

## FEATURES SECTION

# British Orthodontic Society, UTG session abstracts

### Abstracts of Research Projects

Presented at the British Orthodontic Conference (BOS University Teachers' Group session. Sponsors: Forestadent), Edinburgh 8–11th October 2006

#### 1st Prize winner

##### **An RCT comparing paracetamol and ibuprofen for orthodontic pain relief**

R. L. Bradley\*,<sup>1</sup> P. E. Ellis,<sup>2</sup> J. R. Sandy,<sup>1</sup> A. J. Ireland,<sup>1,3</sup> T. H. Bellis,<sup>2</sup> I. P. Coane,<sup>2</sup> (<sup>1</sup>Bristol Dental School, University of Bristol; <sup>2</sup>Dorset County Hospital; <sup>3</sup>Royal United Hospital, Bath).

*Objective:* The aim of this study was to determine the efficacy of paracetamol and ibuprofen in the control of orthodontic pain.

*Design and setting:* The study comprised a multi-centre triple blind randomized clinical trial undertaken in three orthodontic clinics within separate Trusts between February 2004 and December 2005.

*Subjects and methods:* A pilot study and power calculations established the recruitment strategy. Patients (159, aged 12–16 years) attending for routine orthodontic treatment randomly received either 1 g oral paracetamol or 400 mg ibuprofen, one hour prior to orthodontic separator placement and six hours after the initial dose, before and after separator placement. Pain scores were then recorded on seven, ten-point visual analogue scales over a week-long period.

*Results:* Ibuprofen was more effective than paracetamol, from two hours to bedtime, following separator placement. From day 1 onwards, there was a trend for the patients who had taken ibuprofen to experience lower pain levels at most time intervals compared with the paracetamol group. Two doses of ibuprofen, taken on the day of separator placement were not sufficient to control orthodontic pain on day 1 following placement.

*Conclusions:* A combination of pre- and post-operative ibuprofen is more effective than paracetamol in the control of orthodontic pain.

\*=Presenting author

#### 2nd Prize winner

##### **Publication bias of dental clinical trials**

M. E. Spencer\*,<sup>1</sup> C. Preston,<sup>2</sup> J. E. Harrison,<sup>1</sup> (<sup>1</sup>Liverpool University Dental Hospital, Liverpool, UK; <sup>2</sup>Royal Liverpool NHS Trust).

*Aims:* To assess the incidence, time to publication and factors influencing publication of abstracts of clinical trials presented at dental conferences.

*Design:* Retrospective, observational study.

*Subject and setting:* Dental clinical trials presented at the International Association for Dental Research (IADR), European Orthodontic Society (EOS) and European Organisation for Caries Research (ORCA) from January to December 2000.

*Method:* The clinical trials presented were identified from the associated journals. The mode of presentation, study design, statistical reporting, significance of results and sample size were recorded. A MEDLINE search was undertaken to determine whether the abstract had been published in full. The date of publication was recorded.

*Results:* 208 clinical trials were identified. Seventy-nine were published in full by August 2005. The publication rate was 38%. The median time to publication was 20.0 months (IQR 10, 32). Factors affecting publication rate included mode of presentation ( $P<0.001$ ), study design ( $P<0.001$ ) and statistical reporting ( $P<0.001$ ). Neither the statistical significance ( $P=0.15$ ) nor the sample size ( $P=0.39$ ) affected the publication rate.

*Conclusions:* Nearly two-thirds of clinical trials presented at IADR, EOS and ORCA remained unpublished five years after presentation. Modes of presentation, study design and clear statistical reporting, rather than significance of results and sample size, were predictors of publication.

#### 3rd Prize winner (Joint)

##### **The effect of atropine sulphate on orthodontic bond durability—a randomized clinical trial**

S. Ponduri\* (Bristol Dental School, Bristol, UK).

*Objective:* To investigate the effect of atropine sulphate pre-medication on orthodontic bond durability, and to evaluate the attitudes of patients and parents towards the use of antisialogogues prior to orthodontic bonding.

