

# Imaging of Shoulder Trauma

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UT Health San Antonio



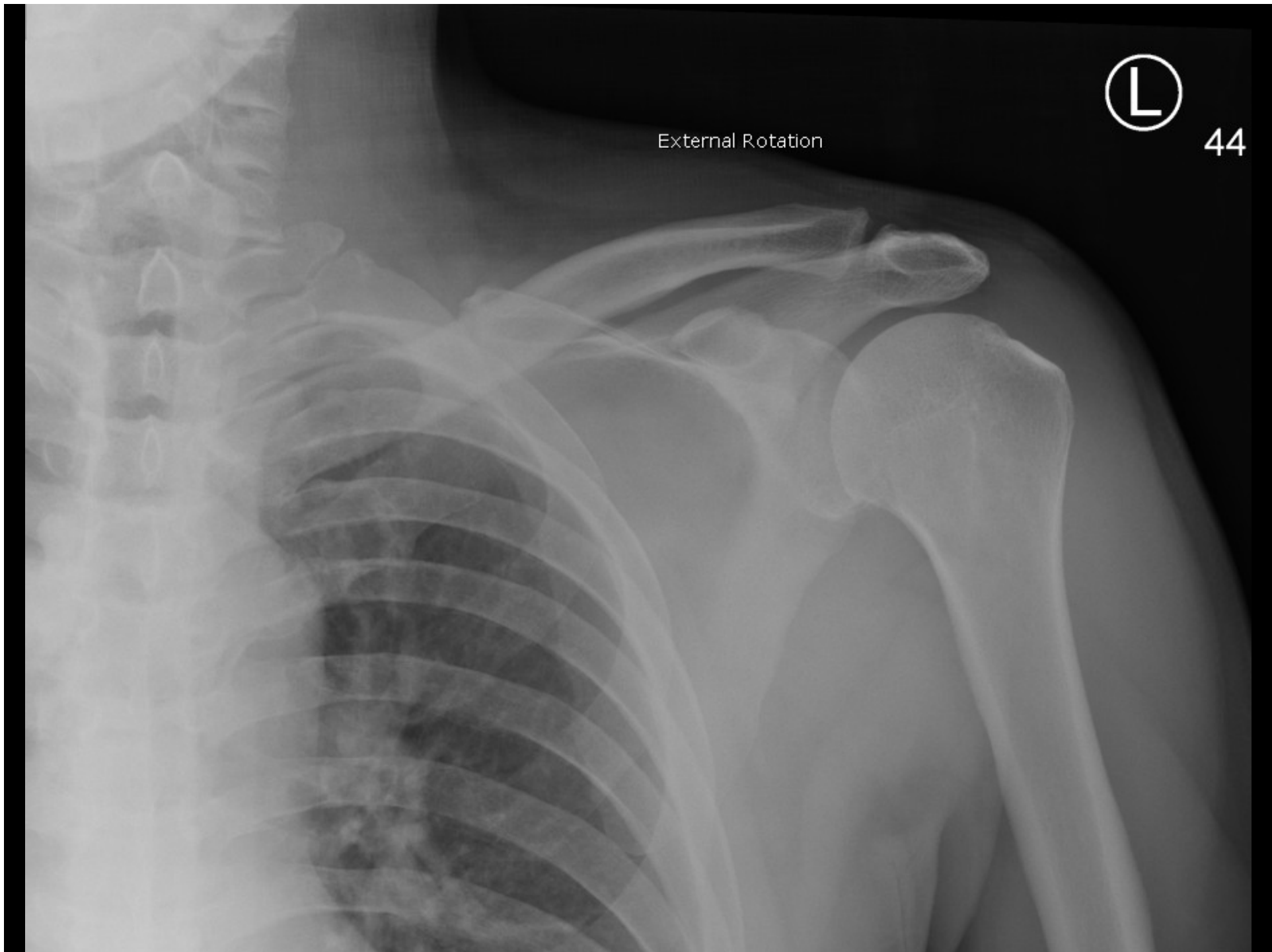
UT Health

San Antonio

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Radiology

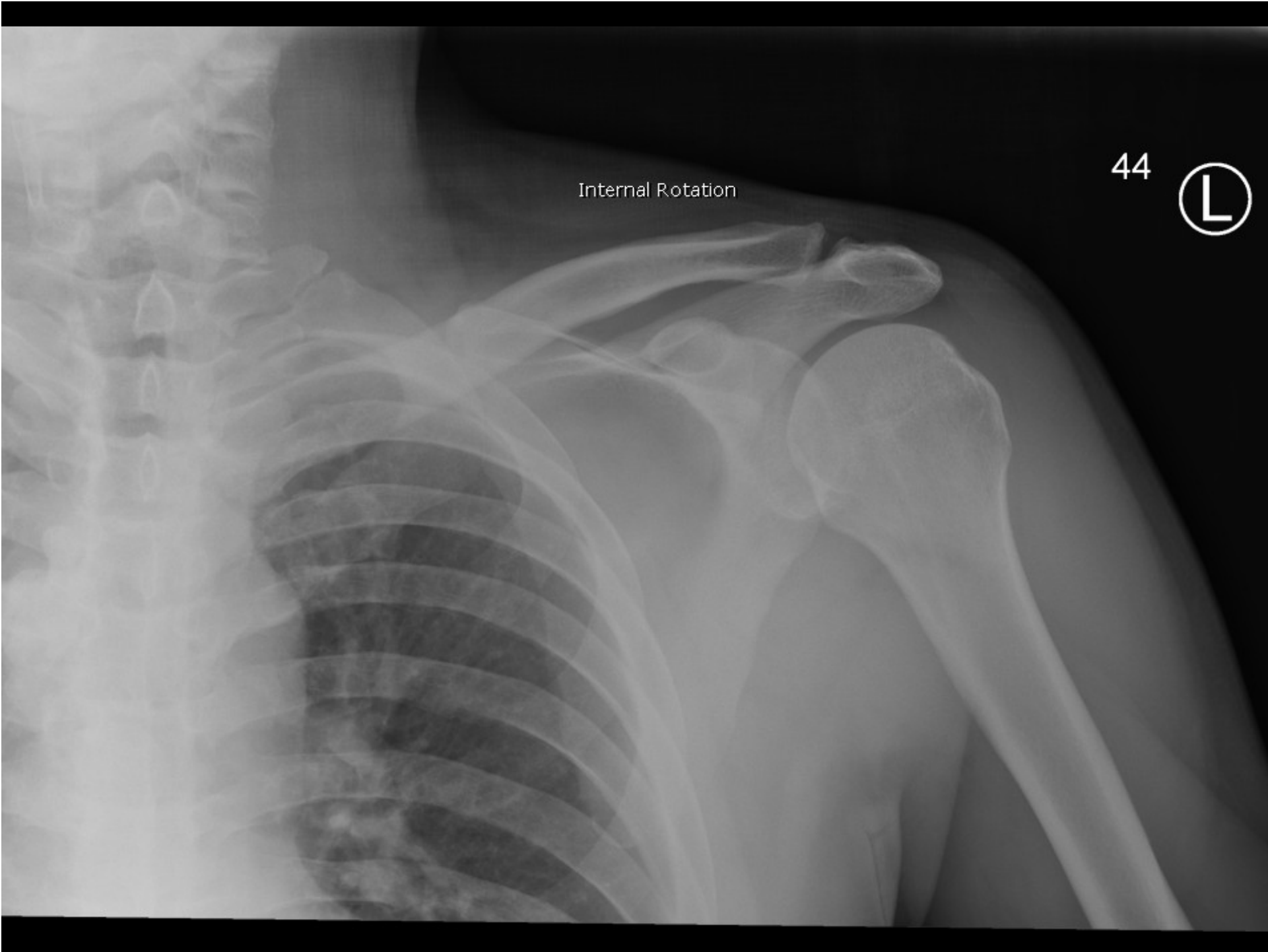
- I have no financial disclosures.



External Rotation

L

44



Internal Rotation

44



Grashey



Axillary



# Imaging Evaluation

- Radiographs, radiographs, radiographs
- All starts with the chest radiograph
- Special views (ie. Serendipity)
- CT
- History helpful to improve sensitivity
- “shoulder pain” vs “TTP of clavicular head” or “absent pulses in left arm”
- Patient’s story

# Mechanism of Injury

- Direct impact
- Lever/Torque
- Avulsion
- Avulsion injury



# Direct Impact

## Fractures

- Clavicle
- Proximal humerus
- Scapula

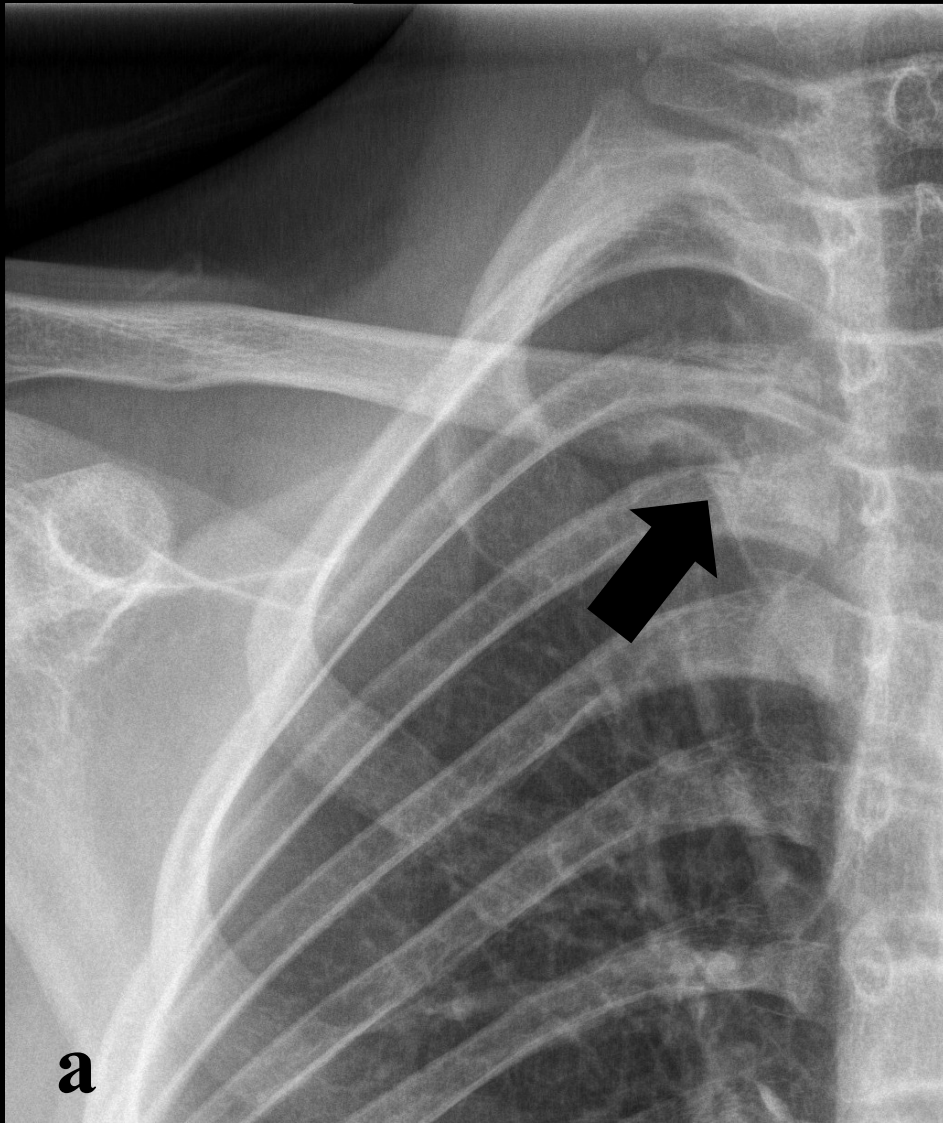
## Dislocation

- Posterior glenohumeral

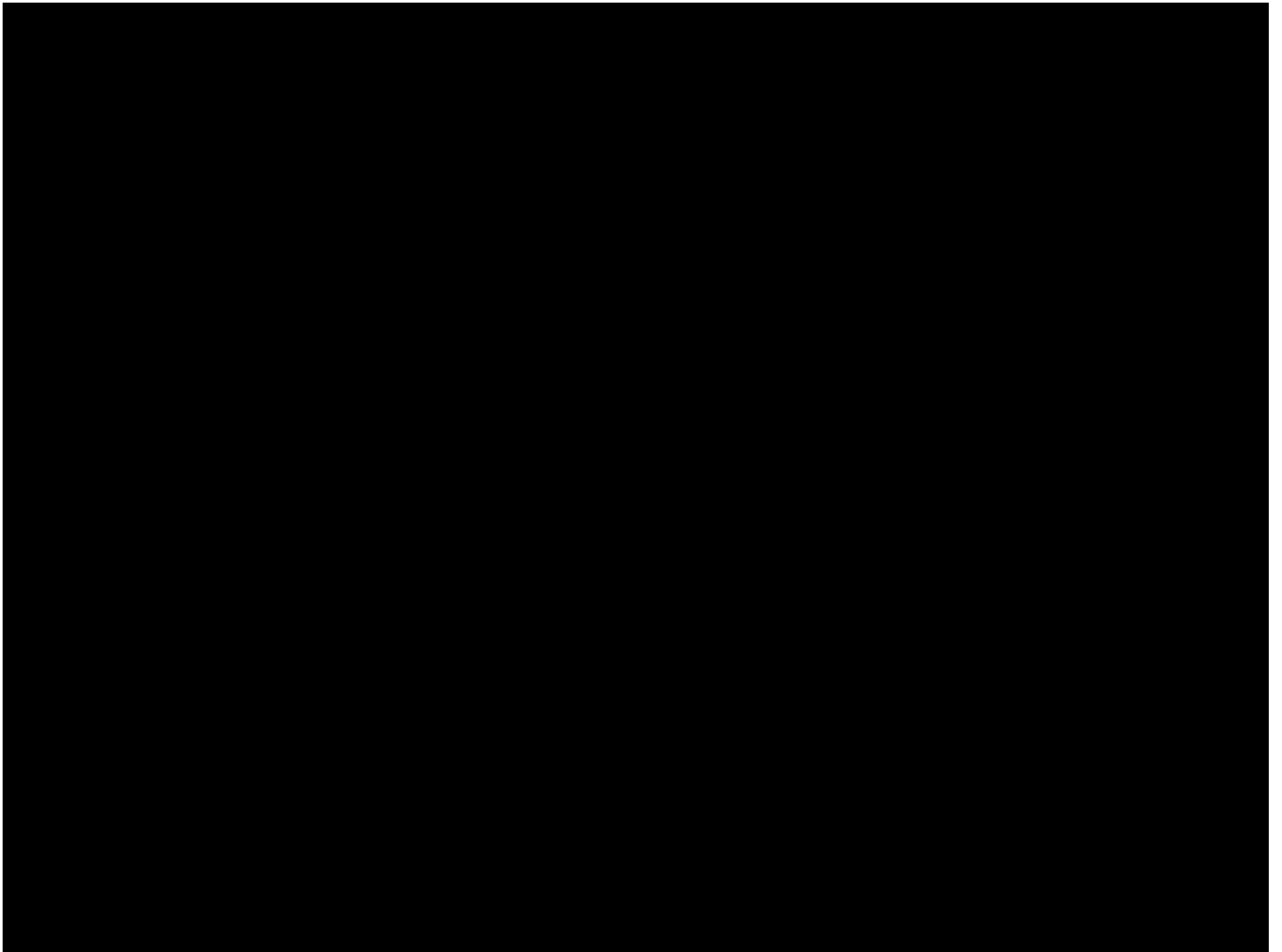
# Clavicle

- Direct blow, fall, FOOSH, MVC
- Midshaft > distal third > medial third
- Medial third often occult or difficult to identify

# Medial Clavicle Fx

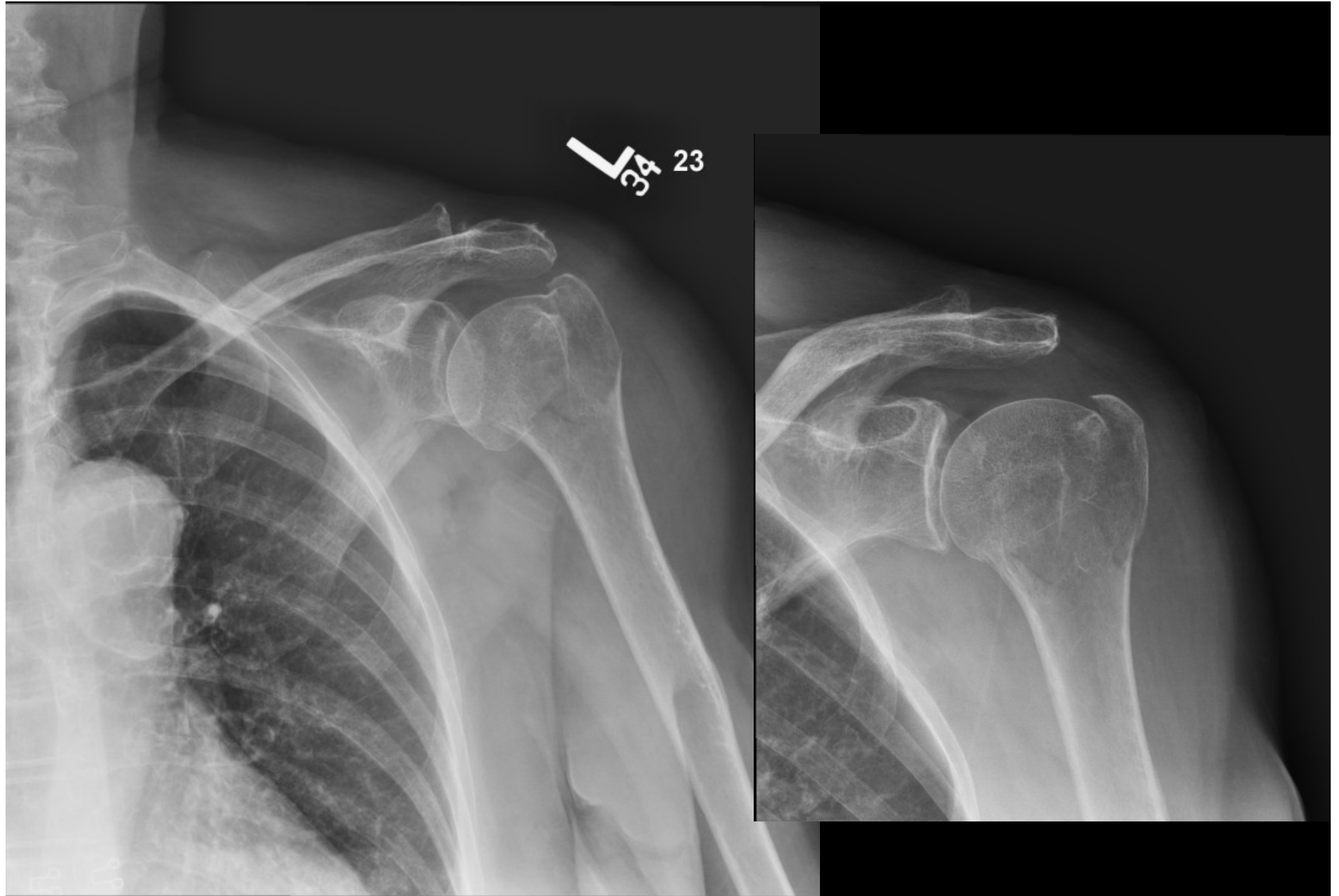


With permission from Nicholas Beckmann

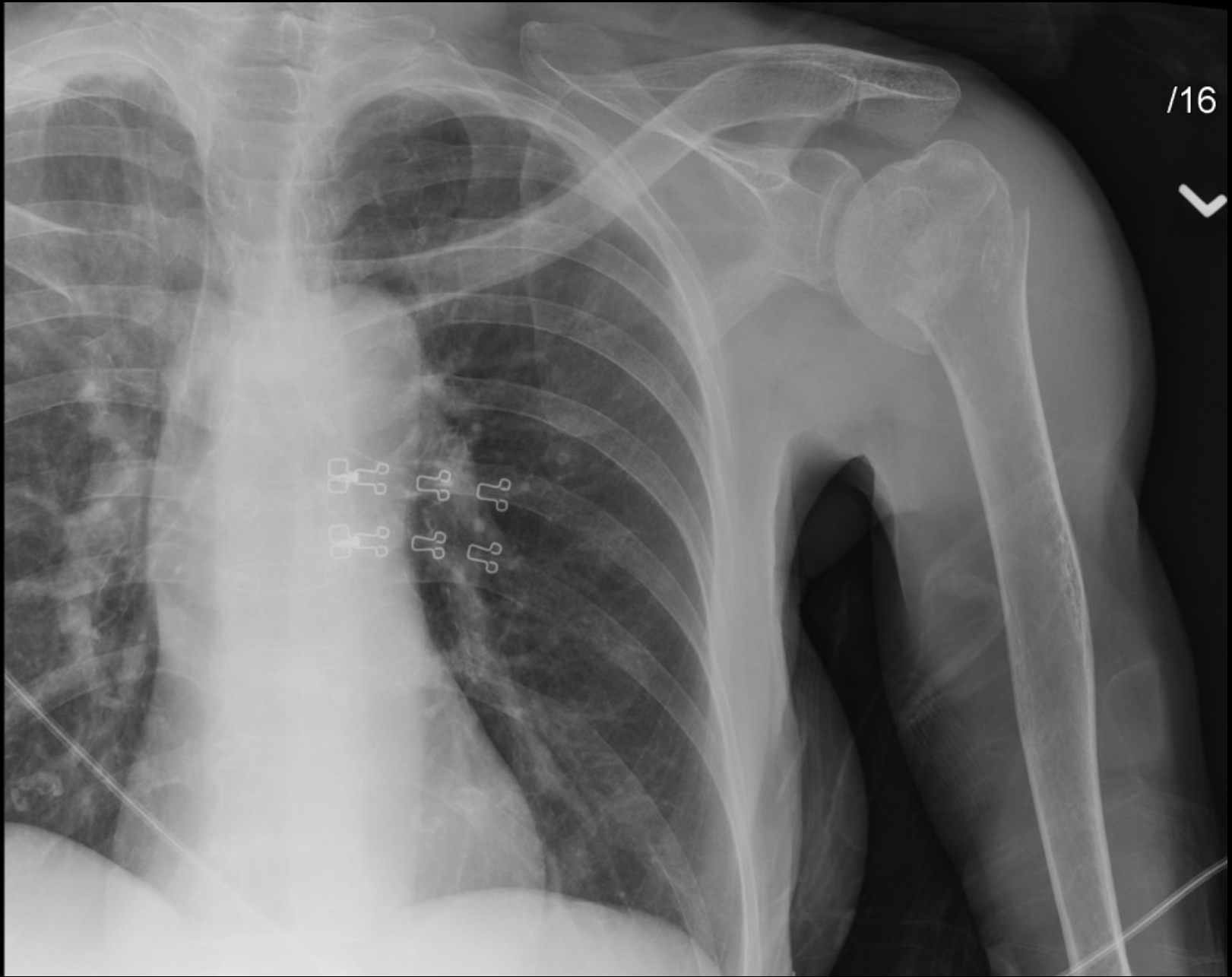


# Proximal Humerus

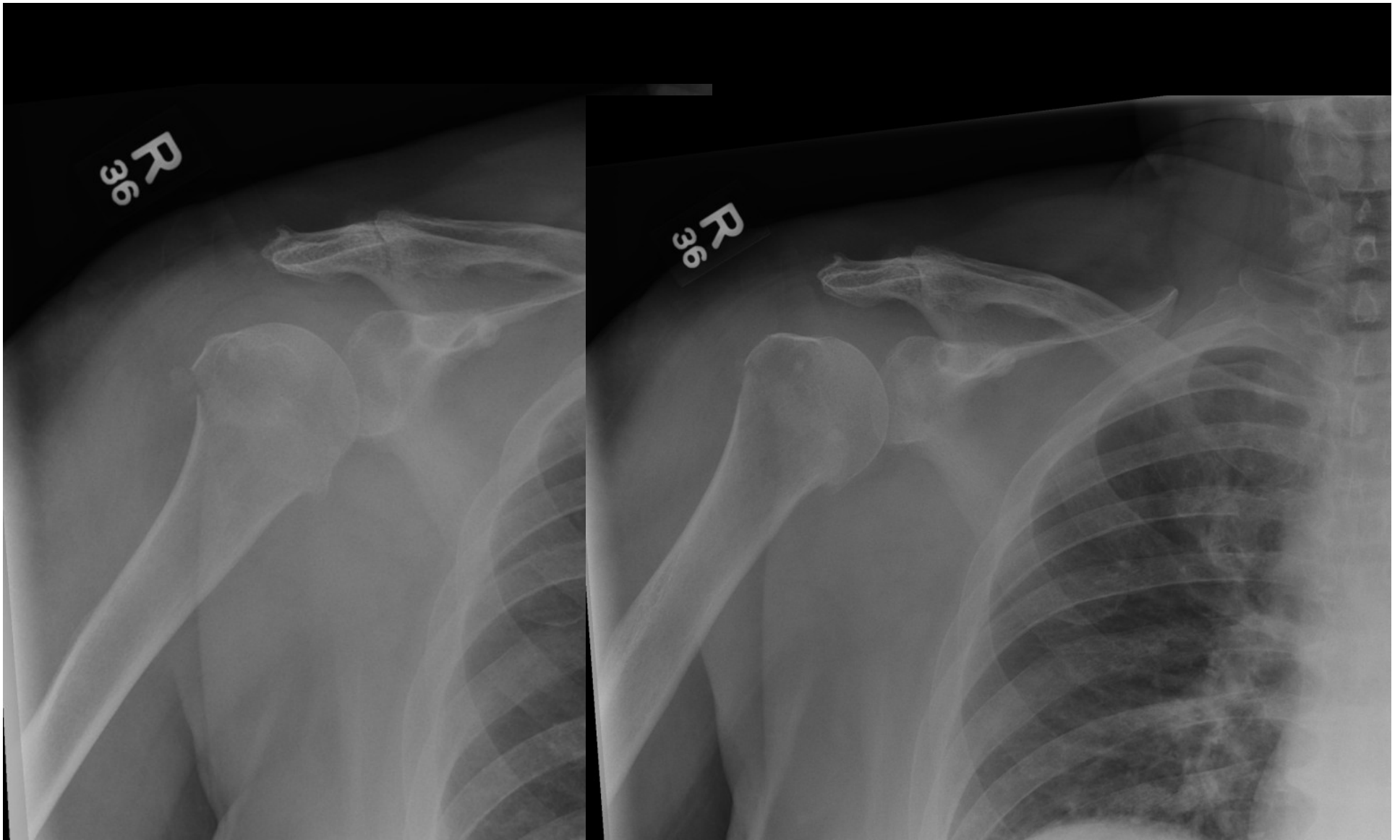
- Fall, direct impact
- Osteoporotic
- Neer-2, 3, and 4 part fractures only if there is greater than 1cm displacement or 45 degrees of angulation



78-year-old female with shoulder pain after fall



79 year-old female s/p fall from standing



61 year-old female with humeral neck fracture after tripping and fall; fragility fracture



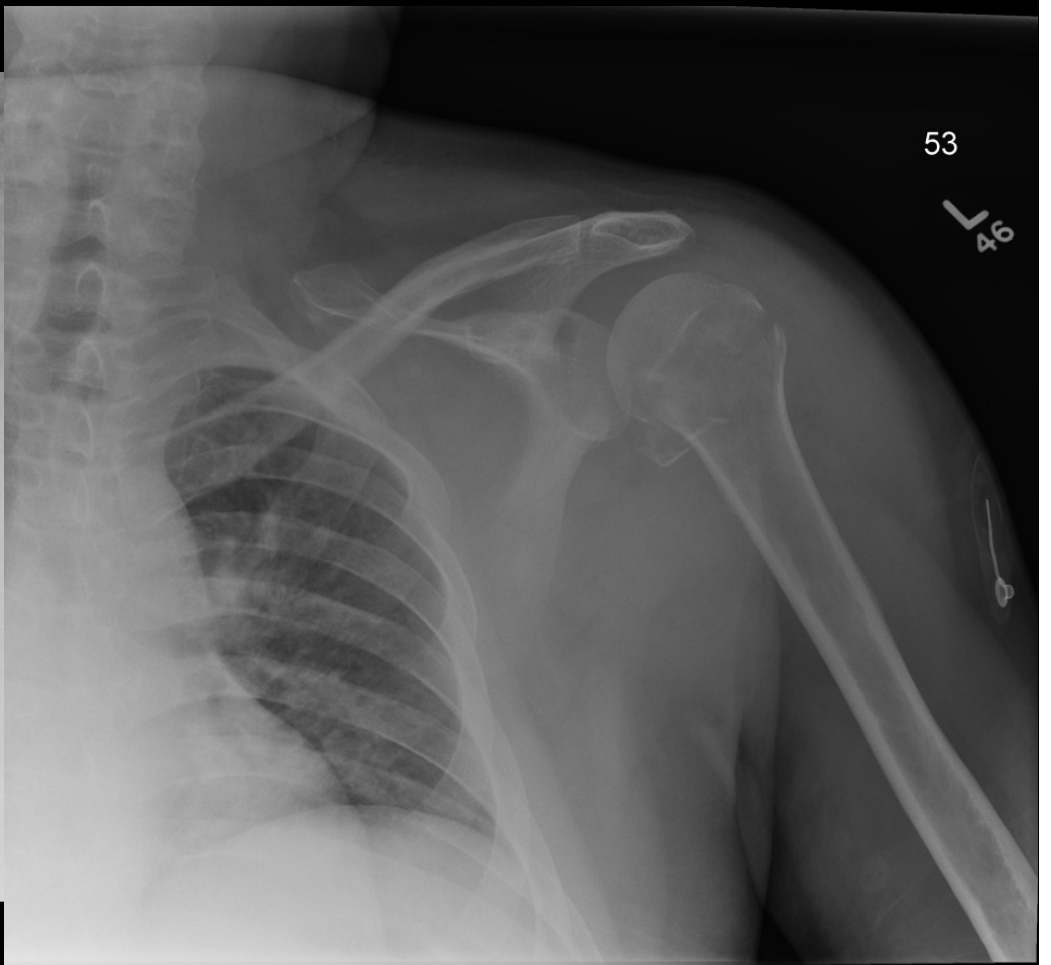
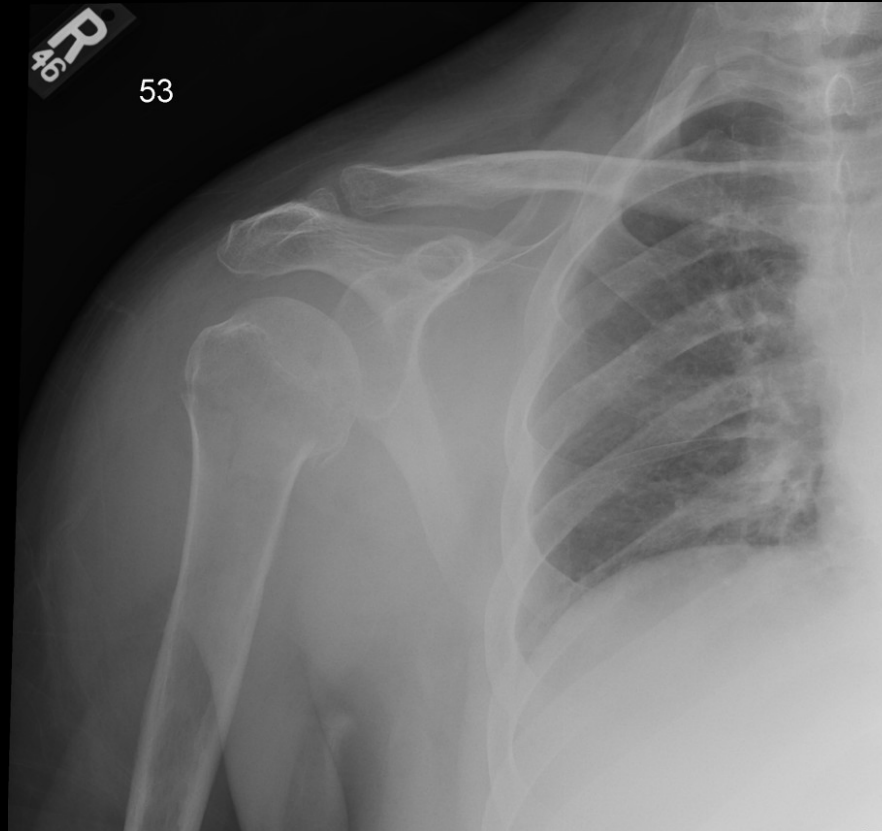


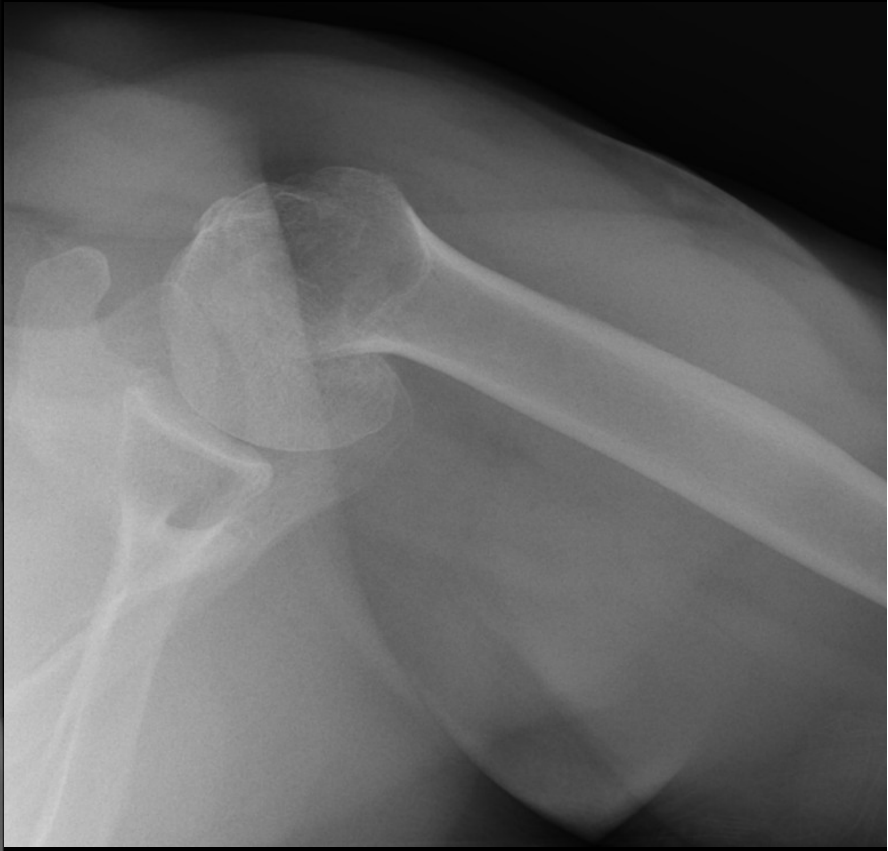
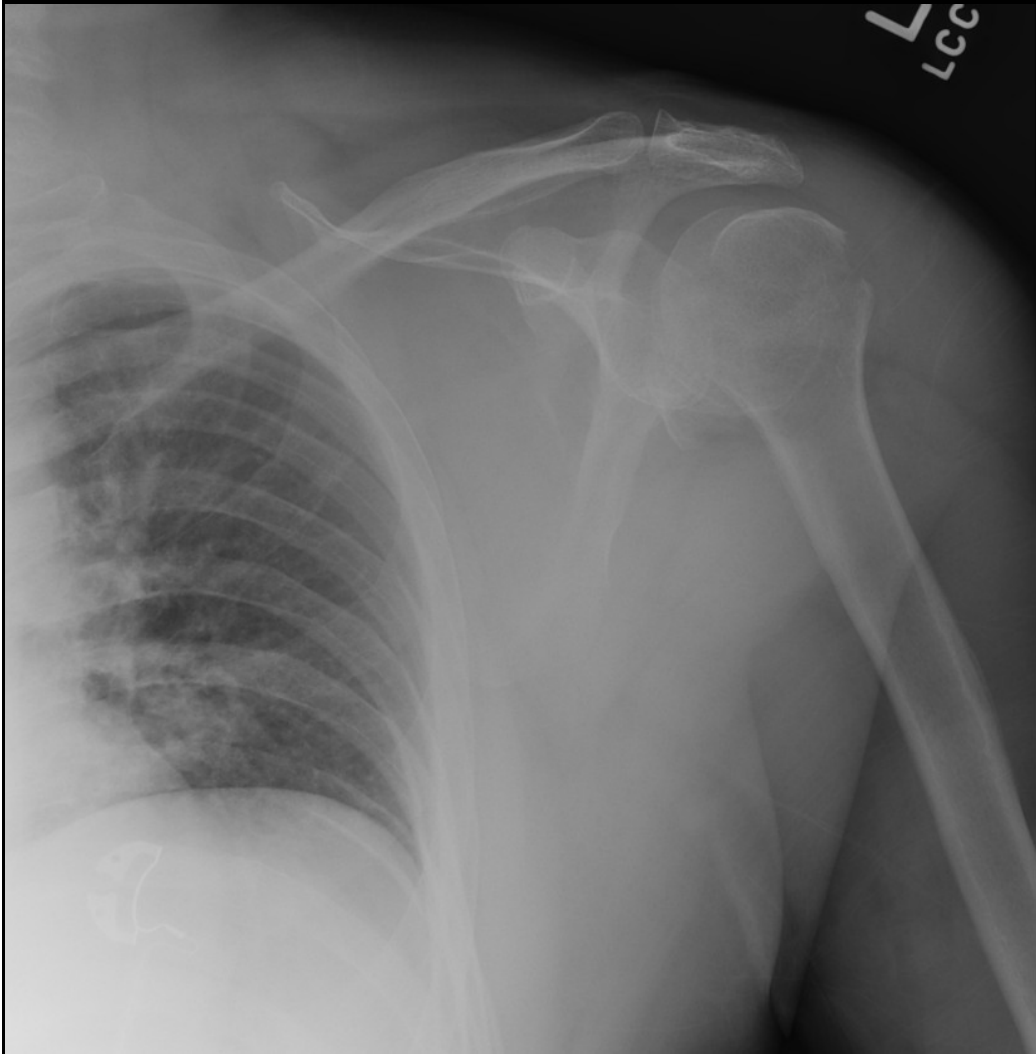
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cm

SE:201  
IM:19

45 year-old male with a history of HSV encephalitis with bilateral humeral neck fractures





Neer 4-part fracture







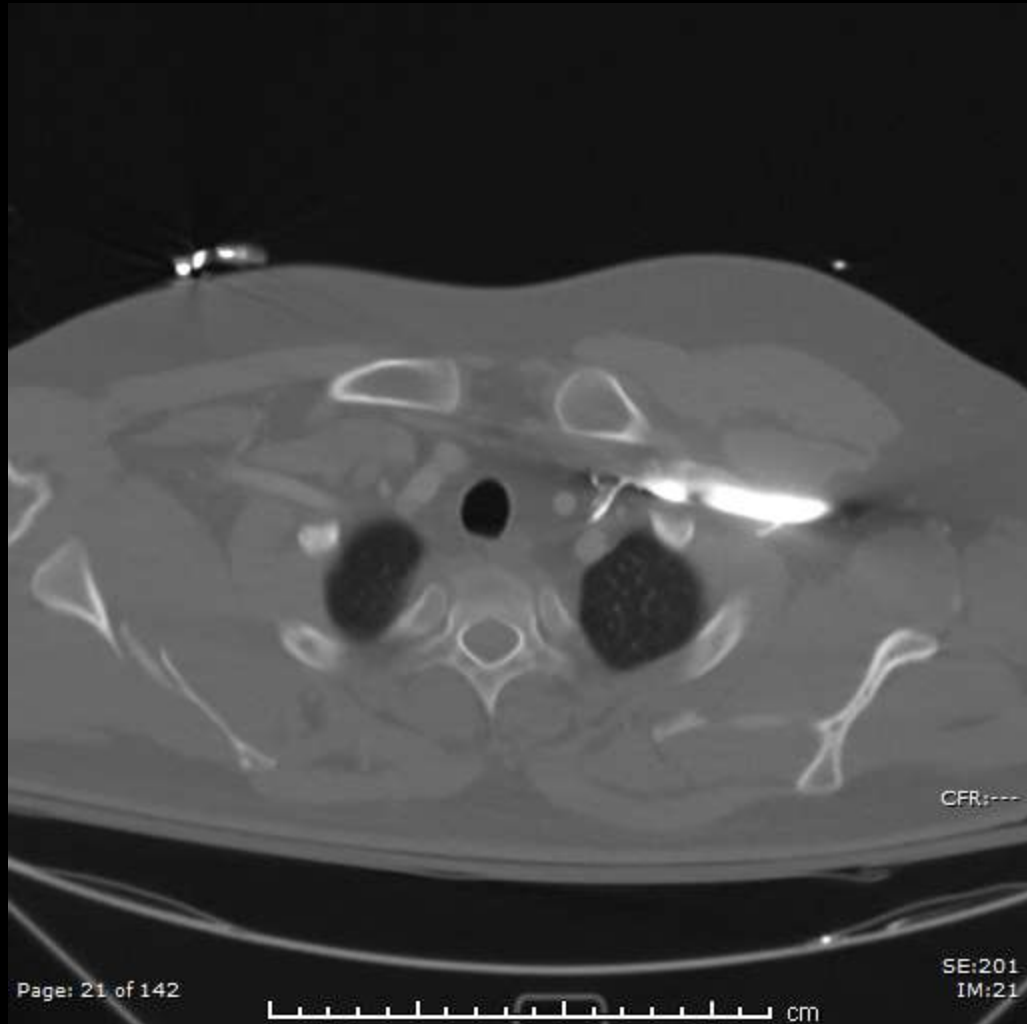
# Scapula

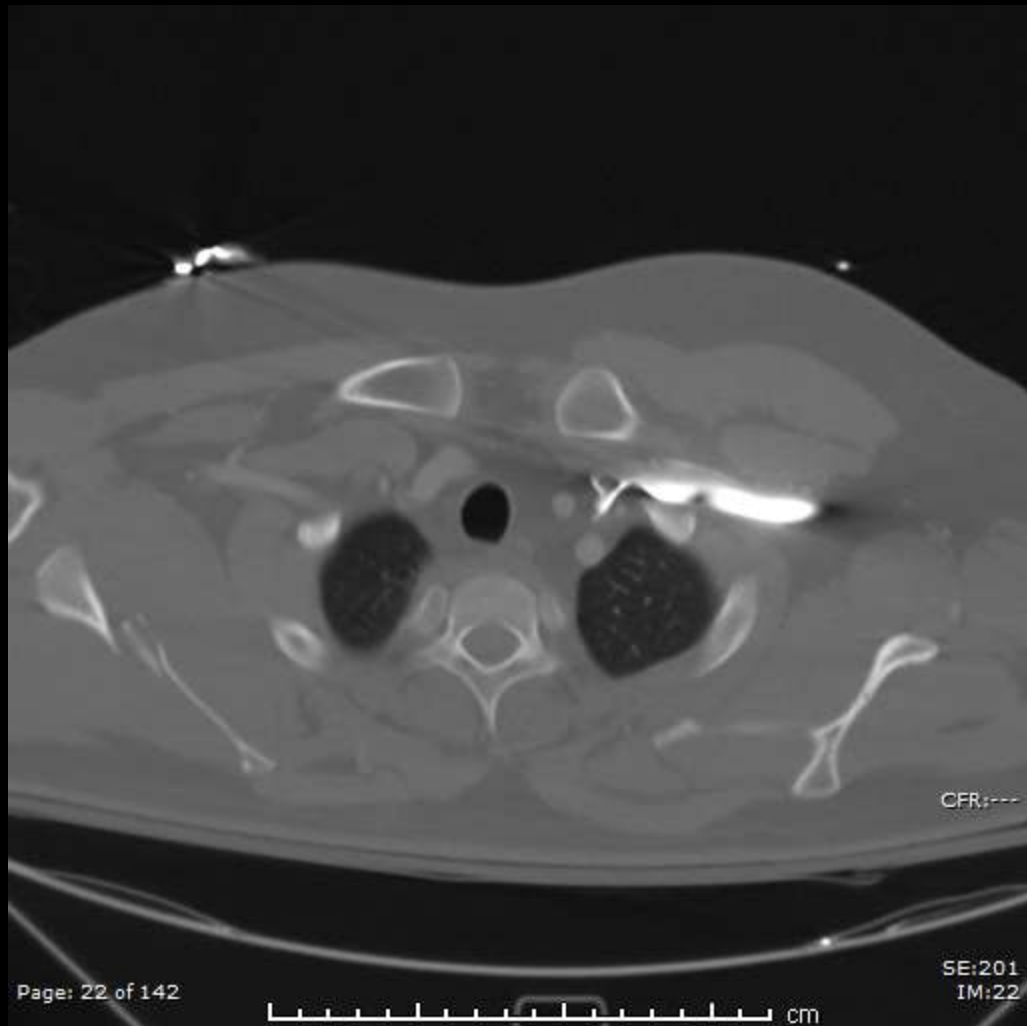
- Fall, MVC
- Majority are non to minimally displaced
- Many radiographically occult
- CT
- Scapular body, coracoid, acromial
- Evaluate for involvement of the glenoid
- Ideberg classification

