



## Class IV Composite Restoration, Clinical case

\*ABU-HUSSEIN MUHAMAD

Limited to Pediatric Dentistry DDS, MSc, MScD, Cert. Ped., PGCert, FPFA Athens-Greece

DOI: 10.5281/zenodo.14680330

Submission Date: 09 Dec. 2024 | Published Date: 17 Jan. 2025

\*Corresponding author: **ABU-HUSSEIN MUHAMAD**

Limited to Pediatric Dentistry DDS, MSc, MScD, Cert. Ped., PGCert, FPFA Athens-Greece

ORCID ID: 0000-0002-4961-5044

### Abstract

Direct composite resins have the potential to offer a reasonably predictable alternative to amalgam and other metal-based restoratives. This assumes they are utilized in the appropriate clinical situation and are properly placed. In fact, the increasing demand for tooth-colored restorations, conservation of tooth structure, and cosmetic dental procedures has encouraged the widespread placement of direct composite restorations. Composite resin has become an integral part of contemporary restorative dentistry and the material of choice for Class IV restorations due to improvements in materials, conservative concepts in restorative dentistry and clinical successes. The purpose of this article is to describe in detail how one patient's maxillary central incisors were restored using a direct composite resin technique. The previously placed layered class IV resin composite restorations on both central incisors were removed, and the patient's smile was enhanced using a two-shade simplified buildup technique.

**Keywords:** Composite Resin, Class IV, Aesthetic, dental fracture.

## INTRODUCTION

In today's world of extreme sports and high-impact pastimes, there are increasing numbers of younger people who have fractured or chipped teeth. The dental professional must be prepared to restore these teeth conservatively and in a minimally invasive manner and give the patient optimal function. [1] What the class IV restorations offer is something that is both predictably strong and esthetically good looking. Composite bondings for class IV restorations allow practitioners to achieve just this in one office visit great fee-for-value dentistry.[2]

A fractured tooth, especially in the anterior segment of the mouth, is an eyesore that can create painful self-consciousness depending on the individual's personality. The patient could shy away from regular activities because of his or her appearance. For a dentist it is a great advertisement for the practice if these fractures can be fixed quickly with minimal trauma, and the patient can be sent home gratified. [1,3] These circumstances allow the dentist to charge a suitable fee as well. If the dentist sees anew patient for a class IV fracture repair and does a good job, it is more likely that the patient will become a regular at the practice. The author treated a movie star once who had opened the cellophane of her new Cartier watch using her teeth and ripped the entire embrasure space between the central incisors. She had to be on camera the next morning. [1-4]

Class IV restorations have become predictably successful. With such restorations, one adds material directly onto the tooth, unlike with a veneer or crown. The rise of these restorations was a result of the evolution of composite materials with regard to strength and optical properties, allowing dentists to recreate beautiful, natural esthetics and durability. [5] The silicate materials are inappropriate to use in a situation like this because they do not have predictable properties or appropriate optical properties, nor do they achieve the strength of the natural teeth along the incisal edge. In addition, after 1 or 2 years they would look like small chalky pieces of material on the corner of the tooth that had been fractured. They are soluble in oral fluids, and have poor surface characteristics, so they collect plaque and may discolor. [1,6]



**Fig.1:** The first retracted view is crucial for analyzing the shape, shades, and characterizations of a tooth. As seen here, there are fractures in the central incisors due to trauma.

The direct bonded resin, bonding systems, and bonding materials have advanced to the point where they achieve predictable strong bonds between resin and tooth. In addition, the materials' chemistry has been altered over the years so that they can replicate the optical and physical properties of natural teeth.

