Terrible triad fracture-dislocations of the elbow

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Complex elbow instability

- Elbow dislocations associated with fractures
- 4 main types
  - “Terrible Triad” fracture-dislocation
  - Transolecranon fracture-dislocation
  - Monteggia-variant fracture-dislocation
  - Posteromedial varus fracture-dislocation
- All require operative repair for good outcomes

Terrible Triad

- Injury complex
  - Radial head fracture
  - Coronoid fracture
  - Elbow dislocation
- Historically abysmal results
Terrible Triad

- Treatment principles
  - Repair coronoid/anterior capsular attachment
  - Repair or replace radial head
  - Repair LCL
- NEVER
  - Ignore "small" (fleck) coronoid fractures
  - Resect radial head without replacing it
- MCL does not usually need operative repair

Terrible Triad – tactic

- Kocher approach to elbow (ECU-anconeus interval)
- LCL often avulsed from lateral epicondyle
- If resecting radial head, do it now to improve access to coronoid
Surgical approach

• Kocher approach
  – Interval between anconeus and ECU
  – Exploit tears in fascia if already present
  – Avoid dissection posterior to anterior anconeus border to avoid damaging LCL
Surgical approach pearls

- Anconeus insertion 10cm distal to olecranon
- Perforating vessels help identify interval
  - “Where is the D*! fat stripe?”
- If LCL intact (unlikely), it will be posterior to Kocher interval

Terrible Triad - tactic

- Repair coronoid or anterior capsule
  - Suture tunnels through proximal ulna
  - Screws
  - Consider medial approach for plating type 3 coronoid fractures
- Complete repair or replacement of radial head (don’t overstuff)
- Repair LCL during closure

Regan and Morrey, Orthopaedics (1992) 15:845
Terrible triad - summary
- Relax and use a systematic approach to treatment
- Use a medial approach if you need to
- Wide exposure is OK
- Repair the coronoid/capsule
- Don't resect the radial head
Transolecranon fracture-dislocation

- Not a simple olecranon fracture
- Do not treat with tension band wiring
- Olecranon fracture with ANTERIOR dislocation but intact proximal radioulnar joint
- Ligaments may be intact!

Transolecranon – tactic

- Extensile posterior exposure
- Full-thickness cutaneous flaps
  - Can access Kocher (ECU-anconeus) interval for radial head repair/replacement if necessary
Transolecranon – tactic

- Address coronoid fractures through olecranon fracture line
- Anatomically reduce olecranon
- Plate-and-screw constructs often necessary (no tension band)
- Normally, ligaments are relatively spared
Monteggia variant fracture-disloc

- Most often posterior dislocations with associated proximal ulna/olecranon fractures
- May have associated radial head fractures
- Principles similar to treatment of standard Monteggia injuries of forearm
Monteggia variant - tactic

- Principle: anatomical reduction of ulna is critical for maintenance of reduction of radial head
- Extensile posterior approach
  - Can get to radial head for repair if necessary
Varus posteromedial fx-disloc

- Recently described injury pattern
- Failure to recognize can result in poor outcomes (arthrosis)
- Easy to overlook (occasionally small coronoid fractures)
Stress views demonstrate that the LCL is ruptured and the elbow is unstable.

Results can be poor without operative treatment.

Varus posteromedial fracture-dislocation – surgical tactic

- Medial approach to elbow
  - Beware of MABC n.
  - Split FCU, mobilize ulnar nerve
  - Dissect anterior to MCL

- Buttress plating +/- lag screw(s) for coronoid

- Stress elbow and repair LCL if instability remains
  - Kocher approach
Thank you