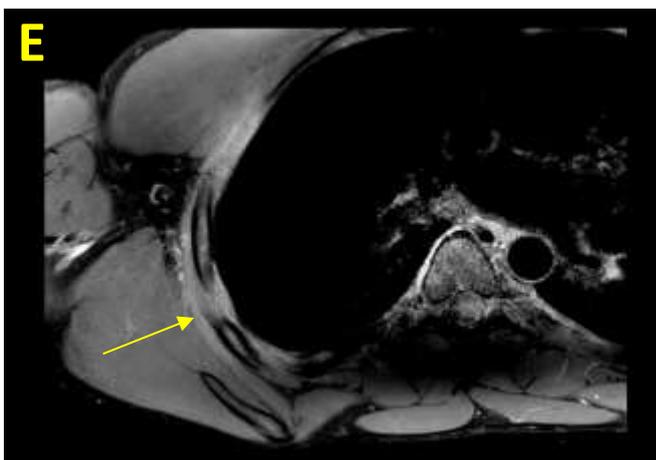
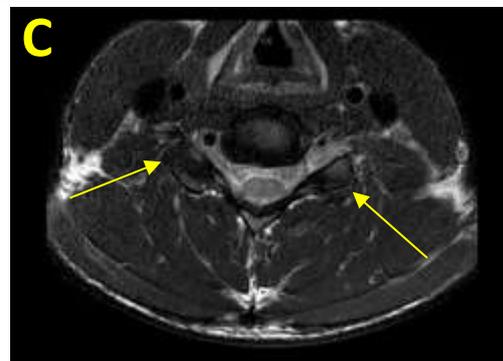
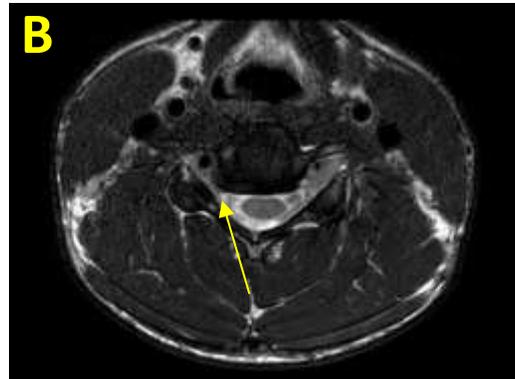
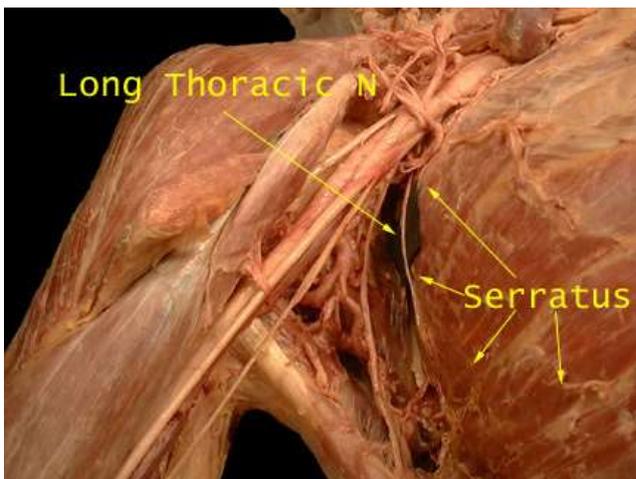
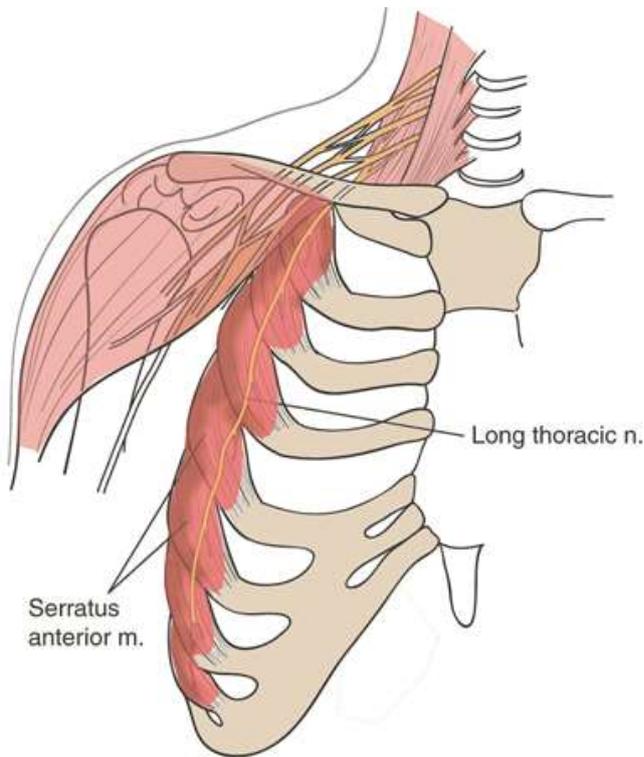


