

**FEATURES
SECTION**

Abstracts of research presented at the British Orthodontic Conference 2001

University Teachers Group Abstracts

First place

A comparison of parents' and patients' views on orthognathic treatment. S. K. Derwent* (Eastman Dental Institute, UCL)

Objective: To assess parents' views of orthognathic treatment and compare them with the views of their son or daughter who underwent treatment.

Design: The study was a retrospective questionnaire base.

Setting: The study was undertaken at the Eastman Dental Hospital with patients recruited over an 8-month period from July 1999 to March 2000.

Subjects and methods: Fifty patients who had undergone orthognathic treatment, and their chosen parent, were asked to complete questionnaires about all aspects of their son or daughters' orthognathic treatment. Comparison of parents' and patients' views was undertaken using Cohen's kappa coefficient. The same test was used to compare individual parent and patient views pre- and post-treatment.

Results: Response rates were 45 (90 per cent) for patients and 40 (80 per cent) for parents. Parents rated their son or daughter as having a more attractive facial and dental appearance, and higher levels of self-confidence both pre- and post-treatment than the patients graded themselves. Parents and patients both showed significantly improved ratings for facial and dental appearance and self-confidence following treatment.

Conclusions: Parents and patients give different ratings of pre- and post-treatment characteristics, although both groups noted significant improvements as a result of treatment

Second place

A prospective RCT comparing Straight-Wire and Tip-Edge fixed appliance systems. G. S. Bhavra* (Eastman Dental Institute)

Objective: The aim of study was to compare the efficiency and outcome of fixed appliance systems. Review of literature shows limited number of comparative studies completed.

Design: Randomized Controlled Clinical Trial, undertaken by a single operator at one centre.

Setting: Maxillo-facial Department, Kettering General Hospital NHS Trust, from March 1997 to April 2000.

Subjects and methods: Original sample comprised 84 Caucasian patients, aged 11–15 years, in permanent dentition with Class II division 1 malocclusion, requiring four premolar extractions and fixed appliances. The appliance systems [Straight -Wire (SWA) and Tip-Edge (TE)] were randomly allocated between the groups, which were matched for age and gender.

Results: The upper incisors were more retroclined at the end of treatment and there was an increased incidence of bracket failure with the Tip-Edge appliance system ($P < 0.05$). *Conclusions:* Total treatment time, total chair time and number of visits were comparable for both treatment groups. There were statistically significantly more bracket failures with TE appliance system. Evaluation of the PAR index did not show statistically significant differences between the two systems. Cephalometric measurement changes for both systems showed a few statistically significant differences. Clinically, the upper incisors remained under-torqued with the TE appliance system.

Demineralization and plaque acids with an ion releasing cement. S. Moopen*, M. Collins, E. Lynch and M. C. Grootveld (Royal London Hospital, London)

Objective: To evaluate demineralization and organic acid content of plaque surrounding brackets of an ion releasing cement, Ariston pHc, when used for orthodontic bonding.

Design: Random controlled double blind prospective trial using a split mouth technique to attach brackets with a conventional composite bonding adhesive, Phase II as control and Ariston pHc as test material.

Subjects and methods: Twenty-five patients were involved in the demineralization study. Demineralization was assessed 3 months after debonding. Twenty patients were involved in the assessment of organic acid content. The plaque around brackets 3 months after bonding was analysed for its organic acid content using a HNMR (Nuclear Magnetic Resonance) Spectroscopy.

Results: A reduction in demineralization was found with Ariston pHc ($P < 0.001$). The percentage of total organic acid content for the major organic acids liable for demineralization showed that there was no significant difference in the organic acid profile between the test and control side for any of the acids studied ($P > 0.05$).

Conclusions: The ion releasing resin-based composite Ariston pHc shows promise as a potential bonding agent since the demineralization was considerably reduced.

A study of the facial morphology of twins. F. B. Naini* and J. P. Moss (Department of Orthodontics, Royal London Hospital, London)

Aim: To assess the genetic influence on antero-posterior and vertical facial parameters.

