

FEATURES SECTION

Relevant research from non-orthodontic journals

This occasional section is designed to draw the attention of readers to papers that have been published in non-orthodontic journals, but which may be of interest. The abstracts have been selected and edited by Professor Nigel Hunt

Treatment outcomes

The long-term benefits of orthodontic treatment

Linklater RA, Fox NA

British Dental Journal, 2002; **192**: 583–7

Objectives: This study aimed to evaluate post-treatment changes at least 5 years out of retention in a cohort of 100 consecutively started patients treated by a post-graduate student in a UK orthodontic department.

Study design: Analysis of study models using recognized occlusal indices.

Methods: Study models and clinical photographs were taken for each patient attending for post-retention records. Weighted Peer Assessment Rating (PAR) Index and Index of Orthodontic Treatment Need (IOTN) scores were recorded for cases at the beginning, end, and at least 5 years post-retention.

Results: Seventy-eight patients attended for post-retention records. Overall PAR reduction immediately post-treatment was 68.6 per cent and at a mean of 6.5 years post-retention was 55.5 per cent. Dual arch fixed appliance treatments achieved the greatest reduction in PAR score, and maintained the reduction beyond the retention period better than other treatment modalities. Eighty-four per cent of the cohort still had some demonstrable improvement after a mean of 6.5 years post-retention. There was a residual need for treatment in 8 per cent of cases on aesthetic grounds and in 24 per cent of cases on dental health grounds.

Conclusions: Occlusal deterioration after orthodontic treatment is almost universal. Dual arch fixed appliance treatment provides the best post-treatment and post-retention result.

Comment: The authors comment on the limitations of the PAR Index for assessing treatment outcome. As in

many previous studies the fall in the sample size at the post-retention recording was disappointing and therefore one can only speculate as to the long-term outcome of those that did not attend. Clearly, the results are based on the outcomes of consecutively treated cases and are representative of 'mixed practice', rather than a selected treatment modality, but never-the-less there is a need to repeat the study based on the outcome of several operators of similar experience, but not necessarily similar ability!

Distraction osteogenesis

Anterior maxillary alveolar distraction osteogenesis: a prospective 5-year clinical study

Jensen OT, Cockrell R, Kuhike L, Reed C

International Journal of Oral & Maxillofacial Implants, 2002; **17**: 1: 52–68

Objective: Anterior maxillary alveolar vertical distractions were followed for a 5-year period of time.

Methods and materials: A total of 30 vertical distractions were done in 28 patients. Two patients had both anterior maxilla and anterior mandibular distractions for a total of 30 distractions. Two distraction techniques were used: an implant device (3i) and an orthodontic screw device (Osteomed) for orthodontic attachment. Both devices enabled some horizontal as well as vertical movement. The average net vertical distraction was 6.5 mm, but the average anterior horizontal movement was less than 2 mm.

Results: Eighty-four implants were placed, but eight implants failed to integrate. All failed implants had been placed in poor quality that needed bone grafting. The most common restoration was a fixed prosthesis supported by implants; the longest follow-up post-loading was 4.4 years.

Conclusion: This clinical study gives additional evidence in favour of the stability and utility of vertical distraction procedures in the maxillary aesthetic alveolar zone.

Comment: The study describes a novel use of orthodontic appliances for alveolar segment distraction prior to restorative dentistry.

Temporomandibular joint disorders

Overbite and overjet are not related to self-report of temporomandibular disorder symptoms

John MT, Hirsch C, Drangsholt MT, Mand LA, Setz JM

Journal of Dental Research, 2002; **81**: 164–169

Objective: Overbite and overjet, especially high or low values, have been found in some studies to be associated with temporomandibular disorders (TMD). This study evaluates the relationship between overbite/overjet and three TMD self-report measures (pain, joint noises, limited mouth-opening).

Materials and methods: Subjects were from two population-based cross-sectional studies (3033 subjects).

