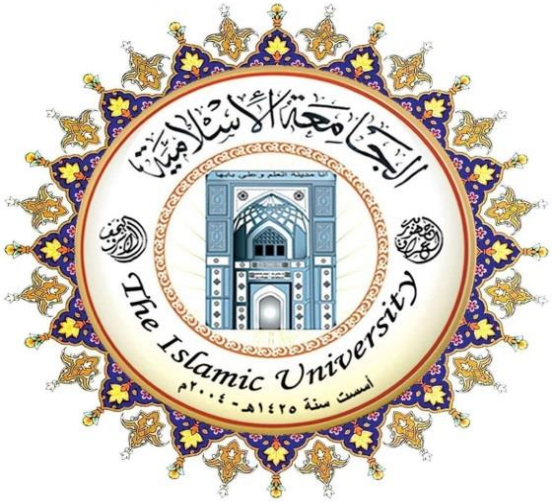
Department of
Radiology
Techniques
The Second Stage



Upper Limp

Lecture 2

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Basic Projections of Hand

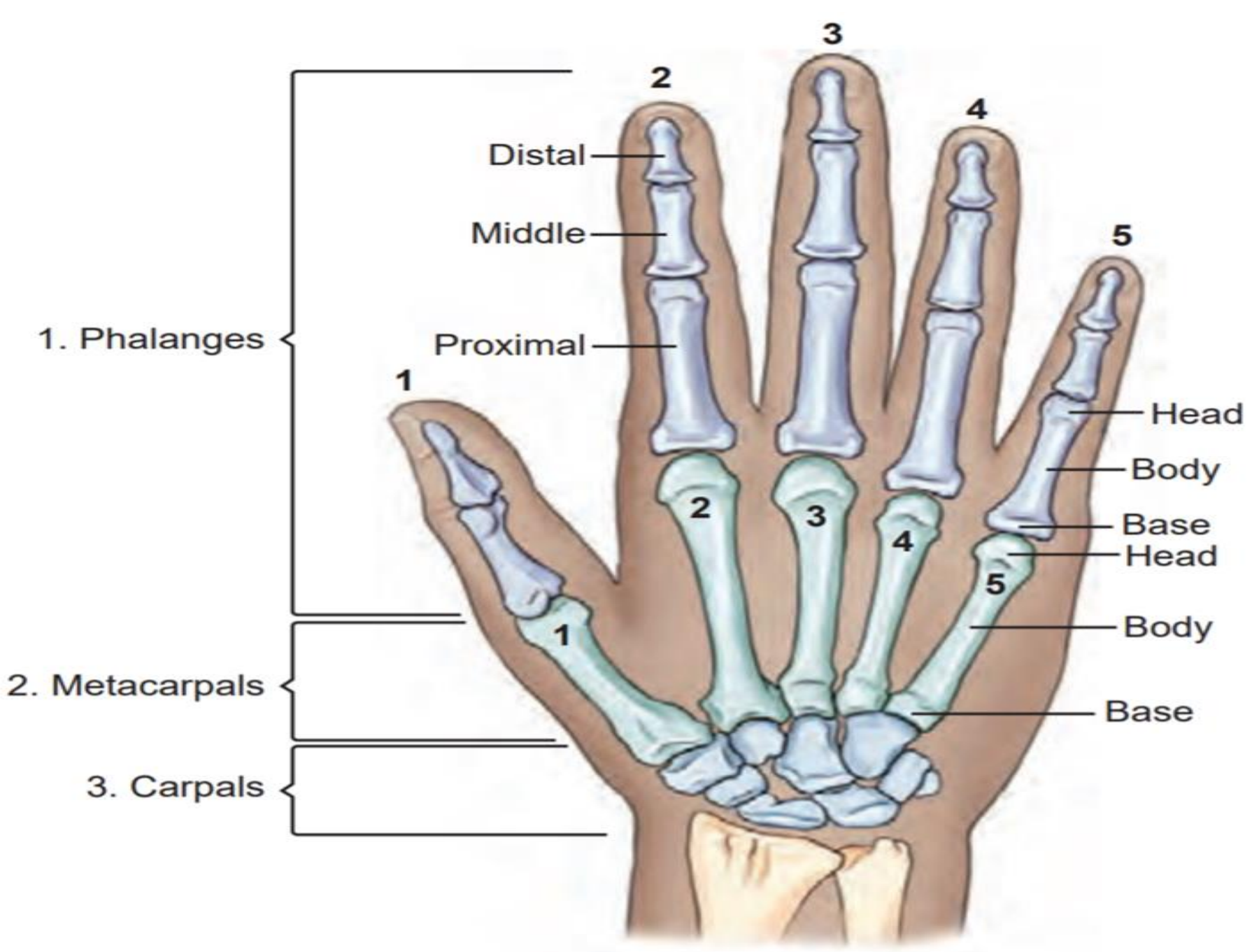
Three Positions

1- Posterior - Anterior (PA)

2- Anterior Oblique

3- Lateral

24 x 30-cm (10x12 inches) cassette.


1. Phalanges
2. Metacarpals
3. Carpals
Distal
Middle
Proximal
1
2
3
4
5
Head
Body
Base
Head
Body
Base

1- Posterio-Anterior (PA)

Position of Patient

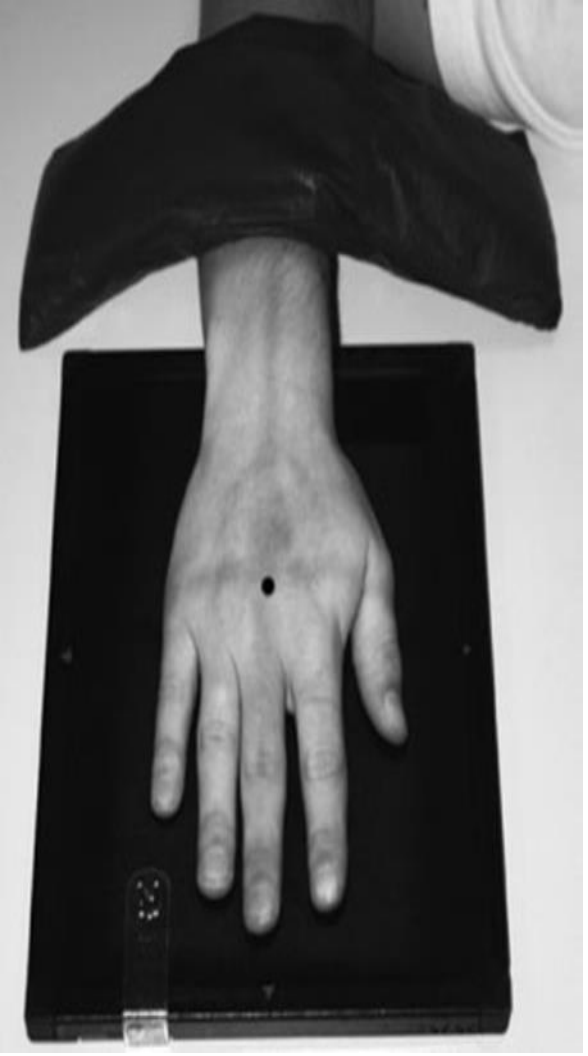
• The patient is seated alongside the table with the affected arm nearest to the table.
• The forearm is pronated and placed on the table with the palmer surface of the hand in contact with the cassette.
• The fingers are separated and extended but relaxed to ensure that they remain in contact with the cassette.
• A sandbag is placed over the lower forearm for immobilization.

Direction and centering of the X-ray beam

• The vertical central ray is centered **over the head of the third metacarpal**.

Essential image characteristics

• The image should demonstrate all the phalanges, including the soft-tissue fingertips, the carpal and metacarpal bones,and the distal end of the radius and ulna.
• The inter-phalangeal and metacarpo-phalangeal and carpometacarpal joints should be demonstrated clearly.
• No rotation.



