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Reattach and Revive: A Case Report on Crown Reattachment Procedure with A Slight Modification of Richmond Reattachment Technique

Dr. Sai Chandana G.P[1], Dr. Parinitha M S[2], Dr. Ashwini Shivakumar[3], Dr. Shiva Ranjan Reddy Bareddy[4]

[1]Post Graduate, Conservative Dentistry and Endodontics, Jssdch
[2]Reader, Conservative Dentistry and Endodontics, Jssdch
[3]Head Of the Department, Conservative Dentistry and Endodontics, Jssdch
[4]Postgraduate, Conservative Dentistry and Endodontics

ABSTRACT:
Restoration of fractured anterior teeth has been greatly improved through advancements in adhesive technologies, allowing the reattachment of natural tooth fragments with both functional reliability and esthetic success. This clinical case report details the management of a complicated crown fracture (Ellis Class III) in a 29-year-old male following trauma. The fractured maxillary left lateral incisor (tooth 22) was endodontically treated, and a fiber-reinforced composite (FRC) post was placed to enhance fragment retention. The detached fragment, preserved in saline, was reattached using dual-cure resin cement after proper surface treatment and bonding procedures. Postoperative follow-up at 8 months showed no symptoms, resorption, or mobility, and the tooth remained esthetically and functionally intact. Reattachment using the patient's original fragment provides numerous benefits, including natural morphology, shade matching, emotional satisfaction, and minimal invasiveness. With careful assessment of occlusion, periodontal status, and fracture pattern, fragment reattachment stands as a highly conservative and effective treatment option for anterior tooth fractures.

INTRODUCTION:

Fragment reattachment was first reported in literature in 1964 by Chosack and Eidelman.The anterior teeth are relatively vulnerable to trauma[1]. According to reports, 37% of trauma cases include the upper central incisors .These fractures significantly affect patients social and psychological well-being Tooth fragment bonding has become more and more popular due to its numerous advantages like anatomic qualities,colour,surface appearance,aesthetics and positive psycological reaction.[2]There are several approaches to treating fractured anterior teeth. The most commonly adopted conventional methods involve the use of composite resin restorations or prostheses that are reinforced with a post-and-core structure [3] ·some factors that have to considered before reattachment procedure are -The tooth's fracture pattern and ability to be repaired (associated root fracture), Traumatic secondary injuries (soft tissue status),The

existence or absence of a broken tooth piece and its suitability for usage (fit between fragment and the remaining tooth structure), Occlusion, appearance, economic state, and prognosis

Case description:
A 29 year old male patient reported to opd with the history of self fall 3 days back No history of pain/ swelling was given by patient ,Clinical finding include ellis class III fracture of 22 and fracture of adjacent teeth was not noted .Fractured tooth was tender to percussionPre-op images are seen as follows.[FIG 1,2]

Cbct evaluation:
[FIG 3] Chisel fracture with the level of fracture line above the bone level can be seen., this indicates positive prognosis.

Treatment protocol:
Access opening of 22 was done under local anesthesia of 2% lignocaine and 1:80,000 adrenaline .Working length was established initial binding file 25mm-15K.[FIG 4]. Biomechanical preparation is done by step back technique .Final enlargement till 50k -25mm was done .[FIG 5] Master cone of 50 size selected and obturation by lateral compaction was done with zinc oxide eugenol sealer. [FIG 6] The fractured fragment was removed and stored in saline in freezer till the post space prepration was done [FIG 7].post space of 15mm was prepared using peeso reamer . [FIG 8]
Prefabricated fibre post of proper fit and diameter was tried and adjusted to desired length and tooth fragment was cleaned with hypochlorite and thoroughly rinsed with saline. [FIG 9]
The coronal fragment was then prepared so that it could be placed over the coronal portion of fibre post . etching both were subjected to a 15 seconds etching process using a 37% phosphoric acid etchant on enamel and dentin . then using a fully saturated applicator , 2-3 coats of bonding agent were applied in quick succession to the dentin and enamelnthat had been etched.
After applying the bonding agent for 15 seconds while gentle air thinning for 5 seconds , the light curing process was then applied for 10 seconds , dual cure resin cement was used to lute the prefabricated glass fibre post in the canal. Multi link dual cure was used to restore the fragment to the tooth with fiber post. The original fragment was accurately placed and photo polymerised for 40 seconds excess composite was removed and polished with composite polishing kit.[FIG 10,11]. In this technique fibre post was first cemented into the post space following this the fractured fragment which was priorly checked for accurate fit was accurately placed over the fibre post and then both of them are bonded together. This is a slight variation from the traditional Richmond crown technique.

Follow-up:
Patient was recalled after 8 months . patient was asymptomatic and clinical examination of the tooth revealed no mobility and tooth was not tender to percussion. Intraoral periapical readiograph revealed no resorption and no boneloss was present. [FIG 12,13]

Discussion:
The evolution of adhesive dental materials has revolutionized the management of tooth fractures, enabling predictable and esthetic reattachment of fractured fragments. Provided the biological considerations, materials, and clinical protocols are appropriately addressed, reattachment stands as a preferred treatment

choice when the fragment is available. This method preserves the tooth's original color and contour, ensures uniform wear with neighboring teeth, supports the patient's emotional well-being, and presents a more economical option. [4,5]

Reattachment of a fractured crown fragment is often the most conservative and preferred treatment for anterior teeth, offering immediate restoration of the tooth's natural appearance.[6]

Using the patient's natural tooth fragment eliminates common challenges associated with other restorative techniques, such as uneven material wear, color mismatch, and difficulties in replicating the original tooth's shape and surface texture.

