

CASE REPORT

Anomalous styloid process and its clinical implications

Srijit Das, Fariah Haji Suhaimi, Faizah Othman, Azian Abd Latiff

Department of Anatomy, Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM),
 Jalan Raja Muda Abd Aziz, Kuala Lumpur, Malaysia. das_srijit23@rediffmail.com

Abstract: In literature, there is paucity of information on the different shapes of styloid processes of the temporal bone of the skull. Textbooks of anatomy describe the styloid process to be slender, approximately 2.5 cm in length and concave on the anterior aspect only. In the present case, we observed the styloid process to be much longer than usual, bearing a concavity on the anterior, as well as the posterior aspects as a consequence of which, the bone was constricted in its proximal part. The mastoid process which is usually conical, was found to be rounded in this case. The length of the styloid process measured 2.8 and 2.7 cm on left and right sides, respectively. The skiagram displayed the biconcave profile of the styloid process and the rounded appearance of the mastoid process, thus substantiated the findings on gross examination of the skull. The anatomical knowledge of the mastoid process is important for surgeons assessing the mastoid air cells. The elongated styloid process is often a feature of Eagle's syndrome. An enlarged and calcified styloid process is often asymptomatic, unless detected radiologically. An abnormally elongated styloid process or its calcification may cause recurrent throat pain, foreign body sensation, dysphagia, or facial pain. An enlarged styloid process may also compress upon the internal carotid artery, leading to transient ischemic attack and may pose a threat to anesthetists performing intubation procedures. Awareness of such variations may be of clinical importance to radiologists and surgeons (*Fig. 2, Ref. 11*). Full Text (Free, PDF) www.bmj.sk.

Key words: styloid, mastoid, process, bone, anomaly, variation, Eagle's syndrome.

The styloid process is a spike-like process in the base of the skull, which projects downwards, lateral to jugular fossa. The styloid process is usually straight but may be occasionally curved. There are very few research reports on the shapes of the styloid process. The styloid process is related antero-medially to the mastoid process. Its length is variable, ranging from few millimeters to centimeters (1). The styloid process gives attachment to two ligaments – the stylohyoid, stylomandibular, and three muscles i.e. stylopharyngeus, stylohyoid and the styloglossus (1). Interestingly, the abnormalities related to length and angulation of the styloid process may be a feature of Eagle's syndrome, in which dysfunctions related to stomatognathic systems are observed (2). The radiological evaluation of styloid process is also important to diagnose any calcification which may cause related symptoms.

The petromastoid part of the temporal bone has a conical mastoid process, projecting downwards (1). An enlarged mas-

toid process may sometimes be observed in adult males. The mastoid process is also important for surgeons while assessing the mastoid air cells. Thus, precise knowledge of anatomy of both normal and abnormal styloid and mastoid processes are important for clinicians, surgeons and radiologists. The present study aims at highlighting the anatomico-radiological features of an anomalous styloid process and an enlarged mastoid process and discusses its clinical implications.

Case report

Anomalous styloid and mastoid processes were detected in an adult skull. The styloid and mastoid processes were studied in detail and the measurements were recorded. A skiagram of the skull was also obtained to study the radiological features.

Observation

The skull presented an elongated styloid process bilaterally ('S' in Fig. 1). the styloid process was angulated and displayed a concavity on the anterior as well as posterior aspects in the proximal third of the bone. As a consequence, the bone was constricted in its proximal part. The distal two thirds of the bone were straight and inclined. The length of the styloid process measured 2.8 and 2.7 cm on the left and right sides respectively. The mastoid process exhibited a rounded and enlarged appearance. The skiagram (lateral view of the skull as seen in Fig. 2) also displayed the biconcave profile of the styloid process and the rounded appearance

Department of Anatomy, Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM), Jalan Raja Muda Abd Aziz, 50300 Kuala Lumpur, Malaysia

Address for correspondence: Srijit Das, MD, Dept of Anatomy, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abd Aziz, 50300 Kuala Lumpur, Malaysia.
 Phone: +006-03-92897263

Acknowledgement: Due acknowledgement to the administration of Universiti Kebangsaan Malaysia who funded the trip of Dr.Srijit Das, to present the article as a poster at the International Medical & Health Science Congress, held at Universiti Sains Malaysia, Kelantan, Malaysia, from 25th–28th May,2007.

