

# Upper limb injuries

Traumatology

RHS 231

Dr. Einas Al-Eisa

# Pain in the limbs:

May be classified under 4 headings:

1. Joint pain
2. **Soft tissue pain**
3. Neurogenic pain
4. Orthopaedic causes (**fractures, dislocations, tumors, infections**)

# Brachial plexus lesions

- Most common in young men thrown from their motorcycles or during difficult deliveries

# Brachial plexus lesions

## Closed injuries:

Can occur in 2 ways:

1. Violent lateral flexion of the neck with depression of the shoulder, or forced abduction of the arm
2. At birth during difficult deliveries

# Brachial plexus lesions

## **Open injuries:**

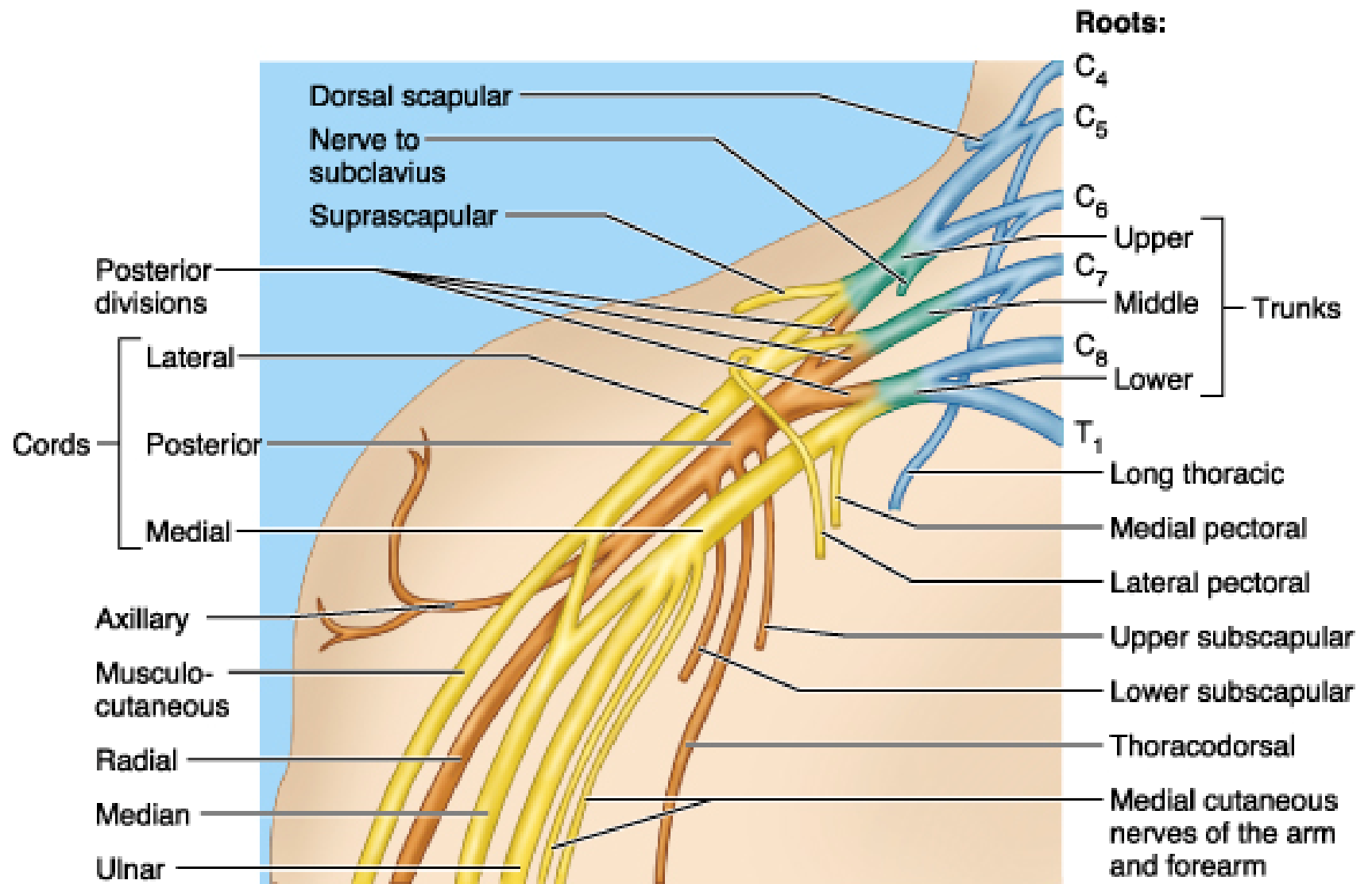
- Rare
- Caused by falling objects such as glass or steel

# Patterns of brachial plexus lesions

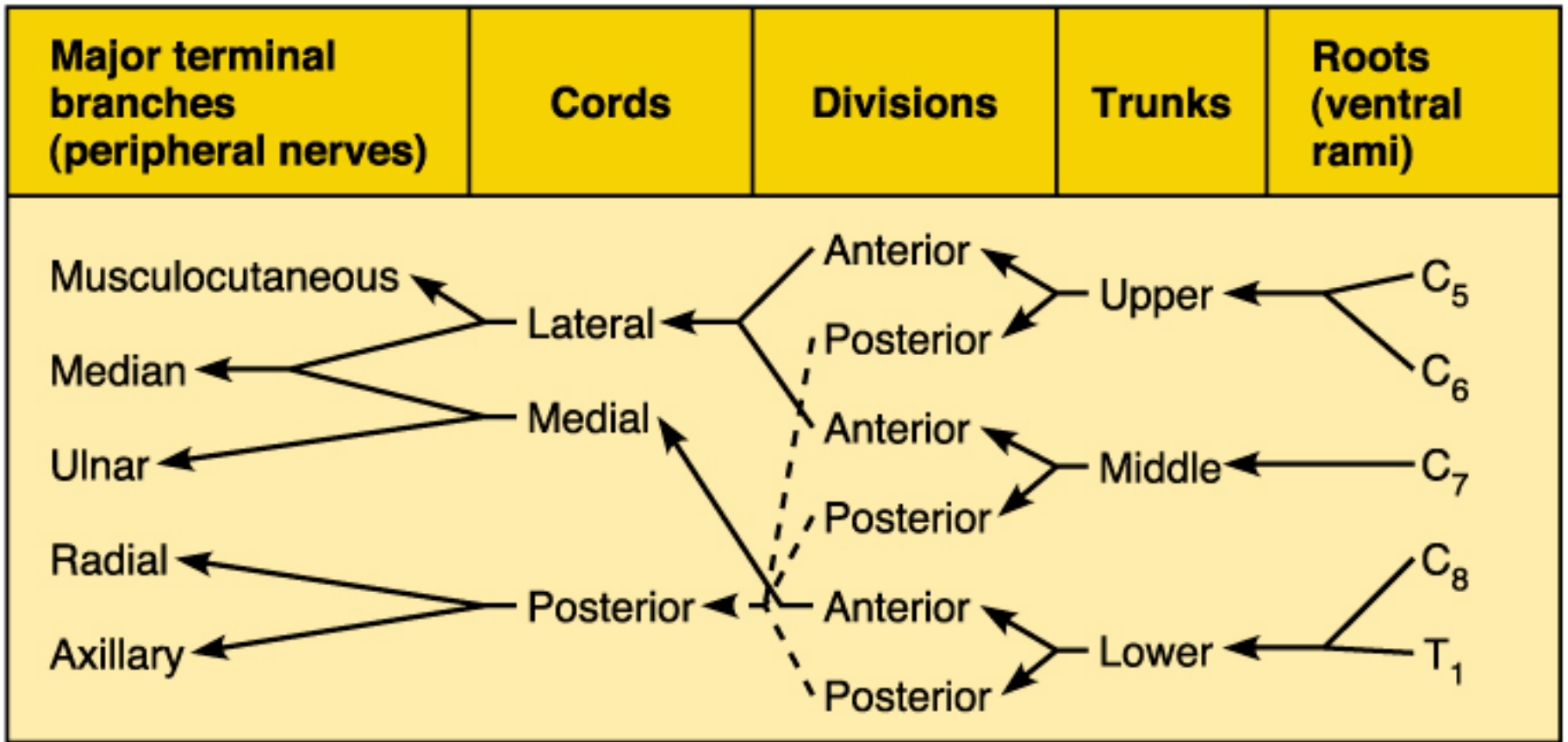
```
graph TD; A[Patterns of brachial plexus lesions] --- B[Supraclavicular lesions]; A --- C[Infraclavicular lesions]
```

