READER'S FORUM

Oh KM, Kim MA, Youn JK, Cho HJ, Park YH

Three-dimensional evaluation of the relationship between nasopharyngeal airway shape and adenoid size in children.

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Q1. As adenoid plane is determined in the multiple planar reconstruction (MPR) images, the validity of reorientation methods would be critical. Authors mentioned that cone-beam computed tomography (CBCT) was taken under the natural head position (mirror position) and it was further reoriented using the Frankfurt horizontal (FH) plane constructed from the midpoint between the right and left porions and both orbitales. If the discrepancy between the horizontal plane at natural head position and the FH plane is shown, how did you calibrate the difference to set an ideal reference plane?

Q2. The adenoid plane is constructed as perpendicular to the midsagittal plane and FH plane, which is tangent to the most enlarged adenoids. Therefore, the nasopharyngeal airway cut obliquely and the cross sectional image in the frontal plane in Figure 2 did not reveal the 'minimum cross sectional area' commonly used for the evaluation of airway. Also, the major axis of the adenoids was not used to construct adenoid plane, the real depth or width of adenoid could not be confirmed in Figure 2. Could you explain the rationale for the selection of adenoid plane used in this study?

Q3. Because CBCT does not provide absolute value

of density, the determination of threshold value is important to evaluate the soft tissue, especially airway. In this study, how did you establish the range of the threshold value from -1,024 to -300 HU to isolate nasopharyngeal airway space?

Q4. Do you have any criteria to recommend adenoidectomy in children (department of otorhinolaryngology refer) based on the evaluation of the adenoid size and the nasopharyngeal airway using three-dimensional (3D) CBCT?

Questioned by

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A1. Previous studies also had referred the relationship between head position and radiographic errors. Solow and Sandham¹ hypothesized that a change in head posture affects the craniocervical angle and the position of the jaw and tongue. A postural change such as head extension causes a down-backward rotation of the mandible. This alteration of jaw posture leads to stretching of the lips, cheeks, and musculature and affects malocclusion and growth pattern. Then, the airway is opened and stabilized as necessary to compensate for the reduced respiratory function caused by the constricted airway and to maintain the airway.¹⁻³ Therefore, we wanted to take CBCT scanning with children's heads in the natural upright position to represent their usual and typical posture in this study. Because FH plane was taken from a stabilized CBCT image only as a reference plane, the measurements on adenoid plane is not affected by horizontal plane.

Therefore, it would not be meaningful to calibrate the difference between the horizontal plane at natural head position and the FH plane.

A2. It is truth that the minimum cross sectional area was exactly on the oblique sectional plane where the most enlarged adenoid was included. However, we could not acquire the obliquely sectioned image of airway, because it is difficult to find absolute point to cut the oblique section in 3D image with InVivoDental software (Anatomage Inc., San Jose, CA, USA). Therefore, we established adenoid plane which was considered as the most similar to oblique section. The way of establishing the measurements was referred from the study of Kolo et al.⁴ In future studies it may be possible to get more precise measurements when other programs become available to show the oblique sectional images without extra standard.

A3. InVivoDental software (Anatomage Inc., San Jose, CA, USA) which we used in this study has the recommended range of the threshold value to evaluate the anatomic structures. When evaluating soft tissue including the nasopharyngeal airway, it was recommended to establish the threshold value from -1,024 to -300 HU. Therefore, we thought that it was the suitable value with reference to their recommendation.

A4. It is meaningful to know that narrow and flat

type and a small nasopharyngeal airway volume might be related to the degree of adenoid hypertrophy. The mean values of children's airway were shown in Table 2 (these are not absolute ones, of course). When clinicians diagnose, it may be helpful to consider the values and determine the shape of a specific type of a nasopharyngeal airway.

References

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