

Distal Humeral Fracture- Principles and Techniques

Regional Training
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Mr DJC Burton
Consultant Orthopaedic Surgeon
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.



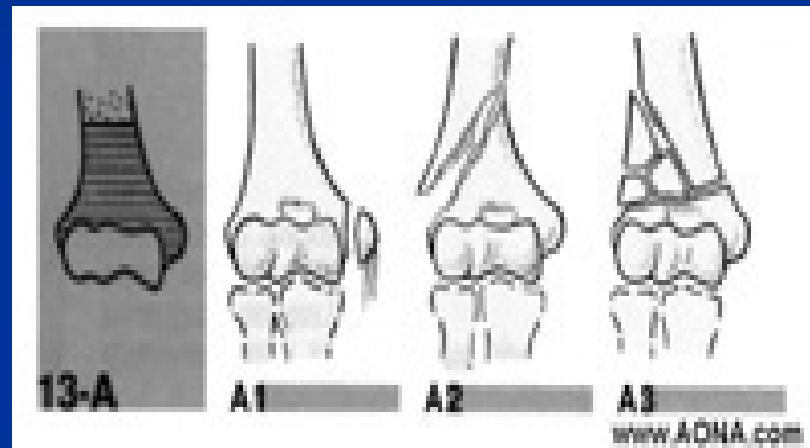
CLASSIFICATION

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

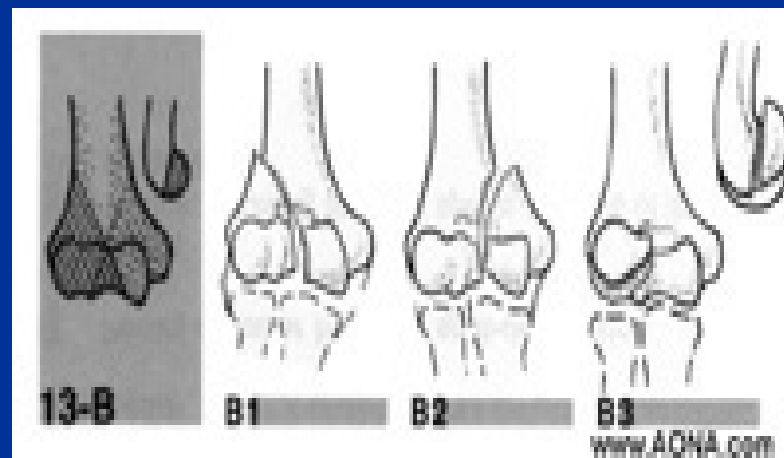
All do not completely describe the #, prognosis or guide management.

AO classification is better, as at least divides into artic/extraartic and partial artic. Complicated !

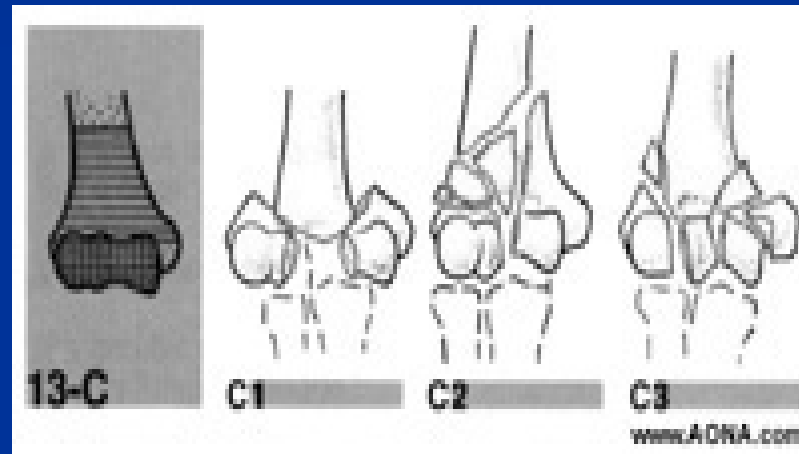
Extraarticular



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)

Biépicondylar



Biépicondylar



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.

