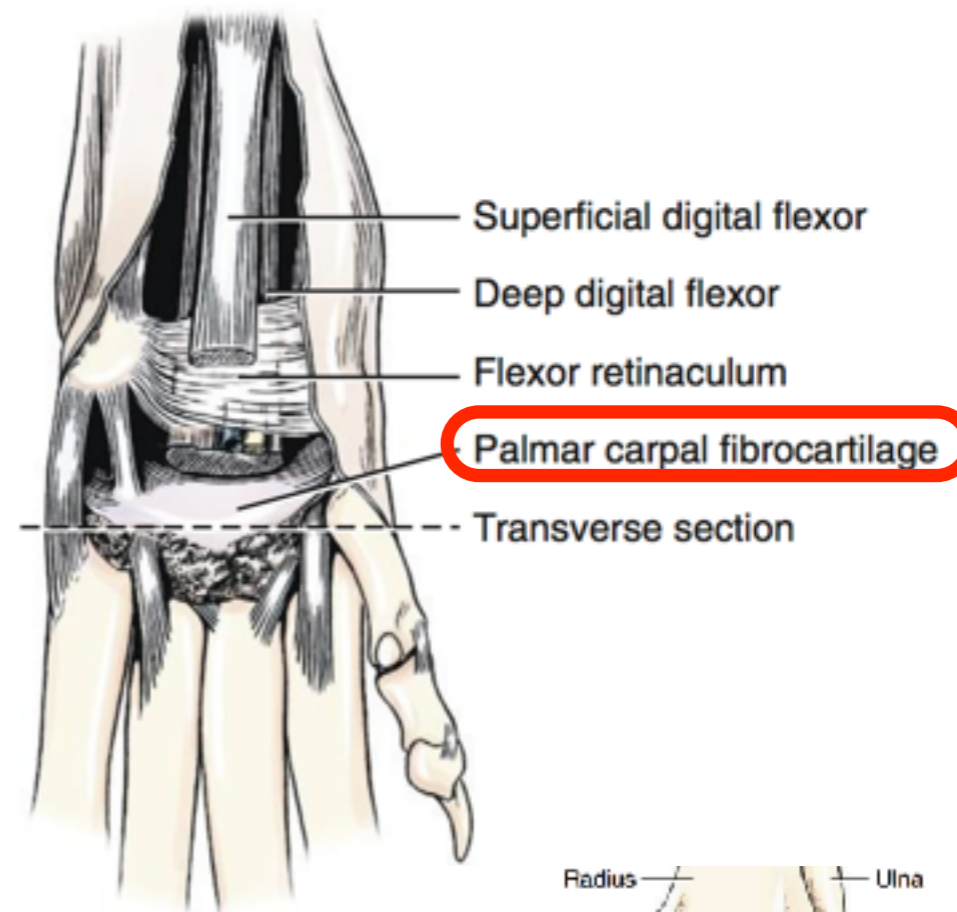


# Stressed carpal radiography

Technique in identifying  
level and severity of carpal  
trauma



# Carpal anatomy



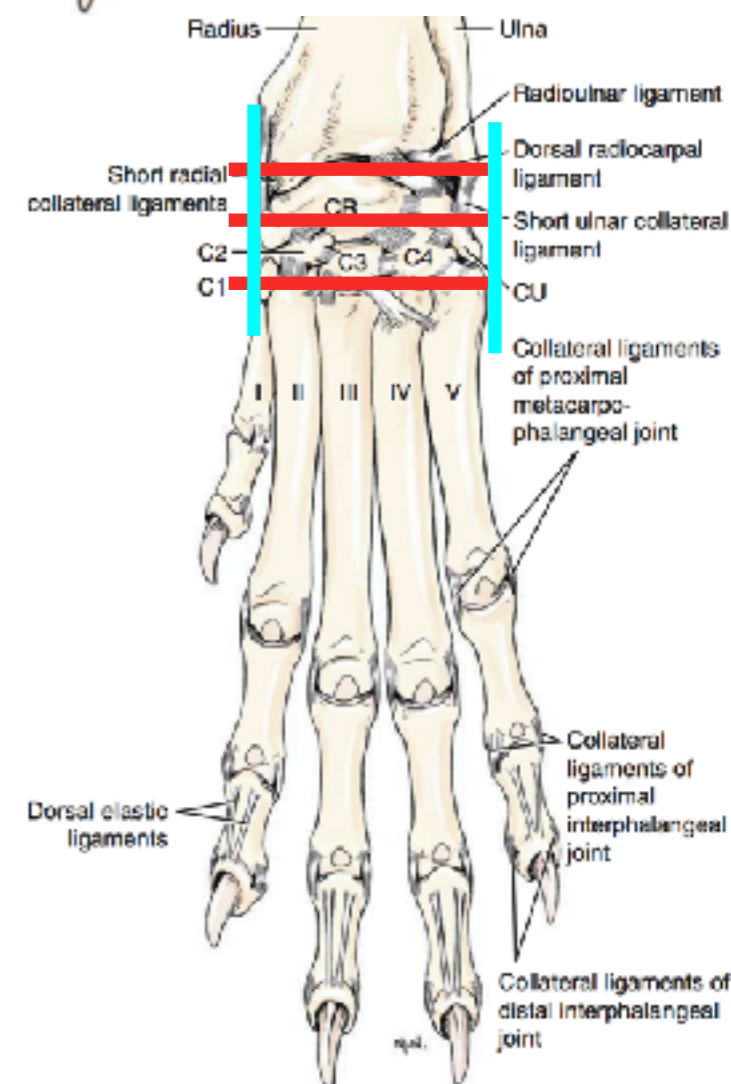
## Practical considerations

There are 3 joint levels

1. Radio-carpal joint space (antebrachio-carpal) which does >90% of all movement (top red line)
2. Inter-carpal joint space (central red line)
3. Carpal-metacarpal joint space (bottom red line)

There are 3 major regions of ligamentous support

- A. Palmar carpal fibrocartilage - supporting carpal extension
- B. Medial and lateral collateral ligaments (cyan lines)





*Left to right: Marked medial collateral ligament failure; carpal hyperextension; MC5 fracture with concurrent hyperextension injury; stress radiography technique*

Radiographic interrogation of carpal trauma is directed at answering the following questions:

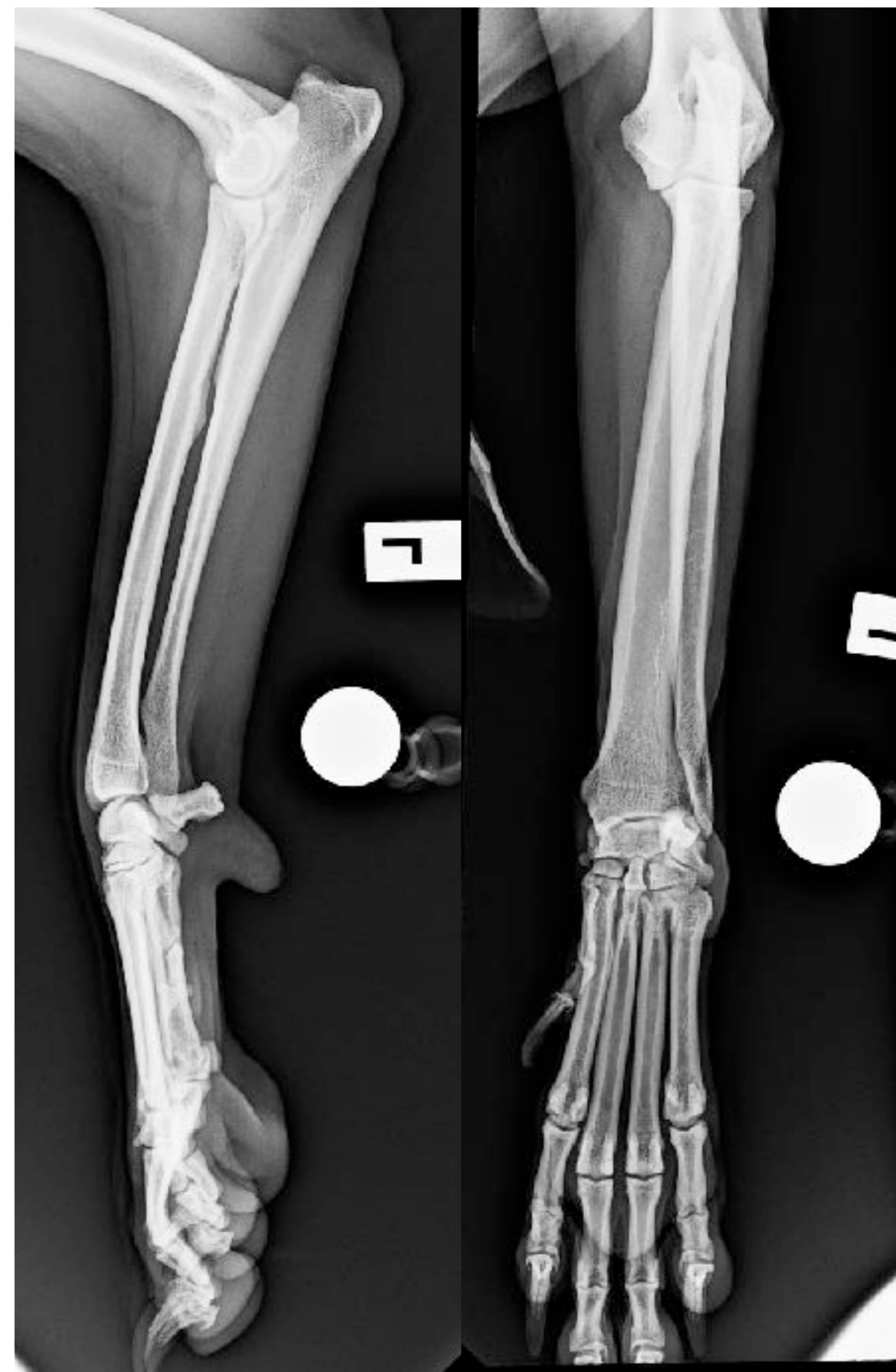
- Is a fracture evident?
- Are there soft tissue changes?
- Is there a ligamentous injury?
- If a ligamentous injury has occurred, at what functional level is it?
- Evidence of chronicity?

# Radiography

## Neutral assessment

Always obtain neutral (non stressed) radiographs with standard orientation:

- Collimate from elbow to toes for assessment of limb alignment
- Obtain orthogonal projections (true ML and CrCa projections) - avoid rotation at the elbow or carpus on the CrCa view, prioritise symmetric humeral condyle appearance and full view of both the radial-carpal and ulna-carpal bones
- If possible, add a calibration marker for 'true size'
- Always obtain bilateral images (both legs) for comparison - if rotation of the joints occurs this can greatly impact accurate assessment and comparison



