

## JUDUL KETERAMPILAN KLINIS SISTEM MUSKULOSKELETAL

Penulis: dr. Dwi Prayogi, Sp.OT

### I. Tingkat Kompetensi Keterampilan

Berdasarkan standar kompetensi dokter yang ditetapkan oleh KKI tahun 2020, maka tingkat kompetensi pemeriksaan muskuloskeletal adalah seperti yang tercantum dalam tabel 1.

Tabel 1. Tingkat kompetensi ketrampilan pemeriksaan fisik sistem muskuloskeletal (KKI, 2020)

No	Keterampilan	Tingkat Keterampilan
	<i>Pemeriksaan Fisik</i>	
1	Inspeksi <i>gait</i>	4
2	Inspeksi tulang belakang saat berbaring dan bergerak	4
3	Inspeksi tonus otot ekstremitas	4
4	Inspeksi sendi ekstremitas	4
5	Inspeksi postur tulang belakang/ pelvis	4
6	Inspeksi posisi scapula	4
7	Inspeksi fleksi dan ekstensi tulang belakang	4
8	Penilaian fleksi lumbal	4
9	Penilaian fleksi ekstensi, adduksi, abduksi dan rotasi panggul	4
10	Menilai atrofi otot	4
11	Penilaian ligamen krusiatatus dan kolateral lutut	4
12	Penilaian meniscus	3
13	Inspeksi postur dan bentuk kaki	4
14	Penilaian fleksi dorsal/plantar, inversi dan eversi kaki	4
15	<i>Palpation for tenderness</i>	4
16	Palpasi untuk mendeteksi nyeri diakibatkan tekanan vertical	4
17	Palpasi tendon dan sendi	4
18	Palpasi tulang belakang, sendi sakro-iliaka dan otot-otot punggung	4
19	<i>Percussion for tenderness</i>	4
20	Penilaian <i>range of motion (ROM)</i> sendi	4
21	Menetapkan ROM kepala	4
22	Tes fungsi otot dan sendi bahu	4
23	Tes fungsi sendi pergelangan tangan, metacarpal dan jari-jari tangan (Tanda Phallen, Tanda Tinnel, Tanda Luthy, Tanda Gower, dll)	4
24	Pengukuran panjang ekstremitas bawah	4

Keterangan:

Tingkat kemampuan 1 Mengetahui dan Menjelaskan

Tingkat kemampuan 2 Pernah Melihat atau pernah didemonstrasikan

Tingkat kemampuan 3 Pernah melakukan atau pernah menerapkan di bawah supervisi

Tingkat kemampuan 4 Mampu melakukan secara mandiri

## II. Tujuan Belajar

1. Mahasiswa mampu menjelaskan konsep pengetahuan tentang pemeriksaan fisik sistem muskuloskeletal (jenis keterampilan pada tabel 1).
2. Mahasiswa mampu melakukan pemeriksaan fisik sistem muskuloskeletal dengan benar dan menginterpretasi hasil pemeriksaan fisik sistem muskuloskeletal

## III. Prerequisite knowledge

Sebelum memahami konsep pemeriksaan fisik sistem muskuloskeletal, mahasiswa harus:

1. Memahami anatomi anggota gerak atas, anggota gerak bawah, dan tulang belakang
2. Memahami fisiologi anggota gerak atas, anggota gerak bawah, dan tulang belakang
3. Mengenal alat bantu diagnostik pada pemeriksaan fisik sistem muskuloskeletal
4. Memahami kelainan patologi pada sistem muskuloskeletal

## IV. Kegiatan Pembelajaran

Pembelajaran dilakukan dalam tahapan sebagai berikut:

Tahapan pembelajaran	Lama	Metode	Pelaksana/ Penanggung Jawab
Praktikum Keterampilan Klinik	2 x 100 menit	Demonstrasi/audiovisual, Role play, feedback	Dosen Pakar
Praktikum keterampilan klinik mandiri	Tentative	Role play dengan Asisten Laboratorium (Aslab)	Aslab
Evaluasi	Tentative	Evaluasi dilakukan pada akhir semester dalam bentuk OSCE	Tim OSCE

## V. Sumber belajar

## **Fisiologi Sistem Muskuloskeletal**

Reaksi inflamasi ditandai oleh serangkaian proses biokimia sebagai respon terhadap injuri akibat trauma atau tindakan pembedahan, metabolik atau proses infeksi. Tanda – tanda klinis inflamasi (*Cardinal sign*) meliputi erythema (rubor), oedema lokal (tumor), peningkatan temperature dalam jaringan (calor), dan nyeri (dolor).

