

## Special Article - Prosthodontics

# White Spot Lesions: Whose fault it is?

Chaudhrya A<sup>1\*</sup> and Chaudharyb G<sup>2</sup><sup>1</sup>Department of Orthodontics, Christian Dental College, Punjab, India<sup>2</sup>Department of Orthodontics, Baba Jaswant Singh Dental College, Hospital and Research Institute, Punjab, India**\*Corresponding author:** Anshul Chaudhry, Department of Orthodontics, Christian Dental College, Punjab, India**Received:** May 25, 2018; **Accepted:** June 18, 2018;**Published:** June 25, 2018**Abstract**

Fixed orthodontic treatment has many side-effects associated with it, especially Demineralization with a very poor oral hygiene [1]. Demineralization of enamel occurs because of the subsequent release of acidic byproducts of the bacteria in the plaque which leads to the formation of White Spot Lesions (WSL). Caries is another side effect leading to poor esthetics, patient dissatisfaction and legal complications [1-3]. For an orthodontic point of view, the formation of these white spot lesions is very discouraging as the main goal of orthodontics is to improve the esthetics in the dento facial region.

**Keywords:** White spot lesions; Demineralization; Bacteria**Introduction**

Orthodontic attachments make oral hygiene maintenance the most difficult job as the small size of these attachments on teeth like brackets, bands, arch wires, ligatures and other orthodontic devices leads to prolonged plaque accumulation and appearance of WSL.

So, before starting orthodontic treatment and initiating other preventive measures, one has to assess the saliva, oral hygiene status and caries rate. Patients should be properly educated about the importance of maintaining good dietary compliance and excellent oral hygiene regime.

Clinically, these white spots can be seen around orthodontic attachments within 4 weeks of starting of treatment [4] and their prevalence can be as high as 96% [5-7]. The most frequently affected area is the labio-gingival area of the lateral incisors and the maxillary posterior segments are the least affected sites with a tendency to be seen in males than in females [8]. A critical evaluation of oral hygiene is recommended during the initial periods as the number of white spot lesions increases in the beginning and keep on increasing at a slower rate [9].

White spot lesions are not only the result of demineralization, however, as fluorosis, hypomineralization /hypomaturation and hypoplasia can also cause lesions. Management of white spots includes the methods of prevention, demineralization and methods used for remineralization of lesions that are already formed. Remineralization is the process of restoring minerals in the form of mineral ions in dental enamels. Demineralization is the process of removing minerals, in the form of mineral ions, from dental enamel [10].

**Etiology of the demineralization**

The white lesions appear as a result of a process that occurs between bacteria found in saliva and dietary carbohydrate. The imbalance in the process of demineralization and remineralization occurring on the surface of enamel results in the appearance of opaque white spots on the tooth due to loss of minerals below the surface of the enamel [11].

The increased surface porosity of the enamel results in a chalk like milky lesion.

If the tooth surface remains intact by this time, it is possible to stop the process of demineralization and can become spontaneous reversible remineralization of the lesion [11-13]. This remineralization requires a combination of fluoride that can be inserted for therapeutic purposes and minerals found in salivary.

However, if it progresses further, it causes the dissolution of apatite crystals along with the loss of calcium, phosphate and the other ions, leading to demineralization of the tooth substrate. The presence of clinically detectable, localized areas of enamel demineralization, observed as white spot lesions of different opacity, is a sign that caries process has begun. Change in the pH of saliva and bacterial presence in the plaque are the major contributing factor for the formation of these lesions [10,14].

**Bacteria**

Increased presence of Streptococcus mutans and Lactobacillus has been reported in the caries lesions.

Sudjalim TR et al. demonstrated increase in the number of acid bacteria with the orthodontic appliances in the mouth and when the orthodontic appliance was removed, reduction of bacteria was found in a period of 6-15 weeks [15].

**Saliva**

Saliva helps in remineralization of enamel. It helps in the flow of fluoride ions to the enamel

Its flow provides mechanical self-cleaning surface of the teeth [16,11,12]. White spot lesions appear more on those teeth that are less exposed to the salivary flow e.g. teeth in the anterior segment of maxillary dental arch on their buccal side. Most commonly affected area is Gingival third of the crown, between the place where the bracket is placed and the cervical side of the crown. Least affected area is the Lingual surface of mandibular teeth due to ample flushing by saliva. Patients with lingual retainers at the mandible from canine to canine often encounter formation of calculi which indicates increased mineralization due to saliva [17]. pH of saliva plays an important role in reducing acidic products from the dental plaque. PH of saliva depends on the amount of secretion. In unstimulated saliva pH equals less than 6, while in stimulated saliva PH is about 8. Low or acidic PH stimulated the growth of acid bacteria.

