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## Direct Anterior Restoration Using a Nanohybrid Composite Material: A Case Report

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### ABSTRACT

Coronal fractures of the anterior teeth as a result of trauma may lead to root canal treatment followed by post core and crown, depending on the extension of the fracture and remaining tooth structure. However, ceramic crown is not recommended for growing patient due to the unpredictable outcome in terms of aesthetic and longevity of the crown. Therefore, in the case where the remaining tooth structure is still favourable, direct composite crown is one of the options. This paper aims to present a clinical procedure for direct composite build up using Ceram.X Duo™ nanohybrid restorative material with Nayyar's core of a 16- year old female patient. This restorative material has been chosen because it provides a natural-like restoration with a simplified shading system.

**Keywords:** Aesthetic layering technique; Direct composite restoration; Nanohybrid composite

### INTRODUCTION

Traumatic dental injuries frequently occurred during childhood age [1]. Following trauma, coronal tooth fracture may lead to root canal treatment depending on the extension of the fracture and remaining tooth structure.

Some guidelines and principles have been ruled out to assist in the restoration of root treated tooth. Whitworth et al[2] provided a detailed restorative guideline for root canal treated teeth depending on the amount of coronal tissue loss. In this case report, only half of the tooth structure remained as a result of trauma. Referring to the guidelines given, the best option would be to place a post and core followed by a ceramic crown. However, this patient is still in her growing stage, the aesthetics and the longevity of the crown would be the main concern. Therefore, direct composite restoration is a conservative approach in restoring fractured anterior

teeth in children[3]. Minimally invasive preparation is essential because as much as tooth structure needs to be preserved for definitive ceramic crown when this patient reaches her adulthood age.

Currently, various techniques and adhesive restorative materials have been introduced in the market. Recently, the 'natural layering concept' is recommended for restoring anterior tooth because it is a simple and an effective approach, able to mimic the natural tooth structure [4]. In this technique, different shades of composite were selected for enamel and dentine to mimic the optical characteristics of these structures and achieve an excellent aesthetics[5].

**Case report**

A 16- year old female patient came to dental clinic with a complaint of discoloured and short upper front tooth. Upon examination and investigation, the tooth was found to be non-vital due to previous fall. The pulp of the tooth has been extirpated by general dental practitioner few months ago. It was also noted that the tooth displaced slightly towards the labial and the gum line of this tooth was slightly higher than the adjacent tooth.

Treatment options for this tooth have been discussed with patient and her mother. They opted for root canal treatment and direct composite build up. The indirect crown will be constructed later with the modification of the gum line when patient reaches her adulthood age.

After root canal treatment has been completed, approximately 2mm of gutta percha was removed at the coronal part of the canal for Nayyar's core, and direct composite build up was done using Ceram X duo™. Presenting below are the clinical photographs of the patient before and after treatment, with step by step of all the procedures involved. (Figure 1 to 9).



Figure 1: Initial view of discoloured tooth 11



Figure 2 and 3: Diagnostic wax up was done to correct the angulation and shape of tooth 11. It was also used for patient consultation and construction of a silicone key



Figure 4 and 5: Shade selection was done using VITA shade guide, shade A2 was chosen. Shade D2 for dentine layer and shade E2 for enamel layer of Ceram X Duo™ corresponded to shade A2 VITA



Figure 6: Labial view of tooth 11 after the existing restoration has been removed. The bevel has been prepared on the labial and interproximal surfaces of the tooth. Polytetrafluoroethylene (Teflon) tape has been placed on the adjacent tooth prior to composite build up to prevent bonding on these teeth



Figure 7 and 8: A silicone key was used to produce a palatal profile, width and position of the incisal edge of the restoration. Enamel layer was built-up using enamel shade composite after the application of 37% phosphoric acid etchant and XP Bond® universal total-etch adhesive



**Figure 9:** Then, dentine layer was built-up using a dentine shade composite. A final layer of enamel was placed on the proximal and labial surface. After completion of the restoration build up, finishing and polishing of the restoration were done using instruments such as discs, fine diamonds and silicone polishers ( ie PoGo, DENTSPLY)

### DISCUSSION

In the case where a considerable tooth structure has been lost following dental trauma, root canal treatment may be required depending on the severity of the trauma and timing of patient seeks the treatment. Root canal treatment is technically difficult and the restoration of the root treated tooth contributes to the longevity of the tooth in terms of the prevention of re-infection to the root canal system, function and aesthetics. Smith and Schumann[6] provided a guideline for the restoration of the endodontically treated tooth, based on the remaining sound tooth structure. In this case, an indirect ceramic crown was deferred until the patient reaches her adulthood age and composite resin is the most recommended direct restorative material due to its conservative technique and preservation of healthy tooth structure [7].

