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TOOTH FRAGMENT REATTACHMENT OF COMPLICATED CROWN FRACTURE WITH 1 YEAR FOLLOW UP: A CASE REPORT

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ABSTRACT

Aim & Background: This report presents the conservative management of a complicated crown fracture. Among various treatment options, reattaching a crown fragment is a viable conservative approach for anterior tooth fractures. In a remarkable display of modern dentistry, a fractured tooth was skilfully redeemed through the innovative reattachment of its fragmented crown, expertly secured with a glass fiber post, showcasing a harmonious blend of art and science in restorative dental care.

Case Description

A female patient, aged 32, was treated for traumatic injuries sustained in an accident, which resulted in crown fractures of her upper central incisors, specifically affecting the right and left maxillary teeth. The fracture in tooth 11 was oblique, extending from the buccal to the palatal aspect, extended sub gingivally on the mesiopalatal area involving enamel, dentin and pulp and Ellis class 2 fracture in 21. Root canal treatment was performed promptly. Crown-lengthening procedure was performed to expose the fracture line. The fragment was reattached using fibre post with dual cure resin cement. At the 1-year follow-up, the tooth demonstrated excellent functional and esthetic outcomes, with the patient experiencing no adverse issues.

Conclusion: Due to the recent advancements in the dental materials and implication of appropriate technique, esthetic outcomes are foreseeable. Therefore, reattaching a tooth fragment is an alternative method for restoring both function and aesthetics using an extremely conservative approach.

Clinical significance :Reattaching fractured tooth fragments is a practical restorative option for dentists, as it effectively restores dental functionality and aesthetics while being highly conservative and cost-effective.

Keywords: Case report, Complicated fracture, Fragment reattachment

INTRODUCTION:

Dental trauma can greatly impact a patient's social and emotional well-being. Tooth fractures are the most common dental issue that is a result of severe injuries, which mostly occur in the front teeth, particularly the maxillary incisors. However, the mandibular central incisors are less usually affected[1] . Approximately 50% of people experience at least one dental injury, specifically a chip or fracture of the front teeth, before reaching the age of 18, with the leading causes being falls, high-impact sports, and motor vehicle accidents [2]

.Buonocore's acid-etching procedure in 1955 revolutionized shattered tooth therapy, maintaining healthy tooth structure. Dentists use two main techniques to repair fractured teeth: either bonding a tooth-colored resin to restore the tooth's shape, or reattaching a salvaged fragment of the original tooth using a specialized adhesive [3] .

Reattachment of a fragmented tooth segment can yield excellent and durable aesthetic outcomes, as it preserves the tooth's natural anatomy, color, and surface texture. Additionally, it restores functional integrity and can have a positive psychological impact. This case report demonstrates a successful treatment of a complex coronal tooth fracture with tooth fragment reattachment, with a follow-up period of one year, highlighting the effectiveness and feasibility of this treatment approach.

Case Description

A female patient, aged 32 reported a chief complaint of bilateral crown fractures involving the maxillary central incisors (tooth 11 & 21) (figure 1 & 2), due to an accident. Upon examination, no fractures were detected in the maxilla or other facial bones. An intraoral examination revealed an oblique crown fracture in tooth 11, extending from the buccal to the palate side., extended subgingivally on the mesiopalatal area involving enamel, dentin and pulp and Ellis class 2 fracture in 21. A X-ray (periapical radiograph) was taken, showing a fracture in the crown of the tooth but no damage to the root or surrounding tissues (figure 3). The tooth fragment had been attached to the soft tissue and did not show any significant change in colour. The fracture margin extended subgingivally, on the mesiopalatal region, which was a significant complexity to the case.

Prompt endodontic intervention was undertaken to prevent further complications and preserve the tooth, access opening was done through the fragment. Working length was verified (23mm) using apex locator and confirmed with intraoral periapical radiograph (figure 4), cleaning and shaping was carried out till #30 9% using lithiflex rotary system (figure 5), During the instrumentation procedure, the root canal was continuously irrigated with a solution of 5.25% sodium hypochlorite, alternating with normal saline, to ensure thorough cleansing and disinfection. The canal was then filled using the sectional obturation method, ensuring a 5-mm apical seal to prevent further infection (figure 6). The tooth fragment is removed and stored in normal saline (figure 7). Crown-lengthening procedure was carried out to expose the fracture line (figure 8 & 9).

After enlarging the post space with a Peeso Reamer (size 2), a prefabricated glass fiber post was securely fixed in the canal using resin cement (figure 10,11). Then, the fractured tooth fragment was readied for reattachment by etching with 37% phosphoric acid, rinsed, blot dried, and a bonding agent was applied. The access cavity and grooves in the fragment were filled with resin cement, and the fragment was precisely positioned and light-cured onto the remaining tooth structure. Firm pressure was applied to ensure a snug fit. Finally, excess material was polished away with a diamond bur, achieving a smooth finish (figure 12, 13).

Patient was recalled after 1 week for semi-rigid splinting around the maxillary anterior teeth (figure 14). Composite restoration was given in 11 and polished (figure 15).

The patient was recalled for follow-up after 1 year and the tooth was in normal function and esthetics to the patient’s satisfaction (figure 16,17).

DISCUSSION

Advances in adhesive dentistry have made it possible to achieve excellent results when reattaching displaced tooth fragments, given careful attention to biological, material, and technical details. Reusing the natural tooth fragment offers several advantages, including avoiding the potential problems associated with alternative restorative methods, such as uneven wear, color mismatch, and difficulties in replicating the natural contour and texture.

