

Composite Resin Restoration: A Conservative Approach To Aesthetic Dentistry

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Abstract: Composite resins have been advocated for decades as a means to conservatively restore minor, moderate and even large defects in teeth caused by decay or trauma. Their indication is predicated on the need to preserve as much healthy tooth structure as possible while using the synthetic composite resin materials to completely replace and augment loss to its structure by adhesive dentistry.

Composite resins are tooth-colored materials that can be applied to the remaining surfaces of teeth to replace lost tooth structure in such a way as to actually make them one, blending and exactly matching the physical characteristics and color of natural teeth, and strengthening them in the process. Modern composites physically adhere by actually bonding to the two elements that teeth are composed of, dentin and enamel. Major advances have resulted from the study and understanding of how the crowns of teeth actually flex or give under biting force and how restorative materials can be used to the greatest effect in the way they interact. Composites can be used to restore teeth directly — they are applied directly to the teeth in the dental office in a single appointment. These are considerable improvements both from medical/biological aspect as well as social/economic aspect as these newer materials are more conservative and cheap.

Three cases have been presented in this paper to highlight the advantages of composite resins. The objective of the paper is to show how tooth restoration can be done with minimum tooth preparation.

Keywords: Incisal edge, median diastema, cosmetic, composite resin

I. INTRODUCTION

A sparkling smile is a want of any individual and as a dentist it becomes our prime responsibility to deliver the same. Of course, with the present day advancements in material science and techniques, a life changing impact can be made on our patient's lives with simple minimum invasive cosmetic dentistry. On the other side, the expectation of our patients continues to rise and it is profoundly important to deliver beautiful and predictable results. It is needless to say at this point of time that we are shifting the gears to minimal prep or no prep dentistry, trying to be as conservative as possible. Composite resin restorations offer a conservative approach to our restorative practice, since the tooth prep is always as minimal as possible. The cases presented in this article are of building up of fractured incisal edge, using

orthodontic wires, and median diastema closure using direct composite resin with minimum prep.

CASE I

An 18 year old male patient reported at Department of Conservative Dentistry of Govt. Dental College & Hospital, Nagpur, with a complain of fractured upper left central Incisor (Fig.1). The patient had suffered from an injury in an accident 5 years ago while skating, which had resulted in fracture of his upper left central incisor. It was Ellis class II fracture with 21. No pain on percussion was present; the crown had a normal color, with no history of swelling or sinus. There was no evidence of periapical pathology. Vitality test was positive.

TREATMENT PLAN

Since the patient's only concern was restoration of the fractured tooth, a treatment plan was formulated to restore this fractured tooth with light cure composite resin. Since the destruction of the tooth was significant, there was a problem of retention, therefore, this restoration was planned with help of a stainless steel wire shaped as a staple pin. A 24 gauge stainless steel wire was given the shape of a staple pin with the help of a plier, in accordance with the mesiodistal width of tooth.

It was important to know the pulpal anatomy and external contours of the tooth under treatment for the proper placement of pin; hence preoperative radiograph was studied carefully to decide where the pinholes were to be placed. By tapered fissure diamond bur two pinholes of 2mm depth were placed at incisal surface of tooth at least 1.5 mm away from external surface of tooth on both sides mesially and distally (Fig. 2). The horizontal portion of the pin was placed 1.5 mm above the incisal surface of adjacent tooth so that it should not get exposed / be seen through restoration. The pin was cemented inside pin channels by zinc phosphate cement (Hardward cement) and there after that tooth was restored with light cured composite resin, using incremental technique. A conventional two step adhesive system was used in which etching was performed for 15 seconds (N-Etch, Ivoclar Vivadent) copious irrigation was used to remove the etchants. Surface was dried and bonding agent (Tetric-N-Bond, Ivoclar Vivadent) was applied with micro brush. Composite resin (Tetric-N-Cream, Ivoclar Vivadent) was built incrementally in 1-2 mm thickness. The material was contoured before light curing and after that finishing and polishing was done using shofu finishing burs and polishing kit (Fig. 3).

etchant was washed away and the surfaces were air dried. Bonding agent was applied and light cured for 40 seconds. The selected shade of composite was placed on the mesial side of 11 and utmost care was taken to contour proximogingival extension of the resin. It was cured for 40 seconds. Then composite resin was applied to the mesial surface of 21 and light cured. In this way the entire median diastema was closed (Fig. 5) by adding composite resin first to 11 and then 21. Great care was taken to establish ideal contact and proper interdental form. The finishing and polishing was done using shofu polishing kit and proximal finishing strips.



Figure 4: Spacing between the central incisors



Figure 5: Median diastema closed

CASE III

A 40 year old female patient reported with an esthetic complaint regarding fractured maxillary central incisors to Govt. Dental College and Hospital. The patient's dental history revealed trauma to central incisors. Her oral hygiene was good and both the fractured anterior teeth were asymptomatic and responded within normal limits to cold and electric pulp tests. No periapical lesion or root fracture was diagnosed during radiographic examination.

