



ELONGATED STYLOID PROCESS: A CADAVERIC FINDING

Dr Suryakanth V Ghule M.D (Ayu)¹, Dr. Arya P², Dr. Meghana Navada³.

1.Professor, 2. Post graduate scholar, 3. Post graduate scholar,

Department of Post-Graduate Studies in Rachana Shareera

Government Ayurveda Medical College, Dhanwantari Road, Bengaluru, Karnataka 560009.

ABSTRACT:

Background:

The styloid process (SP) of the temporal bone is a slender osseous projection derived from the second pharyngeal arch. Although its normal length is approximately 2.5 cm, variations in its length and morphology are frequently encountered. Elongation of the styloid process, either due to true bony overgrowth or calcification of the stylohyoid ligament, can produce significant clinical manifestations known as Eagle's syndrome. Cadaveric documentation of such variations is essential for understanding their anatomical and clinical relevance.

Materials and methods:

During routine head and neck dissection of a 70-year-old cadaver in the Department of Rachana Shareera, Government Ayurveda Medical College, Bengaluru, bilateral elongation of the styloid process was observed. The styloid processes were carefully dissected, cleaned, and measured using standard anatomical instruments. Morphological features and ligamentous attachments were also examined.

Results:

Bilateral elongation of the styloid process was observed with marked asymmetry. The right styloid process measured 4.7 cm and showed complete bony elongation with the stylohyoid ligament attached to its tip. The left side demonstrated a normal bony styloid process of 2.5 cm with an additional 3.3 cm of calcified stylohyoid ligament, giving a total length of 5.8 cm. This represents a mixed type of elongation with ligamentous ossification.

Conclusion:

The present cadaveric finding demonstrates a rare bilateral but asymmetric elongation of the styloid process involving both bony overgrowth and ligamentous calcification. Such variations have important clinical implications, particularly in the diagnosis of Eagle's syndrome and vascular compression syndromes. Awareness of these anatomical deviations is essential for clinicians, radiologists, and surgeons involved in the management of cervicofacial pain and dysphagia.

KEYWORDS: *Styloid process, Eagle's syndrome, Ligamentous calcification*

INTRODUCTION

Human anatomy, although described in standard textbooks as a constant and uniform entity, exhibits a wide spectrum of variations in its structural organization. These anatomical variations represent normal deviations from the classical descriptions and arise due to complex developmental, genetic, and environmental influences. Most variations remain asymptomatic throughout life; however, their recognition holds considerable clinical and academic importance. Among these variations is the elongation of the styloid process of the temporal bone, which represents a significant anatomical deviation with potential diagnostic implications.

Styloid process overview:

The styloid process (SP) is a slender, pointed bony projection extending anteroinferiorly from the inferior surface of the temporal bone, lying anterior and medial to the mastoid process. It shows considerable variation in length and shape, usually measuring up to about 2.5 cm (25mm), and may be straight or curved (commonly with an anteromedial concavity)¹. Developmentally, it arises from cartilage of the second pharyngeal (hyoid) arch²

Relations and Attachments:

Laterally, the styloid process is covered by the parotid gland; the facial nerve crosses its base, and the external carotid artery crosses its tip, while the posterior auricular artery ascends nearby³. Medially, it is related to the stylopharyngeus muscle, glossopharyngeal nerve, accessory nerve, and internal carotid artery, with the internal jugular vein lying deep and separated by muscular structures. Posteriorly lies the stylomastoid foramen transmitting the facial nerve. The process provides attachment to three muscles—styloglossus, stylopharyngeus, and stylohyoid—and two ligaments, the stylohyoid⁴ and stylomandibular ligaments⁵. Through the stylohyoid ligament, it suspends the hyoid bone (at C3 level),⁶ which serves as an anchoring structure for suprahyoid and infrahyoid muscles.

Elongation of Styloid Process:

SP longer than 25mm is considered elongated. Its length often increases with age⁷. Elongation of the SP is an anatomical variation that may cause severe, neuralgic pain in the ipsilateral pharynx when swallowing as the glossopharyngeal nerve rubs against the process known as **Eagle's syndrome**⁸. Clinically, Eagle's syndrome presents with throat pain, dysphagia, foreign body sensation in the pharynx, otalgia, and cervicofacial pain, often exacerbated by swallowing, chewing, or head movement. The vascular variant Stylocarotid artery syndrome⁹ caused by the compression of the internal and external carotid arteries may result in headache, facial pain, dizziness, syncope, visual disturbances, and, rarely, transient ischemic attacks or stroke. The clinical conditions may arise when the elongated styloid process or calcified stylohyoid ligament impinges upon adjacent neural or vascular structures, including cranial nerves V, VII, IX, and X, or the internal and external carotid arteries. Understanding the anatomical variations of the styloid process is therefore critical for clinicians and surgeons to correlate structural anomalies with specific symptomatology, improve diagnostic accuracy, and guide appropriate treatment strategies. Cadaveric studies provide a reliable method to document these variations and their potential clinical implications.