Supraclavicular  
lesions

Infraclavicular  
lesions

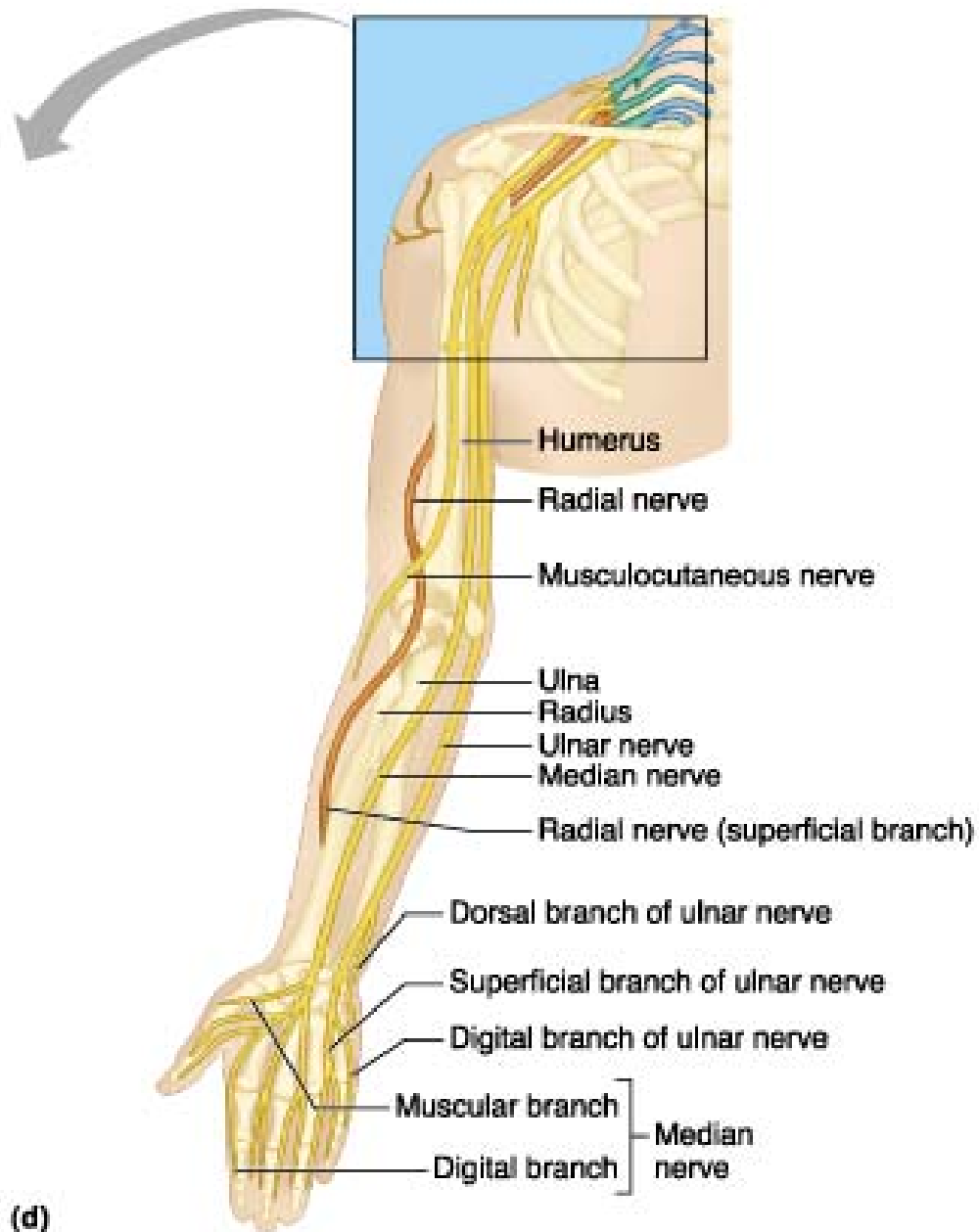


(a) **Key:** ■ = Roots ■ = Trunks ■ = Anterior division  
■ = Posterior division



**(c)**



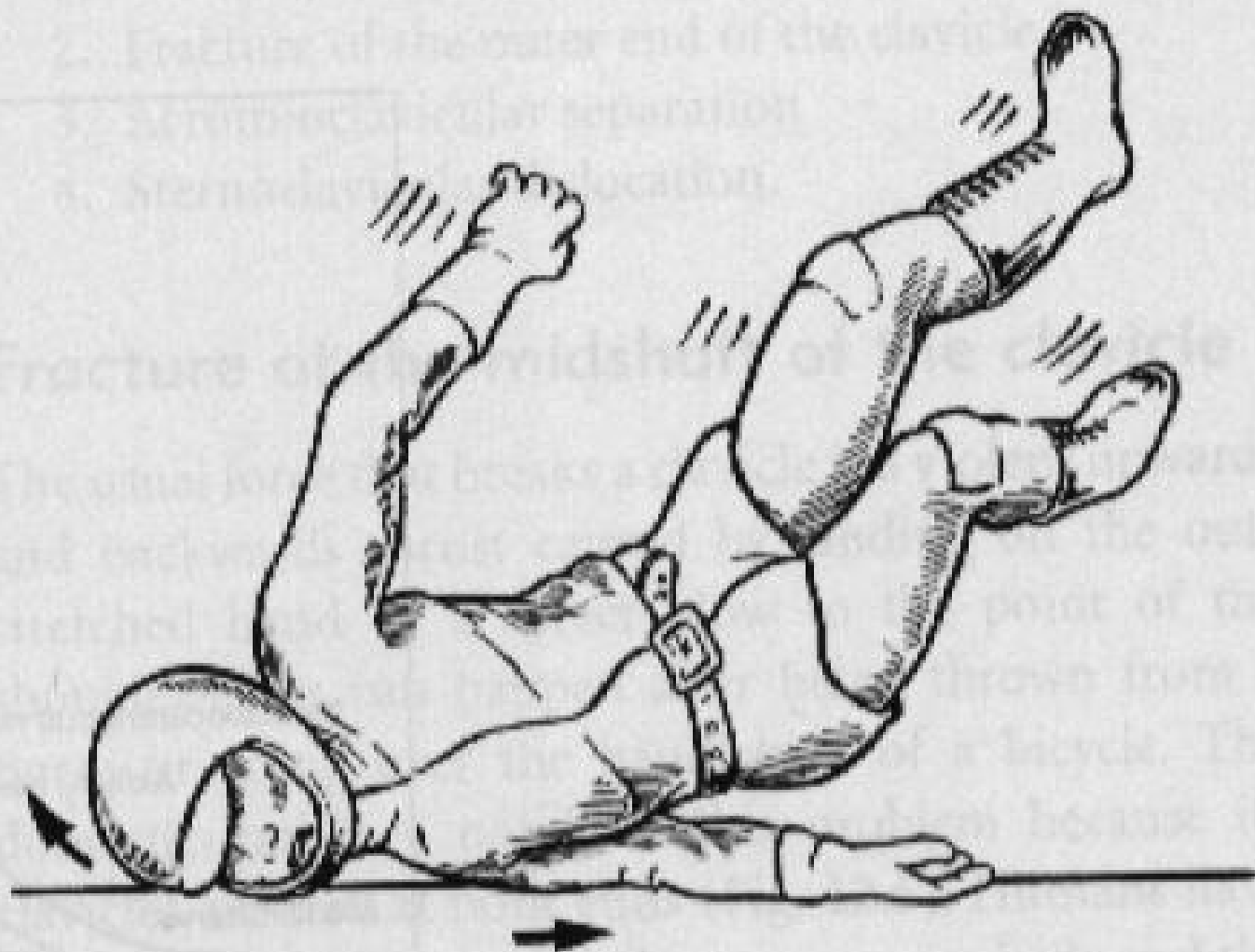


(d)

# Supraclavicular lesions

## Trauma:

- Mechanism of injury: blows to the head and shoulder cause violent *lateral flexion* of the cervical spine and *depression* of the shoulder → tear the *upper cords*
- Example: motorcyclists landing on the head and shoulder



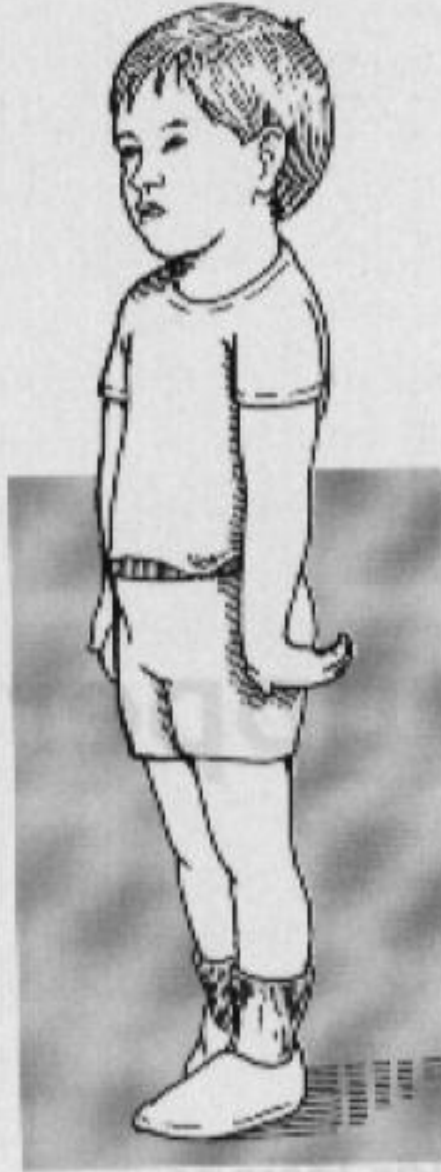
**Fig. 12.1** Traction injury of the brachial plexus. Violent abduction of the neck and shoulder can tear the upper cords of the brachial plexus.

# Supraclavicular lesions

## Obstetric palsy:

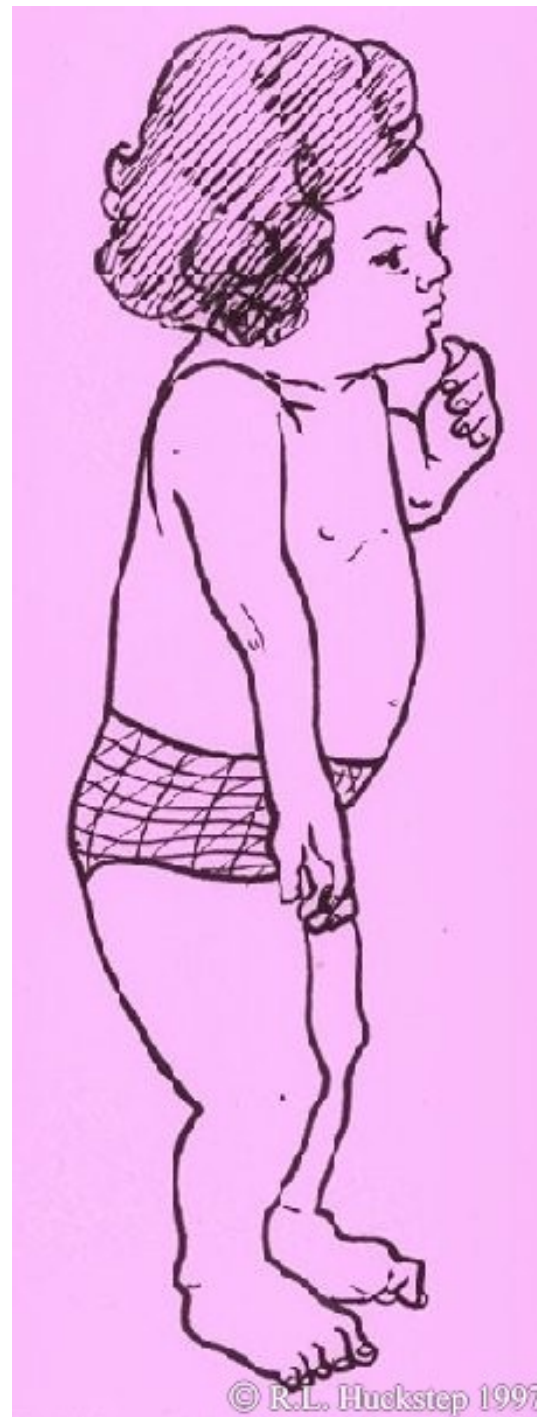
- When the upper cords are damaged at birth →  
weak deltoid, elbow flexors, wrist  
extensors, supinator →  
“waiter’s tip” position of the arm  
(Erb’s palsy)

# Erb's palsy



**Fig. 12.2** The position of the hand in Erb's palsy.

# Erb's palsy



# Infraclavicular lesions

## Trauma:

Mechanism of injury:

- When the arm is violently abducted
- Anterior dislocation of the shoulder



injury to the lower part of the brachial plexus

# Infraclavicular lesions

## Birth injury:

- Damage to the lower cords (C7, C8, T1):  
*Klumpke's palsy* (weakness of finger flexors and intrinsics)



