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SCIENTIFIC SECTION

Commentaries on scientific papers published in this edition

Patients' and parents' expectations of orthodontic treatment

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Patients' expectations of treatment are believed to be important determinants of many different aspects of their experience of treatment including, importantly, the degree to which patients will adhere to recommendations of health care professionals and their overall satisfaction with treatment. It is not uncommon for clinicians to feel that the expectations of patients and their parents are somehow unrealistic. However relatively little is known about patients' expectations of orthodontic treatment, how these expectations are formed, and how expectations are modified in the light of information given by the healthcare team and through the course of treatment. Even at the initial assessment we need to understand how such expectations might vary across individuals. Hiemstra and colleagues sought to explore the degree to which the expectations of parents match those of children first attending for orthodontic treatment. The views of parents were similar to those of their children, with some exceptions. Parents were generally more realistic about the practical aspects of orthodontic treatment – they were less likely to anticipate braces being fitted at the first appointment, anticipated fewer problems and generally felt treatment would take longer than the time anticipated by children. Interestingly though parents anticipated more comments from members of the public about the wearing of orthodontics braces. It is possible that for children the wearing of orthodontic appliances is more acceptable given the prevalence of braces among their peers, whereas parents may be unrealistic about the likelihood of comments. While we might anticipate that parents and children will differ in their views of treatment, there seems to be no *a priori* reason for boys and girls to differ in their views, and the research supports this, with boys differing from girls only in their expectation of the likelihood of jaw surgery. However clinicians operating within different healthcare systems are likely to have very different systems of practice, and thus we might expect differences in the expected practical details of treatment. Further cultural expectations of the importance of the appearance of the teeth may vary across countries. The researchers compared the responses of their participants with those of individuals assessed as part of a previous research project in the United Kingdom. While caution should be expressed about the comparability of the two data sets, it is clear that different expectations of the course of treatment, in particular the form that treatment would take exist. Parents of children living in the Netherlands were more likely to suggest that treatment would have an iatrogenic impact on function, and anticipated fewer social benefits of the completed treatment than their UK counterparts. The reasons for such differences would be worth exploring through qualitative studies.

This research has established that patients' expectations of orthodontic treatment can be assessed at the start of treatment and that there does appear to be variation according to whether the participant is a patient or a parent, and the healthcare system in which the individual receives treatment. Future research could advance beyond such description to explore possible mechanisms for modifying expectations through the provision of timely and relevant information.

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Quantification of cranial base growth during pubertal growth

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Cervical vertebral maturation was used to classify the stage of pubertal development into prepeak, peak, or postpeak. Six cephalometric measurements were taken of the cranial base in 21 males and 15 females. There was no difference in the growth rates of any cranial base measurements between the sexes. This is an interesting finding because whilst the rate of growth appears similar the timing of peak growth differs between males (13.3 years and females (11.5 years). The rate of growth was greater between the prepeak and peak than the peak and postpeak stages as might be expected.

The cranial base forms a junction between the cranium and face, both components having different growth characteristics.[1] The cranium grows rapidly from birth but tails off considerably after about 9 years showing only a small amount of further growth. The face on the other hand shows a slower rate of growth which is constant and

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more prolonged continuing until about 18 years. As a consequence the cranial base must undergo constant readjustment between these two areas which have different growth characteristics. The maxilla is related to the anterior cranial base by the circummaxillary suture system, whilst the mandible is related to the posterior cranial base by the temporomandibular joint. During the time period included in this study both jaws are still actively growing.

This study demonstrated active growth in both the anterior and posterior cranial base during puberty. It would appear to be necessary for growth readjustment to occur in the cranial base because the jaws grow differentially from the cranium and to a lesser extent from each other.

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Reference

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The effect of tooth bleaching on the enamel surface and the tensile force to debond orthodontic brackets

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While orthodontics has traditionally focused on tooth alignment, as knowledge, skills and techniques have advanced, the quest for further improvement in smile aesthetics has included changing both the shape and the colour of teeth. Tooth whitening through bleaching is now a simple, non-invasive and readily available technique which is popular with many adult patients and as orthodontic practice seeks to widen its scope through treating increasing numbers of adults, the effect of tooth bleaching on bond strength becomes a matter of significant contemporary interest.

This paper investigates the effects of two different bleaching techniques using 35% hydrogen peroxide on bond strengths on extracted human teeth in a laboratory setting, differences in the adhesive remnant index between the groups and a qualitative assessment of changes in the enamel surface following bleaching using SEM and light microscopy. In particular, the SEM images of the resin/enamel interface and the enamel surface demonstrating the changes produced by increasingly aggressive bleaching are compelling. The changes in the resin/enamel interface are attributed to the release of residual oxygen from the enamel surface in the weeks subsequent to bleaching causing bubbling and therefore increased porosity in the adhesive layer. Although it is thought that this process becomes less as time elapses following the bleaching process, the time at which its effects become negligible is uncertain. In addition, bleaching has mild etching effect on the enamel surface.

This study looked at the effects seven days after light activated bleaching and also after two light activated bleaching treatments separated by an accelerated artificial aging process equivalent to five years of natural aging. The results are in alignment with several other studies which show that although bleached tooth surfaces generally seem to demonstrate lower bond strengths than unbleached enamel, these bond strengths are adequate for clinical purposes and not significantly different from unbleached enamel. In addition, this study found a different pattern in the ARI scores with the group which had the two bleaching treatments having failures occurring principally within the adhesive rather than at the bracket/adhesive interface.