Results: After adjustment for age and gender, high or low values of overbite were not associated with an increased risk of self-reported TMD pain as compared with a reference category of a normal overbite of 2–3 mm (–8 to –1 mm, odds ratio = 0.36, 95 per cent confidence interval = 0.05–2.76; 6–15 mm, odds ratio = 1.08, 95 per cent confidence interval = 0.68–1.72). Similar non-significant results were found for overjet and TMD pain, and for the association of overjet/overbite and joint noises, or limited mouth-opening.

Conclusion: This study provides the strongest evidence to date that there is no association between overbite or overjet, and self-reported TMD.

Cell biology

Effects of vascular endothelial growth factor on osteoclast induction during tooth movement in mice

Kaku M, Kohno S, Kawata T, Fujita C, Tokimasa C, Tsutsui K, Tanne K

Journal of Dental Research, 2001; **80**: 1880–3

Objective: For orthodontic tooth movement, remodeling of the alveolar bone is maintained by a repeated process of bone resorption and new bone formation, controlled, respectively, by osteoclasts and osteoblasts. Recently, the authors found that recombinant human vascular endothelial growth factor (rhVEGF) acts as a

macrophage colony-stimulating factor in osteoclast induction in osteopetrotic (op/op) mice. The purpose of this study was to investigate whether rhVEGF stimulates osteoclast differentiation during experimental tooth movement.

Materials and methods: Fifty-six 30-day-old mice were divided into seven groups, one of which acted as a control with neither injection nor tooth movement, one had a sham injection of saline, one had an injection once of purified rhVEGF into the buccal groove around the incisors, but no tooth movement, and the remainder with injections of varying concentrations of rhVEGF and tooth movement. The orthodontic force was delivered by an experimental appliance with a helical loop bonded onto the upper incisors and an initial force of 1.0 g was applied for 3 days.

Results: The number of osteoclasts appearing in the periodontal ligament space on the pressure side of the alveolar bone was increased markedly ($p < 0.05$) in those animals injected with 0.5 μg rhVEGF.

Conclusions: These results suggest that local administration of rhVEGF enhances the number of osteoclasts and may increase the rate of orthodontic tooth movement.

Orthodontic bonding

Acid-etch patterns on the buccal surface of human permanent teeth

Hobson RS, Rugg-Gunn AJ, Booth TA

Archives of Oral Biology, 2002; **47**: 407–12

Objectives: Since the introduction of acid etching to aid adhesion to enamel, there has been much research into dental materials to improve bond strength, but little into the surface topography of etched enamel, particularly regarding possible variations between tooth types. This study was a systematic investigation into the quality and quantity of etch patterns found on the buccal surfaces of different human permanent teeth.

Materials and methods: Twenty-nine orthodontic patients had high-resolution silicone impressions taken of the buccal surface of incisor, canine, premolar and molar, upper and lower teeth, following etching for 30 seconds with 37 per cent phosphoric acid. Impressions ($n = 266$) were replicated in epoxy resin and examined under high magnification in a scanning electron microscope. A modification of the classification of Galil and

Wright was used, with histometric techniques, to quantify the quality of etch patterns on enamel surfaces where orthodontic brackets are typically bonded (type A: ideal etch; type B: discernible etch patterns; type C: pitted enamel surface; type D: no etch).

Results: There was no difference between right and left, or between upper and lower teeth of the same type ($p > 0.05$). There was a general trend toward the increasing occurrence of no etch (type D) from anterior to posterior teeth, and a trend toward fewer good quality etches (types A and B) in the same direction. Etch types A and B were found to occupy the smallest area on the etched buccal surface enamel. The greatest amount of

type A etch 'ideal' was found on the lower incisors, yet it occupied less than 5 per cent of the etched buccal surface enamel. The greatest area of etched enamel surface was occupied by type C (etched, but enamel prisms not evident).

Conclusions: It was concluded that there is a significant difference in the acid-etch patterns achieved on different tooth types, which suggests that bond strength studies should be performed with a single tooth type or that an equal number of different tooth types be included.

Comment: This paper should be relevant to both clinicians and researchers alike.