# Erb's palsy:

C5/6 paralysis (particularly following a breech delivery)



paralysis of the deltoid, external rotators of the shoulder, & biceps



the baby's arm is held in adduction, internal rotation and with the elbow extended (waiter's tip position)

## Brachial Plexus Lesions

### Birth injuries



Erb's palsy



Klumpke's palsy

### Trauma



Fall on point of shoulder



Flail arm

# Klumpke's palsy:

C7, C8 and T1 palsy



flexed elbow & paralyzed hand

## Brachial Plexus Lesions

### Birth injuries



Erb's palsy



Klumpke's palsy

### Trauma



Fall on point of  
shoulder



Flail arm

# Assessment

- The roots, trunks, or branches can be torn, or the roots avulsed from the spinal cord
- The more distal the lesion, the better the prognosis

# Assessment

- ***Preganglionic lesions:***
  - between the spinal cord and the distal root ganglion
  - never recover
- ***Postganglionic lesions:***
  - distal to the ganglion
  - can recover sometimes

# Assessment

- To determine the site of the lesion clinically, assess muscle function
- Check *scapular elevation* (because the first branches of the plexus are motor nerves to the *rhomboids* and *levator scapulae*)

# Assessment

- Check the activity of the autonomic nervous system
- If Horner's syndrome is present, the lesion is close to the cord (preganglionic)



**Fig. 12.4** Horner's syndrome with drooping eyelid, small pupil, slight protrusion of the eyeball and no sweating of the surrounding skin.

# Horner's syndrome

- Caused by lesion of the cervical sympathetic trunk:
  - Pupil constriction (paralysis of the dilator pupillae muscle)
  - Ptosis = drooping of the upper eyelid (paralysis of the levator palperae superioris)



# Horner's syndrome

- Sinking of the eye (paralysis of the smooth orbitalis muscle in the floor of the orbit)
- Vasodilatation and absence of sweating in the face and neck (lack of sympathetic vasoconstrictive nerve supply to the blood vessels and sweat glands)

# Treatment (brachial plexus lesions)

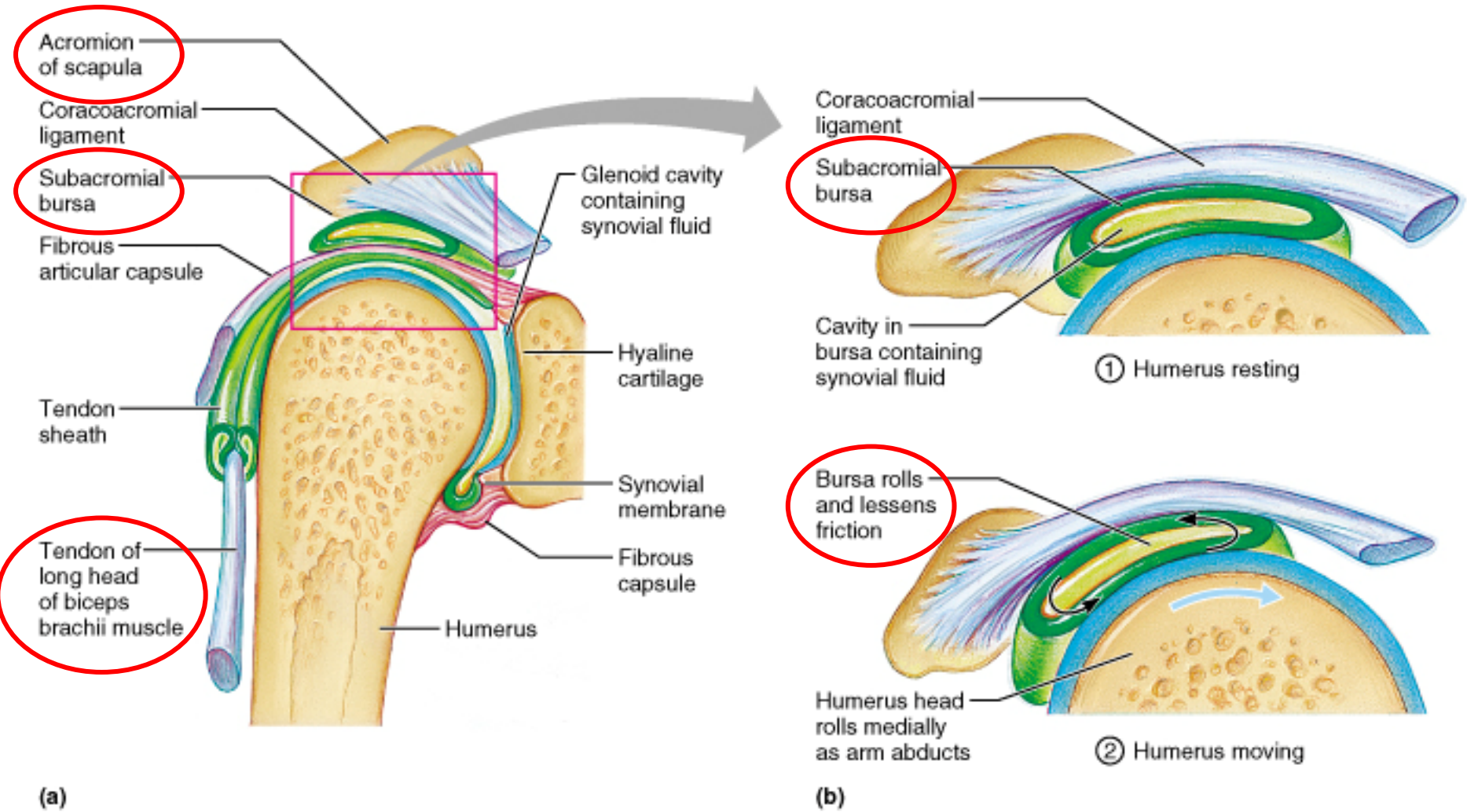
- If the roots are torn out of the spinal cord, nothing can be done to restore continuity
- If the lesions are distal to the ganglion, or there is a clean cut across the nerves, surgical repair or grafting may be possible

# Impingement syndromes

- A common cause of shoulder pain is impingement of the soft tissues in the subacromial space with loss of the normal gliding movement

