International Journal of Dental Research
Online ISSN: 2664-9055, Print ISSN: 2664-9047
Received: 01-11-2019; Accepted: 02-12-2019; Published: 09-01-2020
www.dentaljournal.net
Volume 2; Issue 1; 2020; Page No. 01-04

Orthodontic intervention of traumatic injuries: Aligning an inter-relationship

Jayakrishnan U[1], Anjali Jayaraj[2], K Nillan Shetty[3], Rohan Rai[4], Harshitha V[5]

[1] Postgraduate, Department of Orthodontics and Dentofacial Orthopedics, A.J Institute of Dental Sciences, Mangalore, Karnataka, India

[2] Postgraduate, Navodaya Dental College, Raichur, Karnataka, India

[3] Principal, Department of Orthodontics and Dentofacial Orthopedics, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India

[4] Professor, Department of Orthodontics and Dentofacial Orthopedics, A.J Institute of Dental Sciences, Mangalore, Karnataka, India

[5] Department of Orthodontics and Dentofacial Orthopedics, A.J Institute of Dental Sciences, Mangalore, Karnataka, India

Abstract
Oral trauma is usually associated to protruded upper front teeth causing lacerations on the soft tissues and fracture of the tooth segment. Teeth which are proclined are more vulnerable to a traumatic event and restoration of the tooth in the arch is a challenging task. The extent of trauma and its effect on the oral tissues plays an important role in determining the treatment procedures. The outcome of the treatment is also determined by the health of the adjacent soft tissue apart from the remaining tooth structure present. This article deals with prevention of trauma, primary, secondary and tertiary treatments to deal with the extent of trauma. The effects of trauma during Orthodontic treatment will be also outlined to make the clinician aware of the various effects associated with tooth movements.

Keywords: alignment, intrusion, orthodontics, trauma

Introduction

Orthodontics can be considered as an adjunct to post oral trauma treatment of permanent teeth. The procedures of adjunctive Orthodontics are can be broadly subdivided into those interventions that are used at or near the time of trauma, those available for longer post traumatic treatment and those for patients who are undergoing active Orthodontic treatment. Dental trauma is almost always associated with protrusive maxillary incisor teeth. As per the earlier studies, it was believed that there was a correlation between trauma and Angle's Class II malocclusion [1]. It was proposed that the dental trauma was due to the increasing overjet and inadequate lip coverage associated with such malocclusions. Foresberg and Tedestam [2] reported the predisposing factors and Etiology of the traumatic injuries to the permanent teeth in 1993. In their study, they concluded that an Angle's Class II malocclusion, Overjet exceeding 4mm (Fig: 1), short upper lip, incompetent lips (Fig:2) and habits such as mouth breathing (Fig: 3) lead to increased susceptibility to traumatic oral injuries. Later their findings were confirmed in the studies by Bauss *et al.* [3] in 2008.

As most of the studies suggest a relationship between dental trauma and an increased overjet, it is logical to either protect the teeth from the zone or to move it to a safer area.

Orthodontist plays an important role in dealing with such kinds of malocclusion, where the teeth are made to move into a zone of structural integrity and functional harmony.

Fig 1: Increased Overjet

Fig 2: Incompetent Lips

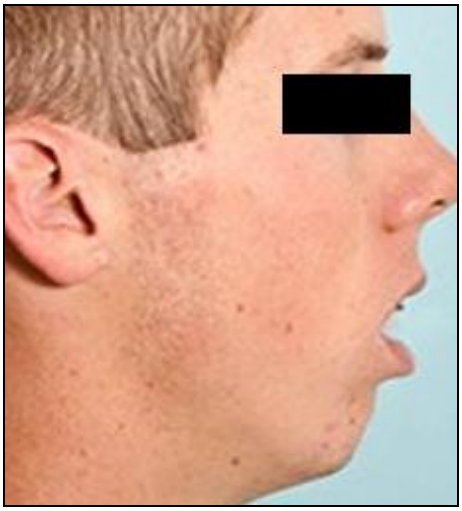

Fig 3: Mouth breathing habit

The intervention into the trauma can be at various levels like:

1. Prevention of dental trauma,
2. Primary treatment,
3. Secondary treatment &
4. Tertiary post traumatic treatment.

Prevention of dental trauma

The mouth guard intervention is found to be one of the useful barriers to deal with the traumatic events especially in contact sports. The American Dental Association also supports the use of mouth guards for active Orthodontic patients [4, 5]. Although the mouth guards are available as pre-fabricated mouth guards, the custom ones are judged to be more comfortable by the patients. Materials like Ethylene vinyl acetate are more popular because of the physical characteristics and manipulability. The design of mouth guards shouldn't lock the teeth in position but should have a smooth, flat occlusal surface so that the teeth can be moved also the soft tissue will be provided adequate protection [6]. Designs with upper and lower lip along with cheek protection may have some benefit. Emphasis has been placed on the role of mouth guards in preventing concussion injuries [7].

