

**SCIENTIFIC
SECTION**

Commentaries on scientific papers published in this edition

'A Cephalometric Inter-centre Comparison of Growth in Children with Cleft Lip and Palate', by Gaukroger *et al.*

This investigation is an attempt to build on the trend in CLP research initiated by the 1992 Eurocleft study, utilizing inter-centre outcome comparisons as a means of elucidating the relative benefits of various treatment protocols. The authors have chosen to compare the results of a centre in the UK to those of Oslo, which was found to be the Eurocleft centre with best records and outcomes, and serves as the 'good practice' archive against which many other comparisons have been made. By using four standard cephalometric dimensions as outcome measures on appropriately matched samples and at ages recommended by the CSAG group, the authors have been able to show some significant differences in facial morphology between the groups, suggestive of poorer growth in the MVH sample.

Studies such as this represent a valuable first step in our attempt to identify those treatment protocols, which are associated with better outcomes. However, it is important to recognize the limitations of outcome studies and inherent dangers in the interpretation of the results. For example, while the authors recognize that their outcomes are a reflection of the entire treatment protocol, they incorrectly attempt to relate the results to the use of a particular surgical technique or timing. Other explanations are clearly possible, especially given the fact that the surgical protocols seemed to have more in common than they differed. Also, the dramatic decreases in SNA in the MVH sample between ages 10 and 15 years, largely responsible for the authors' conclusions, point to the problems in using small samples and cross-sectional data. While a dramatic deterioration of maxillary projection is possible over those 5 years, it seems also possible that the patients evaluated in those two age ranges might represent two different sub-samples within the same centre, perhaps with different primary surgeons, or an improvement in surgical skills of one operator over time. Thus, the use of longitudinal data from consecutively treated patients always strength-

ens the validity of outcome studies such as this. Also, other possible confounders related to treatment include mixed dentition orthodontic/orthopedic treatment, end-stage orthognathic surgery, and maturational status in the 14–16 year age group, all of which could affect the outcomes reported. Finally, it must not be forgotten that cephalometric outcomes represent only one piece of the puzzle and, when comparing protocols, it is important to consider speech and psychosocial outcomes before reaching any conclusions.

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'Effectiveness of community-based salaried orthodontic services provided in England and Wales' by D. Radzic

This study is looking at the effectiveness of the orthodontic treatment provided in the Community Dental Service employing the Index of Orthodontic Treatment Need and the PAR Index. On average, 104 cases from 12 orthodontists were analysed using the occlusal indices.

The Aesthetic Component was reduced on average 4/5 from 7/8 to 3 points and the Dental Health Component from 4 to 2. The PAR percentage reduction ranged from 61.7 to 84.7. The outcome of treatment for two orthodontists was 5 and 8 percentage PAR points below the stated standard of 70 per cent. Two orthodontists were on the borderline. The start PAR score of 29 is similar to that reported in other UK studies. The mean post-treatment PAR score is higher than the ideal of below 5 PAR points. The post-treatment PAR scores for practitioners from districts 4, 6, and 8 are on the high side. Similarly, the percentage of cases reported as 'no improvement' for practitioners from districts 3, 6, 7, 8, and 11 are higher than desirable (ideally the percentage of cases unimproved should be less than 5 per cent). The percentage PAR reduction using removable appliances and single-arch fixed is slightly higher than reported elsewhere. Not surprisingly, the use of upper and lower fixed appliances produces the greatest percentage change in PAR score.

This study highlights the variation of the standard of treatment provided by practitioners. Clearly, there are substantial differences between the most effective and least effective practitioners, and these differences are not fully explained. Valid comparison between the General Dental Services, Hospital Dental Services, and the Community Dental Services is difficult when assessments in each service were undertaken in different time periods. In addition, the collection of 100 cases over a 3-year period may indicate a low caseload and/or the possibility of non-consecutive selected treatment outcomes.

Nevertheless, it is important to describe the effectiveness of all orthodontic services. Identifying the most effective service and determining why it is effective can only lead to a better orthodontic service in the future.

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'Are photographic records reliable for orthodontic screening?' by N. A. Mandall *et al.*

The main aim of this study was to assess whether photographic records might reliably be used by consultants to screen and eliminate inappropriate orthodontic referrals. Using a typical sample of 40 consecutive outpatient referrals, eight orthodontic consultants were asked to indicate which patients they would accept with a view to either (i) starting orthodontic treatment straightaway, (ii) providing a treatment plan, or (iii) giving advice to general dental practitioners. These judgements were repeated using the same photographic records not less than 2 weeks later.

The levels of inter-examiner variability were low, but are similar to those reported in other studies and it appears that the use of photographs introduces no more inconsistency than judgements of this kind made when full clinical records are available. As the authors point out, factors such as the length of the consultant's waiting list, and his or her attitude to poor oral hygiene may adversely affect inter examiner agreement. To this can be added instances where some consultants might wish to see the patient for other reasons: for example, to take additional radiographs to locate unerupted teeth more precisely. Since the study set out to determine the reliability of the use of clinical photographs it seems strange that the examiners did not agree common guidelines to reduce these confounding influences before embarking on their assessments. It may well be thought that given

the relatively low intra-examiner agreements the disagreement between examiners is rather less than the results suggest. This is because a sizeable part of the apparent disagreement may, in fact, be due to the inability of individual examiners to make their own judgements consistently.

