ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 06 | June - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

RESIN COMPOSITE RESTORATIONS OF PERMANENT ANTERIOR WITH CROWN FRACTURES: A CASE SERIES

Orthopaedics

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ABSTRACT

Beauty is power and smile is the sword but a dull sword serves no purpose, so in order to transform this sword, aesthetic corrections are on high demand these days. Treatment of unesthetic anterior teeth is steadily growing. The fracture of anterior incisors becomes aesthetic problem in many cases. Using direct resin composite for the restoration of vital anterior with crown fractures is a conservative and economical treatment option. This paper reports a case series of a permanent maxillary central incisor with class IV fracture treated using composite resin restoration.

KEYWORDS

Traumatic dental injuries, Direct Resin composite restorations, silicone putty index

INTRODUCTION

Trauma to the oral region occurs frequently and comprises 5% of all injuries for which people seek treatment. In preschool children, head and facial non– oral injuries make up as much as 40% of all somatic injuries. In the age group 0–6 years, oral injuries are ranked as the second most common injury covering 18% of all somatic injuries. Of the oral injuries, dental injuries are the most frequent, followed by oral soft– tissue injuries.[1] During any assault to facial region, the incidence of maxillary anteriors being injured is 37% as they are most anteriorly placed in the arch and their protrusive eruptive pattern, followed by maxillary laterals (16%) and mandibular central incisors. Coronal fractures can either be simple or complicated depending on the extent of fracture and involvement of the pulp. The incidence of complicated crown fractures ranges from 2% to 13% of all dental injuries.[2] Coronal fracture of anterior teeth may jeopardize aesthetics, function, tissue biology and occlusal physiology, thus endangering tooth vitality and integrity. Adult teeth suffer traumatic fracture less frequently than adolescents.[3] Aesthetic dentistry involves a harmonious integration of material selection and smile rehabilitation. In relation to treatment of anterior teeth, the maxillary central incisors are the visual focal point for the smile, thus they should be symmetrical and dominant.[4,5] The best approach to anterior teeth treatment has been widely discussed and a number of clinical protocols have been reported.[6] The predictable aesthetic restoration of fractured incisal edge of maxillary central incisors is a demanding and technique sensitive procedure. Its success is dependent on operator's skills and knowledge.[7]

Several treatment options for fractured anterior teeth include reattachment, fragment removal and immediate restoration, forced orthodontic and/or surgical extrusion followed by rehabilitation of damaged tooth structure using PFM crowns, Porcelain veneers and resin composite restorations.[8] In the treatment plan the initial option considered should be the most conservative one that will achieve all the desired objectives of both the patient as well as the dentist. Resin composites are one of the most frequently used materials for rehabilitation of anterior teeth defects. Direct resin composite is minimally invasive, economical and successful in immediately repairing tooth fracture with excellent longevity in carefully selected cases with good aesthetic reproducability.[9]

One of the main challenges in anterior composite restorations is establishing and reproducing the proper contact and contour. Matrix application is a critical step in achieving this objective. Various matrix systems are available for anterior composite restorations. Putty index matrix is a rigid matrix to reproduce exact palatal contour even in large defects and it can also be used predictably to restore multiple defects; disadvantages are that a mock build-up of the defect has to be made, may require second appointment, composite build up can adhere to the adjacent tooth especially if the adjacent tooth is not isolated. Selection of composite shades, tints and opaquer require skills and knowledge.[10] This case series describes the restoration procedures for class IV fractured maxillary central incisors using direct resin composite restoration techniques.

CASE PRESENTATION

Case report 1

A 31 year old Male patient reported to the Department of Conservative Dentistry and Endodontics, Darshan Dental College and Hospital, Loyara, Udaipur, Rajasthan with the chief complaint of fracture in maxillary anterior teeth. Dental history revealed that at the age of nine years he had a trauma due to fall while playing at school. The patient reported no treatment until this time, and the crown fragment had been lost during the accident. Medical history of the patient was not significant. Intraoral examination revealed Ellis class II fracture in both maxillary central incisors. (Figure no. 1)

Figure 1- Pre operative

Both of the fractured anterior teeth were tested negative to percussion and palpation tests and the mobility was within normal limits. Pulp vitality tests using tetrafluoroethane (Endo-Ice, Hygenic Corp., Akron, OH, USA) showed a normal positive response, with no lingering sensation. The adjacent teeth also responded positive and within normal limits to cold stimulation. No periapical pathology or root fracture was diagnosed during radiographic examination. The patient's overall oral hygiene was good. After discussing the treatment modalities with the patient, a direct composite resin was the material of choice to restore the fractured edges. The treatment procedure was performed as follows:

An alginate impression was made and diagnostic casts were obtained from the dental impression. Following which a silicone putty index using polyvinyl siloxane impression material was made. (figure no. 2)

Figure 2- Putty index

The excess was removed and was tried on the patient for proper fit and adaptation. Following isolation, partial bevels were made on the tooth buccal and palatal surface and selective etching was done for 20 seconds for enamel and 10 seconds for dentin. Following this, the etchant was washed and tooth was dried for 15 second and the bonding agent was applied and light cured for 20 seconds. The silicone putty index was then placed in position and using a resin composite instrument, a thin layer for enamel, composite was placed onto the silicone putty index to make the lingual shelf in order to establish the palatal contour and the incisal edge. The excess material was removed and the resin composite was light-polymerized using **I-LED Curing Light** (Woodpecker) for 40 seconds.

