

The Anatomical Basis of The Symptoms of An Elongated Styloid Process

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Abstract

The styloid process is a bony process of the temporal bone of cranium. The stylohyoid ligament that attaches to the apex of the process may also be seen ossified in various radiological images. We can come across some variations about the styloid process including solitary, duplicated, incomplete ossified, the absence of an ossified process (unilateral or bilateral) and ossified stylohyoid ligament in literature and clinical practice. The symptoms that bring the patients with the elongated styloid process to medical centres are mostly related to some neurovascular structures situated around this process. Therefore understanding the anatomy of styloid process and around itself better is important to shorten the diagnosis time of the clinician about the elongated styloid process.

Keywords: elongated styloid process, Eagle syndrome, variation

Özet

Processus styloideus; cranium'da os temporale'ye ait bir kemik çıkıntısıdır. Processus styloideus'un ucuna bağlanan ligamentum stylohyoideum da çeşitli radyolojik görüntülerde kemikleşmiş olarak görülebilir. Literatürde ve klinik hayatta processus styloideus'un soliter, duplike, inkomplet kemikleşmiş, kemikleşmiş bir processus styloideus'un unilateral veya bilateral yokluğu ve kemikleşmiş stylohyoid ligament gibi morfolojik varyasyonları karşımıza çıkabilir. Uzamış processus styloideus'a sahip hastaları kliniğe getiren semptomlar processus styloideus etrafında bulunan bazı nörovasküler yapılar ile ilişkilidir. Bu yüzden processus styloideus ve etrafındaki bölgenin anatomisinin daha iyi anlaşılması uzamış processus styloideus ile ilgili tanı koyma süresini kısaltmak açısından önemlidir.

Anahtar kelimeler: uzamış processus styloideus, Eagle sendromu, varyasyon

Introduction

The styloid process (SP) is a tapering, cylindrical, thin, long and cartilaginous bony process which belongs to the temporal bone of the cranium. The process which is situated anteromedial to stylo-mastoid foramen, and lateral to jugular foramen and carotid canal; extends to medial, caudal and anterior¹ (Figure 1).

The tip of SP continues with the stylohyoid ligament that attaches to the lesser horn of the hyoid bone. SP and the stylohyoid ligament develops embryologically both from the first and the second branchial arches and the Reichert cartilage that binds the SP to the hyoid bone in foetal development². The SP ossifies between the 5-8 years after birth and continues to lengthen^{3,4}. Elongation of the SP slows down in about 30 years of life⁵⁻⁷. The SP, the lesser horn of the hyoid bone, and the stylohyoid ligament are a kind of a chain⁸. This chain consists of four parts. The first part namely the tympanohyal part makes the base of the SP and the second part namely the stylohyal part makes the body of the SP. The third part which is called ceratohyal part constitutes the stylohyoid ligament and the last part namely the hypohyal part brings in the lesser horn of the hyoid bone^{3,4,9,10}

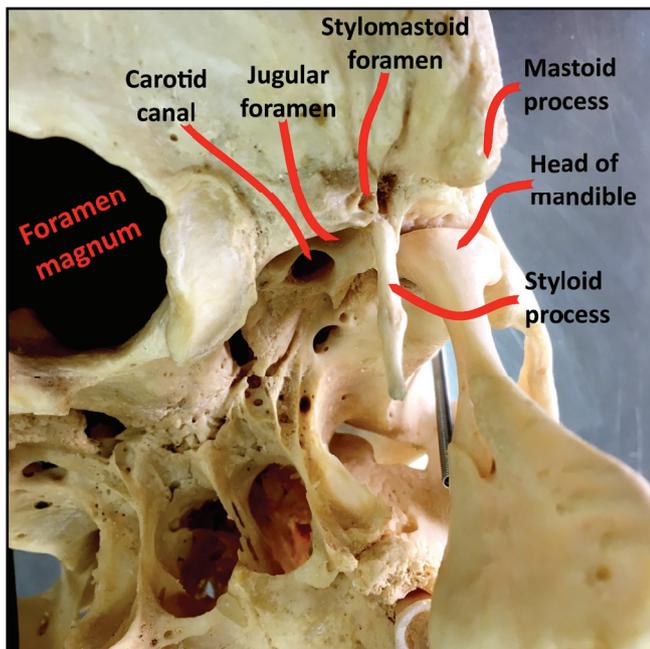


FIGURE 1: Right posteroinferior aspect to the base of cranium.

Medial to the SP are the internal carotid artery and the sympathetic plexus covering this artery, the internal jugular vein, and the

cranial nerves IX., X., XI. and XII.¹¹ The apex of the SP is just lateral to tonsillar fossa at the lateral pharyngeal wall and between the internal and the external carotid arteries. The facial nerve proceeds anterior and medial to the SP. The glossopharyngeal nerve bends near SP just after emerging from the jugular foramen¹¹

The normal length of the SP varies between 20-32 mm in adults according to the literature^{3,7-10,12-17}. And the minimum length that determines the SP as elongated varies in literature as 30 mm^{8,9,18-20} 40 mm⁷ or 45 mm²¹. These different results may be due to performing different measuring methods for SP. Some authors suggest that measuring the SP using plain bones gives the best results compared to radiographs²².

