



Esthetic Rehabilitation of Anterior Teeth in Pediatric Dentistry: A Case Report

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Abstract

Trauma affected tooth structure and malocclusions such as midline diastema pose a serious esthetic problem and stagnant a person confidence. Apart from its esthetic font, other problems associated could be impaired phonetics and hindered oral hygiene maintenance. Composite resin material provided the required esthetic and strength value, along with its desired consideration to minimal preparation and less time consuming. This case highlights the esthetic rehabilitation of fractured anteriors teeth and the spacing present between them with direct composite resin material.

Keywords: Direct restoration, Permanent anterior teeth, Trauma, midline diastema, esthetics, biomimetics.

Introduction

Oro-facial trauma is quite common cause of tooth loss with crown fracture accounting to 92% of all traumatic injuries to the permanent dentition [1]. Coronal fracture requires urgent functional and esthetic repair as along with physical it tends the person's confidence [2]. Coronal fractures of permanent incisors represent 18-22% being simple (enamel & dentin) and 11-15% complex (with the inclusion of pulp) [1,2]. Another common anomaly with hiders the esthetic appearance of an individual, is the presence of malocclusion like midline diastema, which is the presence of space of more than 0.5mm between the proximal surfaces of adjacent teeth [1,3]. Common causes for this defect could be extremely wide arch, congenital tooth absence, anomalous tooth size and labial frenum hypertrophy [8]. It can be closed by indirect or direct restorations or orthodontically, however the latter presents with the time and economic constraints [1]. The demerits of the indirect treatment being it leads to excessive tooth preparation, damage to surrounding gingival tissues and the abrasiveness of ceramic to the tooth structure [2,4]. Direct composite restoration technique is minimally invasive, economical and promotes a conservative dramatic esthetic change in repairing tooth fracture and correcting malocclusion problems like midline diastema [5].



Fig.1: Close-up, preoperative view of the patient's natural smile.



Fig.2: Preoperative incisal view of the patient's fractured anterior maxillary central incisors.

The incisal edges of anterior teeth are often overlooked during an examination unless there is significant trauma or disease. Oftentimes, what is told to patients is that any wear or damage can be



Fig.3: View of the putty stent in place in the patient's mouth.

attributable to parafunction, such as clenching or grinding, or a sign of aging. [6] There is some truth to this, but keep in mind that there may be other factors including poor airway issues and occlusion. [1,7] The next time you pick up your dental journals, look at an aesthetic case, review the before and after photos, and pay attention to the mandibular incisal edges. Here there is moderate destruction of the anterior teeth, and occlusal views in Fig.1,2 help illustrate this in more detail. Here you can clearly see the amount of incisal wear along with posterior damage, we discussed the concept of the “envelope of function,” and in this case, this patient’s envelope of function was not only restricted, but the addition of parafunction also contributed to the destruction of his teeth. [1-8] The incisal edges of both maxillary and mandibular anterior teeth play an important role with respect to both function and aesthetics. Function relates to phonetics, mastication, and occlusion. [9,10] Aesthetics relates to the appearance of anterior teeth with respect to color, size, and position. Anterior teeth that are ideal in size are complemented based on length-to-width ratios and golden rule of proportion [4, 5,10]. The position of the anterior teeth is related by the arch form and support of soft tissue—specifically muscles (lips, tongue, buccinator). [1,11,12]

It is important to remember that both function and aesthetics are connected to each other—that is, over time, a compromised function can create a poor aesthetic outcome (wear, recession, cracks, chipping, etc.).[1,2,10] If a patient is seeking an aesthetic change, then it is the responsibility of the dentist to understand the patient’s existing function before recommending any aesthetic treatment.[2,3,5,10]

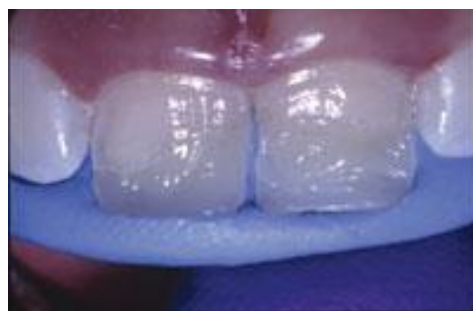


Fig. 4: The same composite was then placed on tooth No. 21 to create the lingual enamel layer.