Normal Postero-Anterior radiograph of left hand

Postero-Anterior radiograph showing fractures of fourth and fifth metacarpals

2- Anterior Oblique

Position of Patient

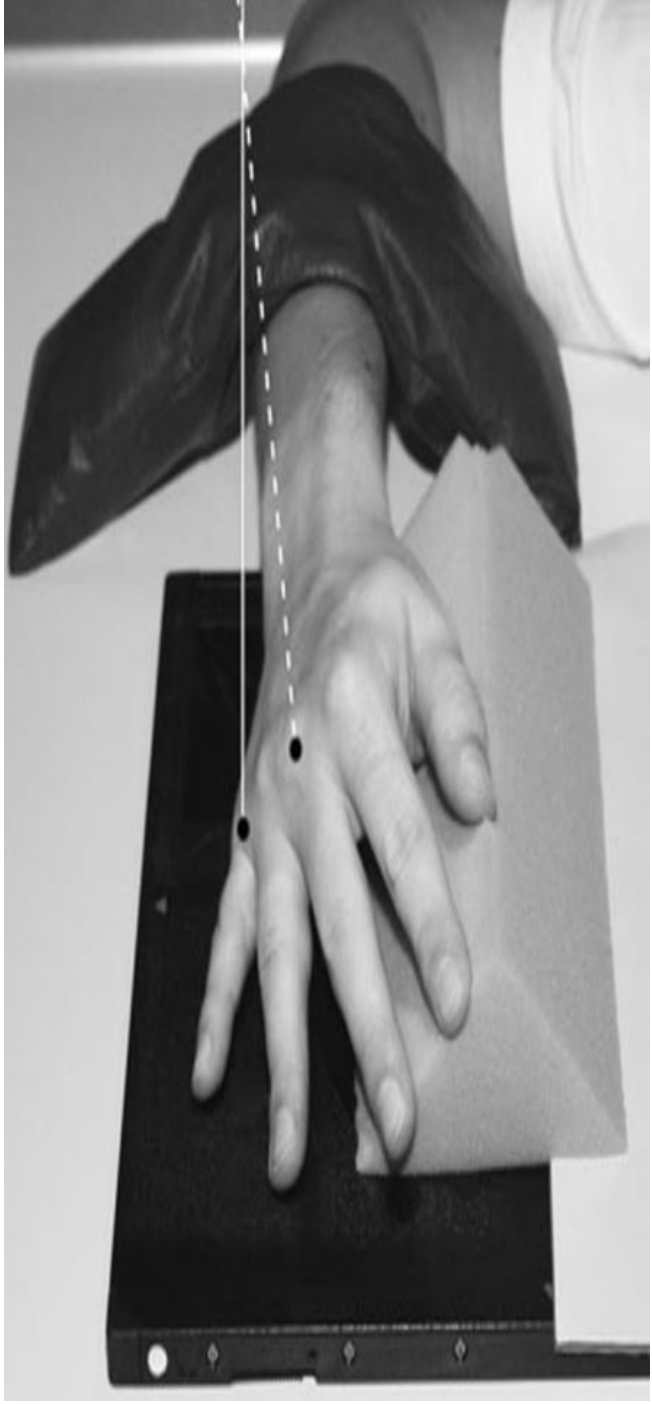
• From the basic postero-anterior position, the hand is externally rotated 45 degrees with the fingers extended.
• The fingers should be separated slightly and the hand supported on a 45-degree non-opaque pad.
• A sandbag is placed over the lower end of the forearm for immobilization.

Direction and Centering of the X-ray beam

• The vertical central ray is centered over the **head of the fifth metacarpal.**
• **The tube is then angled** so that the central ray passes through **the head of the third metacarpal**, enabling a reduction in the size of the field.

Essential Image Characteristics

• The image should demonstrate all the phalanges, including the soft-tissue of the fingertips, the carpal and metacarpal bones, and the distal end of the radius and ulna.
• The correct degree of rotation has been achieved when the heads of the first and second metacarpals are seen separated those of the fourth and fifth are just superimposed.



