Cubitus varus

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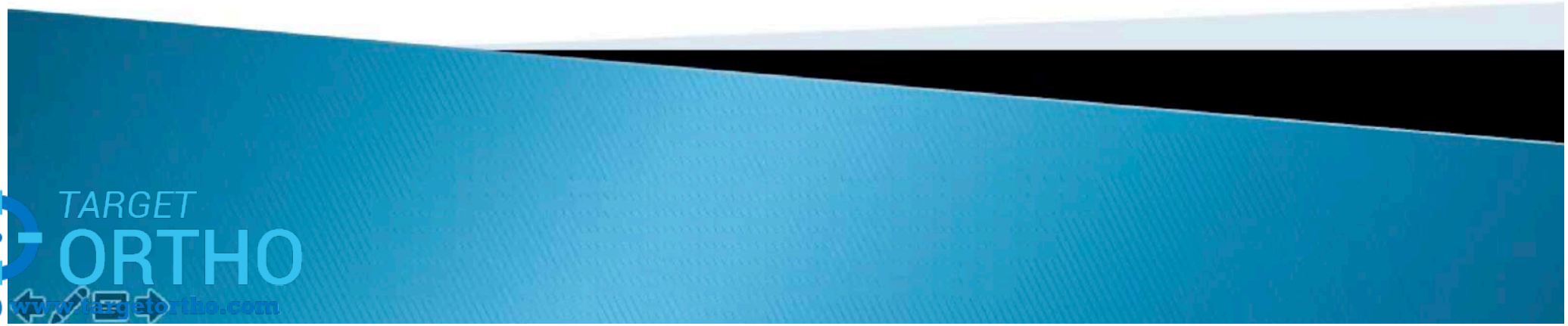
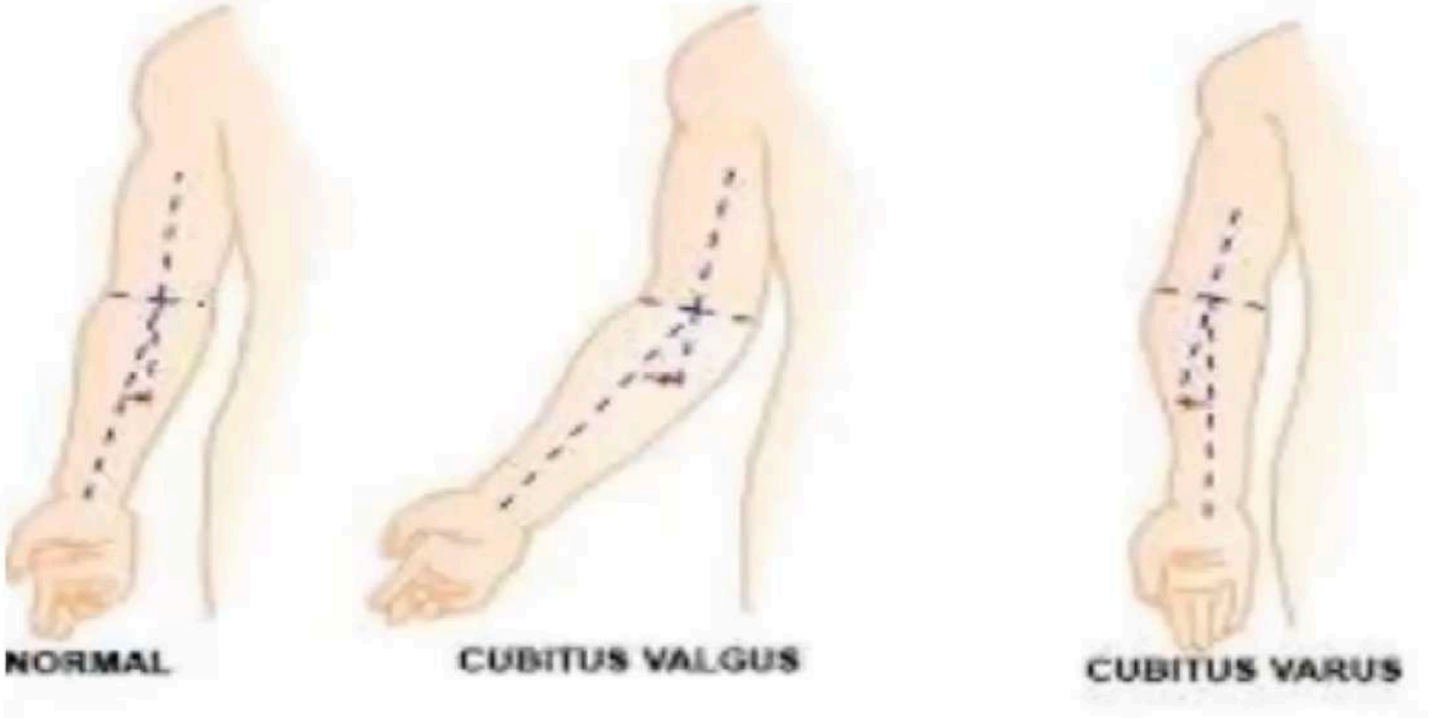


Introduction

- Inward deviation of forearm wrt arm at the elbow joint : lateral angulation in an extended elbow
- Reduction in the physiological valgus at the elbow joint.
- Gunstock deformity
- Cubitus rectus: decrease in angulation with neutral alignment.

