

The Long Thoracic Nerve

Morphological Data

The long thoracic nerve is a collateral motor branch of the brachial plexus, originating from its supraclavicular part.

Origin

It stems from the C5, C6 and C7 roots, shortly after they come out through the transverse foramina (Figure LT1).

Path

The long thoracic nerve goes down behind these previously mentioned roots, before the formation of the trunks of the plexus brachial. Then it generally pierces the scalenus medius muscle; the trunk of the nerve then emerges behind the clavicle and goes down the lateral chest wall in an oblique way, outside and below.

The second rib acts as a “sawhorse” as it travels vertically at this level and reaches the first digitation of the serratus anterior muscle. The latter covers the medial part of the axillary pit. The nerve then gives off a branch for each digitation of the serratus anterior muscle (Figure LT2).

Neurovascular Relations

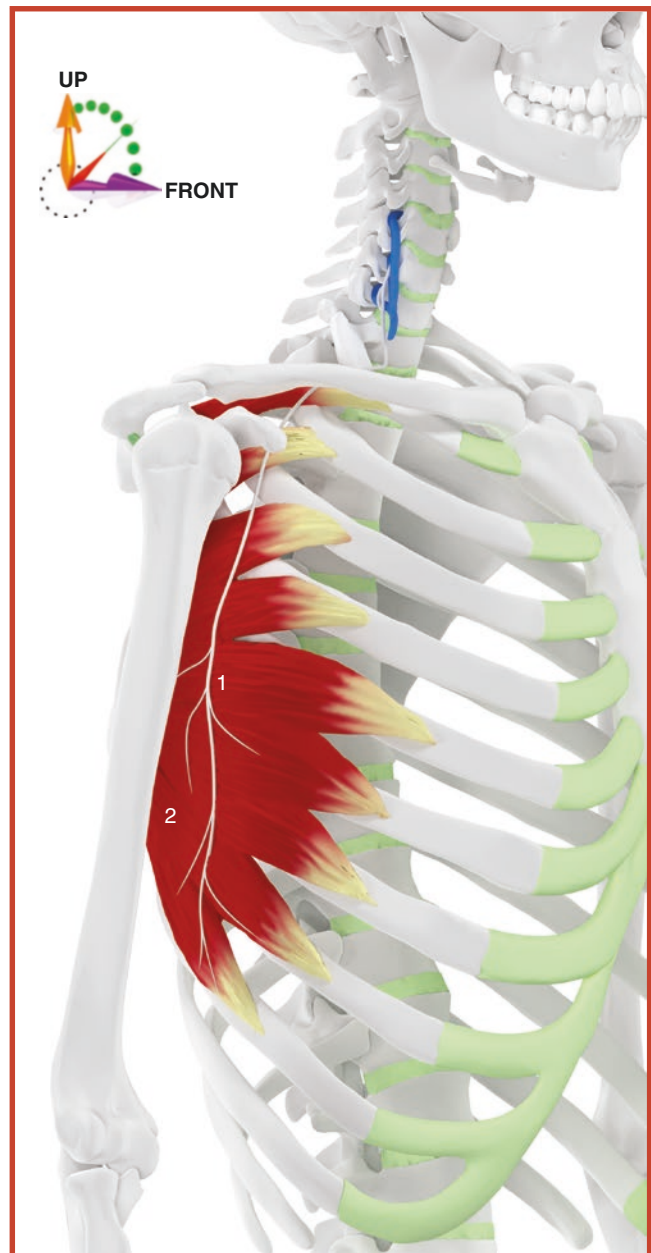
In its thoracic part, the long thoracic nerve faces the lateral thoracic artery in behind (Figure LT2).

Terminal Branches

The long thoracic nerve ends when it gives off its motor fibres to the anterolateral face of the serratus anterior muscle.

