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EFFECT OF ORTHODONTIC TREATMENT ON THE UPPER AIRWAY VOLUME

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Introduction: Currently, the influence of orthodontic treatment on the volume of the upper airway is not well understood. The aim of this study is to examine the effects of orthodontic treatment both with and without extractions on the anatomical characteristics of the upper airway in adults.

Methods: For this retrospective study, the pre and post orthodontic treatment CBCT scans of adult patients treated at the UMN Division of Orthodontics from 2008 and 2012 were reviewed. From a pool of 1680 patient records, 74 patients met the eligibility criteria of the study and were included for further analysis. 3D imaging analysis software was used to segment and measure upper airway regions including the nasopharynx (NP), the retropalatal (RP) and retroglossal (RG) areas of the oropharynx, as well as total airway (TA). Coefficient of variation and the intraclass correlation coefficient were calculated. The Wilcoxon signed-rank test was used to compare volumetric and minimal cross-sectional area changes from pre (T0) to post (T1) treatment.

Results: The reliability was high for all measurements with an ICC ≥ 0.82 . Cephalometric analysis revealed no significant skeletal changes from T0 to T1. The T0 to T1 treatment changes for the upper airway for the extraction and non-extraction groups were as follows: TA: $1039.6 \pm 3674.3 \text{ mm}^3$ vs. 1719.2 ± 4979.2 , NP: $136.1 \text{ mm}^3 \pm 1379.3$ vs. $-36.5 \text{ mm}^3 \pm 1139.8$, RP: $412.7 \text{ mm}^3 \pm 3042.5$ vs. $399.3 \text{ mm}^3 \pm 3294.6$, and RG $412.5 \text{ mm}^3 \pm 1503.2$ vs. $1109.3 \text{ mm}^3 \pm 2328.6$, respectively. The treatment changes for all airway regions examined were not significantly ($p > 0.05$) different between the extraction and non-extraction groups. Similarly, changes in the minimum cross-sectional area were also not significantly different between the two types of treatment.

Conclusion: Orthodontic treatment in adults does not cause clinically significant changes to the volume or minimally constricted area of the upper airway.

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