

WHITE SPOT LESIONS: FORMATION, PREVENTION AND TREATMENT

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ABSTRACT:

The formation of white spot lesions, or enamel demineralization, around fixed orthodontic attachments is a common complication during and following fixed orthodontic treatment, which marks the result of a successfully completed case. This article is a contemporary review of the risk factors and preventive methods of these orthodontic scars. Preventive programmes must be emphasized to all orthodontic patients. The responsibility of an orthodontist is to minimize the risk of the patient having decalcification as a consequence of orthodontic treatment by educating and motivating the patients for excellent oral hygiene practice.

Keywords: orthodontics, white spot lesions, prevention.



INTRODUCTION:

As oral hygiene becomes more difficult in patients with fixed orthodontic appliances, the decalcification of the enamel surface adjacent to these appliances is prevalent. Decalcification is manifested as a white spot lesion (WSL), they are described as "subsurface enamel porosity from carious demineralization, milky white opacities located around the bracketed area in the tooth surface especially gingivally and it is a major clinical problem for orthodontist. The term "white spot lesion" (fig. no 1) (WSL) was first described by FEJERSKOV et al. He described it as –"the first sign of carious lesion that is visible to naked eye". It's an early carious

lesion but without cavitations or enamel surface disruption .^[1]

TUFEKCI et al. studied clinically white spot lesion and they concluded that their prevalence is higher during first six months of orthodontic treatment and chances decrease till twelve months of treatment .Thus during initial period of treatment, maintenance of oral hygiene is very important to prevent white spot lesion formation .^[2]

Thus clinically finding of white spot lesions after deboning of fixed applied can be a discouraging finding for orthodontists , and its proper management is necessary as it may lead to carious lesions . In present article we discuss the formation,

prevention and management of white spot lesion during or post-orthodontic phase .

WHITE SPOT LESION AS A COMPLICATION OF ORTHODONTIC TREATMENT-

Demineralization sites around the brackets or on enamel surface are considered as one of the major complication of orthodontic treatment .^[3-5] Prevalence of white spot lesion varies from 15% to 91% ^[6] in patients after orthodontic treatment .Many other studies suggest that around 50-70% orthodontic patients are affected by white spot lesions

FORMATION OR ETIOLOGY OF WHITE SPOT LESIONS (WSL)-

A higher incidence of white spot lesions was observed in orthodontic patients . After bonding of fixed appliance in patients oral cavity ,the microbial flora of the oral cavity undergoes a drastic change . The level of acidogenic bacteria in plaque drastically increases after bonding ,mainly *Streptococcus mutans* and *Lactobacilli*. These acidogenic bacteria lowers the pH of the oral cavity in orthodontic patients as compared to non orthodontic patients .Thus due to acidic pH caries susceptibility increases and teeth become more prone to white spot lesion .

INCIDENCE OF WHITE SPOT LESION –

The prevalence of white spot lesion ranges from 4% to 96% in orthodontic patients .The most common sites for white spot lesion is buccal surface of lateral incisors and least common is maxillary posteriors segments and males are most affected as compared to females .

Mizrahi stated that incidences are same for lingual and buccal surfaces, and prevalence increases on cervical and middle third of crown . White spot lesion mostly appear on - lateral incisors, canines, first premolars, 2nd premolars, central incisors. There was no significant differences were found in incidence between the right and left sides of the maxilla and mandible.

METHODS TO DETECT WHITE SPOT LESION

The most important factor in clinical practice is to detect and prevent white spot lesion . Visual method is the most widely used most common method used to detect white spot lesion .White spot lesions mainly manifest as areas of whitish or sometimes brown discoloration on the enamel surface , they may be shiny or dull in appearance and they many cause change in texture of enamel , either smooth or may be rough .

Ekstrand et al. stated ^[7]

1. white spot lesions, which are detected only after air-drying, tend to be located in the outer half layer of the enamel.
2. The depth of a white or brown area of decalcification which is clearly seen without air-drying is extended to the inner half of the enamel and the outer one third of the dentin.

