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(CASE REPORT)

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Management of white spot lesion using direct veneer: A case report

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Abstract

White spot lesion (WSL) is an early manifestation of enamel demineralization, often appearing as small, white opacities on the tooth surface. It represents the initial stage of dental caries and can result in esthetic concerns, especially in anterior teeth. WSL formation involves four main factors: bacterial plaque, fermentable carbohydrates, a susceptible enamel surface, and prolonged acid exposure. In recent years, the prevalence of WSL has increased, including those associated with orthodontic treatment. Management focuses not only on arresting caries progression but also on restoring esthetics. A 22-year-old female presented with a white spot lesion on the labial surface of tooth 22. The lesion had appeared over the past two months and caused esthetic dissatisfaction. Clinical examination showed no signs of irreversible pulpitis or apical pathology. Salivary assessment was within normal limits, and radiographic imaging was not indicated. A diagnosis of reversible pulpitis with a non-cavitated WSL was made, and a direct veneer using nanohybrid composite was planned. The procedure was completed over three visits, involving shade selection, conservative preparation, acid etching, bonding, and layered composite application. Two weeks post-treatment, evaluation showed excellent esthetic results, with the veneer remaining intact and the patient free of symptoms. Direct composite veneer is an effective, conservative, and esthetically pleasing treatment for anterior WSLs. It offers functional and visual improvement with minimal tooth alteration and can be considered a reliable option in similar clinical cases.

Keywords: Direct Veneer; White spot lesion; Enamel Demineralization; Aesthetic Dentistry; Composite Resin Restoration.

1. Introduction

White spot lesion (WSL) is considered the earliest clinical manifestation of dental caries (1) WSL typically appears as small, white or whitish-gray opacities on the enamel surface, maintaining a smooth and glossy appearance similar to that of healthy enamel. Due to its subtle presentation, early detection of WSL can be challenging (2)

WSL represents an initial stage of caries (incipient caries) caused by an acidic environment produced by cariogenic biofilm. The progression of caries is closely related to the structure of the dental hard tissues and plaque accumulation (3). The development of WSL on enamel surfaces requires the coexistence of four key factors: bacterial plaque, fermentable carbohydrates, a susceptible tooth surface, and sufficient exposure (4)

Demineralization occurring beneath an intact enamel surface is the main pathologic mechanism of WSL, and the lesion may or may not progress into cavitated caries. This process involves the loss of hydroxyapatite crystals due to acid exposure, leading to enamel porosity. The degree of enamel demineralization correlates with the lesion's appearance — greater opacity often indicates more severe mineral loss (4, 1)

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The incidence of WSL has been increasing over the years, with a reported prevalence of 29.2% in 1986 and a rising trend observed through 2012 (Sampson et al., 2020). Orthodontic treatment is a known contributing factor, particularly during bracket placement, with incidence rates ranging from 24% to 73% (5)

In addition to affecting tooth vitality and function, WSL can cause progressive esthetic concerns (1). This case report discusses a patient presenting with WSL suspected to be an early carious lesion.

2. Case Report

A 22-year-old female presented with a complaint of a white spot on the upper left maxillary lateral incisor (tooth 22), which had appeared over the past two months. The lesion caused esthetic concern, although no spontaneous pain, swelling, dental trauma, or prior dental treatment was reported.

Clinical examination revealed a visible white spot lesion on the labial surface of tooth 22. Percussion and bite tests were negative. Pulp vitality and thermal sensitivity tests were within normal limits, and no gingival abnormalities were observed. Malocclusion was noted during occlusal assessment. Salivary analysis showed normal hydration, consistency, and neutral PH. Radiographic examination was not performed.

Based on clinical findings and diagnostic evaluation, the lesion was classified as a case of reversible pulpitis with normal apical tissue. A direct composite veneer procedure using a nanohybrid resin composite was planned for tooth 22

