SPORTS PHYSICAL THERAPY

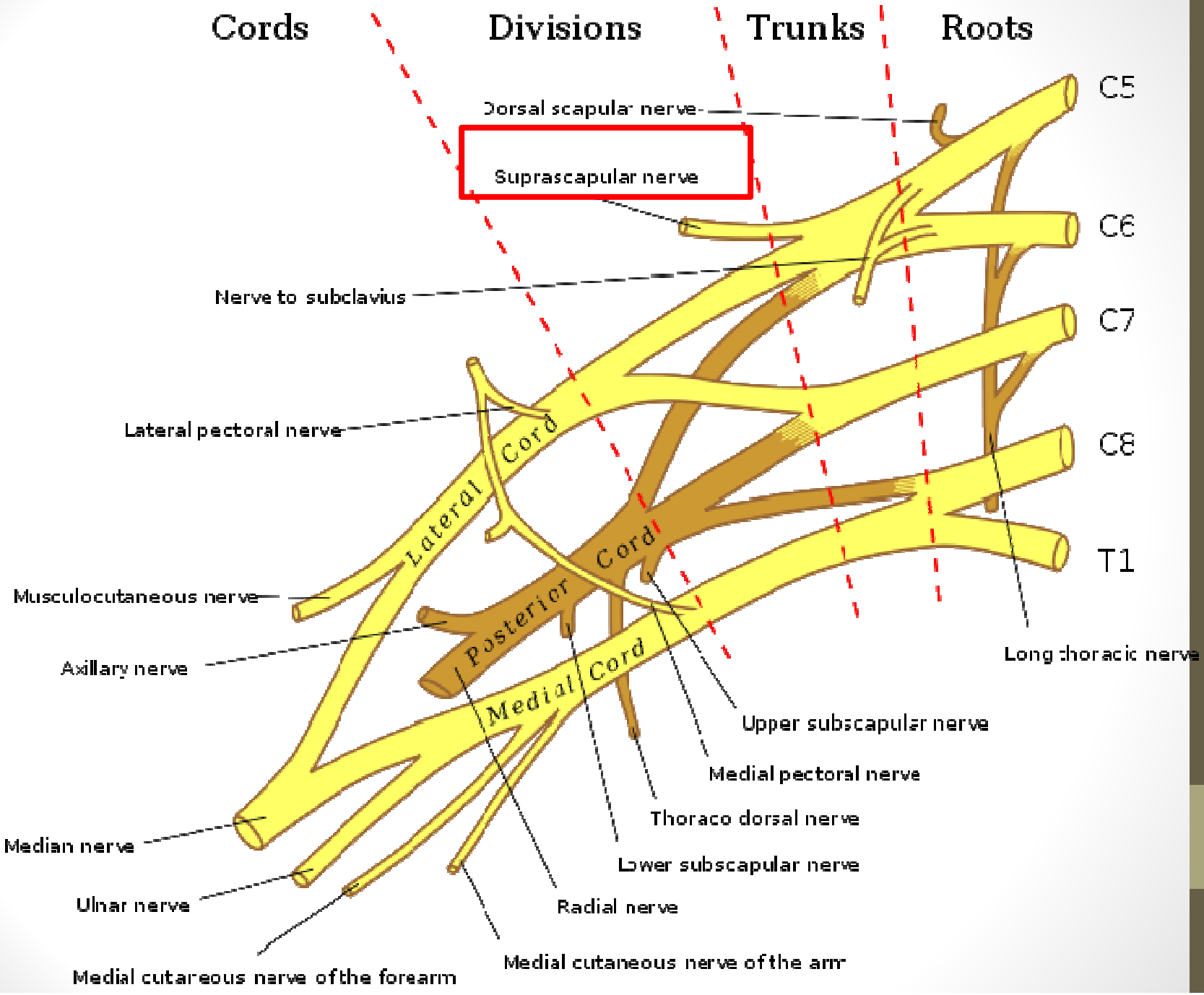
Dr Akhtar Rasul

PERIPHERAL NERVE INJURIES (PART “C”)

BRACHIAL PLEXUS NEUROPATHY

Suprascapular nerve

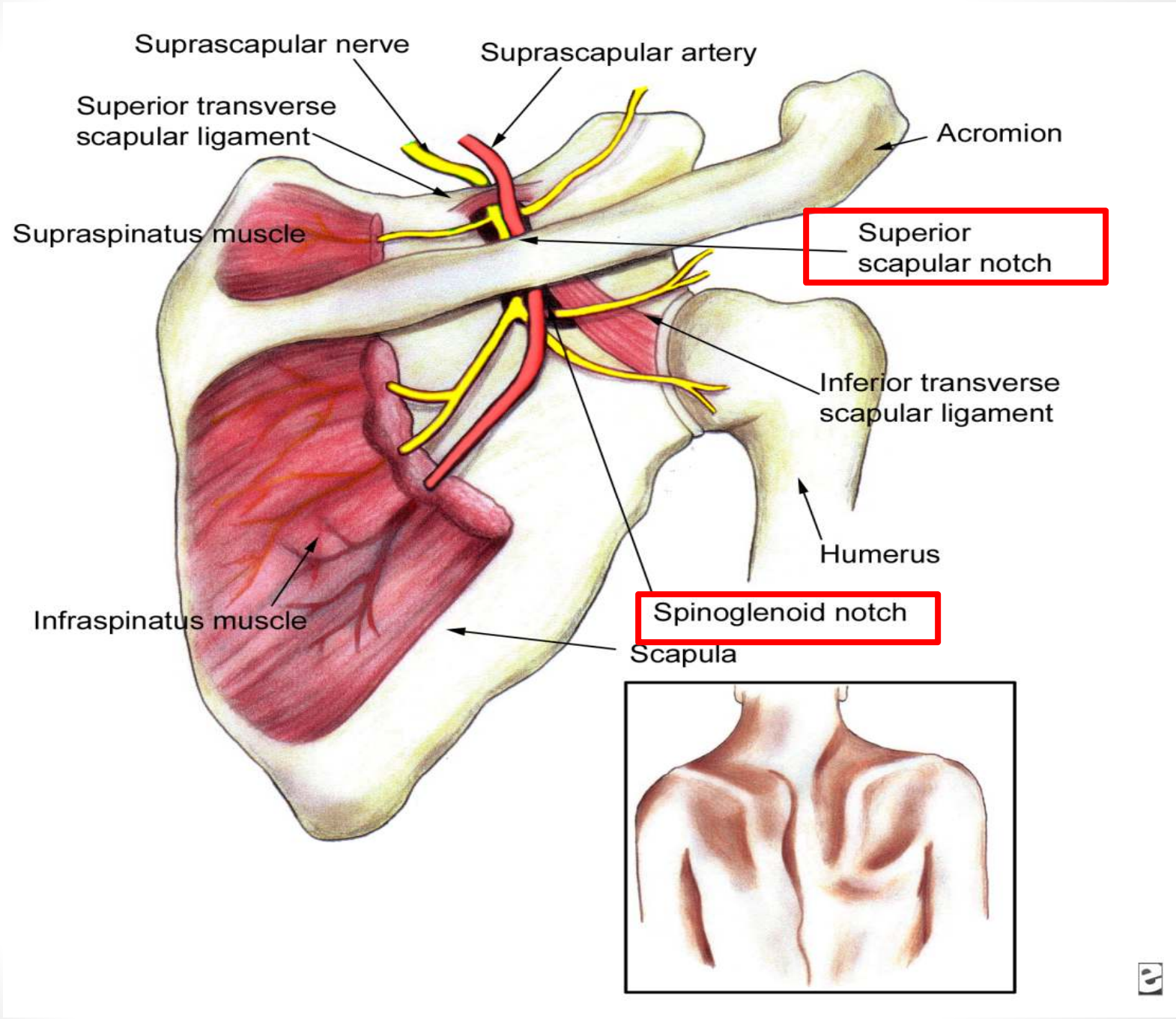
- The suprascapular nerve originates from the superior nerve trunk (C5–C6 nerve roots) at Erbs' point, responsible for innervating supraspinatous and infraspinatous muscles, which abduct and laterally rotate the shoulder respectively


Cords
Divisions
Trunks
Roots
C5
C6
C7
C8
T1
Dorsal scapular nerve
Suprascapular nerve
Nerve to subclavius
Lateral pectoral nerve
Lateral Cord
Posterior Cord
Medial Cord
Musculocutaneous nerve
Axillary nerve
Median nerve
Ulnar nerve
Medial cutaneous nerve of the forearm
Radial nerve
Medial cutaneous nerve of the arm
Lower subscapular nerve
Thoraco dorsal nerve
Medial pectoral nerve
Upper subscapular nerve
Long thoracic nerve

BRACHIAL PLEXUS NEUROPATHY

Suprascapular nerve

The suprascapular nerve is vulnerable to entrapment (Goslin and Krivickas 1999) as it passes through the suprascapular foramen before curving around the spinoglenoid notch; both anatomical points of nerve entrapment (Pratt 2005).


Suprascapular nerve
Suprascapular artery
Superior transverse scapular ligament
Acromion
Supraspinatus muscle
Superior scapular notch
Inferior transverse scapular ligament
Humerus
Infraspinatus muscle
Spinoglenoid notch
Scapula

