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ANATOMY

The carpometacarpal (CMC) joint of the thumb is a synovial saddle joint.

2. It is an articulation between the trapezium and the base of the first metacarpal.

3. The two surfaces are reciprocally concavoconvex.

4. A loose but strong fibrous capsule encloses the joint.

5. Movements of flexion, extension, abduction, adduction and opposition occur at this joint.

BONY LANDMARKS TO BE PALPATED

**LIGAMENTS**

Table 7.1

<table>
<thead>
<tr>
<th>Ligament</th>
<th>Origin</th>
<th>Insertion</th>
<th>Limitation to movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial carpometacarpal ligament</td>
<td>Lateral surface of the trapezium</td>
<td>Lateral surface of the first metacarpal</td>
<td></td>
</tr>
<tr>
<td>Anterior oblique ligament</td>
<td>Anterior surface of the trapezium</td>
<td>Medial side of the first metacarpal</td>
<td>Taut posterior oblique ligament</td>
</tr>
<tr>
<td>Posterior oblique ligament</td>
<td>Posterior surface of the trapezium</td>
<td>Medial side of the first metacarpal</td>
<td>Taut anterior oblique ligament</td>
</tr>
</tbody>
</table>

**MUSCLES**

Extensors

Table 7.2

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Nerve supply</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensor pollicis longus</td>
<td>Middle third of posterior surface of ulna and interosseous membrane</td>
<td>Dorsal surface of the distal phalanx of thumb</td>
<td>Posterior interosseous branch of the radial nerve C7, 8</td>
<td>Extension and radial deviation of the wrist. Extension of all the thumb joints</td>
</tr>
<tr>
<td>Extensor pollicis brevis</td>
<td>Middle part of the posterior surface of the radius and interosseous membrane</td>
<td>Dorsal surface of the base of the proximal phalanx</td>
<td>Posterior interosseous branch of the radial nerve C7, 8</td>
<td>Extension and radial deviation of the wrist. Extension of the carpometacarpal and metacarpophalangeal (MCP) joints of the thumb</td>
</tr>
</tbody>
</table>
### Flexors

**Table 7.3**

The flexors of the thumb

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Nerve supply</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexor pollicis longus</td>
<td>Upper anterior surface of radius and interosseous membrane</td>
<td>Palmar surface of distal phalanx of the thumb</td>
<td>Anterior interosseous branch of median nerve C8, T1</td>
<td>Flexion of the wrist joint. Flexion of the interphalangeal and metacarpophalangeal joints of the thumb. Vital in all gripping activities</td>
</tr>
<tr>
<td>Flexor pollicis brevis</td>
<td>Flexor retinaculum, tubercle of the trapezium, capitate and trapezoid</td>
<td>Radial side of the base of the proximal phalanx of the thumb</td>
<td>Median nerve T1</td>
<td>Flexion of the carpometacarpal and metacarpophalangeal joints of the thumb. It also produces medial rotation of the thumb</td>
</tr>
</tbody>
</table>

### Abductors, adductors and opposers

**Table 7.4**

The abductors, adductors

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Nerve supply</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abductor pollicis longus</td>
<td>Upper, posterior surface of ulna, middle third of the posterior surface of the radius and the interosseous membrane</td>
<td>Radial side of the base of the first metacarpal</td>
<td>Posterior interosseous branch of the radial nerve C7, 8</td>
<td>Working with abductor pollicis brevis it abducts the thumb. Working with the extensors it extends the thumb at the CMC joint. Working by itself it moves the thumb into a mid-extended and abducted position</td>
</tr>
<tr>
<td>Abductor pollicis brevis</td>
<td>Flexor retinaculum, and tubercles of scaphoid and trapezium</td>
<td>Radial side of proximal phalanx of the thumb</td>
<td>Median nerve T1</td>
<td>Abduction of the thumb at the CMC and MCP joints</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 7.4 (Continued)

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Nerve supply</th>
<th>Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opponens pollicis</td>
<td>Flexor retinaculum and tubercle of the trapezium</td>
<td>Lateral half of the anterior surface of the first metacarpal</td>
<td>Median nerve T1</td>
<td>Opposition of the thumb – abduction, medial rotation, and flexion and adduction of the CMC joint. This allows precise hand actions to take place</td>
</tr>
<tr>
<td>Palmaris brevis</td>
<td>Palmar aponeurosis and flexor retinaculum</td>
<td>The skin of the medial border of the hand</td>
<td>Ulnar nerve T1</td>
<td>This muscle wrinkles the skin on the ulnar side of the hand and assists the thumb in producing a good grip</td>
</tr>
</tbody>
</table>

MEASUREMENT

RANGE OF MOVEMENT – CARPOMETACARPAL (CMC) JOINT OF THE THUMB

Abduction

![Fig 7.1](image)  
**Fig 7.1** Goniometric measurement of the carpometacarpal joint of the thumb – abduction.

Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in the
mid-position, their wrist is in the anatomical position and the thumb maintains contact with the metacarpal of the index finger.

**Goniometer axis:** The axis of the goniometer is placed at the junction of the bases of the first and second metacarpal. (A small goniometer is required.)

**Stationary arm:** This is parallel to the longitudinal axis of the second metacarpal.

**Moveable arm:** This is parallel to the longitudinal axis of the first metacarpal. In the start position this will indicate 15–20°. Record as 0°.

**End position:** The thumb is abducted to the limit of motion (70°).

**Flexion/extension**

![Fig 7.2 Goniometric measurement of the carpometacarpal joint of the thumb – flexion and extension.](image)

**Starting position:** The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in supination and their wrist is in neutral.