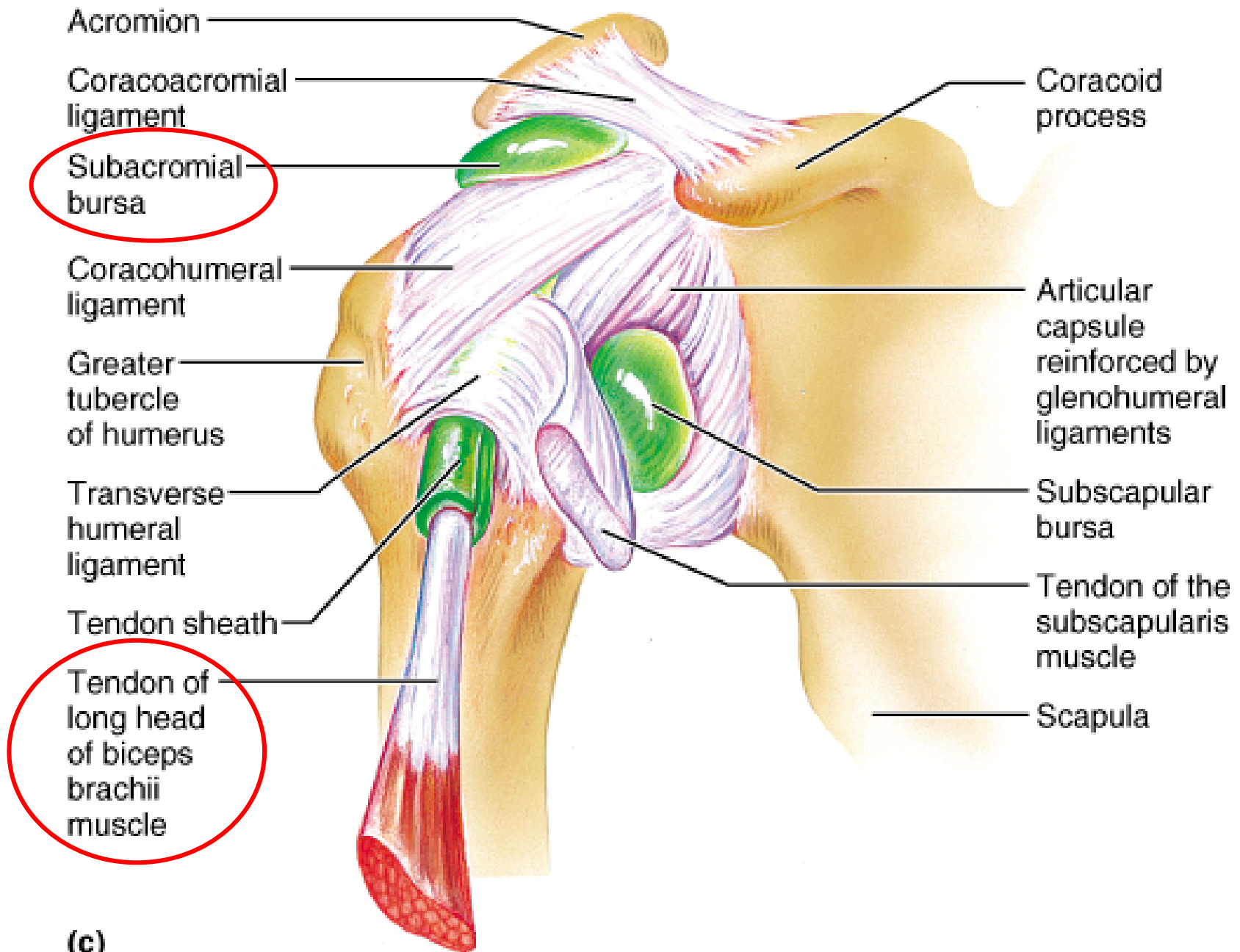
# Impingement syndromes

- The most common structures to be entrapped are:
  - The supraspinatus tendon
  - Subacromial bursa
  - The biceps tendon



(a)

(b)



**(c)**

# Impingement syndromes

## **Most common causes include:**

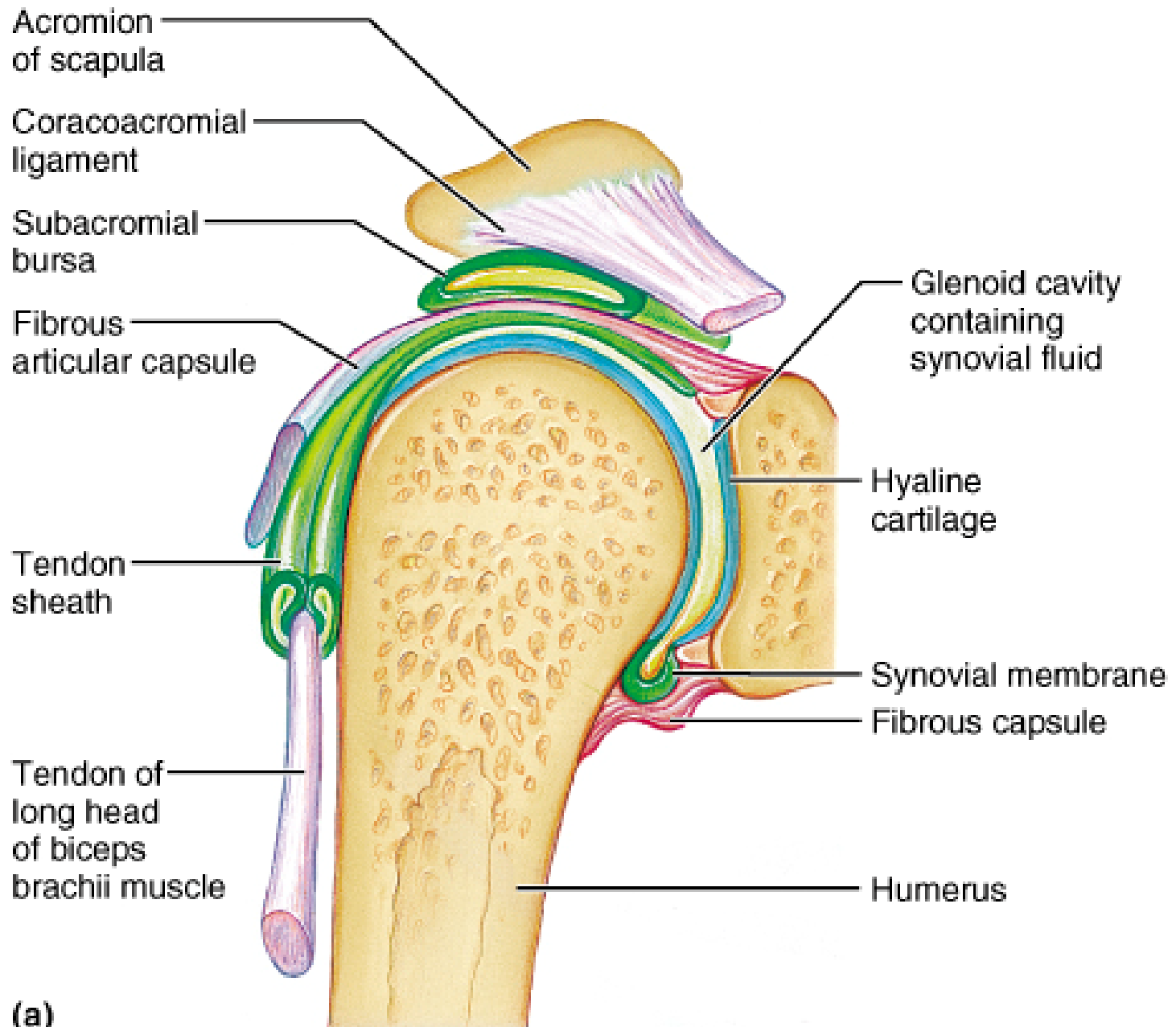
- Prominent anterior acromion
- Bony spurs from under the acromion or arising from the acromioclavicular joint

# Impingement syndromes

## Most common:

- In young athletes, or those whose activities involve repeated overhead actions (e.g., swimming, throwing, tennis)
- In more elderly people working with their arms repeatedly in horizontal position during abduction and elevation





(a)

# Impingement syndromes

## Symptoms

- Oedema and inflammatory changes in the supraspinatus tendon (the biceps tendon may also be involved)
- Rotator cuff degeneration
- Pain on shoulder movement
- Stiffness and weakness