Vasodilatasi lokal yang mengakibatkan ekstrasvasasi cairan menuju ruang ekstra selular dan ekstra vascular, serta terhambatnya aliran system limphatik berperan dalam terjadinya erythema, oedema local dan peningkatan temperatur dalam jaringan. Tanda klinis inflamasi yang keempat berupa nyeri timbul sebagai akibat pembengkakan jaringan yang secara mekanik menekan jaringan lunak sekitarnya dan iritasi kimia yang ditimbulkan oleh mediator inflamasi pada reseptor saraf sensoris.

Fase inflamasi akut berlangsung segera setelah terjadi injuri dan berlangsung selama 24 sampai 48 jam meskipun dalam beberapa kondisi dapat berlangsung sampai 3 minggu.

Fase proliferaatif dapat terjadi pada awal fase inflamasi, meskipun sebagian besar terjadi pada hari ke-21 paska injuri.

Fase remodeling atau formasi matriks mulai terjadi pada minggu ketiga dan dapat berlangsung selama dua tahun.

## **Panduan Tata Cara Pemeriksaan Sistem Muskuloskeletal**

Anamnesis dan pemeriksaan klinis merupakan serangkaian proses yang sistematis yang perlu dipelajari, dilatih dan diterapkan dalam rangka mendapatkan diagnosis dan tata laksana yang tepat. Proses ini memerlukan waktu dan latihan yang berulang-ulang.

Dengan memperhatikan kondisi pasien pada saat masuk ke dalam ruang pemeriksaan dapat memberikan gambaran secara umum tentang kondisi pasien dan kadang-kadang pemeriksa dapat mengetahui kepribadian pasien. Memperkenalkan diri kepada pasien, menanyakan nama pasien dan pengantar, serta hubungan antara pasien dan pengantar

Dokter harus mendengarkan dan memperhatikan setiap perkataan pasien dan mendokumentasi setiap pernyataan pasien yang berhubungan dengan kondisi pasien. Dokter sebaiknya mengarahkan alur pembicaraan dengan menghindari pertanyaan yang mengarahkan pasien.

Dalam pemeriksaan klinis, dokter senantiasa menjelaskan setiap pemeriksaan yang akan dilakukan dan mengapa pemeriksaan tersebut perlu dilakukan untuk mengurangi kecemasan pasien. Pemeriksaan klinis terhadap pasien harus dilakukan secara gentle tanpa menimbulkan nyeri dan dalam kondisi yang nyaman bagi pasien.

Anamnesis meliputi keluhan utama, riwayat seputar keluhan utama, riwayat sebelumnya, riwayat pengobatan, riwayat keluarga, riwayat sosial dan pekerjaan, riwayat pribadi, dan harapan pasien terhadap kondisinya.

Pemeriksaan klinis meliputi :

1. Pemeriksaan kondisi umum

Meliputi pemeriksaan pasien secara menyeluruh. Keadaan umum, status mental, ada tidaknya anemia, jaundice, cyanosis, clubbing, perubahan kulit dan kuku, pedal oedema, demam, deformitas pada sendi dan tulang yang multiple dan manifestasi klinis yang lain.

## 2. Pemeriksaan status lokalis

Meliputi pemeriksaan

- Inspeksi (Look),
- Palpasi (Feel),
- Movement (gerak), meliputi pemeriksaan gerak aktif dan pasif, pengukuran ruang lingkup gerak sendi (Range of Movement) dengan menggunakan goniometer
- Pengukuran dengan alat bantu
- Status neurovascular

Pemeriksaan pada kondisi bengkak atau swelling, meliputi :

- Lokasi
- Ukuran
- Warna



- Suhu
- Tenderness
- Bentuk
- Permukaan; halus, irregular, berbungkul
- Tepi; tegas, tidak tegas
- Konsistensi; lunak, padat kenyal, keras
- Redusibilitas
- Fluktuasi
- Pulsatile
- Transiluminasi
- Hubungan dengan jaringan sekitar
- Fiksasi terhadap tulang atau kulit
- Pembesaran Kelenjar Getah Bening regional
- Status neurovaskular, sendi dan tulang