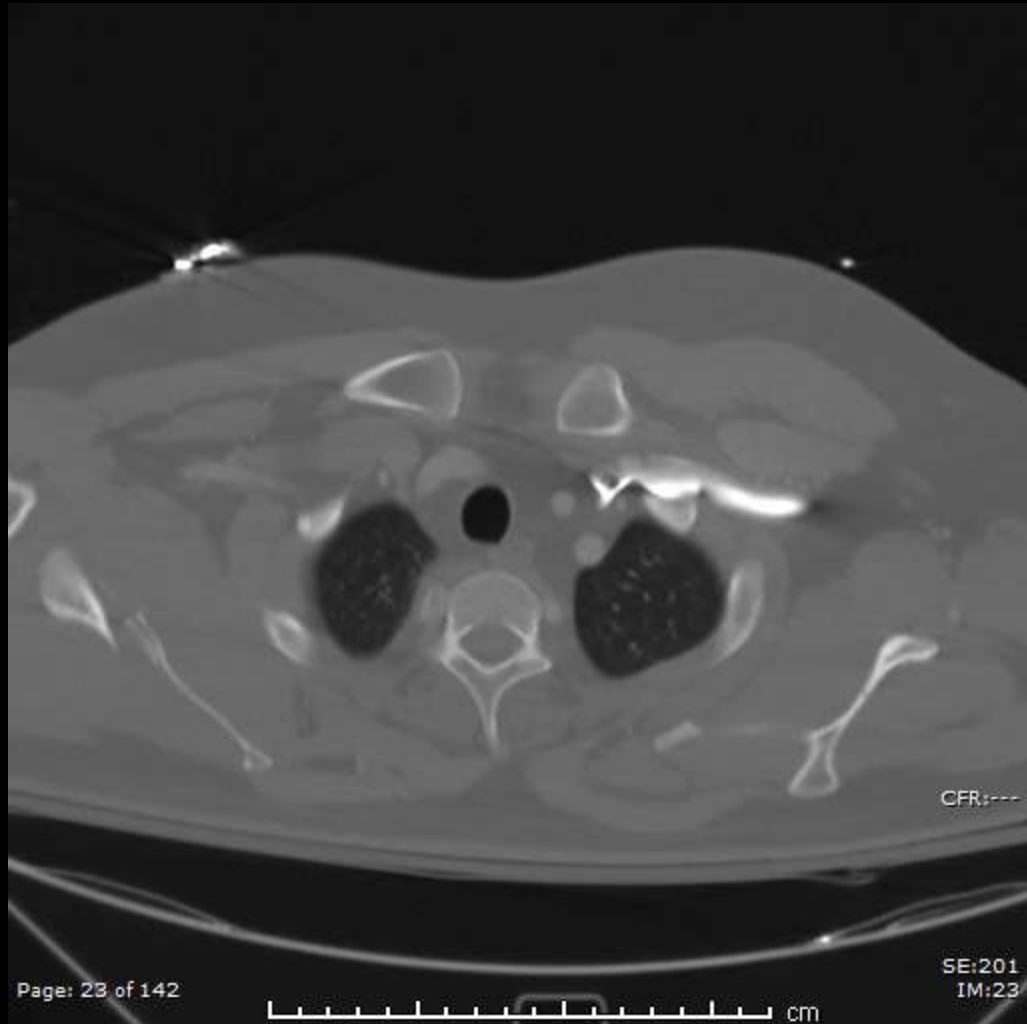


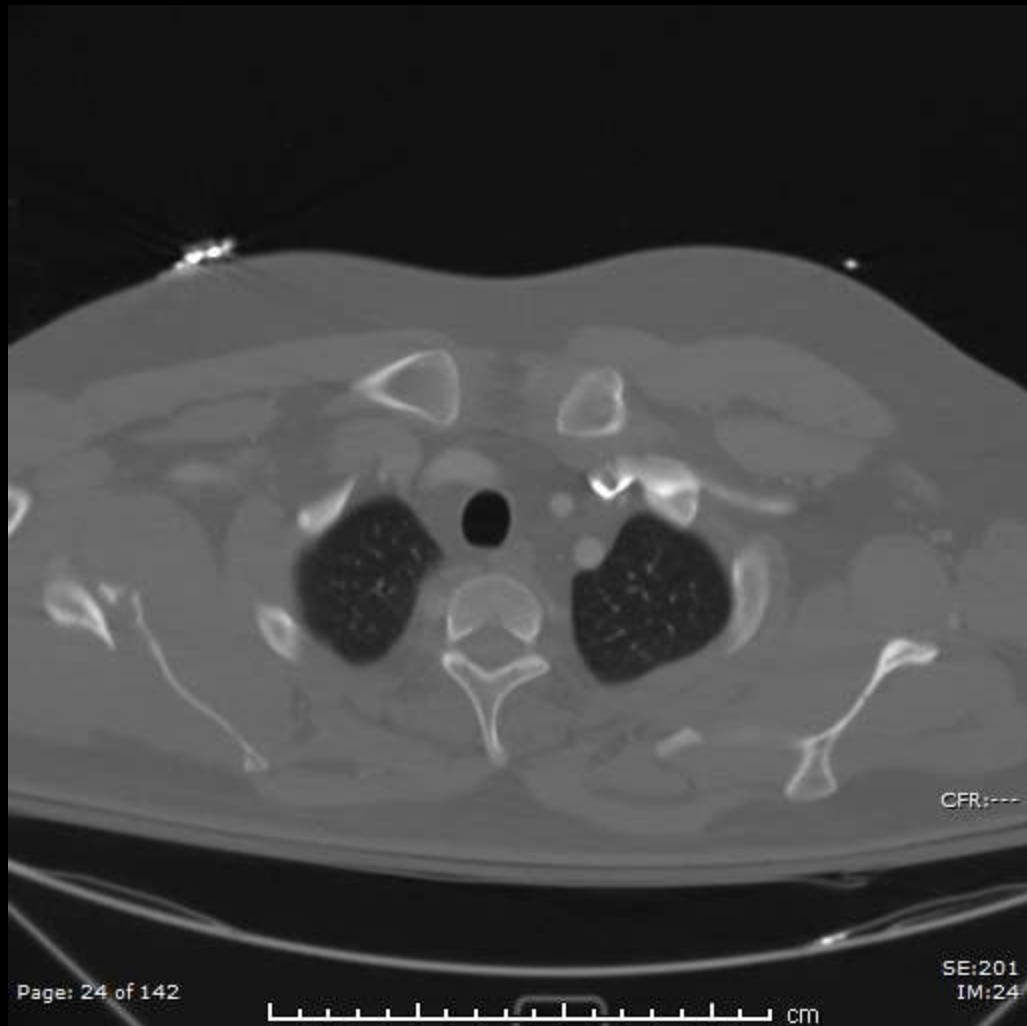
28-year-old male s/p MVC, rear-ended with seat belt sign and deployment of airbag

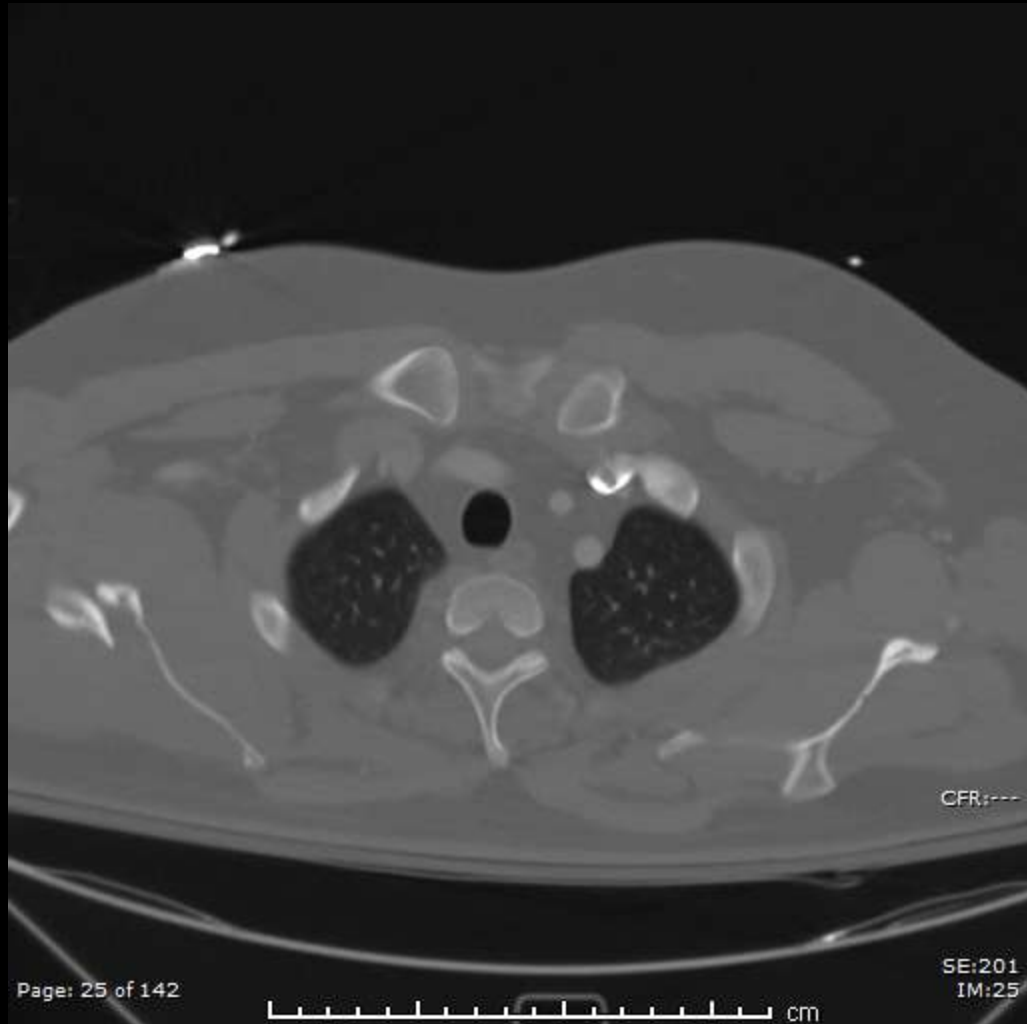










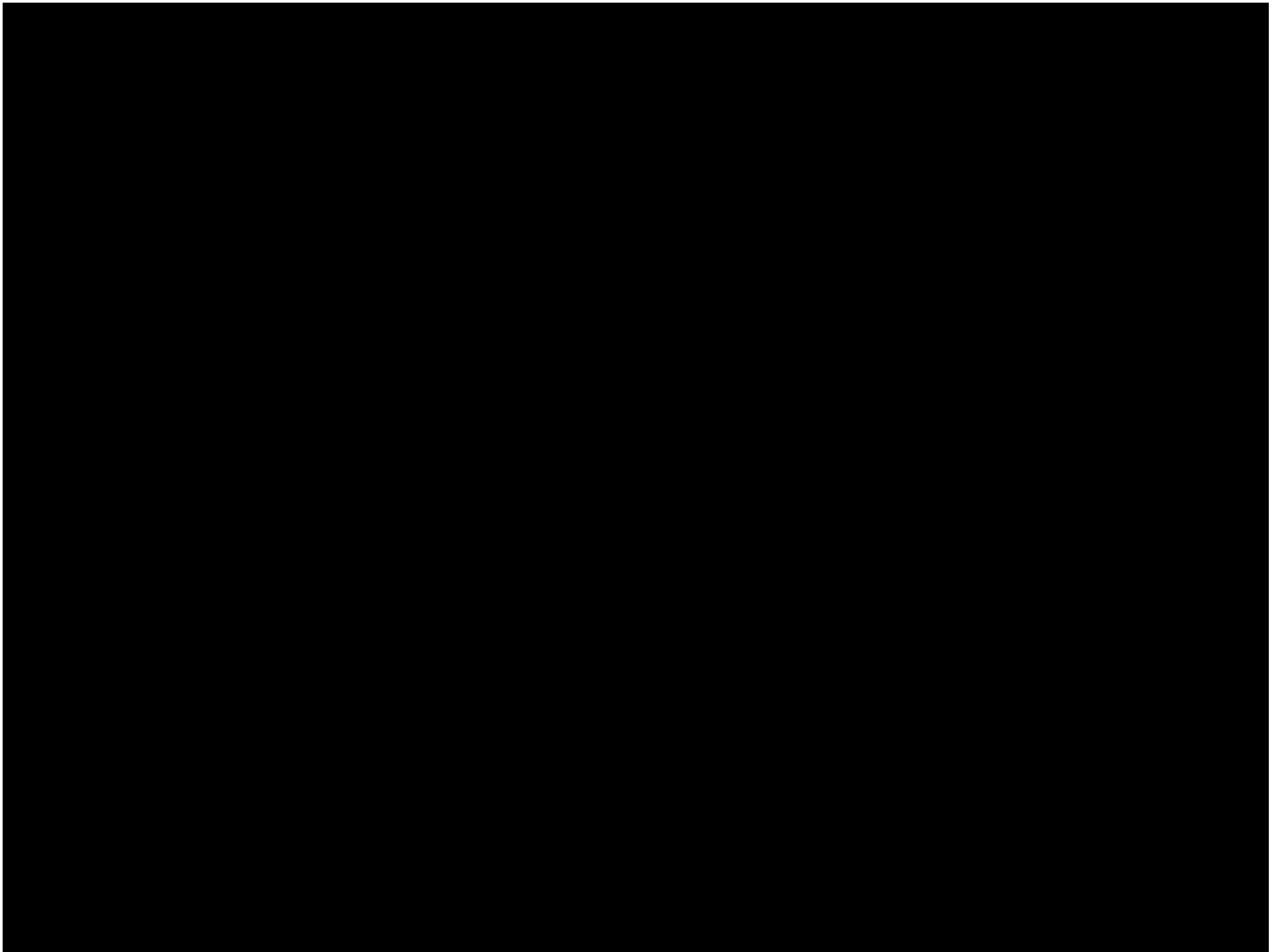




R

43/45

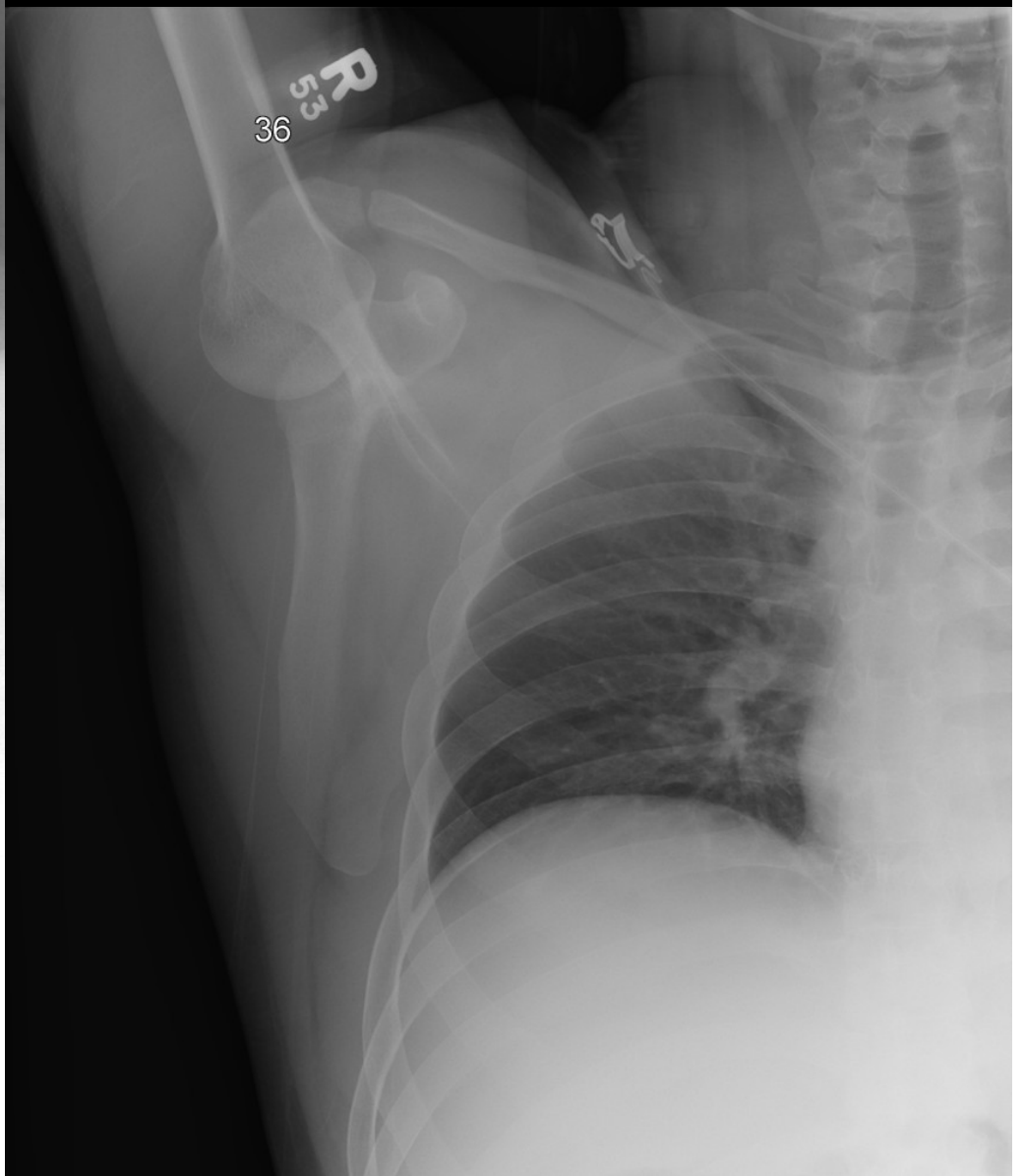
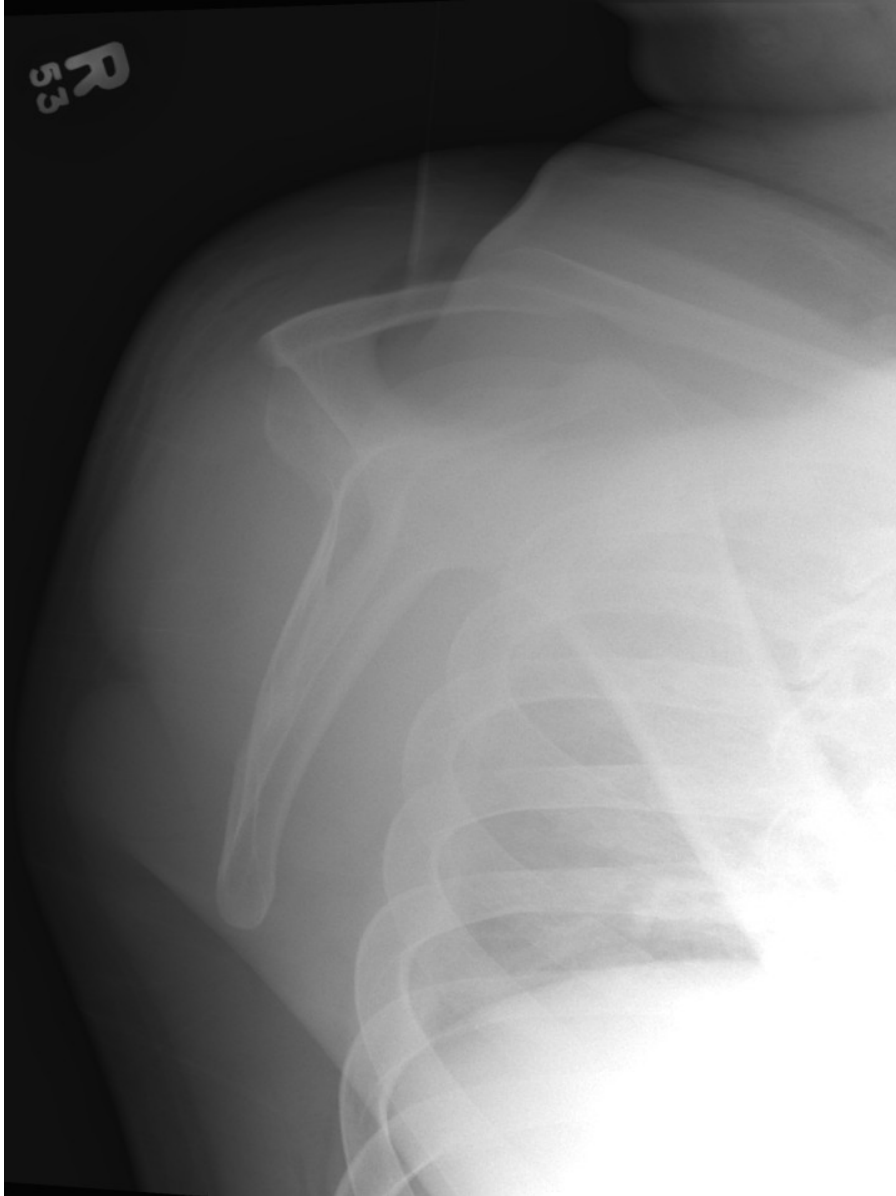


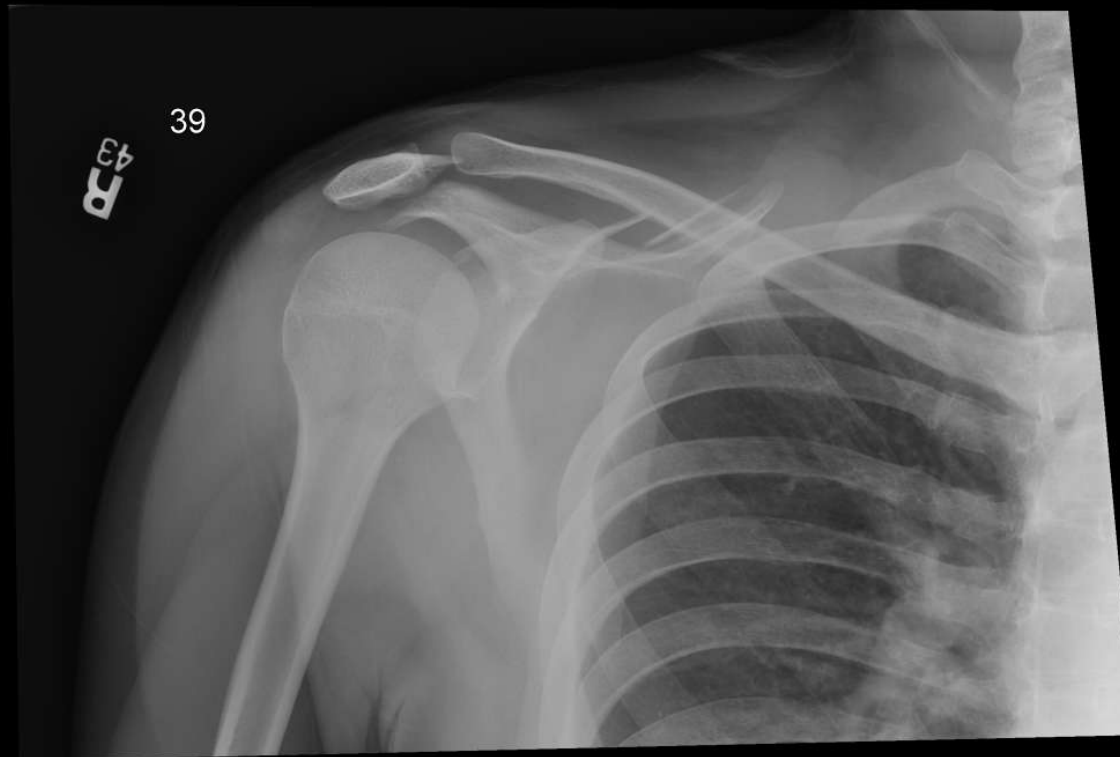




34 year-old who fell from wind turbine





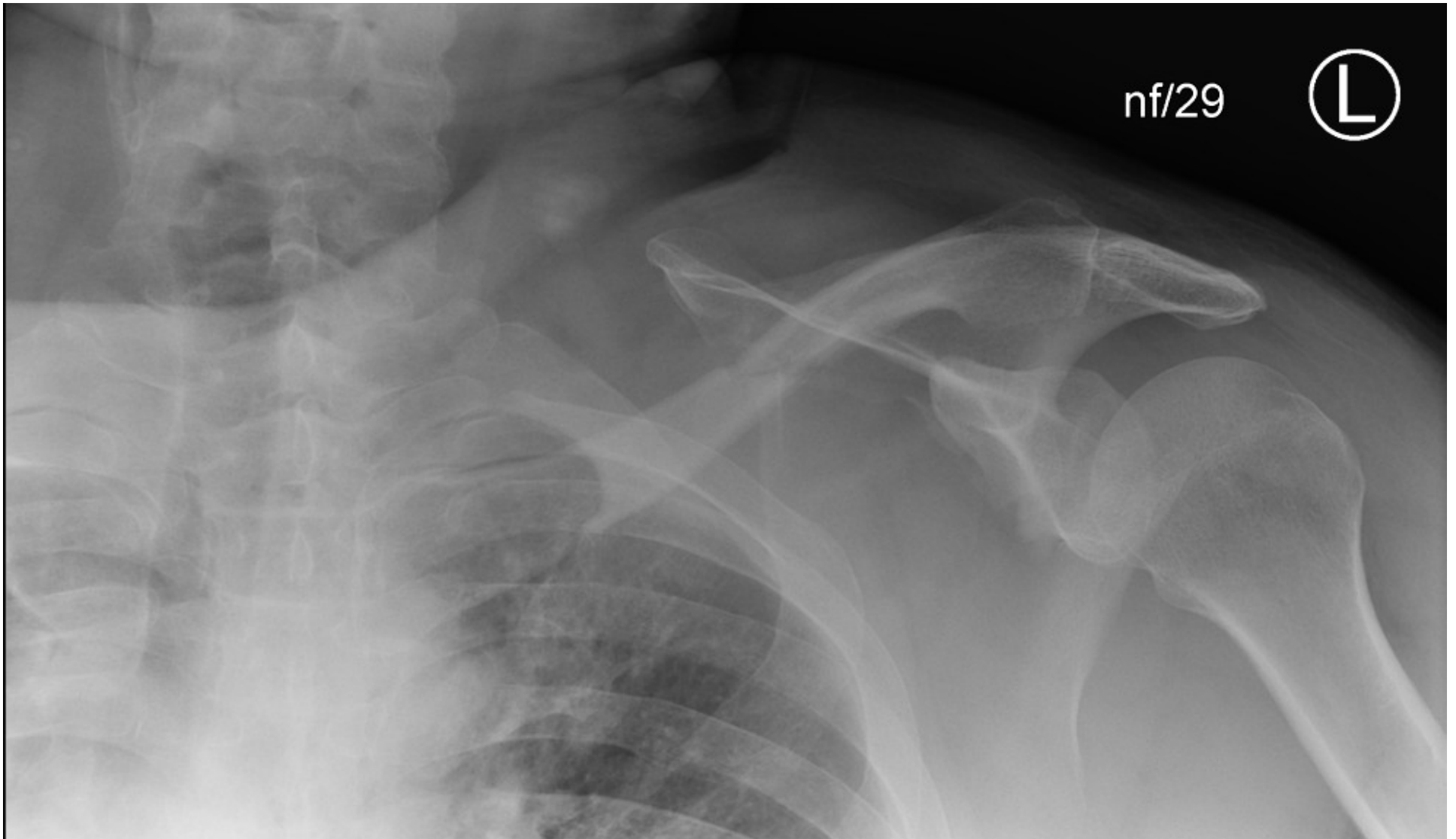


23 year-old with comminuted scapular fracture after slipping on wet ground and landing on posterior shoulder

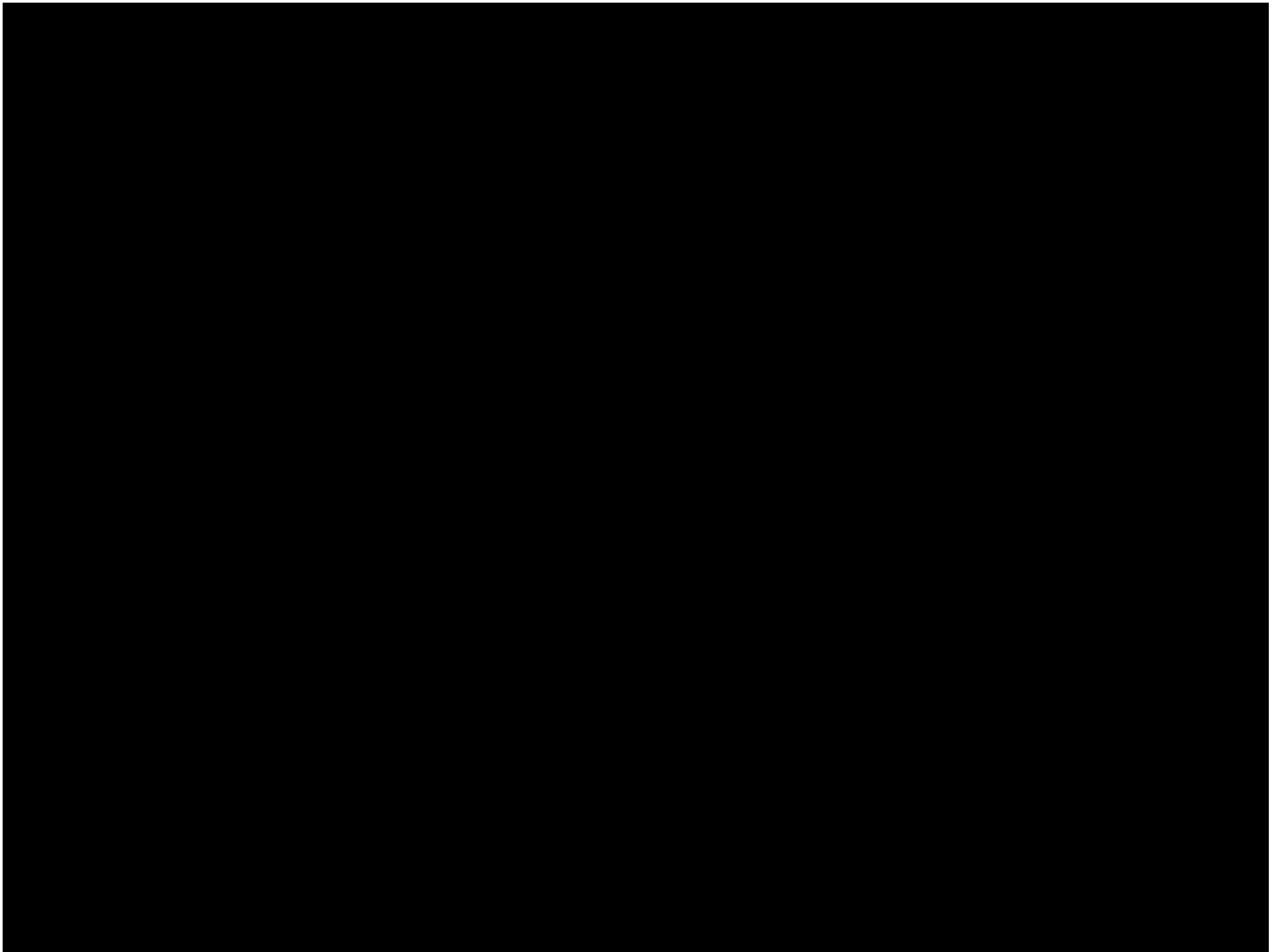


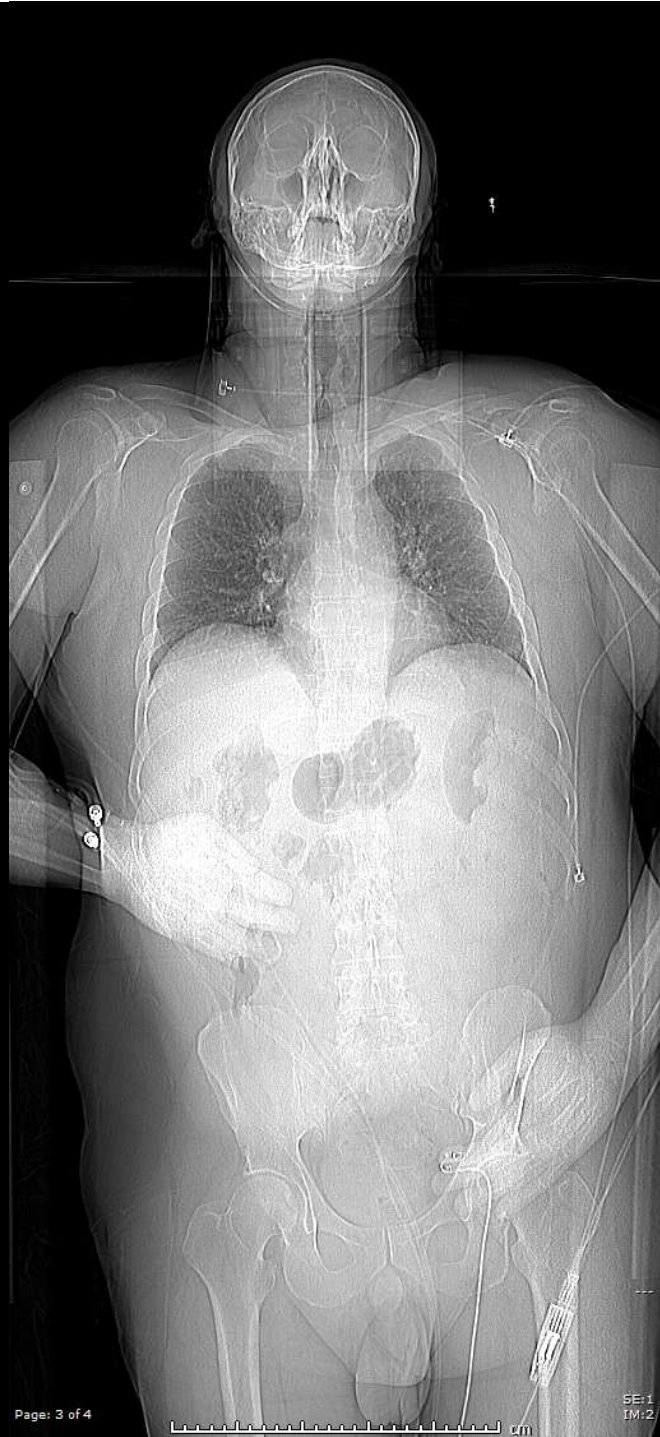


# Floating Shoulder

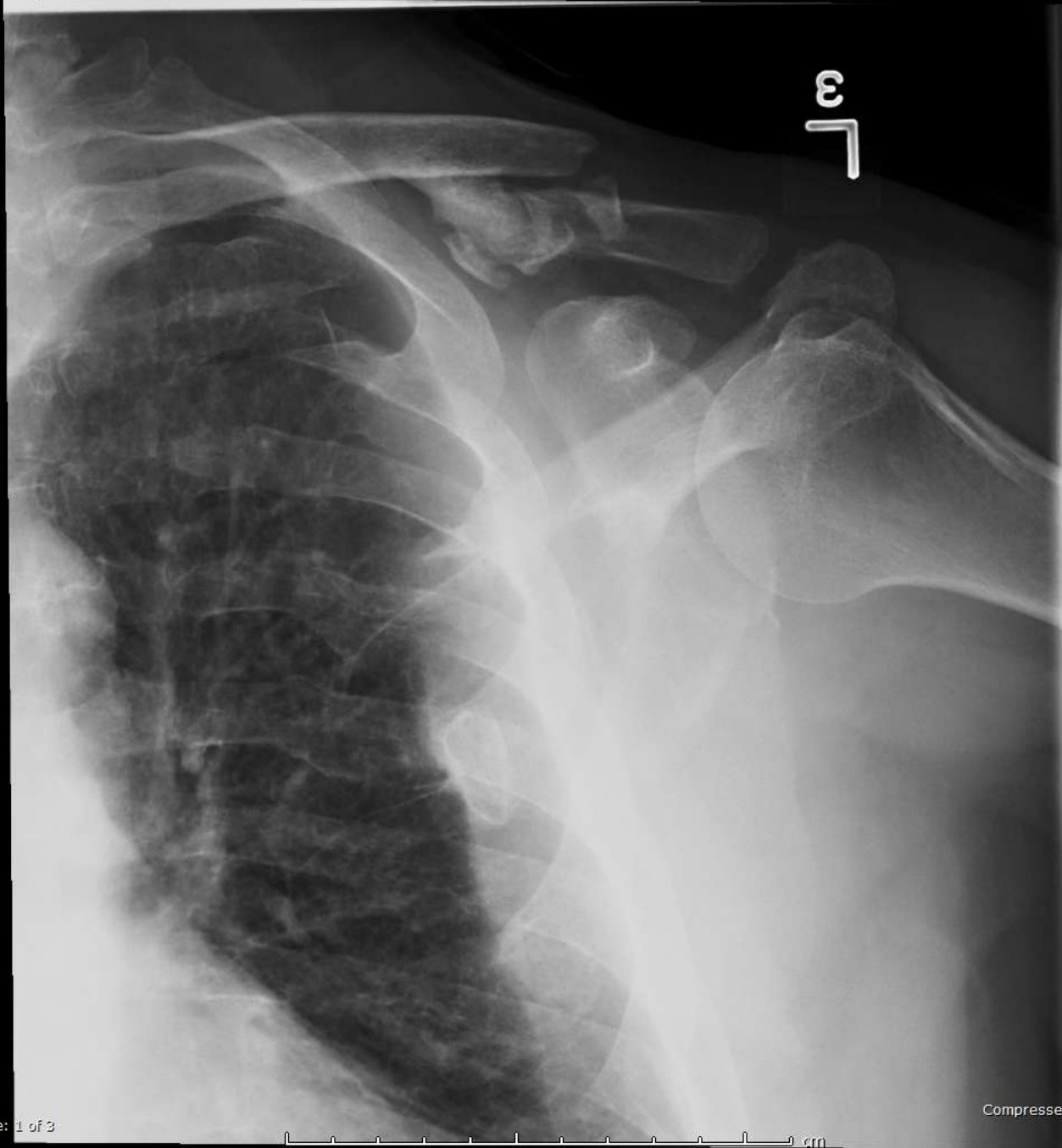


46 yo male s/p mcc with shoulder pain; fx of the clavicle and glenoid neck

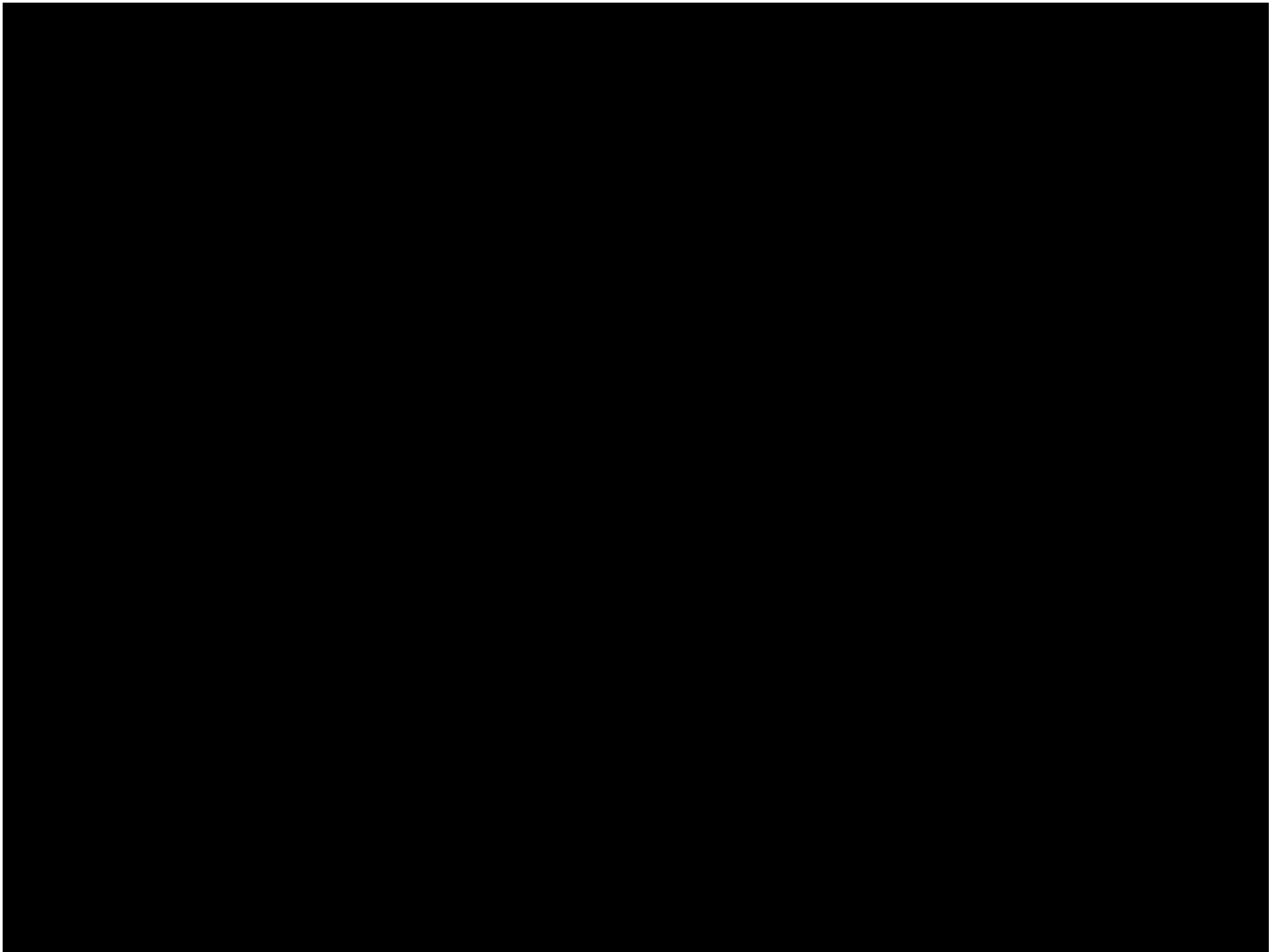








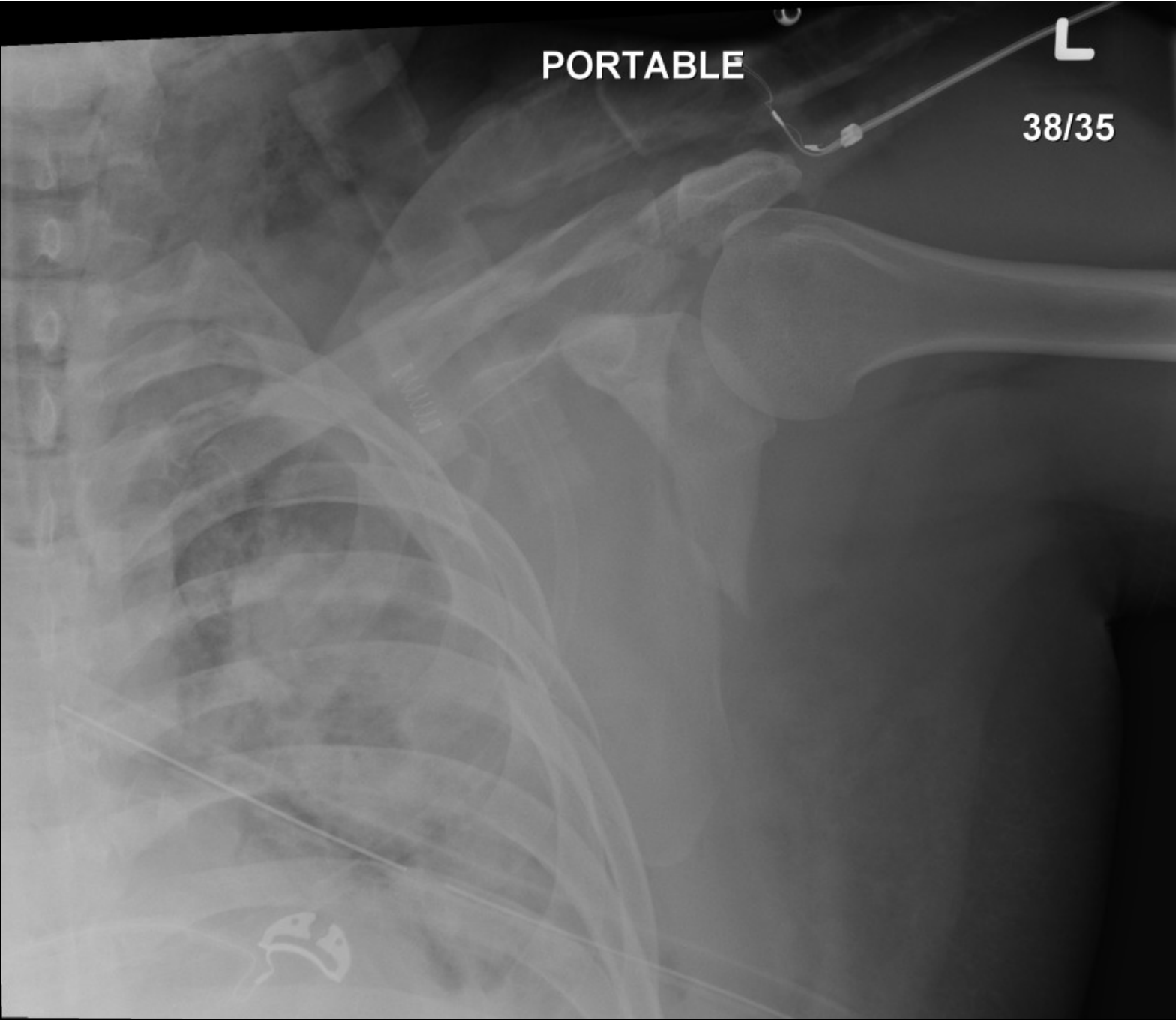




PORTABLE

L

38/35



PORTABLE

L

38/35



# Lever/Torque

- Acromioclavicular injury
- Glenohumeral dislocation
- Sternoclavicular joint disruption
- Scapulothoracic dissociation

# Acromioclavicular Joint Injury

- No longer use weights
- Rockwood classification
- Grade I (sprain of ligaments) is radiographically occult
- Grade II – tear of AC joint ligaments, depression of acromion
- Grade III

# Rockwood Classification

## Grade I

- Sprain of AC ligaments
- Radiographically occult

## Grade II

- Tear of AC ligaments
- Depression of acromion



# Rockwood Classification

## Grade III

- Tear of AC and CC ligaments
- Depression of acromion and widening of CC interval