A study by Badami et al. revealed that neither the type of bevel nor the material used could completely restore a tooth's original fracture resistance. However, specimens prepared with a chamfer and adhesive bonding demonstrated 40-60% of the original fracture resistance, whereas those with an internal dentin groove and over-contour preparation achieved a significantly higher 90% of the original fracture resistance [4].

This case report showcases an interdisciplinary approach to reattaching a tooth fragment in a complex fracture case involving a maxillary central incisor with biologic width violation. The use of a glass fiber post provides an innovative solution for retaining the fragment and restoring the tooth's aesthetics and function. The report highlights the importance of considering the rehabilitation of associated periodontal tissues when managing coronal fractures with significant periodontal injury or biological width invasion.

While tooth fragment reattachment is typically reserved for straightforward cases with visible fracture lines, this case report shows that the procedure can also be successfully applied to more complex cases involving the biological width and tooth root, as demonstrated by the clinical success observed after one year of follow-up. This highlights the potential for expanded indications for tooth fragment reattachment in carefully selected cases. Raniel Fernandes Peixoto demonstrated a successful case report of tooth fragment reattachment with biological width violation which has a success of 3 year follow up [5].

The prevalence of root fractures in teeth rehabilitated with endodontic posts and cores made of metal is attributed to the rigidity and mechanical properties of metal posts. In contrast, glass fiber posts are more flexible and facilitate improved stress distribution in the root, potentially leading to less severe fractures upon failure [6.]

The elastic modulus of glass fiber posts is similar to that of dentin, enabling effective cementation using adhesive systems and yielding acceptable aesthetic outcomes [7].

Considering these factors, a glass fiber post was selected to enhance retention of the reattached crown fragment, taking into account the remaining tooth structure and enamel presence, which enhances adhesion to the adhesive system. tooth fragment reattachment offers a conservative and harmonious solution for anterior crown fractures, as it promotes fragment adaptation, preserves natural tooth contours and occlusal contacts, and offers esthetic and functional rehabilitation while maintaining biocompatibility with the periodontium [8,9,10].

CONCLUSION

With the advancements in materials and an appropriate technique, esthetic outcomes are foreseeable. Therefore, tooth fragment reattachment offers a conservative approach to restore function and aesthetics, providing an alternative technique that preserves the natural tooth structure to the greatest extent possible.

Clinical significance

Reattaching fractured tooth fragments offers dentists a viable and conservative restoration option, effectively restoring dental function and aesthetics while minimizing tooth reduction and costs.

Fig. 1: Preoperative labial view of the fractured tooth 11 & 21

Fig. 2: Preoperative palatal view of the fractured tooth 11 & 21

Fig. 3: Preoperative radiograph.

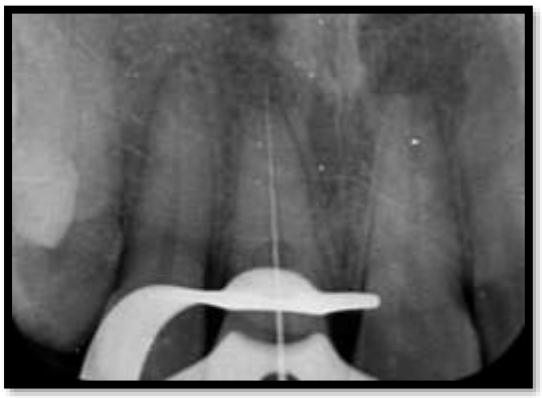

Fig. 4: working length radiograph

Fig. 5: master cone radiograph

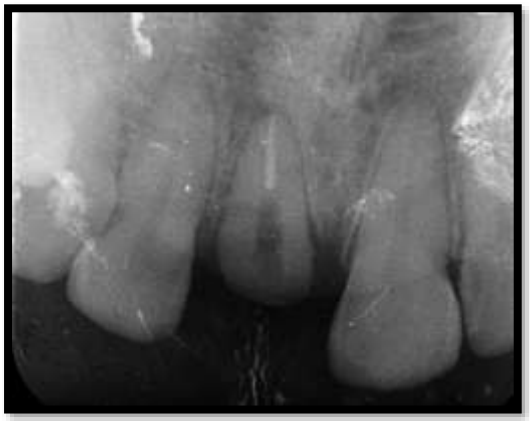

Fig. 6: sectional obturation radiograph

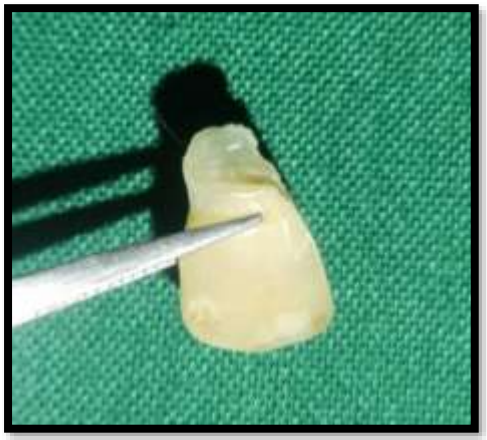

Fig. 7: tooth fragment

Fig. 8,9: labial and occlusal view after crown lengthening procedure to expose the fracture line

Fig. 10: radiographic image of cementation of fibre post in the root canal

Fig. 11: clinical image of cementation of fibre post in the root canal

Fig. 12: labial view of cementation of fibre post in the root canal

Fig. 13: occlusal view of cementation of fibre post in the root canal

Fig. 14: splinting of the tooth

Fig. 15: composite restoration done in 21

Fig. 16: radiographic image of the tooth after reattachment

Fig. 17: 1 year follow up

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