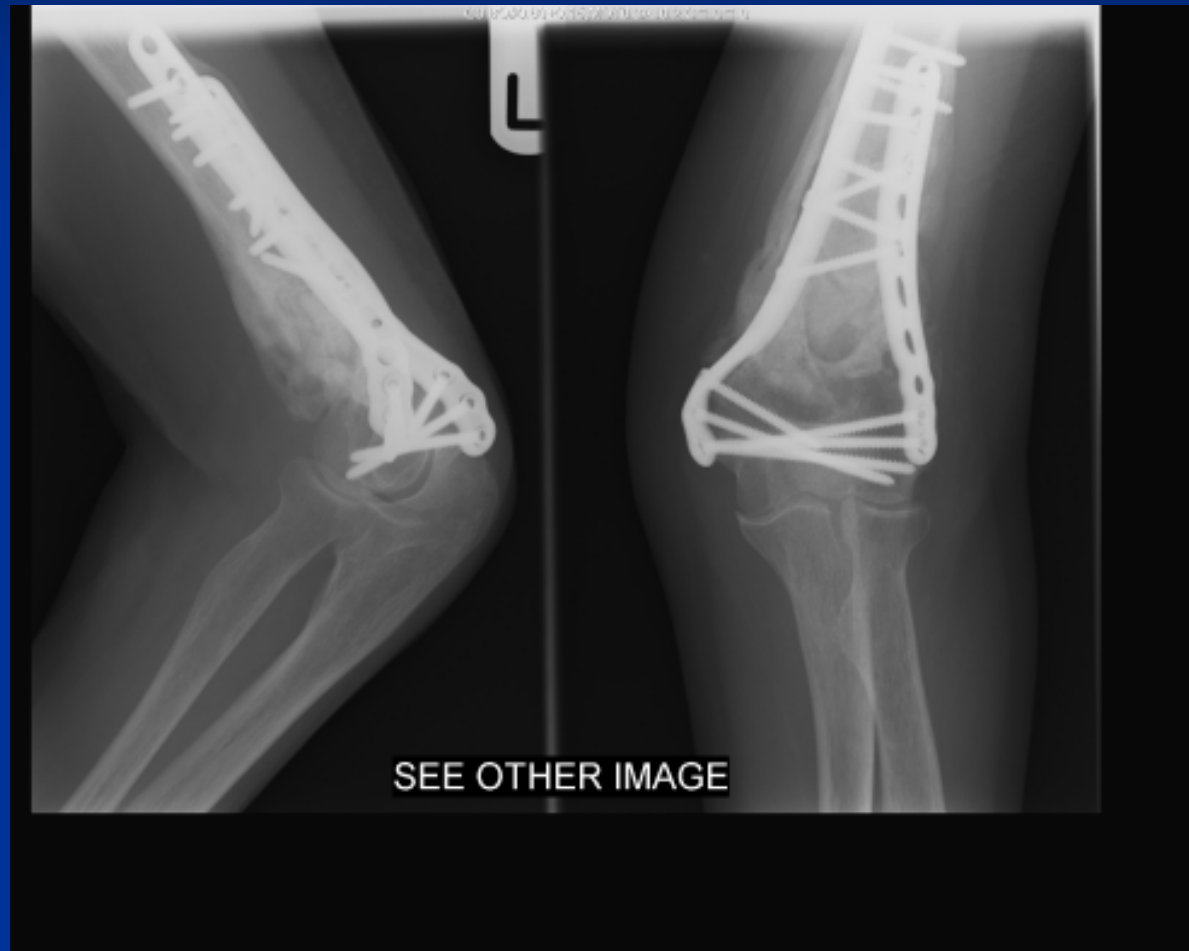
Supracondylar



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

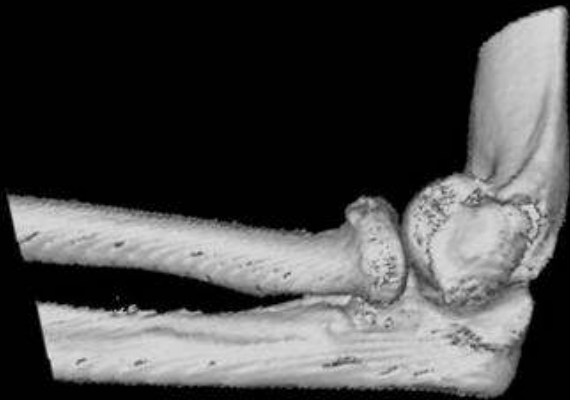


LATERAL CONDYLE



LATERAL CONDYLE

MEDCOM RESAMPLED, Resample R(180.000000)



MEDCOM RESAMPLED, Resample R(180.000000)



