CLINICAL STUDY

Ossified Pterygospinous Ligament and its Clinical Implications

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Abstract

Objective: To study the anatomico-radiological aspects of ossified pterygospinous ligament in human skulls.

Background: The pterygospinous ligament is usually attached to spine of the sphenoid and the posterior border of the lateral pterygoid plate. It may sometimes be ossified.

Materials and methods: The lateral pterygoid plate of the sphenoid bone and the presence of ossified pterygospinous ligament was studied in 50 dried bone specimens and photographed. A skiagram of the ossified pterygospinous ligament was also obtained.

Results: Out of 50 specimens studied, we observed the presence of flattened and broad lateral pterygoid plate and incomplete, ossified, pterygospinous ligament on the right side, in only one bone specimen. The lateral pterygoid was as usual thin, broad and everted in the other 49 specimens.

Conclusion: The study describes anatomical and radiological aspects of an incomplete ossified pterygospinous ligament. The presence of ossified pterygospinous ligament may result in the formation of a foramen, through which the branches of mandibular nerve may pass. Presence of such anomalies may compress upon the branches of the mandibular nerve and chorda tympani nerves. Increase in the width and flattening of the lateral pterygoid plate may leave little space, causing difficulty while performing surgical operations on the pterygoid region. Anomalies involving the pterygospinous ligament may not only be of academic interest but also be beneficial for maxillofacial and dental surgeons and anaesthetists (Fig. 3, Ref. 11). Full Text (Free, PDF) www.bmj.sk.

Key words: pterygospinous ligament, lateral pterygoid, bone, ossification, mandibular nerve, entrapment.

The pterygospinous ligament extends from the lateral pterygoid plate to the spine of the sphenoid. The standard textbooks of anatomy, do not mention much about the ligament except that it stretches between the spine of the sphenoid and the posterior border of the lateral pterygoid plate near its upper border and that it may be occasionally ossified, to as to convert into a foramen (1). In cases where it is ossified, resulting in formation of foramen, the branches of the mandibular nerve, may traverse through it, to innervate the temporalis, lateral pterygoid and the masseter muscle (1).

The present anatomico-radiological study, describes a case of flattened lateral pterygoid plate and in incomplete ossified pterygospinous ligament on the right side of a sphenoid bone. The presence of such an ossified ligament may compress on the surrounding neurovascular structures. There are research reports on the compression of the lingual nerve as a result of the ossified pterygospinous ligament, thereby causing lingual numbness and pain associated with speech impairment (2). Anatomical knowledge of such anomalies must also be borne in mind while administering anaesthesia on the mandibular nerve.

Materials and method

Both sides of fifty sphenoid bones (100 cases) were taken for the study. Anomalous ossified ligament stretching between the spine of the sphenoid and the lateral pterygoid plate was noted in all these bone specimens. The specimen with ossified pterygospinous ligament was photographed and compared to that of the normal (Figs 1 and 2). The anomalous ossified pterygospinous ligament was also subjected to a radiological study (Fig. 3).

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Fig. 1. Photograph of anomalous sphenoid bone (Posterior view) showing: L – lesser wing, G – greater wing, SOF – superior orbital fissure, P – pituitary fossa, S – spine of sphenoid, LP – lateral pterygoid plate, MP – medial pterygoid plate. The incomplete ossified pterygospinous ligament is shown with arrows.

Fig. 2. Photograph of normal sphenoid bone (Posterior view) showing: L – lesser wing, G – greater wing, SOF – superior orbital fissure, P – pituitary fossa, Sp – spine of sphenoid, LP – lateral pterygoid plate, MP – medial pterygoid plate.

Fig. 3. Schematic of anomalous sphenoid bone (Oblique view) showing: G – greater wing, L – lateral pterygoid plate, M – medial pterygoid plate. The incomplete ossified pterygospinous ligament is shown with arrows.

Anomalous bone (Single case) (Fig. 1)

Right side: On the right side, the lateral pterygoid plate was wide and an incomplete ossified pterygospinosus ligament was observed. The projection from the lateral pterygoid plate, measured 0.5 cm, while the projection from the spine measured 0.7 cm. Thus, two projections from the lateral pterygoid plate and the spine of the sphenoid approached each other and left a deficit of 0.1 cm, in between them.

Left side: The lateral pterygoid plate was thin, flat and everted as seen in normal case. No such ossified pterygospinous ligament was observed. The maximum transverse width of the lateral pterygoid plates measured 1.9 cm.

Normal bone (49 cases) (Fig. 2)

No bony projection from the lateral pterygoid plate was observed. The lateral pterygoid plate was thin, flat and everted. The maximum transverse width of the lateral pterygoid plates measured 1.5±1 cm.