Normal Anterior Oblique radiograph of left hand

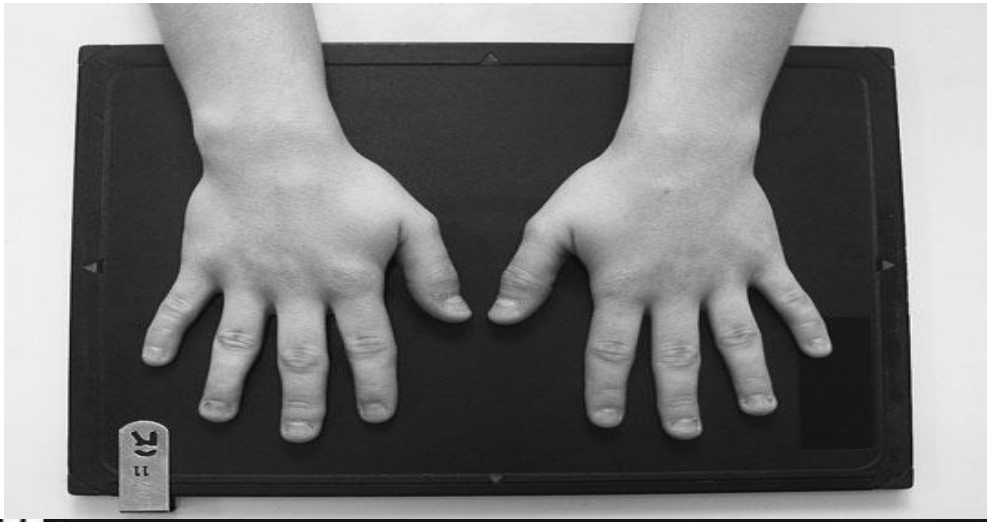
Anterior Oblique radiograph of right hand showing fracture neck of fifth metacarpal (Boxer's fracture)

Posterio-Anterior – Both hands

This projection is often used to demonstrate early rheumatoid arthritis and to monitor the progress of the disease.

Direction and Centering of the X-ray beam

• The vertical central is centered over a point **midway between the inter-phalangeal joints of both thumbs**.



Normal Postero-Anterior radiograph, both hands

Postero-Anterior radiograph of both hands showing severe erosive disease

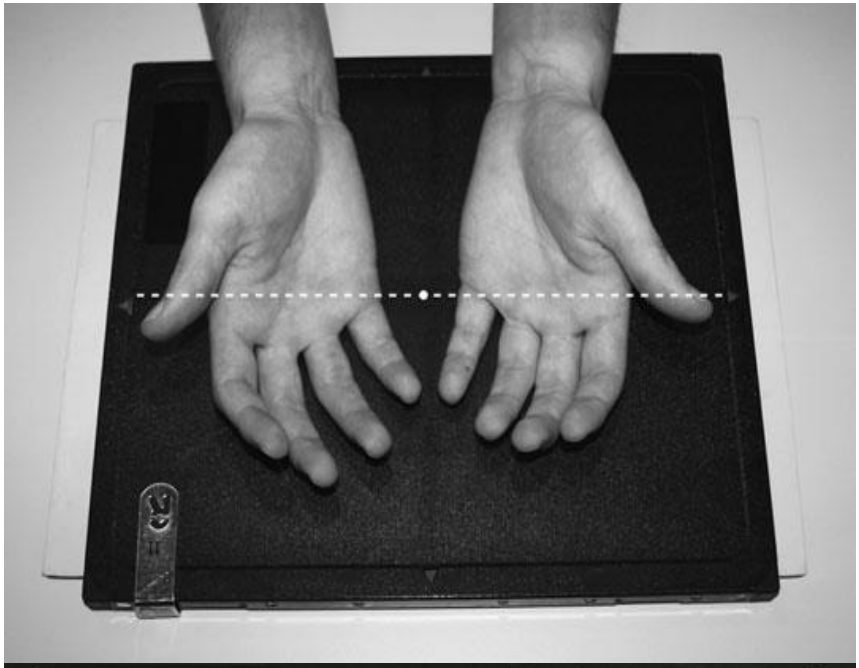
Posterior oblique – Both Hands
(ball catcher's or Nørgaard projection)

This projection may be used in the diagnosis of rheumatoid arthritis. It can also be used to demonstrate a fracture of the base of the fifth metacarpal.

both hands are rotated internally (medially) 45 degrees into a 'ball-catching' position

Centering of the X-ray beam

- **To a point midway between the hands at the level of the fifth metacarpo-phalangeal joints**.