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

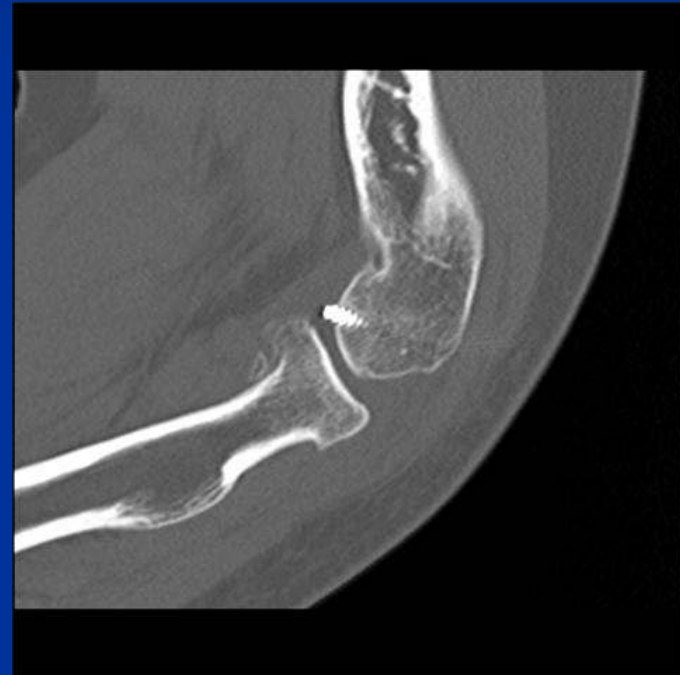
Capitellum



Capitellum



Capitellum

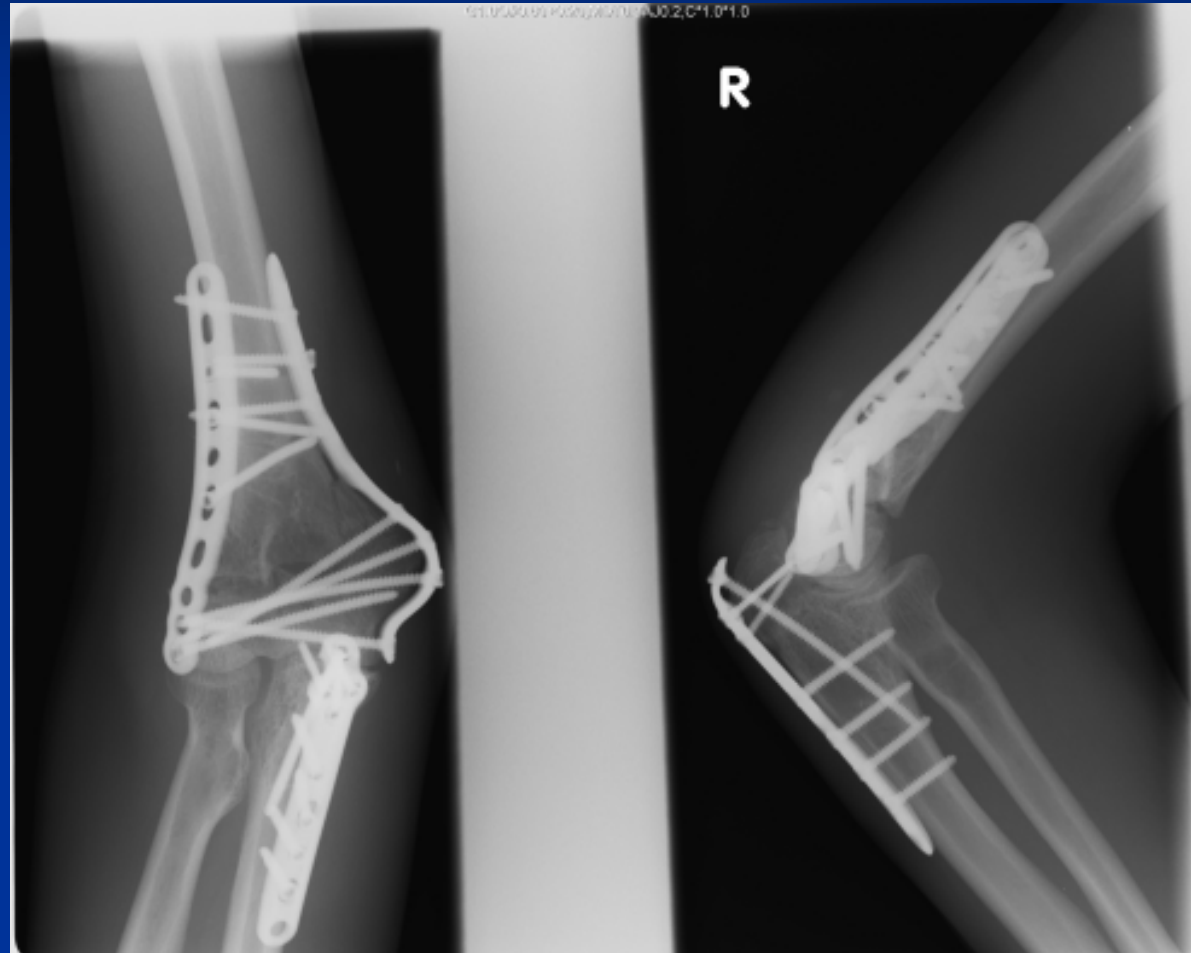


Complete Intraarticular

- Consider CT or traction views under II
- Ideally plan surgery with x ray of opposite side/templates
- ORIF for best functional results (**Holdsworth, B. JBJS 1990;72B:362-65. Jupiter, J. JBJS 1985;67A:226-39.**)
- Olecranon osteotomy/(triceps sparing approach)

