Kinesiology – EXHP 364

Chapter 9 – Shoulder Girdle, Chapter 10 – Shoulder Joint, Chapter 11 – Elbow Joint,

Chapter 12 – Wrist, Chapter 13 - Hand

1. Chapter 9 - Shoulder Complex
   1. Bones
      1. Scapula
      2. Clavicle
      3. Sternum
      4. Humerus
      5. Rib cage
   2. Shoulder Girdle
      1. Scapula
      2. Clavicle
      3. Sternum
      4. Motions
         1. Elevation/depression
         2. Protraction/retraction
         3. Upward/downward rotation
   3. Shoulder Joint (Glenohumeral Joint)
      1. Scapula
      2. Humerus
      3. Motions
         1. Flexion/extension/hyperextension
         2. Abduction/adduction
         3. Medial/lateral rotation (internal/external rotation)
         4. Horizontal abduction/adduction
   4. Landmarks
      1. Scapula
         1. Superior Angle
         2. Inferior Angle
         3. Vertebral Border
         4. Axillary Border
         5. Spine
         6. Coracoid Process
         7. Acromion Process
         8. Glenoid Fossa
      2. Clavicle
         1. Sternal End
         2. Acromial End
         3. Body
      3. Sternum
         1. Manubrium
         2. Body
         3. Xiphoid Process
   5. Joints (Articulations)
      1. Sternoclavicular
      2. Acromioclavicular
      3. Glenohumeral
      4. Scapulothoracic Articulation
   6. Ligaments
      1. Sternoclavicular
      2. Costoclavicular
      3. Interclavicular
      4. Acromioclavicular
      5. Coracoclavicular
   7. Joint Motions
      1. Elevation/Depression
      2. Protraction/Retraction
      3. Upward Rotation/Downward Rotation
      4. Scapular Tilt
   8. Companion Motions (p. 120)
   9. Scapulohumeral Rhythm
      1. First 30 degrees = pure abduction
      2. 2:1 after that: 2o abduction = 1o Scapular upward rotation
   10. Angle of Pull
   11. Muscles

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action | Nerve Innervation |
| Trapezius   * Upper * Middle * Lower | * Occipital Bone, nuchal ligament on upper cspine * Spinous processes of c7-t3 * Spinous processes of middle and lower t vert | * Outer 1/3 of clav, acrom proc * Scapular spine * Base of scapular spine | * Scap elevation & upward rotation * Scap retraction * Scap depression & upward rot | * CN XI, C3 & C4 |
| Levator Scapula | * Transverse process fo C1-4 | * Vertebral border of scap btwn superior angle & spine | * Scap elevation & downward rotation | * C3-C5 |
| Rhomboids | * Spinous processes C7-T5 | * Vertebral border of scap btwn spine and inferior angle | * Scap retraction, elevation & downward rotation | * C5 |
| Serratus Anterior | * Lateral Surface of upper 8 ribs | * Vertebral border of scap, anterior surface | * Scapular protraction & upward rotation | * Long Thoracic Nerve C5-C7 |
| Pectoralis Minor | * Anterior surface of ribs 3-5 | * Coracoid process of scapula | * Scapular depression, protraction, downward rotation and tilt | * C8, T1 |

* 1. Anatomical Relationships
     1. Superficial, deep, anterior, posterior
  2. Force Couples: Muscles pulling in different directions to accomplish the same motion.
  3. Reverse Muscle Action: When insertion is stabilized and the origin of the muscle moves toward the insertion

