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Authors
Wilder-Smith, Petra E
Wilder-Smith, Clive H
Kawakami-Wong, Hilari
et al.

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Quantification of Dental Erosions in GERD Using Optical Coherence Tomography (OCT): An Interventional Placebo-Controlled Study with Esomeprazole

Petra E. Wilder-Smith, Clive H. Wilder-Smith, Hilari Kawakami-Wong, Julia Voronets, Kathy Osann, Adrian Lussi

Dental erosion, the chemical dissolution of enamel without bacterial involvement, is an underreported yet rapidly increasing manifestation of GERD leading to loss of tooth substance, hypersensitivity, functional impairment and even tooth fracture. To date, dental erosions have only been assessed using very basic visual methods and no guidelines or studies exist regarding the prevention or treatment of GERD-related dental erosions. In this randomized, double-blind study we used optical coherence tomography (OCT) to quantify dental tissue demineralization and enamel loss before and after 3 weeks of acid-suppressive treatment with esomeprazole 20 mg bid or placebo in 30 patients presenting to the Berne University Dental Clinic with advanced dental erosions (Lussi erosion index >1) and an abnormal acid exposure by 24h esophageal pH-manometry (defined as >4% of 24h period with pH<4). Enamel and dentin thickness, reflectivity and absorbance were measured by OCT (Niris®, Imalux, USA) pre- and post-therapy at identical localizations on teeth with most severe visible erosions as well as multiple other predefined teeth. The mean ± SD difference in enamel thickness of all teeth before and after treatment at the site of maximum exposure was 7.2±1.3µm with esomeprazole and 15.25±2.8µm with placebo (p=0.013), representing a loss of 0.3% and 0.8% of total enamal thickness, respectively. The change in optical reflectivity to a depth of 25µm after treatment was -1.122 dB with esomeprazole and +2.059 dB with placebo (p=0.012), with increased reflectivity signifying demineralization. OCT non-invasively detected and quantified significant differences in the progression of dental tissue demineralization and enamel loss after only 3 weeks of treatment with esomeprazole 20mg bid versus placebo. This suggests esomeprazole may be useful in preventing progression of GERD-related dental erosions. Further validation of preventative treatment regimens using this sensitive detection method is required, including correlation with quantitative reflux measures.