

## CASE REPORT

# Microinvasive, Esthetic Management of White Spot Lesion Following Orthodontic Treatment Using Resin Infiltration: A Case Report

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### ABSTRACT

**Aim:** White opacities have always been a major esthetic concern in young patients reporting for dental treatment. We aimed to achieve an esthetic noninvasive immediate correction of these lesions.

**Background:** These discolorations of enamel have a multifactorial etiology and are mainly caused by dental fluorosis, early enamel caries, developmental defects, etc. Conventionally available treatment options for these white opacities include noninvasive and invasive approaches. Recently, a novel "microinvasive" technique has been introduced as an alternative therapeutic technique to manage these opacities esthetically and in a painless way, in a single sitting with no complications.

**Case description:** This paper illustrates the use of resin infiltration to esthetically treat white spot lesions (WSLs) on the anterior maxillary teeth in a 24-year-old female caused due to orthodontic treatment.

**Conclusion:** Resin infiltration can be an effective treatment option for the correction of WSLs on the labial surface of anterior teeth seen after orthodontic treatment.

**Clinical significance:** The resin infiltration technique can be a preferred option for treating superficial WSLs and has a high patient acceptance rate with minimal risk of postoperative sensitivity.

**Keywords:** Microinvasive, Resin infiltration, White spot lesion.

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### BACKGROUND

Dental aesthetics has become a widespread branch of dentistry. Many dental products have evolved over the years to help achieve the perfect smile that patients demand. WSLs are common lesions found on the labial surfaces of teeth that denote subsurface demineralization of enamel. The prevalence, however, of WSL is higher in orthodontically treated patients. A meta-analysis done by Sundararaj et al. in 2015 reveals that the prevalence of WSL in orthodontic patients was 64.8%.<sup>1</sup>

Physical appearance, especially in young adults, strongly influences their feelings about themselves and also how well they are judged by others.<sup>2</sup> There are different treatment modalities to treat WSL, both invasive and noninvasive. Invasive treatment options are microabrasion, direct composite restoration, and indirect restorations. Noninvasive treatments include fluoride application, casein phosphopeptide-amorphous calcium phosphate, and resin infiltration.<sup>3</sup> It has been proven, however, that prevention is better than cure for WSL; selective patients are chosen for orthodontic treatment with good oral hygiene and that are free of plaque.<sup>4</sup>

Resin infiltration is a new treatment modality that is noninvasive, painless, and very convenient for the patient, as it can be done in one visit.<sup>5</sup> This case report highlights a novel approach to the treatment of WSLs after orthodontic treatment.

### CASE DESCRIPTION

A 24-year-old healthy female presented to the clinic with WSL on the labial surface of the upper anterior teeth. Her chief complaint

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was that even though she had got her teeth aligned, she disliked her smile due to these opaque WSLs that were visible anteriorly. The patient had undergone fixed orthodontic treatment for 6 years, and the braces were debonded 2 years back, after which she noticed opaque white discoloration on the labial surfaces of anterior maxillary teeth. She visited her dentist but was fearful of any invasive intervention and yet was unsatisfied with the appearance of her teeth. She was moderately built and well-nourished, and her medical history was non-contributory. She brushed her teeth twice daily with fluoridated toothpaste using vertical and horizontal strokes. Her oral hygiene status was fair, and her gingiva was healthy. WSLs were observed on the labial surface of teeth number 11, 13, 21, 22, and 23 (Fig. 1). There

was no associated pain or sensitivity associated. The patient had undergone implant treatment and crown in relation to missing tooth 12. After explaining the condition of her teeth and treatment plan to the patient, her written consent was obtained to perform the procedure of icon resin infiltration.

Thorough oral prophylaxis and pumice prophylaxis was done on the anterior maxillary teeth to remove any stains. Multiple teeth isolation was achieved using an OptiDam to protect the gingiva from any irritation (Fig. 2A).

Icon infiltration contains three syringes:

- Icon etch (15% hydrochloric acid).
- Icon dry (ethanol).
- Icon resin (tetraethylene glycol di-methacrylate).



Fig. 1: Preoperative photograph

Hydrochloric acid of 15% was placed on the WSLs for 2 minutes to allow the etching of teeth and to remove the hypermineralized layer on the surface subsurface of enamel to allow penetration of the resin (Fig. 2B). The acid was washed for 30 seconds and dried (Fig. 2C). After that ethanol (icon dry) was placed on the etched surfaces for 30 seconds and then air-dried again (Fig. 2D). The icon dry allows you to see the expected outcome. The same cycle of etching and icon drying was repeated to ensure access to deeper lesions. Finally, the resin was injected on the tooth surface using tetraethylene glycol dimethacrylate and allowed to settle for 5 minutes before curing (Fig. 2E). Dental floss was used to ensure that there wasn't any excess resin material interdentially. The resin was light-cured for 40 seconds, and finishing and polishing were done to remove excess by polishing discs to avoid staining (Fig. 2F).

The patient's satisfaction was evaluated by the pre and postoperative photographs (Fig. 3). The patient was very satisfied with the esthetic results.

