VARIATIONS IN LENGTH OF STYLOID PROCESS IN ADULT HUMAN DRY SKULLS

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ABSTRACT

Objective: To establish baseline data regarding average length of styloid process in adult human dry skulls in Asian population in Pakistani region.

Study Design: Comparative cross sectional study.

Place and Duration of Study: Department of Anatomy King Edward Medical University, University of Lahore, Services Institute of Medical Sciences, Central Park Medical College, CMH Lahore and Nawaz Sharif Medical College Gujrat, from May to Jun 2018.

Methodology: A total of 71 adult human dry skulls with intact styloid processes were studied from the Anatomy museums of various public and private sector medical colleges of Punjab. The length of both styloid processes from root to tip was measured using a measuring scale in centimetres.

Results: The length of styloid process varied from a minimum value of 0.8 cm to a maximum value of 4.3cm. Mean length of right and left styloid processes was found to be 1.68 ±.781cm and 1.86 ±.738cm respectively. Out of 14.2% of skulls were found to have styloid process >2.5cm. Mean length of styloid process of the skulls studied in our setting is 1.77 ± 0.76cm.

Conclusion: As the styloid process was found to be longer than the normal reported length in 14% of skulls. It might be a reason for symptomatic patients presenting in outpatient ward with throat pain and discomfort which often remains unaddressed and needs consideration.

Keywords: Eagle's syndrome, Styalgia, Styloid process.

INTRODUCTION

Styloid process is a cylindrical projection of varying length from the temporal bone at the base of skull directed downwards, forwards and medially. It is related to parotid gland laterally, facial nerve at its base and external carotid artery at its tip. Three muscles namely stylopheryngeus, styloglossus, stylohyoid and two ligaments, the stylohyoid and the stylomandibular ligaments are attached to it[1]. The average length of styloid process is 2-3cm[2]. Styloid process is called elongated when its length >3cm[3], that puts pressure on surrounding structures leading to symptoms such as facial pain, dysphagia, trismus, tinnitus, headache and deep seated neck pain on head rotation laryngopharyngeal pain and even internal carotid artery dissection[4]. This gives rise to a varying degrees of clinical symptoms termed as styalgia or eagle's syndrome described by Watt W Eagle in 1937[5]. Symptoms of eagle's syndrome may masquerade as pain of dental origin[6].

Styloid process develops from remnant of second pharyngeal arch cartilage (Richart cartilage), while part of it between hyoid bone and styloid process regress completely. Its perichondrium gives origin to the stylohyoid ligament[7]. Sometimes embryonic cartilage may remain in ligament and tends to ossify during later life, therefore the length of styloid process may vary greatly in such individuals[8]. Rarely it is found to be fused with hyoid bone[4]. Literature shows that styloid process can be abnormally long in 20% normal individuals even >5.5cm[9].

Clinicians, radiologists, neurosurgeons and ENT surgeons are aware of immense clinical importance of measurements of styloid process. The present study thus, was performed to know the average length of styloid process in our population as literature was not representing true data of Pakistani population.

METHODOLOGY

It was a comparative cross sectional study that was done in department of Anatomy King Edward Medical University, University of Lahore, Services Institute of Medical Sciences, Central Park Medical College, CMH Lahore and Nawaz Sharif Medical College Gujrat, from May to June of 2018. A total of 71 adult human dry skulls with intact styloid processes were used for this study. Consecutive sampling technique was used due to limited number of human dry skulls available for study. All the available human dry skulls were used in this study that fulfilled the inclusion/ exclusion criteria as intact styloid process is usually prone to damage and hard to found. The with both intact styloid processes were included and skulls with

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eroded or broken styloid process were excluded from this study.

The length of both styloid processes from root to tip was measured using a measuring scale in centimetres. Skulls were not categorised into male and female. All data was collected separately for right and left styloid process. Data was analysed by SPSS-18. Independent t-test was used to compare the difference of mean between length of right and left styloid process. Mean value, standard deviation and percentages were measured separately for right and left sides.

