

Treatment of hypomineralized maxillary central and canine teeth with resin infiltration technique: A case report

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Abstract

Aim: The resin infiltration technique is a minimally invasive approach that can be used to treat white spot lesions and arrest the progression of caries lesions. In this case report, it is aimed to eliminate the existing aesthetic problem by treating enamel hypomineralization in the maxillary central and canine teeth with the resin infiltration technique.

Methodology: A 17-year-old male patient was referred to our clinic because of an aesthetic problem caused by a white spot lesion in his maxillary central and canine teeth. After clinical and radiological examination, his treatment options were evaluated, and we decided to treat it with the resin infiltration technique. After cleaning the surfaces of the teeth with a prophylaxis pad (Ultrapro Tx, Ultradent, South Jordan, UT, USA), isolation was achieved by applying a gingival barrier (Gingival Barrier, SDI, Bayswater, VIC, Australia). The adjacent teeth were protected using Teflon tape. A 15% hydrochloric acid gel (Icon Etch, DMG, Hamburg, Germany) was applied to the enamel surfaces for two minutes by mixing with a brush. After, the acid was removed using a water spray for 30 seconds. Ethanol (Icon Dry, DMG, Hamburg, Germany) was applied for 30 seconds and air dried. Then, a low-viscosity resin infiltrant (Icon Infiltrant; DMG, Hamburg, Germany) was applied to the tooth surfaces for three minutes by slight massage. After the application, the resin was light polymerized for 40 seconds (D-Light Pro, GC, Tokyo, Japan). The whole procedure was performed in such a way that there were two consecutive cycles.

Results: Aesthetics improved after the procedure. The patient was followed up with control sessions.

Conclusion: White spot lesions can be treated with a minimally invasive approach using the resin infiltration technique with appropriate indication.

Keywords: White spot lesion, hypomineralized tooth, aesthetic dentistry, minimally invasive, resin infiltration technique, Icon resin infiltrant

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Received: 15 October 2022

Accepted: 14 December 2022

Access Online



DOI:

<https://doi.org/10.5577/intdentres.452>

How to cite this article: Tüzel S, Çokkeçeci İT, Üçtaşlı MB, Arısu HD. Treatment of hypomineralized maxillary central and canine teeth with resin infiltration technique: A case report. Int Dent Res 2022;12(Suppl.1):124-7. <https://doi.org/10.5577/intdentres.452>

Introduction

Developmental dental anomalies occur with the effect of various pathological factors before or after

the development of the teeth. Insufficient process of the organic matrix while the improvement of enamel can be identified enamel hypoplasia, while hypocalcification happens at a later time, during the

mineralization of the produced matrix (1). When tooth enamel deforms due to hypoplastic or hypocalcific changes it becomes more porous. Clinically, it is not easy to differentiate whether the enamel is hypomineralized or hypoplastic (2, 3).

Dental caries is a multifactorial, infectious, chronic disease that is caused by the combination of many factors, including bacteria in the oral flora, microbial dental plaque, content of saliva, nutritional habits, and the structure of the tooth (4). In recent years, the incidence of dental caries has increased due to changes in dietary habits and the refinement of foods.

Technological developments allow diseases to be diagnosed and treated at an early stage. Today, minimally invasive approaches are becoming more common in the treatment of dental caries and developmental defects. Due to both developments in technology and the increasing aesthetic expectations of patients, it is possible to obtain successful treatments by applying minimally invasive interventions to dental hard tissues, especially defects of the anterior teeth (5).

White spot lesions are demineralized areas in enamel. The superficial structure of the enamel is more porous than sound enamel, without cavitation. Dissolution of enamel crystals begins with the formation of pores in the enamel and demineralization under the surface. The change in the refractive index of light in the affected area is a result of both the loss of surface brightness, surface roughness, and changes in internal reflection. Therefore, the reason for the opacity seen in enamel is that porous enamel reflects light more than sound enamel (6). Various techniques have been proposed to treat white spot lesions. These include restorative procedures, the development of remineralization with the use of casein phosphopeptide amorphous calcium phosphate (CPPACP) and fluoride, microabrasion, and laser applications (7). The resin infiltration technique reduces microporosity, mechanically supports the tooth, and traps cariogenic microorganisms in the internal parts of the lesion, depriving them of nutritional support (8). In addition to these effects, infiltration therapy has also been shown to cosmetically mask demineralized areas in the enamel (9).

In this case report, the effectiveness of the treatment of hypomineralized maxillary central and canine teeth with resin infiltration technique has been demonstrated.

