Introduction

Maintaining good oral hygiene becomes more difficult during orthodontic treatment. Fixed appliances, bands, brackets and wires which are placed on the dentition tend to accumulate and trap food and plaque. As a result of this, more time is required to properly clean the dentition. Poor oral hygiene leads to enamel decalcification and caries development.

Decalcification is a process in which the calcium phosphate mineral of the enamel is dissolved by the acids produced by bacteria. Bacteria produce these acids as a result of carbohydrate metabolism. These decalcification areas can present as unsightly white lesions, and represent a weakening of the enamel structure.

Fluoride-releasing sealants form a barrier and aid in remineralization of enamel. It was hypothesized that these sealants, applied around newly placed brackets, would reduce the decalcification process.

Materials and Methods

A split-mouth design was used for this study. Sixteen orthodontic patients from St. Barnabas Hospital, Bronx, NY who required full-fixed appliance therapy were recruited for this study. The material used for this study is a fluoride-releasing, light-cured, filled sealant, Pro Seal (Reliance). The treated teeth were prepared with the etching agent (37% phosphoric acid) for 30 seconds and then rinsed thoroughly for 10 seconds. There was then a one-time application of the Pro Seal sealant to the enamel surfaces adjacent to the orthodontic brackets of every other anterior tooth. A halogen light was used to light cure the sealant for 20 seconds. This resulted in mild and moderate treatment teeth per patient. Each patient therefore served as their own control. A total of 184 teeth were evaluated: 92 teeth were treated with the sealant, 92 teeth were left untreated.

A baseline plaque index as well as a decalcification score was taken at three different time intervals. Initial, T1, at the time of application, and subsequently every three months during treatment, T2 (3 months) and T3 (6 months). Because Pro Seal is clear, during the study treated and untreated teeth could not be distinguished. The scores were obtained by a visual inspection of the labial surfaces of the anterior teeth.

Plaque scoring: 0 = no recorded plaque, 1 = spots of plaque at the cervical margin, 2 = thin continuous band of plaque at the cervical margin, 3 = gingival 1/3 of tooth surface covered with plaque, 4 = 2/3 of tooth surface covered w/ plaque, 5 = >2/3 of tooth surface covered w/ plaque

Decalcification score: 0 = absence, 1 = mild to moderate, 2 = severe decalcification

Results

Initially, most teeth were not decalcified. The T1 decalcification scores of 0.25-0.26 reflect this. At T2 (three months after application of the Pro Seal), 3 treated and 3 control teeth showed an increase of decalcification. At T3 (six months after application of the Pro Seal), 2 treated and 9 control showed a further increase in decalcification from T2. Other teeth showed no observable change during the six month period. A repeated measures analysis of variance (ANOVA) test was used to show:

- There was a statistically significant change from T1-T2-T3 (p<.05).
- There was a statistically significant interaction (p<.05) between control and treatment groups, which means there is a significant difference in the patterns of increase over time.

A comparative line graph comparing treatment and control over time indicates an increase in decalcification score in both groups, with a significantly greater increase in the untreated group (control).

Conclusions

In the field of Orthodontics, esthetics is a major concern. It becomes important to determine methods of preventing white-spot lesions. Furthermore, preventing decalcification will decrease the likelihood of caries development. This prospective clinical investigation was undertaken to evaluate the efficacy of a fluoride-releasing sealant (Pro Seal) in protecting the enamel from decalcification. The results indicate that there was a significant advantage for the sealant application in preventing decalcification. There was a significant difference in the patterns of increase over time between the treatment and control group with respect to decalcification. Because decalcification was found even on treated teeth, future studies could look into more frequent sealant application and other products.

Bibliography