

Inhibition of early caries lesion progression by the infiltration of light-curing resin

Kristina Gorseta, Tara Vrazic

ABSTRACT

Introduction: The development of white spot lesions (WSL) is a challenging problem during the course of orthodontic treatment. Caries infiltration fills the gap between prophylaxis and filling. **Case Report:** Radiograph was taken of early enamel and dentin lesion on proximal surface of molar. Caries lesion was detected on proximal surfaces of lower left first molar including enamel and outer part of dentin surface. The patient complains of tooth sensitivity to cold and sweet. **ICON infiltration** was applied for treatment of early enamel lesion. Radiograph was taken six months after resin infiltration and there was no visible lesion on proximal surface. Tooth sensitivity is gone, after ICON infiltration and it could be observed healing of early enamel and dentin lesion. **Conclusion:** Resin infiltration could be useful to arrest the progress of early enamel lesion of molar's proximal surfaces.

Keywords: Caries lesion, Dental enamel, Resin infiltration, White spot lesion

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INTRODUCTION

Caries is multifactorial process and a cavity is a symptom of this disease. The development of white spot lesions is a challenging problem during the course of orthodontic treatment [1]. Research of Gorelick et al. showed that the prevalence of white spot lesions (WSL) in patients undergoing fixed orthodontic treatment is 49.6% versus 24% in an untreated control group [2].

Cavity preparation will not cure tooth decay. White spot lesions on smooth enamel surfaces are only supposed to remineralize if patients are frequently exposed to fluorides and have good oral hygiene.

Proximal caries present a great health problem for high risk patients. Kielbassa et al. showed that at the age of 21 years, up to 50 % of patients show carious or restored proximal surfaces [3, 4].

Caries infiltration fills the gap between prophylaxis and filling. It might be a promising approach. It gives us more time for observation and gives tooth the possibility to heal [5]. Caries infiltration works by capillary action and it is a great advantage comparing to sealants which only cover incipient caries lesions at the surface of the tooth. It has been shown that infiltration of white spot lesion has outcome with great success. It is not clear how deep the resin could penetrate into lesion. For success

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of the therapy it is necessary that the lesion should be completely penetrate and also to seal it well. Therefore, the aim of this study was microinvasive treatment of caries lesion in enamel and outer surface of dentin [6].

CASE REPORT

A 17-year-old female was admitted in the Department of Pediatric and Preventive Dentistry, School of Dental Medicine, University of Zagreb with finding of early enamel lesion on proximal surface of molar. Radiograph was taken and caries lesion was detected on proximal surfaces including enamel and outer part of dentin surface (Figure 1). The patient complains of sensitivity of this tooth to cold and sweet.

The patient was informed about the treatment alternatives. Patient requested treatment as soon as possible because of tooth sensitivity. Considering her request, a microinvasive treatment was planned with Icon (DMG, Hamburg, Germany).

A slight separation of the teeth was obtained by orthodontic rubber separating rings (Figure 2). An interdental gap of 0.5–1 mm is readily produced after some days.

The tooth was dried with oil-free and water-free air. A 1.5-mm area beyond the WSL was etched with 15% hydrochloric acid (HCl) (Icon-Etch, DMG, Hamburg) for 120 s (Figure 3). Then, the HCl was collected with an aspirator. The proximal tooth surface was rinsed with water for 30 s and dried with oil-free and water-free air for 30 s. The surface layer of the proximal lesion has to be removed and thus enabling the infiltrant material to penetrate in the pores of demineralized lesion. When the enamel surface is etched and dehydrated, then the better retention of infiltration materials is achieved [7].

Next, 99% ethanol containing Icon-Dry (DMG, Hamburg) was applied to the dry lesion area and allowed to set for 60 s. Then, the lesion area was dried with air for 30 s. Icon-Infiltrant was applied on the dry, cleaned

lesion and allowed to set for three minutes. After that, the infiltrated surfaces were light-cured with a dental polymerization unit (Bluephase G2, Ivoclar Vivadent, Schaan, Liechtenstein) with output of 450 nm and a light intensity of 1200 mW/cm² for 40 s. The icon-infiltrant was applied once more and allowed to set for 60 s and light-cured for 40 s.

