



Aesthetic management of Maxillary anterior tooth using direct Nano hybrid composite – A Case series

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Abstract

Maxillary anterior plays vital role in everybody's smile. Aesthetic management of maxillary anterior teeth affected by trauma or dental caries is a significant problem for dentist to have a successful result. Composite resins are used as restorative materials as they offer flawless aesthetic potential and acceptable longevity. Technique like direct placement of resin-bonded composite to restore damaged anterior teeth are invariably more conservative of tooth tissue than indirect procedures, operative techniques using direct nano hybrid composite can be challenging and are considered technique sensitive. Clinicians require both technical and artistic skill to provide composite restorations that restore function and aesthetics to match with the residual dentition. This case report presents two cases of aesthetic management of maxillary anterior using direct nano hybrid composite restoration.

Key words: Maxillary anterior, aesthetics, Ellis class2 fracture, dental caries, direct nano hybrid composite restoration.

Introduction

People are more concerned about beauty in this modern era, a sociable smile is nothing but mouth full of teeth said Jack Kerouac(1) in which maxillary anterior are visible during everyone's smile. Factors such as trauma, dental caries affects the anterior teeth's natural harmony. (2) The treatment of a maxillary anterior with uncomplicated coronal fracture or dental caries is a significant problem for the dentist because many parameters are implicated in the successful results of the restoration such as the necessity to obtain an aesthetic result that mimics to the natural form, opacity, translucency, fluorescence, opalescence of the natural tooth. (3)

Several techniques have been advocated for the restoration of fractured teeth, such as resin, ceramic and resin composite restorations. The restorative material that is used in the aesthetic procedure should be in such a way that it matches the natural harmony of the tooth. (2)

For more than 40 years dentists worldwide have been using directly placed resin-bonded composite to restore damaged anterior teeth. While such techniques are invariably more conservative of tooth tissue than indirect procedures, operative techniques using direct composite can be challenging and are considered technique sensitive. Clinicians require both technical and artistic skill to provide composite restorations that restore function and aesthetics to blend seamlessly with the residual dentition. Composite resins today hold a supreme position among restorative materials for they offer flawless aesthetic potential and acceptable longevity, being a cost efficient technique than equivalent ceramic restorations for the treatment of both anterior and posterior teeth (4,5,6). Among the several resin-based materials used for direct dental restorations, manufacturers offer a wide array of composites suitable for anterior and posterior teeth. (7) By following , composites with smaller filler particles prevent the wear of the resin matrix and minimize the surface alteration deriving from the particles' detachment, (8) several new filler formulations have been proposed. Specifically, the evolution of filler has recently turned to the fabrication of nanofilled and nanohybrid composites, which are regarded as the state of the art in terms of filler formulation.(9) The size of the filler is surely one of the main determining factors for the most clinically relevant surface properties, such a smoothness and gloss.(10,11)

The advantage of using direct composite, mechanical strength is higher than that of indirect (12) can be done in single visit. Some of the factors to be considered during the procedure are isolation of the tooth which will avoid contaminants, access, reduce salivation of the patient, and preparation and contouring of the bevel. Beveling will enhance a better marginal integrity and durability of the restoration thereby leading to longevity of the restoration. (13 ,14,15)

Finishing and polishing of the restored tooth or teeth will result a perfect aesthetic restorative treatment. (16,17,18,19) And in case of removal of dental caries, especially G.V. BLACK'S class 3 and class 4 complete removal of carious, cavity preparation based on retention and resistance for the restorative material.

This case report presents cases of aesthetic management of maxillary anterior using direct composite restoration.

Case report

Case 1 : Aesthetic management of traumatic Maxillary anterior using direct nano hybrid composite restoration.

A 31-year-old male patient reported to the Department Of Conservative Dentistry And Endodontics with complaint of broken upper anterior tooth. On clinical examination, left maxillary Incisor had ELLIS class 2 fracture and hypo plastic appearance was noted in the maxillary and mandibular teeth.