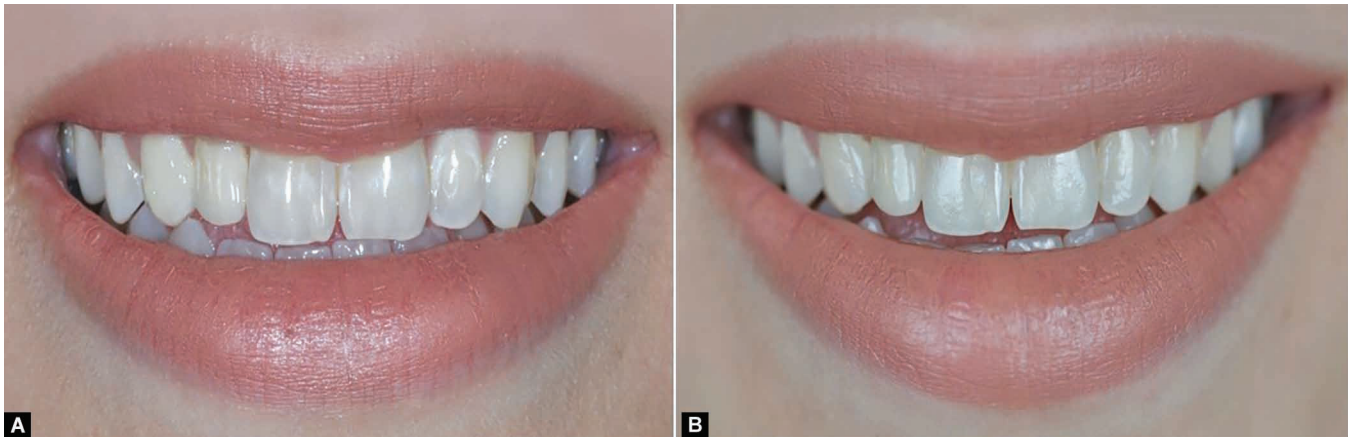
The patient was followed up for a 6 monthly period for 1 year, and the results were satisfactory (Fig. 4).

## DISCUSSION

These WSLs are a common complication after the orthodontic treatment caused by either poor oral hygiene or demineralization of the subsurface of enamel. Regular use of topical fluorides or casein phosphopeptide amorphous calcium phosphate that are either professionally applied by the dentist or self-applied at home can prevent these lesions.<sup>4</sup>



**Figs 2A to F:** (A) Multiple teeth isolation was done using a rubber dam; (B) Hydrochloric acid of 15% was placed on the WSL for 2 minutes; (C) The acid was washed for 30 seconds and dried; (D) Icon dry was placed for 30 seconds and air-dried again. The same cycle of etching and icon drying was repeated; (E) The resin was injected on the tooth surfaces, allowed to settle for 5 minutes and light cured for 40 seconds; (F) Finishing and polishing was done by polishing discs



**Figs 3A and B:** (A) Preoperative and (B) Immediate postoperative photographs



**Fig. 4:** Follow-up after 6 months

The WSLs appear to be white due to the difference in the refractive index of light compared to the sound tooth structure adjacent to it. The bacteria on the surface of enamel produces acid that causes the demineralization of calcium and phosphorous. The body of the lesion becomes hollow (filled with air) or filled with water. Due to the difference in the refractive index of sound enamel [refractive index (RI): 1.62], air (RI: 1.0), and water (RI: 1.33), the light that passes through the surfaces gets scattered, and as a result, the carious lesion appears opaque white.<sup>6,7</sup>

Among the common treatment options available to manage WSLs, resin infiltration is gaining acceptance in both dentist and patient communities. The resin infiltration used in this case was Icon (DMG, Hamburg, Germany). The treatment involves a strong acid to etch the tooth to allow a low-viscosity methacrylate resin to penetrate the body of the lesion and replace the air/water. This arrests the lesion from further progression. Furthermore, it esthetically improves the appearance as the difference in the refractive index of the low viscosity resin (RI: 1.46), and sound enamel (RI: 1.62) is almost negligible.<sup>6,7</sup> This camouflage makes the WSL completely invisible. There are, however, cases where the WSLs are further deeper into enamel (international caries detection and assessment system >3), which are difficult to remove by resin infiltration, and these cases require a more invasive technique like micro-abrasion followed by resin infiltration.

This technique is successful in permanent teeth and primary teeth. This is because the primary teeth enamel is relatively less mineralized, thinner, more porous, and has a higher prevalence of

being aprismatic, resulting in a greater diffusion coefficient. Further, the rate of caries progression in primary tooth enamel is relatively higher when compared to permanent enamel, which makes it less suited for managing the lesions on these teeth.<sup>8</sup> This novel technique bridges the gap between restoring the carious lesion and conservatively managing it by prevention. It is well-suited for camouflaging those WSLs on the buccal surface, which extends up to the superficial third of the dentin. The resin infiltration technique also has a high patient acceptance rate with minimal risk of postoperative sensitivity, pulpal inflammation, and secondary caries.<sup>9</sup> This may be the reason why it is gaining popularity in treating WSLs after or during orthodontic treatment. Just based on the esthetic result of this case and the literature available, it would be premature to recommend resin infiltration; hence it would be prudent to rely on randomized controlled trial studies that have long-term follow-ups to strongly recommend this technique to treat WSLs.

## CONCLUSION

Resin infiltration can be an effective treatment option for the correction of WSLs on the labial surface of anterior teeth seen after orthodontic treatment.

## Clinical Significance

This technique can be a preferred option for treating superficial WSLs and has a high patient acceptance rate with minimal risk of postoperative sensitivity.

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