Subjects: Ten pairs of monozygotic twins (five male, five female, mean age 11.9 years), and 10 pairs of same-sex dizygotic twins (three male, seven female, mean age 12.1 years).

Methods: Data acquisition was by three-dimensional optical surface scanning of the faces of twins. Eighteen landmarks were placed and inter-landmark measurements of 28 facial parameters were recorded, antero-posterior, vertical, and transverse. The mean intra-pair differences for each parameter were compared between the monozygotic and dizygotic groups.

Results: Significant ($P < 0.05$) genetic determination was found for left eye width, inter-canthal width, nose

height, and nose width. The intra-pair differences for the monozygotic twins were larger for the antero-posterior parameters than for the vertical parameters. The differences between the monozygotic twins and the dizygotic twins were also greater for the antero-posterior parameters.

Conclusions: The vertical facial dimensions have a stronger genetic determination than the antero-posterior facial dimensions in this group of twins, which is the largest sample studied to date.

Cephalometric determinants of successful functional appliance therapy. H. P. Patel*, H. C. Moseley and J. H. Noar (Mount Vernon, Watford General and Eastman Dental Hospitals)

Objective: To determine the presence of any features, on a pretreatment lateral cephalogram, which may be used to predict the success of improvement in the sagittal dental base relationship during functional appliance therapy in patients with a Class II skeletal pattern.

Design: Retrospective cephalometric study.

Setting: The study was based at Mount Vernon hospital using the records of patients treated in the Orthodontic Department.

Subjects and methods: Using the departmental database, 72 patients with a Class II division 1 incisor relationship judged to have been successfully treated with a functional appliance were selected for the study. Forty-four variables were analysed on pre- and post-treatment radiographs, and the change in ANB angle was used to determine the skeletal response to treatment. Within the total sample of 72 patients, two sub-groups were selected. 13 patients, who demonstrated a reduction in ANB angle of 3.0 degrees or more, were identified as the 'Skeletal' group. Fifteen patients who demonstrated a change in ANB angle of less than or equal to 0.5 degree were identified as the 'Non-skeletal' group.

Results: In the 'Skeletal' group, which responded with a favourable skeletal change, the mandible was smaller both in length ($P < 0.01$) and ramus height ($P < 0.05$), and the anterior and posterior face heights were smaller. When compared with the 'Non-skeletal' group, the cranial base was also smaller.

Conclusions: Differences in pretreatment cephalometric features were present between those patients that responded with a greater orthopaedic change than those that had less orthopaedic change. Individual variation was found to be too large to allow prediction of outcome.

The integrin surface receptor profile on human masseter muscle cell. G. T. Wynne-Hughes*, N. P. Hunt and M. P. Lewis (Eastman Dental Institute, University College London, UK)

Objective: To catalogue the expression of Integrin extracellular matrix molecules that are expressed on the surface of human masseter muscle cell (myoblasts) which are thought to influence myogenesis and regeneration.

Design: This was a retrospective analysis of clinical samples.

Setting: Eastman Dental Institute 2000.

Subjects and methods: Monoclonal antibodies specific to $11\alpha\beta$ or $\alpha\beta$ integrin subunits on 17 cultures derived from masseter muscle were compared to four cultures derived from soleus muscle *in vitro*. Flow cytometric techniques were used to identify expression of the integrin subunits.

Results: Single cells derived from craniofacial and somatic muscle expressed $\alpha1$, $\alpha3$, $\alpha4$, $\alpha5$, $\alpha6$, αv , $\alpha v\beta3$, $\alpha v\beta5$, and $\beta1$ integrins on their surface. All of the ligands for these receptors are expressed in skeletal muscle. Neither $\alpha2$ nor $\alpha v\beta6$ were identified. When cultures of varying cell densities were compared, there were reciprocal relationships between $\alpha6/\alpha5$ and $\alpha v\beta5/\alpha v\beta3$, where levels of $\alpha6$ and $\alpha v\beta5$ were higher in more confluent cultures, i.e. those cultures closer to terminal differentiation.

