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Restoring of traumatized anterior teeth: a case report

CASE REPORT

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Abstract – The fracture of anterior teeth in children creates psychological impact on both the parents and the child especially if the injury affects the permanent dentition and involves the loss of extensive tooth structure. Besides the pain and discomfort from the injury, the child's changed appearance may make him the target for teasing and even ridicule by other children. Traumatic teeth can be treated in different ways, in the WHO system, eight groups were classified according to the anatomical structure involved, and treatment planning depends on the type of the injuries to the teeth and their supporting structures. This article describes the restoration of smile of the patients after fractured of teeth by different treatment options available. Because of the fact that lost fragmans were not recovered, and bearing in mind the patient age, we considered composite-veneered amalgam restoration of the fractured teeth as the best therapeutic option. The patient was satisfied with the final result.

In current terminology, the use of the word trauma implies a reasonable severe, non-physiological lesion to any part of the body. Any thermal, chemical or mechanical lesion that affects the dentition should be analysed as a dental trauma and its effect, as a traumatic dental injury (1). Violence, traffic accidents and sports activities have been identified as some of the major causes that contribute to dental trauma and pose a definite public health problem (2). These causes especially emerge as an increasingly significant threat to the dental health of children and adolescents (3–5).

The fracture of anterior teeth in children creates psychological impact on both the parents and the child especially if the injury affects the permanent dentition and involves the loss of extensive tooth structure. Besides the pain and discomfort from the injury, the child's changed appearance may make him the target for teasing and even ridicule by other children (6).

Injury can lead to displacement of permanent anterior teeth, rotation, intrution and fracture are more common after injury to the tooth (7). The combination of intrusive luxation of one teeth and avulsion of another is rare, as illustrated by Andreasen (8). The reason of this uncommon occurrence may lie within the different mechanism of injury associated with these types of trauma. It is agreed that crown fracture is the result of a direct impact on the incisal edge in an axial direction (8).

Traumatic teeth can be treated in different ways, in the WHO system, eight groups were classified according to the anatomical structure involved, and treatment planning depends on the type of the injuries to the teeth and their supporting structures (9, 10). One of them is crown fractures, and the therapy of choice depends on the size of exposure, the condition of the pulp, the maturity of the roots, the time between the accident and treatment, concomitant periodontal injury and restorative treatment plan (10–12). In all fractures of tooth structure, emergency endodontic treatment may be required to maintain vitality of the pulp tissue (10, 12, 13). However, the reaction of the dental pulp to traumatic injury can be extremely varied (8, 14).

This article describes the restoration of smile of the patients after fractured of teeth by different treatment options available. Because of the fact that lost fragmans were not recovered, and bearing in mind the patient age, we considered composite-veneered amalgam restoration of the fractured teeth as the best therapeutic option.

Clinical report

A 12-year-old girl reported with a history of roadside injury 4–5 months back leading to fracture of upper left–right central and lateral incisors was referred to the Dicle University Faculty of Dentistry, Department of Prosthodontics. On clinical examination, it was seen that both the upper left and right central incisors and upper left and right lateral incisors teeth sustained a concomitant uncomplicated crown fracture. The two-thirds of the coronal tooth structure were fractured and the fracture line was below the gingival margin on palatal side. There was no tenderness or mobility of tooth on percussion (Fig. 1a). Periapical radiograph revealed close apices and the teeth were endodontically treated. There was no periapical pathosis in teeth. Periodontal spaces around teeth were reduced but no root or bone fracture were detected (Fig. 1b). On the basis of clinical and radiographic finding a definitive treatment plan was made. The first stage of treatment consisted of