Pemeriksaan pada kondisi Ulkus, meliputi :

- Lokasi
- Ukuran dan bentuk
- Warna

- Suhu
- Tenderness
- Dasar luka
- Tepi ulkus
- Kedalaman ulkus
- Discharge
- Pembesaran Kelenjar Getah Bening regional
- Status neurovaskular, sendi dan tulang

Pada kasus trauma, pemeriksaan klinis mengacu pada kaidah-kaidah di dalam **Advanced Trauma Life Support (ATLS)**, yang mengidentifikasi dan secara simultan melakukan penatalaksanaan secara dini pada kondisi atau keadaan yang mengancam nyawa.

**Table 2.1: ATLS® approach to managing the trauma patient**

*Primary survey*

1. Airway with cervical spine control
2. Breathing
3. Circulation with hemorrhage control
4. Disability
5. Exposure
6. Re-evaluation
7. Adjuncts to the primary survey

*Secondary survey*

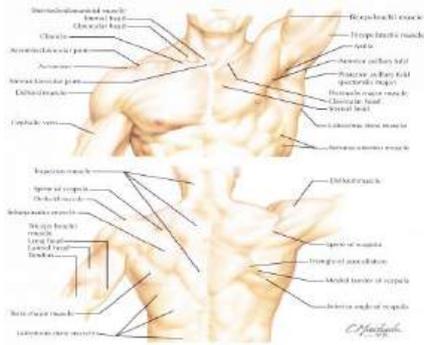
1. History
2. Examination
3. Adjuncts to the secondary survey

Secara umum, pemeriksaan sistem muskuloskeletal mengikuti pola sebagai berikut :

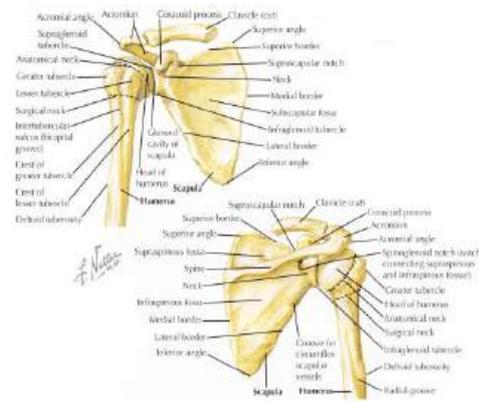
1. Inspeksi (Look)
2. Palpasi (Feel)
3. Movement, meliputi gerak aktif dan pasif
4. Pemeriksaan klinis khusus, meliputi pemeriksaan ligament, pemeriksaan status neurologis
5. Pemeriksaan Tambahan, meliputi radiografi, ultrasound, CT scan, MRI, Doppler, pengukuran tekanan kompartemen