Discussion

According to many authors, the fibrous string between lateral pterygoid plate and the spine of the sphenoid was first described as ‘Ligament of Civinini’ or pterygospinosus ligament by the Italian anatomist F. Civinini (3). Interestingly, the posterior border of the lateral lamina of the pterygoid plate is also named after ‘Civinini’ (3).

The pterygospinous ligament is reported to have muscle fibres and also ossified at times (1). A standard textbook of anatomy has mentioned about the ossification of this ligament so as to convert it into a foramen, through which the branches of the mandibular nerve may traverse to innervate the temporalis, masseter...
and the lateral pterygoid muscle (2). We as anatomists, opine that
the presence of any osseous bar may compress upon the branches
of the mandibular nerve. Admittedly, in the absence of any clini-
cal history of the patient, it is difficult to corroborate the findings.
Considering the close relationship of the chorda tympani nerve,
it may also be compressed by the anomalous bar of bone. Involvement
of the chorda tympani would thus result in the involvement of the
taste sensation to the anterior two third of the tongue.

Although there are reports on the presence of ossified pterygospinous ligament, there is a paucity of literature on the
radiological study of the pterygospinous ligament. The earliest
description of the ossified pterygospinous ligament radiologi-
cally was by De Froe and Wagener (4). The complexity of the
pterygo-maxillary region may not have prompted too many sci-
entists to explore the region radiologically.

The present observation on only one side of lateral ptery-
goid plate, out of 100 cases (i.e. 1% incidence) makes the study
clinically important. The presence of the ossified pterygospinous
ligament means that there would be less accessible space to gain
entry into the para and retro pharyngeal space (3). The maxi-
mum width of the lateral pterygoid plate in the anomalous bone
was 1.9 cm where as in the normal cases it was 1.5±1 cm. These
results clearly states that the lateral pterygoid plate was very much
wider in the anomalous bone specimen. The skigram obtained in
the present case (Fig. 3) depicts that there is very little space for
the surgeons to gain entry into the para and retro pharyngeal space.

It has been reported that the mandibular nerve has some of its
branches passing through the foramen as a result of ossification of
the pterygospinous ligament (5). Some of the branches of the man-
dibular nerve may even change its course because of the presence
of such an ossified pterygospinous ligament (3). A research study
had also advocated that a distance of approximately 0.25 cm be-
yond the distance to the lateral pterygoid plate be taken, while per-
forming maxillary nerve block by the lateral extroral approach (6).

Thus, it has to be remembered that while applying conduc-
tive anaesthesia on mandibular nerve by lateral subzygomatic
route, one may encounter variable ossificated formations at lat-
eral pterygoid plate’s posterior border of pterygoid process, thereby
acting as an obstacle to high-quality conductive anaes-
thesia (5). Thus, lateral pterygoid plate forms an important land-
mark for mandibular anaesthesia and any anomalies in the lat-
eral pterygoid plate is bound to confuse anaesthetists. It has also
been reported that thermo-coagulation of the trigeminal ganglion
may be difficult in presence of such ossified ligament (7).

Interestingly, there are less reports on incomplete ossifica-
tion of this ligament. The incidence of unilateral ossification of
the pterygospinous ligament is extremely rare i.e. around 5.5%
(5). As a result of the presence of ossified pterygospinous liga-
ment, the pterygospinous opening which was formed, was found
to have an incidence of 0.98 and 1.31 % on the left and right
sides, respectively (5). The presence of an osseous bar between
the lateral pterygoid plate and the spine of the sphenoid has been
considered as a phylogenetic remnant in human beings (3).

A past study has mentioned that sometimes a large lamina
of the lateral pterygoid plate causes clinical symptoms (3). The lin-
gual nerve and the inferior alveolar branch of mandibular nerve in
the region of the infratemporal fossa are forced to take a long curved
course in presence of a large pterygoid plate and during contraction
of the pterygoid muscles, these nerves are subjected to compression
(8). An earlier research report, even describes the failure of the anaes-
thesia in cases of treatment of trigeminal neuralgia to be related to the
presence of such an ossified pterygospinous ligament (9).

Conclusion

It may be summarized that the presence of the ossified pterygospinous ligament is a rare finding, which may not be de-
tected unless symptomatic, the cause of which may be very dif-
ticult to diagnose. Knowledge of anatomical variation is very
important for surgeons as it may throw some light for planning
surgical procedures. In case of mandibular nerve entrapments,
decompression of nerves is the treatment of choice (10,11). The
anomalies involving pterygospinous ligament are also important
for anaesthetists positioning the needle. A wider lateral ptery-
goid plate may pose difficulty for surgeons and anaesthetists
exploring the para and retro pharyngeal space. The anatomical
knowledge of ossified pterygospinous ligament may be benefi-
cial for anaesthetists, dental and maxillo-facial surgeons in day
to day clinical practice.

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