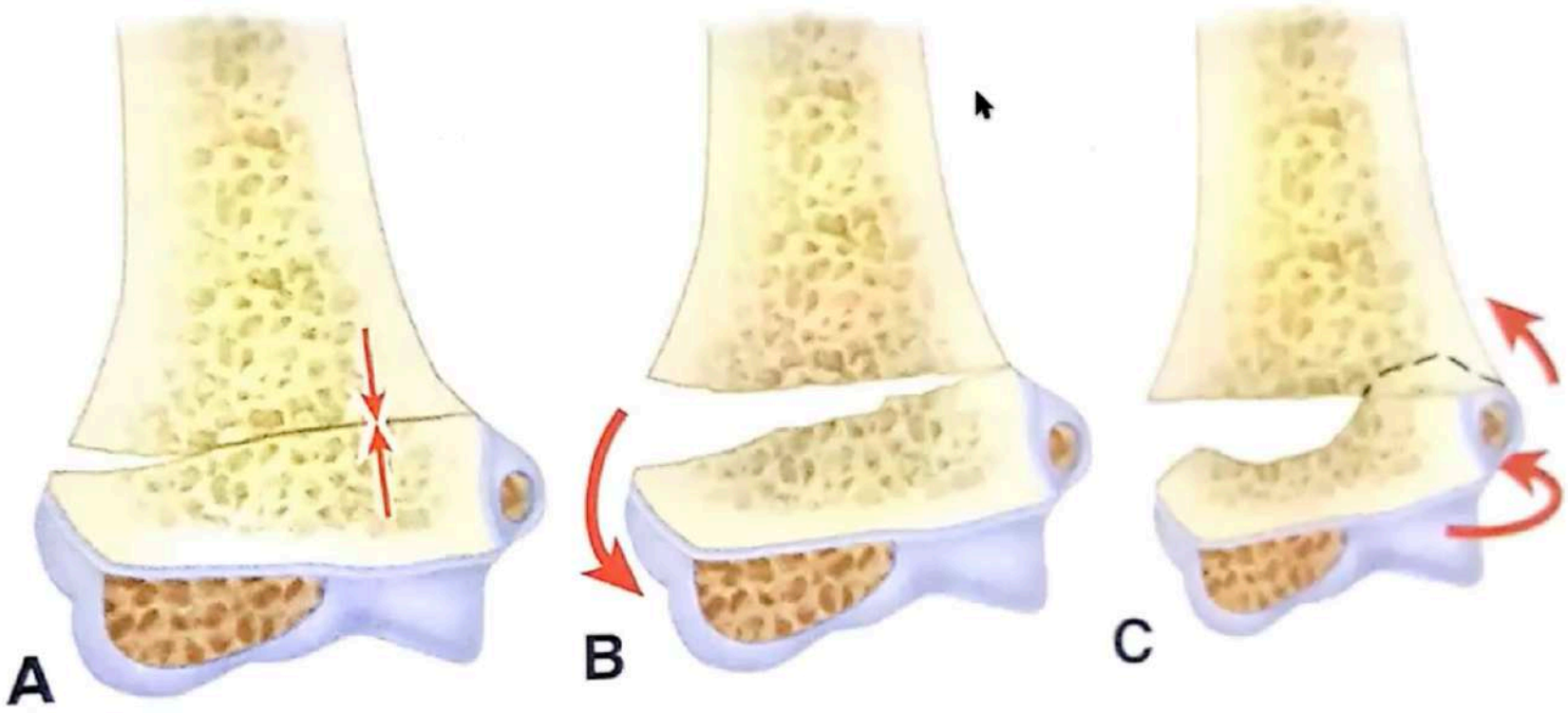


Etiology

- Post traumatic
- Congenital
- Trochlear osteonecrosis

Cause of deformity

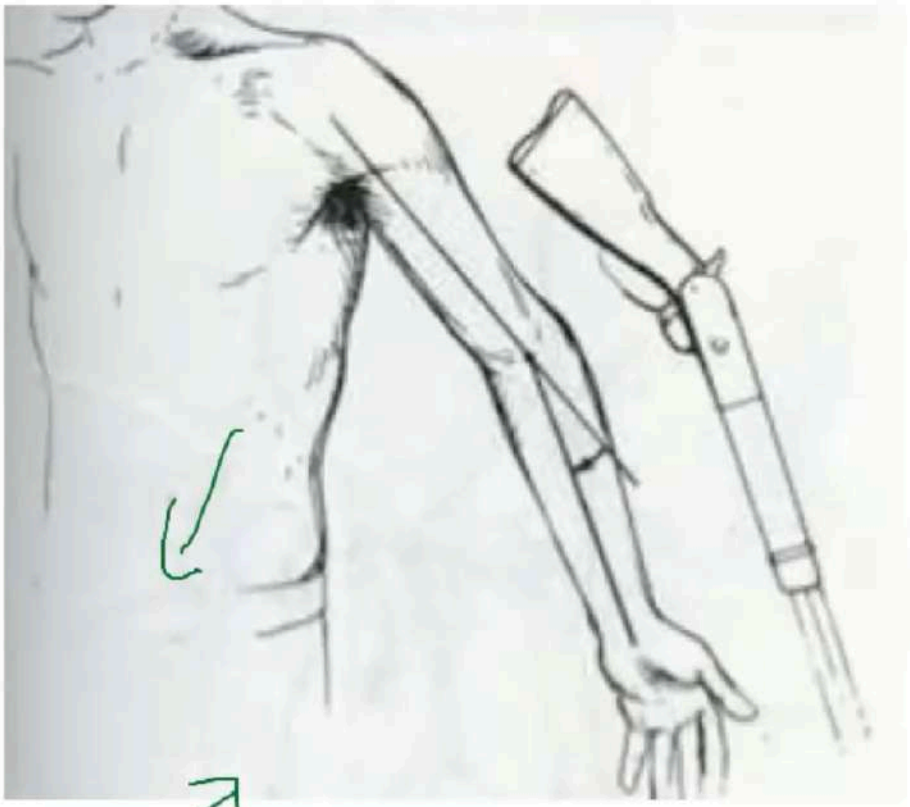
- Medial with posterior displacement and rotation of distal fragment in both horizontal plane and coronal tilt.
- Osteonecrosis and delayed growth of trochlea
- Relative overgrowth of normal lateral side