It is possible to have a translucent material on the incisal edge and opaque material on the body of the tooth so there is no shine-through where the material was added.[2,7] These materials have great strength so the patient can bite into apples or other hard foods without causing damage, although this is not a recommended practice.[8] The combined resin chemistry and bonding system chemistry, regardless of the thin edge, can match the physical compressive strength and the flexural modular strength of human teeth, making these materials quite appropriate for class IV cases. The upper third bonding generation achieved this level of performance through the use of a primer, adhesive, and unfilled resins along with a good durable and esthetic resin system. [1-9]

The purpose of this article is to describe in detail how one patient's maxillary central incisors were restored using a direct composite resin technique. The previously placed layered class IV resin composite restorations on both central incisors were removed, and the patient's smile was enhanced using a two-shade simplified buildup technique.

### Case Report

A 17-year-old male patient expressed dissatisfaction with the appearance of his smile after recently performed direct composite resin restorations. During the examination, it was determined that the class IV composite resin restorations on both central incisors did not match in color, contour, or texture. A composite veneer was also placed on the left lateral incisor in order to "align the tooth" with the central incisors. All the restorations contained opaque white and translucent resin composite used in an attempt to simulate the natural appearance of dental tissues. The layering technique used was inadequate, and the final result was compromised. After discussion of alternative treatments, the patient decided on a direct bonding procedure because of fewer visits and affordable cost. **Fig.1**



Figure 2: The working field was isolated with the use of the rubber dam. The existing restoration and caries were removed and a 2 mm bevel prepared on the labial margin of the preparation to facilitate the aesthetic and functional integration of the restoration to the remaining natural tooth structure.

The right lateral incisor was used for shade selection since it had not been restored. A mild color gradient and translucency in the incisal third was found. A decision was made to replace the existing restorations using a two-shade technique based on Vargas's classification on both central incisors, focusing mainly on establishing ideal contours and texture. After local anesthesia was established via infiltration with 2% Lidocaine with 1:100,000 epinephrine, cotton roll isolation was done.

The existing restoration on the right central incisor was removed. A 1.5-mm 758 functional-esthetic enamel bevel was prepared using an 8888 diamond bur on the facial. The lingual bevel was a 458 functional bevel. A coarse disc was then used to extend the facial bevel interproximally and toward the gingival third of the facial surface to create a so-called "infinite bevel," with which the composite resin margin will be indistinguishable after restoration. **Fig.2**



Figure 3: Following the adhesive protocol, a thin layer of semitranslucent enamel, shade JE, was used to create the palatal shell.

Teflon tape was placed on the adjacent teeth to prevent their being etched. This was followed by the application of 32% phosphoric acid to enamel and dentin for 15 seconds. The acid etchant was then rinsed for 30 seconds, excess water was eliminated, and a dental adhesive was applied. This adhesive was considered to provide a more reliable enamel bond than the supplied self etching adhesive. The lingual PVS matrix was then seated (Figure 3), followed by application of the lingual layer of A2 body shade composite resin to form a lingual shell (Figure 4). After light curing the first increment, the PVS matrix and Teflon tape were removed, and a Mylar strip was placed to restore the interproximal walls and contacts. At the same time, thickness was added to the lingual shell (Figure 5). A final 1-mm A1 shade composite resin layer was applied, extending from the facial bevel toward the incisal edge and onto the mesial and distal contact areas to restore the line angles. After polymerization of this layer, a thin lead mechanical pencil was used to establish the positions of transitional line angles according to the tooth planes (Figure 6). The main objective was to establish correct lengths and contours (Figure 7). After removal of the composite restoration on the left central incisor (Figure 8), esthetic and functional bevels were prepared, and restoration was completed following the same protocol described above.



Figure 4: The interproximal wall was then completed utilising the same semi-translucent enamel shade, shade JE. The interproximal wall was formed with the use of a plastic myeloid strip and pull through technique to help developing an anatomical contour.

The finishing process was initiated with coarse and medium-coarse discs following the contours of the contralateral tooth, followed by the use of the 8888 fine diamond and ET6 extra fine diamond bur for texture and microanatomy.

Finishing strips were used interproximally to eliminate flash and coarse, and medium and fine rubber polishing points were used on the lingual surface after occlusal adjustment (Figure 7). Final esthetic evaluation of shade and texture of the restoration was done 15 days postoperatively (Figure8).