Conclusions: These investigations indicate that cells derived from human craniofacial muscle express the same subset of integrins as those derived from somatic muscle. It appears that down-regulation of integrin subunits that bind fibronectin ($\alpha5$ and $\alpha v\beta3$) are associated with myogenesis.

Publication bias in dental research. J. M. Scholey* and J. E. Harrison (Orthodontic Department, University of Liverpool, Liverpool L69 3BX)

Objectives: To investigate the incidence and time taken to full publication of abstracts presented at dental scientific meetings. To assess factors affecting the incidence of publication.

Design: A retrospective observational study.

Setting: The 1993 conference proceedings for the European Orthodontic Society (EOS), International Association for Dental Research (IADR), and European Organization for Caries Research (ORCA).

Method: A cross-referenced Medline search of abstract title, first author and last author was undertaken to determine whether the abstract had been published as a full paper. The time taken to publication was recorded. Searches were censored 1 year prior to and 5 years post-publication as an abstract. Other variables were recorded to assess their possible effect on publication.

Results: A total of 46.1 per cent of abstracts were found published as full papers: EOS—44.6 per cent; IADR—45.3 per cent; ORCA—50 per cent). The median time to publication of all abstracts was 18 months with an interquartile range of 9–30 months (EOS—23.5 months, IADR—17 months, ORCA—13 months).

Conclusion: More than half of all the dental research presented at EOS, IADR and ORCA in 1993 remained unpublished 5 years after presentation at a conference.

Capillaries as functional indicators in the human muscle. D. V. Savjani* (Eastman Dental Hospital, UCL)

Objective: The aim of this study was to characterize the capillary bed in relation to fibre types in the masseter muscle of adults with long face syndrome (LFS) and normal vertical facial form (VFF).

Design and Setting: The study was an investigative, biopsy based study undertaken at the Eastman Dental Hospital and Institute during 1999–2000.

Materials and Methods: Masseter muscle biopsies were obtained from patients undergoing orthognathic surgery or wisdom teeth removal under General Anaesthetic. Biopsies were categorized according to cephalometric analysis into LFS or normal VFF. Capillaries were identified using a lectin (*Ulex europaeus* agglutinin-1), and fibres were identified using antibodies to myosin heavy chain isoforms. An image analysis system was used to determine the capillary density, capillaries per fibre (CF), number of capillaries surrounding each fibre (CAF), fibre density, fibre cross sectional area (CSA), fibre proportions, and a sharing factor (SF, defined as CAF/CF).

Results: The results showed that of all the parameters measured, the SF reflected the functional level of the masseter most closely.

Conclusions: Therefore, the SF is a good index to use to characterize the capillary bed of the masseter muscle.

Malocclusion traits, palatal dimension and defective fricative/S/production. R. I Atkinson* (John Radcliffe Hospital, Oxford)

Objective: The study aims to investigate the links between palatal dimension, malocclusion traits and defective fricative/S/speech production between a sample of children with defective production and a control group.

Design: A prospective randomized trial.

Setting: The research was performed in Oxfordshire in 1999/2000.

Subjects: The study group consisted of 23 Caucasian, English speaking children with defective fricative/S/production with two matched controls. The age range of the study sample was 119–141 months.

Results: The results indicate no significant difference ($P < 0.05$) in vertical incisor relationship, antero-posterior or molar cross-bite relationship. Comparisons of the palatal widths and heights of the groups revealed highly significant differences ($P < 0.01$) in the variances of the widths/heights in the inter-molar region only maxillary dental arch spacing was found to be significant ($P < 0.05$) in the left lateral region, highly significant ($P < 0.01$) in the right/total lateral regions and very highly significant ($P < 0.001$) in the left/right/total incisal spaces and overall total maxillary spacing.

Conclusions: Children with defective/S/production had a higher variance of horizontal incisor relationship inter-molar palatal width and height and significantly more maxillary dental arch spacing compared with matched controls.

Appraisal of three methods of rating cleft deformity. I. K. Al-Omari*, D. T. Millett and A. F. Ayoub (Glasgow Dental School, University of Glasgow)

Objective: To evaluate the reliability and validity of clinical assessment, three-dimensional imaging and two-dimensional coloured imaging as methods of evaluating facial deformity in patients with repaired complete unilateral cleft lip and palate.