Motor Function

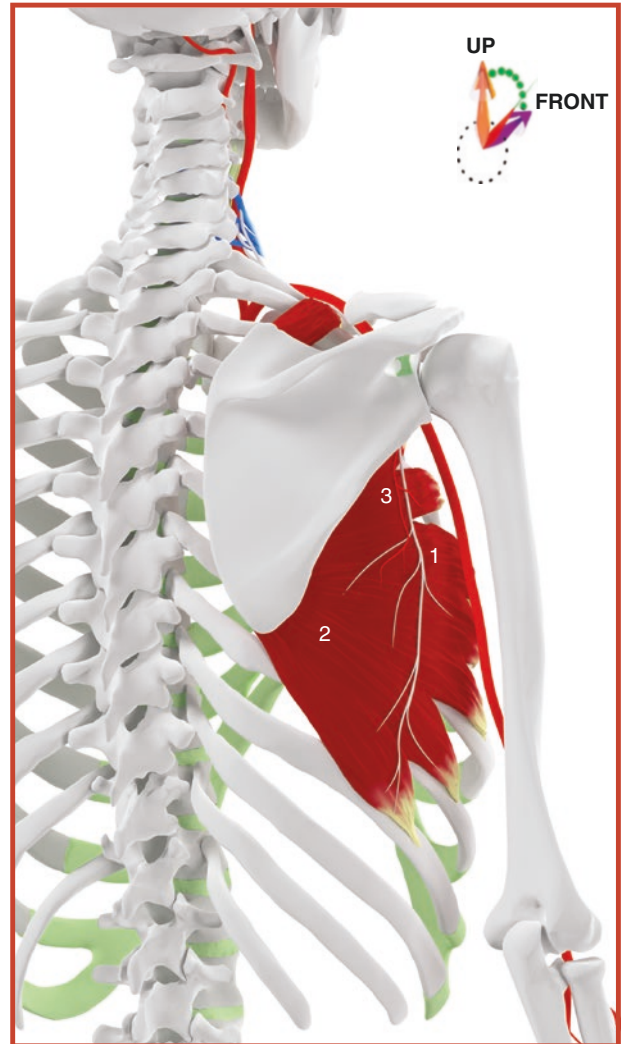
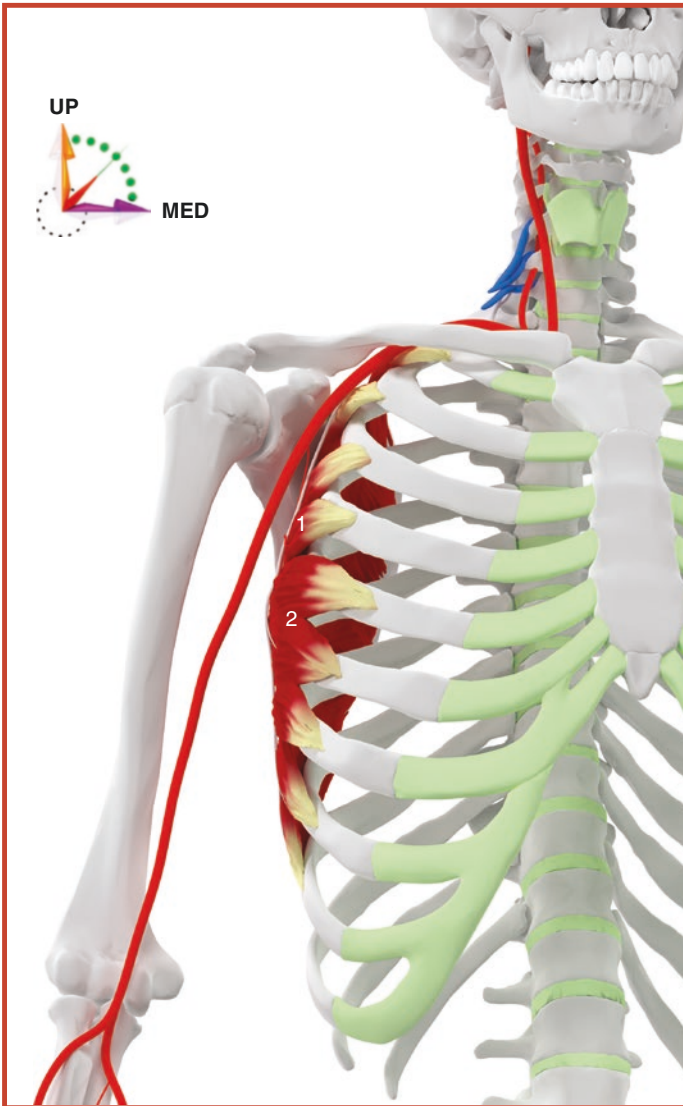
The long thoracic nerve takes charge of the innervation of the serratus anterior muscle. This muscle ends on the medial border of the scapula and delimitates the inter-serrato-thoracic and inter-scapulo-thoracic spaces (Figure LT3). The long thoracic nerve finally takes charge of the functions of abduction, lateral rotation, depression as well as maintaining the scapula against the posterior wall of the ribcage.



