

Stylohyoid ossification with a case report

STYLOHYOID OSSIFICATION in varying degrees is well-known to occur and reports in the literature cite examples met with clinically with symptomatology referable to this ossification (Dwight, 1907; Babitt, 1933, Fritz, 1940; Loeser and Cardwell, 1942). The more extensive type of ossification is less common; also it is not clear in such reports which portions of the second branchial bar from the styloid process into the stylohyoid ligament and the lesser horn of the hyoid bone are ossified. This report presents an example which has been examined post-mortem by dissection and radiography, and is discussed in relation to the reported literature.

CASE REPORT:

A 40-year-old Chinese male, described as a vagrant, was admitted on the 10th November, 1964, to the General Hospital, Kuala Lumpur, for treatment of anaemia. It appears that he was "violent, aggressive, irrational and abusive", and it was also reported that one was "not able to get patient to show tongue." Clinical examination and results of investigations: temperature 99° F; B.P. 110/60; Hb = 8.28 grams %; reticulocyte count 4.4%; W.B.C. 7,900/cu. mm. with 65% polymorphonuclear leucocytes, 31% lymphocytes and 4% eosinophils. The blood film showed microcytic, hypochromic erythrocytes with anisocytosis and poikilocytosis. No X-rays were taken. Treatment included a milk and liquid diet and parenteral vitamins. However, eight days after admission, he died with terminal bronchopneumonia.

POST-MORTEM FINDINGS:

On skin reflection and superficial dissection of the neck, a bony resistance was felt over the stylohyoid ligament on the right side which rendered

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the larynx rigid. The X-ray taken of this region is shown in Fig. 1, which shows the opacity of the ossified ligament, though somewhat displaced in this partly dissected specimen. Dissection to display the ligament showed a 'solid' structure (Fig. 2), which on further dissection revealed some mobility and discontinuity (Fig. 3). In order to examine the definite degree of ossification, a dental X-ray plate was exposed, placed directly behind the dissected specimen, and Fig. 4 illustrates the ossification of the ligament with discontinuity at the styloid process end and at the attachment to the lesser horn. The length of the ossified process was 8 cm. On the left side, the styloid process measured 1.5 cm., while the stylohyoid ligament was 4 cm. and the lesser horn of the hyoid bone 2.6 cm. in length.

DISCUSSION:

The embryology of the second branchial arch has been reported in detail (Bart, Anson and Richany, 1956). In the adult, the skeletal components of this branchial arch usually become ossified at the upper and lower ends, leaving an unossified stylohyoid ligament between them. The styloid process ossifies from two centres: an upper tympano-hyal centre,

which is fused with the petromastoid in the first postnatal year, and a lower stylo-hyal centre, which appears shortly after birth and fuses with the upper centre after puberty. Failure of fusion has given rise to the incorrect diagnosis of fracture of the styloid (Watkins, 1966). These two parts produce a styloid process which is 2.5 cm. long on the average. The lesser horn, which ossifies in the first year, is united to the hyoid bone by a synovial joint which may disappear in old age. The horn, usually a few millimeters in length, may be as long as 10 to 12 mm. (Inkster, 1951).

Dwight (1907) collected 14 cases of "stylohyoid ossification" in the literature and reported five cases of his own. He suggested that this was not a pathological process but was "due to a continued growth and subsequent ossification of the second branchial arch cartilage." He added that "the condition is a thormorphic one; that is, one in which parts of the human body show an exceptional structure which is normal in certain animals as a consequence of a common plan of development."

The frequency and precise form of stylohyoid ossification is difficult to determine routinely on account of the relative inaccessibility of the region and since radiographs do not display it satisfactorily. If they do, the picture of the process, as in Fig. 1, does not permit one to distinguish the elements involved, such as can be obtained from a radiograph of the dissected specimen post-mortem (Fig. 4). In some instances, the ossification is continuous with the styloid process and such a "styloid process" may then measure as much as 8.5 cm., though in only 4% of persons is the average length of 2.5 cm. exceeded (Eagle, 1948); and in those which are symptomatic, they are of 6 to 7 cm. in length (Watkins, 1966). In these instances, they are long enough to impinge on the carotid vessels, the glossopharyngeal nerve, and the tonsillar bed. A twisted process is more likely to be symptomatic (Asherson, 1957). Babitt (1933) gives the average length of the styloid process as 3 cm. and cites the data on 2,000 skulls, giving lengths of 3.8 cm. in only 0.5%, and in only one instance a length of 7.6 cm. (Gruber, quoted by Guthrie, 1924). However, longer styloid processes have been seen on routine X-ray examination or even been palpated in the tonsillar fossa which remained asymptomatic (Watkins, 1966), so that some instances of extended ossification may be of this type.

The styloid process has been referred to as a "mobile" structure and in operations on an elongated one, it is said to be necessary to "reorientate its



Fig. 1: A lateral X-ray view of the partly dissected specimen. The stylohyoid ossification is visible, somewhat displaced and only the faint outline of ossification is discernible. This is the general appearance of such ossification as seen in clinical cases.