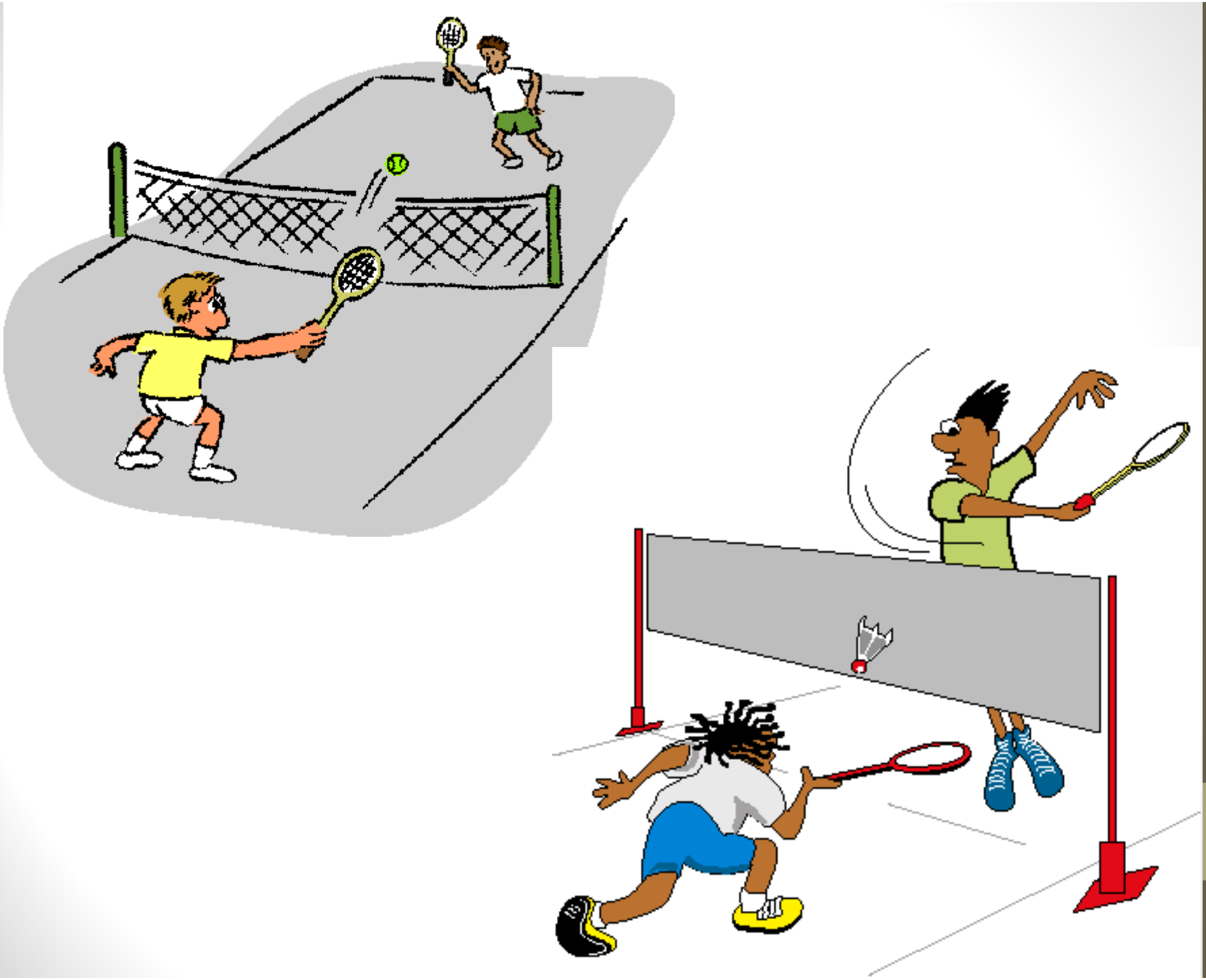
BRACHIAL PLEXUS NEUROPATHY

Suprascapular nerve

INJURY BIOMECHANICS

- Acute Stretching,
- A Blow To The Superior Aspect Of The Shoulder,
- Repetitive scapular motion,

(overhead activities in tennis or badminton can stretch and compress the supra scapular nerve and induce entrapment neuropathy)



BRACHIAL PLEXUS NEUROPATHY

Suprascapular nerve

SYMPTOMS

- Pain at the superior border of the scapula
- Weakness and pain during shoulder abduction and lateral rotation
- Point tenderness over the area of nerve compression

BRACHIAL PLEXUS NEUROPATHY

Suprascapular nerve

TREATMENT STRATEGY

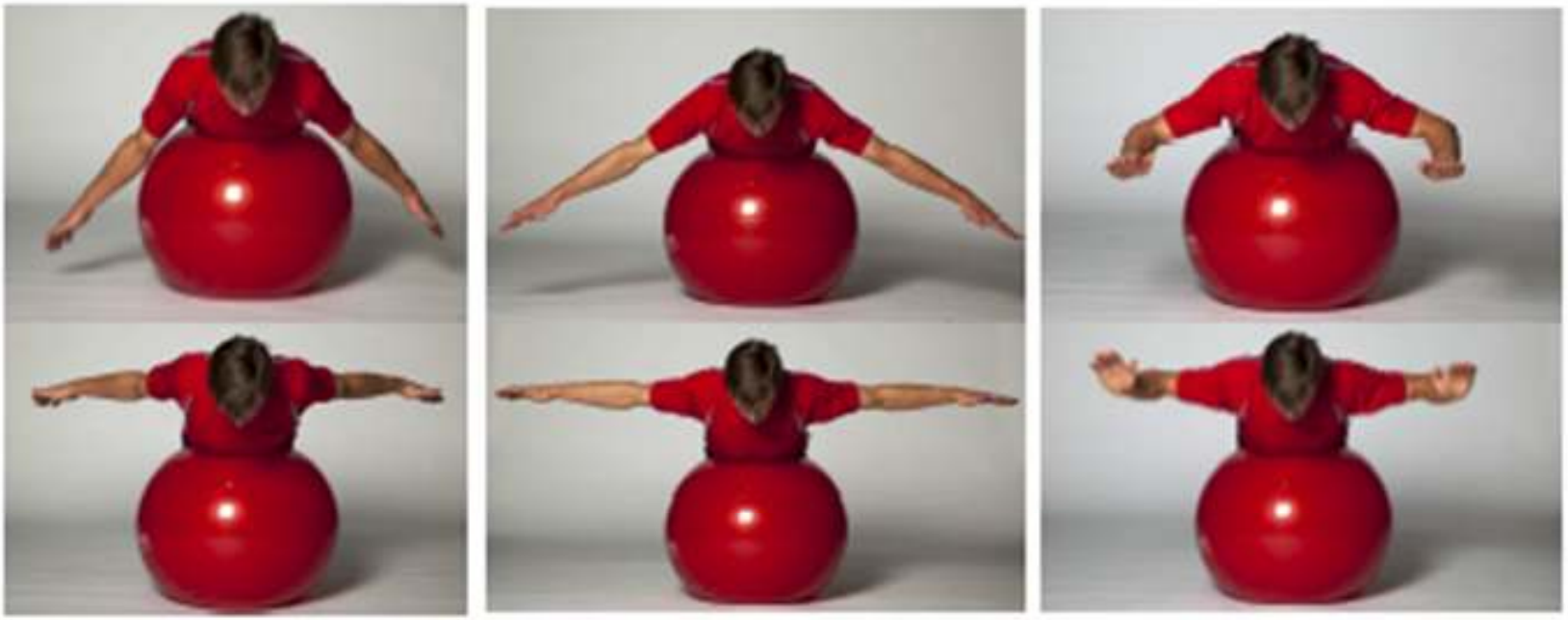
- Modifying or ceasing the aggravating activity
- Restoring full range of motion at the shoulder,
- Increasing strength of the scapular stabilizers and rotator cuff muscles

Prone Horizontal Abduction (Middle and Lower Trap)

- Lie with shoulder over edge of bed. Pull shoulder blade back toward spine while lifting arm up.
- Make sure shoulder does not climb towards ear with activation of upper trapezius muscle.
- You should feel fatigue between your shoulder blade and your spine.

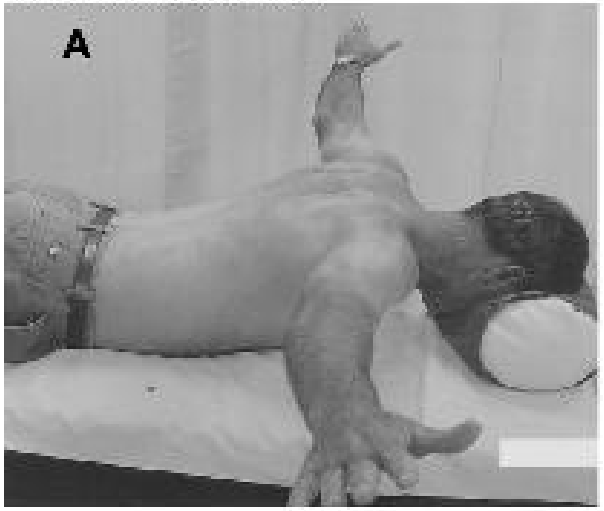
Rowing/Shoulder Blade Squeeze (Rhomboids and Middle Trap)

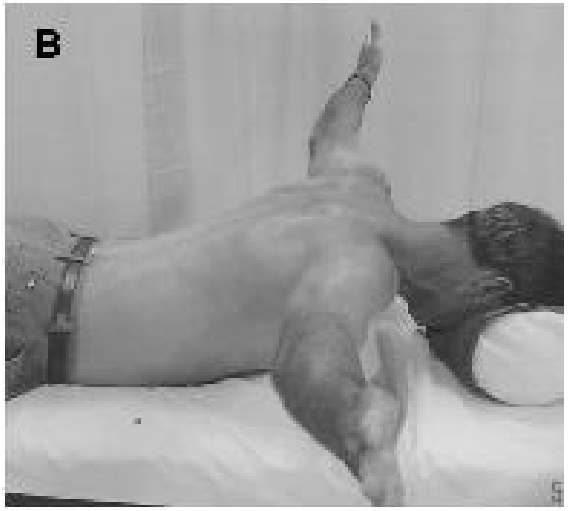
- Anchor Theraband in door just below height of your chest.
- Pull Theraband back by squeezing shoulder blades together. Keep elbows away from your side.
- Over emphasize the pinching of your shoulder blades together.

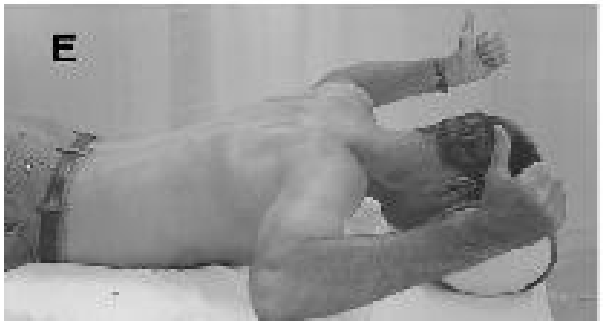


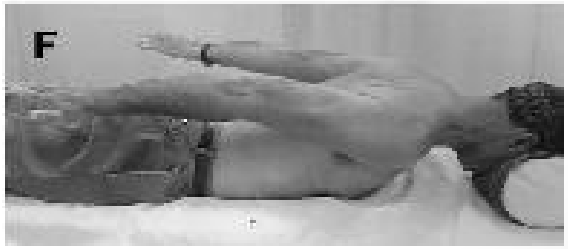
- **3 Position Shoulder Blade Squeeze:**
- Squeeze shoulder blades together 5 times each position. Your arms are moving only because the shoulder blades are retracting. You should feel fatigue between shoulder blades.
- First Two Pictures: Palms facing the floor and arms pointing back at a 45° angle.
- Second Two Pictures: Palms facing the floor and arms out to side at a 90° angle.
- Third Two Pictures: Palms facing the floor and arms out to side at a 90° angle and elbows bent at 90°.

