

Lateral Pterygoid Muscle

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Abstract

Lateral pterygoid muscle is one of the four classical muscles of mastication including masseter, temporalis and medial pterygoid. Main function of lateral pterygoid muscle is to open the mouth or lower the mandible at temporomandibular joint. The upper/superior head of lateral pterygoid muscle originates from the infratemporal surface and infratemporal crest of the greater wing of sphenoid bone, and lower/inferior head from outer or lateral surface of lateral pterygoid plate. Inferior head inserts into the pterygoid fovea at neck of condylar process of the mandible; upper/superior head inserts into articular disc and fibrous capsule of temporomandibular joint. The mandibular division of trigeminal nerve, specifically nerve to lateral pterygoid nerve, innervates the lateral pterygoid muscle. The primary function of the lateral pterygoid muscle is to pull the head of the condyle out of the mandibular fossa along the articular eminence to protrude the mandible. A concerted effort of the lateral pterygoid muscles helps in lowering the mandible and open the jaw whereas unilateral action of a lateral pterygoid produces contralateral excursion (a form of mastication), usually performed in concert with the medial pterygoids. Unlike the other three muscles of mastication, the lateral pterygoid is the only muscle of mastication that assists in lowering/depression of the mandible (opening the jaw). At the beginning of this action it is assisted by the digastric, mylohyoid and geniohyoid muscles.

Keywords: Lateral Pterygoid Muscle; Muscle of Mastication; Temporomandibular Joint.

Introduction

Lateral pterygoid, one of the key muscle of mastication is short, thick and comprise of two heads. The upper/superior head originates on the infratemporal surface and infratemporal crest of the greater wing of the sphenoid bone, and the lower/inferior head on the lateral surface of the lateral pterygoid plate. Inferior head inserts onto the neck of condyloid process of the mandible; upper/superior head inserts on articular disc and also on fibrous capsule of temporomandibular joint. Structures superficially related to Lateral pterygoid muscle are mandibular ramus, masseter, maxillary artery, superficial head of medial pterygoid and tendon of temporalis muscle. Deep head of medial

pterygoid, sphenomandibular ligament, middle meningeal artery and mandibular nerve are deeper relations of lateral pterygoid muscle. Temporal and masseteric branches of the mandibular nerve come in relation to upper border while lower border is related to its lingual and inferior alveolar branches. Buccal nerve along with maxillary artery pass between its two heads that is upper and lower. As maxillary artery crosses (LPM), it gives pterygoid branches. Muscle also receives supply from ascending palatine branch of facial artery. Anterior trunk of mandibular nerve innervates both the heads.

Lateral pterygoid muscle (LPM) plays an important role in the mandibular movements and dynamics of temporomandibular joint (TMJ). Temporomandibular joint (TMJ) disc displacement is a common disorder in patients with internal derangement. The variation in anatomical insertion of lateral pterygoid muscle makes patients prone to TMJ disc displacement. Spasm of lateral pterygoid muscle elicits tenderness in case of temporomandibular joint dysfunction syndrome, when palpated behind maxillary tuberosity high in the buccal sulcus (Pterygoid sign).

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With the contraction of right and left LPM together condyle is pulled forward and slight downward, this protrusive movement assist the opening of jaw. LPM and medial pterygoid together helps in grinding of food. Upper head pulls the articular disc when the jaw is opened.

Anterior displacement of the disc and temporomandibular dysfunction has been related to the insertion of upper head of LPM in the TMJ disc. The lateral pterygoid muscle works in harmony with the other muscles of mastication (the temporalis, masseter and medial pterygoid) to ensure adequate function [1-5].

Context

A detailed understanding of anatomy and functions of lateral pterygoid muscle is necessary to optimize preoperative planning in Temporomandibular joint (TMJ) surgeries, operative technique and provide a basis for improved outcomes.

Objectives

To evaluate the literature regarding anatomy and functions of the lateral pterygoid and related structures and current surgical strategies to have best of existing knowledge regarding the subject for better outcome in oral and maxillofacial surgeries.

Methods

More than forty original articles and books that were relevant to this review were studied. The articles and texts were used for this review were published between 1991 and 2016, were systematically reviewed for the anatomy and functions of lateral pterygoid during TMJ surgeries.

Discussion

The lateral pterygoid of human plays important role in movements of jaw during mastication. This literature review gives certain important updates on some aspects of the normal function of the lateral pterygoid muscle and its importance of both the heads during movements at TMJ. The upper or superior head (SHLP) and the lower or inferior head (IHLP) of the lateral pterygoid get insertion predominantly into the neck of the condyle [5] but some fibers of SHIL embedded in the disc of TMJ

which causes development of anterior disc displacement and temporomandibular dysfunction [6-9].

LPM hyperactivity can cause progression of anterior disc displacement however the lateral pterygoid muscle can be reattached during total joint reconstruction surgery to the sigmoid notch when performing total prosthetic joint reconstruction can provide the patient with a greater interincisal opening and improved lateral and protrusive movement [10].

In recent studies recording of jaw movements and electromyography (EMG) from the lateral pterygoid is carried out, where through computer tomography imaging verification of electrode location has been achieved. From these studies, there is no evidence of background EMG activity within IHLP or SHLP when the jaw is in the clinically determined postural jaw position. There is little evidence for a reciprocal relation in activity between SHLP and IHPL, and both SHLP and IHPL play an important role in contralateral, protrusive, and jaw-opening movements and force generation [10]. There is evidence for independent activation of sub compartments within the lateral pterygoid muscle to allow a range of force vectors to be delivered to the condyle [10,11].

With the help of Micro-CT images the insertion of lateral pterygoid is found into the anterior impression and attached to the medial impression of the process [12].

The patients were assessed for the anatomical insertion of superior head of lateral pterygoid muscle to the condyle -discs complex and possible correlation with the disc position with the help of magnetic resonance (MR) imaging. There was a lack of correlation between attachment pattern of the superior head of LPM and presence or absence of anterior disc displacement [13].

Conclusion

The lateral pterygoid muscle is a difficult muscle to access, and only verified recordings from the muscle will yield definitive conclusions. The electromyographic recordings are questionable so the palpation of the muscle is important. Micro CT is also giving the co-relation between the anatomic insertion of lateral pterygoid and TMJ dysfunction. With the finding through MRI this co-relation is lacking. So certain types of the LPM insertion are correlated with TMJ dysfunction.

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