APPLICATION OF DN ON UPPER EXTREMITIES

I PUTU EKA WIDYADHARMA

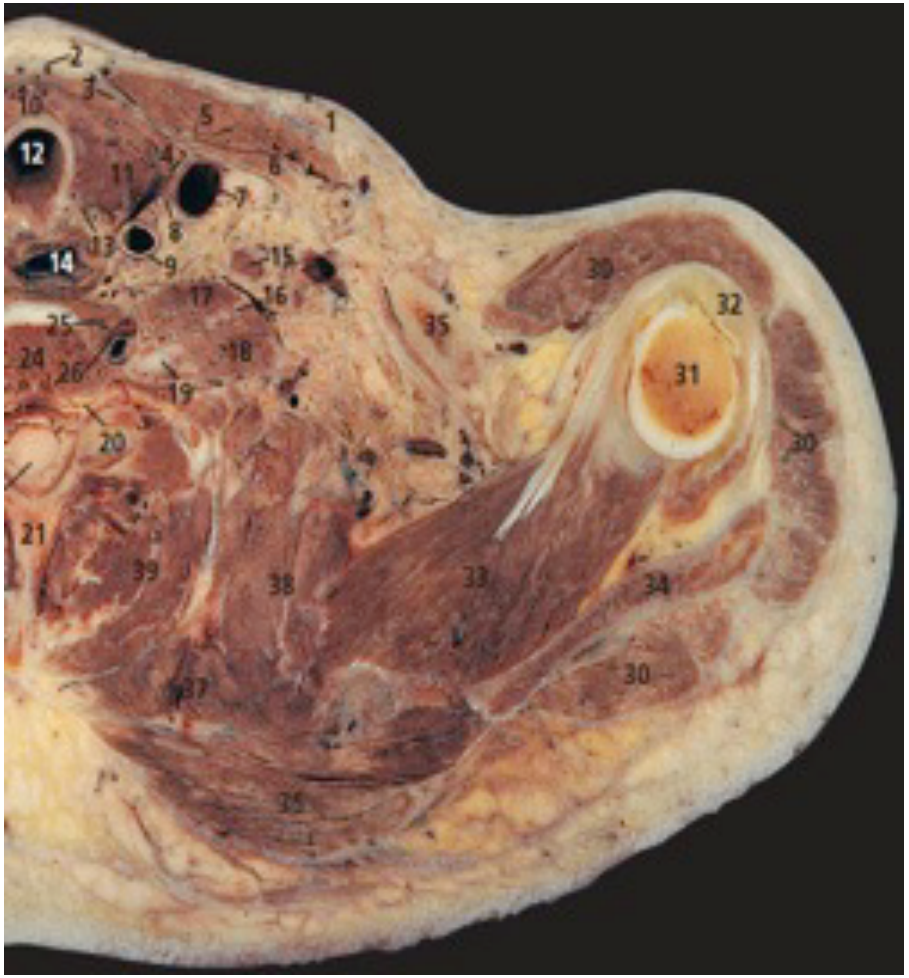
SUPRASPINATUS

ANATOMY

- Arising from the supraspinous fossa it passes under the sub-acromial arch forming the floor to the sub acromial bursa and attaching to the greater tuberosity of the humerus. Supraspinatus and infraspinatus have the greatest passive tension of the rotator cuff muscles in the anatomic position, (194). It receives innervation from the suprascapular nerve C5.

- Clinical Pearl

On MRI examination 30% of 30 year olds, 50% of 40 year olds and 70% of 50 year olds have full or partial thickness tears of rotator cuff. No correlation was found between RC pathology and symptoms. (71)



30 deltoid: anterior, lateral, posterior
32 shoulder joint capsule
33 supraspinatus
34 spine of scapula
36 trapezius

FUNCTION

- During abduction supraspinatus approximates the humeral head with the other rotator cuff muscles.
- If supraspinatus is ruptured, the infraspinatus and subscapularis muscles can function adequately to maintain humeral head position.
- It also functions with the arm nearby the side to prevent downward displacement such as in holding a briefcase or restraining a dog on a lead.