# Impingement syndromes

## Symptoms

- ***The painful arc***: impingement of the supraspinatus felt in the middle range of abduction  
(as the greater tubercle approaches the acromion, structures between those two bony prominences are impinged producing pain)

# Impingement syndromes

## Management

- Early or mild cases may respond to conservative therapy:
  - Rest from activities known to aggravate pain
  - Non-steroidal anti-inflammatory drugs
  - Injection of local anaesthetic and corticosteroid into the subacromial space

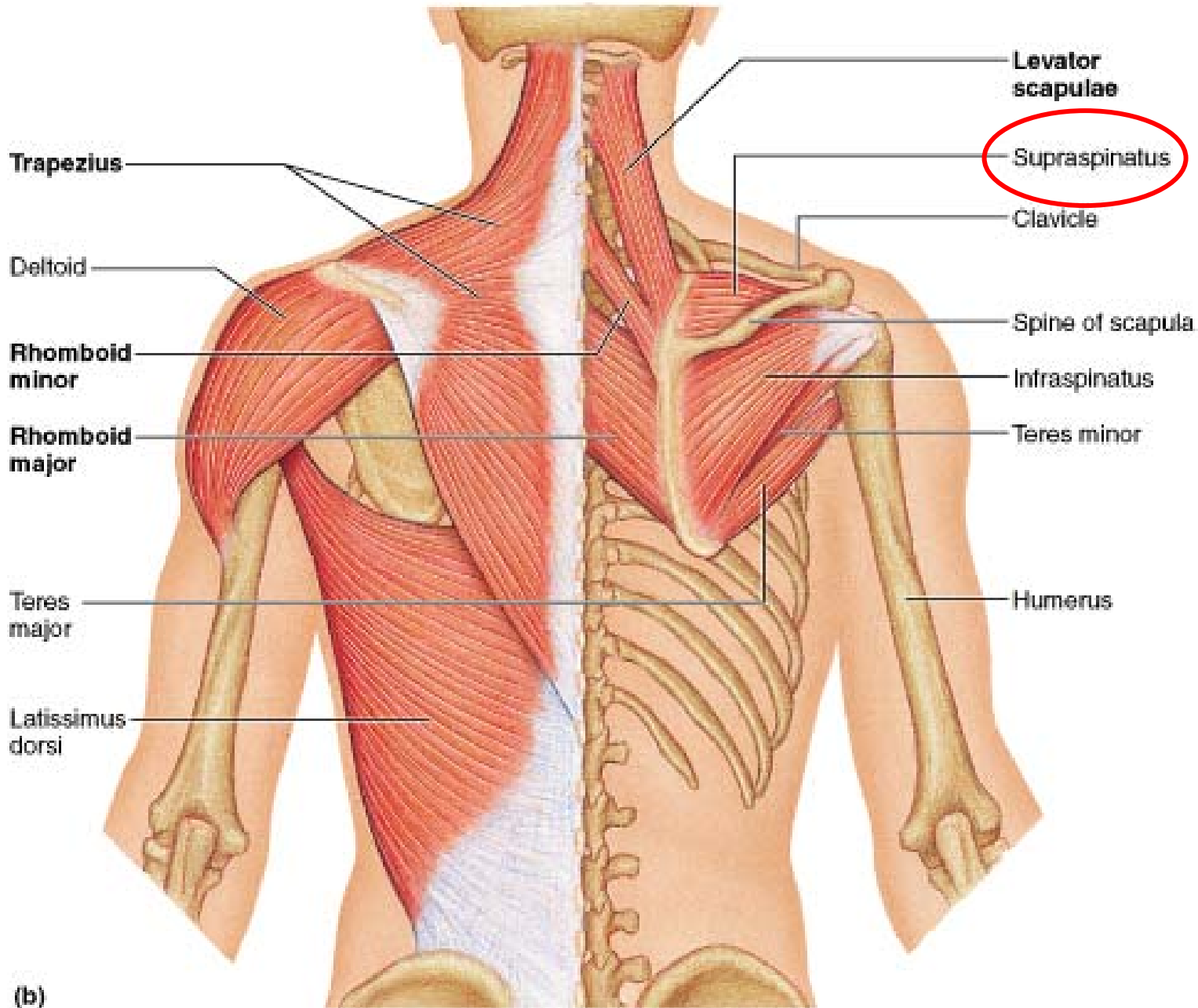
# Impingement syndromes

## Management

- Ice, heat, and ultrasound
- Mobilization techniques to restore passive range of motion and scapulohumeral rhythm
- Strengthening exercises in a pain-free range
- Surgery is indicated in patients with recurrent or chronic pain, cuff tears, or biceps tendon involvement



# Lesions of the supraspinatus tendon

- Supraspinatus tendinitis
- Subacromial bursitis
- Complete or incomplete rupture of the tendon
- Calcification



(b)

# Supraspinatus tendinitis

- Impingement or overuse   
wear and tear with friction of the tendon in  
the subacromial space   
degeneration of the tendon collagen fibers



# Supraspinatus tendinitis

- Pain is felt over the outer aspect of the shoulder, and may radiate to the region of deltoid insertion
- Pain may disturb sleep
- Pain may be reproduced on isometric contraction of the supraspinatus muscle

# Bicipital tendinitis

- Inflammation of the biceps tendon in the bicipital groove is the 2<sup>nd</sup> most common cause of shoulder tendinitis
- Due to impingement of the tendon against the acromial arch and overuse

# Bicipital tendinitis

- Associated with ***tenosynovitis***: inflammation of its synovial sheath
- Pain in the shoulder is usually localized anteriorly, but may radiate down the arm
- Pain is reproduced by stretching the biceps tendon

# Shoulder dislocation

- The shoulder is mechanically unstable
- The head of humerus is held against the relatively flat glenoid cavity by muscles

# Shoulder dislocation

## ***1. Anterior Dislocation***

- The most common
- The head of humerus slips off the front of the glenoid when the arm is abducted and externally rotated
- When the arm is lowered, the head slips medially

# Shoulder dislocation

## ***1. Anterior Dislocation***

- The shoulder has a flatter appearance than usual and the elbow points outwards
- Hamilton's ruler test: the shoulder is dislocated when the tip of the acromion and the lateral epicondyle can be joined by a straight line

# Shoulder dislocation

## **1. *Anterior Dislocation***

- Complications:
  - Damage to the axillary nerve (partial or complete paralysis of the deltoid)
  - Damage to the axillary artery by traction (pressure from the humeral head)