1. Chapter 10 - Shoulder Joint (Glenohumeral Joint)
   1. Joint Motions
      1. Flexion/Extension
      2. Abduction/Adduction
      3. Medial/Lateral Rotation (Internal/External Rotation)
      4. Horizontal Abduction/Adduction
      5. “Scaption” (abduction in the scapular plane – 30o anterior to the frontal plane)
   2. Bones and Landmarks
      1. Scapula
         1. Glenoid Fossa
         2. Glenoid Labrum
         3. Subscapular Fossa
         4. Infraspinous Fossa
         5. Supraspinous Fossa
         6. Axillary Border
         7. Acromion Process
      2. Humerus
         1. Head
         2. Surgical Neck
         3. Anatomical Neck
         4. Shaft
         5. Greater Tubercle
         6. Lesser Tubercle
         7. Deltoid Tuberosity
         8. Bicipital Groove (intertubercular groove)
         9. Bicipital Ridges
   3. Ligaments and Other Structures
      1. Joint Capsule
         1. Outer Fibrous Membrane
         2. Inner Synovial Membrane
      2. Glenohumeral Ligaments
      3. Coracohumeral Ligament
      4. Glenoid Labrum (meniscus of the shoulder)
      5. Bursae
      6. Rotator Cuff (described later)
      7. Thoracolumbar Fascia (attachment for Latissimus Dorsi)
   4. Muscles

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| --- | --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action | Nerve Innervation |
| Deltoid   * Anterior * Middle * Posterior | * Lateral 1/3 of clavicle * Acromion process * Spine of scapula | * Deltoid Tub | * abd/ fl / IR, Had * abduction * abd/ext/hyp/ER/H ab | * Axillary Nerve (C5, C6) |
| Pectoralis Major   * Clavicular portion * Sternal portion * Combined | * Medial 1/3 of clavical * Sternum, costal cart of rib 1-6 | * Lateral lip of bicep groove | * Sh flex 1st 60 deg * Sh ext (180-120) * Sh add, IR, H add | * Lateral & Medial Pectoral Nerve – C5-C8 & T1 |
| Latissimus Dorsi | * Spinous processes of T7-L5, post surface of sacrum, iliac crest & lower 3 ribs | * Medial floor of bicipital groove of humerus | * Sh ext, add, IR, hyper ext | * Thoracodorsal N – C6-C8 |
| Teres Major | * Axillary border of scapula near inferior angle | * Crest below lesser tubercle inferior to latissiums dorsi | * Sh ext, add, IR | * Lower subscapular N – C5-C7 |
| Supraspinatus | * Supraspinous fossa of scapula | * Greater tubercle of humerus | * Sh abd, scaption | * Suprascapular nerve – C5, C6 |
| Infraspinatus | * Infraspinous fossa of scapula | * Greater tubercle of humerus | * Shoulder ER, H abd | * Suprascapular N – C5, C6 |
| Teres Minor | * Axillary border of scapula | * Greater tubercle of humerus | * Shoulder ER, H Abd | * Axillary N – C5, C6 |
| Subscapularis | * Subscapular fossa of the scapula | * Lesser tubercle of humerus | * Sh IR | * Upper & Lower subscapular N – C5, C6 |
| Coracobrachialis | * Coracoid process of the scapula | * Medial surface of the humerus near midpoint | * Stabilizes shoulder joint | * Musculocutaneous N – C6, C7 |
| Biceps Brachii   * Long Head\* * Short Head\* |  |  |  |  |
| Triceps Brachii   * Long Head\* * Medial Head * Lateral Head |  |  |  |  |

* 1. Anatomical Relationships
     1. Superficial/Deep, Anterior/Posterior, Superior/Inferior
  2. Glenohumeral Movement
     1. Humeral head too large for Glenoid fossa, therefore, roll & glide occur with abduction
     2. Accomplished by Rotator Cuff Muscles (SITS muscles)
        1. Supraspinatus
        2. Infraspinatus
        3. Teres Minor
        4. Subscapularis
     3. Glenoid Labrum “deepens” the joint
     4. Full abduction accomplished only when shoulder is externally rotated
        1. Without, the greater tubercle bumps into the acromion process of the scapula
  3. Common shoulder pathologies
     1. Acromioclavicular Separation (AC Sprain)
     2. Clavicular Fracture
     3. Humeral Neck Fracture (Surgical Neck)
     4. Midhumeral Fracture
     5. Radial Nerve Palsy
     6. Anterior Shoulder Dislocation
     7. Glenohumeral Subluxation
     8. Impingement Syndrome
     9. Adhesive Capsulitis (Frozen Shoulder)
     10. Rotator Cuff Tear
     11. Calcific Tendinitis
     12. Bicipital Tendinitis
     13. Subluxing Biceps Tendon