## **Anatomi Anggota Gerak Atas**

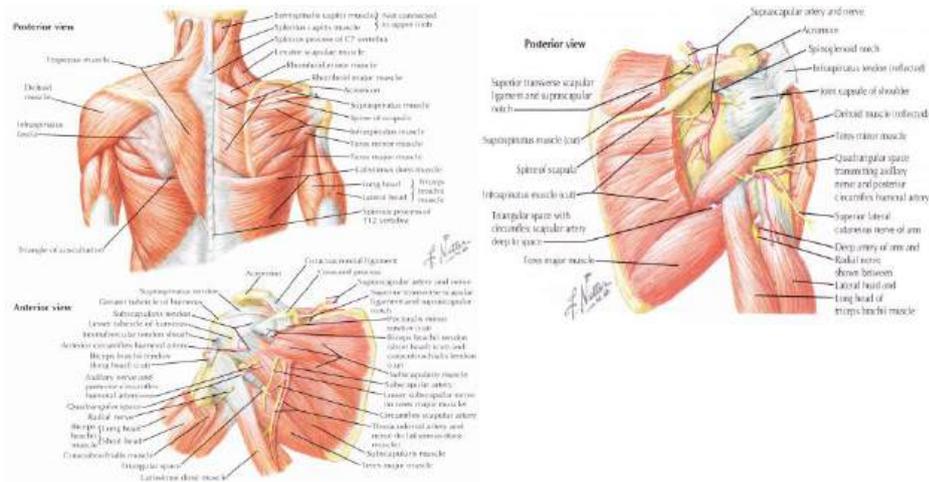
### **A. Shoulder / Bahu**



**Gambar A.1. Anatomi Topografi Bahu**



**Gambar A.2. Anatomi Osteologi Bahu**



**Gambar A.3. Anatomi Otot-Otot Bahu**

**Table 5-11**  
**Muscles About the Shoulder: Their Actions, Nerve Supply, and Nerve Root Derivation**

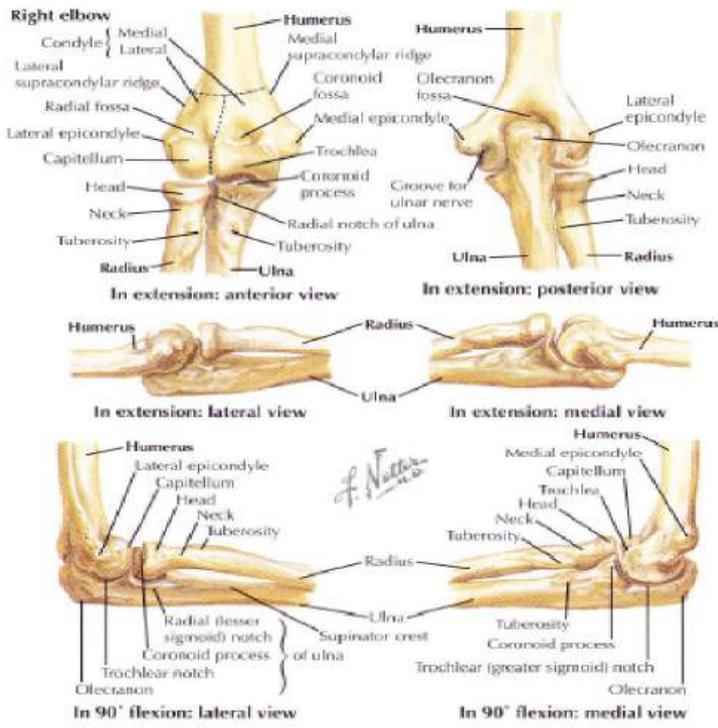
Action	Muscles Acting	Nerve Supply	Nerve Root Derivation
Forward flexion	1. Deltoid (anterior fibers)	Axillary (circumflex)	C5-C6 (posterior cord)
	2. Pectoralis major (clavicular fibers)	Lateral pectoral	C5-C6 (lateral cord)
	3. Coracobrachialis	Musculocutaneous	C5-C7 (lateral cord)
	4. Biceps (when strong contraction required)	Musculocutaneous	C5-C7 (lateral cord)
Extension	1. Deltoid (posterior fibers)	Axillary (circumflex)	C5-C6 (posterior cord)
	2. Teres major	Subscapular	C5-C6 (posterior cord)
	3. Teres minor	Axillary (circumflex)	C5-C6 (posterior cord)
	4. Latissimus dorsi	Thoracodorsal	C6-C8 (posterior cord)
	5. Pectoralis major (sternocostal fibers)	Lateral pectoral	C5-C6 (lateral cord)
	6. Triceps (long head)	Medial pectoral	C8, T1 (medial cord)
Horizontal adduction	1. Pectoralis major	Radial	C5-C8, T1 (posterior cord)
	2. Deltoid (anterior fibers)	Lateral pectoral	C5-C6 (lateral cord)