The key question now is whether the use of teledentistry for providing orthodontic advice introduces systematic intra-examiner errors of clinical judgement. One therefore looks forward to the results of the prospective study that the authors report they are carrying out into the validity of decisions made in this way.

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'Experimental tooth movement under light orthodontic forces: rates of tooth movement and changes of the periodontium' by T. Kohno *et al.*

The study of orthodontic tooth movement has attracted a number of clinicians interested in biological problems. Much of the early work in orthodontic tooth movement relied on histology. These early investigators managed to identify that if too much force was applied to teeth, then a number of potentially unwanted effects were seen. Most of these revolved around hyalinization, root resorption undermining bone resorption, and a potential for slowing down the rate of tooth movement.

It is the latter aspect that most clinicians are interested in and it is important to understand the biological consequences of heavy and light forces. Heavy forces have been interpreted as inducing chaos into an otherwise orderly biological response, which is seen with light forces. There is considerable difficulty in introducing appropriate forces for experimental tooth movement in various animal models. We do not know what the optimum force is for examining tooth movement, and by and large the forces that have been used in experimental tooth movement are heavy. A study, which examines levels of different forces, could do much to unravel some of the uncertainties in applying appropriate forces to teeth in a rat model.

In this study, the authors did much to control many of the variables, they used a rat model and took the precaution of extracting molars on one side of the mandible in order to eliminate the influence of occlusal forces caused by occlusal contact with the opposing side. They used a novel system for inducing tooth movement and

used wires to produce forces from as light as 1.2 gf up to 10 gf with application of these forces for 14 days.

Tooth displacements were measured by taking alginate impressions of the teeth and estimates with a digital microscopic gauge of the tooth displacement were made. Critically, the experimental period was divided into six portions, each of 56 hours and the rate of tooth displacements per hour were calculated. Histological examination provided a microscopic view of the experimental process. Interestingly, in the early period of tooth movement, irrespective of the level of force there were no significant differences in tooth displacement. It is important to remember that the method involved tipping of teeth with no friction. In the very light force group, the rate of tooth displacement was fastest in the first 56 hours and then it decreased in a gradually constant fashion to day 14. This suggests two phases of tooth movement, initially the tooth moves because of compression of the periodontal ligament and probably some bone bending. Thereafter, the rate of movement is more constant and the histology showed bone resorption on the pressure side with no hyalinization or undermining resorption. This makes sense and justifies their experimental approach in determining an optimum force level in a rat model. Classically, heavy forces produce three phases of tooth movement: an initial strain, where the periodontal ligament undergoes visco elastic change; a lag phase, where tooth movement slows down with hyalinization of the periodontal ligament; and finally, tooth movement with undermining, rather than frontal resorption. Interestingly, none of the other groups where heavy forces were applied showed any of these features. Tooth displacement in the heavy force groups fluctuated in cycles, which lasted for several days. There was no hyalinization or undermining bone resorption, the whole process seemed to fluctuate between visco elastic changes of the periodontal ligament or when this was compressed, frontal resorption in order to re-establish the periodontal ligament width. Possibly the collagen fibres and the periodontal ligament on the tension side, may limit the rate of tooth displacement.

This is an important paper, which might make investigators rethink their understanding of phases of tooth movement. Irrespective of this, there does seem to be a justification for using light orthodontic forces at all

times. However, potentially the damage we think we induce with heavy forces may not be as great as previously estimated.

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'Attitudes of UK consultants to teledentistry as a means of providing orthodontic advice to dental practitioners and their patients' by Stephens and Cook

The accessibility of patient access to healthcare advice (directly or via their GMP or GDP) is an important issue in the NHS at present. The present study evaluates UK orthodontic consultant's attitudes to the use of teledentistry in order to improve access to orthodontic advice. The study used a combination of e-mail and postal survey with a good 86% response rate. It is interesting that post (snail mail in electronic parlance) resulted in a better return than e-mail (93% vs 80.4%), the authors reporting that it was due to the perceived anonymity of the post. This is an interesting comment by the respondents as most postal questionnaires have some form of tracking method so non-respondents can be followed up.

The results suggest that most orthodontic consultants would not like to see patients having direct access to orthodontic advice would seem to conflict with Governments attempts to increase patient access to health care via NHS Direct, PDS, etc. It would be worthwhile exploring the reasons behind these apparent fears.

Orthodontic consultants were in favour of further investigating the potential role of teledentistry in providing consultant advice. This possibility of remote diagnosis, even at the basic level of advising a practitioner to refer or not, has potential in reducing the numbers of inappropriate referrals¹. Hopefully a number of consultants will take up the new technology.

1. O'Brien K, McComb JL, Fox N, Bearn D, Wright J. Do dentists refer orthodontic patients in appropriately? *Br Dent J* 1996; **181**: 132-136

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