

White Spot Lesions after Orthodontic Treatment : Prevention and Treatment

Dr. Amit Gupta

Asst. Professor
Dept. of Orthodontics & Dentofacial Orthopaedics

Dr. Nidhi Gupta

Asst. Professor
Dept. of Periodontics

Dr. Alok Sharma

Asst. Professor
Dept. of Prosthodontics

Dr. Sumit Sharma

Asst. Professor
Dept. of Periodontics

Jaipur Dental College, Jaipur

Abstract

Enamel white spots lesions due to decalcification are known complications of orthodontic treatment. The presence of arch wires complicates the maintenance of oral hygiene and makes access to plaque retaining areas difficult. As a consequence, areas of local decalcification of enamel without cavity formation often form adjacent to the orthodontic bands and brackets. These spots can be considered as initial carious lesions and are unesthetic. To prevent development of white spot lesions, an orthodontist should assess each patient's risk factors before and during treatment.

Introduction

Dental caries initiates on enamel surface when there is a shift in equilibrium between demineralization and remineralization towards the former. The formation of incipient caries, commonly called white spot lesions (WSLs) is an unesthetic and a common side effect of orthodontic treatment with fixed appliances. The irregular surfaces of brackets, bands and wires limit the naturally occurring self cleansing mechanisms of the oral musculature and saliva. This encourages plaque accumulation and colonization of aciduric bacteria and over time, results in active white spot lesions. If left untreated, a cavitated caries lesion can develop. Despite intensive efforts to educate patient about effective oral hygiene procedures, enamel demineralization associated with fixed orthodontic appliances remains a significant clinical problem¹.

Gorelick et al² found that individuals with fixed appliance exhibit significantly more white spot lesions than in the control group. The highest incidence of lesions was found at the facio-gingival area of the maxillary lateral incisors, and the lowest was in the maxillary posterior segment. There was no white spot formation on the lingual surface of mandibular canine and incisors after prolonged use of a canine to canine bonded retainer. These findings suggest a relationship between resistance to white spot formation and rate of salivary flow and emphasize the need for preventive regimens.

The likelihood of developing white spot lesions increases if the patient has any of the following: inadequate oral hygiene, inappropriate diet (high frequency of elevated carbohydrate beverages and snacks), history of recent caries lesions or high DMFS scores (Decay Missing Filled Surfaces) and lack of adjunctive preventive measures, such as fluoride and antibacterial exposure, xylitol gum and calcium derived supplements. The relationship between refined sugar, frequency

of snacks and meals, and dental caries is well documented^{3,4}. Individualized diet evaluation and counseling can be used to emphasize simple concepts to help reduce exposure or frequency of exposure to sugared beverages such as regular pop or soda, juice and sports drinks or candy. An evaluation of sugared beverage intake is a key item that should be included in the patient's dietary assessment.

Strategies to Prevent White Spot Lesions in Orthodontic Patients

Depending on the patients risk factors, a number of suitable agents and therapies can be applied; fluoride tooth pastes, gels, varnishes and mouth rinses; anti microbials, xylitol gum, diet counseling and casein derivatives.

Fluoride

For many years, fluoride tooth paste (1000 ppm) has been considered the most effective and widely used method of applying fluoride, in addition to fluoridated water. The American Dental Association's Council on Scientific Affairs recommends that "moderate risk and high risk patients should receive in office fluoride varnish at six month intervals. A fluoride varnish application at three month intervals may provide an additional caries prevention benefit"⁵.

Chlorhexidine

Chlorhexidine mouthwashes might be beneficial as a part of an intensive, short term regimen to prevent white spot caries lesions, when patients have been noncompliant with other oral hygiene regimens. The main goal of antimicrobial therapy is to achieve a shift from an ecologically unfavorable to an ecological favorable biofilm⁶.

Xylitol

Xylitol gum and mints have been shown to be effective as caries preventive agents in arresting carious lesions.

CPP-ACP

The application of products containing casein phosphopeptides-amorphous calcium phosphate (CPP-ACP) might help to prevent enamel demineralization.

Treatment Protocols to be Followed After Braces are Removed

Within the first few weeks after debanding, most white spot lesions have already been in a demineralization and remineralization cycle and are most likely arrested. Nearly half of the original lesions will have remineralized after 6 months with no specific additional treatment. Fluoride must not be used in high concentrations because it can arrest remineralization and lead to staining. Low concentrations of fluoride might assist remineralization. The application of CPP-ACP products and salivary stimulation by chewing gum might be effective in assisting remineralization.

After the natural remineralization process is allowed to occur, external bleaching might be an option to help camouflage white spot lesions and obtain better esthetic results for the patient⁷. Moreover, the susceptibility to formation of caries-like lesions after bleaching increases⁸. Therefore, this kind of therapy should be restricted only to well-selected patients with perfect oral health and hygiene. Fluoridation should be performed during and after the bleaching therapy to enhance remineralization of bleached teeth.

For severe cases, acid microabrasion is recommended when the esthetic results after external bleaching therapy are not satisfactory. Lastly, aggressive restorative treatments such as a direct or an indirect veneer can be considered if the patient still sees the need for further esthetic improvement when white spot lesions cannot be totally removed. No studies address when to determine whether more aggressive restorative treatment, such as resin or porcelain veneers, is necessary only for esthetic purposes to cover white spot lesions. However, the most conservative approach to tooth structure should be considered first.

Conclusion

Clinicians still must be concerned about the potential for their patients to develop decalcification areas during orthodontic treatment. At the debanding appointment, discuss possible options with the patient to treat the white spot lesions and explain the scientific evidence behind each possibility ranging from external bleaching, microabrasion, calcium phosphate derived applications, to a more invasive treatment, such as resin composite or porcelain veneers.

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