



The Elbow – Scanning Protocol



Diagnostic Imaging of the Elbow: Introduction

The elbow maybe considered as consisting of four quadrants, anterior, medial, lateral and posterior. Ultrasound would normally be focused on only one or two of these quadrants depending upon the clinical diagnosis.

Imaging includes:

Anterior:

- Brachialis muscle
- Brachial artery and vein
- Median nerve
- Anterior radiocapitellar joint
- Radial fossa
- Anterior humeroulnar joint
- Coronoid fossa
- Distal biceps tendon

Lateral:

- Lateral epicondyle and common extensor tendon
- Radial collateral ligament including dynamic varus stress as indicated
- Radiocapitellar joint

Medial:

- Medial epicondyle and common flexor tendon
- Ulnar collateral ligament including dynamic valgus stress as indicated
- Humeroulnar joint
- Ulnar nerve including dynamic scan for subluxation as indicated

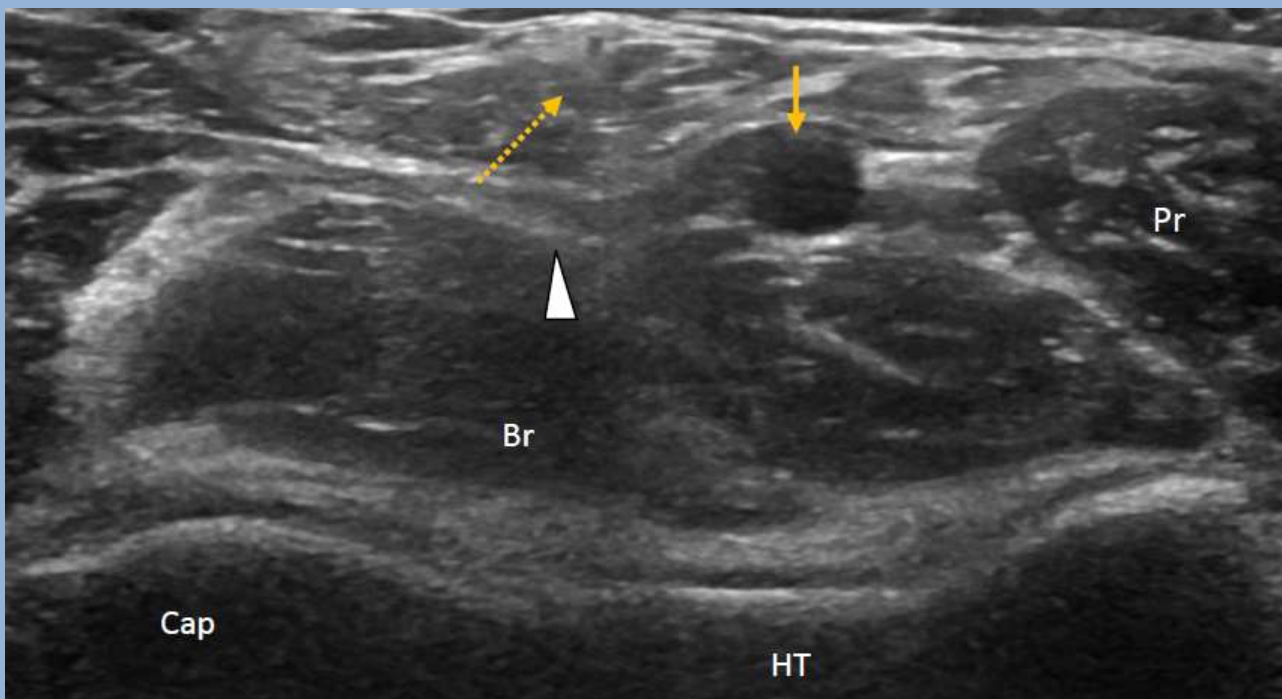
Posterior:

- Triceps tendon
- Olecranon process and Olecranon bursa
- Olecranon fossa and posterior joint

1. Anterior

Transverse Scan

The patient is seated opposite the clinician with the arm resting on a table. The elbow should be placed in extension and full supination. A few degrees of flexion maybe of use if an effusion is suspected as full extension will tend to force any fluid from the anterior aspect of the elbow resulting in a false negative result. The probe is placed in the anatomical coronal plane over the anterior aspect of the elbow.