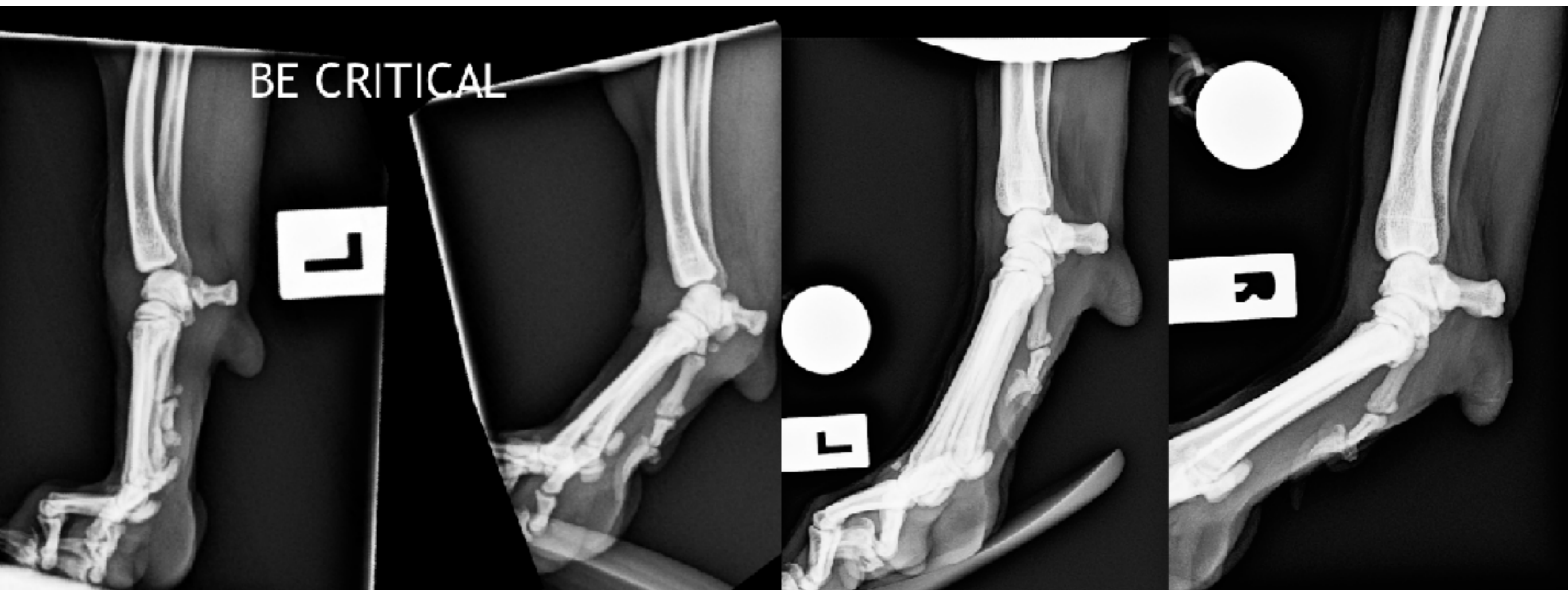
# Radiography

## Hyper-extension

Hyper-extension injuries are common and their identification can significantly alter treatment. Tips include:

- True ML positioning must be maintained (do not allow the carpus to rotate or else interpretation becomes impossible)
- Simulate weight bearing forces - this can be substantial in large dogs
- A wooden spoon or right angle thick ruler can be used to simulate the pressure of the ground underneath weight bearing
- 1 hand holds the proximal ante brachium firmly (hidden under a lead glove) while the other hand generates the forces of the ground during weight bearing





*Left to right: 1st pair of bilateral comparison images represent a injury at the radio-carpal joint; the 2nd pair of bilateral comparison images represent a injury at the inter-carpal joint*

Interpreting stress hyperextension radiographs must include BOTH LIMBS FOR COMPARISON.

Assess the following joint levels for range of motion / degree of hyper extension:

- Radio-carpal (85-90% all movement)

- Intercarpal (10-15%)
- Carpal-metacarpal (0%)

The normal standing angle of the carpus is approximately 140 - 180 degrees in the dog

# Radiography

## Valgus assessment

Valgus assessment is aimed at assessing disruption to the MEDIAL collateral ligaments. By applying a laterally directed force on the toes, load is applied on the medial support structures:

- True CrCa positioning must be maintained (do not allow the carpus to rotate or else interpretation becomes impossible)
- Simulate weight bearing forces - this can be substantial in large dogs
- A wooden spoon or right angle thick ruler can be used to simulate the pressure of the ground underneath weight bearing
- 1 hand holds the proximal ante brachium firmly (hidden under a lead glove) while the other hand generates the force on the toes directed laterally





*Left to right: 1st pair of bilateral comparison images represent a injury at the inter-carpal joint associated with injury to the medial collateral ligament on the right; the 2nd pair of bilateral comparison images represent a injury at the radial-carpal joint on the left*

Interpreting stress valgus radiographs must include BOTH LIMBS FOR COMPARISON.