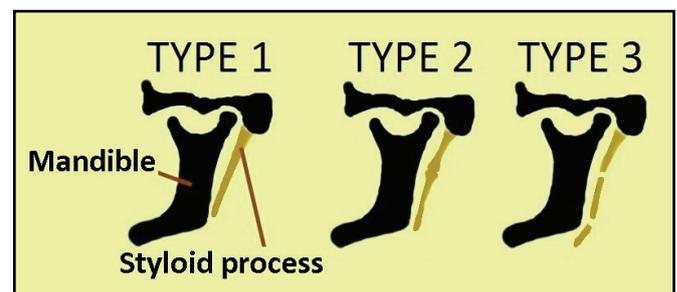


FIGURE 2: The three types of an elongated styloid process according to Langlais classification. (The figure is revised from the article of İlğüy M. et al. 2005)

The elongated SP is classified into three groups according to Langlais (FIGURE 2)¹⁵. Type 1 is an elongated SP without segment or articulation, type 2 is an articulated SP and lastly type 3 is a segmented SP¹⁵. The incidence of the elongated SP vary as 1%, 4%, 8.2%, 18,2%, 21%, 28%, 29%, 32% in literature^{7,11,15,18,19,22-28}. Besides elongation, the SP has some variations including solitary SP, duplicated SP, incomplete ossified SP, the absence of an ossified SP unilaterally or bilaterally, and ossified stylohyoid ligament¹¹

In adults, a partial or complete ossification of the stylohyoid ligament causes pain^{7,9,29}. Four percent of the people with the elongated SP is reported to be asymptomatic^{30,31}. And the fact that the symptomatic people are mostly over 40 years old suggests that elasticity decreases with ageing among regional ligaments and soft tissues¹⁰.

The most agreed opinions about why the SP elongates are the congenital elongation of the SP and calcification and ossification

of the stylohyoid ligament^{3,4,23,32}. Eagle – an otorhinolaryngologist – reported some cases telling that elongation and ossification of SP may occur in a few months after tonsillectomy emerging some cervicofacial symptoms, and he determined “The Eagle Syndrome”²³. But the Eagle Syndrome has some other synonyms called “Elongated Styloid Process Syndrome”, “Styloid Process-Carotid Artery Syndrome”, “Stylohyoid Syndrome” and “Styloid Process Neuralgia”¹⁵. Fini et al. showed that the Eagle Syndrome is related to tonsillectomy¹³. SP may also elongate by traumas of mineralised stylohyoid ligament³³. According to Thot et al., isolated elongation of SP is not the real reason of Eagle Syndrome, but the tapering tip of the elongated SP that extends more anterior and medial is the reason of the syndrome³⁴.

The most common complaint of the eagle syndrome is earache^{3,4,7-9,12,13,35}. Besides pain in the oropharynx and abnormal findings in palpation of the tonsillar region³⁶; intermittent glossitis³⁷, dysphagia, globus hystericus³⁸, and referred pain at the ear and mastoid region³⁹ may be complaints of Eagle Syndrome. Some other symptoms supporting the diagnosis of the syndrome are a pain in head rotation, recurrent headache, vertigo, facial pain, cephalgia and dysphonia^{40,43}.

The symptoms emerged in elongated SP are usually related to the anatomical structures around the SP^{3,4,12}. A sore throat, earache and foreign body feeling symptoms of the Eagle Syndrome are all because of relationships of SP with pharyngeal and cervical nerves⁴⁴. The stylohyoid ligament approaches glossopharyngeal nerve in Eagle Syndrome resulting in the glossopharyngeal neurological symptoms. The SP which is elongated and flexed to medial irritates especially lateral pharyngeal wall so the patients may apply to medical centres with the complaints including a recurrent sore throat, foreign body feeling and dysphagia.

Involvement of the cranial nerves situated at parapharyngeal space and in retromandibular fossa may come out the facial pain in Eagle Syndrome. The tip of the SP deviated to lateral is in close contact with the bifurcation of the external carotid artery where the terminal branches including the maxillary and superficial temporal artery come out. The tip of the elongated SP hits the artery at the neck of the mandible. Lastly in the parapharyngeal space between the lateral mass of the atlas vertebra and the SP deviated in a dorsal direction, some vital structures including cranial nerves IX–XII.,

truncus sympathicus, internal carotid artery and internal jugular vein may be entrapped⁴⁵. Lastly the stylopharyngeal, stylohyoid and styloglossal muscles whose nerves are around the SP are all originated from the SP and have roles in mastication and swallowing⁹.

The clinicians may consider that the elongated SP among people is less common than it really is because most of them are asymptomatic and the symptomatic patients apply to various medical departments including otolaryngology, family practice, dentistry, neurology, neurosurgery and psychiatry⁴⁴. The symptoms that bring the patient to medical centres are mostly formed by the vital neurovascular structures around the elongated SP. Therefore understanding the anatomy of the region where the SP is situated better may shorten the diagnosis time by better establishing the relationships between the symptoms and the elongated SP resulting in gaining energy and time benefits.

Kaynaklar

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