주관절의 해부학 및 생역학

고려의대

문 준 규

해부학(Anatomy)

1. Surface Anatomy

- Antecubital fossa, Biceps
- Flexion crease: line medial ~ lat epicondyle
- Lateral column: avascular interval BR~Triceps[13]
  Landmark for approach (Kocher lateral J approach)

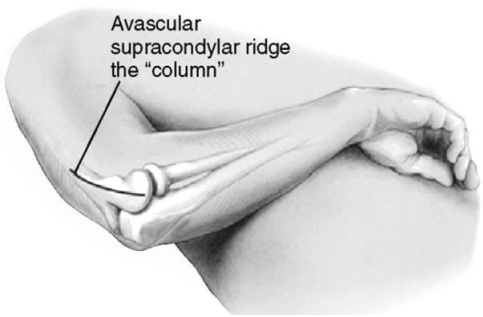

Fig. 1. The supracondylar bone immediately proximal to the lateral epicondyle is called the column

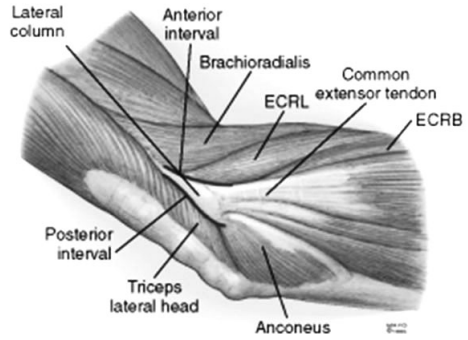

Fig. 2. The anterior and posterior aspect of the lateral column

- Soft △ spot: olecranon tip~lat epicondyle~radial head. Joint aspiration

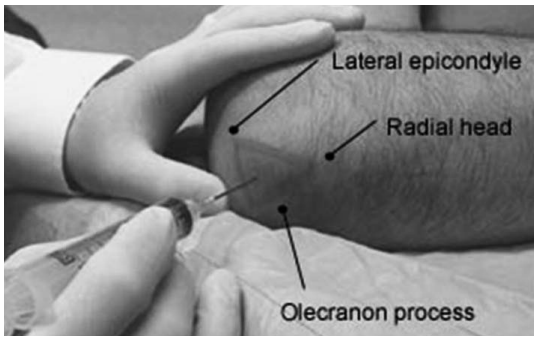

Fig. 3. Aspiration of the elbow

2. Osteo-articulation (골-관절)[6,13]

1) Distal humerus (원위 상완골)

- Two condyles (과): Trochlea (활차), Capitellum(소두)
- Two epicondyles (상과): Medial, Lateral epicondyle
- Three fossaes (와): Coronoid, Radial, Olecranon fossa
- Two column (주): Medial, Lateral

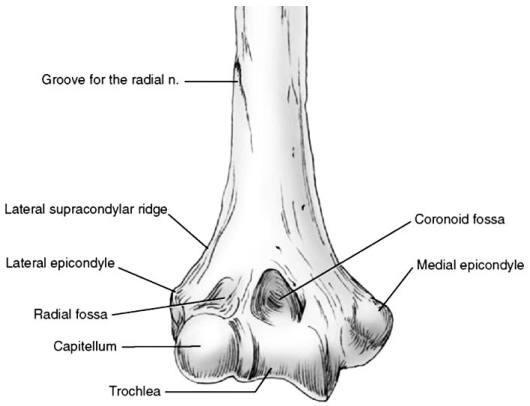

Fig. 4. The bony landmarks of the anterior aspect of the distal radius

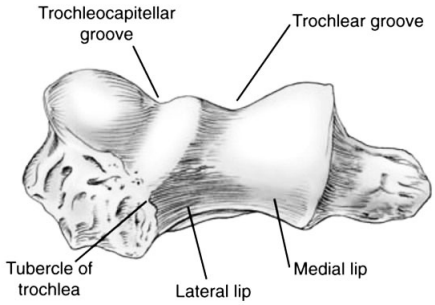

Fig. 5. Axial view of the distal humerus

2) Proximal Ulna (근위 척골)