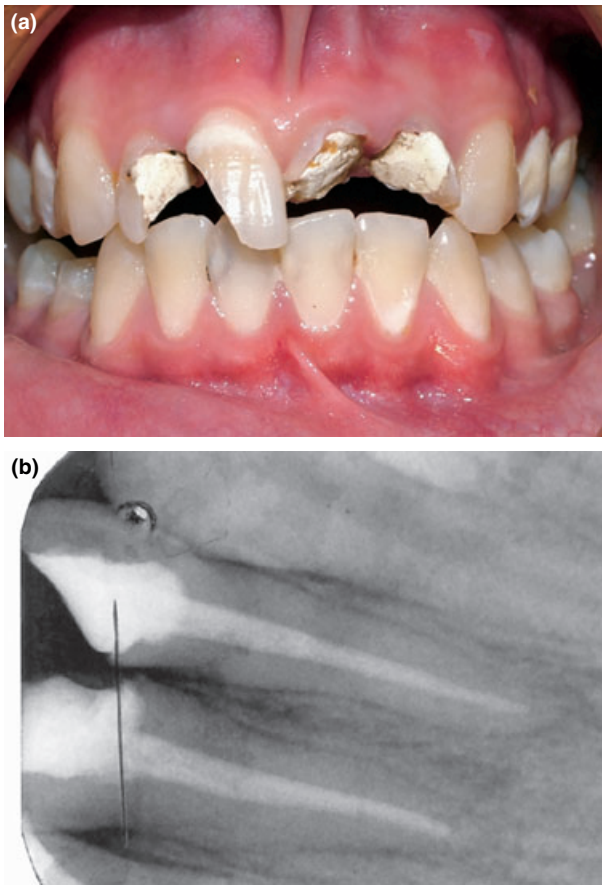

Fig. 1. (a) The intraoral view of the patient before treatment. (b) The radiographic view of the patient before treatment.

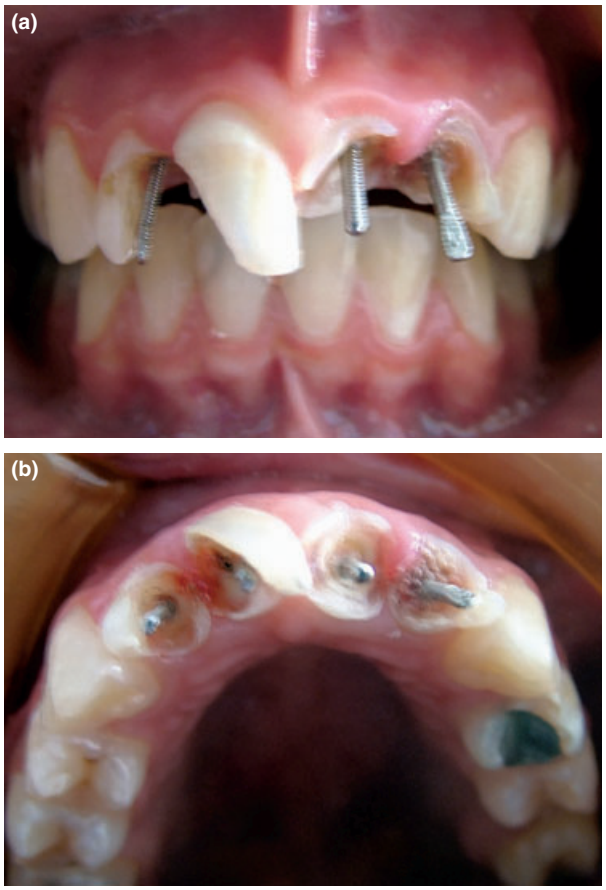

Fig. 2. (a) The intraoral view of the applied postsystem. (b) The intraoral view of the applied postsystem.

postrestoration of the teeth. The second phase of treatment was to restore the smile with the help of composite-veneered amalgam restoration.