RESULTS

Out of 71 skulls analysed, the length of styloid process varied from a minimum value of 0.3cm to a maximum value of 4.3cm. Mean length of right and left styloid processes was found to be 1.833 ± 0.781cm and 1.683 ± 0.738 cm respectively (table). Independent t-test was used to compare the difference of mean between length of right and left styloid process. Mean length of styloid process of the skulls studied in our setting is 1.77 ± 0.76cm. Elongated styloid process was found in 10 (14%) of individuals in our setting as length varies between 2.5-4.3cm.

Table: Measurements of styloid process.

Styloid Process	n	Mean ± SD (cm)	Minimum Length (cm)	Maximum Length (cm)	*p*-value
Right	71	1.833 ± 0.781	0.30	4.00	0.258
Left	71	1.683 ± 0.738	0.40	4.3	

The difference in mean length of styloid process of right and left side was not significant with a *p*-value 0.258. This can also be seen in the box plot graph fig-2.

DISCUSSION

Elongated styloid process is distributed among normal population. In spite of its distribution among normal population, it may or may not be symptomatic, therefore its length can be divided in two main categories i.e. short styloid process <2.5cm and long >2.5cm. There may be unilateral or bilateral elongation of styloid process depending upon the etiology[10], however unilateral elongation is more common.

Elongated styloid process may be associated with Eagle's syndrome which is not true in each case. It can result from either elongated styloid process, calcification of stylohyoid ligament which is remnant of second pharyngeal arch, post tonsillectomy scarring or compression of internal or external carotid artery by the tip of this process. In all such cases the syndrome is associated from mild discomfort to dysphagia, tinnitus, otalgia, vertigo and headache[11]. There is no sex difference in occurrence in elongated styloid process[12], but it is common observation that symptoms of eagle's syndrome are mostly present in female especially after 30 years of age[13]. Similar study was done in Brazilian population[14], that also showed insignificant statistical difference in gender related elongation but prevalence in females. In contrast to this study, male population of South Kerala[15], was found to be having prevalence of elongated styloid process (35%) that advances with advancing age.

Figure-1: Measuring the left sided styloid process.

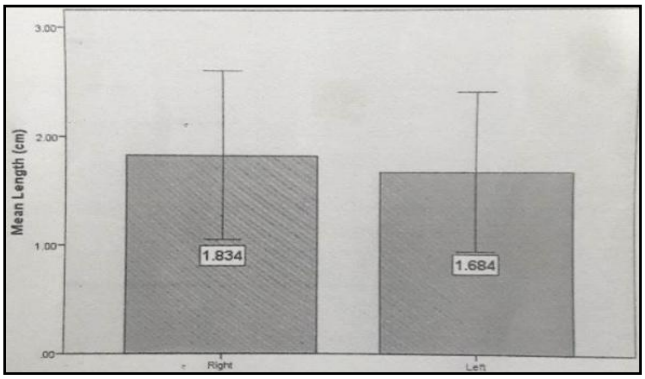

Figure-II: Box plot graph for mean length of right and left styloid process.

Exact measurements of elongated styloid process may vary according to race, age group, sex and anatomical variations. The mean lengths of the elongated right and left styloid.

process in Nepalese was found to be 33.57 ± 6.02 mm and 36.21 ± 6.47mm, respectively[16], while in South Indian values found were 24.92 ± 5.06mm and 23.01 ± 4.02mm in males and females respectively[17]. In Greek population, length of styloid process in male and female was 38.35 ± 8.9mm and 34.24 ± 8.63mm respectively among which 30.6% exceeded the normal length[18].

Mean length of styloid process of the skulls studied in our setting is 1.77cm, SD ± 0.760. As the styloid

process was found to be longer than the normal reported length in 14% of skulls. It might be a reason for symptomatic patients presenting in OPD with throat pain and discomfort which is often remain unaddressed and needs consideration to evaluate and treat as a case of elongated styloid process.

CONCLUSION

It was found in this study that the length of styloid process varies among population; therefore average length of elongated styloid process may also vary. Exact etiology of elongated styloid process is still unknown but the symptoms because of this elongation (eagle's syndrome) vary among patients. We believe that our study provides additional information about variation in length of styloid process in Pakistani population as 14% of adult dry skulls were categorized to be having elongated styloid process as their length was >2.5cm. Further studies including larger sample size and different measuring techniques are required to measure the length of elongated styloid process.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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