FEATURES SECTION

Relevant research from non-orthodontic journals

This 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 James Grant and Professor Nigel Hunt.

Post-surgical orthodontics

Orthodontic treatment following orthognathic surgery: how long does it take and why? A retrospective study. *J Oral Maxillofac Surg* 2007; 65: 1969–76
Luther F, Morris DO, Karnezi K

Objective: This study was conducted to examine the duration of postoperative orthodontic treatment of patients who underwent combined orthodontic and orthognathic treatment and to investigate factors that might influence this, to assess the strength of association between preoperative and postoperative orthodontic treatment duration, and to perform a retrospective power calculation to assess the likelihood of this study detecting a clinically significant (weeks) difference.

Methodology: Records of patients who had undergone combined orthodontic and orthognathic treatment between 1998 and 2003 ($n=69$) were obtained from three consultant orthodontists at three major hospitals in Leeds, UK. The duration of postoperative orthodontic treatment was calculated as the date of operation to the date of fixed appliance removal. Variables investigated included patient age and gender, malocclusion, type of operation, presence of open bite, extractions (excluding third molars), hospital, operator, missed appointments/breakages and debonding, and retainer arrangements.

Results: The median duration of postoperative treatment was 7.5 months (range 5–11 months). None of the variables clearly affected the duration; no correlation was found between preoperative and postoperative treatment times ($r_s=-0.07$; $P>0.05$). A retrospective power calculation demonstrated a 57.5% likelihood of this study detecting a difference of eight weeks between two groups.

Conclusions: Patients should be informed that the postoperative orthodontic phase of combined orthognathic–orthodontic treatment may last approximately 5–11 months. No association was found between preoperative and postoperative treatment duration. Many more patients will have to be recruited to assess whether specific variables result in a clinically significant difference in treatment duration.

Comment: This article highlights the variable amount of time taken for finishing procedures following orthognathic surgery. However, by its own admission it is under-powered and a larger body of subjects will be needed to establish the possible causes of the variation in treatment time.

Masticatory musculature and mandibular growth

Relationship between the masticatory muscles and mandibular skeleton in mandibular prognathism with and without asymmetry. *J Oral Maxillofac Surg* 2007; 65: 1538–43
Kwon TG, Lee KH, Park HS, Ryoo HM, Kim HJ, Lee SH

Objective: The purpose of the present study was to evaluate the relationship between masticatory muscle volume and mandibular skeletal measurements in patients with and without facial asymmetry. This was done in order to determine whether asymmetric mandibular prognathism is related to masticatory muscle asymmetry.

Methodology: The study was conducted with 40 adult patients with mandibular prognathism composed of two groups, the asymmetry group ($n=20$) and the non-asymmetry group ($n=20$). Using three-dimensional reformatted computer tomography (CT) images, the volume of the masticatory muscle (masseter, temporal, medial and lateral pterygoid muscles) and various skeletal measurements (hemimandibular volume, ramal height, body length, mandibular length, gonial angle) were evaluated and compared. The right–left difference

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was expressed by an asymmetry index {(right–left)/left, %}.

Results: The results showed that in the asymmetry group, the longer mandibular side (contralateral side of chin deviation) exhibited longer ramal and body length, a wider gonial angle, and more hemimandibular volume with less medial pterygoid volume, whereas the non-asymmetry group did not show a statistical bilateral difference between the skeletal and muscular measurements. The correlation analysis showed that patients with facial asymmetry did not have similar patterns of muscle–bone relation as compared with the symmetrical subjects.

Conclusions: In patients with mandibular prognathism, the bilateral difference in muscle volume would reflect the difference in spatial anatomy of a skeletal structure and could not predict mandibular skeletal asymmetry.

Comment: This article tries to throw further light on the long term debate over the influence of skeletal musculature on the development and form of the facial skeleton. Although differences in muscle volume are observed when comparing symmetric and asymmetric groups, the paper fails to establish whether these differences in muscle volume are the cause of the asymmetry or as a result of volumetric differences in the skeletal structure. The debate continues…

Orthodontic provision and uptake

Inequality in uptake of orthodontic services. *Br Dent J* 2007; 202: E15
Drugan CS, Hamilton S, Naqvi H, Boyles JR

Objective: The purpose of this ecological study was to investigate the relationship between uptake of orthodontic services and factors that might influence receipt of care at a population level.

Methodology: The dental practice board supplied data on claims for courses of active orthodontic treatment from April 2001 to March 2002 for children from the former county of Avon. These data were analysed in relation to deprivation, living in an urban/rural setting and the proportion of the population from black or minority ethnic groups (BME).

Results: In Avon, children from deprived and rural areas were significantly less likely to be undergoing an active course of orthodontic treatment. Children from an area with a high proportion BME were significantly more likely to be undergoing treatment.

Conclusions: This research demonstrates that children from more deprived and rural communities in Avon are less likely to receive orthodontic treatment. This has important policy implications for primary care trusts that have a responsibility to ensure equal access to care for all of their children.