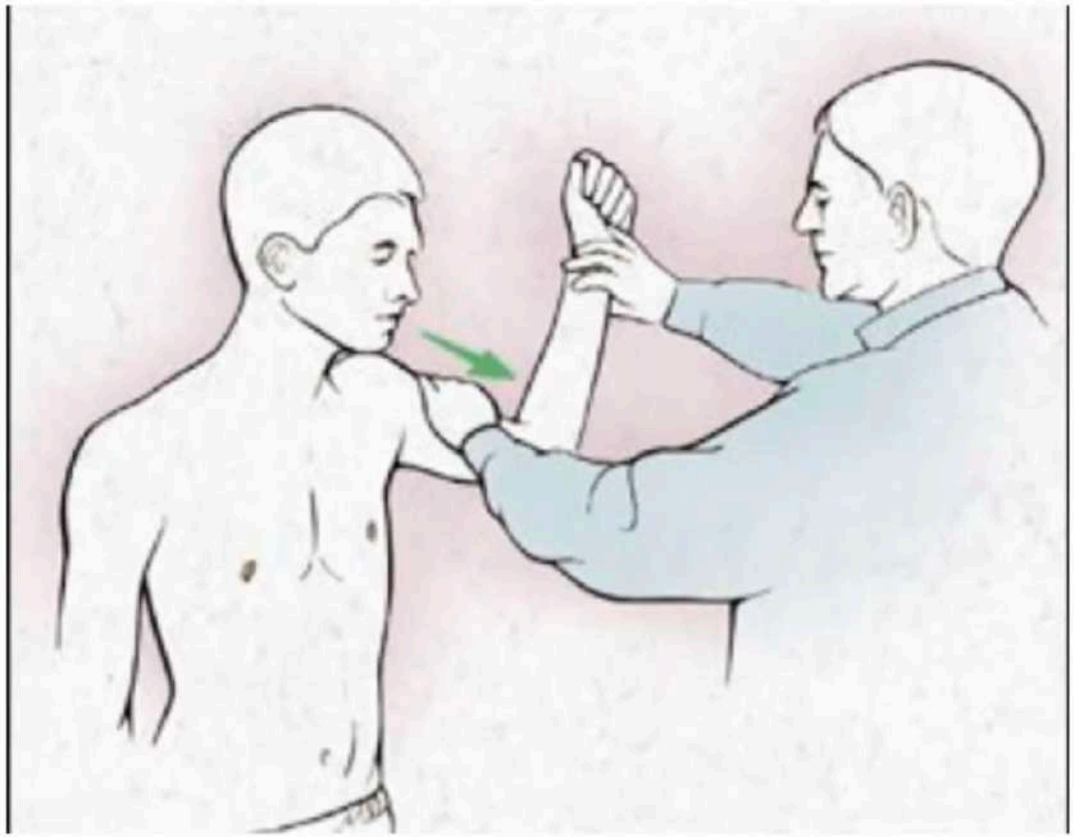
Types

- Static
- progressive

Gun-stock deformity



Clinical examination



Diagnosis

- Short case
- Complete diagnosis
- Informative
- Crisp
- Scope of differential if needed

- 10 year old male child, right hand dominant with 2 years old post traumatic right cubitus varus deformity due to malunited supracondylar humerus fracture.
- +/- deformity, neurovascular status and functional status of hand.

Long case

- Patient was apparently asymptomatic 3 years back when allegedly after lifting heavy weight he injured his left hand. Since then patient complained of wasting of left hand which was insidious in onset gradually progressive and has progressed to the present condition. Wasting was not associated with any pain. Patient complained of clawing of the left hand more so of the medial 2 fingers slowly progressive causing limitation in fine activities. Patient had suffered injury to his left elbow during childhood for which he was managed conservatively.
- No history of multiple joint involvement / morning stiffness.

Why????

- h/o trauma with predisposing age group
- Conservatively managed/ relevant rx
- o/e:

  :Irregularity over medial and lateral supracondylar ridges

  : Maintained three-point relationship

  : Medial epicondyle tip is higher

  : Hyperextension at elbow

  : No widening at intercondylar region

  : Internal rotation deformity with restricted external rotation and increased internal rotation

On examination

- Inspection :
  : hyperextension deformity
  : limited flexion
  : lateral angulation & medial tilt
  : prominence of lateral condyle
  : muscle wasting
  : scar/ sinuses/redness

