Calcified Stylohyoid ligament in 50 human Cadavers

Evaluation of the calcified stylohyoid ligament in 50 human cadavers

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ABSTRACT

BACKGROUND: The calcified stylohyoid ligament has various clinical implications and is one of the most common causes of the Eagle’s syndrome. Objective: The present study aimed to identify the incidence of occurrence of calcified stylohyoid ligament in the Indian population. MATERIALS AND METHODS: Stylohyoid ligament complexes of both sides were studied during routine educational dissection of 50 human cadavers of Indian origin in the department of anatomy over a period of three years. There were 30 male and 20 female cadavers with mean age of 58 years. The lengths of the styloid process and stylohyoid ligament were measured on each side with vernier calliper and then photographed. The stylohyoid ligament was resected in each specimen for microscopic examination. RESULTS: Out of 100 stylohyoid ligaments, calcified ligaments were found in twenty cases. In the three cases complete calcification of the ligament have been found; and in seventeen cases variable lengths of calcified ligaments were found. The average length of the styloid process was found to be 29 mm on the left side and 28 mm on the right side. CONCLUSION: Calcified stylohyoid ligament may undergo calcification at variable lengths and could compress vital neck structures.

KeyWords: Eagle’s syndrome, Stylohyoid ligament, Facial pain, Glossopharyngeal neuralgia.

INTRODUCTION

The stylohyoid ligament is a fibrous cord stretched between the tip of the styloid process and the lesser cornu of the hyoid bone. The styloid process together with the stylohyoid ligament is referred as the stylohyoid complex. Embryologically, the stylohyoid ligament is derived from the second pharyngeal arch, or Reichert’s cartilage1. Hollinshead WH (1954) mentioned stylohyoid ligament attaches to the lesser cornu of hyoid bone and represents an unossified intermediate part of the skeleton of the second pharyngeal arch, upper portions of which is represented by the styloid process, lower portion by the lesser cornu and perhaps some of the body of the hyoid. Variations in the ossification of this intermediate segment lead to greater or less length of styloid process and sometimes to complete mineralization of the ligament2. The stylohyoid ligament is in close proximity to a number of neurovascular structures. Medial to it the internal carotid artery with sympathetic chain; internal jugular vein; and cranial nerves VII, IX, X, XI and XII. One or more of these structures may be in impacted adversely as the ligament undergoes calcification along all or part of its length3,4. Previous reports suggest that calcification of the ligament may give rise to symptoms including unilateral neck pain, dysphagia, otalgia and tinnitus, which have been referred to as ‘Eagle’s’ syndrome. A vascular form of the condition is said to result from compression of the extra-cranial portion of the internal carotid artery and result in a transient ischaemic event, dissection, or even stroke5,6. Pain has also been reported in the vicinity of the laryngopharynx which has been attributed to irritation of the glossopharyngeal nerve7.

The aim of the present study is to know the frequency of occurrence of calcified stylohyoid ligaments which is unexpected etiological cause of glossopharyngeal neuralgia, compression of internal carotid artery which leads to interruption in blood supply to brain, compression of internal jugular vein results into defective venous return of vital organ- brain.

MATERIALS AND METHODS

Stylohyoid ligament complexes of both sides were studied during routine educational dissection of 50 human cadavers of Indian origin in the department of anatomy over a period of three years. There were 30 male and 20 female cadavers with mean age of 45 years. There were no signs of trauma, surgery or wound scars in the head and neck regions of any of the cadavers. The minimal breach in continuity in the middle part of the stylohyoid complex was considered as the place of attachment of the
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The stylohyoid ligament with the tip of the corresponding styloid process.
The lengths of the styloid process from its base to apex (beginning of the stylohyoid ligament) were measured on both sides; the lengths of the stylohyoid ligament were measured from its attachment to the tip of corresponding styloid process to lesser cornu of corresponding hyoid bone with vernier calliper and then photographed.

Statistical comparisons between percentages to find sexual significance in term of lengths of styloid process and stylohyoid ligament, and any lateralization were performed by the Chi-squared test. \( P < 0.05 \) was regarded as statistically significant.

The stylohyoid ligament was resected in each specimen for microscopic examination to check calcified tissue. Specimen was excluded if bony tissue was found.

**RESULTS**

Close visual inspection of stylohyoid complex revealed a minimal breach in continuity in the middle part of the stylohyoid complex, beyond which the part of the complex was considered as calcified stylohyoid ligament, was considered as the place of attachment of the stylohyoid ligament with the tip of the corresponding styloid process.