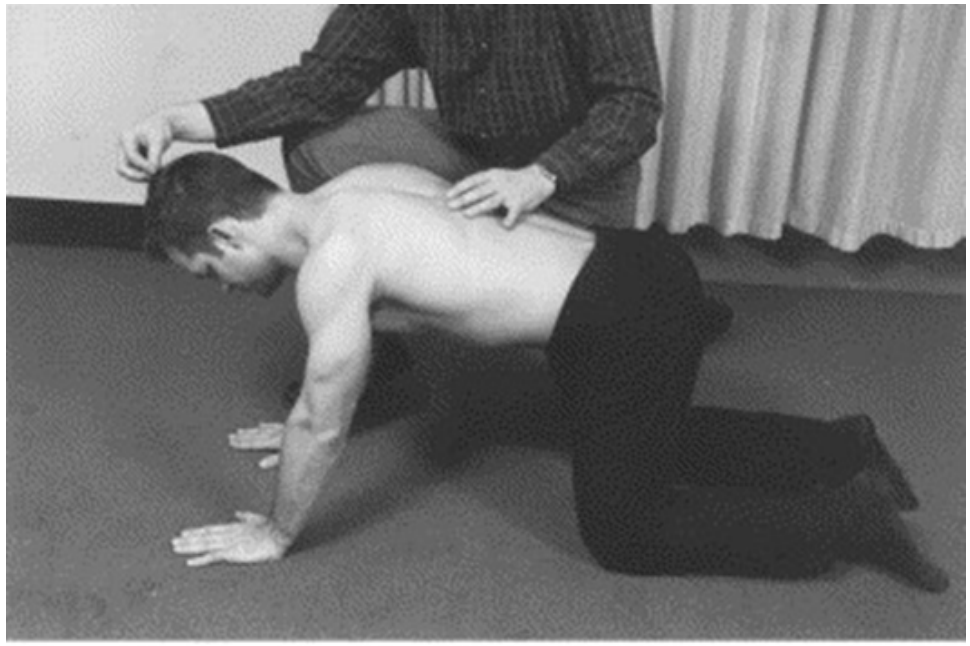
1. Blackburn exercises



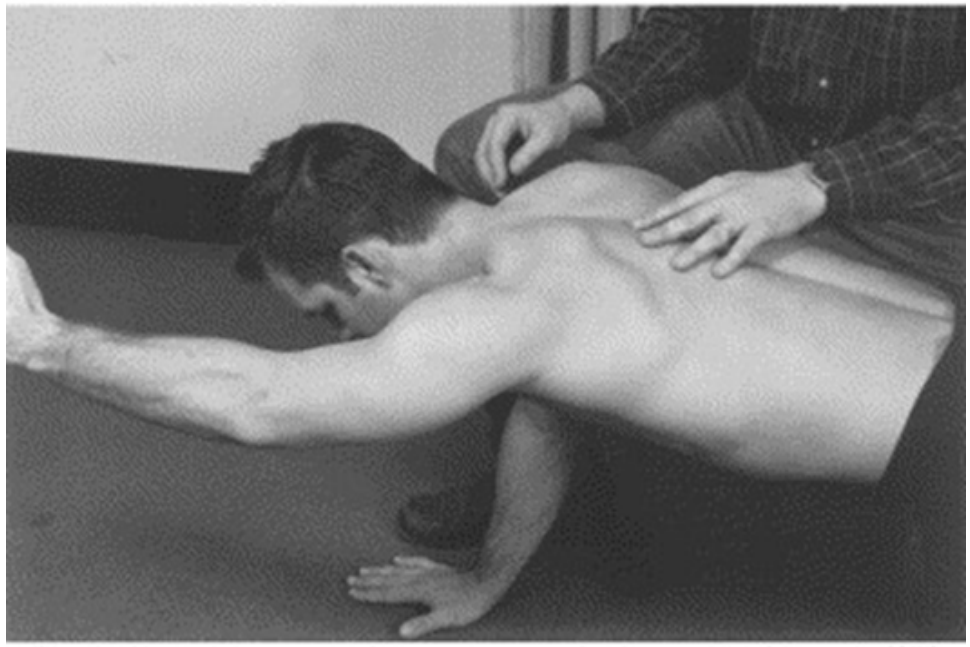








(A)



(B)


ENS 2004
ENS 2004

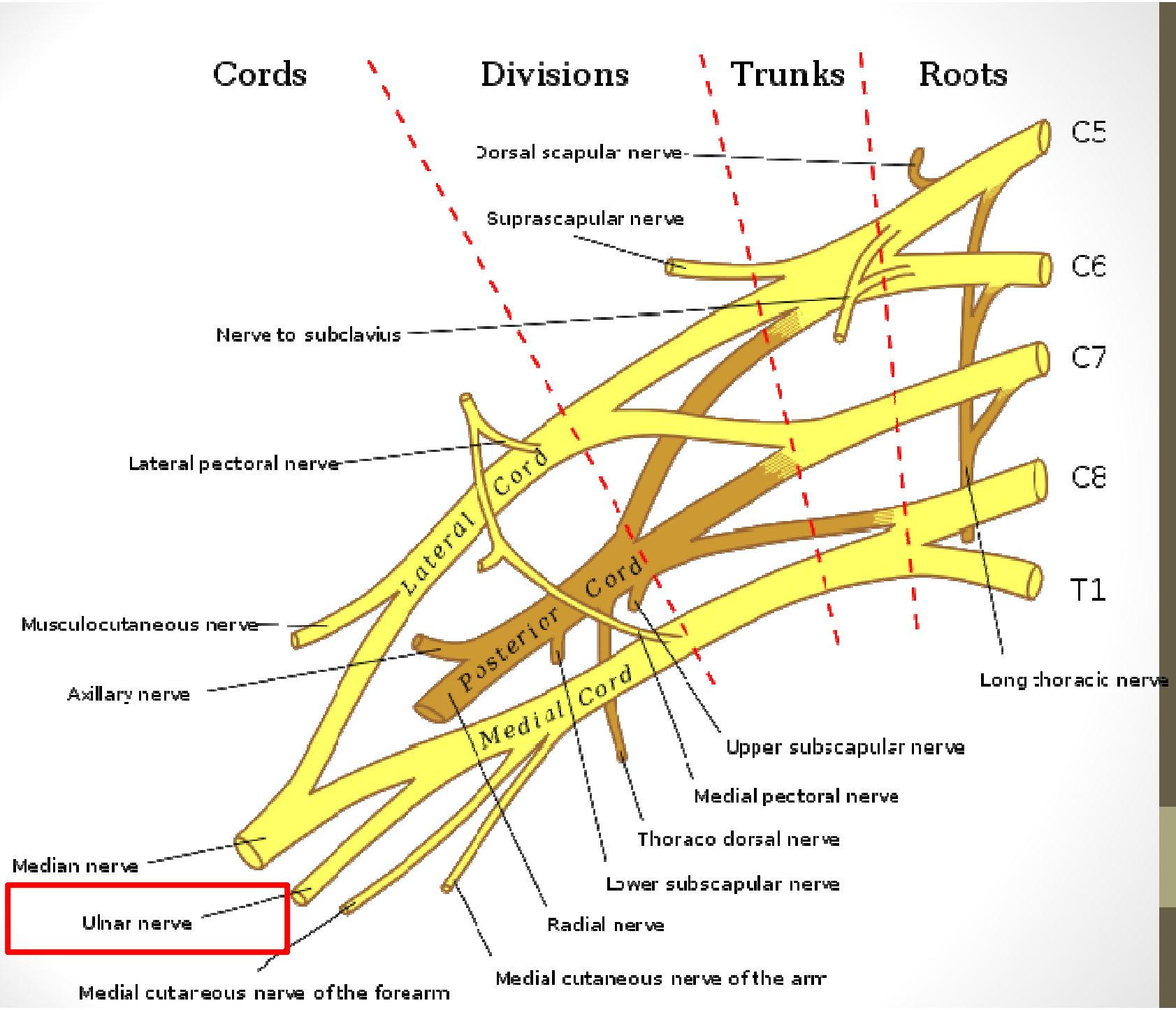
CUBITAL TUNNEL SYNDROME

BRACHIAL PLEXUS NEUROPATHY

CUBITAL TUNNEL SYNDROME

Ulnar nerve

The ulnar nerve is the end point of the medial cord of the brachial plexus, composed of fibres from C8 and T1 nerve roots


Cords
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Suprascapular nerve
Nerve to subclavius
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Medial cutaneous nerve of the forearm
Radial nerve
Medial cutaneous nerve of the arm
Lower subscapular nerve
Thoraco dorsal nerve
Medial pectoral nerve
Upper subscapular nerve
Long thoracic nerve

BRACHIAL PLEXUS NEUROPATHY

CUBITAL TUNNEL SYNDROME

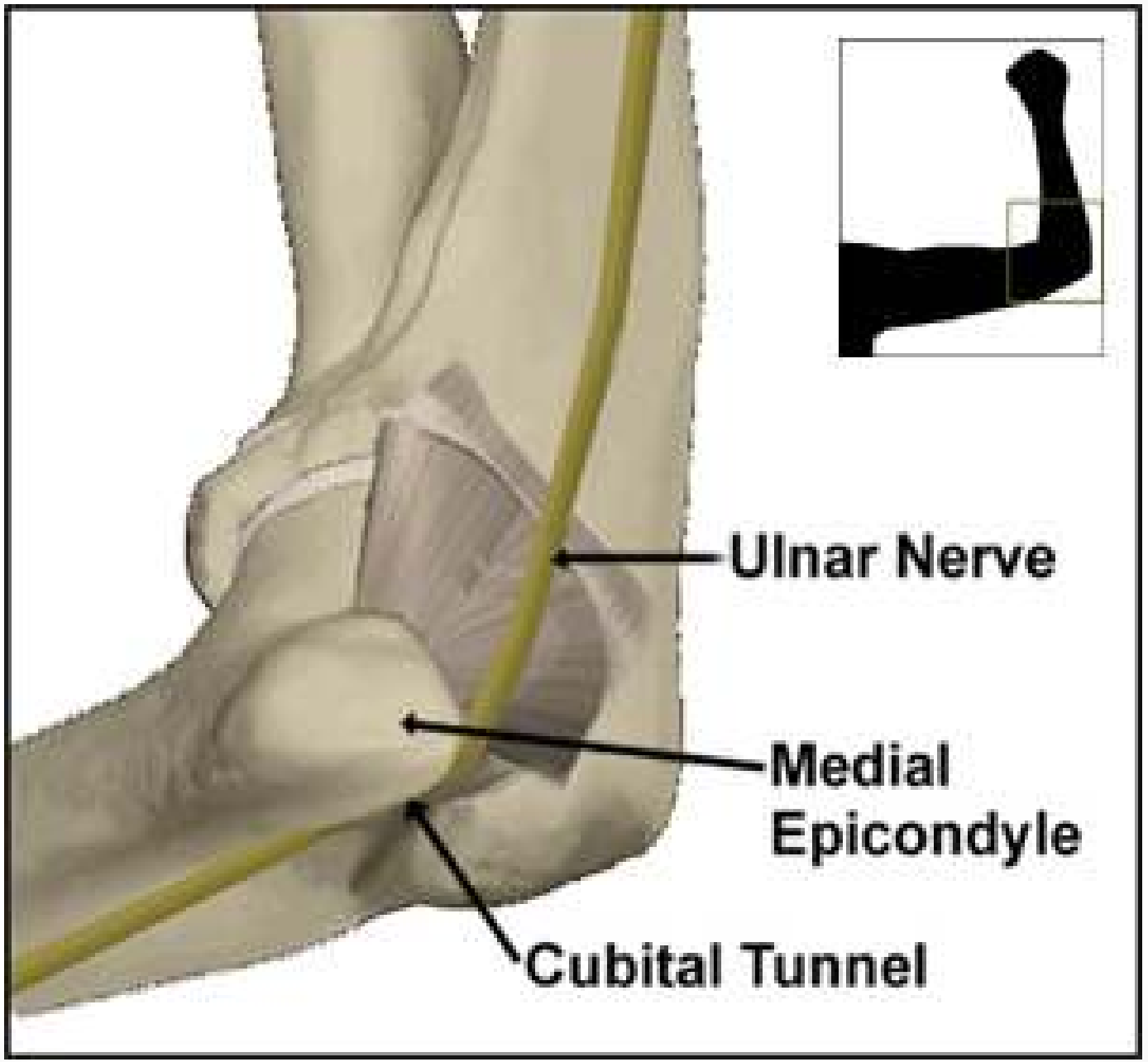
Cubital tunnel syndrome is the second most common neuropathy in the upper extremity (Bencardino and Rosenberg 2006) and the commonest entrapment neuropathy at the elbow (Salama and Stanley 2008)

