Clavicle Fractures

- Mechanism – either a blow to the point of the shoulder on striking the floor in sports or fall from motorcycle, or from a lateral blow during a T-bone road traffic accident.

- Attachments to the clavicle:
  - Deltoid and superior fibres of trapezius laterally
  - Sternocleidomastoid and clavicular head of Pectoralis major
  - Subclavias runs from the 1st costal cartilage to insert on the underside of the middle third of the clavicle, and protects the subclavian vessels and trunks/divisions of the brachial plexus
  - Coraco-clavicular (CC) ligaments just medial to AC-joint and provide the majority of vertical stability = conoid & trapezoid
  - Anterior sternoclavicular ligaments in midline
  - Acromioclavicular ligament around AC-J

- The shoulder is hung between two struts (clavicle and scapula), by the superior shoulder suspensory complex (SSSC)
  - SSSC comprised of glenoid, coracoid, conoid & trapezoid ligaments, acromion & AC joint
  - Disruption of one strut (clavicle) should not compromise stability
  - Traumatic disruption of the SSSC in two places is problematic
  - Inspect standing for a cosmetic droop which indicates a “floating shoulder”

- Examination:
  - Beware pressure can result in skin necrosis converting a closed fracture to open
  - Cosmetic droop?
  - Ulnar nerve for any medial cord injury to brachial plexus
  - Pulses with radio-radial comparison; check BP in each arm in worried

- Allman & Neer Classification:
  - Group 1 = fracture of the middle third (75%)
    - I – minimally displaced
    - IIA – displaced with fracture medial to CC-ligaments which remain intact
    - IIB – displaced with fracture medial to CC-ligaments, which are torn
    - III – fracture involving articular surface of AC-J (minimally or un-displaced)
    - IV – ligaments intact, with displacement of proximal fragment
    - V – comminated
  - Group 2 = fracture of distal third (20%)
    - I – minimally displaced
    - II – displaced
    - III – intra-articular involving SC-joint
    - IV – epiphyseal separation (physitis is among the last to close from late adolescence to early 20’s)
    - V – comminated
  - Group 3 = fracture of proximal third (<5%)
    - I – minimally displaced
    - II – displaced
    - III – intra-articular involving SC-joint
    - IV – epiphyseal separation (physitis is among the last to close from late adolescence to early 20’s)
    - V – comminated

- Management:
  - Medial third – usually managed non-operatively as displacement rare
  - Middle third:
    - Can be managed non-operatively with polysling (traditionally figure-of-8 bandage)
- Never operate for cosmesis alone
- Immobilise for 3 weeks with simple pendulum movements, and start physiotherapy. Discard sling at 4-6 weeks as pain allows, and expect union by 6-8 weeks. Full function expected by 12 weeks.
- Surgical indications:
  - Open or impending open fracture from skin necrosis
  - Floating shoulder injury – 2 papers suggest minimal displacement (<5mm) can be managed conservatively
  - Shortening > 2cm (increases non-union rate from 4.5% to 15%)
  - Painful non-union

**Canadian Orthopaedic Trauma Society, 2007; J Bone Joint Surg Am, 89:1-10**

*Displaced mid-shaft clavicle fracture – ORIF vs. conservative*

Closed acute displaced fracture to mid-shaft clavicle (age 16-60, mean 33). 49 managed conservatively in sling for 6 weeks. 62 had ORIF with ROM-physio started at 10 days, strengthening-physio at 6 weeks, and return to sports at 3 months. At 1 year ORIF offered better union (2% vs. 14%), Constant & DASH score (10 points better), satisfaction and cosmesis. No difference in ROM. Overall complication rate 37% (ORIF), and 63% (conservative), with no permanent NV-injuries.

- Distal third:
  - Type I & III often minimally displaced → non-operative management.
  - Type II can progress to non-union in up to 30%, but only 20% of them painful
  - Surgery still recommended for displaced type II distal third fractures

- ORIF with anterior-inferior plates on middle third allows screw tips to be in safer area away from NV-structures, and allows wider screws for better fixation, while reducing metalwork prominence.
  - Post-operative sling for 7-10 days, with pendular and active-assisted movements initially
  - Strengthening and weight bearing activities after union (6-12 weeks)