

FEATURES SECTION

Evidence-based orthodontics

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The effects of argon laser irradiation on enamel decalcification: an *in vivo* study.

Anderson AM, Kao E, Gladwin M, Benli O, Ngan P

Objectives: To assess the effects of argon laser irradiation on enamel decalcification during orthodontic treatment.

Design: A controlled clinical trial.

Setting: West Virginia, USA.

Participants: Nine patients who required four premolar extractions.

Interventions: *Group 1:* teeth pumiced for 3 seconds and exposed to argon laser (100 J/cm²) for 60 seconds; *Group 2:* teeth pumiced for 3 seconds, etched for 30 seconds, and exposed to argon laser (100 J/cm²) for 60 seconds; *Group 3:* teeth exposed to argon laser (100 J/cm²) for 60 seconds; *Control:* no treatment. *All teeth:* fitted with spaced premolar band, extracted after 5 weeks, sectioned and examined under a polarized light microscope.

Outcome measures: Area and depth of decalcified enamel.

Results: There were statistically significant differences in the area ($P < 0.01$) and depth ($P < 0.001$) of the lesions that developed in the four groups. Significant differences were found between the pumice-etch-laser and laser-only groups compared with the control group ($P < 0.05$) with a 92.2 and 94.6 per cent reduction in lesion area and an 89.1 and 91.4 per cent reduction in lesion depth respectively. The difference between the pumice-laser and control groups was not statistically significant.

Conclusions: This short-term trial has shown that treatment of teeth with an argon laser alone or in combination with etching, significantly reduced the area and depth of decalcified lesions.

Implications: The reduction in area and depth of decalcified lesions that argon laser irradiation brought about could have significant benefits for our patients. A long-term clinical trial, involving bonded and banded teeth, may provide information of more clinical relevance.

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Efficacy of a wax containing benzocaine in the relief of oral mucosal pain caused by orthodontic appliances.

Kluemper GT, Hiser DG, Rayens MK, Jay MJ

Objectives: To determine the efficacy of an orthodontic wax containing benzocaine in the relief of oral mucosal pain caused by orthodontic appliances.

Design: A randomized controlled trial.

Setting: Kentucky, USA.

Participants: Eighty patients with full fixed orthodontic appliances, but no archwires.

Interventions: *Treatment:* orthodontic wax with benzocaine incorporated into its matrix to allow a slow, controlled release. *Control:* unmedicated orthodontic wax. Wax applied as necessary to all brackets causing irritation after 24 hours.

Outcome measures: A visual analogue scale (VAS) was used to record pain levels at baseline (24 hours after bonding), and 1, 17, 29, 41 and 53 hours after baseline.

Results: Seventy of the 80 participants returned their pain score forms. There were no statistically significant differences between the age and sex composition of the groups (*medicated group:* mean age 23.8 years SD 10.3; *unmedicated group* 25.2 years SD 8.6). There was a statistically significant interaction between treatment effect and time ($P < 0.0001$) with pain relief increasing over time. The medicated wax gave statistically significantly more pain relief ($P < 0.003$ – 0.0001) at all time points except 1 hour post-application.

Conclusions: Wax containing benzocaine appears to be effective at reducing the pain associated with mucosal irritation due to orthodontic appliances. The pain relief it provides is immediate and increases with time.

Implications: Wax containing benzocaine may be useful to help our patients through the first few days following appliance placement. A clinical trial assessing its effect in adolescents and/or when archwires have been placed as well may provide information on other clinically relevant scenarios.

Angle Orthodontist 2002; 72: 387–396

Effect of varying force direction on maxillary orthopedic protraction.

Keles A, Tokmak EC, Erverdi N, Nanda R

Objectives: To examine the effect of varying force direction on maxillary orthopedic protraction.

Design: A randomized controlled trial.

Setting: Istanbul, Turkey.

Participants: Twenty participants with an anterior crossbite, Class III molar relationship and maxillary hypoplasia. Mean age of Group 1, 8.58 years; Group 2, 8.51 years.

Interventions: *Group 1:* conventional facemask and protraction headgear applied parallel to the occlusal plane via hooks in the canine area of cap splint rapid maxillary expander (CSRME). *Group 2:* Petit type protraction headgear attached via tubes in the premolar region to a CSRME. Outer arms were bent upwards at 30 degrees to the occlusal plane. *Both groups:* Ten days of RME followed by facemask treatment at 500g for 16 hours/day for 3 months then 12 hours/day for 3 months.

Outcome measures: Angular and linear measures from cephalometric radiographs.

Results: There was no statistically significant difference in changes in ANB between the two groups ($P = 0.053$). There were statistically significant differences in the rotational changes of the maxilla (SN–PP $P = 0.0021$) and occlusal plane (SN–PP $P = 0.0002$).

Conclusions: Maxillary advancement was achieved in both groups, but the rotational changes of the maxilla and the dentition were different. Group 1 underwent a counter clockwise rotation of the palatal plane and minimal rotation of the occlusal plane. Group 2 underwent minimal rotation of the palatal plane and a clockwise rotation of the occlusal plane.

Implications: The angled facemask may be useful for treating patients with a Class III relationship and reduced overbite or openbite. Further research is required on the long-term effects of these treatments.