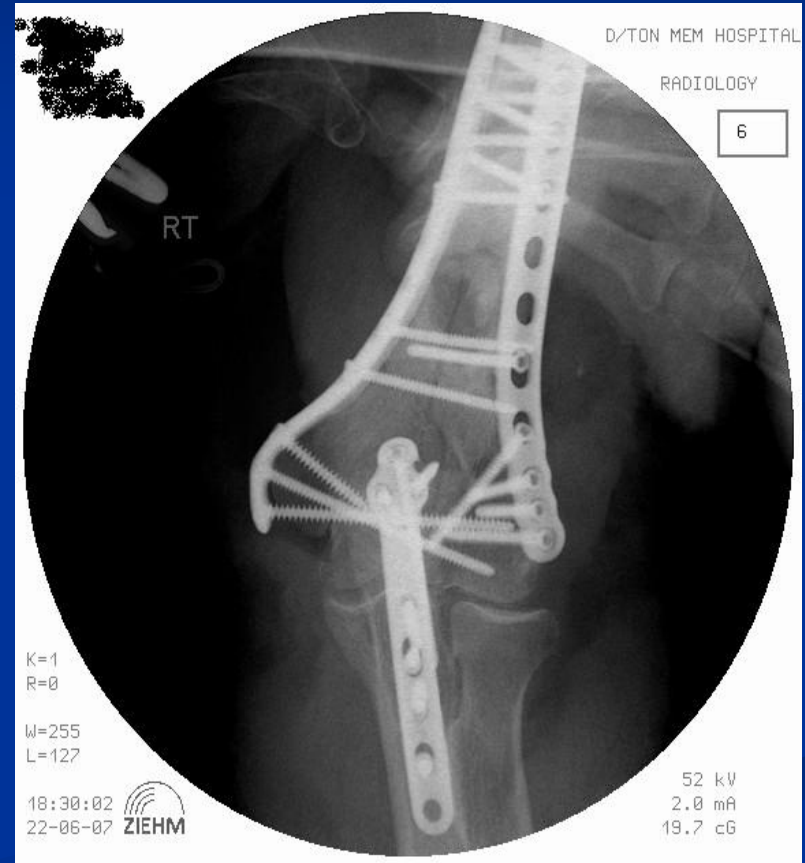


Complete Intraarticular



Complete Intraarticular # 2





Complete Intraarticular # 2



Positioning



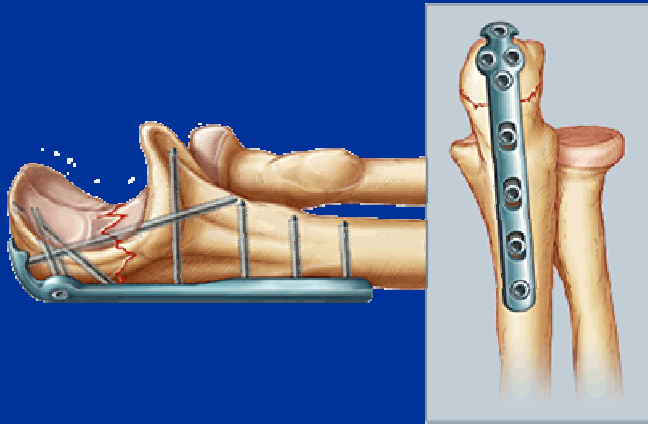
Approach

- 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

