

Study the Length of Styloid process in South Indian adults dry skulls

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Abstract:

The styloid process is a bony projection located just anterior to the stylomastoid foramen. The normal length of which is approximately 20-25mm. Abnormal length of styloid process may cause chronic pain in the pharyngeal region, radiating otalgia and dystyloid processhagia described as Eagle`s syndrome. The present study focused to determine the mean length of styloid process and incidence elongated styloid process in adult dry skulls. We were assessed the mean length of the styloid process in dry skulls as 23.98 ± 4.32 mm and in males 24.92 ± 5.06 mm and in females 23.01 ± 4.02 mm. We were assessed right and left in males and females as 25.12 ± 4.2 mm, 23.65 ± 3.30 mm, 24.99 ± 5.20 mm and 23.15 ± 4.02 mm restyloid processectively. The males had greater length than the females and the differences in length on both the right and left side were statistically significant. The incidence of elongated styloid process was 3.87%.

Introduction:

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 styloid process is a thin, cylindrical, sharp osseous process, from the posterior part of lower surface of the petros part of temporal bone. The process is directed downwards to the front and slightly medially. The apex of the styloid process is connected with the ipsilateral lesser cornu of hyoid bone via stylohyoid ligament. The ligament represents from embryological view the continuation of the apex of styloid process. All the above The entire previous mentioned features constitute the stylohyoid chain. The whole chain derives embryologically from four cartilages: tympanohyale, stylohyale, ceratohyale, and hypohyale. The styloid process originates from the second branchial arch [1]. The length of styloid process which averages from 20 to 25 mm. The tip of the process is situated laterally from the pharyngeal wall and immediately behind the tonsil fossa, and critically between the internal and external carotid arteries. Three muscles and two ligaments are attached to the styloid process. It is considered elongated when it is longer than 30 mm [2]. Panoramic radiography is the most common projection to detect an elongated styloid process. The mean length of the styloid

process, determined by measuring from panoramic radiograph, was reported to range from 20 to 30 mm [3]. Elongated styloid process or calcified stylohyoid ligament can cause recurrent throat pain along with foreign body sensation, dystyloid processhagia or facial pain. Additional symptoms may include neck or throat pain with radiation to ipsilateral ear. The styloid process in some cases could be long enough to cause symptoms due to compression of surrounding neurovascular structures. Early in 1949 Eagle described the homonymous syndrome, characterized by elongated styloid process or ossified stylohyoid ligament . Variation is the law of nature. Every human is unique anatomically to such an extent that even identical twins are not alike. The attached structures include tylopharyngeous, 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 publication by Eagle in reports concerning findings in dentomaxillofacial and ear – nose – throat patients[4]. The aim of present study was to determine the mean length of stolid process and to evaluate and incidence of elongated styloid process in adult dry skulls.

Materials and methods:

The material used in this study consisted of 594 adult skulls in the Department of

anatomy, JJM Medical College, Davangere, Karnataka, India. This was examined to determine mean length of stolid process and to evaluate and incidence of elongated styloid process.

Results:

The study was carried out with a total of 594 adult dryskulls, 288(48.4%) females and 306(51.6%) males. The main length of styloid process was 23.98 ± 4.32 mm and in males 24.92 ± 5.06 mm and in females 23.01 ± 4.02 mm. The right and left in males and females as 25.12 ± 4.2 mm, 23.65 ± 3.30 mm, 24.99 ± 5.20 mm and 23.15 ± 4.02 mm restyloid processectively. The males had greater length than the females and the differences in length on both the right and left side were statistically significant. The incidence of elongated styloid process was 3.87%(23/594).