The putty index was then removed and dentin shade (Shade A3) was placed over the prepared palatal shelf and sculpted in the shape of the lobes and developmental depressions. To mimic the halo effect of the natural enamel, a small increment of translucent composite applied to the region of the incisal third between the mamelon spaces and extremities. The final layer, which corresponded to the surface enamel, was restored with the same composite of shade A1. Increments of resin composite were light-cured according to the manufacturer's instructions. A Mylar strip was placed interproximally and pulled through to aid in creating a tight contact point and the correct facial embrasure forms. Finally, both the Labial and palatal surfaces were cured for 40 seconds. Finishing and polishing procedure was performed with aliminium-oxide polishing discs (Shofu super snap rainbow technique kit) (figure no. 3).

Figure 3- Post- operative

Case report 2

A 22-year-old female patient reported to Department of Conservative Dentistry and Endodontics, Darshan Dental College and Hospital, Loyara, Udaipur, Rajasthan. Dental history revealed that she had a trauma as a result of fall when she was eleven years old. The clinical and radiographic evaluation was done. During the intraoral examination, it was diagnosed that right maxillary central incisor was Ellis class II fracture. (Figure no. 4)

Figure 4- Pre- operative

The patient's oral hygiene was good. Fractured tooth was asymptomatic. Pulp vitality tests using tetrafluoroethane (Endo-Ice, Hygenic Corp., Akron, OH, USA) showed a normal positive response, with no lingering sensation. No periapical pathology or root fracture was diagnosed during radiographic examination. Medical history of the patient was not significant. The tooth was restored as described in case 1 (figure no. 5).

Figure 5- Post- operative

DISCUSSION

One of the most common dental problems during childhood and young adolescence is the fracture of anterior teeth by a traumatic injury. The majority of dental injuries include the maxillary incisors due to their position in the dental arch.[11] This case report offers a conservative, time saving, cost effective treatment.

The patient in this case report had excellent oral hygiene and wanted a treatment option that was conservative. Considering these factors, direct resin composite restoration technique was performed Natural teeth exhibit translucency, opalescence, and fluorescence, all of which should be emulated by the restorative materials for better aesthetic result. Recent composite resins have different colours, hues, and opacities that mimic the chromacity and translucency of enamel and dentin.[11] The composite used for the present case is a nano-hybrid, radiopaque, and light-curing resin which has opalescence and fluorescence properties and is available in wide variety of enamel and dentin shades. The described anatomical incremental layering technique with this variety of composite shades allows reproducing natural tooth colour, contour, translucency, and texture.

In the present case, the silicone putty index allowed the appropriate implementation of the enamel and dentin thicknesses by working directly from the Labial surface after the formation of palatal enamel layer.[11]

When a fracture creates a need for restoration, if there is no carious or pulpal involvement, a bevel is often the only preparation necessary. A bevel preparation offers a better finishing and reduced risk of having “white lines” at the margins. A bevel preparation also improves the etching pattern, causing transverse exposure of enamel prisms and increasing the area available for acid etching. The exposure of the subsurface enamel layer is favourable to adhesion, possibly resulting in increased bond strength for the restoration and a better marginal seal.[3] As presented in this case series satisfactory restoration of anterior teeth with composites in a predictable and acceptable manner can be achieved by diligent use of putty index matrix especially in situations where the defect to be restored is of greater dimensions.[10]

In patients with fractured anterior incisor, satisfactory results were reported with composites which are cost effective as well as aesthetics. With further improvements in bonding chemistry, the success rate of composites is speculated to improve. A good polishing system including polishing paste, cups and wheels is recommended to achieve appropriate lustre. A regular charmois brush with polishing paste can be used for obtaining final luster.[9]

CONCLUSION

The recent advancement in composite materials enables us to reproduce the natural anatomic form and function in conservative manner. The composite resin restoration of permanent incisors with crown fractures is a simple procedure that should be planned and executed with attention to dental contours and convexities, facilitating the reestablishment of function and aesthetics. The current case indicates that the indirect resin composite restoration technique presented excellent clinical performance.

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