*Design and setting:* The study was a randomized clinical trial at Queen Alexandra Hospital, Portsmouth.

*Methods:* Fifty-two patients were consented and randomized to receive intervention 1 (atropine sulphate pre-medication, 600 µg) or intervention 2 (no pre-medication). A split-mouth design was employed, and bond failure data was collected at 6 and 12 months and scrutinized with Kaplan–Meier survival probabilities and the log rank test. Patient centred outcome measures included a questionnaire relating to the treatment with antisialogogues.

*Results:* No statistically significant difference was found between the two interventions for bracket or molar tube failures. 94% of subjects claimed to have taken the atropine sulphate, and 76% felt it was an acceptable part of treatment. Minimal side-effects were reported.

*Conclusions:* The use of a premedicant to induce hypo-salivation before orthodontic bonding appears to be an acceptable procedure to patients and parents, with minimal side-effects reported. However, it does not demonstrate significant differences in bond failure rates, and is therefore not indicated for routine bonding procedures.

*Acknowledgements:* Mr N. Turnbull, Professor J. Sandy.

### 3rd Prize winner (Joint)

#### Tooth size and shape in hypodontia

J. M. Parkhill\*, N. J. A. Jepson, R. S. Hobson (School of Dental Sciences, Newcastle-upon-Tyne).

*Objectives:* To compare tooth size and shape between subjects with hypodontia and a control group.

*Subjects and Methods:* The study comprised 150 patients with hypodontia and 150 age and sex matched controls. Hypodontia patients were divided into three groups of mild, moderate and severe hypodontia. Tooth size was recorded by measuring mesiodistal and buccolingual dimensions of all erupted teeth on study models using digital callipers. Tooth shape was investigated by recording the

number of premolar and molar cusps. For upper molars the presence and size of Carabelli's cusp and the distopalatal cusp (hypocone) were recorded using the Arizona State University (ASU) classification.

*Results:* Preliminary analysis using ANOVA revealed patients with hypodontia had significantly smaller mesiodistal and buccolingual tooth dimensions compared with controls ( $P < 0.05$ ). Patients with severe hypodontia demonstrated significantly smaller tooth dimensions than those in the mild and moderate subgroups ( $P < 0.05$ ). Patients with hypodontia also had significantly smaller values for Carabelli's cusp and hypocone ( $P < 0.05$ ).

*Conclusions:* Patients with hypodontia have smaller tooth dimensions and a less well developed Carabelli's cusp and hypocone. Tooth size appears to be affected by the degree of hypodontia, with severe hypodontia having a greater effect.

#### Expression of transglutaminases in human craniofacial skeletal muscle

O. J. Campbell\*, R. Shah, N. P. Hunt, M. P. Lewis (UCL Eastman Dental Institute, London).

*Objective:* The aim of this study was to investigate the gene expression of transglutaminases (enzymes involved in adaptive responses; TGases) during the early developmental stages of human masseter muscle (myotube) formation.

*Design and setting:* A laboratory based *in vitro* study.

*Materials and methods:* The study utilized archived human muscle derived cells from masseter biopsies previously obtained from consenting, healthy adult patients who had undergone elective mandibular osteotomies. Immunocytochemistry was undertaken to identify myotubes (nascent myofibres) using antibodies to the muscle-specific markers desmin and alpha-sarcomeric actin. Qualitative and quantitative polymerase chain reaction (Q-PCR) analyses were employed to amplify and quantify TGase expression.

*Results:* Q-PCR analyses confirmed the presence of TGases 2, 6 and 7. TG2 was expressed during all stages of myotube development with maximal expression during cellular proliferation and migration ( $P < 0.05$ ). TG6 and TG7 were expressed at lower levels. Maximal TG7 expression appeared at the pre-fusion culture stage ( $P < 0.05$ ). TG6 expression pattern was similar to TG7 but was not significant during myofibrillogenesis ( $P > 0.05$ ).

*Conclusions:* Inter-isoform TGase expression variability exists during early myofibrillogenesis dependent on the stage of myotube formation.

