HORIZONS

Elongated Styloid Process:Anatomical Variations

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The present case is regarding the incidental finding of elongated styloid process during routine dissection of a male middle aged cadaver. The length of the styloid process from the base to the tip was 54 mm on the right side and 52 mm on the left side and the length of the entire stylohyoid chain was 63 mm on the right side and 62 mm on the left side. A widespread terminology is found in the literature to express the elongation of styloid process. Some consider the calcification of stylohyoid chain the best terminology. (1, 2, 3).

Variation is the law of nature. Every human is unique anatomically to such an extent that even identical twins are not alike. Styloid process is derived from the Greek word 'Stylos' meaning a pillar. The styloid process is normally a cylindrical bone which arises from the temporal bone in front of the stylomastoid foramen. The attached structures include stylopharyngeous, stylohyoid and styloglossus muscles and stylohyoid and stylomandibular ligaments. Reviewing articles we found that the length of the styloid process varies from 25 mm to 30 mm with 28.00 mm as the mean.

'Elongated styloid process' a term used since a publication by Eagle in reports concerning findings in dentomaxillofacial and ear- nose- throat patients (4).The term defines a styloid process that is longer then normal (25 to 30 mm) and thus associated with advanced calcification of the process and its ligaments .Eagle's definition was that the normal styloid process measures between 2.5 to 3 cms. His method of measurement was not described but his examples showed lateral radiographs of the skull According to MacDonald Jankowski's report the term calcified stylohyoid complex is used to describe the elongated styloid process with advanced calcification. (3). It is important that clinicians especially dentists and otolaryngologists are aware of the natural variations of styloid process and do not consider styloid process with a length of 30 mm as an abnormality or as an anomaly. The significance of the natural variation of the length for the definition 'Elongated 'is emphasized only by Moffat *et al* (5) who measured 80 styloid processes in cadavers from the departments of the London hospital. The widely used definitions and variations given by Eagle and used by many authors may be the reason why the styloid process has often been denoted as 'Elongated' or 'Megastyloid' even when it is measured only 30 mm. Mostly elongated styloid process is asymptomatic .Occasionally persons with styloid process over 30 mm were even said to be having Eagle's syndrome. According to some authors like T Jung *et al* (6) the styloid process showing lengths between 30 mm and 38 mm cannot be denoted as elongated. When about 20% of normal subjects exhibit such lengths and 30%even greater. Very few literatures cite the length of styloid process more then 50 mm. This case was reported for consistent terminology in anatomy and anthropology.

The submandibular region of a middle aged male cadaver was dissected according to Cunningham's Manual of practical Anatomy (7). Both the pterygoid muscles along with the maxillary artery and the branches of the mandibular nerve were exposed. The posterior belly of the digastric was exposed along with the stylohyoid. The stylohyoid muscle was followed to its origin and an elongated styloid process was exposed which was passing downward, forward and medially (Fig.-1). The stylohyoid muscle was seen to be arising as a narrow slip from the posterior surface of the styloid processes (Fig.-2). Then it became fleshy and passed along the superior border of the digastric and then divided to

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Fig-1 Showing Disected Styloid Process with Part of Submandibular Gland

Fig-2. Showing Styloid Process with Attached Stylohyoid Styloglossus & Stylopharyngeus Muscle

surround its intermediate tendon and is finally inserted on the hyoid. The styloglossus arose from the tip and anterior surface of the styloid process as well as from the upper part of the calcified stylohyoid ligament. It passed forward towards the tongue. The stylopharyngeous had a wider belly and was arising from the medial surface of the base of the styloid process and was passing between the external and internal carotid arteries. The glossopharyngeal nerve curved around the stylopharyngeus muscle. The stylohyoid ligament arose from the tip and was calcified in its upper part (Fig.-3). As the mandible was removed so only a small part of the stylomandibular ligament was seen emerging from the lateral surface of the styloid process. A Vernier calliper was used to measure in mm the elongated styloid process from base of the temporal bone to the tip of the structure. The landmark used as the base was the anatomical base of the styloid process .The length we measured corresponds to the free part of the styloid process situated on its frontal side. The definition of the tip of the styloid

Fig-3. Showing Elongated Styloid Process with Calcified Stylohyoid Ligament (SH)

process excluded the calcified parts of stylohyoid ligament. It was 54 mm on the right side and 52 mm on the left side. The entire stylohyoid complex that is from the base of the styloid process to the minor horn of the Hyoid bone was 63 mm on the right side and 62 mm on the left side.

Anatomical variation in the length of the styloid process and its stylohyoid chain is of profound anatomical, anthropological as well as clinical importance. The stylohyoid chain extends between the temporal bone and hyoid bones and is divided into 4 sections;

1) Tympanohyal- which forms the base of the styloid process
2) Stylohyal- which forms major portion of the styloid process
3) Ceratohyal- which forms the stylohyoid ligament
4) Hypohyal- which forms the minor horn of the hyoid bone

The first two sections form the stylohyoid process. The cartilage that is embryologically located at the stylohyoid ligament may undergo calcification of varying degrees which causes variations. The stylohyoid ligament may undergo ossification due to unknown causes such as osseous growth or trauma like tonsillectomy. As a result of advancements in examinations methods stylohyoid chain variations are more frequently diagnosed among the general population and an elongated styloid process is the most common variation amongst them. Normal range of the length of the styloid process differs among the studies in the literature. Eagle *et al* (4) reported the normal length of the styloid process as 2.5 cms other authors measured the length as 3 cms (8). It has been reported that it is probably symptomatic when the length exceeds 4cms (8). Furthermore many variations including the absence of the styloid process , double styloid outlet and localized or diffuse stylohyoid ossification have been detected (8). In the present study diffuse ossification of the stylohyoid chain was seen which is one of the rarest variation (9). A significant finding in the present study is the slight increase in the length pf the right styloid process as compared to the left one. As the length of 54 mm found in this study may be helpful for comparison purposes in future provided that the same landmarks are used.

Embryologically the styloid process ,stylohyoid ligament and the lesser cornu of the hyoid bone are developed from the second brachial arch called as the Reichert's cartilage because it is of cartilaginous origin .The ligament has the potential to mineralize (10). In the present case this is the reason for the increase in the length of the styloid process.

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