Göteborg, 2022

Caries Prevention in Patients Undergoing Orthodontic Treatment

Akademisk avhandling
Som för avläggande av odontologie doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Medicinaregatan 3, den 11 november 2022, klockan 9.00

Hanna Enerbäck

Fakultetsopponent:
Docent Gunnel Hänsel Petersson
Avdelningen för Cariologi, Malmö universitet

Avhandlingen baseras på följande delarbeten

I. Hanna Enerbäck, Marie Möller, Cathrine Nylén, Cecilia Ödman Bresin, Ingrid Östman Ros, Anna Westerlund. Effects of orthodontic treatment and different fluoride regimens on numbers of cariogenic bacteria and caries risk: a randomized controlled trial. European Journal of Orthodontics 2019; 41:59-66.

II. Hanna Enerbäck, Peter Lingström, Marie Möller, Cathrine Nylén, Cecilia Ödman Bresin, Ingrid Östman Ros, Anna Westerlund. Validation of caries risk assessment methods in orthodontic patients. American Journal of Orthodontics and Dentofacial Orthopedics 2020; 158:92-101.e3

III. Hanna Enerbäck, Peter Lingström, Marie Möller, Cathrine Nylén, Cecilia Ödman Bresin, Ingrid Östman Ros, Anna Westerlund. Effect of a mouth rinse and a high- fluoride toothpaste on caries incidence in orthodontic patients: A randomized controlled trial. American Journal of Orthodontics and Dentofacial Orthopedics 2022; 162:6-15.e3

IV. Hanna Enerbäck, Mai Lin Lövgren, Nicklas Strömberg, Anna Westerlund. Effect of high-fluoride toothpaste and mouth rinse on the prevention of white spot lesions during orthodontic treatment: a randomised controlled trial. *In manuscript.*

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR ODONTOLOGI

GÖTEBORGS UNIVERSITET

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Abstract

Background: Scientifically based guidelines to predict and prevent caries during orthodontic treatment with fixed orthodontic appliances are lacking.

Aim: The overall aim of this thesis was to improve caries risk assessment before orthodontic treatment, as well as to evaluate caries risk and improve caries prevention during treatment.

Patients and methods: Patients (n=270) undergoing treatment with fixed appliance at the Specialist Clinic of Orthodontics in Mölndal, Sweden, were included. Studies I, III and IV were performed with an RCT design, with the subjects being randomly assigned to one of the following groups: i. Fluoride mouth rinse (FMR) group, 0.2 % sodium fluoride (NaF) mouth rinse plus 1450 ppm F toothpaste; ii. High-fluoride toothpaste (HFT) group, 5000 ppm F; and iii. Control (CTR) group, 1450 ppm F toothpaste. In study I, the effect of orthodontic treatment and the different fluoride regimens on caries risk and caries risk factors were evaluated. Study II was performed with a prospective design that evaluated the CRA programmes and the caries indices abilities to predict the outcome of caries during treatment. In studies III and IV, the impacts of the different fluoride regimens on caries incidence (through radiographs and clinical photographs) during orthodontic treatment were evaluated.

Results: The FMR and HFT groups showed an unchanged caries risk during treatment, while the caries risk increased significantly in the CTR group ($p<0.0001$). The DiFS index demonstrated the highest accuracy in predicting initial and manifest caries during treatment with fixed appliances, as compared to the multi-factorial CRA programmes. Radiographic analyses revealed no significant difference between the fluoride groups in terms of increased caries incidence during treatment. However, the numbers of patients with an increase of one or more white spot lesions (WSL) during orthodontic treatment were significantly higher in the CTR group than in the FMR group ($p=0.0097$) or HFT group ($p=0.018$) when the data for incisors, lateral incisors and canines were included.

Conclusion: The DiFS index most-accurately predicts caries during orthodontic treatment. Furthermore, a mouth rinse or high-fluoride toothpaste can be recommended during orthodontic treatment to retain low caries risk and to reduce the numbers of WSLs in the aesthetic front.

Keywords: caries, caries incidence, caries prevalence, caries risk, fluoride, mouth rinse, orthodontics, risk assessment, toothpaste.

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