WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.453
Volume 15, Issue 2, 1132-1140. Case Study ISSN 2277–7105

SINGLE VISIT AESTHETIC SMILE REHABILITATION WITH DIRECT COMPOSITE LAMINATE VENEERS USING MINIMALLY INVASIVE APPROACH UNDER DENTAL OPERATING MICROSCOPE IN MANAGEMENT OF DENTAL FLUOROSIS - A CASE REPORT

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Article Received on 15 Dec 2025,
Article Revised on 05 January. 2026,
Article Published on 16 January 2026,

https://doi.org/10.5281/zenodo.18266713

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How to cite this Article: Sandhya Shanmugam*. (2026) Single Visit Aesthetic Smile Rehabilitation With Direct Composite Laminate Veneers Using Minimally Invasive Approach Under Dental Operating Microscope In Management Of Dental Fluorosis - A Case Report, "World Journal of Pharmaceutical Research, 15(2), 1132–1140.

ABSTRACT

Aim and Objective: The aim of this article is to provide insight about single visit aesthetic smile rehabilitation with direct composite laminate veneers using minimally invasive approach under dental operating microscope in management of dental fluorosis. **Case Description**: The presented case is unique in its minimally invasive approach in managing mild dental fluorosis by following a conservative single visit chair side aesthetic smile rehabilitation of all the upper anterior teeth using direct composite laminate veneers under dental operating microscope in a 25-year-old female patient reported with discoloured, frosted, and attrited front teeth surfaces graded according to Dean's fluorosis index. Direct composite laminate veneers were placed following shade selection, tooth preparation, bonding, finishing, and polishing, resulting in restorations that blended harmoniously with the natural dentition, thereby enhancing aesthetics, form, function, and self-confidence of the patient. Overall, direct composite laminate veneers are conservative, reliable and cost effective option for managing dental fluorosis-related discoloration,

providing immediate aesthetic improvement, functional success, and long-term sustainability. **Conclusion:** This case report along with the literature discusses and highlights the fact that the direct composite resin laminate veneering technique is a conservative, aesthetic and effective treatment option for management of mild dental fluorosis in single visit.

KEYWORDS: Dental Fluorosis, direct composite resin laminate veneers, minimally invasive approach, magnification.

INTRODUCTION

Dental fluorosis is defined as a developmental disturbance of enamel caused by excessive exposure to higher concentrations of fluoride during tooth development, leading to enamel with lower mineral content and increased porosity change in the dental hard tissues during the period of tooth development before eruption into the mouth. Once the tooth erupts, dental fluorosis refers to a range of changes from barely visible chalky white appearance in milder cases to converged opaque areas, browning, and pitting of the teeth in severe forms. The selection of an appropriate treatment plan depends on the grade of severity of dental fluorosis, the colour, darkness, location and extent of the staining, as well as the number of teeth affected, the age, cooperation level and expectations of the patient and the treatment trends of the period.[1]

Smile designing involves a series of minimally invasive procedures to improve the appearance of a smile that is compromised by various factors such as colour, teeth alignment, shape, and spacing. The direct composite laminate veneers aim to correct aesthetic deficiencies and discolorations. The technique involves directly applying and sculpting composite resin onto the tooth surface, allowing precise customization of shade, translucency, and surface texture. These restorations can be made in single visit along chair side.[2,3]

Dental operating microscopes and loupes have been used by dentists in clinical dentistry for decades for restorative procedures.[4] Moreover, the microscope is proved to lead the highest degree of magnification and the most neutral working position in dentistry.[5] Magnification may also improve the visibility during direct restorative treatments and allows for minimum tooth reduction and a good finishing of the margins.[6]

The objective of this case report is to correct the discoloration caused due to dental fluorosis by using direct composite laminate veneers under dental operating microscope to restore the patient's lost aesthetic dental appearance and smile in single visit.