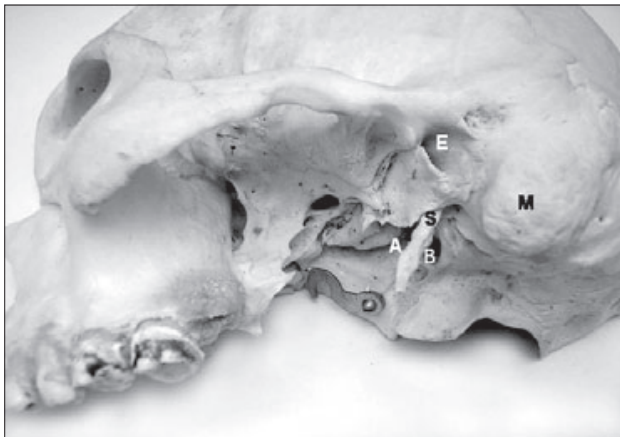


Fig. 1. Photograph of skull showing: M – mastoid process, S – styloid process, A & B – constricted anterior and posterior parts, E – external acoustic meatus.



Fig. 2. Photograph of X ray of skull (lateral view) showing: S – styloid process, M – mastoid process, A & B – constricted anterior and posterior parts, P – pituitary fossa.

of the mastoid process. This substantiated the findings on gross examination of the skull. As a consequence of these concavities, the constricted portion of the bone was easily appreciated in the proximal third of the styloid process ('A' & 'B' in Fig. 2).

Discussion

The styloid process is part of the temporal bone and develops from the second pharyngeal arch (1). It gives attachment to ligaments – stylohyoid and stylomandibular and muscles – the stylopharyngeus, stylohyoid and the styloglossus (1).

Few past studies have focused on the length and its calcification of the styloid process (3). There is paucity of information on the different shapes of the styloid process. Standard textbooks of anatomy describe the styloid process to have a concavity more common on the anterior aspect as compared to the posterior aspect (1).

The elongated styloid process is clinically important as it is found in Eagle's syndrome. In this syndrome, the elongated styloid process or calcification causes recurrent throat pain, foreign body sensation, dysphagia, or facial pain (4). The symptoms sometimes mimic those of facial neuralgia. It requires proper physical examination by digital palpation of the styloid process in the tonsillar fossa (4). It has been found that in these cases, there is muscular hyperactivity as compared to healthy individuals due to the interference of the elongated styloid process. This leads to dysfunctions of the stomatognathic system in these patients of Eagle's syndrome, with craniofacial pain, dysphagia, otalgia, temporomandibular dysfunctions, and headache (2). Sometimes the pain is localized, or it radiates to the jaw and ear and it may simulate pain of dental origin. Radiographic demonstration of styloid elongation is readily made in most instances. The only effective treatment is surgical shortening of the styloid process which may cause relief (5).

Mechanical stresses stretching the second branchial arch during the fetal development probably induce a variable involve-

ment of the different parts of Reichert's cartilage in the morphogenesis of the styloid process. The so-called 'elongated styloid process' is thus regarded to be congenital in origin (6). Interestingly, the growth of the process is not due to calcification or ossification of the stylohyoid ligament, as it was thought earlier (6).

It has been reported that often the enlarged and calcified styloid process does not cause any symptoms, till the time it is discovered in extra oral radiographs (7). Research reports have also reported a case of the transient ischemic attack due to an elongated styloid process (8). This was due to mechanical compression of the internal carotid artery leading to transient ischemic attack. Elongated styloid process may also cause difficulty during intubation procedures (9).

