

**ORIGINAL RESEARCH**

# Evaluating the relation between the elongated styloid process and the ponticulusposticus using cone-beam computed tomography

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**ABSTRACT**

**Background:** The purpose of this research was to identify symptoms associated with an extended styloid process and to establish diagnostic and treatment criteria for this condition. **Material and methods:** One hundred subjects out of which 40 were men while 60 were women, had their CBCT scans analyzed. Sagittal images of the atlas vertebra were analyzed for the presence of PP and its classified as either partial or complete. Panoramic and three-dimensional images that were recreated using the styloid method were also analyzed for the existence of ESP. Chi-square, Fisher's exact, and the Mann-Whitney tests were used to see if there was a statistically significant difference in the existence of PP and ESP based on age or gender. **Results:** Out of 100 subjects, 40 were men and 60 were women. Only 30% of people with ESP had a ponticulusposticus (PP), while 42% of people without ESP had PP. There was no statistically significant correlation between PP and ESP. There were 30 patients with ESP who also had PP, with 4% having PP on one side and 2% on the other. The majority of ESP and PP cases (10%) were bilateral. Patients with both ESP and PP tend to be older than the general population. The differences between men and women were insignificant. **Conclusion:** There was no statistically significant association between PP and ESP, taking into account the prevalence and features of PP in the case and control groups.

**Keywords:** elongated styloid process, ponticulusposticus, cone-beam computed tomography

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**INTRODUCTION**

Styloid process (SP) is derived from the Greek word stylos, meaning a pillar. This structure is a long, cylindrical, cartilaginous bone located on the inferior aspect of temporal bone, posterior to the mastoid apex, anteromedial to the stylomastoid foramen, and lateral to the jugular foramen and carotid canal. Medial to the SP is the internal jugular vein along with cranial nerves VII, IX, X, XI, and XII. The tip of the SP is close to the external carotid artery laterally while medially, it is in close proximity to the internal carotid artery and accompanying sympathetic chain. It forms with the stylohyoid apparatus along with stylohyoid ligament and a small horn of the hyoid bone. Three muscles originate from the SP: The styloglossus, stylohyoid, and stylopharyngeus. The styloid and the stylomandibular ligaments are also attached to the SP.<sup>1,2</sup> Considering a substantial

variability in the length of styloid process in the general population, the styloid process should be considered "elongated" when longer than 3 cm.<sup>3</sup>

Hence, the purpose of this research was to identify symptoms associated with an extended styloid process and to establish diagnostic and treatment criteria for this condition.

**MATERIAL AND METHODS**

One hundred subjects out of which 40 were men while 60 were women, had their CBCT scans analyzed. Sagittal images of the atlas vertebra were analyzed for the presence of PP and its classified as either partial or complete. Panoramic and three-dimensional images that were recreated using the styloid method were also analyzed for the existence of ESP. Chi-square, Fisher's exact, and the Mann-Whitney tests were used to see if

there was a statistically significant difference in the existence of PP and ESP based on age or gender.

## RESULTS

**Table 1: Gender-wise distribution of subjects.**

Gender	Number of subjects
Males	40
Females	60
Total	100



Out of 100 subjects, 40 were men and 60 were women.

Only 30% of people with ESP had a ponticulusposticus (PP), while 42% of people without ESP had PP. There was no statistically significant correlation between PP and ESP. There were 30 patients with ESP who also had PP, with 4% having PP on one side and 2% on the other. The majority of ESP and PP cases (10%) were bilateral. Patients with both ESP and PP tend to be older than the general population. The differences between men and women were insignificant.

## DISCUSSION

Eagle syndrome, also known as stylohyoid syndrome, styloid syndrome, or styloid-carotid artery syndrome, is a rare condition caused by an elongated or disfigured styloid process. This abnormal styloid process interferes with the function of neighboring structures and gives rise to orofacial and cervical pain that is often triggered by neck movements. Eagle syndrome was named after Watt W. Eagle, an otolaryngologist at Duke University, who described the first cases in 1937. It is a rare condition caused by an elongated or disfigured styloid process, which interferes with the functioning of neighboring structures and gives rise to orofacial and cervical pain often triggered by neck movements. Eagle syndrome is also referred to as stylohyoid syndrome, styloid syndrome, or styloid-carotid artery syndrome by some authors.<sup>4-6</sup>

The aetiology is not well defined and a number of theories have been suggested, such as congenital elongation due to the persistence of an embryonic cartilaginous outgrowth, calcification of the stylohyoid ligament and formation of bone tissue at the insertion of the ligament. This clinical picture might also be seen in patients after tonsillectomy.<sup>7</sup>

Hence, the purpose of this research was to identify symptoms associated with an extended styloid process

and to establish diagnostic and treatment criteria for this condition.

In this study, out of 100 subjects, 40 were men and 60 were women. Only 30% of people with ESP had a ponticulusposticus (PP), while 42% of people without ESP had PP. There was no statistically significant correlation between PP and ESP. There were 30 patients with ESP who also had PP, with 4% having PP on one side and 2% on the other. The majority of ESP and PP cases (10%) were bilateral. Patients with both ESP and PP tend to be older than the general population. The differences between men and women were insignificant.

Sekerci AE et al<sup>8</sup> determined a possible relationship concerning the presence of ponticulusposticus (PP) in patients with elongated styloid process (ESP) on three-dimensional cone beam computed tomography (CBCT) images. The presence or absence of the PP (whether partial or complete) was determined and noted as a positive or negative finding. Then, the patients with PP were evaluated for ESP. For this purpose, 3-D CBCT scanning digital images of 542 patients having ESP (247 males and 295 females) were examined retrospectively. There was a significant relationship between the presence of PP and ESP ( $P=.03$ ). The results of this study suggested that there was a significant correlation between the presence of PP and ESP.

## CONCLUSION

There was no statistically significant association between PP and ESP, taking into account the prevalence and features of PP in the case and control groups.

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