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RESEARCH ARTICLE

MANAGEMENT OF FRACTURED TOOTH BY FRAGMENT REATTACHMENT

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ABSTRACT

Traumatic injuries to anterior teeth are common among young individuals and often present with significant esthetic and functional implications. When the fractured tooth fragment is intact and promptly recovered, fragment reattachment provides a conservative and highly esthetic treatment option. This case report describes the management of an uncomplicated crown fracture of the maxillary left central incisor in a 20-year-old male following a fall. Clinical examination revealed a horizontal enamel–dentin fracture at the middle–incisal third junction, with radiographs confirming the absence of root involvement. The patient presented within one hour of the accident, and the fractured fragment, stored in water, remained well-hydrated. After local anesthesia and rubber dam isolation, the fractured tooth and fragment were disinfected, and circumferential beveling was performed to enhance bonding surface area. Mineral trioxide aggregate was placed as an indirect pulp capping material, followed by etching, bonding, and reattachment using a nanocomposite flowable resin to ensure optimal adaptation within the limited interfacial space. Final finishing and polishing were completed using a multi-step system. Follow-up evaluations at 1 week, 1 month, 3 months, and 6 months demonstrated stable clinical and radiographic outcomes, with the tooth exhibiting normal pulp sensibility, satisfactory color match with adjacent teeth, and no signs of fracture line discoloration, detachment, or functional compromise. This case highlights that, when the fractured segment is available and properly preserved, fragment reattachment offers a predictable, biologically favorable, and esthetically superior restorative option, supported by advancements in adhesive dentistry and conservative clinical protocols.

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INTRODUCTION

Approximately 5% of all physical injuries involve the oral cavity, and among these cases, traumatic dental injuries (TDIs) represent about 92% of patients seeking treatment for oral trauma. Fractures of anterior teeth caused by trauma are common among children and adolescents, with a reported prevalence of 18.8%. (1) The primary challenge for the dentist remains selecting the most suitable esthetic restorative procedure for damaged anterior teeth. Available treatment options include composite resin restorations, full- or partial-coverage ceramic restorations, and fragment reattachment. (2) Eidelman and Chosack (1964) published the first documented study on fragment reattachment treatment. (3) When a tooth fragment is available and the permanent tooth has sustained an uncomplicated crown fracture, reattachment is considered the treatment of choice. (4) Reattaching a fractured tooth fragment offers excellent and long-lasting esthetics, as it preserves the tooth's natural shape, color, and surface texture. Additionally, it restores normal function, promotes a positive psychological response, and is a relatively straightforward procedure. (5).

This case report describes in detail the management of an uncomplicated fracture involving a maxillary anterior tooth through the reattachment of the original fractured fragment. The report highlights the clinical procedure, materials used, and the outcomes achieved, - emphasizing the effectiveness of this conservative approach in restoring both esthetics and function.

CASE REPORT

A 20 year old male patient reported with the chief complaint of a fractured tooth in the upper jaw front tooth region associated with pain following a fall 1 hour back from the time of reporting.

Investigations: On extraoral examination no injuries were noted. On intraoral examination, the maxillary left central incisor exhibited a horizontal fracture extending mesiodistally at the middle-to-incisal third junction. (Fig. 1) The adjacent teeth did not exhibit any fractures or cracks.