#### **The addition of Microban to acrylic to prevent biofilm formation**

F. R. Jenkins\*, D. Devine, D. J. Wood, R. Percival (Leeds Dental Institute, University of Leeds, UK).

*Aim:* To assess whether the addition of Microban® (Microban International Ltd, Huntersville, US) additive IB2 to Orthoresin® (Dentsply International, York PA, USA) dental acrylic can prevent biofilm formation.

*Design and setting:* A laboratory based study, undertaken at Leeds Dental Institute.

*Materials and methods:* Equalized Orthoresin discs with Microban added at 0.5% and plain Orthoresin discs were inoculated in test, control pairs with candida albicans, or fresh mixed saliva and cultured for 24 hours. The resultant biofilms were harvested, cultured and enumerated to determine the viable count.

*Results:* Initial results showed a mean candidal biofilm increase of 75% and a mean saliva biofilm reduction of 68% on Microban added Orthoresin discs compared to plain orthoresin controls. The Microban-Orthoresin discoloured eight days following manufacture and exhibited different antimicrobial activity. Showing a mean candidal biofilm reduction of 13% and a mean saliva biofilm reduction of 51% on Microban discs compared to plain controls.

*Conclusions:* The addition of Microban additive IB2 to Orthoresin dental acrylic at a concentration of 0.5% does not prevent biofilm formation.

BOTLA award 2005.

#### **Prediction of soft tissue changes following mandibular advancement surgery**

L. C. Kneafsey\*, S. J. Cunningham (UCL Eastman Dental Institute, London and Whipps Cross Hospital, London).

*Introduction:* Pre-surgical prediction is an integral part of orthognathic treatment planning, aimed at providing realistic estimates of treatment outcome for both clinician and patient. Prediction is difficult due to the variability in nature of soft tissues and differences in soft tissue displacement compared with osseous translation.

*Aim:* To produce a predictive equation to improve accuracy of soft tissue prediction following mandibular advancement surgery; providing more precise information regarding soft tissue characteristics and skeletal changes which affect the post-surgical soft tissue drape.

*Subjects and methods:* A retrospective cephalometric study in which the pre- and post-surgical lateral cephalograms of 64 patients, who had undergone mandibular sagittal split advancement, were scanned and digitized. Multivariable regression analyses were used to create a prediction equation for changes at soft tissue pogonion, inferior labial sulcus, labrale inferius and stomion inferius.

*Results and conclusions:* Using multiple independent variables appears to be useful in the prediction of soft tissue changes. At least 96% of the variation of the chosen soft tissue points was explained by the relationship with the explanatory variables in the prediction equations. This is more than has been possible previously using simple ratios. Importantly, when the prediction equation was applied to an independent sample the results appeared to be clinically useful.

#### **Effect of tooth mousse on demineralized enamel**

V. Purcell\*, N. Pender, S. Higham (Liverpool University Dental Hospital and School, UK).

*Aims:* To investigate the remineralization potential of Tooth Mousse (GC Corporation, Tokyo) on subsurface caries enamel lesions.

*Design:* In-vitro study.

*Material and methods:* 12 bovine incisors, divided into 4 sections, were covered with varnish except for a 5 × 5 mm enamel window. The window was demineralized with partially saturated acidic buffer. Three groups of 12 sections were dipped for 74 days in either artificial saliva alone (S) or with either a slurry of GC Tooth Mousse (TM) or toothpaste (TP). Every 3-4 days quantitative light-induced fluorescence images were made of each window.

*Results:* Remineralization of the demineralized lesions occurred in groups S and TP until day 25 but continued in group TM until day 50 ( $P < 0.01$ ). The amount of remineralization in group TM was significantly greater ( $P < 0.01$ ) than in groups S and TP. After day 25 in groups S and TP and day 50 in group TM demineralization occurred and continued until day 74. The amount of demineralization in

group TM was significantly less ( $P < 0.01$ ) than in groups S and TP.

*Conclusion:* Tooth Mousse appeared to have a greater potential than toothpaste or saliva alone to remineralize demineralized enamel and subsequently a greater ability to retard demineralization of the lesions.

