



Original Research Article

## Study of Elongated Styloid Process in Human Skulls Along With Its Clinical and Medico Legal Importance

Arun Kumar S Bilodi<sup>1\*</sup>, Siva Reddy B<sup>2</sup>

<sup>1</sup>Professor and HOD, Department of Anatomy, Velammal Medical College Hospital, Velammal village, Anupannadi post- Tuticuron Highway, Madurai, Tamil Nadu-625009

<sup>2</sup>Professor and HOD, Department of Forensic Medicine, Sri Venkateswara Medical College & Research Institute, Pondicherry-605102.

\*Correspondence Email: drbilodi@yahoo.com

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### ABSTRACT

**Aim:** The objective of present study is to record the incidence of elongated styloid process and to determine average length of styloid process

**Place of study:** This study was done in the department of Anatomy of Sree Devraj Urs Medical College, Tamaka Kolar

**Period of Study:** This study was done during 1996-1997 and 1997-1998 batches of students

**Materials & Methods:** 300 skulls from the bone sets of students of first year MB., B.S of the above college during the year 1996-1997 and 1997-1998 batches were studied during the routine osteology classes Careful observations were made on skulls

**Results:** Out of 300 unknown dry human skulls, 61 had elongated styloid process. Their incidence is 2.03%. In 19.67% (12 skulls) showed unilateral elongated styloid process while 80.27 % (49 skulls) showed bilateral elongated styloid process.

In 45.90% (28 skulls,) they were short and stout in (54.09%) 33 skulls styloid process were long and slender measuring 3.9cms to 5.8cm, while the rest in 54.09% (33 skulls) showed thick stout styloid process measuring from 2.8cm--3.6 cm having elongated styloid process. Other features were also noted.

**Conclusion:** This study on styloid process gives knowledge of elongated styloid process and its effect. It gives knowledge of the presence of long styloid process and their directions to otolaryngologists for managing any cases of Eagle's Syndrome.

**Key words:** Elongated styloid process, stylohyoid ligament, Ossification of stylohyoid ligament, otolaryngologists, Eagle's Syndrome, complete metopic sutures

### INTRODUCTION

Elongated styloid process was first studied by Eagle. <sup>[1]</sup> He described two

different syndromes which was associated with elongated styloid process, namely Styloid process syndrome and carotid artery

syndrome. [2, 3] The average length of styloid process was 2-3 has been reported by Kufman et al, [4] Chandler et al, [5] Faerrario et al, [6] Zakie et al, [7] Palsey et al [8]

**Development** Styloid process is a thin cylindrical pointed osseous process arising from the projection from petrous part of temporal bone derived from the second branchial arch. There is stylohyoid chain derived from 4 embryological cartilages, namely- tympanohyale-stylohyale, ceratohyale, hypohale [9] Styloid Process has range of variation from 5mm to 50mm. Normal range of length of styloid process is 2.5 cm to 3.0cms. [10] Elongation of styloid process can occur unilaterally or bilaterally. It was Manchetti of Padua who first described case of ossification of stylohyoid ligament. [11]

## MATERIALS AND METHODS

61 dry of unknown human skulls from the students bone sets of first year M.B.B.S. of Sri Daevraj Urs Medical College, Tamaka, Kolar during the year 1996-98, constituted the materials for the present study. All these 61 human skulls had elongated styloid process which was unusually long. Each skull was carefully examined for the presence of elongated styloid processes from its base. They were measured with divider and measuring tape. Their directions were also noted. Any associated features on the surface were also noted down. Then present study is well correlated and compared with available literatures.

## OBSERVATIONS

Out of 300 unknown dry human skulls, all the Styloid processes were measuring more than 3.00 cms.

- 61 Skulls had elongated styloid process. Their incidence was 2.03%.
- Elongated styloid process was ranging from 3.6 to 5.5cms.

- 17 skulls (27.86%) were projecting laterally, five (8.19%) skulls projecting medially and rest 39(63.98%) skulls were straight.
- 12 skulls (19.67%) showed unilateral elongated styloid process while 49 skulls(80.27%) showed bilateral elongated styloid process.
- 28 (45.90%) skulls showed short and stout styloid process measuring from 3.6 cm to 4.4cm. while in 33 (54.09%) skulls, styloid process were long and slender measuring 3.9cms to 5.8cm
- Shortest styloid process was 3.6 cms and longest was 5.8 cms.
- Other findings were Seven (11.47%) skulls showed complete metopic sutures. Four (6.55%) skulls showed incomplete metopic sutures all seen near the nasion.
- Eleven skulls(11.08%) showed prominent External occipital protuberance
- Length of styloid process varied from 3.6cm—4.4 cm on the left side and 3.6 to 5.8cms on the right side
- Average length of styloid process on the left and right side were 3.2cm and 4.8cm respectively