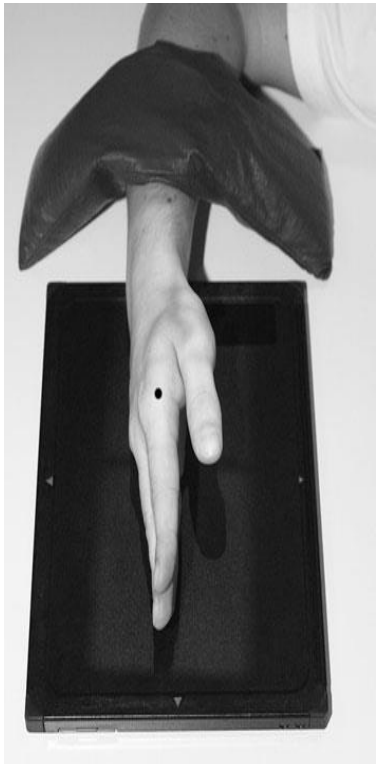
severe erosive disease

Normal

3- Lateral

This Position used to locate a foreign body. It may also be used to demonstrate a fracture or dislocation of the carpal bones

- The vertical central ray is **centred over the head of the second metacarpal.**



Fingers Basic projections

It is common practice to obtain two projections, **Posterio-Anterior and lateral**

- The vertical central ray is centered over **the proximal interphalangeal joint** of the affected finger.

Thumb

It is common practice to obtain two projections, **Antero-Posterior and Lateral**

1- Lateral

• The thumb is flexed slightly and the palm of the hand is placed on the cassette
• The palm of the hand is raised slightly with the fingers partially flexed and supported on a non-opaque pad, such that the lateral aspect of the thumb is in contact with the cassette.

Direction and centring of the X-ray beam

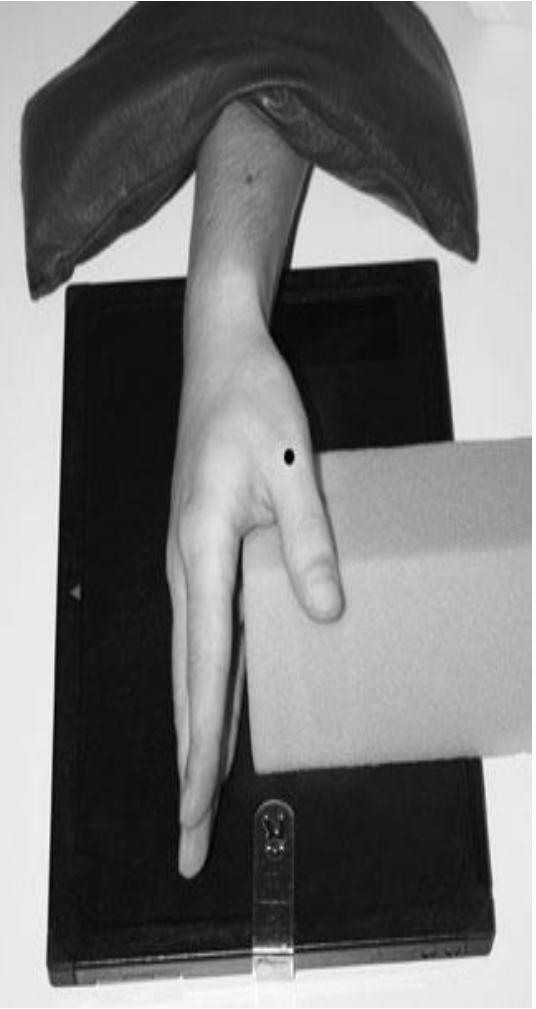
• The vertical central ray is centred over the **first meta-carpo phalangeal joint**.