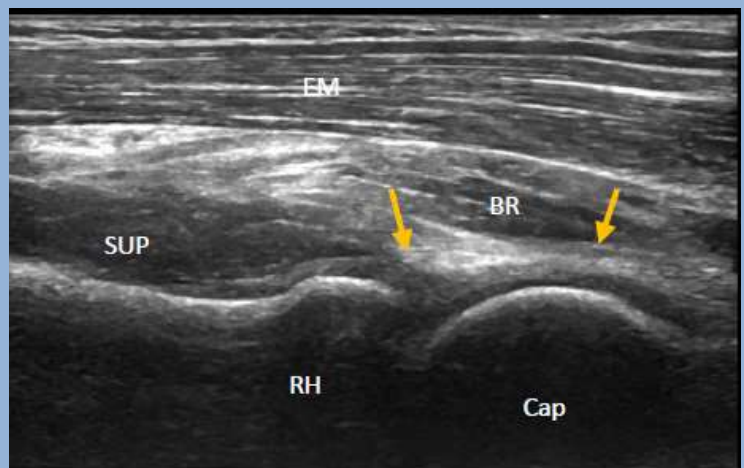


Legend: Cap-capitellum; HT-humeral trochlea; Br-brachialis; Pr-pronator teres; White arrowhead-median nerve; Yellow arrow-brachial artery; Dashed yellow arrow-distal biceps tendon.

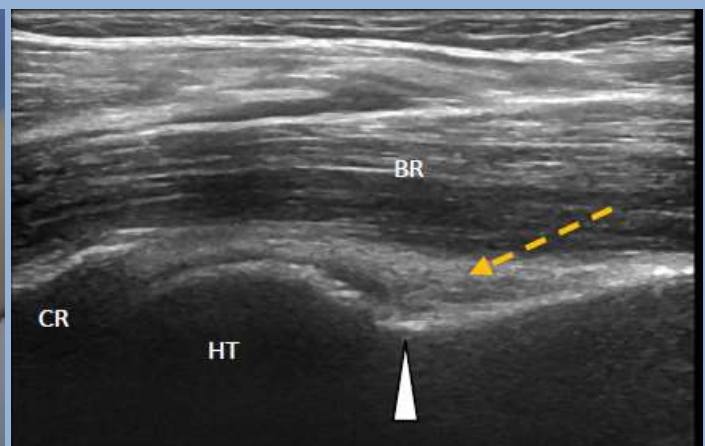
Longitudinal Scan

As the elbow consists of two distinct articulations two separate longitudinal views are required one of the lateral radiocapitellar joint the other of the medial humeroulnar joint.

Radiocapitellar Joint: The elbow should be in extension and full supination. The probe is placed in the sagittal plane over the lateral half of the anterior aspect of the antecubital fossa.



Humeroulnar Joint: The elbow is maintained in extension and full supination. The probe remains in the sagittal plane and is moved medially over the medial half of the anterior aspect of the antecubital fossa.



Legend: : Cap-capitellum; RH-radial head; BR-brachialis; EM-extensor muscles; SUP-supinator; Yellow arrow-anterior joint capsule; CR-coronoid; HT-humeral trochlea; Yellow arrow dashed-anterior fat pad; White arrowhead-coronoid fossa.