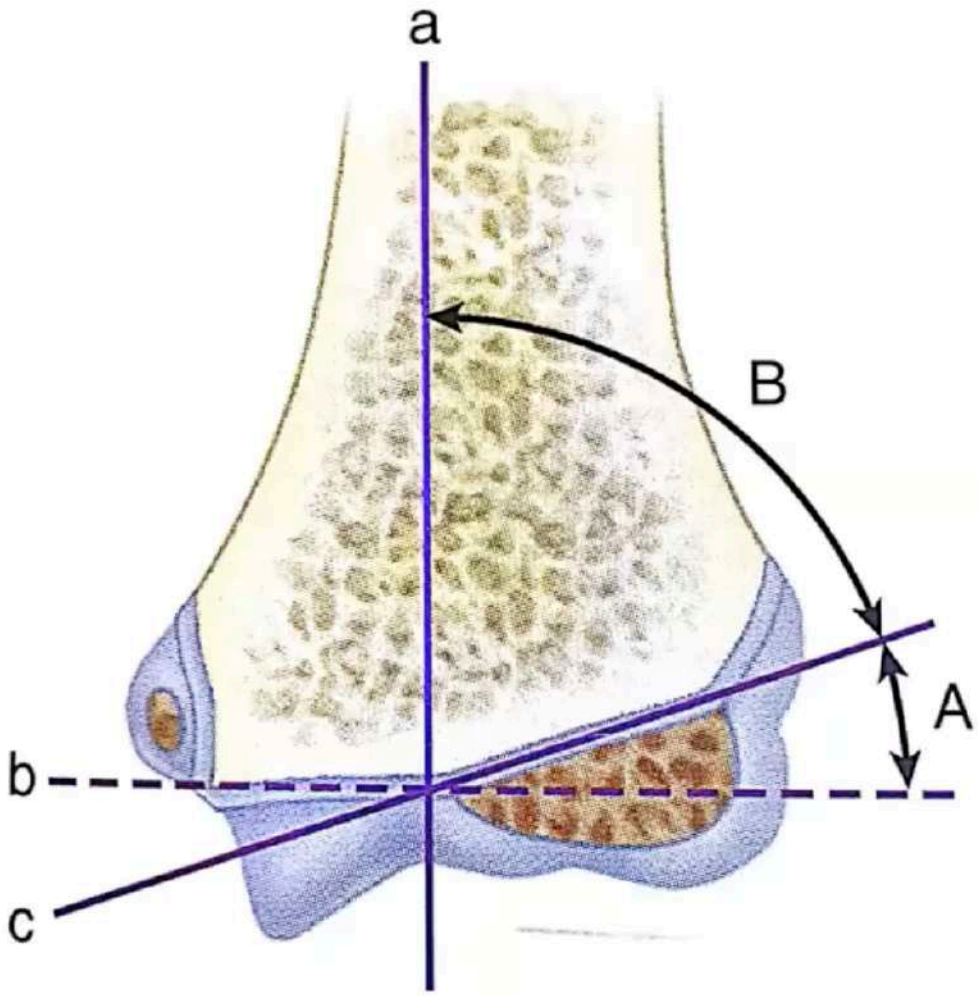
palpation

- Thickening of supracondylar ridges
- Irregularity
- 3 point bony relationship maintained
- Medial epicondyle tip is higher
- No widening of intercondylar region
- Hyperextension at elbow
- Internal rotation deformity with increased internal rotation (yamamoto test)
- Decreased external rotation compensated by shoulder.

Displacements of s/c

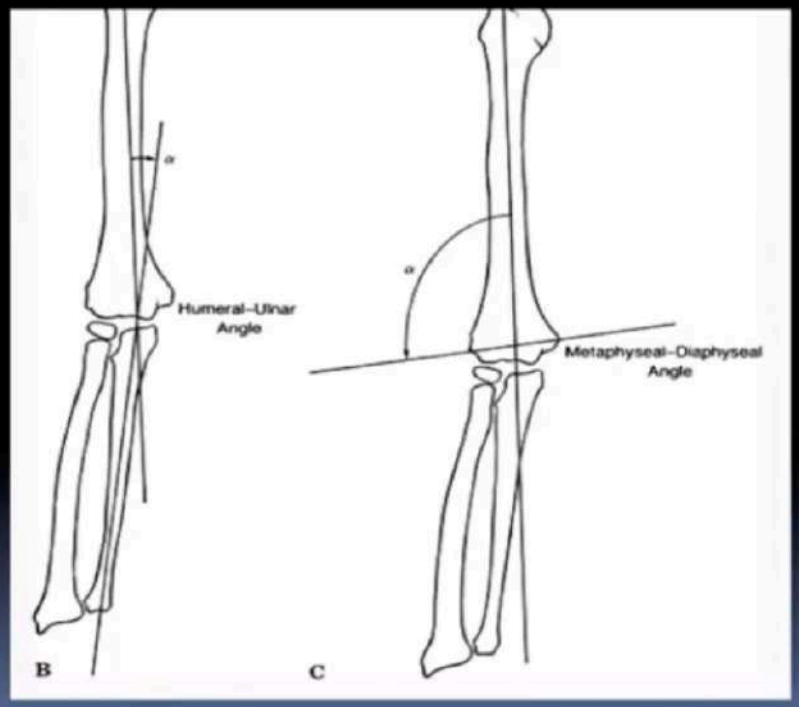
- Medial tilt
- Medial displacement
- Posterior tilt
- Posterior displacement
- Internal rotation
- Proximal migration

