

The Lateral Pterygoid Muscle: Fact and Fiction

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No feature of the temporomandibular joint anatomy and physiology is more misunderstood than the lateral pterygoid muscle. Although many consider this to be a single muscle, the lateral pterygoid is, in fact, composed of two muscle divisions with antagonistic functions.¹ Both heads of the muscle lie deep to and largely behind the zygomatic arch and the coronoid process (Fig. 1). The inferior head arises from the outer surface of the lateral pterygoid plate of the sphenoid bone.

The smaller, superior head originates from the infratemporal crest of the inferior lateral surface of the greater sphenoid wing medial to the infratemporal crest. The fibers of the superior head are directed downward, backward, and outward in close relation to the cranial base. When they reach the anterior limit of the joint, the fibers bend horizontally and backward, and insert into the ligament and the articular disc.²

The fibers of the inferior division slant

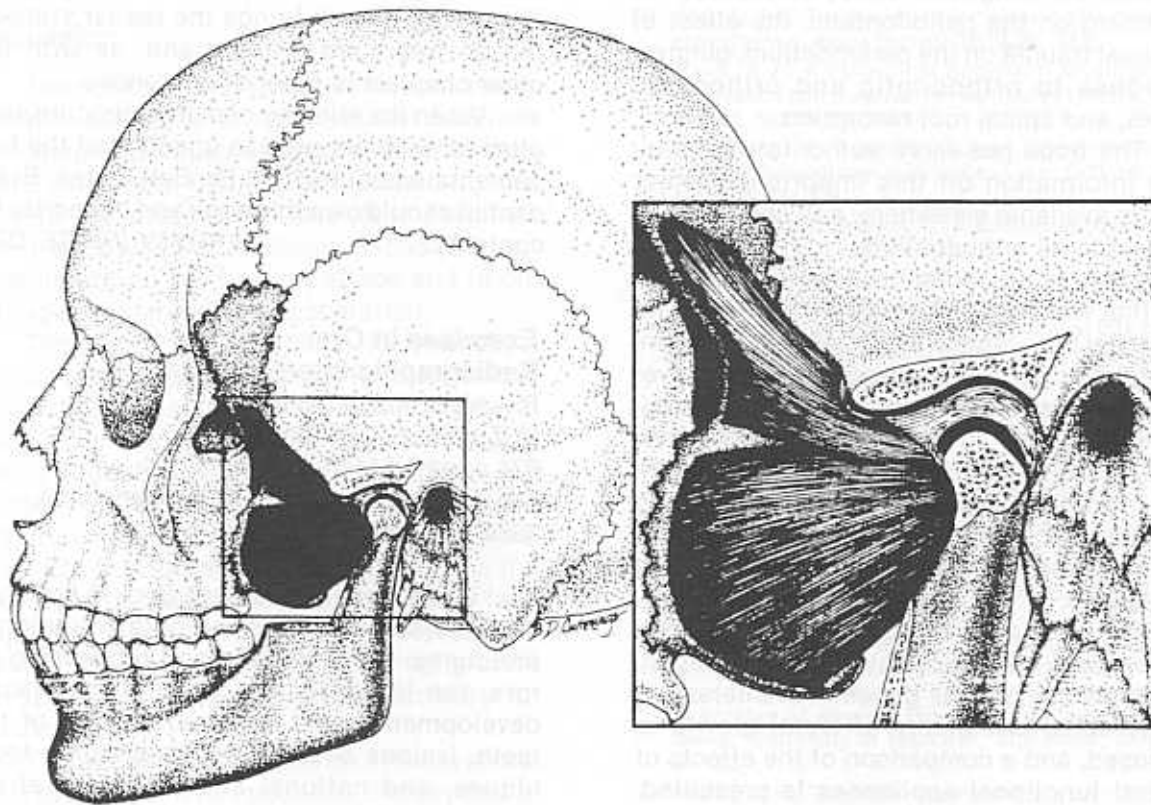


Fig. 1 Attachments of the lateral pterygoid muscle. (From Travell, J.G. and Simons, D.G.: *Myofascial Pain and Dysfunction: The Trigger Point Manual*, 1st ed., Williams and Wilkins, Baltimore, 1983.)



diagonally upward and generally attach to the condylar neck and ramus of the mandible just below the joint.³ The two muscle divisions are mainly activated by the lateral pterygoid nerve of the anterior division of the mandibular branch of the fifth cranial nerve. Even though these muscles have a common nerve supply, one should think of the two divisions as functionally and anatomically separate, reciprocating muscles.