- Olecranon (주두)
- Coronoid process (구상돌기)
- Two notches (절흔): Greater sigmoid(semilunar), Radial (lesser sigmoid)

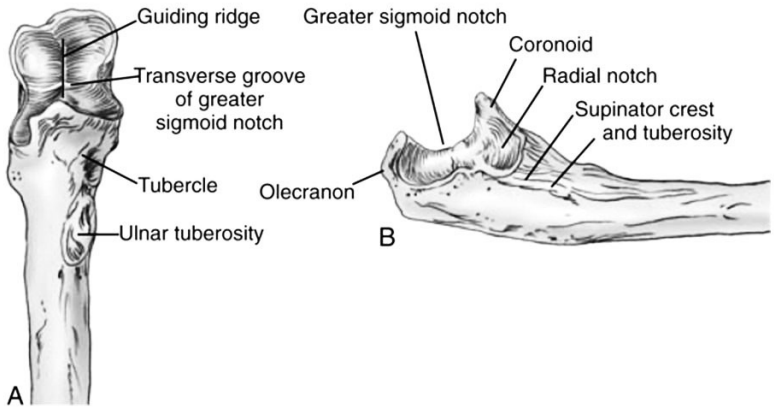

Fig. 6. (**A**) Anterior aspect of the proximal ulnar. (**B**) Lateral aspect with landmark

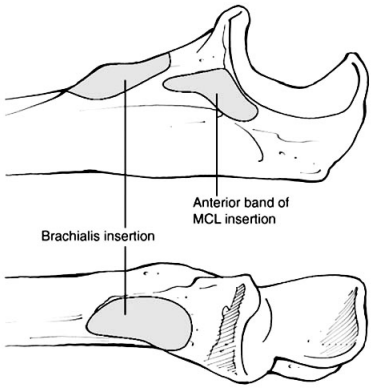

Fig. 7. The soft tissue attachments to the coronoid process[7)]

- Sublime tubercle (attachment of AMCL)
- Supinator crest (attachment of LUCL)

3) Proximal Radius (근위 요골)

- Head (요골두)
- Neck (요골경부)
- Tuberosity (요골결절)

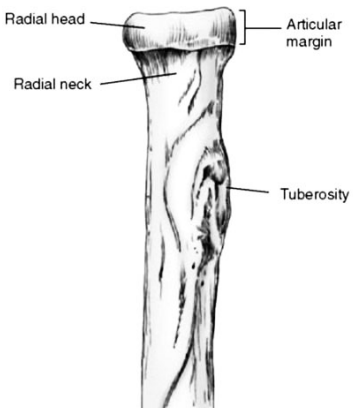

Fig. 8. Proximal aspect of the radius

4) Ulno– humeral joint

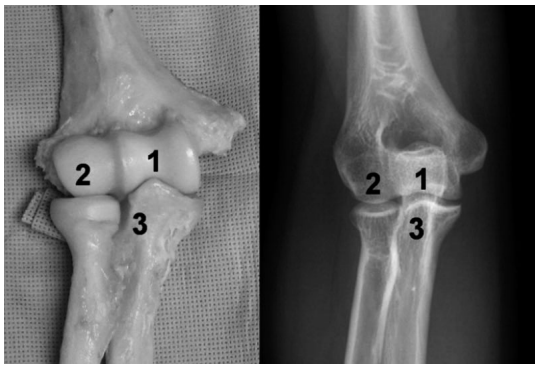

Fig. 9. Three joint composing elbow. 1. Ulnohumeral, 2. Radiocapitellar 3. Proximal Radioulnar joint