COMPLAINT

- Functional complaints include, a lack of full abduction e.g. combing hair, putting in rollers, blow drying hair, hanging out the washing.
- Supraspinatus can have a similar pain referral to infraspinatus but not usually into hand dorsum.
- Also supraspinatus can seem to concentrate over the common extensor origin and deltoid. It can occur in combination with ACJ trauma/pathology and postoperative e.g. decompressions and rotator cuff repairs.

EXAMINATION & NEEDLE INSERTION

- The hand behind the back test is limited. Resisted abduction in the plane of the scapular below 45 degrees may be weak and painful.
- Trigger point location is commonly found in both medial and lateral portions of the muscle.
- Safe needle depth 15-25mm, lateral point 35 – 50mm.

INFRASPINATUS

ANATOMY

- Arising from the infraspinous fossa it passes lateral to the greater tuberosity of the humerus forming part of the posterior rotator cuff.
- Innervation is from the suprascapular nerve C5/6. Nerve entrapment can occur in the suprascapular notch and the spinoglenoid notch causing motor and sensory deficits in the IS & SS, then IS only respectively. (146).

Clinical Pearl

- There have been reported cases of deficient scapulae fossa, which could 'potentially' allow the penetration of a needle into the chest cavity.

FUNCTION

- A primer lateral rotator of the arm; regardless of shoulder angle it is most differentiated from supraspinatus in neutral and flexion (97).
- It functions to decelerate the arm eccentrically with the late stage of the throwing action.
- Clinically it is injured when people fall onto their hand suggesting a humeral stabilising action in the inferior direction.

COMPLAINT

- Functional complaints of “I can’t tuck in my shirt, do up my bra, put my arm last into a jacket“ are common.
- The chief complaint is of a deep anterior shoulder pain and hence this muscle is commonly overlooked during examination.
- Pain can extend diffusely down the arm; lateral, anterior or posterior.
- Pain maybe present along the medial scapula boarder.
- Clients will usually be unable to lie supine or on the opposite side as these both place increased load on infraspinatus.

EXAMINATION & NEEDLE INSERTION

- Look at ‘hand behind back,’ which requires full internal rotation and adduction.
- Client positioning can be sitting for access to range of muscles or side lying for comfort and specific localisation as is easy to place arm in optimal positions.
- Palpate the muscle belly to locate trigger points.
- Resisted external rotation may be weak.
- Safe needle depth 5-25mm.

BRACHIORADIALIS

ANATOMY

- Arising from the upper portion of the supracondylar ridge it passes distal to attach on the radial side of the styloid process of the radius.
- Medical ‘elbow jerk’ C6 reflex. Innervation is by the radial nerve, C5 & 6.

FUNCTION

- A weak elbow flexor, it pronates the forearm from supination and supinates the forearm from pronation to neutral

COMPLAINT

- Pain present in the lateral elbow (hence a tennis elbow candidate), lateral forearm and first web space on the dorsum of the hand.

EXAMINATION & NEEDLE INSERTION

- With the elbow at 90 degrees flexion and forearm in the mid position, resist elbow flexion.
- BR will lift up off the radius. In this position pincer palpate the muscle in the upper of the forearm and use a rolling palpation to locate trigger points.
- Safe needle depth 10-20mm.

EXTENSOR CARPI RADIALIS LONGUS & BREVIS

ANATOMY

- ECRL arises from the supracondylar ridge distal to brachioradialis. ECRB arises from the common extensor origin and radial collateral ligament.
- They attach with slips into the base of the 2nd (ECRL) and 3rd (ECRB) metacarpal bones. ECRB's muscle belly is widest at the junction of the upper and middle 1/3. At this point the longus is thinning into a tendon.
- At it's origin, ECRB forms a fibrous arch of attachment. Through this arch the motor (deep) branch of the radial nerve passes on its way to the supinator muscle.
- The superficial branch has usually already divided and is passing distal, under the brachioradialis.
- Innervation is by the radial nerve, C6 & 7.

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- Palpate the common extensor origin, move distally 2-3 cm towards the thumb and note the soft tissue groove your palpating finger is in. Above is ECRL and below is ECRB.

FUNCTION

- ECRL extends and radially deviates the wrist; ECRB extends and radially (minimal compared with longus) deviates the wrist.
- The Finger Flexion Test can be used to elicit trigger points in the extensors, by having the client flex all digits with the MCPJ fully extended.
- Trigger points in the extensors will prevent being able to place distal finger pads onto the volar pads of the MCPJs.
- The digit that can’t touch will be the one harbouring trigger points.

