

Anatomy, Back, Rhomboid Muscles

Connor Farrell; John Kiel.

Author Information and Affiliations

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Introduction

The rhomboids are a collective group of muscles formed by the rhomboid major and minor. The rhomboids are important in upper limb movement and stability of both the shoulder girdle and scapula. Both rhomboids receive innervation from the dorsal scapular nerve, and their vascular supply the dorsal scapular artery. Variants in rhomboid musculature have been found but are very rare. While surgeries of the rhomboid musculature are infrequent, winged scapula and rhomboid palsy are clinical pathologies associated with the rhomboids.[1]

Structure and Function

The rhomboids consist of two separate muscles; the major and minor muscles, which are found immediately deep to the trapezius. The rhomboid minor is a cylindrical muscle that originates at the ligamentum nuchae and C7 and T1 vertebra. It inserts at the scapula's medial border near the base of the spine of the scapula. The rhomboid major is a quadrangular muscle located inferior to the rhomboid minor. The origin of the rhomboid muscles is from the spinous processes of the T2-T5 vertebra and inserts on the medial border of the scapula, just inferior to the rhomboid minor.[2][3][4]

With the assistance of many other muscles, the rhomboids help form the shoulder girdle. This group of muscles is important for the movement of the upper extremity and stabilization of the shoulder through articulation with the trunk. Functionally, the rhomboid muscles retract, elevate and rotate the scapula. They also protract the medial border of the scapula, keeping it in position at the posterior thoracic wall. Dysfunction, weakness, or loss of nerve function to the rhomboids causes winging of the medial border of the scapula and inferior scapular angle rotation.[2][5]

The rhomboids are also vital to actions such as pulling and have been shown to play a large role in throwing and overhead arm movement.[4]

Embryology

The deep shoulder girdle muscles (i.e., rhomboid major, rhomboid minor, and serratus anterior) are derived from thoracic somitic cells, unlike other muscles of the shoulder and upper limb, which develop from the lateral plate mesoderm and limb bud.[5] Compared to the rest of the skeletal limb muscles, which receive innervation from the brachial plexus, the deep shoulder girdle muscles have been innervated by branches of cervical spinal nerves.[6]

Despite these differences, the embryonic origin of the rhomboids correlates to their respective nerve supply, as is the case with other muscles of the shoulder and upper limb.[5] Ultimately, it may be concluded that the rhomboid muscles, like other deep shoulder girdle muscles, have a

distinct developmental program different from that of the limb and superficial shoulder muscles.
[6]

Blood Supply and Lymphatics

The rhomboid muscles primarily receive their vascular supply via the dorsal scapular artery (DSA), which generally arises from either the second or the third portion of the subclavian artery. Some studies have also shown variations where the DSA stems from the thyrocervical trunk. Regardless of its site of origin, the DSA passes through the brachial plexus, where it joins and runs parallel to the dorsal scapular nerve. Together both the nerve and artery course inferiorly to supply the rhomboid muscles.[7][8]

Nerves

The motor function of the rhomboid muscles is controlled by the dorsal scapular nerve (DSN). The dorsal scapular nerve originates from the ventral ramus of the spinal nerve root C5 and courses posterior inferiorly through the middle scalene muscles and between the posterior scalene, levator scapulae (to which it also provides innervation), and the serratus posterior superior. It continues deep to the brachial plexus to innervate both the rhomboid minor and major muscles at their anterior border.[9]

Muscles

The rhomboid major and minor are a group of deep intrinsic shoulder muscles that, together with the sternocleidomastoid, trapezius, pectoralis muscles, latissimus dorsi, and serratus anterior, form the shoulder girdle. Furthermore, the serratus anterior, trapezius, and rhomboid major and minor work with the rhomboids to anchor the scapula and prevent winging. Additionally, the serratus anterior is the antagonist muscle group to the rhomboids.[2] The rhomboids also work in conjunction with the levator scapulae to elevate and retract the scapula.[10]

Physiologic Variants

Variants of the rhomboid muscles are rare but present interesting cases when discovered. There have been three reported cases of an additional rhomboid muscle discovered in humans. The first, known as “occipito-scapularis,” is attached at the level of the occipital bone and passes inferior and across the splenius capitis. It coursed deep to the trapezius and inserted into the insertions of the rhomboid major and minor muscles at the level of the spine of the scapula. A second variant, “rhomboideus-occipitalis or capitis,” originated at the superior nuchal line deep to the trapezius. It then inserts between the inferior rhomboid minor and superior levator scapulae and into the serratus posterior. The third variant, also referred to as “rhomboideus capitis,” originated from the superior nuchal line and moved inferiorly on the splenius capitis. It follows the medial levator scapulae before inserting on the medial scapula opposite the scapular spine.[11]

Surgical Considerations

Surgical intervention of the rhomboid muscles is rare. However, it may be required in some cases. Rhomboid muscle flaps can be used in the treatment of head and neck cancers, esophagus reconstruction, mandibular defects, and Sprengel disease (Sprengel deformity), which is the

congenital elevation of the scapula.[3] Additionally, severe winging of the scapula due to weakened rhomboid muscles may be corrected by using fascia lata grafts. These grafts act to assist the weakened rhomboids and also connect the infra-medial border and the inferior angle of the scapula to the spinal muscles and latissimus dorsi, respectively. However, complications may arise as the grafts have been known to fail and weaken over time.[2][12]

Although not specifically surgical, ultrasound-guided injections into the rhomboids have also been shown to be more effective than superficial trapezius injections for pain, disability, and quality of life for patients with myofascial pain syndrome.[13]

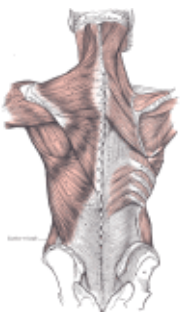
Clinical Significance

A winged scapula due to rhomboid palsy is one of the more common pathologies specific to this muscle group. Rhomboid palsy most often occurs due to damage to the dorsal scapular nerve. Entrapment of the dorsal scapular nerve is the most frequent cause, but the exact location of entrapment has not been specified. Additionally, direct injury to the dorsal scapular nerve through trauma, anterior shoulder dislocation, or overuse of overhead athletics (i.e., baseball and volleyball) are other noted causes of rhomboid palsy.[2]

Patients often present with medial scapular pain, abnormal shoulder motion, and neck, back, and shoulder discomfort. Physical examination often yields subtle lateral winging of the scapula. As a result of the subtle exam finding and the deep anatomic position of the rhomboids, rhomboid palsy is often underdiagnosed. EMG is most specific for the diagnosis of rhomboid palsy and shows prolonged muscle latency of the muscle action potential.[14] Treatment is usually conservative and focused on cervical spine stabilization, muscle relaxants, physical therapy, NSAIDs, and possibly surgery in extreme cases.[2]

Review Questions

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Figure

Muscles connecting the upper extremity to the vertebral column, Occipital Bone, Superior Nuchal Line, Sternocleidomastoid, Ligamentum Nuchae, Splenius Capitis of Cervicis, Levator Scapula, Rhomboideus Minor and Major, Spine of Scapula, Trapezius, Deltoideus, ([more...](#))

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