

Orthodontic Extrusion of Fractured Maxillary Lateral Incisor – A Case Report

P. Sri Ishwarya¹, A. Lakshmi Prasanna², Saritha Madham³, J. Vissista⁴
Department of Orthodontics and Dentofacial Orthopedics,
Mallareddy Institute of Dental Sciences, Suraram, Hyderabad.

Abstract:- This case report describes an approach using orthodontic forced eruption to facilitate prosthetic restoration of a mid-crown fractured maxillary permanent right lateral incisor. A 24-year-old male patient presented at the due to pain and unesthetic appearance and for management of a fractured maxillary right lateral incisor tooth. Intraoral examination revealed that the maxillary right lateral incisor had sustained a mid crown fracture with pulp exposure and fractured lingual cusp. We treated the tooth endodontically and performed orthodontic root extrusion with a modified Hawley appliance prior to prosthetic rehabilitation. Approximately 3 mm of extrusion of the tooth was obtained within 4 weeks. A fiber post was then inserted into the root canal, and final restoration was completed with an all-ceramic crown. Follow-up 8 months after treatment revealed good periodontal health, esthetics and normal function.

Keywords:- Orthodontic extrusion, Mid-crown fracture, Post core.

I. INTRODUCTION

Traumatic injuries are the foremost common dental injuries in anterior teeth of which maxillary central incisor account for about 80% followed by lateral incisor injuries (70%).¹ The restoration of fractured incisors is vital esthetically yet well as functionally. Over other teeth, the maxillary incisors dominate physical appearance. A means of, conservative, quick and esthetic restoration is important. Various treatment modalities can be opted for treating a fractured teeth are fragment removal and restoration, gingivectomy and osteotomy crown lengthening, orthodontic extrusion with/without gingivoplasty, surgical extrusion, vital root submergence and extraction followed by surgical implants and fixed partial dentures. Extractions should be carried out only when the tooth is fractured subgingivally and when the biological width cannot be maintained. One of the basic conservative approach for treating fractured teeth are often orthodontic extrusion where the original tooth structure can be preserved and it doesn't involve bone loss or periodontal support. Moreover, crown-lengthening techniques involve extra removal of bone or periodontal tissues which results in reduced bone support. Orthodontic extrusion is one among the easiest orthodontic movement to achieve as it resembles natural tooth eruption. Orthodontic root extrusion alters the relationship between a natural tooth and periodontal apparatus, by raising the sound tooth material

from the alveolar socket. Orthodontic extrusion will elevate the fracture line above from the epithelial attachment in order that finishing margins are prepared easily.⁷ Orthodontic extrusion will be done using a fixed appliance or a removable appliance. The amount of force required for extrusion is about 20-30gms. Forced eruption is usually carried out for one or two maxillary anterior teeth or premolars with as much as 5 mm of extrusion possible.² Various splint and modified Hawley appliances are been used for orthodontic forced eruption.³

II. PROCEDURE

A 24yrs old adult male patient came to our institution with a fractured maxillary right lateral incisor which broke following a hit while opening the house gate 1 week prior to reporting to the department. On clinical examination, patient presented with Angle's class II div I subdivision on right side with anterior deepbite, the lateral incisor teeth showed a horizontal mid-crown fracture with a mobile fractured lingual segment. The patient complained of pain and tender on percussion of the lateral incisor. On radiographic examination, the IOPA showed intact root with no fracture lines and slight widening of periodontal ligament space, with no periapical radiolucencies. The patient was given different treatment options like fixed orthodontic therapy, extraction of the tooth and implant and extrusion of the fractured tooth followed by post and core then finally restored the tooth with crown. The treatment objectives were discussed with the patient and also the patient opted for the extrusion as the treatment option. Firstly, the fractured lingual portion of crown which was mobile has been removed and also the tooth underwent root canal therapy followed by restoration with zinc oxide eugenol in department of conservative and endodontics. Then, orthodontic extrusion phase is started with the alginate impressions of both the arches and working cast is prepared. the appliance design included a anterior biteplane as the patient already presented with an anterior deepbite and posteriors bite was used on occlusal surfaces of the molars to allow patient to carry out normal chewing. A modified Anterior biteplane was fabricated with cold cure acrylic engaging the canine on one side to canine on the opposite side with a clearance given to the right lateral incisor a wire component placed in acrylic labially extending from canine to canine of biteplane. the biteplane was cement using glass ionomer cement. A begg bracket is bonded on to the maxillary lateral incisor and placed as high as possible a E-chain is engaged from the bracket to the wire passing through the anterior biteplane. 20 gms of extrusion force used was

applied which is measured employing a Dontrix guage. The activation is administered for each 2 weeks , by the end of 4 weeks the tooth extruded around 3mm . This amount of extrusion was sufficient for the post and core preparation the

patient is referred to department of conservative and endodontics. Then the post was placed and core buildup was done and tooth was restored with the porcelain fused to metal crown.



Fig 1:- Intraoral picture of the mid-crown fracture of lateral incisor



Fig 2:- A modified anterior biteplane with wire 19 guage wire component embedded in the acrylic.