## Grade IV

- Same with posterior displacement of clavicle on axillary view

# Rockwood Classification

## Grade V

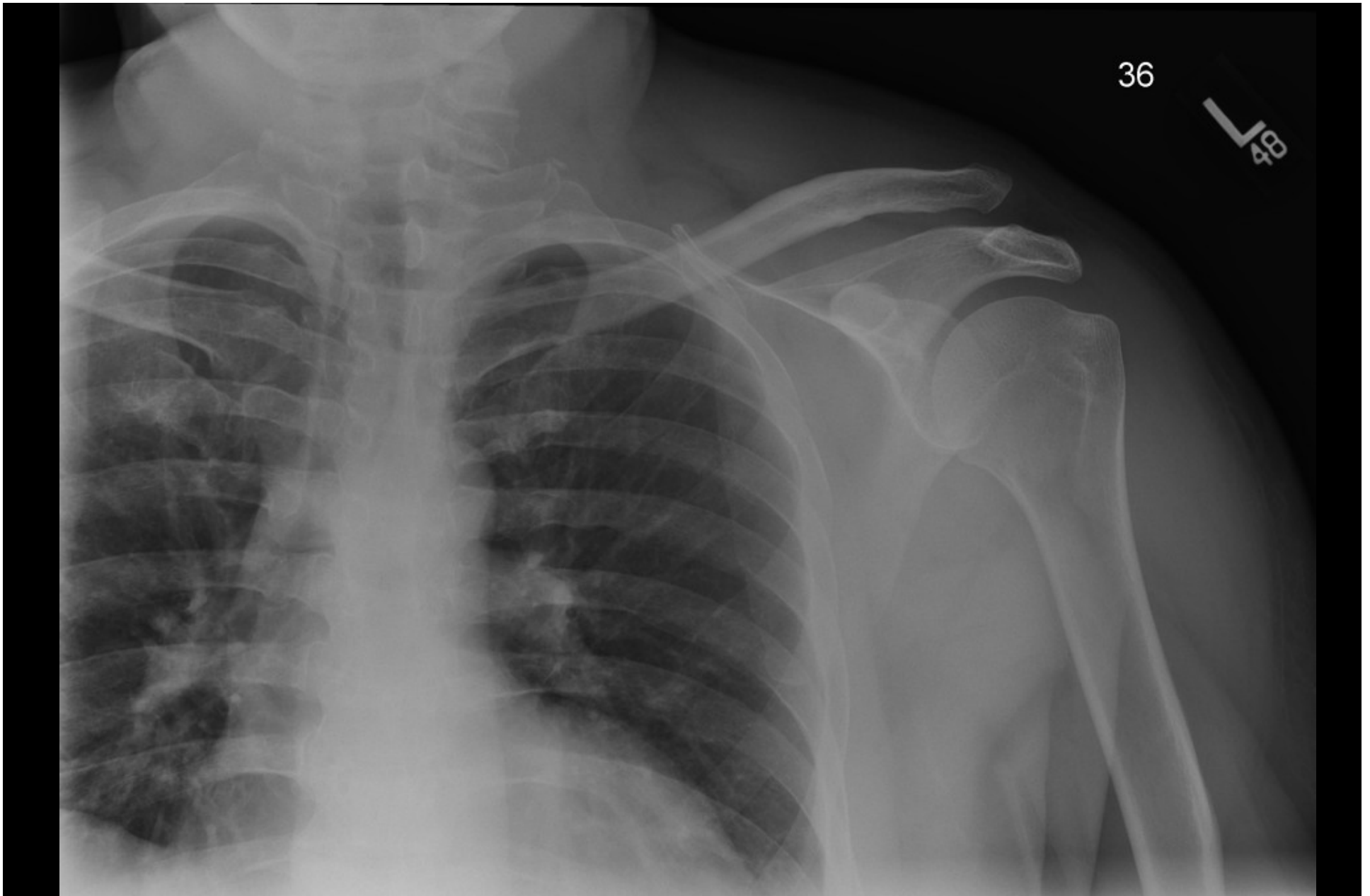
- Same with extreme elevation of distal clavicle through the trapezius

## Grade VI

- Inferior displacement of clavicle



53-year-old male s/p assault with type II ac injury

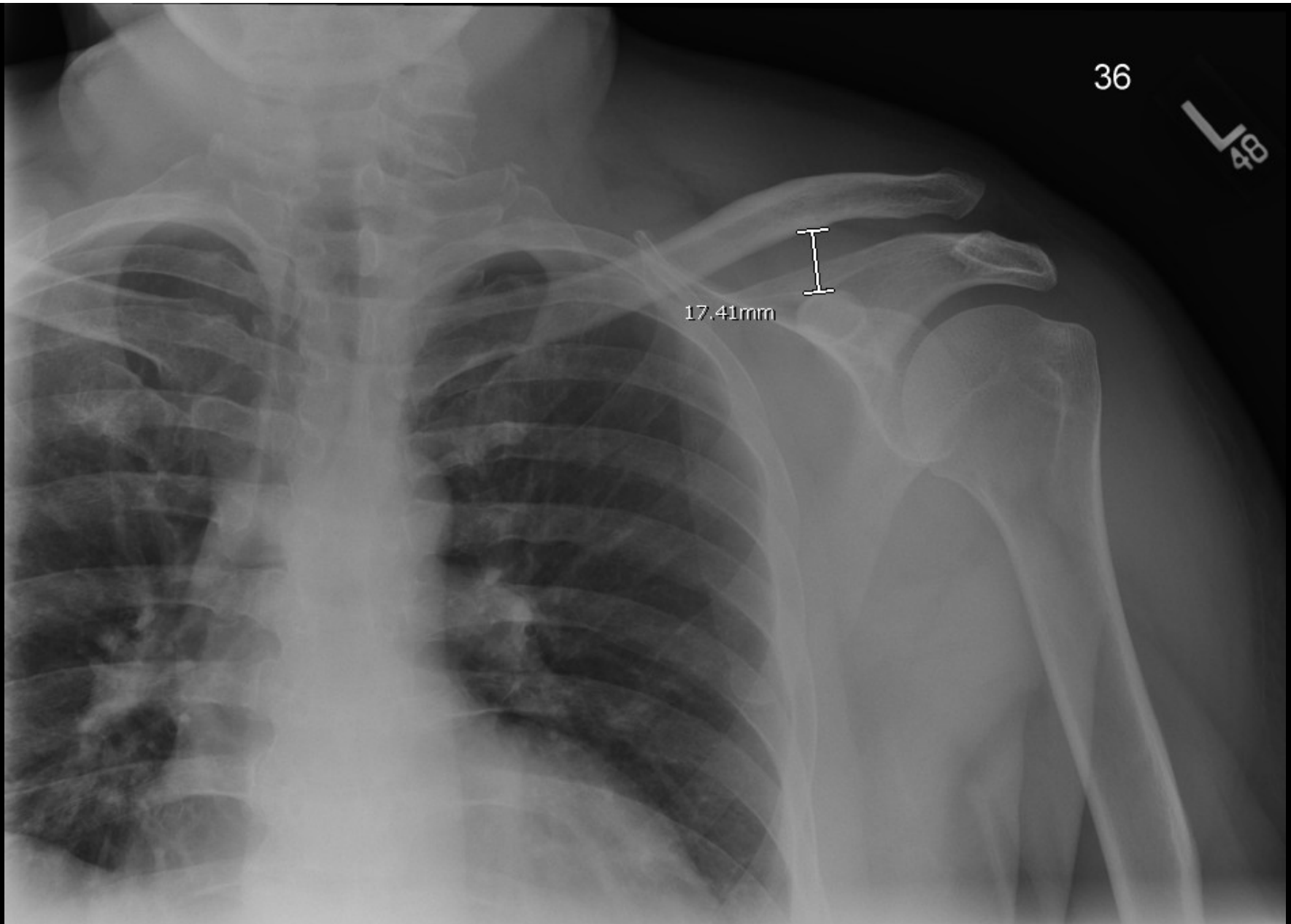


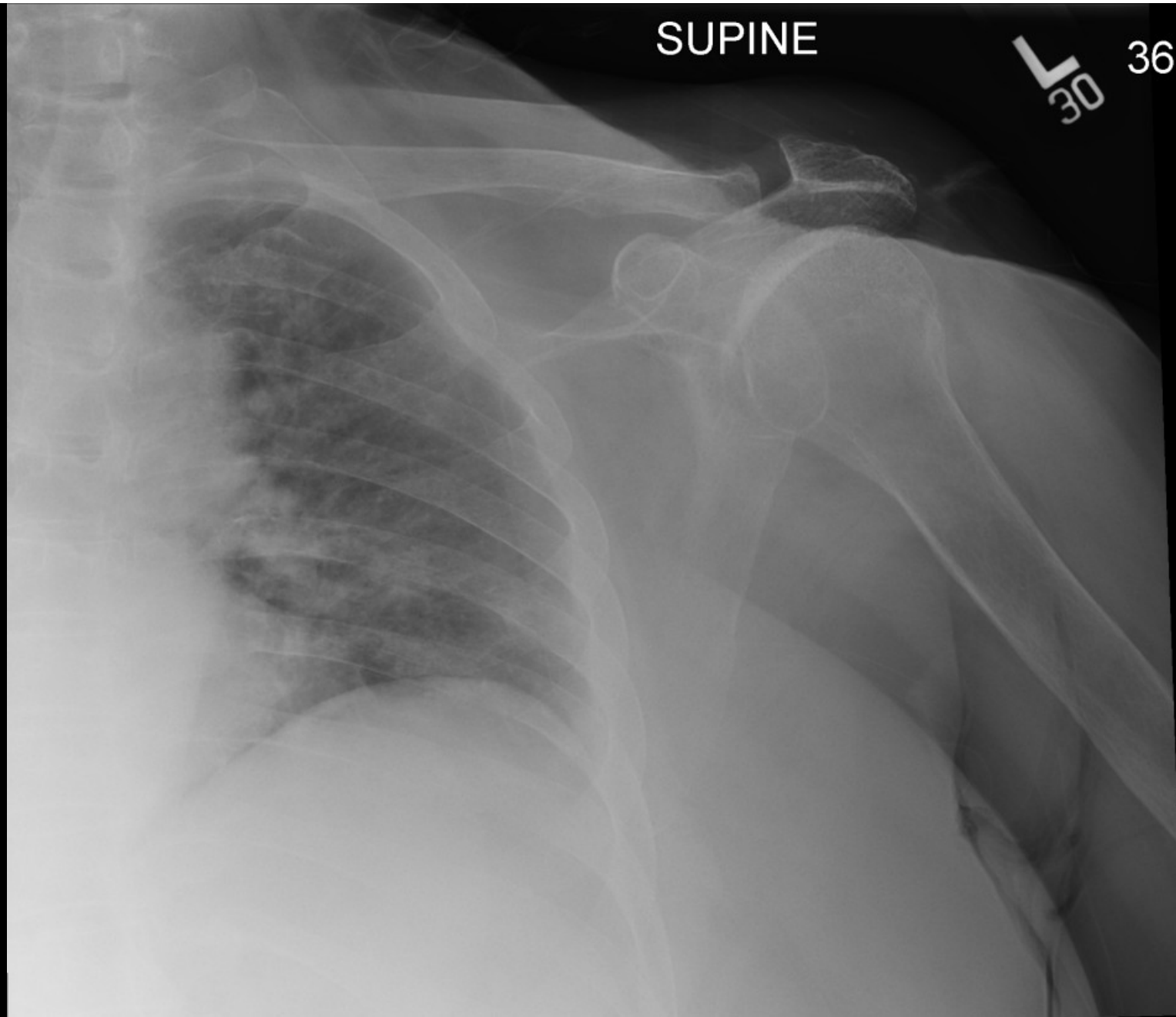
46 year-old incarcerated male with shoulder pain after fall onto left shoulder

36



17.41mm

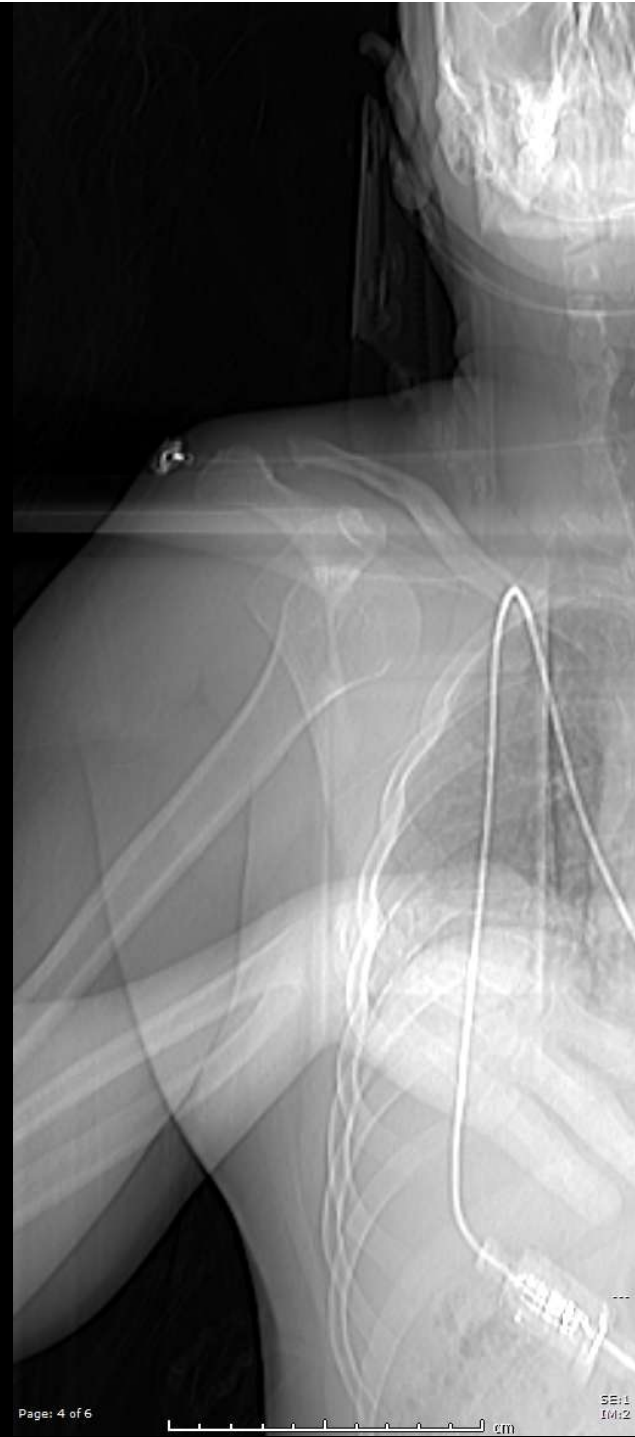




58-year-old female with type VI ac joint injury

# Glenohumeral Dislocation

- Anterior (95%) >> posterior >> inferior (luxatio erecta) > intra-thoracic
- Anterior: Abduction, extension, external rotation
- Posterior: adduction, flexion, internal rotation (electric shock or seizure due to muscular contraction)
- Luxatio Erecta: fall head-first (ie dive position) with arm overhead





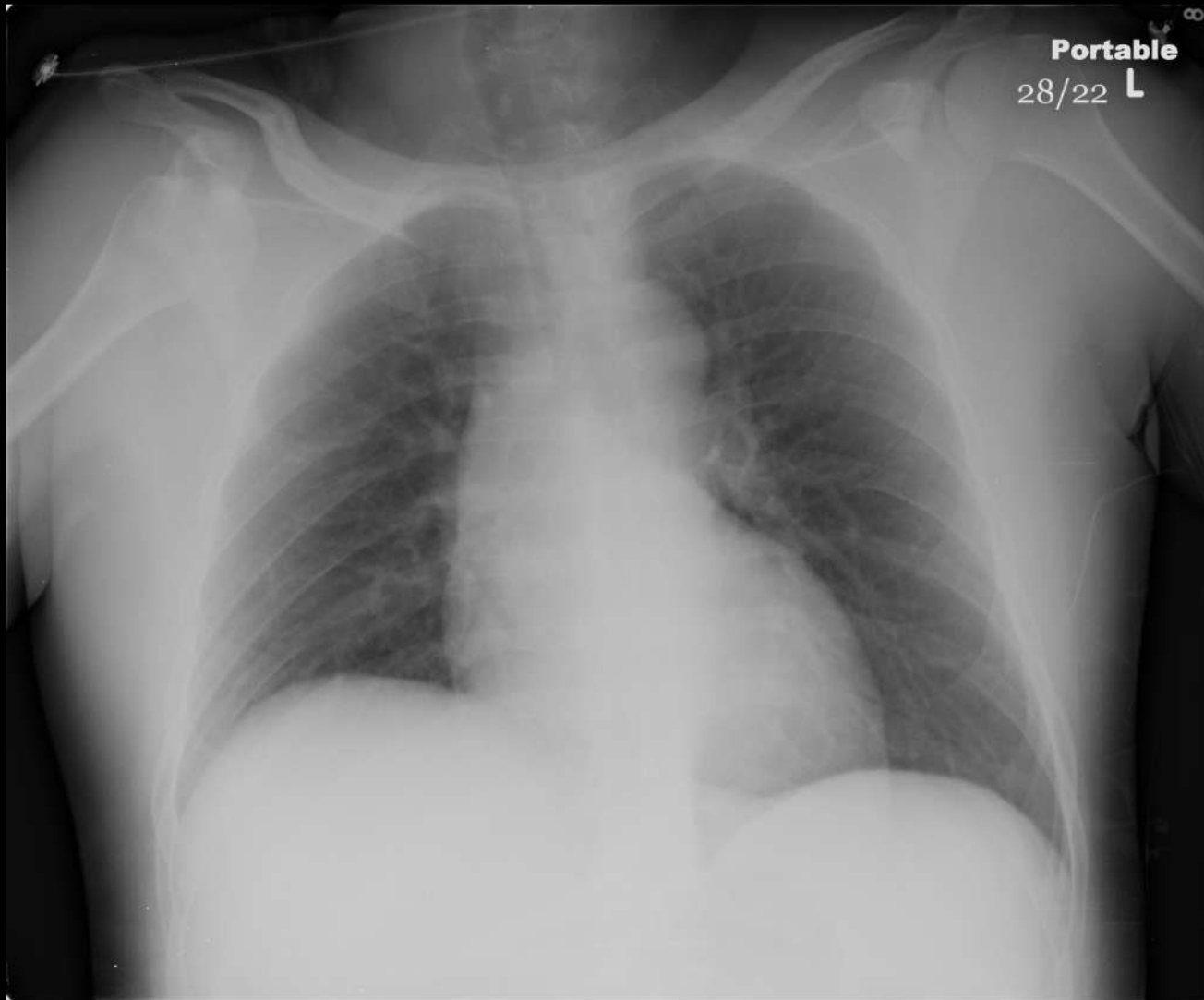


CFR:3

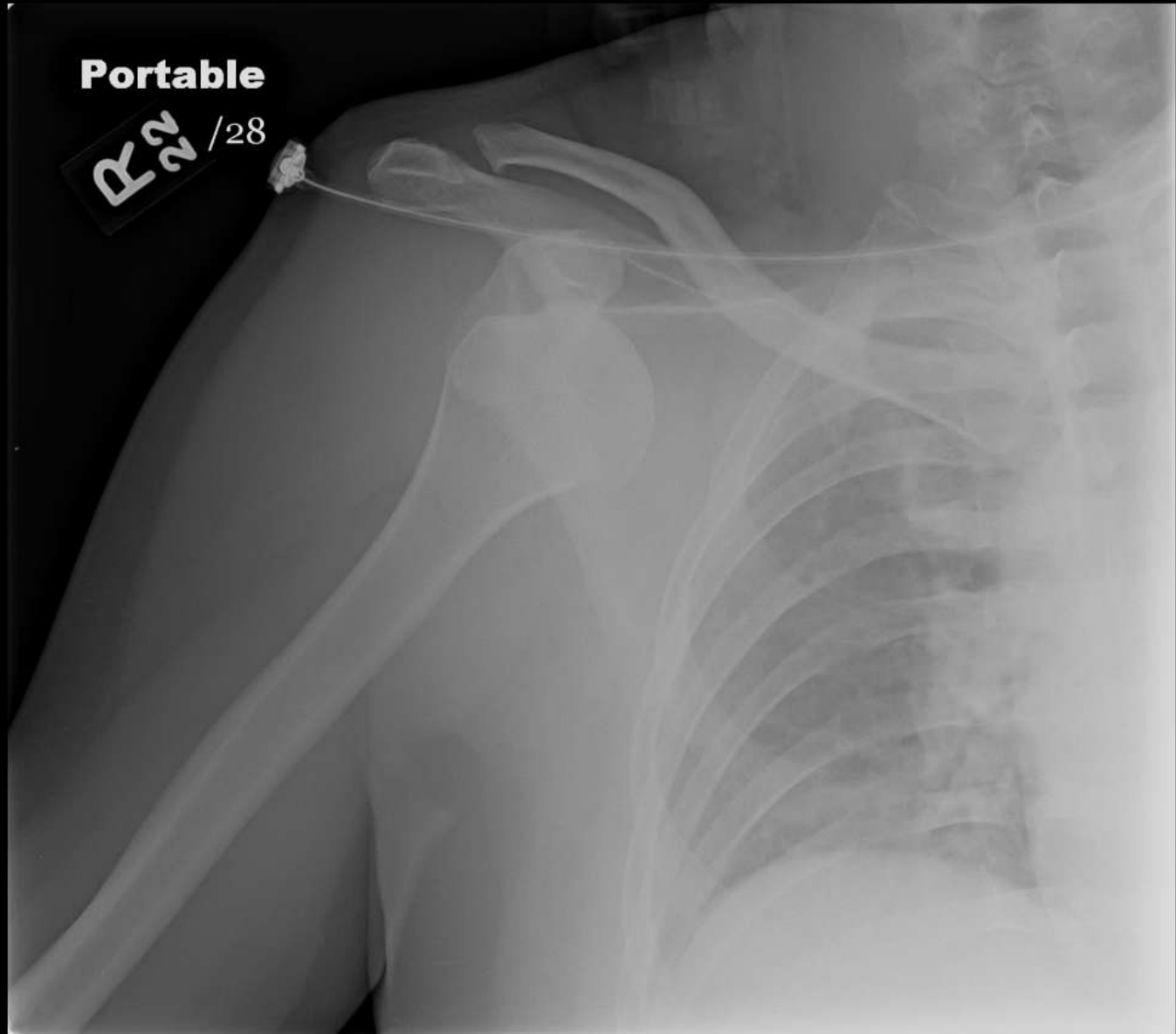
SE:5

IM:10

cm



47 year-old MVC vs Ped

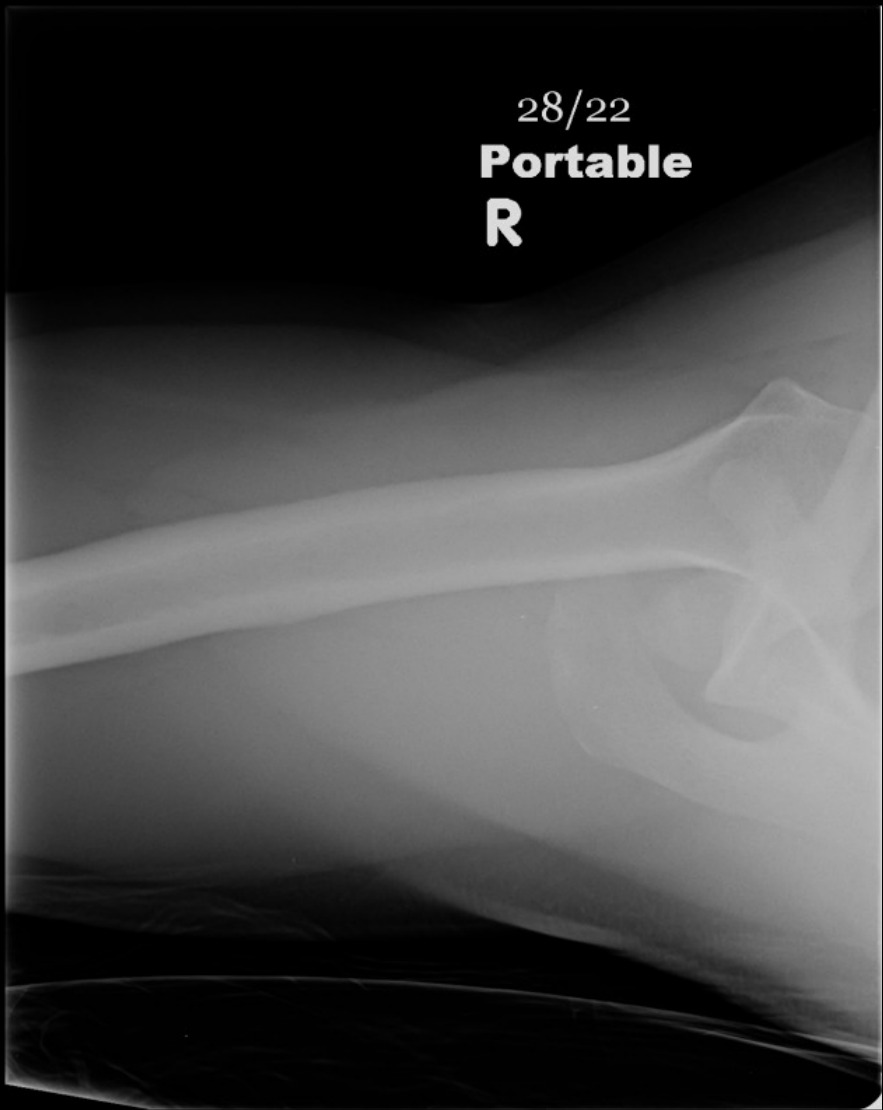


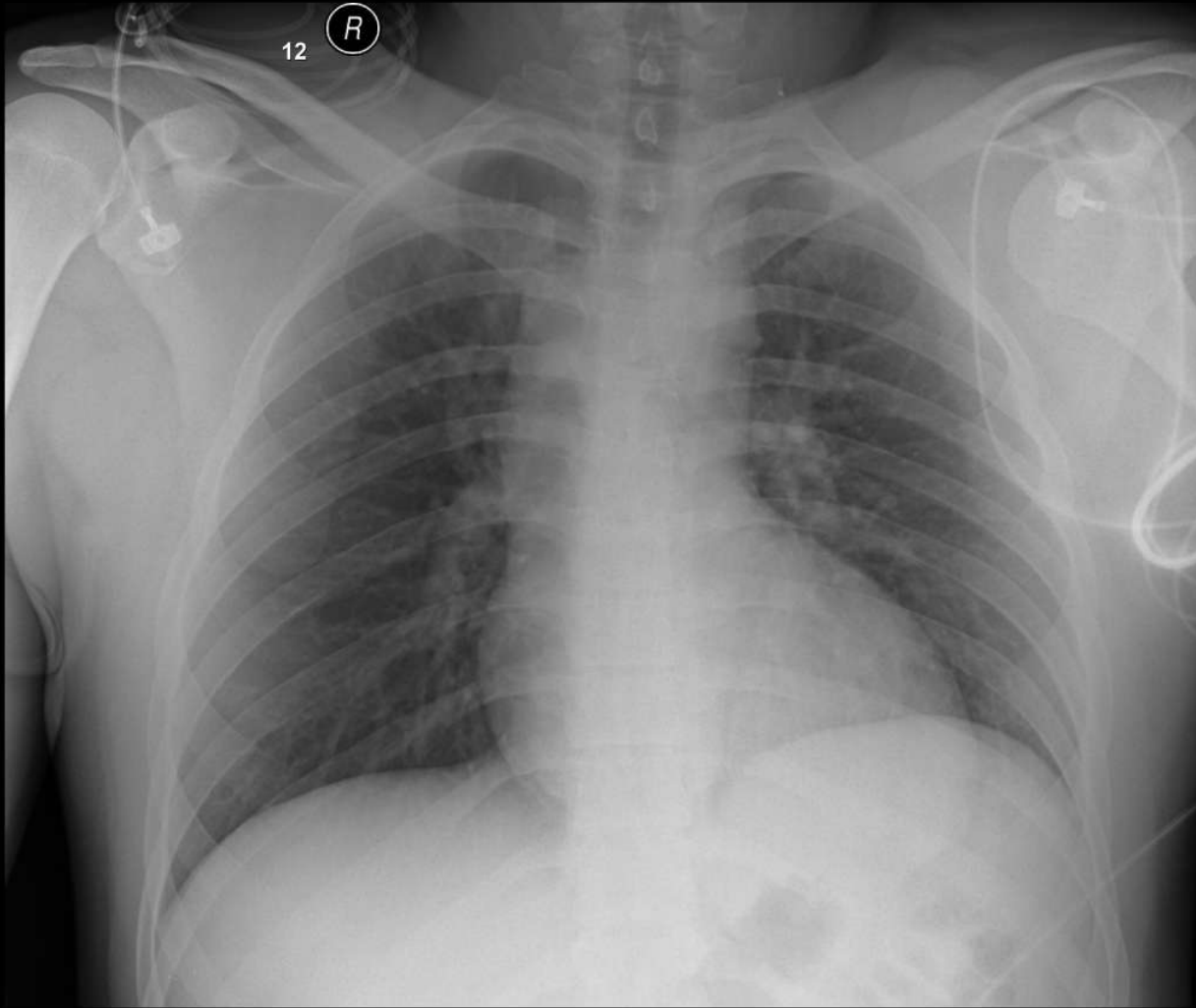
Portable

R22 /28



28/22  
**Portable**  
**R**





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Compressed 27:1  
IM: 1

21 year-old male s/p motorcross accident, fall from 15-20 feet after jump and landed on bike

# Hill Sachs and Bankart

- Impaction fracture of posterolateral humeral head and anterior glenoid
- Measured on CT



CFR:3\0\3\3

SE:401  
IM:40

cm



PORTABLE  
INTERNAL ROTATION

L  
23



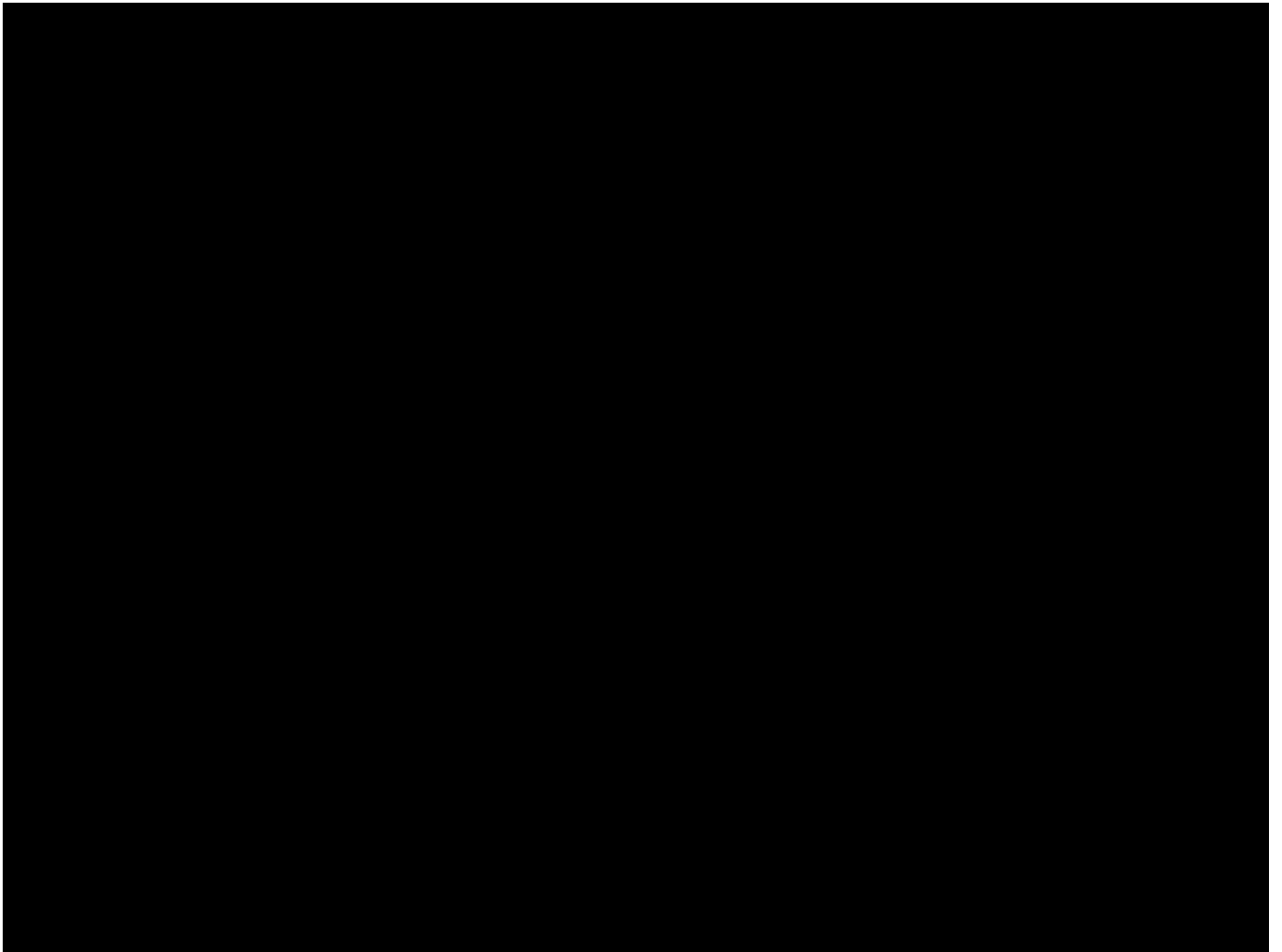


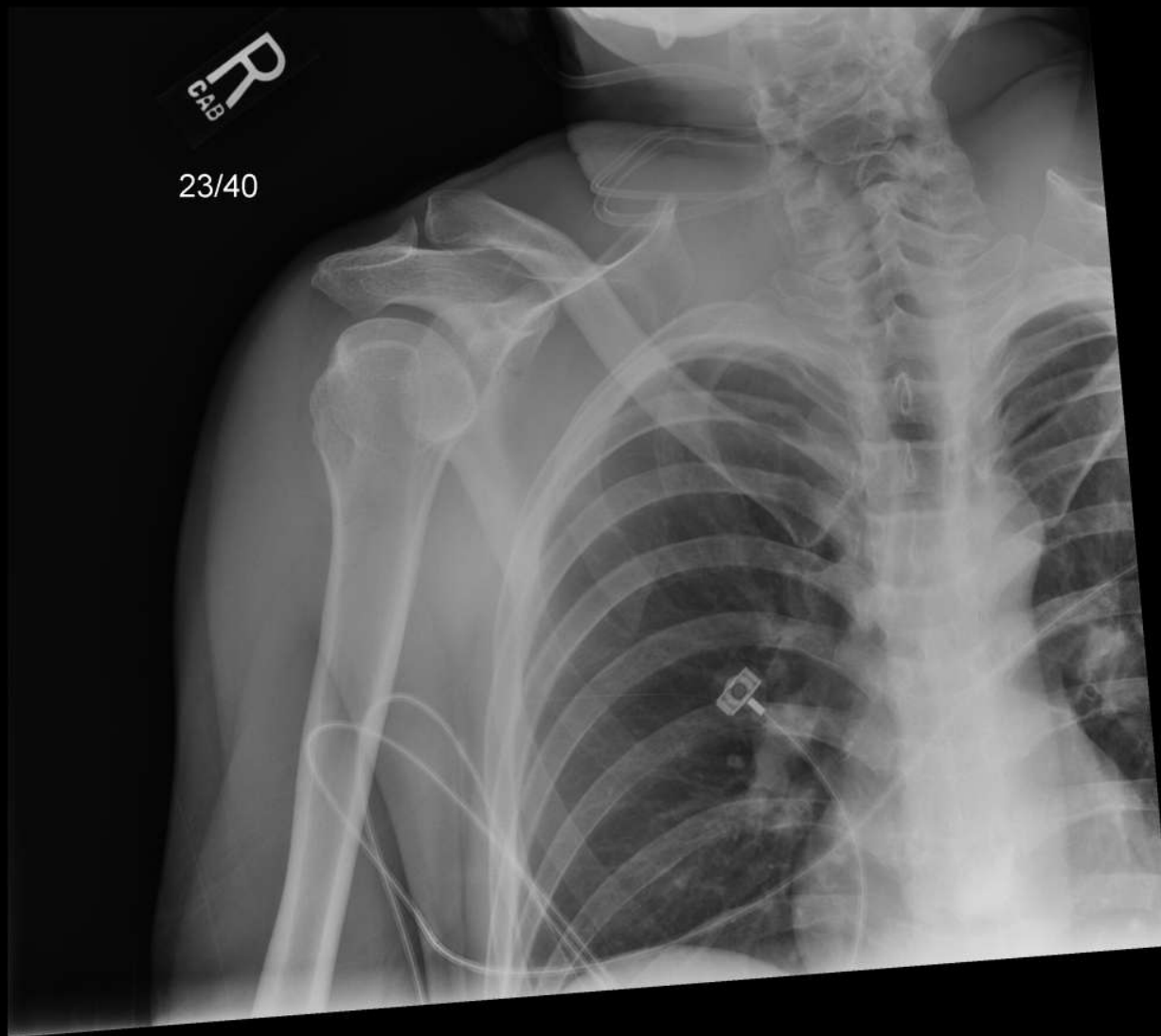
L

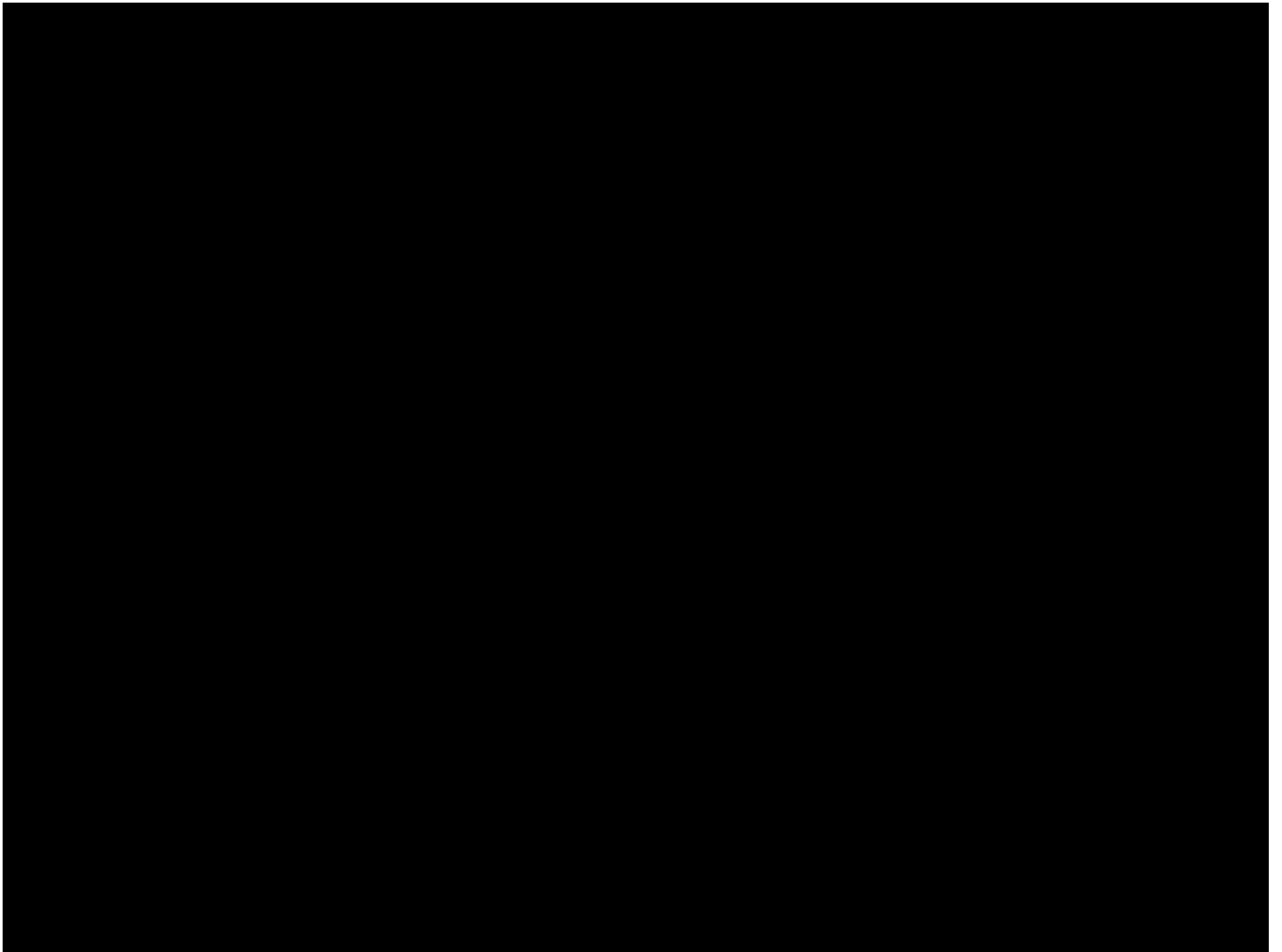
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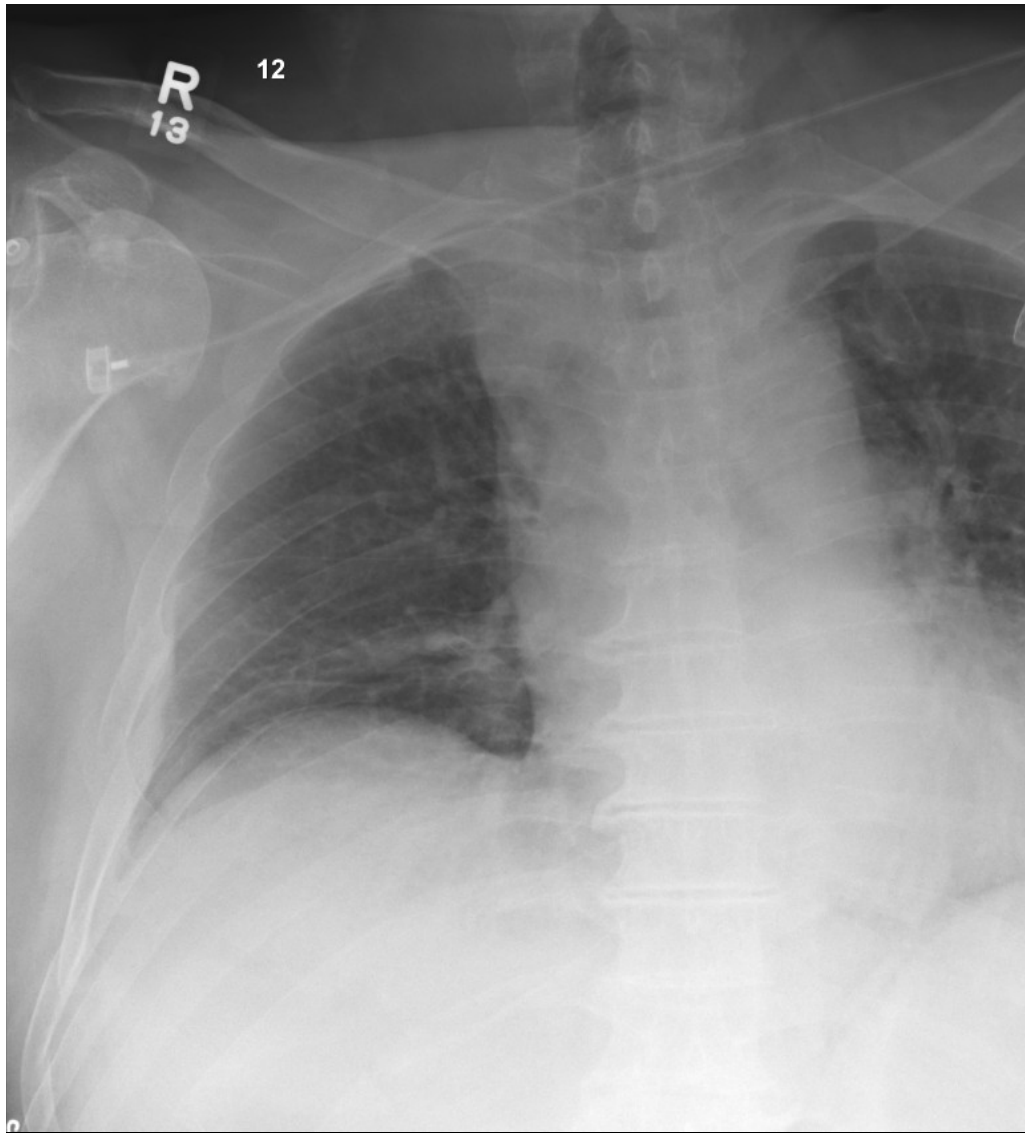
# CROSS-TABLE











PORTABLE

speer

PR

R A



20 cm



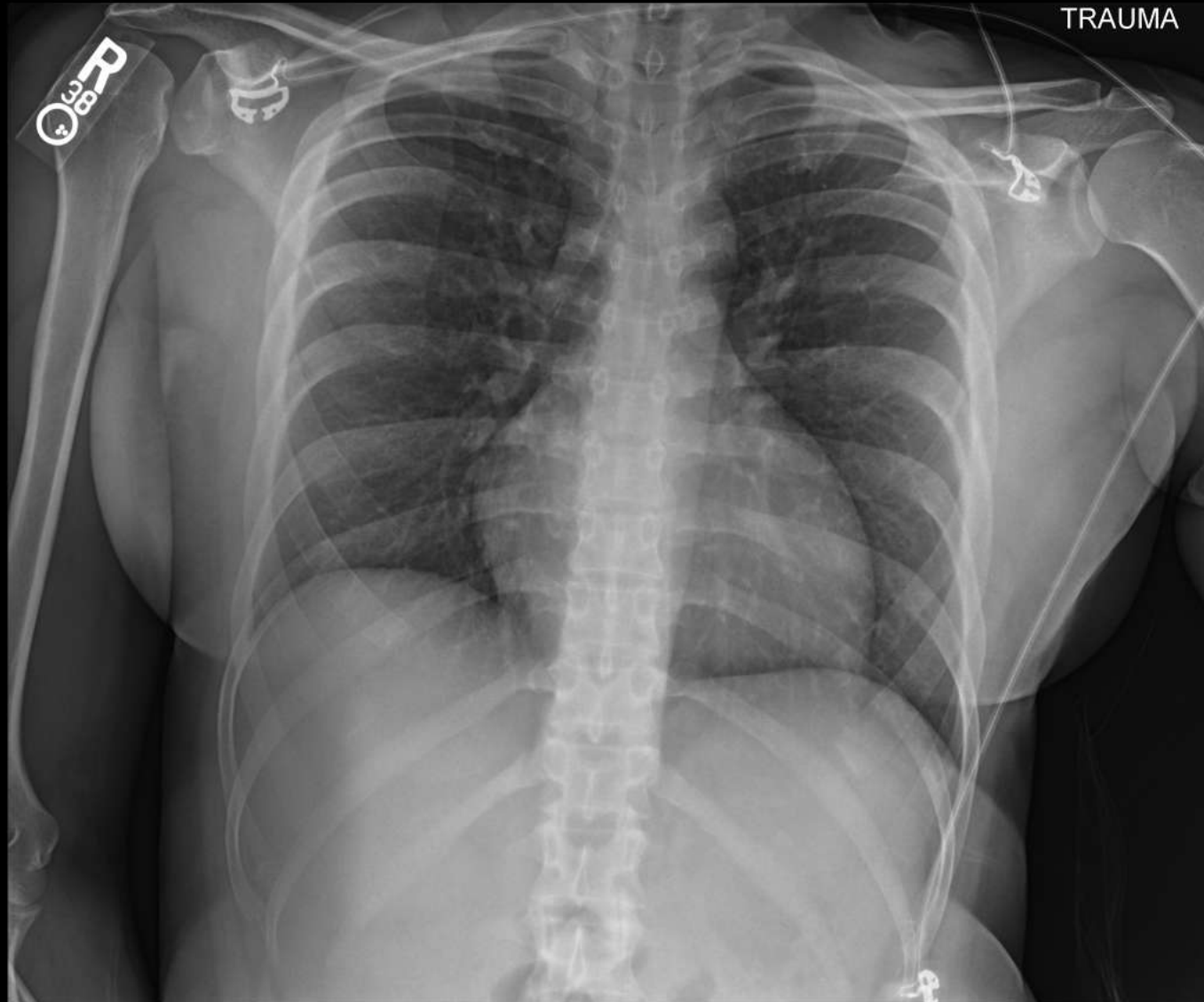
65 year-old man s/p MVC vs pedi



# Posterior dislocation

- Overlap of medial humeral head on Grashey
- Non-overlap of medial head on AP
- Reverse Hill Sachs and Bankart fractures
- Trough sign (impaction of humeral head; “Liability line” – Lee Rogers)
- Rim sign – widening of joint
- Loss of half moon (decreased overlap)
- Arm held in adduction and internal rotation