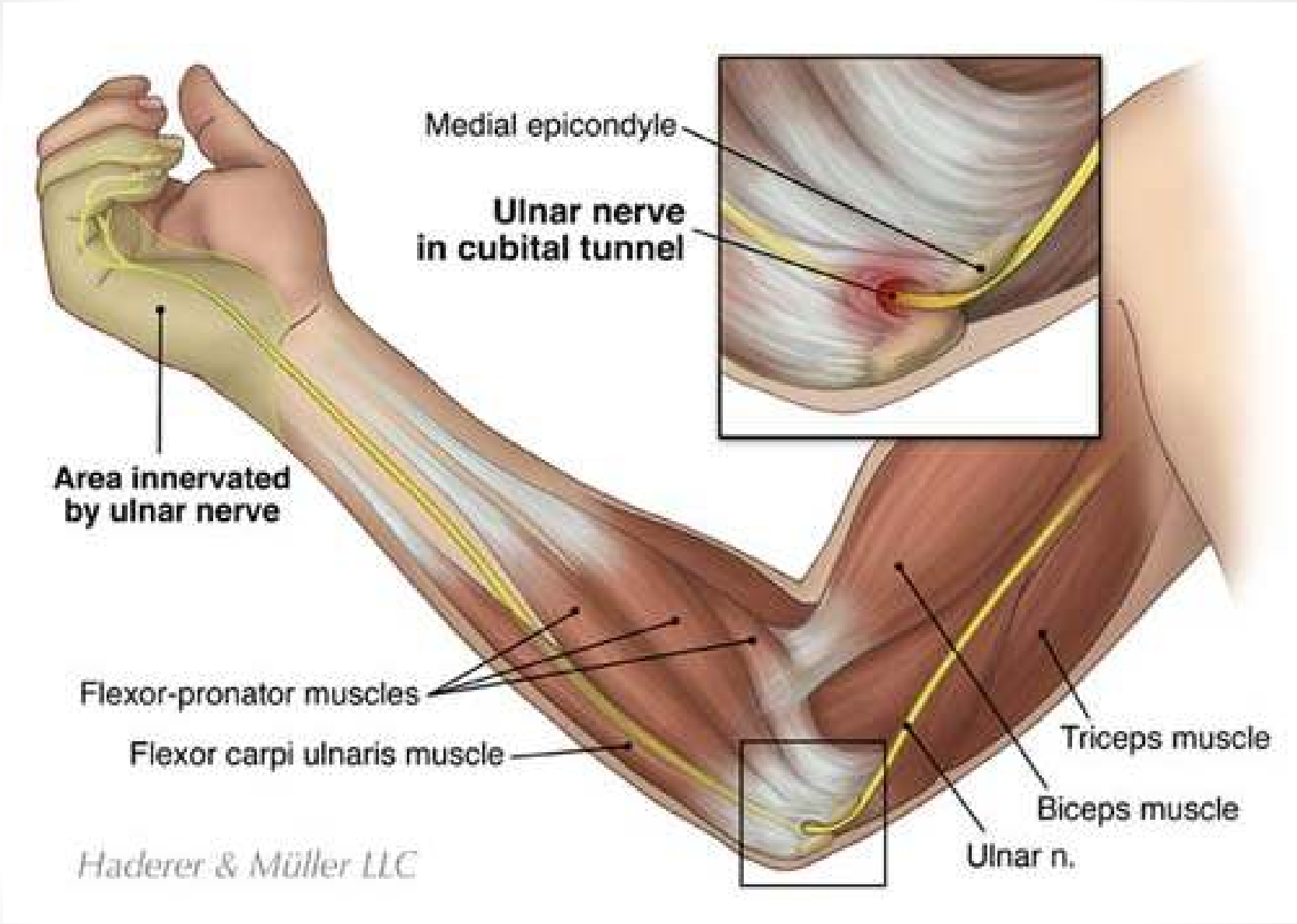
BRACHIAL PLEXUS NEUROPATHY

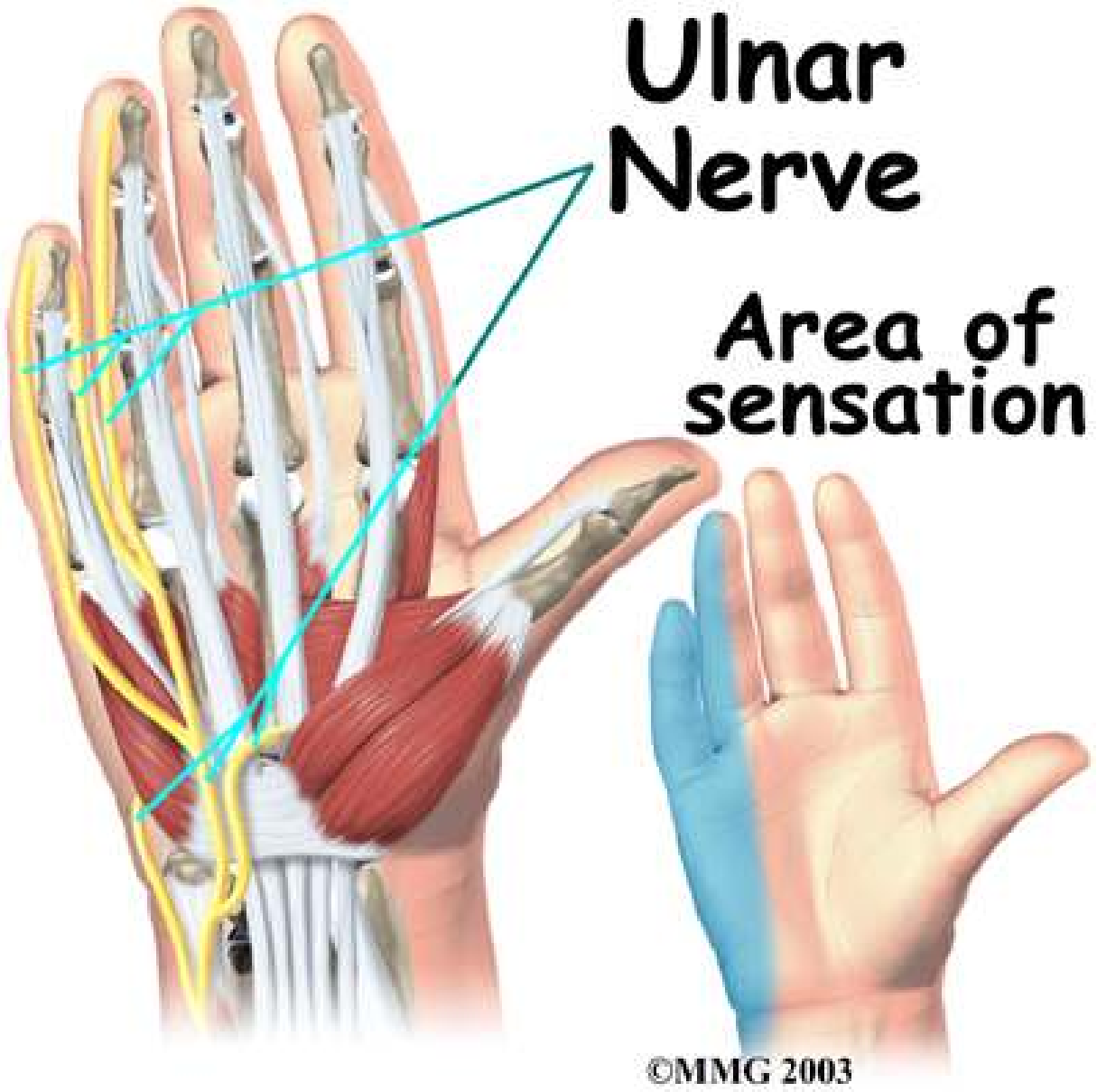
CUBITAL TUNNEL SYNDROME

CUBITAL TUNNEL

The arcuate ligament and medial collateral ligament of the elbow form the roof and floor aspect of the tunnel respectively (Pratt 2005; Bencardino and Rosenberg 2006).


Ulnar Nerve
Medial Epicondyle
Cubital Tunnel


Medial epicondyle
Ulnar nerve
in cubital tunnel
Area innervated
by ulnar nerve
Flexor-pronator muscles
Flexor carpi ulnaris muscle
Triceps muscle
Biceps muscle
Ulnar n.
Haderer & Müller LLC


Ulnar Nerve
Area of sensation
©MMG 2003

BRACHIAL PLEXUS NEUROPATHY
CUBITAL TUNNEL SYNDROME

- **INJURY BIOMECHANICS**

- During elbow flexion the points of attachments for the structures of the cubital tunnel are pulled further apart, resulting in tightening of both the floor and roof of the tunnel.
- Therefore, it is unsurprising that this syndrome is prevalent in throwing athletes (Izzi et al. 2001), many of whom undertake repetitive elbow joint movements, with forced extension, such as seen in pitching a baseball


PAKISTAN

BRACHIAL PLEXUS NEUROPATHY

CUBITAL TUNNEL SYNDROME

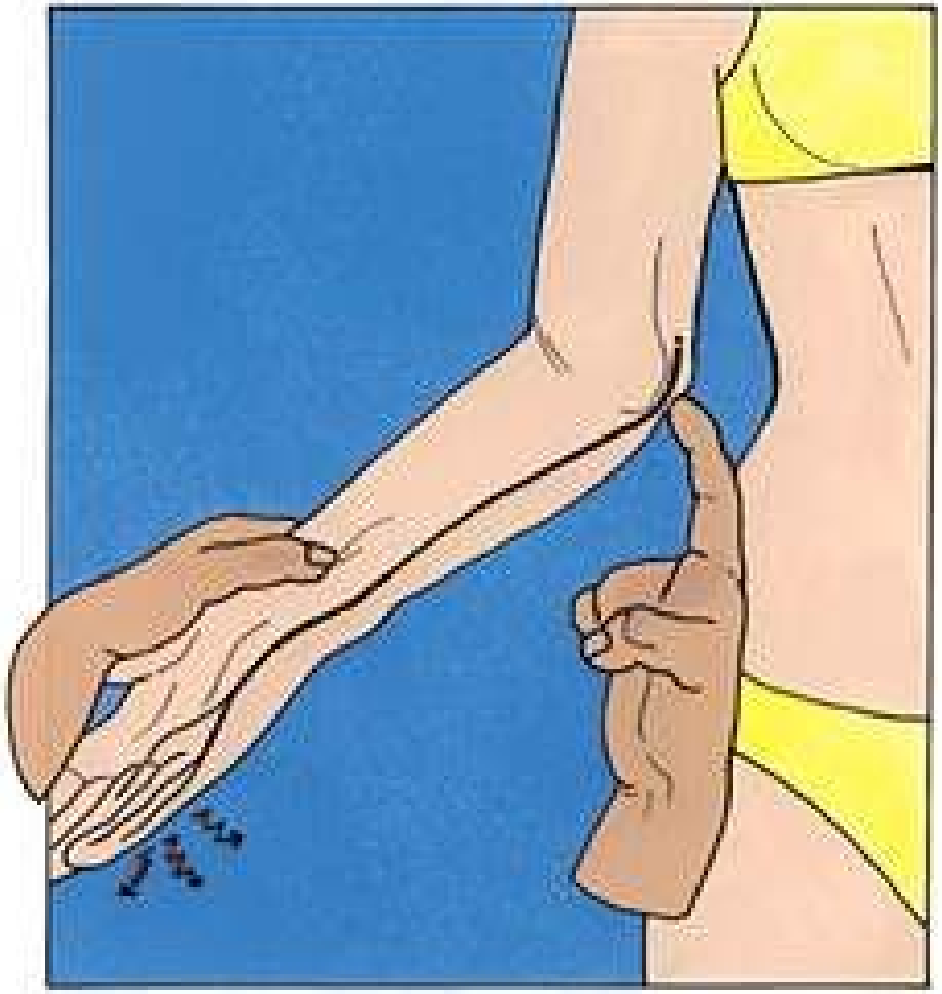
SYMPTOMS

1. Diminished sensation in the ulnar aspect of the fourth finger and all of the fifth finger
2. Elbow pain radiating to the hand with sensory symptoms
3. Weakness in the finger abductors, and thumb adductor
4. Struggling to maintain a powerful grip