Design: Prospective multimedia analyses.

Setting: The facial deformity of the full face, the lip, the nose, and the mid-face were scored using a five-point ordinal scale on two occasions with a 1-month interval.

Subjects and methods: Thirty-one subjects aged 10–30 years with repaired complete unilateral cleft lip and palate were randomly selected. A panel of five profes-

sionals and five laypersons performed an independent clinical assessment of each subject. They also assessed independently the residual cleft-related facial deformity using two-dimensional coloured transparencies and three-dimensional images of each subject. Intra- and inter-examiner agreements were calculated from weighted kappa statistics. Bootstrap permutation tests were used to detect any differences in agreement.

Results: Assessment of facial deformity, in general, showed good reproducibility across the three assessment media [$K = 0.54$ to 0.83 (SE 0.08)]. Clinical assessment among lay assessors, however, was poor to moderate [$K = 0.16$ to 0.58 (SE 0.07)]. For assessments of the full face, there was no difference in the two non-clinical media relative to the standard clinical assessment ($P = 0.377$). For assessments of the lip or nose, transparencies scores were in greater agreement with the clinical scores than were the three-dimensional assessments scores ($P = 0.017$ and $P = 0.011$, respectively). For rating the mid-face, the three-dimensional scores were in greater agreement with the clinical scores than were the coloured transparencies scores ($P = 0.047$).

Conclusions: In comparison to lay assessors, clinical assessment among professionals was more reproducible. This was not so for non-clinical media.

Orthodontic Research Forum Presentations

Abstract number 1

A comparison of two modifications of the Twin Block appliance in matched Class II samples. N. A. Parkin*, H. F. McKeown and P. J. Sandler (Chesterfield Royal Hospital)

The purpose of this study was to compare the skeletal and dental changes contributing to class II correction using two modifications of the Twin Block appliance, i.e. Twin Blocks using a labial bow (TB1) and Twin Blocks incorporating high-pull headgear and torquing spurs on the maxillary central incisors (TB2). A total of 36 consecutively treated patients with the TB1 modification were compared cephalometrically with 27 patients with the TB2 modification. Both samples were treated in the same hospital department and the same technician made all the appliances. Intra-operator error was determined using Altman and Blands' 'Limits of Agreement' method. Pretreatment equivalence was checked using independent *t*-tests. The results of the skeletal

changes included a statistically significant increase in maxillary restraint in the TB2 sample, the difference between the two groups being a mean of 1.5 mm per year measured at A-point. There was a statistically significant greater reduction in the ANB angle (1.8 degrees) with the TB2 sample, primarily due to reduction in the SNA angle (1.3 degrees). The most significant difference between the two groups was control of the lower face height, in the TB2 sample there was no increase in the lower face height to total face height ratio from pre to post treatment. The use of torquing spurs in the TB2 sample resulted in a mean retroclination of 6.9 degrees, this is 4.1 degrees less than in the TB 1 sample. In conclusion, the addition of headgear to the appliance resulted in effective vertical and sagittal control of the maxillary complex thus maximizing the class II skeletal correction in the TB2 sample.

Abstract number 2

Maxillary arch changes in randomized control trial of cleft surgery. J. I. Russell* and B. M. Richard (Royal Liverpool Children's NHS Trust, Alder Hey, Eaton Rd, Liverpool)

Surgical scarring is presumed responsible for impaired maxillary growth after infant hard palate closure. Malek proposed closing the soft palate first in order to narrow the bony palatal cleft and make subsequent surgical closure easier. To test this hypothesis 47 patients were entered in a RCT comparing posterior with anterior cleft closure as the first operation.

Anterior closure first (Oslo type—lip and hard palate with a vomerine single layer flap) followed 3 months later by a soft palate repair, was compared with a posterior palatoplasty first (Malek sequencing), followed 3 months later by lip and hard palate repair. A maxillary impression was taken before each operation. Models were measured using a reflex metrograph.