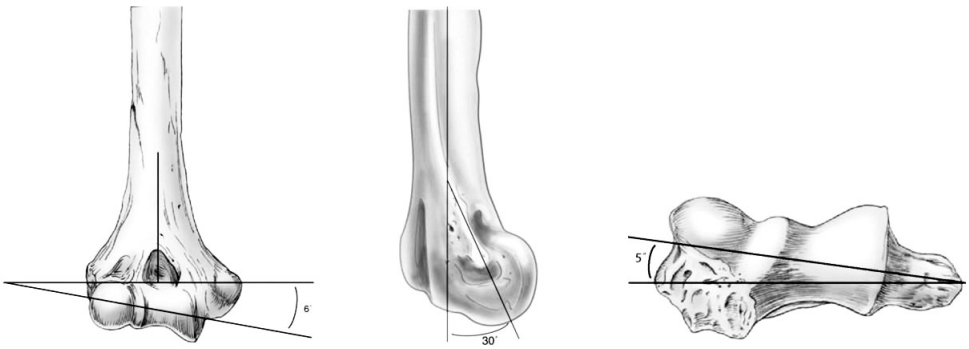

Fig. 10. Distal humerus articulation with respect to the humeral axis[13)]

5) Radio–capitellar joint

6) Proximal radio–ulnar joint

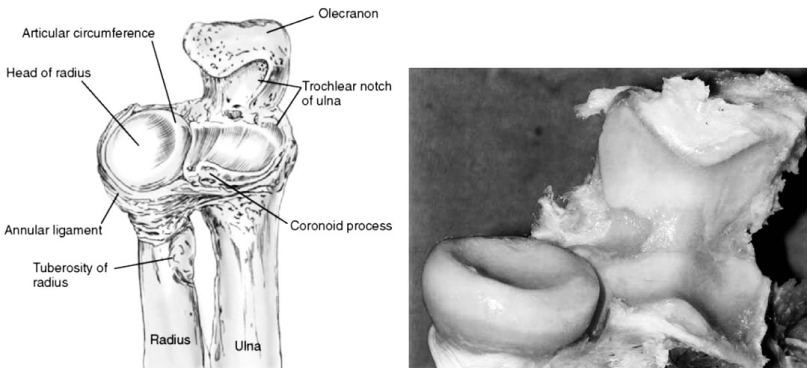

Fig. 11. (**A**) Proximal radio-ulnar joint. (**B**) Wide bare area on proximal ulna

3. Capsule-ligaments (관절낭 및 인대)

1) Capsule

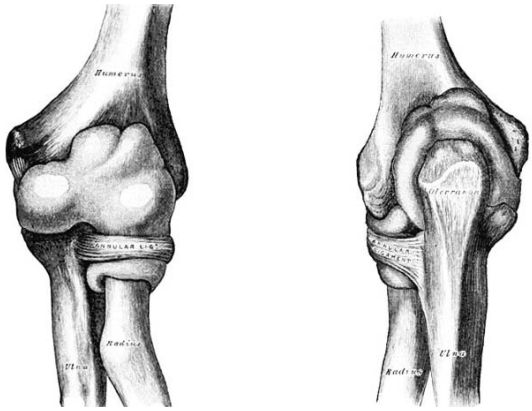

Fig. 12. Elbow joint capsule inserts above the coronoid and radial fossa. Distally the capsules attaches to the anterior margin of coronoid and annular ligament. Posteriorly, the capsule attaches above the olecranon fossa and distal attachment is along the margin of sigmoid notch

- Thin, transparent structure
- 25~30 ml, great capacity at 80° of flexion[19]

2) Ligaments: Medial, Lateral collateral ligament complex[9]

- Medial collateral ligament complex (내측 측부인대)
  : Anterior bundle (전방속)
  Posterior bundle
  Transverse bundle
- Lateral collateral ligament complex (외측 측부인대)
  : Radial collateral ligament
  Annular ligament (요골윤상인대)
  Lateral ulnar collateral ligament (LUCL, 외측 척골측부인대)
  Accessory lateral collateral ligament