The prevalence of dental injuries in orthodontic patients evaluated in clinical settings indicates that they have a similar prevalence of previous oral trauma compared with the general population, with infarction, enamel fractures, enamel-dentin fractures being the most common [8].

Primary treatment

It is the immediate care that is provided as soon as possible after a traumatic incident. Generally, traumatic event is mostly time dependent and the outcomes also depends on the time of presentation to the clinician. The outcomes are more positive with immediate treatment as there is no time lag between the injury and the time of addressing the event. Apart from crown fractures and crown fractures with pulp exposure, the primary care also deals with treatment of a displaced tooth that can be either lateral, intrusive and extrusive luxation/avulsion.

When displacement has taken place, it is imperative to place the teeth back into proper position and splint it to hold the tooth in the same position. Active Orthodontic treatment should not be considered at this point and is not a part of primary care.

Secondary treatment

Secondary level of treatment usually consists of monitoring the pulp and periodontal tissues for the healing post trauma. It also deals with orthodontic treatment of the displaced tooth. The primary goal is to provide treatment to maximise the healing capabilities of both pulp and periodontium.

The success of treatment depends on the amount of tooth displacement, the developmental stage of the tooth and splinting methods [9]. The treatment of displaced tooth becomes complicated when the time interval between the traumatic incident and treatment is extended. It is often difficult to place enough pressure on the tooth to completely reposition the tooth in its original position. In such circumstances, orthodontic treatment can help in repositioning with a much lighter force than digital pressure. A light flexible wire can provide gentle seating force for an extended period of time. Trope concluded that the goal of dental trauma treatment is to optimize healing after a traumatic injury. It is critical to ensure that the surface area of root damage is minimised as the post trauma damages can be controlled with proper treatment care [10].

Specific indications for Orthodontic treatment

For addressing traumatic events in the dental office, a trauma kit can be made which includes Orthodontic hand instruments, cheek retractors, self-etching primer, orthodontic brackets and NiTi wires. Self-ligating brackets are preferred as it is difficult to ensure proper ligation with ligature ties or elastomeric rings in case of traumatic event. (Fig: 4)

Fig 4: Patient with dental trauma and lingual luxation (From Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics, 5th ed. St Louis, MO: Mosby; 2013.)

Trauma during Orthodontic treatment

The teeth experiencing trauma in between an active Orthodontic treatment are more likely to encounter pulpal necrosis than trauma limited to the teeth surface [11]. Moreover, teeth with extrusion, intrusion or lateral luxation were significantly more likely to have pulpal necrosis that injury restricted to the crown. Regular monitoring of these teeth at definite intervals is indicated as total pulp obliteration was reported in most cases.

Essential biomechanics

The concept of heavy straight wire bonded to the teeth with elastomeric chains extending to the affected teeth for either labio lingual or cervico-gingival movements (Fig: 5), appears to be simple, its placement often is a challenge. Multiple loops can cause soft tissue irritation [12] (Fig 6). The

use of super elastic wires can simplify post traumatic tooth movement due to its property of thermal transformation (Fig: 7).

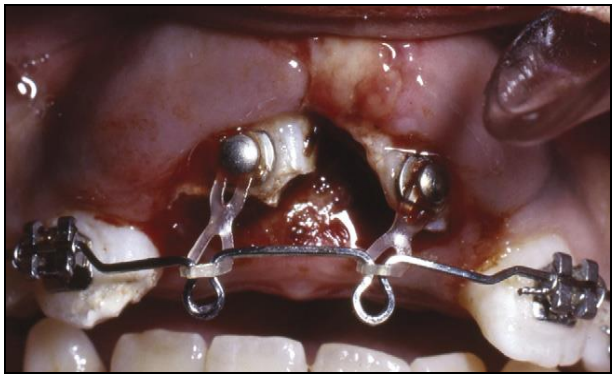

Fig 5: The heavy base wire with elastomeric chain attached for tooth moving force appears simple but can be difficult to fabricate. (From Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics, 5th ed. St Louis, MO: Mosby; 2013).