BRACHIAL PLEXUS NEUROPATHY

CUBITAL TUNNEL SYNDROME

A positive Tinel's sign



BRACHIAL PLEXUS NEUROPATHY
CUBITAL TUNNEL SYNDROME

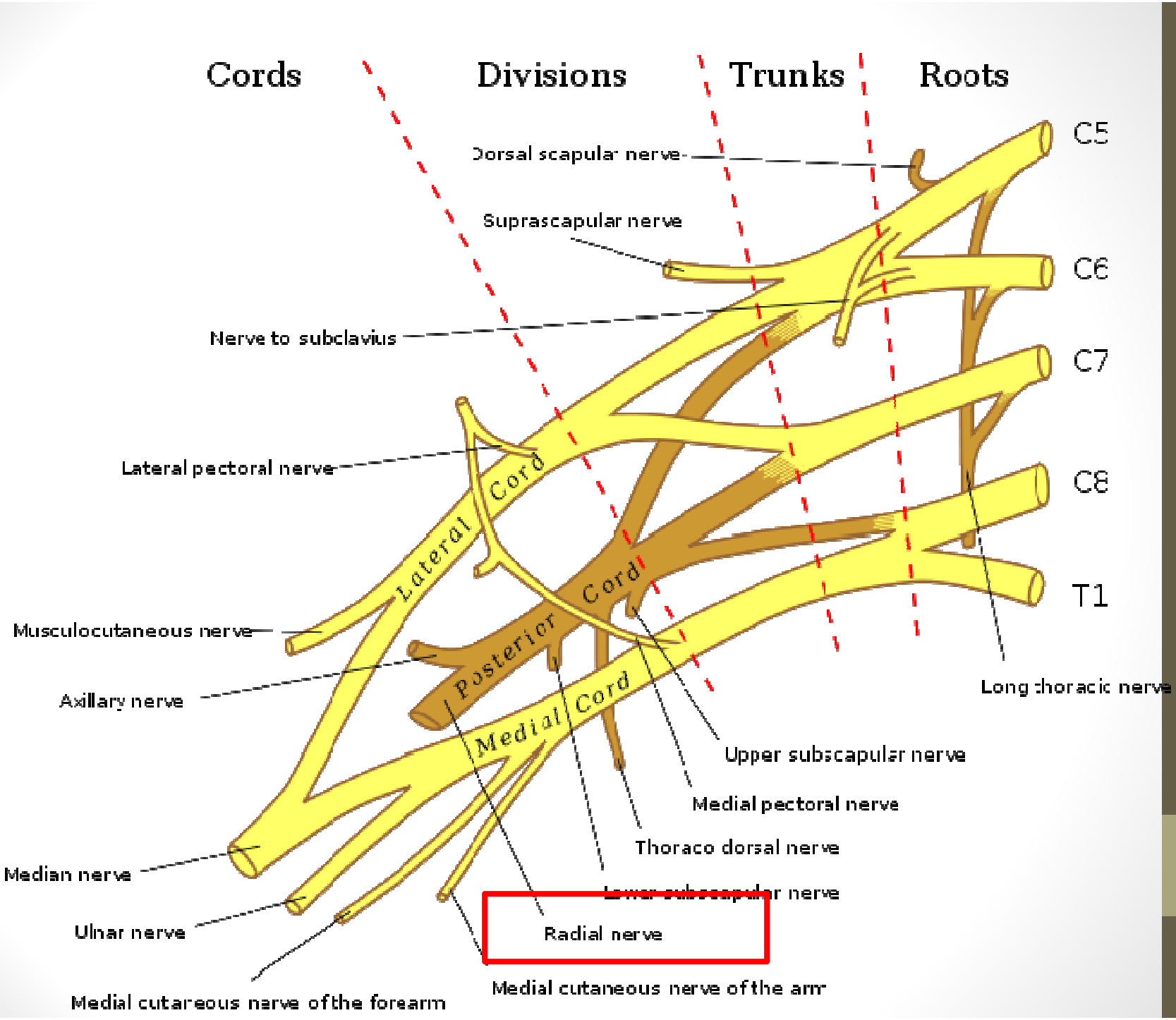
- **TREATMENT STRATEGY**
- Avoidance of the aggravating activity
- NSAIDs,
- Altering throwing technique,
- Manual therapy,
- Nerve gliding
- Progressive strengthening exercise programme
- Night splints should only be utilized if the patient complains of symptoms whilst sleeping.


PowerFlexor

RADIAL TUNNEL SYNDROME

BRACHIAL PLEXUS NEUROPATHY
Radial tunnel syndrome

Compression of the radial nerve at the elbow is referred to as radial tunnel syndrome and more commonly affects the posterior Interosseus nerve (Bencardino and Rosenberg 2006).


Cords
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Lower subscapular nerve
Long thoracic nerve

BRACHIAL PLEXUS NEUROPATHY
Radial tunnel syndrome

- **INJURY BIOMECHANICS**

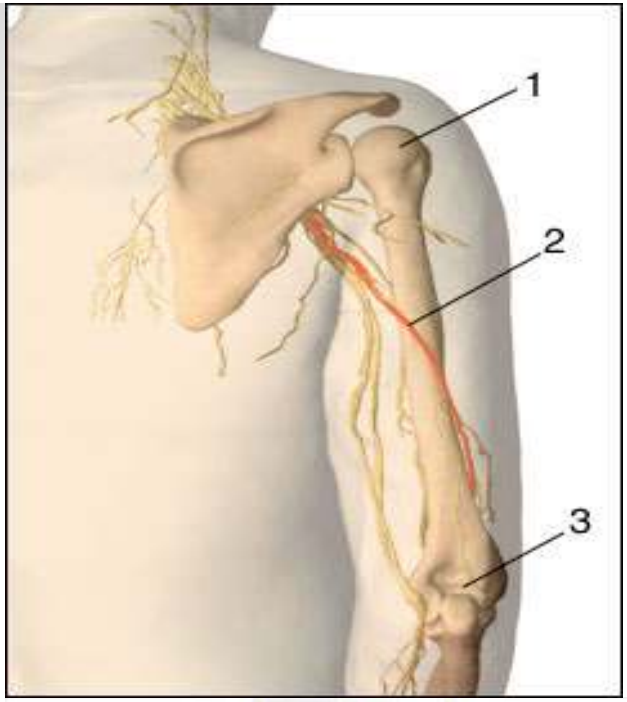
It is commonly seen in racquet sport athletes or swimmers where repetitive pronation and supination occurs

BRACHIAL PLEXUS NEUROPATHY

Radial tunnel syndrome

SYMPTOMS

- Poorly localized pain to the antero-lateral aspect of the elbow,
- Provoked by manoeuvers that stretch or compress the nerve
- Tenderness over the radial nerve along the radial tunnel,
- Pain on resisted supination
- Positive Tinels' sign over the radial forearm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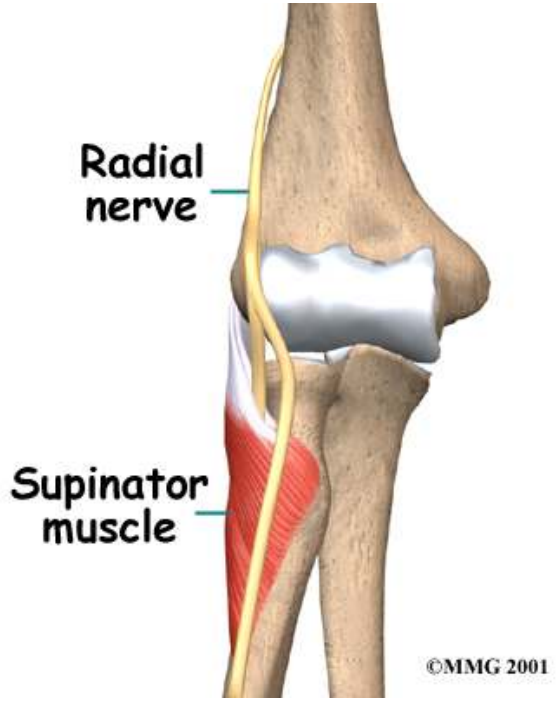
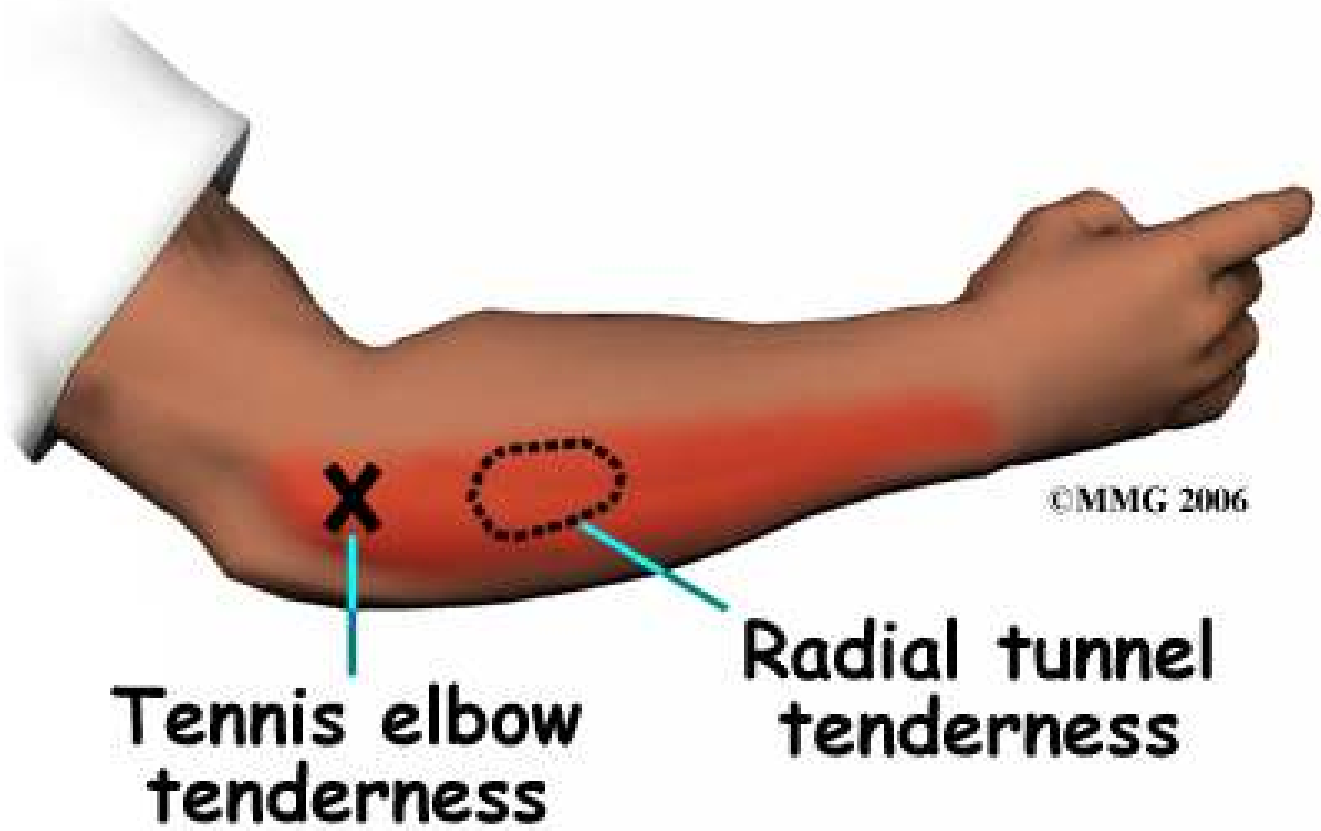
3