Beginning of prosthodontic rehabilitation, gutta-percha was removed from the root canals with a reamer (Peso Reamer; Dentsply-Maillefer, Ballaigues, Switzerland). Postholes were prepared to a depth of 14 mm with a No. 5 Para-post drill (ParaPost System, Whaledent International, New York, NY, USA) zinc-policarboxilate cement (Poly-F Plus, Dentsply De Trey), were mixed according to the manufacturer's instructions and then introduced into each dowel space using a lentulo spiral instrument (Dentsply-Maillefer). Then the dowels were coated with cement and slowly seated by finger pressure. Finger pressure was maintained until the cement set. Excess cement was removed, and each teeth was cleaned with a moist cotton roll (Fig. 2a,b).

The teeth crowns were practised into two steps. First, an amalgam core was adapted to performed a core; secondly, preparing the amalgam core for composite-veneered amalgam restoration.

A copper-ano were trimmed for each teeth in the same manner as that used for the upper left central. An intimate adaptation to the gingival contour of the tooth, as well as, an adequate height of the incisal board, is crucial. The copper-ano is filled with amalgam (Cavex, Germany) and the teeth remained with copper-ano for approximately 24 h. The patient was seen 24 h later and the copper-anos were removed for every teeth and the amalgam core were revised to verify gingival health (Fig. 3).

Fig. 3. The intraoral view of the teeth after removing the copper anos.

The amalgam cores were prepared with diamond burs (KG Sorensen, Zenith Dental, Denmark) for composite-veneered amalgam restoration. The facial surface of the

Fig. 4. The intraoral view of the teeth after preparing for the laminate veneer restorations.

upper left and right central and lateral incisors were prepared. A 1-mm facial reduction was performed, creating a chamfer cervical finish line. The incisal portions of the teeth were prepared to allow overlap of the restoration. Self-limiting depth-cutting discs of 1-mm thickness (824-31-021; Gebr. Brasseler, Lemgo, Germany) were used to define the depth of the cuts, and 1.4-mm chamfer diamond burs (6844-314-014; Gebr. Brasseler). The gingival margin for each teeth was carefully placed just supragingivally to facilitate plaque control and maintain gingival health. The proximal contact areas were carefully prepared for direct composite laminate veneer restoration, the proximal aspects of the tooth preparation were extended (Fig. 4).

For masking the amalgam's metallic grey colour the opaquer (Clearfil ST Opaquer, Kuraray Medical INC., 710–8622, Okayama, Japan) was applied for upper right and left central and upper right and left lateral incisors in the optimal thickness (Fig. 5). Each teeth and the whole surface of the teeth were etched with self-etched system (Kuraray Medical INC.) for 20 s, then followed extensive washing with water spray, accompanied by high volume suction, to eliminate excess water and maintain a slightly humid surface.

Colour was determined, and for that, in the gingival, middle and incisal areas small quantities of different colours of composite were placed and cured as a colour determination method. The colours chosen were A3 for the cervical third and A2 for the middle and incisal thirds (Ecusit-Composite, Fullungsmaterial Dental Restorative,

Fig. 5. The view of the applied oraquer.

