

Case Report

Management of Sub-Gingival Caries of Anterior Tooth by Orthodontic Extrusion: A Case Report

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ABSTRACT:

Traumatized anterior teeth with sub-gingival crown fractures, perforation, root resorption, or caries in the cervical area of the tooth or sub-gingivally, especially in the anterior part of the mouth are challenge to treat. Management of sub-gingival fractures includes exposing the cervical margin, above the gingiva followed by appropriate coronal restoration. Surgical crown lengthening or by orthodontic extrusion are the treatment modalities, which involve exposing the cervical margin. These case report of curiously exposed maxillary anterior tooth at the sub-gingival level that was managed by orthodontic extrusion after endodontic treatment followed by esthetic rehabilitation, a technique not utilized routinely but yet conservative and cost-effective.

Key words: Orthodontic extrusion, Sub-gingival caries, biological width, gingivectomy, fiberotomy, prosthetic rehabilitation.

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INTRODUCTION

Invasion of the biologic width¹ with endodontic perforations, traumatic fractures, external root resorption, caries, or subgingival prosthetic preparations present many challenges to clinician. Today scenario is the replacement of a non-restorable tooth with an implant; it is not a complication-free procedure. Efforts must be taken to avoid tooth loss and restore form and function and paying special respect to the gingival portion of the attachment apparatus. Extraction should be the last option in the anterior maxillary region because it leads to loss of expected amount of hard and soft tissue loss after extraction.^{2,3}

In situations in which the biologic width has been compromised, there is solution of surgical approach, a clinical crown lengthening procedure sacrificing supporting bone of the tooth and its neighbours. But there is an alternative treatment is forced eruption which was introduced by Heithersay GS in 1973⁴. Orthodontic forced eruption is the suitable approach to tooth fracture or

curiously exposed below the gingival attachment or alveolar bone crest. Subsequent to endodontic and orthodontic treatment, prosthodontic rehabilitation is done. Orthodontic extrusion is the most appropriate and conservative simple technique for the restoration of teeth without sacrificing the supporting periodontal ligament and bone. It provides an adequate preparation for proper finish line on sound margin so that prosthesis can be prepared and the aesthetic appearance of the tooth is also maintained without any negative change in the length of the clinical crowns⁵. The present article discusses the case reports in the management of subgingival carious tooth. The article also emphasises the importance of orthodontic extrusion in such treatment approaches, so as to restore and rehabilitate the tooth functionally and aesthetically.

CASE-REPORT

A female patient aged 32 years, reported to the Department with the chief complaint of pain and discoloured teeth of

upper left front teeth region since one year. She gave a history of pain which was dull and intermittent in nature and was relieved on taking medication. On intra-oral examination, tenderness on percussion was present in relation to 21 and 22, caries was extending subgingivally on the palatal aspect in relation to 22 and swelling was also present. On radiographic examination revealed that there was periapical radiolucency in relation to 21 and 22. So, the diagnosis was symptomatic apical periodontitis in relation to 21 and periapical abscess without sinus in relation to 22. (Fig.-1). So, we started the endodontic treatment in relation to 21 and 22 and the remaining, roots appeared to have sufficient length, width and taper in relation to 22 and could be considered for extrusion. After removal of the caries fracture line was extending subgingivally on the palatal aspect (Fig.-2). A custom made 'J' hook was prepared (Fig.-3), which was luted with zinc phosphate cement in the prepared post space (Fig.-4). Extrusion was done with the help of fixed orthodontic appliance (0.018 inch MBT brackets) bonded from tooth 13 to tooth 24 by using composite resin. 016 inch Nickel Titanium wire was used to extrude the incisor. Extrusion force was applied using 016 Ni-Ti wire, which was used to engage the hook and then was secured on to the brackets (Fig.-5). The patient was kept on follow up twice in a week. Amount of extrusion was gained after 14 days (Fig.-6). The incisal and palatal aspects of the provisional restoration were reduced to prevent occlusal interferences during extrusive

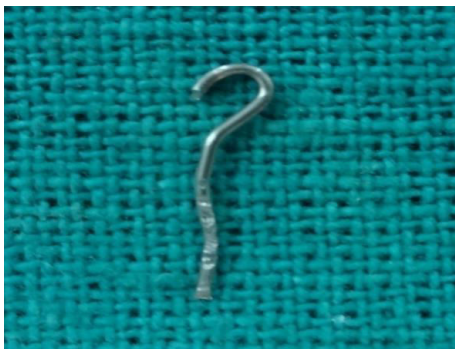
movement. Gingivectomy was done to maintain the gingival contour and fibrotomy of the stretched periodontal fibres was performed to avoid relapse after extrusion (Fig.-7). This allows the fibres to heal and reorganize in the new position of the root. Provisional acrylic resin restoration was prepared to fit the fracture line (Fig.-8). The bracket on the target tooth was positioned more apically than the brackets on the adjacent teeth and ligated with ligature wire (Fig.-9). Sufficient amount of extrusion was obtained after 28 days (Fig.-10). By considering the estimated crown- root ratio, 3-4 mm extrusion was obtained as adequate to provide sufficient biologic width as well as to provide a ferrule for the final restoration. After attaining a final position, this position was maintained for 4 weeks without stretching it i.e., no active force was applied. Passive phase was necessary to avoid relapse. Following the retentive phase, during which tooth stability was gained, the provisional crown was removed (Fig.-11). After stabilization, cast post and core was fabricated and luted with GIC and crown was prepared. Shade matching was done (Fig.-12). Retraction cord was applied for impression (Fig.-13). After impression taken, the provisional acrylic resin restoration was then readapted on prepared sound tooth margins with a proper ferrule effect to prevent any change in tooth position (Fig.-14). After one week, a porcelain-fused-to-metal crown was fabricated and delivered (Fig.-15).



