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Temporary stabilization of a partially displaced complicated crown fracture followed by Endodontic treatment and fragment reattachment: A Case report.

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Abstract
Traumatic complicated crown fractures of permanent anterior teeth require timely management to restore function, aesthetics, and biological integrity while preserving sound tooth structure. Fragment reattachment is a conservative treatment option when the original fragment is available and can be accurately adapted to the remaining tooth structure. However, repositioning may be difficult when the fragment is partially displaced and pulpal tissue is interposed between the fractured segments. A 34-year-old patient presented on the day of a road traffic accident with traumatic injuries involving the maxillary anterior teeth. Clinical and radiographic examination revealed a complicated crown fracture of the maxillary left central incisor (21), with partial displacement of the coronal fragment and interposed pulpal tissue, along with an Ellis Class II fracture involving the maxillary right central incisor (11). Because complete repositioning of the fragment was initially not possible, temporary wire-composite stabilization was performed to maintain its position during endodontic treatment. Following removal of the interposed tissue during biomechanical preparation, the temporary stabilization was removed and the original fragment was repositioned and reattached using composite resin. Root canal obturation and subsequent fibre post placement were performed. At six-month follow-up, the patient remained asymptomatic, with no abnormal mobility, periodontal probing abnormality, or radiographic evidence of periapical changes. This case demonstrates that temporary stabilization can facilitate endodontic management and subsequent anatomical reattachment of a partially displaced crown fragment, providing a conservative approach for managing complex traumatic crown fractures.

Keywords: Tooth fractures; dental trauma; fragment reattachment; Root canal therapy; temporary stabilization; fiber post.

I. Introduction

Traumatic dental injuries involving the permanent anterior teeth are common clinical emergencies, with crown fractures representing an important proportion of injuries affecting the permanent dentition. Appropriate diagnosis, treatment planning, and longitudinal follow-up are essential for achieving favourable biological and functional outcomes. The International Association of Dental Traumatology (IADT) recommends systematic assessment of the fractured tooth, associated periodontal tissues, pulp status, and radiographic findings when managing traumatic injuries to permanent teeth [1].

Complicated crown fractures involve enamel and dentin with exposure of the dental pulp. Management depends on several factors, including the extent of the fracture, pulpal status, stage of root development, time elapsed since trauma, restorability, periodontal involvement, and availability of the fractured fragment [1]. When the original fragment is available and can be aligned accurately with the remaining tooth structure, reattachment represents a particularly conservative treatment option [2-4].

The principal advantage of fragment reattachment is that it allows restoration using the

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patient's own dental tissue, thereby preserving the original morphology, surface texture, contour, translucency, and optical characteristics. The technique may also reduce the amount of additional tooth preparation required compared with conventional prosthetic rehabilitation [2,3]. Fiber reinforced posts have additionally been described as an intraradicular means of reinforcing and stabilizing reattached fragments in endodontically treated teeth [4-6].

Despite these advantages, fragment reattachment can become technically challenging when the coronal fragment is partially displaced and tissue becomes interposed between the fractured surfaces. In such circumstances, forceful repositioning before removal of the interposed tissue may compromise the fragment or traumatize the surrounding tissues.

The present case describes the conservative management of a partially displaced complicated crown fracture of the maxillary left central incisor using temporary wire composite stabilization during endodontic treatment, followed by anatomical repositioning and fragment reattachment. The clinical significance of this approach lies in maintaining control of the fractured segment while the obstruction preventing complete repositioning is addressed endodontically.

Case Presentation

A 34-year-old patient reported to the department on the same day following a road traffic accident, with a history of trauma to the maxillary anterior region.

Clinical and Radiographic Examination

Intraoral examination revealed a complicated crown fracture involving the maxillary left central incisor (21). The fracture line was oblique and extended mesiodistally from the coronal region toward the gingival aspect of the crown. The coronal fragment was partially displaced, with pulpal tissue interposed between the fractured segments. The clinical photographs supplied with the case demonstrate the displaced coronal segment and the extent of the anterior crown injury.

A concomitant Ellis Class II fracture of the maxillary right central incisor (11) was also documented. An intraoral periapical radiograph was obtained to assess the extent of the traumatic injury and the status of the root and periapical tissues. The radiograph demonstrated the crown fracture without evidence of an associated root fracture or periapical abnormality.

The availability of the original coronal fragment and its close fit with the remaining tooth structure favoured a conservative fragment reattachment approach.

Figure 1 and 2: Preoperative clinical and radiographic assessment.