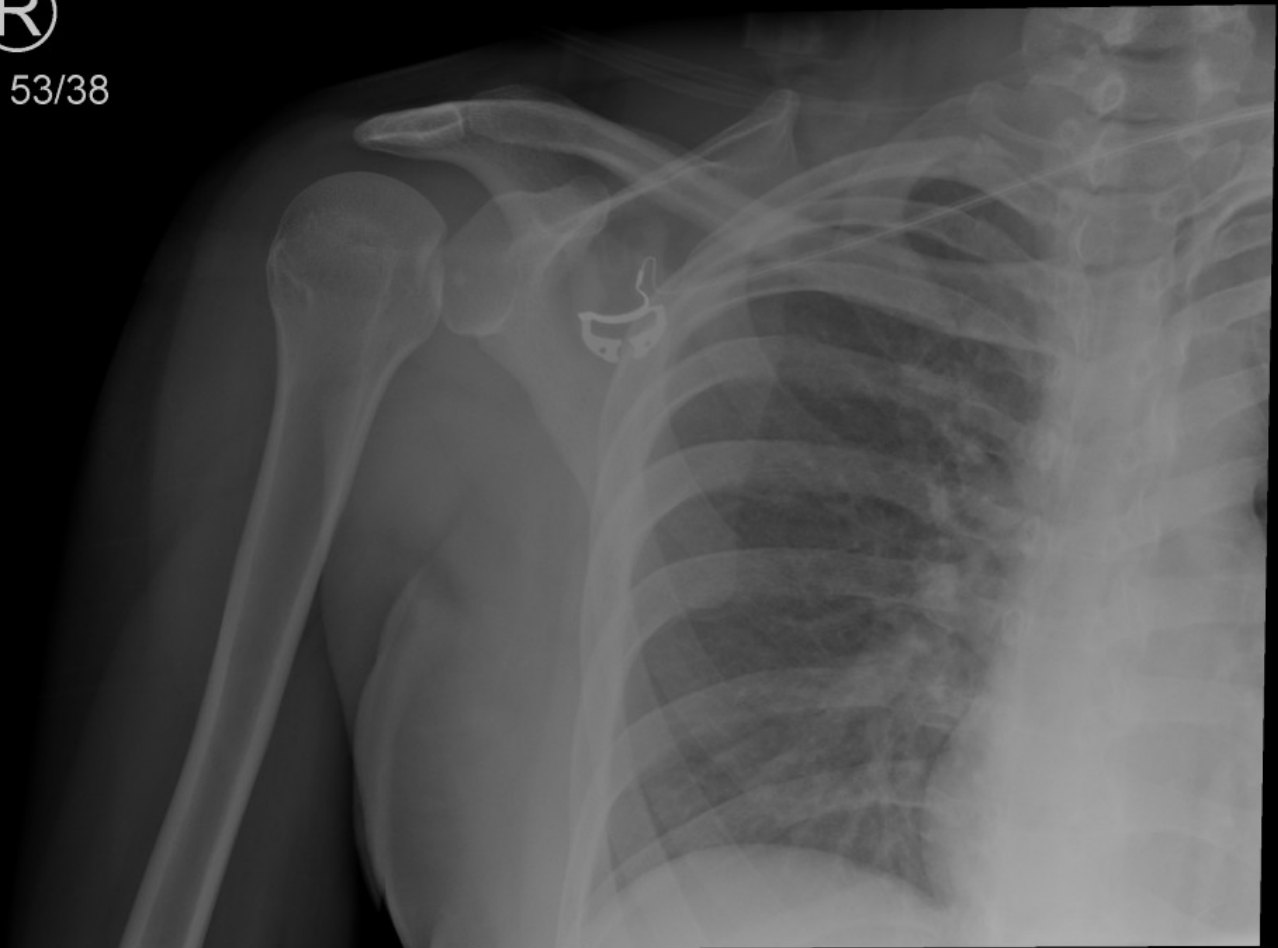




Page: 1 of 1  
27-year-old with posterior dislocation, internal rotation, and reverse Hill Sachs™ after an MVC-ped injury

Ⓜ

53/38



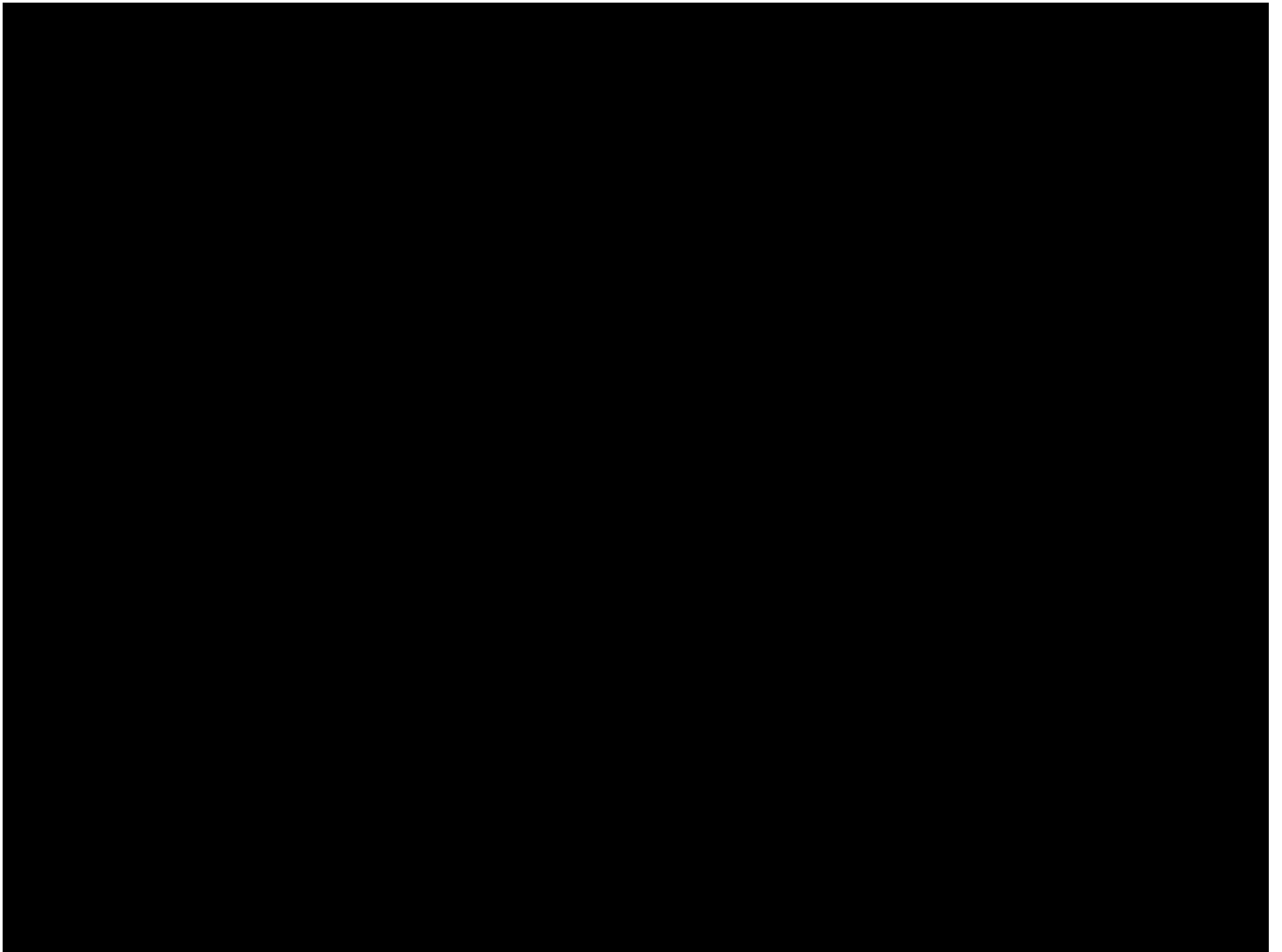
53/38

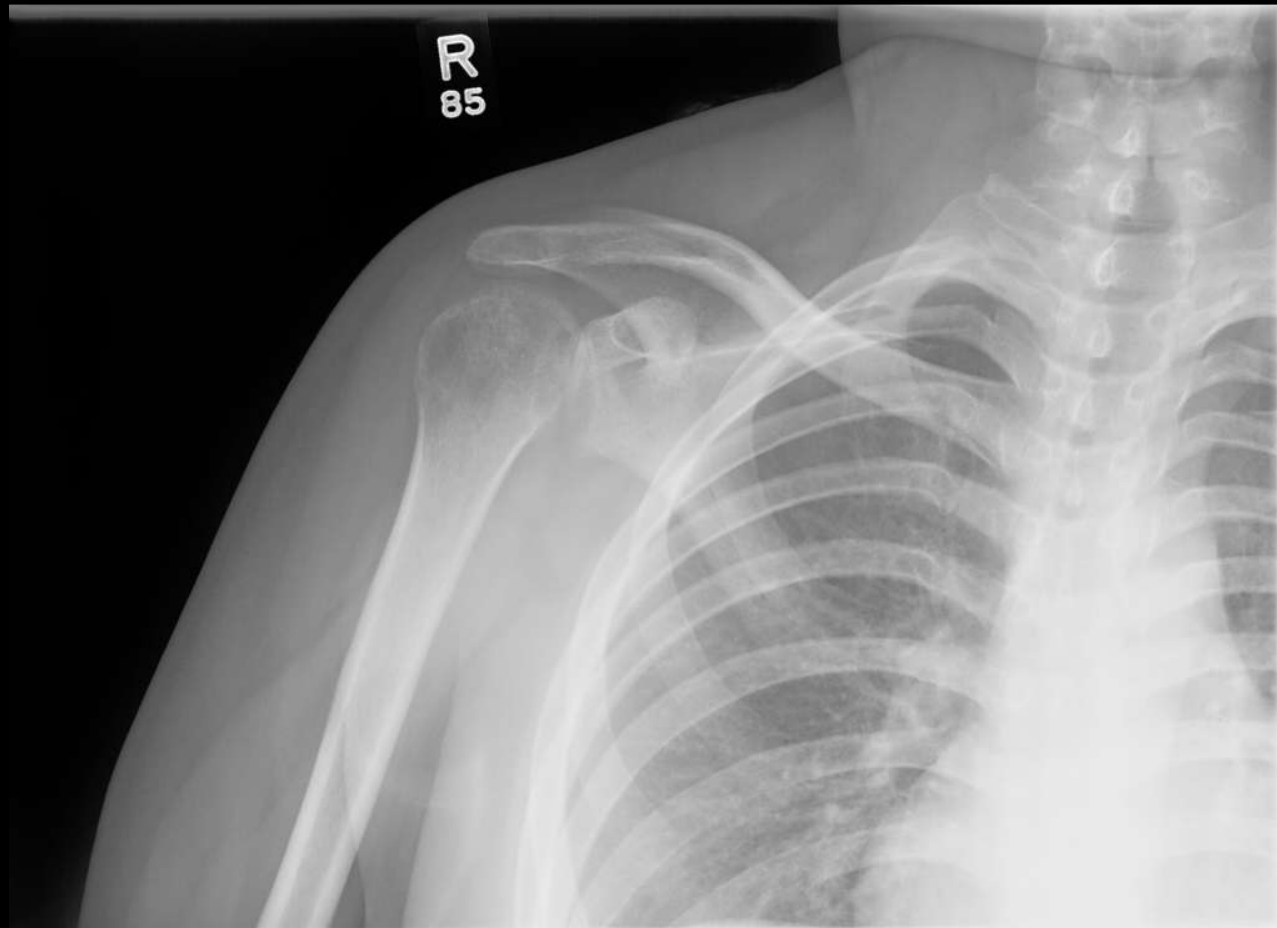


X-TABLE

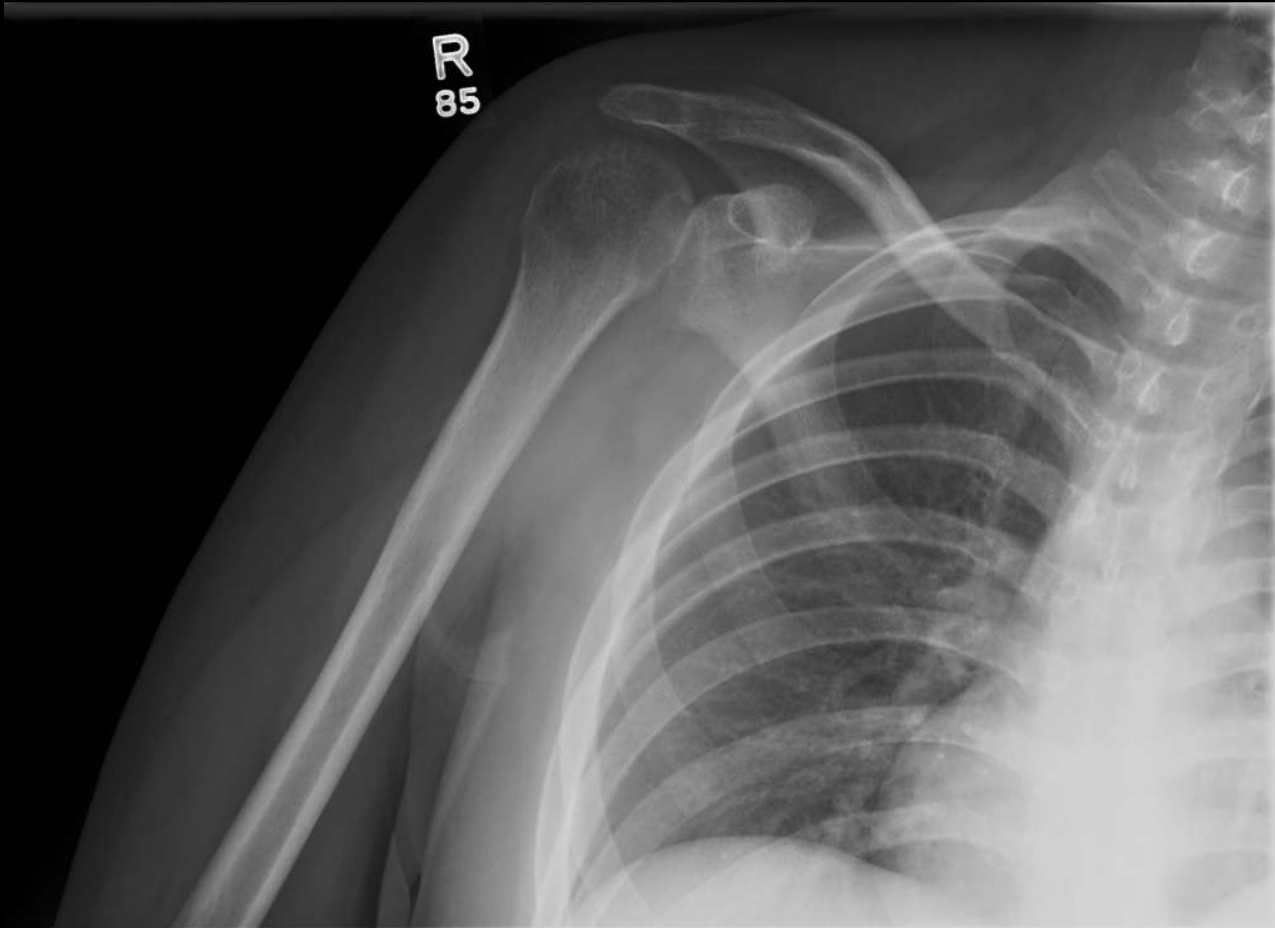




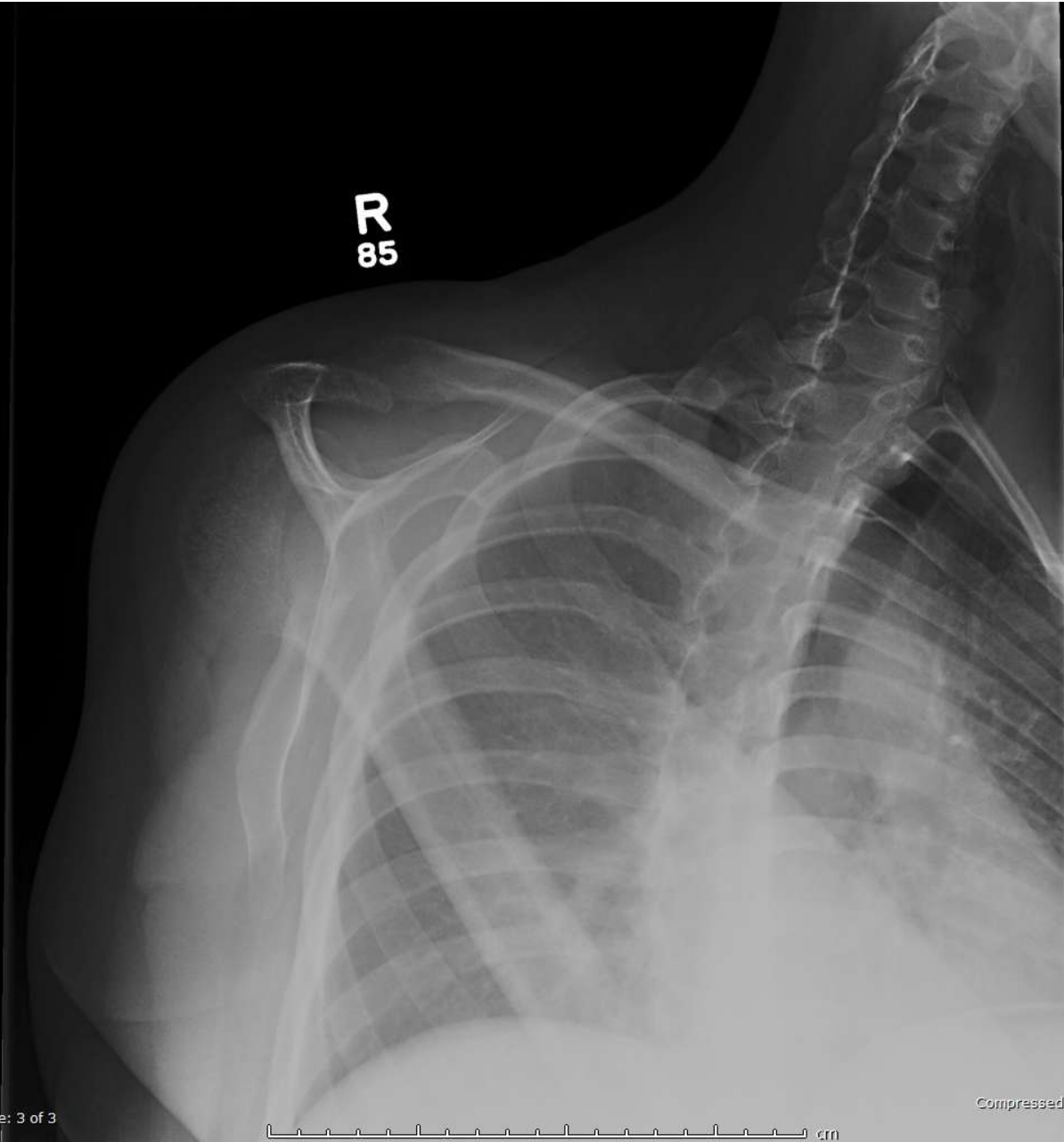




21 year-old with posterior dislocation; Assaulted 3 months prior; on physical exam, shoulder in adduction and internal rotation

