

SCIENTIFIC SECTION

Commentaries on scientific papers published in this edition

Clinical Trials in Orthodontics I: Demographic details of clinical trials published in three orthodontic journals between 1989 and 1998.

J E Harrison,

At an orthodontic gathering in 1985, David Sackett, one of the pioneers of evidence based medicine, judged orthodontics to be behind 'such treatment modalities as acupuncture, hypnosis, homeopathy, and orthomolecular therapy, and on a par with scientology, dianetics and podiatry'¹. This disappointing health check was based on the number of randomized trials published in the previous five years.

Covering the decade from 1989, Jayne Harrison's report gives us hope that the patient's health is improving, with a doubling of the number of trials published in the second half of that decade. (Admittedly we don't know how well scientology, dianetics and podiatry are doing for the same period). Thanks to the adoption of precise, reproducible methods for her survey, prospective monitoring of the state of evidence in orthodontics will be possible.

The discussion touches on some of the challenges to orthodontic trials, and in this respect, future reports could include an appraisal of the setting and management of trials. Most orthodontic trials have been undertaken in dental schools, with arguably, the least external validity (generalisability); or by networks of salaried providers in a national health service setting. If future initiatives find ways of including orthodontists in private/independent practices, future studies will be all the more valuable.

Reporting bias is a particular issue in drug trials sponsored by the pharmaceutical industry, where there is a tendency for trials with less successful outcomes to remain unpublished². Trials of orthodontic materials with industrial sponsors, though the easiest to conduct, may be subject to a similar fate, and it would be interesting to see the frequency of sponsorship reported in future surveys of this literature.

The paper rightly concludes on an optimistic note. Though trials account for only 4–7% of orthodontic

reports, there are now sufficient trials to make systemic reviews viable, heralding the true dawn of evidence based orthodontics.

References

1. Sackett, D.L., Nine years later: a commentary on revisiting the Moyers Symposium. In orthodontic Treatment: Outcome and Effectiveness. Trotman, C. and McNamara, J.A. Volume 30, Craniofacial Growth Series, Center for Human Growth and Development, University of Michigan, Ann Arbor, 1995.
2. Horton, R., Sponsorship, authorship and a tale of two media The Lancet; 349, 1411.

W.C. Shaw
Manchester, UK

Inactivated periods of constant orthodontic forces related to desirable tooth movement in rats

T Kameyama, Y Matsumoto, H Warita,
K Soma.

Orthodontists are notorious for having widely differing views with regard to all aspects of treatment provision but one thing is universal, they are all in the business of moving teeth through alveolar bone. Unfortunately orthodontic appliances can also have potentially negative effects upon the periodontium, namely unwanted external root resorption. This particular study has used an animal model to investigate the effects of varying lengths of force *inactivity* upon the amount of orthodontic tooth movement that can be achieved and its relationship to histological evidence of root resorption.

The findings of this investigation raise some interesting issues. As expected, more tooth movement was achieved with the application of constant force, but this was accompanied by hyalinisation of the periodontal ligament and associated root resorption. In contrast, the introduction of around four hours of force quiescence per day, whilst producing slightly less total tooth movement, significantly reduced the amount of root resorption that occurred. There was also the further suggestion that in the rat at least, teeth seem to move more effectively during the day when the animal is at rest.

Clearly, the extrapolation of any data from rats to humans has to be treated with some caution, particularly when applying this information to a clinical environment. Rodents are very much nocturnal creatures and both the metabolism and physiology of their periodontal ligament will differ significantly from that of humans. Further, this particular study only took place over a relatively short fourteen day period. However, these points notwithstanding, asking your patient to leave the elastics in their school bag for a few hours during the day might be something to consider. Not only may it endear you to them a little more, it might also reduce their chances of experiencing unwanted external root resorption.

Martyn Colbourne
Guy's, King's and St Thomas' Dental Institute, UK

Orthodontic treatment need and self-perception of 11-16 year old Saudi Arabian children with a sensory impairment attending special schools **M Al-Sarheed, R Bedi, NP Hunt**

This study aimed to compare orthodontic treatment need in visually-impaired (VI), hearing-impaired (HI) and healthy Saudi schoolchildren. Superficially, these impairments would not seem to be associated with the development of malocclusion and the results of the examiner-rated IOTN index (DHC) show, as expected, that the HI and VI children have similar orthodontic treatment needs to the control group (20–30%). While examiner-rated attractiveness (AC) showed the HI and controls to be similar, the VI children showed a greater need for treatment when judged from appearance. Because VI children cannot comprehend the concept of attractiveness, special standardized and graded tactile models were prepared to enable comparison with their own dentitions. This failed to offer them the key to assessment of attractiveness, since it generated an exaggerated negative determination. Alternatively, the exaggeration could have been due to the VI child's low self-esteem/image and a yearning for improvement (Becker et al, EJO 2000).

The desire for treatment among the VI children correlated well with their DHC and AC scores. In the HI and control groups, this far exceeded examiner-rated and self-perceived AC values, suggesting the existence of peer pressure or status-seeking in the classroom, absent in the parents.

