Orthodontic Considerations for Traumatized Teeth: An Overview

Karishma Rathore[1], Debasruti Naik[2], Stithaprajna Lenka[3], Ramesh Nagarajappa[4], Utkalika Das[1]

[1]Tutor, Department of Public Health Dentistry, [2]Senior Lecturer, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, [3]Professor, Department of Oral Surgery, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India, [4]Professor and Head, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

This article reviews the orthodontic consideration for the proper management of traumatic dental injuries which requires an understanding of the immediate and short- term response to the involved tissues: the periodontal ligament (PDL), pulp, and alveolar bone. This document discusses a few protocols required for orthodontic management of traumatically injured teeth.

Keywords: *Traumatized teeth, Orthodontic Management, Precautions.*

Introduction

Dental trauma mostly occurs in the age group of 7-19 years and is most prevalent in boys. Most commonly involved teeth during dental trauma accidents are the maxillary incisors. Commonly associated risk factors during trauma for class 2 patients division 1 malocclusion are increased overjet and incompetent lip coverage.[1] If there is an increase upto 0–6 mm, then it increases the threat of dental injury due to trauma which makes incomplete or partial lip closure resulting in unsupported maxillary incisors which is also said to be one of the majority factors in escalating the occurrence of traumatic dental injuries.[2] According to the Children's Dental Health Survey 2003, it is being reported that from 5% at age 8 to 11% by age 12 have undergone accidental damage to their permanent incisors. Data shows that many of them are remaining untreated. There is also evidences that 10.8% of orthodontic patients have a history of dental trauma.[3]

Types of dental trauma: It includes lateral luxation, avulsion, concussion, subluxation, extrusion, intrusion.

Dental trauma and orthodontics: During orthodontic treatment, if dental trauma occurs then there is a risk of root resorption associated with other dental problems. Every patient should be asked about any previous dental trauma before doing any kind of orthodontic treatment. By knowing the history of dental trauma, the orthodontist will prevent themselves from any potential complications to occur.[4]

Concussion

A concussion is a type of injury to the tooth and its supporting structures with an increased percussion that doesn't involve anyasymmetricaldisarticulation of the tooth. On examination plus radiographic findings suggested that the concerned tooth has high sensitivity on percussion but devoid of any increased mobility. There is no abnormality in radiographic findings. According to clinical guidelines there should be a record of the condition of the pulp of the tooth till 1 year. And according to orthodontic protocol, the patient needs to

Corresponding Author:
Debasruti Naik
Senior Lecturer, Department of Public Health Dentistry, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India
e-mail: smilewithdebshruti@gmail.com

wait for 3-5 months to start any kind of orthodontic treatment. There has to be the maintenance of a record of radiographs throughout 1 year after trauma. In such cases, mild and intermittent forces can be used.[5]

Subluxation: Subluxation is a type of injury where the supporting structures of the tooth along with unusual loosening of tooth takes place, however, there will be no displacement of the tooth to be found. According to clinical findings, the concerned tooth will be having tooth sensitivity along with an increase in the grade of mobility. Also, there will be bleeding in the gingival crevice in this case but there will be no abnormalities in radiographic findings.[6]

Extrusive luxation: Extrusive luxation also known as peripheral dislocation or partial avulsion. It refers to the incomplete dislocation of the tooth that is exposedout of its jaw socket. According to the clinical signs there will be an elongated tooth that will be excessively mobile. The immature teeth will have revascularization of pulp. The radiographic examination in this case will show an increased space in the periodontal ligament area apically. Therefore, according to clinical protocol there should be the relocation of the tooth into its jaw socket to be done very gently. By using a flexible splint, stabilization of the tooth can be done for 2 weeks by utilizing flexible splint while keeping an eye onthe condition of pulp and radiographic control for 5 years. If we stick to the protocols of orthodontics criteria then, the patient should wait for 6 months to begin the orthodontic treatment. And during orthodontic treatment, radiographic control has to be performed every 3 months. Mild as well as intermittent forces has to be used. If necessary then the orthodontic treatment should be simplified.[7]

Lateral luxation :When the tooth is displaced in a particular direction other than axially then the displacement of the tooth is called lateral luxation which is associated with comminution or the fracture of the alveolar socket. In this case, clinical findings like the displacement of the tooth take place buccally or lingually/palatally which is immobile as well as tender on percussion that gives a metallic sound. The immature teeth will have revascularization of pulp. The radiographic examination in this case will show an increased space in the periodontal ligament area apically wide in an occlusal radiographic view. Therefore, according to the clinical code of behavior, the tooth should be repositioned gently by stabilizing tooth for 4 weeks using a flexible splint while keeping an eye on the condition of pulp through radiograph for 5 years. If we see the protocols of orthodontics criteria then, the patient should wait for 6 months, to begin with, the orthodontic treatment. And during orthodontic treatment, radiographic control has to be performed every 3 months. Mild as well as intermittent forces has to be used. If necessary then the orthodontic treatment should be simplified.[8]