Fig 6: Multiloop arch wires

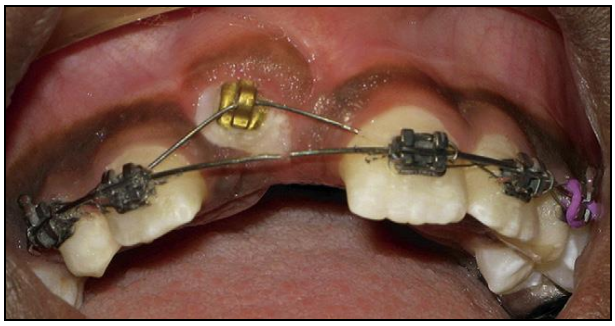

Fig 7: Using a formable base wire and a segment of super elastic wire tied loosely with steel ligatures will provide a light continuous force, stability in the anchorage units, and reduced friction. (From Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics, 5th ed. St Louis, MO: Mosby; 2013).

Tertiary Post trauma treatment

Kindelan [13] suggested 3 months of waiting period before undertaking orthodontic treatment for minor injuries and 6 months up to 1 year for more severe injuries.

It was found that endodontically treated teeth could be moved orthodontically with little consequence [14] and they show less apical orthodontically induced root resorption than the contra lateral control teeth [15].

Interdisciplinary Post trauma treatments

Orthodontic treatments can be integrated with other disciplinary care to provide a much comprehensive treatment after trauma. Traditional tooth transplantation of premolar into the anterior segment space can be considered when the anterior teeth is lost due to trauma. Substitution of teeth with implants or fixed/ removable prosthesis can be another option [16].

Conclusion

Emergency care to the dental tissues after trauma is critical in ensuring proper function and also structural integrity of the tissues. Time is an essential factor to be considered before arriving at a treatment option. As the time lag between trauma and treatment is reduced, the long-term success of the treatment is also improved.

Orthodontics acts as an adjunct in treating traumatic events as it can both help in preventing the injury to the teeth but moving it into a more safer position and also ensure symmetric tooth movements for further prosthetic treatment if required. The clinician should not let any time lapse occur, as the vitality of the teeth also plays a major role in treatment success. The combinations of disciplines in dentistry can ensure a more comprehensive and thus, a stable treatment outcome

References

1. Lewis TE. Incidence of fractured anterior teeth as related to their protrusion. Angle Orthodontol, 1959; 29:128-31.
2. Forsberg CM, Tedestam G. Etiological and predisposing factors related to traumatic injuries to permanent teeth. Swed Dent J, 1993; 17:183-90.
3. Bauss O, Freitag S, Rohling J, Rahman A. Influence of overjet and lip coverage on the prevalence and severity of incisor trauma. J Orofac Orthop, 2008; 69:402-10.
4. American Dental Association. Policy statement on orofacial protectors. Transactions, 1995, 613.
5. ADA Council on Access, Prevention and Interprofessional Relations, ADA Council on Scientific Affairs. Using mouthguards to reduce the incidence and severity of sports related oral injuries. J Am Dent Assoc, 2006; 137:1712-20.
6. Maede Y, Kumamoto D, Yagi K, Ikebe K. Effectiveness and fabrication of mouthguards. Dent Traumatol, 2009; 25:556-64.
7. National Federation of State High School Associations mouth guards in high school sports: NFHS position statement revised and approved October, 2008. Available at: http://www.chsaa.org/sports/medicine/3NFHS%20Mouth%20Guards.pdf. Accessed September 2012.
8. Bauss O, Rohling J, Schwestka-Polly R. Prevalence of traumatic injuries to the permanent incisors in candidates for orthodontic treatment. Dent Traumatol, 2004; 20:61-6.
9. Andreasen JO, Andreasen FM, Andersson L. eds. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th ed. Hoboken, NJ: Wiley-Blackwell, 2007.
10. American Association of Endodontists. Endodontic Considerations in the Management of Traumatic Dental Injuries. Chicago, IL: American Association of Endodontists, 2006.
11. Bauss O, Rohling J, Meyer K, Kiliaridis S. Pulp vitality in teeth suffering trauma during orthodontic therapy. Angle Orthod, 2009; 79:166-71.
12. Henry W. Fields, John R. Christensen. Orthodontic Procedures after Trauma. J Endod, 2013; 39:78-S87.

13. Kindelan SA, Day PF, Kindelan JD, *et al*. Dental trauma: an overview of its influence on the management of orthodontic treatment: part 1. J Orthod, 2008; 35:68-78.
14. Esteves T, Ramos AL, Pereira CM, Hidalgo MM. Orthodontic root resorption of endodontically treated teeth. J Endod, 2007; 33:119-22.
15. Spurrier SW, Hall SH, Joondeph DR, *et al*. A comparison of apical root resorption during orthodontic treatment in endodontically treated vital teeth. Am J Orthod, 1990; 97:130-4.
16. Rizzatto S, Closs L, Freitas M, Rizzatto L. Orthodontic-restorative treatment as an option for biologic replacement of a maxillary central incisor: 5-year follow-up. Am J Orthod Dentofacial Orthop, 2012; 142:393-401.