

living anatome:
On-the-Wards Review: Neck & Upper Extremity

I. **INTRODUCTION**

II. **WARM-UP**

II. **NECK**

Inspection:

Comprised of cervical vertebrae (C1-C7). The cervical prominence is C7/T1. C1 is the atlas, and C2 is the axial.

Palpation:

Palpate spinous processes, C7, facet joints (one inch lateral to spinous process), and paravertebral muscles.

Clinical Correlate: Tenderness at spinous processes can suggest fracture or dislocation, especially if preceded by trauma, infection, or arthritis. Tenderness at facet joints occurs with arthritis, especially between C5 and C6.

Range of Motion:

There are four major movements of the neck: flexion and extension (which mainly occur at the atlanto-occipital joint), rotation (which mainly occurs at the atlanto-axial joint), and lateral bending (which occurs between C2-C7).

Clinical Correlate: Decreased range of motion can result from rheumatoid arthritis, pain from trauma, or muscle spasm.

Exercises:

1. *Head Nods*

- Featured muscles: Scalenes, sternocleidomastoid, longus colli & capitis
- Function: Flexion of the neck
- Note: Unilaterally, the scalenes laterally flex the neck, and the sternocleidomastoid rotates the neck to the contralateral side. In addition, there are other neck flexors such the rectus capitis anterior.

2. *Head Nods with Ab Prep, Hundreds, and Ab Series (Pilates)*

- Featured muscles: Scalenes, sternocleidomastoid, longus colli & capitis
- Function: Flexion of the neck
- *Clinical Correlate:* The brachial plexus and subclavian artery run in between the anterior and the medial scalenes. If the muscles are hypertrophied (e.g., in a weight-lifter), an entrapment neuropathy called

Thoracic Outlet Syndrome can develop, resulting in ischemia and nerve dysfunction of the upper limb.

III. SHOULDER

Inspection:

What are we referring to exactly by the term “shoulder”? The contour of the shoulder is given by the deltoid muscle. When you tap on someone’s shoulder, you are actually tapping on the acromion of the scapula. The shoulder joint is the glenohumeral joint, a synovial, ball and socket, multi-axial joint that is formed by the head of the humerus (ball) and the glenoid fossa (socket) of the scapula. This joint has an incredible range of motion but little stability because of its large ball and relatively small socket architecture. So what keeps it in place? A whole host of stabilizers, including the joint capsule, ligaments, and the labrum (also called static stabilizers) and the muscles of the rotator cuff (also called dynamic stabilizers, because they, themselves, are capable of movement).

Palpation:

Palpate the clavicle, the coracoid process, the acromioclavicular joint, the biceps tendon, and the deltoid muscle,. The short head of the biceps attaches to the coracoid process, along with the pec minor, and the corachobrachialis. The long head of the biceps tendon runs in the bicipital groove and attaches to the superior aspect of the labrum.

Clinical correlate: Shoulder dislocations and subluxations occur at the glenohumeral joint. Shoulder separations occur at the acromioclavicular joint.

Range of Motion:

The movements of the shoulder are: flexion, extension, abduction, adduction, internal rotation, and external rotation.

Exercises:

1. Flexion and Extension Exercises with Flex Bands (Pilates)

- Featured muscles: Corachobrachialis, anterior deltoid, pectoralis major (clavicular head), biceps brachii, latissimus dorsi, teres major, posterior deltoid, triceps brachii
- Function:
 - Flexion of humerus: Corachobrachialis, anterior deltoid, pectoralis major (clavicular head), biceps brachii.
 - Extension of humerus: Latissimus dorsi, teres major, posterior deltoid, triceps brachii

2. Side-Arm Series (Pilates)

- Featured muscles: Infraspinatus, teres minor, subscapularis
- Function:
 - Internal rotation of humerus: Subscapularis.
 - External rotation of humerus: Infraspinatus and teres minor
- Innervation: Infraspinatus: suprascapular n. (C5), Teres minor: axillary n. (C5-6); Subscapularis: upper and lower subscapular n. (C5-6)
- *Clinical correlate:* Pain or difficulty with these movements may be caused by a rotator cuff tear. Tears can be partial, meaning involvement of one or some of the rotator cuff tendons, or full, involving all of the tendons. The most common tendon to tear is the supraspinatus.

3. Breast-stroke, kneeling (Pilates)

- Featured muscles: Supraspinatus, deltoid, serratus anterior
- Function: Abduction of humerus
- Innervation: Supraspinatus: suprascapular n. (C5-6); Deltoid: axillary n. (C5-6); Serratus: long thoracic n. (C5-7)
- *Clinical correlate:* The deltoid muscle attaches onto the deltoid tuberosity of the humerus. The deltoid bursa lies deep to the muscle and can become very painful and tender if inflamed. Likewise, the subacromial bursa lies superficially to the supraspinatus muscle, beneath the acromion, and can become inflamed if overused or damaged.

Special Maneuvers:

1. *Drop Arm Test:* To test for rotator cuff tears, or supraspinatus dysfunction, passively abduct the patient's arm to 180 degrees. Observe as the patient slowly lowers the arm. If the patient has a rotator cuff tear, the arm will often "drop" to the side. Often times, patients will be able to lower the arm to 90 degrees, because this movement is mainly a function of the deltoid muscle. However, if the rotator cuff or supraspinatus is impaired, the patient will be unable to continue the controlled movement to the waist.