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1. Chapter 11 – Elbow
   1. Joint Structure and Motions
      1. 3 bones
      2. 3 ligaments
      3. 1 capsule
      4. Flexion/Extension (no hyperextension)
      5. Joints
         1. Elbow
            1. Trochlea / Ulnar Notch
            2. Capitulum / Radial Head
         2. Radioulnar
            1. Superior (proximal)
            2. Inferior (distal)
      6. Carrying Angle
         1. Longitudinal line through humerus and forearm
         2. Greater in women than men (b/c of hips)
   2. Bones & Landmarks
      1. Bones
         1. Humerus
         2. Ulna
         3. Radius
      2. Landmarks
         1. Scapula
            1. Infraglenoid tubercle (scapula)
            2. Supraglenoid tubercle (scapula)
            3. Coracoid process
         2. Distal Humerus
            1. Trochlea
            2. Capitulum
            3. Medial Epicondyle
            4. Lateral Epicondyle
            5. Lateral Supracondylar Ridge
            6. Olecranon Fossa
         3. Ulna
            1. Olecranon Process
            2. Trochlear Notch
            3. Coronoid Process
            4. Radial Notch
            5. Ulnar Tuberosity
            6. Styloid Process
            7. Head
         4. Radius
            1. Head
            2. Radial Tuberosity
            3. Styloid Process
   3. Ligaments and Other Structures
      1. Medial Collateral Ligament
      2. Lateral Collateral Ligament
      3. Annular Ligament
      4. Joint Capsule
      5. Interosseuous Membrane
   4. Muscles

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| --- | --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action | Nerve Innervation |
| Brachialis | * Distal ½ of humerus, anterior surface | * Coronoid process and ulnar tuberosity of ulna | * Elbow Flexion | * Musculocutaneous N – C5, C6 |
| Brachioradialis | * Lateral supracondylar ridge of humerus | * Styloid process of radius | * Elbow Flexion | * Radial N – C5, C6 |
| Biceps Brachii   * Long Head * Short Head | L   * Supraglenoid tubercle of scapula * Coracoids process of scapula | * Radial tuberosity of radius | * Elbow Flexion, Supination | * Musculocutaneous N – C5, C6 |
| Supinator | * Lateral epicondyle of humerus and ulna | * Anterior surface of proximal radius | * Forearm supination | * Radial N – C6 |
| Triceps Brachii   * Long head * Lateral Head * Medial Head | * Infraglenoid tubercle of scapula * Inferior to greater tubercle on posterior humerus * Posterior surface of humerus | * Olecranon Process of ulna | * Elbow Extension | * Radial N – C7, C8 |
| Anconeus | * Lateral epicondyle of humerus | * Lateral and inferior to olecranon process of ulna | * Assists in elbow extension | * Radial N – C7, C8 |
| Pronator Teres | * Medial epicondyle of humerus and coronoid process of ulna | * Lateral aspect of radius at its midpoint | * Forearm pronation, assists in elbow flexion | * Median N – C6, C7 |
| Pronator Quadratus | * Distal ¼ of ulna | * Distal ¼ of Radius | * Forearm pronation | * Median N – C8, T1 |

* 1. Anatomical Relationships
     1. Anterior/Posterior, Deep/Superficial, Distal/Proximal
  2. Common Elbow Pathologies
     1. Lateral Epicondylitis (Tennis Elbow)
     2. Medial Epicondylitis (Golfer’s Elbow / Little League Elbow)
     3. Pulled Elbow (Nursemaid’s Elbow)
        1. Radial Head subluxation c/b sudden traction
     4. Elbow Dislocation
     5. Supracondylar Fractures
     6. Volkmann’s Ischemic Contracture

