

Review Article

Role of adhesive attachments in traumatic dental injury

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ABSTRACT

Crown root cracking is uncommon, accounting for less than 7% of irreversible damage. All the hard tissues of the teeth (crust, dentin, and cementum), as well as the pulp and periodontal ligament, are commonly involved in these complicated fractures. The care of such instances offers major biological hurdles, and success is dependent on considering a variety of regenerative, endodontic, and temporal variables. Numerous clinical investigations demonstrate that adhesive coronal attachment might be an essential therapy for fractured teeth with crown roots. Because it maintains the original tooth, this technique may save the gums and decrease the time and expense of therapy. Before considering adhesive attachments for dental fractures, several factors should be considered-the site and size of the fracture, the fracture pattern, and the position of traumatized teeth. The aim of the article was to review the role of adhesive attachments in a traumatic dental injury.

Keywords: Traumatic dental injury, Adhesive attachments, Prosthesis

INTRODUCTION

Crown root cracking is uncommon, accounting for less than 7% of irreversible damage.^{1,2} All of the hard tissues of the teeth (crust, dentin, and cementum), as well as the pulp and periodontal ligament, are commonly involved in these complicated fractures. The care of such instances offers major biological hurdles, and success is dependent on taking into account a variety of regenerative, endodontic, and temporal variables. Numerous clinical

investigations demonstrate that adhesive coronal attachment might be an essential therapy for fractured teeth with crown roots.³⁻⁶ Because it maintains the original tooth, this technique may save the gums and decrease the time and expense of therapy.

Before considering adhesive attachments for dental fractures, several factors should be considered- the site and size of the fracture, the fracture pattern, and the position of traumatized teeth. Most of the time, the subsequent fracture continues vertically inside the root and

returns to the apical side, while the detached portion separates from the root. On radiographs, the diagonal fracture lines inside the roots are difficult to see, mainly if the pieces are contacting and the fractured region is coming together. Such a separator is a significant predictor of the danger of subsequent root fractures (Figure 1), and the more significant the risk of further fracture, the opposite of the adhesive clip attachment. Alternative treatments should be investigated in such instances.



Figure 1: Separated traumatized tooth.⁷

Furthermore, if a fracture site is present or below the level of the alveolar bone, the impact of re-attachment of the adhesive piece may be impaired owing to poor moisture management in the working surface. In these situations, enlarging the mucoperiosteal flap, with or without the crown, maybe beneficial inappropriately exposing the cracked region and controlling moisture. Cohort studies on the clinical consequences of implanting fractured teeth with crown roots are currently limited. The only known cohort trial, which looked at 20 teeth in 18 patients, found that two years after treatment, 18/20 linked parts survived, while the remaining two pieces died owing to fresh damage.⁶

The authors concluded that adhesive fragment re-attachment had no adverse effect on the quality of life for two years. Furthermore, gingival irritation remained low, even when the fracture was beyond the range of organisms. The authors concluded that well-built and completed buildings might be employed in subgingival situations without raising the danger of time waste. The aim of the article was to review the role of adhesive attachments in a traumatic dental injury.

METHODS

This literature review is based on an extensive literature search in Medline, Cochrane, and EMBASE databases which was performed on 4th November 2021 using the Medical subject headings (MeSH) or a combination of all possible related terms, according to the database. To avoid missing potential studies, further manual search for papers was done through Google Scholar, while the reference lists of the initially included papers. Studies

discussing role of adhesive attachments in traumatic dental injury were screened for useful information, with no limitations posed on date, language, age of participants, or publication type.

DISCUSSION

Epidemiological and anatomical characteristics

According to the clinical investigations, the incidence of complex crown-root fractures accounts for all extra tooth fractures about 8.1%, accounting for the total number of crown and root fracture injuries about 97.2%.^{2,8} Therefore, most of the crown-root fractures are complex crown-root fractures. Completely erupted permanent anterior teeth usually have complex crown and root fractures, and the part the teeth that erupted are mostly simple crown-root folds, while complex crown-root folds are few.

