TARGET ORTHO

TRAUMA MCQ DISCUSSIONS

Trauma MCQ discussion

- Controversial Questions
- High Yield MCQs

Shoulder

TARGET ORTHO

A 23-year-old man sustains the injury shown in Figures 4A and 4B.
In association with this injury which of the following nerve is most injured?

A) Axillary

B) Musculocutaneous

C) Radial

D) Ulnar

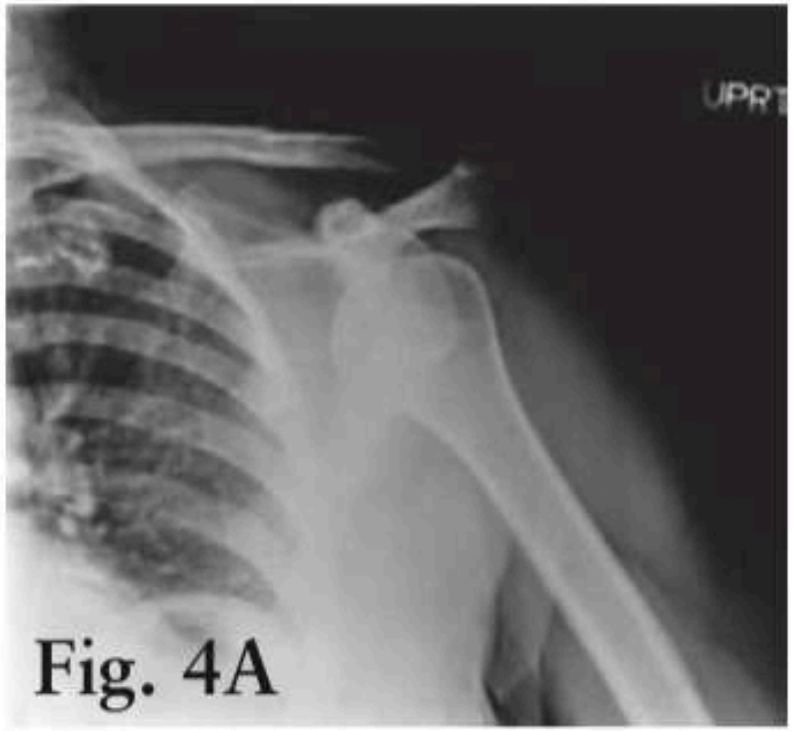


Fig. 4A

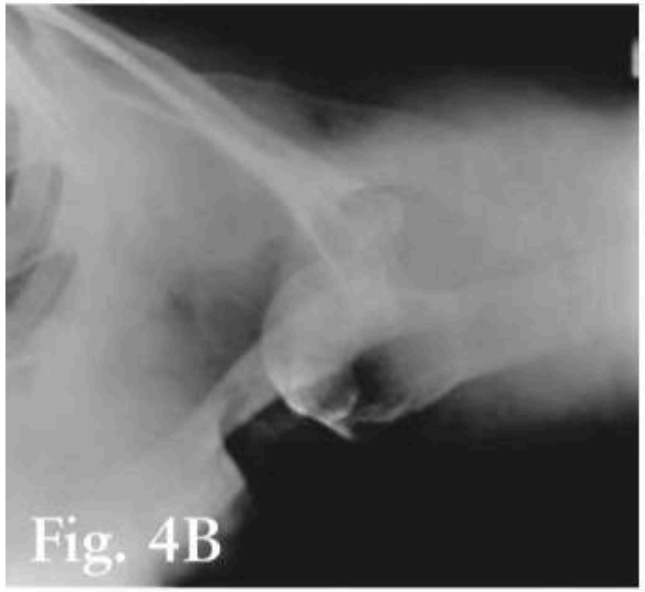


Fig. 4B

A 23-year-old man sustains the injury shown in Figures 4A and 4B.
In association with this injury which of the following nerve is most injured?

- A) Axillary
- B) Musculocutaneous
- C) Radial
- D) Ulnar

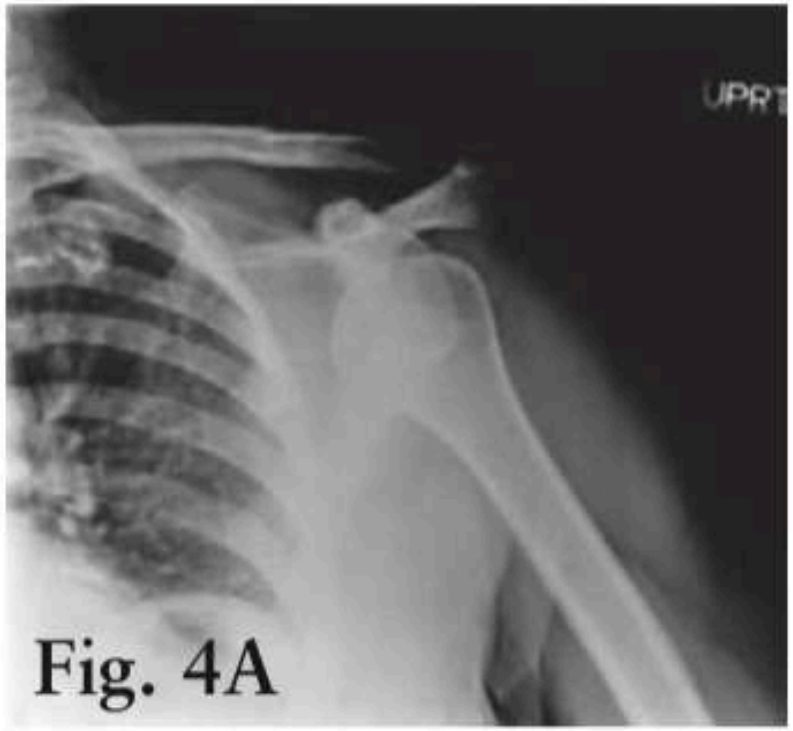


Fig. 4A

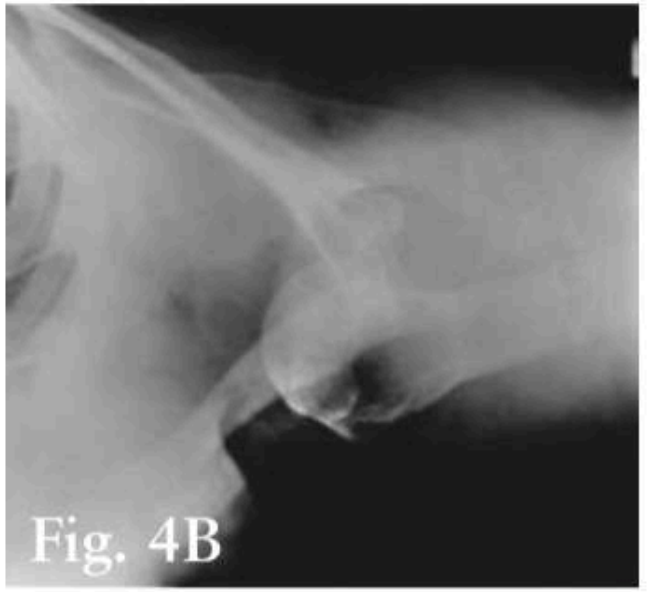


Fig. 4B

What should be the ideal position for Shoulder fracture reductions and shoulder dislocations ?

a) 140 degree abduction

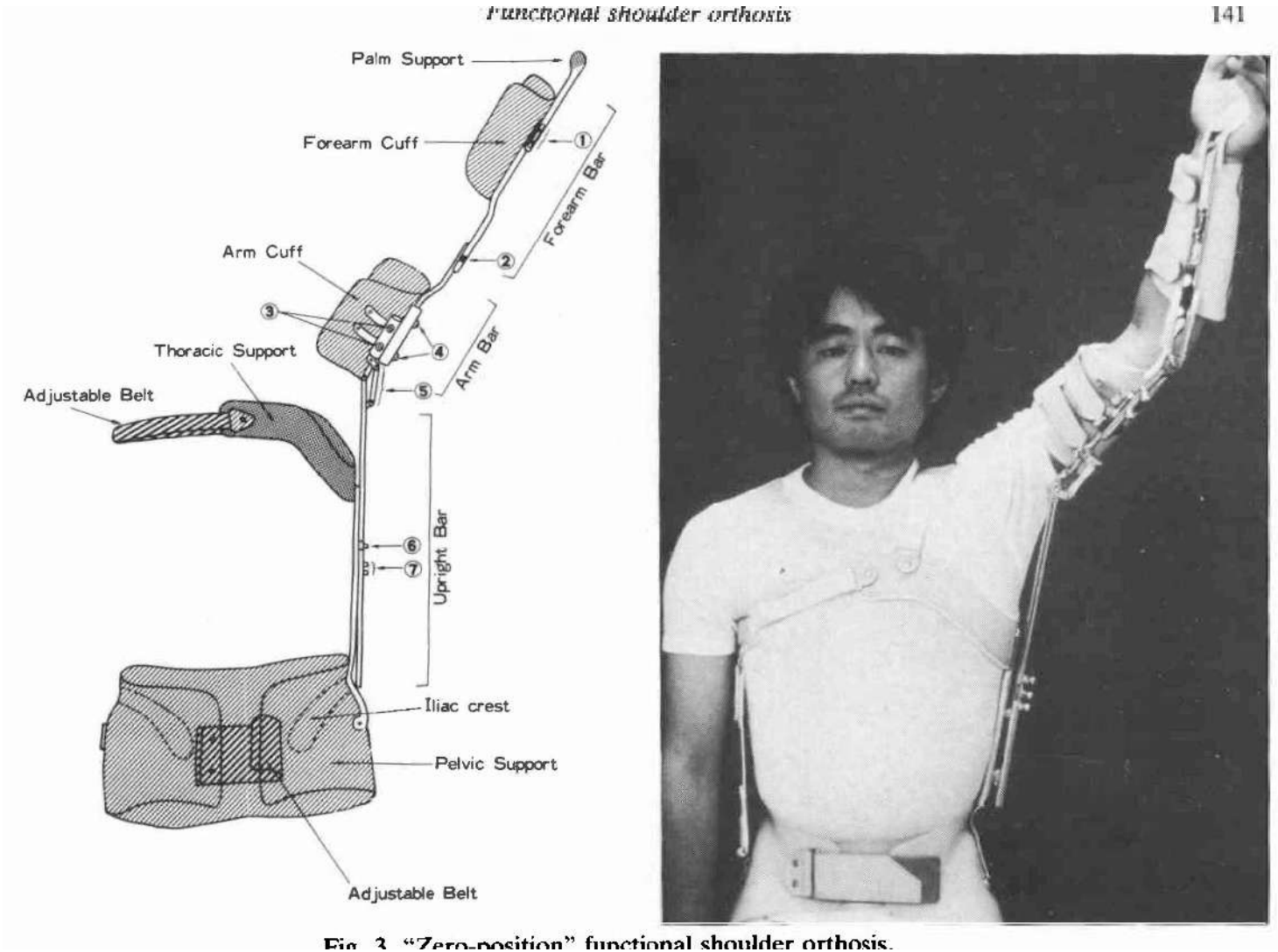
b) 140 degree abduction in scapular plane

c) 160 degree abduction

d) 160 degree abduction in scapular plane

- 160-degree abduction in Scapular plane

  Zero position ‘Angle of Saha’



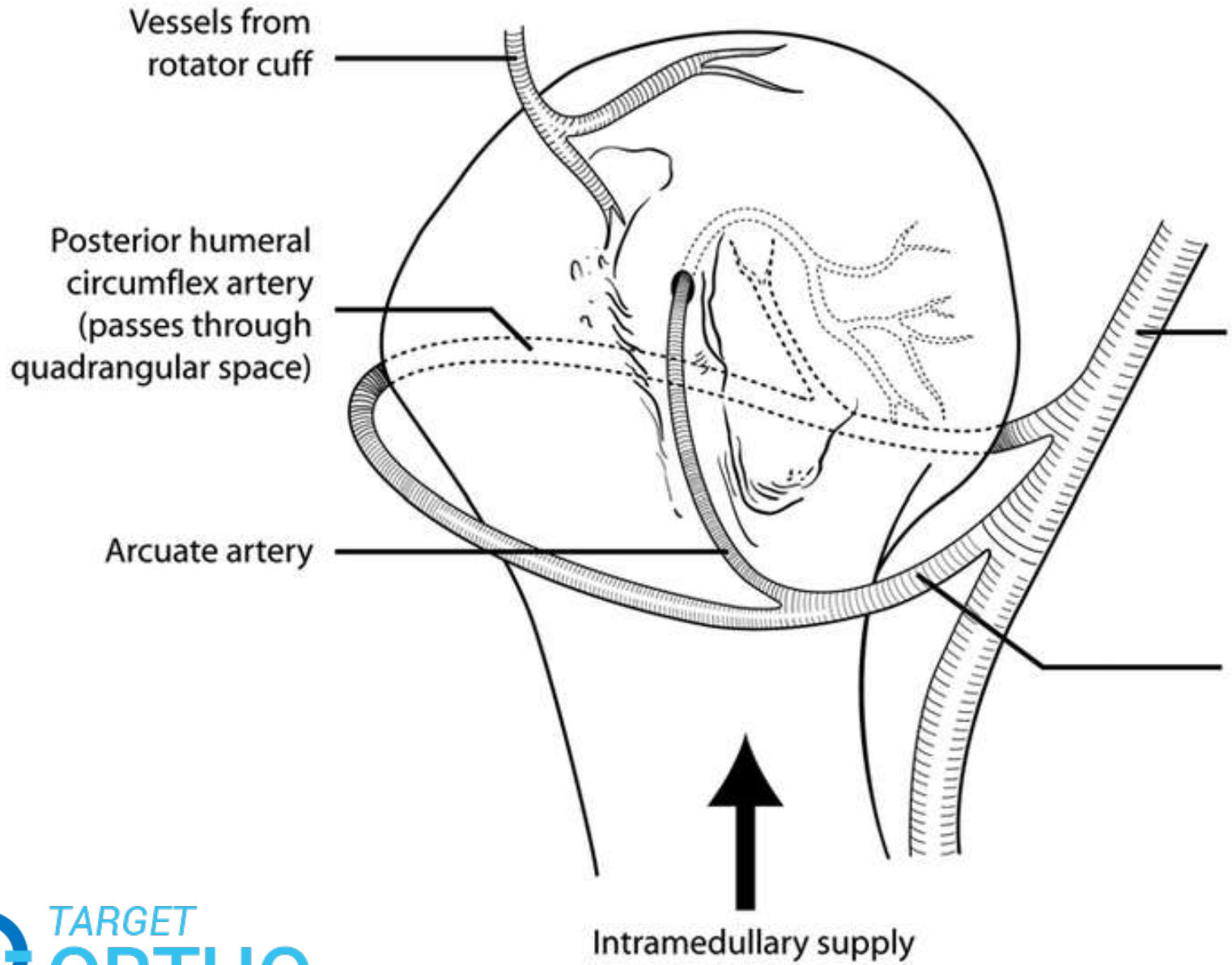
Majority of Humeral head is supplied by which blood vessel?

