

STRUCTURAL OVERVIEW

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SERRATUS ANTERIOR

OVERVIEW

The serratus anterior is a broad, flat muscle with multiple bellies. It usually has 8 bellies, connecting the vertebral border of the scapula to each of the first 8 ribs. This makes it an extrinsic chest muscle. It is on the lateral trunk, under the scapula, extending like a fan through the axilla onto the anterior thorax.

It's bellies are divided into 3 sections.

An upper section that has nearly transverse bellies that extends along the upper scapula and ribs. It is difficult to palpate under the scapula and chest muscles. The middle section has flat bellies that are triangular and extend upward from the vertebral border to the 2nd, to the 4th ribs. They are usually very sensitive and pop out for palpation as the shoulder is protracted against resistance. The lower bellies are fingerlike projections that extend anteriorly and inferiorly from the lower angle of the scapula to the 6th, 7th and 8th ribs. They are visible as the chevrons on the lower, lateral ribs of the anterior thorax. These lower bellies can be quite variable in number and may include bellies that extend all the way down to the 12th rib.

INNERVATION

Serratus Anterior is innervated by the spinal roots of C5-C7 or C8 as they pass through the brachial plexus and form the long thoracic nerve. The upper portions of the muscle are innervated by the upper spinal segments. As the spinal segments descend, the sections of the muscle that it innervates also descend so that the lower portion of the muscle is innervated by the lower spinal segments.

ATTACHMENTS

Upper

The upper bellies attach posteriorly to the superior angle of the scapula. They attach anteriorly to the first and second ribs and the fascia of the thorax. There is some variance in the rib attachments and does not always extend onto the second rib.

Middle

The middle bellies attach along the vertebral border of the scapula. In the first vertebral belly, shorter fibers extend from the upper vertebral border to the nearby 2nd rib. As the origin continues down the vertebral border, fibers extend upward at a 45 degree angle. They are progressively longer to extend to a more anterior aspect of the 2nd rib, forming a flat, triangular belly.

The origin of the next belly extends further down the vertebral border. Fibers extend up to attach to the 3rd rib. This insertion is shorter than the insertion of the belly attaching to the 2nd rib.

The origin of the next belly attaches near the inferior angle of the scapula. It inserts along the 4th rib in an attachment that is shorter than the belly above.

Lower

The lower bellies originate on the inferior angle of the scapula. They attach along the ribs and fascia of the thorax. The last belly usually attaches to the 8th rib in men and the 9th rib in women. According to Travell, dissections reveal that they may extend all the way to the 12th rib.

FUNCTION

The upper bellies attach pull the superior angle of the scapula anteriorly around the ribs protracting the upper scapula.

The middle bellies attach along the medial border and elevate the scapula while pulling it anteriorly so that the shoulders are shrugged and protracted so that the upper chest is caved.

The lower bellies draw the lower angle of the scapula anterior and inferior.

Working together, all the bellies pull the vertebral border of the scapula anteriorly with refined control in elevation and depression.

When the scapulae are stabilized by the extrinsic back muscles, the serratus anterior expands the chest cavity by elevating, depressing and widening

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the thoracic cavity. This, in combination with muscles like serratus posterior superior, scalenes and pectoralis minor, assists in the complexities of breathing when the diaphragm is inhibited.

Serratus Anterior is very involved in postural support of the ribs. It acts as fingers that extend to the lateral ribs to support the ribs in extending the trunk.

NEUROMUSCULAR CONSIDERATIONS

Serratus Anterior is difficult to pinpoint as the muscle to be treated.

So many other muscles share the same function. As an extrinsic chest muscle, it is a synergist with pectoralis major. As an elevator of the scapula, it is synergist with levator scapula, rhomboids and trapezius (upper). As a depressor of the scapula, it is a synergist with latissimus dorsi, the abdominal section of pectoralis major and trapezius (lower). The ability of the middle bellies to elevate and protract the scapula is often confused with the combined efforts of other muscles.

It can be difficult to treat. It is usually very sensitive and covered by breast tissue. Many patients feel that treating under the scapula feels unnatural. Skin in that area is overly sensitive. Palpation of the bellies that attach to the 2nd and 3rd rib can be difficult to reach and release.

Its indicators are easily confused with the indications for other muscles. Pain between the

scapulae is more often seen as a problem with scales or rhomboids. After that, iliocostalis, trapezius and latissimus dorsi are considered.

