza's Clinical Periodontology 10th edition Pg 115.
6. Clark AB, Sims MR, Leppard PI. An analysis of the effect of tooth intrusion on the microvascular bed and fenestrae in the apical periodontal ligament of the rat molar. Am J Orthod Dentofacial Orthop. 1991;99(1):21-29.
7. Zachrisson HB. Gingival conditions associated with orthodontic treatment. Angle Orthod vol 142,4:339-352.
8. Levander E, Malmgren O. Evaluation of the risk of root resorption during orthodontic treatment: a study of upper incisors. Eur J Orthod. 1988;10(1):30-38.

9. Reitan. Clinical and histologic observations on tooth movement during and after orthodontic treatment. *Am J Orthod* 1967;53:721-745.
10. Steiner RD, West DJ. Orthodontic-Endodontic Treatment Planning of Traumatized Teeth. *Semin Orthod* 1997;3:39-44.
11. Andreasen JO, Andreasen FM. Textbook and Color Atlas of Traumatic Injuries to the Teeth (ed. 3). Copenhagen: Munksgaard, Mosby; c1994.
12. Graber TM, Swain BE Orthodontics Current Principles and Techniques. St. Louis MO: Mosby; c1985.
13. Tanner JM. Growth at Adolescence (ed. 2). Oxford: Blackwell Scientific; c1962.
14. Steiner DR. Timing of extraction of ankylosed teeth to maximize ridge development. *J Endod.* 1997;23(4):242-5.
15. Garguilo A, Wenz F, Orban B. Dimensions and relation at the dentogingival junction in humans. *J Periodontol* 1961.
16. Malmgren B, Cvek M, Lundberg M, Frykholm A. Surgical treatment of ankylosed and infrapositioned reimplanted incisors in adolescents. *Scand J Dent Res.* 1984;92(5):391-399.
17. Van Gorp G, Bormans N, Vanham I, Willems G, Declerck D. Orthodontic treatment recommendation and expected adverse reactions in patients with a history of dental trauma: A survey among general dentists, paediatric dentists, and orthodontic specialists. *Int J Paediatr Dent.* 2020;30(3):360-369.
18. Sharma D, Garg S, Sheoran N, Swami S, Singh G. Multidisciplinary approach to the rehabilitation of a tooth with two trauma episodes: systematic review and report of a case. *Dent Traumatol.* 2011;27(4):321-326.
19. Addy LD, Durning P, Thomas MB, McLaughlin WS. Orthodontic extrusion: an interdisciplinary approach to patient management. *Dent Update.* 2009;36(4):212-224.
20. Brudvik P, Rygh P. Transition and determinants of orthodontic root resorption repair sequence. *European Journal of Orthodontics.* 1995;17:177-188.
21. Bunner M, Johnson D. Quantitative assessment of pulp axon response to orthodontic movement. *American Journal of Orthodontics* 1982;82:244-250.
22. Andreasen JO, Andreasen FM. Essentials of Traumatic Injuries to the Teeth. Copenhagen: Munksgaard; c1991.
23. Artun J, Urbye KS. The effect of orthodontic treatment on periodontal bone support in patients with advanced loss of marginal periodontium. *Am J Orthod Dentofacial Orthop.* 1988;93(2):143-148.
24. Anthony DR. Apexification during active orthodontic movement. *J Endodon* 1986;12:419-21.
25. Spurrier SW, Hall SH, Joondeph DR, Shapiro PA, Riedel RA. A comparison of apical root resorption during orthodontic treatment in endodontically treated and vital teeth. *Am J Orthod Dentofacial Orthop.* 1990;97(2):130-134.
26. Cvek M. Prognosis of luxated nonvital maxillary incisors treated with calcium hydroxide and filled with gutta percha. A retrospective clinical study. *Endodon Dent Traumatol.* 1992;8:45-55.

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How to Cite This Article

Dr. Thakur G, Dr. Sharma D, Dr. Gurung D, Thakur A. Orthodontic-endodontic treatment planning of traumatized tooth: A review. *International Journal of Applied Dental Sciences.* 2024;10(2):18-20.