TREATMENT PLAN

A bevel was placed at the incisal edges and was extended to 1 mm of periphery on the palatal surface. The enamel was etched with 37% phosphoric acid (scotch bond Etchant, 3M ESPE, St Paul, MN, USA) for 15 seconds and rinsed thoroughly with water. Excess water removed with an air syringe. Then bonding agent was applied and cured for 40 seconds. The bonding agent (Tetric-N-Bond, Ivoclar Vivadent) was then applied to the prepared surface and light cured for 40 seconds. A thin layer of composite (Tetric-N-Ceram, Ivoclar Vivadent) not more than 1 mm in thickness was placed on the right central incisor which covered from facial to lingual preparation. Once the composite preparation was done in accurate and precise position, the material was cured for 40 seconds on each surface for 40 seconds. During the restoration the adjacent tooth was isolated with Mylar strip. Similarly adjacent tooth was built using visible light cure resin.

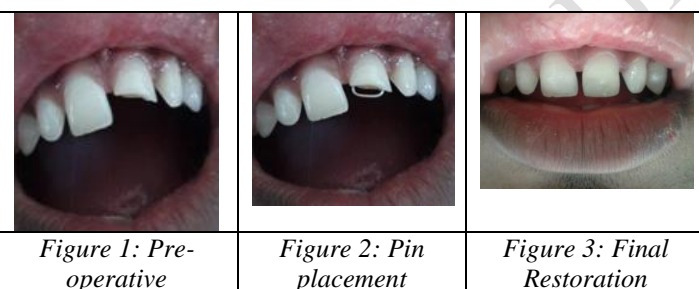


Figure 1: Pre-operative



Figure 2: Pin placement



Figure 3: Final Restoration

CASE II

A 45 year old female reported with the complain of spacing between maxillary central incisors (Fig. 4) .She was conscious of the appearance of her as her children always reminded her of the spacing and insisted on getting it treated. The patient was quite scared of the treatment and insisted on minimal preparation. Study models and photographs were taken and a diagnostic wax mock was conducted to explain the treatment to the patient.

TREATMENT PLAN

After thorough scaling, the enamel surfaces of 11 and 21 were prepared with pumice scrub more towards mesial halves of 11 and 21. The mesial surfaces of 11 and 21 along with 1 mm of facial surface were etched for 20 seconds. Then the



Figure 6: Fractured maxillary central incisors



Figure 7: Restored teeth

II. DISCUSSION

Dental trauma occurs most frequently to central incisors, and fracture zone may involve both enamel and dentin. The current cases offer a conservative, time saving, inexpensive treatment option of a common type of esthetic problem following dental trauma (1). When a fracture creates a need for restoration and if there is no caries or pulpal involvement, and retention and resistance of composite resin is a question mark then one can focus on the use of pins to be one of the options. As we can see in the first case stainless steel wire is used to provide micro mechanical retention. Controversy exists about efficiency of retentive pins in retention of composite resin for class IV restoration (Tyas 1990, Smales 1991, Dietz & Mesko 1980, Darveniza 1987). Moreover it does not interfere with esthetic appearance of the restoration. Interocclusal shear forces can cause fracture of restoration (Denchy, Doering & Torney 1980). In the first case instead of using other types of pins, orthodontic wire of 24 gauge was used and it gave satisfactory results. This simple low cost procedure increased the retention of adhesive material, reducing the risk of fracture. Use of self-threaded dentin pins to increase the long term stability of composite was studied and shown by (Papa .J, Wilson R and Attin T).

In the second case of median diastema closure, with no prep and use of direct composite resin a beautiful smile was given to the patient. The direct composite restoration techniques continue to be popular for restoration of fractured anterior teeth, as it is conservative, less expensive, simpler procedure when compared to prosthetic approach. Despite the tremendous amount of improvements, resin composites still present some shortcomings, such as shrinkage upon curing, discoloration over extended period of time and insufficient fracture resistance of the restoration.

In the third case a simple bevel preparation was done, which improved the etching pattern, causing transverse exposure of enamel prisms and increasing the area available

for acid etching. The exposure of subsurface enamel layer is favorable to adhesion, possibly resulting in increased bond strength for the restoration and a better marginal seal. In this case the surface left after reduction was irregular, allowing for restorative material to blend harmoniously with tooth for esthetic reasons. It was made sure that composite resin had enough thickness facio-palatally.

III. CONCLUSION

Using resin composite for restoration of permanent incisors that have crown fractures is conservative, timely and economical treatment option. The current cases have given good clinical results. It is important to note that the patient related condition of sufficient of remaining tooth structure, excellent oral hygiene and no excessive occlusal forces were optimal in these cases.

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