

Effect of Threshold Configuration on Accuracy in Upper Airway Analysis Using Cone Beam Computed Tomography

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Abstract : Objective: The objective is to determine the optimal threshold of Romexis software for the airway volume and minimum cross-section area (MCA) analysis using Image J as a gold standard. Materials and Methods: A total of ten cone-beam computed tomography (CBCT) images were collected. The airway volume and MCA of each patient were analyzed using the automatic airway segmentation function in the CBCT DICOM viewer (Romexis). Airway volume and MCA measurements were conducted on each CBCT sagittal view with fifteen different threshold values from the Romexis software, Ranging from 300 to 1000. Duplicate DICOM files, in axial view, were imported into Image J for concurrent airway volume and MCA analysis as the gold standard. The airway volume and MCA measured from Romexis and Image J were compared using a t-test with Bonferroni correction, and statistical significance was set at $p < 0.003$. Results: Concerning airway volume, thresholds of 600 to 850 as well as 1000, exhibited results that were not significantly distinct from those obtained through Image J. Regarding MCA, employing thresholds from 400 to 850 within Romexis Viewer showed no variance from Image J. Notably, within the threshold range of 600 to 850, there were no statistically significant differences observed in both airway volume and MCA analyses, in comparison to Image J. Conclusion: This study demonstrated that the utilization of Planmeca Romexis Viewer 6.4.3.3 within threshold range of 600 to 850 yields airway volume and MCA measurements that exhibit no statistically significant variance in comparison to measurements obtained through Image J. This outcome holds implications for diagnosing upper airway obstructions and post-orthodontic surgical monitoring.

Keywords : airway analysis, airway segmentation, cone beam computed tomography, threshold

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