Intrusive luxation (central dislocation): The least common displacement injury in the permanent dentition is known as central dislocation or intrusive luxation where dislocation of the tooth into the alveolar bone occurs. Such type of wound is combined with the fracture of alveolar bone. If we see the clinical findings then, the displacement of the tooth takes place buccally or lingually/palatally which is immobile as well as tender on percussion that gives a metallic sound. The immature teeth will have revascularization of pulp. The radiographic examination in this case will show anabsence or partial absence of the periodontal space in an occlusal radiographic examination. Therefore, according to guidelines, the tooth should be repositioned gently by stabilizing the tooth for 4 weeks using a flexible splint while keeping an eye on pulpal condition and radiographic control for 5 years. According to the clinical protocols, for 3 weeks, waiting for spontaneous re-eruption is indicated only for immature teeth with intrusion <3mm. cases of intrusion >3mm and <6mm may be treated by orthodontic repositioning, while surgical repositioning is recommended for teeth with intrusion >6mm. If we see the protocols of orthodontics criteria then, the patient should wait for 6 months to begin the orthodontic movement. And during orthodontic treatment, radiographic control has to be performed every 3 months. Mild as well as intermittent forces has to be used. If necessary then the orthodontic treatment should be simplified.[9]

Avulsion (exarticulation): Avulsion injury is seen in 0.5% to 3% of all dental injuries and is characterized by an absolute dislocation of the tooth out of the socket. This wound is accompanied by comminution or by fracture of the alveolar jaw socket.In this case the clinical, as well as readiographic findings like absolute dislocation of the tooth from its jaw socket, is found. According to the clinical protocol, the treatment of tooth placement is the alternative option, but proper prognosis of the tooth should be present for better orthodontic treatment. Prescription of antibiotics and anti-tetanic vaccination. If we see the protocols of orthodontics

criteria then, the patient should wait for 6 months to start the orthodontic movement. And during orthodontic treatment, radiographic control has to be performed every 3 months. Mild as well as intermittent forces has to be used. If necessary then the orthodontic treatment should be simplified.[10]

Significant risk factors due to dental trauma[11]

(a) It can be seen in the face i.e. increased overjet

(b) Maxillary incisors will be having inadequate lip coverage.

(c) Children who undergo treatment for dental injuries are usually at risk of getting injury to teeth repeatedly if the trauma occurs at an early age.

Considerations of a traumatized dental patient before orthodontic treatment: Before proceeding for any kind of treatment for traumatized teeth, a dentist need to take care of the complete profile of the patient. A comprehensive dental history including earlier episodes of dental distress and the treatment should be recorded.[12] Sometimes patient may not recall their history of trauma, therefore in such cases, a radiographic examination aforementioned to the beginning of any orthodontic management should include all these following points below:[13]

1. For assessment of colour, it has to be kept in mind about the transillumination seen in the radiograph which will disclose enamel infraction lines along with colour changes in the concerned injured teeth which are indicative of pathology or repair.[14]
2. Before proceeding towards the treatment examination for sinus or any kind of swelling should be done.
3. If there is any tooth mobility then the examination for the concerned tooth has to be done in both a horizontalas well as vertical direction. [15]
4. During the clinical examination palpation over the tooth apex for tenderness should be checked.[16]
5. Diagnostic tests for ankylosis can be done by the method of percussion tests in which a high metallic percussion note can be felt, while a duller note can suggest of a root fracture.[17]
6. For accurate diagnosis of dental trauma, radiographs like reproducible long cone periapical radiographs are the best. In such cases, radiographs at different angulations can be taken.[18]
7. Test like sensibility tests can be done for diagnosis of the teeth involved in dental trauma which is currently the most useful test to assess the neurovascular supply to the pulp of a traumatized tooth by the use of an electric pulp tester (EPT).[19] Before the commencement of orthodontic treatment, Proper detailed history of the tooth should be confirmed about any kind of existing root canal filling. Every patient should be asked about any previous dental trauma before doing any kind of orthodontic treatment. By knowing the history of dental trauma, the orthodontist will prevent themselves from any potential complications to occur.[20]

Precaution to be taken due to the dental trauma[21]

(a) Interceptive treatment can be opted.