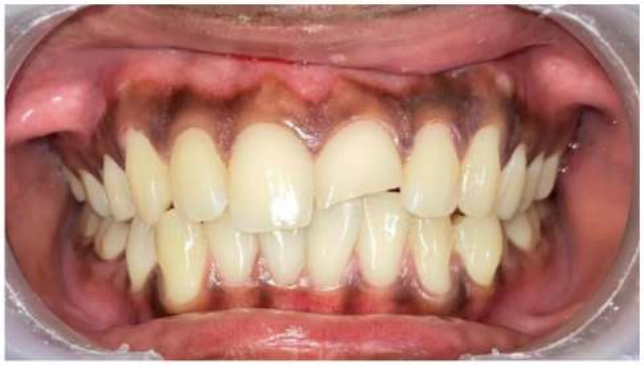

Figure 1. Horizontal crown fracture irt 21

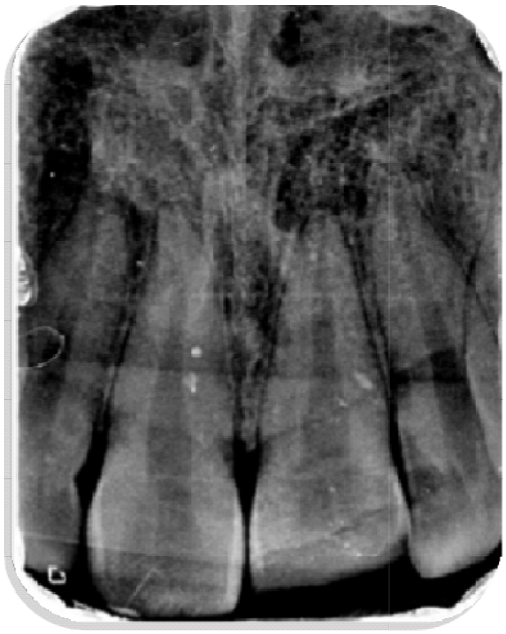

Figure 2. Preoperative IOPA irt 21

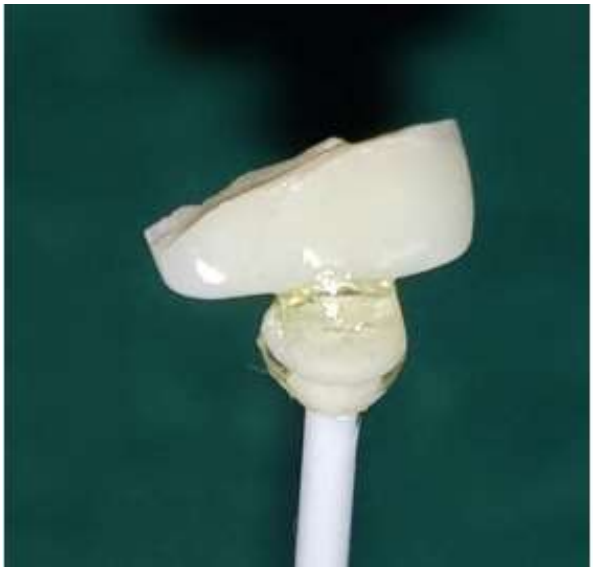

Figure 3 : Fractured tooth fragment

The surrounding soft tissues also did not exhibit any injuries. The fractured fragment was brought immersed in water within a container. Radiographic examination with an intraoral periapical radiograph revealed the extent of the fracture. The fracture involved enamel, dentin and approximated the pulp. Any potential root involvement was ruled out.

The periapical tissues showed no gross changes. (Fig. 2). A thermal pulp sensibility test was performed using Endofrost, which produced an early but lingering response. However, this result was considered inconclusive, as pulp sensibility tests have limited reliability in the period immediately following trauma (6). The test was conducted solely for follow-up assessment rather than diagnostic decision-making. A diagnosis of an uncomplicated crown fracture involving tooth 21 was established. As the fractured fragment was intact and brought to the department within an hour in optimal condition, a conservative approach of fragment reattachment was proposed.

Reattachment Procedure: The fractured tooth fragment (Fig. 3) was wiped clean with 3% NaoOCl (Sodium hypochlorite) and quickly transferred to a sterile vessel with normal saline till reattachment, to prevent dehydration. Under local anesthesia and rubber dam isolation, the fractured tooth was disinfected with 3% NaoOCl. The fit and marginal integrity of the fractured fragment and tooth were checked.(Fig. 4) Circumferential beveling of the fractured margins were done to facilitate adequate bonding.(Fig. 5) A thin layer of MTA (MTA ANGELUS) was placed over the deepest part of fractured site as an indirect pulp capping agent.(Fig. 6) The fractured tooth and fragment were etched with 37% orthophosphoric acid for 20 seconds, rinsed, and air-dried. An adhesive bonding agent was applied and light-cured for 20 seconds. A thin layer of flowable composite ((Filtek Z350 flowable composite) was applied over the fractured surfaces and repositioned correctly before curing for 20 seconds. The fracture line on the labial and palatal surface were masked with the same flowable composite. (Fig. 7) Final finishing and polishing were done with the Super-Snap Mini-kit (Shofu) (Fig. 8), and occlusion was checked.

