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A study of Prevalence and pattern of the elongated styloid process among geriatric patients

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ABSTRACT

Aims: The aims of this study were to assess the elongation of the styloid process on digital panoramic radiographs and to evaluate the prevalence of the elongation according to age, sex and types. **Methods:** Digital panoramic radiographs of 198 geriatric edentulous patients were analyzed. The radiographic length of the styloid process was measured on both sides. **Results:** The elongated styloid process was seen in 87 of the 198 patients. It was observed that as age increased, elongation of the styloid process increased with a male predominance. Type I elongation was more common than other types of elongation. **Conclusions:** The prevalence of the elongated styloid process in the present study was higher in comparison to the other reports from edentulous patients.

KEYWORDS : elongated styloid process, geriatric

Introduction:

The term styloid process has been gleaned from the word "stylos", which implies the pillar in Greek dialect. The styloid process appertains to the temporal bone of the skull, and it abuts front to the stylomastoid foramen.[1] Stylopharyngeus, stylohyoid, styloglossus muscles, stylohyoid and stylomandibular ligaments are attached to the styloid process.[2] The length of the styloid process is reported to range between 15.2 mm and 47.7 mm,[3] and various authors have observed that the normal length of the styloid process is between 20 mm and 30 mm,3–9 with length >30 mm regarded as elongated.[2–4],[7–13] This elongation of the styloid process or calcification of ligaments, which is the cause of the stylohyoid syndrome or Eagle syndrome, was first reported by the otorhinolaryngologist Eagle.[14] Individuals with Eagle syndrome may report neck and cervicofacial pain, difficulty in swallowing and pain at the angle of the mandible, which aggravates while rotating the neck or during protrusion of the tongue. It is proposed that these features are manifested due to the pressure of the styloid process on the neural and vascular structures, which are in its vicinity.[15] Differential diagnoses in these patients include cranial nerve neuralgias, unerupted or impacted tooth, temporal arthritis, diseases of the temporomandibular joint, migraine headaches, pharyngotonsillitis and head and neck tumors.[2,4] The etiology of the elongation of the styloid process is not yet exactly determined, but the congenital elongation of the styloid process, calcification of the stylohyoid ligament and growth of osseous tissue where the stylohyoid ligament inserts are regarded as few of the causative factors.[16,17] Radiographic studies report the prevalence of the elongated styloid process from 2% to 30%.[2,6,9,18,19] Elongation may be seen in both sexes, unilaterally or bilaterally and more commonly in elderly individuals.[15] The present study was carried out in the edentulous population of the central India with the following aims and objectives:

To measure and assess the length of the styloid process on digital panoramic radiographs

To determine the variation in age, sex, type and sides of the elongated styloid process

To compare the length of the styloid process between the right and left sides

To compare the type or pattern of the elongation of the styloid process with the length

Materials and methods:

The present study was carried out in the College of Dentistry in a tertiary hospital in central India. Panoramic radiographs of patients who were >60 years of age, attending the Department of Prosthodontics with various complaints, were examined from January 2016 to January 2017.

In this study, 198 radiographs were obtained using a digital panoramic imaging system. Those radiographs showing the styloid processes of both sides were included in the study, and radiographs with artifacts and those with patient positioning and magnification errors were excluded from the study.

Analysis of variance was used to find the significance of study parameters between three groups of patients. Student's t-test (two tailed, independent) was used to find the significance of study parameters on a continuous scale between two groups (intergroup analysis) on metric parameters. Chi-square test was used to find the significance of study parameters on a categorical scale between two or more groups. The reliability of measurements was evaluated by kappa statistics.

Results:

Panoramic radiographs of 198 patients, of whom 103 were males and 95 were female subjects, who were aged ≥60 years, were studied. Among them a majority i.e. 94 subjects belonged to the age group of 60–69 years.

On the right side, type I and type III elongations were more common in patients aged 70–79 years, and type II was more common in patients aged ≥80 years. On the left side, all the three types of elongation were most commonly found in the patients aged 70–79 years (Table 1).

