Elbow

Routine: AP, Medial Oblique, Lateral Oblique, and Lateral

Projection: **AP**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

Technique: 1.4 mAs 70 kVp tabletop

SID: 40”

Collimation: To anatomy of interest

Patient Position: Patient is seated. Entire arm in same plane. Extend the elbow and supinate the hand. Place the elbow in a true AP. Epicondyles should be parallel to the image receptor (patient make need to lean laterally until the humeral epicondyles and anterior surface of the elbow are parallel with the plane of the IR)

Central Ray: To the elbow joint

Marker Placement: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: AP projection of the elbow joint, distal arm, and proximal forearm

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Radial head, neck, and tuberosity slightly superimposed over the proximal ulna
- Elbow joint open and centered to the exposure field
- Open humeroradial joint
- No rotation of humeral epicondyles (coronoid and olecranon fossae approximately equidistant to epicondyles)
- Bony trabecular detail and surrounding soft tissues

Elbow

Routine:	AP, Medial Oblique, Lateral Oblique, and Lateral
Projection:	**Medial Oblique (AP projection)**
Patient Prep:	Remove all jewelry from area of interest and clothing articles, if possible
Technique:	1.4 mAs 70 kVp tabletop
SID:	40”
Collimation:	To anatomy of interest
Patient Position:	Patient is seated. Extend elbow into an AP projection. Medially (internally) rotate or pronate the hand and adjust the elbow to place its anterior surface at an angle of 45 degrees.
Central Ray:	To the elbow joint
Marker Placement:	Right or Left as appropriate
Shielding:	Shield gonads
Purpose/Structures:	Oblique projection of the elbow with the coronoid process projected free of superimposition

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint opened and centered to the exposure field
- 45-degree medial rotation of the elbow:
    - Coronoid process in profile
    - Elongated medial humeral epicondyle
    - Ulna superimposed by the radial head and neck
- Trochlea
- Olecranon process within the olecranon fossa
- Bony trabecular detail and surrounding soft tissues

Elbow

Routine: AP, Medial Oblique, Lateral Oblique, and Lateral

Projection: **Lateral Oblique (AP projection)**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

Technique: 1.4 mAs 70 kVp tabletop

SID: 40”

Collimation: To anatomy of interest

Patient Position: Patient is seated. Extend elbow into an AP projection. Rotate the hand laterally (externally) to place the poster surface of the elbow at a 45 degree angle.

Tip: You may need to have the patient lean back in their chair to obtain this view or slightly lower board.

Central Ray: To the elbow joint

Marker Placement: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: Oblique projection of the elbow with the radial head and neck projected free of superimposition of the ulna.

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint open and centered to the exposure field
- 45-degree lateral rotation of elbow:
    - Radial head, neck, and tuberosity projected free of the ulna
    - Elongated lateral humeral epicondyle
- Capitulum
- Bony trabecular detail and surrounding soft tissues

Elbow

Routine: AP, Medial Oblique, Lateral Oblique, and Lateral

Projection: **Lateral (Lateromedial)**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

Technique: 1.4 mAs 70 kVp tabletop

SID: 40”

Collimation: To anatomy of interest

Patient Position: Patient is seated. Shoulder and elbow should be in the same plane. Flex the elbow 90 degrees and place the hand in a lateral position. Humeral epicondyles must be perpendicular to the image receptor.
Merrill’s states: On patients with muscular forearms, elevate the wrist to place the forearm parallel with the IR

Central Ray: To the elbow joint

Marker Placement: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: Elbow joint, distal arm, and proximal forearm. Two reasons for importance of flexing elbow 90 degrees: (1) the olecranon process can be seen in profile, and (2) the elbow fat pads are least compressed. In partial or complete extension, the olecranon process elevates the posterior elbow fat pad and simulates joint pathology.

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Elbow joint centered to the exposure field
- Elbow in true lateral position:
    - Superimposed humeral epicondyles
    - Radial tuberosity facing anteriorly
    - Radial head partially superimposing the coronoid process
    - Olecranon process in profile
- Elbow flexed 90 degrees
- Boney trabecular detail and any elevated fat pads in the soft tissue at the anterior and posterior distal humerus and the anterior proximal forearm

RH Additional Note:

- Lateral elbow image can be oriented either with the humerus down or across the image

Special Views for Elbow

*information from 14th edition Merrill's Volume I, page 200

Projection: **AP Partial Flexion - Distal Humerus**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

SID: 40"

Collimation: 3" proximal and distal to elbow joint

Patient Position Seat the patient low enough to place the entire humerus in the same plane. Support the elevated forearm. If possible, supinate the hand. Place the IR under the elbow, and center it to the condyloid area of the humerus.

