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


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 stylomastoid 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 lengthen3,4. 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 bone3,4,9,10

The normal length of the SP varies between 20-32 mm in adults according to the literature3,7-10,12-17 And the minimum length that determines the SP as elongated varies in literature as 30 mm8,9,18-20 or 40 mm 7 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.

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 literature7,11,15,18,19,22-28. 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 pain7,9,29. Four percent of the people with the elongated SP is reported to be asymptomatic30,31. 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. 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”. But the Eagle Syndrome has some other synonyms called “Elongated Styloid Process Syndrome”, “Styloid Process-Carotid Artery Syndrome”, “Stylohyoid Syndrome” and “Styloid Process Neuralgia”. Fini et al. showed that the Eagle Syndrome is related to tonsillectomy. SP may also elongate by traumas of mineralised stylohyoid ligament. 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 syndrome.

The most common complaint of the eagle syndrome is earache. Besides pain in the oropharynx and abnormal findings in palpation of the tonsillar region; intermittent glossitis, dysphagia, globus hystericus, and referred pain at the ear and mastoid region 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.

The symptoms emerged in elongated SP are usually related to the anatomical structures around the SP. A sore throat, earache and foreign body feeling symptoms of the Eagle Syndrome are all because of relationships of SP with pharyngeal and cervical nerves. The stylohyoid ligament approaches glosopharyngeal nerve in Eagle Syndrome resulting in the glosopharyngeal 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 sympathetic, internal carotid artery and internal jugular vein may be entrapped. 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 swallowing.

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 psychiatry. 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.

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