Oslo, closed the anterior alveolar gap by 7 mm, and narrowed the inter-canine distance (4.3mm) but there was no change in the inter-tuberosity distance. Malek, did not change the anterior alveolar or the inter-tuberosity distance.

The plasticity of the maxilla to surgery on the cleft is in its anterior portion yet the posterior maxilla seems more resistant to these forces.

Abstract number 3

Craniofacial form in treated unilateral cleft lip and palate cases. C. D. Johnston*, A. J. Leonard, D. J. Burden and P. F. McSherry (School of Dentistry, Queen's University, Belfast; Royal Belfast Hospital for Sick Children; Trinity College, Dublin)

Objective: The quality of outcomes in unilateral cleft lip and palate (UCLP) cases was compared between two senior plastic surgeons. Surgeon A carried out a one-stage Wardill–Kilner palate repair. Surgeon B employed a vomer flap hard palate repair followed by a von-Langenbeck soft palate closure (Oslo protocol).

Design: Retrospective analysis.

Subjects: Thirty-three children (mean age 9.6 years) born with complete skeletal UCLP in Northern Ireland from 1983 to 1991 who received primary repair surgery from one of the two surgeons.

Outcome measures: Cephalometric analysis was used to determine the craniofacial form and soft tissue profile. The quality of the dental arch relationships was independently assessed using the Goslon ranking system.

Results: Goslon ranking revealed that 28 of the 33 subjects had good or satisfactory arch relationships. Comparison between the surgeons revealed that the Wardill–Kilner group had a significantly greater proportion ($P < 0.05$) of Goslon grades of greater than 3, indicating poor arch relationships. The only significant cephalometric difference between patients treated by the two surgeons was a smaller maxillary height in the Wardill–Kilner group ($P < 0.05$).

Conclusions: Although differences in surgeon may explain these results the highest proportion of cases likely to require orthognathic surgery was found in those treated using the Wardill–Kilner technique.

Abstract number 4

Orthodontic adhesives: a systematic review. N. A. Mandall*, D. T. Millett, C. R. Mattick, J. Hickman, H. V. Worthington and T. MacFarlane (University of Manchester and University of Glasgow UK)

A Cochrane Systematic Review was carried out to evaluate which group of orthodontic adhesives (a) bond orthodontic brackets to teeth most reliably and (b) are the most effective at preventing decalcification. The search strategy for the review followed standard Cochrane

systematic review methodology. The primary outcome measure of interest was the failure of the orthodontic adhesive. A secondary outcome of decalcification occurring around the orthodontic bracket was recorded, if data were available. Comparison was made between chemical and light cured adhesives (where appropriate) between the following groups: (a) conventional glass ionomer cement (b) resin-modified glass ionomer cement (c) compomer (polyacid modified composite), and (d) conventional composite. Four randomized controlled trials and two controlled trials were identified which fulfilled all the inclusion and exclusion criteria. Qualitative data analysis suggested that chemical cured conventional composite (a) had similar or lower bond failures than light cured conventional composite (b) exhibited fewer bond failures than conventional glass ionomer cement (c) had similar bond failure rate in comparison with compomer. Light cured composite appears to have fewer bond failures than resin-modified light cured glass ionomer cement. It is suggested that chemical cured or light cured conventional composite resin is the orthodontic adhesive of choice at present. Suggestions are made for methods of improving future research involving orthodontic adhesives.

Abstract number 5

Predictors of root resorption among patients with Class II division 1 malocclusions treated with fixed appliances.

N. J. McGuinness*, M. Stevenson and D. J. Burden (Merlin Park Hospital, Galway and Queen's University, Belfast)

In this study the prevalence of root resorption experienced by patients with Class II division 1 malocclusion who were treated using a standard approach was studied using two radiographic techniques. The sample comprised 409 consecutively treated Caucasian patients with complete records available who had a Class II division 1 malocclusion with an initial overjet greater than 6 mm. Pre- and post-treatment orthopantomogram radiographs were used to rank the root length loss during treatment using the method reported by Sharpe *et al.* (1987). Pre- and post-treatment cephalograms were also used to measure directly the amount of root shortening that occurred in the upper central incisors during treatment. Analysis of the OPT data only explained 7 per cent of the variation in root length encountered. However, analysis of the cephalometric data explained 37 per cent of the variation. The