2. Distal Biceps Tendon

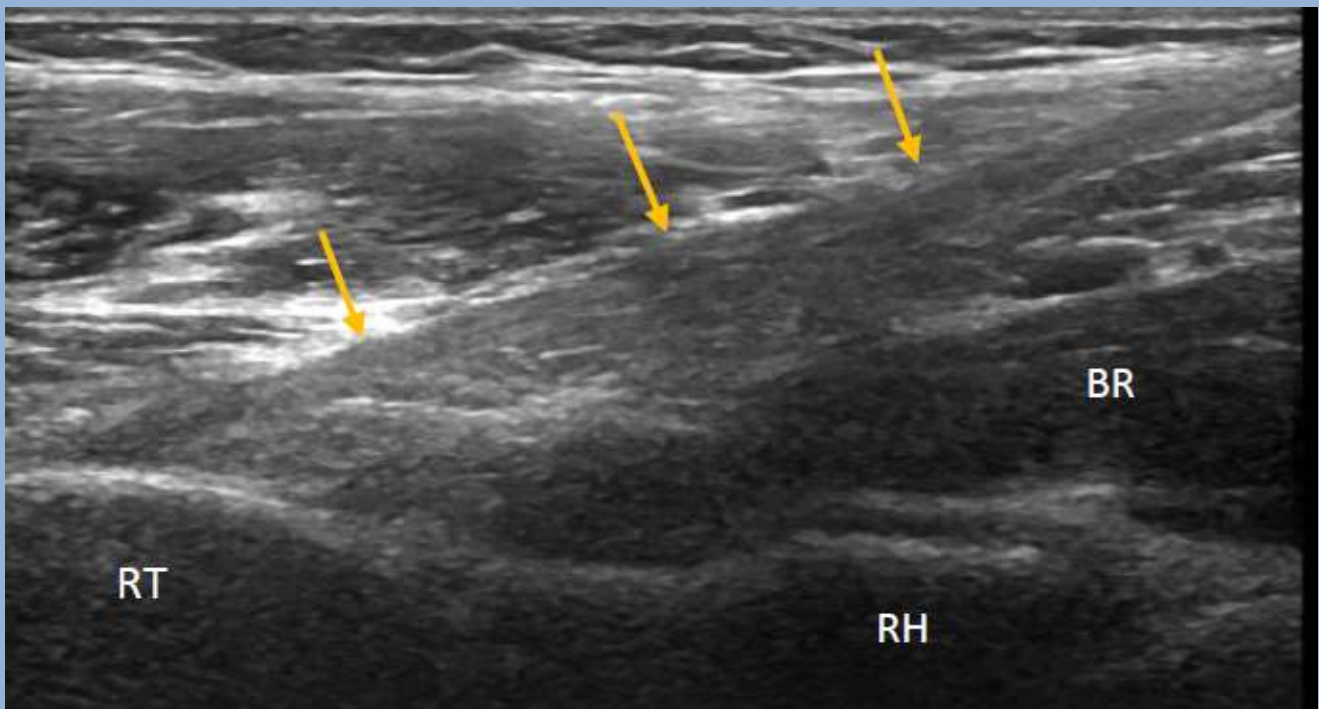
Distal Biceps Tendon: Longitudinal

The distal biceps tendon is best examined longitudinally. Transverse imaging is of little practical value due to anisotropy.

The forearm should be placed in full extension and supination to bring the radial tuberosity into an anterior position. The probe is aligned in an oblique orientation and aimed laterally a few degrees towards the radius. In addition the probe maybe 'toed-in' distally to allow better visualisation of the biceps tendon. Even so the tendon is difficult to image particularly in patients with muscular forearms or who have pathology involving the tendon and are reluctant to allow optimal positioning due to pain inhibition.



Legend: RT-radial tuberosity; RH-radial head; BR-brachialis; Yellow arrows-distal biceps tendon.



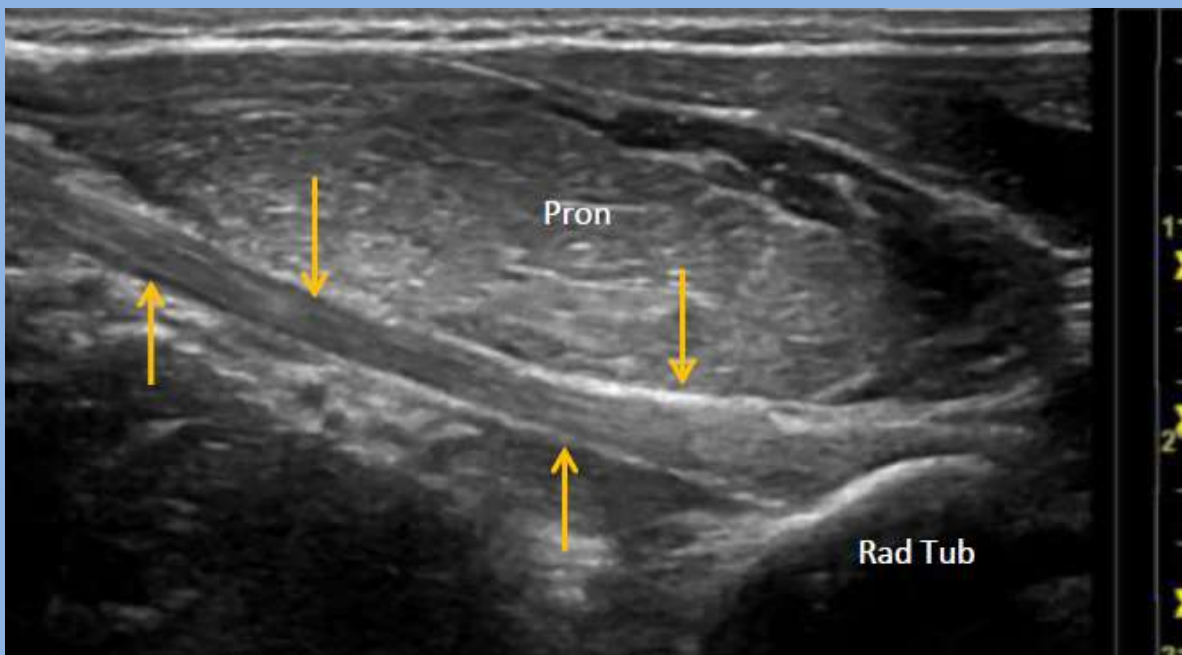
Distal Biceps Tendon: Longitudinal – Alternative View

Alternatively the distal biceps tendon may be viewed from the medial aspect of the elbow joint with the elbow bent to 90 degrees.

