DOCTOR
2016

Clinical Cases & Lecture Notes 2017
Anatomy

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Lecture 1

Done by Lina Al Qerem

- Cytology: the science of the cell.
- Lysosome -> Lyso: analysis, some: body

- Inflammation in tonsils -> tonsillitis.
  Inflammation in bones-> osteitis.
  Inflammation in stomach-> gastritis.
  Removal of the tonsils-> tonsillectomy.

- In the MRI (Magnetic resonance imaging) each cut is called a slice.

Connective tissue has 3 forms:

1. Fluid -> the plasma
   - If a person comes with a burn we give him plasma not blood.

2. Semi solid -> Cartilage
3. Solid/Hard -> bone (the foundation of our body)

- The body has 206 bones which articulate through joints.
- In the vertebral column there is 33 vertebrae, each vertebra articulates with the other through Intervertebral disk.
- Sternum is the breast bone.
- There are 12 pairs of ribs in our body.
- Long bones in general have: proximal end, distal end and a shaft in the middle (no matter what size it is).
- Some examples of flat bones in addition to scapula are skull and sternum.

- The upper and lower limbs don’t connect to the axial skeleton directly, they need a mediator (a connection) in the upper limb it’s the shoulder girdle.

- The shoulder girdle is composed of clavicle anteriorly and scapula posteriorly.

- The clavicle is commonly fractured in old ladies due to pregnancy and lactating (breast feeding) in their young age.

- Glenoid -> glen: lips, oid: like.
Notes:

- Pectus: Upper anterior part of the thorax, that’s why the breast area is called pectoral region.
- For every muscle you should know the origin, insertion, nerve supply and action. The action is maintained by the movement of insertion towards origin.
- Layers of pectoral region:
  1. Skin
  2. Superficial fascia:
     a. It is composed of loose connective tissue, fats and breast.

**Side question:** Why is breast located in the superficial fascia and not the deep fascia?

To let the mother feed her baby easily since the breast is not fixed, it is mobile and moves a bit.

3. Deep fascia
   a. Its function is to cover all muscles and each muscle alone.

**Muscles of the pectoral region:**
- **Pectoralis major**
  Origin: Clavicle, Sternum and upper 6 ribs.
  Insertion: Lateral lip of the intertubercular groove.
  Action: Flexion, medial rotation and adduction.
  NS: Medial and lateral pectoral nerves.
- **Pectoralis minor**
  Origin: 3rd, 4th and 5th rib.
  Insertion: Coracoid process.
Action: Depresses the scapula forwards and downwards. 
NS: Medial pectoral nerve.

- **Subclavius**
  Origin: First rib.
  Insertion: Clavicle inferior surface (Subclavian groove).
  Action: Protection of the underlying structures.
  NS: Nerve to subclavius.

- **Deltoid:**
  Origin: Clavicle, acromion and spine of scapula.
  Insertion: Deltoid tuberosity of humerus.
  Action: Anterior fiber → Flexion.
  Posterior fiber → Extension.
  Middle fiber → Abduction 15-90.

**Muscles connecting upper arm to scapula:**

- **Supraspinatus**: (Rotator cuff muscle)
  Origin: Supraspinous fossa
  Insertion: Greater tubercle
  Action: Initiation of abduction 0-15
  NS: Suprascapular nerve

- **Infraspinatus**: (Rotator cuff muscle)
  Origin: Infraspinus fossa
  Insertion: Greater tubercle
  Action: Lateral rotation
  NS: Suprascapular nerve

- **Teres minor**: (Rotator cuff muscle)
  Origin: Lateral border of scapula
  Insertion: Greater tubercle
  Action: Lateral rotation
  NS: Axillary nerve

- **Teres major**:
  Origin: Lateral lip of scapula
  Insertion: Medial lip of intertubercular groove
  Action: Adduction and medial rotation
  NS: Lower subscapular nerve
- **Subscapularis:**
  Origin: Subscapular fossa  
  Insertion: Lesser tubercle  
  Action: Medial rotation  
  NS: Upper and lower subscapular nerve

Clinical cases:

1- Suppose we have a lady with breast cancer, and she cannot adduct her upper arm, this means that the underlying muscle (Pectoralis major) is involved in cancer.
2- To remove a part of the right breast for example, we must say “we want to do partial mastectomy”.
3- When your hand is turning blue, you have compressed a vein. When your hand has started numbing (تشمل), you have compressed a nerve supply. If your hand is becoming yellow in color, it means you have compressed an artery.
4- If we have a patient and he cannot abduct his arm from 15-90, this means that deltoid is paralyzed, and the involved nerve is the axillary nerve.
The breast is in the superficial fascia, that’s why it’s mobile.
The subclavius muscle protects the underlying structures, nerve to subclavius, subclavius A&V.
If a patient came to the clinic with:
Blue colored limb, “moshkelitis” in vein.
Yellow colored limb, “moshkelitis” in artery.
Numbing limb, “moshkelitis” in nerve.