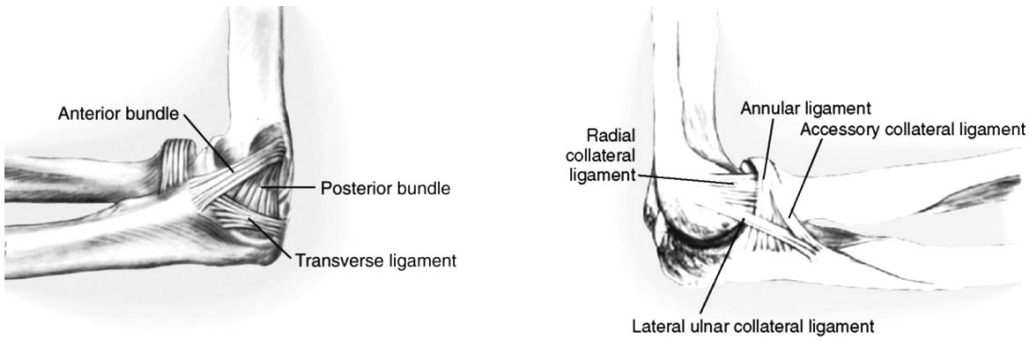

Fig. 13. Medial and lateral collateral ligament complex

생역학 (Biomechanics)

1. Kinematics (Motion)[1,5)]

1) Flexion–Extension

- Hinge, Screw displacement axis (SDA)
- Instant center of rotation (ICR): Center of capitellum ~ Ant-inf med epicondyle

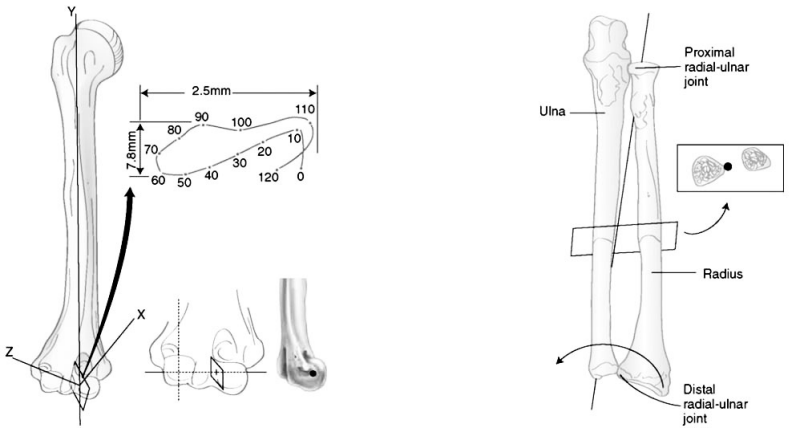

Fig. 14. Configuration and dimension of the locus of the instant center of rotation of the elbow (**B**) Axis of forearm rotation.

2) Forearm rotation

- Supination-pronation
- Axis: center of radial head ~ center of distal ulna

2. Stability (안정성)

1) Osseous stabilization

- Coronoid: key role in preventing posterior dislocation
  Varus stability
- Olecranon: 80% could be removed
  But, 〉 50% olecranonectomy increase joint pressure[4)]
- Radial head: 2ndary valgus stabilizer[21,24)]
  Main stabilizer in MCL deficiency

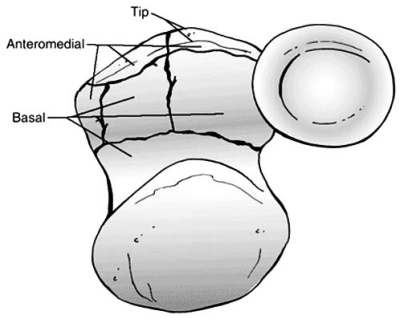

Fig. 15. Coronoid fractures relating to elbow instability[16)]