1. Chapter 12 – Wrist Joint
   1. Joint Structure
      1. Radiocarpal
         1. Distal radius and radioulnar disk proximally with scaphoid, lunate & triquetrum distally
         2. Considered “condyloid”
            1. Concave = distal radius & disk
            2. Convex = scaphoid, lunate, triquetrum
            3. During wrist flexion, carpals glide posteriorly
            4. During wrist extension, carpals glide anteriorly
            5. During radial deviation, carpals glide toward ulna
            6. During ulnar deviation, carpals glide toward radius
         3. Allow wrist
            1. Flexion/Extension
            2. RD/UD
            3. Combination = Circumduction
      2. Midcarpal (intercarpal)
         1. Only allow gliding motions to contribute to radiocarpal joint motion
      3. Carpometacarpal (CMC) (more in chapter 13)
         1. Distal row of carpals with proximal end of metacarpal bones
   2. Joint Motions
      1. Flexion
      2. Neutral
      3. Extension
      4. Radial Deviation
      5. Ulnar Deviation
   3. Bones and Landmarks (Some Lovers Try Positions That They Can’t Handle)
      1. Scaphoid
      2. Lunate
      3. Triquetrum
      4. Pisiform
      5. Trapezium
      6. Trapezoid
      7. Capitate
      8. Hamate
      9. Styloid Processes – attachment for collateral ligaments
         1. Distal Projection on lateral side of the radius
         2. Distal medial posterior side of ulna
      10. Hook of Hamate
      11. Medial Epicondyle – attachment for common flexor tendon
          1. Distal medial side of humerus
      12. Lateral Epicondyle – attachment for common extensor tendon
          1. Distal lateral side of humerus
      13. Supracondylar Ridge – attachment for extensor carpi radialis longus
          1. Proximal to lateral epicondyle
   4. Ligaments & Other Structures
      1. Radial Collateral Ligament
      2. Ulnar Collateral Ligament
      3. Palmar Radiocarpal Ligament
      4. Dorsal Radiocarpal Ligament
      5. Joint Capsule
      6. Articular Disk
      7. Palmar Fascia
   5. Muscles

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| --- | --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action | Nerve Innervation |
| Anterior (Flexors) PFPF |  |  |  |  |
| Pronator Teres (see elbow) |  |  |  |  |
| Flexor Carpi Radialis | * Medial epicondyle of humerus | * Base of 2nd & 3rd Metacarpals | * Wrist Flexion, RD | * Median N – C6, C7 |
| Palmaris Longus | * Medial epicondyle of humerus | * Palmar Fascia | * Assists Wrist Flexion | * Median N – C6, C7 |
| Flexor Carpi Ulnaris | * Medial epicondyle of humerus | * Pisiform and base of 5th metacarpal | * Wrist flexion, UD | * Ulnar N – C8, T1 |
| Posterior (Extensors) |  |  |  |  |
| Extensor Carpi Radialis Longus | * Supracondylar ridge of humerus | * Base of 2nd metacarpal | * Wrist Extension, RD | * Radial N – C6, C7 |
| Extensor Carpi Radialis Brevis | * Lateral epicondyle of humerus | * Base of 3rd metacarpal | * Wrist extension | * Radial N – C6, C7 |
| Extensor Carpi Ulnaris | * Lateral epicondyle of humerus | * Base of 5th metacarpal | * Wrist extension, UD | * Radial N – C6, C7, C8 |

* 1. Anatomical Relationships
     1. Superficial / Deep
     2. Anterior / Posterior
     3. Medial / Lateral
     4. Extensor Retinaculum

1. Chapter 13 – Hand
   1. Joints and Motions of Thumb
      1. CMC
      2. MCP
      3. IP
      4. Trapezium and 1st metacarpal create saddle joint
      5. Flexion/Extension (in frontal plane)
      6. Abduction/Adduction (in sagittal plane)
      7. Opposition/Reposition
   2. Joints and Motions of Fingers
      1. CMC
      2. MCP
      3. Interphalangeal (IP)
         1. PIP
         2. DIP
      4. Trapezoid and 2nd metacarpal
      5. Capitate and 3rd metacarpal
      6. Hamate with 4th and 5th metacarpal
      7. Flexion/Extension (in sagittal plane)
      8. Abduction/Adduction (in frontal plane)
   3. Bones and Landmarks
      1. Thumb = 2 phalanges
      2. Fingers = 3 phalanges
      3. Proximal = base
      4. Distal = head
   4. Ligaments and Other Structures
      1. Flexor Retinaculum
      2. Palmar Carpal Ligament
      3. Transverse Carpal Ligament
      4. “Carpal Tunnel”
      5. Extensor Retinaculum
      6. Extensor Expansion Ligament
      7. Extensor Hood
      8. Proximal Carpal Arch
      9. Distal Carpal Arch
      10. Longitudinal Arch
   5. Muscles

