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SCIENTIFIC SECTION

Commentaries on scientific papers published in this edition

'A randomized clinical trial to compare the effectiveness of canine lace backs with reference to canine tip' by T Usmani, K D O'Brien, H V Worthington, S Derwent, D Fox, S Harrison, P J Sandler, N A Mandall

When the standard full edgewise appliance was largely replaced by the straight wire appliance we all learned to use canine lace backs to prevent an increase in overjet during levelling and aligning in the initial stage of treatment. Canine lace backs are assumed to be effective based on theoretical biomechanical considerations. But as for many other orthodontic treatment procedures the real effectiveness was never tested.

The authors give a clear description of the randomized clinical trial (RCT) they performed on this topic. In their report they largely follow the CONSORT (Consolidated Standards of Reporting Trials) statement. By using the checklist of 22 items authors can improve the reporting of their RCT while the readers could use the guidelines as an instrument to assess the strengths and limitations of a trial. More information about CONSORT can be found on www.consort-statement.org.

What does this study tell us? Firstly, it shows a statistical significant difference for the overjet reduction with or without the use of lace backs. However the difference was less than a millimeter which cannot be considered as clinically relevant. Secondly, if the canine was more distally inclined at the start of treatment the overjet was more likely to increase whether or not canine lace backs were applied. In other words canine lace backs are not very effective in the prevention of overjet increase during the first phase of treatment.

Canine lace backs are a simple clinical procedure. However, as in many other more complicated orthodontic treatment strategies its use so far was just based on expert opinions and clinical expertise rather than on sound scientific data. Therefore the increasing attention for the methodology of clinical research is promising as there are still many myths to unravel in modern orthodontics.

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'Perception of orthodontic treatment need: opinion comparison of orthodontists, pediatric dentists and general practitioners ' by NW Berk, H Dukich Bush, J Cavalier, R Kapur, D Studen-Pavlovich, J Sciote, & RJ. Weyant

The aim of this study was to determine the relationship between treatment need assessment scores of orthodontists, pediatric dentists and general practitioners given that there will be differences in their educational focus.

The study used a dichotomous score of treatment need as either indicated or not indicated for a series of 137 study casts.

The strength of this paper was the high intra- and inter-rater reliability for the decision about whether treatment was indicated. The weighted kappa values were excellent compared with other literature investigating agreement around clinical decision making. It was interesting to see that these clinician groups had high agreement despite being trained in different ways.

Although a dichotomous treatment need scale is useful, simple and quick to use, it may not be substantive enough as it cannot explain the reason for not offering orthodontic treatment. In areas of high need, both legally and politically, it may be advisable to use the scale treatment indicated/ not indicated in the light of other occlusal indices and consumer perceptions.

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'Mutation testing in Treacher Collins Syndrome' by P E Ellis, M Dawson, M J Dixon

This is a very tidy paper to be publishing in the Journal of Orthodontics and it represents a link between molecular genetics, clinical genetics and orthodontists. Practising clinical orthodontists need to be reminded every now and then that these advances are of relevance, they take many years to filter through to the clinical situation, but here is an example. Treacher Collins Syndrome affects about 1:10,000 live births making it about ten times less common than cleft lip and palate. Nevertheless, in a practising lifetime most orthodontists would expect to encounter someone with this syndrome, although any treatment should be in conjunction with a specialist craniofacial unit. This paper outlines the main features of Treacher Collins Syndrome (TCS) and gives a brief overview of the genetic component of the condition. The gene for TCS is *TCOF1* and this ultimately results in the formation of a protein called "treacle". No one yet knows what "treacle" does, but obviously "treacle" will be affected by any mutation of the *TCOF1* gene.

What this study did was to look at 97 patients who had TCS to see what their mutations were. In order to do this, they had to obtain DNA samples from clinicians all over the world. The technology of finding these mutations would probably escape most orthodontists, but the most common mutations found were those where some of the base pairs were deleted. The other mutations found were mis-sense mutations, non-sense mutations and spliced junction mutations.