2. *Impingement Test:* The Hawkins' Impingement Test is commonly used to assess for rotator cuff tendonitis or subacromial impingement of the cuff tendons. To perform the test, flex the patient's elbow and abduct the shoulder to approximately 90 degrees. Forcibly internally rotate the head of the humerus within the shoulder joint.

Exercise (yoga):

- *Eagle Pose (yoga)*
 - *Emphasizing stretching of the shoulder complex*

IV. ELBOW

Inspection:

The elbow joint is a synovial, compound hinge joint formed by the articulation of humerus with both the radius and the ulna.

Palpation:

Palpate the medial and lateral epicondyles of the humerus, the olecranon process of the ulna, the ulnar groove, the triceps and biceps tendons, and the origins of the muscles of forearms.

Clinical correlate: Most of the muscles of the anterior compartment of the forearm arise from the medial epicondyle and are active during wrist flexion. Overuse can result in Medial Epicondylitis, i.e. Golfer's Elbow. Most of the muscles of the posterior compartment of the forearm arise from the lateral epicondyle of humerus are active during wrist extension. Overuse of these muscles can result in Lateral Epicondylitis, i.e. Tennis Elbow. Big exception of the posterior compartment: The brachioradialis is **not** a wrist extensor; it arises from the brachium and inserts on anterior surface of radius and flexes elbow (as elicited by deep tendon reflex exam)!

Range of Motion:

The movements of the elbow include flexion, extension, supination, and pronation.

Exercises:

1. *Bridge Push Ups (Pilates)*
2. *Dolphin (yoga)*

- Featured muscles: Anterior compartment of arm: biceps brachii, brachialis, (coracobrachialis not involved because it does not cross elbow joint)
- Function: Flexion of elbow
- Innervation: Musculocutaneous n. (C5-7)

- Featured muscles: 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.). Fracture of the shaft of the humerus can cause damage to and palsy of the radial nerve, which is closely applied to the bone, running in the spiral groove of the bone.

3. Bow Pose (yoga)

- *Featured muscles:* Pronator teres and pronator quadratus
- *Function:* Pronation of elbow
- *Innervation:* Median n. (C5-T1)

4. Simple Locust Pose (yoga)

- *Featured muscles:* Biceps brachii, supinator, brachioradialis
- *Function:* Supination of elbow
- *Innervation:* Median n. (C5-T1)

IV. WRIST & HAND

Inspection:

The “wrist” consists of the distal ends of the radius and the ulna and eight carpal bones: scaphoid, lunate, triquetrum, pisiform, hamate, capitate, trapezoid, and trapezium. There are joints between the radius and the carpal bones, between the ulna and the carpal bones, and between the carpal bones themselves. The carpal bones articulate with five metacarpal bones. Digits two through five have a metacarpophalangeal joint (MCP), a proximal interphalangeal joint (PIP), and a distal interphalangeal joint (DIP). The thumb only has an MCP and a DIP because it is without a middle phalanx. The carpal bones also form the floor of the carpal tunnel, which is bordered anteriorly by the flexor retinaculum.

Clinical correlate: The carpal tunnel contains the median nerve along with the flexors digitorum profundus and superficialis, flexor pollicis longus. Carpal Tunnel Syndrome can result from several factors, including swelling of the synovial sheath and inflammation of the flexor retinaculum, resulting in compression of the median nerve.

Palpation:

Palpate distal ends of ulna and radius, carpal bones, anatomic snuff box, MCPs, DIPs, and PIPs.

Clinical correlate: The anatomic snuff box consists of the abductor pollicis longus, the extensor pollicis brevis, and the extensor pollicis longus (oriented laterally to medially). The snuff box houses both the radial artery (feel its pulse!) and the scaphoid bone, which can be tender to palpation if fractured.

Range of Motion:

The movements of the wrist include flexion, extension, radial deviation and ulnar deviation.

Exercises:

1. *Sun salutation (yoga)*

- Featured muscles: Anterior compartment of forearm: extensor carpi radialis longus and brevis, extensor carpi ulnaris.
- Function: Wrist extension
- Innervation: Radial n. (C5-T1)

2. *Hand-to-foot pose (yoga)*

- Featured muscles: Posterior compartment of forearm: flexor carpi radialis (FCR) and ulnaris (FCU), and palmaris longus (PL).
- Function: Wrist flexion
- Innervation: Median n. (C5-T1): FCR and PL; Ulnar n. (C8-T1): FCU

Special Maneuvers:

1. *Grind Test*: Hold below the MCP of the thumb with one hand. With the other hand, apply a force directed toward the joint and rotate the thumb in circles. If painful, this movement can indicate osteoarthritis.

2. *Finkelstein*: Rotate the patient's forearm so that the palm faces the body. Ask the patient to make a fist, placing the thumb inside. Apply pressure on the patient's hand to move the wrist into ulnar deviation. If painful, this test can indicate tenosynovitis of extensor pollicus brevis and/or abductor pollicus longus (also known as DeQuervain's Tenosynovitis).

VII. SAVASANA? Always!

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