Horizontal abduction	1. Deltoid (posterior fibers)	Axillary (circumflex)	C5-C6 (posterior cord)
	2. Teres major	Subscapular	C5-C6 (posterior cord)
	3. Teres minor	Axillary (circumflex)	C5-C6 (brachial plexus trunk)
	4. Infraspinatus	Suprascapular	C5-C6 (brachial plexus trunk)
Abduction	1. Deltoid	Axillary (circumflex)	C5-C6 (posterior cord)
	2. Suprascapular	Suprascapular	C5-C6 (brachial plexus trunk)
	3. Infraspinatus	Suprascapular	C5-C6 (brachial plexus trunk)
	4. Subscapularis	Subscapular	C5-C6 (posterior cord)
	5. Teres minor	Axillary (circumflex)	C5-C6 (posterior cord)
	6. Long head of biceps (if arm laterally rotated first, trick movement)	Musculocutaneous	C5-C7 (lateral cord)
Adduction	1. Pectoralis major	Lateral pectoral	C5-C6 (lateral cord)
	2. Latissimus dorsi	Thoracodorsal	C6-C8 (posterior cord)
	3. Teres major	Subscapular	C5-C6 (posterior cord)
	4. Subscapularis	Subscapular	C5-C6 (posterior cord)
Medial rotation	1. Pectoralis major	Lateral pectoral	C5-C6 (lateral cord)
	2. Deltoid (anterior fibers)	Axillary (circumflex)	C5-C6 (posterior cord)
	3. Latissimus dorsi	Thoracodorsal	C6-C8 (posterior cord)
	4. Teres major	Subscapular	C5-C6 (posterior cord)
	5. Subscapularis (when arm is by side)	Subscapular	C5-C6 (posterior cord)