The treatment of dental trauma is sometimes neglected although it might lead to pain, difficulty in articulation and mastication as well as having considerable negative effects on patient's self-esteem [8,9]. However, aesthetics of the anterior teeth are very important aspects of human appearance and could be affected by many factors including the presence of fillings, tooth color, position, alignment, shape and number [2,3,4]. Crown fractures have been documented to account for up to 92% of all traumatic injuries to the permanent dentition. [1,7]

The objective of this case report is to describe the clinical sequence for restoration of a maxillary central incisors 11 and 21 that presented a crown fracture using an immediate insert technique for resin composite (a "free hand" technique) with a modification to obtain dentin layer.

CASE REPORT

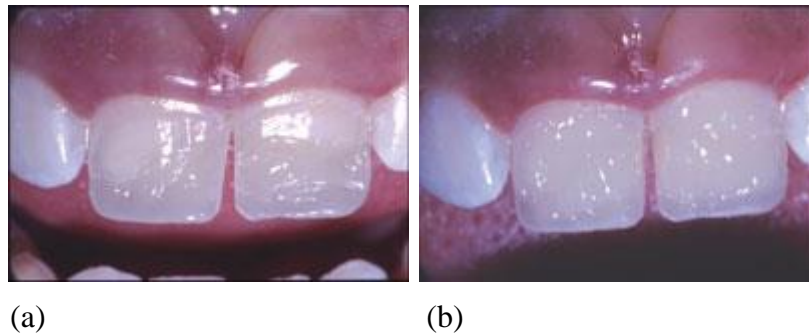


Fig.5a, b;(a) This P-A2 layer was then previewed without the putty stent in order to assess opacity. (b) The dentin replacement layer was formed by placing standard anterior shade A2 of the Direct composite to create the body and mammelons of teeth Nos.11 and 21.

A 10-year-old boy presented with fractures in both maxillary central incisors teeth Nos. 11 and 21 resulting from a skateboarding accident that occurred 2 days earlier (Figures1,2). The patient had been taken immediately to a clinician, who recommended an aggressive treatment plan that included root canal therapy and placement of a post and core. However, the patient's parents declined the invasive treatment and instead sought a more conservative approach.

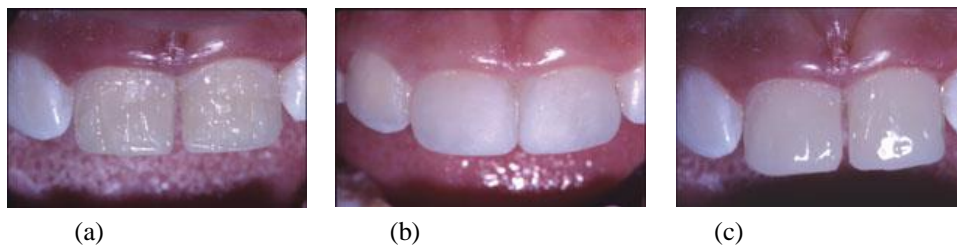


Fig. 6a,b,c; (a) A second dentin layer—this time in anterior Shade A1—was placed in the middle and incisal third of teeth Nos. 11 and 21.(b) A transitional layer of anterior WT (White Translucent) Direct composite was placed at the gingival and middle third, and the anterior NT (Natural Translucent) composite was placed on the incisal third of teeth Nos. 11 and 21.(c) Prior to polishing and finishing, the final enamel layer was critiqued.

A complete examination, which included a review of radiographs, photographs, and the patient's intraoral condition, was performed. The patient was generally in good health, but his age and the continuing development of his teeth would dictate the restorative process. However, no pathologies were present that would hinder treatment.

The patient's parents expressed a desire for the most conservative treatment possible, but also one that would be the most natural-looking. They were pleased at the prospects of restoring both anterior maxillary teeth with direct composite restoratives, and they selected this option.