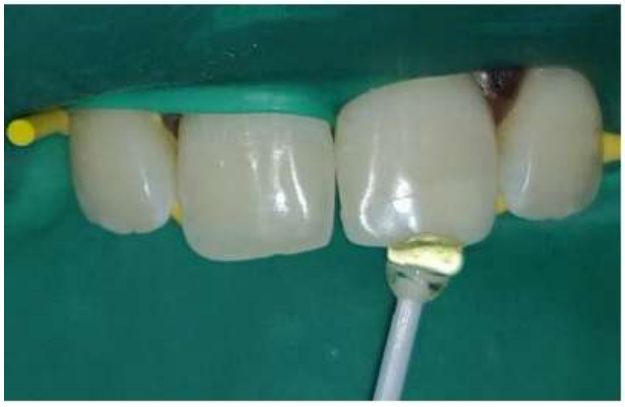

Figure 4 Fragment repositioned to check marginal fit

Figure 5. Bevelled fractured margins

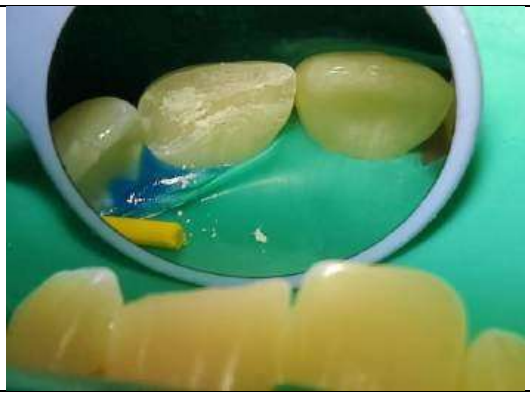

Figure 6. MTA placed over the deepest part of fractured site as an indirect pulp capping agent