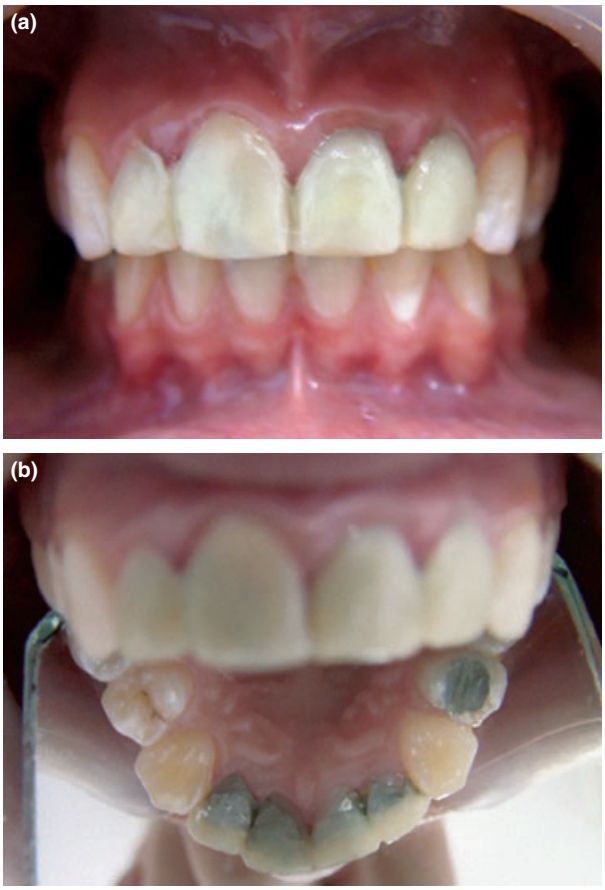

Fig. 6. (a) The intraoral view of the final restorations. (b) The intraoral view of the final restorations.

Hamburg, Germany). By using sandwiches technique; each increment was cured for 60 s at 90° angle to the surface of the composite to visible light-curing unit (Bluephase® C5, Ivoclar Vivadent AG, Schaan, Liechtenstein) and composite-veneered amalgam restoration were finished (Fig. 6a,b).

The occlusion was adjusted and the surfaces were polished. The patient was satisfied with the final result. The patient was recalled at 2-month intervals. Six months later, the patient returned for a review examination. The restorations were found to be in excellent condition, although a slight gingival inflammation was notices in the papilla, between the upper left lateral and canine teeth. A slight polish of the labial surface was necessary to eliminate small irregularities that had developed in the surface. Ten months after the completion of treatment, the gingivae were slightly inflamed, because of insufficient brushing. Radiographic examination revealed no evidence of disease associated with the restored teeth or their supporting structures. A year later in the following annual check-up no significant alterations were detected (Fig. 7a–c).

Discussion

The necessity for an interdisciplinary approach for the treatment of anterior tooth injury has been emphasized