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action | Nerve Innervation |
| Anterior |  |  |  |  |
| Flexor Digitorum Superficialis | * Common Flexor Tendon on medial epicondyle, coronoid process, radius | * Sides of middle phalanx of 4 fingers | * Flexes MCP and PIP joints of fingers | * Median N – C7, C8, T1 |
| Flexor Digitorum Profundus | * Proximal ¾ of ulna | * Distal phalanx of 4 fingers | * Flexes three joints of fingers | * Median and Ulnar N – C8, T1 |
| Flexor Pollicis Longus | * Radius, Anterior surface | * Distal phalanx of thumb | * Flexes three joints of thumb | * Median N – C8, T1 |
| Posterior |  |  |  |  |
| Abductor Pollicis Longus | * Posterior radius, interosseous membrane, middle ulna | * Base of 1st metacarpal | * Abducts thumb (CMC) | * Radial N – C6, C7 |
| Extensor Pollicis Brevis | * Posterior distal radius | * Base of proximal phalanx of thumb | * Extends CMC and MCP joints of thumb | * Radial N – C6, C7 |
| Extensor Pollicis Longus | * Middle posterior ulna and interosseous membrane | * Base of distal phalanx of thumb | * Extends all three joints of thumb | * Radial N – C6, C7, C8 |
| Extensor Digitorum | * Lateral epicondyle of humerus | * Ase of distal phalanx of 2nd – 5th fingers | * Extends all three joints of fingers | * Radial N – C6, C7, C8 |
| Extensor Indicis | * Distal ulna | * Base of distal phalanx of 2nd finger | * Extends all three joints of 2nd finger | * Radial N – C6, C7, C8 |
| Extensor Digiti Minimi | * Lateral Epicondyle of humerus | * Base of distal phalanx of 5th finger | * Extends all three joints of 5th finger | * Radial N – C6, C7, C8 |

* 1. Intrinsic Muscles
     1. Proximal attachment at or distal to carpal bones
     2. Act on thumb of fingers
     3. Responsible for fine motor control and precision
     4. Thenar (form thenar eminence)
        1. Function to move thumb
        2. Flexor Pollicis Brevis
        3. Abductor Pollicis Brevis
        4. Opponens Pollicis
     5. Deep Palm Muscles (between thenar and hypothenar eminence)
        1. Adductor Pollicis
        2. Interossei
        3. Lumbricales
     6. Hypothenar (form hypothenar eminence)
        1. Function to move 5th finger
        2. Flexor Digiti Minimi
        3. Abductor Digiti Minimi
        4. Opponens Digiti Minimi
  2. Anatomical Relationships
     1. Intrinsic/Extrinsic
  3. Common Wrist and Hand Pathologies
     1. Colles’ Fracture
     2. Smith’s Fracture
     3. Greenstick Fracture
     4. Ganglion Cyst
     5. Carpal Tunnel Syndrome (CTS)
     6. DeQuervain’s Disease
     7. Tenosynovitis
     8. Dupuytren’s Contracture
     9. Stenosing Tenosynovitis (Trigger Finger)
     10. Skier’s Thumb
     11. Gamekeeper’s Thumb
     12. Swan Neck Deformity
     13. Boutonniere Deformity
     14. Ulnar Drive
     15. Mallet Finger
     16. Jersey Finger
     17. Scaphoid Fracture
     18. Keinbock’s Disease
  4. Hand Function
     1. Functional Position of the Hand
  5. Grasps
     1. Power Grip
        1. Cylindrical Grip
        2. Spherical Grip
        3. Hook Grip
     2. Precision Grip
        1. Pad-to-Pad Grip
        2. Pinch Grip
        3. Three-Jaw Chuck
        4. Tip-to-Tip Grip
        5. Pincer Grip
        6. Pad-to-Side Grip
        7. Side-to-Side Grip
        8. Lumbrical Grip (Plate Grip)