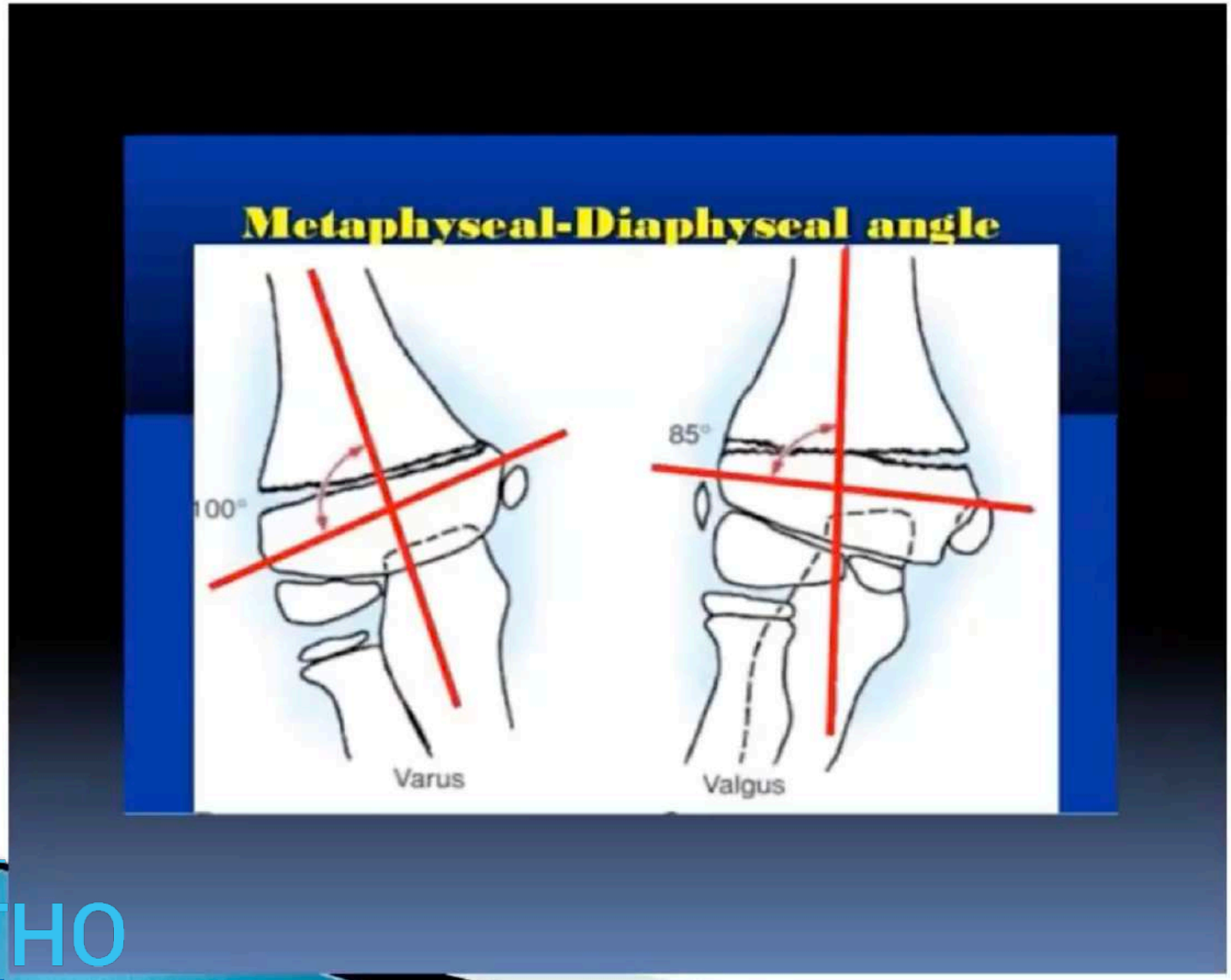
X ray measurements: AP view



•Metaphyseo-diaphyseal angle
(Klebb-Sherman)
Normally- 90
>Normal- Varus deformity
<Normal- Valgus deformity

•Humero-Ulno angle
(Oppenheim)
Decreased
Most accurate

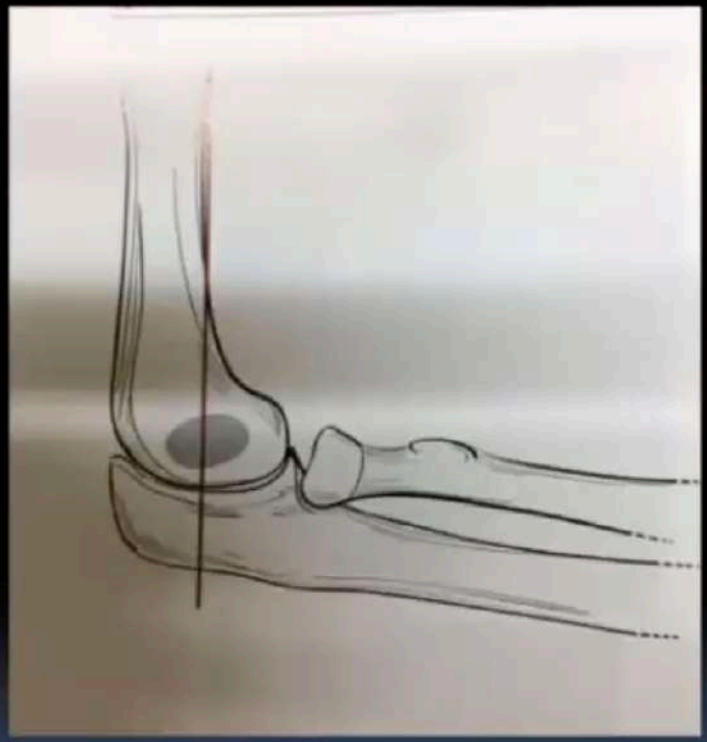




Lateral view

LATERAL VIEW

- Normally no overlap between the lateral condylar epiphysis and olecranon epiphysis
- If significant tilt of distal fragment occurs, there is overlap between the two which appears like a crescent → 'Crescent Sign"



Crescent sign

Anterior humeral line

Figure 3. Lateral x-ray of an extension type supracondylar humerus fracture. Note the anterior humeral line (black dotted line) passes far anterior to the capitellum rather than bisecting the anterior two-thirds.

Treatment

- Observation and supervised neglect
- Hemiepiphysiodesis & growth alterartion
- Corrective osteotomies

Observation

- Young child
- Hyperextension may remodel

Hemiepiphysiodesis

- Prevents deformity in presence of medial growth arrest
- Trochlear osteonecrosis
- Deformity increases due to lateral overgrowth

Corrective Osteotomies

- Pre requisites:

  1. bone remodeling and tissue equilibrium achieved. (1 year)

  2. patient is well informed and demanding surgery

- Wedge calculation:

  angle= normal physiological valgus+ deformity angle

Metal wedge ready

Types of osteotomies

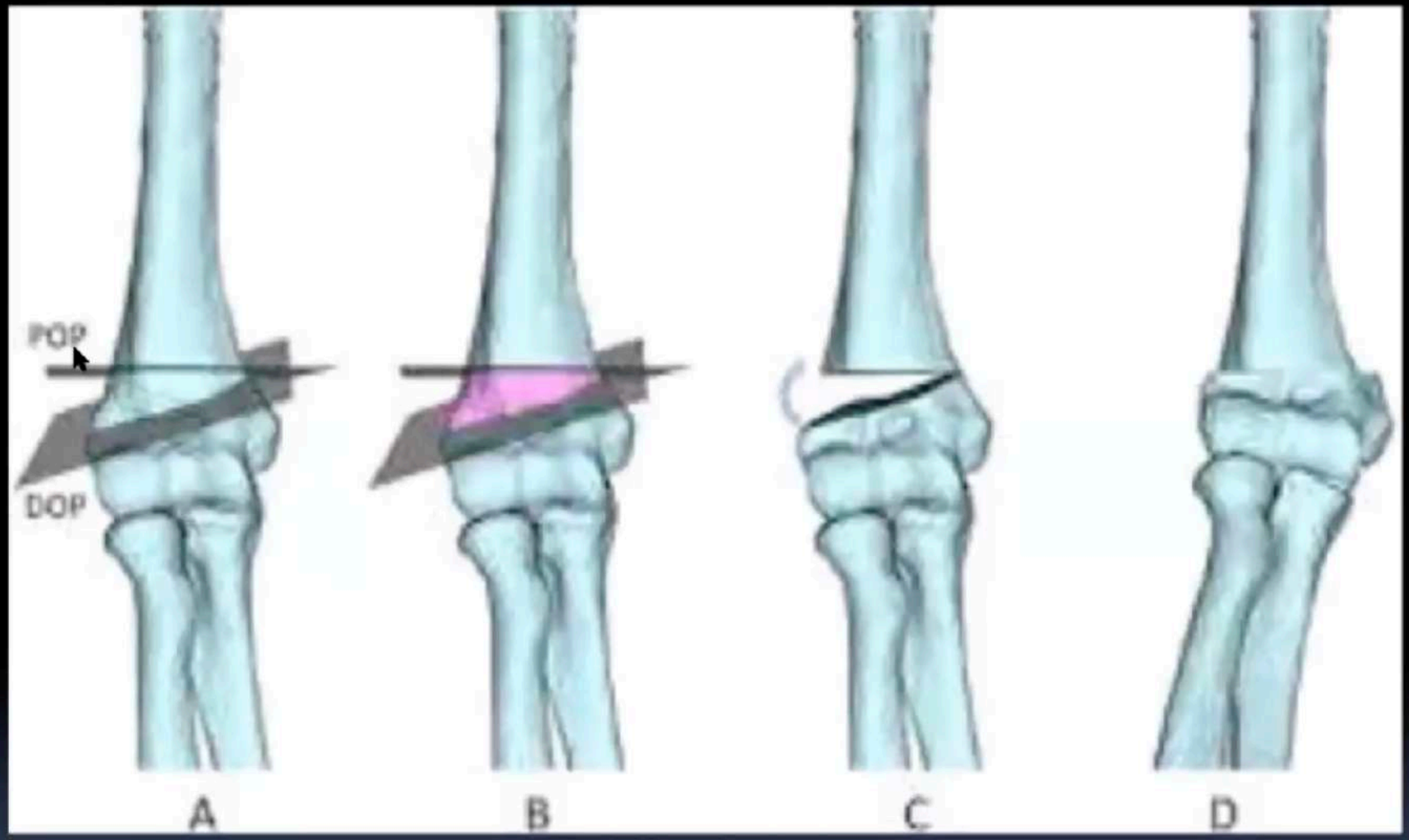
- Medial opening wedge with bone graft
- Lateral closing wedge
- Oblique osteotomy with derotation.

Lateral closing wedge

- Easiest
- Safest
- Most stable

Lateral closing wedge osteotomy (Voss et al.)

- Standard preparation, draping, tourniquet inflation
- *Lateral incision* at elbow
- With fluoroscopic guidance, insert 2 K-wires into lateral condyle just distal to the planned distal cut. Advance proximally after making wedge osteotomy closing laterally.

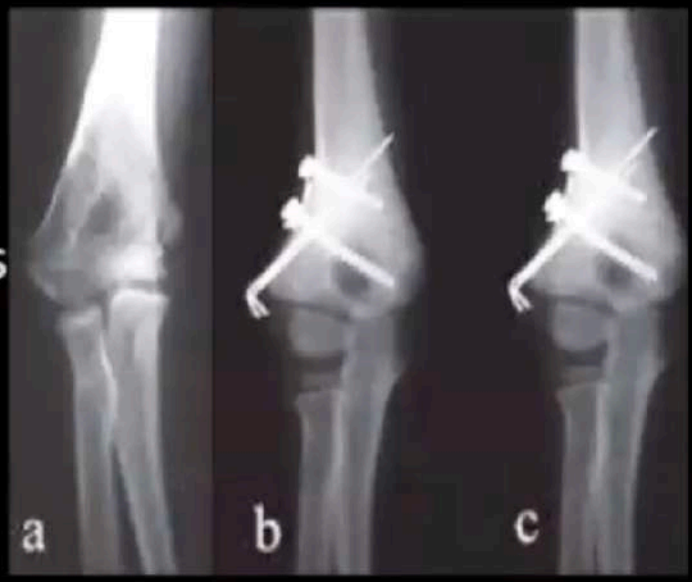


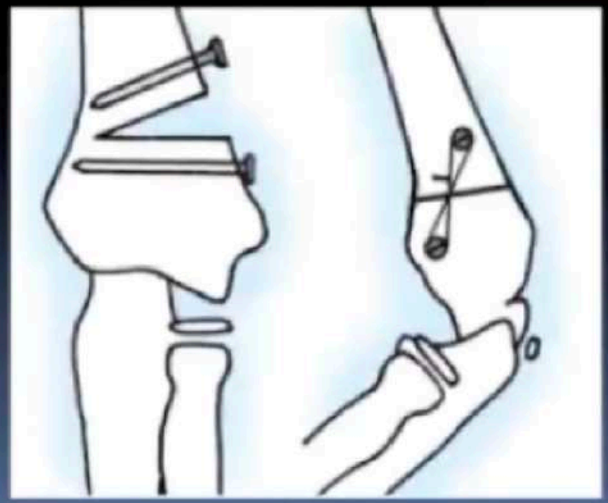
- Keep medial cortex intact; weaken it by multiple drill holes and a Apply forceful valgus stress to complete the osteotomy .Close the osteotomy and advance the K-wires into the medial cortex of proximal fragment. Leave the wires buried under the skin. A third wire can be used if necessary for stability.

- Close the wound in layers; splint the arm in 90° flexion and full pronation.