The causes of complex crown-root fractures in adults and children are detailed in the difference is that the causes of adults are more sports and traffic accidents, and children. Most of them are toddlers and campus events.⁸ The etiology of complex crown-root fractures can also be divided. For direct dental trauma and indirect dental trauma, the former refers to the direct contact of the teeth damage caused by hitting playground land, equipment, tables, chairs, and other objects. The latter refers to the chin being hit during a fight or a fall, and the mandibular arch is facing up the jaw produces a powerful mouth-closing effect that has caused damage to the upper teeth in recent years. In the coming days, the prevalence of iatrogenic dental trauma has risen, and doctors need to take precautions. Furthermore, issues that should be paid attention to.²

Anterior tooth trauma is usually a direct tooth trauma. The direction of impact of external force determines the type of trauma. The general frontal impact is more typical and prone to occur complex crown folds or complex crown-root folds. The clinical manifestations are oblique folds, longitudinal folds, and comminuted fractures. Sometimes multiple teeth are involved; young permanent teeth occur more often incomplete fracture, the coronal fracture is usually due to the dental pulp and periodontal fibres traction, causing only slight movement or staying in place without falling off, it is easy to be misdiagnosed or missed, and clinicians should pay attention to it.

Crown and root fractures in the posterior teeth area often cause premolars and cheeks of molars. The tip or the tip of the tongue is broken, usually a simple crown and root break. Crown and root fractures of posterior teeth are often indirect injuries, common in teeth after treatment, and are easily overlooked. Crown and root fractures caused by iatrogenic factors are more common in premolars and molars. In the area, the crown and root fractures are mostly longitudinal, which can be added due to the lateral side of the root canal filling. Pressing and cementing the post and core operation, the corrosive effect of the post

and core or bad restoration, and other factors caused.⁹⁻¹³ Most complex crown and root fractures have mild pain. Only when the function is exercised, the loosening of the crown end will worsen the symptoms when the sharp tooth pain occurs when the pulp is exposed.¹⁴

Classifications and types

A typical type of damage is a complicated crown fracture in permanent dentition. This has implications for epidemiological research since many of these injuries are not considered to be treatable. As a result, the prevalence of dental decay may be understated. When documented, subluxation injuries were also prevalent, particularly in the early dentition. Many studies have found that tooth migration (comfort damage) happens more commonly in the first dentist when some authors have proposed that the rigidity of the supporting structures is eliminated rather than divided.¹⁵⁻¹⁷ The prevalence of luxation may also be underestimated because most of the studies looked retrospective, and other studies did not take this damage into account. Avulsion injury was rare, although it was more prevalent in trials that focused on particular underlying problems. Warren et al revealed a significant prevalence of these injuries.¹⁸ Similarly, Advocacy stated that battles were prevalent in their basement, with avulsions accounting for one-fifth of the injuries.¹⁹ Only a few studies have recorded soft tissue damage.

The outer teeth are responsible for most of the tooth decay in both primary and permanent teeth. The most frequent teeth were the maxillary central and lateral incisors. Trauma often affects one tooth, although some occurrences (sports, violence, and car accidents) have been linked to a higher incidence of multiple tooth injuries.²⁰ Other studies^{20,21} found a significant frequency of multiple injuries following trauma 'after hours' combined with facial injuries. There are also conflicting results indicating that teeth were more vulnerable to damage during specific months or seasons. Some persons were at a higher risk of retaining numerous abuse events.²⁰ According to Lenzi et al people who have had their first teeth extracted have more issues with permanent tooth growth than people who have not had past trauma.²² The authors also claim that when a child is younger at the time of trauma, the severity of problems from this permanent dentition increases significantly.