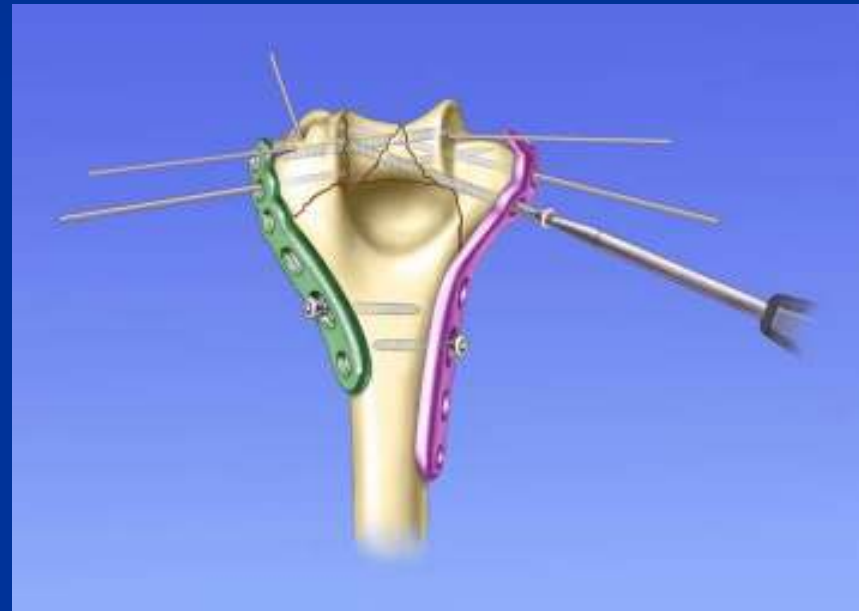
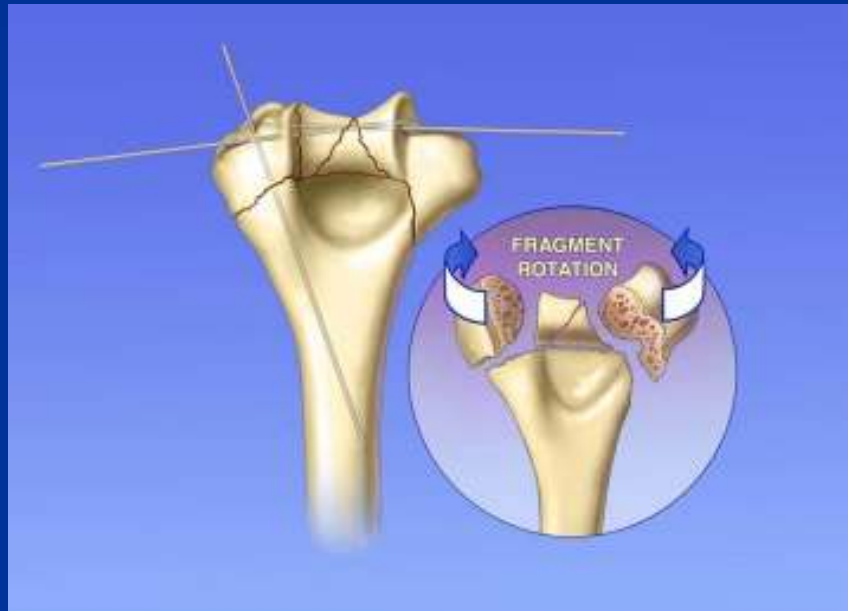


Provisional Fixation

- 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 comparative* trials with 90/90 technique.