**Table 5-11**  
**Muscles About the Shoulder: Their Actions, Nerve Supply, and Nerve Root Derivation (Continued)**

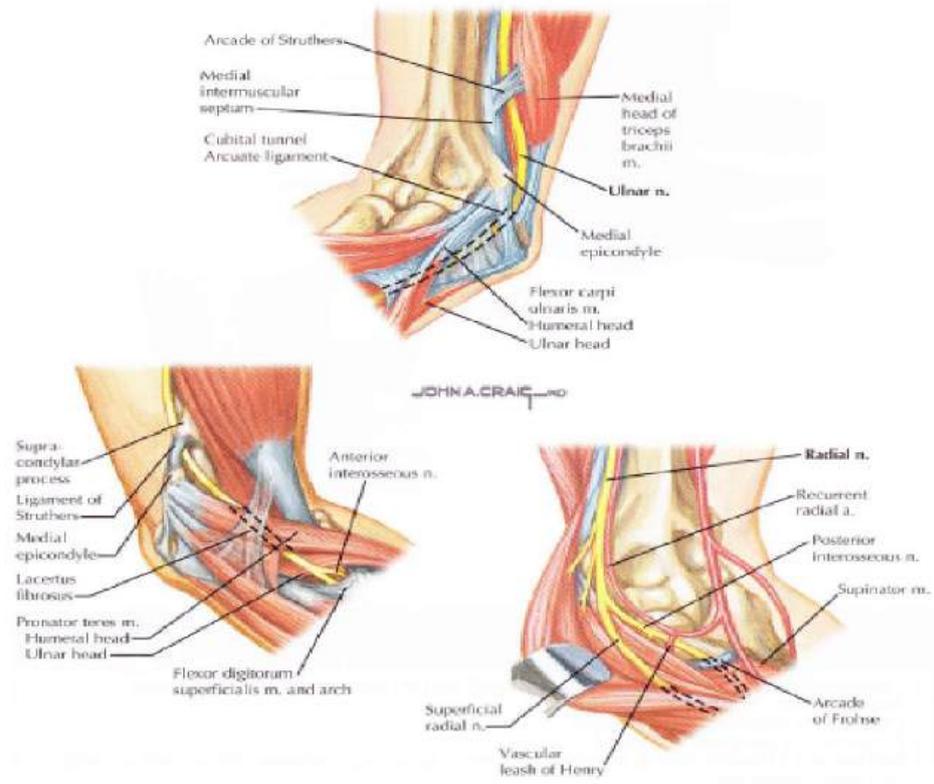
Action	Muscles Acting	Nerve Supply	Nerve Root Derivation
Lateral rotation	1. Infraspinatus	Suprascapular	C5-C6 (brachial plexus trunk)
	2. Deltoid (posterior fibers)	Axillary (circumflex)	C5-C6 (posterior cord)
	3. Teres minor	Axillary (circumflex)	C5-C6 (posterior cord)
Elevation of scapula	1. Trapezius (upper fibers)	Accessory	Cranial nerve XI
	2. Levator scapulae	C3-C4 nerve roots	C3-C4
	3. Rhomboid major	C3-C4 nerve roots	C3-C4
	4. Rhomboid minor	Dorsal scapular	C5
	5. Serratus anterior	Dorsal scapular	(C4), C5
Depression of scapula	1. Serratus anterior	Dorsal scapular	(C4), C5
	2. Pectoralis major	Long thoracic	C5-C6, (C7)
	3. Pectoralis minor	Lateral pectoral	C5-C6 (lateral cord)
	4. Latissimus dorsi	Medial pectoral	C8, T1 (medial cord)
	5. Trapezius (lower fibers)	Thoracodorsal	C6-C8 (posterior cord)
Protraction (forward movement) of scapula	1. Serratus anterior	Accessory	Cranial nerve XI
	2. Pectoralis major	C3-C4 nerve roots	C3-C4
	3. Pectoralis minor	Long thoracic	C5-C6, (C7)
	4. Latissimus dorsi	Lateral pectoral	C5-C6 (lateral cord)
Retraction (backward movement) of scapula	1. Trapezius	Medial pectoral	C8, T1 (medial cord)
	2. Rhomboid major	Thoracodorsal	C6-C8 (posterior cord)
	3. Rhomboid minor	Accessory	Cranial nerve XI
Lateral (upward) rotation of inferior angle of scapula	1. Trapezius (upper and lower fibers)	C3-C4 nerve roots	C3-C4
	2. Serratus anterior	Long thoracic	C5-C6, (C7)
	3. Rhomboid major	Dorsal scapular	C5
	4. Pectoralis minor	Dorsal scapular	(C4), C5
Medial (downward) rotation of inferior angle of scapula	1. Levator scapulae	Dorsal scapular	(C4), C5
	2. Rhomboid major	Dorsal scapular	(C4), C5
	3. Rhomboid minor	Medial pectoral	C8, T1 (medial cord)
	4. Pectoralis minor	Medial pectoral	C8, T1 (medial cord)
Flexion of elbow	1. Brachialis	Musculocutaneous	C5-C6, (C7)
	2. Biceps brachii	Musculocutaneous	C5-C5
	3. Brachioradialis	Radial	C5-C6, (C7)
	4. Pronator teres	Median	C6-C7
	5. Flexor carpi ulnaris	Ulnar	C7-C8
Extension of elbow	1. Triceps	Radial	C6-C8
	2. Anconeus	Radial	C7-C8, (T1)