# Shoulder dislocation

## **1. *Anterior Dislocation***

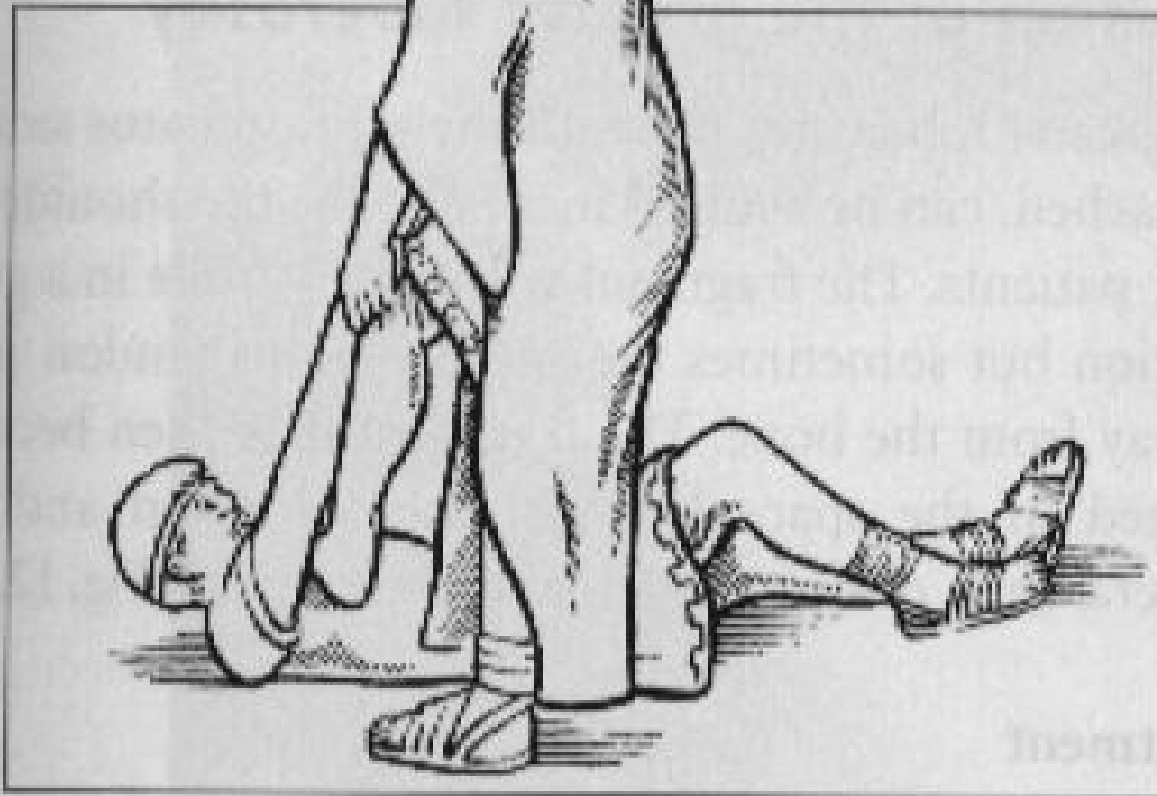
- Complications:
  - If reduction is not undertaken within a few days of dislocation, reduction may then be impossible
  - Stiffness and loss of movement (adhesions or fibrosis in the rotator cuff)



