

Elongated Styloid Process: A Retrospective Panoramic Radiographic Study

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Abstract

Background: The styloid process (SP) is a bony projection, located just anterior to the stylomastoid foramen, the normal length of which is approximately 20–30 mm. The length of SP when exceeds 30 mm is said to “elongated.” **Aim:** The aim of the study is to study elongation of SP through panoramic radiographs. **Materials and Methods:** A total of 200 panoramic radiographs were examined for the purpose of the study. These radiographs are present as soft copies on the computer of radiology department. The software Triana is used for taking radiographs. All the radiographs were taken for routine dental examination and not for study. **Results:** A total of 200 panoramic radiographs were evaluated. In the present study, the incidence of ESP was more in males (45.26%) in comparison to females (34.72%). Incidence of Type I-Elongated type of SP (70%, 74.60%) was more than Type II and Type III. Incidence of completely calcified pattern (63%, 60%) was more than other types of pattern. **Conclusion:** Panoramic radiography can be used for the diagnosis of elongated SP but the norms which explain ESP are needed to be reevaluated.

Keywords: Calcification, Elongated styloid process, Panoramic radiographs, Patterns.

INTRODUCTION

The styloid process (SP) is a cylindrical long cartilaginous bone, developed due to mineralization of Reichert’s cartilage (styloid ligament and lesser Cornu of hyoid bone).^[1] The SP can be seen on both sides of a panoramic radiograph as a slender bony projection extending inferior and slightly mesially just beneath the external auditory meatus.^[2] SP consists of SP, styloid ligament, and stylomandibular ligament, where SP and ligament are derived from first and second brachial arches.^[3] The normal length of SP is approximately 20–30 mm. The elongation of SP is considered when the measurement is ≥ 30 mm.^[1]

The process is of cartilaginous origin, Hence, it has potential to calcify. As the calcification occurs, the variations are seen in length of the process, type of its calcification and the pattern in which the ossification of the ligament occurs. After calcification, if the SP appears elongated it is referred to as “elongated SP”. The term elongated SP was first described by Watt Eagle, an Otolaryngologist in 1937.^[2]

The elongated styloid is diagnosed by both radiographical and physical examination.^[1] In that the more commonly

panoramic radiography is used to determine SP elongation. In the present study, our aim is to investigate the number of asymptomatic SP elongation in relation to gender, type of elongation, and calcification pattern in patients who visited to maxillofacial radiology department of Goenka Research Institute of Dental Science, Gandhinagar, between June 2023 and August 2023.

MATERIALS AND METHODS

This study was retrospective, involving 200 panoramic radiographs which were available as soft copies in the hard drive of computer in radiology department.^[4] The radiographs of these patients were taken as routine examination for having dental problems, and not for the purpose of the elongated SP examination.^[1]

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All the panoramic radiographs were evaluated by drawing outline of SP on both right and left side beginning from the origin at the temporal bone to the tip of the process.^[5] The length of the SP is measured with the help of measurement tool on the accompanying software which is Triana.^[4] The

radiographs showing any kind of artifacts are excluded from the study. Langlais *et al.* classification of elongated SP was used in this study [Tables 1 and 2] and [Figures 1-3].

Table 1: Classification of elongated styloid process

Types	Description
Type I	Elongated
Type II	Pseudoarticulated
Type III	Segmented

Table 2: Pattern of calcification

Type	Pattern
A	Calcified outline
B	Partially calcified
C	Nodular
D	Completely calcified

Table 3: Incidence of ESP based on gender

Gender	No of elongated styloid process	Incidence
Male	43	45.26%
Female	25	34.72%

Table 4: Incidence of types of elongated styloid process

S. No	Type of elongation	Incidence% (Left)	Incidence% (Right)
1.	Type I	70.00	74.60
2.	Type II	08.30	15.30
3.	Type III	21.70	10.20

Table 5: Incidence of calcification pattern

S. No.	Calcification Pattern	Incidence (%) (Left)	Incidence (%) (Right)
1.	Calcified outline	6.30	9.87
2.	Partially calcified	25.40	24.60
3.	Nodular	4.75	4.90
4.	Completely calcified	63.55	60.63

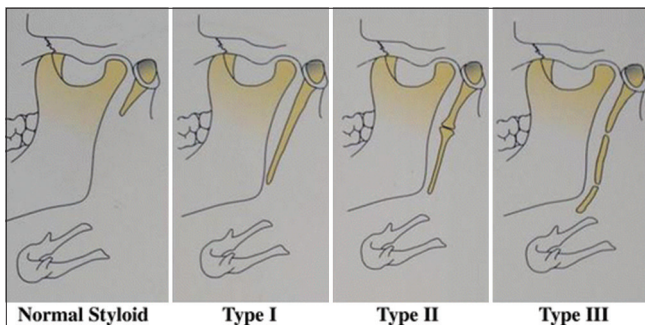
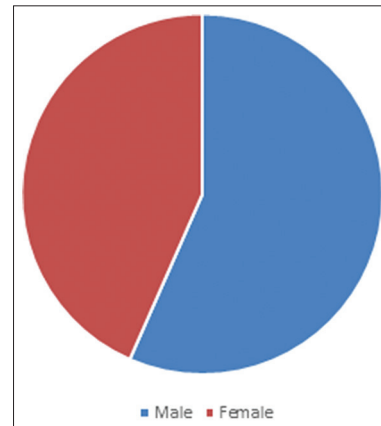
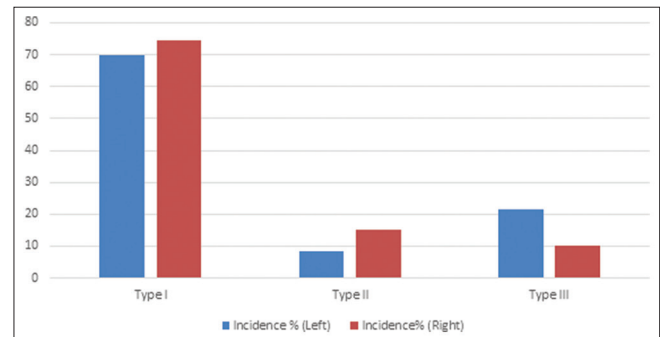