The probe is placed in line with the humerus and then moved anteriorly so that it lays obliquely over the pronator teres muscle. The tendon may be seen as a hyperechoic band extending down to its insertion onto the radial tuberosity.



The elbow is bent to 90 degrees and the probe placed over the medial aspect of the joint to lay obliquely over the pronator teres muscle with its distal edge over the radial tuberosity.

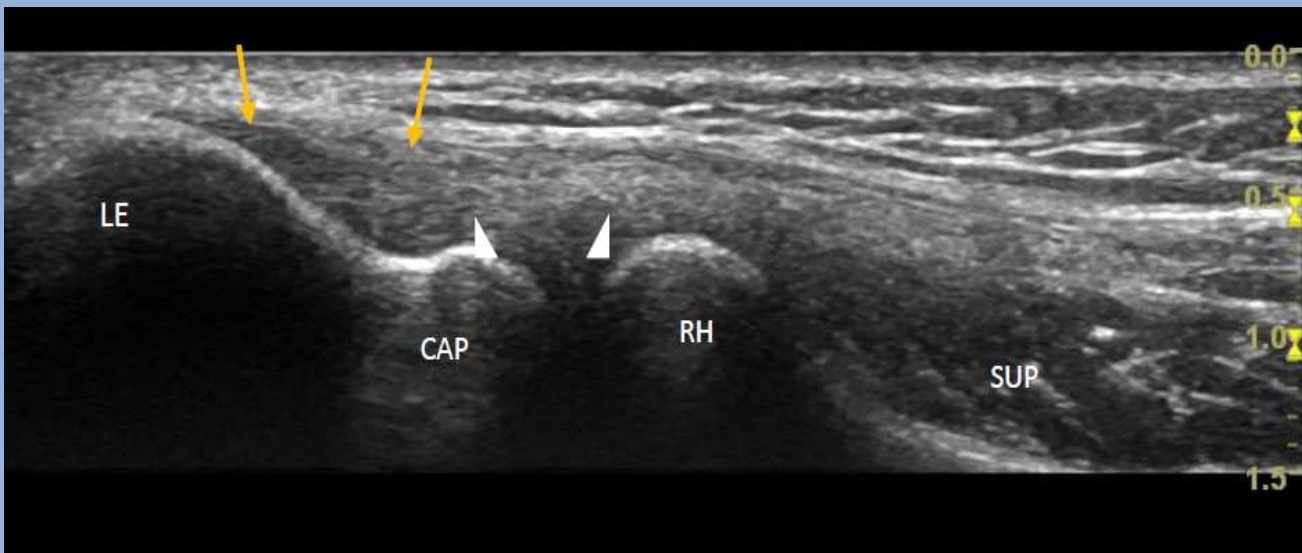


The distal biceps tendon (yellow arrows) may be seen down to its attachment onto the radial tuberosity (Rad Tub).

3. Lateral

Longitudinal Scan

The patient is seated facing the clinician with the arm resting on a table. The elbow is bent to 90 degrees flexion and the forearm supinated. The probe is placed so that it rests with its proximal edge over the lateral epicondyle in the coronal plane. In the absence of pathology the radial collateral ligament is difficult to distinguish from the overlying common extensor tendon.

