Upper limb injuries

Traumatology
RHS 231
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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

- Supraclavicular lesions
- Infraclavicular lesions
<table>
<thead>
<tr>
<th>Major terminal branches (peripheral nerves)</th>
<th>Cords</th>
<th>Divisions</th>
<th>Trunks</th>
<th>Roots (ventral rami)</th>
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<tbody>
<tr>
<td>Musculocutaneous</td>
<td>Lateral</td>
<td>Anterior</td>
<td>Upper</td>
<td>C&lt;sub&gt;5&lt;/sub&gt;</td>
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<td>Posterior</td>
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<td>Lower</td>
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<td>Anterior</td>
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</tbody>
</table>
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

(\textit{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)
Klumpke's palsy:
C7, C8 and T1 palsy
flexed elbow & paralyzed hand
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 *rhomboïds* 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 pupilae muscle)

  ➢ Ptosis = drooping of the upper eyelid (paralysis of the levator palpebrae 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
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
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
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\textsuperscript{nd} 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 deltotid.
DISLOCATED SHOULDER

Anterior
Fracture Dislocation
Posterior

EXAMINATION
(Anterior Dislocation)

Arm Abducted
Subcoracoid Fullness Anteriorly
Flattening Posteriorly

ACUTE COMPLICATIONS

Diminished Sensation
Circumflex Palsy
Nerve or Arterial Damage
Associated Fracture

Neck or Tuberosity

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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.