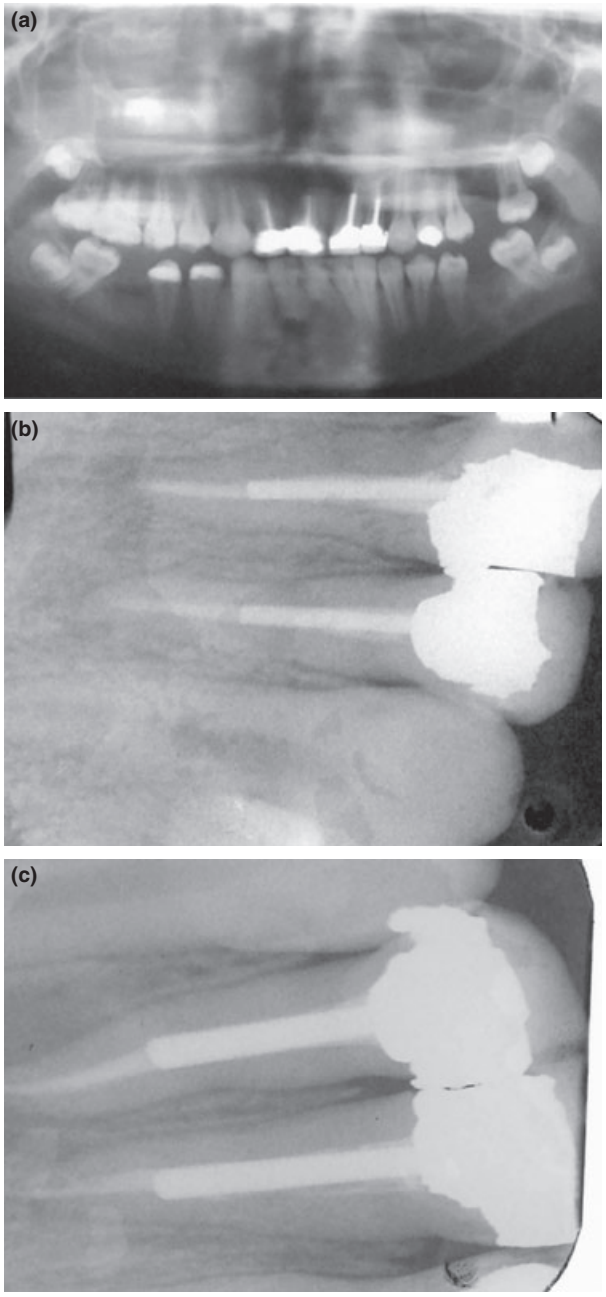

Fig. 7. (a) The radiographic view of the final restorations. (b) The radiographic view of the final restorations. (c) The radiographic view of the final restorations.

since a long time. It is also clear from this case that without co-operation of each other the treatment of such case is difficult. In young patients, it is important to save as many teeth as possible, both for psychological reason and or maintenance of function and esthetics. A definite treatment protocol should be followed to functionally and esthetically restore fractured anterior teeth.

It is advisable to give emergency treatment immediately after the injury to avoid the patient apprehension and the oedema of soft tissue. If a patient is seen soon after the trauma and fracture is involving only enamel, the fractured edges can be covered with a commercial adhesive to protect the pulp from additional irritation (15). If the fracture is long standing when first observed by the dentist and the pulp is vital and asymptomatic, protective covering is not required. If a patient with pulp exposure report to the dentist after 72 h or more, the only treatment option available is pulpectomy, the complete removal of pulp.

The prognosis and survival of pulp depend on many variables, of which the duration for which pulp remains exposed in oral cavity and the stage of root formation is important. Skieller (16) has found that teeth with incomplete closure of root apices have more chances to retain their vitality because of beter reparative capacity of the pulp.

The restoration of fractured teeth after endodontic treatment depends upon amount of coronal tooth structure fractured. If only enamel and dentin is fractured than they can be restored by simple composite or by porcelain laminate. If more than half of the coronal part is missing then a dowel and crown is required.

Metal posts and amalgam cores are commonly used because of their superior physical properties. Nevertheless, their metallic grey colour poses an esthetic problem in anterior restorations, particularly when a high lip or broad smile reveals the entire restoration. The composite core seems to be the treatment of choice esthetically for anterior teeth, but failures of these restorations can occur as a result of their physical properties (17). In this article, the amalgam's metallic grey colour was masked with opaquer, so the esthetic problem was solved.

Composite-veneered amalgam restoration is a method of treatment primarily aimed at the visible areas in the mouth, incorporating both the desired mechanical properties of amalgam and the esthetic qualities of composites (18–20). This procedure can be accomplished in one or two sessions. In the one-session procedure, retantion is obtained from freshly mixed amalgam immediately after condensation. In the two-session procedure, retention is obtained from set amalgam. In this case report, the two-session procedure were used because, retention to fresh amalgam is more dependent on the application of adhesives.

In composite-veneered amalgam restoration, retantion can be provided by mechanical and/or micromechanical means (18–21) or chemical means (22). For chemical means, multipurpose adhesive materials are used that bond to amalgam, composite and tooth structures. The application of an adhesive system on the amalgam surface before placing composite has the advantage of avoiding aggressive mechanical means that compromise the amalgam restoration, providing extra retention and decreasing microleakage at the junction of amalgam alloy and composite resin (23, 24). In this case report, the adhesive system used is self-etched system (Kuraray Medical INC.).

The functional behaviour of a porcelain crown, from an esthetic and mechanical point of view, is superior to a composite (25), but it is contra-indicated in a child at the age of 11, with an immature dental and periodontal system. In addition, composite materials can be easily repaired, reconditioned or even replaced. Composite

crown cost is minor and never rules out the use of porcelain crowns in the future. It is important to note that this clinical procedure could be enhanced if we can rely on broader variety of sizes and forms of amalgam cores and composite laminate crowns. After restoration of the teeth, the smile of the patient and normal eating habits were established.

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