

# First report of a “latissimo-cleidocostal” muscle on the anterolateral thoracic wall

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## ABSTRACT

During routine cadaveric dissection of the thorax and upper limb in a clinical gross anatomy course, we identified an unusual, supernumerary muscle in the right torso of a 91 year-old, Caucasian male. This consisted of a substantial muscle bundle continuous with the antero-inferior border of the latissimus dorsi, bearing a lengthy, strap-like tendon that passed superomedially, deep to the pectoralis minor, to insert broadly on the neck of the clavicle and first costal cartilage. It was innervated by branches of the thoracodorsal nerve. Although this muscle bore

some partial resemblance to reported anterior supracostal muscle variants on the anterior thoracic skeleton, which are typically innervated by intercostal nerves, it showed a unique pattern of origin, insertions, and innervation. Furthermore, there was no resemblance to previously describe axillary arch muscles and other rare variations of latissimus dorsi muscle slips and insertions. We therefore name this unusual variant a “latissimo-cleidocostal muscle”. Future observation and study of this muscle variant should further test whether it is truly distinct from currently recognized supracostal or other latissimus dorsi variants.

**Key Words:** *Latissimo-cleidocostal muscle, Ltissimus dorsi variants, Supracostal muscle variants, First report*

## INTRODUCTION

In previous studies, we have examined and reported on neuromuscular variation in the upper limb (1,2). Among the most common variations of upper limb musculature are those involving latissimus dorsi, and these have been reviewed by Bergman et al (3). In general, these fall into three groups: axillary arch, supracostal, and latissimus dorsi muscle variants. Each of these has their own distinguishing characteristics which are reviewed below.

We report a previously undescribed muscle that is structurally related to latissimus dorsi, with unusual tendon course and insertions on the anterosuperior thoracic skeleton. Based on its demonstrated insertions and innervation, we name this unusual muscle “latissimo-cleidocostalis” and discuss its potential clinical significance with respect to pain secondary to muscle spasm.

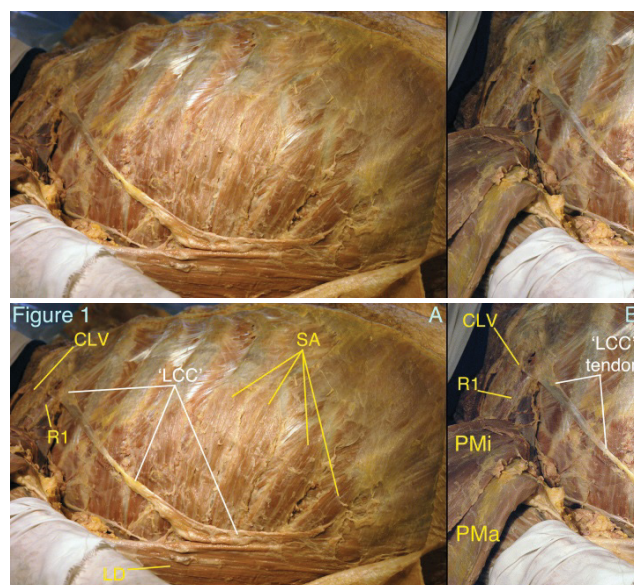
## CASE REPORT

During routine dissection of the thorax and upper limb in a clinical gross anatomy course, we identified an unusual muscle in the right torso of a 91 year-old, Caucasian male cadaver fixed with a 6% formalin solution. This consisted of a substantial muscle bundle continuous with the antero-inferior border of the latissimus dorsi, bearing a lengthy, strap-like tendon that passed superomedially, deep to the pectoralis minor, to insert broadly on the neck of the clavicle and first costal cartilage. It measured 20.3 cm in length at full arm abduction and varied in width from 0.3 to 2 cm. This muscle bundle was innervated by branches of the thoracodorsal nerve (Figure 1).

## DISCUSSION

The extant literature includes three classes of variants relevant to the novel muscle described in this report: axillary arch variants, supracostal variants, and latissimus dorsi variants.

