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Orthodontic extrusion of a subgingivally fractured maxillary central incisor using "J" hook: A multi-disciplinary case report.

Abstract

Traumatic injuries to permanent maxillary anterior teeth are seen commonly in children. Restoration of these traumatically injured teeth are always a clinical challenge for a predictable aesthetic outcome. This case report describes a multidisciplinary approach of a subgingivally fractured maxillary permanent central incisor by endodontic therapy, orthodontic extrusion using J-hook, fiber post placement, core build-up followed by surgical gingival recountouring using electro-cautery to reestablish the biological width. Finally esthetics was restored using porcelain fused to metal crown.

Keywords: Biological width, crown-root fracture, orthodontic extrusion, trauma, j-hook.

Introduction:

Traumatic injuries to teeth and their supporting tissues usually occur in children and damage may vary from enamel fracture to avulsion, with or without pulpal involvement or alveolar bone fracture. Crown root fractures of permanent anterior teeth in young patients lead to functional and esthetic problems.[1,2] The most commonly affected tooth is the maxillary central incisor (58.3%). [3] Indication to their treatment depends on the level of fracture line and the remaining tooth structure. The subgingivally fractured teeth present a complex treatment in order to preserve the gingival biological width. These teeth are mostly difficult to restore and so are generally extracted. Several methods [4-5] have been described for root fracture treatment:

1. Crown lengthening procedures using periodontal surgery
2. Orthodontic extrusion or forced eruption. Tooth extrusion helps in natural tooth eruption maintaining crown-root ratio of approximately 1:[1].
3. Biological width realignment is required to obtain proper gingival and crestal bone contour.[6]
4. Tooth extraction can also be done in severe cases

This case report outlines a multidisciplinary management of a subgingivally fractured tooth using orthodontic extrusion with J-hook thereby re-establishing biological width using electro-cautery and esthetic restoration using porcelain fused to metal crown in a 14 year old male patient.

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Case Description:

A 14- year old male patient reported to the Department of Pediatric and Preventive Dentistry with the chief complain of fractured maxillary right permanent central incisor. [figure 1].

Figure : Pre-Operative Clinical image of the patient

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Patient had a history of trauma 10 days ago due to fall from the stairs. The medical history was non-significant and the findings of extra-oral examination were unremarkable.

Intra-oral examination revealed a sub gingival fracture at the cervical third of the root irt tooth 11. Gingival inflammation was seen with no signs of mobility and tender on percussion. Intra-oral peri-apical radiograph revealed horizontal crown-root fracture with no signs of peri-apical pathology. Root apex closure was seen with dental caries extending to one-third of the root
[figure 2].

Figure : Pre-operative radiographic image of the maxillary central incisor

On the basis of clinical and radiographic findings, a definite treatment plan was made and was explained to the parents. After parental consent was obtained, anesthesia was established by local infiltration of lidocaine with 1:80,000 adrenaline. Root canal treatment was initiated, after the canal preparation using Pro Taper rotary instrument till F2, canal was filled with intra canal medicament (Metapex) for 14 days so as to disinfect the canal [figure3].

Figure : Metapex dressing given irt tooth 11 for disinfection of the root canal

After 14 days metapex dressing was removed and F2 size gutta percha cone was lightly coated with eposy-resin based sealer and root canal treatment was completed [figure 4].

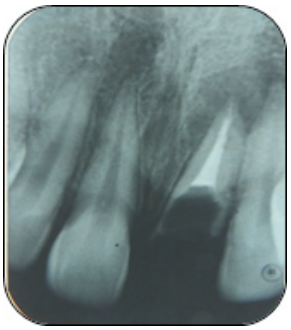

Figure : Gutta-Percha obturation done irt tooth 11

Post-space was prepared with the help of peaso-reamer size 3 (Mani,INC,Japan). A "J" shaped post hook was prepared using a 19-gauge stainless steel wire and cemented with glass-ionomer cement [figure 5].

