**MUSCULAR SYSTEM (CONTINUATION)**

**Muscles of the Forearm (Antebra chium Muscles)**

These muscles are divided into anterior and posterior antebrachium.

1. **Anterior antebrachium**

They are divided into 2 groups.

1. Superficial group
2. Deep group
3. **Superficial group**

We have

1. Pronator teres
2. Flexion carpi radialis
3. Palmaris longus
4. Flexor carpi ulnaris
5. Flexor digitorium supeficials or sublimis.
6. **Deep group**
7. Flexor digiturum profundus
8. Flexor policis longus
9. Pronator quadratus
10. **Pronator teres**

These muscles have two heads.

Origin: a) Humeral head (larger head)

1. Immediately above medial epicondyle of humerus.
2. Common flexor tendon at medial epicondyle of humerus.
3. Deep fascia of forearm.
4. Ulna head (smaller head)

Comes from the medial side coronoid process of ulna.

Insertion: Middle lateral surface shaft of radius.

Nerve supply: Median nerve C6,7

Action:

* It assists flexion of forearm.
* It pronates the forearm and hand (chief pronator of forearm).

1. **The flexor carpi radialis**

Origin:

* Common flexor tendon medial epindyle of humerus.
* Intermuscular septum between it and the adjacent muscles.
* Deep fascia of forearm.

Insertion: palmer surface of 2nd and 3rd metacarpal bones.

Nerve supply: Medial nerve C6,7.

Action:

* It weakly assists elbow flexion.
* It assists forearm pronation
* Flexes the wrist
* Abducts the hand (Radial deviation)

1. **Palmaris longus**

Origin:

* Common flexor tendon on medial epindyle of humerus.
* Intermuscular septum between it and the adjacent muscles.
* Deep fascia of fore arm.

Insertion:

* Flexor retinaculum.
* Central tendon of palmar aponeurosis.

Nerve supply- Median nerve C7,8.

Action:

* Flexes the wrist joint.

1. **Flexor carpi ulnas**

This muscle consists of a humeral head and an ulna head.

Origin:

1. Humeral head – common flexor tendon medial epicondyle of humerus.
2. Ulna head – Medial margin of olecranon process of ulna.

Insertion:

* Flexor retinaculum
* Fisiform bone
* 5th metacarpal bone

Nerve supply – Ulna nerve C7,8.

Action:

* Weakly assist elbow flexion.
* Flexes wrist
* It assists adduction of hand (ulna deviation)

1. **Flexor digitorum superficialis**

* It has 2 heads of origin.

1. Humerus ulna head- common flexor tendon from medial epicondyle of humerus.

Coronoid process of ulna.

1. Radial head- anterior surface of radius below radial tuberosity.

Insertion: Palmar surface middle phalanges of medial four digits. (fingers)

Nerve supply: Median nerve C7,8, T1

Action:

* It weakly assists flexion of elbow joint.
* Assists wrist flexion.
* Flexes DIP and MP joints of the medial four digits (fingers)

**The deep group**

1. **Flexor digitorum profundus**.

This is the bulkiest (biggest) of all the muscles of forearm.

Origin: It has 3 origins

* Medial surface of olecranon process of ulna bone.
* Upper ¾ of medial anterior surface of ulna
* Interosseous membrane between ulna and radius.

Insertion: Distal phalanges of four digits (fingers).

Nerve supply: Median nerve, Ulna nerve C8, T1

Actions:

* Flexes of wrist joint.
* It flexes DIP, PIP and M-P joints.

1. **Flexor pollicis longus**

This muscle inserts on the thumb hence the name pollicis.

Origin:

* Medial epicondyle of humerus.
* Interosseous membrane between radius and ulna
* Medial border of coranoid process of ulna.

Insertion: Palmer surface base insertion distal phalange of thumb.

Nerve supply: Median nerve C8, T1.

Action:

* Assist wrist flexion.
* Flexes phalanges of thumb.

1. **Pronator quadratus**

Origin:

* Lower anterior surface, shaft of ulna.
* Medial part, anterior surface lower quarter shaft of ulna.

Insertion: Lower quarter anterior surface shaft of radius

Nerve supply: Medial nerve C8, T1

Action: It initiates forearm pronation it is a weak pronator.

Summary: All muscles on the anterior antebrachium are supplied by the median nerve.