Fig. 2: Partial dissection of the ossified stylohyoid structure shows what appears to be a solid rod continuous from styloid process to hyoid bone.

position from time to time by palpating it" (Watkins, 1966). A solidly fused styloid process connected to the temporal bone is not 'mobile' and movements of soft tissues are more likely to change their own relative relationships to the bony process. Alternatively, the "stylohyoid" ossification is likely to be in the stylohyoid ligament, discrete from the styloid process and only visualised as we have done in artificially good conditions for radiological clarity in this relatively inaccessible area.

It seems unlikely that a solid rod of ossification extending from temporal bone to hyoid bone ever occurs, for this would impose too rigid an immobility upon the hyoid and larynx, even if it were an unilateral abnormality. In fact, ossification extending along the length of the 2nd branchial bar, but



Fig. 3: Isolation of the ossified process by further dissection exhibits discontinuity at the portion marked by the arrow.

interrupted in its continuity, is a more likely condition. Dwight (1907) contributes to this view and Loeser and Cardwell (1942) state that "there are usually three segments in the process." It is interesting that Babitt (1933) describes massive efforts of swallowing, sneezing, coughing or laughing as causation of "spontaneous" (non 'traumatic') fracture of the styloid process in the half dozen cases he collected; there is no means of identifying how many may have been discontinuous ossification instead. Perhaps, extending ossification and immobilisation of the stapes, which represents the upper end of the 2nd branchial bar (tympanohyal), is a reflection of this ossification extending into the otic capsule, though the relation between this latter process and stylohyoid ossification remains to be examined.

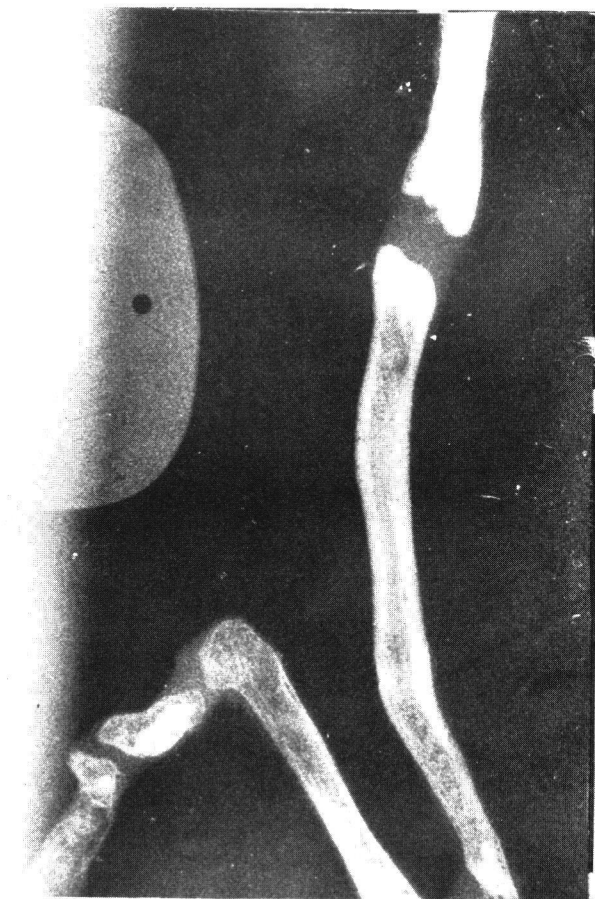


Fig. 4: A dental X-ray plate placed against the process, dissected free as in Fig. 3 and exposed, shows discontinuous ossification. At the top is the styloid process; the greater horn and thyro-hyoid ligament (containing ossification) occupy the lower left corner of the picture.

Thus, clinical material is the chief source of reports, and many structures related to the stylohyoid area have been implicated in symptomatology. At tonsillectomy, ossified parts projecting into or lying in the tonsillar bed have been removed; post-tonsillectomy neuralgic pain has been relieved by subsequent excision of an 'elongated styloid process', while in some instances a chronic sore throat, dull pain in this area, or even "glossopharyngeal neuralgia" in unoperated patients is claimed to occur with stylohyoid ossification. (Loeser and Cardwell, 1942; Asherson, 1957; Fritz, 1940). Further, it is claimed that headaches may be attributed to compression of the carotid vessels by the ossified stylohyoid ligament, or to irritation of the sympathetic nerves that accompany these vessels (Eagle, 1949).

Phylogenetically, the skeletal components of gills have in the higher vertebrates taken over other functions, such as giving support to the mobile larynx, the stylohyoid arch components of which are quite mobile during movement of the head and jaws (Watkins, 1966). Limitation of this movement has interfered with direct vision endotracheal intubation (Potgieter, 1959; Cavenagh, 1937), or with per oral oesophagoscopy (Cavenagh, 1937) in the anaesthetised patient. In these instances, calcification prevents the oropharyngeal region from straightening out from its normally curved configuration owing to limitation of hyoid mobility. There is no reference to limitation

of lingual mobility or to difficulty in swallowing or speech in these patients. The case reported here was mentally deranged, and it was not possible to establish difficulty in either function in this instance, because access to it was available only at post-mortem examination.

SUMMARY

A case of complete stylohyoid ossification, discovered post-mortem, is reported. The anatomy and clinical significance of this condition and of elongated styloid processes are discussed.

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