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Original Research

Morphometric analysis of styloid process of dry adult human skull

¹Bonita Gupte, ²Apurab Gupta, ³Sangeeta Gupta

¹Demonstrator, ³Professor, Department of Anatomy, GMC Jammu, Jammu and Kashmir, India; ²Assistant Professor, Department of ENT, GMC Jammu, Jammu and Kashmir, India

ABSTRACT:

Introduction: Styloid process is a thin, slender process that projects from anteroinferior aspect oftbone of the skull and it lies anterior to the Stylomastoid foramen. There are studies that describe that the range of styloid process to be 20-25 mm. Styloid process longer than 30mm is called as Elongated Styloid Syndrome, the incidence of which is 4%. It was 1st discovered by Eagle and hence is called Eagle's Syndrome. It produces clinical symptoms like neck and cervicofacial pain and occasionally dysphagia, tinnitus and otalgia. **Methods:** 36 adult dry human skulls were procured from the department of anatomy, GMC Jammu. Out of which 32 skulls were selected and length of right and left styloid process of each skull were measured, using Vernier calliper, range and mean we're then calculated. Other parameters included distance between two styloid process and the thickness at the base of styloid process. **Result:** The average length of right side was 16.42mm and left was 15. 39 mm. Average distance between the two mastoid process was found to be 66.78mm and the average thickness at the base of the styloid was 4.42mm. **Conclusion:** Many important anatomical structures lie close to the styloid process. Hence, they could be compressed while approaching them through intratemporal fossa. So, variations in the morAssistant Professor, ENT, GMC Jammu

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Corresponding author: Apurab Gupta, Assistant Professor, Department of ENT, GMC Jammu, Jammu and Kashmir, India

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INTRODUCTION

The world styloid process has been originated from the word 'Stylos' which means THE PILLAR in Greek language ^[1]. This process belongs to temporal bone of the skull and it lies anterior to Stylomastoid foramen ^[2]. The styloid process (SP) of temporal bone is slender, pointed and projects anteroinferiorly from inferior aspect of temporal bone.

It's length varies from 2.5 cm, sometimes as long as 8cm^{[3].} Relations of styloid process are very important. Laterally, it is covered by parotid gland, facial nerve crosses it's base. External Carotid artery crosses it's tip and medially it is separated from the beginning of Internal Jugular Vein by stylopharyngeus ^{[4].} Lateral to styloid process, tympanomastoid suture lies which accomodates auricular branch of Vagus nerve.^[5] ICA, IJV and 10th, 11th and 12th Cranial nerves lie on its side. medial In close proximity is the glossopharyngeal nerve, lying in the posterolateral wall of the Tonsillar fossa.^[6]

There are studies that describe the range of normal length of styloid process to be 20-25 cm ^[7]. However, Eagle had outlined the normal length of SP to be 25-

30 cm^[8]. SP longer than 30 mm is called Elongated Styloid Syndrome ^{[9].} Incidence of elongation of styloid process is around 4-7%; only 4% of patients with Elongated Styloid Syndrome show the symptoms ^{[10].} Elongation of styloid process causes symptoms like neck and cervicofacial pain ^{[11].} The signs and symptoms are believed to be formed due to styloid process pressure on neurovascular structures like facial nerve, ICA, ECA. More occasionally, dysphagia, tinnitus otalgia are called as Eagle's Syndrome.

Since the length of styloid process have significant clinical implications l, we decided to conduct this study.

METHODS

The study was conducted in the Anatomy department of GMC Jammu, in the months of June 2021. 38 adult dry skills were procured from the Department. Out of which 6 broken skulls were excluded from the study. The sex of the Skulls was unknown. Following parameters were measured using Vernier Caliper:

- Length of Right and Left styloid process of each skull
- Distance between two styloid process
- Thickness at the base

RESULTS

Parameter	Right side	Left side
Length of the styloid process	32 skulls	32 skulls
Range	6-47 mm	5-48 mm
Mean	16.42mm	15.39mm

Parameter	No of skulls
Distance between two mastoid process	32 skulls
Mean	66.78mm
Range	24-83 mm

Parameter	No. Of skulls	
Thickness at base	32	
Mean	4.42mm	
Range	2-8 mm	

The average length of the styloid process was 16.42 mm and 15.39 mam for right and left side of the skull respectively. The mean distance between two styloid processes was found to be 66.78mm. Mean thickness at the base of the styloid process was found to be 4.42mm.

DISCUSSION

Styloid process of temporal bone in Greek means' standing pillar'. SP ossified in cartilage and from its tip styloid ligament passes to the lesser cornua of hyoid bone. Embryologically, the styloid process, the stylohyoid ligament and lesser cornua of hyoid bone are developed from 2nd pharyngeal pouch called as Reichert's cartilage. Stylohyoid ligament has potential to mineralize ^{[12].} So, the length of the styloid process is variable.

Styloid process is considered normal if it is more than 2.5 mm and less than 4 cm. An elongated SP occurs in about 4% of the general population. Out of this only 4 to 10% are symptomatic with 1:3 ratio of males to females^[13]. The elongated styloid process is observed in 3^{rd} to 4^{th} decade of life ^[14] and more frequently in males as compared with females.

Table: showing length of styloid process as seen in various studies

Study	Length of styloid process in mm	
Eagle (1937) [15]	20-30mm	
Moffat et al (1997) [16]	15.2-47.7mm	
That B et al (2000) [17]	R: 15.9mm L: 15.2mm	
More CB, Asrani MK (2010) [18]	Males: R: 25.9mm L: 24.69mm	
	Females: R: 25.17mm L: 24.69mm	
Patil S, Gosh S, Vasudeva N (2014) [6]	R: 13.9mm	
	L: 12.9mm	
Present study	R: 16.42mm	
	L: 15.39mm	

In our study, it was observed that the average length of the SP was 16.42 for the right styloid process. This is in correspondence to the study done by That B et al, as mentioned in table above. Similarly, in another study done by Patil S, similar findings were seen.

The average distance between the two mastoid process was found to be 66.78 mm, which is in correspondence to a study done by Patil S, et al, where he has found that the mean distance between two styloid process is 6.8 cm.

In our study, we reported only 2 cases, where the length of the styloid process was more than 30mm and were considered as elongated styloid process. Hence the incidence of elongated styloid process came out to be about only 3.1%, which was close to the studies done before as discussed earlier.

Our study lacked the gender discretion and also the the sample size was less. These findings may help surgeons to consider the SP, whether it's length could be the factor that obstruct the surgical approach from intratemporal fossa. Our study is an attempt to provide proper data about different parameters of SP.

CONCLUSION

Many important anatomical structures are in close proximity with SP. These structures may be compressed or irritated because of variations in morphology of SP. This, our study may prove helpful to dentists, maxillofacial surgeons, anatomists, otolaryngologists.

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