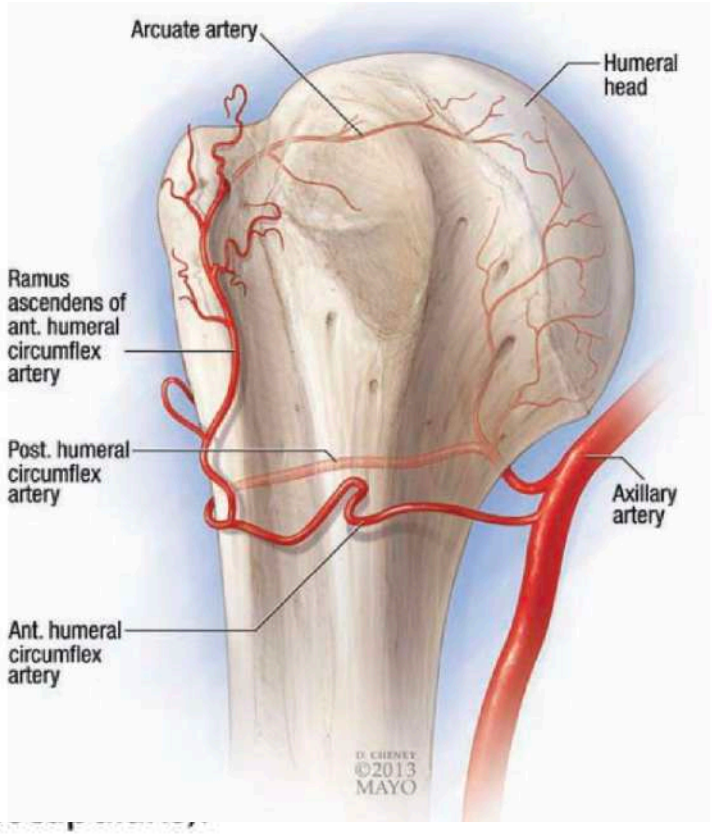
A) Thoraco-acromial

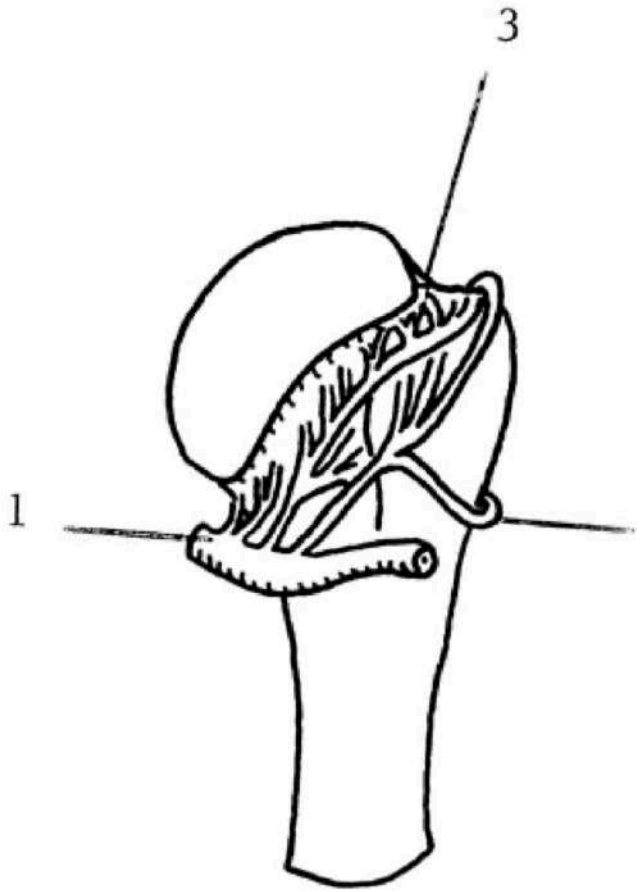
B) PHCA

C) AHCA

D) Suprascapular







Arterial blood supply of the proximal humeral epiphysis

F. Duparc, J.-M. Muller and P. Fréger

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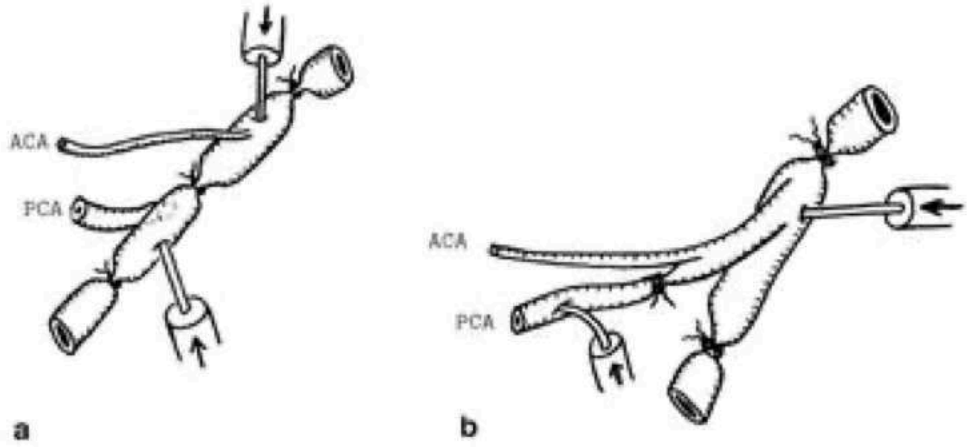
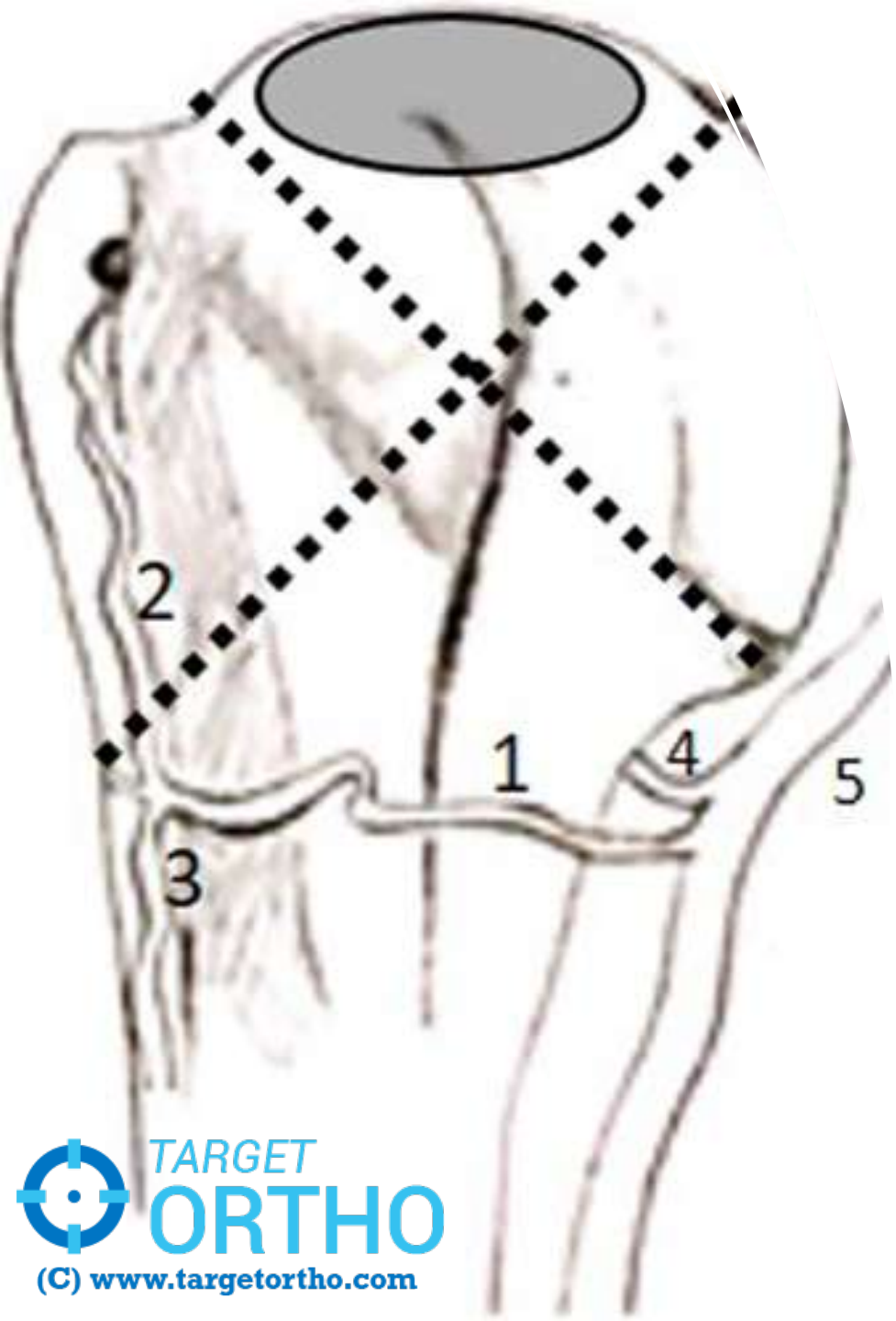


Injected a series of blood vessels with barium sulphate solution and confirmed that the vascularization of the humeral head is attributed to the branches of the arcuate artery.

Old fact : Arcuate artery (ACHA) supplies majority of the humeral head



Current Consensus

PHCA supplies 64% of the Humeral Head (Superior, Lateral and Inferior)

Hettrich et al

Keough et al

Majority of Humeral head is supplied by which blood vessel?

A) Thoraco-acromial

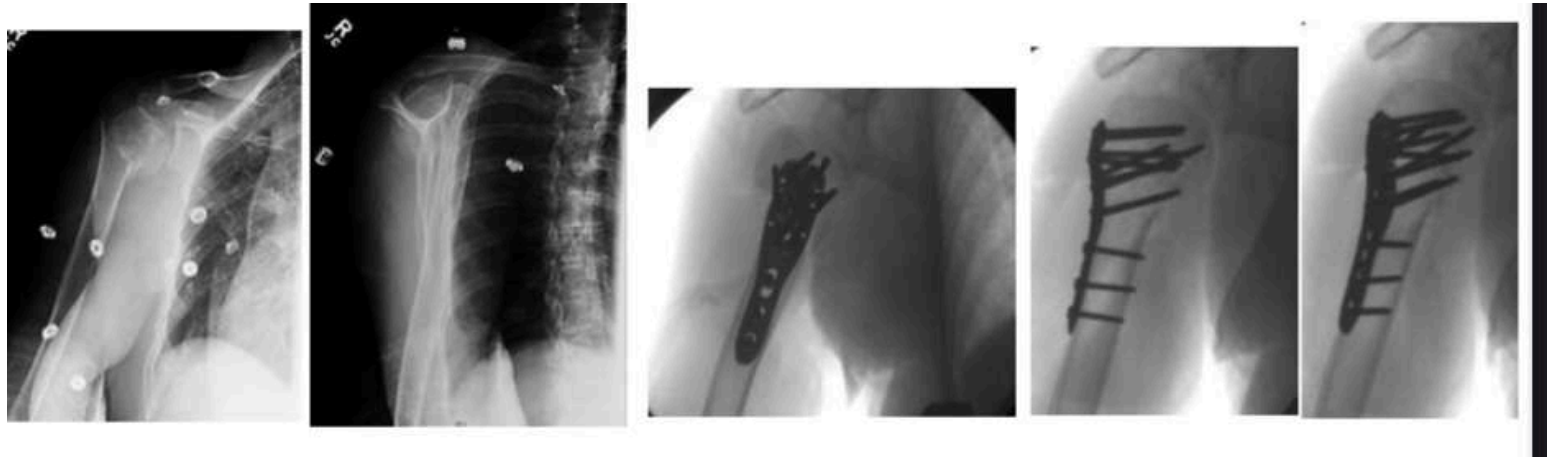
B) PHCA

C) AHCA

D) Suprascapular

A 64-year-old woman is thrown off a horse, sustaining the injury shown in Figures A and B. She undergoes surgical fixation as seen in Figures C through E. What is the most reported complication of this procedure?

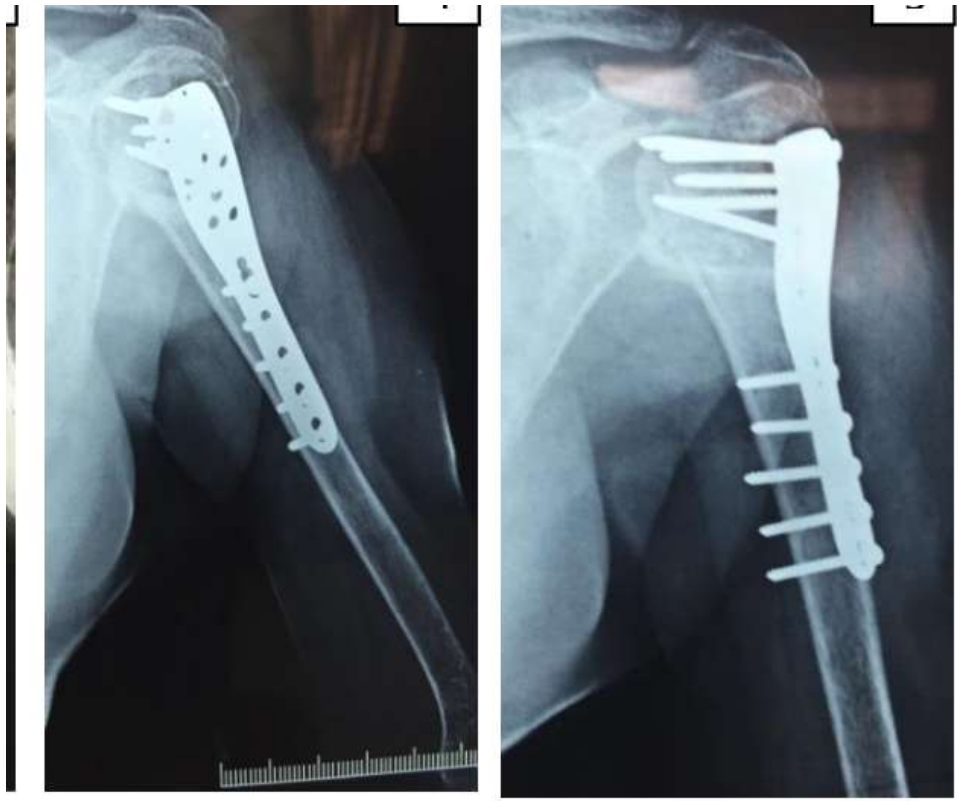
1. Axillary nerve injury
2. Valgus migration of the fracture
3. Non-union
4. Screw penetration



A B C D E

Most common reported complication of PHILOS plating

Screw perforation through humeral head



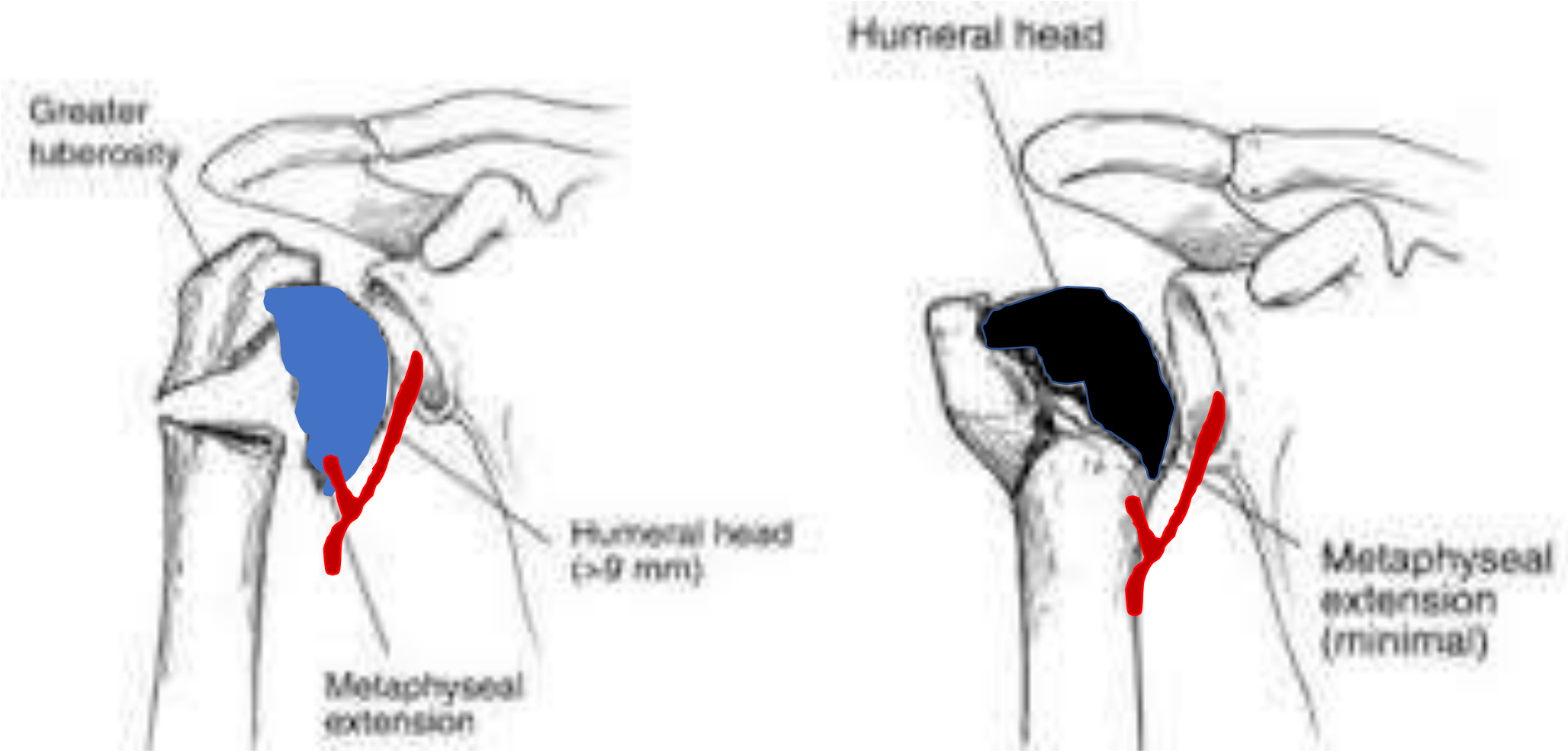
A 63-year-old female presents to the ED after tripping on the stairs and falling on her shoulder. Radiographs demonstrate a 3-part proximal humerus fracture. You discuss management of these fractures with her and warn her that there is a risk of humeral head ischemia. What is the most prognostic radiographic risk factor for humeral head ischemia?

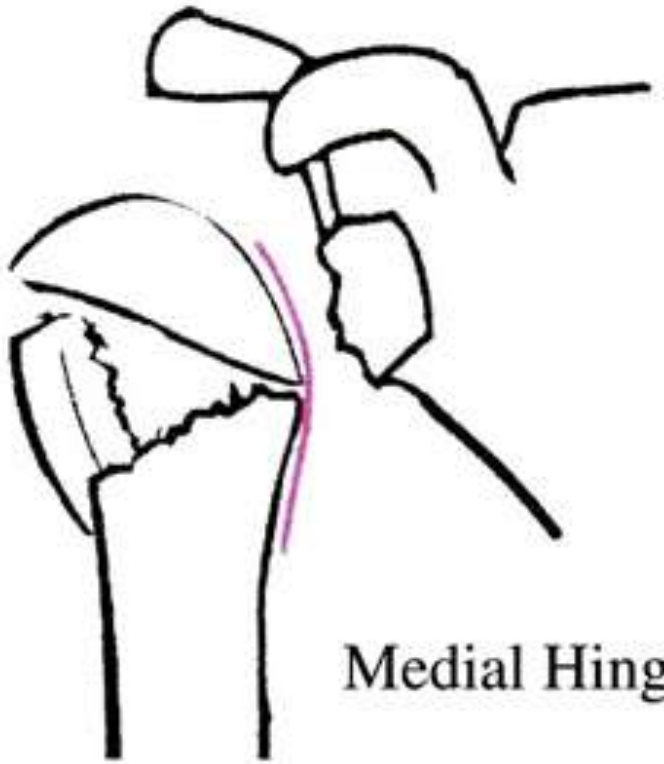
1) Displacement of 7 mm
2) 3-part valgus fracture pattern
3) Intact calcar length of 6 mm
4) Angulation of 30 degrees
5) Concomitant fracture involvement of the meta-diaphyseal humerus

Hertel's criteria

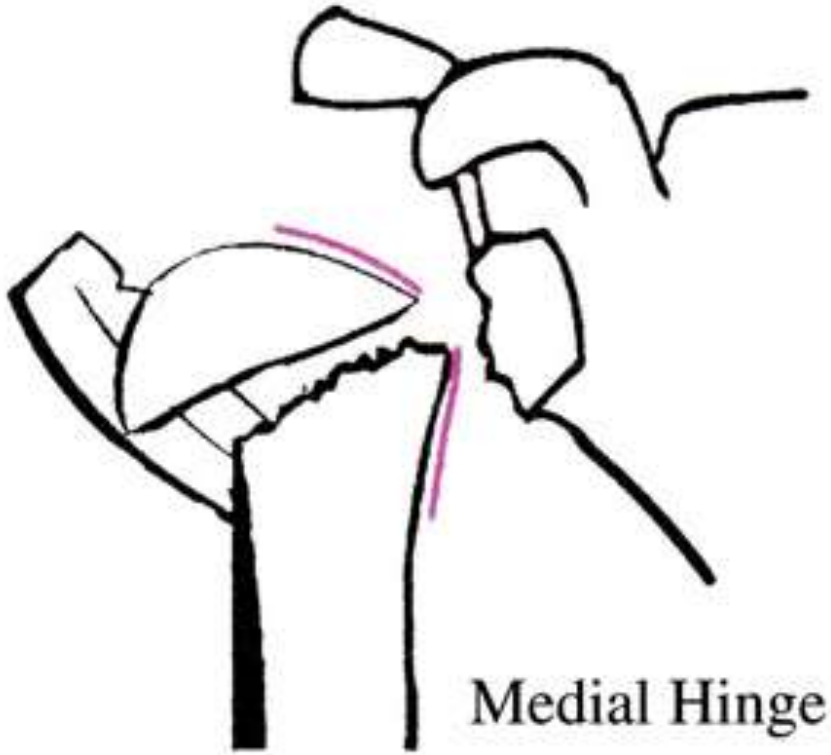
- Metaphyseal extension (with calcar) <8mm
- Loss of integrity of medial hinge (> 2mm)
- Fracture pattern - anatomical neck
- Comminution of medial metaphysis

97% Positive Predictive Value





Medial Hinge Intact



Medial Hinge Displaced

> 2mm displacement

Incorrect Answers:

- Answer 1: Displacement >10mm is a risk factor for humeral head ischemia
- Answer 2: While increasing fracture severity is a risk factor for humeral head ischemia, 3- part valgus fractures are not necessarily a specific risk factor for ischemia.
- Answer 4: Angulation > 45 degrees is a risk factor for humeral head ischemia.
- Answer 5: Concomitant involvement of the meta-diaphyseal proximal humerus is not a risk factor for humeral head

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5) Concomitant fracture involvement of the meta-diaphyseal humerus

A 37-year-old man sustains an isolated injury to his right arm as the result of being struck by a car. Examination reveals that the radial and ulnar pulses are normal, and the neurologic examination reveals that he is unable to extend the wrist, fingers, or thumb. A radiograph of the right humerus is shown in Figure. Management should consist of.

- 1. plate osteosynthesis via an anterolateral approach.
- 2. external fixation.
- 3. closed reduction and application of a splint.
- 4. exploration of the radial nerve and a locked intramedullary nail.
- 5. electrodiagnostic studies of the radial nerve

- PREFERRED RESPONSE: 3
- DISCUSSION: The patient has a high-energy closed humeral shaft fracture with an immediate complete radial nerve palsy. Closed reduction and application of a splint yield excellent results in closed humeral shaft fractures. With observation, the prognosis of the nerve injury is favorable for return of extension.
- Indications for surgical treatment, such as open fracture, vascular injury, a floating elbow, or associated intra-articular fractures, are not present. Exploration of radial nerve injuries has not been shown to improve the neurologic outcome.
- REFERENCES: Levine AM (ed): Orthopaedic Knowledge Update: Trauma. Rosemont, IL, American Academy of Orthopaedic Surgeons, 1996, pp 25-34. Zagorski JB, Latta LL, Zych GA, Finnieston AR: Diaphyseal fractures of the humerus: Treatment with prefabricated braces. J Bone Joint Surg Am 1988;70:607-610

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- **3. closed reduction and application of a splint.**
- 4. exploration of the radial nerve and a locked intramedullary nail.
- 5. electrodiagnostic studies of the radial nerve

Which of the following fracture patterns depicted in figures A-E is associated with the highest risk of radial nerve

- Spiral distal third humeral shaft fractures, called Holstein-Lewis fractures, have a 22% chance of having associated radial nerve palsy at presentation.
- Overall, 11% of humeral shaft fractures have associated radial nerve palsies.

Terrible triad of shoulder include all except (FNB Pattern Paper 2019)

1) Brachial plexus injury
2) Rotator cuff (RC) tear
3) Proximal humeral fracture
4) Anterior shoulder dislocation

“ Shoulder Terrible Triad Injury “

A	B	C
Abductor injury	Brachial plexus injury	Anterior glenoid injury
1. Rotator Cuff	1. Distal nerves	1. Capsulolabral
2. Greater tuberosity	2. Shoulder nerves	2. Bony Bankart

Terrible triad of shoulder include all except (FNB Pattern Paper 2019)

1) Brachial plexus injury
2) Rotator cuff (RC) tear
3) **Proximal humeral fracture**
4) Anterior shoulder dislocation

Elbow

Most important Varus Stabilizer of the elbow is :

(2016 FNB)

A) Coronoid process

B) MCL Anterior bundle

C) Extensor mass

D) LUCL

VALGUS STABILIZER	VARUS STABILIZER	PLR STABILITY	PMR STABILITY
PRIMARY – MCL ANTERIOR BUNDLE **SECONDARY** – RADIAL HEAD ARTICULATION FLEXOR PRONATOR MASS	**PRIMARY –** CORONOID PROCESS **SECONDARY-** LUCL EXTENSORS	**PRIMARY –** LUCL **SECONDARY-** RADIAL HEAD	MCL

Most important Varus Stabilizer of the elbow is :

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Which of the following is the most appropriate treatment for acute comminuted radial head fracture in association to Essex Lopresti injury?

a) Radial head preservation

b) Radial head excision

c) Sauvé Kapandji procedure

d) Darrach Procedure

- An Essex-Lopresti injury consists of a fracture of the radial head, disruption of the radio- ulnar interosseous membrane, and dislocation of the distal radioulnar joint.
- The diagnosis is frequently made late, ie, after excision of a comminuted radial head fracture, after pain develops at the distal radio- ulnar joint, and radiographs show progressive positive ulnar variance and/or dislocation due to proximal migration of the radial shaft.
- Patients who have undergone reduction and internal fixation of the radial head or replacement have done better than those who have had excision. Concurrent treatment should include reduction of the distal radioulnar joint and temporary stabilization.

