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## Study on Styloid Process and Its Clinical Implications

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### Abstract

*The styloid process (SP) is a cylindrical, long cartilaginous bone located on the temporal bone. It normally measures between 2cm and 3cm in adults.<sup>1,2,3</sup>*

*Elongated styloid process can be due to styloid process itself or due to ossification of stylohyoid ligament showing an overall length of more than 3 cm. In living persons, the elongated styloid process when present can produce characteristic cervicofacial and neck pain syndromes, commonly known as Eagle's syndrome. The signs and symptoms are due to the compression of the styloid process on some neural and vascular structures. It may also cause stroke due to the compression of carotid arteries. This syndrome is diagnosed by both radiographical and physical examination. Eagle's syndrome is important clinically as it is involved in the diagnosis and treatment cervicofacial and neck pain. This article reviews the clinical importance of the elongated styloid process.*

**Key Words:** *styloid process elongated eagle's syndrome.*

### INTRODUCTION

The styloid process is a slender pointed projection of bone just beneath the external auditory meatus that normally measures between 2cm<sup>1</sup> and 3cm<sup>2,3</sup> in adults. It arises from the inferior surface of the temporal bone at the junction of its petrous and tympanic portions.<sup>1,3</sup>

The styloid process tapers anteriorly and inferiorly to an apex from which several ligaments (stylohyoid and stylomandibular) and muscles (styloglossus, stylohyoid and stylopharyngeus) originate. The muscles and ligaments which have a role in mastication and swallowing are attached to the SP. There are many nerves and vessels such as carotid

arteries adjacent to the SP. The SP and the stylohyoid ligament develop from the Reichert's cartilage (second pharyngeal arch).<sup>4-9</sup>

## MATERIALS AND METHODS

The present study was undertaken on 100 dry human adult skull of unknown sex without any gross pathology or abnormality. On both sides styloid process was measured from base to tip. Measurements were taken by means of vernier calipers. Styloid process measuring more than 3cm is considered as elongated styloid process.



## RESULTS

Out of 100 dry human adult skulls only two skulls had elongated styloid process. Among which one skull had styloid process measuring 4cm other measuring 3.5cm.

## DISCUSSION

Patients with elongated styloid process may be symptomatic or asymptomatic. Most of them are asymptomatic and are identified incidentally at imaging or are detected at post-mortem examination. It has been estimated that approximately 4-10% of people with an elongated styloid process will have symptoms.

Although there is no gender predilection for elongated styloid processes, the symptoms tend to be commoner in women over 40 years of age.<sup>1,10</sup>

The clinical sequelae that accompany the elongated styloid process was first described by otolaryngologist Watt Eagle.<sup>11</sup>

The constellation of associated symptoms has now become commonly known as Eagle's syndrome. Watt Eagle; in his study described two types clinical presentation. It is supposed that symptoms and signs are due to the compression of the SP on some neural and vascular structures

The first type of presentation was after many years of tonsillectomy. In this type patients complained of foreign body sensation in pharynx; dysphagia and pain radiating to the ear while on rotation of neck or protrusion of neck.<sup>12-16</sup>

Watt Eagle was of the opinion that it was due to scar in the region of tonsillar fossa involving the branches of glossopharyngeal nerve. The signs and symptoms are also seen due to involvement of cranial nerves V, VII, X and/or XI.<sup>1,2, 16,17</sup>

The second type of presentation is carotid artery syndrome. Carotid artery syndrome is not associated with It is believed to be due to direct mechanical irritation of sympathetic nerves that accompany the internal and/or external carotid arteries within the carotid sheath.<sup>12, 16</sup>

When external carotid artery is affected, the patient may experience pain in the neck that radiates to the eye, ear, mandible, soft palate and nose. In the case of impingement upon the internal carotid artery, the symptoms are parietal headaches and pain along the distribution of the ophthalmic artery.<sup>1,18</sup>

Eagle's syndrome is also caused by degenerative or inflammatory changes in the tendinous portion of the styloid ligament insertion or rheumatic styloiditis.<sup>19</sup>

The cause of elongated styloid process is no clear. It can be due to calcified and ossified bone and ligament. The local chronic irritations, surgical trauma, endocrine disorders in female at menopause, persistence of mesenchymal elements, growth of the osseous tissue and mechanical stress or trauma during development of SP could result in calcified hyperplasia of the SP. calcification and loss of pliability with the ageing process<sup>5</sup> or as congenital variant without an inciting cause.<sup>8,19</sup>

Okabe et al.<sup>20</sup> conducted a study among 80-year-old subjects found a significant correlation between the serum calcium (Ca) concentration and the SP length.

Elongated styloid process can be easily detected by physical examination and by radiography. Styloid process can be palpated in the tonsillar fossa. Normally styloid process is not palpable. If styloid process is palpable in tonsillar fossa is indicative of Elongated styloid process. Palpation of the tip of the SP should exacerbate existing symptoms. If highly suspicious for Eagle's syndrome, confirmation can be done by radiographical imaging.<sup>21</sup>

The diagnoses can be ascertained with imaging. Plain radiographs are the commonest modality chosen. Lateral views are the best to show the length of the styloid process, but antero-posterior views are also needed to determine whether there is bilateral involvement and the presence of lateral deviation. A threshold length of 3cm is accepted as abnormal by current conventions. Computed tomography scans have been used in difficult cases to supplement diagnosis.<sup>12</sup>

## CONCLUSION

In living persons, the elongated styloid process may produce characteristic head and neck pain syndromes, commonly known as Eagle's syndrome. An awareness of this syndrome is important to all clinicians involved

in the diagnosis and treatment of neck and head pain. This article reviews the clinical importance of the elongated styloid process.

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