Radial nerve
Supinator muscle
©MMG 2001


Radial nerve
Ulnar nerve
Median nerve
©MMG 2001


Radial Tunnel Syndrome
©MMG 2001


©MMG 2006
Tennis elbow tenderness
Radial tunnel tenderness

BRACHIAL PLEXUS NEUROPATHY

Radial tunnel syndrome

- **TREATMENT STRATEGY**

- NSAIDs
- TENS
- Ultrasound
- IRR
- Nerve gliding exercises
- Activity modification and splinting

arm stretch

"make a fist first"

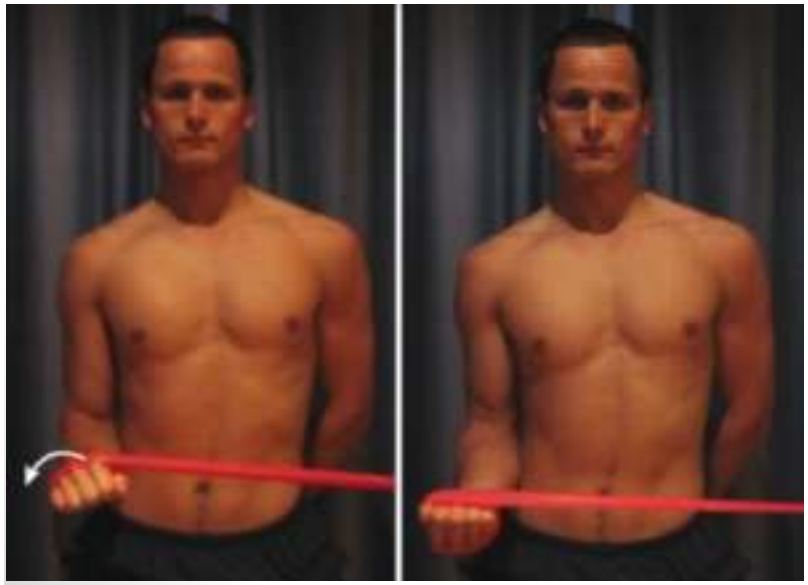
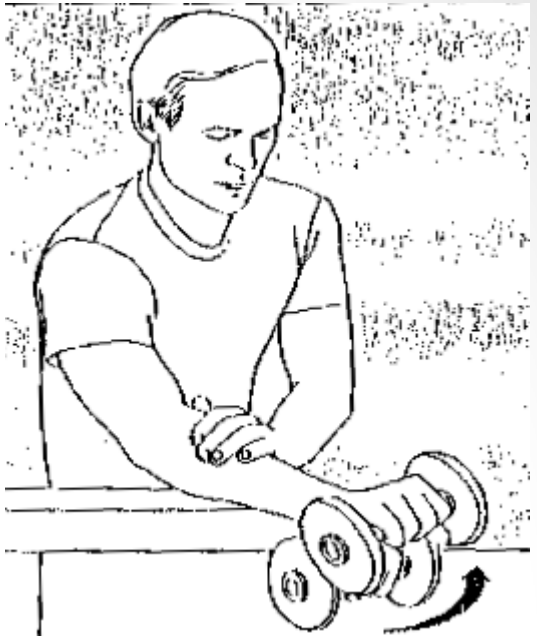
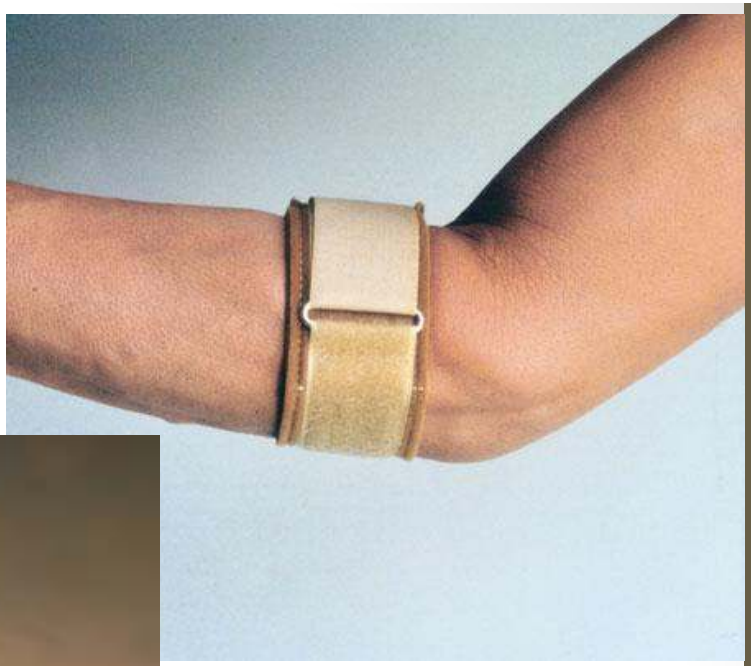
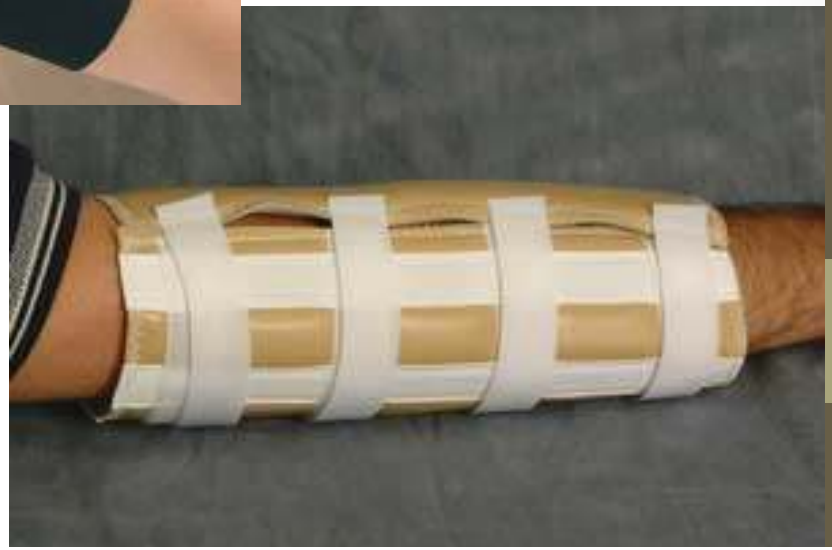



Fig. 4



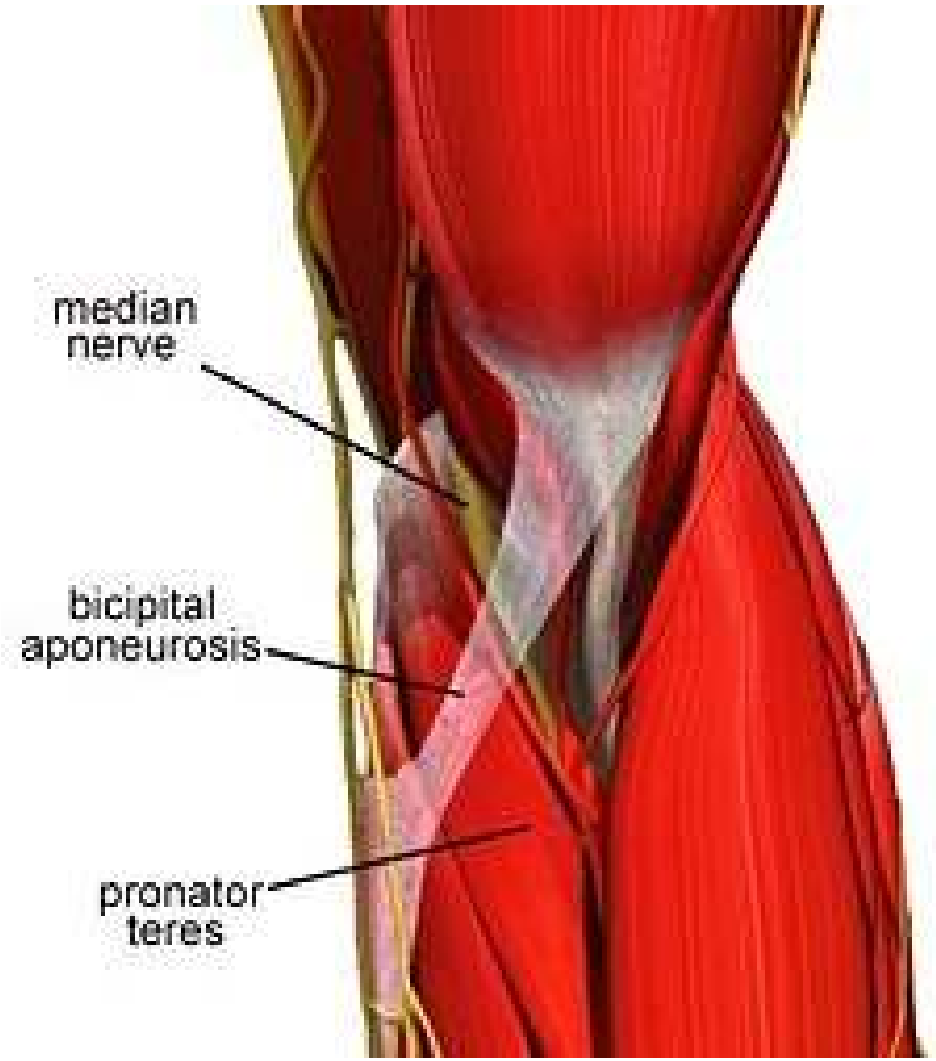
Many cite 'kipping' during chin-ups as the cause of their elbow pain





PRONATOR TERES SYNDROME

BRACHIAL PLEXUS NEUROPATHY
PRONATOR TERES SYNDROME



BRACHIAL PLEXUS NEUROPATHY
PRONATOR TERES SYNDROME

BRACHIAL PLEXUS NEUROPATHY
PRONATOR TERES SYNDROME

- **INJURY BIOMECHANICS**

- The most common cause of median nerve entrapment at the elbow
- It is more prevalent in athletes as opposed to the general population
- External compression on the forearm muscles
- wrapped a curtain of material around the forearm

BRACHIAL PLEXUS NEUROPATHY
PRONATOR TERES SYNDROME

SYMPTOMS

- Pain in Pronation, wrist flexion and radial deviation are additional clinical presentations with this condition
- Thenar atrophy and an inability to oppose or flex the thumb
- Tenderness on palpation can be evident over the pronator muscle.