Essential image characteristics

• Where there is a possibility of injury to the base of the first metacarpal, the carpo-metacarpal joint must be included on the image.

2- Postero-anterior

• With the hand in the postero-anterior position, the palm of the hand is rotated through 90 degrees to bring the medial aspect of the hand in contact with the table and the palm vertical.
• The fingers are extended and the hand is rotated slightly forwards until the anterior aspect of the thumb is parallel to the cassette.
• The thumb is supported in position on a non-opaque pad.
• The vertical central ray is **centered to the first meta-carpophalangeal joint.**
• The use of the postero-anterior projection maintains the relationship of the adjacent bones, i.e. the radius and ulna, which is essential in cases of suspected foreign body .



Postero-anterior thumb showing dislocation at the firstmetacarpophalangeal joint

Radiograph of thumb showing Bennett's fracture

Antero-posterior radiograph of thumb – incorrectly positioned

Scaphoid

The projections may also be used to demonstrate other carpal bones and scaphoid fractures.
Three Positios
(Posterio-Anterior, Anterior Oblique and Lateral)

1- Posterio-Anterior – Ulnar deviation

• The patient is seated alongside the table with the affected side nearest the table.
• The arm is extended across the table with the elbow flexed and the forearm pronated.
• If possible, the shoulder, elbow and wrist should be at the level of the tabletop.
•the hand is adducted (ulnar deviation).
• The vertical central ray is **centered midway between the radial and ulnar styloid processes**.

Essential Image characteristics

• The image should include the distal end of the radius and ulna and the proximal end of the metacarpals.
• The joint space around the scaphoid should be demonstrated clearly.

2- Anterior Oblique – ulnar deviation

• From the Postero-Anterior position, the hand and wrist are rotated 45 degrees externally. The hand should remain adducted in ulnar deviation.

• The hand is supported in position, with a non-opaque pad placed under the thumb.

• The forearm is immobilized using a sandbag.

• The vertical central ray is **centered midway between the radial and ulnar styloid processes**

3- Lateral

• From the posterior oblique position, the hand and wrist are rotated internally through 45 degrees, such that the medial aspect of the wrist is in contact with the cassette.

• The hand is adjusted to ensure that the radial and ulnar styloid processes are superimposed.

• The vertical central ray is **centered over the radial styloid process.**

Essential Image characteristics

• The image should include the distal end of the radius and ulna and the proximal end of the metacarpals.

• The image should demonstrate clearly any subluxation or dislocation of the carpal bones.


R
scaphoid

Wrist

Basic projection ;; **Posterio-Anterior and Lateral**

1- Posterio-Anterior

• The patient is seated alongside the table, with the affected side nearest to the table.

• The elbow joint is flexed to 90 degrees and the arm is abducted, such that the anterior aspect of the forearm and the palm of the hand rest on the cassette.

• If the mobility of the patient permits, the shoulder joint should be at the same height as the forearm.

• The wrist joint is placed on one half of the cassette and adjusted to include the lower part of the radius and ulna and the proximal two-thirds of the metacarpals.

• The fingers are flexed slightly to bring the anterior aspect of the wrist into contact with the cassette

• The vertical central ray is **centered to a point midway between the radial and ulnar styloid processes.**

Essential Image characteristics

• The image should demonstrate the proximal two-thirds of the metacarpals, the carpal bones, and the distal third of the radius and ulna.

• There should be no rotation of the wrist joint.

2- Lateral

• From the Posterio-Anterior position, the wrist is externally rotated through 90 degrees, to bring the palm of the hand vertical. The hand is rotated externally slightly further to ensure that the radial and styloid processes are superimposed. The forearm is immobilized using sandbag.

• The vertical central ray is centered over the **styloid process of the radius**

Essential Image characteristics

• The exposure should provide adequate penetration to visualize the carpal bones.

• The radial and ulnar styloid processes should be superimposed.


Thanks