Joint Surfaces

• The elbow is a trochoginglymoid joint:
  - Possesses 2 degrees of freedom
    ▪ Flexion-extension
    ▪ Forearm rotation

• Joint surfaces of the humerus, ulna, and radius make up the elbow.
Joint Surfaces

- Humerus
- Radius
- Ulna

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Humerus

• The articulation surface of the humerus is rotated anteriorly about 30 degrees in reference to the long axis of the humerus

• Articular surface
  - The distal humerus is composed of a trochlea containing medial and lateral contours.
Ulna

- Laterally, the articular surface is oriented about 30 degrees posteriorly referable to the long axis thus allowing the elbow to be stable when completely extended.

- Articular surface
  - Greater sigmoid fossa (olecranon) consists of the coronoid process distally and the olecranon process proximally.
  - Lesser sigmoid notch located on the lateral side of the greater sigmoid fossa. It accommodates the radial head.
Radial Head

- The radial neck makes an angle of approximately 15 degrees away from the long axis measured at the radial tuberosity.
- This relationship allows for 180 degrees of forearm rotation.
- The slightest abnormality or alteration of this angle alters forearm rotation.
Joint Motion

• Elbow flexion 0-145 degrees of flexion
  - Functionally can live with 30-130 degrees
• Pronation averages about 80 degrees
  - Functionally 50 degrees
• Supination averages about 85 degrees
  - Functionally 50 degrees
Carrying Angle

- Undergoes a linear change from valgus to varus from extension to flexion.
- Varies as a function of both age and sex.
- “Normal” angle varies from approximately 10 degrees in males and 13 degrees in females.
- Proper measuring of the angle is the orientation of the forearm in reference to the humerus when the elbow is fully extended.
Carrying angle
Stability

• 2 elements contribute to static stability
  - Articular surfaces
  - Capsule and ligamentous structures

• Dynamic stability is contributed through the muscles that cross the joint but under normal circumstances the contribution is minimal.

• Rehabilitation programs have little value in the unstable elbow.
Stability

Static

Dynamic
Articular contribution to Stability

- Olecranon
- Coronoid
- Radial Head
  - May be considered a secondary stabilizer in valgus elbow instability.
- Provide about 50% of elbow stability.
Capsuloligamentous Complex

- MCL - medial collateral ligament
- LCL - lateral collateral ligament
  - Discrete portion of the LCL is the lateral ulnar collateral ligament (LUCL).
  - LUCL deficiencies result in posterior lateral rotatory instability.
- Ligaments provide about 50% of elbow stability
Forces across the elbow joint

- Greatest amount of force generated at the elbow occurs with the initiation of flexion.
  - Calculations suggest that about 3 times the body weight may be transmitted across the elbow joint when it is flexed at 90 degrees.
Common Injuries

- Muscle strain
- Contusions
- Tendonitis
- Bursitis
- UCL sprain/tear
- Fractures
- Dislocation/subluxation
Reference