Other methods to detect white spot lesion include-

1. DIAGNO-dent - The principle of DIAGNO-dent is that spectrum of carious tooth enamel exposed to red light induced fluorescence

considerably differs from that of sound enamel.^[8]

2. Quantitative light-induced fluorescence (QLF)-In this method it is possible to measure a changes in mineral structure of enamel by detecting decrease in florescence intensity of enamel, when enamel is exposed to violet-blue light.^[9]

Con-focal Laser Scanning Microscopy (CLSM)- This technique accelerates and simplifies the measuring of mineral loss. The enamel specimens are sectioned in half, stained with fluorescent dye, and analyzed using a CLSM system (Fontana *et al.*, 1996).^[10]

3. Transverse Micro-radiography (TMR)^[11] or contact-micro-radiography- In this method the tooth sample to be investigated is cut into thin slices ,about 80 µm and 200 µm for dentine samples. A micro-radiographic image is made on high resolution film by X-ray exposure of the sections together with a calibration step wedge. The micro-radiogram is digitized by a video camera or photo-multiplier. The mineral can be automatically calculated from the gray levels of the images of section and step wedge using a custom-made software.

PREVENTION OF WHITE SPOT LESION –

Prevention of WSLs begins by implementing a good oral hygiene regimen including

proper tooth brushing with a fluoridated dentifrice, fluorides have an benefit of enamel re-mineralization, and act as anti caries agent . Additional sources of fluoride such as fluoride mouth rinses containing 0.05% fluorine sodium fluoride or fluoride varnishes like Fluor Protector, Duraphat , may be beneficial for those patients with an increased caries risk and should be considered by the clinician as part of the oral hygiene regimen.

For less compliant patients, a continuous release of fluoride from the bonding system around the bracket base would be advantageous. Thus, using fluoride containing sealants and adhesives to bond brackets has been attempted. Garcia-Godoy F stated that if light cured pit and fissure resin was applied around the bonded bracket reduces the chances of demineralization by 80% in vitro.

- A. ORAL HYGINE MAINTENANCE- This is one of the basic and the most simplest method of prevention of white spot lesion , that can be performed even by patients .Oral hygiene maintenance is very critical during and after orthodontic treatment .Mechanical plaque control with the help of regular tooth brushing with proper tooth brushing technique, regular flossing , mouthwash containing choro-hexidine ,Harvey WJ, Powell KR stated that use of power tooth brush with water irrigation can be a better option of plaque control than manual tooth-brushing alone . In many cases where in-house plaque

control measures are not able to fulfill the preventive measures, in such cases scaling and polishing by fluoridated paste in dental office can be effective measure. Polishing by rubber cup or polishing brush reduces the chances of plaque accumulation by reducing the mechanical plaque retention. Use of a power toothbrush or daily water irrigation in combination with manual tooth brushing may be a more effective method in reducing plaque accumulation than manual tooth brushing alone.^[12]

- B. FLOURIDATED TOOTHPASTE – Patients undergoing orthodontic treatment are at high risk of caries, in such cases fluoride ion supplement can be beneficial as they help in remineralization, toothpaste containing fluorides provides fluoride ions and reduces the chances of white spot lesion and act as anti caries agents.
- C. FLOURIDE CONTAINING VARNISH - Azarpazhooh et al. ^[13] through their study stated that, application of fluoride varnish every six months during orthodontic treatment is most cost effective treatment for caries risk patient. Vivaldi Rodrigues G, Demito CF, suggested application of fluoride varnish over 90 days as over 6 months stated by Azarpazhooh.
- D. FLOURIDE MOUTH RINSE –Benson stated that 0.05% sodium fluoride (NaF) containing mouth rinse is the

most effective method to control the incidence of white spot lesion during orthodontic treatment. Geiger et al. reported ^[14] a 25% reduction in the number of WSLs using fluoride rinse. Gwinnett & Buonocore stated that daily mouth rinse with 0.05% or 0.2% sodium fluoride mouth rinse or weekly mouth rinse with 1.2% acidulated phosphate fluoride (APF) is very helpful during fixed orthodontic treatment to reduce white spot lesions.

- E. FLOURIDES IN BONDING AGENTS – Now a day's fluoride reinforced glass ionomer cement is used to bond brackets to the tooth surface, this not only gives a continuous supply of fluoride ions but the reinforced cement have a greater strength than traditional GIC cement.

CONCLUSION

Decalcification of the enamel surface adjacent to fixed orthodontic appliances is an important and prevalent iatrogenic effect of orthodontic therapy. The banding and bonding of orthodontic appliances to teeth increases the number of plaque retention sites and, as a result, optimal oral hygiene becomes more difficult. In general, treatment of WSLs should begin with the most conservative approaches; if such approaches do not resolve the problem to the clinician's satisfaction, more aggressive treatment modalities can be pursued if the patient desires it.

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FIGURE:



Figure 1 White spot lesions