When compared between the sexes, on the right side, type I and type III elongations were more common in males and type II elongation was more common in females. On the left side, all the three types of elongation were more common in males (Table 2).

Bilateral elongation was most commonly found (71.4%) than unilateral elongation (28.6%). It was also found that unilateral and bilateral elongations were frequently seen in males compared to females (Table 3).

Discussion:

There are assortments of approaches to decide the measurements of the styloid process and analyze Eagle syndrome: panoramic radiographs, lateral views of the neck and processed computed

tomography.[2,7,8] In some cases, the lengthened styloid process can be clinically recognized by palpating over the tonsillar fossa.[22] In the present study, it was observed that there was an increase in the length of the styloid process as age increased, which was consistent with the studies by various researchers.[19,20,23–25] However, these findings differed from others who suggested that age may not have a role in elongation.[18,26] In the present study, it was found that males had more elongated styloid processes than females, which was in accordance with More and Aarani.[27] However, in the studies conducted by Roopashri et al,[23] Phulambrikar et al[24] it was found that females had an elongated styloid process than males, but their data were not statistically significant.

In this study, the length of the elongated styloid process on the left side was significantly more when compared to the right side. This finding was in accordance with Bozkir et al,[19] Vadgaonkar et al,[22] and Roopashri et al[23].

Bilateral elongation was most commonly found than unilateral elongation in this study; this finding was consistent with those of other studies.[19,23,26] However, in the study conducted by and Bozkir et al[19] and Roopashri et al,[23] it was found that bilateral elongation was frequently seen in females than unilateral elongation.

In the present study, a high prevalence (43.93%) of the elongated styloid process was observed; in contrast to this, Keur et al,[2] Bozkir et al,[19] Scaf et al[20] and Correll et al[26] reported a prevalence of <30% in edentulous individuals. This difference may be due to the older age group of the participants in this study compared to the above mentioned studies.

Conclusions:

The present study showed a higher prevalence of the elongated styloid process, which is in comparison to the other reports from edentulous patients.

Tables:

TABLE 1: Correlation of type of the elongated styloid process with age

Type of elongation	Age (years)			Total (n=198)	*P*-value
	60–69 (n=94)	70–79 (n=75)	≥80 (n=29)		
Right side, n (%)					
Normal	83 (88.3)	34 (45.3)	3 (10.3)	120 (60.6)	<0.001**
Type I	10 (10.6)	32 (42.7)	12 (41.4)	54 (27.3)	
Type II	0 (0)	5 (6.7)	14 (48.3)	19 (9.6)	
Type III	1 (1.1)	4 (5.3)	0 (0)	5 (2.5)	
Left side, n (%)					
Normal	76 (80.9)	32 (42.7)	3 (10.3)	111 (56.1)	<0.001**
Type I	10 (10.6)	23 (30.7)	11 (37.9)	44 (22.2)	
Type II	4 (4.3)	12 (16)	8 (27.6)	24 (12.1)	
Type III	4 (4.3)	8 (10.7)	7 (24.1)	19 (9.6)	

TABLE 2: Correlation of type of the elongated styloid process with sex

Type of elongation	Sex		Total (n=198)	*P*-value
	Male (n=103)	Female (n=95)		
Right side, n (%)				
Normal	59 (57.3)	61 (64.2)	120 (60.6)	0.380
Type I	33 (32)	21 (22.1)	54 (27.3)	
Type II	8 (7.8)	11 (11.6)	19 (9.6)	
Type III	3 (2.9)	2 (2.1)	5 (2.5)	
Left side, n (%)				
Normal	49 (47.6)	62 (65.3)	111 (56.1)	0.085#
Type I	27 (26.2)	17 (17.9)	44 (22.2)	
Type II	16 (15.5)	8 (8.4)	24 (12.1)	
Type III	11 (10.7)	8 (8.4)	19 (9.6)	

TABLE 3: Distribution of unilateral and bilateral elongation of the styloid process

Sex	Unilateral		Bilateral	
	n	%	n	%
Male	15	17.2	39	44.8
Female	10	11.4	23	26.6
Total	25	28.6	62	71.4

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