Effective treatment planning depends on evaluating periodontal, endodontic, coronal, and occlusal factors. Cavalleri and Zerman reported that reattached crown fragments typically demonstrate superior long-term outcomes compared to composite restorations. [7]

If the fractured fragment remains outside the oral environment for an extended period, it may become dehydrated. To prevent this, it is recommended to store the fragment in a suitable medium, such as physiologic saline. Most resin cements and resin-based composite core materials are compatible for bonding with fiber-reinforced posts during the restoration process.[8,9]

The success and practicality of these restorations depend on various factors such as the position and extent of the fracture, the size of the remaining fragment, the patient's periodontal condition, involvement of the pulp, the stage of root development, any violation of the biological width, occlusal forces, and the time since the trauma occurred. The post not only helps in securing the coronal fragment through frictional retention but also reinforces the restoration against dislodgment from lateral or non-axial forces, complementing the adhesive bond.[10,11]

Reattaching the fractured crown fragment using a fiber-reinforced composite (FRC) post bonded within the root canal improves retention significantly. The enhanced fracture resistance results from the synergy of the post's elastic properties and strong adhesive bonding. This allows the post and tooth to function as a unified structure, promoting even distribution of stress and reducing the risk of failure. [12]

Assessing the patient's bite is crucial for the success of reattachment procedures. Vertical root fractures are an unfavorable outcome that can arise from trauma, premature occlusal contacts, strong biting forces, or clinical mishandling. Reattachment is typically not advised in cases where the occlusion is compromised—such as in patients with deep overbites or bruxism—due to the high risk of failure. In this case, the reattached tooth remained stable, functional, and aesthetically acceptable during follow-up, indicating a positive short-term result. However, the absence of long-term monitoring is a drawback, as it limits our understanding of the reattachment's durability over time.[13]

Conclusion:

Fragment reattachment is a minimally invasive and effective approach for restoring fractured anterior teeth, offering excellent esthetic integration and functional outcomes. While it may not completely replicate the original strength of an uninjured tooth, the use of modern adhesive systems and appropriate clinical techniques can enhance durability and overall success. With careful case selection and proper execution, this technique serves as a reliable and conservative alternative for managing crown fractures.

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Figure 1

Figure 2

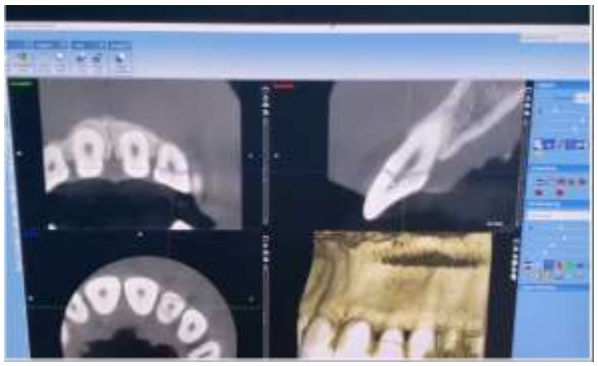

Figure 3

Figure 4

Figure 5

Figure 6

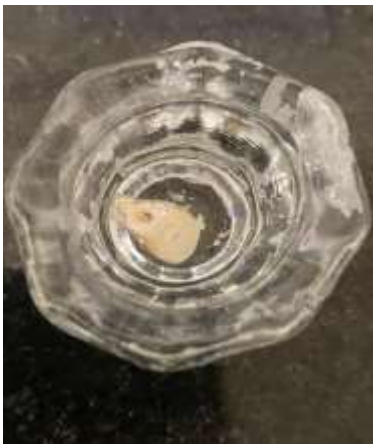

Figure 7

Figure 8

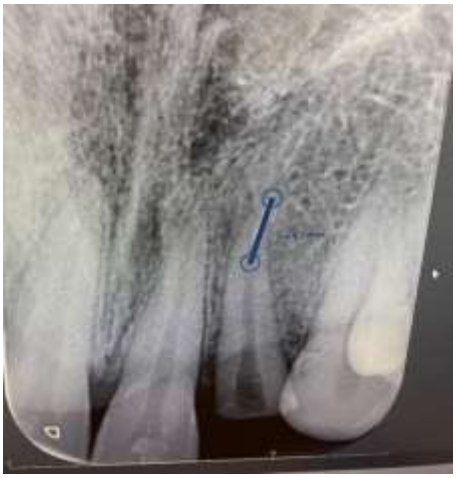

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

Legends:

Figure 1 - pre-op image showing fracture line
Figure 2- IOPAR of fractured 22
Figure 3- CBCT image
Figure 4 – working length
Figure 5 - master cone selection
Figure 6- obturation
Figure 7- fractured fragment stored in saline
Figure 8- occlusal view of fractured tooth 22
Figure 9 – post space preparation
Figure 10- fibre post try-in
Figure 11 – post -op view
Figure 12- post op palatal view
Figure 13 – follow up at 8 months
Figure 14 – iopar at 8 months