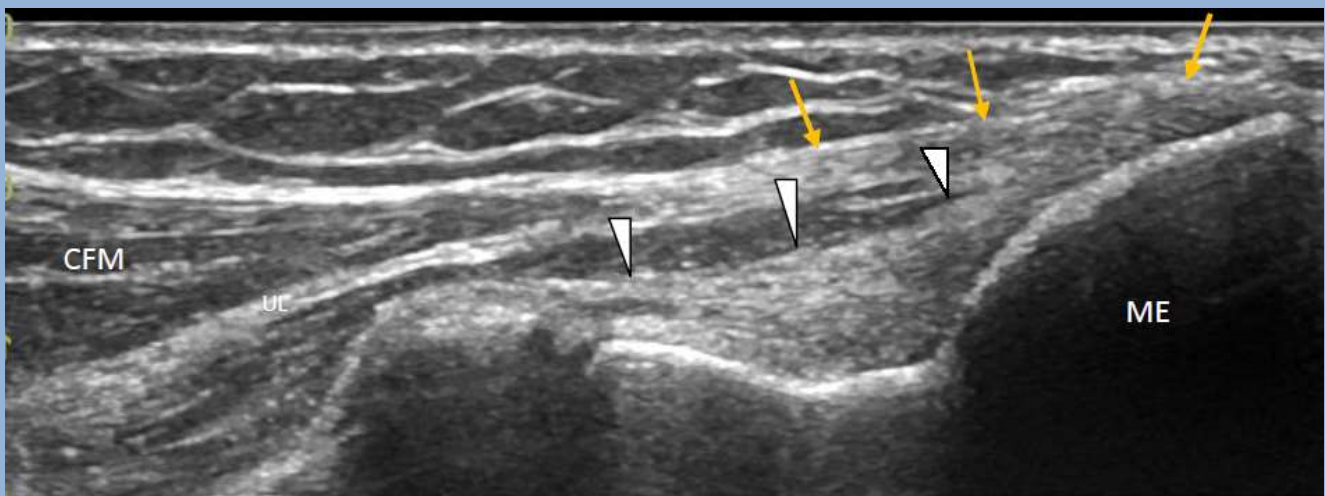


Legend: SUP-supinator; LE-lateral epicondyle; RH-radial head; CAP-capitulum; Yellow arrows-common extensor tendon; White arrowheads-radial collateral ligament.

4. Medial

Longitudinal Scan

The patient is seated facing the clinician with the arm resting on a table. The elbow is bent to 90 degrees flexion and the forearm supinated. The arm is externally rotated. The probe is placed so that it rests with its proximal edge over the medial epicondyle in the coronal plane.

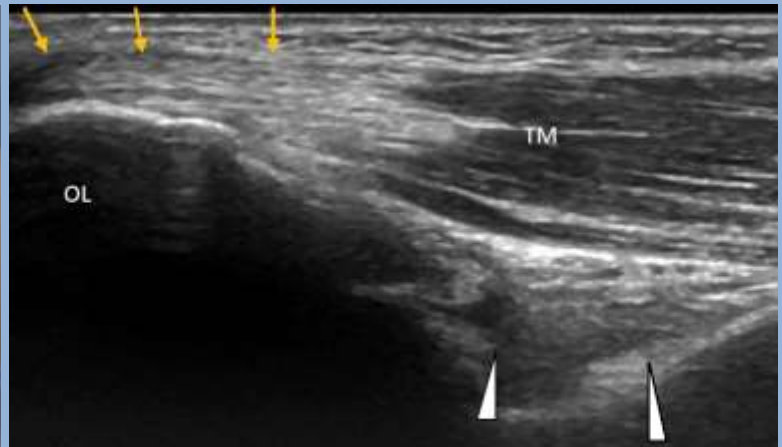


Legend: ME-medial epicondyle; CFM-common flexor muscle; Yellow arrows-common flexor tendon; White arrowheads-ulnar collateral ligament

5. Posterior

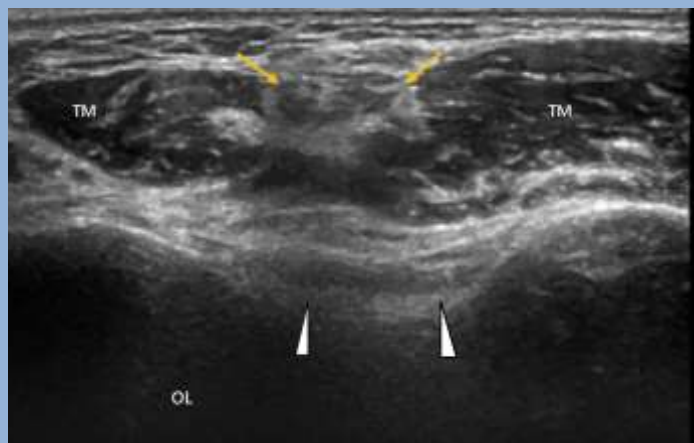
Longitudinal Scan

The patient is seated facing the clinician with the shoulder in 90 degrees abduction and the elbow bent to 90 degrees flexion. The hand rests on a table in front of the patient. The probe is placed so that it rests with its distal edge over the posterior aspect of the olecranon in line with the triceps tendon in the sagittal plane.



Transverse Scan

The patient is seated facing the clinician with the elbow bent to 90 degrees flexion and the arm resting on a table. The probe is placed so that it rests in the transverse plane over the posterior aspect of the olecranon fossa and triceps tendon.



Legend: OL-olecranon; White arrowheads-olecranon fossa and fat pad; Yellow arrows-triceps tendon; TM-triceps muscle.