### Referral proformas—fact or fiction?

C. M. A. Boardman\* (Leeds Dental Institute, University of Leeds, UK).

*Objective:* The aim of this study was to assess the accuracy of information recorded on orthodontic referral proformas sent in by general dental practitioners in Leeds.

*Design and setting:* The study was a prospective, double centre, hospital based clinical process audit undertaken at Leeds Dental Institute (LDI) and Seacroft Hospital (SCH), Leeds during 2004–2006.

*Materials and methods:* Referral proformas were sent to all GDPs in the area to use for referring patients to the orthodontic departments at LDI and SCH. The proforma included all administrative, dental and orthodontic information felt necessary to be able to prioritize a referral from a GDP. The same data were collected for 270 consecutive patients during their new patient assessment by an orthodontic consultant. In addition the following was collected from the consultant's assessment:

- Presence of any undiagnosed pathology.
- Outcome of the new patient assessment.

The GDP's assessment was compared to the gold standard consultant's assessment.

*Results:* The results showed that there is generally poor agreement between GDPs and orthodontic consultants in the majority of aspects in dental and orthodontic diagnosis.

*Conclusion:* GDPs require further training in orthodontic diagnosis and referral. This could be achieved through improved undergraduate teaching and Section 63 courses.

### Validation of a quality of life measure for children with malocclusion

C. H. O'Brien\* (Charles Clifford Dental Hospital, Sheffield, UK and Chesterfield Royal Hospital, Chesterfield, UK).

*Objective:* To explore the validity and reliability of the Child Perception Questionnaire (CPQ) as an

oral-health-related quality of life (OHRQoL) measure for children with malocclusion.

*Design and setting:* A cross-sectional cohort study at orthodontic departments at Charles Clifford Dental Hospital (CCDH), and Chesterfield Royal Hospital (CRH).

*Subjects and methods:* The experimental group consisted of 116 patients aged 11 to 14 years about to commence orthodontic treatment. The control group consisted of 31 11 to 14-year-old patients with IOTN 1 and 2, DMFT  $\leq 2$ , with no history of orthodontic treatment. The children completed the CPQ, including global ratings of oral health and satisfaction. The child rated their own IOTN Aesthetic Component (AC) score.

*Results:* There was a statistically significant difference between the malocclusion and control total CPQ scores ( $P = 0.012$ ). These differences were significant for the emotional ( $P = 0.006$ ) and social well-being ( $P = 0.001$ ) health domains, and not significant for the oral symptoms and functional limitations health domains. There were significant correlations between the total CPQ score and overall well-being ( $P \leq 0.01$ ) and patient satisfaction ( $P \leq 0.01$ ).

*Conclusion:* Malocclusion has a negative impact on the OHRQoL of a child.

### A Cochrane systematic review: rigid versus wire fixation for stabilization following orthognathic surgery

S. Patel\*, S. J. Cunningham, D. Moles, N. P. Hunt (UCL Eastman Dental Institute, London, UK).

*Objective:* To evaluate the influence of the method of fixation on skeletal and dental stability following mandibular surgery.

*Design and setting:* A Cochrane systematic review undertaken at UCL.

*Search strategy:* Cochrane Oral Health Group's Trials Register, Cochrane Central Register of Controlled Trials, MEDLINE and EMBASE. Hand searching was also undertaken.

*Selection criteria:* Randomized controlled trials. Cohort studies were considered where there were matched groups. The interventions were rigid fixation (plates/screws) and wire fixation (skeletal wire fixation and IMF) and the primary outcomes were skeletal and dental stability. Secondary outcomes

included adverse outcomes, masticatory efficiency and resource use.

*Data extraction and analysis:* Two reviewers abstracted the data independently and in duplicate and evidence tables were collated. The number and heterogeneity of the included studies precluded meta-analysis or sub-group analyses.

*Results:* Eight studies satisfied the inclusion criteria. Six reported on stability of mandibular advancement following bilateral sagittal split osteotomy and two reported on stability of mandibular setback.