**Clinical case:** patient came to the hospital and he can’t elevate his arm 180° above his head, then these muscles, nerves might be injured:
Supraspinatus m., deltoid m., serratus anterior m., trapezius m., suprascapular nerve, axillary nerve, long thoracic nerve, accessory IX nerve.

The lesser tubercle is medial, the greater tubercle is lateral.
If the greater tubercle is fractured, these muscles will be involved:
**SIT** muscles: supraspinatus, infraspinatus, teres minor.

If the axillary nerve is injured, deltoid and teres minor will be involved.
The two majors (pectoralis and teres) are inserted in the lateral and medial lip of the intertubercular sulcus (biceptal groove).
If a patient came to the hospital with a fractured intertubercular groove, pectoralis major, latissimus dorsii and teres major will be involved.
The two majors have the same action, adduction and medial rotation of the arm.
Medial rotators are the two majors and subscapularis.
If the superior subscapular nerve is injured, the subscapular will still function because it’s also innervated with the inferior subscapular nerve.
Winging of scapula, injury in the long thoracic nerve, serratus anterior muscle.
Lecture 4

Done by Ahmad Gharibeh

AXILLA:

Apex: the Apex is guarded and controlled by hard Objects (clavicle, Scapula, 1st Rip)

Base: formed by mobile skin, smooth in abduction, it has course hair and sweat glands.

Anterior Wall: formed by 3 M (pectoralis major and minor, subclavious).

Posterior Wall: formed by 3 M (latissimus Dorsi, Subscapularis m, Teres major m).

Medial Wall: Convex in shape formed by Intercostal spaces Serratus anterior m., Upper 4 ribs.)

Lateral Wall: formed by • Intertubercular groove (biceptal groove). • Long head of Biceps muscle.

Contents of the Axilla: "we name the structure according to the region".

1. **Axillary artery**: The heart pumps the blood to the Aortic artery which gives 3 branches:
   - Left Subclavian artery (beneath clavicle).
   - Left common Carotid A. (supplies head and neck which divides into external and internal Carotids).
   - Brachiocephalic (goes to the head through the right common Carotid and to the upper limb through Subclavian A.) the Axillary Artery is branched from the Subclavian A. Divided into 3 divisions according to pectoralis minor: above and behind and below pectoralis minor (1, 2, 3).

2. **Axillary vein**: same name and reversed direction of the Axillary artery.

   *Deep Veins in upper and lower limbs are accompanied with the arteries. (Venae comitantes)

   *Superficial Veins: 1) Cephalic (superior) 2) Basilic (inferior)

   *blood is taken from the medial cubical vein, which connects Basilic and Cephalic Veins, also Fluids are supplied in that spot.
3. **Axillary sheath** (for Isolation it’s formed by Deep Fascia and it covers the vessels).

4. Axillary lymph nodes.

5. Brachial plexus (Network) of nerves.

6. Axillary fat.

Humerus is the new name of Brachium.
Lecture 5

Done by Ahmad Ar’ar

Within the axillary sheath, we have:
- Axillary artery
- Axillary vein
- Cords of brachial plexus

Beside the axillary sheath, we have:
- Axillary lymph nodes

Lymph nodes group:
Anterior, posterior and lateral groups drain the central group, the central group drains the apical group, apical group (on the right side) -----> it drains into the right lymph trunk.

Deltoplectoral group is located between pectoralis major and deltoid muscles.

Importance of lymphatic system: carries the products of metabolism of cells from intercellular spaces -----> filtered by lymph nodes

Enlargement of lymph nodes reflects infection (it may be due to cancer).

Spinal segments,

Outer matter is white?! Full with nerve fibers

Inner matter is gray?! Full with nerve cells

(Light and dark as they appear in the microscope).

