

Management of Subgingivally Fractured Teeth

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ABSTRACT:

Orthodontic forced eruption is an appropriate approach without jeopardizing the esthetic appearance in tooth fracture below the gingival attachment or alveolar bone crest. Extrusion of such teeth lifts the fracture line above the epithelial attachment; to accomplish proper finishing margins. Restoration after orthodontic eruption may present a more conservative treatment choice in young patients compared with the prosthetic restoration after extraction. This case illustrates a multidisciplinary approach using the orthodontic forced eruption facilitating the composite restoration of a fractured upper permanent left lateral incisor.

Key words: Dental trauma, esthetic treatment, orthodontic extrusion.

Introduction: Crown fractures have been documented to account for up to 92% of all traumatic injuries to the permanent dentition.¹ Some fractures are minor, others are severe enough to result in the untimely loss of the tooth involved.² Traumatic dental injuries are unscheduled events, both for the patients and for the dentist to manage the problem. Trauma with accompanying fracture of a permanent central or lateral incisor is a catastrophic occurrence for the young patient and creates psychological impact on both the parents and children. If the injury involves the loss of extensive tooth structure, it alters the child's appearance and makes him the target for teasing and ridicule by other children. Often limited time is available to examine and treat patients with traumatic dental injuries. Only tooth colored filling, endodontic treatment with tooth colored restoration, post and core, forced eruption followed by post and core, splinting in case of avulsion and extraction in case of an unfavorable fracture. Providing a proper care based on accurate diagnosis will favor successful healing. Orthodontic forced eruption is an appropriate approach without jeopardizing the esthetic appearance in tooth fracture below the gingival attachment or alveolar bone crest.³

Case report: A 18 years old male patient reported to the department of conservative dentistry & endodontics having a chief complaint of pain in upper left front teeth since 5 days. Patient had history of trauma before 5 days. Clinical examination revealed Elli's class III fracture with upper left lateral incisor running obliquely, extending sub-gingivally on the palatal aspect. Tenderness on percussion upper left central & lateral incisor was present. Pulp vitality testing gives delayed response in upper left central & lateral incisor. (Figure 1)

After compiling the observations from clinical and radiographic examination we arrived at a diagnosis of Acute irreversible pulpitis with 21 and 22, Elli's class III fracture with 22.

We planned our treatment with endodontic treatment with 21 and 22 followed by orthodontic extrusion with 22 and placement of crown with 22.

Since an interdisciplinary treatment approach was planned for our treatment we sequenced our protocol of treatment: endodontic treatment, temporary composite build up, orthodontic extrusion, post and core placement, tooth preparation and placement of crown. With this protocol we finished our endodontic treatment with 21 and 22 (figure 2). A temporary composite restoration with 22 was placed after taking an opinion from orthodontic department.⁴ (Figure 2)

After placement of temporary composite restoration with 22 the patient was referred to the department of orthodontics for forced extrusion with 22. (Figure 2)

They developed a problem list of increased over bite, fractured and labially rotated 22 and endodontically treated 21 and 22.

A diagnosis of Angle's class I malocclusion and a treatment plan of non extraction with extrusion of 22 was carried out. Since the patient was not concerned of esthetics with the lower arch only the upper arch was strapped up with Begg's brackets. The bracket placed on the fractured lateral incisor was gingival in relation to its adjacent teeth. The wire was progressively changed from 0.014" to 0.016" NiTi wire and finally a 0.016" stainless wire was

placed. A relative extrusion of 2mm and correction of rotation was accomplished with orthodontic treatment. This contributed to treatment duration of 4 months. After completion of orthodontic extrusion with fractured lateral incisor the patient was referred back to department of conservative dentistry for its further treatment. (Figure 3)

Subsequent to extrusion with 22 temporary composite restoration was removed. Post space preparation was carried out followed by fiber post insertion. Core build up was done with composite restoration. After post and core build up crown preparation was carried out having a shoulder finish line which was kept equigingival. (Figure 4)

A rubber base impression was made with upper and lower jaw. Casts were prepared which were sent to the laboratory for fabrication of porcelain fused to metal crown after shade selection with vita easy shade guide. A temporary crown with 22 was placed till the final restoration was placed. After placement of permanent crown with 22 a permanent retainer in relation to 11, 21, 22 and 23 was given.

Discussion: There are several options for the treatment of tooth fracture. Complicated treatment options are involved in those where extensive amount of fracture occurs on the tooth. Controversies do arise in sequence of treatment of the tooth when an interdisciplinary treatment approach is indicated. These controversies are in the form of which treatment should be started first like whether endodontic, periodontal or orthodontic treatment. The selection of protocol mainly depends on the clinical situation the patient presents.

We referred the literature for sequence of treatment for our case. We tried to search literature regarding on impact of Orthodontic extrusion on Pulpal Vitality of traumatized maxillary Incisors. Literature revealed that maxillary incisors with a history of severe periodontal injury have a higher susceptibility to pulp necrosis during orthodontic extrusion than nontraumatized teeth.⁵ The most common side effect of orthodontics is to blunt the root of the moved tooth, due to apical and sometimes lateral resorption. Orthodontic tooth movement can cause degenerative and/or inflammatory responses in the dental pulp of teeth with completed apical

Figure 1: Intra-oral Preoperative photograph and radiograph representing fractured 22



A: frontal view of fractured 22

B: occlusal view of fractured 22

C: Intra-oral radiograph with 21 and 22

Figure 2: Placement of temporary composite with 22 and completion of endodontic treatment with 21 and 22.



A: frontal view of fractured 22 after placement of temporary composite.

B: occlusal view of fractured 22 after placement of temporary composite

C: intra-oral radiograph with 21 and 22 after completion of endodontic treatment

Figure 3: After completion of orthodontic extrusion with



Pretreatment

Midtreatment

Posttreatment

Figure 4: Placement of final restoration



A: fiber post insertion with 22

B: crown preparation with 22

C: placement of porcelain fused to metal crown

formation. This observation made us to choose the protocol of treatment with endodontic treatment to be initiated at first. Inadequate crown structure was present for placement of an attachment after completion of endodontic treatment. This generated the need of either tooth preparation or placement of an auxiliary for applying traction. Literature suggested that tooth preparation or placement of temporary composite restoration can be done.^{6, 7} After consultation with orthodontic department we placed a temporary composite restoration.⁸

Research suggest that orthodontic therapy will improve the existing periodontal environment by modifying the osseous topography and minimizing the need to remove supporting bone on adjacent teeth, because movement of the tooth in an occlusal direction carries the connective tissue attachment in the same direction. It is also observed that orthodontic extrusion of tooth also causes movement of soft tissues in the same direction.^{6, 7, 8}

Biological width represents the combined dimension of supra-alveolar gingival connective tissue and the junctional epithelium. It averages 2.04mm.

Under controlled orthodontic force, the biologic width of gingival tissue moves with the tooth

It is important to maintain the health and integrity of the biologic width because the impingement of restoration will result in periodontal disease.⁹

Orthodontics can act as a co-treatment for extrusion may be indicated to save teeth with: Advanced caries, Traumatic destruction of the clinical crown, Lateral root perforation, External or internal root resorption near the alveolar crest and

overzealous tooth preparation.^{8, 9} Forced orthodontic eruption, in conjunction with endodontic, periodontal and restorative therapy is the solution usually recommended for this type of cases.

Conclusion: conservative treatment of such type of patient results in restoration having a compromised function and esthetics. However an interdisciplinary treatment approach was able to achieve additional correction of rotation with 22 and relatively extrude 22. Hence an interdisciplinary treatment approach is more beneficial than a solo treatment approach as indicated.

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