Which of the following is the most appropriate treatment for acute comminuted radial head fracture in association to Essex Lopresti injury?

a) Radial head preservation

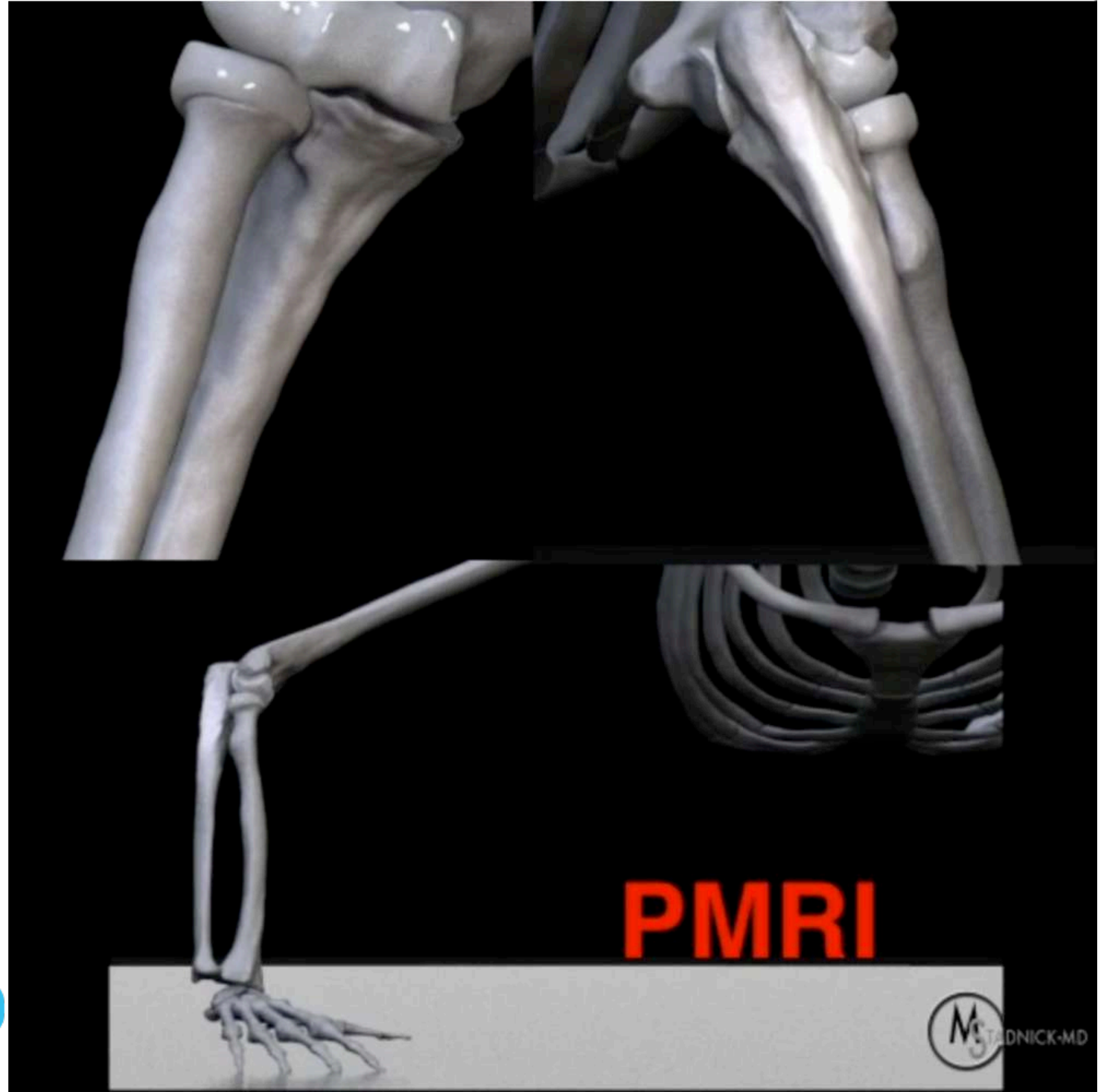
b) Radial head excision

c) Sauvé Kapandji procedure

d) Darrach Procedure

A 43-year-old male presents to the office one week after falling from a ladder and injuring his elbow. After reviewing the radiographs, it's determined that the patient has an injury pattern consistent with posteromedial rotatory instability. You explain to him that surgery will likely require fixation of both bony structures and soft tissues. Which of the following fractures is most likely

1) Coronoid tip fracture measuring 4mm
2) Anteromedial coronoid facet fracture
3) Medial humeral epicondyle fracture
4) Radial head fracture
5) Posteromedial olecranon fracture



Patients with posteromedial rotatory instability of the elbow present with fractures of the anteromedial facet of the coronoid.
Posteromedial rotatory instability of the elbow is typically associated with a fall backwards onto an outstretched arm, resulting in varus stress across the elbow and progressive pronation of the forearm. This results in fracture of the anteromedial coronoid facet, which often require open reduction internal fixation.
In addition, the lateral collateral ligament is typically compromised. This is identified as widening of the radio-capitellar joint during preoperative dynamic fluoroscopic examination.

A 43-year-old male presents to the office one week after falling from a ladder and injuring his elbow. After reviewing the radiographs, it's determined that the patient has an injury pattern consistent with posteromedial rotatory instability. You explain to him that surgery will likely require fixation of both bony structures and soft tissues. Which of the following fractures is most likely

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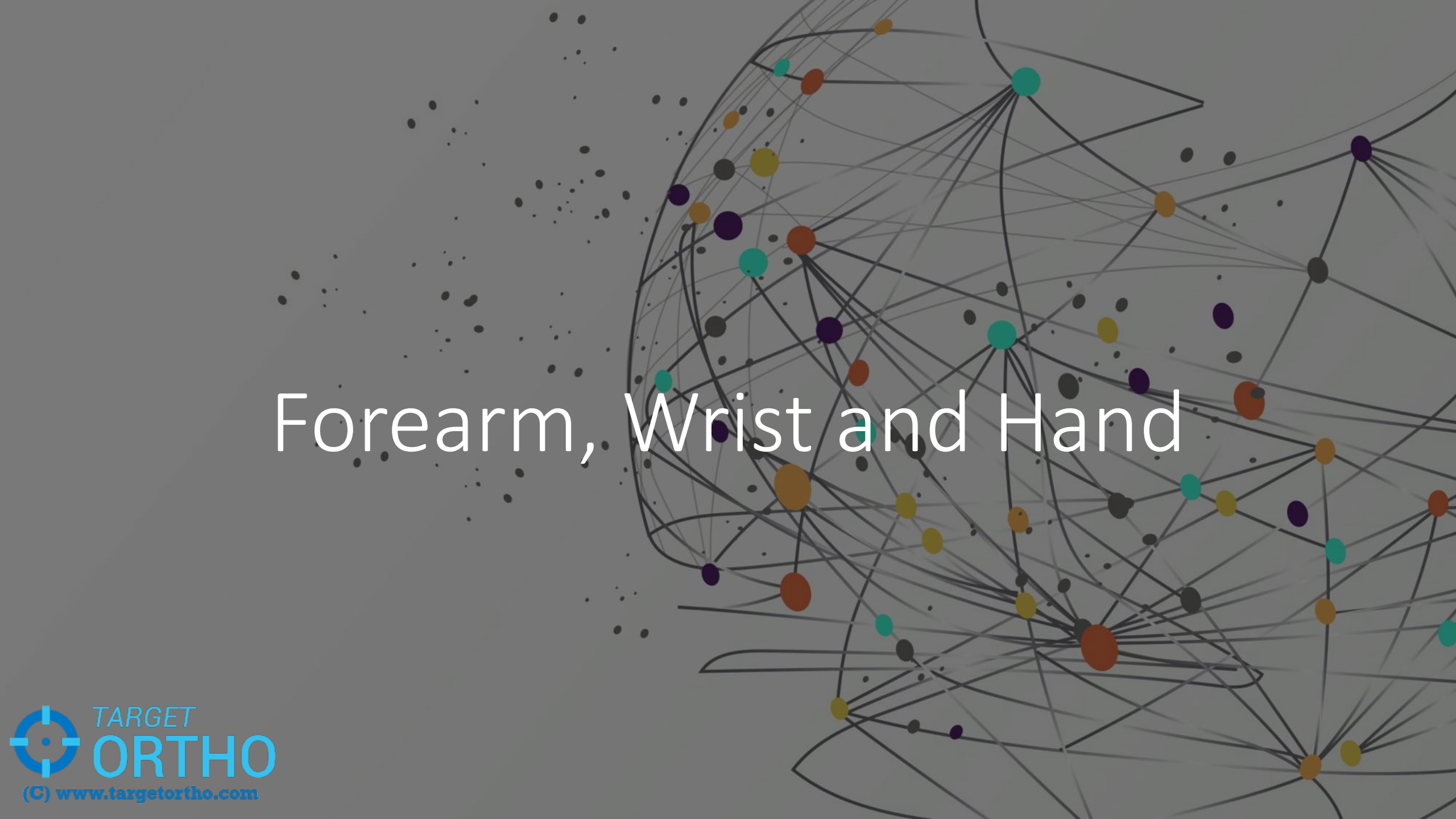
Most common nerve injury in Elbow Dislocations ?

- Median nerve
- Ulnar nerve
- Radial nerve
- PIN

Most common nerve injury in Elbow Dislocations ?

- Median nerve
- Ulnar nerve
- Radial nerve
- PIN

Forearm, Wrist and Hand



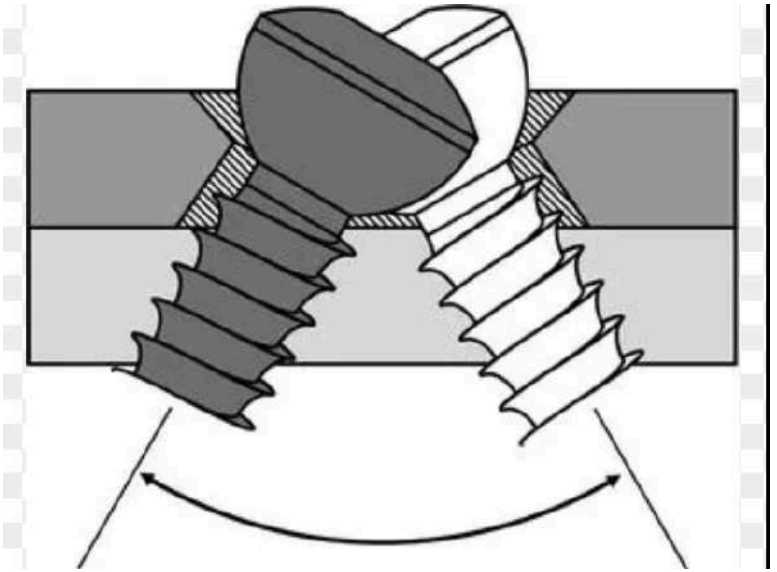
What angulation is allowed by screw holes in **LCDCP plate** in Transverse and Longitudinal plane ?

A) 7 degrees and 25 degrees

B) 7 degrees and 40 degrees

C) 20 degrees and 25 degrees

D) 20 degrees and 40 degrees



	Transverse	Longitudinal
LCP	7	25
LC DCP	20	40

What angulation is allowed by screw holes in **LCDCP plate** in Transverse and Longitudinal plane ?

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C) 20 degrees and 25 degrees

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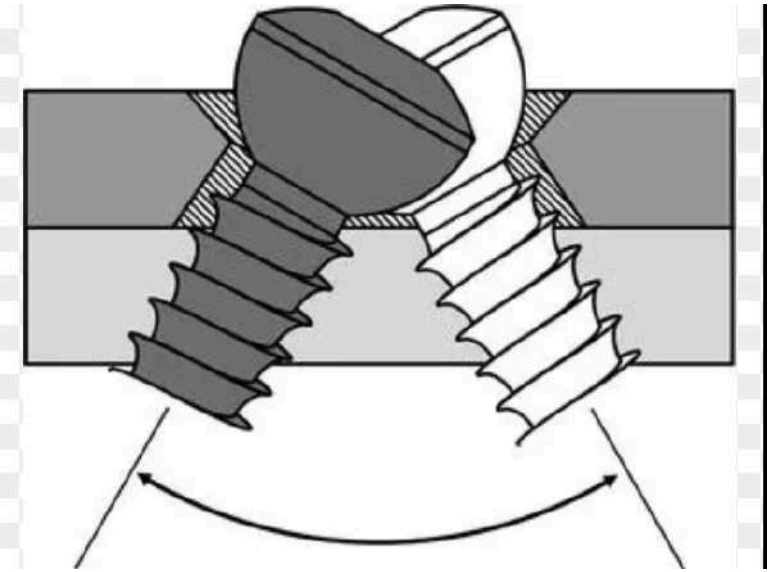
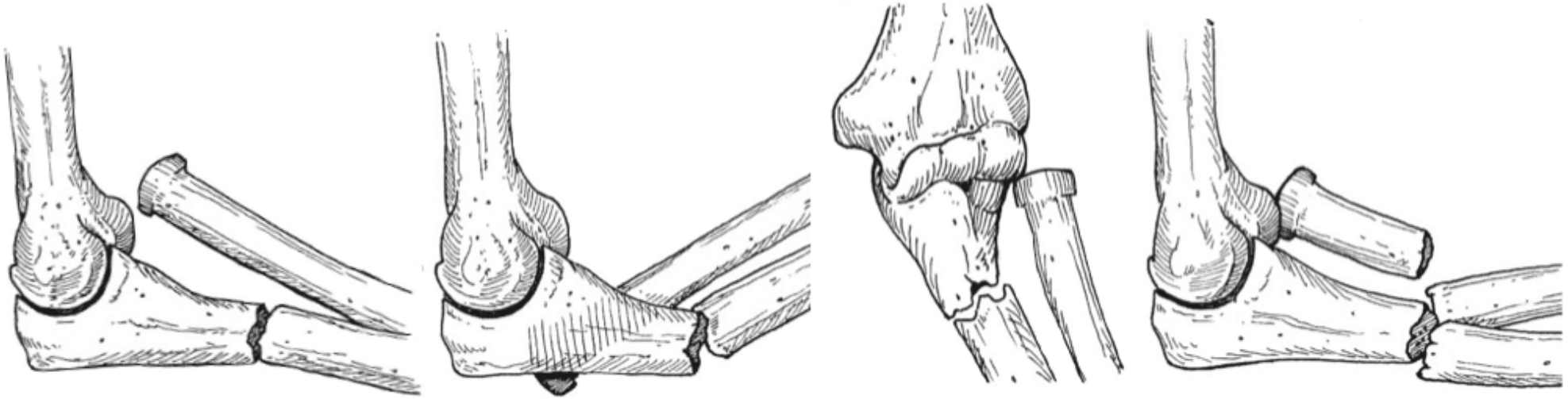


Based on Bado classification what type of Monteggia fracture Dislocation is this?

- Type 3
- Type 1
- Type 4
- Type 2



Type I | Type II | Type III | Type IV

Classification	Description	Notes
Type 1	Apex anterior angulation and anterior radial head dislocation	More common in children
Type 2	Apex posterior angulation with posterior radial head dislocation	More common in adults
Type 3	Lateral radial head dislocation	
Type 4	Fractures of both radius and ulna with radial head dislocation	

Figures 1 and 2 are the radiographs of a 64-year-old female who presents with an injury to the left wrist. Closed reduction and casting are performed as definitive treatment, and the fracture heals. Six months later, the patient has acute inability to extend her thumb. What is the most appropriate treatment?

A. Primary repair of the extensor pollicis longus (EPL) tendon
B. Malunion correction and primary repair of the EPL tendon
C. Transfer of the extensor indicis proprius to the EPL tendon
D. Splinting of the thumb and occupational therapy to maintain range of motion and regain strength

- Rupture of the EPL tendon may occur after nonoperative treatment of a distal radius fracture. Described incidence is between 0.3% and 3% of nonoperatively treated distal radius fractures. Transfer of the extensor indicis proprius to the EPL has resulted in excellent results for restoring thumb extension. Primary repair or nonoperative treatment are unlikely to result in sustained improvement in thumb extension.

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C. Transfer of the extensor indicis proprius to the EPL tendon

D. Splinting of the thumb and occupational therapy to maintain range of motion and regain strength

Name the main structure for hindrance of reduction ?

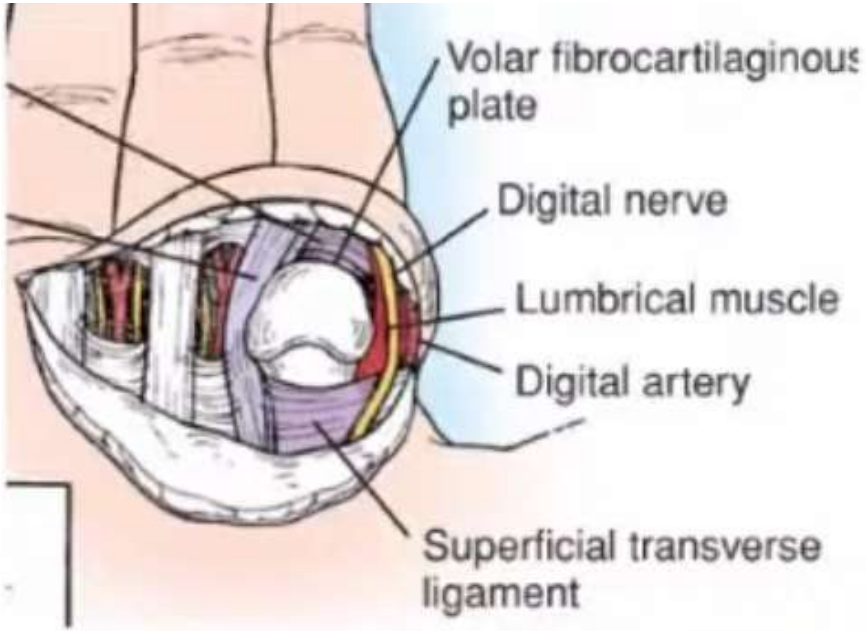
A) Metacarpal head

B) Flexor pollicis brevis

C) Volar fibrocartilage

D) Sagittal bands

c) Volar Fibrocartilage plate placed dorsally



often is required. The major obstruction preventing reduction of the metacarpophalangeal joint is the displaced volar fibrocartilaginous plate lying dorsal to the metacarpal head.

Name the main structure for hindrance of reduction ?