The referral of trapezius (lower) is difficult to separate without ischemic compression. It is often part of the same postural distortion with elevated shoulders. It is usually easiest to just treat trapezius (lower) and Serratus anterior at the same time.

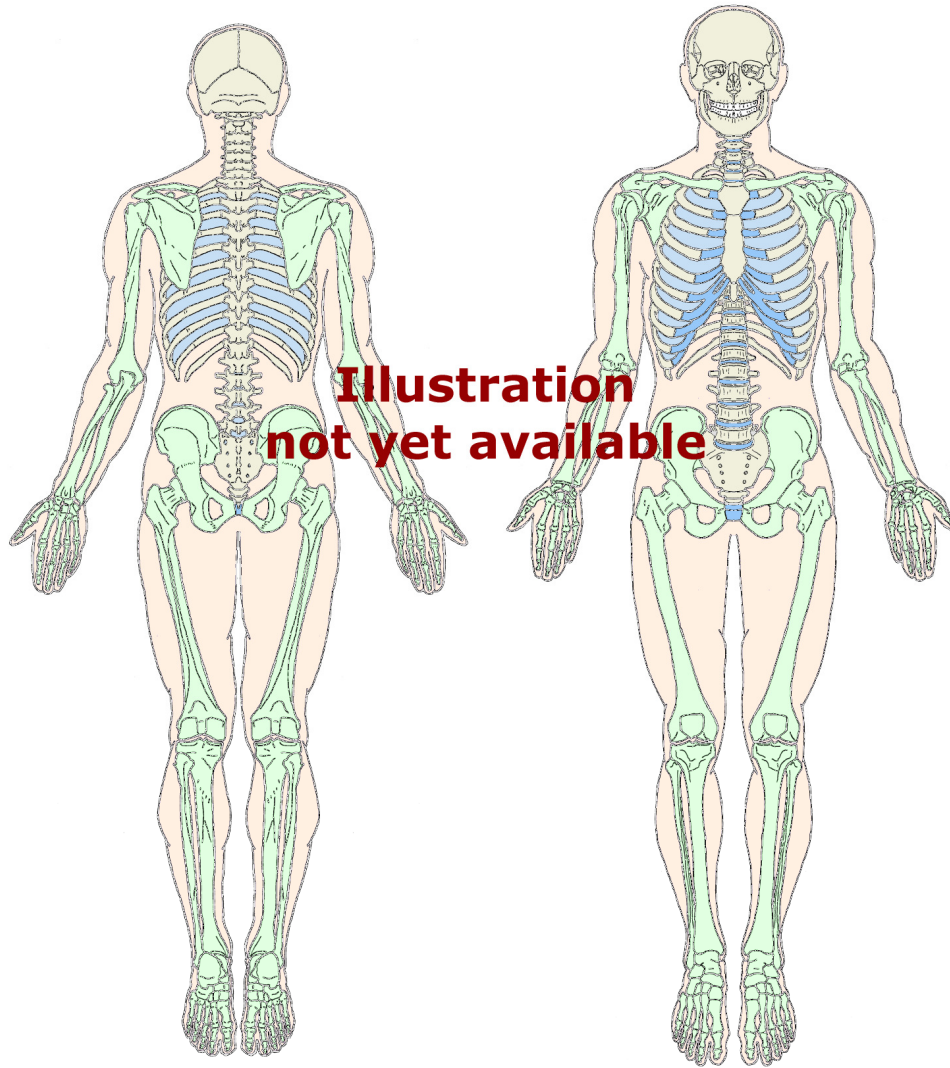
It often gets short and like latissimus dorsi or sartorius, is easy to avoid lengthening or contracting by adjusting posture. This occurs until another muscle produce symptoms and cries for attention.

Because these muscles are so connected to supporting the ribs during postural extension, they are often involved bilaterally. Both shoulders are usually elevated and protracted. A strongly contracted middle trap or levator scapula will often create an overstretched and painful lower serratus anterior on the more elevated shoulder.

Once identified, it can be difficult to resolve as other muscles usually have become involved in supporting the distorted posture. All of those, along the governing components, especially local joints, usually have to be addressed for lasting results.

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○ MUSCLE

ORIGIN

section

- vertebral border of the scapula

INSERTION

- lateral aspect of ribs 1-8

FUNCTION

- protraction of the scapula
- elevation of the scapula
- depression of the scapula