significant covariates identified from the cephalometric recording method were alveolus width (the wider the alveolus the greater the root resorption recorded, $t = -10.31$, $P < 0.001$), incisor apex to palatal cortex distance post-treatment (the greater the distance between the palatal cortex and the incisor apex post-treatment the less root resorption noted, $t = 11.64$, $P < 0.001$), incisor intrusion (the greater the incisor intrusion the more root resorption recorded, $t = -11.19$, $P < 0.001$) and time in rectangular archwires (the longer rectangular archwires were worn the less root resorption was recorded, $t = 3.07$, $P = 0.002$).

These results confirm the increased risk of root resorption when incisors are intruded and their roots are moved closer to the palatal cortical plate.

Abstract number 6

Can we predict unmet treatment need in cleft patients? A. C. Williams* and J. R. Sandy (Division of Child Dental Health, University of Bristol)

Cleft services in the United Kingdom (UK) are being reorganized to create regional centres. There is a risk that this will reduce access to specialist care in vulnerable population groups. The aim of this study was to identify children at risk of being lost to follow-up so that arrangements can be made to ensure that they receive appropriate care.

Objectives: To examine the demographic and treatment characteristics of children born with unilateral cleft lip and palate (UCLP) in the UK who have unmet treatment needs for speech therapy dental care or secondary alveolar bone grafting.

Methods: Residual needs for speech therapy and dental treatment were independently assessed for 456 children born with UCLP. Socio-economic status was determined from postcodes using the Carstairs and Morris Index. Details of delivery of speech therapy, dental care and secondary alveolar bone grafting were recorded from the clinical notes.

Results: Socio-economic status was inversely associated with unmet need for speech therapy (OR = 1.24, 95 per cent CI: 1.04–1.47). Being under the exclusive care of the team therapist was protective against need for speech therapy (OR = 0.38, 95 per cent CI: 0.21–0.68). In younger children, being under the care of a high volume cleft team (>25 referrals per year) was a risk factor for unmet need for dental care (OR = 2.42, 95 per

cent CI: 1.30–4.51). *Conclusions:* Socio-economic status and the method of delivery of care appear to be important factors in determining which children receive adequate treatment from UK cleft services. This study was funded by the Department of Health.

Abstract number 7

Development of a quality of life measure for orthognathic patients. S. J. Clinmngnam* (Eastman Dental Institute, University College, London)

Assessment of health-related quality of life (HRQL) is becoming increasingly important and may be measured using two groups of instrument: generic and/or condition-specific. The purpose of the study was to develop a condition-specific measure for patients requesting orthognathic treatment (Orthognathic Quality of Life Questionnaire: OQLQ) and to assess reliability, validity, and responsiveness. The OQLQ was developed in three stages: (i) item generation followed interviews with 25 patients and 25 clinicians; (ii) item reduction involved 46 patients; and (iii) instrument testing involved 88 respondents. A Principal Component Analy-

sis (PCA) divided the instrument into domains that were used in subsequent analyses. Reliability was established by assessing internal consistency and through the use of a test-retest. Validity was tested by specifying expected levels of correlation between the four domains and both the generic Short-Form 36 (SF-36) health survey and a 100-mm visual analogue scale. The final step established responsiveness using longitudinal data before treatment (T1), following presurgical orthodontics (T2) and at debond (T3). Reliability in the form of alpha coefficients for internal consistency varied between 0.83 and 0.93, and intra-class correlation coefficients for the test-retest were acceptable at values between 0.76 and 0.88. Validity testing confirmed that the majority of hypotheses were proven. Responsiveness testing showed no significant changes in HRQL between T1 and T2, but three of the four domains showed significant improvements ($P < 0.01$) between T2 and T3. The OOLO has good evidence of validity, reliability, and responsiveness and can now be used in larger clinical trials. It was also found to be acceptable to respondents. The finding that quality of life is improved following treatment has important implications.