The incidence of the enlarged styloid process has been found to be higher in rural Indian population, with female preponderance owing to the fact that they carry heavy weight (10). However the skull in which we observed the elongated styloid process belonged to the male sex, as the superciliary arches were prominent. Admittedly, the clinical history of the patient could not be obtained in this case. The peculiar biconcave profile of the styloid process on its anterior and posterior aspects is a unique finding which has not been reported earlier. We as anatomists also opine that the presence of the concavity, both on anterior and posterior aspects of the styloid process, may reduce the thickness of the bone thereby rendering it susceptible to fracture. Awareness of variation of such kind may also be of interest to radiologists and surgeons.

A certain number of patients with elongated styloid process may not have the classic cervicofacial complaints which were originally described by W. Eagle in 1937. Some of these cases who have radiologic evidence of elongated styloid process are symptom-free and can be accepted as normal anatomical variants. On the other hand, some of those symptomatic cases may present uncommon neurologic signs and can be misdiagnosed as cases with neurologic or infectious origin (11). Researchers have also reiterated the fact that the radiologic finding of an elongated

styloid process may often cause the clinician to miss other pathology (11).

Conclusion

Summarizing the above facts, the present study highlighted an unusual styloid process which had a peculiar concavity both on the anterior and posterior aspects of its upper third and an enlarged mastoid process. The radiological picture of the anomalous styloid process may be beneficial for surgeons, neurologists and radiologists in daily clinical practice. Awareness of the anomalies related to styloid process may help in arriving at a correct diagnosis and help in avoiding erroneous interpretation of radiographs.

References

1. **Standring Susan (Ed)**. Gray's Anatomy. The anatomical basis of clinical practice. Edinburgh; Elsevier Churchill Livingstone; 2005, pp. 450 & 470.
2. **Siessere S, Vitti M, de Sousa LG, Semprini M, Watanabe PC, Hal-lak JE**. Changes in masticatory muscles activity associated with Eagle's syndrome. *Electromyogr Clin Neurophysiol* 2006; 46: 223—228.
3. **Kursoglu P, Unalan F, Erdem T**. Radiological evaluation of the styloid process in young adults resident in Turkey's Yeditepe Universi-ty faculty of dentistry. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005; 100: 491—484.
4. **Orhan KS, Guldiken Y, Ural HI, Cakmak A**. Elongated styloid process (Eagle's syndrome): literature review and a case report. *Agri* 2005; 17: 23—25.
5. **Zohar Y, Strauss M, Laurian N**. Elongated styloid process syndrome masquerading as pain of dental origin. *J Maxillofac Surg* 1986; 14: 294—297.
6. **Lengele B, Dhem A**. Microradiographic and histological study of the styloid process of the temporal bone. *Acta Anat (Basel)* 1989; 135: 193—199.
7. **Mupparapu M, Robinson MD**. The mineralized and elongated styloid process: a review of current diagnostic criteria and evaluation strategies. *Gen Dent* 2005; 53: 54—59.
8. **Infante-Cossio P, Garcia-Perla A, Gonzalez-Garcia A, Gil-Peralta A, Gutierrez-Perez JL**. Compression of the internal carotid artery due to elongated styloid process. *Rev Neurol* 2004; 39: 339—343.
9. **Potgieter SV**. Elongated styloid process causing difficulty during intubation. *Anaesthesia* 1959; 14: 278—281.
10. **Yadav SP, Chanda R, Gera A, Yadav RK**. Stylalgia: an Indian perspective. *J Otolaryngol* 2001; 30: 304—306.
11. **Yetiser S, Gerek M, Ozkaptan Y**. Elongated styloid process: diagnostic problems related to symptomatology. *Cranio* 1997; 15: 236—241.

Received June 11, 2007.

Accepted December 3, 2007.