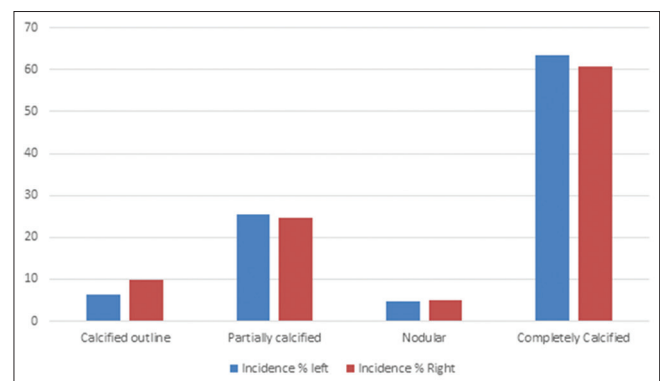
Figure 1: Classification of Elongated styloid process



Graph 1: Incidence of ESP based on gender



Graph 2: Incidence of types of elongated styloid process



Graph 3: Incidence of calcification pattern

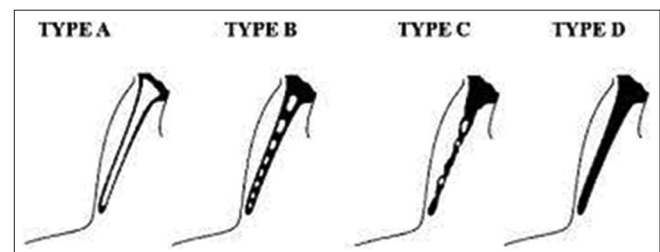


Figure 2: Patterns of calcification

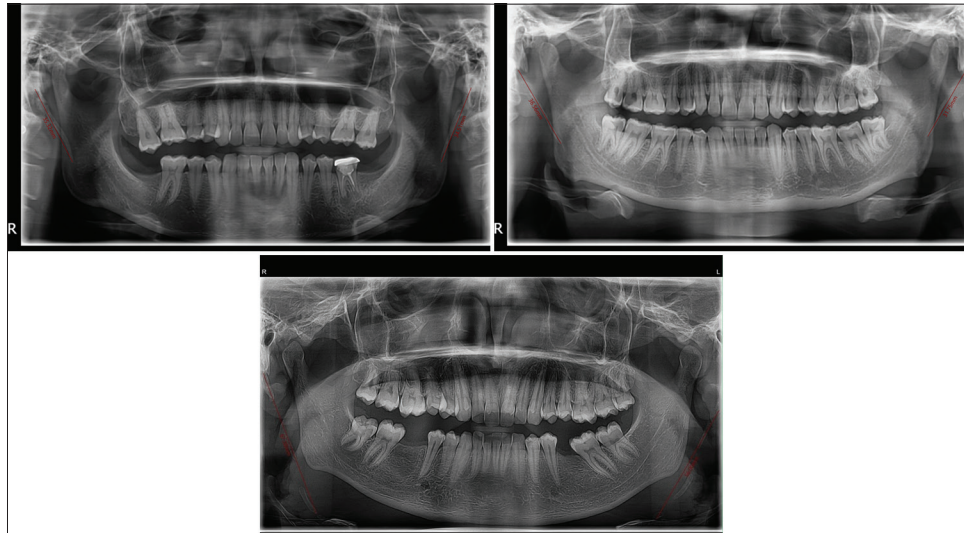


Figure 3: OPGs showing ESP

RESULTS

A total of 200 panoramic radiographs were evaluated. In the present study, the incidence of ESP was more in males (45.26%) in comparison to females (34.72%) [Table 3 and Graph 1]. Incidence of Type I-Elongated type of SP (70%, 74.60%) was more than Type II and Type III [Table 4 and Graph 2]. The incidence of completely calcified pattern (63%, 60%) was more than other types of pattern [Table 5 and Graph 3].

DISCUSSION

The SP can be elongated bilaterally or unilaterally, however, unilateral elongation of the SP is more frequent. Ossification of the stylohyoid ligament occurs with differing frequency and may be as low as 2–4% or as high as 84.4% but may be asymptomatic. CBCT is an alternative method to CT or Panoramic radiographs for the measurement and assessment of SP.^[5-7]

“Elongated SP” is a term used since the publication by Eagle in reports concerning findings in both dentomaxillofacial and ear-nose-throat patients. This term denotes a SP exceeding its normal length. Eagle’s definition was: The normal SP measures between 2.5 and 3 cm.^[8]

An ESP occurs in about 4% of the general population, while only small percentages (between 4 and 10.3%) of these patients are symptomatic. Bilateral involvement is quite common but does not always involve bilateral symptoms. No significant difference is detectable between the right and left sides.^[9]

Image magnification and distortion ultimately limit dimensional accuracy in panoramic radiography. Patient head positioning is important in panoramic radiography because poor positioning

techniques may result in structures lying outside the focal trough, causing images to be blurred and distorted with lack of definition.^[10] This highly suggests the re-evaluation of standards which explain the elongation of SP on panoramic radiography.

CONCLUSION

The panoramic radiography can be used for the diagnosis of ESP but the norms which explain ESP are needed to be reevaluated.

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