A) Metacarpal head

B) Flexor pollicis brevis

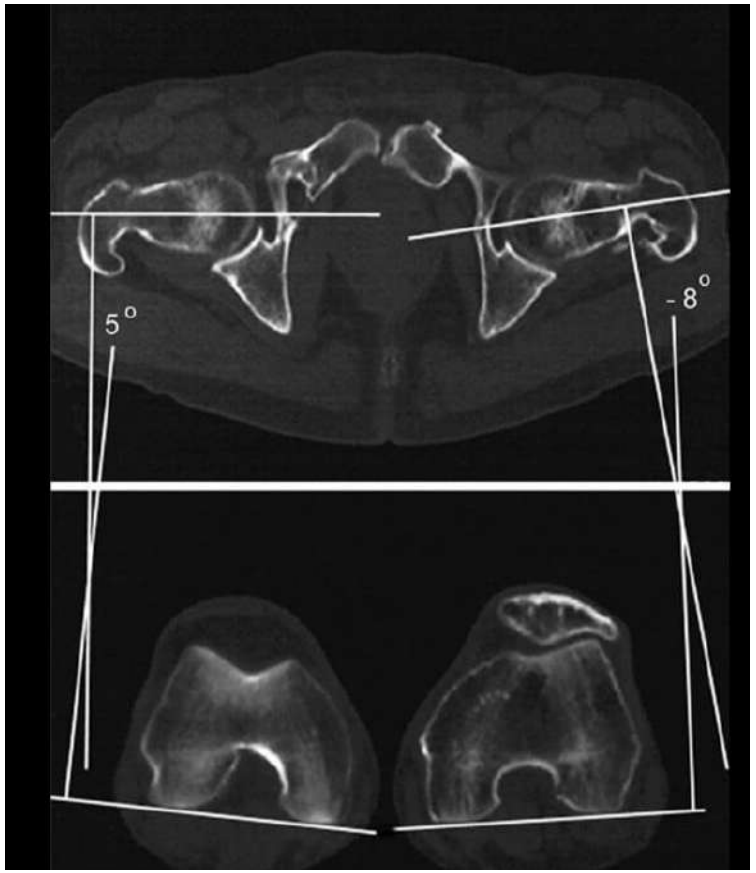
C) Volar fibrocartilage

D) Sagittal bands

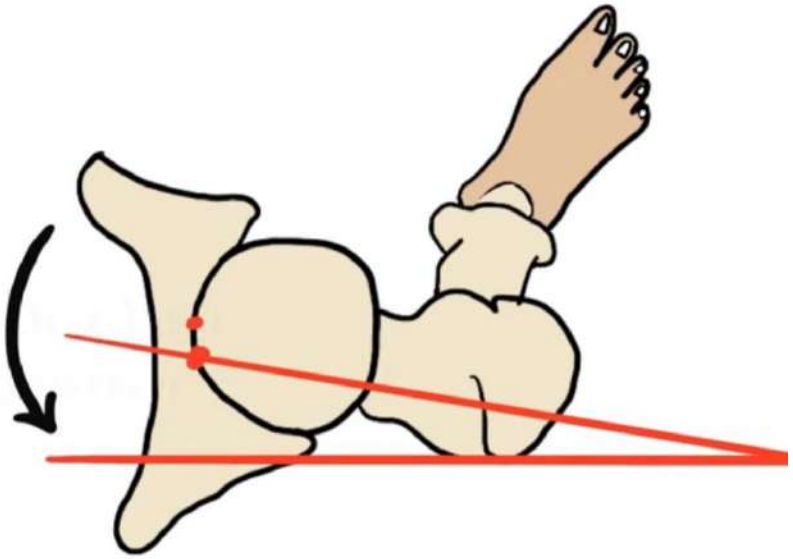
Hip and Knee

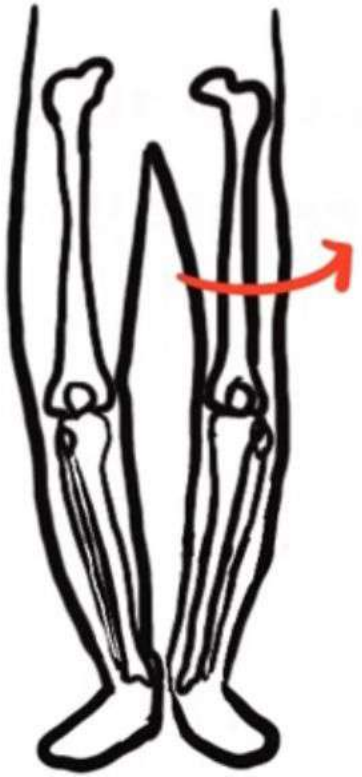
A radiologist uses CT scans to perform research on rotational malalignment of femoral shaft fractures treated with IM nails. He determines the angle between a line drawn tangential to the femoral condyles and a line drawn through the axis of femoral neck . He does this for both the injured and uninjured sides. In Figure A what malalignment is present for injured left side compared with uninjured right side?

- Internal rotational malalignment of 13 degree
- External rotational malalignment of 13 degree
- Internal rotational malalignment of 3 degree
- External rotational malalignment of 3 degree



- If we take the Right side anteversion as normal that is 5 degrees
- Left side angle has reduced to – 8 degrees
- This is 13 degrees reduction in Anteversion (to retroversion)





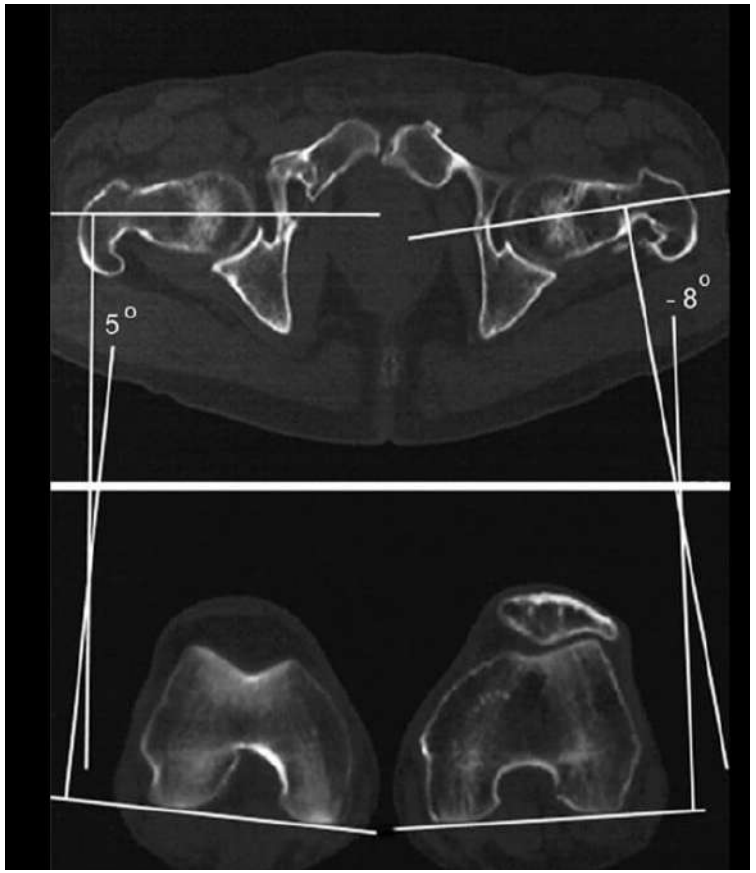
In retroversion femoral head will get rotated posteriorly

And patient will walk with out-toeing gait

and there is Compensatory External rotation of femoral shaft

A radiologist uses CT scans to perform research on rotational malalignment of femoral shaft fractures treated with IM nails. He determines the angle between a line drawn tangential to the femoral condyles and a line drawn through the axis of femoral neck . He does this for both the injured and uninjured sides. In Figure A what malalignment is present for injured left side compared with injured right side?

- Internal rotational malalignment of 13 degree
- **External rotational malalignment of 13 degree**
- Internal rotational malalignment of 3 degree
- External rotational malalignment of 3 degree



A 36-year-old male presents to the emergency department following a high-speed motor vehicle collision. Imaging obtained in the trauma bay shows a comminuted femoral shaft fracture. Which additional imaging should be obtained to rule out a concomitant fracture

1) CT imaging of the knee
2) Radiograph of the contralateral femur
3) Radiograph of the ipsilateral hip
4) Radiograph of the ipsilateral tibia
5) Radiograph of the lumbar spine

- This patient sustained a high-energy femoral shaft fracture. Imaging of the ipsilateral hip should be obtained to rule out a concomitant femoral neck fracture. Ipsilateral femoral neck fractures should be considered in all high-energy femoral shaft fractures, as they have a reported incidence of 0-15%. These associated injuries are often Basi cervical, vertical, and nondisplaced in nature. The lack of displacement is due to the majority of energy being dissipated through femoral shaft. These injuries are missed approximately 19-31% of the time. Imaging of the ipsilateral hip should be obtained.

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3) Radiograph of the ipsilateral hip
4) Radiograph of the ipsilateral tibia
5) Radiograph of the lumbar spine

A 35-year-old man presented to emergency with H/O RTA. He finds difficulty in bearing weight on right lower limb. He C/O pain in right hip. The limb is in an attitude of flexion, adduction and internal rotation. What may be the likely cause?

a. Fracture neck femur
b. Transverse fracture acetabulum
c. Posterior dislocation hip
d. Pipkins fracture dislocation hip

Pipkin	Description	Illustration
Pipkin 1	Femoral head fracture inferior to the fovea capitis. If nondisplaced, can be treated conservatively.	
Pipkin 2	Femoral head fracture extends above the fovea capitis (the medial fracture fragment includes the fovea). Typically treated operatively.	
Pipkin 3	Femoral head fracture (Pipkin 1 or 2) with femoral neck fracture. Increased risk of avascular necrosis. Typically treated with fixation in a younger patient and with arthroplasty in an older patient.	
Pipkin 4	Femoral head fracture (Pipkin 1 or 2) with an acetabular fracture. Treatment depends on the size and degree of displacement of the fragments.	

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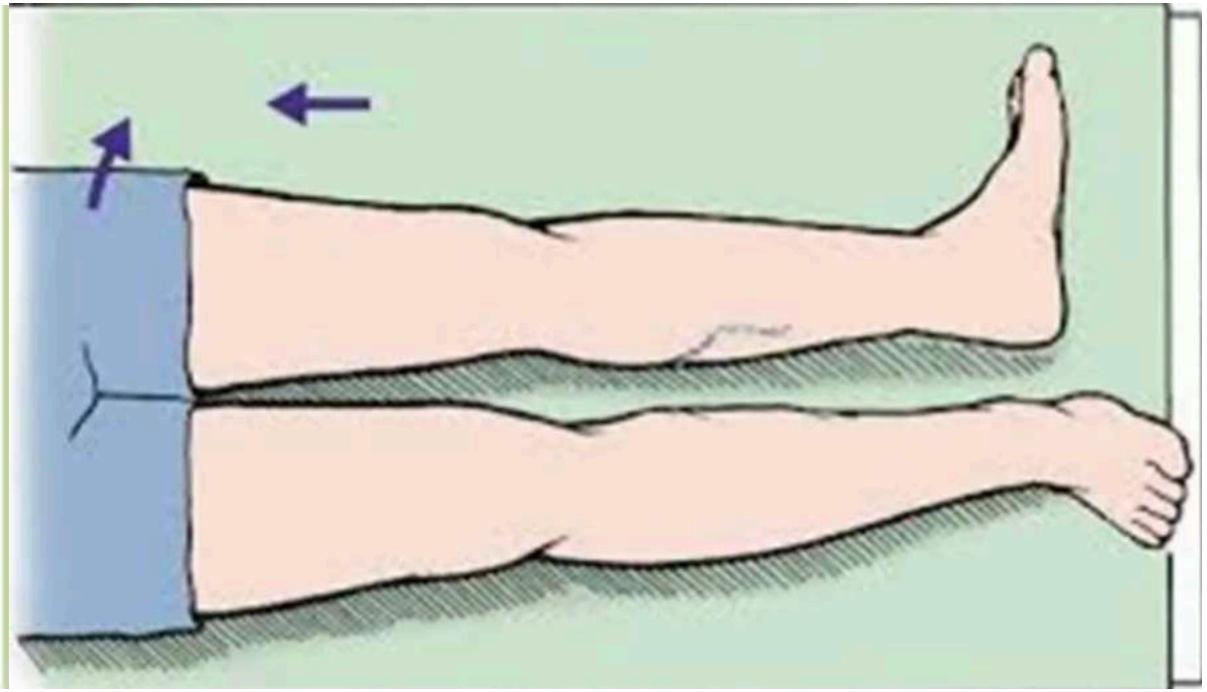
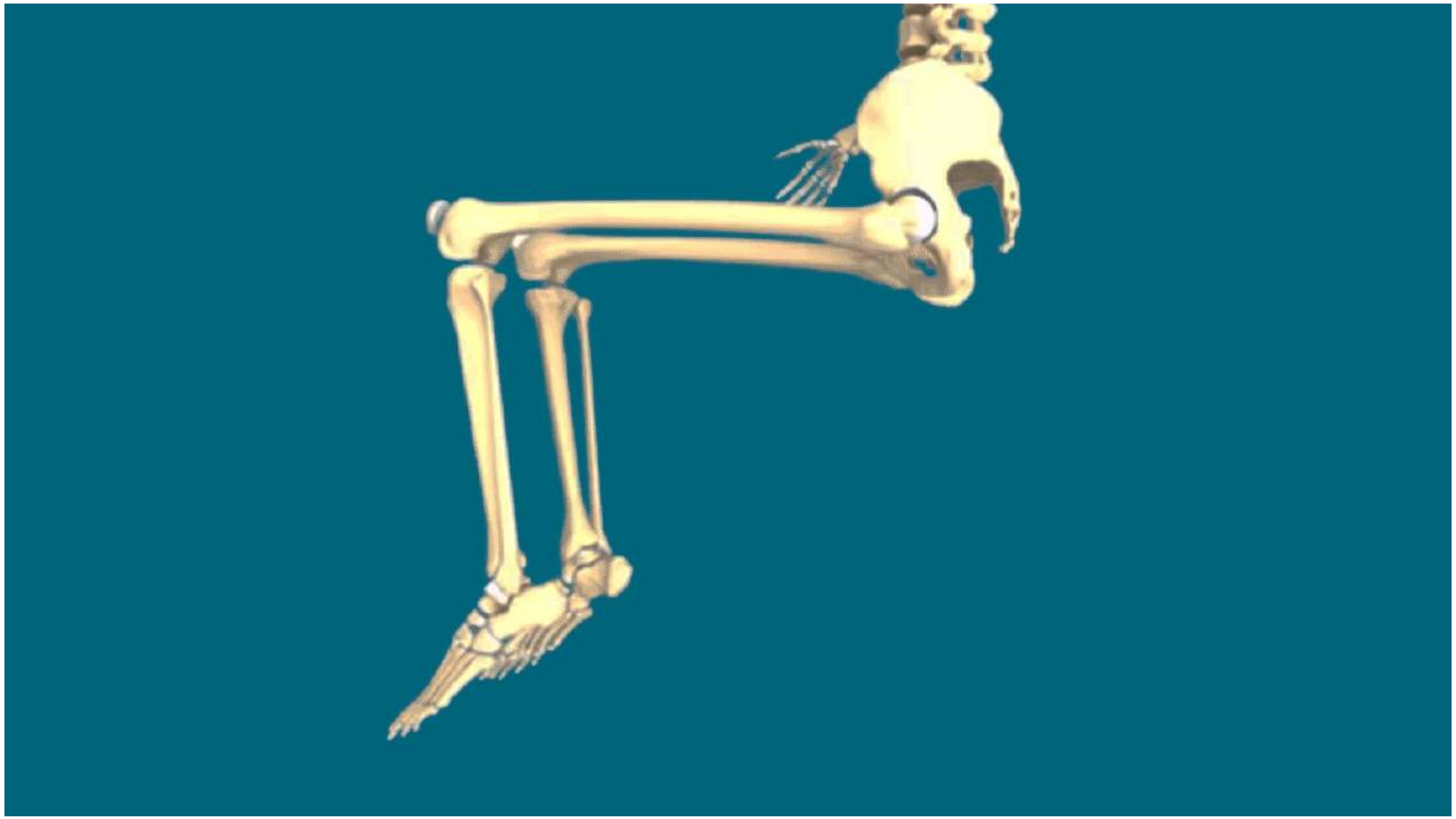
a. Fracture neck femur
b. Transverse fracture acetabulum
c. Posterior dislocation hip
d. Posterior fracture dislocation of hip (with Femoral head #)

Neck of Femur and Intertrochanteric Femur Fracture – Attitude of Limb





ALGORITHM FOR HIP DISLOCATION

SUSPECTED HIP DISLOCATION

"Look for keywords"

Femoral head or globular mass felt…

In Gluteal region

Attitude – FADIR
Limb shortening

POSTERIOR PURE HIP D/L

Attitude – Mixed

POSTERIOR HIP FRACTURE D/L

In Groin / femoral triangle

Attitude – FABER
Limb lengthening

ANTERIOR PURE HIP D/L

Attitude – Mixed

ANTERIOR HIP FRACTURE D/L

On per rectal examination

CENTRAL HIP FRACTURE DISLOCATION

A 35-year-old man presented to emergency with H/O RTA. He finds difficulty in bearing weight on right lower limb. He C/O pain in right hip. The limb is in an attitude of flexion, adduction and internal rotation. What may be the likely cause?

a. Fracture neck femur
b. Transverse fracture acetabulum
c. **Posterior dislocation hip**
d. Pipkins fracture dislocation hip

Concerning Pipkin's classification of femoral head and neck fracture, which of the following is not true ?

A. Posterior dislocation of the hip with fracture of the femoral head caudal to the fovea centralis is a Type 1 fracture
B. A type 3 fracture is rare, in conjunction with Femoral neck fracture
C. Posterior dislocation of the hip with fracture of the femoral head cephalad to the fovea centralis is type 2 fracture
D. A femoral head fracture with associated fracture of acetabulum is a type 3 fracture

Concerning Pipkin's classification of femoral head and neck fracture, which of the following is not true ?

A. Posterior dislocation of the hip with fracture of the femoral head caudal to the fovea centralis is a Type 1 fracture
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C. Posterior dislocation of the hip with fracture of the femoral head cephalad to the fovea centralis is type 2 fracture
D. A femoral head fracture with associated fracture of acetabulum is a type 3 fracture

Figures 1 through 3 are the radiograph and CT scans of a 15-year-old female who presents to the emergency department with pain in her left hip. She says she fell several hours ago while riding a scooter and has been unable to ambulate ever since. On physical examination, the patient is neurovascularly intact to the left lower extremity and is otherwise stable; no other systemic injuries are noted. By the time the workup of this patient is completed, it is 2:15 AM. What is the most appropriate next step

A. Closed reduction under conscious sedation in the emergency department
B. Placement of left distal femoral skeletal traction
C. Proceed to the operating room emergently for operative fixation
D. Proceed to the operating room when the appropriate

- The patient sustained a displaced, intracapsular, transcervical femoral neck fracture and is stable with the isolated skeletal injury. The fracture is displaced with a classic apex anterior deformity and is notably vertical in nature, which is typical of high- energy injuries with a documented propensity for potential failure.
- While it is an urgent procedure, there is no need for emergent overnight surgery; the timing to reduction and fixation for this injury has been shown not to be necessary within 6 hours as previously thought.
- The 1 factor that remains critical to success is the quality of and achieving the most anatomic reduction possible, and this will likely happen with a well-rested and alert surgeon with the most optimal setup including an orthopaedic trauma room with orthopaedic staff and optimal fluoroscopic support. There is no need for any type of traction, as it can potentially put the capsule, which is likely still intact, on tension and therefore increase the intracapsular pressure. This could potentially restrict circulation to the femoral neck blood supply and is therefore not indicated.
- Similarly, the role for percutaneous capsulotomy makes sense from a basic science standpoint but has not been shown to have a visible clinical impact and is therefore not warranted

Figures 1 through 3 are the radiograph and CT scans of a 15-year-old female who presents to the emergency department with pain in her left hip. She says she fell several hours ago while riding a scooter and has been unable to ambulate ever since. On physical examination, the patient is neurovascularly intact to the left lower extremity and is otherwise stable; no other systemic injuries are noted. By the time the workup of this patient is completed, it is 2:15 AM. What is the most appropriate next step

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B. Placement of left distal femoral skeletal traction
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D. Proceed to the operating room when the appropriate team

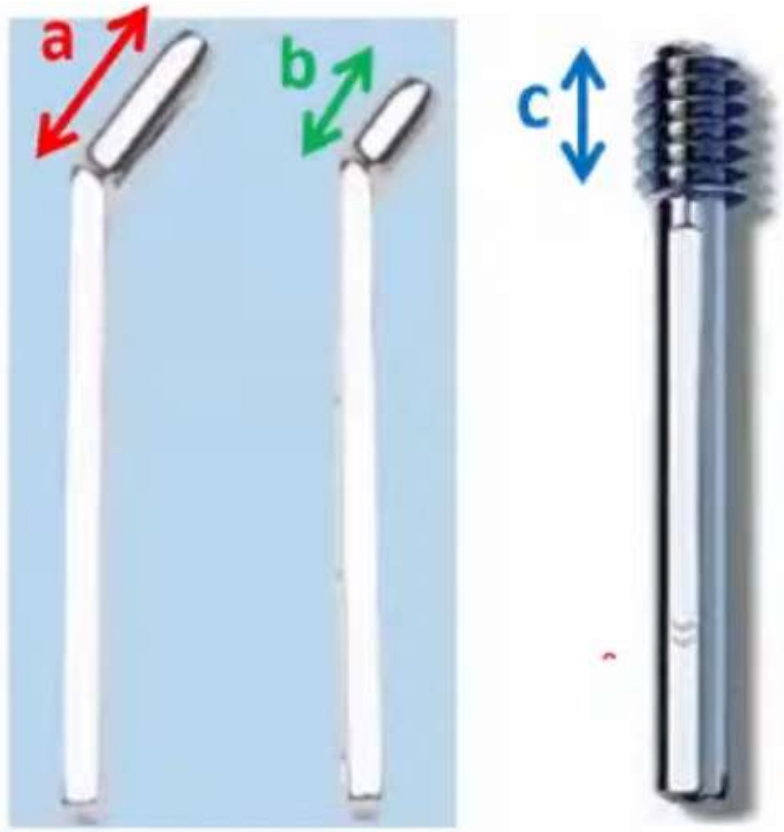
In Dynamic Hip Screw, give the measurement of

a) Barrel length for long barrel

b) Barrel length for short barrel

c) Length of threads in Richard Screw

- 38mm, 25mm, 14mm
- 38mm,22mm,14mm
- 35mm,25mm,22mm
- 38mm,25mm,22mm



Richard Screw

RICHARD SCREW PARTS	DIMENSIONS
THREAD DIAMETER	14MM
CORE DIAMETER	8MM
PITCH	3MM
THREAD LENGTH	22MM

SHORT BARREL VS LONG BARREL

SIDE PLATE → LONG BARREL 38mm

SHORT BARREL 25mm

BARREL LENGTH – 38MM
THREAD LENGTH – 22MM
COLLAPSE – 25MM

IF LAG SCREW > 85MM
LONG BARREL

IF LAG SCREW < 85MM
SHORT BARREL

In Dynamic Hip Screw, give the measurement of
a) Barrel length for long barrel
b) Barrel length for short barrel
c) Length of threads in Richard Screw