A 1.5-mm modified shoulder preparation was completed on teeth Nos. 11 and 21 using diamond burs, and a 2-mm facial bevel was placed on both teeth. Additionally, an infinite/virtual bevel was added for use in transitioning the enamel shade of composite into the remaining tooth structure. The long bevel was approximately 0.3 mm in depth, and it extended 2

mm to 3 mm around the entire margin. This preparation technique supports fracture resistance and durability of the restorations by enabling the placement of a layer of composite at the restorative margins.

The putty stent was then removed so that the P-A2 layer could be previewed to assess opacity (Figure 3), as well as to allow the bulk of the artificial dentin layers of both teeth to be placed. A 2-mm thick dentin replacement layer was formed by placing standard anterior shade A2 of the Direct composite on teeth Nos. 11 and 21 to create the body and mammelons (Figure 4). This layer was sculpted into place just short of the proximal and incisal edges, as well as onto the long bevel to mask the fracture line, and light-cured for 20 seconds.

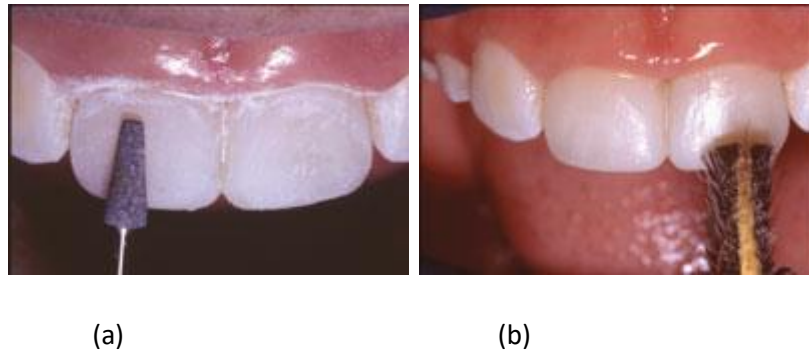


Fig.7a, b; (a)A green stone was used to establish the spectral reflectance layer. (b) Final polishing was accomplished using a chamois/felt wheel

To create the natural-looking variations in shade and chroma, a second dentin layer—anterior Shade A1—was placed in the middle and incisal third of teeth Nos. 11 and 21 (Figure 5a, b, c), sculpted, and light-cured for 20 seconds. By placing the additional dentin layer, the author was able to ensure a better depth of color, diffusion of light, and stabilization of the overall color, in addition to achieving greater control of the restoration's value. A thin transitional layer of anterior WT (White Translucent) Direct composite was then placed at the gingival and middle third, and NT (Natural Translucent) Direct composite on the incisal third, of teeth Nos. 11 and 21 (Figure 6a), after which the teeth were light-cured for 20 seconds.

Direct composite was placed on teeth Nos. 11 and 21 with the putty stent in place (Figure 4), sculpted, and light-cured for 20 seconds. Prior to imparting surface texture and tertiary characterizations, the enamel layer was critiqued (Figure 6a, b, c). Transenamel light-curing was then completed from multiple aspects to ensure the total depth of cure.



Fig.8a, b; (a)Postoperative close-up view of the patient's anterior maxillary central incisors. (b) Postoperative incisal view of the patient's restored dentition.

The final incisal edges as well as the slight opening of the embrasure between the central incisors—were created using an ultra-fine polishing disc. Surface texture and tertiary anatomy were created using a diamond bur, while a Brasseler green stone was used to establish the spectral reflectance layer (Figure 7a) and create natural looking light reflecting zones. Final polishing was accomplished using a chamois/felt wheel (Figure 7b), in addition to polishers, cups, discs, and points. The final restorations blended invisibly with the adjacent dentition and demonstrated natural looking, lifelike characteristics. (Figure 8a, b)

Discussion

Dental trauma of central incisors is subject to direct visual access hence requiring immediate dental care as its continuous neglect would cause considerable negative effect on the patient's self-esteem. In the same way, midline diastema deters an individual from gaining social and cultural confidence and considers it as a disfiguring dental figure [12-14]. Several factors associated with the occurrence of midline diastema are tooth material-arch length discrepancy along with missing teeth, microdontia and peg shaped laterals. Along with this, several habits (thumb sucking, tongue thrusting) and midline pathologies (cysts, tumors and odontomas) can also cause midline diastema. [1,5,16]