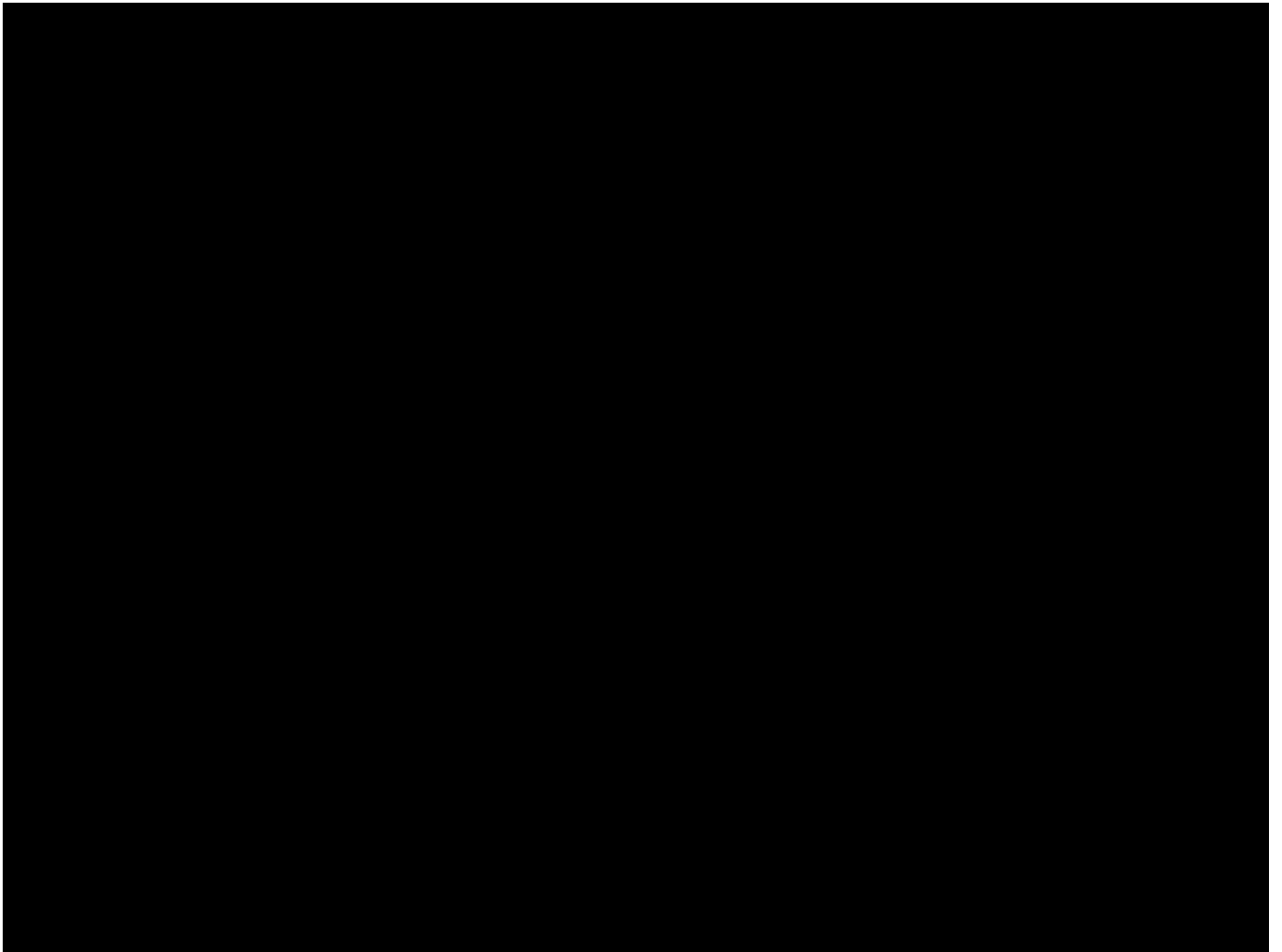


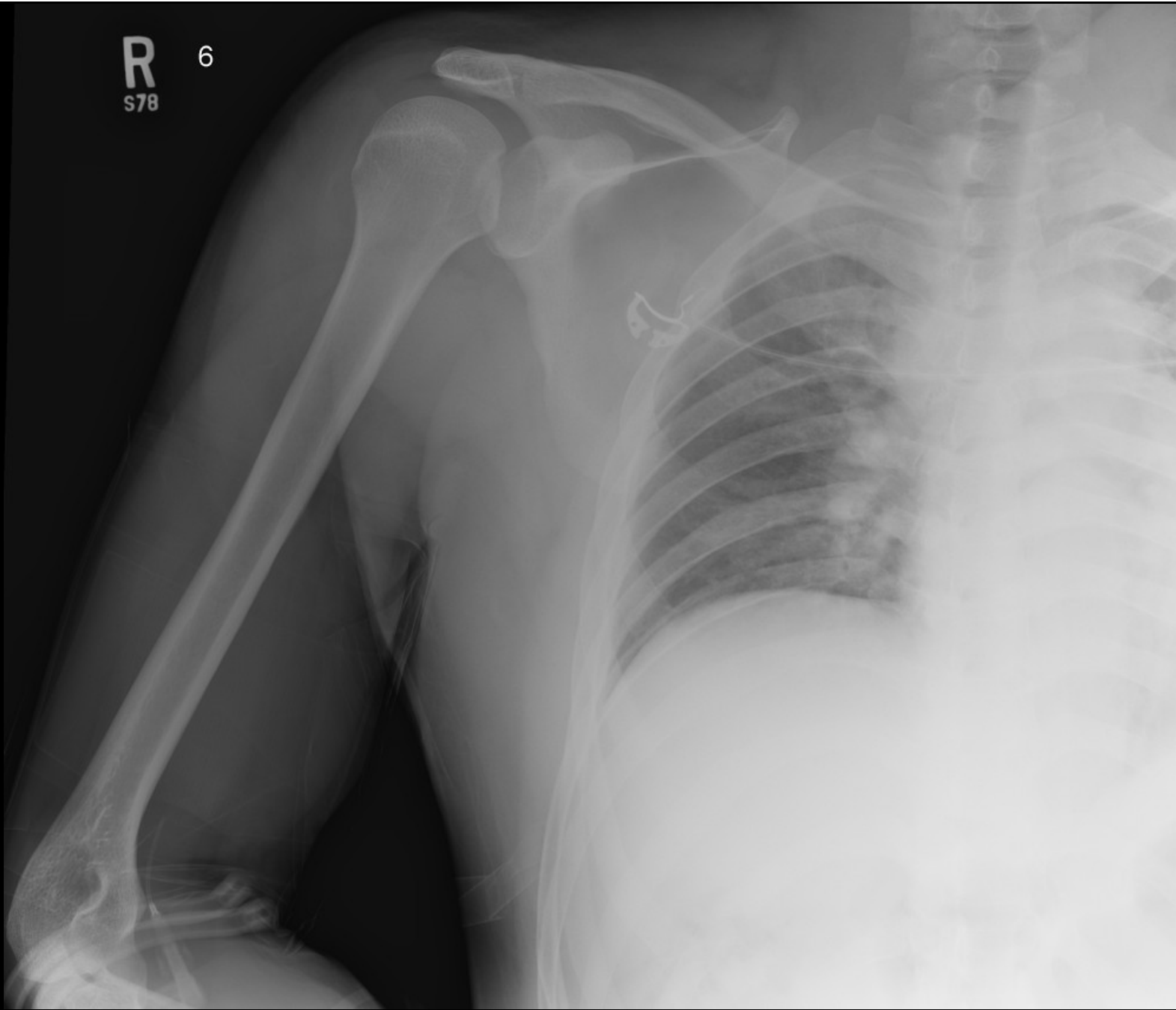
Trough sign







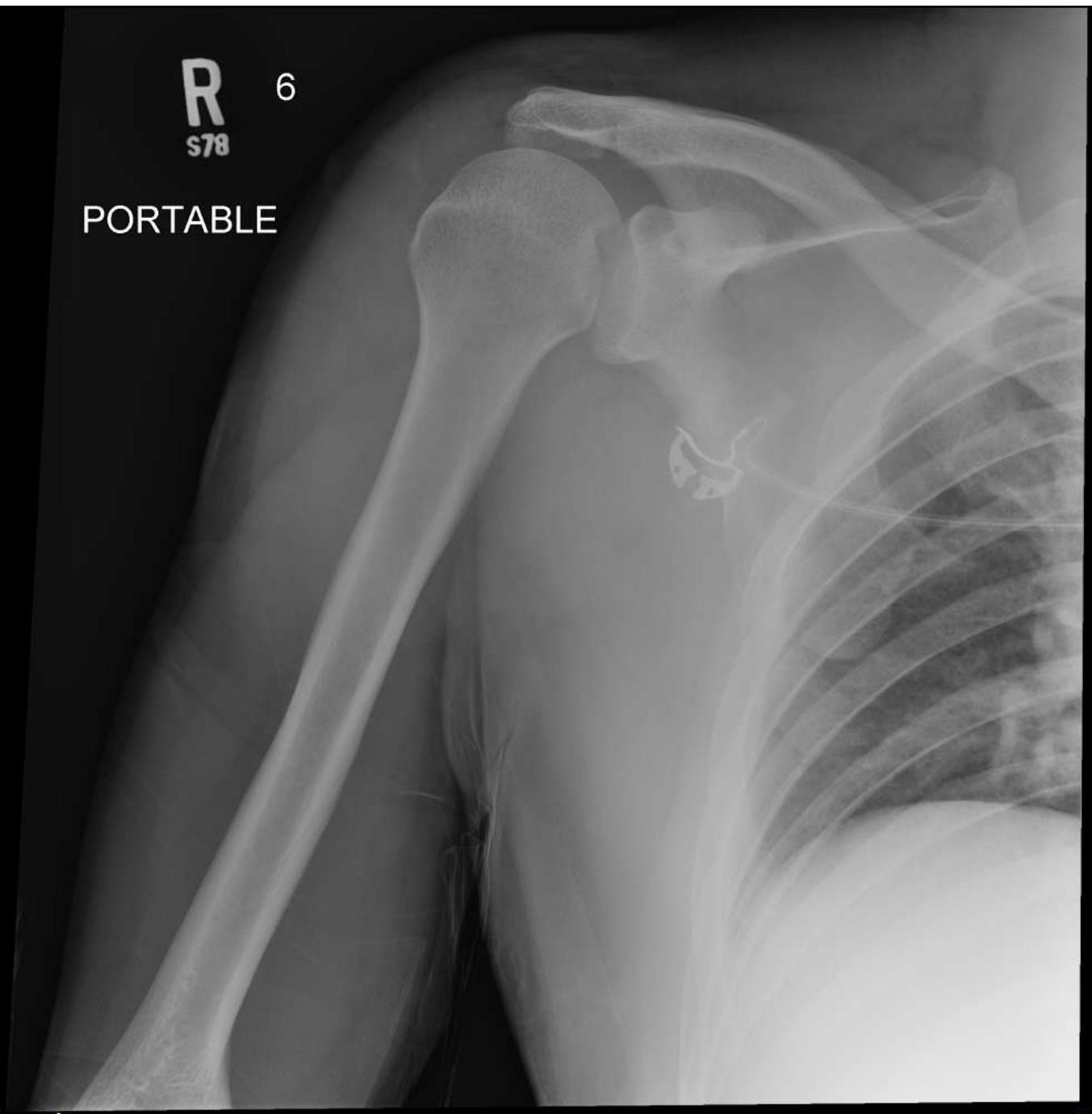




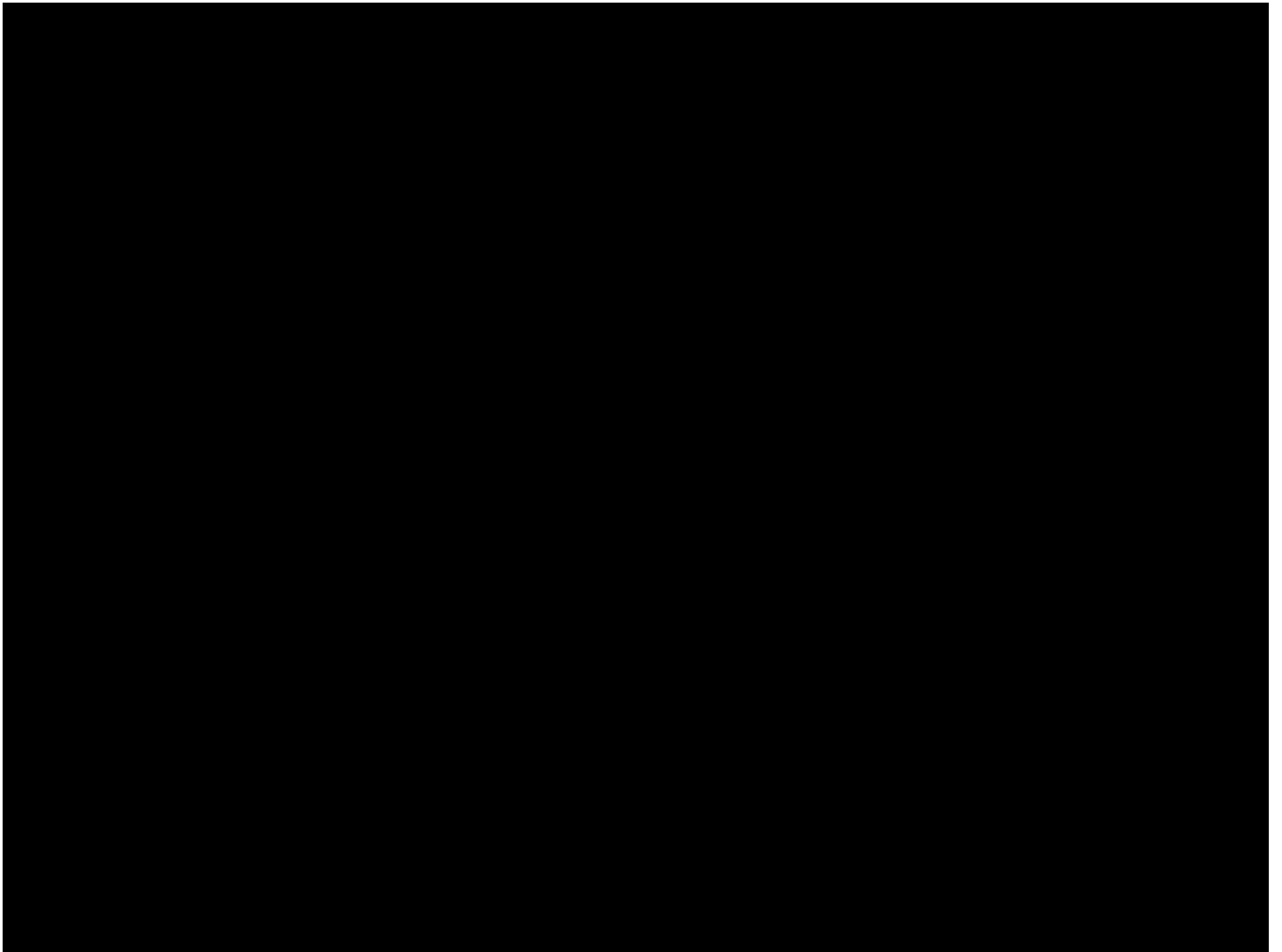
trough sign

R 6  
S78

PORTABLE









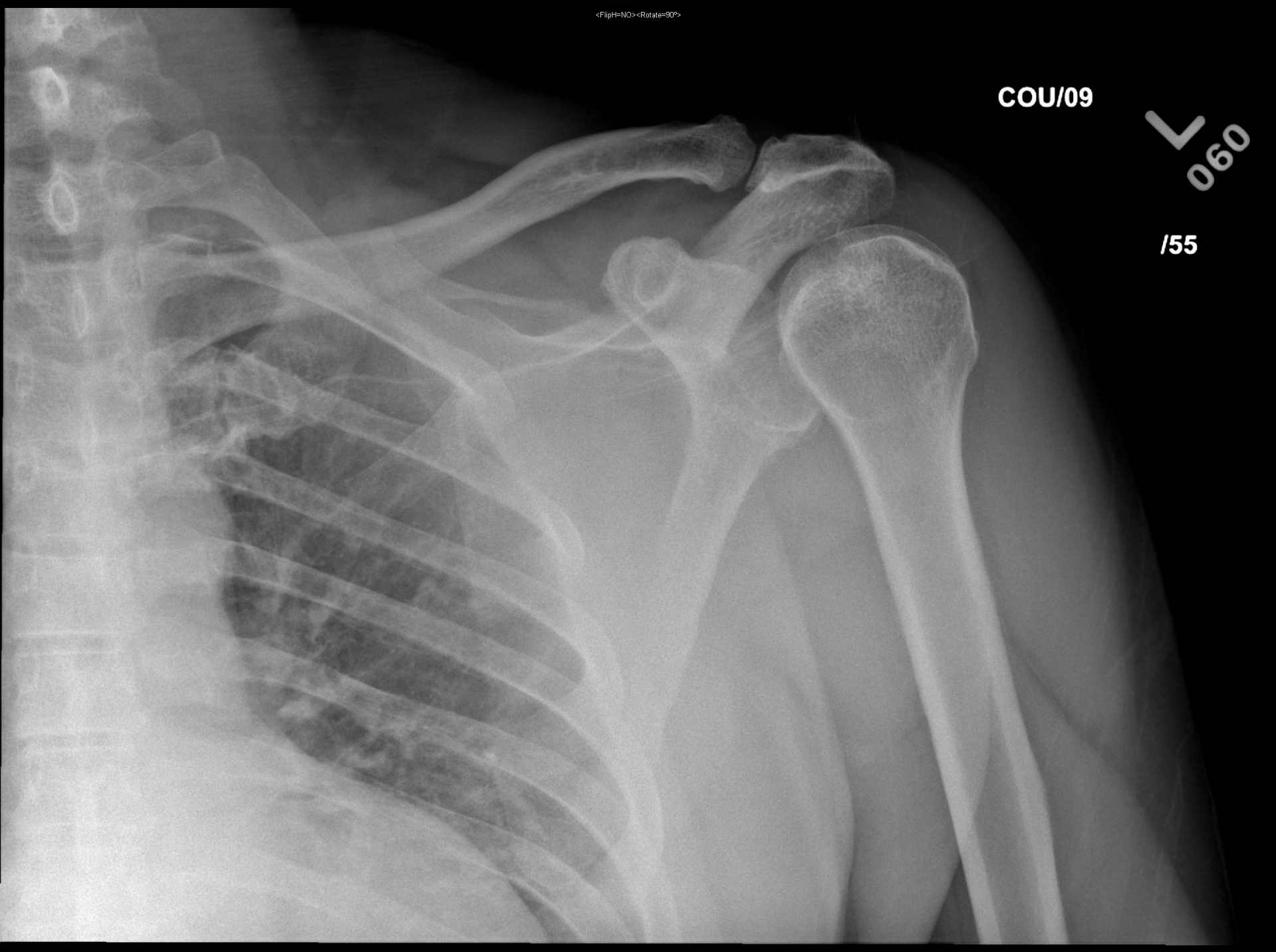
Case courtesy Nick Beckmann

<Flip=NO><Rotate=90>

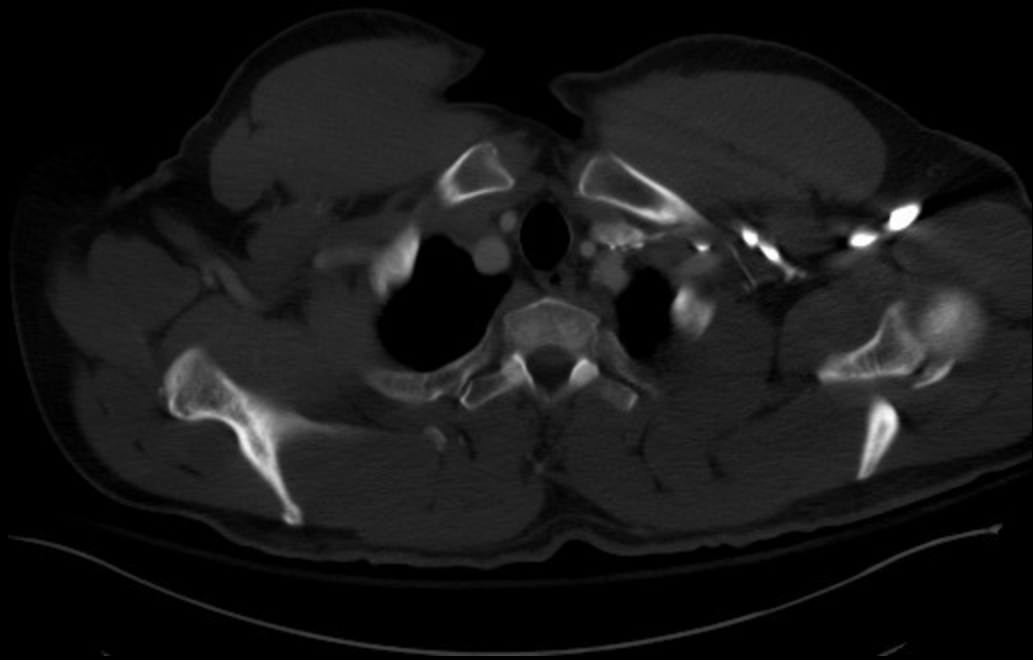
COU/09

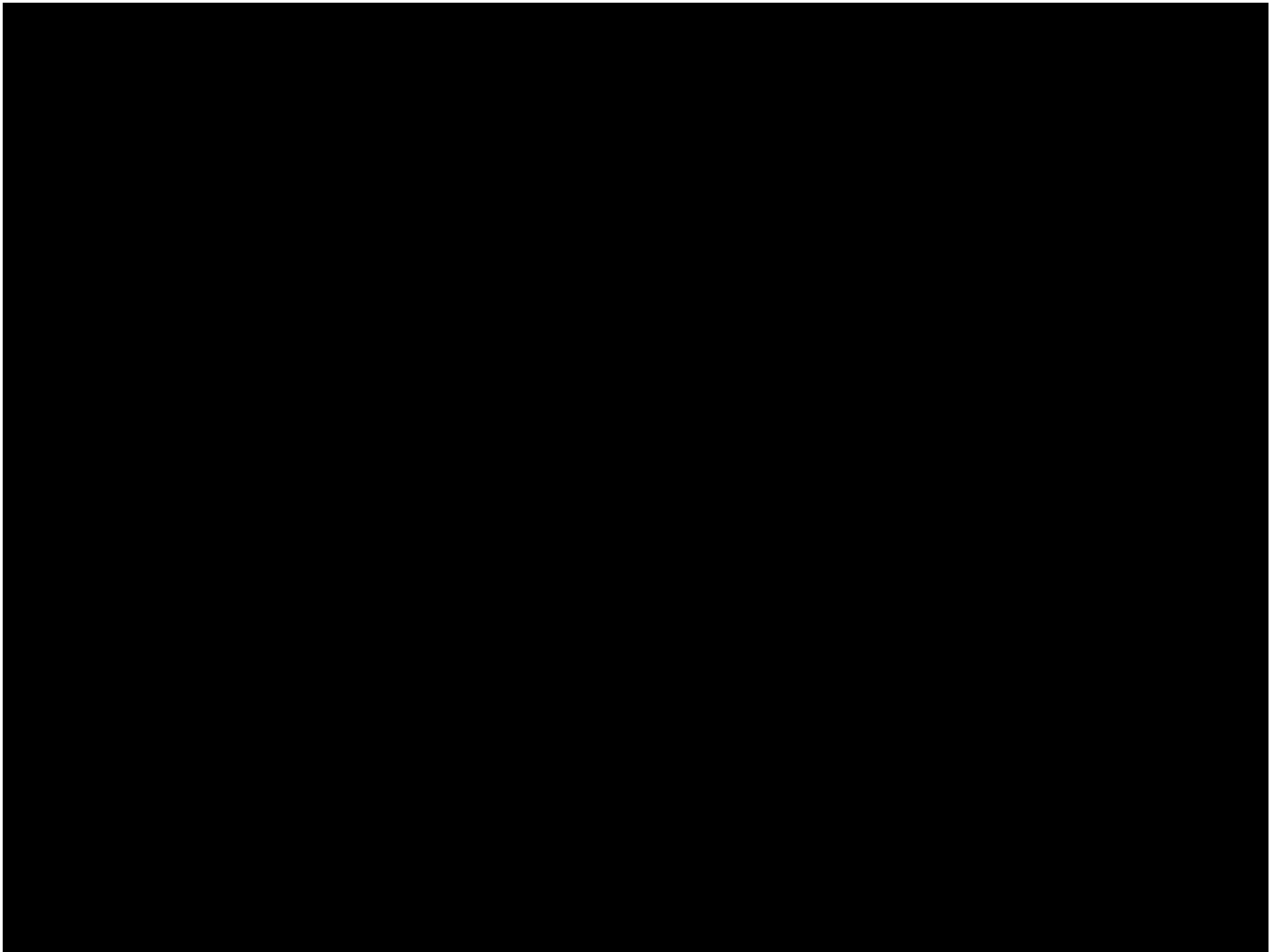
L  
060

155



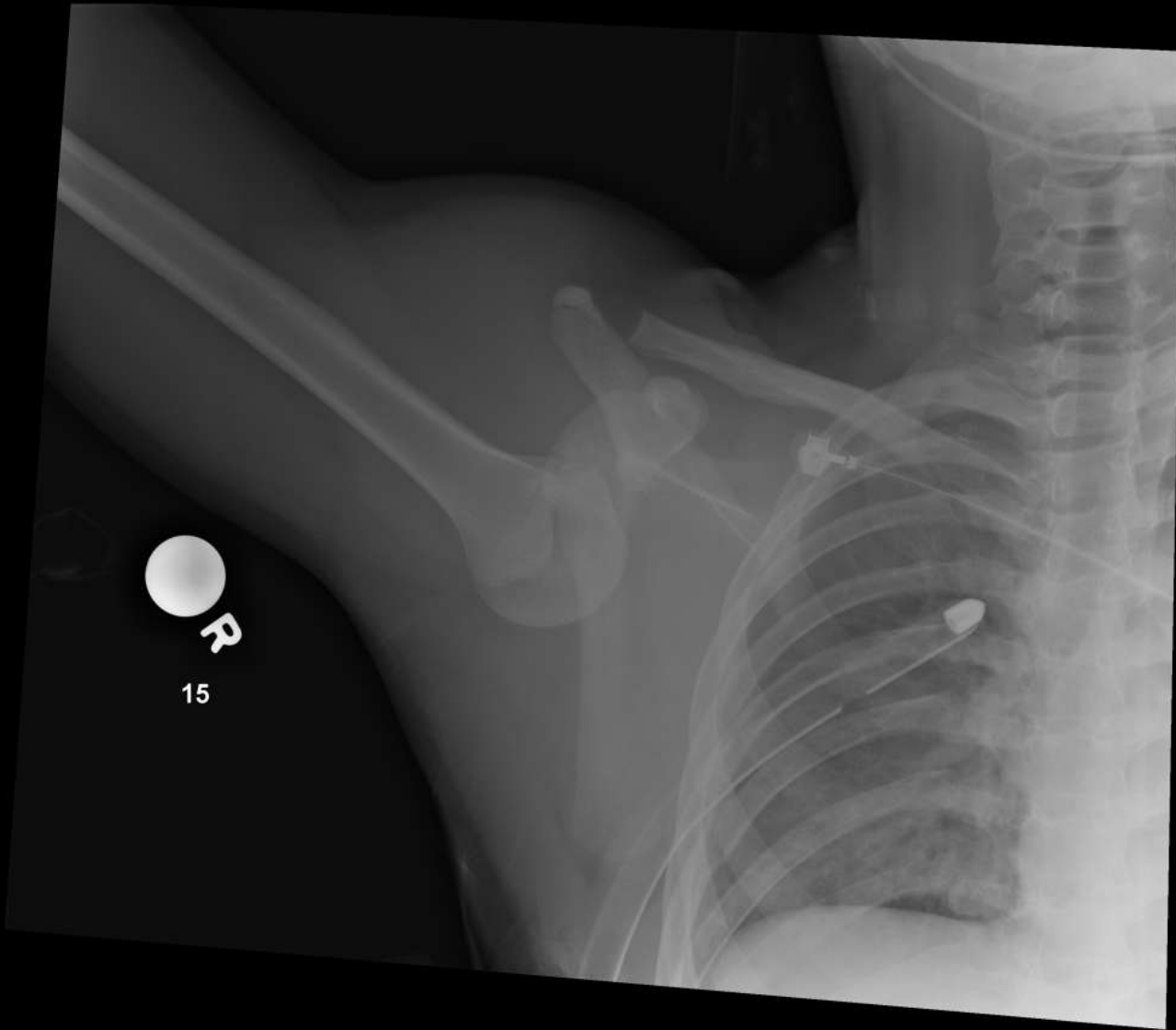








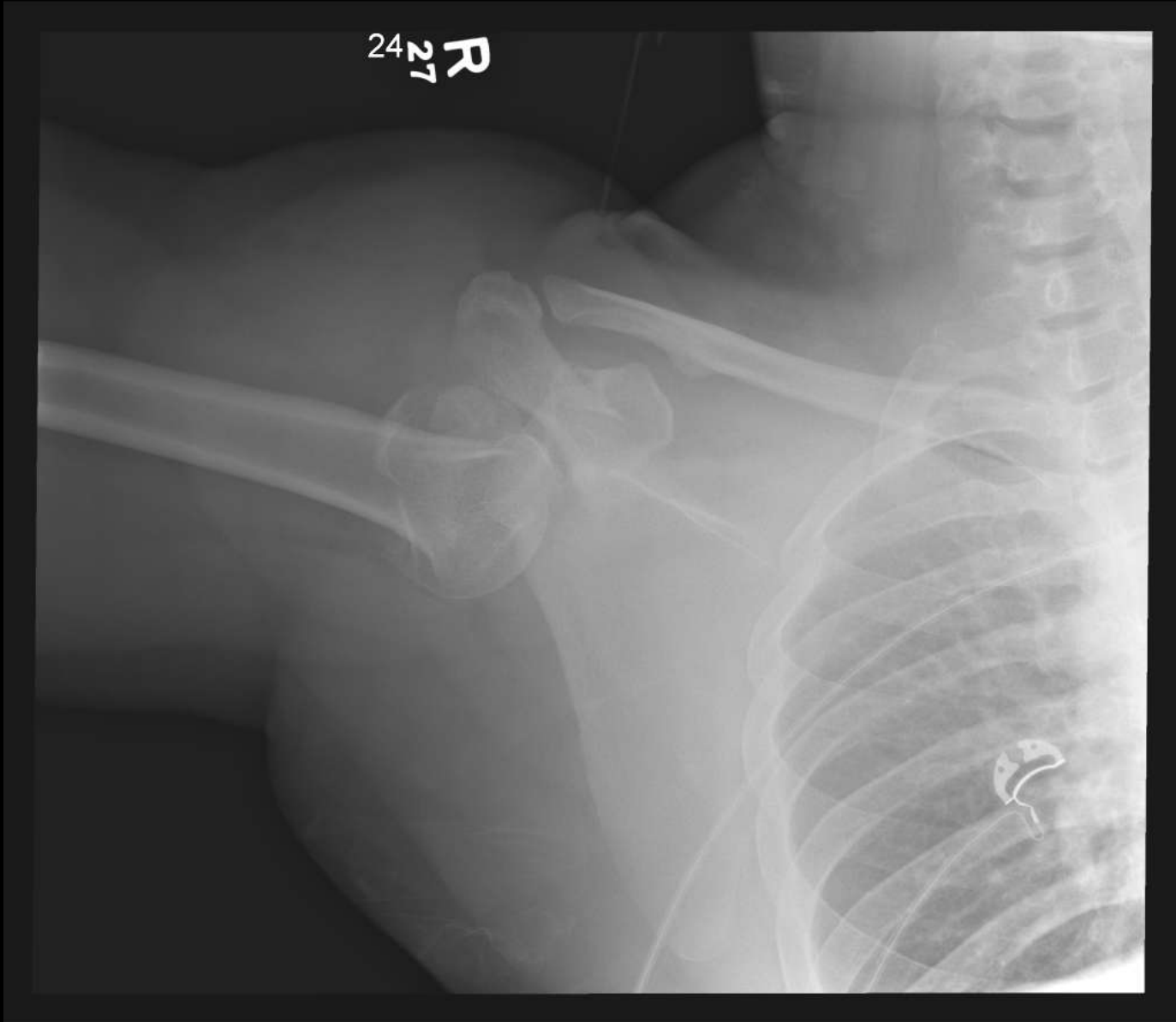
15 year-old male with head on MVC at 70 mph with ejection; ulnar nerve distribution deficits





# Luxatio Erecta

- Hyperabducted shoulder
- Neurovascular injury (brachial plexus)
- Tear of inferior joint capsule, rotator cuff
- Fracture of greater and lesser tuberosities



41 year-old male s/p MCC 30mph, fell onto right shoulder

20/ht

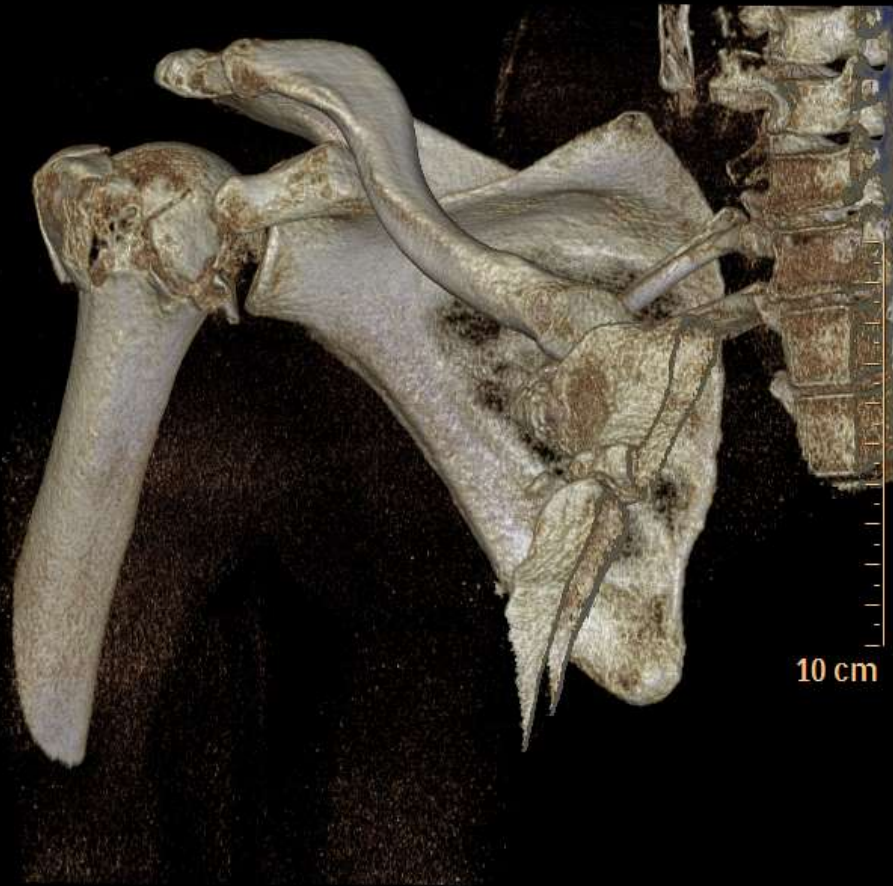
Ⓜ





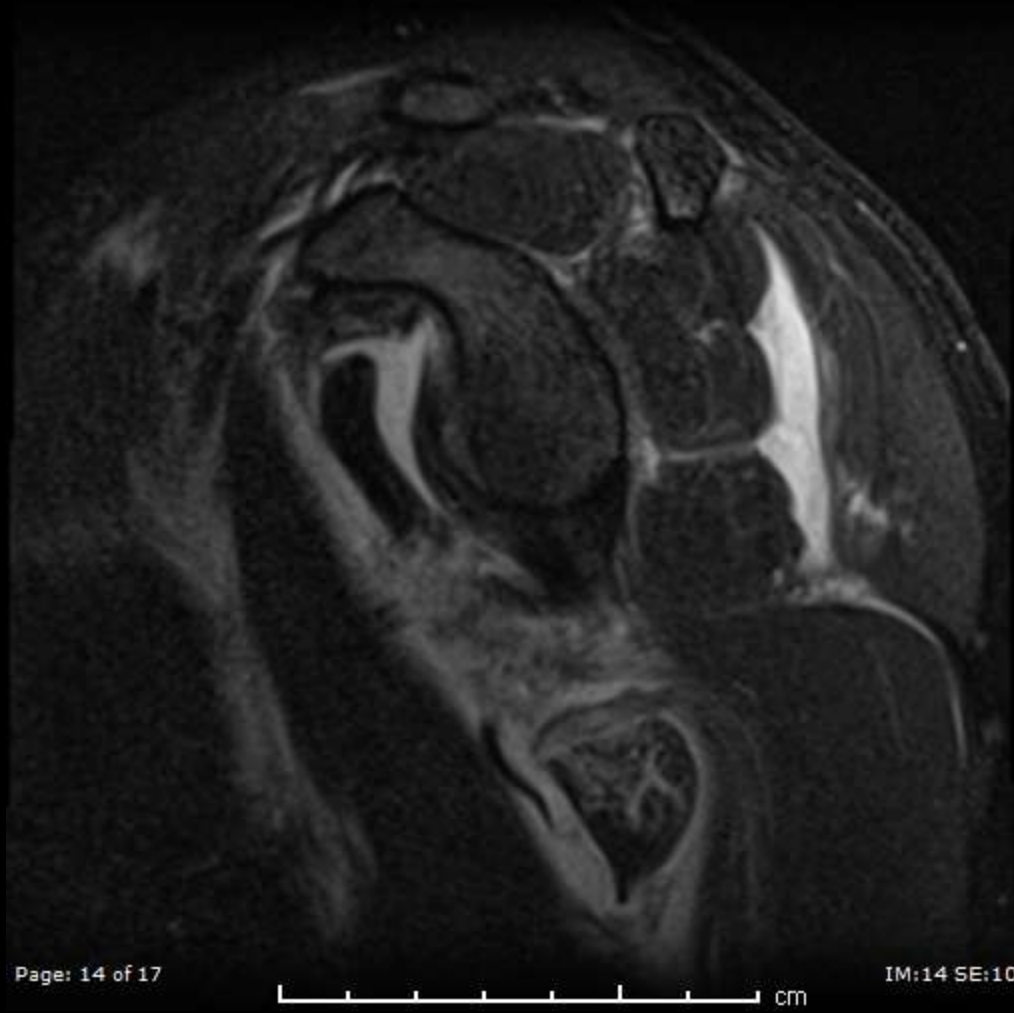


RA

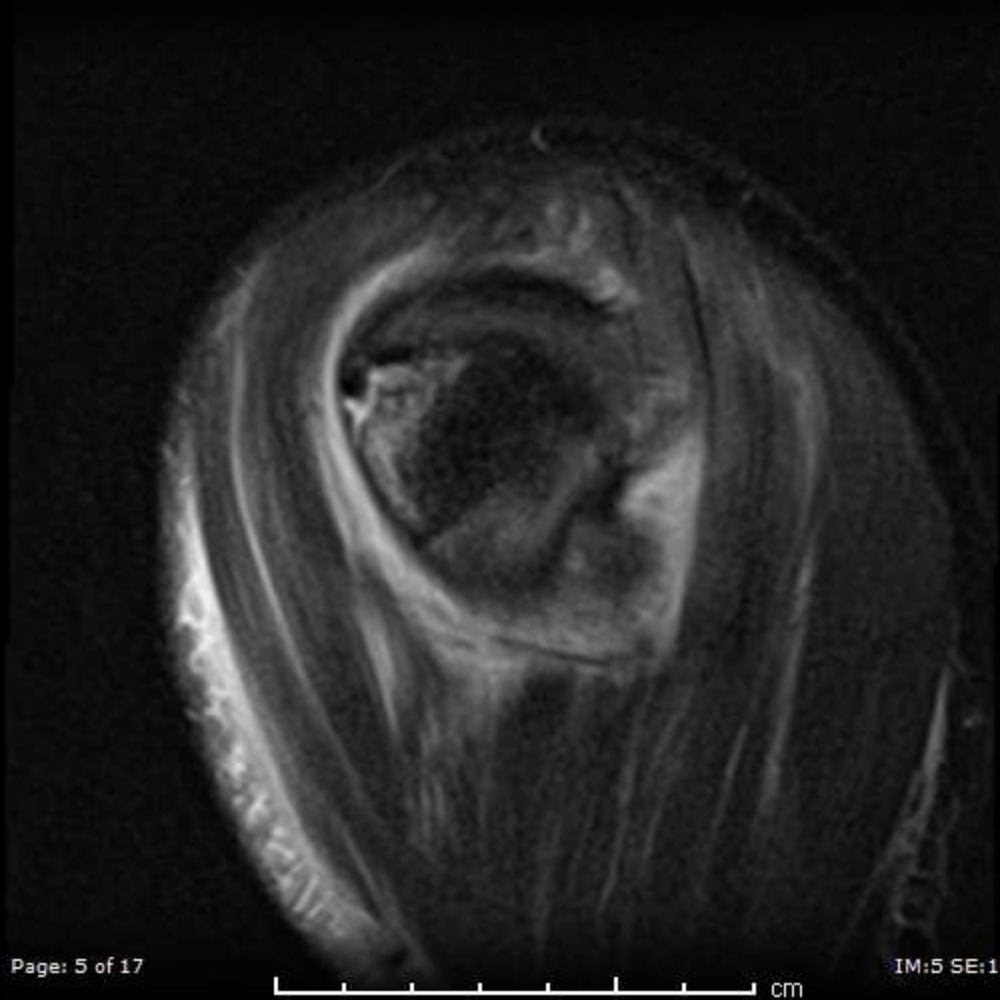


10 cm

A L



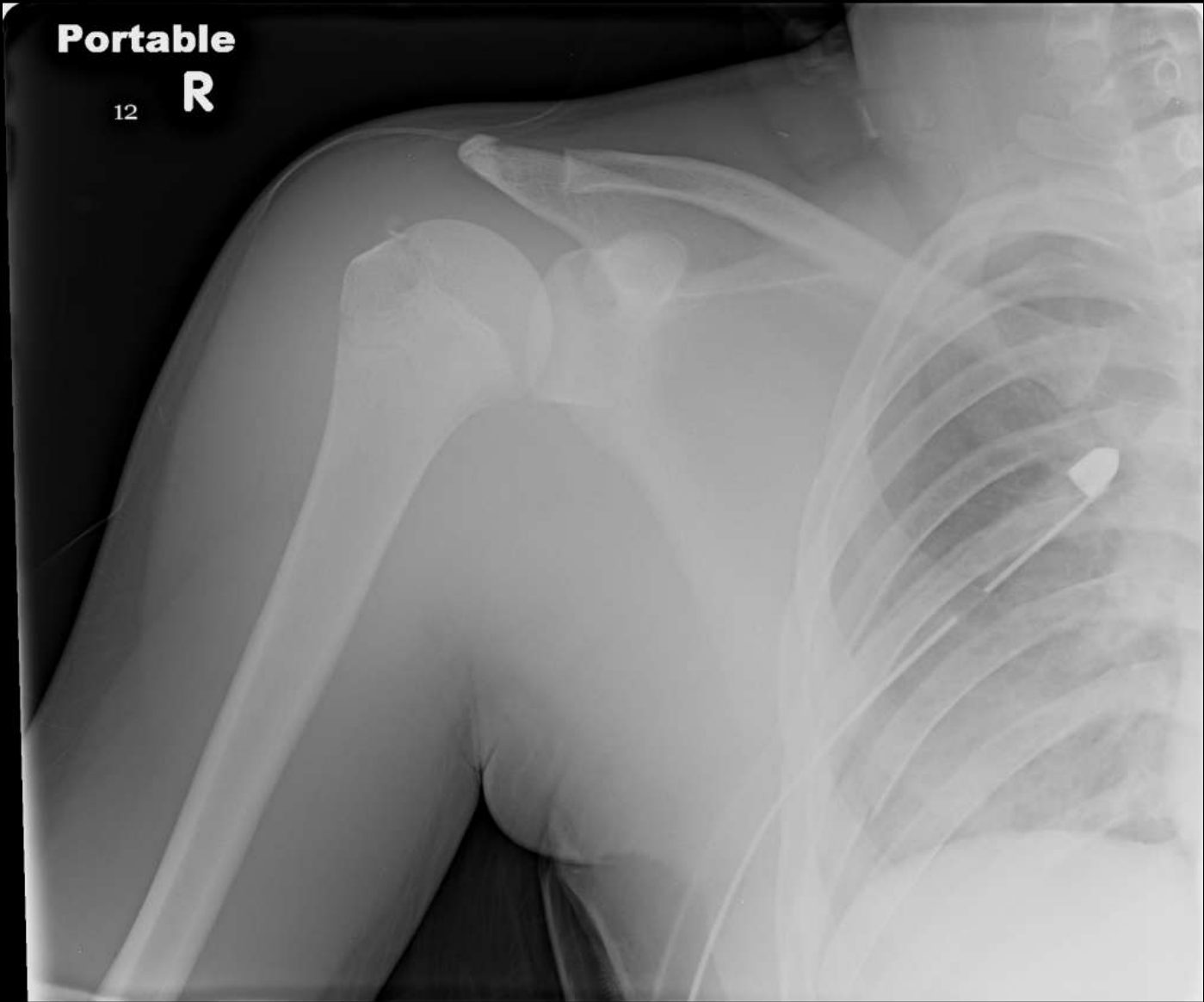
Subscapularis and inferior joint capsule tears

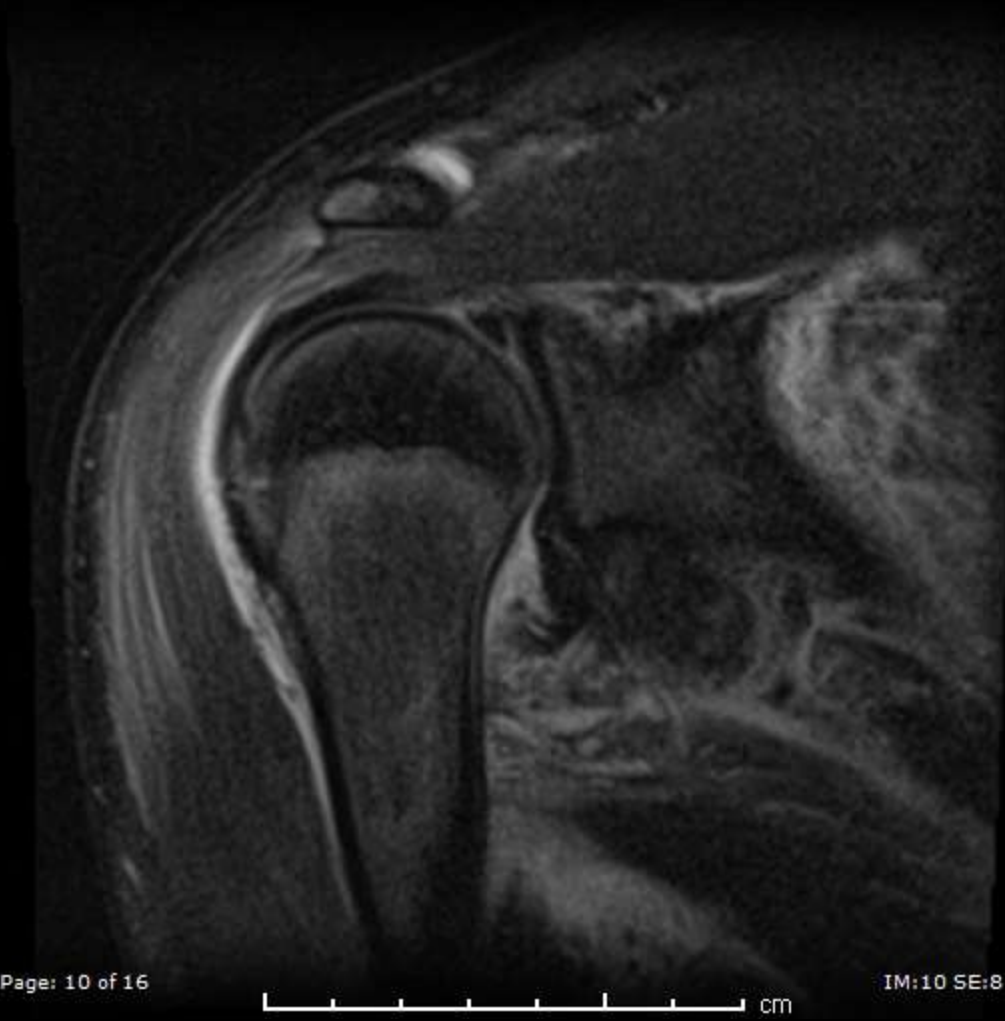


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IM:5 SE:10

Avulsion of the supraspinatus

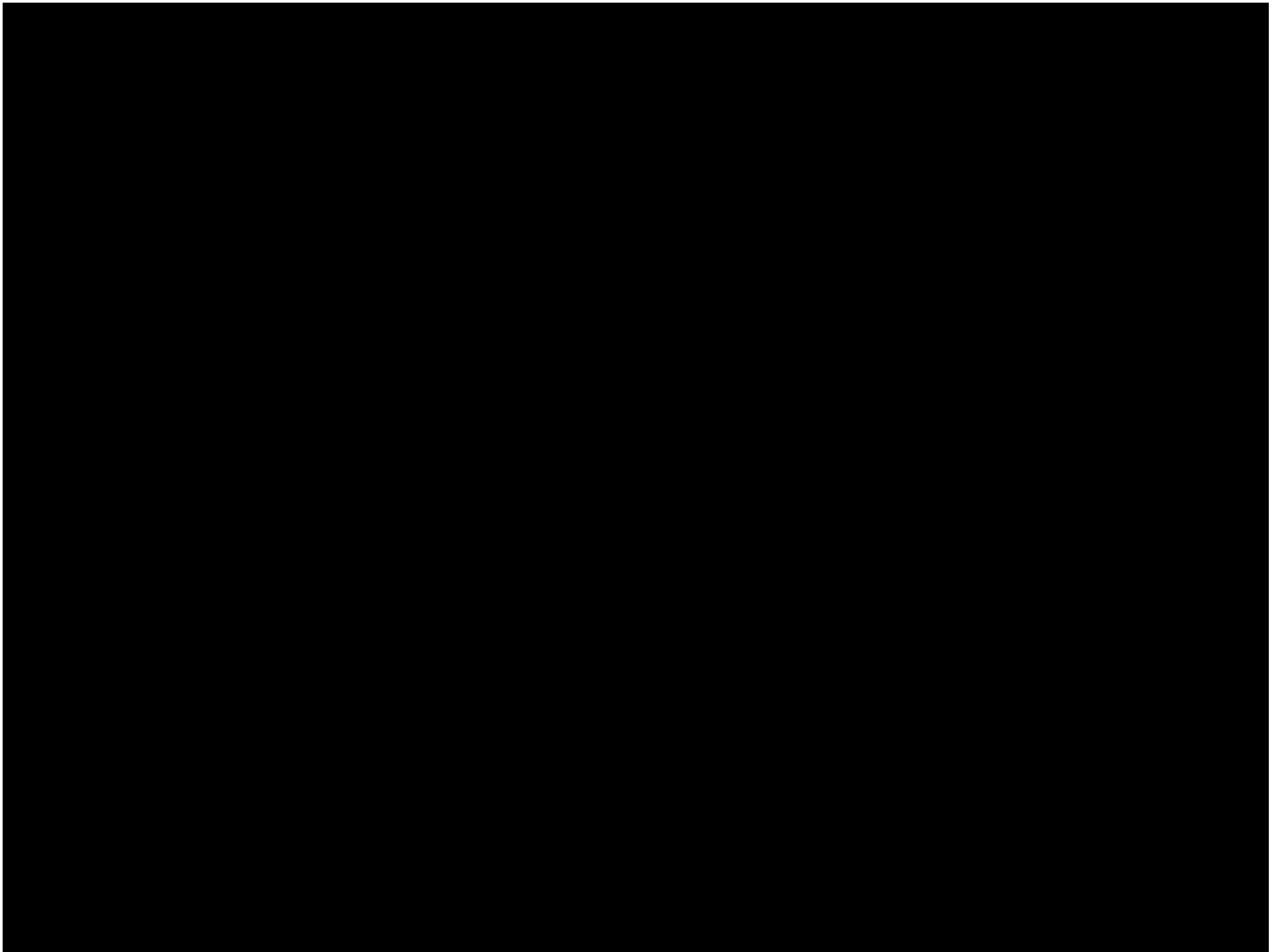


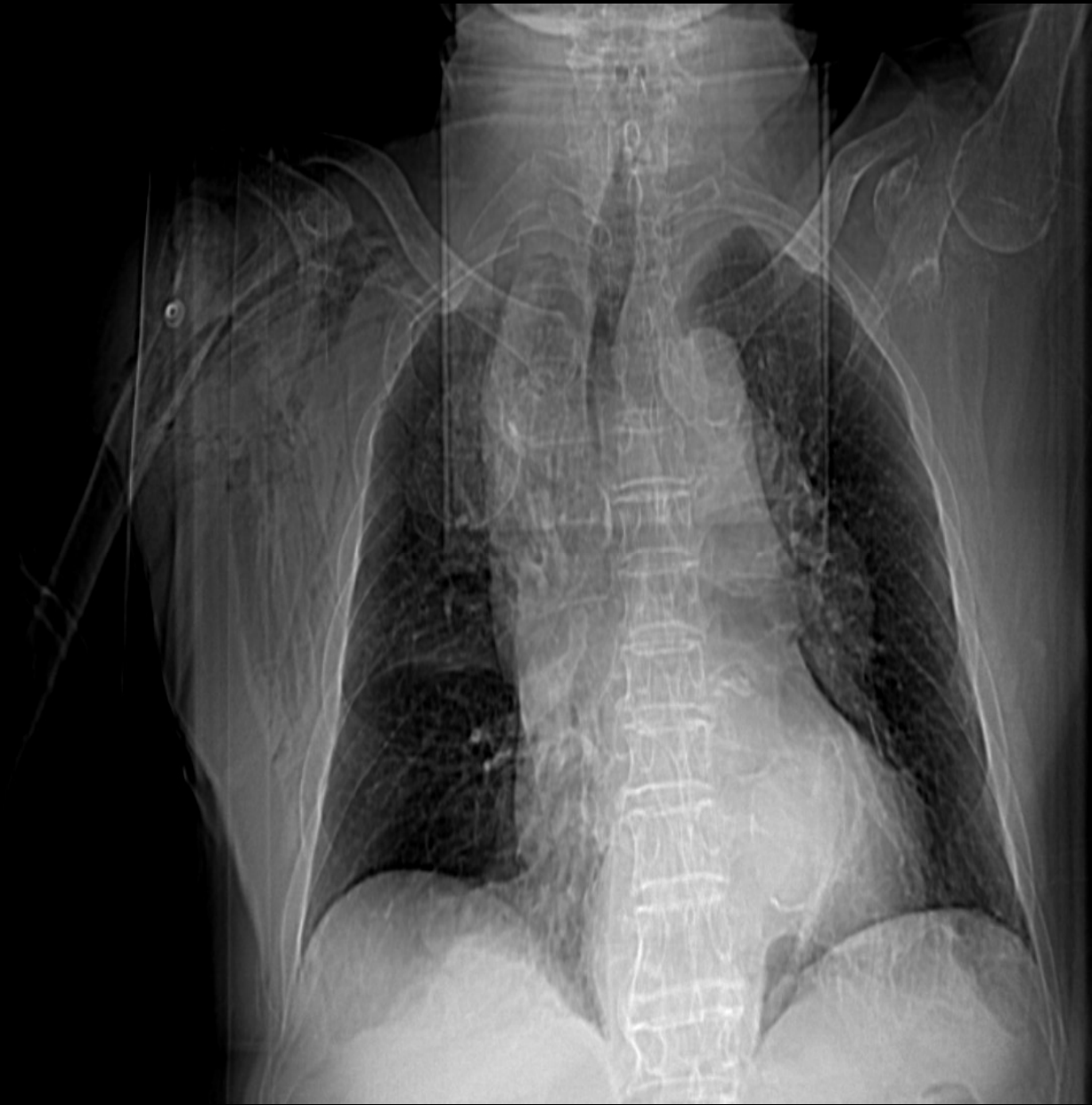


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IM:10 SE:8

IGHL avulsion





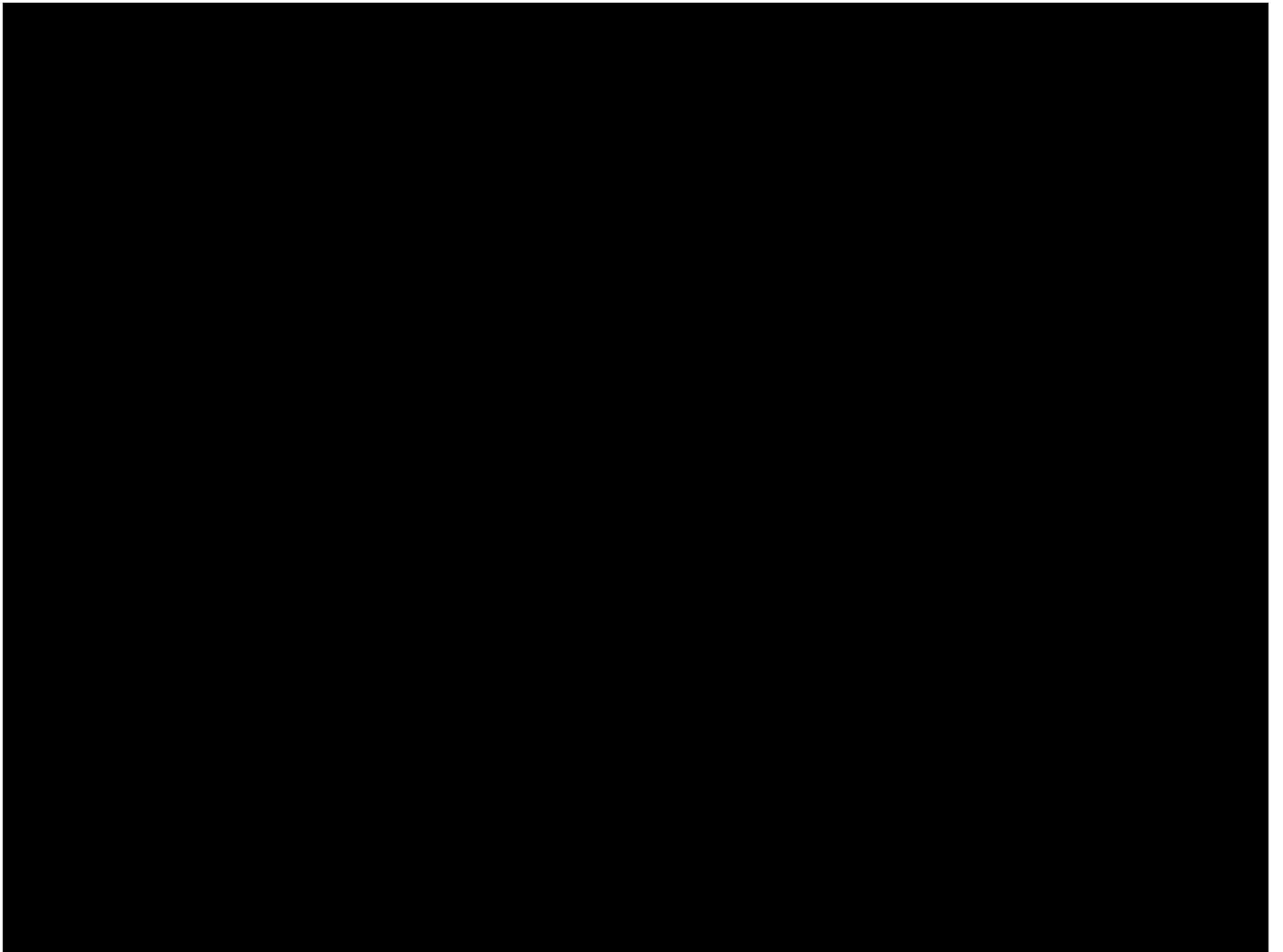
Courtesy Susanna Spence





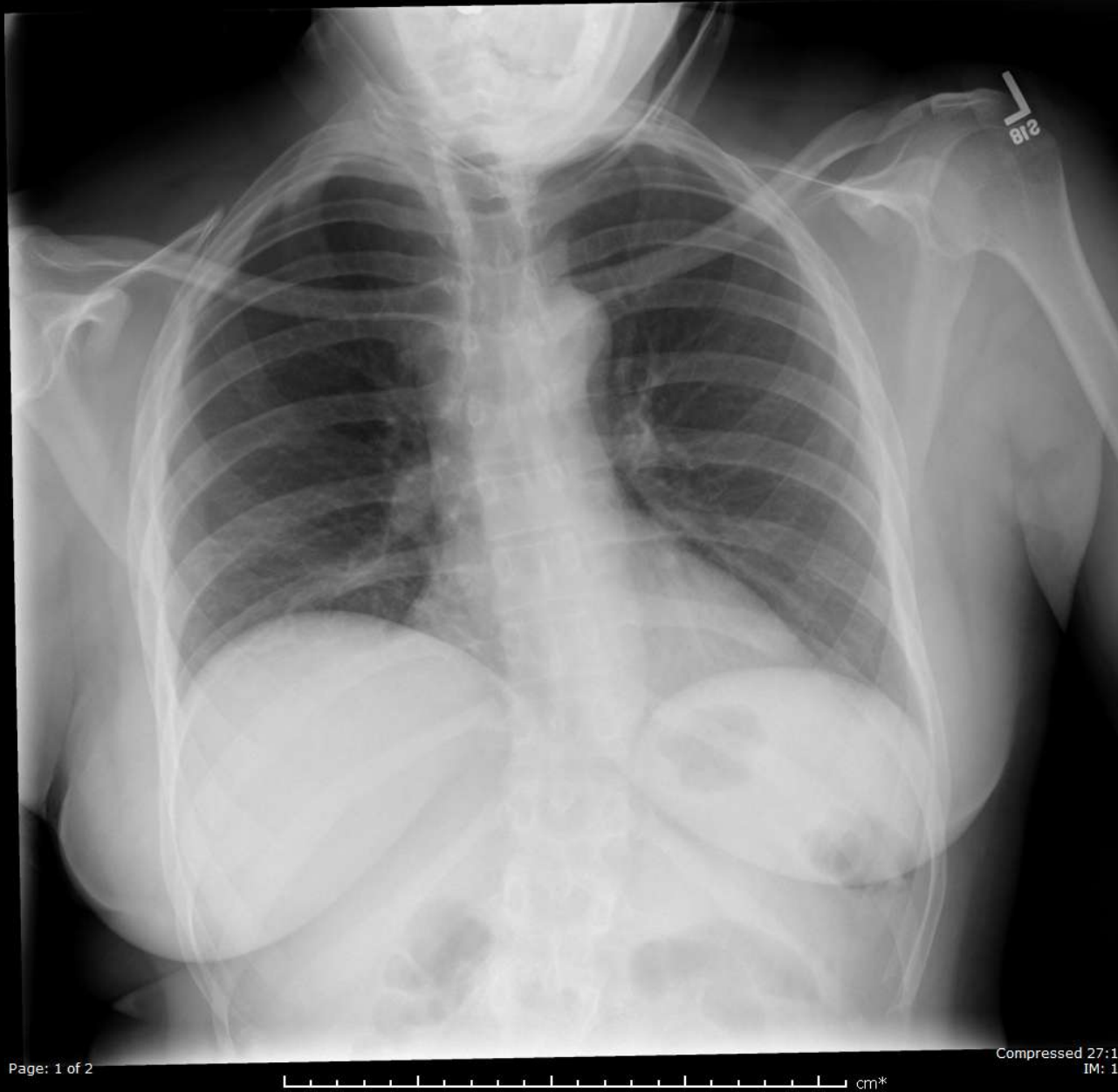




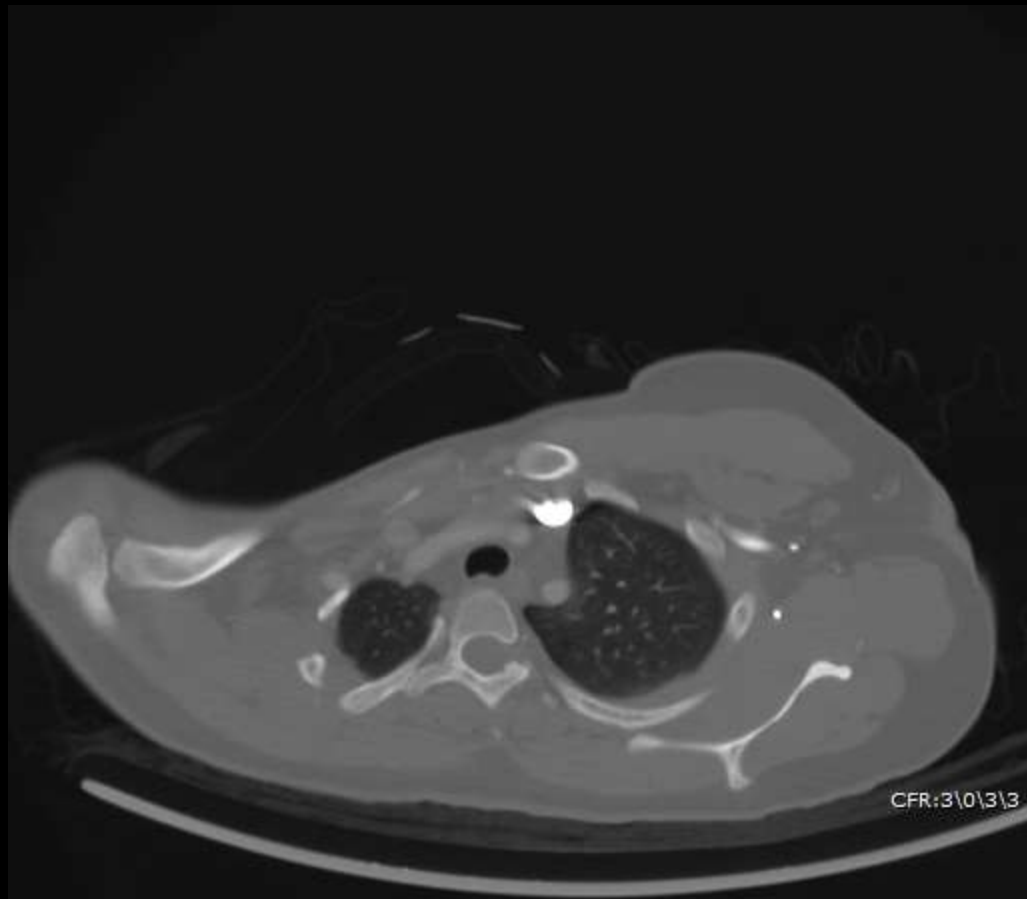


# Sternoclavicular Joint Dislocation

- Anterior > Posterior
- Impact upon the shoulder with torque to the clavicle
- Direct impact to sternum
- Posterior dislocation can result in vascular impingement

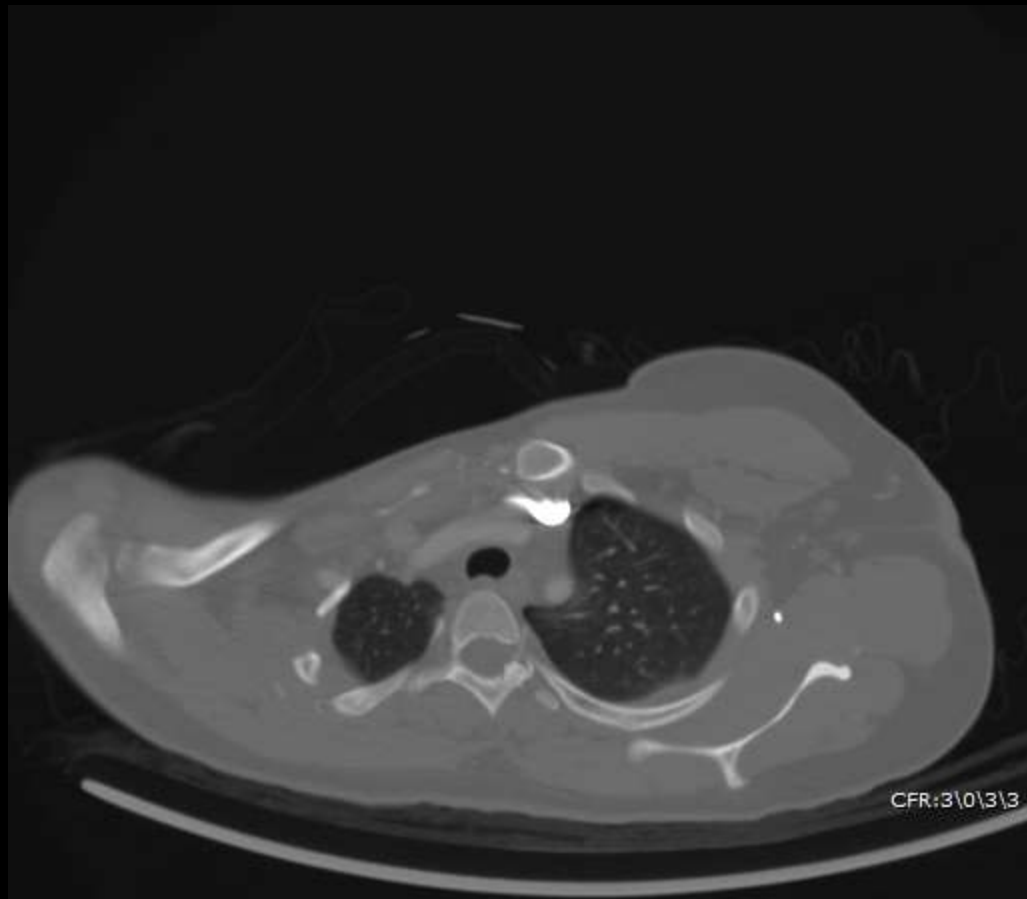


32 year-old female with fall onto right shoulder in adduction after falling down 3 stairs while running