The patient was more concerned about aesthetics. Alternative treatment plan of Bleaching and micro abrasion treatment options were explained to the patient. Pre-operative photographs were taken (figure 1). Beveling of the tooth followed by etching and bonding with direct light cure composite restoration was planned. Oral prophylaxis was performed. Patient placed in semi supine position, shade matching done using (VITA classical shade guide) 45° beveling was done, etched with 37% orthophosphoric acid (3M) for 10 seconds after which it was rinsed off dried and 5th generation bonding agent (Ivoclar Vivadent) was applied. The selected shade packable composite A3 (Anabond) was mixed with flowable composite A2(Ivoclar Vivadent) to match the discolored appearance of the teeth for providing natural harmony of the tooth was applied and light cured (i LED UV light). Finishing and polishing done. Post-operative photographs were taken. (figure 2).



Figure 1 : Pre-Operative Intraoral View



Figure 2 : Post Operative Intraoral View



Figure 3: Patient's Smile Line

Case 2: Aesthetic management of dental caries of Maxillary anterior using direct nano hybrid composite restoration.

A 45-year-old female patient reported to the Department Of Conservative Dentistry And Endodontics with complaint of dental caries in left upper anterior teeth. On clinical examination, left Maxillary Central Incisor had GV BLACK'S class 4 dental caries and left Maxillary Lateral Incisor had G V BLACK'S class 3 dental caries. Pre-operative photographs were taken. (figure 4) Treatment plan was suggested as, removal of caries followed by beveling of the tooth, etching, bonding and restoration with direct light cure composite. Patient placed in semi supine position and isolation of the teeth done. Shade matching done using (VITA classical shade guide). Caries excavated (figure 5) ,45° beveling done, etched with 37% Orthophosphoric acid (3M) for 10 seconds after which it was rinsed off dried and 5th generation bonding agent (Ivoclar Vivadent) was applied and cured (i LED UV light)simultaneously in both tooth. The selected shade packable composite A2(Anabond) was applied and light cured. Finishing and polishing done. (figure 6)



Figure 4 : Pre Operative Intraoral View



Figure 5: Preparation of Tooth



Figure 6: Postoperative Intraoral View



Figure 7: Patient's Smile Line

Discussion

Operative techniques and materials with enhanced optical properties have been refined to such a highly sophisticated level that they present a first line approach, delivering predictable and reliable restorations of aesthetic and functional excellence, rivalling the best ceramics. The great popularity of composite resin restorations also results from their acceptable longevity at relatively low financial cost. (20)

Aesthetic dentistry is an art and science that provides more than one-treatment- for-all modality which would enhance the overall appearance of the teeth. Thorough clinical and radiographic examination coupled with a clinician 's expertise and patient demand and compliance all contribute towards determining the ideal treatment plan for a particular case.(21) Dental caries is one of the oral diseases which are a major health problem for many people across the globe. It can lead to pain, discomfort, disfigurement. Dental caries is caused by the infection of the calcified tissue of the teeth. They can be prevented easily by early diagnosis and treated in the early stages. (22) Dental caries is one of the most significant health problems facing older adults. More than half of the elderly who are dentate are affected with either coronal or root caries, and caries is the primary cause of tooth loss in this population.

(23) Creating aesthetic direct restorations requires dentists to combine artistic creativity with a fundamental knowledge of tooth structure along with selection and use of appropriate composite materials. (24,25,26) This involves comprehensive understanding of tooth colour, form, and function and the teeth's natural optical properties in order to select the most appropriate replacement materials. (27,28,29)

Such a summary of direct composite restoration considerations oversimplifies the challenges in ascertaining physical and optical tooth characteristics. Opalescence and opacity, as well as their variation within a tooth and among different teeth, create natural aesthetic effects to be replicated in restorations. (30) Enhancements in dental materials have delivered various composite systems with enamel and dentin shades for re-creating natural tooth anatomy, but mimicking inherent variations of tooth opacities and translucencies, chromas, and hues has required use of multiple composites for each distinct tooth structure. (28,31,32). Selecting appropriate direct composites also entails evaluating handling, sculptability, and viscosities, which affect final restorative outcomes, influence specific manipulation techniques, and impact delivery. (31,32) Time from delivery to contouring and brushing are other aspects for consideration before undertaking direct restorative procedures. (33)

