FEATURES SECTION

Evidence-based orthodontics

J. E. Harrison
Liverpool University Dental Hospital, UK

Since starting this section I have seen the number of clinical trials published in the journals that I review (*American Journal of Orthodontics and Dentofacial Orthopedics*, *European Journal of Orthodontics*, *Angle Orthodontist* and *Clinical Orthodontics and Craniofacial Research*) escalate. In 2002 there were only 13 clinical trials published in these journals, whereas last year I reviewed 35. To me, this is an uplifting sea change, because when I first looked at this topic I only found 6 randomized controlled trials published in the British and European journals of orthodontics over a 5 year period. The strength of orthodontic research has certainly moved on over the last decade. Following discussions with the editorial board, I have decided to review only the strongest research, which will include reports of randomized controlled clinical trials and systematic reviews.

European Journal of Orthodontics 2004; 26: 565–71

Six and 12 months' evaluations of a self-etching primer versus two-stage etch and prime for orthodontic bonding: a randomized clinical trial.

Aljubouri YD, Millett DT, Gilmour WH.

Objectives: To compare the mean bracket bonding time and bond failure rate at 6 and 12 months of stainless steel brackets bonded with a light-cured composite using either a self-etching primer (SEP) or a two-stage etch and prime system.

Design: A split-mouth randomized controlled trial.

Setting: Glasgow, UK.

Participants: Fifty-one consecutive patients awaiting fixed appliance therapy.

Interventions: Self-etching primer (3M Unitek, Monrovia, California, USA) or etching with orthophosphoric acid gel followed by application of Transbond XT primer.

Outcome measures: Mean bracket bonding time = time taken/number of teeth bonded in each patient. Bond failure rate per patient.

Results: Seven-hundred-and-seventy-seven brackets bonded in 51 patients. The mean difference between the two bonding systems was 24.9 seconds (95% CI 22.1, 22.7). Bonding with SEP was statistically significantly quicker than the two-stage system ($P<0.001$). The mean bond failure rate per patient at 6 months was 0.8% in the SEP group and 1.1% in the two-stage group. At 12 months it was 1.5 and 2.8%, respectively. These differences were not statistically significantly different at either 6 or 12 months ($P=1.00$ and 0.125, respectively).

Conclusions: The mean bracket bonding time with the SEP per patient was significantly quicker than with the two-stage system. There was no statistically or clinically significant difference in the bond failure rate per patient between the two groups.

Implications: This study suggests that the SEP may be an attractive alternative to a two-stage etch and prime system because the mean bracket bonding time with the SEP was significantly shorter and there was no significant effect on the bond failure rate.

Table 1 Number of clinical trials reported

	March	June	Sept	Dec	Total
2002		3	3	7	13
2003	5	3	7	5	20
2004	11	5	11	8	35
2005	10				

References* Harrison, JE, Ashby, D, Lennon, MA. An analysis of papers published in the British and European Journals of Orthodontics. J. Orthod. 1996 23: 203-209Table 1. Number of clinical trials reported

DOI 10.1179/146531205225020988

European Journal of Orthodontics 2004; 26: 573-577.

An *in vivo* study to compare a plasma arc light and a conventional quartz halogen curing light in orthodontic bonding.

Pettemerides AP, Sherriff M, Ireland AJ.

Objectives: To compare the bond failure rate of orthodontic brackets bonded with a light-cured composite or a resin-modified glass polyalkenoate cement, and cured with either a plasma arc lamp with a tungsten quartz halogen lamp.

Design: A split-mouth randomized controlled trial.

Setting: Bath, UK.

Participants: Twenty patients requiring upper and lower fixed appliance therapy who had no crowns, veneers or bridges anterior to their first permanent molars.

Interventions: Brackets (Omni, GAC Int., Bohemia, USA), in randomly allocated patients, were bonded with either a light-cured composite (Transbond XT, 3M Unitek, St Paul, USA) or a resin modified glass polyalkenoate cement (GPA) (Fuji Ortho LC, GC Corp., Tokyo, Japan). Brackets in contralateral quadrants in each patient were cured with either a plasma arc lamp (Apollo 95E, Dental Medical Diagnostics, Woodland Hills, Ca, USA) for 3 seconds per tooth or with a tungsten quartz halogen lamp (Ortholux^{TM} XT curing lamp, 3M Unitek, St Paul, USA) for 20 seconds per tooth.