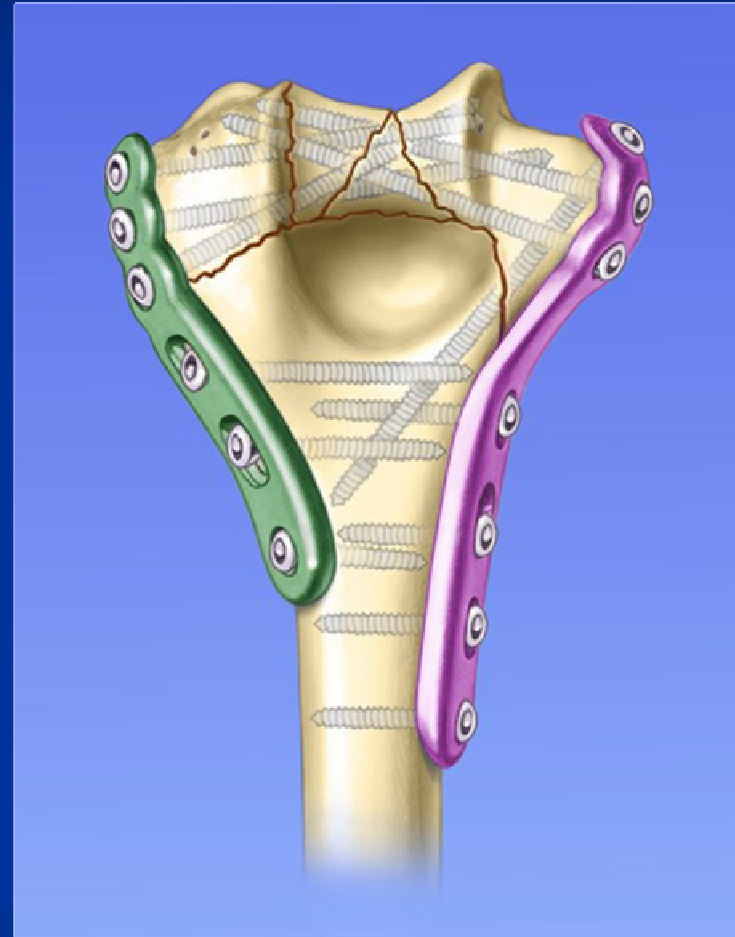
90/90 vs parallel plating

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



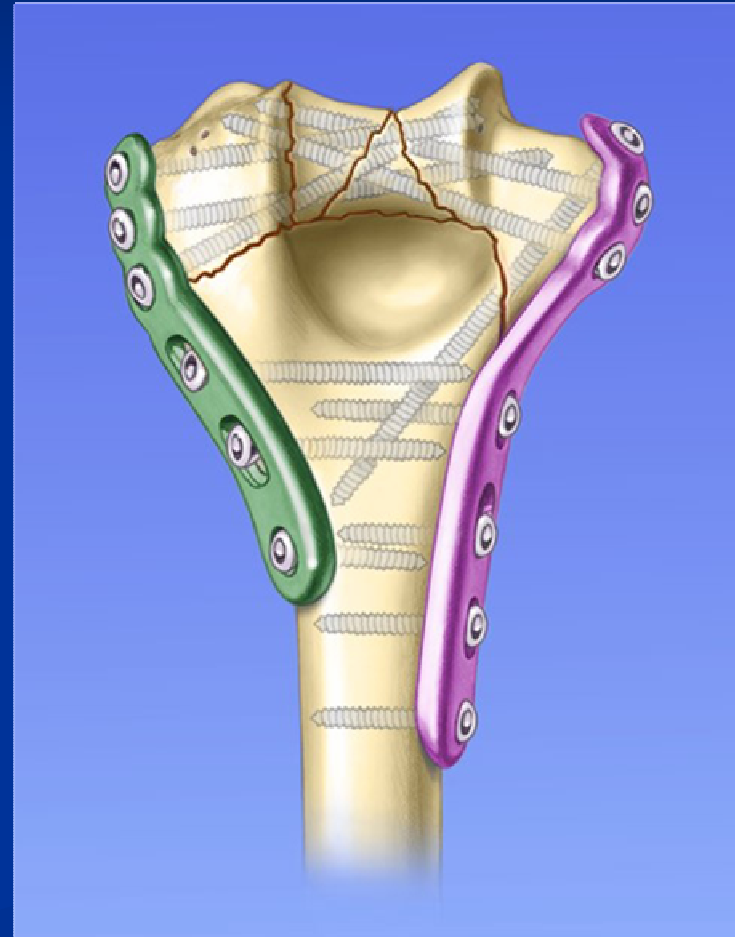
A different philosophy-

- 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



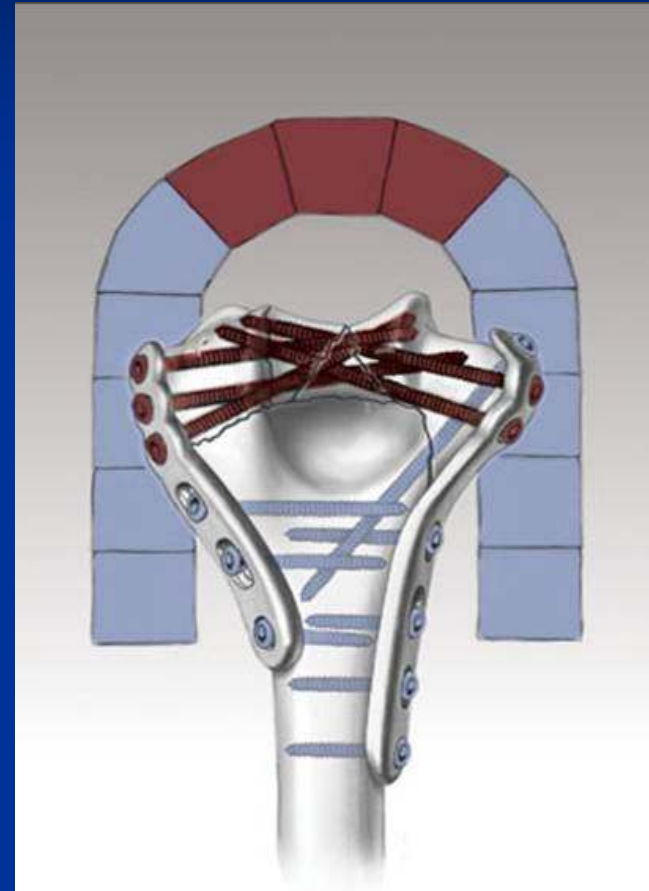
A different philosophy-

