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ASSESSMENT OF THE HYOID BONE POSITION IN MALOCCLUSIONS**Kobtseva O.A.***PhD in Medicine, as. prof.*

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Abstract. *The purpose of the study.* To conduct an analysis of the scientific literature regarding the available methods of cephalometric diagnosis of the position of the hyoid bone.

Results. *The articles analyzed mention that hyoid bone position differs in each type of malocclusion and founded significant differences in hyoid bone position, tongue position, and pharyngeal airway dimension in the three skeletal malocclusions. The hyoid bone is positioned inferior and anterior in Class I; more inferior and posterior in Class II; and more anterior and superior in Class III. The hyoid bone position was determined using Hyoid triangle analysis and assessment in horizontal and vertical planes. The hyoid triangle relates the hyoid bone to the vertebrae and to the mandible.*

Conclusions. *Studying the location of the head and hyoid bone on lateral cephalograms of the head in dynamics makes it possible to judge the functional state of the muscles of the maxillofacial area and neck. This makes it possible to predict the length of the retention period after the elimination of occlusion abnormalities, which is important for the non-recurrence treatment of dental occlusal disorders.*

Key words: *hyoid bone, cephalometric analysis, airway, malocclusion.*

Introduction.

The hyoid bone plays a key role in chewing, phonation, and swallowing. It also helps keep the airways unobstructed due to the attachment of the infrahyoid (omohyoid) muscle to the shoulder girdle. In addition, this bone is closely related to the tongue, as the genioglossus and the geniohyoid muscle join them. Hyoid bone position plays an essential and active role in achieving postural balance and patency of the pharyngeal airway [1].

The purpose of the study. To conduct an analysis of the scientific literature regarding the available methods of cephalometric diagnosis of the position of the hyoid bone.

Material and Methods.

A Medline-Pubmed database search was performed to identify relevant articles. For this review, the literature was searched for published studies on the assessment of the hyoid bone position on lateral head cephalograms.

Results.

The anterior limit of the pharyngeal airway space is formed by the hyoid. The pharyngeal airway space thus is affected by the position of the hyoid bone. Obstructive sleep apnea patients have been associated with a possibility of narrowing of pharyngeal airway space. Thus, the position of hyoid bone and position of tongue can be considered to be determinants of pharyngeal airway space [2, p. 353]. The analysis and evaluation of the hyoid bone position, tongue position, and pharyngeal airway in malocclusions have received significant attention in the literature due to the need for a complete diagnosis and an effective treatment plan. This suggests that the stomatognathic system should be evaluated comprehensively and not partially [1]. In

order to determine the effectiveness of orthodontic treatment in patients with malocclusion, it is necessary to study the position of the hyoid bone before and after the treatment in order to determine its effectiveness and prevent possible recurrences of the disease [3, p. 29].

The articles analyzed mention that hyoid bone position differs in each type of malocclusion and founded significant differences in hyoid bone position, tongue position, and pharyngeal airway dimension in the three skeletal malocclusions. The hyoid bone is positioned inferior and anterior in Class I; more inferior and posterior in Class II; and more anterior and superior in Class III. Additionally, an inverse inclination of the hyoid bone (long axis of the hyoid bone not parallel to the mandibular plane) is observed in Class III patients. Other studies show a statistically significant difference in the hyoid bone's position and inclination toward the palatal plane and toward the basion-nasion line in Class I and III patients [1].

The hyoid bone position was determined using Hyoid triangle analysis (fig.1). The triangle is formed by joining the cephalometric points retrognathion (the most inferior, posterior point on the mandibular symphysis), hyoidale (the most superior, anterior point on the body of the hyoid bone) and C3 (the most anteroinferior point on the third cervical vertebra). The hyoid triangle relates the hyoid bone to the vertebrae and to the mandible [2, p. 354].

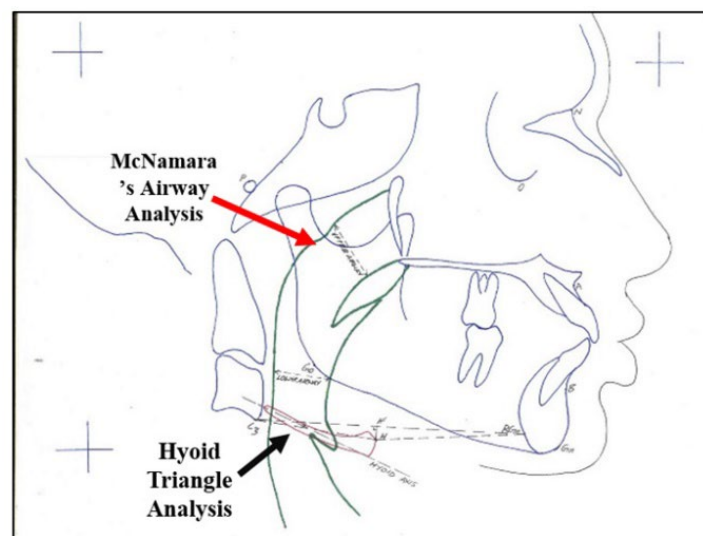


Figure 1: Mc Namara's analysis and Hyoid triangle analysis.