Comment: As of April 2006, PCTs have had the responsibility for commissioning a reasonable level of NHS dental services and one of the important priorities for PCTs is to reduce inequalities. This paper highlights inequality in the provision and uptake of orthodontic treatment in rural areas in Avon and highlights the need for equitable planning for the provision of orthodontic care at a local level.

Orthodontics and quality of life

Quality of life in patients with dentofacial deformity: a comparison of measurement approaches. *Int J Oral Maxillofac Surg* 2007; 36: 488–92
Lee S, McGrath C, Samman N

Objective: The aim of this study was to examine the effect of dentofacial deformity on quality of life (QoL) as assessed by generic health, generic oral health and condition-specific approaches.

Methodology: A case-control study was performed involving 154 subjects: 76 with dentofacial deformity (non-cleft) and 76 without dentofacial deformity. Generic health-related QoL was assessed employing the 36-item Short Form Health Survey (SF-36), generic oral health-related QoL was assessed by the 14-item short form Oral Health Impact Profile (OHIP-14) and condition-specific QoL was assessed by the 22-item Orthognathic Quality of Life Questionnaire (OQLQ).

Results: No significant difference in SF-36 scores between case and control groups was observed ($P>0.05$). There were significant differences in overall OHIP-14 scores ($P<0.001$) and overall OQLQ scores ($P<0.001$) between case and control groups.

Conclusion: The results suggest that dentofacial deformity affects individuals in many aspects of their lives, and that generic oral health and condition-specific approaches to assessing QoL are able to discriminate patients with dentofacial deformities from those without, and thus have value in determining the impact of dentofacial deformities on QoL.

Comment: This paper demonstrates the usefulness of condition specific QoL questionnaires.

Orthodontic imaging and cephalometrics

Three-dimensional computed tomography cephalometric analysis: experimental validation *in vitro*. *Int J Oral Maxillofac Surg* 2007; 36: 828–33
Olszewski R, Zech F, Cosnard G, Nicolas V, Macq B, Reychler H

Objective: The development of three-dimensional (3D) cephalometric analysis is essential for the computer-assisted planning of orthognathic surgery. The aim of this study was to transform and adapt Delaire's two-dimensional cephalometric analysis into the third dimension; this transposition was then validated.

Methodology: The comparative advantage of using 3D computed tomography (CT) surface renderings over profile X-rays was analysed. Comparison between inter- and intra-observer reproducibility of the cephalometric measurements on profile X-rays and on 3D CT surface renderings on the same 26 dry skulls was made. The accuracy was also tested with the measurements on 3D CT surface renderings (ACRO 3D) in relation to those directly taken on dry skulls with the help of a 3D measuring instrument.

Results: Inter- and intra-observer reproducibility proved significantly superior ($P<0.0001$) following the 3D CT method. There were no significant differences in the accuracy of measurements between the ACRO 3D software and the 3D measuring instrument.

Conclusion: The ACRO 3D software was confirmed as being a reliable tool for developing 3D CT cephalometric analyses. Further research may entail clinical validation of the 3D CT craniofacial cephalometric method of analysis.

Comment: With the increasing use of cone beam tomography in orthodontic and orthognathic planning the development of a 3D cephalometric analysis is essential. Further work is required to develop this technique with images taken clinically, establishing the validity and reproducibility of landmarks in clinical samples.

Orthodontic microsurgical techniques

Orthodontic microsurgery: a new surgically guided technique for dental movement. *Int J Periodontics Restorative Dent* 2007; 27: 325–31
Vercellotti T, Podesta A

Objective: The purpose of this article was to describe the monocortical tooth dislocation and ligament distraction (MTDLD) technique for tooth movement.

Methodology: Eight patients (six female and two male) were treated using the MTDLD technique. The technique involves the following procedure: on the root surface corresponding to the direction of movement, vertical and horizontal microsurgical corticotomies are performed around each tooth root with a piezosurgical microsaw to eliminate cortical bone resistance. The immediate application of strong biomechanical forces produces rapid dislocation of the root and the cortical bone together. On the root surface opposite the direction of movement, the force of dislocation produces rapid distraction of ligament fibres. During the osteogenic process that follows, application of normal orthodontic biomechanics achieves the final tooth movement. All eight patients underwent periodontal and radiographic examination for more than one year after treatment.

Results: No periodontal defects were observed in any of the patients, including one with a severe malocclusion and a thin periodontal tissue biotype.

Conclusion: Compared to traditional orthodontic therapy, the average treatment time with the MTDLD technique in the mandible and maxilla was reduced by 60% and 70% respectively.

Comment: This paper demonstrates using a series of cases the monocortical tooth dislocation and ligament distraction technique. To be able to draw further conclusions regarding treatment outcomes, such as periodontal attachment, treatment time and quality of finish compared to conventional treatments, an experimental study design would be necessary. It would also be desirable to follow up treatment results for longer than a year to establish the stability of differing outcomes.