



CFAO GRADUATE STUDENT POSTERBOARD ABSTRACTS

Sponsored By: 

University of Alberta

Development of a Three-dimensional method to segment the mandibular condyle from CBCT

Justin Kim, Manuel Lagravere, and Dan Romanyk – University of Alberta

Introduction: Despite recent advancements in using CBCT images for three-dimensional analysis of various craniofacial structures, segmentation methods of condyles continue to be challenging for clinicians. Previous research has explained that relatively low density of bone in the condylar area, various overlapping bony structures, and its proximity to the articular disc make accurate segmentation of mandibular condyles a challenging task.

Aim: The proposed study will develop and validate a technique for segmentation of mandibular condyles from 3D CBCT images.

Methods: Study skulls' mandibles were scanned using CBCT and three mandible models were fabricated using 3D-printer. CBCT images of 3D-printed mandibles and corresponding skulls were obtained using clinical protocol. Semi-automatic segmentation of condyles was completed using Avizo 9.0 software. Frankfurt plane was located and translated inferiorly until it reached the most inferior point of sigmoid notch, and condylar area superior to this plane was included for assessment. This technique was repeated three times a week apart to assess its reliability. This technique was validated for accuracy by comparing the segmented condylar volume obtained from CBCT to the corresponding volume obtained from the physical models using water displacement method.

Results: The developed semi-automatic segmentation of condyle exhibited excellent reliability (ICC=0.984~0.988) and there was no statistical difference between the condylar volumes obtained using semi-automatic segmentation technique from CBCT images and the condylar volumes from the physical models.