Lateral Pterygoid Functions

The functions of the inferior lateral pterygoid muscle are jaw opening, mandibular protrusion, and lateral deviation of the mandible when one muscle acts unilaterally. The superior division pulls on the disc during power strokes and causes the disc to rotate so that a thicker portion moves into the widened articular space and prevents the bony parts of the joint from disarticulating. This causes the superior division of the muscle to act in concert with the closing muscles of the jaw—the masseter and the temporalis. These actions have been confirmed electromyographically.^{4,5}

The inferior division pulls the condylar head forward and down so the condyle can translate over the posterior surface of the articular eminence of the temporal bone—a movement essential for full opening. During empty mouth movements, muscle tonus in the superior head keeps the disc in the most forward rotary position permitted by the width of the articular disc space. But when the elevator muscles contract to execute a power stroke, the superior lateral pterygoid muscle contracts and rotates the disc forward so that sharp contact between the articulating surfaces is maintained.

Muscle Palpation

Most of the muscles of mastication are accessible to palpation, and many authors consider this to be true for the lateral pterygoids. Several have suggested using a finger to squeeze backward as far as possible in the superior buccal vestibule between the cheek and the maxilla in an attempt to reach the pterygoid plate. However, the soft tissue pharyngeal wall and buccinator muscle prevent the finger from coming close to the origins of the lateral pterygoid muscles—much less close to the bellies of the muscles where trigger points might be located. This type of probing can and does produce pain in asymptomatic patients, but when it occurs in symptomatic patients, it is often misinterpreted as prima facie evidence that the lateral pterygoid muscles are involved in the production of pain or dysfunction.

A better way to test for lateral pterygoid muscle involvement is by manipulating the two muscles as follows.⁶ First, protrude the jaw against resistance to contract the inferior head. This will cause pain if the muscle is sore. Second, have the patient bite against a separator. This will reduce superior division pain, which is caused by stretching the muscle during maximum intercuspation. If confirmation of a pain source is needed, analgesic blocking can be used. This is an extraoral injection with the needle passing through the mandibular sigmoid notch.⁷ Because the injection occurs near the area of the pterygoid venous plexus, the clinician should study the anatomy of this area carefully before proceeding.