Figure 7. Fragment reattached with flowable composite

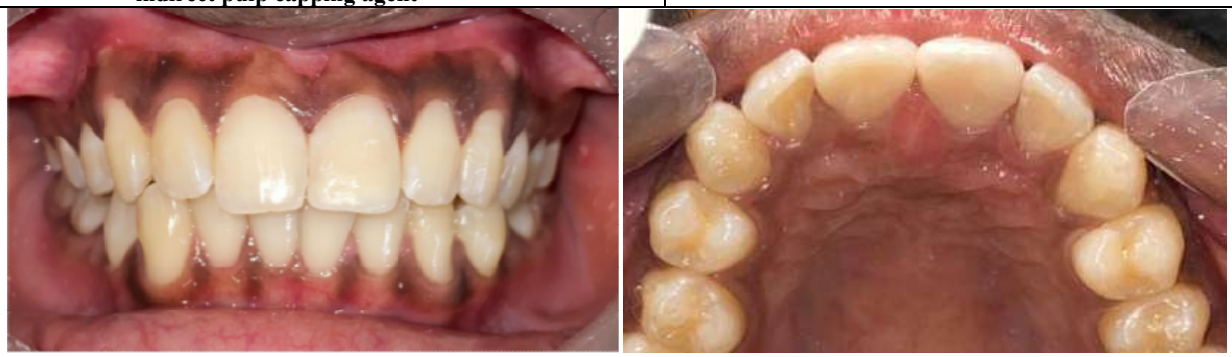

Figure 8 : Immediate Post-OP after finishing and polishing

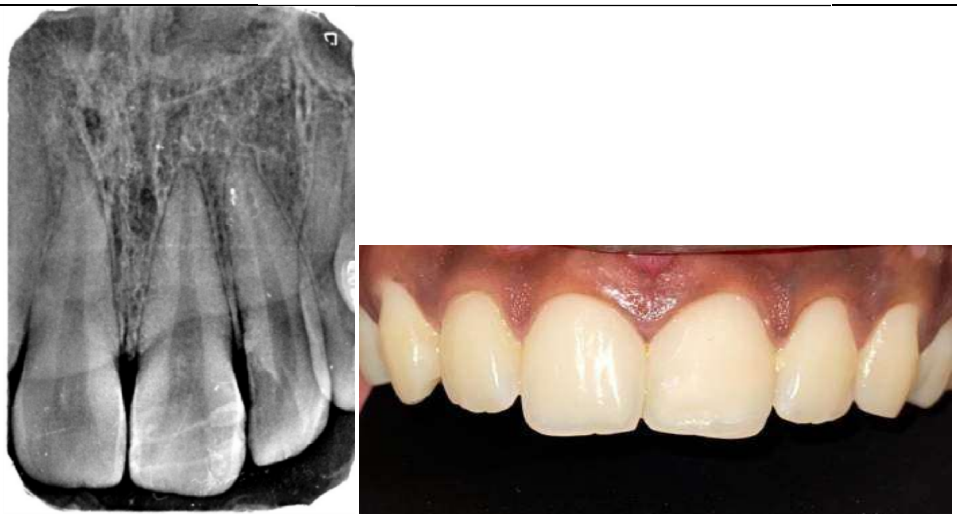

Figure 9 : 3 Months review - IOPA and photograph

Post-treatment instructions were provided, emphasizing the need to avoid heavy functional loads on the anterior region. The patient was evaluated at 1 week, 1 month, 3 months and 6 months (Fig. 9), showing no symptoms or complications, with functional and esthetic outcomes remaining satisfactory. Pulp sensibility testing consistently demonstrated a positive response comparable to that of the adjacent teeth.

DISCUSSION

Anterior tooth fractures resulting from trauma are frequently encountered in clinical practice and often cause considerable distress to patients because of their noticeable impact on appearance. Effective management of such cases requires a careful balance between preserving as much healthy tooth structure as possible and restoring the tooth's natural form, function, and esthetics (McDonald et al., 2004). Several factors significantly influence how long a reattached tooth fragment remains functional. Among the most critical are the storage medium used for the fragment immediately after the fracture, the type of adhesive material selected for reattachment, the use of protective agents to safeguard the dentin–pulp complex, the handling characteristics or flow properties of the composite resin or cement employed, and the specific technique applied during the reattachment procedure. Each of these elements plays a vital role in determining the long-term success and durability of the restored tooth (7). Tooth fragments that remain dehydrated for more than one hour exhibit a significant reduction in fracture resistance. In addition, prolonged dehydration can lead to esthetic complications, such as changes in color or translucency. (8) In the present case, the patient reported to the department within one hour of the

accident, the fragment had been kept in a moist environment until reattachment, thereby preventing dehydration and preserving their structural and esthetic integrity. Over the years, several techniques for tooth fragment reattachment have been developed and refined. Simonsen's technique, in particular, involves creating a bevel-type preparation that serves as a finishing line for the restoration. Circumferential beveling of the enamel margins, both on the fractured fragment and the remaining tooth structure enhances retention by increasing the available bonding surface area. Additionally, it helps to mask the fracture line, which is subsequently covered with composite resin for improved esthetics. (9) Therefore, in the present case, circumferential beveling was performed on both the fractured fragment and the remaining tooth structure to optimize bond strength and achieve a seamless restorative outcome. Mineral trioxide aggregate (MTA), a calcium silicate based material was used in this case as an indirect pulp capping agent since it has good reparative dentin-forming ability (10). Because successful fragment reattachment requires precise adaptation and the space between the fractured surfaces is minimal, a flowable composite resin is preferred due to its low viscosity and excellent interfacial adaptation.(11) Therefore, a nanocomposite flowable resin (Filtek Z350) was used in this case, followed by finishing and polishing with the Super-Snap Mini-kit (Shofu).At the 1-week, 1-month, 3-month, and 6-month follow-ups, the reattached fragment showed stable clinical and radiographic outcomes, with normal pulp sensibility, good color match, functional integrity, and no signs of discoloration or failure.

CONCLUSION

Reattaching fractured tooth fragments represents one of the most conservative and esthetically pleasing restorative approaches, as long as the fragment remains available and intact. Advances in bonding technology now enable clinicians to achieve restorations that are durable, functional, and natural in appearance. However, long-term follow-up remains essential before this technique can be endorsed as a standard treatment option.

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