Musculocutaneous Nerve Lesion (C5-C6)

The musculocutaneous nerve has a segmental origin - C5-C6. As its name suggests, it has both motor and sensory fibres. The brachial plexus originates from anterior rami of C5, C6, C7, C8 and T1 and it forms the musculocutaneous, median, ulnar, axillary and radial nerves. The lateral cord divides into the musculocutaneous nerve and the lateral branch of the median nerve.\(^\text{[1]}\)

The nerve usually passes through the coracobrachialis and between the biceps and the brachialis and at the elbow it becomes the lateral antebrachial cutaneous nerve. Above the elbow it supplies only motor nerves but below the elbow it contains only sensory fibres.\(^\text{[2]}\)

There are, however, considerable anatomical variations which can have clinical significance.\(^\text{[3, 4]}\)

The arrangements of the fibrous sheaths of the corocobrachialis muscle allow for a 'telescoping' effect in relation to the musculocutaneous nerve. Any factor which decreases this sliding effect may expose the nerve to mechanical effects of muscle contraction, with the possibility of a compression syndrome.\(^\text{[5, 6]}\)

Lesions of the nerve produce weakness of flexion at the elbow and weakness of supination. The biceps is an important supinator. There is sensory loss on the lateral side of the forearm. The brachialis muscle receives innervation from both the musculocutaneous nerve and the radial nerve.\(^\text{[7, 8]}\) One study found that the musculocutaneous nerve contributes to 42% of the muscle power that flexes the elbow.\(^\text{[9]}\)

**Epidemiology**

Isolated injury to the musculocutaneous nerve or the lateral antebrachial cutaneous nerve is rare.\(^\text{[4]}\)

**Risk factors**

- Damage to the shoulder and brachial plexus can affect the musculocutaneous nerve.\(^\text{[10]}\)
- Compression of the nerve by the biceps aponeurosis and tendon against the fascia of the brachialis muscle causes sensory loss below the elbow on the lateral side of the forearm. Entrapment of the nerve is one cause of pain at the elbow.\(^\text{[11]}\)
- During shoulder joint replacement, before placing a retractor on the medial side of the incision to retract the conjoined muscles and pectoralis major, it is necessary to palpate and identify the nerve to avoid damage.\(^\text{[12]}\)
- Using an anterolateral approach to the humerus during orthopaedic surgery also carries a risk.\(^\text{[8]}\)

**Presentation\(^\text{[13]}\)**

**History**

- There may be complaint of weakness of flexion of the elbow, poor power at supination or numbness over the lower lateral forearm. This may follow trauma to the shoulder or upper limb or excessive use or training.
- It presents with loss in power of biceps and brachialis muscles without a disturbing pain. The injury generally occurs after strenuous exercise and can be demonstrated by electrophysiology.\(^\text{[14]}\)
- Strenuous elbow extension and forearm pronation are the risk exercises for the lesion. Presentation can be pain at the elbow or ‘burning’ in the forearm.\(^\text{[11]}\)

**Examination**

The following features are characteristic:

- Weakness of elbow flexion and forearm supination.
Sensory loss over the lateral and volar aspect of the forearm.
Weak or absent biceps tendon reflex.
Being a lower motor neurone lesion, other expected signs include poor muscle tone, marked wasting and possibly fasciculation.

Investigations\[13, 15\]
Nerve conduction studies, electromyography and MRI scan should confirm a lower motor neurone and sensory nerve lesion and are useful in differentiating musculocutaneous nerve lesions from cervical spine nerve root impingement.

Management

- Spontaneous recovery is possible but may take several months.\[16\] In lesions that are not directly due to trauma, rehabilitative measures may be appropriate.\[13\]
- If conservative therapy fails, surgical decompression should be considered. Surgical decompression is indicated as first-line treatment if there is paraesthesia, as this suggests that the affected nerve still has some function.\[17\]
- Traumatic lesions of the musculocutaneous nerve are amenable to surgical repair. They are graded as open tidy, open untidy and closed traction lesions. Open tidy lesions get the best results and traction lesions the worst. There is poorer prognosis if there is associated vascular injury. Repair within 14 days and nerve grafts of less than 10 cm length give better results.\[2\]
- Since the early 1990s, the Oberlin technique of transferring ulnar nerve fascicles to the motor branch of the musculocutaneous nerve has been the preferred operative technique for re-innervation and restoration of biceps muscle function. However, median nerve fascicle transfer has been developed as an option and in some cases leads to a better functional result.\[18\]

Further reading & references