BRACHIAL PLEXUS NEUROPATHY
PRONATOR TERES SYNDROME

- **TREATMENT STRATEGY**

- Advised to withdraw from the aggravating activity
- Modify their choice of equipment or technique
- NSAIDs,
- Rest
- Nerve gliding exercises
- Stretching of the pronator teres muscle
- Splinting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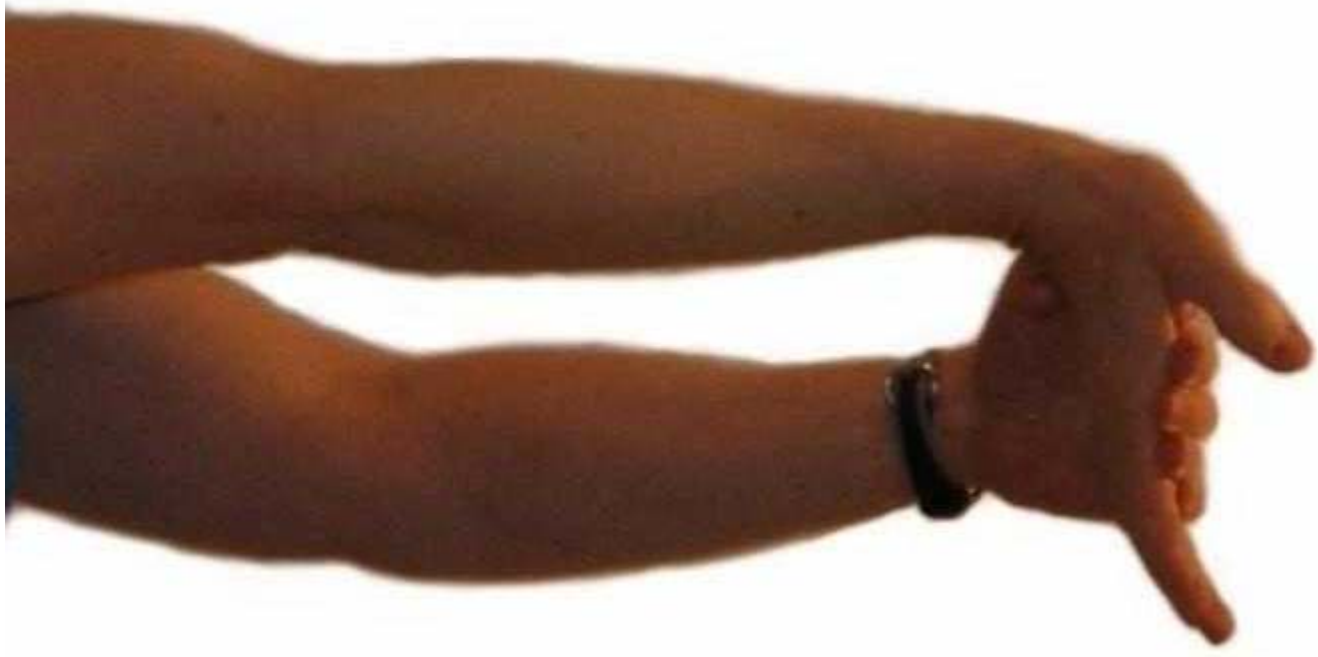
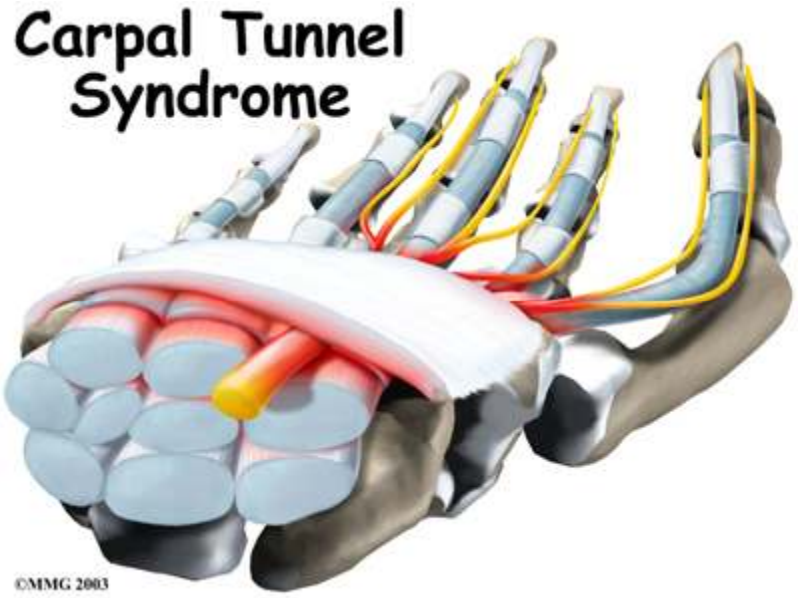


CARPAL TUNNEL SYNDROME


Carpal Tunnel
Syndrome
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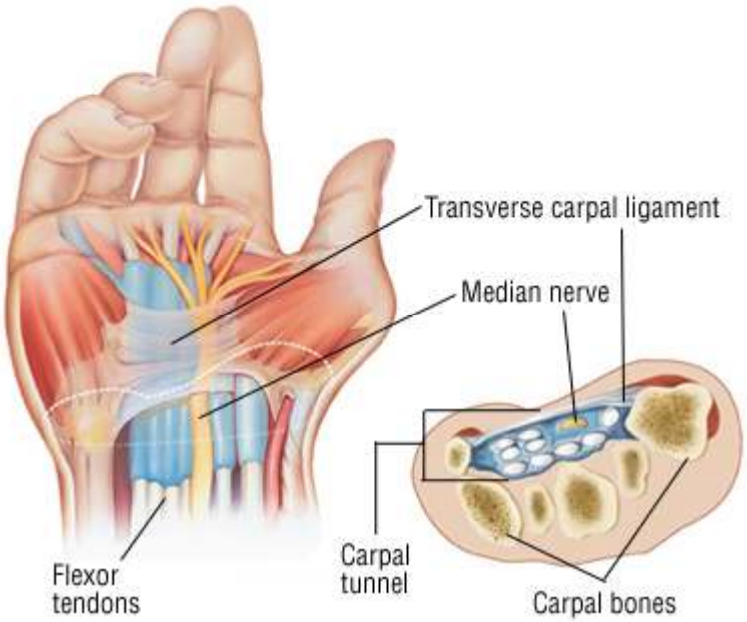
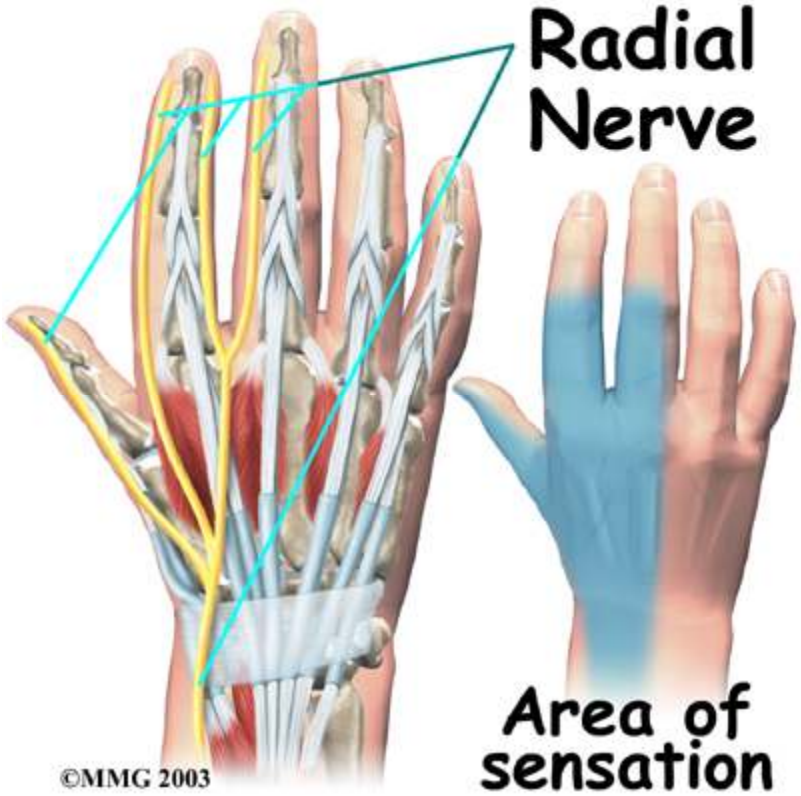

Transverse carpal ligament
Median nerve
Flexor tendons
Carpal tunnel
Carpal bones