Collateral ligaments are rarely isolated, make sure to assess in light of hyperextension injury

Assess each of the 3 joint levels for increased space

Look for soft tissue change

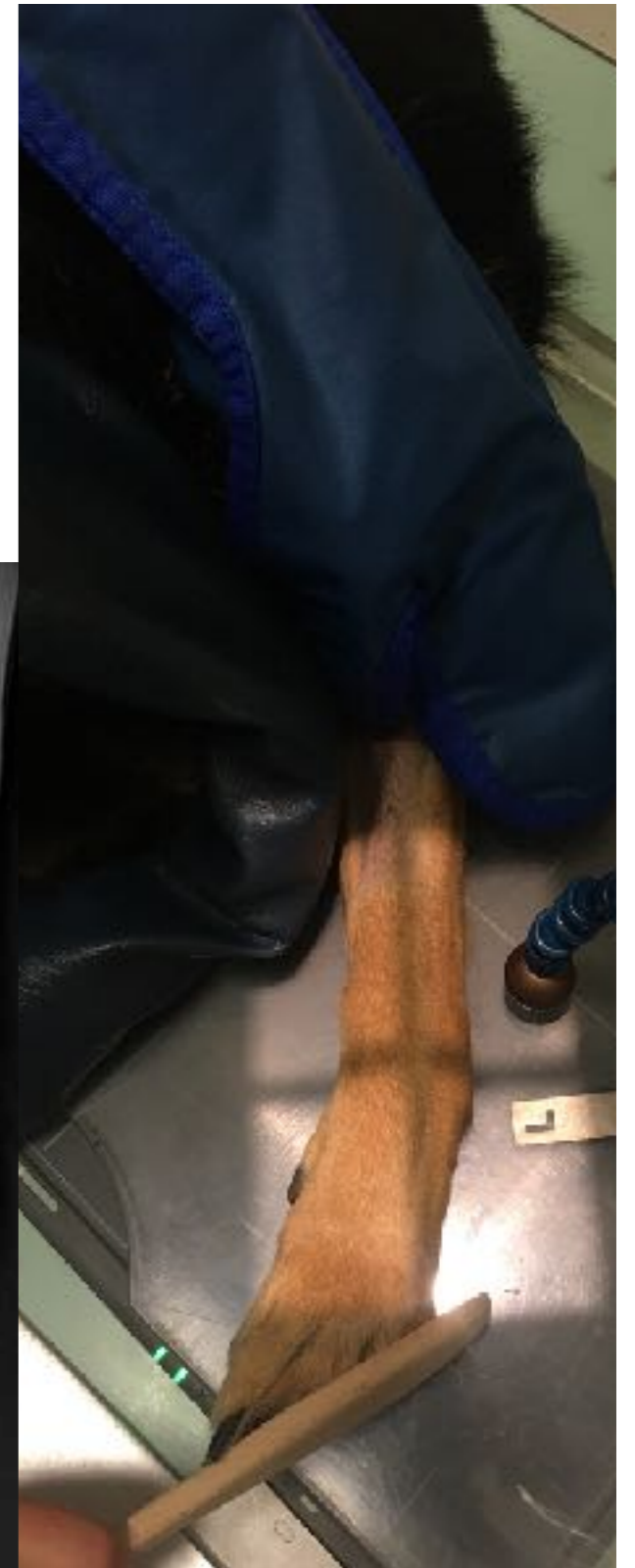


# Radiography

## Varus assessment

Varus assessment is aimed at assessing disruption to the LATERAL collateral ligaments. By applying a medially directed force on the toes, load is applied on the lateral support structures:

- True CrCa positioning must be maintained (do not allow the carpus to rotate or else interpretation becomes impossible)
- Simulate weight bearing forces - this can be substantial in large dogs
- A wooden spoon or right angle thick ruler can be used to simulate the pressure of the ground underneath weight bearing
- 1 hand holds the proximal ante brachium firmly (hidden under a lead glove) while the other hand generates the force on the toes directed medially





*Left to right: A pair of bilateral comparison images represent an injury at the radial-carpal joint on the right involving the lateral collateral*

Interpreting stress view radiographs must include BOTH LIMBS FOR COMPARISON.

Collateral ligaments are rarely isolated, make sure to assess in light of hyperextension injury

Assess each of the 3 joint levels for increased space

Look for soft tissue change