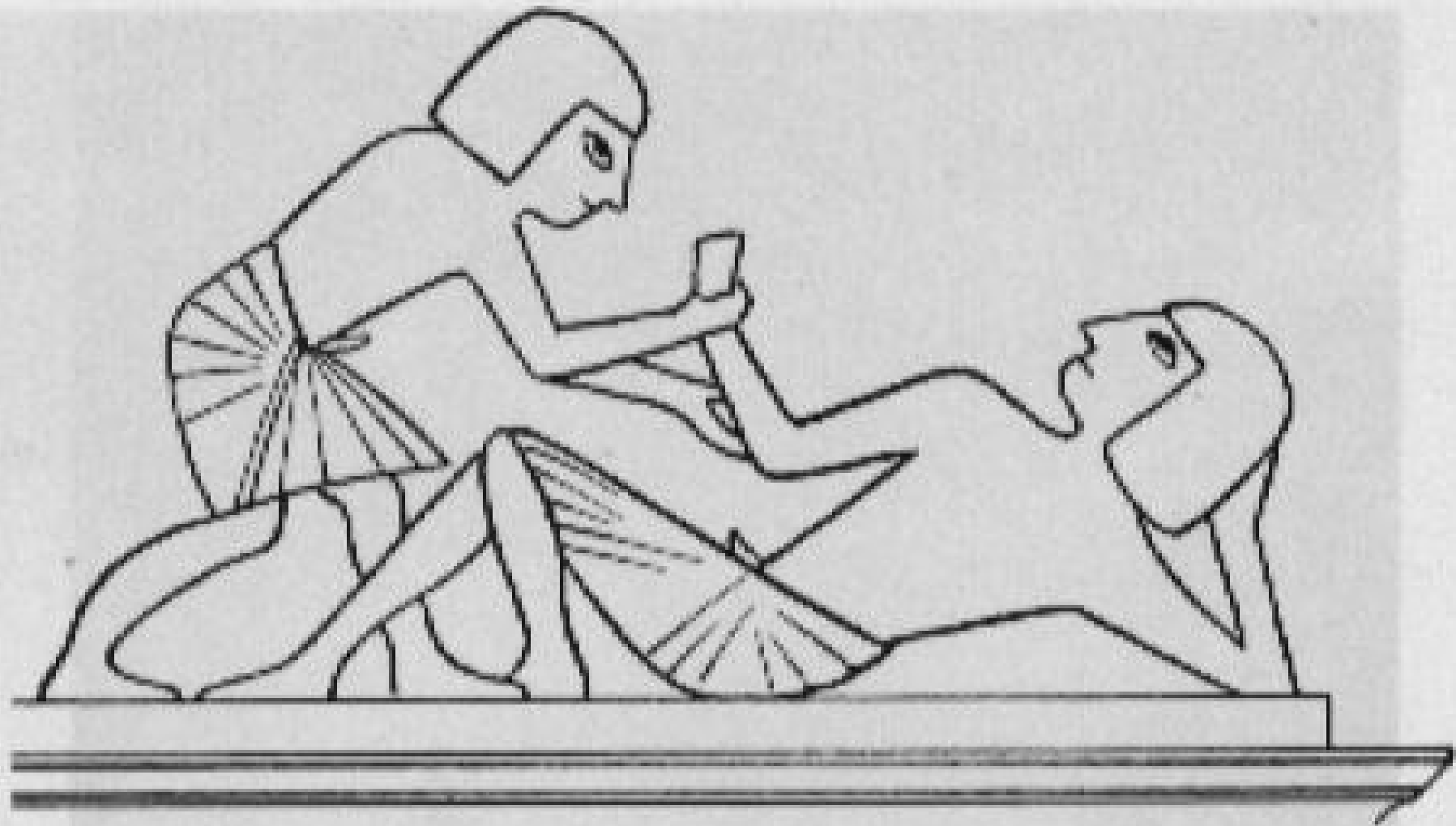
# Shoulder dislocation

## Treatment

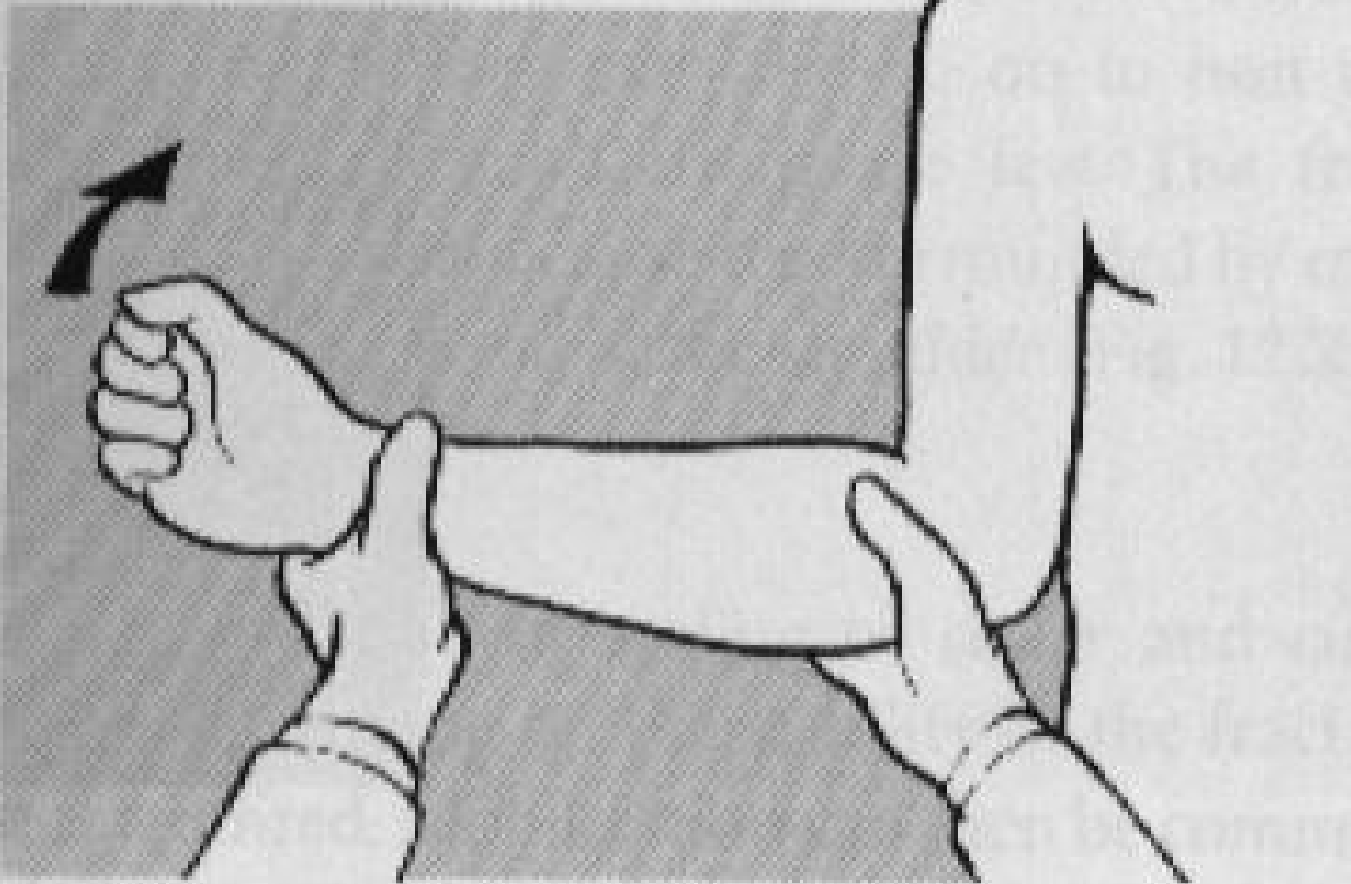
- Reduction:
  - Manipulation under general anaesthesia
  - Hanging arm technique
  - Hippocratic method
  - Kocher's method



**Fig. 12.19** Hippocratic method of reducing a dislocated shoulder with the unbooted foot in the axilla.



**Fig. 12.21** Original illustration of Kocher's method in an Egyptian wall painting.



**Fig. 12.20** Kocher's technique for reducing a dislocated shoulder.

Old untreated fracture/dislocation of the head and neck of the humerus of 10 months' duration in a 34 year old man.

The shoulder was stiff and painful, and the axillary nerve had been damaged with paralysis of the deltoid.



# DISLOCATED SHOULDER



Anterior



Fracture  
Dislocation



Posterior

## EXAMINATION

(Anterior Dislocation)



Subcoracoid  
Fullness  
Anteriorly

Arm Abducted



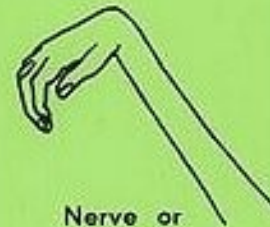
Flattening  
Posteriorly

## ACUTE COMPLICATIONS



Diminished  
Sensation

Circumflex  
Palsy



Nerve or  
Arterial  
Damage

Neck or  
Tuberosity



Associated  
Fracture

# Anterior shoulder dislocation:

- associated with paralysis of the deltoid and flattening of the muscle due to damage to the axillary nerve



# Shoulder dislocation

## ***1. Posterior Dislocation***

- Less common
- Caused by a direct blow to the shoulder in internal rotation or after an epileptic seizure
- Characteristic “light bulb” appearance



# Recurrent dislocation of the shoulder:

the use of a Huckstep titanium staple and screw

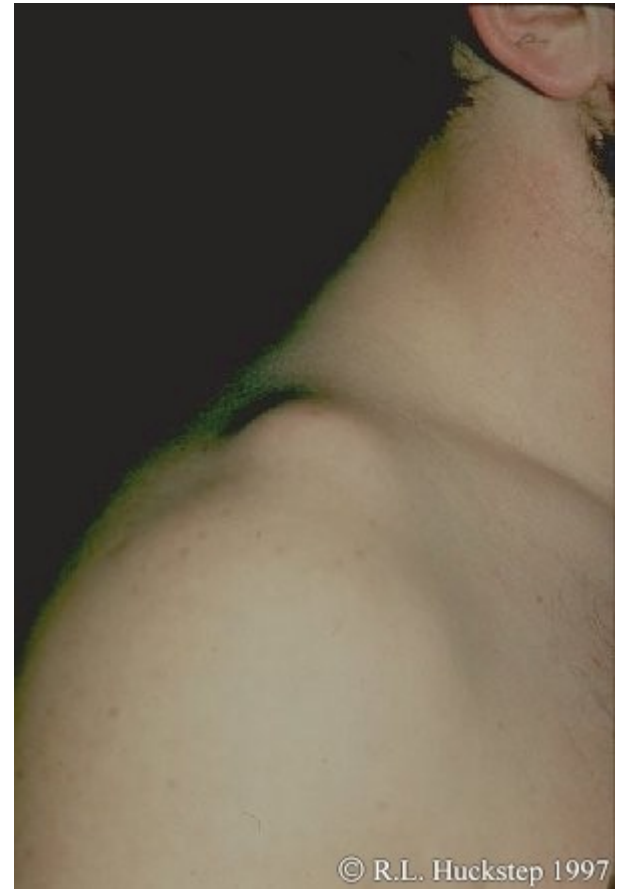




***Inferior dislocation of the shoulder:*** due to paralysis of the deltoid (rare)

# Acromioclavicular joint dislocation:

- treated in most cases by a triangular sling
- occasionally operative repair may be indicated if cosmetic appearance is important



# Myositis (traumatic) ossificans:

- common around the hip and elbow
- due to calcification and new bone formation following a dislocation or fracture
- often initiated by too early active or passive movements of the joint following injury resulting in repeated tearing of the muscles and capsule
- Note the solid blocks of bone on the front and the back of the elbow in this X-ray which was preventing all movement



- This was treated by excising the new bone
- Following excision the elbow was rested in a plaster back slab for 3 weeks
- The optimum prevention of myositis ossificans is rest in the acute stage.