COMPLAINT

- Mainly of pain in the dorsum of the wrist, especially on static usage of the wrist e.g. keyboard work.

EXAMINATION & NEEDLE INSERTION

- After location of trigger points (pincher palpation for ECRL and flat palpation against the radius for ECRB) needle insertion is guided from thumb to index for ECRL and towards the underlying radius for ECRB.
- Safe needle depth 10-20mm

EXTENSOR DIGITORUM

ANATOMY

- Arising from the common extensor origin it forms a large muscle that in the lower 1/3 divides into separate tendons which then pass onto the respective digits, they form the extensor hood with the lumbricals and interossei muscles, attaching into the base of the middle and distal phalanges.
- The deep radial nerve, C67 & 8, provides innervation.

FUNCTION

- To extend wrist & all phalanges of the digits.

COMPLAINT

- Depending on the belly involved, ED pain is perceived, in the associated finger.
- There is also often pain referred into the lateral elbow. The client complains of extensor forearm stiffness. Any form of gripping, opening or lifting in the pronated position will produce pain.
- This is often a great source of frustration as lifting in the supinated position is effortless and the client fails to see the relationship.
- Grip strength is also reduced as an inhibitory response to the pain.

Clinical Pearl On isometric testing, the index finger is most commonly involved.

EXAMINATION & NEEDLE INSERTION

- The middle finger is the most common and easiest muscle to evoke a twitch response.
- Often present but non painful in the general population, it is amazing that more don't become involved.
- Gripping tests in the normal, deviated positions (wrist cocked) may show signs of weakness (hand dynamometer) and referred pain.
- Pain arising from trigger points in the extensor mass will largely be eliminated by encircling pressure provided externally. Pain that is being referred into the lateral epicondyle from above will not be affected.
- It is always worth considering using MWM techniques as a quick test to determine suitability.
- Safe needle depth 5-15mm.

SUPINATOR

ANATOMY

- Arising from the dorsal surface of the proximal ulna the superficial layer spirals around the lateral radius passing anterior to attach into the proximal 1/3 of the radius.
- Deep fibres pass from the anterior elbow capsule and pass down onto the radius just lateral to the biceps tendon.
- Passing under the superficial layer (through the Arcade of Froshe) is the deep radial (motor) nerve.
- Innervation is by the (deep radial) posterior interosseus nerve, C78.

FUNCTION

- Supinator is the prime supinator of the forearm. Biceps involvement interplays when the elbow is flexed, strong force is required or with rapid movements into supination.
- EMG studies indicate that forceful resisted elbow flexion in pronation is negative on biceps and positive for supinator function (probably the deeper fibres).
- Elbow flexion in supination is mainly biceps in function.
- Supination in elbow extension is mainly supinator.

COMPLAINT

- Trigger points refer pain up into the lateral epicondyle and into the 1st web space, hence, another candidate for ‘tennis elbow’ pain.

EXAMINATION & NEEDLE INSERTION

- Supinator is probably one of the most commonly overlooked sources of tennis elbow pain.
- Common trigger points are located lateral to the biceps tendon and deep to the ECU, about 5 cm distal to the radial head.
- Safe needle depth superficial fibres 5-10mm, deep 35-50mm.

EXTENSOR CARPI ULNARIS

ANATOMY

- Extensor carpi ulnaris arises from the common extensor tendon off the lateral epicondyle and a shared aponeurosis with FCU along the proximal ulna.
- Distally it inserts into the ulna side at the base of the 5th metacarpal bone.
- Innervation is by the deep radial nerve, C678.

FUNCTION

- A weak wrist extensor it ulna deviates the wrist

COMPLAINT

- Pain on the ulna side of wrist joint, in the location of the triangular fibro cartilage.

EXAMINATION & NEEDLING

- Place the wrist in flexion with radial deviation and palpate the muscle belly to locate the trigger points. Underlying the proximal end is supinator deep portion.
- Safe needle depth 5-10mm.

Clinical Pearl

- Muscles to consider for lateral elbow pain include SS, IS, lateral portion of the medial head of triceps, brachioradialis, supinator, ECRL, ECRB, and ED

THANK YOU