## Discussion



Figure 5: The dentine layer was then completed by the application of an opaque shade, A shade AO2. This increment was shaped to emulate the extensions of natural dentine core morphology and was extended just slightly short the prepared bevel. The dentine or opaque shade provides the correct opacity to the final restoration.

Nanofill resin and the nanometric-sized range of materials have given most dentists a “universal material” that can be maintained and removed as needed. [1-7] The resins allow a more than adequate finish and luster, reasonably extended wear on the tooth, and shine and surface qualities that last for a long time. [9-12] If the case demands a more exacting result, the dentist may want to overlay a microhybrid or a nanofill with a microfill, and the microfill will remain serviceable for a much longer time.[8,13]

In relating function to esthetics with a class IV restoration, an important aspect is the overall impact of the incisal edges compared with the other teeth. Some people have excessive wear on their teeth. They have disocclusion on one of the incisal edges in protrusion. [6,14] Others may have parafunctional habits. It is necessary to map out all these things and provide a restoration with predictable longevity and outcome. The contributing factors besides individual preference include biologic status, which relates to the longevity of the work. [1,4,7,15]

The indication for a class IV restoration is anyone with a fracture caused by a sports injury, incidental trauma, or accident. All of these could certainly be restored using a bonded class IV restoration.

The class IV restoration is considered a minimally invasive approach to restorative dentistry and is done by lightly adding material onto existing tooth. [2,5,8,16]

Among the contraindications are parafunctional habits. If the patient has habits such as biting on bones or using the teeth to open bags, he or she must be warned that the restoration may not be successful. [8,17,18]

Patients who want bonded or cosmetic procedures done for anterior teeth should;

- (1) avoid tearing into hardfoods such as whole apples directly with the anterior teeth and
- (2) refrain from parafunctional habits.



Figure 6: The dentine layer was then completed by the application of an opaque shade, shade AO2. This increment was shaped to emulate the extensions of natural dentine core morphology and was extended just slightly short the prepared bevel. The dentine or opaque shade provides the correct opacity to the final restoration.

When doing a class IV restoration, the dentist should check the bite and centric relationship to make sure that there is adequate clearance and no protrusion that could cause additional trauma to the restoration. [6,19] It is also necessary to ensure that the material chosen has adequate strength and flexural modulus and that the patient’s occlusion will not cause fractures in that area thereafter. In addition, the dentist must examine the occlusion afterward to verify that there are no immaturities or interferences created by the restoration. [1,6,8,20]

If the patient is wearing a night guard and the dentist has created a class IV restoration on a tooth that was chipped after the night guard was made, it is necessary to check the fit of the night guard for interferences. If it cannot be ensured that there is no additional interference, a new night guard should be fabricated to match the new occlusion. [2,8,20]

When restoring a vital fractured anterior tooth, in most situations it is wise to build up the fragment using a bonded restoration. [1,5,8,21]



Figure 7: A final translucent shade of shade JE was then layered to bring the anatomy to full contour and to achieve a natural optical blending effect.

If a large portion of the tooth for instance, two thirds is missing, then the dentist may consider creating a ceramic crown, fortifying it, and establishing a good ferrule around the margins.[8] To build this compromises the durability of the restoration, as there is just a little bit of tooth structure and a very large restoration. [6,7,9,22]

A class IV restoration using a bonded resin is one of the most minimally invasive dental procedures being done. The material is bonded onto the tooth after creation of something as mundane as a bevel. The bite and occlusion are checked, the restoration is finished and polished, and the patient is done. [6,8,23]

Restoration polishing is particularly important in order to delay the discolouration and aging processes of the composite, because higher smoothness and less porosity reduce the adherence of agents responsible for changing the color of composites, such as dental biofilm, food colourants, tobacco, and others.[12,23,24] Oral habits such as tobacco use and certain, dietary patterns (for example, caffeine intake) may exacerbate the external discolouration of composite materials.[6,25]

Direct restorative procedure was presented as an effective and safe alternative for oral rehabilitation. 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. [8,11,26,27-29] **Fig.8**



**Figure 8:** The polishing and finishing protocol employed the use of abrasive discs, polishing diamond burs, followed a graded sequence of silicone polishers and finishers. The restoration was then completed using a Diapolisher paste on a felt-buff to recreate the gloss of natural enamel.

