Distal Humeral Fracture-Principles and Techniques

Regional Training
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CDDFT
Impending doom!
Questions

- Are there other more urgent injuries (ATLS)?
- Is it open?
- Is there a neurovascular problem?
- Is there compartment syndrome?
- Are there other injuries in the same limb?
- What are the patient’s needs and expectations?
- Do I need to fix it?
- Have I got the skills to fix it?
- Have I got the kit to fix it?
EXTERNAL FIXATOR-TEMPORISING

- Open and...
  Skills or kit not available
  Other more urgent injuries/multiple injuries
  Need to transfer
  While revascularisation is performed, if cannot wait for ORIF.

Otherwise, a Plaster backslab will do, initially.
EXTERNAL FIXATOR

- Know your kit
- **Open** technique for pins
- Humerus proximally, ulna distally. Well away from zone of injury.
CLASSIFICATION

- Horne (J Trauma 1980;20:71-4)
- Riseborough & Radin (JBJS 1969;51A;130-41)
- Orthopaedic Trauma Association 1987

All do not completely describe the #, prognosis or guide management.

AO classification is better, as at least divides into artic/extraartic and partial artic. Complicated!
Extraarticular
Partial Articular
Completely Intraarticular
Past Problems

- Conservative treatment (plaster) led to stiffness, even if # reduced.
- Inadequate operative treatment led to failure, infection and stiffness.
- Inadequate operative treatment and plaster led to worst of both worlds.
- AO led on adequate implants, accurate reduction and stable fixation with early movement.
Epicondyle Fracture

- Lateral rare
- Medial with elbow dislocation (high level of suspicion)

Undisplaced, conservative treatment in brace.

Displaced, ORIF cannulated screw(s)
Biepicondylar #
Biepicondylar #
Supracondylar Fracture

- Extraarticular
- Unstable/difficult to control (shorten/rotate)
- Dual plate ORIF
- Either split or work either side of triceps. Use olecranon osteotomy if low fracture.
Supracondylar #
Supracondylar #
Supracondylar #
Unicondylar Fracture

- Intraarticular, lateral more common.
- Consider CT scan
- Look for collateral ligament injury on opposite side of elbow.
- Usually unstable-rotated/displaced
- Olecranon osteotomy for access/vision
- Single buttress plate ORIF
LATERAL CONDYLE #
Capitellar/Trochlear #

- X Rays may be misleading-always consider CT
- Consider ligament injury on opposite side of elbow
- Usually displaced
- ORIF-Lateral approach avoiding LCL or olecranon osteotomy
- Headless screw A-P or P-A
- Discard thin cartilage flakes
Capitellum #
Capitellum #
Complete Intraarticular #

- Consider CT or traction views under II
- Ideally plan surgery with x ray of opposite side/templates
- Olecranon osteotomy/(triceps sparing approach)
Complete Intraarticular #
Complete Intraarticular # 2
Complete Intaarticular # 2
Positioning
Approach

- Olecranon osteotomy for all intraarticular fractures – the only way to see the articular surface
- Posterior incision avoiding the olecranon bursa
- Mobilise the ulnar nerve and sloop-DO NOT CLIP TO DRAPES!
- Osteotomy and continue medial and lateral triceps mobilising incisions
- (Bryan and Morrey/triceps tongue also possible)
Chevron Olecranon Osteotomy

- Point to wrist!
- Complete with osteotome
- Repair with Tension Band or plate
Provisional Fixation

- K wires for preliminary reconstruction of the articular block
- **THERE IS NO PLACE FOR K WIRES AS DEFINITIVE FIXATION IN THESE FRACTURES!**

Though may be used to hold tiny articular fragments, headless screws are better or ‘lock in’ with larger fragments.
K wire set-up
FIXATION

- THERE IS NO PLACE FOR 1/3 TUBULAR PLATES IN DISTAL HUMERAL # RECONSTRUCTION
- Either use small fragment set DCP/Recon plate or precontoured periarticular plates
- New locking technology *may* have advantages in soft bone
90/90 Plating

- Original AO technique
- Well proven technique
- Reconstruct the articular block first
- Then attach to humerus with compression
- As low as possible with plates but care not to detach ligaments
- Planning required to prevent screw clashes
- Schatzker & Tile ‘The Rationale of Operative Fracture Care.’ Springer Verlag Pub.
90/90 Plating
90/90 Plating
90/90 Plating
90/90 Precontoured Locking Implants
Parallel Plating

- Mayo Clinic USA. Shawn O’Driscoll.

Aims-
- Early movement (@ 3 days)
- Union, especially supracondylar
- Now precontoured plates-save time, improve accuracy, prevent metal fatigue
- Stable fixation distally, extra plate holes distally
- Low profile plates with functional variation in thickness for less irritation and greater strength where needed
Technique and references

- Sanchez-Sotelo J, Torcia M, O’Driscoll S.
  Complex distal humeral fractures: internal fixation with a principle based parallel plate technique. 
  JBJS 2008; 90A Supplement 2, part 1: 31-46.

  Biomechanically superior in resistance to all stress planes, particularly torsion.

  Few good clinical comparitive trials with 90/90 technique.
90/90 vs parallel plating

- JSES JAN 2010
- 17 PERPENDICULAR
- 18 PARALLEL
- NO DIFFERENCE CLINICALLY
- SLIGHTLY INCREASED NON UNION RATE (2 in 90/90, 0 in parallel)
A different philosophy-

- Every screw passes through a plate
- Every screw engages a fragment on opposite side that is held by a plate
- As many distal screws as possible
A different philosophy-

- Screws should be as long as possible
- Screws should engage as many articular fragments as possible
A different philosophy-

Distally screws should form an interdigitating arch
(should not need locking, though available)
A different philosophy-

Supracondylar compression must be applied
The end result
Not necessarily Acumed plates!
Heterotopic ossification

- **INDOMETHACIN** 25 mg BD if no contraindications
- Radiotherapy only if history of HO
REHABILITATION

- CAST only for 2-3 days for immediate comfort, I prefer in extension.
- Fixation should allow early movement
- ELEVATE on pillows, +/- hand pump
- ACTIVE/ASSISTED moving to ACTIVE
- NO RESISTANCE UNTIL HEALING ON XRAY
ORIF NOT SAFE

- ‘Bag of Bones’ approach
- Very frail elderly
- Medically unfit for GA/prolonged lateral decubitus
- Osteopenia
- Remember TER for trauma - don’t burn bridges with an olecranon osteotomy or infected/loose metalware in poor bone stock.
Bag of Bones
Bag of Bones
BAG OF BONES

- Eastwood. JBJS 1937;19:364-9, coined the term. Gradual extension from 120 deg flexion after initial 2 weeks in C&C sling.

TER for Complete Intraarticular #
TER for Complete Intraarticular #
TER FOR TRAUMA

- Cobb T, Morrey B. JBJS(A)1997;79:826-32
INDICATIONS FOR TER

- AGE >65
- COMMINUTED
- DISTAL FRACTURE
- POOR QUALITY BONE
- CONCERNS OVER ORIF QUALITY AND EARLY MOVEMENT
TER FOR TRAUMA
TER FOR TRAUMA
?TER
Thankyou