Does Variation in Anatomic Landmarks Affect Volumetric Changes in the Upper Airway Following Mandibular Setback Surgery?

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Purpose
While diminished airway volumes occur following isolated mandibular setback surgery, a relationship between the amount of setback and volumetric airway change has not been established. Establishing this relationship will allow the prediction of airway narrowing in response to the magnitude of mandibular setback and permit risk assessment of developing or worsening obstructive sleep apnea. This study aims to assess whether variations in chosen landmarks correlate with differences in airway volume changes after isolated bilateral sagittal split osteotomy (BSSO) with mandibular setback.

Materials and Methods
A retrospective study of patients who underwent isolated BSSO setback surgery at a single center from 1/1/2013 - 3/16/2020 was performed. Preoperative and immediate post-operative Cone beam CTs (CBCT) were evaluated in a standardized head position. The predictor variables included positional changes of the lower right first incisal edge, pogonion, genial tubercle, lower first molar furcation, as well as changes of the menton-gonion length. Outcome variables were upper airway volume and minimum axial cross-sectional area at the oropharyngeal and hypopharyngeal levels. Statistical analysis was performed using a simple linear regression and multiple linear regression with stepwise selection to determine individual and multiple predictor variables’ effects on outcome variables.

Results
In 31 total subjects, the mean mandibular skeletal setback change was 1.41mm using gonion-menton length, 6.11mm at the lower right incisor, 4.11mm at pogonion, 4.38mm at the genial tubercle, 4.90 at B point and 5.51mm at lower first molar furcation. The remaining data showed no statistically significant correlation between predictor variables and upper airway dimensional change (P > .05).

Conclusion
Within the ranges shown in the study sample, the magnitude of mandibular setback setback as measured by various methods could not be correlated with upper airway volume and minimum axial area changes on CBCT. Clinical judgement using other factors such as OSA screening remain important, whereas methods other than static imaging should be strongly considered in further investigating this topic.