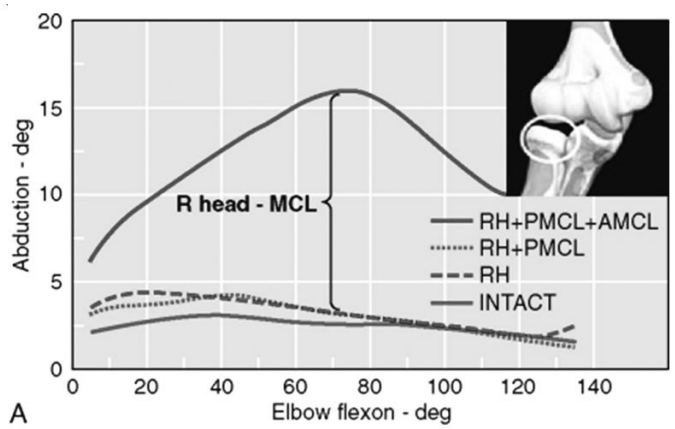

Fig. 16. Stabilizing role of the radial head to valgus stress[15)]

2) Soft tissues stabilization

- Anterior capsule[22)]
- MCL Complex: AMCL (main valgus stabilizer)[23)]
- LCL Complex: LUCL (main varus stabilizer, Posterolateral)[8,17,18,20)]

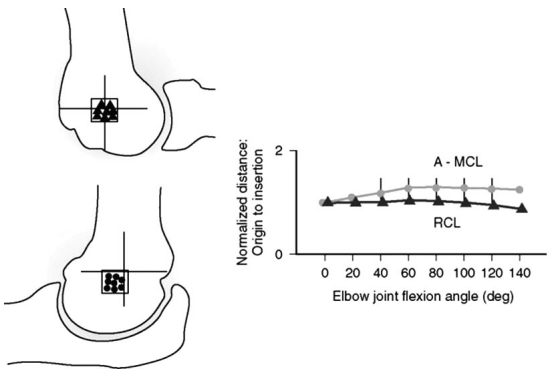

Fig. 17. LUCL and AMCL origin at the axis of rotation

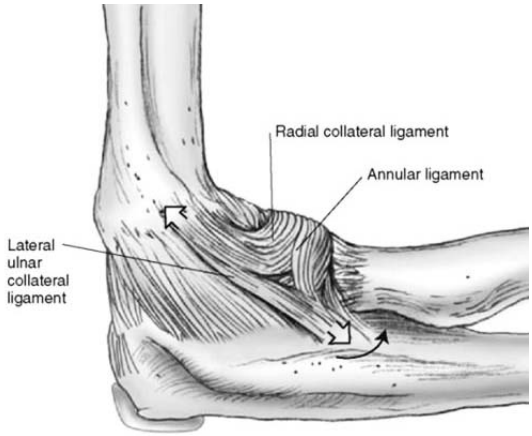

Fig. 18. LUCL resists varus and rotator stress

3. Force transmission[14)]

1) Force on the articular surface

- Not "Non-weight bearing" joint: 45% body weight during push-up[2)]
- 43% across the ulno-humeral, 57% across the radio-capitellar joint[3,10,11)]

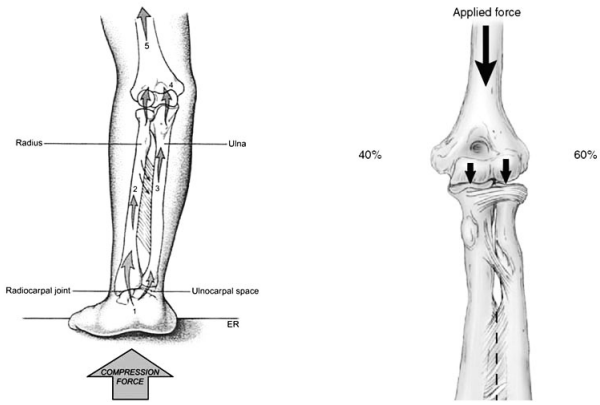

Fig. 19. Static compression of the extended elbow places more force on the radiohumeral than the ulnohumeral joint[12)]

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