



ANGULATION AND LENGTH OF STYLOID PROCESS IN EAGLE'S SYNDROME

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ABSTRACT

Background: Eagle's syndrome is caused by an elongated ossified styloid process, characterized by pain in throat and adjacent head and neck area, radiating to the ear. Average length of styloid process is about 15 to 25mm, over 30mm should be considered abnormal. Only abnormal angulation of styloid process in association with symptoms can confirm the syndrome. **Aims and Objectives:** To find out prevalence of Eagle's syndrome in patients with throat pain, to assess the length and angulation of styloid process causing Eagle's syndrome. **Materials and Methods:** This is a prospective study done in Department of Otorhinolaryngology, SMCH. Patients with history of throat and neck pain with radiation to ear was clinically examined. Xray styloid process and three-dimensional CT reconstruction of styloid process was done for assessing the length and angulation of symptomatic patients. **Results:** The prevalence of Eagle's syndrome was found to be 30%. The mean medial angulation was 35.8° and 33.25° on right and left side respectively. **Conclusion:** It is not the increase in length alone, but the angulation of styloid process which is more important in causing the symptoms of Eagle's syndrome, as there may not be any symptom in some cases of elongated styloid process.

KEYWORDS

Styloid process, length, medial angulation, CT scan.

INTRODUCTION

Eagle's syndrome is caused by elongated styloid process or calcified stylohyoid ligament. It is clinically characterized by throat pain with radiation to adjacent head and neck area and ipsilateral ear pain along with foreign body sensation in throat and pain on swallowing. Patients describe the pain as stabbing, which does not respond to analgesics. Average length of styloid process is about 15 to 25mm. Length above 30mm is considered as elongated. Exact etiology of elongated styloid process is not known, however trauma, endocrine disorders, embryological remnants, mechanical stress can be some factors causing elongated styloid process. Although Eagle's syndrome is thought to be caused by an elongated styloid process or calcified stylohyoid ligament, but many patients with elongated styloid process are asymptomatic. Therefore, the presence of an elongated styloid process alone is not sufficient for the diagnosis of Eagle's syndrome, but an abnormal angulation of styloid process in association with symptoms, is more important to confirm the syndrome. Digital palpation of the styloid process in the tonsillar fossa along with radiological imaging helps to confirm the diagnosis. CT scan is an effective method for evaluation of the length, angulation, and other morphological features of styloid process.

AIMS AND OBJECTIVES

- 1) To find out the prevalence of Eagle's syndrome in patients with throat pain.
- 2) To assess the length of styloid process causing Eagle's syndrome.
- 3) To assess the angulation of styloid process causing Eagle's syndrome.

MATERIALS AND METHODS

50 patients with throat and neck pain with radiation to ipsilateral ear was clinically examined. Xray of styloid process was advised to measure its length. Three-dimensional computed tomography reconstruction of styloid process was done to see for the angulation of the styloid process in the symptomatic patients. Average length of styloid process is about 15 to 25mm. Length over 30mm is considered as elongated.

Study Area –

Patients attending Outpatient Department of Otorhinolaryngology, Silchar Medical College, and Hospital, Silchar.

Study Period – 6 months

Study Design – Prospective study

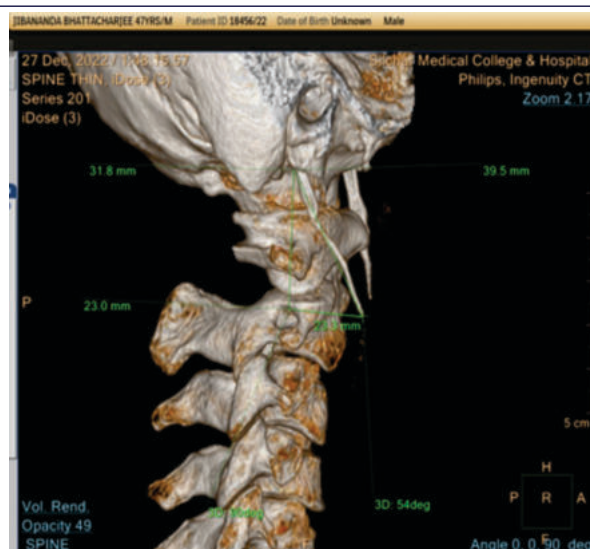


Fig.1 Measurement of anterior angulation of styloid process



Fig.2 Measurement of medial angulation of styloid process

The length of styloid process was measured between the attachment of temporal bone and tip of styloid process on coronal images. Chi square test was used to analyze the differences between right and left styloid process length, medial angulation, and anterior angulations respectively.

Inclusion Criteria

Patients with complaints of throat pain with radiation to adjacent head and neck area and ipsilateral ear. Patients with foreign body sensation in throat and who experiences pain on swallowing.

Exclusion Criteria

Patients with growth in oral cavity with referred pain to the neck.

RESULTS AND OBSERVATIONS

50 patients with throat and neck pain with radiation to ipsilateral ear were examined. The prevalence of eagle's syndrome in patients was about 30%. In this about 16 patients showed elongated styloid process on plain radiographic images. Such patients were advised for 3D CT. Double sided elongated styloid process was seen in 12 of them and single sided in 4 of the patients. Out of this 16 subjects, 10 were males and 6 were females.