Case Report

A 17-year-old male patient was referred to the Gazi University, Faculty of Dentistry, Department of Restorative Dentistry clinic because of an aesthetic problem caused by the white spot lesion in his maxillary central and canine teeth. After the clinical and radiological examination, the treatment options were evaluated, and we decided to treat it with the resin infiltration technique. After cleaning the surfaces of the teeth with a prophylaxis pad (Ultrapro Tx, Ultradent, South Jordan, UT, USA) (Fig. 1A), isolation

was achieved by applying a gingival barrier (Gingival Barrier, SDI, Bayswater, VIC, Australia) (Fig. 1B). The adjacent teeth were protected using Teflon tape. A 15% hydrochloric acid gel (Icon Etch, DMG, Hamburg, Germany) was applied to the enamel surfaces for two minutes by mixing with a brush (Fig. 1C). After, the acid was removed using a water spray for 30 seconds. Ethanol (Icon Dry, DMG) was applied for 30 seconds and air dried (Fig. 1D). Then, a low-viscosity resin infiltrant (Icon Infiltrant; DMG) was applied to the tooth surfaces for three minutes by slight massage. After the application, the resin was light-cured for 40 seconds (D-Light Pro, GC, Tokyo, Japan) (Fig. 1E). The whole procedure was performed in such a way that there were two consecutive cycles. As can be seen in the beginning (Fig. 1F) and end (Fig. 1G) photos of the case, the result is quite satisfactory. The aesthetics improved after the procedure. The patient was followed up with control sessions. At the end of a one-month follow-up, it was observed that this aesthetic appearance was preserved (Fig. 1H).

Discussion

The present case report determined that the resin infiltration treatment, which is preferred for masking white spot lesions in anterior maxillary central and canine teeth, resulted in high patient satisfaction. White spot lesions occur due to subsurface demineralization of enamel under hypermineralized superficial enamel tissue (10). When the tooth surface is air-dried and saliva is removed, white lesions become more visible. This can be explained by the dissimilarities in the diffraction index of water, air, and enamel. The porous structure of demineralized enamel becomes more opaque when filled with air and more transparent when filled with water. However, when these pores are filled with a low-viscosity resin infiltrant, the difference between infiltrating lesions and sound enamel indices becomes negligible. Thus, these lesions seem the same as the adjacent normal enamel tissue (11).

The resin infiltration technique is the most conservative treatment option because it is non-invasive compared to microabrasion, macroabrasion, and other restorative options (10). Instead of trying to remove the white spot lesion, this technique mechanically strengthens the demineralized enamel through resin infiltration, thereby preventing the diffusion of acid into the enamel and helping to prevent new lesions.

Etching the lesion area with acid removes the superficial hypermineralized enamel layer and exposes the lesion body. According to Meyer-Lückel et al., 15% HCl is sufficient to remove the hypermineralized surface layer (approximately 40 µm) (12,13). The water present in the porosities of the lesion is removed with 99% ethanol, which allows the resin infiltrant to penetrate the pores guided by capillary forces (13). Low viscosity, high surface tension, and a low contact angle allow Icon™ resin infiltrant to flow and quickly penetrate the tissue of the enamel (14). After the first



Figure 1. Procedure of resin infiltration technique (A) Cleaning the surfaces of the teeth. (B) Applying a gingival barrier. (C) The 15% hydrochloric acid gel application. (D) Removal of acid with a water spray and ethanol application. (E) Resin infiltrant application. (F) Initial photo. (G) Final photo. (H) One-month follow-up.

application, the resin is applied a second time to eliminate the gap caused by the shrinkage in the material. The second resin application helps to close these gaps completely (15).

This technique is a useful option in the treatment of moderate and soft white point lesions, preventing early caries and restoring the aesthetics of white spot lesions after orthodontic treatment (16).

The technique, which has become popular in recent years, is frequently preferred by patients and dentists because it is painless and easy to perform.

Conclusions

The resin infiltration technique is a minimally invasive approach that restores the appearance of white spot lesions when used in the appropriate indication.

Acknowledgments: This study has been presented at the Necmettin Erbakan University 2nd International Dentistry Congress in Konya, Turkey held between October 1-3, 2022.

Patient consent for publication: Written informed consent was obtained from the patient.

Peer-review: Externally peer-reviewed.

Author Contributions: Conception - S.T.; Design - S.T., İ.T.Ç.; Supervision - M.B.Ü.; Materials - S.T., İ.T.Ç.; Data Collection and/or Processing - S.T., M.B.Ü.; Analysis and/or Interpretation - S.T., M.B.Ü.; Literature Review - S.T., İ.T.Ç.; Writer - S.T.; Critical Review - H.D.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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