- Screws should be as long as possible
- Screws should engage as many articular fragments as possible



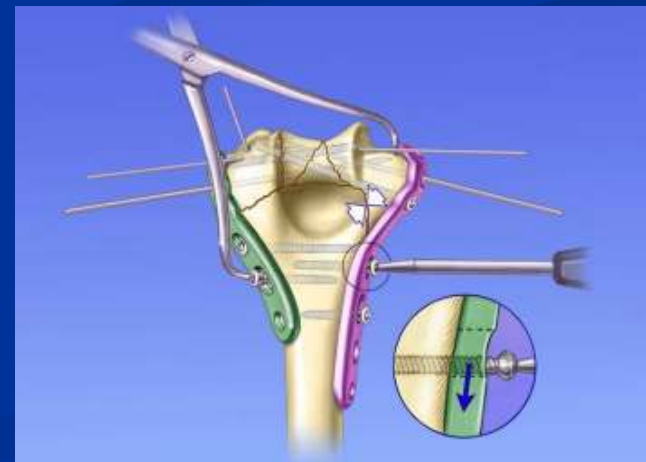
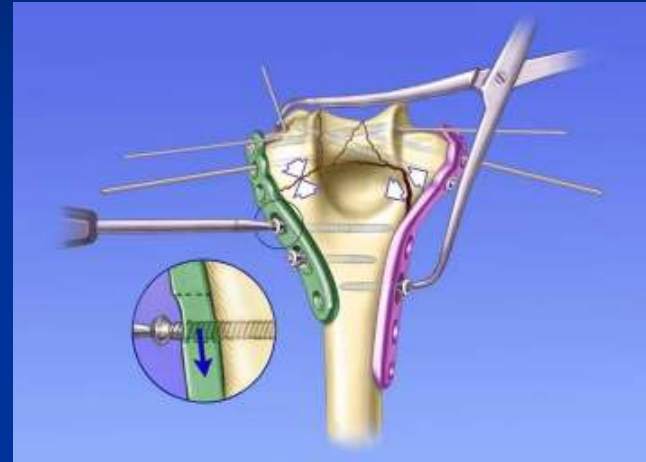
A different philosophy-

Distally screws should form
an interdigitating arch
(should not need locking,
though available)