(b) Use of mouth guards during sports can be used to prevent trauma to face and oral cavity structures.

Impact of orthodontic treatment on the tooth and its supporting structures[22]

(a) Loss of pulp vitality

(b) alternative resorption can be seen

(c) Non-responsiveness to sensibility testing

(d) Inflammation of supported gingival to the concerned tooth

Conclusion

Traumatized dental teeth should always be carefully examined regularly. In every month on a regular interval basis teeth should be monitored for the status of the traumatized teeth. Before commencing any kind of orthodontic treatment proper detailed history has to be recorded for avoiding any complications before the orthodontic treatment.

Conflict of Interests: None

Ethical Permission: Approved

Funding: Nil

References

1. Schwartz-Arad D, Levin L, Ashkenazi M. Treatment options of untreatable traumatized anterior maxillary teeth for future use of dental implantation, implant dent, 13: 120-8, 2004.
2. Owtad P, Shastry S, Papademetriou M, Park JH. Management Guidelines for Traumatically Injured

Teeth during Orthodontic Treatment. J Clin Pediatr Dent. 2015;39(3):292-296.

3. Andreasen JO, Andreasen FM Textbook and color atlas of traumatic injuries to the teeth, 4th ed. Oxford: Blackwell:2007.
4. Tanaka OM, Filho JB, Vitral RF, Bósio JA. Orthodontic treatment in an endodontically treated maxillary incisors. Eur J Gen Dent 2013;2:72-5
5. Fidel SR, Fidel-Junior RA, Sassone LM, Murad CF, Fidel RA. Clinical management of a complicated crown-root fracture: a case report. Braz Dent J. 2011;22(3):258-262.
6. Fields HW, Christensen JR. Orthodontic procedures after trauma. J Endod. 2013;39(S3):S78-S87.
7. Bach N, Baylard JF, Voyer R. Orthodontic extrusion: periodontal considerations and applications. J Can Dent Assoc. 2004;70(11):775-780.
8. Devanna R, Hegde V, Kavitha V. Management of subgingivally fractured teeth: A multidisciplinary approach. J Interdiscip Dentistry 2011;1:49-54
9. Bauss O, Rohling J, Sadat-Khonsari R, Kiliaridis S. Influence of orthodontic intrusion on pulpal vitality of previously traumatized maxillary permanent incisors. Am J Orthod Dentofacial Orthop, 134:12-7,2008.
10. Borzabadi- Farahani A, Borzabadi-Farahani A. The association between orthodontic treatment need and maxillary incisor trauma,a retrospective clinical study.
11. Forsberg CM, Tedestam G. Etiological and predisposing factors related to traumatic injuries. Swed Dent J,17:183-90,1993.
12. Otuyemi OD, Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. Int J pediatric Dent, 4:81-5,1994.
13. Soriano EP, Caldas AF, Goes PS. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. Dent Traumatol, 20:246-50,2004.
14. Contemporary Orthodontics–Kaley Ann, page no-297-299.
15. Görür I, Orhan K, Can-Karabulut DC, Orhan AI, Oztürk A. Low-level laser therapy effects in traumatized permanent teeth with extrusive luxation in an orthodontic patient. Angle Orthod. 2010;80(5):968-74.
16. Proffit WR, Fields HW, Sarver DM. Contemporary orthodontic. 4th ed. St. Louis: Mosby Elsevier; 2007.
17. Martins WD, Westphalen VP, Perin CP, Da Silva Neto UX, Westphalen FH. Treatment of extrusive luxation by intentional replantation. Int J Paediatr Dent. 2007;17:134-138.
18. Elizane Ferreira Hamanaka, Lamis Meorin Nogueira, Willian Ricardo Pires, Sônia Regina Panzarini, Wilson Roberto Poi, Celso Koogi Sonoda. Replantation as treatment for extrusive luxation. Brazilian Dental Journal. 2015;26(3):308-311.
19. Andreasen JO. Luxation of permanent teeth due to trauma. Stand J Dent Res. 1970;78:273-286.
20. Bruszt P. Secondary eruption of teeth intruded into the maxilla by blow. Oral Surg Oral Med Pathol. 1958;11:146-9.
21. Ravin. Intrusion of permanent incisive. Tandlaegebladet. 1975;79:643-6.
22. Turley PK, Joiner MW, Hellstrom S. The effect of orthodontic extrusion on traumatically intruded teeth. Am J Orthod Dentofacial Orthop. 1984;85:47-56.