The lengths of styloid process from its base to apex were measured on both sides. The lengths of styloid process on the left side were found to be 21-32 mm in male and 20-30 mm in female, and on the right side were found to be 23-31 mm in male and 21-29 mm in female. The average length of the styloid process was found to be 29 mm on the left side in both sexes, and on the right side 28 mm in male and 26 mm in female.

The average length of calcified stylohyoid ligament was found to be 26 mm on the left side and 28 mm on the right side. Complete calcification of the stylohyoid ligaments was found in three cases; two cases on the left side (Fig. 1) in male cadavers, and one on the right side (Fig. 2) in female specimen. Variable lengths of calcified stylohyoid ligaments were found in another 17 cases; four on the left side in male; five on the left side in female; and four on the right side in both sexes. So we found calcified stylohyoid ligaments in 10 out of 60 stylohyoid complexes (16.6%) in males and 10 out of 40 stylohyoid complexes (25%) in females. The calcified stylohyoid ligaments were found in 11 out of 20 complexes (55%) on the left side and 9 out of 20 complexes (45%) on the right side. The Chi-squared test did not show statistically significant differences between males and females \( (\chi^2 = 1.44, P > 0.05) \), or right and left sides \( (\chi^2 = 0.542, P > 0.05) \).

In each case where we found calcified stylohyoid ligament, we have resected the ligament for microscopic examination, found only calcified tissue, and have not found the bony tissue in any of the specimen.

**DISCUSSION**

Because it is cartilaginous origin, the ligaments has the potential to undergo calcification. Calcified stylohyoid ligaments resulted from abnormal mineralization and are not merely an elongation of styloid process\(^8\).

Eagle’s syndrome is defined as the symptomatic elongation of the styloid process or mineralization of stylohyoid ligament complex. This syndrome was first documented by Walt W. Eagle\(^5\). Over a twenty-year period, Eagle reported over 200 cases and explained that the normal styloid process is approximately 25-30 mm in length, which matches with our study. Another study on 241 dissections revealed an average length of 31 mm with a range between 14 and 58 mm\(^7\). However, most authors agree that any measurement over 30 mm is enlarged.

Thot et al. reported that the length of the left side Styloid ranged from 0.7 to 1.6 cm and on the right side from 0.8 to 2.4 cm. The average length for the left and right Styloid were 1.52 and 1.59 cm respectively in Indian subject\(^9\). Keur et al. stated that, if the length of the process or the mineralised part of the ligaments which appeared in radiography was 30 mm or more, this could be considered an elongated styloid process, however, very little correlation exists between extent of the calcification and intensity of symptoms\(^8\).

The incidence of calcification of stylohyoid ligament varies and was found to be 18.2\(^%\)\(^10\). It may be as low as 4\(^%\) to as high as 84\(^%\)\(^11\). Although
approximately 4% of the general population is thought to have an elongated styloid process and a calcified stylohyoid ligament, only a small percentage of this group (4%-10%) 12, 1%-5%13 is symptomatic. Ilguy et al. using panoramic radiographs on 860 subjects to study the incidence of elongated stylohyoid complex, reported that partial left sided calcification of stylohyoid complex is commoner than complete right sided calcification14. Radiographic examination of 35 year old male patient presented with complain of neck pain which was exacerbated with rotation of his head either right or left, dull headache, shows calcification of stylohyoid ligaments of both sides15. Sharwood-Smith stated that one of the unexpected causes of difficult tracheal intubation is calcified stylohyoid ligament16.

Camarda AJ et al. found that patients presented with cervicopharyngeal pain due to stylohyoid calcification - the stylohyoid syndrome have no prior trauma or surgery, but rather radiographic evidence of stylohyoid ligament calcification at a young age. In spite of the presence of calcification at an earlier age, these patients are generally older than 40 years at time of presentation11. Rizzatti-Barbosa et al. reported that in Brazilian population, 90% of those with anatomical finding of elongated mineralized stylohyoid complex were in the age range of 40-59 years17. In present study we found appearance of calcified stylohyoid ligaments in mean age of 45 years.

CONCLUSION

Frequent occurrence of calcification of variable lengths of stylohyoid ligaments ranging from small lengths to complete calcification the ligaments could cause severe pain and significantly restricted head and neck movements. Compression by calcified stylohyoid complex on surrounding structures lead to wide range of clinical syndromes.

REFERENCES