Radial
Nerve
Area of
sensation
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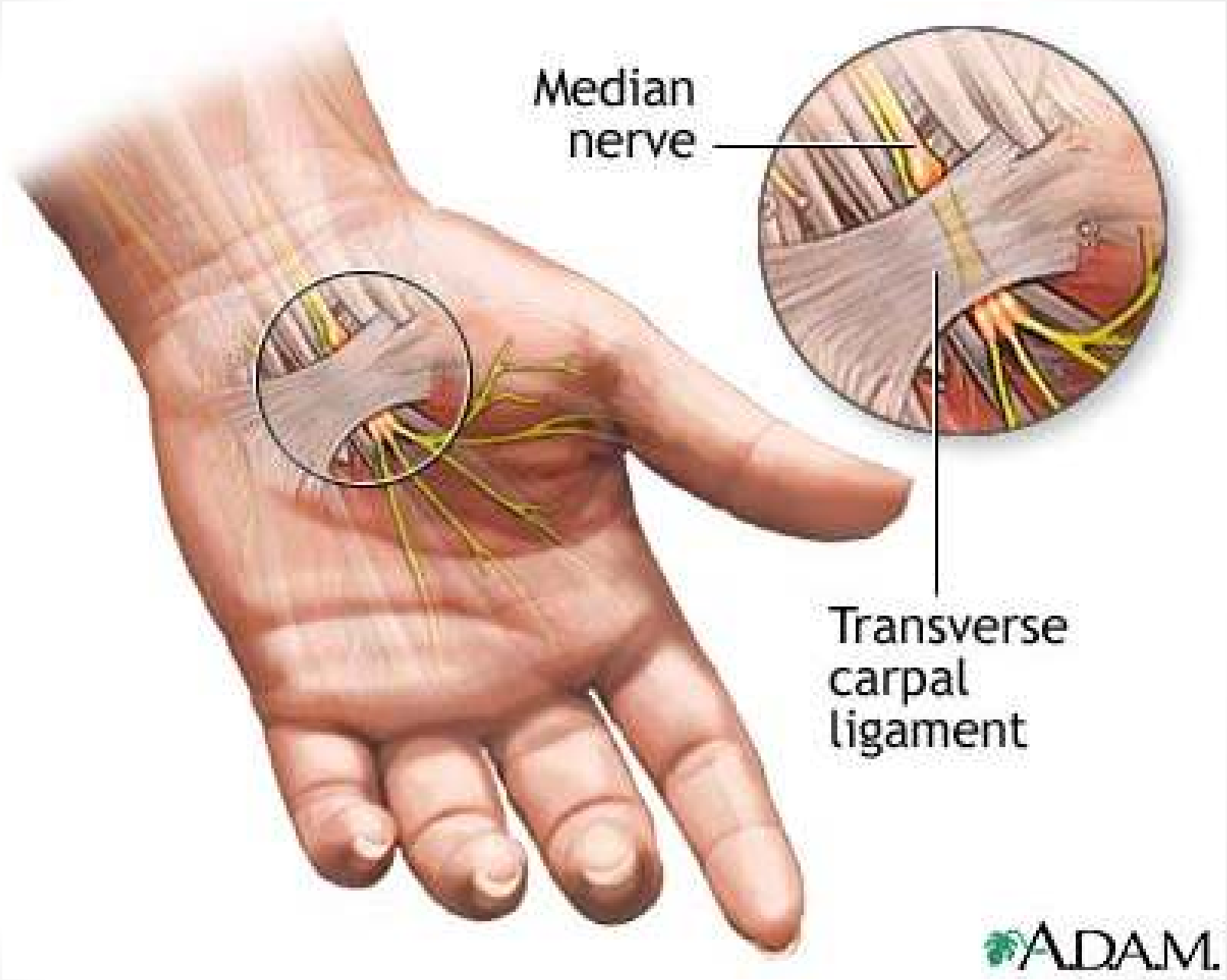

Median nerve
Transverse carpal ligament
A.D.A.M.

BRACHIAL PLEXUS NEUROPATHY
CARPAL TUNNEL SYNDROME

- **Anatomy**
- Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy in the upper body (Shapiro and Preston 2009), involving compression of the median nerve as it traverses through the wrist at the carpal tunnel (Rempel and Diao 2004) and presents relatively frequent in athletes (Aldridge et al. 2001).
- The carpal tunnel is composed of the stiff carpal bones of the wrist, which make up the floor and walls of the tunnel and the flexor retinaculum, which acts as the roof of the tunnel (Kostopoulos 2004).
- Nine tendons, the median nerve, synovium and radial and ulnar bursae occupy the carpal tunnel (Rempel and Diao 2004).
- It is therefore quite apparent how this particular area may be subjected to entrapment neuropathy due to the limited space within the tunnel, and the high volume of structures occupying this space.

BRACHIAL PLEXUS NEUROPATHY
CARPAL TUNNEL SYNDROME

INJURY BIOMECHANICS

- CTS is considered to develop as the result of repetitive wrist use and commonly presents in gripping athletes, such as archery, racquet and throwing athletes (Izzi et al. 2001).

CARPAL TUNNEL SYNDROME

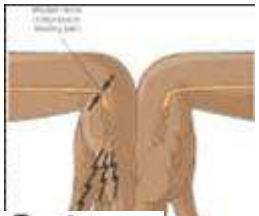
SYMPTOMS

- The syndrome, according to Kostopoulos (2004) is defined by the signs and symptoms of the median nerve at the wrist, as sensory loss and paresthesia are commonly present in the distribution of the median nerve with this condition (Shapiro and Preston 2009).
- In chronic conditions, symptoms may be reported above the carpal region, as far distal as the cervical spine (Kostopoulos 2004). Abductor pollicis weakness is the most common motor weakness associated with CTS (Izzi et al. 2001) and a diminished grip strength may be evident when compared to the asymptomatic side (Aldridge et al. 2001).
- A positive Tinel's sign or Phalens test is indicative of CTS (Aldridge et al. 2001; Shapiro and Preston 2009) and thenar atrophy may be observed in advanced cases of CTS (Aldridge et al. 2001).

BRACHIAL PLEXUS NEUROPATHY
CARPAL TUNNEL SYNDROME

- **TREATMENT STRATEGY**
- Conservative treatment of CTS can include
- NSAIDs,
- active rest,
- Modification of the aggravating activity,
- tendon and nerve gliding (Aldridge et al. 2001; Izzi et al. 2001; Kostopoulos 2004) and
- exercise therapy
- Splinting of the wrist is another treatment option for clinicians for CTS management


Median nerve glide




Numbness
Pain
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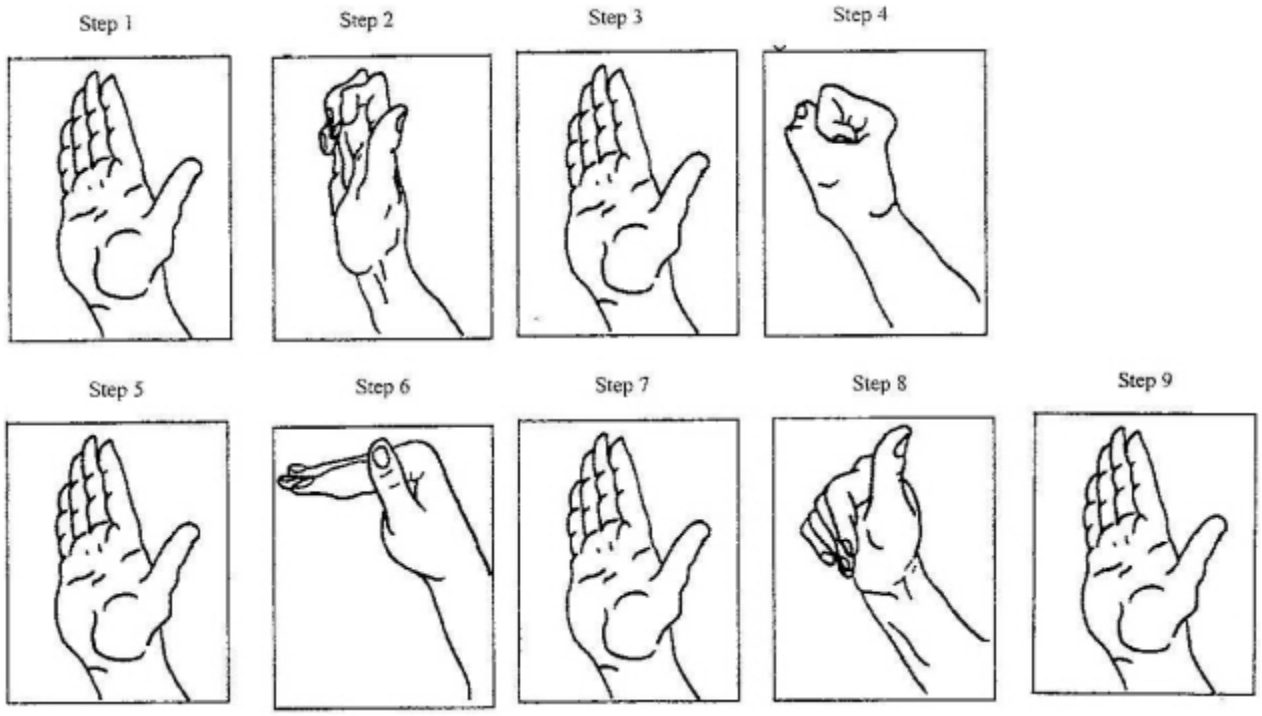
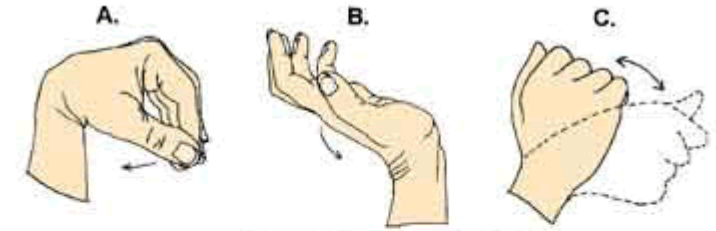
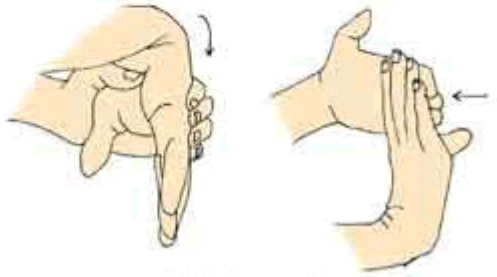

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9

Carpal Tunnel Syndrome Exercises

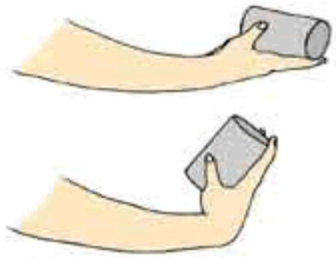


Active range of motion

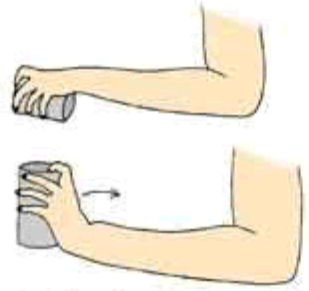


Wrist stretch

Tendon glides



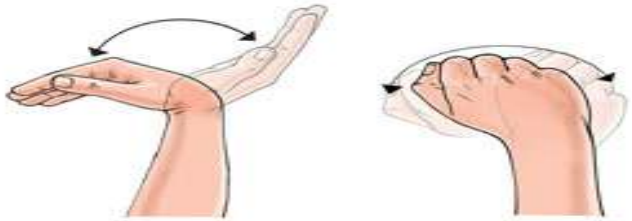
Wrist flexion exercise



Wrist extension exercise

Grip strengthening

Carpal Tunnel Rehabilitation Exercises



Wrist range of motion

Wrist stretch

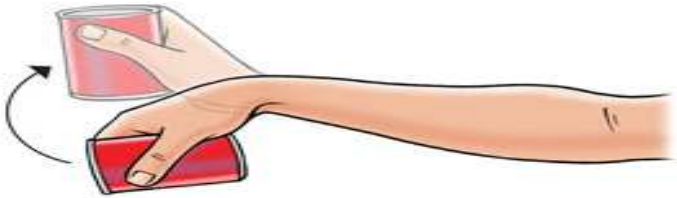
Mid-trap exercise

Pectoralis stretch

Scalene stretch

Thoracic extension

Scapular squeeze



Wrist extension

Grip strengthening

END OF LECTURE 10