So what does this all mean? Two examples are given of how mutation testing is used for genetic counselling. In the first example the family had five members and four of these were unequivocally affected by TCS. In the fifth family member it was not clear if they were affected by TCS. A specific mutation was found in one of the children in the family and the remaining family members were then tested. It was found that all five family members had this mutation and therefore the fifth family member carried the genotype, even though this had not been expressed in their phenotype. In the second example a family of three was examined. The child definitely had TCS and showed all of the craniofacial abnormalities; neither parent appeared to have TCS and this suggested that the TCS child had resulted from a *de novo* mutation. Both parents were screened and neither showed the mutations observed in the child. This confirmed that the mutation had arisen *de novo* which has the consequence of a considerably reduced risk of a second child having TCS as a opposed to a 50% risk for each future child if the mutation had been detected in either of the parents. This post-natal diagnosis allows genetic counselling to explain risks for producing more such children. Mutation testing may also be of value in pre-natal diagnosis, although obtaining the foetal sample is not without risk to the foetus and the mutation, if present, gives no indication of the degree of severity of the syndrome. Quite what happens after diagnosis raises issues not normally debated in the Journal of Orthodontics, but in theory, gives patients a "choice" as to whether to continue with the pregnancy.

This is a good contemporary paper which highlights the need for orthodontists to maintain an interest in basic sciences.

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'Asymmetry of the parental craniofacial skeleton in orofacial clefting' by GT McIntyre and PA Mossey.

This is a retrospective PA cephalometric study of 92 parental volunteers from a sample of 286 children born with orofacial clefting (OFC) during the period of 1980-1984 in the West of Scotland. This study investigates skeletal craniofacial asymmetries evaluating the size of independent left and right-sided measurements and assessing the shape of each side by means of Euclidean distance matrix analysis.

The investigation has been performed with sound methodological care concerning cephalometric data elaboration, analysis and interpretation. The use of a quantitative analysis concerning shape, in addition to the conventional PA cephalometric variables, further corroborates to the value of this article.

Although no information is provided concerning gender distribution and its correspondence to the OFC children, the relationship between side of clefting and relevance to the larger or smaller side of the asymmetric parents and the lack of controls to determine the level of asymmetry in the Scottish population, the parental sample constitutes a valuable group for evaluation. Nowadays the ethical and biological concerns regarding X-ray examinations limit the availability of such samples.

It is my opinion that this paper constitutes a substantial contribution to the field of orofacial clefting since it investigates craniofacial asymmetry *per se* as a heritable predisposing factor towards the development of OFC in their offspring. Its conclusions that size and shape directional asymmetries characterise the parental craniofacial complex in OFC are directly related to the hypothesis that this heritable directional craniofacial skeletal asymmetry could be of considerable relevance in the left-sided predilection of OFC.

Evidence for major gene involvement in the etiology of OFC has been frequently reported. This does not necessarily imply that there is only one locus. As the authors have stated correctly, further studies evaluating size- and shape-related asymmetry in unoperated and operated cleft lip and/or palate individuals, their non-cleft parents and siblings in different population groups are necessary.

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'Breathing modes, body positions and suprahyoid muscle activity' by S Takahashi, T Ono, Y Ishiwata, T Kuroda.

This small study sought to differentiate between the activity of two suprahyoid muscles, geniohyoid and genioglossus, during different breathing modes, oral versus nasal respiration, and at different body positions, sitting upright versus lying supine. Recording of muscle action potentials through electromyography (EMG) using fine wire electrodes placed within the muscles of interest successfully demonstrated that the activity of the two muscles could be differentiated. The authors have concluded that, using this technique, changes in both breathing mode and body position are associated with discernible changes in genioglossus muscle activity but not with regard to geniohyoid activity.

Electromyographic recordings are notoriously difficult to reproduce due to the large individual variations often present when undertaking clinical investigations. For this reason, recordings are undertaken, whenever possible, using bipolar rather than monopolar techniques and using electrodes inserted directly into the muscle rather than using surface electrodes. The authors are aware of this problem and have tried to ensure the most reproducible technique within the spatial confines of the muscles under investigation. Nevertheless, there remains the possibility of "cross-talk" in that the recordings may include activity from superimposed or adjacent muscles, a point mentioned in the discussion. Furthermore, it would have been helpful to other researchers in the field to have included objective data relating not only to the variation in the levels of EMG activity recorded but also the reproducibility of the technique.

Within the limitations of the study, this paper should prove of value to orthodontists, especially those involved with the management of sleep disorders and obstructive sleep apnoea, as well as to functional anatomists.

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