MATERIALS AND METHODS

During the routine head and neck dissection of a cadaver aged approximately 70 years, conducted in the Department of Rachana Shareera at the Government Ayurveda Medical College, Bengaluru, Karnataka, India, an uncommon case of bilateral elongation of the styloid process was identified. The styloid processes were carefully exposed and cleared of surrounding tissues. Detailed observations were recorded, and the lengths of the elongated styloid processes were measured using standard anatomical measuring instruments. Relevant anatomical features were documented, and photographs were taken for academic and clinical reference.

OBSERVATIONS:

	Right styloid process	Left styloid process
Length in cm	4.7	5.8

On examination, elongation of the styloid process was observed bilaterally with asymmetrical involvement. On the right side, the styloid process measured **4.7 cm** in length, showing complete bony elongation. The stylohyoid ligament was seen attached to the tip of the elongated styloid process, indicating a continuous osseous projection.

On the left side, the styloid process measured approximately **2.5 cm**, with an additional **3.3 cm** of calcification of the stylohyoid ligament, contributing to an overall elongation measuring **5.8 cm**. The findings suggest partial ligamentous calcification extending the effective length of the styloid process on the left side.



(b)

Fig.1: Bilateral elongated styloid processes, a – Right side, b – Left side

RESULT:

A bilateral elongated styloid process of the temporal bone was found, measuring **5.8cm** and **4.7 cm** on the right and left, respectively.

DISCUSSION:

The styloid process is a slender projection from the temporal bone derived from Reichert's cartilage of the second pharyngeal arch and normally measures about 2–2.5 cm in length (1,2). Any length exceeding 25 mm is considered elongated and may be associated with clinical manifestations (1). In the present cadaveric study, marked bilateral elongation was observed, with lengths of 4.7 cm on the right and 5.8 cm on the left, far exceeding the accepted normal range.

Elongation of the styloid complex may occur either due to true bony overgrowth of the styloid process or due to ossification and calcification of the stylohyoid ligament (2,7). In the present case, the right side showed complete bony elongation, whereas the left side demonstrated a normal styloid process with extensive calcification of the stylohyoid ligament, producing a greater overall length. This asymmetrical pattern supports the classification proposed by Langlais et al., who described elongated, pseudo-articulated, and segmented types of styloid complex elongation¹⁰.

Age is considered an important factor in styloid elongation, as ligamentous structures tend to undergo dystrophic calcification with advancing years (1,4). The cadaver in this study was approximately 70 years old, supporting the role of age-related degenerative changes in the observed ligamentous ossification, particularly on the left side.

Clinically, an elongated styloid process may produce Eagle's syndrome, characterized by throat pain, dysphagia, otalgia, and cervicofacial pain due to irritation of adjacent cranial nerves, particularly the glossopharyngeal nerve. Compression of the carotid arteries by an excessively long styloid process may also result in the vascular variant of Eagle's syndrome, leading to dizziness, syncope, and cerebrovascular symptoms. The extreme elongation observed on the left side (5.8 cm) could potentially have caused significant neurovascular compression during life.

Thus, this rare bilateral but asymmetrical elongation of the styloid complex highlights the importance of recognizing both bony and ligamentous contributions to styloid length. Cadaveric documentation of such variations is crucial for improving anatomical understanding and for accurate clinical and radiological diagnosis of cervicofacial pain syndromes.

CONCLUSION:

The styloid process shows wide anatomical variation, and its elongation may result from either bony overgrowth or ossification of the stylohyoid ligament. The present cadaveric finding of bilateral but asymmetrical elongation highlights the diverse patterns of this variation. Excessive elongation can compress adjacent nerves and vessels, forming the basis of Eagle's syndrome and its vascular variant. Age-related calcification appears to play an important role in this process. Awareness of such variations is essential for accurate diagnosis, radiological interpretation, and safe surgical management of cervicofacial and pharyngeal pain.

REFERENCES:

1. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.626
2. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.627
3. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.626
4. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.449
5. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.542
6. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.443
7. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.421
8. Standring Susan (editor in chief). Gray's Anatomy The Anatomical Basis of Clinical Practice,41st ed.London: Elsevier .2015. p.421
9. Stylocaroid artery syndrome - Arun Panwar, Vaishali Keluskar, Shivayogi Charantimath, Lokesh Kumar S, Sridhar M & Jayapriya T (2022) Bilateral elongated styloid process (Eagle's syndrome) - a case report and short review, Acta Oto-Laryngologica Case Reports, 7:1, 33-38, DOI:10.1080/23772484.2022.2077206vv
10. Langlais RP, Miles DA, Van Dis ML. Elongated and mineralized stylohyoid ligament complex: a proposed classification and report of a case. Oral Surg Oral Med Oral Pathol. 1986;61(5):527-32.