Treatment Planning

Treatment options were considered based on the extent of the fracture, availability of the original fragment, and the possibility of preserving the remaining tooth structure. Reattachment of the original fragment was selected because it allowed preservation of the patient's natural crown morphology and provided a minimally invasive restorative solution.

However, complete seating of the fragment was initially impossible because pulpal tissue was interposed between the fractured segments. Therefore, rather than applying force to achieve immediate repositioning, temporary stabilization was planned to maintain the fragment in an approximately anatomical position while endodontic treatment was performed.

Temporary Stabilization

A wire was adapted to the buccal aspect of the fractured tooth and secured to the fractured segments using composite resin. This temporary wire composite stabilization was deliberately used only as a provisional means of maintaining the fractured segment in position during endodontic treatment.

This step was particularly important because the displaced fragment could not initially be completely seated owing to the interposed pulpal tissue. Temporary stabilization avoided unnecessary manipulation of the fragment while providing

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sufficient positional control to permit access preparation.

Figure 2: Temporary wire composite stabilization of the displaced crown fragment.

Endodontic Treatment

Following temporary stabilization, endodontic access was established in 21. Biomechanical preparation was subsequently performed, during which the interposed pulpal tissue was removed. Following completion of the preparation, the temporary wire composite stabilization was removed.

The accompanying presentation documents the working length determination and mastercone stages before obturation.

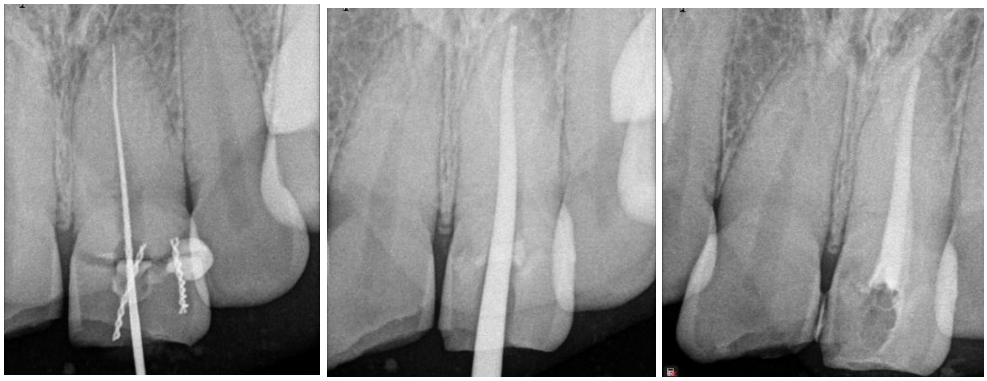

Figure 3,4,5: Working-length determination, master-cone verification, and obturation.

Fragment Repositioning and Reattachment

After removal of the interposed tissue and temporary stabilization, the original coronal fragment was carefully repositioned and completely seated against the remaining tooth structure. Close adaptation of the fragment along the fracture line was achieved. The fragment was then reattached to the remaining tooth structure using composite resin.

Root canal obturation was subsequently completed. The postoperative radiographic sequence in the supplied presentation demonstrates the obturated canal and the final postoperative radiographic appearance.

At a subsequent appointment, space was prepared for a fiber post in 21, and the fiber post was luted. The associated coronal fracture of 11 and the remaining coronal restorative requirements of 21 were restored with composite resin. The restorations were finished and polished, and occlusion was evaluated.

The postoperative clinical photograph demonstrates restoration of the anterior crown contour and overall aesthetic integration of the reattached fragment.

Figure 6: Postoperative clinical and radiographic outcome.

Follow-Up

The patient was recalled for clinical and radiographic follow-up. At the six-month evaluation, the patient was clinically asymptomatic. The treated tooth demonstrated no abnormal mobility, and periodontal probing revealed no abnormal probing depth. Radiographic examination showed no evidence of periapical changes. The integrity of the reattached fragment and the

periodontal and periapical status of the treated tooth were also evaluated.

Figure 7: Preoperative and postoperative clinical comparison.

II. Discussion

Management of traumatic anterior crown fractures should prioritize preservation of sound tooth structure while simultaneously addressing biological, functional, and aesthetic requirements. The current IADT recommendations emphasize careful clinical and radiographic assessment following traumatic injuries because the immediate appearance of the fracture may not completely reflect the extent of the underlying injury [1].