FRENCH OSTEOTOMY

- Posterior approach
- Lateral closing wedge osteotomy with 2 guide pins and 2 screws inserted proximal and distal to the pins parallel to them.
- Medial cortex broken
- Only periosteum intact
- Approximately the wedge till the 2 screws are parallel
- Hold this position with TBW





French Osteotomy

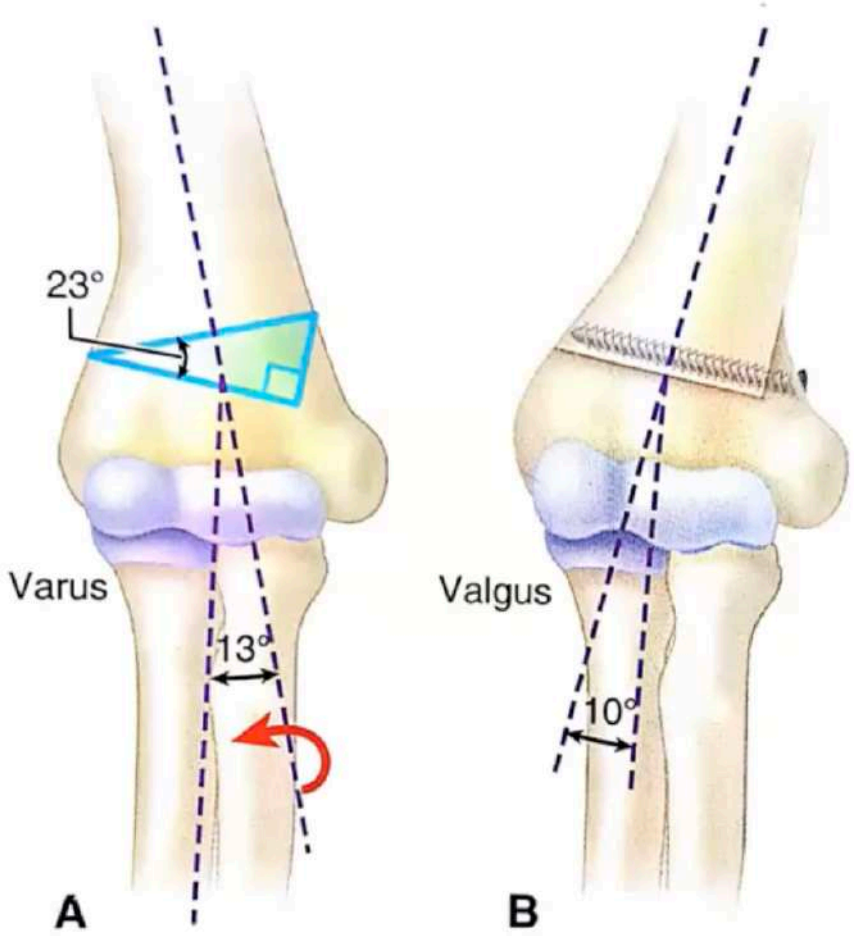
- Post. Longitudinal approach
- Detach whole of triceps
- Ulnar nerve explored
- Medial cortex broken

Modified French Osteotomy (Bellemore)

- Posterolateral approach
- Lateral half of triceps detached
- Ulnar nerve Not explored
- Medial cortex intact so more stability

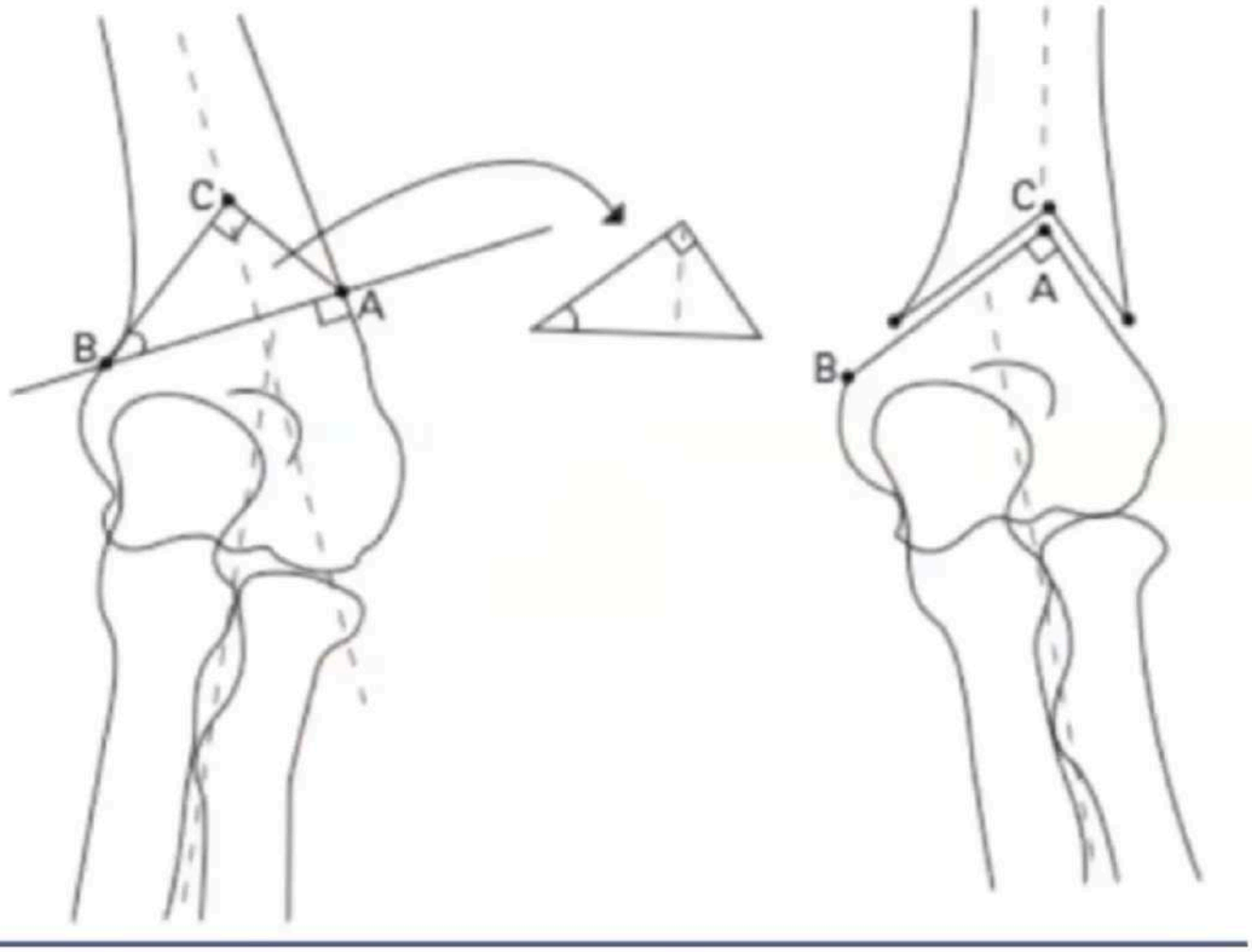
STEP-CUT OSTEOTOMY (DEROSA & GRAZIANO)

- A modification of lateral closing wedge osteotomy
- Using a template constructed preoperatively, make a lateral closing wedge osteotomy in the metaphyseal region superior to the olecranon fossa.
- Make the osteotomy leaving a lateral spike of bone distally
- Trim lateral portion of proximal fragment for close approximation.
- Correct the medial tilt, rotational malalignment, hyperextension and fix with crossed K-wires
- Then, use a lag screw from lateral portion of distal fragment to proximal fragment
- Close the wound and apply posterior splint for 4 weeks.