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- 38mm,22mm,14mm
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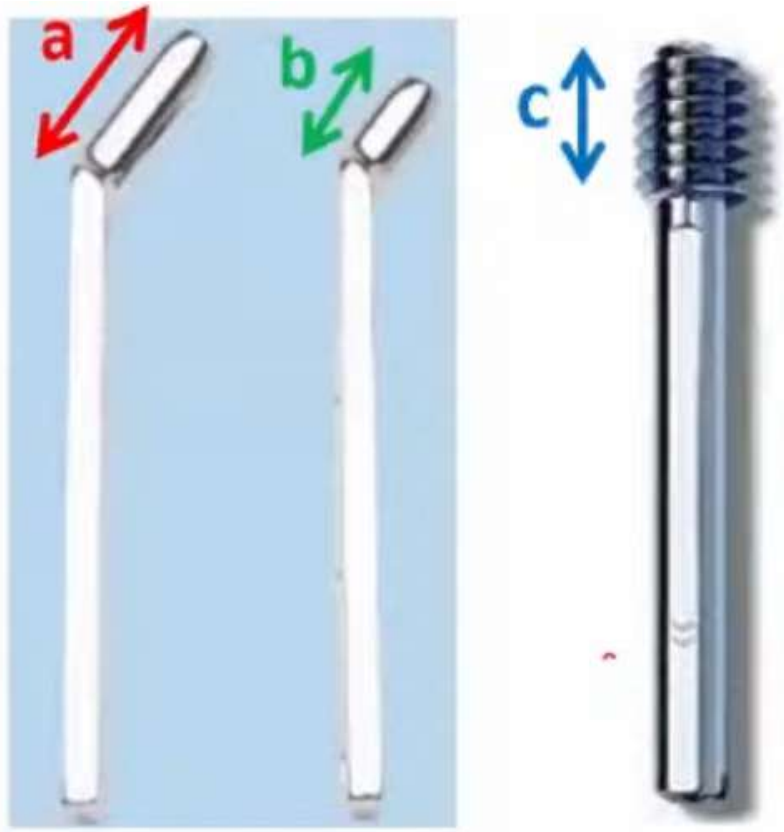
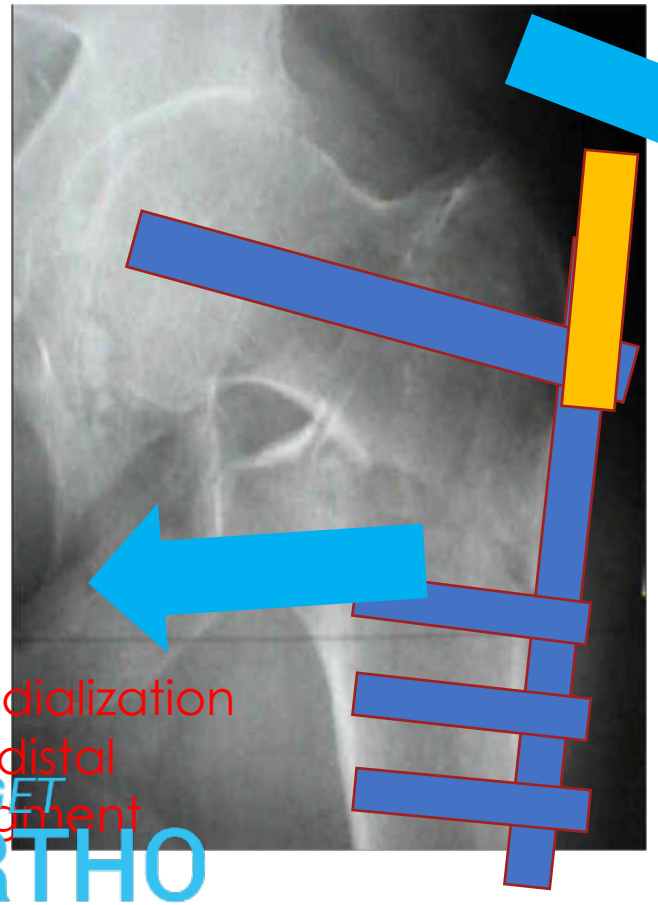


90-year-old female who lives alone at home trips over her cat and falls to the ground. She complains of hip pain and inability to bear weight and is brought to the ED where radiographs are obtained and seen in Figure A. For what reason would a cephalo-medullary nail be preferred to a sliding hip screw?

1) Shorter length of hospital stay
2) Improved stability due to fracture pattern
3) Less damage to hip abductors
4) Easier conversion to total hip arthroplasty
5) More cost-effective

REVERSE OBLIQUE FRACTURE



Shearing force
Proximal fragment to collapse

Mediolization
Of distal fragment

SOLUTION

PFN

TSP+ DHS

- Cephalo-medullary nailing (CMN) would be preferred to sliding hip screw (SHS) fixation in intertrochanteric hip fractures with reverse obliquity patterns.

- In intertrochanteric hip fractures with less stability, like those with subtrochanteric extension or reverse obliquity, CMN may improve failure and reoperation rates by creating a fixed angle device with favorable biomechanical properties

- DHS and CMN are reasonable options for use in stable intertrochanteric hip fractures, but CMN is recommended in cases of unstable fracture. Chou et al. looked at the outcomes regarding CMN use to treat reverse obliquity intertrochanteric hip fractures. They noted that those with reverse obliquity fractures treated with CMN demonstrated satisfactory reduction with low rates of complication. They suggested that long CMN is recommended in cases of reverse obliquity hip fractures

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Figure 1 is radiograph of a 96-year-old woman who fell down two steps and comes to the emergency department with an inability to bear weight and right hip pain. Figure 2 is the post-traction radiograph. What intra- operative event would increase the rate of failure when using a sliding hip screw (SHS) to treat this fracture pattern

A) Penetration of femoral head with guide wire

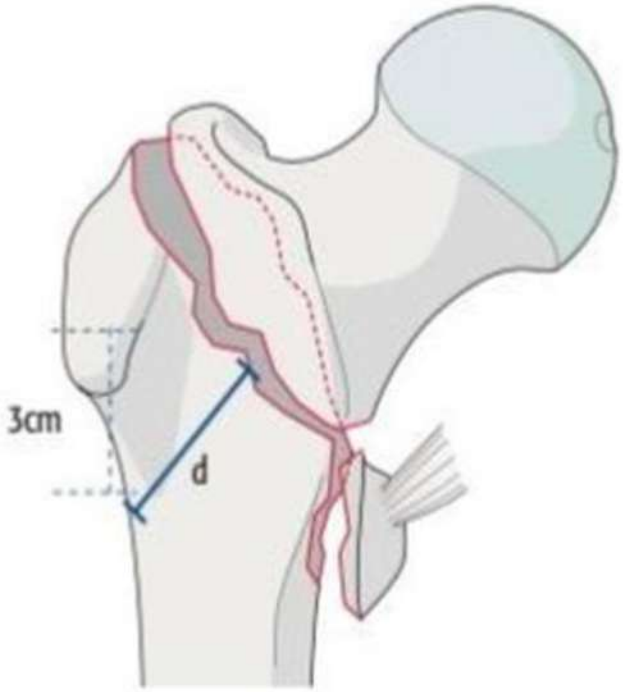
B) Obtaining a tip apex distance of less than 25mm

C) Fracture of lateral wall

D) Using a 2-hole SHS instead of 4-hole SHS

CONCEPT OF LATERAL WALL

CONCEPT OF LATERAL WALL



- Lateral wall thickness is defined as distance in millimeters (mm) from a reference point 3 cm below innominate tubercle of GT angled 135° upwards to the fracture line in the midpoint between the two cortex point on AP traction x-rays in neutral rotation
- The thickness must be less than 20.5 mm for the fracture to be A2

AO

D = < 20.5

↓

Lateral wall insufficiency

↓

UNSTABLE A2

STABLE FRACTURE – DHS
UNSTABLE FRACTURE – PFN

Figure 1 is radiograph of a 96-year-old woman who fell down two steps and comes to the emergency department with an inability to bear weight and right hip pain. Figure 2 is the post-traction radiograph. What intra- operative event would increase the rate of failure when using a sliding hip screw (SHS) to treat this fracture pattern

A) Penetration of femoral head with guide wire

B) Obtaining a tip apex distance of less than 25mm

C) Fracture of lateral wall

D) Using a 2-hole SHS instead of 4-hole SHS

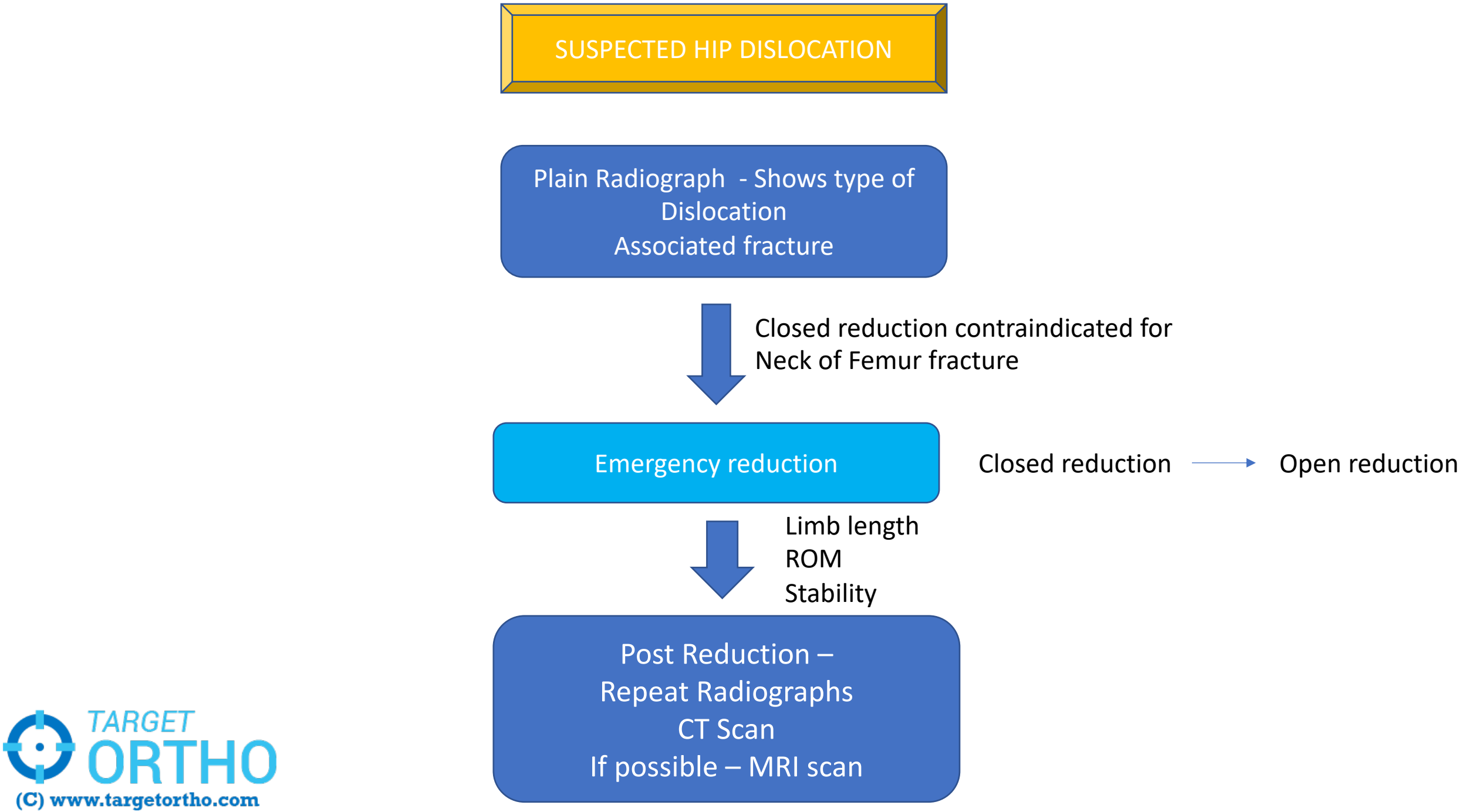
- Figure 1 is the initial CT scan of a 55-year-old day laborer who is brought to the emergency department after he fell off a roof. He has no other injuries, and medical history is unremarkable. Physical examination shows a shortened and internally rotated leg. Several attempts at closed reduction in the trauma bay are unsuccessful, but closed reduction under general anesthesia is successful. A post reduction radiograph is shown in Figure 2, and a coronal cut CT scan showing anatomical reduction is shown in Figure 3. After reduction, no mechanical block or instability is noted with range of motion of the hip under anaesthesia. Given this patient's injury pattern and the current location of the injury, what is the best next step?

A) ORIF of Fracture

B) Hip arthroscopy with fragment excision

C) Non operative treatment

D) Total hip arthroplasty



CT Post reduction

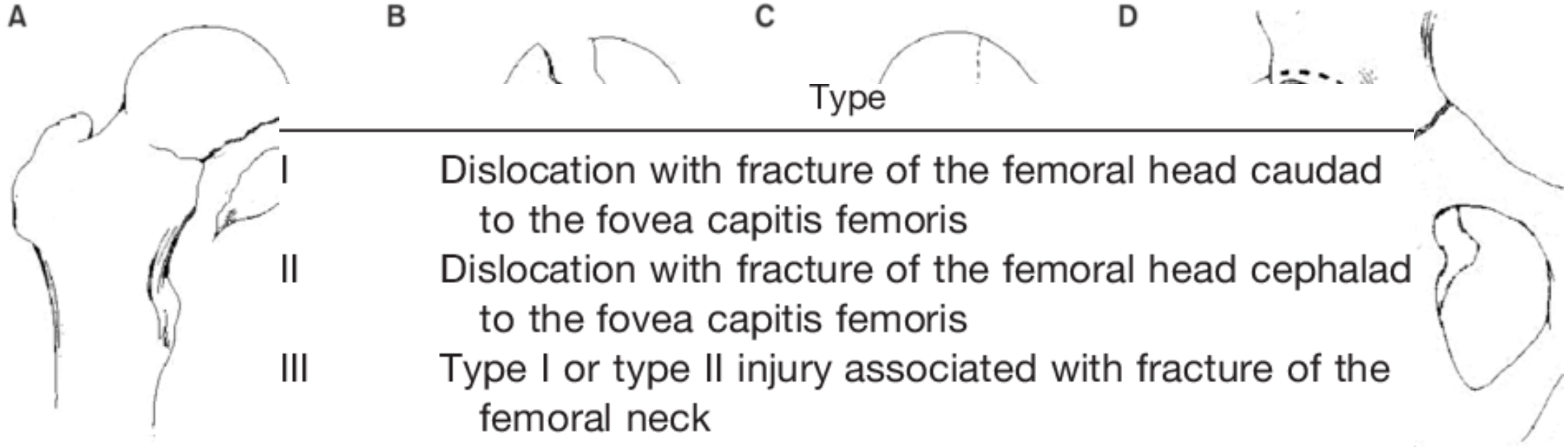
- Congruent reduction
- Intra articular fragments
- Femoral head #
- Acetabular #

Thompson Epstein Classification

Type 1	Pure dislocation / no fracture involved
Type 2	Posterior hip dislocation with single large fracture fragment of posterior wall
Type 3	Posterior hip dislocation with Comminuted fracture of posterior wall
Type 4	Posterior hip dislocation with fracture of acetabular floor
Type 5	Posterior hip dislocation with fracture of the femoral head

Type 5 Subclassification

PIPKIN'S CLASSIFICATION



Type	
I	Dislocation with fracture of the femoral head caudad to the fovea capitis femoris
II	Dislocation with fracture of the femoral head cephalad to the fovea capitis femoris
III	Type I or type II injury associated with fracture of the femoral neck
IV	Type I or type II injury associated with fracture of the acetabular rim

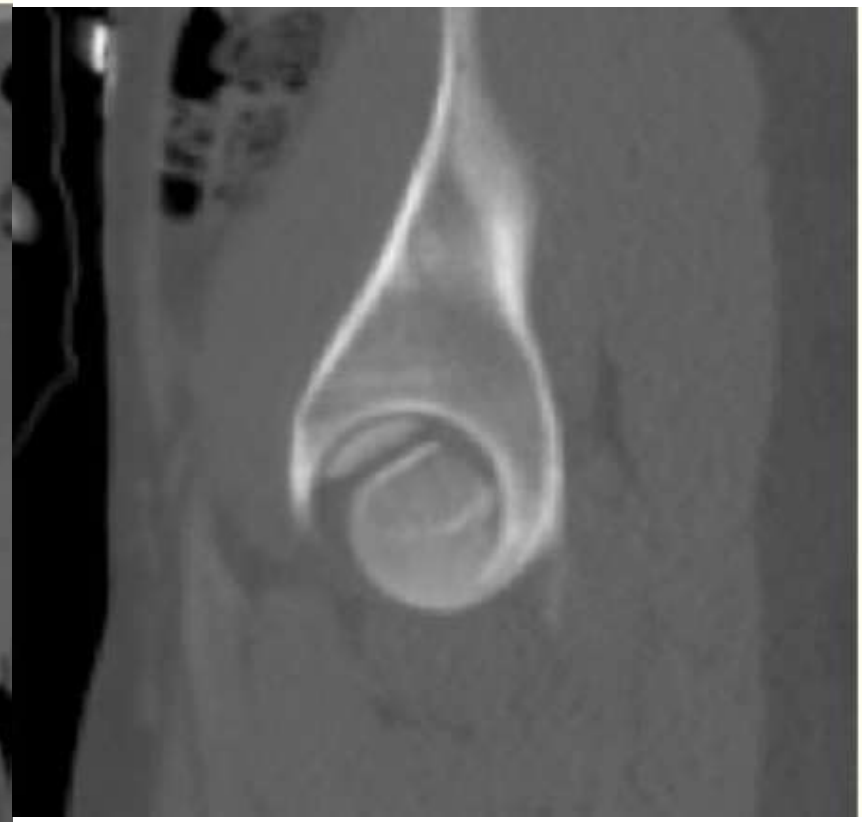
A) ORIF of Fracture

B) Hip arthroscopy with fragment excision

C) Non operative treatment

D) Total hip arthroplasty

A 58-year-old woman is involved in a motor vehicle collision and sustains the injury shown in Figures 1 through 3. What best describes the correct diagnosis and treatment option?



A. Pipkin IV and total hip arthroplasty (THA)

B. Pipkin III and THA

C. Pipkin IV and open reduction and internal fixation (ORIF)

D. Pipkin III and ORIF

- Femoral head fractures are significant injuries to the hip, and the location and additional sites of injury have an impact on treatment choices.
- Pipkin I injuries can be treated nonsurgically or with excision, depending on location of fragment.
- Pipkin II injuries typically involve a sizeable portion of the femoral head and are candidates for operative repair with either an anterior or posterior approach, depending on surgeon comfort and experience.
- Pipkin III injuries are catastrophic injuries to the hip that have been shown to have very poor outcomes and should have consideration for primary THA, depending on patient age and functional level.
- Pipkin IV injuries are also quite complex and are treated operatively with the approach depending on surgeon experience/preference, as well as the size and location of each fracture.