**POSTERIOR ANTEBRACHIAL MUSCLES**

These mms are also divided into 2 groups.

1. Superficial group
2. Deep group

**Superficial group**

1. Brachioradialis
2. Extensor carpi radialis longus (long)
3. Extensor carpi radialis brevis (short)
4. Extensor digitorum communis.
5. Extensor digits minimi (little finger)
6. Extensor carpi ulnas
7. Anconeus

**Deep group**

1. Supinator
2. Abductor pollicis longus
3. Extensor pollicis brevis
4. Extensor pollicis longus
5. Extensor indicis (index finger)
6. **Brachioradialis**

Origin: Upper 2/3 lateral supracondylar ridge of humerus

Insertion: Lateral lower end of radius above styloid process.

Nerve supply: Radio nerve C5,6.

Action: Is a flexor of the elbow joint.

1. **Extensor carpi radialis longus**

Origin: Common extensor tendon, from lateral epicondyle of humerus.

Insertion: 2nd metacarpal bone

Nerve supply: Radial nerve C5, 6

Action:

* Extends wrist joint.
* Abducts hand (radial deviation)
* It assists elbow flexion
* Forearm supination.

1. **Extensor carpi radialis brevis**

Origin:

* Common extensor tendon from lateral epicondyle of humerus.
* Radial collateral ligament of elbow joint.

Insertion: Dorsal surface of 3rd meta-carpal nerve bone.

Nerve supply: Nerve – Radial C7,8.

Actions:

* Wrist extension
* Abduction of the hand (radial deviation)
* Assist elbow flexion.

1. **Extensor digitorum communis**

Origin:

* Common extensor tendon from lateral epicondyle of humerus.
* Intermuscular septum between it and adjacent muscles.
* Deep fascia of forearm covering it.

Insertion: Middle and distal phalanges of the medial four digits (fingers).

Nerve supply: Radial nerve C7,8.

Action:

* It extends fingers at PIP & DIP joints.

1. Interphalangeal joints
2. Intermetacarpophalangeal joints as in opening and relaxing grip.

* Assists wrist extension.
* Abducts index, ring and little finger as it extents them.

1. **Extensor digits minimi**

Origin:

* Common extensor tendon lateral epicondyle of humerus.
* Intermuscular septum between it and adjacent muscles.

Insertion: Little finger (5th digit).

Nerve supply: Radial nerve C7,8

Action:

* It extends the little fingers at DIP and PIP joints.
* Assist wrist extension.

1. **Extensor carpi ulnas**

Origin:

* Common extensor tendon from lateral epicondyle of humerus.
* Posterior border of ulna.

Insertion: 5th metacarpal bone.

Nerve supply: Radial nerve C7,8.

Action:

* Extends wrist.
* Abducts hand (ulna deviation).

1. **Anconeus muscle**

Origin: Posterior surface lateral epicondyle of humerus.

Insertion: Lateral side of olecranon process of ulna.

Nerve supply: radial nerve C7,8 (T1)

Action: It is a feable weak extensor of elbow joint.

**DEEP GROUP**

1. **Supinator**

Origin:

1. The superficial part or head.
2. Distal surface of lateral epicondyle of humerus.
3. Lateral ligament of elbow.
4. Deep part or head- It originates from superior crest of ulna

Insertion: Upper 1/3 lateral surface of radius.

Nerve supply: Radial nerve C5,6.

Action: Supinates the forearm.

1. **Abductor pollicis longus**

Origin:

* Lateral posterior surface of ulna
* Interosseous membrane between radius and ulna.
* Middle 1/3 posterior surface of radius.

Insertion: Radial side and base of 1st metacarpal bone.

Nerve supply: Radial nerve C7,8

Action:

* Abducts thumb
* Abducts wrist (Radial deviation)
* Assist extension of the carpo-metacarpal joint of the thumb.

1. **Extensor pollicis brevis**

Origin:

* Posterior surface of radial shaft.
* Interosseous membrane between radius and ulna.

Insertion: Dorsal surface proximal phalange of thumb

Nerve supply: Radial nerve C7,8.

Action:

* Extends proximal phalange of thumb.
* Extends metacarpal bone.
* Assist wrist abduction. (radial deviation)

1. **Extensor pollicis longus**

Origin:

* Middle 1/3 and posterior surface of ulna.
* Interosseous membrane between radius and ulna.

