EDITORIAL

Entering the 3-D Era in Orthodontic Imaging

In the past decade, orthodontics entered its maturation period largely because of the accumulation of a high volume of scientific data. High-tech information derived from advances in related scientific and medical fields, such as material science and medical imaging, started to give a more thorough perspective on diagnosis and treatment modalities.

Researchers in orthodontics were heavily occupied for more than 50 years with the study of cephalometric images to unravel craniofacial growth patterns and deviations. The limitations of a 2-dimensional image representing a 3-dimensional structure quickly became apparent. Orthodontists and dentofacial orthopedists were in need of more accurate information regarding the growth and development of hard and soft craniofacial tissues. Cone-beam computer tomography (CBCT) was introduced to dentistry in the late 1990s, and in the past 5 years, CBCT technology has gradually started to take its place in orthodontic diagnosis. The orthodontic community seems to be aware of this, as more than 5 articles about CBCT technology appeared in major orthodontic journals in only the past few months. It seems that there are 2 main problems that need to be overcome: irradiation doses (not a fair comparison to conventional images)[1,2] and accuracy/reliability of measurements of CBCT images.[3–5] Drs Cattaneo and Melsen from the University of Aarchus, Denmark, address all these points in this issue's Frontiers in Clinical Research article. In this exceptional review, Drs Cattaneo and Melsen provide information about how a CBCT scanner works, products currently available, and the validity of the information CBCT scanners provide. As with any new technique and advancement, clinicians need training and education. Close collaboration with a maxillofacial radiologist is necessary. Drs Cattaneo and Melsen conclude that it takes time for a new technology to "be adopted and become an industry standard" when it replaces conventional techniques, as "CBCT imaging appears to be an unstoppable trend."

Mechanical trauma from orthodontic appliances can cause a mucocele in the lower lip, as Drs Pedron, dos Santos, Perrella, Borsatti, and Adde report from Sao Paulo, Brazil. Surgical intervention resolved the problem, but close monitoring of the wound is suggested.

Drs Singh, Sehgal, Pradhan, Chandna, and Gupta from Dental College, Yamunanagar, Haryana, India, report higher nickel and chromium concentrations in saliva after fixed orthodontic appliance insertion compared to baseline levels, with maximum concentration seen in the first week after placement.

Drs Palomares, Cal-Neto, Sampiao-Filho, Almeida, and Miguel from Rio de Janeiro, Brazil, provide an in vitro report on the effect of high-intensity LED units at reduced curing time on the in vitro bond strength of orthodontic brackets.

Evolution of human dentition has a great impact on orthodontic treatment, and tooth agenesis appears to be a common trend. Most often, premolar agenesis and overretention of deciduous second molars represent clinical situations in need of resolution. Dr Roy Sabri from Beirut, Lebanon, discusses orthodontic treatment alternatives such as orthodontic space closure, space opening, or retaining deciduous molars, for this situation.

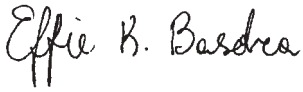
The next 2 articles come from the University of Hong Kong, China. Drs Lee, Leung, Wong, and Rabie update clinicians on the current concepts, techniques, and clinical applications of skeletal anchorage. In a thorough review of up-to-date literature, they provide a useful and elaborate guide for clinical indications, implant types, surgical sites, biomechanics, treatment time, and treatment outcomes.

The second article compares 2 groups of adult skeletal Class II patients, one treated with Herbst appliances and maximum jumping and the other with Herbst appliances and stepwise advancement. Drs Purkayastha, Rabie, and Wong believe that in both groups, correction occurred through skeletal and dental changes despite the subjects' ages. They suggest that in the stepwise sample, the amount of correction due to skeletal changes was higher, while in both groups, the soft tissue profile convexity was reduced significantly.

Dr Karad of India presents an approach for distalizing maxillary molars and describes the construction and clinical management of such.

Drs Kim, Choo, Hwang, and Chung from The Catholic University of Korea, Seoul, South Korea provide an excellent case report; how many of us have encountered the difficult problem of arranging ectopically impacted maxillary canines? Many choose, correctly, to leave them as is because of adjacent teeth root resorption problems, and some go the way of relocation. This case deals with the relocation of impacted maxillary canines by introducing a novel double-archwire mechanics using orthodontic mini-implants in a 14-year-old girl. Time and tissue reaction will show the worthiness of the whole procedure.

This issue's online articles are: by Dr Closs from Brazil on the "Occurrence, extension, and severity of gingival margin alterations post orthodontic treatment;" by Drs Altug-Atac, Dalci, and Memikoglu from Turkey on the "Skeletal Class II treatment with twin-force bite corrector;" by Drs Davidovitch and Krishnan of the United States and India, respectively, on "Adverse effects of orthodontics;" and by Drs Naini and Gill of England on "Tooth fracture associated with debonding a metal orthodontic bracket."



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Editor

1. Loubele M, Bogaerts R, Van Dijck E, et al. Comparison between effective radiation dose of CBCT and MSCT scanners for dentomaxillofacial applications. Eur J Radiol 2008 Jul 16.
2. Silva MA, Wolf U, Heinicke F, Bumann A, Visser H, Hirsch E. Cone-beam computed tomography for routine orthodontic treatment planning: A radiation dose evaluation. Am J Orthod Dentofacial Orthop 2008;133:640.e1–5.
3. Lagravère MO, Carey J, Toogood RW, Major PW. Three-dimensional accuracy of measurements made with software on cone-beam computed tomography images. Am J Orthod Dentofacial Orthop 2008; 134:112–116.
4. Periago DR, Scarfe WC, Moshiri M, Scheetz JP, Silveira AM, Farman AG. Linear accuracy and reliability of cone beam CT derived 3-dimensional images constructed using an orthodontic volumetric rendering program. Angle Orthod 2008;78:387–395.
5. Kumar V, Ludlow J, Soares Cevidanes LH, Mol A. In vivo comparison of conventional and cone beam CT synthesized cephalograms. Angle Orthod 2008;78:873–879.