A. Pipkin IV and total hip arthroplasty (THA)

B. Pipkin III and THA

C. Pipkin IV and open reduction and internal fixation (ORIF)

D. Pipkin III and ORIF

Based on X-RAY establish a diagnosis on the right femur?

a. Osteomalacic stress fracture
b. Atypical fracture
c. Osteopetrotic fracture
d. Pathological fracture due to secondaries

Atypical Femoral Fracture

- **Major Criteria (atleast 4)**

1. Minimal trauma
2. Fracture originates from lateral cortex and transverse fracture orientation
3. Complete fracture have medial spike, incomplete involve only lateral cortex
4. Non comminuted, minimally comminuted
5. Localized periosteal or endosteal thickening of lateral cortex

- **Minor Criteria (may or may not be present)**

1. Generalized increase in cortical thickness of femoral diaphysis
2. Unilateral or bilateral prodromal symptoms , dull ache in lateral groin or thigh
3. Bilateral incomplete or complete femoral diaphyseal fracture
4. Delayed fracture healing

Based on X-RAY establish a diagnosis on the right femur?

a. Osteomalacic stress fracture
b. Atypical fracture
c. Osteopetrotic fracture
d. Pathological fracture due to secondaries

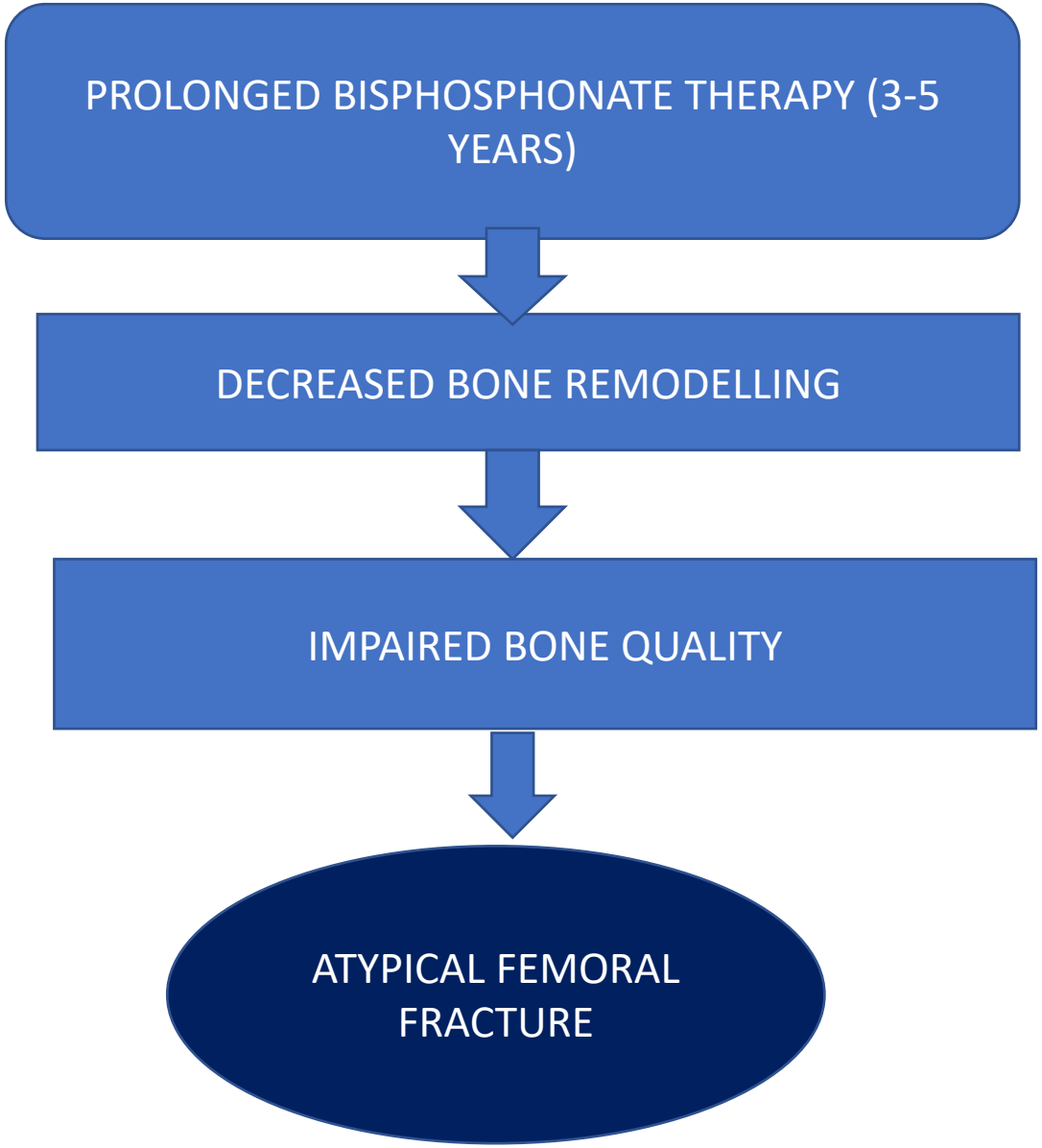


Figure A is the radiograph of a 45-year-old male who presents to the trauma bay following a gunshot wound. On examination, two wounds, one anteriorly and one posteriorly, are identified. You perform an ABI. Which of the following results would heighten your concern for associated vascular injury and cause you to order a CT angiography?

1) 0.81
2) 0.93
3) 1.01
4) 1.14
5) 1.28

- An ABI of 0.81 is abnormal and would warrant a CTA to better evaluate for vascular injury. The location of this fracture is concerning for vascular injury.
- Patients with a lack of hard signs of vascular injury such as arterial bleeding, absent distal pulses, limb ischemia, and expanding hematoma are often evaluated with an ABI.
- The ABI is performed by taking the systolic blood pressure at the ankle and dividing it by the systolic pressure of the arm.
- ABI <0.9 are abnormal and require further evaluation with a CTA.
- If the ABI >0.9, there is a 100% negative predictive value of arterial injury, and serial examinations should be performed.
- Use of a CTA had 100% sensitivity and specificity for clinically relevant vascular injuries.

What is Lobenhoffer Approach ?

- Knee Extensive Medial
- Knee Anteromedial approach
- Knee Posteromedial approach
- Lateral Parapatellar/ Hockey stick approach

Lobenhoffer – Posteromedial approach

- Prone position
- Dorsal incision
- Lateralizing the medial head of gastroc muscle

And partial proximal detachment of soleus

Fix the main PM fragment

Figure A is the radiograph of a 45-year-old male who presents to the trauma bay following a gunshot wound. On examination, two wounds, one anteriorly and one posteriorly, are identified. You perform an ABI. Which of the following results would heighten your concern for associated vascular injury and cause you to order a CT angiography?

1) 0.81

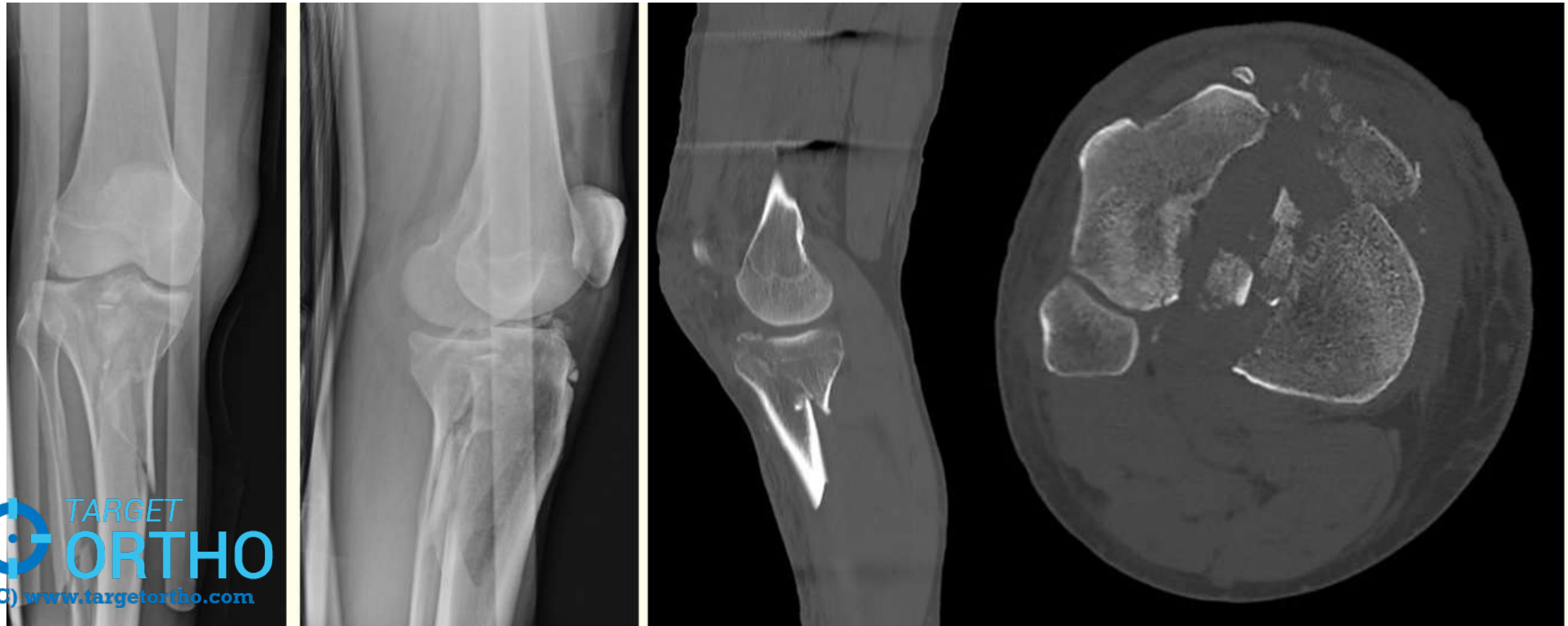
2) 0.93

3) 1.01

4) 1.14

5) 1.28

- Figures 1 through 4 are the radiographs and CT scans of a 40-year-old male who comes to the emergency department after he fell while skateboarding. He undergoes placement of a temporary external fixator due to soft-tissue swelling. What approach is likely to be most useful



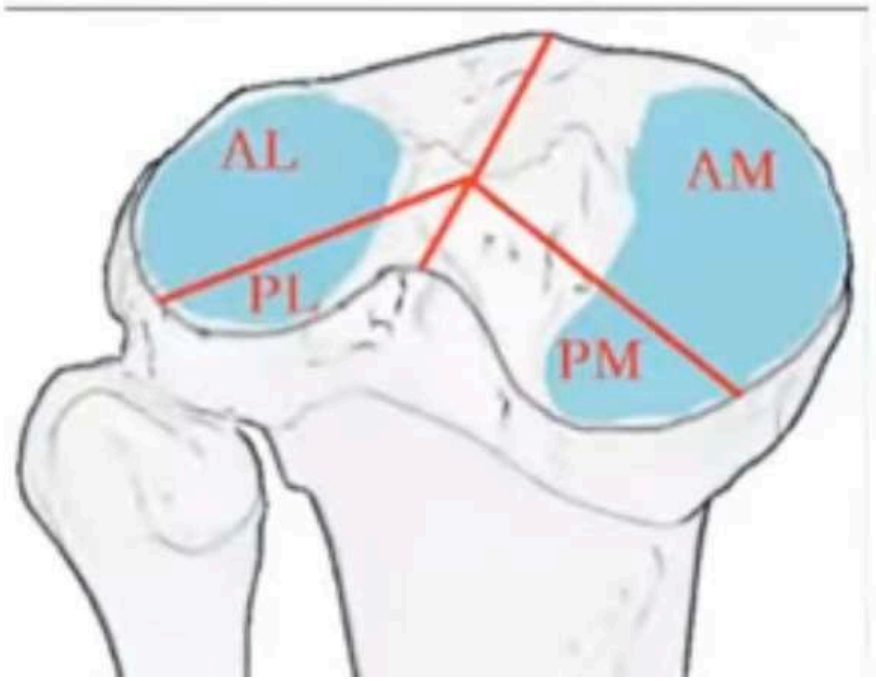
A. Anterolateral

B. Posteromedial via prone positioning

C. Posteromedial via supine positioning

D. Combined anterolateral and posteromedial approaches

CT based classification



Chang SM et al. **Schatzker Type IV Medial Tibial Plateau Fractures: A Computed Tomography–based Morphological Subclassification**
Orthopedics August 2014 - Volume 37 · Issue 8: e699-e706

Kfuri et al – Column based classification

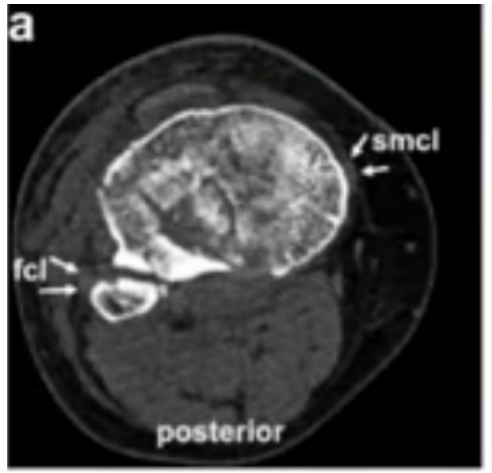
ELSEVIER

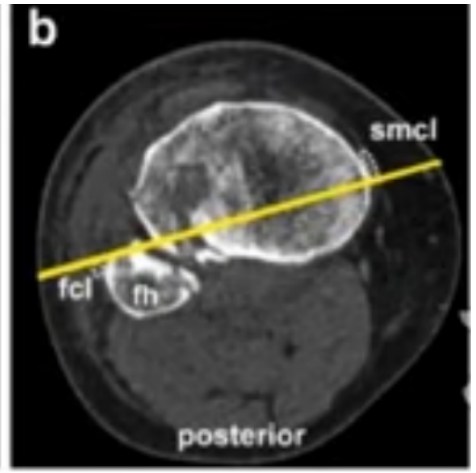
Injury

Volume 49, Issue 12, December 2018, Pages 2252-2263

Revisiting the Schatzker classification of tibial plateau fractures

Mauricio Kfuri [a, b], Joseph Schatzker [c]





Based on quadrant

QUADRANT	APPROACH
Anterolateral quadrant	LATERAL PARAPATELLAR OR HOCKEYSTICK
Posteromedial quadrant	POSTEROMEDIAL APPROACH
Combined (5, 6)	AL & PM

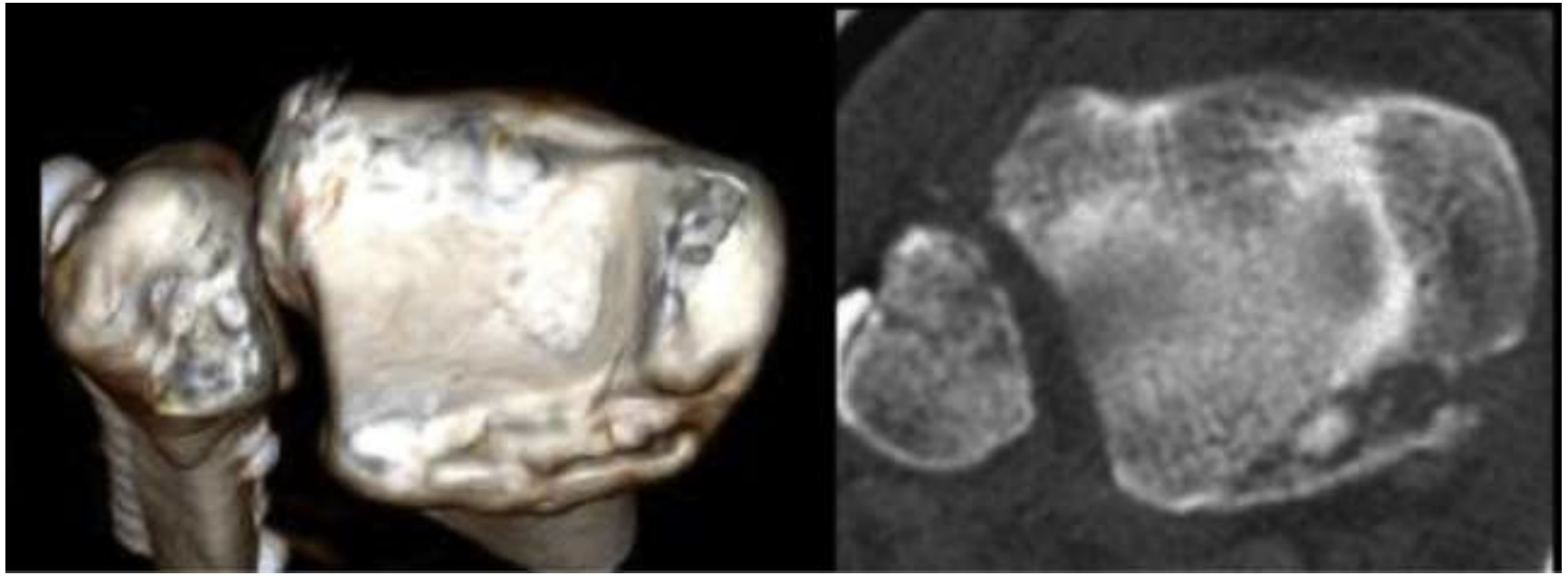
A. Anterolateral

B. Posteromedial via prone positioning

C. Posteromedial via supine positioning

D. Combined anterolateral and posteromedial approaches

Ankle and Foot



- Regarding posterior malleolar fracture in this case which statement is true?

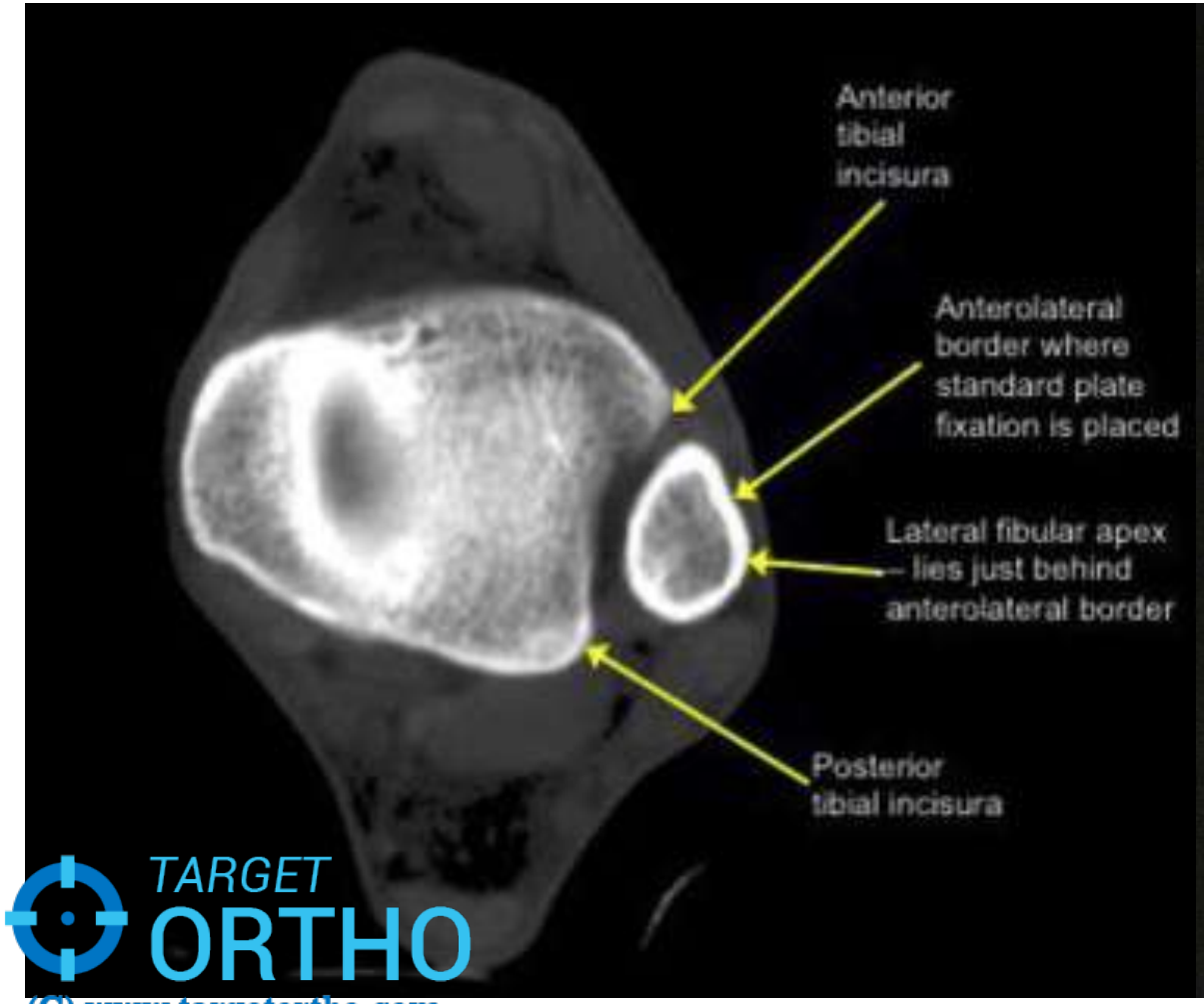
a. This does not require fixation as it is a small fragment (< 25%)