(Fig-1). Pre-operative photograph



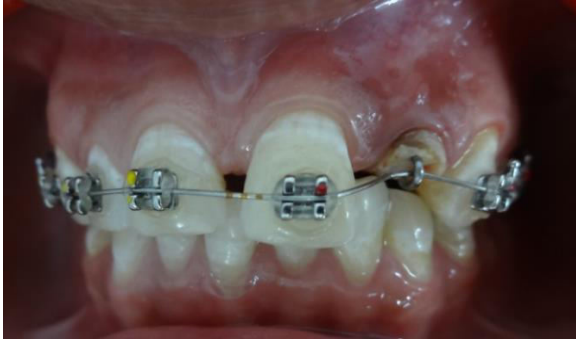
(Fig-2). Caries was removed



(Fig-3). A custom made 'J' hook was prepared



(Fig-4). A custom made 'J' hook was luted.



(Fig-5).Extrusion force was applied.



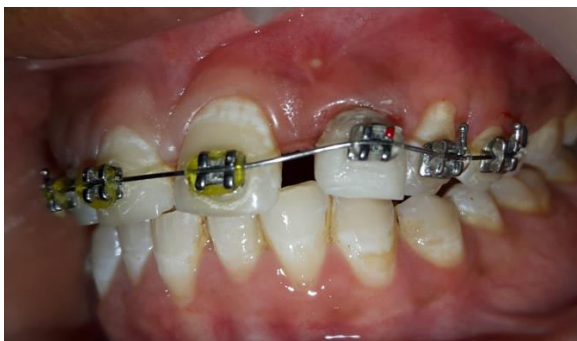
(Fig-6). Amount of extrusion after 14 days



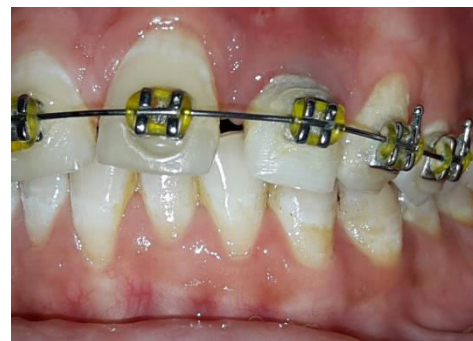
(Fig-7).Fibrotomy of the stretched periodontal fibres was performed to avoid relapse.



(Fig-8). Provisional acrylic resin restoration was prepared



(Fig-9) Brackets placed on teeth



(Fig-10). Amount of extrusion after 28 days



(Fig-11). Provisional crown was removed



(Fig-12). Shade matching was done



(Fig-13). Retraction cord was applied



(Fig-14). Temporary crown was placed



(Fig-15) Final fitted PFM crown

DISCUSSION

An essential requirements for an interdisciplinary approach for the treatment of anterior tooth injury by trauma or carious has been given special importance since a long time. In present case, after endodontic therapy, orthodontic forced eruption with fixed appliance was done to extrude 22. Subgingival caries may leave unsuitable for restoration of the remaining tooth. Because of sub-gingival or sub-crestal margin involvement, the remaining root for restoration will effect on the biological width. The biological width is achieved by orthodontic extrusion and get sufficient supra-gingival tooth tissue. It is indicated in all cases where defect are subcrestal such as fractures, perforations or caries.^{6,7} Surgical reposition is also the choice of treatment but due to this their is increase possibility of external root resorption and loss of bone support⁸. In 1985, Andreasen and vestergaard reported that

extrusion was done by fixed or removable appliances.They found that orthodontic extrusion is faster in fixed appliance as compared to removable appliance.⁹

In present case, active orthodontic treatment was followed out for 28 days. With the help of fixed appliances, adequate ferrule was obtained for proper fabrication of cast post and core and the placement of crown on sound tooth structure. Ferrule is a band of extracoronal material at the cervical margin of a crown preparation that encompass the teeth and obtained by the crown that is placed over the post and core system. Successful resistance form is always depend on adequate ferreule. Researcher have shown that 1 to 1.5 mm of ferrule is required for adequate fatigue resistance for restoration.¹⁰ A crown root ratio must be obtained approx 1:1 for a successful post-treatment restoration.

After sufficient extrusion, a fibrotomy of the stretched periodontal fibres is usually done. It is done to avoid

relapse. Forced eruption combined with fibrotomy allows the fibres to heal and reorganize in the new position of the root^{11,12}. It should be stabilized for 8-12 weeks before the fabrication of a permanent post and core.¹³

CONCLUSION

The need to place a restoration margin on sound tooth structure, orthodontic extrusion is successful in the management of subgingivally fractured or carious teeth. It gives us better chance to solve the problem with a conservative and minimal traumatized approach so as to restore and rehabilitate the tooth functionally and aesthetically.

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