Adhesive attachments, role and discussion

Although the demonstration of dental implants is limited in simple cases where the fracture line is visible in the clinic, this case report has demonstrated, with clinical success over the next three years, that this procedure can be performed even in complex fractures involving biologic scales and root canals, in collaboration with Durkan et al and Rajput et al.²³⁻²⁵ This example emphasizes the significance of long-term follow-up visits, during which cosmetic, functional, and periodontal health should be clinically and radiographically verified over five years.²⁵

Preventing early contact and mending connections between near teeth enhances medical success. The development of acid formulation and dentin adhesion advances the process of dental restoration.

8 failure of metal and core-restored teeth is generally caused by root fractures, which are frequently related to stiffness and different metal structures.²⁶ Glass posts, as opposed to steel posts, are less stable and result in improved pressure distribution at the root, which might lead to highly tiny cracks following failure.²⁶ Aside from the resemblance of the coefficient of dentin to dentin, the ability to bind glass to the adhesive system, as well as sound aesthetic effects, is critical.²⁷ In light of these considerations, glass posts were employed to improve the retention of the connected crown clip, and their selection was based on the number of surviving teeth and the existence of their crust, which promotes adherence to the adhesive system (Figure 2).

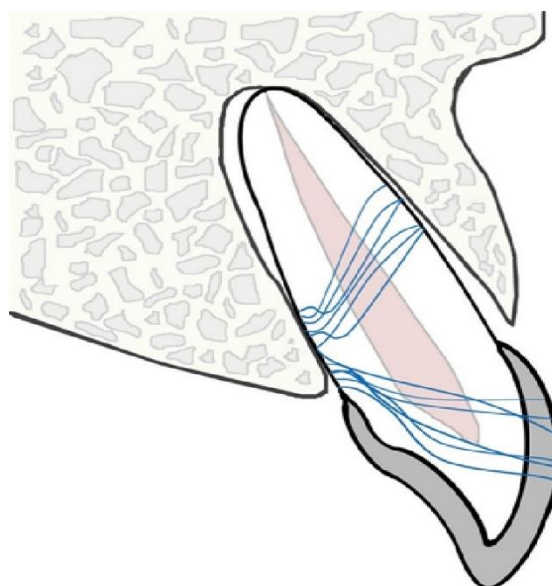


Figure 2: Illustration elaborating the adhesive attachment for tooth.²⁸

Replacement of the toothbrush is considered the most conservative treatment of the frontal tooth fracture as it provides improved transition to the remaining tooth, as well as better stability and alignment of the dental surface in the periodontium and retention of original dental braces, occlusal.^{25,29-32} It also aids in the healing of damaged teeth.

There is little information available on the strength of reassembled broken segments.²⁶ There have been reports of the lack of clinical and pathological alterations in the exterior teeth during the first episode covered and followed by two years.^{26,27} After a one-year follow-up, the present case was reported. Zerman et al evaluated two techniques of treating crown fractures: direct adhesion and re-attachment of dental pieces.³³ More cosmetic results

were attained with the usage of clip replacement after a five-year follow-up. In recent clinical research, the authors discovered 'excellent' and 'very good' clinical and roentgen outcomes in terms of periodontal, pulpal, colour consistency, and occlusion after two years of tracking of reconstituted braces on ten children at an average age of ten years old.²⁶

In conclusion, when a fracture is discovered in a younger patient, restoration of dental implants is the best approach to identify fractured exterior teeth. The advantages of this conservative approach exceed the disadvantages of any artificial therapy. To repair damaged teeth with adequate force, toothpaste reinforcement with new adhesives can be utilized efficiently, although long-term follow-up is necessary to anticipate treatment effectiveness. Collaboration with patients and awareness of therapy limits are essential for accurate prognosis.

CONCLUSION

The role of adhesive attachments in traumatic dental injury is complex. The capability of applying adhesive approaches to fragmented dental injuries depends on several factors. The factors include the size, shape, location, and vitality of the damaged tooth. At the moment, aesthetic effects can be accomplished with existing resources and the suitable method, but with unexpected consequences. Techniques that prevent resin composite from exposing the oral environment, such as constructing an interior groove, would be perfect when the components join together without apparent interference or flaws due to the low breaking strength associated with this technique.

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