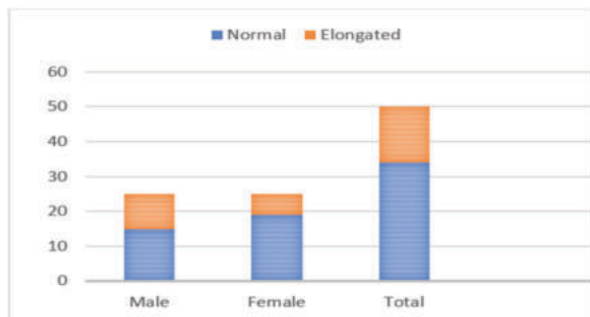


Chart showing normal and elongated styloid process in males and females

Mean length of styloid process regardless of gender was 3.3cm on right side and 3.4cm on left side. Mean length of styloid process of males on right side was 3.1cm and 3.4cm on left side, whereas for females it was 3.6cm on right side and 3.5cm on left side. Upon comparison of the lengths of the right and left side of the males with females, there was no statistically significant difference defined. ($p=0.297$, $p>0.05$).

Table 1. Comparison of styloid process length according to sex

SEX	LOCATION	MEAN
MALE	RIGHT	3.1cm
	LEFT	3.4cm
FEMALE	RIGHT	3.6cm
	LEFT	3.5cm

P value = 0.2792 (Not significant)

Mean medial angulation of styloid process was found to be 35.8° on right side and 33.25° on left side, regardless of gender. The mean medial angulation was 47.6° on right side and 33° on left side for males and 24° and 33.5° on right and left side for women respectively. On comparison of medial angulation of both sides of males with females, there was a statistically significant difference. ($p=0.044$, $p<0.05$)

Table 2. Comparison of medial angulation according to sex

SEX	LOCATION	MEAN ANGLE
MALE	RIGHT	47.6°
	LEFT	33°
FEMALE	RIGHT	24°
	LEFT	33.5°

P value = 0.044 (significant)

Mean anterior angulation was 33° on right side and 29° on left side for males and 29° on right side and 35.4° on left side for females. On comparison of males with females, there was no statistically significant difference. ($p=0.35$, $p>0.05$)

Table 3. Comparison of anterior angulation according to sex

SEX	LOCATION	MEAN ANGLE
MALE	RIGHT	33°
	LEFT	29°
FEMALE	RIGHT	29°
	LEFT	35.4°

P value = 0.35 (Not Significant)

DISCUSSION

The aim of our study was not only to find out the length of styloid process but also to know about the medial and anterior angulation of the styloid process. Plain radiograph is not enough for assessing the length and angulation, so we must use 3D CT for the accurate assessment of the same. There have been numerous studies conducted to determine the length of styloid process and the length is highly variable in all these studies. Normal length and angulations may vary according to various measurements and reference points. In our study it was found out that length of styloid process on comparison of males with females was not significant. Medial angulation show significance on comparison of males with females of both right and left sides. We demonstrated statistical significance between medial angulation and complaints of patients. The lesser the angle, more the severity of symptoms as it causes irritation to the nearby structures. In our study it is thus concluded that the severity of symptoms is related to the medial angulation of styloid process rather than the length and anterior angulation.

Stylagia refers to elongation of styloid process, length more than 30mm or calcification of stylohyoid ligament. Eagle's syndrome is characterized by recurrent throat pain with radiation to adjacent head and neck areas and to ipsilateral ear, foreign body sensation in throat because of elongated styloid process. The prevalence of eagle's syndrome was found out to be about 30% of the total population. In general, no correlation between length of styloid process and severity of complaints was found in symptomatic patients. Abnormal angulations are more responsible for the severity of symptoms. If the angle is narrower, it may produce more complaints because of compression of adjacent structures. This study has shown that there is no significant difference in length between two sexes. Elongation of styloid process may be bilateral, and each styloid process should be assessed separately as each of them vary in length, morphology, and angulations. The aim of the study was not only to find out the length of the styloid process but also the angulations of the process which causes most of the symptoms as elongated styloid process is also seen in asymptomatic patients which is an incidental finding.

In the study of Palesy et al, the patients who did not have elongated styloid process had orofacial pain and dysfunction symptoms seemingly referred from this area, due to position, form, or structural variations. They suggested that the styloid process area should be included in any examination of orofacial patients.⁽¹⁾

Yavuz et al, investigated the effect of the angulation of styloid process in Eagle's syndrome using 2D radiographic techniques and found a significant difference between symptomatic patients and control group in antero-posterior styloid process angulation, but there were no significant differences between 2 groups with respect to medial-lateral styloid process angulation.⁽²⁾

Burulday et al, used 3D CT images to evaluate the importance of medial-lateral angle in symptomatic Eagle syndrome and found that symptoms are more intense when the angle is smaller.⁽³⁾

CONCLUSION

3D CT is a reliable method to find out the length and angulation of styloid process, evaluate the adjacent structures and to plan surgical approaches. Abnormal angulations are responsible for the clinical symptoms rather than the length of styloid process. Of the two angulation, medial angulation is more important for causing symptoms than anterior angulation.

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