# Of segments: 31
# Of right spinal nerves: 31(mixed)
# Of left spinal nerves: 31(mixed)
Total # of spinal nerves: 62(mixed)
Each spinal nerve exits the vertebral column between two sequential vertebrae in a foramen (intervertebral foramen), then divides into two mixed branches; anterior (ventral) and posterior (dorsal) ramus.

**BRACHIAL PLEXUS**

**Trunks** are named (upper, middle and lower) according to their position in the neck, pass below clavicle (subclavius muscle) where each trunk divides into an anterior division (for flexors) and posterior division (for extensors).

**Cords** are named (lateral, posterior and medial) according to their position to the 2nd part of Axillary artery, each cord gives terminal branches.

Median nerve comes from both; medial and lateral cords by the union of medial root and lateral root.

**ANTERIOR COMPARTMENT OF ARM**

**Biceps:**

**Origin:** has two heads
Long head from supraglenoid tubercle -
- Short head from coracoid process

**Insertion:**
Radial tuberosity and bicipital aponeurosis

**Action:**
#1 Supination (prime supinator of forearm)
#2 Flexion
**Coracobrachialis:**

**Origin:**
Coracoid process

**Insertion:**
Medial aspect of shaft of humerus

**Action:**
According to Hilton's law which states; when a muscle crosses a joint, it should perform an action over it, this muscle crosses shoulder joint, so it assists in flexion of the **shoulder**.

(Flexes the **ARM**)

**Brachialis:**

**Origin:**
Front of lower half of humerus

**Insertion:**
Coronoid process of ulna

**Action:**
Flexion of **elbow joint** (prime flexor)

**Flexion of the elbow is done by:**

#1 brachialis (prime).

#2 biceps.

**to use screwdriver we use the biceps muscle.**
Lecture 6

Done by Mamoon Qatameen
2. Profunda brachii artery supplies the whole posterior compartment (upper arm).

3. Brachial artery lateral to the brachial vein.

4. Action for the Biceps is:
   - Primary supinator
   - Accessory flexor for the shoulder joint
   - Flexor for the forearm at elbow joint.

5. Tightening the screws is function for the Biceps.

6. Helton's law in any muscle crosses the joint should move it.

7. Coraco-brachialis is named according to its origin and insertion.

8. Brachialis is named according to the location.
General information.

1. The deep branch of brachial artery (profunda brachii Artery) two veins

2. Radial groove (radial nerve + profunda brachii Artery)

Clinical Case: any fracture in the radial groove involves the radial nerve and profunda brachii artery.

Wrist drop.

Clinical Case: any fracture of the Surgical neck of the humerus involves the axillary nerve & posterior circumflex artery and vein.

the Contents of Quadrangular space.
The bones of the forearm.
- Radius (lateral) - Ulna (medial)

- The most important features for the radius:
  - Deep bone - Long bone
    - Proximal + shaft + distal
      - Proximal - Head articulates with Capitulum
      - Neck - Narrow part
        - Good clinical landmark
      - Shaft - Convex lateral
      - Distal - Triangular in shape
        - Inferiorly articulates with the wrist bone.

- On the distal end you can feel the pulse of radial artery.
Clinical Case: Fracture at the distal end of radius may injure the radial artery.

→ The most important features for the Ulna:
  1. Subcutaneous
  2. Long bone
  3. Wrench-like
  4. Trochlear fossa
  5. Olecranon process

→ Caronoid process

Very important:

Elbow joint is only but only between Ulna and humerus.

→ It performs only two functions (flexion, extension)
- Agapath: Agapath
- Brachialis is the prime flexor for the elbow joint.

Clinical Case:
- Any fracture in the medial epicondyle of the humerus may involve the ulnar nerve.

1. If the median nerve is cut, you can't do pronation (ext. wrist).

2. If the radial nerve is cut, you can do assisted expiration (breaths move).
The upper limb from: 1) shoulder to head

- Elbow joint to shoulder joint skeleton (humerus)
- Wrist joint to elbow joint skeleton (ulna + radius)
- The hand

- Humerus
- In the posterior surface an oblique line (radial groove): Site for the radial nerve and profound brachii artery.

- Triangular in shape.
  - Anterior border
  - Lateral border
  - Medial border
  - Medial surface
  - Lateral surface
  - Posterior surface
ANTERIOR COMPARTMENT OF THE FOREARM

- Forearm is the part of the body that extends from the **ELBOW** to the **WRIST**.
- There are only two bones in the forearm: **MEDially (ULNA)** and **LATERALLY (RADIUS)**.