Since the introduction in the 60's, composite resins have become increasingly popular and currently they are considered universal materials, being the first choice for direct restorations in anterior and posterior teeth. (4,5,6) Composite resin restorative materials were developed to overcome the disadvantages of amalgam restorative materials. (34) Dental amalgams are unaesthetic, and toxic. Composite fillings have a more natural appearance than other options. (35) The aesthetic characteristics of matching the natural tooth colour, ability to be bonded to tooth tissues, reduced need of sound tooth removal, and being economical compared to indirect materials are some of the reasons for the great popularity of composite resins. (36) Composite restorations allow for minimally invasive or no preparation at all when assuming the replacement of decayed or missing tissues which gives thinking to a new concept called Bio AESTHETICS. (37,38) The treatment plan of using direct composite resin restorations for aesthetic restorative procedures is elicited due to their excellent properties and performance.

Composite resins are filled resins and they exhibit high compressive strength, abrasion resistance, ease of application and high translucency. Depending on the filler size and shapes, various composites have been developed till now. (39) Recent developments in anterior direct composite restorations have centered around the attainment of aesthetic, lifelike restorations. Several techniques are available for these restorations, including single layer and Multilayer restorations. (40)

Skinner (1991) defined composite as "A compound of two or more distinctly different materials with properties that are superior or intermediate to those of the individual constituents." (41)

For a better treatment prognosis, dental professionals should consider the type and shade of the composite resin as well as the hybridisation of the tooth structure whether it is elicited as self-etching

or enamel etching or no etching technique. A study by Jour et al showed the high success rate for the direct method of composite resin restorations, provided they follow the principles of the restoration. There is about an 80-90% success rate for Class I, II and III

restorations even after a period of 10 years. (42) Coronal fractures can occur at any age, but generally affects children and teenagers (Andreasen & Andreasen, 1994). Due to its high incidence and the main involvement of anterior teeth, deserve special attention. Direct adhesive restoration is the treatment more commonly used for conservative restoration of such defect (Fahl Jr & Swift Jr, 1989). The combination of aesthetic expectation of the patient and desire for the development of a conservative treatment by the dentist resulted in the implementation of different clinical protocols (Terry, 2000; Ramirez et al., 2011). The Restorative Dentistry currently recommends minimally invasive procedures to prevent the unnecessary removal of healthy sound tooth structure during the restorative procedure.

(43) Several studies have suggested the preparation of a bevel in order to provide better retention of the restoration, as well as to mask the fracture line (44). Moreover, allowing the preservation of dental structure, some authors advocate for restoring a clinical protocol with no preparation (45,46).

Anterior tooth fracture management still poses a great challenge to the operator from a functional as well as an aesthetic perspective. Treatment phases may alter due to the differences in age, socio-economic status and the intraoral status of the patient. Among different types of tooth injuries, Ellis Class II fracture is maximum in number with a percentage of thirty. Class II fractures are predominant in accidents, falls and sports injuries. (47) A study by Zerfowski et al (1998) demonstrated that the majority of crown fractures in permanent dentition had a percentage range between 26-76% while crown root or complicated fractures account for about 0.3-5% only (47) treatment done.

In a nutshell, all of the treatment sequences are ruled by the same plan i.e. taking a detailed case history, diagnostic impressions, radiographs and mock-ups, proper clinical protocols along with consideration of adhesive systems, ceramics, ceramic etching, light curing, resin cements, and the correct photographic protocol.

Conclusion

The new nanohybrid composite helps streamline the creation of esthetic direct composite restorations by providing a single-shade option. Its availability represents an innovative time- and money-saving alternative for delivering predictably esthetic restorations that satisfy dentist and patient expectations. The case presented here demonstrates the simplified protocol and results that can be achieved using this recently introduced composite.

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