CASE DESCRIPTION

A 25-year-old female reported with the chief complaint of discoloration of her upper front teeth. She complained that her teeth exhibited irregular chalky white spots that substantially affected her smile. A complete history and preoperative photographs were recorded. Intraoral examination revealed white spot lesions involving all the upper and lower teeth on the entire labial surface with a smooth surface suggestive of intrinsic staining (Fig. 1). Patient's predominant concern was about the upper anterior teeth discoloration which was affecting her smile. Pulp sensibility test was exhibiting positive response in all the maxillary anterior teeth and there was no evident periapical lesion on radiographic examinations. The patient exhibited a bilateral class I molar occlusal relationship and demonstrated good oral hygiene. Past dental and medical history was non-contributory. Clinical findings were suggestive of mild dental fluorosis. The distribution of chalky, opaque white spots on anterior and posterior teeth supported a diagnosis of Dental fluorosis with Dean's fluorosis index of 2.[7] Various treatment options were discussed with the patient and based on the patient's aesthetic concerns and preference for a conservative and cost-effective solution, the treatment plan was established to include a smile makeover using direct composite laminate veneers. The procedure was explained to the patient in detail, and informed consent was taken prior to initiating the treatment.

The shade selection was completed using VITA Classical Shade Guide (VITA Zahnfabrik, Germany), followed by minimal tooth preparation done using a 0.5 mm depth cutting bur (MANI DIA BUR) to create a window preparation (Fig 2a), with reduction ranging from 0.5–0.75 mm in the midfacial region and 0.2–0.5 mm near the gingival margin on maxillary anteriors.[8] All stained enamel was removed and finishing done using a yellow fissure diamond bur.[8] Following window preparation teeth were placed under the dental operating microscope (Magna, Labomed R, California, and United States) using 7.5x magnification (Fig 2b), when preparing for the direct composite restorations.[9,10] An orange light filter was used in order to prevent light curing the composite during adaptation onto the tooth surface.

After the tooth preparation is completed, the frosty chalky appearance were diminished, which eliminated the need for opaquer application. The treatment regimen was standardized,

beginning with the application of etching gel (Scotch bond Universal etchant, 3 M ESPE, St. Paul, MN, United States), containing 37% phosphoric acid. Etching was performed for a specific duration of 30 seconds in the enamel and 15 seconds in the dentin. Subsequently, the etchant was meticulously rinsed with water for 20 seconds and air dried. Following etching, two coats of bonding agent (Adper Single Bond, 3M ESPE) was uniformly applied using a micro-brush for 20 seconds, followed by gentle air drying for 5seconds, and light curing for 10 seconds using (Waldent ECO Plus (India). The prepared surface was restored using a universal restorative composite (Filtek Z250, 3M ESPE), using a two-layer incremental technique dentin with shade B2 and enamel shade A2, facilitated by hand instruments designed for composite material manipulation. Light curing was conducted for 20 seconds between each composite increment with a final curing duration of 20seconds.[11] The restorations were initially contoured using a flame-shaped superfine diamond bur (368–016 SF-FG) from the composite finishing kit (NTI-Kahla Gmbh, Kahla, Germany), the final finishing was done using a sequential Super-Snap Mini Kit discs (black, purple, green, and pink discs) and final polishing with Direct Dia Paste.[11] Post operative clinical photograph and microscopic image of maxillary anterior teeth from left to right canine were recorded (Fig. 3). The patient was satisfied with the outcome and post operative instructions were given to avoid tough or sticky foods to reduce fracture risk along with maintenance of overall oral hygiene.