**Goniometer axis:** The axis of the goniometer is placed over the CMC joint of the thumb. (A small goniometer is required.)

**Stationary arm:** This is parallel to the longitudinal axis of the radius.

**Moveable arm:** This is parallel to the longitudinal axis of the thumb metacarpal.

**End position:** Flexion – the thumb if flexed across palm (15°). Extension – the thumb is extended away from the palm (20°).
RANGE OF MOVEMENT – METACARPOPHALANGEAL (MCP) JOINT OF THE THUMB

Flexion

Fig 7.3 Goniometric measurement of finger metacarpophalangeal (MCP) flexion.

Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in the mid-position and their wrist is slightly extended. The MCP joint being measured is in 0° of extension.

Stabilization: The clinician stabilizes the metacarpal.

Goniometer axis: The axis of the goniometer is placed over the dorsal aspect of the joint being measured. (A small goniometer is required.)

Stationary arm: This is parallel to the longitudinal axis of the shaft of the metacarpal.

Moveable arm: This is parallel to the longitudinal axis of the proximal phalanx.

End position: The MCP joint is flexed to the limit of motion.

Clinical tip
During the movement the interphalangeal (IP) joint is allowed to flex.
RANGE OF MOVEMENT – INTERPHALANGEAL (IP) JOINT OF THE THUMB

Flexion

Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in the mid-position and their wrist is slightly extended. The IP joint being measured is in 0° of extension.

Stabilization: The clinician stabilizes the metacarpal.

Goniometer axis: The axis of the goniometer is placed over the dorsal aspect of the joint being measured.

Stationary arm: This is parallel to the longitudinal axis of the shaft of the proximal phalanx.

Moveable arm: This is parallel to the longitudinal axis of the distal phalanx.

End position: The thumb is flexed to the limit of motion.
RANGE OF MOVEMENT – METACARPOPHALANGEAL (MCP) JOINT OF THE FINGER

Flexion

Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in pronation and their wrist is extended. The MCP joint being measured is in 0° of extension.

Stabilization: The clinician stabilizes the metacarpal.

Goniometer axis: The axis of the goniometer is placed over the dorsal aspect of the joint being measured.

Stationary arm: This is parallel to the longitudinal axis of the shaft of the metacarpal.

Moveable arm: This is parallel to the longitudinal axis of the proximal phalanx.

End position: The MCP joint is flexed to the limit of motion.

Clinical tip
During the movement the proximal interphalangeal (PIP) joint is allowed to flex and the distal interphalangeal (DIP) joint remains in extension.
RANGE OF MOVEMENT – METACARPOPHALANGEAL (MCP) JOINT OF THE FINGER

Abduction

Fig 7.6  Goniometric measurement of finger metacarpophalangeal (MCP) abduction.

Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in pronation and their wrist is in neutral.

Stabilization: The clinician stabilizes the metacarpals.

Goniometer axis: The axis of the goniometer is placed over the dorsal surface of the MCP joint being measured.

Stationary arm: This is parallel to the long axis of the shaft of the metacarpal.

Moveable arm: This is parallel to the long axis of the proximal phalanx.

End position: The finger is moved away from the mid-line.

Alternate method: The patient spreads his/her hand out on a page. The clinician draws round the hand. After the patient removes their hand, the clinician records the linear measurement between the mid-point of each finger.
Starting position: The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in pronation and their wrist and fingers are in extension (0° of extension at the MCP and IP joints).

Stabilization: The clinician stabilizes the phalanx, proximal to the joint being measured.

Goniometer axis: The axis of the goniometer is placed over the dorsal surface of the PIP joint being measured.

Stationary arm: This is parallel to the longitudinal axis of the proximal phalanx.

Moveable arm: This is parallel to the longitudinal axis of the middle phalanx.

End position: The PIP joint is flexed to the limit of motion.
**RANGE OF MOVEMENT – DISTAL INTERPHALANGEAL (DIP) JOINT OF THE FINGER**

**Flexion/extension**

**Starting position:** The patient is positioned in sitting, their arm supported on a table. Their elbow is flexed, their forearm is in supination and their wrist and fingers are in extension (0° of extension at the MCP and IP joints).

**Stabilization:** The clinician stabilizes the phalanx, proximal to the joint being measured.

**Goniometer axis:** The axis of the goniometer is placed over the dorsal surface of the DIP joint being measured.

**Stationary arm:** This is parallel to the longitudinal axis of the middle phalanx.

**Moveable arm:** This is parallel to the longitudinal axis of the distal phalanx.

**End position:** The DIP joint is flexed to the limit of motion.
### Observational/reflective checklist

<table>
<thead>
<tr>
<th>Observation</th>
<th>Y/N</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction and preparation for the skill</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the treatment area properly prepared for the patient, e.g. pillow, blanket, safe environment, etc.?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the therapist introduce him/herself?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the patient comfortable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the patient adequately exposed/draped?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was an explanation of the procedure given?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the explanation clear and succinct?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was consent obtained?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performing the skill</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the plinth set at the correct height?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the therapist's posture compromised?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the therapist identify the joint and other relevant bony landmarks?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the goniometer correctly aligned?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the reading of the joint range of movement accurate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the therapist compare both sides of the body?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safe and effective performance of the technique</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was the procedure carried out with due care and attention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>How would you rate the proficiency in the overall performance of the skill?</strong></td>
<td>Excellent</td>
<td>Very good</td>
</tr>
</tbody>
</table>