

FEATURES SECTION

Evidence-based orthodontics

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European Journal of Orthodontics 2001; 23: 475–484

Bacterial colonization associated with fixed appliances. A scanning electron microscopy study

Sukontapitark W, El-Agroudi MA, Selliseth NJ, Thunold K, Selvig KA.

Objective: To assess bacterial plaque accumulation adjacent to orthodontic brackets.

Design: A split-mouth randomized controlled trial.

Setting: University of Bergen, Norway.

Participants: Nineteen patients requiring the extraction of two or four premolars and fixed appliance therapy.

Interventions: *Experimental*—36 teeth extracted from 11 patients. Brackets on contralateral premolars ligated with either elastomeric ring or wire ligature. Teeth extracted at either 1, 2, or 3 weeks after bonding.

Control—32 teeth extracted from eight patients. Teeth either examined directly after extraction or after etching and bonding of a bracket.

Outcome measures: Assessment of plaque distribution and composition using SEM.

Results: *Non-bonded premolars*—fine layer of plaque with clumps of cocci and rods and occasional filamentous bacteria.

Post-extraction bonded premolars—tooth surface clean. Surface of excess composite rough.

Premolars extracted 1 week post-bonding—largest plaque deposits under bracket wings and ligatures, and on composite surface. Bacteria cocci with some rods.

Premolars extracted 2 weeks post-bonding—similar to 1-week samples.

Premolars extracted 3 weeks post-bonding—abundant plaque consisting of cocci and short rods. Brackets ligated with elastomeric ring retained more plaque than those tied with wire ligature.

Conclusions: Excess composite around bracket bases was a critical site for plaque accumulation. Elastomeric ligatures retained more plaque than wire ligatures.

Implications: Plaque accumulates rapidly following bonding especially gingival to the bracket. Plaque mainly associated with excess composite so this should be minimized. Wire ligatures appear to be a cleaner option and should be used when oral hygiene may be compromised, e.g. post-surgery.

American Journal of Orthodontics and Dentofacial Orthopedics 2001; 120: 353–360

Comparative study of 2 electric and 2 normal toothbrushes in patients with fixed orthodontic appliances

Thienpont V, Dermaut LR, Van Maele G.

Objectives: To evaluate the efficacy of four toothbrushes in children undergoing fixed appliance therapy.

Design: A single-blind cross-over randomized controlled trial.

Setting: University of Ghent, Belgium.

Participants: 36 patients undergoing full upper and lower fixed appliance therapy—18 boys, 18 girls, mean age 13½ years. Three boys excluded during trial.

Interventions: Four toothbrush types—two electric (Braun Oral-B 3D, Phillips-Jordan), two manual (Oral-B Advantage, Lactona Orthodontic) used in a random order over 1 year. One-month experimental periods followed by 1 month washout periods. Brushing time was 3 minutes.

Outcome measures: Modified gingival index; bleeding on blunt probing index; plaque index, bracket; plaque index, tooth. Assessment by calibrated examiner blind to the brush type.

Results: No significant differences were found between the four brushes for any parameter. There was no difference between boys and girls. The PIT was higher for the maxillary teeth.

Conclusions: The four brushes tested appeared to be equally efficient at maintaining oral hygiene in orthodontic patients. However, this could have been because the patients' oral hygiene was very good so improvements would have been small and the significance of any changes may have been missed.

Implications: There appears to be little advantage for patients undergoing orthodontic treatment, who have a very good baseline level of oral hygiene, in using an electric or specific orthodontic toothbrush. A further trial, in patients with less than ideal oral hygiene, could be planned to assess whether specialized or electric brushes are more efficient in these circumstances.

***Angle Orthodontist* 2001; 71: 318–323**

Sensitivity of titanium brackets to the corrosive influence of fluoride-containing toothpaste and tea

Harzer W, Schroter A, Gedrange T, Muschter F.

Objectives: To assess the corrosive influence of acidic fluoride-containing toothpaste on orthodontic brackets.

Design: A split-mouth, controlled, clinical trial.

Setting: Technical University of Dresden, Germany.

Participants: Eighteen patients receiving upper and lower fixed appliance therapy.

Interventions: Titanium brackets (Dentaurum, Pforzheim, Germany) bonded to the left side and stainless steel brackets to the right side. Fifteen patients used Gel Kam (Colgate, Hamburg, Germany) toothpaste, three patients used fluoride-free Putzi (Dental Kosmetik, Dresden, Germany) toothpaste. Diet record of tea consumption was kept.

Outcome measures: The brackets were examined with a stereo and a scanning microscope.

Results: Eight weeks after bonding the titanium brackets had darkened and had significantly more plaque accumulation irrespective of toothpaste used. The surface of the titanium brackets was very rough. Corrosion occurred in 3/165 brackets. It extended from fissures in the surface that were twice as wide in the brackets exposed to fluoride toothpaste.

Conclusions: The surface roughness and biocompatibility of titanium supports plaque adherence. This increases plaque accumulation and discoloration of the bracket surface. The pH of Gel Kam is lower than that at which corrosion of titanium brackets occurs, but only 2 per cent of brackets showed signs of significant corrosion. This is likely to be due to dilution of the fluoride ion by saliva.

Implications: Although the titanium brackets accumulated plaque and discoloured more than the stainless steel ones it appears that the acidic environment, created by fluoride toothpaste, is harmless to the bracket and does not cause significant corrosion. Titanium brackets could therefore be considered for patients who are sensitive to stainless steel ones.