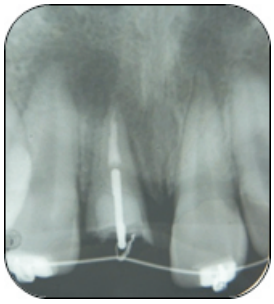

Figure 5: Radiographic image showing "J" hook is luted in the root canal and NiTi wire is secured in the brackets

Begg brackets were placed on all the maxillary teeth and 0.014 Ni-Ti round arch wire was secured [figure 6].

Figure : Clinical image showing "J" hook is luted in the root canal and NiTi wire is secured in the brackets

Extrusion was activated by Ni-Ti wire which was attached to the brackets and the "J" hook. A force of 0.2-0.3N is required for extrusion of single-rooted tooth with 2-4mm movement for the central incisor. Within a span of 1month, 1mm extrusion was observed, after 2 month recall desired 3mm extrusion was observed along with repositioning of right central incisor [figure 7].

Figure 7: Radiographic image showing movement of tooth 11 after 2 month of follow-up.

The brackets and J hook were then debonded. Glass fiber post with a 1.4mm diameter (Reforpost, ANGELUS Ind. E Com Ltda. Londrina, PR, Brazil) was placed into the root canal for supporting the coronal fragment. [figure 8]

Figure 8: Clinical image showing fiber post is luted in the root canal space of tooth 11

Core buildup was done using composite resin (SDI, Australia). The circumferential supra-crestal fibrotomy was performed using electrocautery to prevent relapse [figure 9].

Figure 9: Clinical image after electro-cautery and crown reduction

The tooth was then restored with porcelain fused to metal crown [figure10].

Figure 10: Clinical image showing esthetic crown restoration with Porcelain fused to metal crown irt tooth 11.

The written informed consent form was signed by his parents for publication of the case.

Discussion:

Location of fracture line affects the treatment options, clinical outcomes, and prognosis of teeth. In case of teeth with subgingival fracture due to loss of coronal fragment and loss of pulp vitality prognosis is generally questionable. Root canal therapy is indicated in teeth where pulp neurovascular supply is disrupted, to avoid pulp necrosis which can lead to external inflammatory root resorption. [6,7]

The 3-4mm distance from the alveolar crest to the coronal extension of the remaining tooth structure has been recommended for optimal periodontal health.[6] There are various treatment options for tooth fracture involving biological width: mucoperiosteal flap, osteotomy/osteoplasty, orthodontic/surgical extrusion followed by prosthetic rehabilitation of the tooth. Orthodontic extrusion maintains the periodontal tissues at the same level and also restores physiological attachment.[8] The forced eruption should be maximum 5mm according to Ingle and was limited to 3mm in the present case.[9]

Orthodontic extrusion helps in supragingival positioning of the fracture line. To reinforce cervical portion of the tooth for receiving coronal restoration it is recommended to use intra canal post which also minimizes stress.[10]

In the present case, subgingival fracture of tooth was there so to gain intraradicular retention fiber posts were used.

To prevent relapse, after supra crestal fibrotomy using electrocautery was done to severe periodontal ligament attachments to aid in retaining the newly attained position of tooth.[11]

The present case reports a multidisciplinary management of a dental trauma that leads to conservation of the tooth, in addition the adjacent teeth need not be prepared for fixed prosthesis and the alveolar bone is conserved.

The major drawback of this treatment is longer duration of treatment and stabilization period. It may also impair good esthetic resolution because the cervical diameter of extruded tooth is smaller than the adjacent teeth.

Conclusion:

Traumatic injuries involving maxillary anterior teeth are mostly common in pediatric patients and requires a multidisciplinary approach. As a pedodontist it is our duty to achieve adequate coronal and marginal seal during such long procedures thereby also restoring periodontal health, child esthetics and his confidence for a better future. It is also mandatory to institute a strict and regular recall regimen to guarantee the long term prognosis.

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