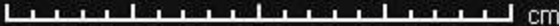


CFR:3\0\3\3

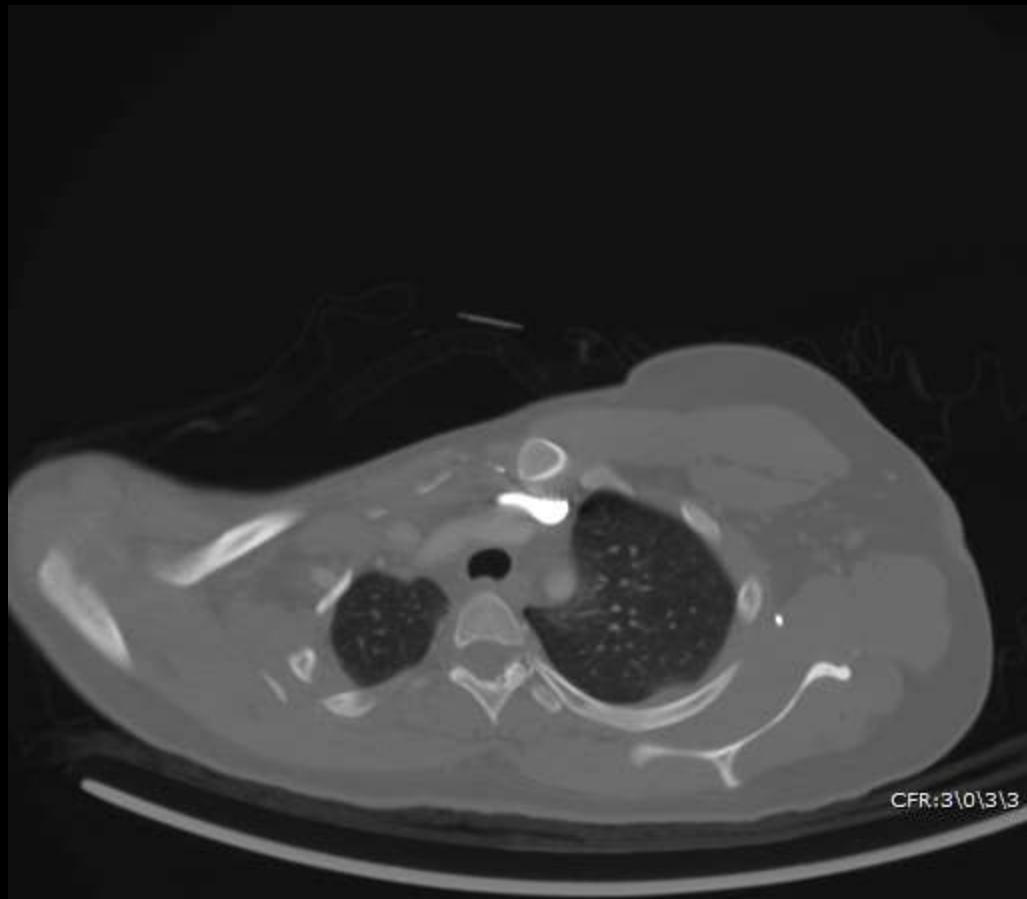




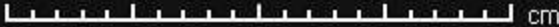
CFR:3\0\3\3

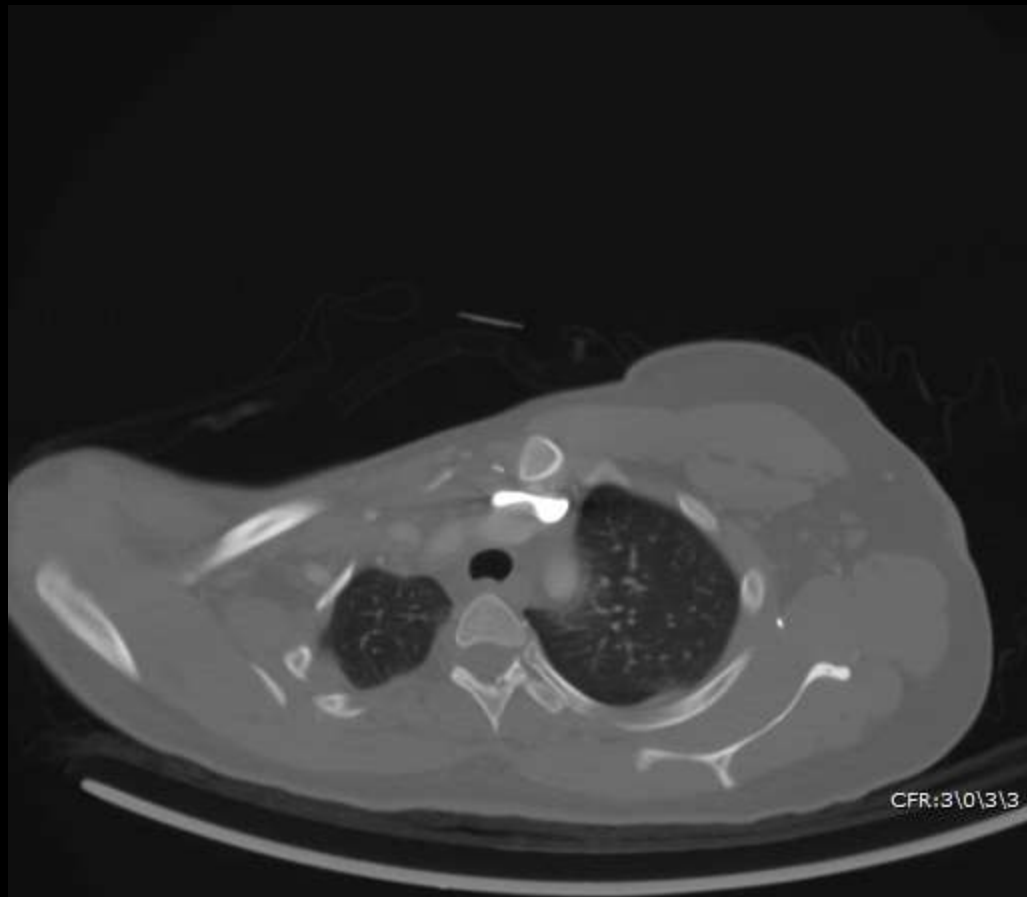






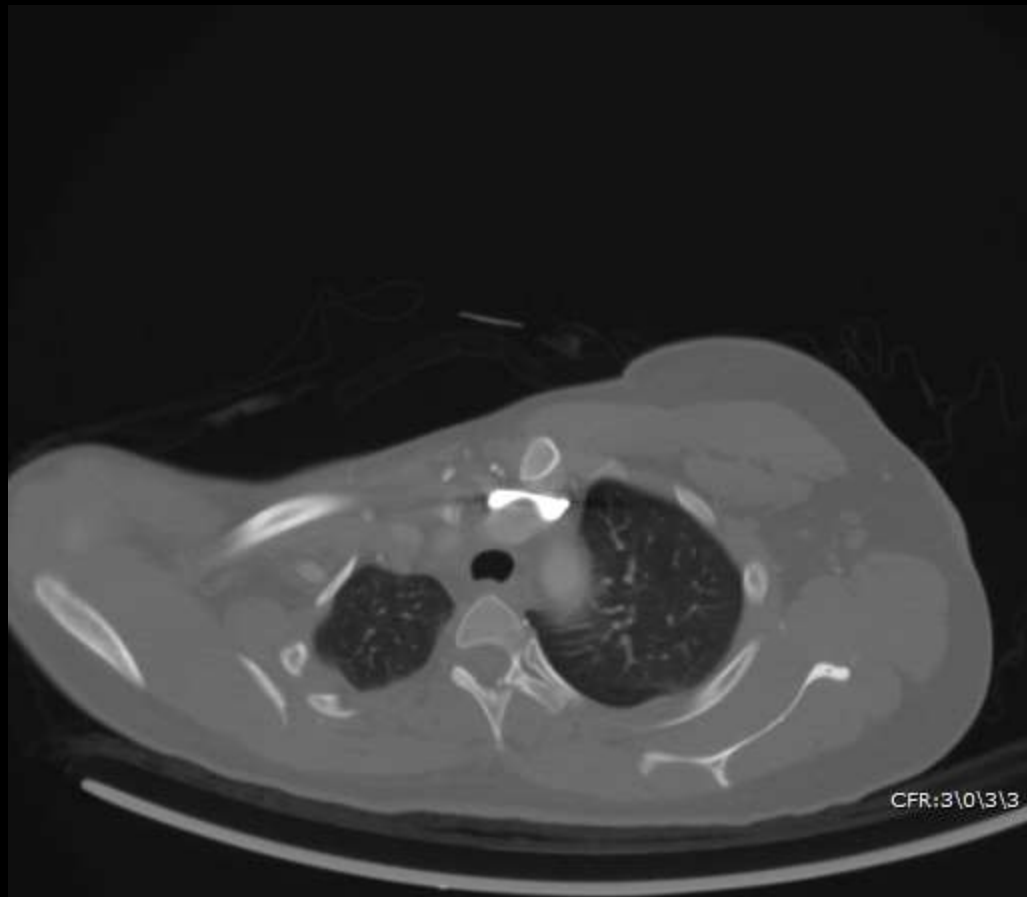
CFR:3\0\3\3





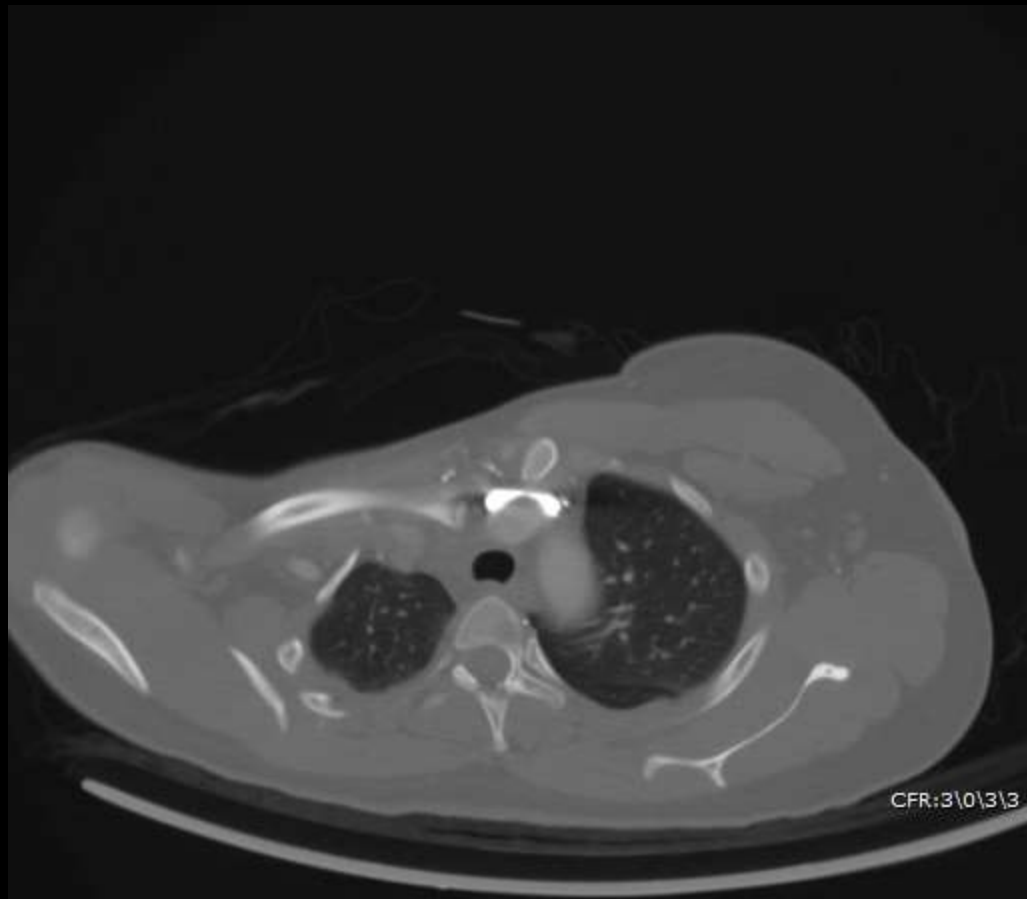
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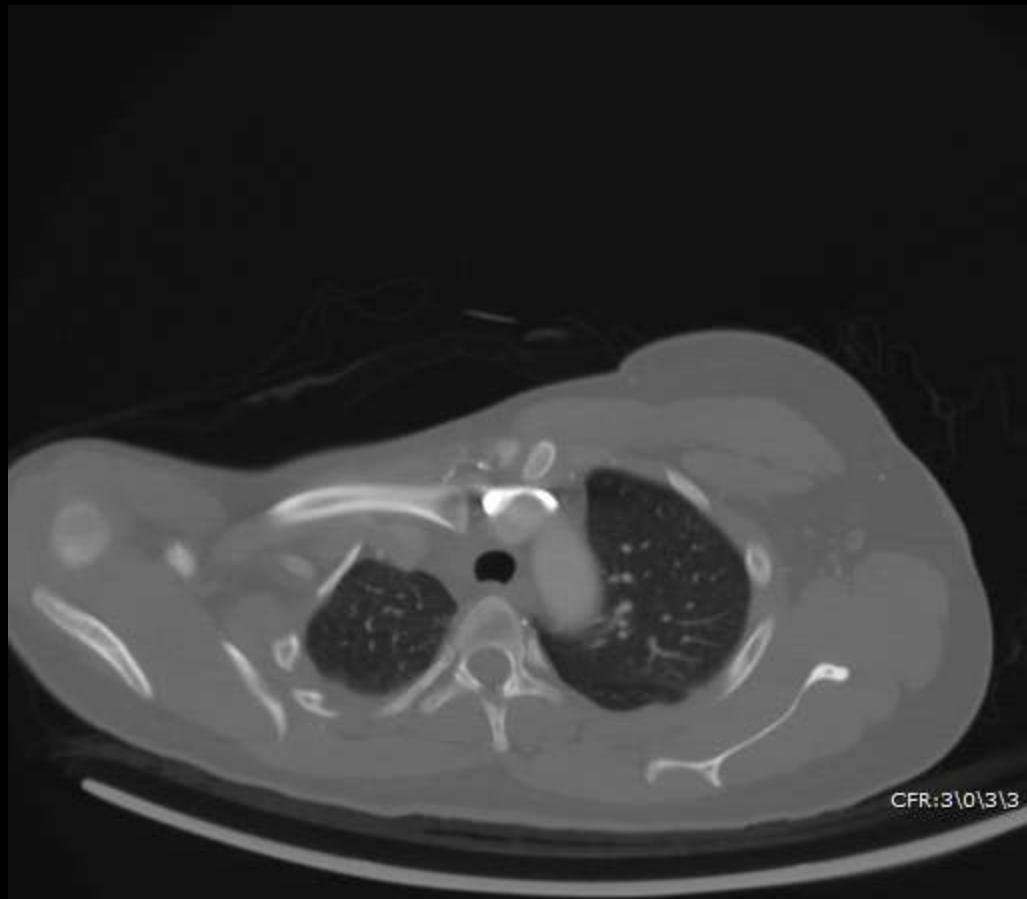
CFR:3\0\3\3



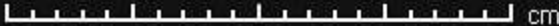


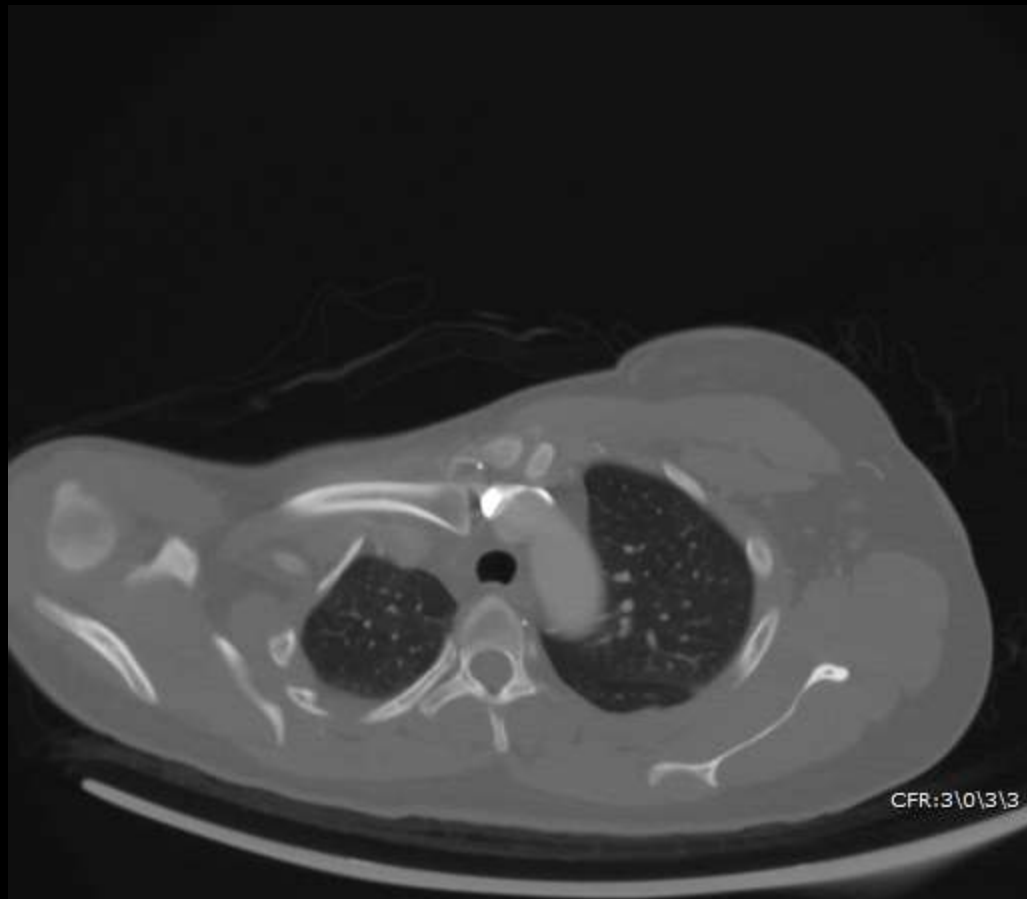
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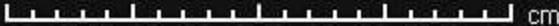


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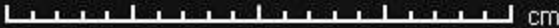


CFR:3\0\3\3





CFR:3\0\3\3





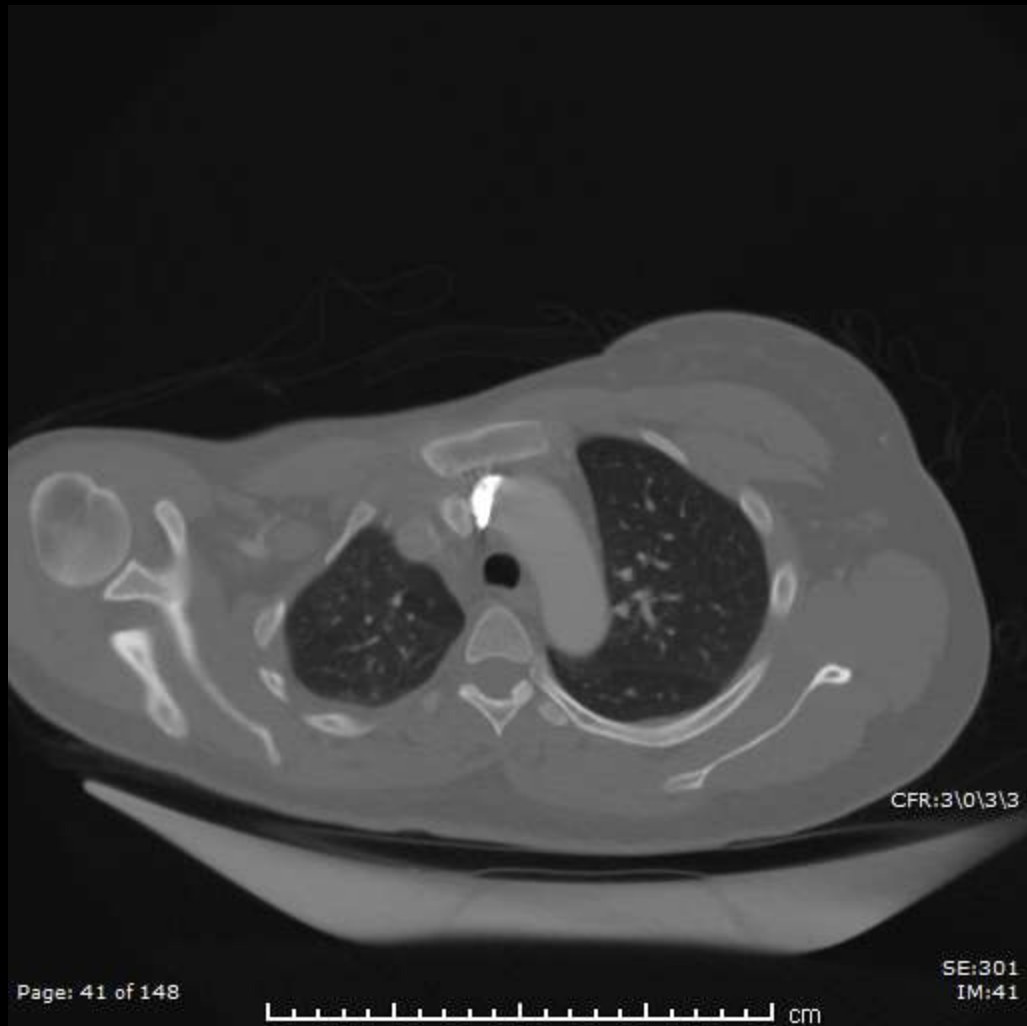
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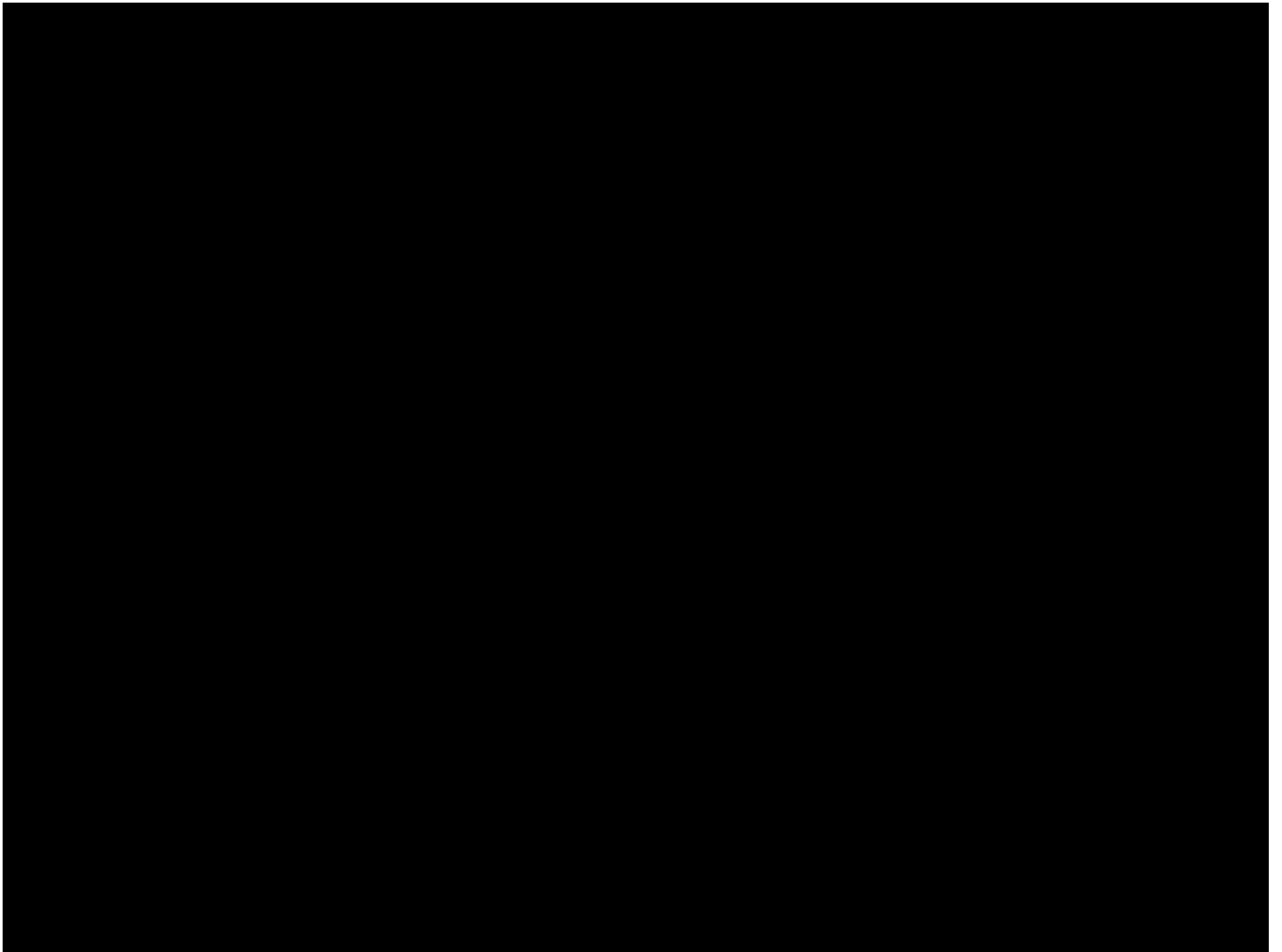






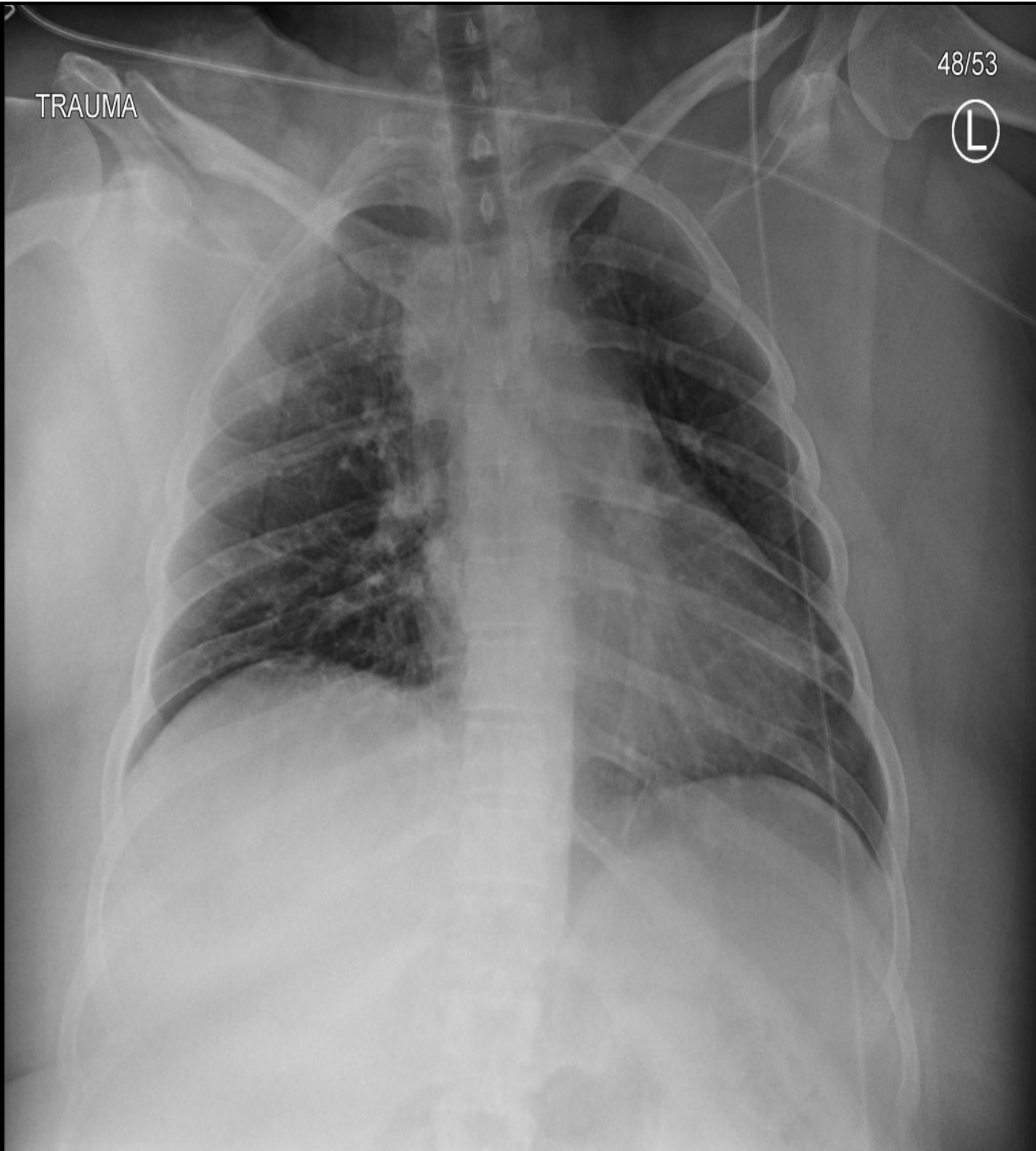






# Imaging

- Asymmetry in position of the clavicular head
- CT
- Serendipity view
  - posterior dislocation = inferior
  - anterior dislocation = superior

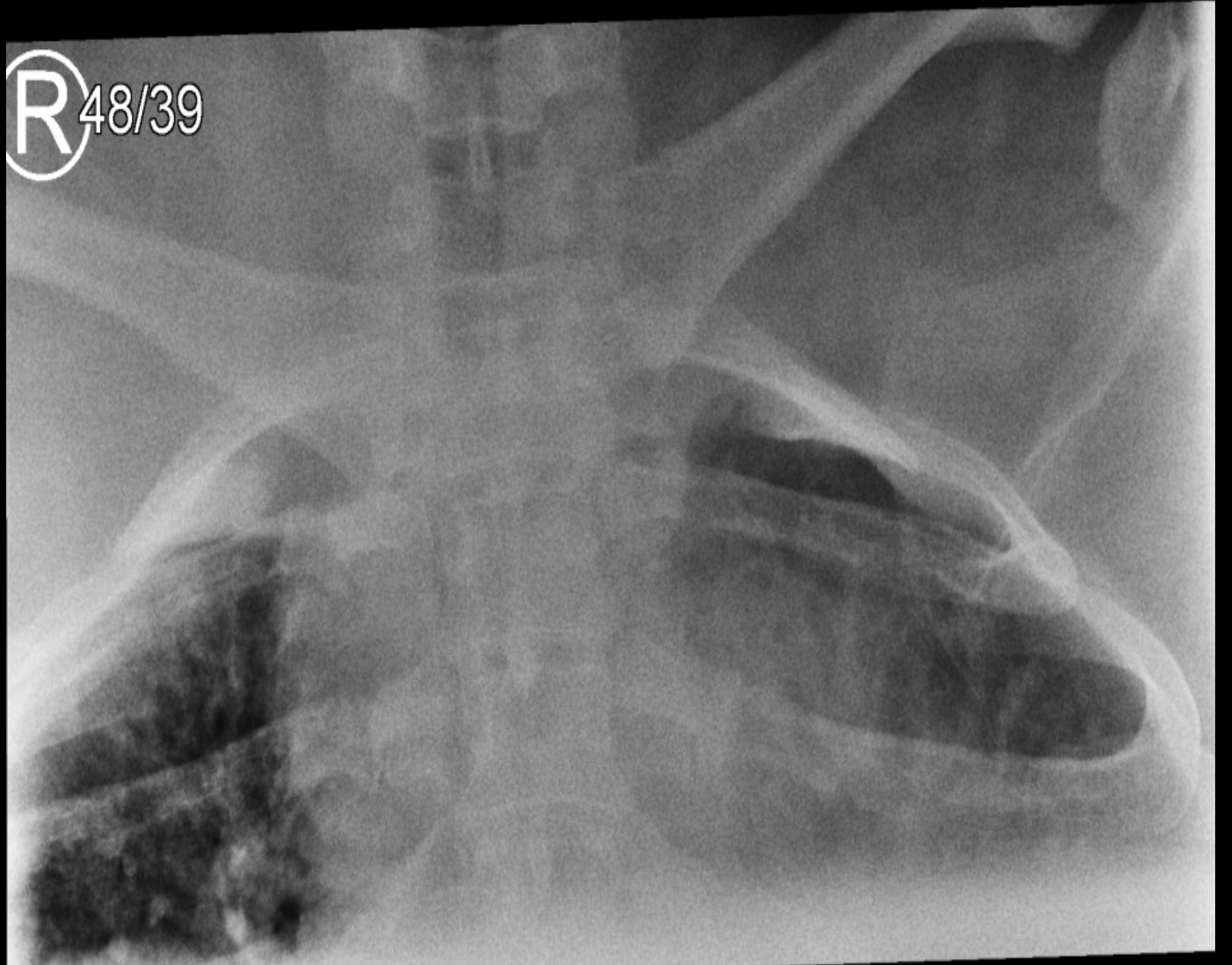


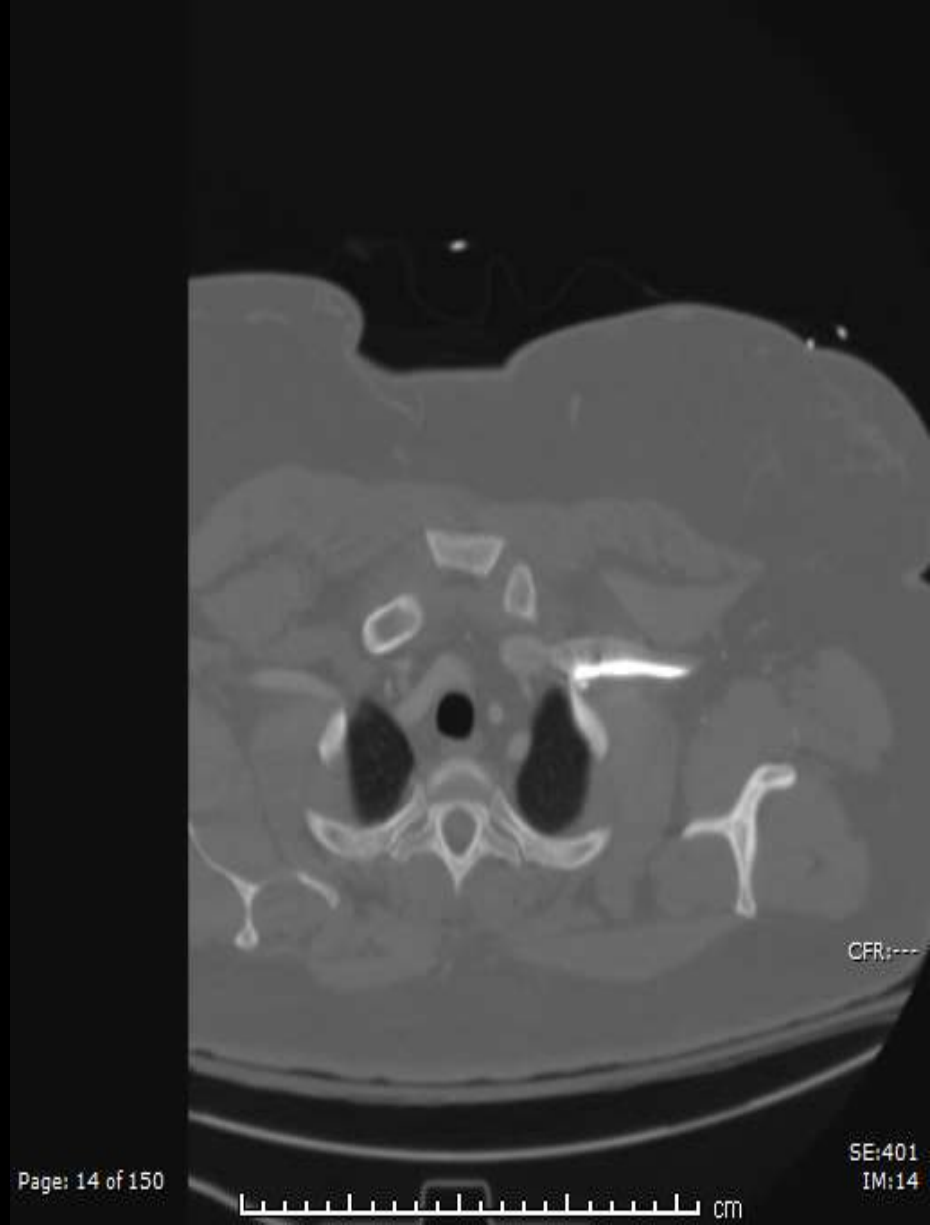
TRAUMA

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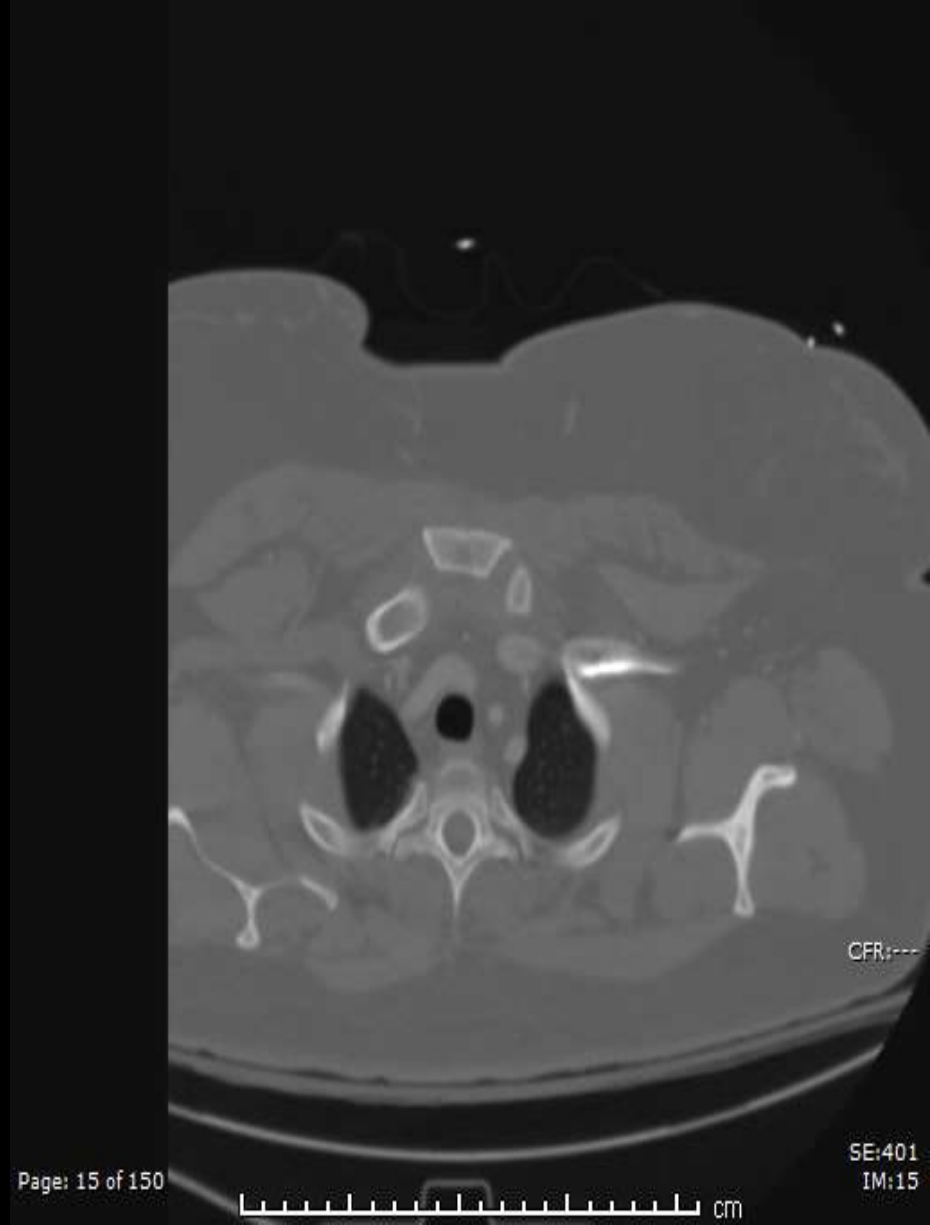
L