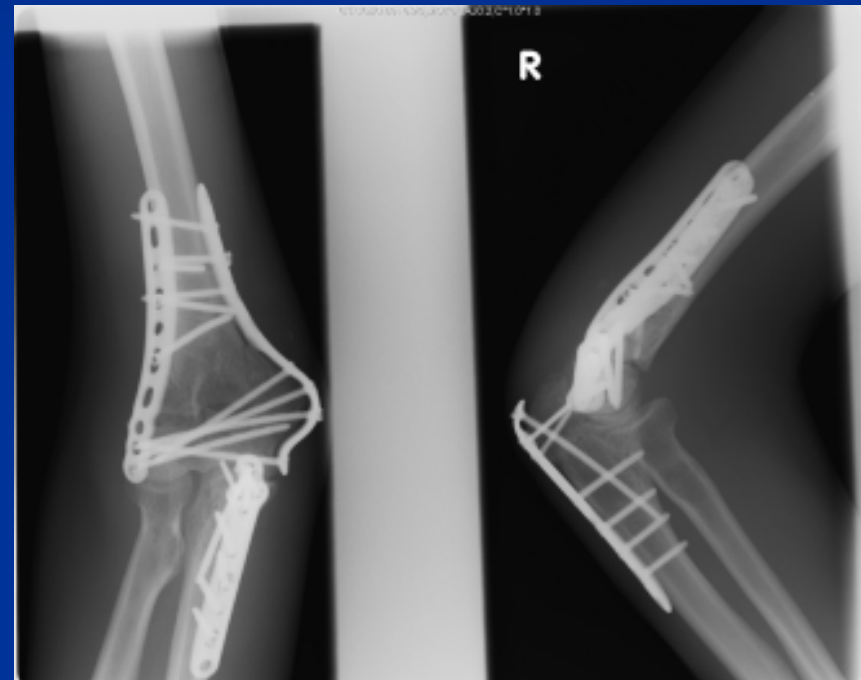


A different philosophy-

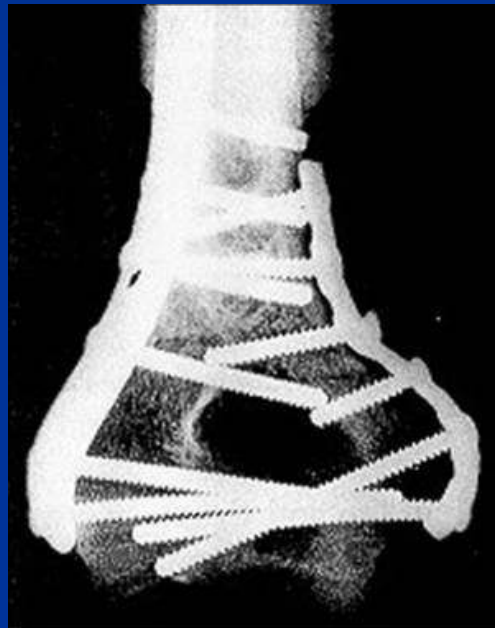
Supracondylar compression
must be applied



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.
- Evans. JBJS 1953;35:371-5. Unpredictable results, weakness and deformity.

TER for Complete Intraarticular



TER for Complete Intraarticular



TER FOR TRAUMA



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

■ Kamineni S, Morrey B.
JBJS(A)2004;86:940-7.

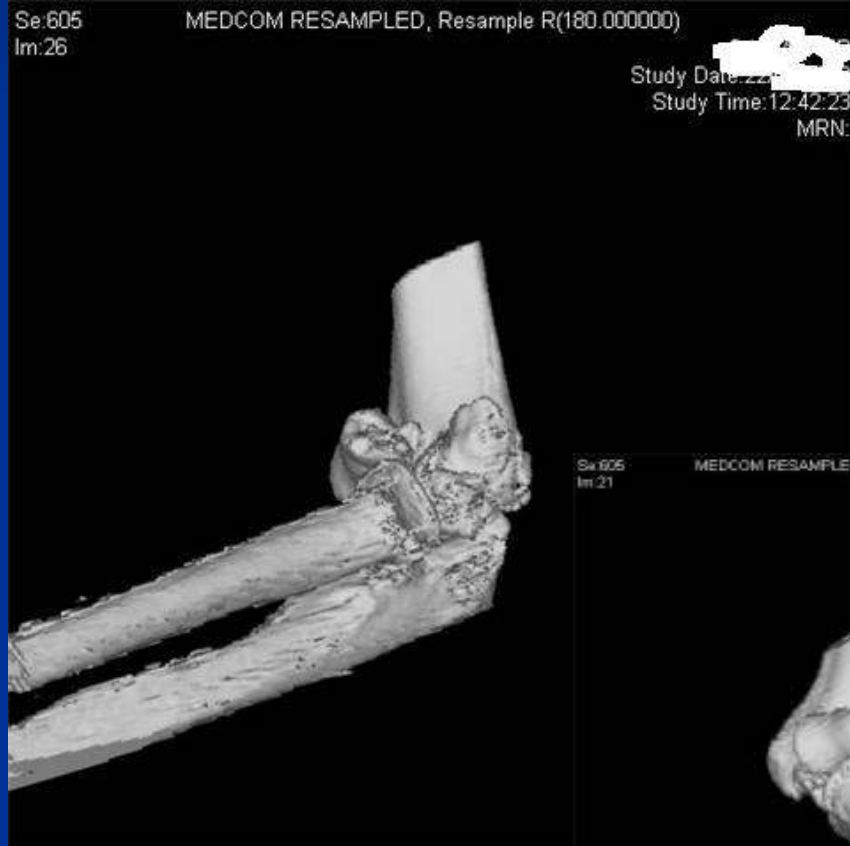
INDICATIONS FOR TER

- AGE >65
- COMMINUTED
- DISTAL FRACTURE
- POOR QUALITY BONE
- CONCERNS OVER ORIF QUALITY AND EARLY MOVEMENT

TER FOR TRAUMA



TER FOR TRAUMA



C2200
W3800

C2200
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TER FOR TRAUMA



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POSTER



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Thankyou