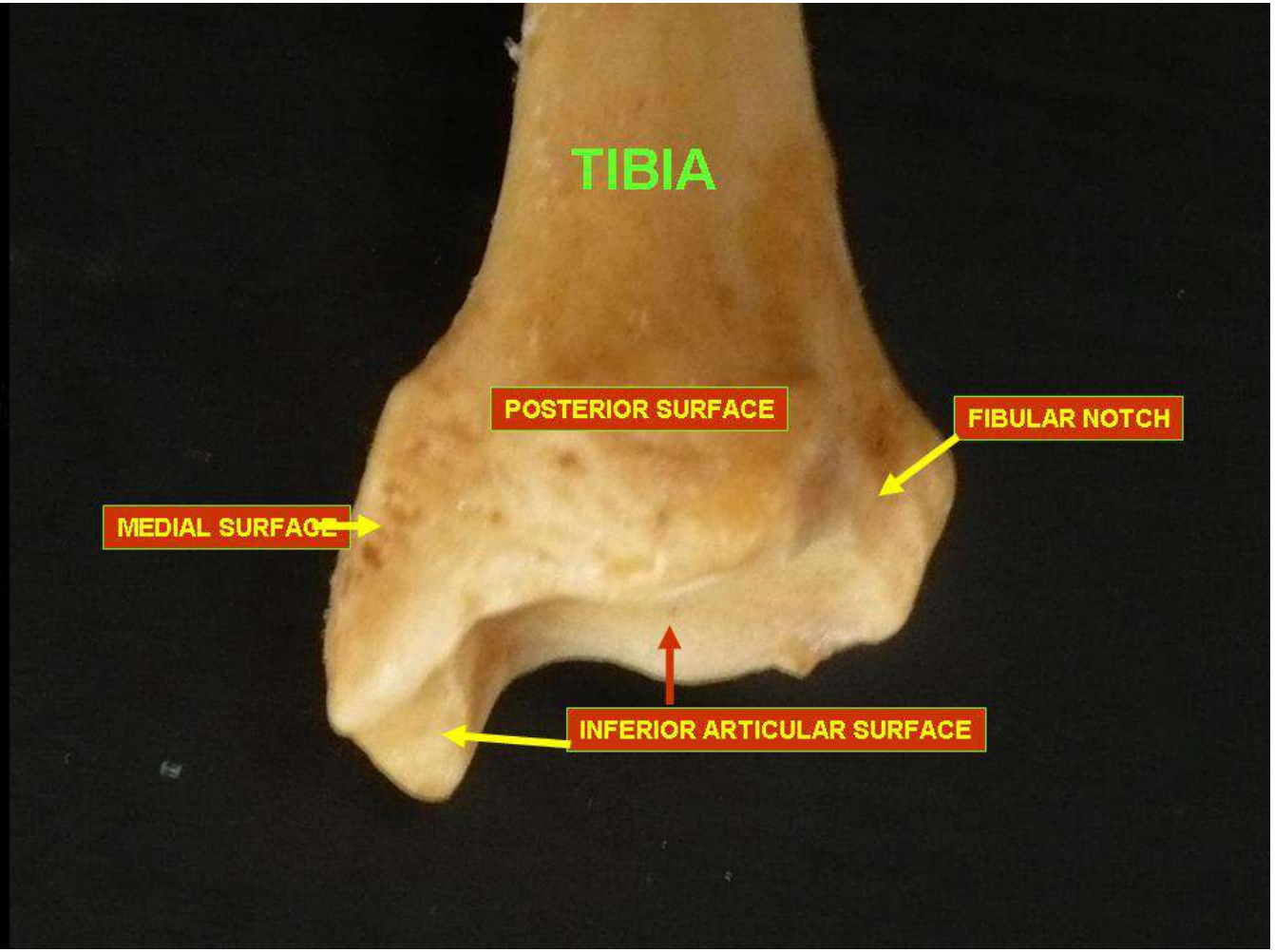
b. This does not require surgery as it does not involve the distal tibiofibular joint

c. This requires surgery as it involves the posteromedial aspect

d. This requires surgery as there is comminution and hence may cause instability

Fibular Incisura



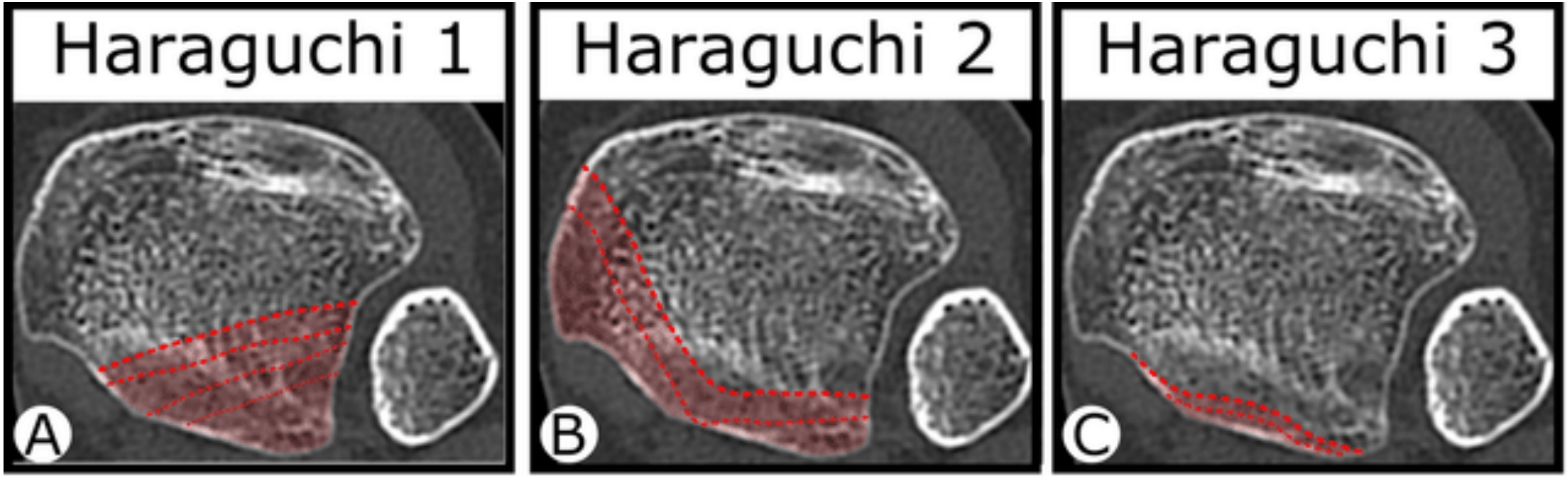


Classification

Pathoanatomy of Posterior Malleolar Fractures of the Ankle

By Naoki Haraguchi, MD, Hiroki Haruyama, MD, Hidekazu Toga, MD, and Fumio Kato, MD

Investigation performed at the Tokyo Metropolitan Police Hospital and the Haruyama Hospital for Surgery, Tokyo, Japan



Bartonicek et al (2015)

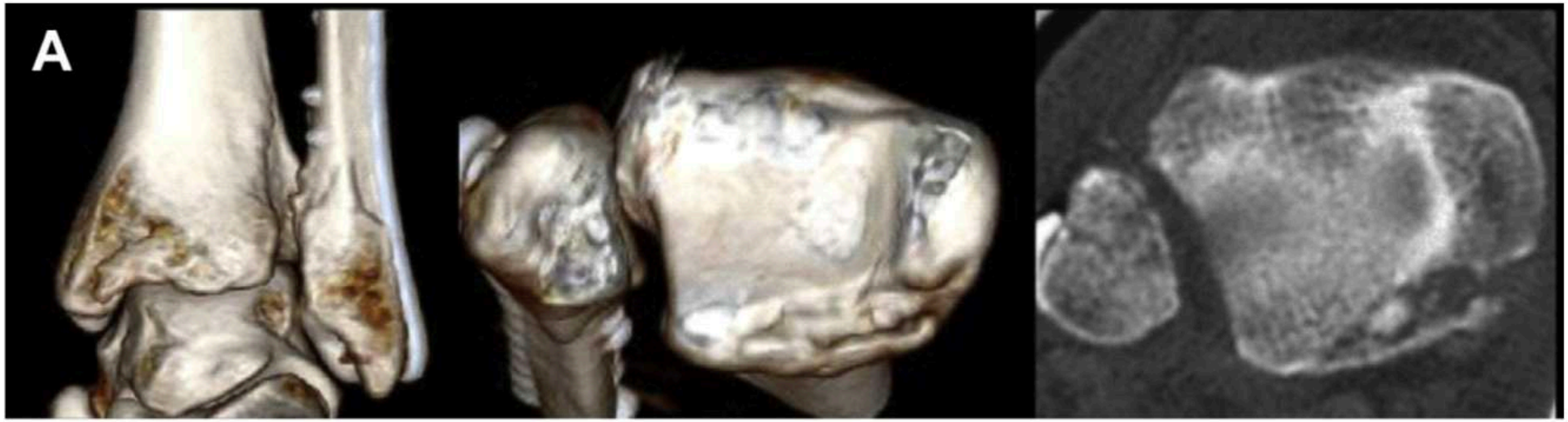
Posterior Malleolar Fractures

Changing Concepts and Recent Developments

Jan Bartoníček, MD[a,b,*], Stefan Rammelt, MD[c], Michal Tuček, MD[a]

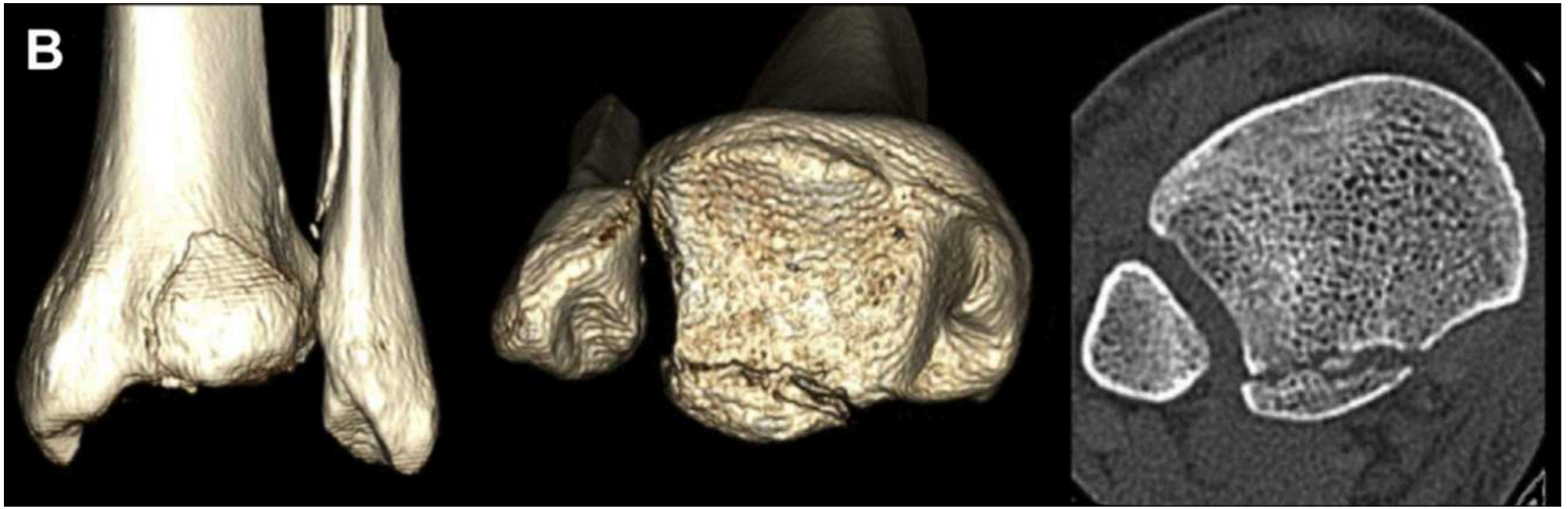
These authors, in 2015, analysed 141 consecutive CT scans of individuals with an ankle fracture or fracture-dislocation of types Weber B or Weber C with fracture of PM

The fractures of PM were classified into four basic types having constant pathoanatomic features, with special reference to involvement of the fibular notch



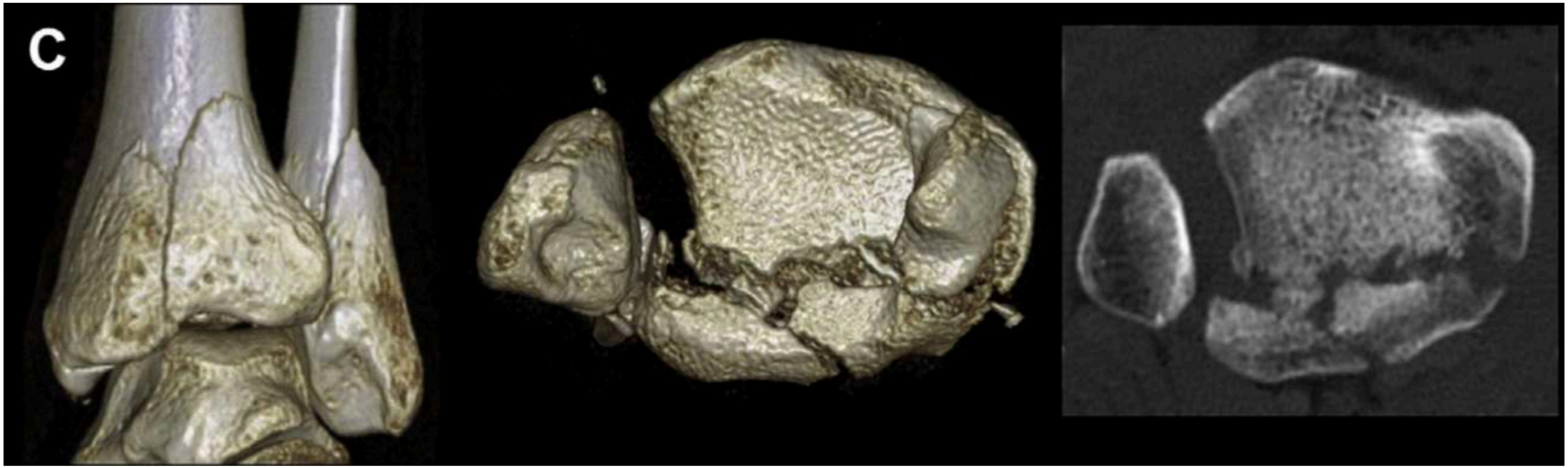
Type 1

Extraincisural fragment with an intact fibular notch



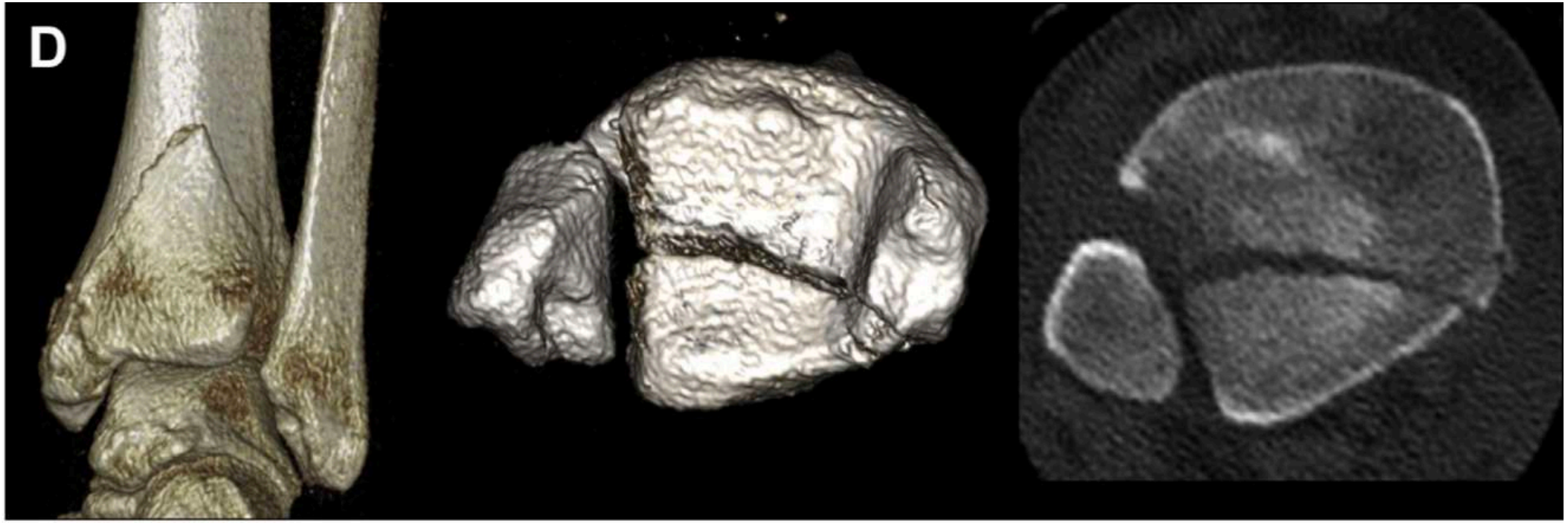
Type 2

Posterolateral fragment extending into the fibular notch



Type 3

Posteromedial two-part fragment involving the medial Malleolus



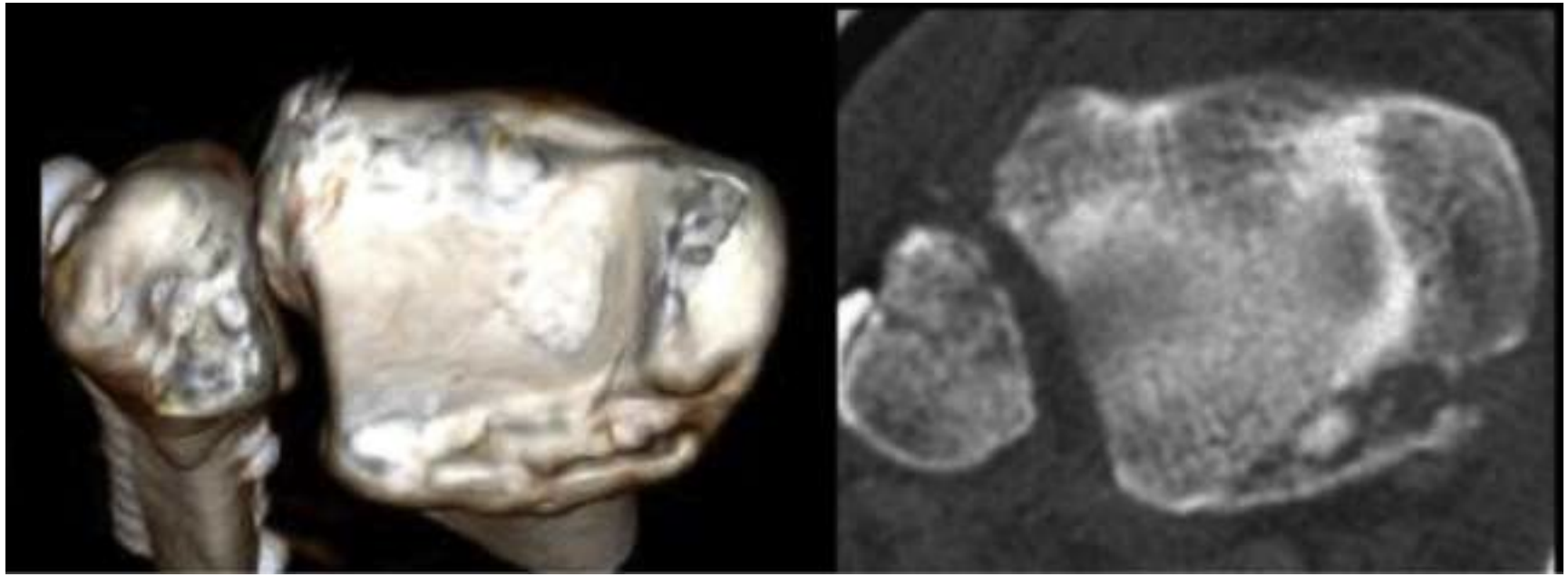
Type 4

Large posterolateral triangular fragment (involving more than one-third of the notch)

Type 5

- Irregular , osteoporotic fractures

Type 1	**Conservative management**
Type 2 and type 4	**Posterior lateral approach** **Medial malleolar fixation / deltoid ligament repair** **ORIF of Posterior malleolus performed first** **Internal Fixation of Fibula**
Type 3	**Posterior Medial approach** **Allows reduction and fixation of posterior fragment and medial malleolus**
Type 5	**Tailored treatment** **Combined approach** **Poor results**