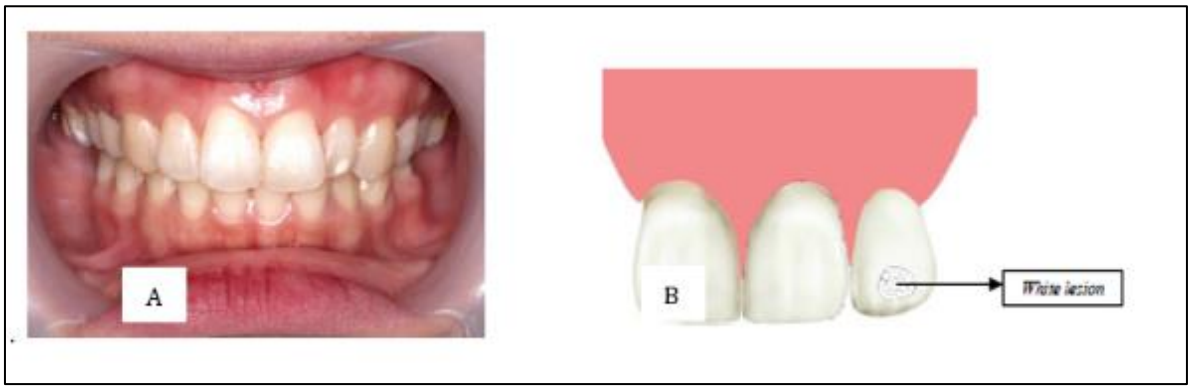

Figure 1 (A) Before treatment, (B) Schematic lesion

3. Case Management

The treatment was carried out in three visits, **Visit 1** Initial consultation, examination and maxillary and mandibular impressions were taken to fabricate a diagnostic wax-up model in preparation for direct composite veneer treatment, other clinical procedure was scheduled for the following day.

During the first follow-up visit (Visit 2), conducted one day after the initial appointment, a saliva test was performed, and the patient was instructed to rinse with a 1% povidone-iodine solution, the patient did not complaints during examination. Extraoral and intraoral examinations revealed no abnormalities; the gingiva appeared healthy, and both percussion and bite tests yielded negative results. Composite shade matching was carried out using the button try technique. Tooth preparation began using a round-end bur, followed by the fabrication of a 3D-printed digital wax-up and mock-up. Rubber dam isolation was implemented, and gingival retraction was managed with a retraction cord. Depth grooves were made using a depth-cutting marker bur, with specific reductions of 0.5 mm at the cervical third, 0.7 mm at the middle third, and 1.0 mm at the incisal third. The veneer was prepared using a feather-edge approach with a round-end tapered bur. Enamel etching was done with 37% phosphoric acid for 20 seconds, then thoroughly rinsed and dried. A bonding agent was applied and polymerized with a curing light for 10 seconds. Using a palatal putty guide and anterior matrix strip, the palatal and proximal walls were constructed. Composite resin was applied in an anatomical layering technique—shade A3 for the cervical and middle thirds and shade A2 for the incisal third—with each layer cured for 20 seconds. Finishing was accomplished with fine diamond burs and aluminum oxide discs, while polishing was completed using Eve Diacomp polishers (coarse and fine) along with a goat-hair wheel for a smooth final surface.