Outcome measures: Bond failure rate over 6 months.

Results: There were no statistically significant differences in the bond failure rate of both adhesives cured with either lamp (composite bond failures both 3.41%; resin modified GPA $P=0.93$). There were statistically significantly more bond failures in the resin modified GPA group that the composite group ($P=0.03$).

Conclusions: The results of this study suggest that the bond failure rate of brackets cured with the plasma arc lamp were similar to those bonded with a tungsten quartz halogen lamp and that the failure rate with the resin modified GPA was greater than with the composite.

Implications: It appears that there may be a significant time saving when using a plasma arc lamp rather than a tungsten quartz halogen lamp and that resin-bonded GPA does not offer greater bracket survival when compared with a light-cured composite.

American Journal of Orthodontics and Dentofacial Orthopedics 2004; 126: 583–8.

Incremental versus maximum bite advancement during Twin-block therapy: A randomized controlled clinical trial.

Banks P, Wright J, O'Brien K.

Objectives: To test the null hypothesis that there was no difference in the completion rate, duration of treatment, final overjet and skeletal discrepancy between incremental and maximum bite advancement during Twin-block treatment.

Design: A randomized controlled trial stratified by sex and operator.

Setting: Three district general hospitals in Northwest England, UK.

Participants: Two-hundred-and-three patients, with an overjet of $\geqslant$7 mm, in the permanent dentition and aged 10–14 years who were treated by 4 operators.

Interventions: Twin-block functional appliances made to either an edge-to-edge position or 2 mm advancement, which was increased by adding 2 mm thick acetal spacers to the maxillary blocks at 6-weekly intervals.

Outcome measures: cephalometric measures, number and size of bite advancements, patients' date of birth, postcode (to determine the level of social deprivation) and clinical record, reasons for discontinuation of treatment.

Results: Two-hundred-and-three patients were enrolled into the study; 189 proceeded with 94 being allocated to the maximum advancement group and 95 the incremental group. Sixty-six and 77 patients in each group, respectively, completed the trial. There were no statistically significantly differences in the final overjet and skeletal discrepancy between the two groups. The only variables that influenced the completion rate were the age of the patient and operator.

Conclusions: This study suggests that incremental advancement of the Twin-block did not affect the outcome of treatment in terms of process or morphological effects, and that the duration and completion rate were influenced by the age of the patient (with younger patients doing better) and operator.

Implications: It appears that incremental advancement of the Twin-block did not offer any advantages over a maximally postured appliance and that it may be preferable to treat patients before they are 12 years of age.

American Journal of Orthodontics and Dentofacial Orthopedics 2004; 126: 666-71.

Transverse skeletal base adaptations with Bionator therapy: a pilot implant study.

Araujo AM, Buschang PH, Melo ACM.

Objectives: To test the hypothesis that there would be greater transverse growth changes in patients treated with bionator therapy than untreated controls.

Design: A randomized controlled trial.

Setting: Unclear.

Participants: Twenty-five patients, with Class II division 1 malocclusions, aged 6.9–11.2 years with minimal crowding (<1.5 mm) and no crossbites.

Interventions: Both groups: Four maxillary and three mandibular implants were placed prior to treatment. Participants were randomly allocated to either no treatment or bionator treatment and followed-up for 1 year.

Outcome measures: Transverse growth changes measured cephalometrically.

Results: There were no statistically significant differences between the two groups in the amount of transverse growth occurring in the anterior maxilla ($P=0.06$) and mandible ($P=0.08$). The bionator group showed statistically significantly more growth in the posterior maxilla ($P=0.03$) than the control group.

Conclusions: This implant study suggests that the bionator induces greater amounts of growth in the posterior maxilla.

Implications: It appears that bionator therapy encourages expansion of the posterior maxilla, which may provide extra space for alignment of the dentition and/or prevent crossbite development as a result of anterior posturing of the mandible during the treatment of Class II division 1 malocclusions with a functional appliance.

References

1. Harrison, JE, Ashby, D, Lennon, MA. An analysis of papers published in the British and European Journals of Orthodontics. J. Orthod. 1996, 23: 203–209