This interesting study expands our knowledge about the effect of bleaching on bond strength, the adhesive interface and the effect of bleaching on the tooth surface and is aligned with other studies on the same subject. Clinically, this paper might influence our clinical diagnosis and treatment as follows:

- bleaching does not increase bond strength
- bleaching with 3% hydrogen peroxide probably results in a small reduction in bond strength compared with bonding to unbleached surfaces but this does not reach statistical significance
- multiple bleaching treatments aggravate this effect
- the explanation for the reduction in bond strength is the release of residual oxygen from the enamel surface which causes bubbling in the adhesive layer; the mild etching effect of bleaching either has no effect or is masked by the effect of oxygen release
- the tooth surface returns to its pre-bleached state approximately three months after bleaching but maybe sooner
- if an orthodontic appliance has to be fitted seven days after bleaching, the bond strength may be a little less than to a unbleached surface but this is not statistically significant and may not be clinically detectable
- the longer time that elapses between bleaching and bonding, the more time the enamel will have had to revert to its prebleached state with the implication that bond strengths will be less affected by bleaching and increasingly return to the levels of an unbleached tooth.

In particular, the reader's attention is drawn to Figs. 5 and 6 which demonstrate the effect of bleaching on the resin/enamel interface and the enamel surface respectively.

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Morphological observations of the medial pterygoid muscle by the superimposition of images obtained by lateral cephalogram and MRI

Shinta Wirahadi Kusumah, Shoichi Suzuki, Kouichi Itoh, Ryoji Higashino, Naoto Ohbayashi, Tohru Kurabayashi and Keiji Moriyama

The nature of the relationship between facial growth and the structure/function of the muscles of mastication remains controversial. Overall, studies have ranged from animal investigations, mainly through non-invasive dietary regulation, or more recently through injection of Botulinum neurotoxin, as a means of providing an alteration of muscle function, through to human biopsy based, molecular and genetic studies of muscle structure. Alongside developments in three-dimensional (3D) ultrasonography and magnetic resonance imaging techniques, masticatory muscle cross-sectional area and volume have been also related to craniofacial form. Principally, because of ease of identification or access, the majority of these studies have been based on investigations of masseter muscle structure and function. Equally relevant is the medial pterygoid muscle as it is also finds its origins and insertions in both the maxilla and mandible. This study had two aims: to observe the possible relationship between craniofacial morphology and the shape and orientation of the medial pterygoid muscle in patients with a range of skeletal patterns, and secondly, to investigate whether the orientation and volume of the muscle correlates with facial form. The study used a technique, previously reported by one of the authors, of superimposing the contour of medial pterygoid muscle, as established from MRI, on the corresponding cephalogram. Although the cephalograms were taken in the upright position whilst the MRI scans were in the supine position, potential alterations in the patient's mandibular position were overcome through the use of a previously prepared, interocclusal wax record. The study sample had a relatively large age range (13.5 to 27.5 years) and, as acknowledged by the authors, the sample was small (16 patients), particularly when considering the number of correlations investigated. Nevertheless, the study forms a useful contribution to the on-going debate as to the muscle–bone relationship and its relevance to both aetiology of facial form and the correction of facial deformity.

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Prediction of Space Available for Unerupted Permanent Canine and Premolars in Nepalese Population

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Space analysis techniques aim to give a prediction of space discrepancy in the established permanent dentition whilst the patient is still in the mixed dentition phase. The most popular traditional techniques such as the Moyer's, and the Tanaka and Johnston techniques, were originally based on population data sourced mainly from white, Caucasian populations. It has been widely recognised that such data may not necessarily accurately represent tooth size in other ethnic groups, and studies such as detailed in this current paper serve to verify that suspicion. Detailed tooth-size data for a number of diverse ethnic groups is now available and this latest study proposes a more accurate regression equation for a Nepalese population. Whilst further refinement based on a larger sample is desirable, this work should enable more meaningful prediction of unerupted premolar and permanent canine size in subjects from this ethnic group.

The value of such predictions has been the subject of some debate over the years. With modern orthodontic mechanics, the components of malocclusion arising from space discrepancy and space loss can usually be readily corrected. Some Orthodontists and Paediatric Dentists are not especially concerned with considerations such as space maintenance during the mixed dentition phase, preferring to allow the malocclusion to develop, dealing with any discrepancies once all permanent teeth have erupted. Such an approach may be valid in societies where there is easy and equitable access to state-of-the-art orthodontic care, but may disadvantage individuals in countries where access to orthodontic care is less readily available. Also, this 'let it all happen and sort it out later' methodology may not be the most efficient use of resources (or patient time).

It is easy to think that this argument only applies to 'developing' countries. However, in many so-called 'developed' countries, access to orthodontic care may only be available to those who can pay. Even where state-funded orthodontic care is available, such as in the UK, access may be rationed. Treatment may be limited to only those with the more severe malocclusions, those with lower treatment-need scores falling short of the threshold for funding. Hence, even in countries with well established health care systems, health economics might serve to highlight the value of careful management of the developing dentition, including the use of tools such as mixed dentition analysis.

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