Orthodontic treatment cannot resolve the disability, but it has been highly valued by patients and their families in other "special needs" populations (Becker et al, EJO 2000). These families have long accepted their child's disability, but are keen to provide treatment to improve appearance in an area where success may impact positively on his/her self-esteem and social interactions. Disability often poses severe financial burdens on young families, due to indirect expenses (physiotherapy, private lessons, special training, transportation, need for escort), which may not be reimbursed or subsidized by local health authorities in some countries and which may compete with the provision of costly orthodontic treatment.

Adrian Becker and Stella Chaushu,
Jerusalem, Israel.

Reference

Becker A, Shapira J, Chaushu S. Orthodontic treatment for disabled children: motivation, expectation and satisfaction. *Eur J Orthod.* 2000; 22:151–158.

Does articulating study casts make a difference to treatment planning? **PE Ellis, PE Benson**

This study asked a controversial question which addresses the belief held by those orthodontists who routinely articulate models that their treatment decisions are more valid, reliable and accurate. The authors examined 20 case vignettes on three occasions each a minimum of two weeks apart. The vignettes consisted of study models, facial photographs, panorex and lateral skull radiographs, and a tracing of the cephalogram. On two occasions the vignettes included hand held casts in the intercuspal position (ICP) and once with the casts articulated on a semi-adjustable articulator. The orthodontists received the hand held or articulated models in random order on the three occasions but always in the same order of Case 1 to Case 20. The cases comprised the full spectrum of malocclusion types and local tooth anomalies including ectopic canines. The results of the intra-examiner agreement between the two hand held casts assessment and between the first set of handheld casts compared with the articulated casts revealed no statistically significant difference in the Kappa scores except for the extraction decision. The authors therefore concluded that the results from this study do not justify the routine articulation of study models.

The evidence from this well designed study does not support the concept that routinely mounting models will improve the diagnostic accuracy for making treatment decisions. Criticisms of this study might include the expert versus the novice practicing orthodontist, who were the raters, explains the inconsistencies in reliable decision making. As intra-examiner agreement is notoriously inconsistent in treatment planning decisions, as reported in the literature and cited by the authors, this may also contribute to the findings.

To understand the fundamental and apparently irrational belief surrounding the routine articulation of models may seem counter-intuitive in the light of new evidence. Nonetheless those who believe in the routine articulation of models are entitled to be concerned that the type of unsophisticated articulator used in this study was not appropriate. The counter argument being that the more expensive and comprehensive articulators make better decisions – especially if combined with the training and influence of charismatic experts with illustrative anecdotal case reports. Additionally, the controversy concerning the biologically ideal position of the condyle in the articular fossa continues to be contested and perhaps a semi-adjustable articulator is incapable of representing the occlusal relationship accurately?

Strong beliefs are difficult to shake and are usually more influential in defining clinical practice than the results of well conducted clinical studies engaging the scientific method in both medicine and dentistry. The authors discussed the evidence from relevant literature which influenced the design and conduct of their study. Details of how the orthodontists were instructed to make their decisions and if there was a time limit imposed or collusion between and among the raters in the decision making are unclear. Did the training programs expose the orthodontic raters to the perceived benefits and beliefs of the effectiveness and efficiency of articulated models? Were any of the raters routinely articulating or NOT articulating their models? Perhaps specific mal-occlusions, if articulated, provide the clinician with information from which they can improve their decision making?

This study has asked a question which the orthodontic profession has historically been unable to answer. It is a valuable contribution to our understanding of a time consuming and costly addition to the diagnostic decision making process and the disputed benefits of routinely articulating models.

Kate Vig
The Ohio State University, USA

An ex vivo investigation to compare orthodontic bonding using a 4-META based adhesive or a composite adhesive to acid-etched and sandblasted enamel.

SA Clark, PH Gordon, JF McCabe

A literature search on the subject of orthodontic bond strength testing will always generate a large number of references. The majority compare different bonding composites or one composite under differing conditions. Results are usually given in terms of mean bond strengths and due to widely differing methodology comparison between papers is often impossible. Quoting mean bond strength often has limited value to the clinical orthodontist. This paper is different as it compares a composite (Right-On) with an unfilled acrylic resin (MCP Bond). It also compares the bond strength using a conventional etching technique with sandblasting, a technique not widely used in conjunction with orthodontic bonds.

The results suggest that the unfilled acrylic (MCP Bond) has a greater bond strength than the composite (Right-On) and that the site of bond failure is more likely to be between the enamel and acrylic making clean up easier and quicker. This will be music to the ears of all practising orthodontists! The authors include a Weibull analysis, which gives an indication of bond reliability and probability of failure at different applied forces. This is much more use than just quoting bond strengths when assessing the viability of bonding materials. For example, two materials may have similar mean bond strength but if the range of bond strength values is high, some bonds may fail under normal conditions or conversely some may be exceptionally difficult to remove. The inclusion of a survival analysis adds great value to this paper.

The authors make the point that some specimens showed enamel damage when the acid etch technique was used with the unfilled acrylic resin (MCP Bond) and sandblasting is probably the better technique. They quite correctly state that extending the findings of this *ex vivo* study directly to the clinical situation is not appropriate. The paper should however encourage work to develop a safe sandblasting protocol and a subsequent randomized clinical trial.

Nigel A Fox
Middlesbrough General Hospital, UK