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Figure LT1. Motor innervation of the long thoracic nerve and its relations with the bones

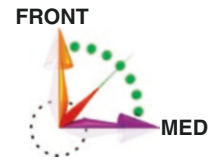
- 1- Long thoracic nerve
- 2- Serratus anterior
- 3- Lateral thoracic artery



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Figure LT2. Motor innervation of the long thoracic nerve and its relations with bones

The Long Thoracic Nerve



- 1- Pectoralis major muscle
- 2- Pectoralis minor muscle
- 3- Cephalic vein
- 4- Deltoid muscle
- 5- Short head of the Biceps brachii muscle
- 6- Coracobrachialis muscle
- 7- Tendon of the long head of the Biceps brachii muscle
- 8- Latissimus dorsi muscle
- 9- Humerus
- 10- Teres major muscle
- 11- Lateral head of the triceps brachii muscle
- 12- Circumflex artery and nerve
- 13- Long head of the triceps brachii muscle
- 14- Teres minor muscle
- 15- Infraspinatus muscle
- 16- Scapula
- 17- Medial cutaneous nerve of arm
- 18- Median nerve
- 19- Medial cutaneous nerve of forearm
- 20- Ulnar nerve
- 21- Radial nerve
- 22- Musculocutaneous nerve
- 23- Subscapularis muscle
- 24- Serratus anterior
- 25- Intercostal muscles
- 26- Long thoracic nerve
- 27- Suprascapular nerve



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Figure LT3. Axial section at axillary fossa through the long thoracic nerve

Pathologies

The long thoracic nerve is weakened by its length and slenderness. It can move on the “sawhorse” of the second rib, where it changes direction with a 60° angle on average. It can be compressed and/or stretched in the case of a forced depression of the shoulder or of an excessive retropulsion, especially in some sports or occupations: repetitive lifting of heavy weights, throws, etc. Isolated palsy of the serratus anterior ordinarily affects young adults between 20 and 40 years old.

Aetiology

- Traction: It can happen whilst carrying heavy weights or in cases of shoulder injuries of sternum-clavicle dislocation type, or clavicle fracture. Repeated movements with lateral extension or rotation, or even shoulder protraction, can also injure the long thoracic nerve.
- Compression: it can be positional, especially during general anaesthesia, when the arm is placed under the patient’s thorax.
- Section: an isolated injury of the long thoracic nerve can be seen in most cardiothoracic surgeries.

Clinical Significance

- Sensitive signs: A sudden parascapular thoracic pain, often during night-time, appears within a few hours after physical exercise. The pain’s location can vary, sometimes radiating to the upper limb.
- Motor signs: The medical practitioner can search for a winged scapula or “scapula alata” by making the patient press both hands flat against a wall. This can often show a unilateral bump on the spinal border of the scapula instead of a complete tilt (Figure [LT4](#)).

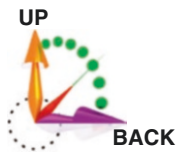
Treatment

Rest and the suppression of the triggering events can generally allow the nerve to heal, but the process is slow, requiring between 6 and 18 months.

A direct surgery at the level of the nerve is not advised.

In the case of persisting paralysis, several orthopaedic surgery techniques of scapular stabilisation can be suggested as a palliative solution.

The Long Thoracic Nerve



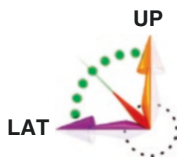
Internal border of the scapula



Inactive

While pushing against a wall

External border of the scapula



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Figure LT4. Case of a patient showing a scapula alata caused by a direct injury of the long thoracic nerve after a scoliosis surgery with combined approach, including a posterior (*) approach and a right thoracotomy

Plexus Brachial

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