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b. This does not require surgery as it does not involve the distal tibiofibular joint

c. This requires surgery as it involves the posteromedial aspect

d. This requires surgery as there is comminution and hence may cause instability

- Name the structures involved in this injury

a. Fibula and posterior malleoli

b. Fibula, AITFL and posterior malleoli

c. Fibula, deltoid ligament and posterior malleoli

d. Fibula, AITFL, deltoid ligament and posterior malleoli

Lauge Hansen Classification

SAd
SEr
PAb
PEr

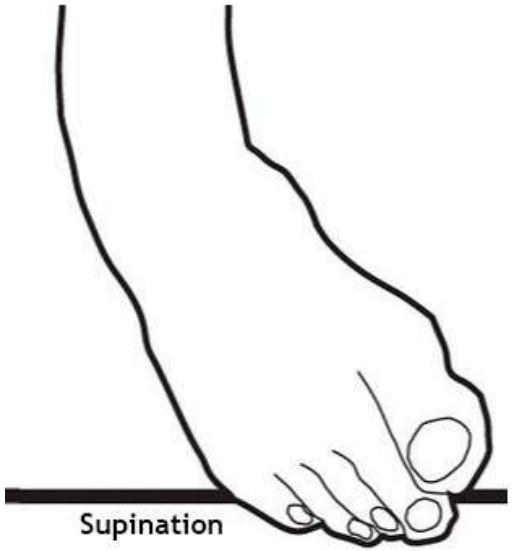
Supination Adduction

Supination External Rotation

Pronation Abduction

Pronation External Rotation

Algorithm



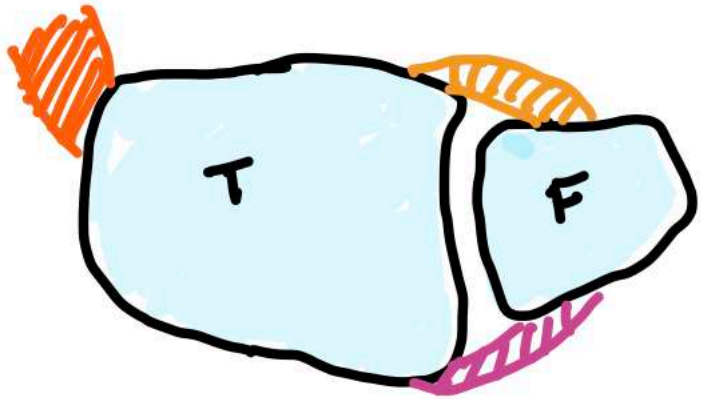
Supination – Adduction

Supination Adduction (SA)

Stage 1 – Transverse fracture of fibula

Stage 2 – Vertical fracture of Medial malleolus

Supination – External Rotation



Supination – External Rotation (SER)

Most common type

Stage 1 - Sprain of Anterior Talofibular ligament

Stage 2 – Short oblique distal fibula # (Syndesmotic)

Stage 3 – tear of posterior tibiofibular ligament +/- fracture of posterior malleolus

Stage 4 – transverse fracture of medial malleolus or tear of deltoid ligament

Pronation Abduction (PA)

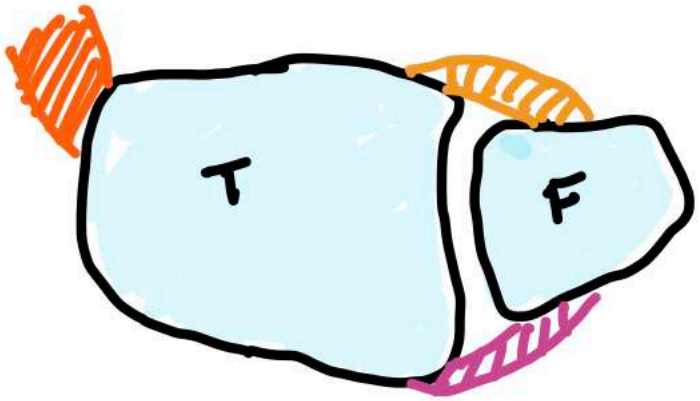
Pronation and Abduction

Stage 1 – Transverse fracture of medial malleolus

Stage 2 – rupture of syndesmotic ligaments

Stage 3 – Comminuted fibula fracture

Pronation – External Rotation (PER)



Pronation – External Rotation

Stage 1 – Tear of deltoid ligament or transverse fracture of medial malleolus

Stage 2 – Tear of Anterior tibiofibular ligament

(Avulsion fracture Tillaux chaput fracture)

Stage 3 – Spiral fracture of fibula above the level of the syndesmosis

(Maisonneuve fracture)

Stage 4 – Tear of Posterior tibiofibular ligament or avulsion fracture of posterior malleolus

- Name the structures involved in this injury

a. Fibula and posterior malleoli

b. Fibula, AITFL and posterior malleoli

c. Fibula, deltoid ligament and posterior malleoli

d. Fibula, AITFL, deltoid ligament and posterior malleoli

After stabilizing a bimalleolar ankle fracture with a plate and lag screws for the fibula and two inter-fragmental compression screws for Medial Malleolus, a syndesmosis screw is indicated in which of the following structures ?

A) In all Supra-syndesmotic fibular fractures

B) In all trans-syndesmotic fibular fractures

C) Increased Medial clear space with external rotation stress

D) Deltoid ligament is ruptured

It is imperative to recognize the need for a position screw (syndesmosis screw) to hold the syndesmosis in proper alignment when surgically stabilizing an ankle fracture.

Although many different fracture patterns are suspicious for a disrupted syndesmosis, **the only sure way to assess the syndesmosis is to stress it with abduction and external rotation of the talus and attempt to displace the fibula from the incisura fibularis**.

Under fluoroscopy, the talus will move laterally and displace the fibula, show a valgus talar tilt, or show an increase in the medial clear space. If any or all of these signs occur, a syndesmosis screw is inserted after making sure that the fibula is reduced into the incisura fibularis.

This screw may traverse three or four cortices but must not act as a lag screw. It usually is inserted with the ankle in maximal dorsiflexion, although this is probably not necessary because it is almost impossible to over- compress the syndesmosis. The diameter of the screw does not make any difference. It may or may not be removed, but not before 3 months.

After stabilizing a bimalleolar ankle fracture with a plate and lag screws for the fibula and two inter-fragmental compression screws for Medial Malleolus, a syndesmosis screw is indicated in which of the following structures ?

A) In all Supra-syndesmotic fibular fractures

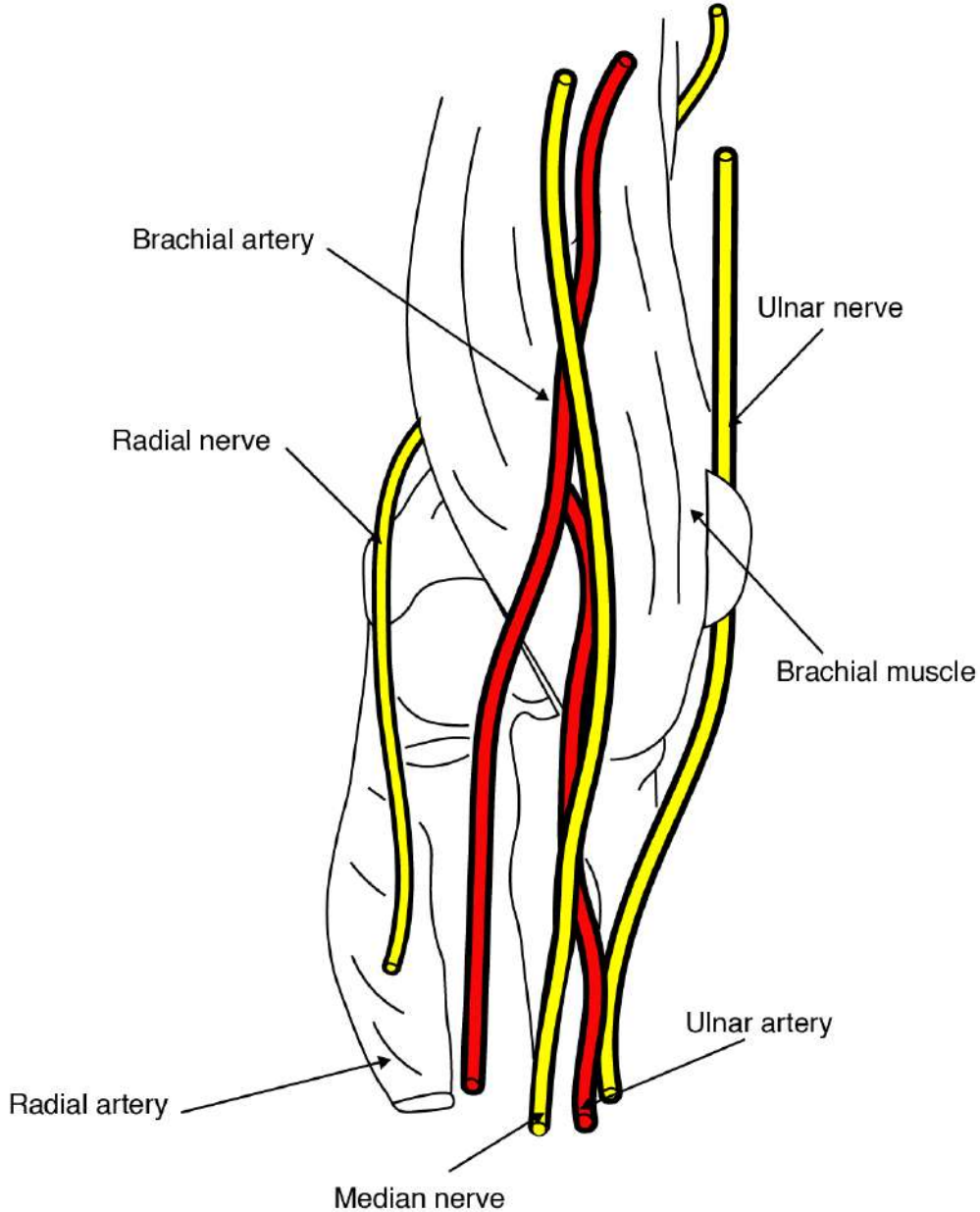
B) In all trans-syndesmotic fibular fractures

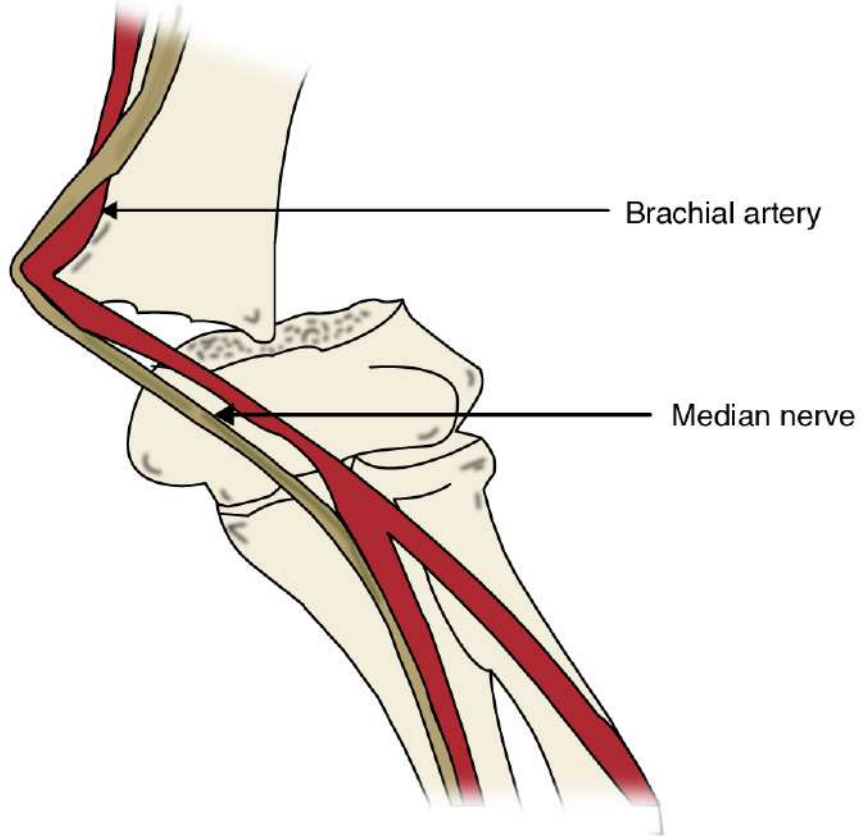
C) Increased Medial clear space with external rotation stress

D) Deltoid ligament is ruptured

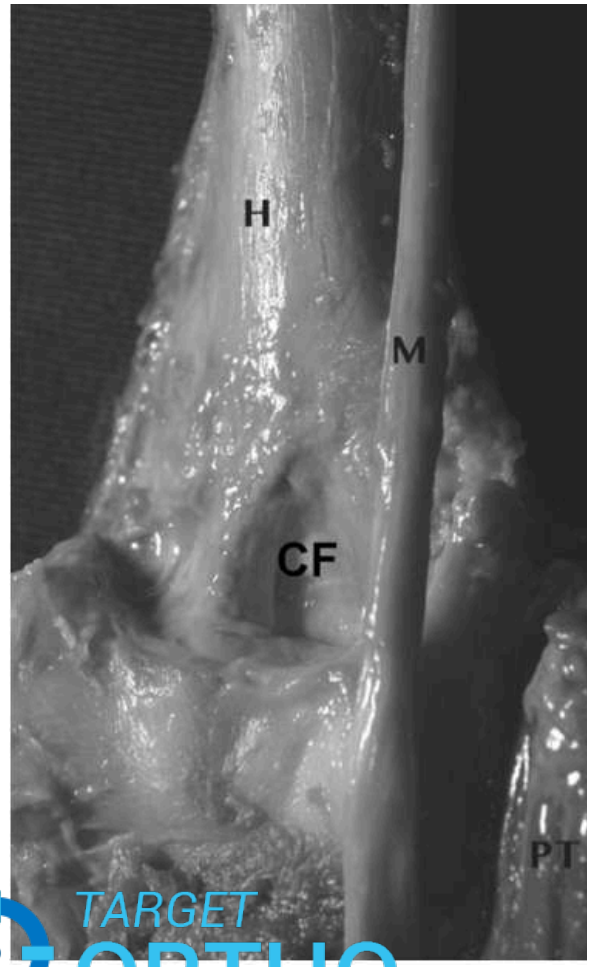
- The nerve that could be most likely damaged in this injury would be

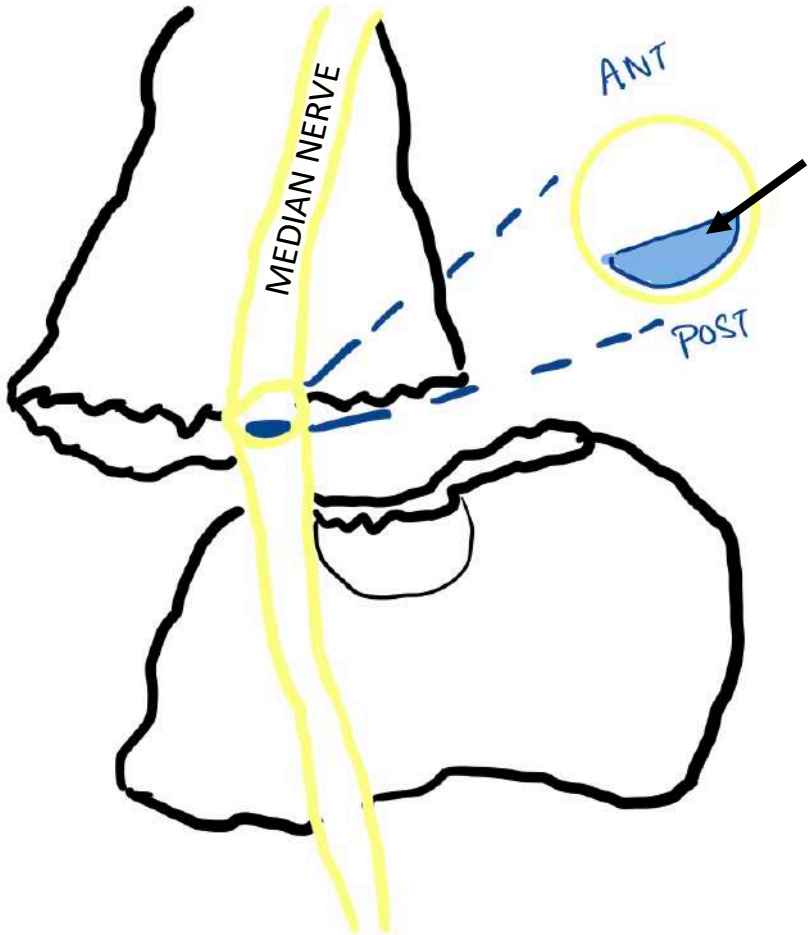
a. Radial nerve
b. Median nerve
c. Anterior interosseus nerve
d. Ulnar nerve





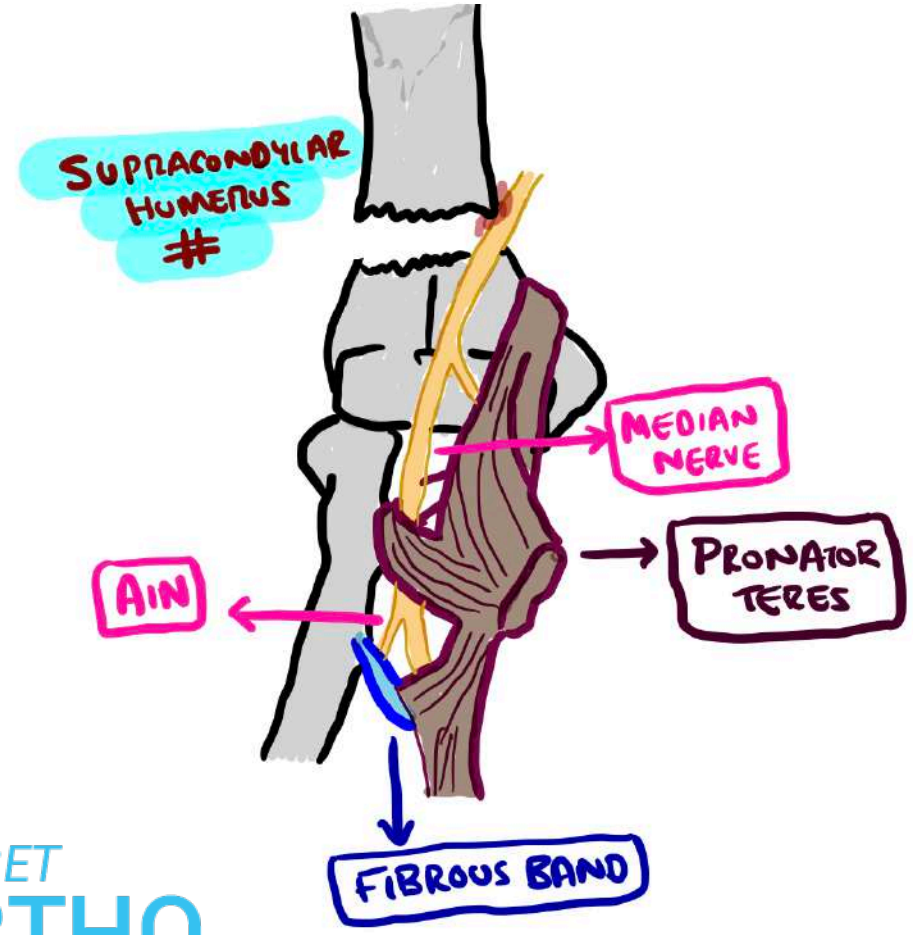
WHY IS THE AIN BRANCH INVOLVED ?





AIN FASCICLES IN POSTERIOR PART OF MEDIAN NERVE

M/C Nerve Injured ?



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c. Anterior interosseus nerve

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Which of the following preoperative findings correlates best with results after operative fixation of the calcaneus ?

A) Displacement of lateral wall

B) Number of major fragments of posterior facet

c) Diminution of Bohler’s angle

D) Amount of Heel Varus

- Satisfactory results correlate with lower fragments of the posterior facet.
- Two-part fractures have good outcome, four part tend to do poorly
- Varus and lateral wall displacement that occur post operatively predict a poor result, but presence of these findings preoperatively is common and indicate a need for surgery.

Which of the following preoperative findings correlates best with results after operative fixation of the calcaneus ?

A) Displacement of lateral wall

B) Number of major fragments of posterior facet

c) Diminution of Bohler's angle

D) Amount of Heel Varus

Figures 1 and 2 are the radiographs of a 33-year-old female who sustained an open injury to her left foot and ankle in a motor vehicle collision. The development of osteonecrosis has been shown to correlate to what characteristic of this patient's injury?

A. Medial neck comminution

B. Subtalar dislocation

C. Open fracture type

D. Time to definitive surgical fixation

- A displaced comminuted talus fracture with tibiotalar and subtalar dislocation is shown. The Hawkins classification, based on displacement and location of peri-talar joint dislocation, has been shown to affect the rate of osteonecrosis.
- **Vallier and associates** reported that the presence of subtalar dislocation predicted osteonecrosis in their series; presence of an open fracture did not. Medial neck comminution is a common finding in talar neck fractures, and timing of definitive surgical management has not been shown to affect the rate of osteonecrosis.

Figures 1 and 2 are the radiographs of a 33-year-old female who sustained an open injury to her left foot and ankle in a motor vehicle collision. The development of osteonecrosis has been shown to correlate to what characteristic of this patient's injury?

A. Medial neck comminution

B. Subtalar dislocation

C. Open fracture type

D. Time to definitive surgical fixation

Thank you
All the best !