Ⓜ 48/39





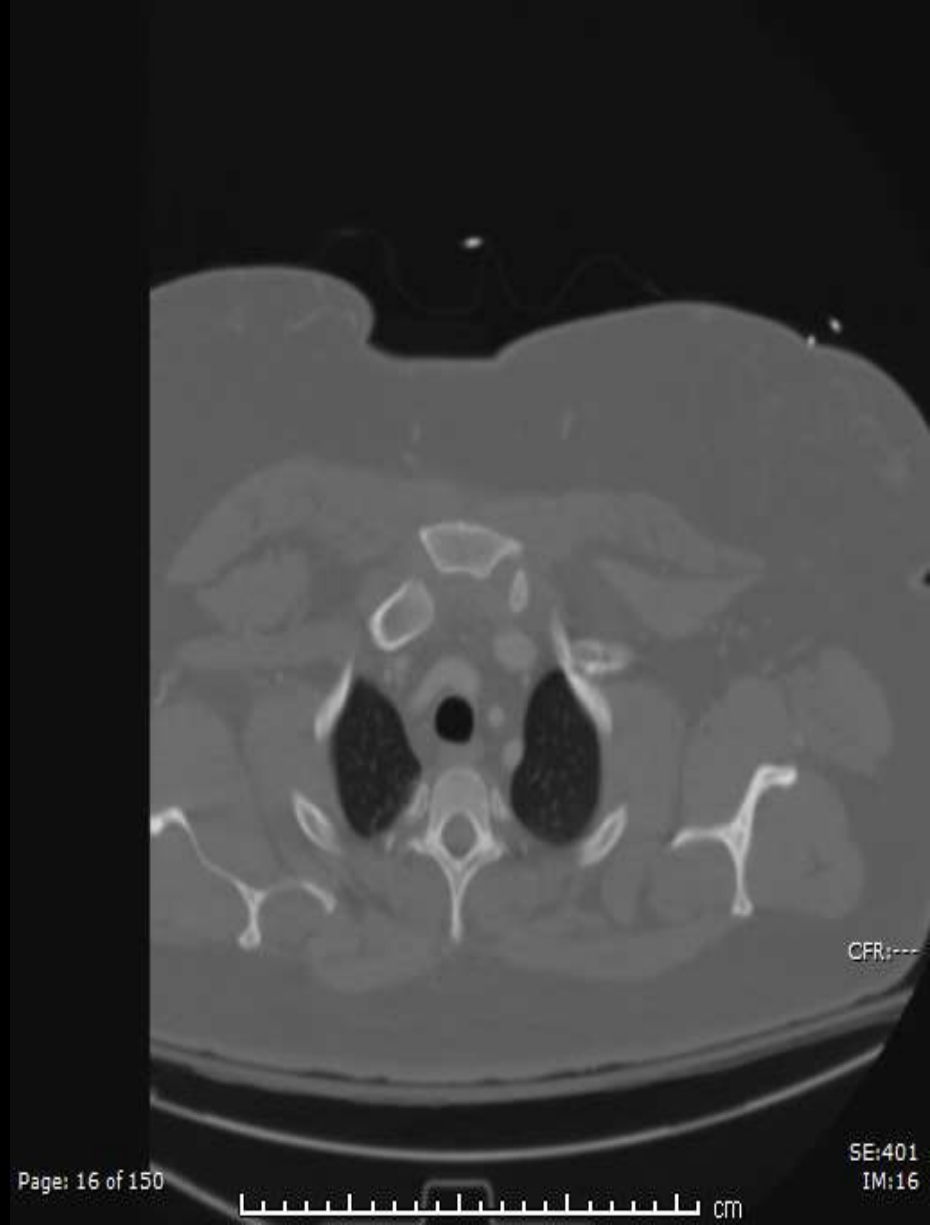


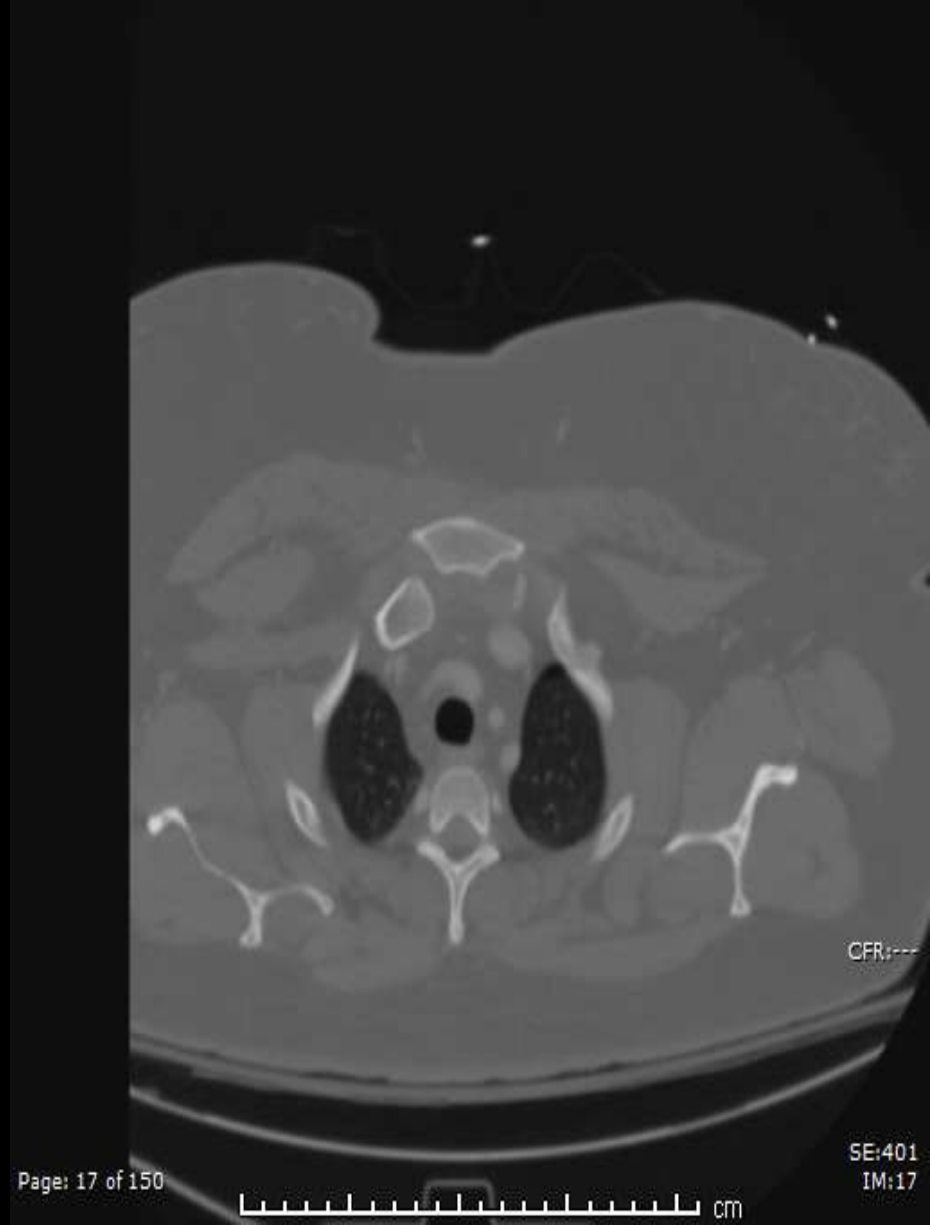


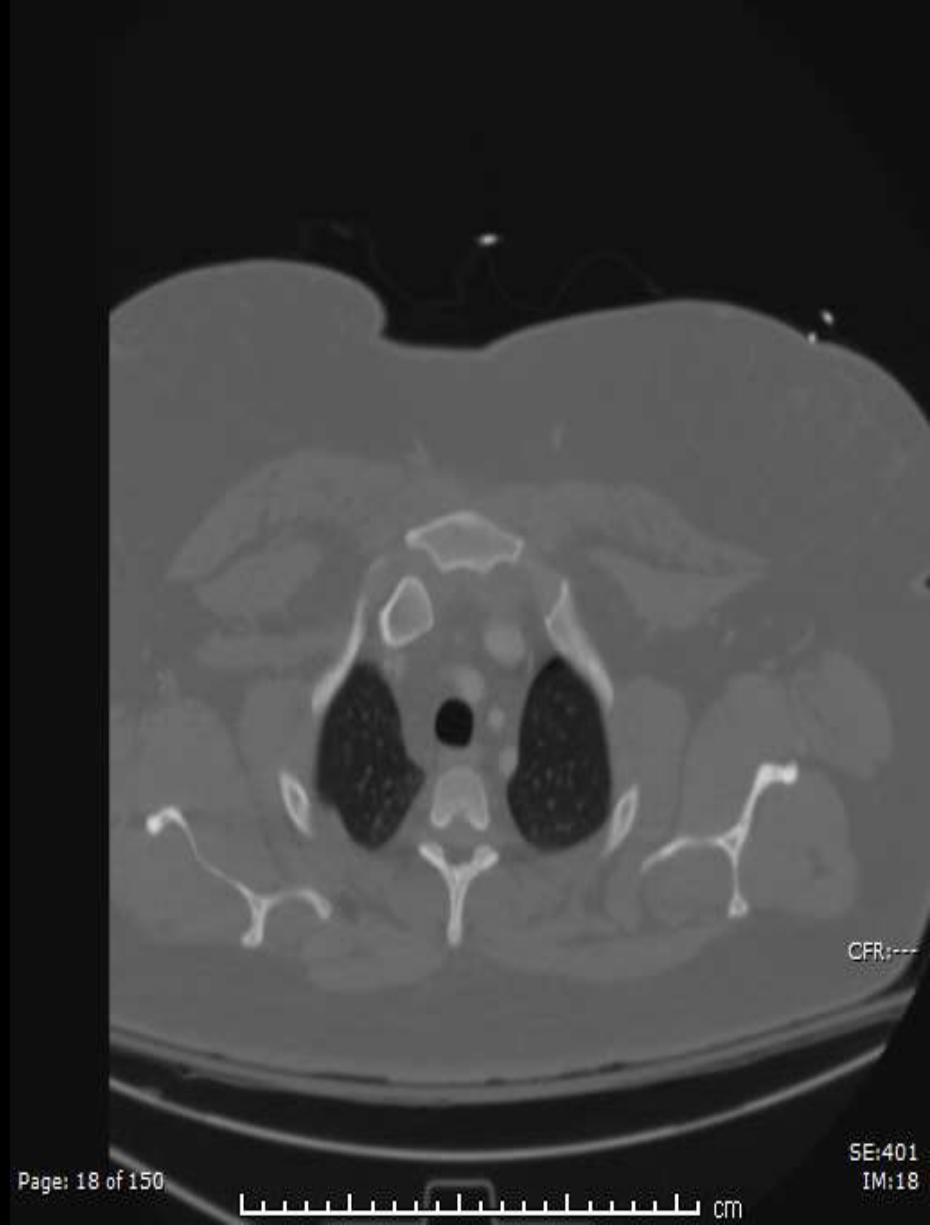
CFR:---

SE:401  
IM:15

cm



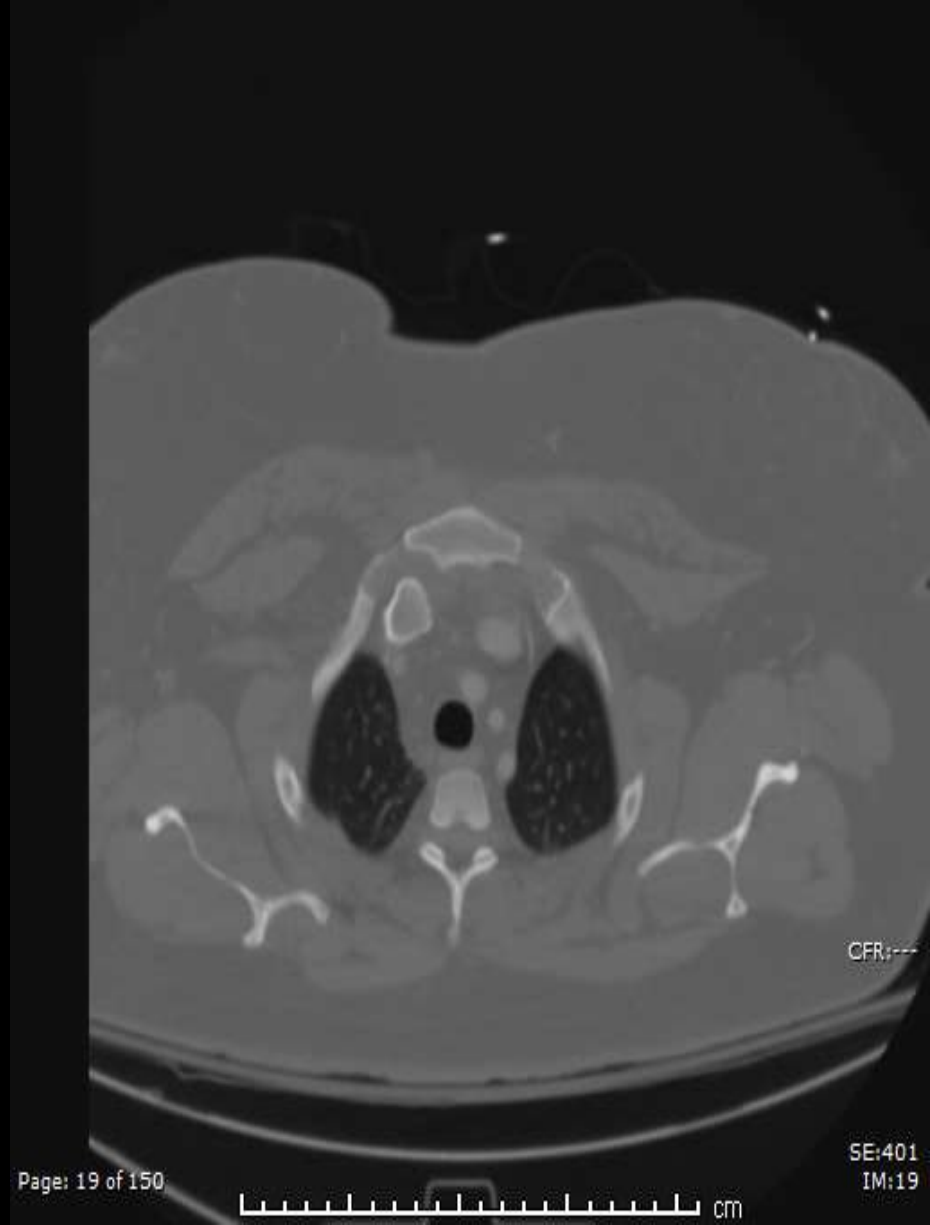




CFR:---

SE:401  
IM:18

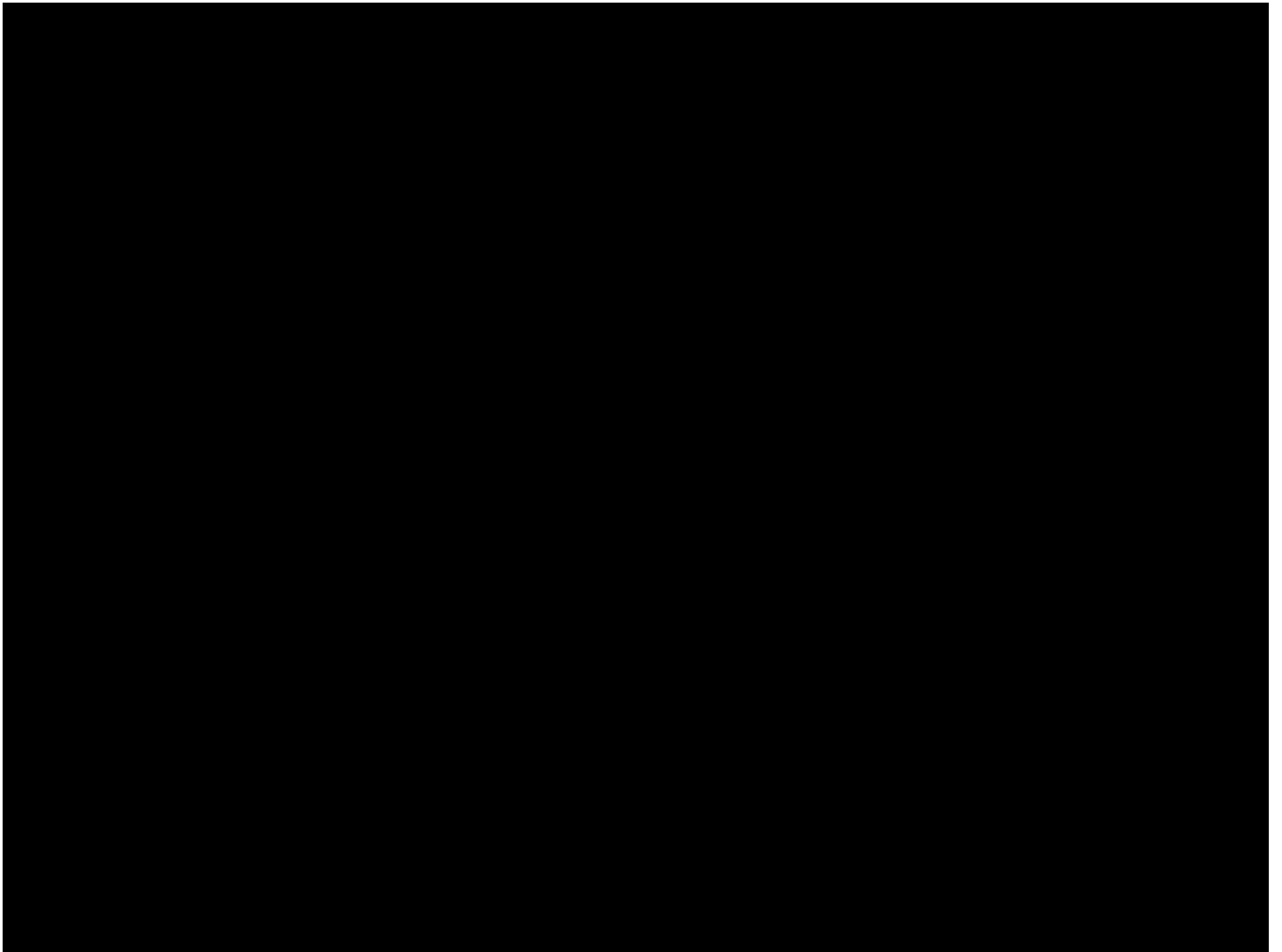
cm

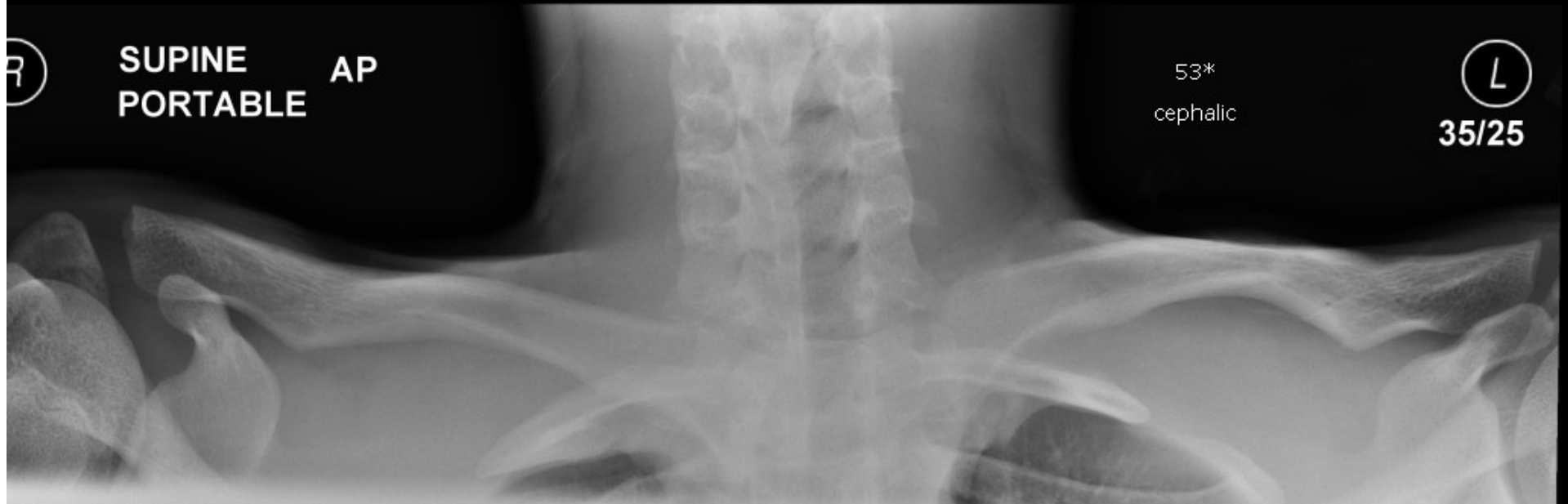


CFR:---

SE:401  
IM:19





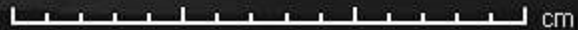
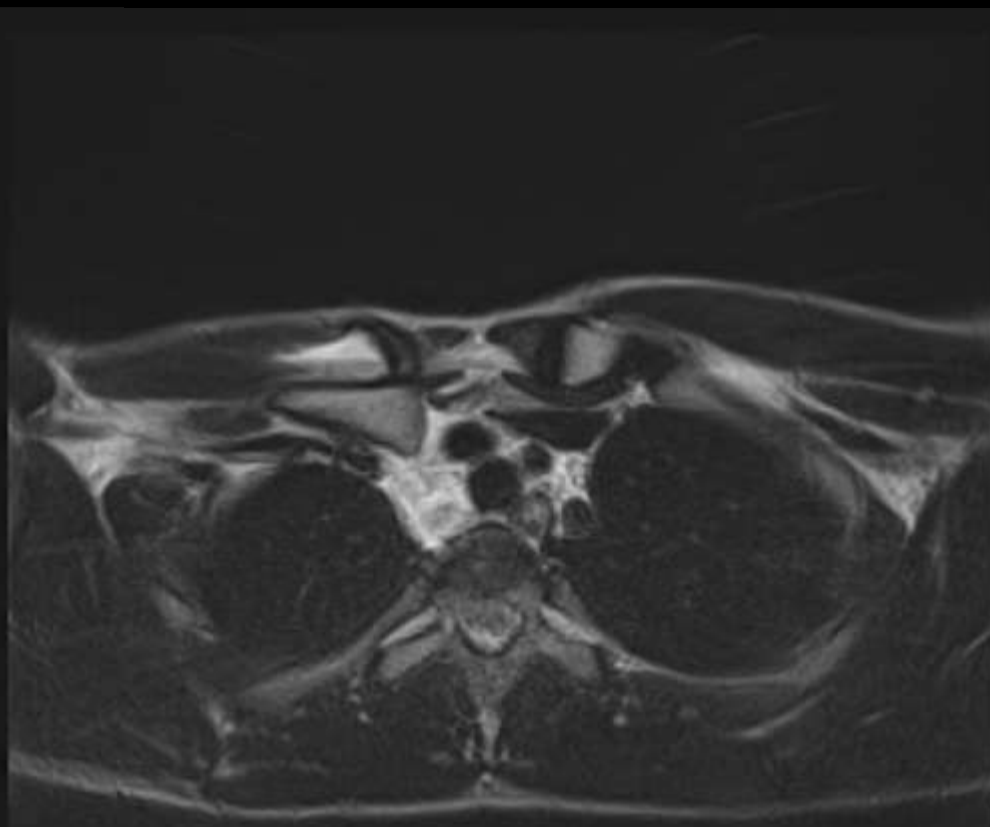
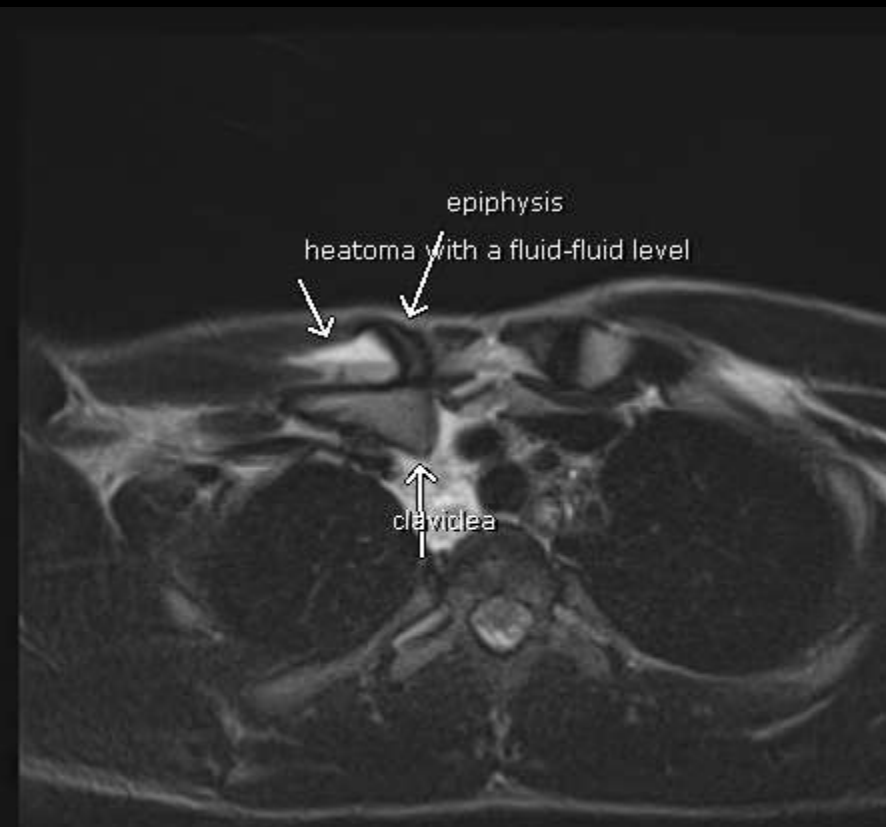


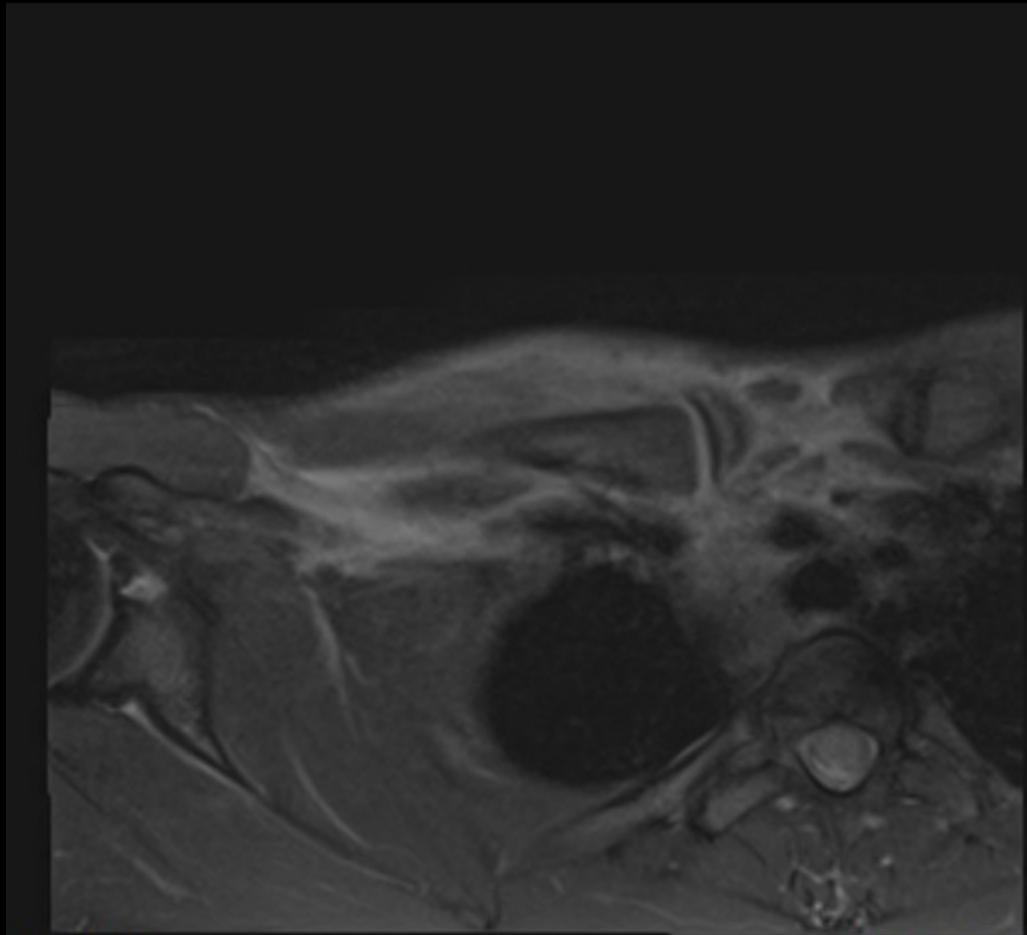
16-year-old male s/p football injury (pile up) with right SC dislocation; Serendipity view







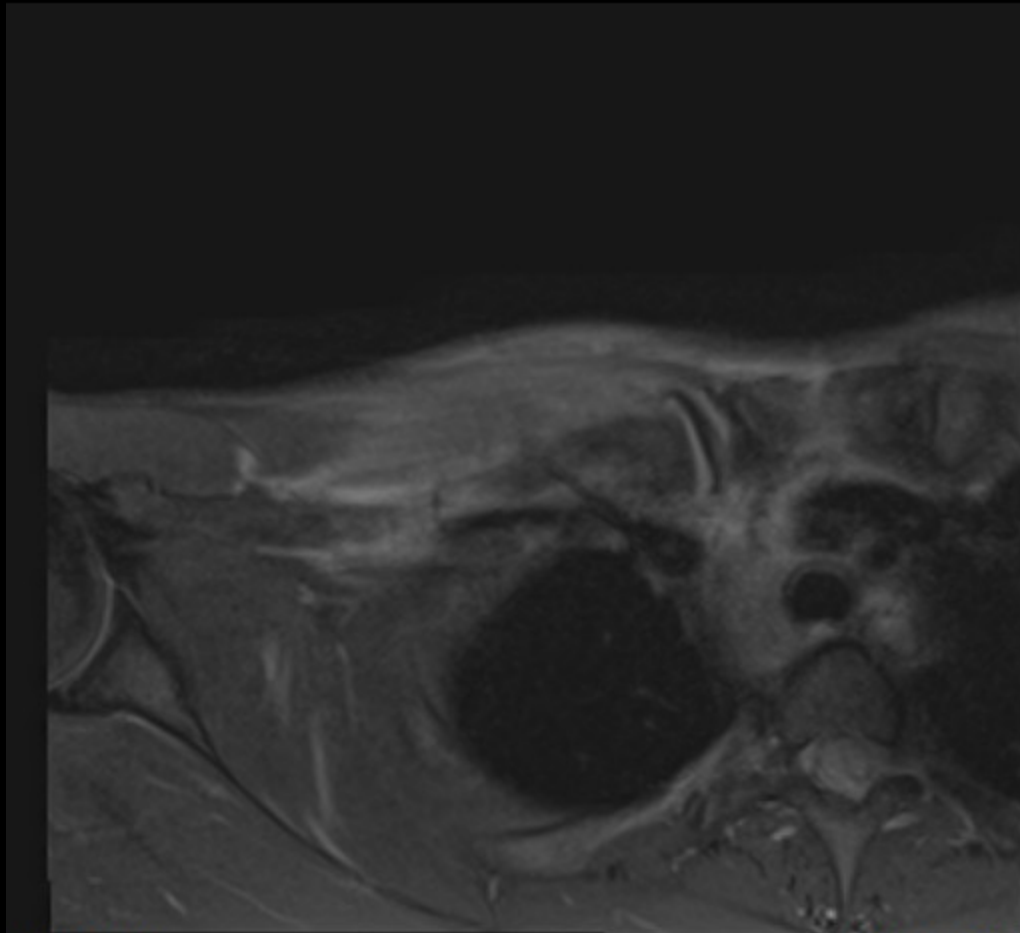


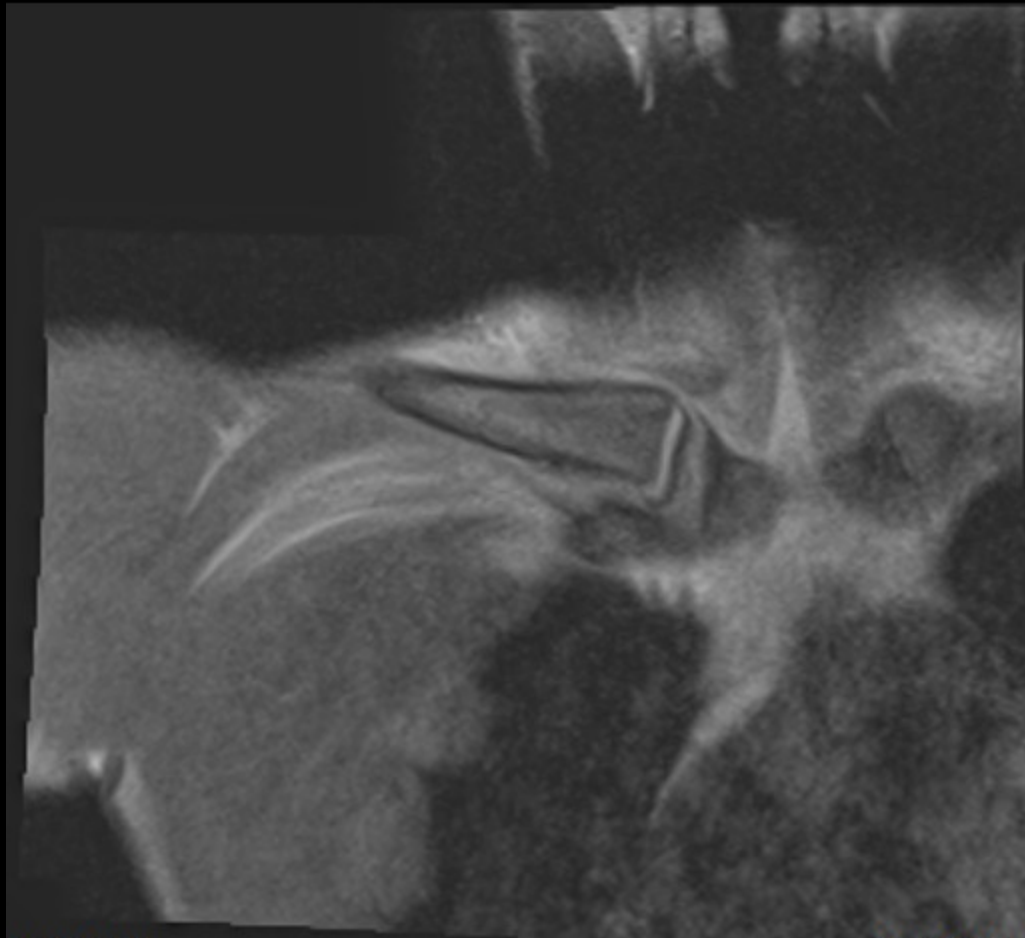


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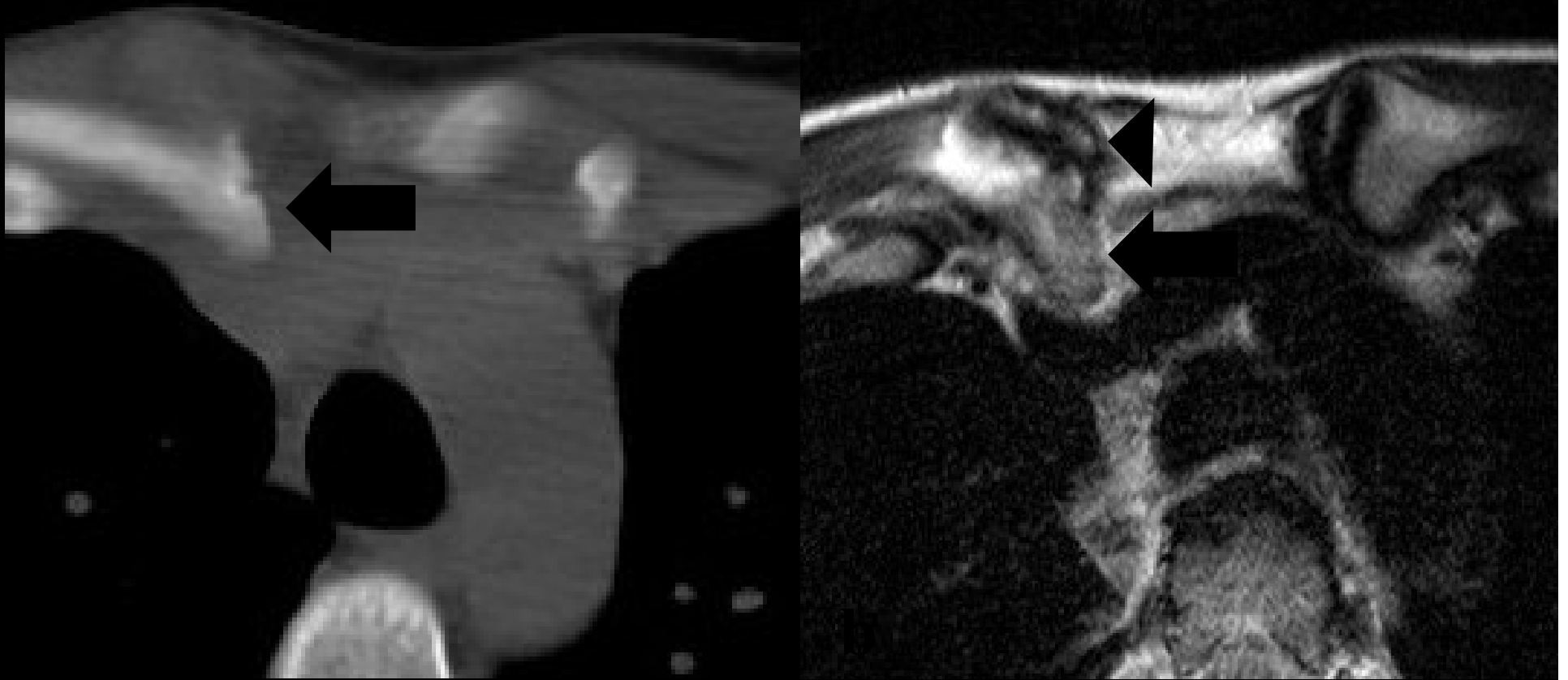
IM:8 SE:10001







# Transphyseal Sternoclavicular Dislocation

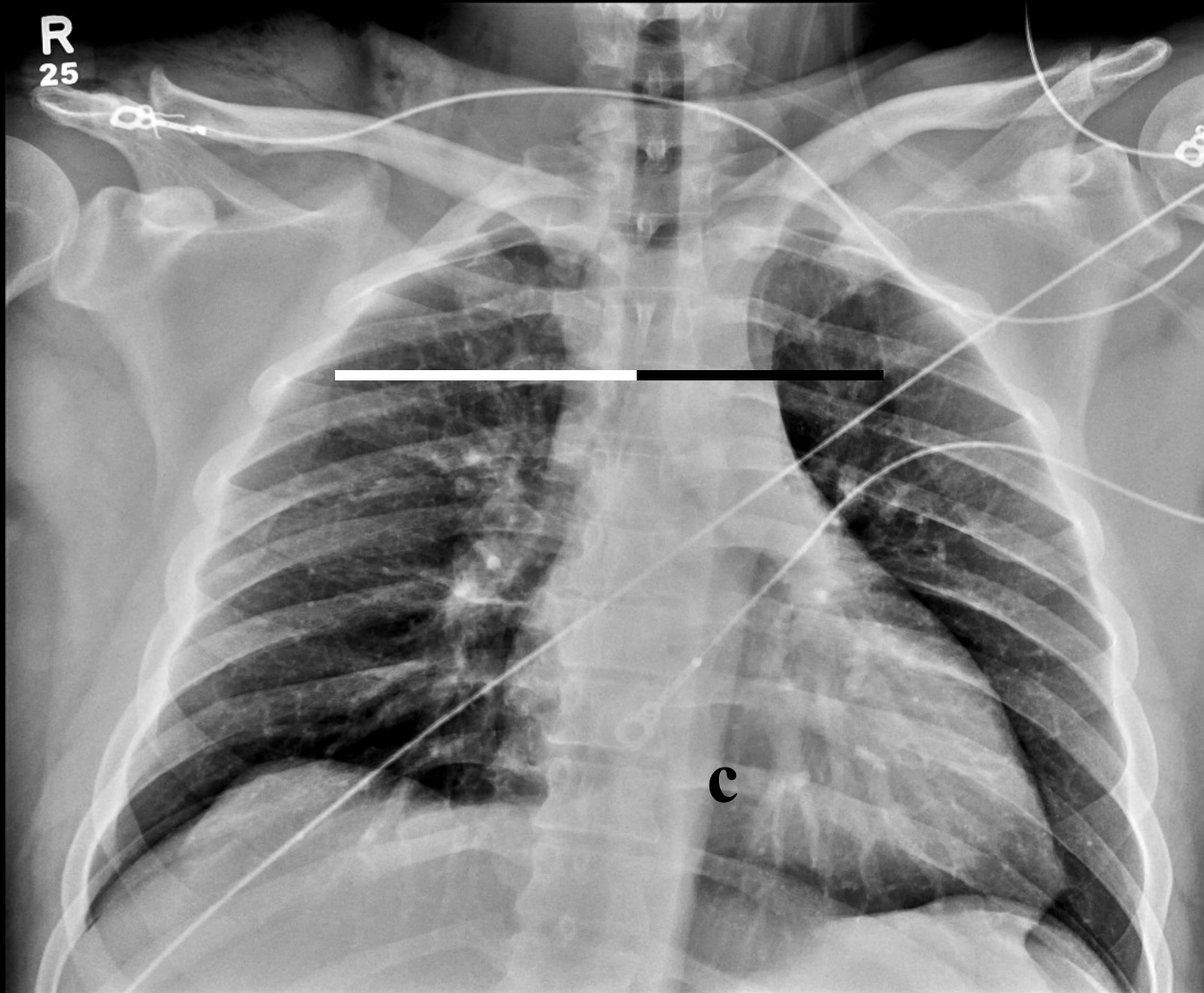


With permission from Nicholas Beckmann

# Scapulothoracic Dissociation

- Close forequarter amputation
- Diagnosed by physical exam (lack of pulses and neurologic deficit)

# Scapulothoracic Dissociation



With permission from Nicholas Beckmann



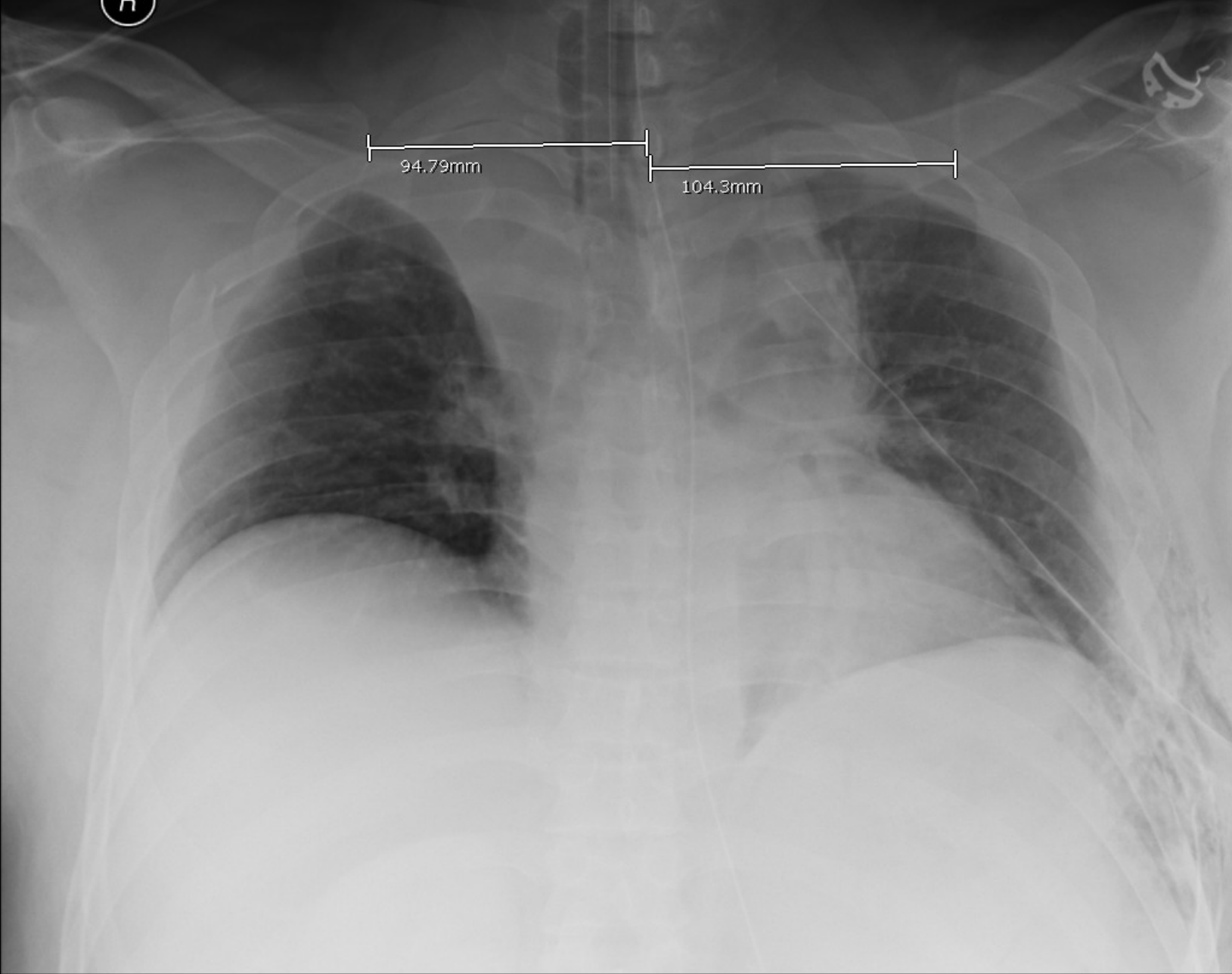
R

35

SUPINE

PORTABLE

94.79mm 104.3mm





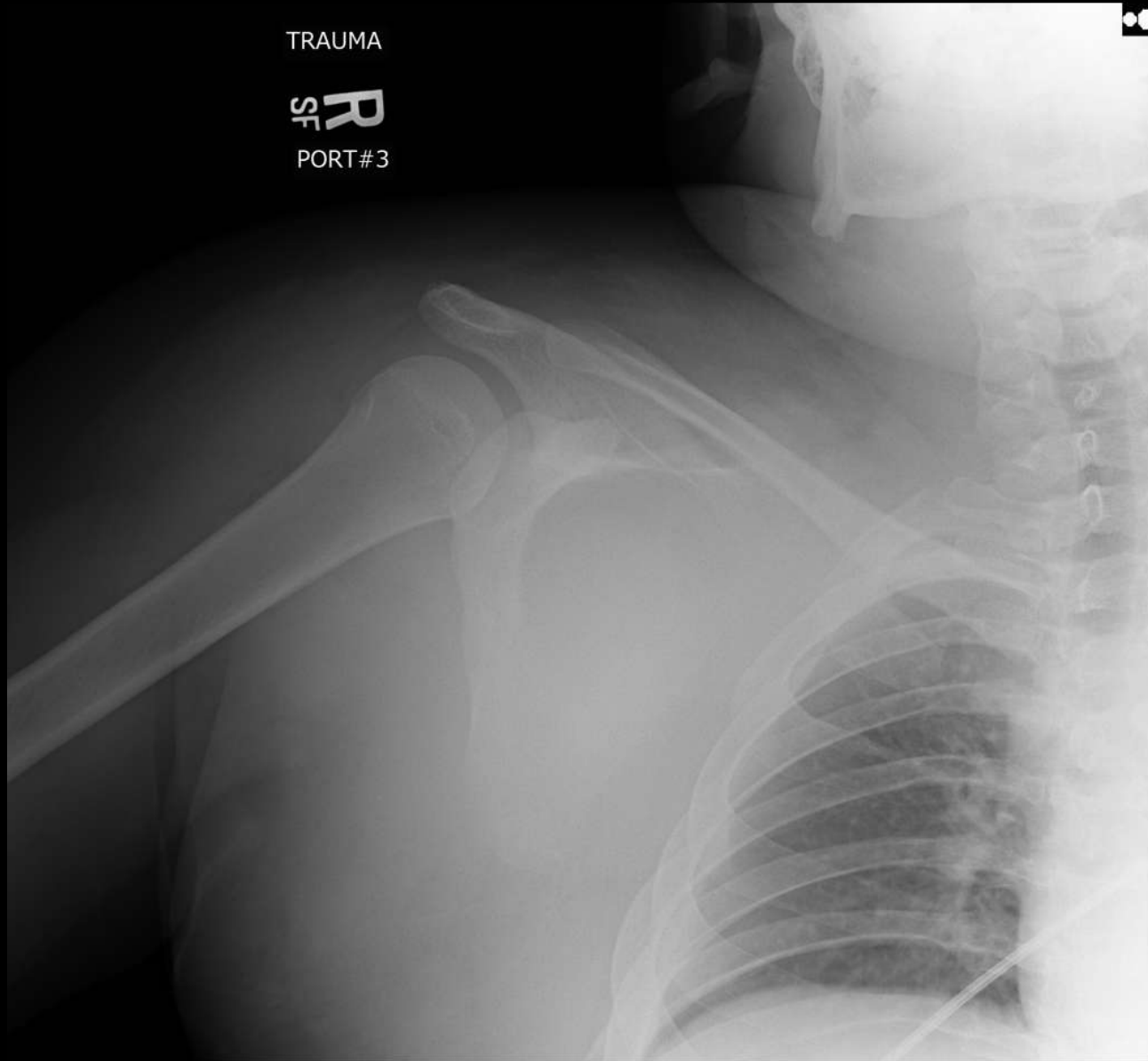


Non—overlap of the scapula and ribcage

TRAUMA

R  
ST

PORT#3



Page: 1 of 4

cm

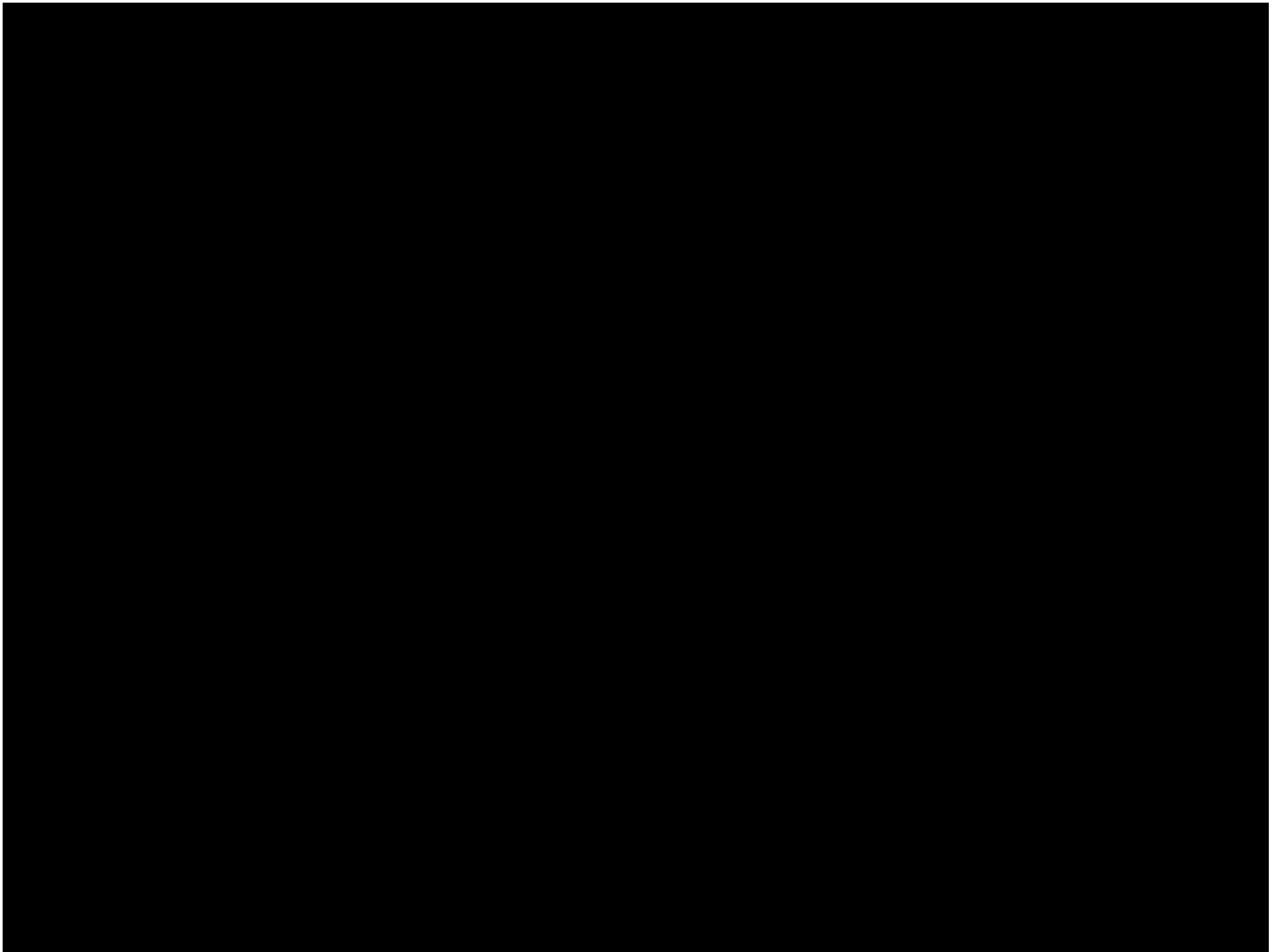
IM: 3

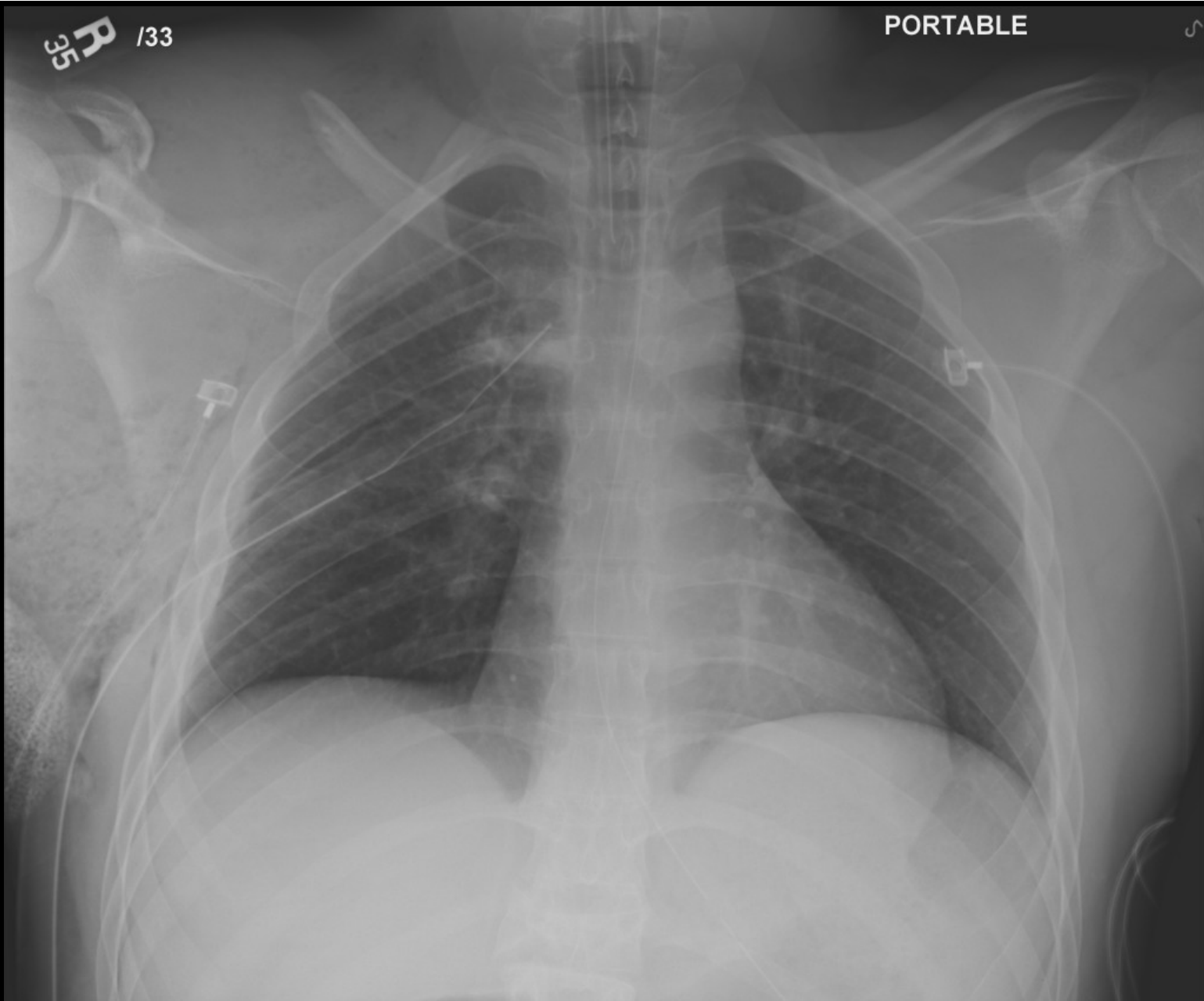
19 yo male s/p MVC rollover, unrestrained passenger; found to have pulseless RUE