**Presentation:**

- 33-year-old male presenting with 6 months of right arm weakness and restricted movement after 2 days of carrying a heavy hiking backpack.
- An MRI of the cervical spine and brachial plexus was requested to investigate for right long thoracic nerve denervation and brachial plexopathy.

**Images:**

- Fig. A:** T2 sagittal MRI. Reversal of the cervical lordosis. Upper cervical disc desiccation and degenerative end plate changes.
- Fig. B:** T2 axial MRI. Mild C4-5 disc-osteophyte complex, causing moderate foraminal stenosis for the exiting right C5 nerve (arrow).
- Fig. C:** T2 axial MRI. Mild bilateral C5-6 facet joint degenerative changes (arrows) but no neural compromise at this level.
- Fig. D:** T2 axial MRI. No significant pathology at the level of the C6-7 neural foramina.
- Fig. E:** T2 fat saturated axial MRI. Serratus anterior muscle hyperintensity (arrow) compatible with long thoracic nerve denervation.
- Fig. F:** T2 fat saturated axial MRI. The outline and perineural fat of the long thoracic nerve is normal (circle), as is the brachial plexus.



Images Source:  
<https://www.orthobullets.com/anatomy/10135/long-thoracic-nerve>

## Anatomy:

- The long thoracic nerve arises from the anterior rami of C5, C6 and C7 roots of the brachial plexus (and additionally C8 in 10% of the population).
- The C5 and C6 roots pass through the scalenus medius and the C7 root passes in front of this muscle.
- The long thoracic nerve descends through the cervicoaxillary canal, which is posterior to the brachial plexus and axillary vessels, deep to the clavicle.
- The long thoracic nerve has a long course along the chest wall in the mid-axillary line to lie on the superficial surface of the serratus anterior muscle.[1]

## Function:

- The long thoracic nerve innervates the serratus anterior muscle.

## Pathology:

- The long superficial course of the long thoracic nerve makes it vulnerable to direct trauma or over-stretching, resulting in so-called 'backpack palsy'.
- Injury causes winging of the scapula, as the serratus anterior muscle no longer holds the scapula against the chest wall.
- This can be clinically assessed by using the 'serratus wall test'.

## Treatment:

- Most injuries resolve within 9 months.[2]
- Conservative management consists of initial protective measures, followed by isolated activation and then functional retraining.[3]
- Surgical treatment involves direct or graft repair.

1. *Clinically Oriented Anatomy*. Lippincott Williams & Wilkins. ISBN:1451119453.
2. Gregg JR, Labosky D, Harty M, Lotke P, Ecker M, DiStefano V, Das M. Serratus anterior paralysis in the young athlete. *J Bone Joint Surg Am*. 1979 Sep;61(6A):825-32.
3. Watson CJ, Schenkman M. Physical therapy management of isolated serratus anterior muscle paralysis. *Phys Ther*. 1995 Mar;75(3):194-202.