In the present case, the availability of the original crown fragment was an important factor in selecting fragment reattachment. Reattachment has been described as a conservative approach that allows restoration of the original tooth morphology and surface characteristics while minimizing unnecessary removal of sound dental tissues [2-5].

In the present case, root canal treatment was selected rather than vital pulp therapy because of the extent and configuration of the traumatic injury. The oblique complicated crown fracture resulted in partial displacement of the coronal fragment, with pulp tissue interfering with its complete repositioning. Removal of the exposed pulp tissue was therefore necessary to facilitate complete seating of the fragment and restoration of the original tooth anatomy. Considering the extent of pulpal involvement and the need for definitive fragment repositioning and subsequent restorative reinforcement, endodontic treatment was considered an appropriate treatment option in this case.

The particular clinical difficulty in this case was not simply the presence of a complicated crown fracture, but the partial displacement of the coronal fragment with pulpal tissue physically interposed between the fractured segments. Consequently, the fragment could not initially be completely seated. Attempting to force the fragment into position under these circumstances could potentially damage the fragment, compromise adaptation, or further traumatize the exposed pulp and surrounding tissues.

Temporary stabilization provided a controlled solution to this problem. The wire composite splint maintained the fractured segment in an approximately anatomical position while permitting access to the root canal system. Once biomechanical preparation removed the interposed pulpal tissue, the provisional stabilization could be removed and the fragment could be accurately repositioned.

This sequence is clinically relevant because it separates two objectives that are sometimes difficult to achieve simultaneously: maintaining fragment stability and obtaining adequate endodontic access. Rather than sacrificing the original fragment or attempting premature definitive bonding, temporary stabilization allowed the clinician to preserve the fragment until complete adaptation became possible.

The use of the patient's own fragment has several biological and aesthetic advantages. Reattached fragments retain the natural enamel surface, morphology, contour, translucency, and colour characteristics of the original tooth [2,3]. These features are difficult to reproduce completely with direct composite restorations, even when sophisticated layering techniques are used.

Fiber post-supported reattachment has additionally been reported for complicated crown fractures in endodontically treated anterior teeth. The post can function as an intraradicular reinforcing element, particularly when the remaining coronal tooth structure is limited [4-6]. Previous reports have described successful use of fiber posts in conjunction with adhesive fragment reattachment, with favourable clinical and radiographic outcomes during follow-up [4,5].

The present case is also consistent with the broader literature demonstrating that reattachment can provide favourable short and medium term clinical outcomes when cases are appropriately selected. A systematic review has described fragment reattachment as a conservative and aesthetically favourable treatment option, although longevity is influenced by fracture characteristics, reattachment technique, restorative materials, occlusal conditions, and other patient-related factors [7].

Importantly, fragment reattachment should not be presented as a universally permanent solution. Complicated fractures may carry a greater risk of fragment loss or refracture than uncomplicated fractures, and long-term maintenance depends on the extent and location of the fracture, quality of adhesion, occlusal loading, periodontal status, and remaining tooth structure. Contemporary literature continues to emphasize the need for appropriate case selection and periodic clinical and radiographic review [7,8].

In the present case, the six-month outcome was favourable, with absence of symptoms, abnormal mobility, pathological periodontal probing depth, and radiographic evidence of periapical disease. Although this represents encouraging short-term evidence of treatment success, a six-month follow-up cannot establish long-term survival. Continued periodic monitoring would therefore be appropriate.

The clinical value of this case lies in the sequence of management rather than in the concept of fragment reattachment itself. When a crown fragment is partially displaced and complete repositioning is mechanically prevented by interposed tissue, temporary stabilization can provide positional control until the obstructing tissue is removed and definitive reattachment can be performed.

III. Conclusion

Reattachment of an available natural tooth fragment remains a valuable conservative option for selected traumatic crown fractures. In the present case, temporary wire-composite stabilization allowed the partially displaced coronal fragment to be maintained in a controlled position while endodontic treatment was performed. Following removal of the interposed pulpal tissue, the fragment could be accurately repositioned and definitively reattached.

This approach emphasizes an important principle in traumatic dental injury management: when preservation of the original tooth fragment is possible, temporary stabilization can be used to facilitate subsequent definitive treatment rather than abandoning the fragment because immediate repositioning is difficult. The favourable six month clinical and radiographic outcome supports the feasibility of this conservative approach, although longer follow-up is required to determine the durability of the reattachment.

Consent for Publication

Written informed consent for publication of the clinical photographs and radiographs obtained.

Conflicts of Interest

The authors declare that they have no competing interests.

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