living anatome: The Upper Extremity

I. INTRODUCTION

II. WARM-UP

III. ANATOMY OF THE UPPER EXTREMITY

Shoulder Joint: Bones, Muscles, & Movements

Talking points:

- Joint type: Synovial, ball-and-socket, multi-axial
- Movements: flexion, extension, ab/adduction, ex/internal rotation
- Static (e.g. labrum) and dynamic stabilizers (e.g. rotator cuff muscles)
- *Clinical correlate:* Shoulder dislocation (most likely to happen anteroinferiorly)

Exercise *(Pilates): Lateral Rotation with flex-band*

- Featured muscle: Rotator cuff (only infrapsinatus and teres minor)
- Function: Lateral rotation of humerus
- Innervation: Infraspinatus: suprascapular n. (C5-6), Teres minor: axillary n. (C5-6)
- Note: The other rotator cuff muscle that rotates, subscapularis, is responsible for internal rotation of the humerus. Supraspinatus, the final rotator cuff muscle, does not rotate at all—it abducts (next exercise).

Exercise *(Pilates): Breast Stroke (with flex-band, on knees)*

- Featured muscle: Supraspinatus, deltoid, serratus anterior
- Function: Abduction of humerus (0-15°, 15-90°, 90-180°)
- Innervation: Supraspinatus: suprascapular n. (C5-6); Deltoid: axillary n. (C5-6); Serratus: long thoracic n. (C5-7)

Exercise *(Pilates): Pilates Push-Ups*

Note: demonstrate "bad" push-up position on instructor first with winging scapulae

- Featured muscle: Serratus anterior
- Function: Protraction and scapular stabilization
- Innervations: Long thoracic n. (C5-7)
- Clinical correlate*:* Because of its crucial role in stabilization of the scapula, the serratus is necessary for maintenance of proper form during push-ups. With loss of function of long thoracic n., the scapula is no longer stabilized on the posterior aspect of trunk and will elevate off of the rib cage, causing "winged scapula."

- Note: Other muscles used during push-up: biceps, triceps, and pectoralis major

Arm

Exercise (*Pilates*)*: Bicep Curls (standing, with flex-band)*

- Featured muscle: Anterior compartment of arm: biceps brachii, brachialis (strongest elbow flexor!) (note: coracobrachialis not involved because it does not cross elbow joint)
- Function: Flexion of elbow
- Innervation: Musculocutaneous n. (C5-7)
- *Note*: Biceps is a two-joint muscle since it crosses both shoulder and elbow joints. Short head attaches to coracoid, along with pec minor and corachobrachialis.

Exercise (*Pilates*)*: Triceps (standing, with flex band)*

- Feature muscle: Triceps brachii and anconeus
- Function: Extension of elbow
- Innervation: Radial n. (C5-T1)
- *Clinical correlate:* There are three heads to the triceps (long head arises from infraglenoid tubercle, lateral and medial heads arise from posterior humerus); Triangular Interval is found in between long and lateral heads and houses the radial n. and profunda brachii a.).

Forearm (with brief discussion on elbow and wrist joints, and a brief nod to the hand, in context of many its muscles coming from the forearm)

Exercise (*yoga*)*: Hand-to-foot pose*

- Featured muscle: *Anterior Compartment:* First, palpate muscles of ant compartment of forearm (arising from medial epicondyle), many of which are active during wrist flexion. Superficial compartment has 5 muscles, originates on medial epicondyle and crosses two joints (except pronator teres, which only crosses elbow joint); deep has 3 muscles which do not cross elbow joint, only wrist. All innervated by median n. (C5-T1) except flexor carpi ulnaris and ulnar portion of flexor digitorum superficialis, which are innervated by ulnar n (C8-T1).
- *Clinical correlate:* Golfer's Elbow (Medial epicondylitis)

Exercise *(yoga): Plank pose (modification on knees)*

- Featured muscle: *Posterior Compartment:* Palpate muscles of post compartment of forearm (arising from lateral condyle), many of which are active during wrist extension. Superficial compartment has 7 and originates on or near lateral epicondyle of humerus. Deep

compartment has 5. All innervated by radial n. Big Exception: Brachioradialis inserts on anterior surface of radius and flexes wrist!

- Notes: Part of proper position in this pose is your fingers awake, alert & evenly spread, thanks to intrinsic hand muscles, like the dorsal interossei (only muscles on dorsum) and abductor pollicis (one of many muscles on palm)
- *Clinical correlate:* Tennis Elbow (Lateral epicondylitis)

Exercise *(yoga): Sun Salutation*

- Integration of wrist and elbow movements
- It works all our muscles!! That's why we love it…

IV. Savasana

Om om om…