

Original Research

Evaluating the relation between the elongated styloid process and the ponticulus posticus using cone-beam computed tomography

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ABSTRACT:

Background: To evaluate the relation between the elongated styloid process and the ponticulus posticus using cone-beam computed tomography. **Materials & methods:** A total of 100 patients were enrolled. Out of which 50 were female and 50 were male. They were further divided as case and control groups. In this case group included 18 females and 24 males whereas control group included 32 female and 26 males. The age group included was 15-60 years. CBCT examination was done and proper history was taken. Analysis of elongated styloid process and ponticulus posticus was done according to age and gender. **Results:** A study included 50 female and 50 males. Mean age was 33.62 years. The study presents the analysis of PP and ESP in patients regarding the mean age and gender. The mean age of the patients with ESP and PP was higher than that of the control group. Also, the highest mean age was 38.33 years as reported in cases of bilateral ESP and PP. **Conclusion:** There was no significant relationship between ESP and PP.

Keywords: styloid process, cone-beam computed tomography, ponticulus posticus.

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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. ^(1,2)

Ponticulus posticus (PP) (Latin for “little posterior bridge”) is a bony anomaly of the atlas that consists of a complete or partial calcified bridge over the vertebral groove of the posterior arch. ⁽³⁾ The vertebral artery passes through the groove in its path from the

transverse foramen into the foramen magnum, accompanied by the suboccipital nerve. Ponticulus lateralis (PL) (“little lateral bridge”) is formed by a bony growth extending from the lateral side of the superior articular process of the atlas laterally and inferiorly towards the lateral process. ^(4,5)

The elongated SP and the ossified stylohyoid ligament can compress the structure in close vicinity, leading to symptoms like sore throat, dysphasia, otalgia, the sensation of a foreign body in the throat, facial pain radiating to the ear or along the mandible, and head and neck mimicking neuralgic pain. ^(6,7) Hence, this study was conducted to evaluate the relation between the elongated styloid process and the ponticulus posticus using cone-beam computed tomography.

MATERIALS & METHODS

A total of 100 patients were enrolled. Out of which 50 were female and 50 were male. They were further divided as case and control groups. In this case group included 18 females and 24 males whereas control group included 32 female and 26 males. The age group included was 15-60 years. CBCT examination

was done and proper history was taken. Analysis of elongated styloid process and ponticulus posticus was done according to age and gender. Data was collected. Results were analysed using SPSS software.

RESULTS

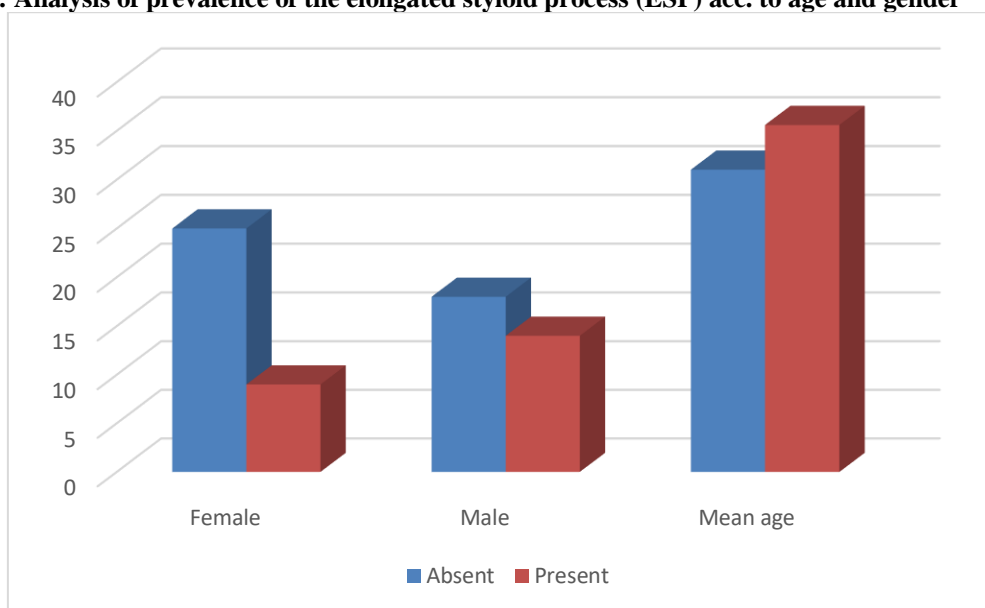
A study included 50 female and 50 males. Mean age was 33.62 years. The study presents the analysis of

PP and ESP in patients regarding the mean age and gender. The mean age of the patients with ESP and PP was higher than that of the control group. Also, the highest mean age was 38.33 years as reported in cases of bilateral ESP and PP. Considering gender, there was no significant difference between males and females.