## Prevention

The first and foremost measure is patient education towards maintaining a good oral hygiene and use of floridated mouth washes during fixed orthodontic treatment.12 Still, if the WSLs appear due to improper oral hygiene, there are alternative methods to hide out their visibility by using CPP-ACP cream and by microabrasion.

This cream should be used after brushing the teeth twice a day. After applying the cream, patient should be with open mouth for 3 minutes. After 30 minutes of application, eating and drinking is prohibited. During this period, the cream can act on teeth at repairing the WSLs

In Microabrasion, 18% hydrochloric acid is used. Tooth surface with the lesion is cleaned with pumice and water. Rubber dam can be used for isolation. This procedure is repeated 3-4 times for a period of 2 weeks. Srivastava et al. showed [10] a dramatic cosmetic Result by using microabrasion technique. They achieved 99% success for mild and moderate white spot lesions and 94% for severe lesions.

## Conclusion

Demineralization is a major concern during the orthodontic treatment. There are certain measures which one can take to prevent the formation of white spot lesions. Patient should be motivated for maintenance of oral hygiene by brushing properly at least three times a day, along with floridated mouth wash. Mechanical removal of plaque is essential for preventing the occurrence of WSLs. If white spot lesions appear, application of tooth mouse and mikroabrasion can be done.

## References

- Zachrisson BU, Brobakken BO. Clinical comparison of direct versus indirect bonding with different bracket types and adhesives. *Am J Orthod.* 1978; 74: 62-78.
- Ogaard B, Rølla G, Arends J. Orthodontic appliances and enamel demineralization. Part 1. Lesion development. *Am J Orthod Dentofacial Orthop.* 1988; 94: 68-73.
- Sangamesh B, Kallury A. Iatrogenic effects of orthodontic treatment - Review on white spot lesions. *Int J Sci Eng Res.* 2011; 2: 16.
- Reilly MM, Featherstone JD. Decalcification and remineralization around orthodontic appliances: An *in vivo* study. *J Dent Res.* 1985; 64: 301.
- Mizrahi E. Enamel demineralization following orthodontic treatment. *Am J Orthod.* 1982; 82: 62-67.
- Gorelick L, Geiger AM, Gwinnett AJ. Incidence of white spot formation after bonding and banding. *Am J Orthod.* 1982; 81: 93-98.
- Mitchell L. Decalcification during orthodontic treatment with fixed appliances - An overview. *Br J Orthod.* 1992; 19: 199-205.
- Zachrisson BU, Zachrisson S. Caries incidence and oral hygiene during orthodontic treatment. *Scand J Dent Res.* 1971; 79: 394-401.
- Tufekci E, Dixon JS, Gunsolley JC, Lindauer SJ. Prevalence of white spot lesions during orthodontic treatment with fixed appliances. *Angle Orthod.* 2011; 81: 206-210.
- Srivastava K, Tikku T, Khanna R, Sachan K. Risk factors and management of white spot lesions in Orthodontics. *J Orthod Sci.* 2013; 2: 43-49.
- O'Reilly MM, Featherstone JD. Demineralization and remineralization around orthodontic appliances: an *in vivo* study. *Am J Orthod Dentofacial Orthop.* 1987; 92: 33-40.
- Hamdan AM, Maxfield BJ, Tüfekçi E, Shroff B, Lindauer SJ. Preventing and treating white-spot lesions associated with orthodontic treatment: a survey of general dentists and orthodontists. *J Am Dent Assoc* 143: 777-783.
- Shungin D. Long-term changes of white spot lesions after orthodontic treatment. Master Thesis in Public Health, Epidemiology and Public Health Sciences Department of Public Health and Clinical Medicine Umeå University. 1-37.
- Basaran G, Veli I, Basaran EG. Non-Cavitated Approach for the Treatment of White Spot Lesions: A Case Report. *International Dental Research.* 2011; 1: 65.
- Sudjalim TR, Woods MG, Manton DJ. Prevention of white spot lesions in orthodontic practice: a contemporary review. *Aust Dent J.* 2006; 51: 284-289.
- Maxfield B, Hamdan A, Tufekci E, Shroff B, Best A, et al. Development of white spot lesions during orthodontic treatment: Perceptions of patients, parents, orthodontists, and general dentists. *Am Journal of Orthod and Dentofac Orthop.* 2012; 141: 337-343.
- Chang HS, Walsh LJ, Freer TJ. Enamel demineralization during orthodontic treatment. Aetiology and prevention. *Aust Dent J.* 1997; 42: 322-327.