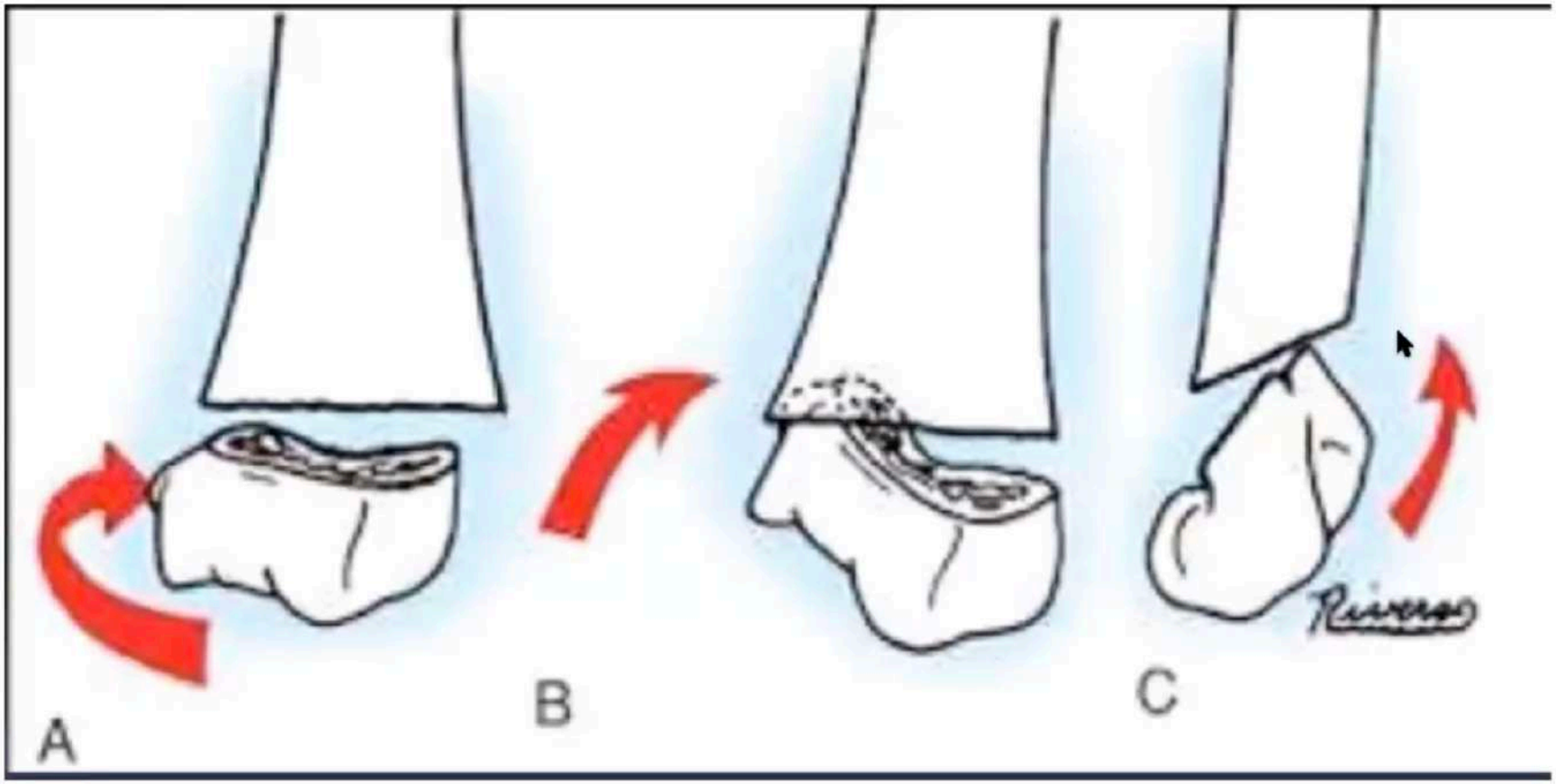
STEP-CUT TRANSLATION OSTEOTOMY WITH A Y-SHAPED HUMERAL PLATE

- Posterior approach to distal humerus.
- Incise the capsule to expose medial and lateral condyles
- Basic step-cut osteotomy involves osteotomy with a triangular template 0.5 cm proximal to olecranon fossa with base of triangle perpendicular to humeral shaft and apex directed proximally.
- Remove wedge of bone.
- In cubitus varus, rotate distal fragment so as to fix its lateral border into V-shaped apex of proximal fragment.



OBLIQUE OSTEOTOMY WITH DEROTATION (AMSPACHER & MESSENBAUGH)

- Patient prone and pneumatic tourniquet in place.
- Posterior elbow exposure through a longitudinal incision; divide triceps in line with its muscle fibres, expose the s/c part of humerus subperiosteally protecting the radial and ulnar nerves.
- Oscillating saw used to make an oblique osteotomy about 3.8cm proximal to distal end of humerus directing it posteriorly above to anteriorly below. Complete it anteriorly with osteotome. Tilt and rotate the distal fragment until ***cubitus varus and internal rotation*** have been corrected.
- With fragments in position, fix them with a screw inserted across the middle of osteotomy.
- Arm is immobilized in a long arm cast or splint until union at 4-6 weeks.



Complications

- Stiffness
- Nerve injury
- Under correction
- Recurrence
- Non union
- Infection
- Skin complications