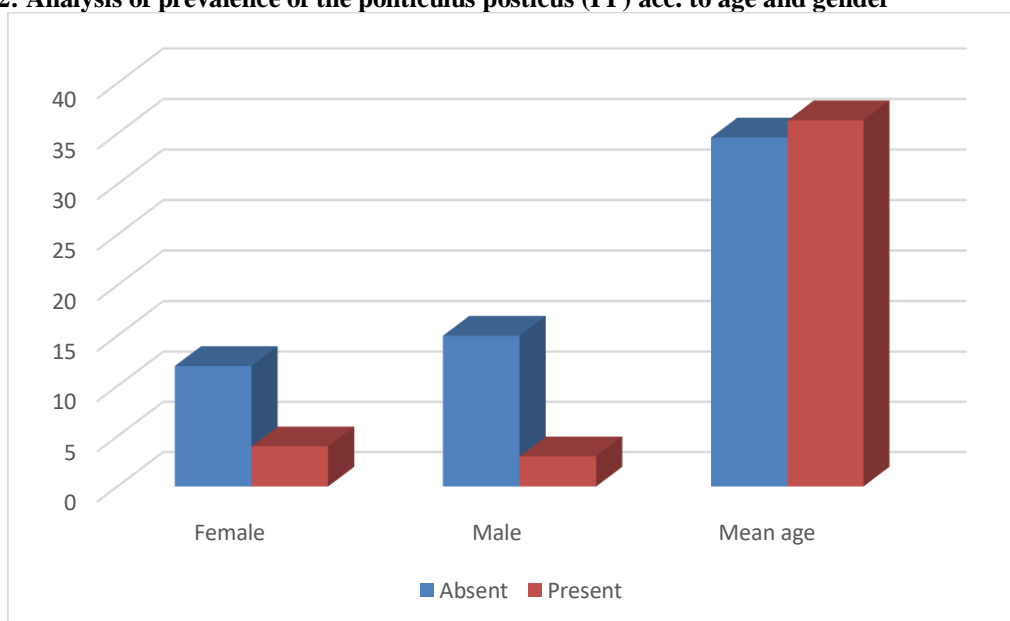
Table 1: Analysis of prevalence of the elongated styloid process (ESP) and ponticulus posticus (PP) acc. to age and gender

Variable	ESP				PP			
	Female	Male	Mean age	Std.deviation	Female	Male	Mean age	Std. deviation
Absent	25	18	31.02	16.926	12	15	34.62	11.342
Present	9	14	35.60	10.364	4	3	36.32	11.536

Graph 1: Analysis of prevalence of the elongated styloid process (ESP) acc. to age and gender



Graph 2: Analysis of prevalence of the ponticulus posticus (PP) acc. to age and gender



DISCUSSION

The SP can be elongated bilaterally or unilaterally, however unilateral elongation of the SP is more frequent.⁽⁸⁾ 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. In the Eagle's syndrome, the elongated SP or ossified stylohyoid ligament is a source of pain.⁽⁹⁾“Elongated SP” is a term used since the publication reports concerning findings in both dentomaxillofacial and ear–nose–throat patients.⁽¹⁰⁾ This term denotes a SP exceeding its normal length. Eagle's definition was: “The normal SP measures between 2.5 cm and 3 cm.” His method of measurement was not described, but his examples showed lateral radiographs of the skull.⁽¹¹⁾ In our study, included 50 female and 50 males. Mean age was 33.62 years. The study presents the analysis of PP and ESP in patients regarding the mean age and gender. The mean age of the patients with ESP and PP was higher than that of the control group. One of the study was designed to investigate the association of poniculus posticus (PP) and elongated styloid process (ESP) with headaches. Presence of partial or complete PP and ESP length, type, thickness, mediolateral angulation, anterioposterior angulation (horizontal & vertical), lateral or medial curvature.⁽¹²⁾ Among 134 subjects, 62 subjects (46.3%) presented with headache and 72 subjects (53.7%) did not have any headache. On further analysing the total 62 subjects with headache, it was found out that 31 subjects (50.0%) of them had ESP and PP both, 16 subjects (25.8%) had only ESP, and 15 subjects (24.2%) had only PP. A strong association was present between headache and presence of PP & ESP individually and together. All health care professionals dealing with the head and neck pain disorders should also consider the presence of ESP & PP during diagnosis and treatment.⁽¹³⁾ Also, the highest mean age was 38.33 years as reported in cases of bilateral ESP and PP. Considering gender, there was no significant difference between males and females.

Ponticulus posticus (PP) as a one of the cervical vertebra variations brings about symptoms similar to Eagle syndrome.⁽¹⁴⁾ Another study aimed to determine the relationship between elongated styloid process (ESP) and PP in a group of Iranian patients using cone-beam computed tomography (CBCT) images. The CBCT images of 349 patients (118 males and 231 females; mean age: 32.53 ± 14.143) were involved in this study. Ponticulus posticus was observed in 24.5% of patients with ESP and 31.98% of patients without ESP. There was no significant relationship between the presence of PP and ESP ($p = 0.198$). Twenty-five patients with ESP showed PP; cases of ESP with either side and opposite side PP were 7.84% and 1.96%, respectively. Cases of bilateral ESP and PP were predominant (14.70%). The mean age of patients with bilateral ESP and PP was

higher than others. There was no significant difference between males and females ($p = 0.456$).⁽¹⁵⁾

CONCLUSION

There was no significant relationship between ESP and PP.

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