Lateral Pterygoid and TMJ Pain

The emphasis on the lateral pterygoid muscle as a cause of TMJ pain is seriously

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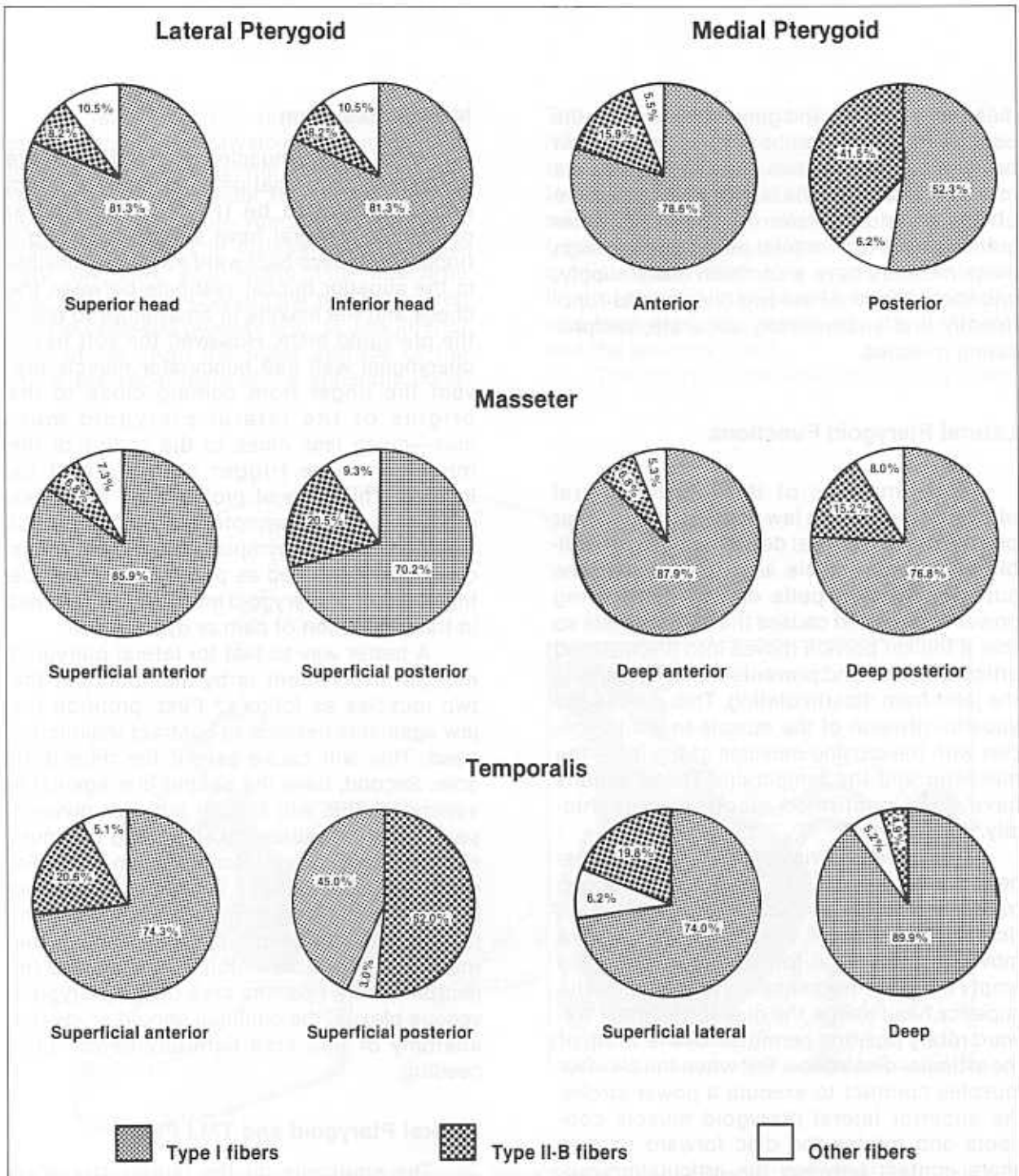


Fig. 2 Muscle fiber distribution in muscles of mastication.

undermined by the discoveries of Eriksson relating to the quality of fiber composition of these muscles.⁸ There are at least five types of muscle fibers that can be distinguished by histochemical methods:

- Type I fibers are slow twitch, glycogen poor, and high in aerobic enzymes and mitochondrial density. They are resistant to fatigue, and well suited for prolonged activity such as postural maintenance.
- Type II-A fibers belong to the fast twitch group with high glycolytic and oxidative enzymes. These are rapidly contracting and also fatigue-resistant. They seem to occupy a gap between the fatigue-resistant type of Class I fibers and the easily fatigued types.
- Type II-B fibers have a high myofibrillar activity with a high level of glycogen. They have a poor capillary network and low mitochondrial enzymes. They are fast twitch fibers and are very sensitive to fatigue. They can generate large forces and are best suited for bursts of intense intermittent activity.
- Type II-C fibers and AT Paser-IM fibers have high myofibrillar activity and develop mainly in connection with physical training. They contain various proportions of slow myosin and fast myosin fibers.

For the clinician, it is important to know what percentage of each muscle is of fast twitch, easily fatigued myosin, and what percentage is of slow twitch, slowly fatigued myosin (Fig. 2). The fibers most likely to fatigue are the Type II-B fibers, and the lateral pterygoids have significantly less of these fibers than other masticatory muscles.

The muscle mass that histochemically seems most likely to fatigue and develop pain and dysfunction is the superficial, posterior part of the temporalis muscle, which is responsible for many of the tension headaches physicians and dentists treat every day.

Summary

In summary, we can say with some con-

fidence that:

1. The lateral pterygoid muscle is composed of two divisions with antagonistic functions.
2. The superior head of the lateral pterygoid contracts forcefully only with closing-jaw power strokes.
3. The inferior head of the lateral pterygoid is responsible for translation of the mandible.
4. Neither head of the lateral pterygoid muscle is palpable, but there are manipulative techniques that can accurately test them for pain and dysfunction.
5. Neither head of the lateral pterygoid muscle is easily fatigued, and based upon histochemical evidence, these appear to be the masticatory muscles least likely to become painful or dysfunctional.

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