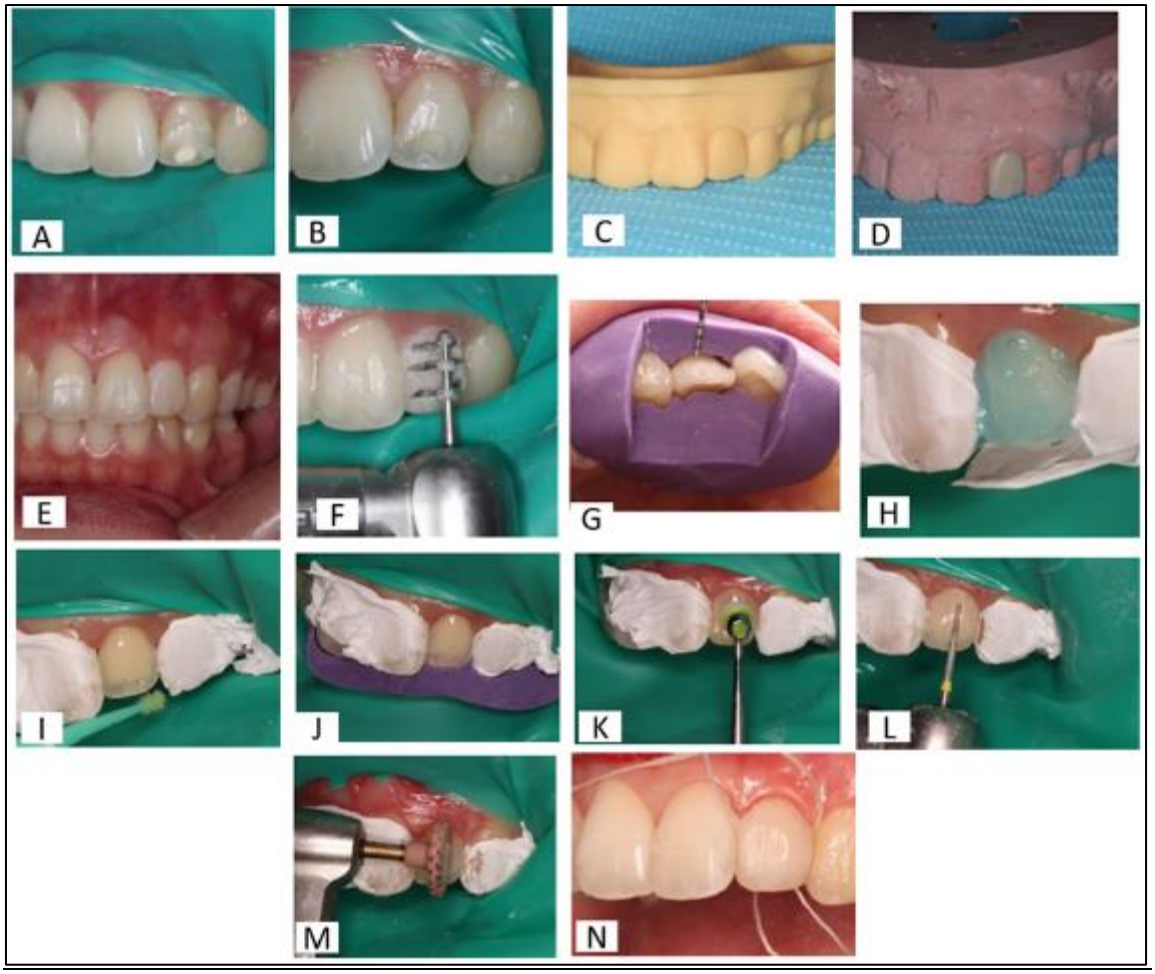

Figure 2 Shade selection was performed using the button try technique (A), Tooth preparation of white spot lesion (B), 3D Printing (C), The result of wax-up (D), Mock-up (E), Preparing veneer with deep cutting bur (F), Evaluation of preparation direct veneer with silicone guide (G), figure and esta application (H), Application of bonding agent (I), The result of Palatal wall (J), The Composite was contured using an optrasclupt pad (K), Finishing (L), Polishing (M), Proximal evaluation tooth (N)

Visit 3: Evaluation two weeks post-treatment. A saliva test was performed, and the patient rinsed with a 1% povidone-iodine solution as part of the infection control protocol, during anamnesis the patient did not express any discomfort or complaint. The veneer was clinically stable with improved esthetics. No subjective complaints or objective abnormalities were found.

Figure 3 Post treatment

4. Discussion

This case demonstrated favorable esthetic and functional outcomes following the application of a direct veneer. Evaluation at two weeks showed lesion stabilization and resolution of the patient's esthetic concerns.

WSL is the result of repeated cycles of enamel demineralization and remineralization caused by acid production from bacterial metabolism of fermentable carbohydrates. Initially invisible to the naked eye, lesions eventually become clinically detectable due to the activity of acid-producing bacteria invading microscopic defects in the enamel surface (6)

In active caries, demineralization progresses toward the dentino enamel junction (DEJ). Once porosity reaches approximately 400 μm in depth, a WSL becomes visible upon air drying for around 5 seconds. Light dispersion in porous enamel affects the tissue's natural anisotropic translucency, resulting in the characteristic chalky appearance (7)

In this case, nanohybrid resin composite was used for direct veneering. This technique is commonly indicated for esthetic correction of anterior teeth affected by discoloration, shape anomalies, minor misalignment, fractures, or failed restorations. Direct veneer placement often requires minimal or no tooth preparation (8) Previous case reports have demonstrated favorable long-term outcomes of direct veneers up to two years postoperatively (9)

Studies by (1) support the use of resin composites and fluoride varnish in WSL management. Other researchers have shown that resin-based materials offer both esthetic improvement and aid in remineralization. Treatment success is highly influenced by the depth of the lesion (10, 11)

After two weeks, this patient showed no clinical progression or new complaints (12) noted that direct veneers perform best in vital teeth. Retrospective studies have found that micro filled composites provide excellent esthetic results, though statistical analysis shows no significant difference in long-term survival among various composite types. Anterior teeth play a key role in esthetics, and finer resin particles used in direct veneers contribute to a smoother surface and improved optical appearance (Damarco et al., 2013). The technique is associated with low failure rates, even in non-vital teeth (12).

Overall, direct veneers offer a reliable treatment approach for preserving dental vitality and restoring esthetic function. Proper case selection and execution are critical to success.

5. Conclusion

WSL in anterior teeth is a common indication for esthetic restorative treatment. Direct veneer application serves as an effective and minimally invasive option, offering strong adhesion, clinical efficiency, cost-effectiveness, and excellent esthetic and functional outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of informed consent

Informed consent was obtained from the patient for publication of this case report and accompanying images.

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