The different manufacturers' resin composite and adhesive systems were combined to treat this patient, it has been demonstrated that etch-and-rinse adhesive systems can be safely used with composites from different manufacturers without compromising bond strength.[1,2,27,28] The three-step etch-and-rinse adhesive system was used instead of the self-etching adhesive system supplied by the resin composite manufacturer because it provides a more reliable enamel bond and has been demonstrated in many clinical trials to be very effective. In addition, both manufacturers claim that the products used in this case are compatible. [13,30-32] **Fig.8**

## Conclusion

An acceptable outcome of a class IV composite resin restoration can be achieved by adherence to a systematic protocol outlined in these clinical techniques. With advancements in the improvement of physical, chemical and mechanical properties of dental composites, esthetic and lasting restorations are possible.

## Source of Funding

No financial support was received for the work within this manuscript

## Conflict of Interest

The authors declare they have no conflict of interest.

## References

1. Abu-Hussein Muhamad, et al. (2019); Anterior Esthetic Restorations Using Direct Composite Restoration; a Case Report. *Dentistry & Dent Pract J*, 2(1): 180008.
2. Abdulgani Azzaldeen, Abdulgani Mai, Abu-Hussein Muhamad (2017); Fractured Anterior Tooth Using Direct Composite Restoration: A Case Report. *IOSR Journal of Dental and Medical Sciences* 16(10): 61-65
3. Abu-Hussein Muhamad et al. (2019); Restoring Fractured Anterior Tooth Using Direct Composite Restoration: A Case Report. *Global Journal of Dental Sciences* 1:1
4. Abu-Hussein M, Abdulgani Az, Ziyad M, Watted N (2016); Autogenous Tooth Fragment Reattachment A 12 -Years Follow-Up. *Journal of Dental and Medical Sciences* 15(4): 85-90

