論 文 要 旨

Effect of palatine tonsil hypertrophy on tongue posture and maxillofacial dentition: A pharyngeal airway computational fluid dynamics study

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ABSTRACT

Objectives: This study aimed to clarify the effect of palatine tonsil hypertrophy-induced ventilation obstruction on maxillofacial dentition morphology using computational fluid dynamics (CFD) to represent tongue posture and maxillofacial dentition three dimensionally.

Materials and Methods: We analyzed data of 20 patients with tonsil hypertrophy (tonsil hypertrophy group (TG); 9.0 years old, seven boys) and a comparison group (CG) of 20 patients without tonsil hyperplasia (comparison group; 9.4 years old, 10 boys). Cone-beam computed tomography and CFD data were used to assess the effects of palatine tonsil hypertrophy on pharyngeal airway ventilation, tongue posture, and morphology of the maxillofacial dentition.

Results: The TG exhibited significantly greater depth, narrower width, smaller cross-sectional area of the pharyngeal airway, and narrower maxillary dental arch with Class II than the CG. Additionally, the tongue was positioned significantly more anteriorly and inferiorly in the TG than that in the CG.

Conclusions: Our data suggest that hypertrophy of the palatine tonsils narrows the pharyngeal airway, resulting in a smaller cross-sectional area. Widening of the pharyngeal airway may occur due to compensatory anterior displacement of the tongue to prevent ventilation obstruction. This may decrease palatal support, disturbing the pressure balance of the maxillary molar region between the buccal and palatal sides and resulting in lateral undergrowth of the maxillary bone and narrowing of the maxillary dental arch.