## DISCUSSION

Law of nature is the variation and so the styloid process, which varies in the length reaching almost to the hyoid bone. It is palpable in the tonsillar fossa. It is difficult to identify by X-Rays. It is from the second branchial arch styloid process and lesser cornua of hyoid bone are developed. Ossified styloid chain is common finding in some mammals, but in human beings, it is uncommon but not rare [12] Stylohyoid complex is made up of styloid process, stylohyoid ligament, and stylomandibular ligament. [13] Various authors have studied

on length of styloid process namely Wang et al [14] Basekim et al, [15] Savranlar et al, [16] Lung et al [17] by the plain X-Rays and three dimensional computed tomography. He (Lung et al) has suggested that elongated styloid process to be considered only when it is more than 4.5cm [17] Where as Keur et al has stated that radiological appearances of styloid process more than 30mm is considered to be elongation of styloid process. [18] In That det al has reported that in Indian subjects, length of styloid process on the left side varied from 0.8cm to 2.4cm.while average length of styloid process on the left and right side were 1.52cm and 1.59cm respectively. [19]

**In the present study,** Elongated styloid process was ranging from 3.6cm—4.4 cm on the left side and 3.6 to 5.5cms on the right side. Average length of styloid process on the left and right side were 3.2cm and 4.8cm respectively

Some authors say that length of styloid process ranges between 15.2mm & 47.7mm considered to be normal. [20] Elongation of styloid process can occur either unilaterally or bilaterally. [21] Studies of other authors considers length of styloid process over 30 mm.as elongated styloid process. [22, 23] few has considered 40mm of length of styloid process. [22] In some rare cases there is very long styloid process measuring 73mm [24] Some authors claim that elongation of styloid process occurs more commonly unilaterally, [21] but some authors on the contrary claim it to bilaterally [25] Before the age of 20 years there is rapid rate of ossification stylohyoid ligament during the bone growth,(childhood and adolescent),while after 20 years of age there is decline in the ossification of stylohyoid ligament. [26] Other authors claim that there is greater incidence of stylohyoid ligament as age advances [27] Only nine cases of fractures of ossified stylohyoid ligament have been reported in the literature which

has been caused by either by trauma or by spontaneous fractures. [25, 28] A case of unilateral elongated styloid process was reported with a length of 5.8cm in dry skull of male cadver. This body when he was alive had complained ipsilateral otalgia probably due to compression of nerves due to elongated styloid process. [29] A case of exceptionally elongated styloid process present unilaterally measuring 8.2cms which was found incidentally in a male body causing death due to hanging This length of elongated styloid is said to be exceptionally longest after review of literatures. [30] Diagnosis of enlarged styloid process can be done by bimanual palpation in the tonsillar fossa, which can be confirmed by plain radiographic studies and CT Scan which provides an additional information regarding presence of stylohyoid ligament. [23]

#### **Medicolegal and Clinical Importance**

Ossified stylohyoid ligament is not asymptomatic in all cases. Elongated styloid process may cause various problems giving rise to clinical symptoms like pain in the cervico facial as found in Eagle's syndrome. It may cause compression of surrounding anatomical structures like vertebral artery, nerves. It may cause difficulty in swallowing (dysphagia) sensation of foreign body, pain the neck during rotation, pain during extension of tongue, and carotid pain. [20, 31, 28] There are other conditions along with elongated styloid process like cervical osteophytes, cervical spondylosis. [31] and anomalies of vertebral arteries [32] and there may be fracture of the ossified stylohyoid ligament. [25] The elongated styloid process if present may get fractured following trauma( hanging) or spontaneously. [25, 28] In elderly patients with history of repeated pain in the face and neck, then there is possibility of presence of **elongated** styloid process. This can be confirmed by radiologically after thorough clinical examination.

## Present Study

In this study, 300 unknown dry human skulls were studied. Out of them, 61 skulls had elongated styloid process with an incidence was 2.03%. The length of elongated styloid process was ranging from 3.6 to 5.5 cms. There were 17 skulls (27.86%) were laterally angulated five (8.19%) medially angulated and rest 39 (63.98%) were straight. There were 12 skulls (19.67%) having elongated styloid process on one side while 49 skulls (80.27%) had elongated styloid process on both sides. 28 (45.90%) skulls had short and stout styloid process measuring from 3.6 cm-4.4 cm on the left side while in 33 (54.09%) skulls, they were long and slender measuring 3.9 cms to 5.8 cm. The length of shortest styloid process was 3.6 cms and longest was 5.8 cms. The average length of styloid process on the left and right side were 3.2 cm and 4.8 cm respectively. The other findings were Seven (11.47%) skulls showed complete metopic sutures and four (6.55%) skulls showed incomplete metopic sutures near the nasion. There were eleven skulls (11.08%) which showed prominent External occipital protuberance

## CONCLUSION

Early diagnosis of asymptomatic elongated styloid process has to be made. Any undue pressure in and around the tonsillar fossa or rough manipulation may lead to fracture of elongated styloid process. In elderly patients pain in the neck or face, intermittent in nature, then suspicion of elongated styloid process has to be made.

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