Insertion: Distal phalange of thumb.

Nerve supply: Radial nerve C7,8.

Action:

* Extends distal pharynx of thumb.

1. **Extensor indicis**

Origin:

* Posterior surface, shaft of ulna.
* Interosseous membrane between radius and ulna.

Insertion: Index finger.

Nerve supply: Radial nerve C7,8.

Action:

* Extends index finger at DIP, PIP and M-P joints.
* Assist extension of wrist joint.

**MUSCLES OF THE HAND**

MMs of the hand are divided into 3 groups.

1. Lateral palm – (Thumb MMs/Thenar eminence)
2. Medial palm – (Little finger MMs/ Hypothenar eminence).
3. Intermediate of palm – Middle of palm of hand.
4. Thenar eminence muscles
5. Abductor pollicis brevis.
6. Flexor pollicis brevis.
7. Opponens pollicis
8. Adductor pollicis brevis.
9. Hypothenar eminence muscles
10. Palmaris brevis
11. Abductor digiti minimi
12. Flexor digiti minimi brevis
13. Oppones digiti minimi
14. MMs of middle palm region
15. Lumbricals
16. Dorsal interossei
17. Palmar interossei

**Diagram showing the 3 groups of muscles**.

**Thenar eminence MMs**

1. Abductor pollicis brevis
2. Flexor pollicis brevis
3. Opponens pollicis

**Origin of the 3 MMs**

* Tubercle of scaphoid and trapezium bones.

Insertion: Lateral side of the base of the proximal of the thumb.

Nerve supply: Median nerve C8, T1

Action:

* Abductor pollicis brevis - Abducts thumb at MP- Joints.
* Flexor pollicis brevis - Flexes thumb at Mp joints
* Oppones pollicis - Does opposition of thumb towards the medial palm (little finger region)

**Adductor pollicis brevis**

Origin: Consist of two heads

* Oblique head
* Transverse head

1. Oblique head – from capitate, trapezoid, 2nd and 3rd metacarpals bone.
2. Transverse head – distal 2/3 of palmar surface of 3rd metacarpal bone.

Insertion: Medial side of proximal phalange of thumb.

Nerve supply: Ulna nerve C8, T1

Action:

* Abducts the thumb.
* Assists thumb opposition.

**Hypothenar eminence**

1. **Palmaris brevis**

This is a small muscle lying superficially over hypothenar eminence region.

Origin:

* Flexor retinaculum
* Palmer aponeurosis

Insertion: Skin on medial side of hand

Nerve supply: Ulna nerve C8, T1

Action:

* Wrinkle the skin over hypothenar eminence.
* It deepens the hollow of hand.
* It contributes to strengthening the grip of the hand.

1. **Abductor digiti minimi**

Origin: Fusiform and

* Tendon of flexor carpi ulnaris

Insertion:

* Medial side of base of proximal phalange of little finger.

Nerve supply: Ulna nerve C8,T1

Action: Abducts and flexes little finger at M-P joints.

1. **Flexor digiti minimi brevis**

Origin: Flexor retinaculum and hamate bone.

Insertion: Medial side of base of proximal phalange of the little finger.

Nerve supply: Ulna nerve C8,T1

Action: Flexes M-P of little finger.

1. **Opponens digiti minimi**

* Flexor retinaculm
* Hamate bone

Insertion: Medial surface of the 5th metacarpal bone.

Nerve supply: Ulna nerve C8, T1

Action:

* Does opposition of little finger towards the lateral palm (thumb)
* Deepens the hollow of the hand

**The middle palm region**

This consists of:

1. Lumbricals
2. Interosseous
3. **The lumbricals**

They are four in number 1,2,3& 4.

Origin: From flexor digitorum profundus tendons to their respective fingers except the thumb

Insertion: lateral side of the base of proximal and dorsal phalanges of 2nd to 5th digit.

Nerve supply: 1st and 2nd lumbrical – median nerve

* 3rd and 4th lumbrical – ulna nerve

Action:

* Flexes M-P joints
* Extends DIP and PIP joints of 2nd to 5th digit

1. **Interossei**

These are divided into 2 groups

* Dorsal interossei
* Palmar interossei