**Important note:** the elbow joint is simply an articulation between the Humerus and the Ulna (between Trochlea on Humerus and Trochlear fossa on Ulna).
- The radius is only for two movements: Supination and Pronation.
- Wrist bones = carpal bones are:
  *short bones
  *8 in number
  *arranged into two rows (Aisles) but **NOT LINES**.

**METAcarpals:** META=after

- A sentence to help you guys memorize the names of the carpal bones:

"سارة لازم تلعب بوكر تخسر تكسب كله هلس"

-Metacarpal bones are 5 in number and they are numbered from lateral to medial.
-The thumb (digit 1) has two phalanges: proximal and distal.
-The medial 4 fingers have 3 phalanges: proximal, middle and distal.

**SOME JOINTS:**

- Between the two rows of carpals: **Midcarpal joint**
- Between the carpals and metacarpals: **CarpoMetacarpal joint**.
- Between the metacarpals: **InterMetacarpal joint**.
*Cross section of the forearm is taken by CT: (Computerized Tomography)

- The deep fascia in the forearm sends two septa:

*Medial Septum to Ulna and Lateral septum to Radius.

(CUBITAL FOSSA):

If we want to do a surgery in the area anterior to the elbow the first thing we take care of is the (median cubital vein).

Contents from medial to lateral:

*Median nerve

*Brachial artery and its two terminal branches (Radial and Ulnar arteries)

*Biceptal tendon

* Radial nerve and its two branches (superficial and deep)

NOTE: Supination of the forearm is done by two muscles:

**Biceps muscle** (prime supinator) and **supinator muscle**.

- Muscles of the anterior compartment of the forearm are 8 in number.

*Superficial layer: 4 muscles

**All Originated from CFO**

-NOTE: The medial epicondyle of the humerus is the common flexor origin (CFO)

**All supplied by Median nerve Except (Flexor carpi Ulnaris) which is supplied by ulnar nerve**

-Now let's talk about the insertion and action of each one of them

<table>
<thead>
<tr>
<th>Name</th>
<th>Insertion</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronator Teres</td>
<td>Pronator tubercle on radius</td>
<td>Pronation</td>
</tr>
<tr>
<td>Flexor Carpi Radialis</td>
<td>Base of Second metacarpal (2MC)</td>
<td>Flexion of the wrist at the radial side</td>
</tr>
<tr>
<td>Palmaris Longus</td>
<td>Palmar Aponeurosis</td>
<td>Flexion of the wrist</td>
</tr>
<tr>
<td>Flexor Carpi Ulnaris</td>
<td>Pisiform bone, hamate and base of the fifth metacarpal</td>
<td>Flexion of the wrist at the ulnar side</td>
</tr>
</tbody>
</table>
Some Important notes:

* The pisiform is overriding the hamate.

* Pronator tubercle at the lateral midshaft of the radius is the site of maximum convexity.

The middle (intermediate) layer: 1 muscle

Flexor Digitorum Superficialis.

** It gives 4 tendons to flex the four medial fingers and when these tendons reach the proximal phalange they divide into two branches (splits), then these branches are inserted on the middle phalange.

** IMPORTANT QUESTION: Which muscle do you use when you scratch your back? Flexor Digitorum Superficialis.

The deep layer: 3 muscles

NOTES:

* We use flexor digitorum profundus for (Fine arts) such as: Drawing, playing piano, playing saxophone.

* The purpose of these three muscles: (FDS, FDP and Flexor pollicis longus) is to make a firm grip.

* Pollicis = Thumb.

* All muscles of the anterior compartment of the forearm are supplied by the median nerve except 1 and a half muscles:
  - Flexor carpi Ulnaris
  - Medial half of Flexor Digitorum Profundus (associated with the ring and little fingers).

How the tendons pass below Flexor retinaculum (through the carpal tunnel)??

* Tendons of flexor digitorum superficialis don’t pass in the same plane, the tendons going to the ring and middle fingers are superficial to the tendons going to the index and little fingers.

*** Don’t forget to study the origin and insertion of all the muscles of the anterior compartment of the forearm either from the book or from summaries uploaded on the group by my colleagues.

Good luck
Lecture 8

Done by Osama Al Zoubi