5. Abu-Hussein Muhamad, Nezar Watted, Azzaldeen Abdulgani, Mai Abdulgani (2016); Prevalence of Traumatic Dental Injury in Arab Israeli Community. *Journal of Dental and Medical Sciences* 15(7): 91-98.
6. Abu-Hussein Muhamad, Abdulgani Azzaldeen, Abdulgani Mai (2015); Step-by-Step Approaches for Anterior Direct Restorative. *Int J Dent Health Sci* 2(6): 1305-1310
7. Muhamad Abu-Hussein, Nezar Watted, Azzaldeen Abdulgani (2015); Gummy Smile and Optimization of Dentofacial Esthetics. *Journal of Dental and Medical Sciences* 14(4): 24-28.
8. Abu-Hussein Muhamad, Abdulgani Azzaldeen, Abdulgani Mai (2016); Esthetics of Class IV Restorations with Composite Resins. *Journal of Dental and Medical Sciences* 15(1): 61-66
9. Abu-Hussein M, Watted N, Abdulgani A, Abu- Shilabayeh H (2015); Anterior Dental Esthetics in Primary Teeth. *International Journal of Public Health Research* 3(1): 25-36
10. Muhamad A, et al. (2022); Aesthetic Rehabilitation with Nano Composite Material-Case Reports. *Dentistry & Dent Pract J* ;5(1):180035.
11. Leinfelder KF (1989); Dental Materials: Properties and selection. In: Chicago Q, Brien WJ (Eds.), Quintessence Publishing, Co Inc, pp: 139-157.
12. Muhamad Ah, Azzaldeen A (2021); The Concept of The Golden Proportion In Dentistry. *J Dent Med Sci* 20(10): 37-45.
13. Muhamad AB, Nezar W, Azzaldeen A (2015); The Curve Of Dental Arch In Normal Occlusion. *Open Science Journal Of Clinical Medicine* 3(2): 47-54.
14. Muhamad AB, Shilbayih HA (2023); Minimally Invasive Approaches of Median Diastema With Putty Matrix Technique: A Case Report. *J Res Med Dent Sci* 11(5): 22- 26.
15. Azzaldeen A, Mai A, Muhamad AB (2024); “Resin Composite—State of The Art”. *Journal of Dental and Medical Sciences* 23(8): 15-23.
16. Nour Q, Azzaldeen A, Mai A, Muhamad AH (2024); Digital Technologies in Dentistry. *J Oral Dental Care* 1(1): 1-2.
17. Azzaldeen AA, Nezar W, Muhamad AB (2019); Anterior Esthetic Restorations Using Direct Composite Restoration; a Case Report. *Dentistry & Dent Pract J* 2(1):180008
18. Qawasmeh N, Abdulgani Azz, Abdulgani M, Abu-Hussein M (2024); Composite Resins in Posterior Teeth; Clinical Review, Case Study. *American Research Journal of Dentistry* 4(1): 1-6.
19. Muhamad AB (2024); Midline Diastema Closure in a Single Visit: Case Report. *Dentistry & Dent Pract* 6(1):180052
20. Abu-Hussein Muhamad, Hanali Abu Shilbayih (2023); Minimally Invasive Approaches of Median Diastema with Putty Matrix Technique; A Case Report. *J Res Med Dent Sci* 11(5): 22-26.
21. Abdulgani AZZ, Abdulgani M, Abu-Hussein M (2024); Minimally Invasive Approach for Anterior Dental Aesthetics: Case Report. *Journal of Medical and Dental Science Research* 11(8): 31-36.
22. V Gopikrishna Sturdevant's Art & Science of Operative Dentistry Second South Asian edition 2018
23. Geissberger M. Esthetic dentistry in clinical practice. New York: Willey Blackwell; 2010. p. 155, 162-3, 175-82.
24. Terry DA, Leifelder KF. (2004); An integration of composite resin with natural tooth structure: the class IV restoration. *Pract Proced Aesthet Dent*; 16(3): 235-42
25. Goyal R, Mittal R, Goyal N, Gupta S, Bogra P. (2021); Restorative technique for class IV direct composite restoration. *IP Ann Prosthodont Restor* ;7(1):59-63
26. Ruschel VC, Stolf SC, Shibata S, Baratieri LN. (2017); A Conservative Technique for Repairing Class IV Composite Restorations. *Oper Dent* ;42(1): E10–5.
27. Dietschi D (1995); Free-hand composite resin restorations: a key to anterior aesthetics. *Practical Periodontic and Aesthetic Dentistry* 7(7) 15-25.
28. Dietschi D (2001); Layering concepts in anterior composite restorations *Journal of Adhesive Dentistry* 3(1) 71-80.
29. RAMÍREZ, J., ARAUJO, E. & NARCISO, L., (2014): Clinical Evaluation of Direct Composite Resin Restorations in Fractured Anterior Teeth. -ODOVTOS *Int. J. Dental S.C.*, 16: 47-61.
30. Anwar, R.S.; Hussein, Y.F.; Riad, M. (2024); Optical behavior and marginal discoloration of a single shade resin composite with a chameleon effect: A randomized controlled clinical trial. *BDJ Open* 2024, 10, 11.
31. Marghalani HY (2010); Effect of finishing/polishing systems on the surface roughness of novel posterior composites. *J Esthet Restor Dent* 22(2): 127-38
32. Strnad G, Kovacs M, Andras E, Beresescu L (2015); Effect of curing, finishing and polishing techniques on microhardness of composite restorative materials. *Procedia Technology* 19: 233-238.

#### CITATION

ABU-HUSSEIN M. (2025). Class IV Composite Restoration, Clinical case. In *Global Journal of Research in Dental Sciences* (Vol. 5, Number 1, pp. 15–20). <https://doi.org/10.5281/zenodo.14680330>