As a considerable amount of tooth structure has been lost in this case, the retention and resistance form of restoration were gained from the remaining tooth structure, pulp chamber and coronal radicular dowel and core. As recommended by previous studies, a core build up may be done using 2-4mm of restorative materials which were condensed into the coronal part of the root canal system[8, 9] .

A missing tooth structure may be replaced by composite resin restorative material using a layering technique to achieve a natural like restoration similar to the adjacent tooth[7]. However, this technique requires a thorough knowledge and good skill of the operator to produce a highly aesthetic restoration. According to Dietschi [10], various layering concepts were available such as Classical 2-layer concept, Classical 3-layer concept, Modern 2-layer concept and Trendy 3-layer concept.

In this clinical situation, a modern 2-layer concept was used using nanohybrid composite Ceram-X Duo™ whereby composite resin was placed incrementally using bucco-lingual technique where a silicone key was made from diagnostic wax up[4]. As a first step, a silicone key was used to produce a palatal profile, width and position of the incisal edge of the restoration. Then, a layer of dentine was built-up using a dentine shade composite. A final layer of enamel was placed on the proximal and labial surfaces. After completion of the restoration build up, finishing and polishing were done using polishing instruments such as discs, fine diamonds and silicone polishers( ie PoGo, DENTSPLY).

A study by Østervemb *et al*[11] found that less time required for Ceram-X Duo™ compared to other restorative materials. However, its aesthetic result was inferior compared to other materials such as Filtek supreme XT(Trendy 3-layer concept), Tetric EvoCeram (modern 2-layer concept) and Enamel Plus HRI(modern 3-layer concept). Therefore, they recommended that Ceram-X Duo may be used where time is a limitation due to its simple system, yet aesthetically acceptable.

Demirci *et al*[12] in their study found a high survival rate for Ceram X Duo/ XP Bond used for direct composite build-ups for diastema closure. They concluded that this type of nanohybrid composite material showed excellent

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performance in terms of its colour match, marginal adaptation, surface texture, marginal discolouration, wear/loss of anatomical form and caries formation after a 4-year clinical assessment follow up.

### CONCLUSION

In this case, the outcome of the final restoration was aesthetically satisfactory and was accepted by the patient to serve as a provisional restoration prior to ceramic crown construction. Selecting the proper opacities of artificial dentine and enamel that matched the natural tooth is a great challenge and placement of a correct thickness of each layer requires a good skill and experience[13].

### REFERENCES

- [1] S Mittal, M Dogra, K Mittal, V Pathania, J Kaur. *Ind J Dent Sc.* **2015**;2:005-8.
- [2] JM Whitworth, AWG Walls, RW Wassel. *Br Dent J.* **2002**;192:315-27.
- [3] VT Sakai, A, SMB Anzai Silva, CF Santos, MAAM Machado. *Dent Traumatol.* **2007**:371-5.
- [4] D Dietschi. *Br Dent J.* **2008**;204:181-5.
- [5] G Oliveira, A Ritter. *Pediat Dent* **2009**;31.
- [6] C Smith, N Shumann. *Quint Int.* **1997**;28:457-62.
- [7] RB Anchieta, EP Rocha, MU Watanabe, EO de Almeida, CF Amilcar -Jr, AP Martini, et al. *Dent Traumatol.* **2012**; 28:166-72.
- [8] A Nayyar, RE Walton, LA Leonard. *J Prosth Dent.* **1980**;43:511-5.
- [9] J Foley, EM Saunders, WP Saunders. *Am J of Dent.* **1997**;10:166-72.
- [10] D Dietschi. *J Adhesive Dent.* **2001**;3:71-80.
- [11] N Østervemb, JN Jørgensen, P Hørsted-Bindslev. *J Esthet Restor Dent* **2011**;23:238-49.
- [12] M Demirci, S Tuncer, E Öztaş, N Tekçe, Ö Uysal. *Clin Oral Invest.* **2015**;19:2187-99.
- [13] M Villarroel , NJ Fahl, AM De Sousa, OBJ De Oliveira. *J Esthet Restor Dent* **2011**:73-88.