DISCUSSION

Fluorosis staining is commonly considered as a serious aesthetic problem because of the psychological impact of unaesthetic maxillary and or mandibular anterior teeth. Mild form of dental fluorosis appears as barely discernable fine flecks or lines of opaque white enamel. The appearance of dental fluorosis can range from such slight disturbances of enamel that it can be seen only on close examination with drying of the teeth to severe staining and pitting that can be a significant cosmetic concern.[1]

A number of conservative or restorative techniques have been proposed for the aesthetic management of fluorosed teeth. Treatment choice depends primarily on the severity of the condition, which is commonly evaluated using Dean’s fluorosis index. For individuals with mild forms of fluorosis (ranging from very mild to mild), conservative interventions like enamel microabrasion and tooth bleaching can effectively improve the appearance. On the other hand, moderate to severe fluorosis, where enamel defects such as discoloration, pitting,

or structural breakdown are present, may require various restorative solutions, including composite restorations, veneers, or dental crowns, to restore both function and appearance of the affected teeth. While ceramic restorations such as veneers and crowns deliver excellent aesthetic results, they usually require substantial enamel reduction and multiple visits.[12]

Composite resins represent the most commonly utilized direct tooth-colored restorative materials due to advancements in mechanical performance and enhanced wear resistance. Direct composite laminate veneer procedure allows the clinician to manage and evaluate the entire process, from shade selection to the final tooth contour, typically within a single appointment.[13] Visual shade guides are the most common and convenient method for tooth shade selection. Popular systems include VITA Classical, VITA 3D-Master (VITA Zahnfabrik, Germany), and Chromascop (Ivoclar Vivadent, USA). VITA Classical shade guide was used in this case.[14] A research study examined the long-term clinical performance of direct anterior composite restorations. Clinical investigations that assessed the survival rates of anterior light-cured composite restorations, with a minimum follow-up period of two years, were reviewed, revealing survival rates that varied from 28.6% to 100%.[15]

Composite laminate veneer restorations are single-visit procedures which require minimal removal of tooth structure are one of the best treatment choices for this young patient who sought a conservative treatment plan with rapid result and inexpensive technique.[16,17]

Magnification may be used to increase the quality of the final direct restoration by improving the marginal adaptation integrity, reducing excess material, preventing marginal microleakage, and avoiding subsequent failure. Mamoun J et al reported that the use of 6 to 8 magnifications by binocular surgical loupes or the operating microscope resulted in a composite restoration that was perfect at the initial placement and free of secondary caries or marginal staining at follow-up visits.[10]

The 3M™ Filtek™ Z250 Universal Restorative material delivers natural-looking results. These dental filling material exhibits reduced shrinkage which has minimal post-operative sensitivity, low wear and high fracture toughness. It has good handling and sculptability, while the easy-to-polish surface provides a long-lasting shine. This composite resin restorative material is indicated for anterior and posterior teeth restorations, core build-ups and indirect procedures.[18] The limitation of this study is the need for follow up recall period.

IMAGES

Fig. 1: Pre operative intraoral photograph of the maxillary anterior teeth (#13--#23) with mild dental fluorosis.

Fig. 2a: Clinical photograph of tooth preparation for direct composite laminate veneers #13-#23.

Fig. 2b: Microscopic image of tooth preparation done for direct composite laminate veneers in #13-#23.

Fig. 3a: Post operative clinical photograph of direct composite laminate veneers done in all maxillary anterior teeth (#13-#23).

Fig. 3b: Post operative microscopic image of direct composite laminate veneers done in all maxillary anterior teeth (#13-#23).

CONCLUSION

Direct composite laminate veneers offer a conservative and cost-effective solution for improving the esthetics of fluorosis-affected anterior teeth, with minimal tooth reduction. This case report highlights their effectiveness in enhancing aesthetics, smile appearance thus boosting the patient's confidence. The technique serves as a practical alternative to more invasive restorative options; however, long-term follow-up is crucial to evaluate their durability.

CLINICAL SIGNIFICANCE

This article describes a minimally invasive technique to treat a mild case of dental fluorosis and to makeover the patient's smile using direct application of composite resin material on the prepared tooth surfaces or even without any preparation in a single visit is the main

procedure as well as the advantage of these restorations while preserving the natural tooth integrity. This technique is fast and easy to perform, improving the unaesthetic discolorations of the anterior teeth.

ACKNOWLEDGEMENTS

The author denies any conflict of interest related to this study.

AUTHOR CONTRIBUTION

This article was solely done by the corresponding author.

FUNDING

Self funding

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