Axillary arch variants typically attach from the anterior border of latissimus dorsi to pectoralis major, or less frequently to the short head of the biceps or coracoid process (4). Iamsaard et al (5) reported axillary arch muscles that arose from latissimus dorsi and inserted into fascia superficial to the pectoralis minor. Other reported axillary arch muscles have included named variants such as the latissimocondyloideus or dorsoepitrochlearis muscle-which attach from latissimus dorsi to brachial or antebrachial fascia to the humerus to the lateral epicondyle and olecranon or to the long head of the triceps (3). Loukas et al (6) describe axillary arch muscles as being innervated by either the medial pectoral nerve or thoracodorsal nerve.



**Figure 1)** Composite photographs show a dissected right thorax with the latissimo-cleidocostal muscle originating from the lateral edge of latissimus dorsi to insert on the first rib and clavicle and passing deep to the pectoralis major and pectoralis minor. LCC Latissimocleidocostal muscle; LD Latissimus dorsi; R1 Rib 1; CLV Clavicle; SA Serratus anterior; PMa Pectoralis major; PMi Pectoralis minor

Supracostal muscles are typically found deep to pectoralis minor and attach to ribs of the upper thoracic cage, but not the clavicle. Anterior and posterior variants have been described (7). These muscles typically are innervated by superficial branches of intercostal nerves (8,9). Nelson et al (10), Bluntschli (11), Brettschneider (12), and Miyauchi (8) discuss a supracostal variant with fusion with latissimus dorsi.

Unnamed latissimus dorsi variants have been recognized based on deviations from classically described origins and insertions, continuity or fusion with teres major, and the presence of distinguishable muscle groups (3).

Historically, the discussion of these three types of variants has been morphological, centering on a class of thoracic or truncus muscles related to the panniculus carnosus of superficial dermal muscles of the thorax and

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upper limb. This would include pectoralis major, pectoralis minor, latissimus dorsi, etc. (8,11,12). Miyauchi (8) has further differentiated the discussion on the innervation of the variant muscles.

Although the muscle described here bore some partial resemblance to reported anterior supracostal muscle variants on the anterior thoracic skeleton, which are typically innervated by intercostal nerves, it was unique in it's:

1. Continuity with the latissimus dorsi.
2. Tendon passing deep to pectoralis minor.
3. Bifid insertion on both clavicle and first rib.
4. Innervation by branches of the thoracodorsal nerve.

Furthermore, there was no overall resemblance to previously describe axillary arch muscles and other rare variations of latissimus dorsi muscle slips and insertions. Given these unique differences from the other three muscle variants discussed above, we name this new muscle variant, the "latissimocleidocostalis."

Haninac et al (13) have presented a compelling and complete view of the embryonic development of the latissimus dorsi and a range of attached dorsoepitrochlearis muscle variants, based on embryological studies and clinical cases. In their schema, latissimus dorsi-attached fascicles, remaining after embryonic dorsoepitrochlearis muscle "extinction", could insert distally at a variety of locations, ranging from the brachial intermuscular septum and triceps fascia (most laterally) to the coracoid process (most medially). We believe that it is most likely that the developmental origin of our "latissimocleidocostalis" muscle variant was related to the known dorsoepitrochlearis variants as discussed, with the exception of a tendon inserting more medially onto the first rib and the neck of the clavicle. The course of the latissimocleidocostalis tendon in the fascia deep to the pectoralis major, as well as innervation by the thoracodorsal nerve, is also comparable to a majority of the reported dorsoepitrochlearis remnant variants.

Clinical significance: In reviewing the literature, there are examples of axillary arch variants causing neurovascular compression and muscle variant masses complicating surgical procedures (e.g., such as lymphadenectomy) (6,14). Latissimus dorsi variants have been implicated in muscle pain, shoulder pain, and tendonitis (15). In the case of the latissimocleidocostalis muscle, it does not cross any significant neurovascular structures; thus, neurovascular compression would not be an issue. It does not pass close to existing fields of axillary nodes, therefore would not be a surgical concern in the case of lymphadenectomy. However, its significant muscle belly could be affected by muscle spasm resulting in pain.

### CONCLUSION

Based on its demonstrated attachments and innervation and given its uniqueness relative to axillary arch, supracostal, and other latissimus dorsi variants, we name this unusual muscle "latissimocleidocostalis". This

recognition should now serve as a working hypothesis, to be tested with future observation and study, that this muscle is distinct from currently recognized supracostal or other latissimus dorsi variants. Its primary clinical significance is potential pain due to muscle spasm.

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