Direct composite resin possesses similar physical and mechanical properties to tooth structure and increases the longevity of the treatment [16]. (Figure 8a, b) Due to the polychromatic nature of the natural tooth, layering technique is indicated for anterior composite restoration as it enables complete light curing of resin increment, mimics natural tooth esthetics and reduces the polymerization stresses. [17,18]

The treatment planning process begins with a complete comprehensive examination. This examination involves 12 steps and completing the first 10 will determine whether your patient has stability with structure and/or function. [1,2,3,19] Remember, we define instability in the structure of teeth as observing signs of breakdown such as wear, cracks, abfractions, and mobility. Instability in function shows signs such as temporomandibular joint disorders, tenderness to any of the muscles of mastication, centric relation to maximum intercuspation differences, and poor occlusal relationships during excursive movements. [20,21]

Begin the case presentation by reviewing why the patient came to see you in the first place, and mention any specific issues they had addressed during the initial interview.[22] Remind patient of the boundaries or priorities that they mentioned during the initial interview and/or during the comprehensive examination.[23] Briefly summarize the examination by addressing both structure and function, and be sure to make the connection with the initial reason as to why they came to see you in the first place. This is powerful as it tells the patient that you paid attention and listened to their initial concern.[24] During the consultation, prior to moving on to another subject, always ask the patient if they have any questions or concerns before discussing the next item. Summarize for the patient the overall treatment plan, then present the fees, and discuss any issues or concerns before the financial arrangements are finalized. The financial arrangements can be handled by another team member.[25]

Treatment acceptance has little to do about the technical components of the treatment plan, but has everything to do with the emotional experience of the patient. This experience is related to how the patient feels about the office experience including the team members and environment. In addition, the confidence of the dentist has a profound impact on treatment acceptance. [26,27]

The finishing and polishing process can affect many aspects of the final restoration, including surface staining, plaque accumulation and wear characteristics of the resin composite. Therefore, finishing and polishing procedures are of primary importance in terms of esthetics and clinical success of the restoration. [28,29]

In the present case, the location and aspect of the fracture combined with a balanced occlusion may have favored the clinical success. Limitations of the adhesives Restoration techniques can be attributed to detachment of the restoration by a new trauma or the restoration does not recover its original color. [15,16,23,28,29,30]] With regard to the restorative procedure, the applied technique has facilitated the obtaining of dental contours and convexities, which would be more labored and lengthy in a direct restorative technique. [15,28] If handled properly, prognosis of the tooth, after traumatic crown fracture, is satisfactory. [17,24,30]

Direct composite veneers are indicated for esthetic rehabilitation in these cases because of conservative tooth preparation and because they can be completed in single appointment, frequency of replacement or repair is less, they are strong and durable, no luting agent is required, and it is cost-effective. In addition, they have similar abrasion rates as that of natural tooth structures. [15-18,28,30]

Direct restorative procedure was presented as an effective and safe alternative for oral rehabilitation. [2,3,4,15,19,21] Many factors, such as planning stage, knowledge and mastery of technique and finish and polishing materials decide the success of the restorations; monitoring and maintenance ensure the treatment longevity. [20,21,28-30]

For the success of the esthetic treatment, it is necessary that from the diagnostic wax-up phase to take into account the imposed aesthetic desideratum and the realization of diagnostic layouts, which can be adapted to the patient's situation. Diagnostic wax-up is a good way to achieve, first and foremost, communication between patients and dental practitioners and to establish a starting point for esthetic treatment. [28,29,30]

Conclusion

Direct composite resin serves as an effective biomimetic restorative material for the management of traumatized or maloccluded tooth structure. Proper treatment planning and clinical protocol usage provides effective long-term results. 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. Today for restorations on anterior teeth, the professional must learn the rules of aesthetics of natural teeth for the use of these materials. Treating that natural teeth are polychromatic, while composite resins are monochromatic.

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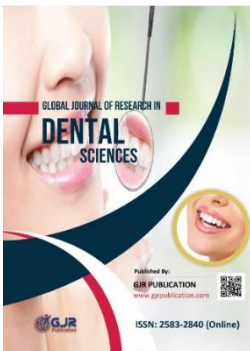
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