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Application of current 3D technologies in orthodontics

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Statement of the Problem: The traditional two-dimensional imaging methods in orthodontics have limitations in providing a complete understanding of the complex three-dimensional anatomy of craniofacial structures. The advancement of 3D imaging technologies, such as Cone Beam Computed Tomography (CBCT) and the integration of Artificial Intelligence (AI) services, offer a promising solution for overcoming these limitations, enabling more accurate diagnostics and improved treatment planning.

The purpose of this study: This research aims to provide a comprehensive overview of the current 3D technologies and their practical application in orthodontics, with a specific focus on CBCT diagnostics and AI services. Through the presentation of clinical cases, will demonstrate the importance of utilizing 3D imaging for diagnosis and evaluation of treatment outcomes, showcasing the benefits of these advanced technologies in daily orthodontic practice. The key topics will include an introduction to 3D technologies, digital diagnostic, and planning tools, the relationship between the temporomandibular joint (TMJ) and craniofacial morphology and asymmetry, and clinical cases with 3D superimposition of CBCT images for outcome assessment.

Recent publications:

1. Bazargani, Farhan & Knode, Vanessa & Plaksin, Alexander & Magnuson, Anders & Ludwig, Björn. (2023). Three-dimensional comparison of tooth-borne and tooth-bone-borne RME appliances: a randomized controlled trial with 5-year follow-up. *European journal of orthodontics*.
2. Orhan, K., Shamshiev, M., Ezhov, M. et al. AI-based automatic segmentation of craniomaxillofacial anatomy from CBCT scans for automatic detection of pharyngeal airway evaluations in OSA patients. *Sci Rep* 12, 11863 (2022)
3. Martin, Domingo & Arraiz, Javier & Lilly, Pablo & Plaksin, Alexander. (2021). Orthodontic treatment with skeletal anchorage of a severe hyper divergent retrognathic patient. *AJO-DO Clinical Companion*. .

Biography

Alexander Plaksin, D.M.D., M.S., is an orthodontist with 15 years of experience, specializing in advanced imaging and complex case management. An active member of the AAO and WFO, he has held key positions at Diagnocat, and Dexis. As an Orthodontic Product Lead at Diagnocat, he developed algorithms for 2D and 3D image labeling and contributed to orthodontic IT products. At Dexis, he created an educational workshop on Computer Tomography diagnostics and provides training for orthodontists. With expertise in medical image processing, including Optical scans, CBCT, MSCT, and MRI is dedicated to incorporating cutting-edge technology in orthodontic practice and is a sought-after expert and educator in the field.

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