*Conclusion:* The limited number and rigour of the included studies were insufficient to allow reliable conclusions to be drawn. However, the indication is that the margin for relapse between current methods of rigid and wire fixation is narrow and the justification for the use of IMF is questionable.

#### **The influence of incisor capping on pH recovery times**

M. Dixon\* (Birmingham School of Dentistry, Birmingham, UK).

*Objective:* The aim of this study was to investigate the effect of lower incisor capping on the pH recovery time at the tips of the lower incisors in response to two acidic soft drinks.

*Design and setting:* This was a clinically based cross-over trial undertaken at the Birmingham Dental Hospital during 2005 and 2006.

*Subjects and method:* Following a pilot study, 18 subjects were recruited from the staff and students of Birmingham Dental Hospital. Customized lower removable appliances were constructed for each subject, these were able to house a small-bore pH probe above and below the area of lower incisor capping. Continuous recordings were taken using an ambulatory pH recorder until the pH returned to baseline, following a randomized series of exposures to water, Pepsi Cola™ and Orange Juice.

*Results:* An analysis of variance showed increased pH recovery times for both soft drinks. Orange Juice showed the longest recovery time.

*Conclusions:* Incisor capping delays pH recovery at the lower incisor tips. Orange Juice has a greater impact on the pH recovery time than Pepsi Cola™.

*Supporting agency:* Ethical approval was granted and, funding received from a Birmingham University Small Research Grant.

#### **The stability of palatal rugae as measured from a palatal implant**

J. W. Dwyer\* (Charles Clifford Dental Hospital, Sheffield, UK).

*Objective:* The aim was to determine the stability of palatal rugae during tooth movements with the aid of palatal implants as fixed reference points.

*Design and Setting:* A longitudinal, prospective investigation undertaken at the Charles Clifford Dental Hospital during 2003–2005.

*Materials and methods:* Impressions were taken of 19 patients undergoing orthodontic treatment with a palatal implant for anchorage support following implant osseointegration, prior to active treatment (T1), and again once the lower arch was aligned and the canines were Class I (T2). Digital callipers were used to determine the distances from the centre of the implant to 13 designated rugal landmarks. The examiner was blind to the identity of the patient's models and whether it was T1 or T2. Repeat measurements were taken following further randomization, to test for systematic and random error.

*Results:* A statistically significant change occurred between T1 and T2 at three points ( $P < 0.01$ ), the medial edge of the left first ruga, the medial edge of the right first ruga, and the medial edge of the right second ruga.

*Conclusions:* Except for the medial edges of the first and second rugae, palatal rugal landmarks remain stable during orthodontic treatment. With modern techniques, model superimposition on stable landmarks may provide an alternative to cephalometry.

#### **Assessment methods used in postgraduate orthodontic programmes in the UK**

E. El-Bahnassawy\* (King's College London, UK).

*Objective:* To explore methods of student assessment and course evaluation used in UK postgraduate orthodontic programmes.

*Design and setting:* Questionnaire survey of postgraduate course coordinators of orthodontics in the UK dental school ( $n=13$ ) during January to May 2005.

*Materials and methods:* A questionnaire based on the 44 modules of the SAC orthodontic curriculum was constructed to gather information on assessment methods and evaluation methods. After piloting, the questionnaire was posted to all postgraduate

orthodontic course coordinators in the UK ( $n=15$ ) with a covering letter and pre-addressed reply-paid envelope.

*Results:* Responses were received from 13 course directors (87% of those approached). Most institutes use essays as the main assessment tool, though this varied across modules (range 0–46%). Other commonly used forms of assessment were MCQs and formal examinations. There was a degree of informal

evaluation of clinical skills on the clinic. The most commonly reported method of course feedback was termly questionnaire ( $N=4$ , 31%). One institute reported gathering feedback after each teaching session, while two (15%) reported not carrying out any form of evaluation.

*Conclusions:* Postgraduate courses in orthodontics in the UK rely on traditional forms of assessment, and relatively infrequent course evaluation.