Central Ray: Perpendicular to the humerus, traversing the elbow joint. Depending on the degree of flexion, angle the CR distally into the joint

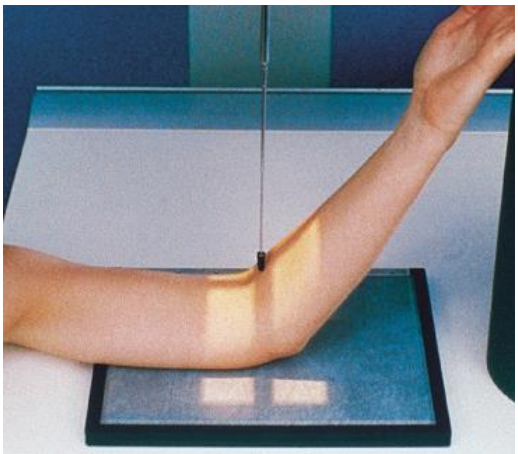
Marker: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: Done for patients who are unable to fully extend elbow. Distal humerus when the elbow cannot be fully extended

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Distal humerus without rotation or distortion
- Proximal radius superimposed over the ulna
- Closed elbow joint
- Greatly foreshortened proximal forearm
- Bony trabecular detail of the distal humerus and surrounding soft tissues of the elbow



Special Views for Elbow

*information from 14th edition Merrill's Volume I, page 201

Projection: **AP Partial Flexion - Proximal Forearm**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

SID: 40"

Collimation: 3" proximal and distal to elbow joint

Patient Position Seat the patient at the end of the radiographic table, with the hand supinated. Seat the patient high enough to permit the dorsal surface of the forearm to rest on the table.

Central Ray: Perpendicular to the elbow joint and long axis of the forearm. Adjust the IR so that the CR passes to its midpoint

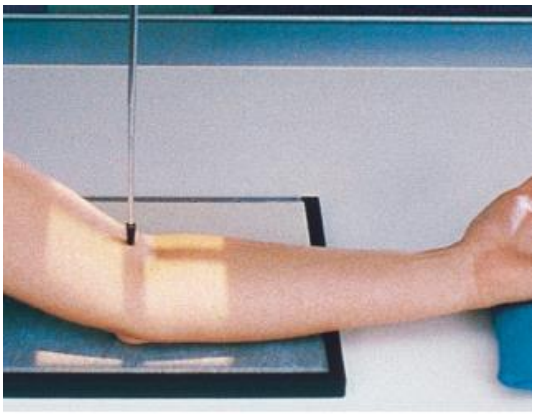
Marker: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: Done for patients who are unable to fully extend elbow. Proximal forearm when the elbow cannot be fully extended

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Proximal radius and ulna without rotation or distortion
- Radial head, neck, and tuberosity slightly superimposed over the proximal ulna
- Partially open elbow joint
- Foreshortened distal humerus
- Bony trabecular detail of the proximal radius and ulna, as well as the soft tissues of surrounding the elbow



Special Views for Elbow

*information from 14th edition Merrill's Volume I, page 206-208

Projection:	**Axiolaterals Projection (Coyle Method)**
Patient Prep:	Remove all jewelry from area of interest and clothing articles, if possible
SID:	40"
Collimation:	3" proximal and distal to elbow joint
Patient Position	**Seated Position:** Seat the patient at the end of the radiographic table, low enough to place the humerus, elbow, and wrist joints on the same plane. Pronate the hand and flex the elbow 90 degrees to show the radial head or 80 degrees to show the coronoid process. Center the IR to the elbow joint. **Supine position for trauma:** the patient is lying in the supine position. Elevate the distal humerus on a radiolucent sponge. Place the IR in vertical position centered to the elbow joint. Epicondyles should be approximately perpendicular to the IR. Slowly flex the elbow 90 degrees to show the radial head or 80 degrees for the coronoid process. Turn the hand so that the palmar aspect is facing medially.
Central Ray:	**Seated Position:** **Radial Head -** directed toward the shoulder at an angle of 45 degrees to the radial head; CR enters the joint at mid-elbow. **Coronoid Process –** directed away from the shoulder at an angle of 45 degrees to the coronoid process: CR enters the joint at mid-elbow. **Supine position for trauma:** **Radial Head –** the horizontal CR is directed cephalad at an angle of 45 degrees to the radial head, entering the joint at mid-elbow. **Coronoid Process –** the horizontal CR is directed caudad at an angle of 45 degrees to the coronoid process, entering the joint at mid-elbow.
Marker:	Right or Left as appropriate
Shielding:	Gonadal shielding on those of reproductive years
Purpose/Structures:	Shows an open elbow joint between the radial head and capitulum or between the coronoid process and trochlea with the area of interest in profile

Evaluation Criteria:

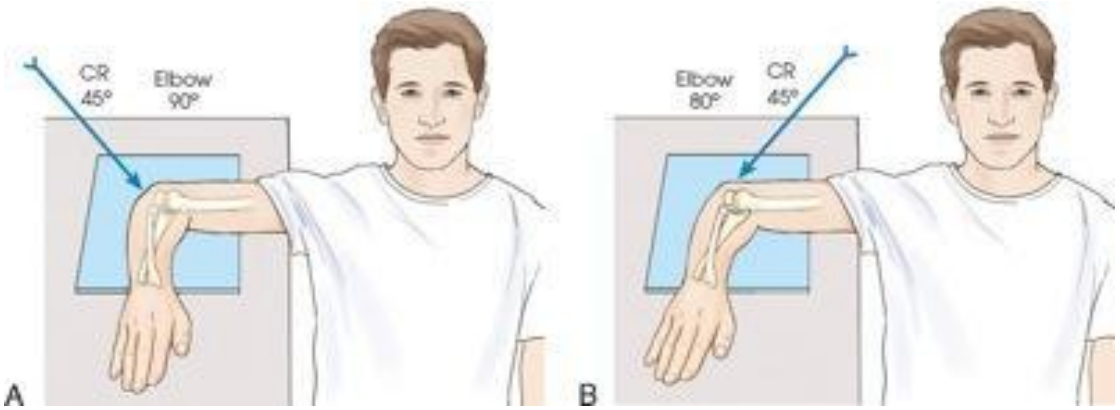
- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Bony trabecular detail and surrounding soft tissues

Radial Head:

- Open joint space between radial had and capitulum
- Radial head, neck, and tuberosity in profile and free from superimposition with the exception of a small portion of the coronoid process
- Humeral epicondyles distorted owing to CR angulation
- Radial tuberosity facing posteriorly
- Elbow flexed 90 degrees

Coronoid Process:

- Open joint space between coronoid process and trochlea
- Coronoid process in profile and elongated
- Radial head and neck superimposed by ulna
- Elbow flexed 80 degrees



Forearm

Routine: AP and Lateral

Projection: **AP**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

Technique: 1.25 mAs 70 kVp tabletop

SID: 40”

Collimation: To anatomy of interest

Patient Position: Patient is seated. Supinate hand, extend elbow. Place the extremity in the same plane. Place the forearm in a true AP and include entire forearm.

- Additional images should be obtained if joint is distorted
  - If additional image of the wrist should be taken, take image in **AP** projection (per RH)

Central Ray: To the middle of the image receptor (midpoint of forearm).

Marker: Right or Left as appropriate

Shielding: Shield gonads

Purpose/Structures: Elbow joint, the radius, and ulna, and the proximal row of slightly distorted carpal bones

RH Image Orientation: Fingers should be at the top of the image on both views

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Entire forearm, including wrist and distal humerus
- Slight superimposition of the radial head, neck, tuberosity over the proximal ulna
- No elongation or foreshortening of the humeral epicondyles
- Partially open elbow joint if the shoulder was placed in the same plane as the forearm
- Open radioulnar space ***(Merrill’s only)***
- Bony trabecular detail and surrounding soft tissues

Repeats:

- Repeat images to correct the positioning of the wrist or elbow joint only should be performed as separate elbow or wrist images, not the entire forearm.

Forearm

Routine: AP and Lateral

Projection: **Lateral**

Patient Prep: Remove all jewelry from area of interest and clothing articles, if possible

Technique: 1.25 mAs 70 kVp tabletop

SID: 40”

Collimation: To anatomy of interest

Patient Position: Patient is seated. Flex the elbow 90 degrees. Place the forearm in a true lateral. Adjust the IR so that the long axis is parallel with the forearm. Epicondyles and styloid processes should be perpendicular to image receptor. The elbow should be in the same plane as the shoulder. Can use a sponge to immobilize if necessary.

- Additional wrist image should be obtained if wrist joint is also not in a true lateral

Central Ray: To the middle of the image receptor (midpoint of forearm).

Marker: Right or Left as appropriate

Shielding: Gonadal shielding on those of reproductive years

Purpose/Structures: Bones of forearm, the elbow joint, and the proximal row of carpal bones

RH Image Orientation: Fingers should be at the top of the image on both images

Evaluation Criteria:

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Entire forearm, including wrist a distal humerus in a true lateral position
    - Superimposition of the radius and ulna at their distal end
    - Superimposition by the radial head over the coronoid process
    - Radial tuberosity facing anteriorly
    - Superimposed humeral epicondyles
- Elbow flexed 90 degrees

- Bony trabecular detail and surrounding soft tissues

RH Additional Note:

- If any combination of forearm and joint (wrist and/or elbow) are requested, each must be imaged as a stand-alone study.
- If elbow epicondyles are not perpendicular, place triangle sponge under wrist.

Repeats:

- Repeat images to correct the positioning of the wrist or elbow joint only should be performed as separate elbow or wrist images, not the entire forearm.
- If the patient cannot fully rotate the wrist for a lateral forearm, a repeat may be taken with the image receptor slightly lowered to facilitate patient positioning.