Fig 3:- Begg bracket bonded onto the lateral incisor and E-chain is engaged from the bracket to the wire.



Fig (4a):- Post extrusion by 3mm (4b) Post and core buildup



Fig 5: -After crown preparation



Fig 6:- Final restoration done with zirconia crown.

III. DISCUSSION

For a fractured tooth various treatment alternatives are available depending on the position and circumferential extent of the fracture and therefore the severity of the fracture. The treatment options were reviewed by Mule and Heithersay and that they include periodontal surgery to expose the crown margins for better cervical restoration.⁴ Although they are complex and time consuming, the crown-root fractures can be restored. Extraction mustn't be the primary choice of treatment for a fractured or extremely broken young

permanent tooth within the anterior area, because it leads to loss of bone in the area, compromising future treatment with implants ⁵. To prevent inconsistent bone levels which successively resulting periodontal complications crown lengthening procedure can be employed. This approach may require surgical intervention including the adjacent teeth and produces a severe esthetic problem in the anterior area. Surgical extrusion is a single-step procedure which is simple and less time taking , requiring less compliance of the patient. The main drawback to this procedure is the possible risk of root resorption due to damage of the periodontal ligament.⁶

After considering the assorted treatment options, we chose orthodontic extrusion for treating fractured teeth.⁷ The extrusion involves applying traction forces in all areas of the periodontal ligament to stimulate marginal apposition of crestal alveolar bone because the periodontal fibers are attached to the cementum of root, during the process of extrusion, the vertical movement of the root which inturn followed by the gingiva. In the similar way, the periodontal ligament fibers are pulled along with the root from the underlying the alveolar process.⁸ The slow extrusion meets all the factors, and therefore the alveolar bone surrounding the root will move along the tooth. It is essential that the constant slow force be maintained between the extrusion and hyalinization phases; otherwise, the specified orthodontic movement will not be achieved.⁹ Rapid extrusion of tooth results in tearing periodontal ligament which inturn leads to ankylosis of the tooth. The application of too heavier a force, if not controlled, could also lead to root resorption.¹¹ Based on the rate of tooth movement, 1 mm of extrusion per week is considered physiologic for slow extrusion. In the present case, a 20 gm of force was applied and the tooth moved at a very slow rate of 1 mm/4weeks; it was determined to bring about extrusion with minimal forces and without damaging the surrounding tissues and root structures.

IV. CONCLUSION

The orthodontic slow extrusion is one of the treatment options for fractured teeth, as it meets all the physiological tooth movement criteria. The restoration of the fractured anterior teeth not only improves the appearance of the individual and also reduces the psychological impact.

REFERENCES

- [1]. Simnoson RJ. Restoration of a fractured central incisor using original tooth fragment. *J Am Dent Assoc.* 1982 Oct;105(4):646–648.
- [2]. Wang WR, Wang WN. Forced eruption: An alternative to extraction or periodontal surgery. *J Clin Orthod* 1992;26:146-9.
- [3]. Mandel RC, Binzer WC, Withers JA. Forced eruption in restoring severely fractured teeth using a removable orthodontic appliance. *J Prosthet Dent* 1982;47:269-74.
- [4]. Bach N, Baylard JF, Voyer R. Orthodontic extrusion: periodontal considerations and applications. *J Can Dent Assoc.* 2004 Dec;70(11):775–780.
- [5]. Olsburgh S, Jacoby T, Krejci I. Crown fractures in the permanent dentition: pulpal and restorative considerations. *Dent Traumatol.* 2002 Jun;18(3):103-15.
- [6]. Zyskind K, Zyskind D, Soskolne WA, Harary D. Orthodontic forced eruption: case report of an alternative treatment for subgingivally fractured young permanent incisors. *Quintessence Int* 1992;23:393e9.
- [7]. Dede DÖ, Tunç EŞ, Güler AU, Yazicioğlu S. Multidisciplinary approach to a subgingivally fractured incisor tooth: A case report. *J Dent Sci.* 2017 Jun;12(2):190-194.

- [8]. Mohammad Z, Penmetcha S, Bagalkotkar A, Namineni S. A Novel Approach to extrude Subgingivally Fractured Tooth using Customized Removable Appliance. *Int J Clin Pediatr Dent.* 2018 Jan-Feb;11(1):53-57.
- [9]. Alves LD, Donnelly JC, Lugo A, Carter DR. Reeruption and extrusion of a traumatically intruded immature permanent incisor: case report. *J Endod.* 1997 Apr;23(4):246–248.
- [10]. Dede DÖ, Tunç EŞ, Güler AU, Yazicioğlu S. Multidisciplinary approach to a subgingivally fractured incisor tooth: A case report. *J Dent Sci.* 2017 Jun;12(2):190-194.
- [11]. Addy LD, Durning P, Thomas MB, McLaughlin WS. Orthodontic extrusion: an interdisciplinary approach to patient management. *Dent Update.* 2009 May;36(4):212-4, 217-8.