0343 3D Diagnosis of Dentofacial Deformities Using Cone-beam CT

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Objectives: To evaluate the skeletal three-dimensional morphology of dentofacial deformities, assessing diagnostic deviations in size, shape and position of all surfaces of the mandibular condyles, rami and body. Methods: Low-cost, low radiation cone-beam CT scans were taken at pre-treatment for 15 subjects with complex dentofacial deformities including resorption, fractures and asymmetries. Three-dimensional surface reconstructions were generated with a spatial resolution of 0.59 x 0.59 x 0.6 mm. 3D models of the cranial base, maxilla and mandible were constructed utilizing semi-automatic segmentation and manual editing. An interactive image analysis tool was used for navigation through any of the orthogonal slice windows. A three-dimensional graphical rendering of the volumetric data allowed graphic display, and navigation through the volumetric model. Results: The 3D models showed the condylar position was anteriorly displaced in the mandibular fossa in 5 of 6 asymmetric cases. The 3D display of patients with mandibular asymmetry revealed condylar head shape alterations in 5, condylar neck elongation in 1, discrepancy in the mandibular corpus width in 1, and discrepancy in the morphology of the mandibular lower border in 5 patients. Severe condylar resorption was observed in 1 of 8 subjects with skeletal open bite. One patient with reduced range of mouth opening showed an unanticipated bony projection on the medial surface of the ramus. Conclusion: 3D modeling of cone-beam CT images of patients with dentofacial deformities may be an effective low-cost method for precise, early, and detailed recognition of anomalies. This imaging method could decrease the need for additional surgical explorations. The technique has the potential to improve diagnosis, treatment planning and treatment outcomes for complex cases particularly those involving asymmetries and fractures. (Supported by NIDCR DE-05215).

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