Discussion:

The styloid process is a slender, elongated, cylindrical bony projection from temporal bone that lies anteromedial to the mastoid process. It normally varies in length from 2 cm. to 3 cm [5], and a styloid process longer than 3 cms is found in 4 to 7 % of the population [6]. The styloid process has attachments to three muscles and two ligaments. The stylopharyngeus, stylohyoid and styloglossus muscles originate here. The Facial nerve emerges from the stylomastoid foramen posteriorly. The stylohyoid ligament extends from the styloid process to the lesser cornu of the hyoid bone. The stylohyoid process and ligament are derived from the first and second brachial arches, in addition to Reichert's cartilage. It has been demonstrated that during foetal development, Reichert's cartilage links the styloid bone to the hyoid bone. In the adult, the stylohyoid ligament, which is normally composed of dense fibrous connective tissue, may retain some of its

embryonic cartilage and thus have the potential to become partially or completely ossified. If these structures solidify, they can cause the pain and suffering[7,8]. Steinmann proposed various theories to explain ossification. These were: "Theory of reactive hyperplasia" – trauma can cause ossification at the end of the styloid process, down the length of the styloid ligament, since the styloid ligament contains remnants of its connective tissue and fibrocartilaginous origins, the potential for ossification remains; "Theory of reactive metaplasia" – an abnormal post-traumatic healing restyloid processense initiates the calcification of stylohyoid ligament; and "Theory of anatomic variance" – the early elongation of the styloid process and ossification of the styloid ligament are anatomical variations that occur without recognisable trauma[9].

Diagnosis can usually be made on physical examination by digital palpation of the styloid process in the tonsillar fossa which exacerbates the pain. In addition relief of symptoms with injection of an anaesthetic solution in to the tonsillar fossa is highly suggestive of this diagnosis. Radiographic work up should include antero-posterior and lateral skull films [10]. Diagnosis can also be made by plain radiography, orthopantomogram and CT scan. Injection of local anesthetic into tonsillar fossa relives pain[11]. The styloid process can be shortened through an intraoral or external approach. Other isolated cases were reported until Eagle described the syndrome in (1937). Eagle divided the syndrome into two categories. He described the classic syndrome as persistant pain in the pharynx, aggravated by swallowing with the pain frequently referred to the ear on the side of the elongated styloid process. He also notice increased

salivation, hesitancy, difficulty in swallowing, gagging and a foreign body sensation [12,13].

The first report of the Anatomic pathology was by Marchetti of Padua (1952) who described the ossification of the stylohyoid ligament. Other isolated cases were reported until Eagle described the syndrome in (1937). Fritz [14] reported that only 11 of 43 patients with the syndrome in his series had tonsillectomy. Both Eagle and Fritz reported that their patients were completely relieved of symptoms by the intraoral shortening of the styloid process. Harma [15] noted that bilateral elongation occurred in 50 % of the patients but only half of them had bilateral symptoms. Steinmann [9] reported the syndrome in 30 patients, 26 of whom did not have an elongated styloid process. Keur et al [7] assessed 1135 edentulous patients clinically and radio graphically to determine the relationship between the elongated styloid process and four symptoms frequently encountered in patients with Eagles syndrome. Woolery [16] stated that Eagle's syndrome occurs more frequently in women. Bozkir et al. [17] stated that the average length of the elongated styloid process was 53 mm but did not state the mean length of the styloid process in their sample. In a cadaver study of Moffat et al. [18], the length of styloid process was reported to vary between 15.2 and 47.7 mm, while Montelbetti et al. [19] claimed the length of normal styloid process was less than 25 mm. In a computed tomography study, Onbas et al. [20] estimated the length of the styloid process on both sides to vary between 0 and 62 mm (mean 26.8 mm). Winkler S [21] stated that styloid process greater than 25 mm in length, as measured on the PR from the cranial base to the tips of the processes, is considered elongated. However, since the most common findings vary between 20–30 mm, and when the mean lengths we found are considered, the styloid process should be

considered to be elongated when it is more than 30 mm in length. Lateral or medial deviation of the styloid process, which may result in impingement of the internal or external carotid artery, is described as another form of the syndrome. A referred pain may accompany the distribution of the artery, caused by stimulation of the sympathetic nerve plexus associated with the artery. Facial pain by impingement and stimulation of the external carotid artery plexus may develop [22]. The knowledge length of styloid and Elongated styloid process can be of great importance for the dentists, otolaryngologists and neurologists for performing surgical procedures in that area.

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