Abrupt cutoff of arterial supply





25 yo MCC at highway speeds, hit guard rail; asymmetric position of the scapula

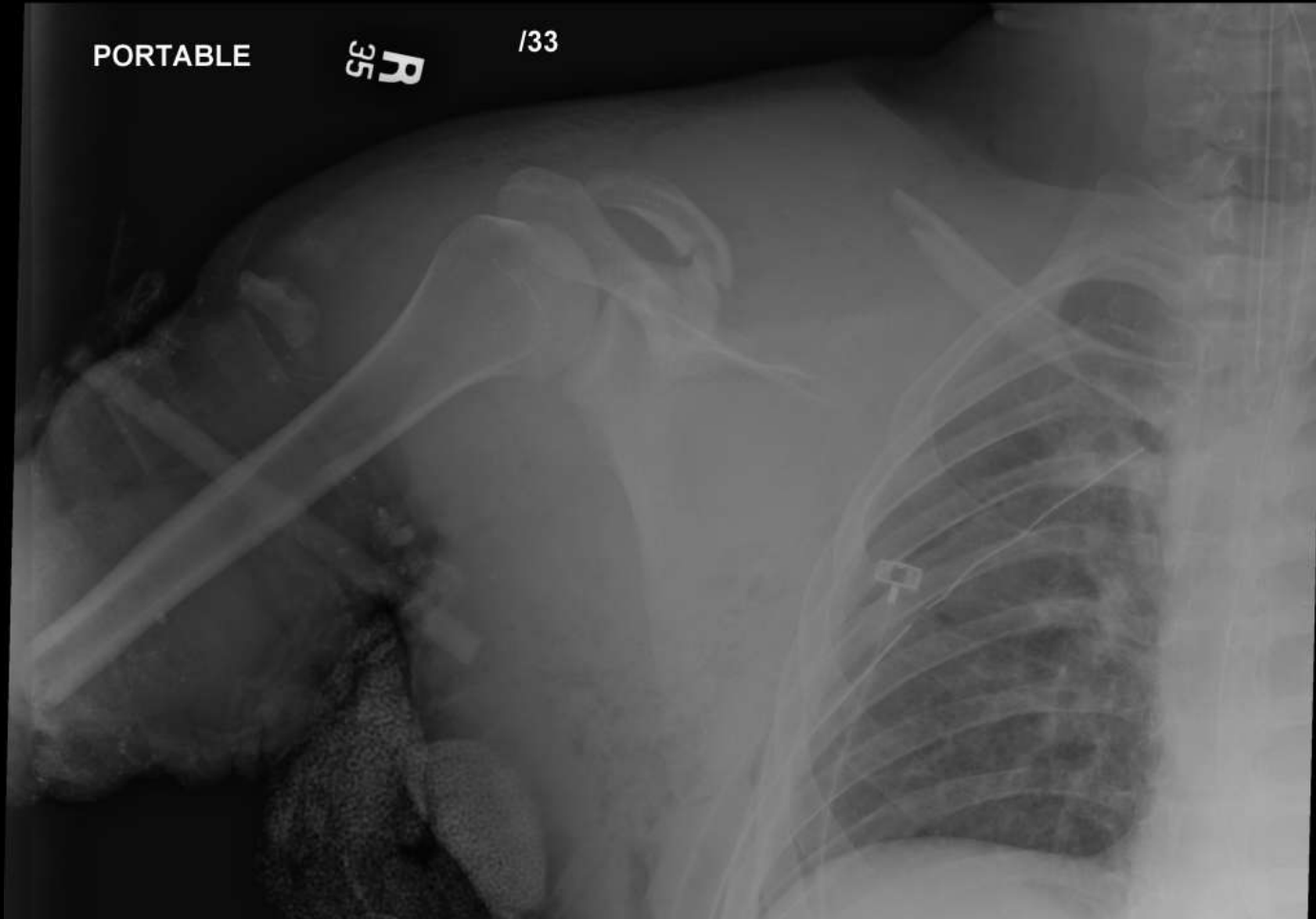


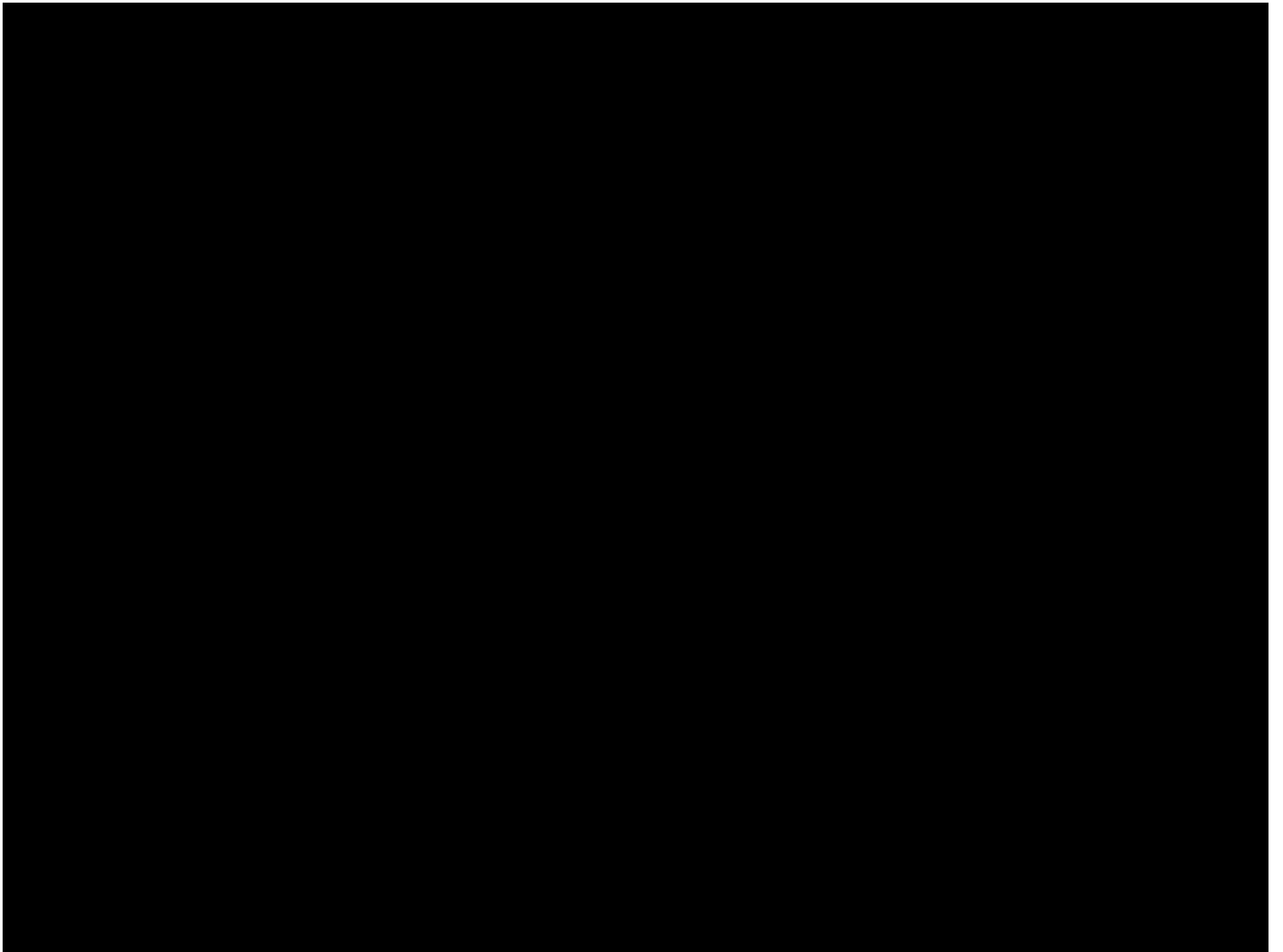


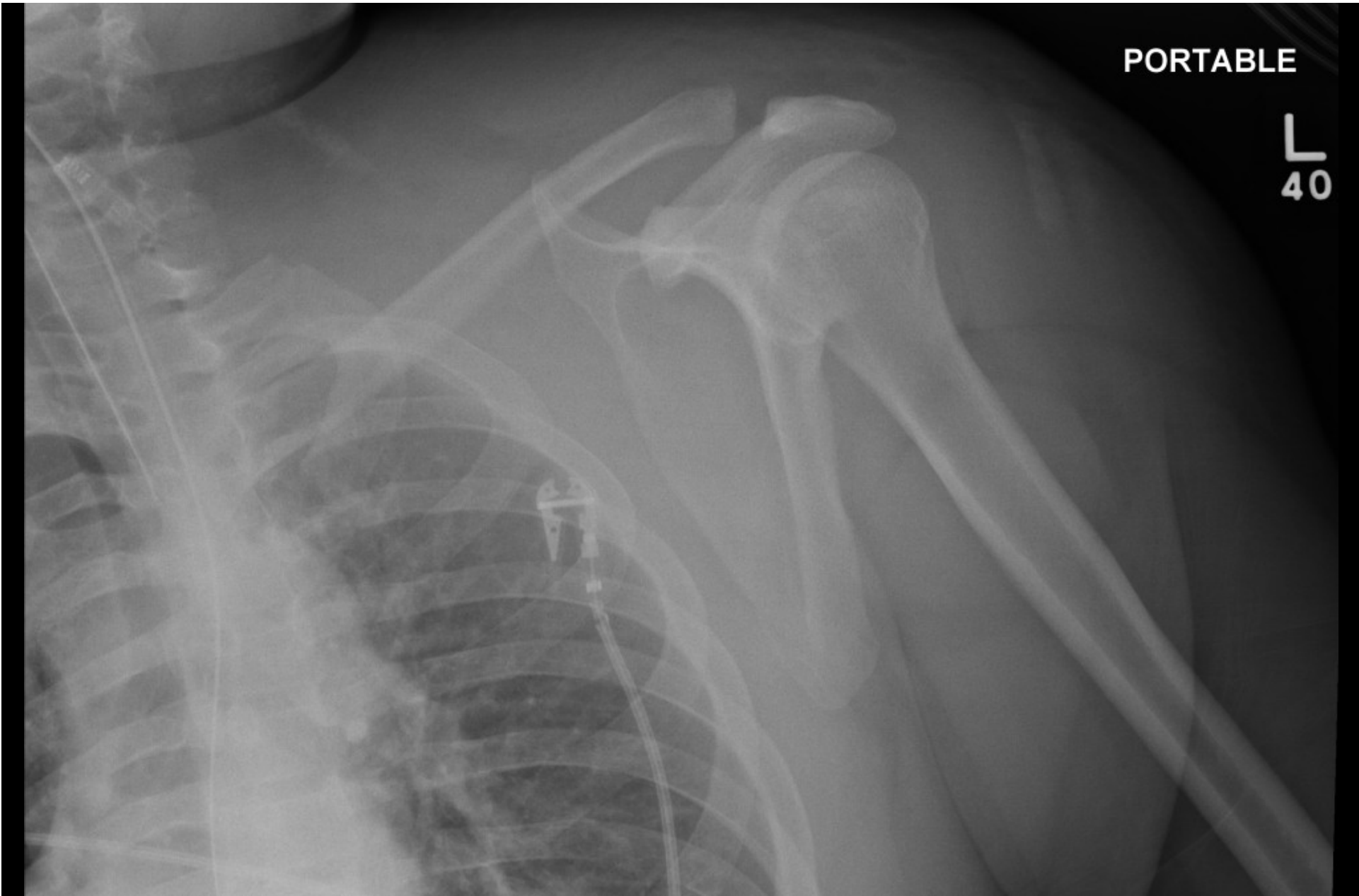
PORTABLE

R  
35

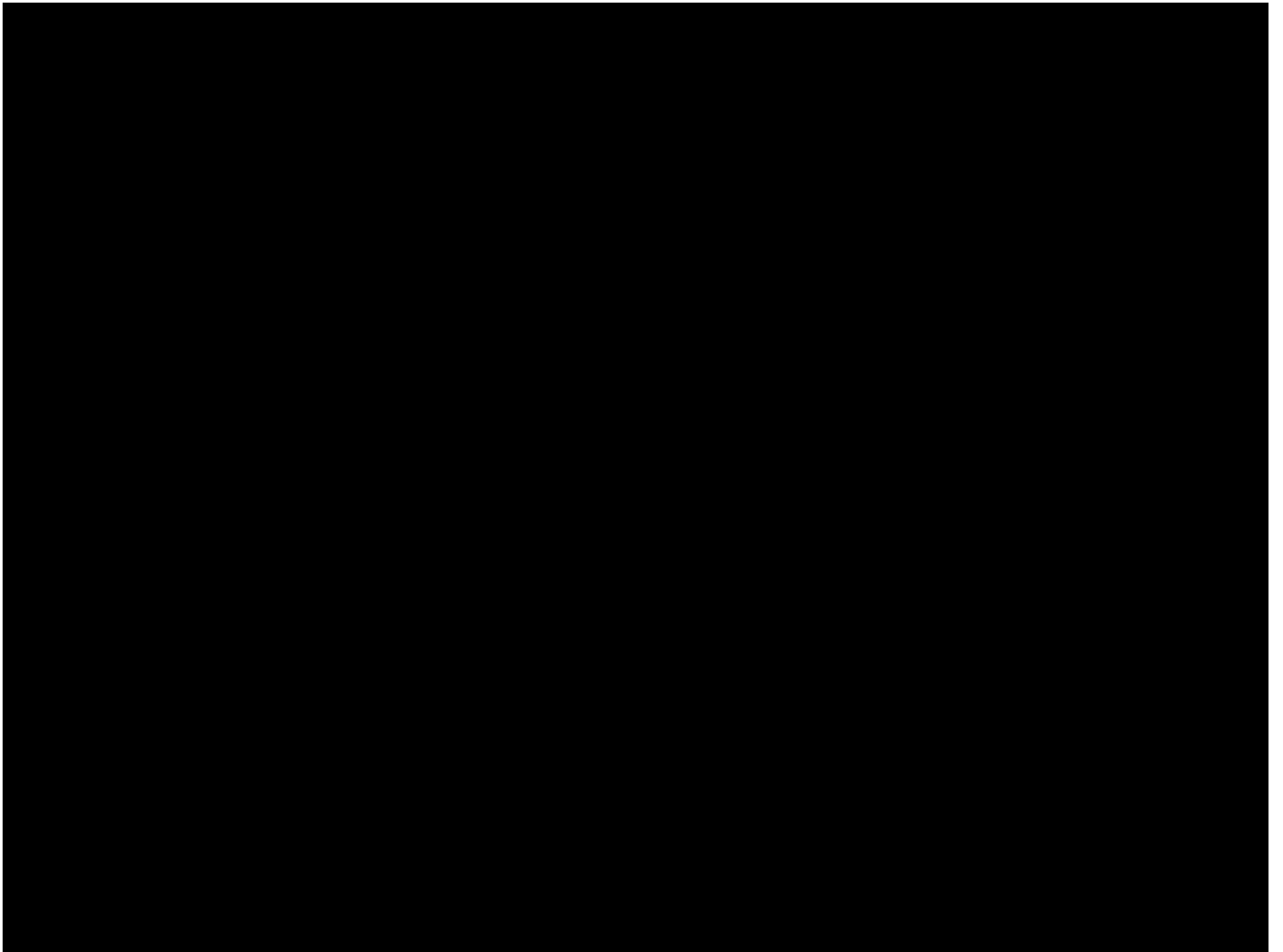
/33







30-year-old male MCC vs Truck



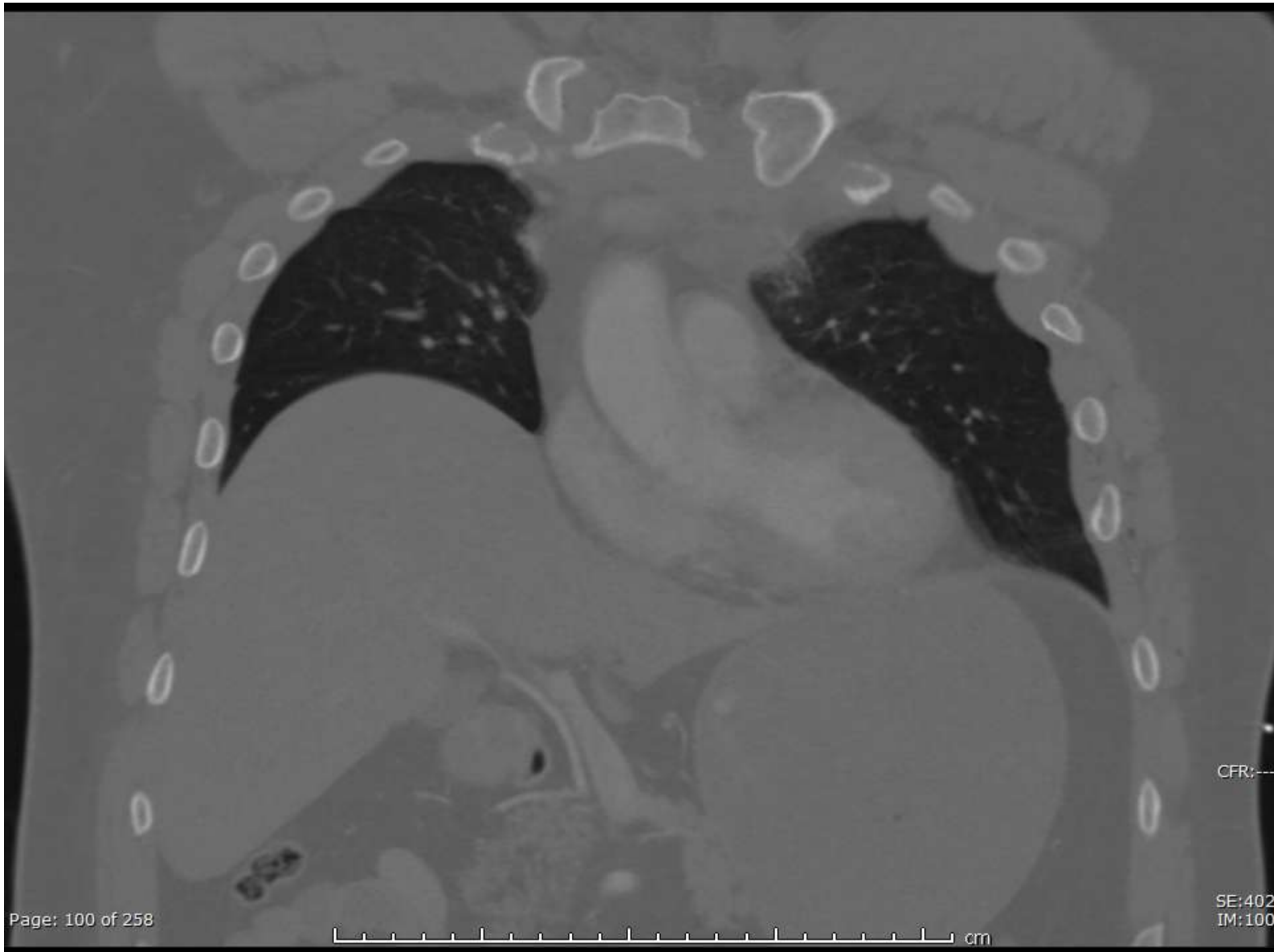
trauma

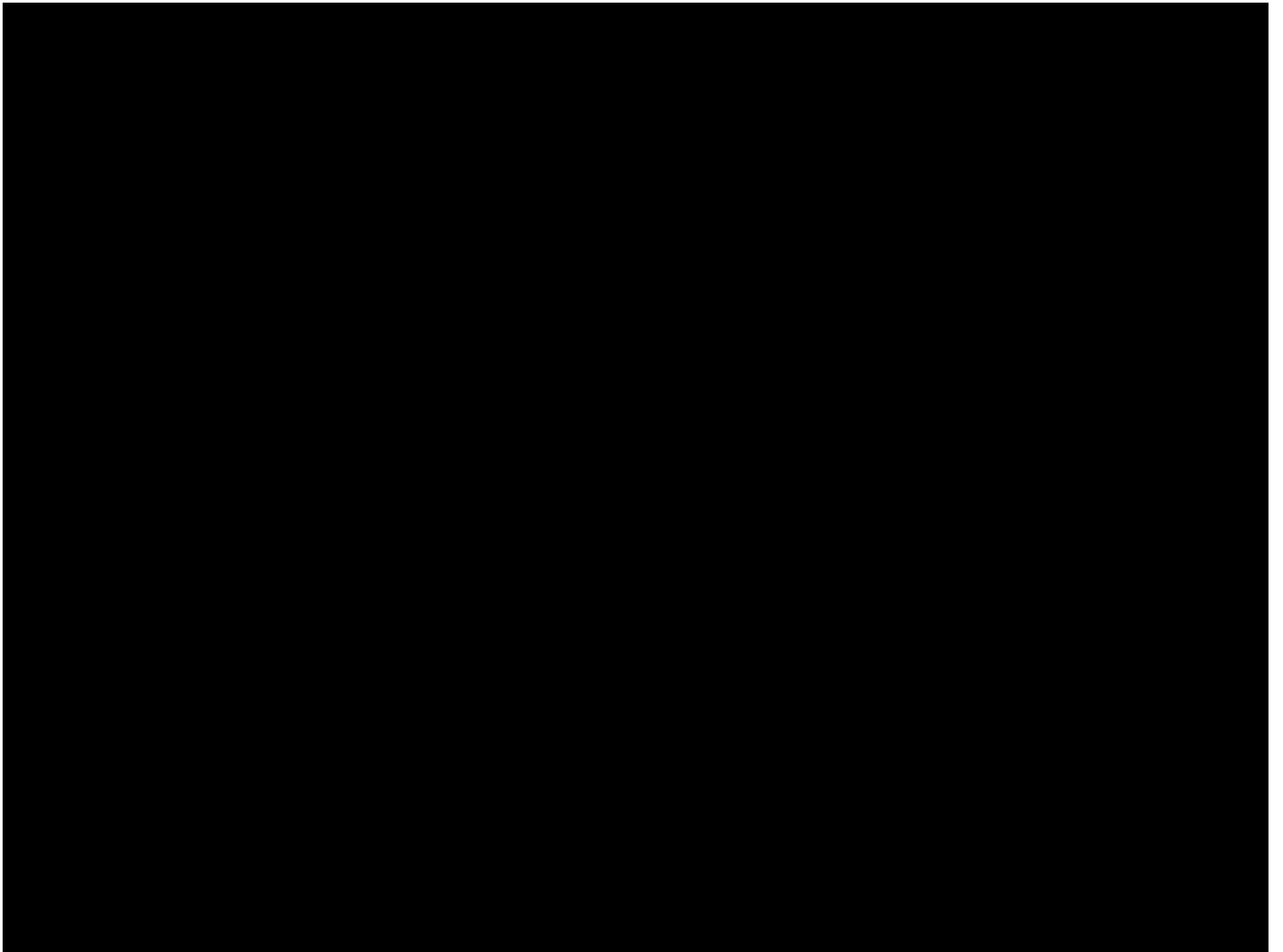
SUPINE

PORTABLE

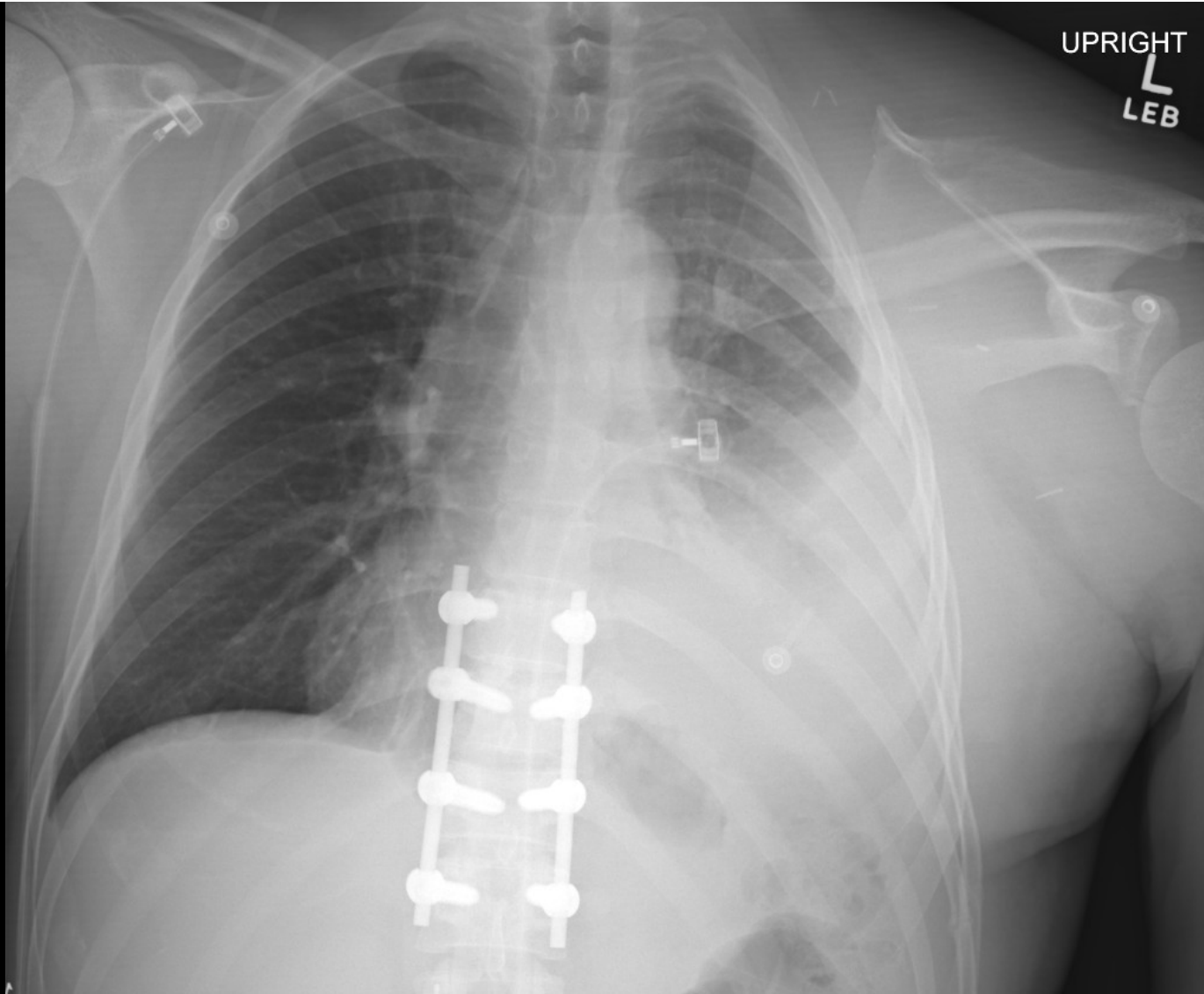
25









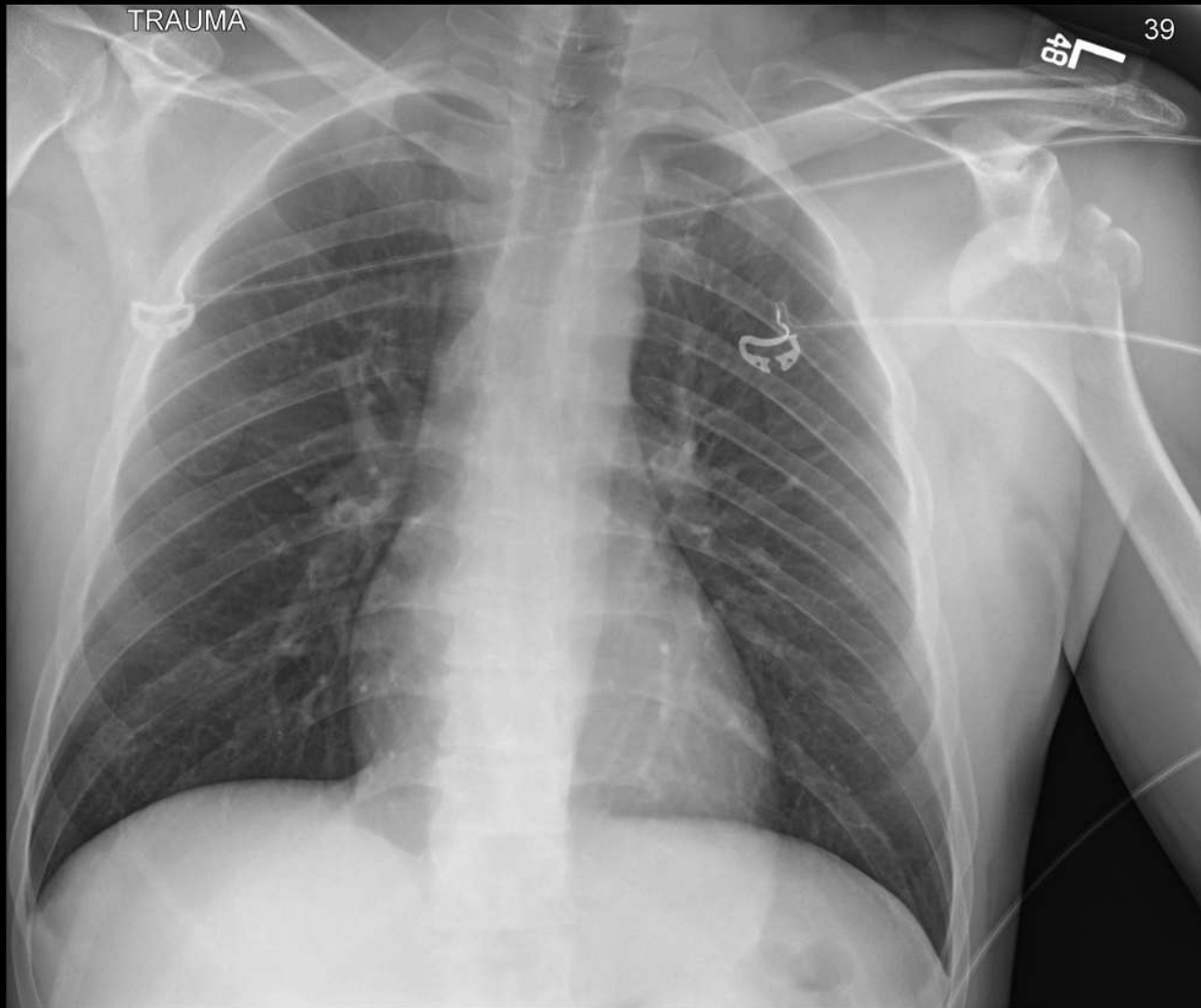


# Avulsion

- Greater tuberosity
- Coracoid process
- Biceps
- Latissimus dorsi/Pectoralis

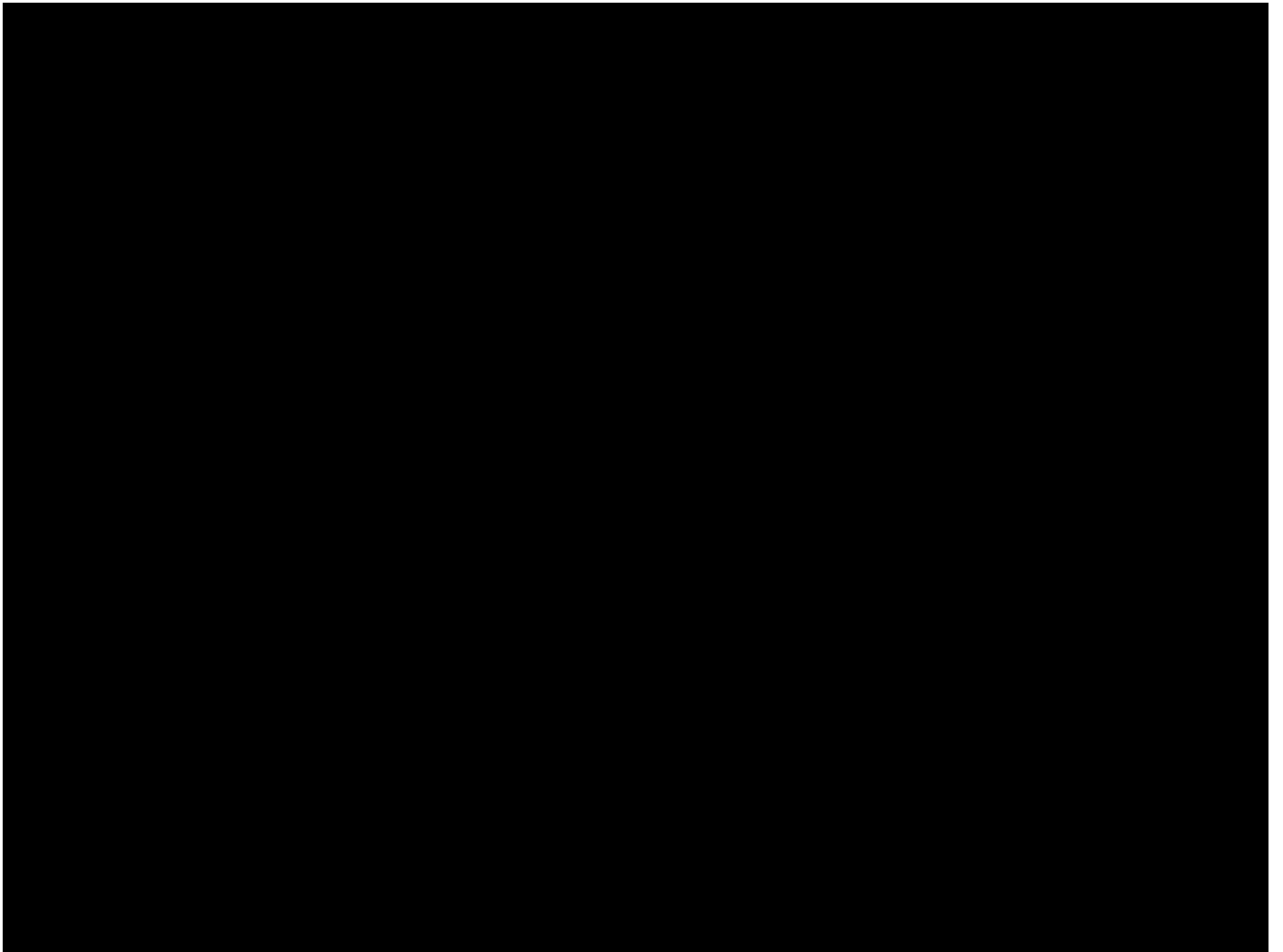
# Greater Tuberosity

- Avulsion (osteoporosis), impaction
- Variant of Hill Sachs



33 year-old s/p MCC with obvious shoulder deformity



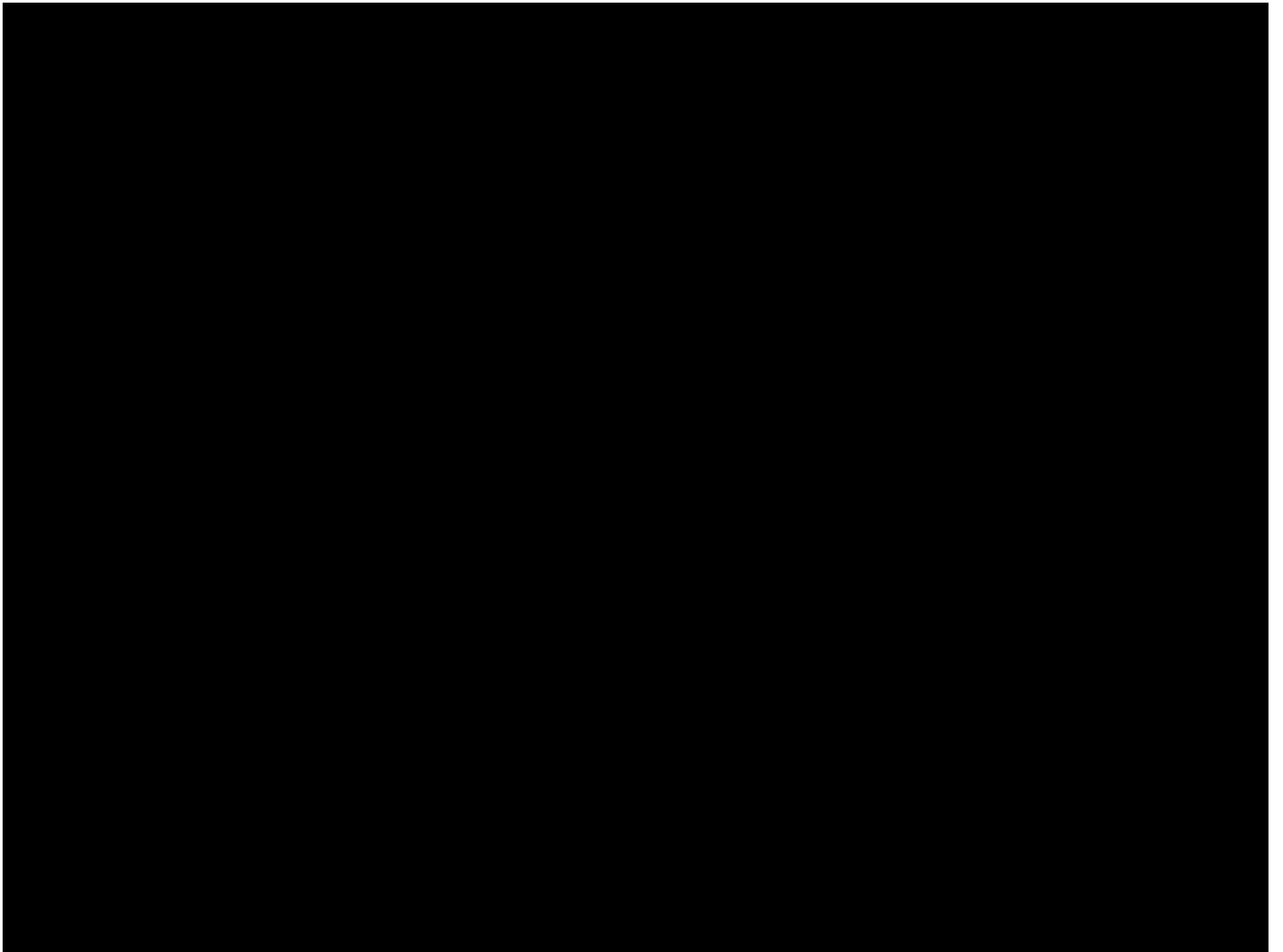




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IM: 4

36 year-old MV vs Ped; car traveling at 30 mph, struck pt on left side







25-year-old male s/p trauma







# Coracoid Process



26 year-old male s/p MCC going 30 mph

11/7

R



# Pectoralis/Latissimus Dorsi Avulsion

125 R



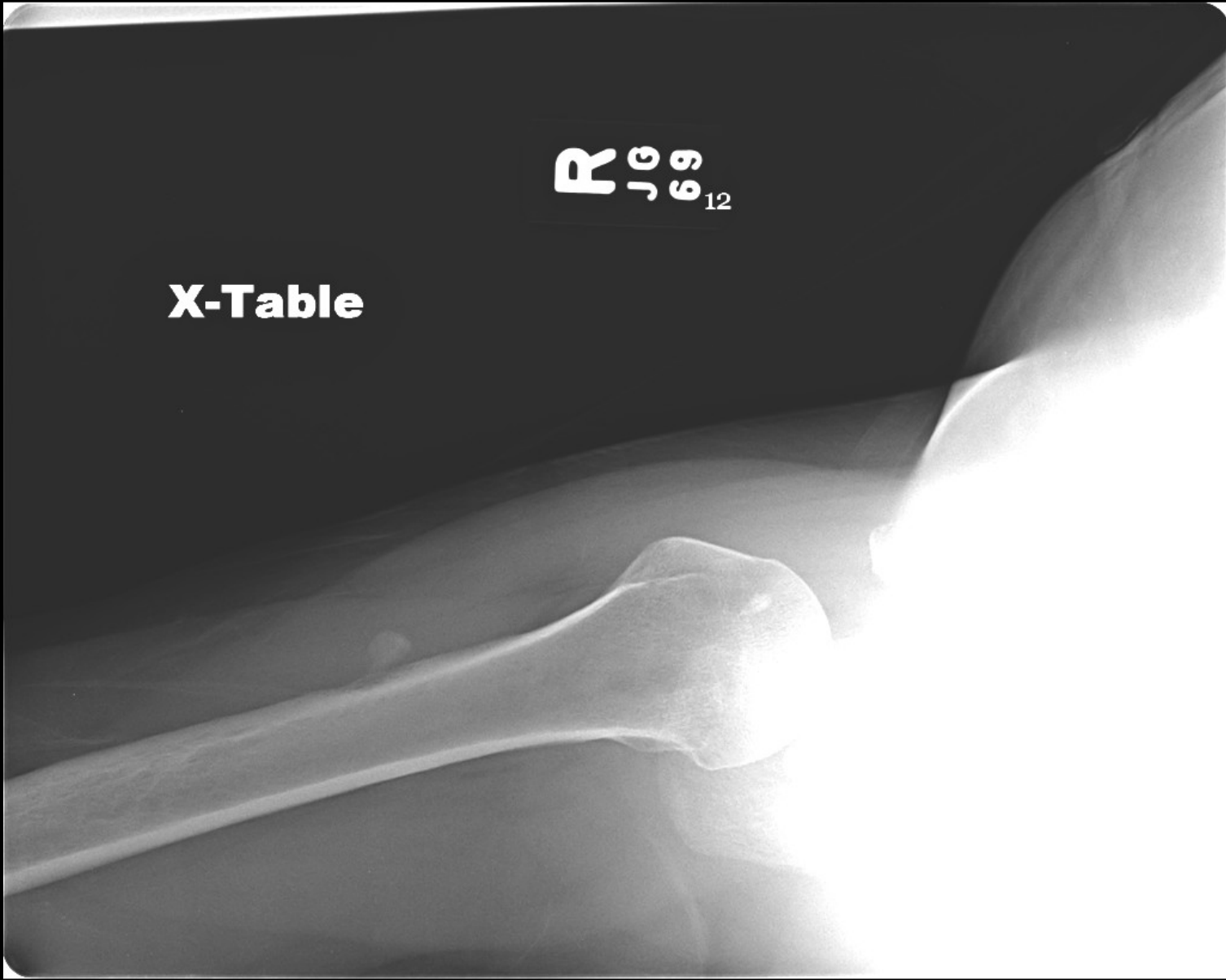
Page: 1 of 2



Compressed 27:1  
IM: 1

46-year old with arm pain after exercising





**X-Table**

**R**  
**10**  
**69**  
**12**

# Thank you

- Anil Dutta, UT Health San Antonio,  
Orthopaedic Surgery
- Nicholas Beckmann, UT Health Houston,  
Radiology
- Susanna Spence, UT Health Houston,  
Radiology