Two weeks after treatment patient did not have any complain on the tooth sensitivity. Interdental gap produced by orthodontic rubber separating rings was closed. Radiograph was taken six months after and showed no visible lesions on proximal surface (Figure 4). With this microinvasive treatment procedure, the progression of initial enamel lesion was arrested without drilling or invasive approach.

DISCUSSION

It has been shown that progression of initial proximal lesions can be arrested by interceptive approaches such as prophylactic cleaning, sealing and infiltration [8].



Figure 2: Separation of the molars with rubber ring.

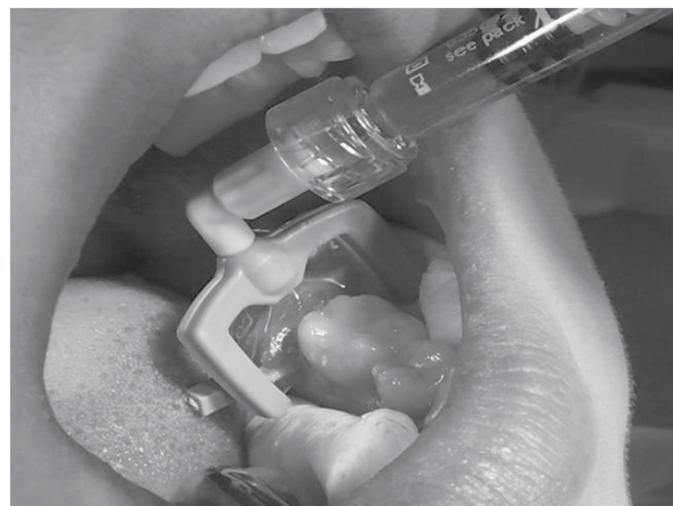


Figure 3: Etching with 15% hydrochloric acid (Icon-etch).



Figure 1: Radiograph of first molar with proximal caries lesion.



Figure 4: Radiograph of first molar six months after resin infiltration of caries lesion.

However, this treatment relies upon maintenance of an intact margin between the sealant and tooth [6]. In contrast to fissure sealing, the diffusion barrier for acids and dissolved minerals is established inside the enamel lesions. Moreover, the matrix resin can strengthen the structure of the enamel and prevent the breakdown of the enamel surface [9]. In the primary and permanent dentition, caries progression in dentin is three times faster than in hard enamel tissue [8].

Resin infiltration is a new minimally invasive approach to arrest the progress of proximal initial caries lesions. The pores in the enamel caries act as diffusion pathways for acids and dissolved minerals. Thus, the occlusion of these pores by infiltration with light curing resin can arrest lesion progression and mechanically stabilize the fragile structure of the lesion. Caries infiltrant was optimized for rapid capillary penetration and show a very low viscosity, high surface tension and low contact angle to enamel [9]. Since infiltrant does not require the resin coating and has a low viscosity, the clinical application on proximal tooth surface is possible [10]. The location of the infiltrated tooth, separation problems, and the clinical handling of clinicians with the infiltration technique had an effect on the duration of the infiltration [6].

Earlier research showed that the superficial sealing of initial lesions seems to be successful in arresting lesion progression after exposure to a carious challenge [9,10]. New emerging materials with better infiltration properties offer better clinical success and have a favorable penetration potential in subsurface enamel lesions. A careful application technique is very important to obtain adequate sealing of initial lesions. This treatment should be alternative to minimally invasive dentistry and any type of drilling. Thus drilling is delayed and in the meantime healing could be achieved [8, 9].

CONCLUSION

Under the limitations of this report, the resin infiltration technique is a promising minimally invasive approach in arresting caries progression and preservation of demineralized enamel. Prognosis of this case depends on oral hygiene, available fluorides, re/demineralization periods, biological behavior of materials used as infiltrants and clinical sensitivity of application procedures.

Author Contributions

Kristina Gorseta – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Tara Vrazic – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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