Source of the figure: [2, p. 354].

The position of hyoid bone in horizontal plane is «ah-cv» [from ah to cv and parallel to FH] (fig.2). Anterior hyoid (ah) - the most anterior and superior point on the body of the hyoid bone, (represents the inferior part of the tongue). Cervical vertebrae (cv), the line overlying the anterior surface of the 2nd and 3rd cervical vertebrae was the reference point. Frankfort horizontal plane (FH), line joining the orbitale to the porion. Average value = 24-30 mm. The position of hyoid bone in vertical plane is «ah \perp FH» [from ah perpendicular to FH] Average value = 70,5-79,4 mm [3, p. 56].

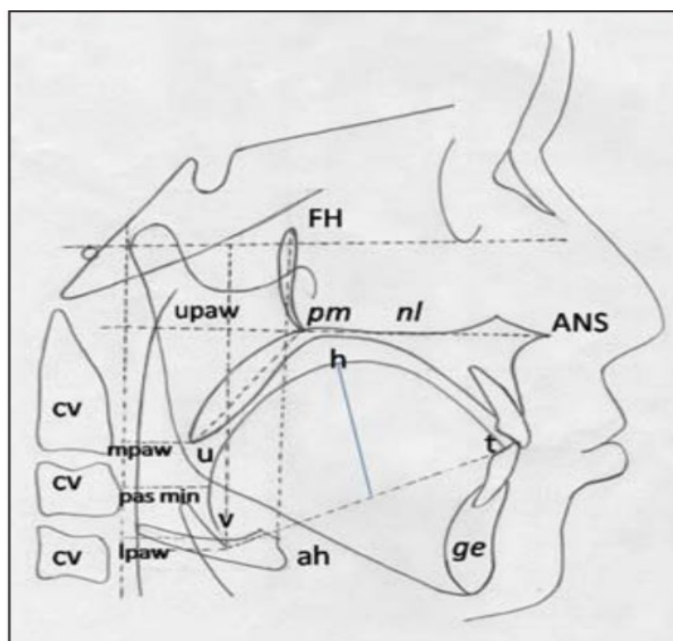


Figure 2: Representation of landmarks of the position of hyoid bone in horizontal and vertical planes.

Source of the figure: [3, p. 57].

Conclusions.

Cephalometric measurements are reliable and reproducible. Studying the location of the head and hyoid bone on lateral cephalograms of the head in dynamics makes it possible to judge the functional state of the muscles of the maxillofacial area and neck. This makes it possible to predict the length of the retention period after the elimination of occlusion abnormalities, which is important for the non-recurrence treatment of dental occlusal disorders.

References:

1. Espada De-La-Cruz, M., Soldevilla Galarza, L., & Mattos-Vela, M. (2021). Hyoid position, lingual position and dimension of the pharyngeal airway according to skeletal malocclusion. *Odontoestomatología*, 23(38). Doi:10.22592/ode2021n37e305
2. Jose. N.P, Sehgal. A., Shetty, S., Mary, L. & Ashith, M.V. (2019). Correlation Between Hyoid Bone and Pharyngeal Airway Space in Differing Vertical Skeletal Dysplasia. *Biomed Pharmacol J*, 12(1). Doi: [10.13005/bpj/1647](https://doi.org/10.13005/bpj/1647)
3. Drohomyretska, M.S., Bilous, M.K., Kushpela, Yu.I., Voitovych, O.A. (2015). Kranio-posturalna adaptatsiia u ortodontychnykh patsiientiv. *Mystetstvo likuvannia*. №3–4 (119–120). S. 54-60. UPL: <http://www.health-medix.com/> [in Ukrainian].
4. Guttal, Kruthika & Burde, Krishna. (2013). Cephalometric evaluation of upper airway in healthy adult population: A preliminary study. *Journal of oral & maxillofacial radiology*. Doi:10.4103/2321-3841.120115

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