**Gambar A.4. Fungsi otot-otot pada bahu**

**B. Elbow / Siku**

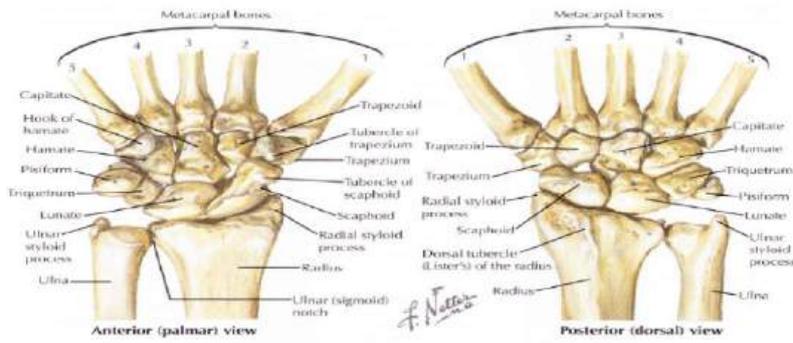


**Gambar B1. Anatomi Osteologi Siku**

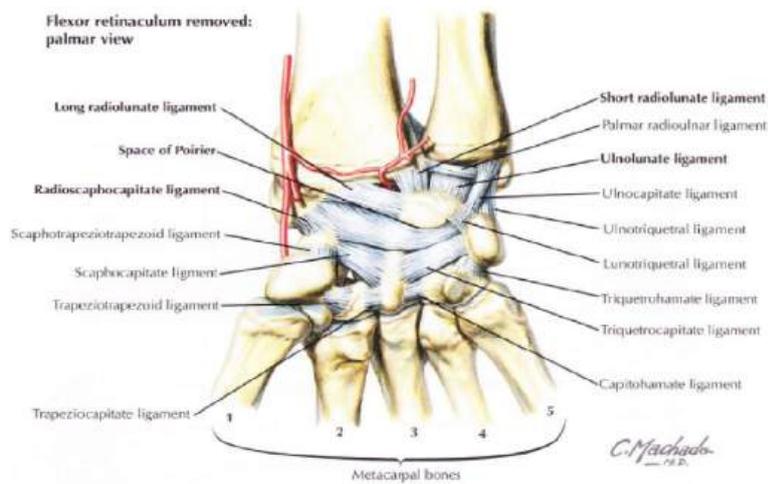


**Gambar B2. Anatomi Otot-Otot Siku**

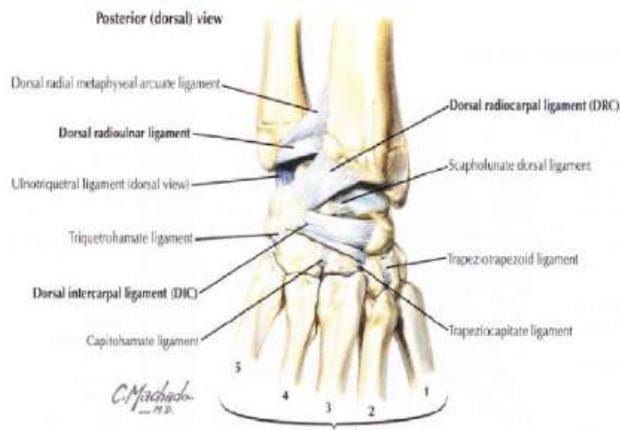
**C. Wrist / Pergelangan Tangan**



**Gambar C1. Anatomi Osteologi Wrist**

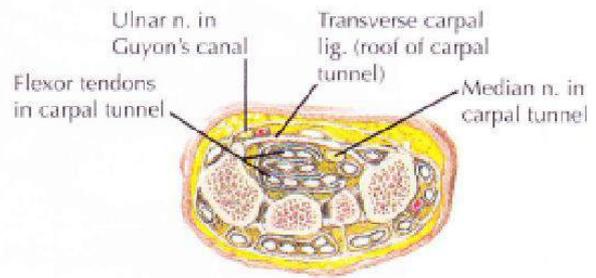
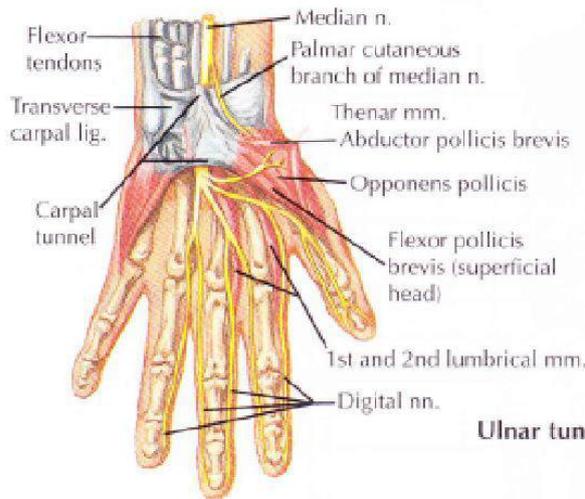


**Gambar C2. Anatomi Ligamen pada Wrist (Volar)**

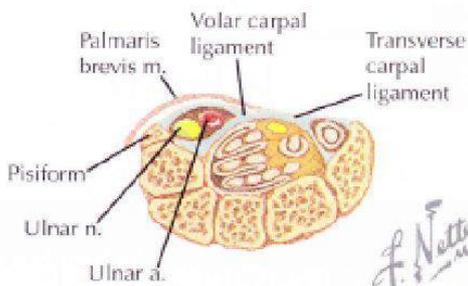


**Gambar C3. Anatomi Ligamen pada Wrist (dorsal)**

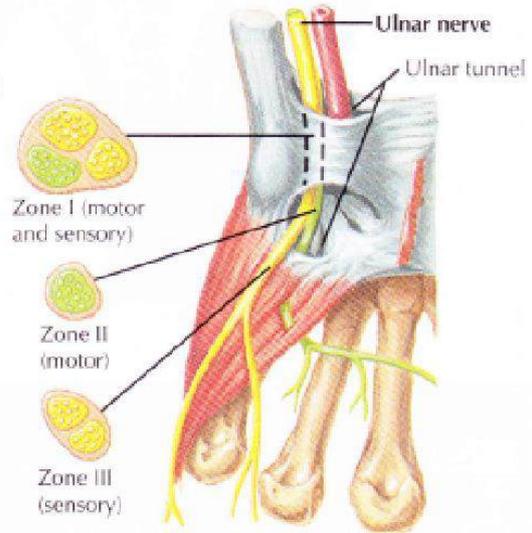
### Carpal tunnel



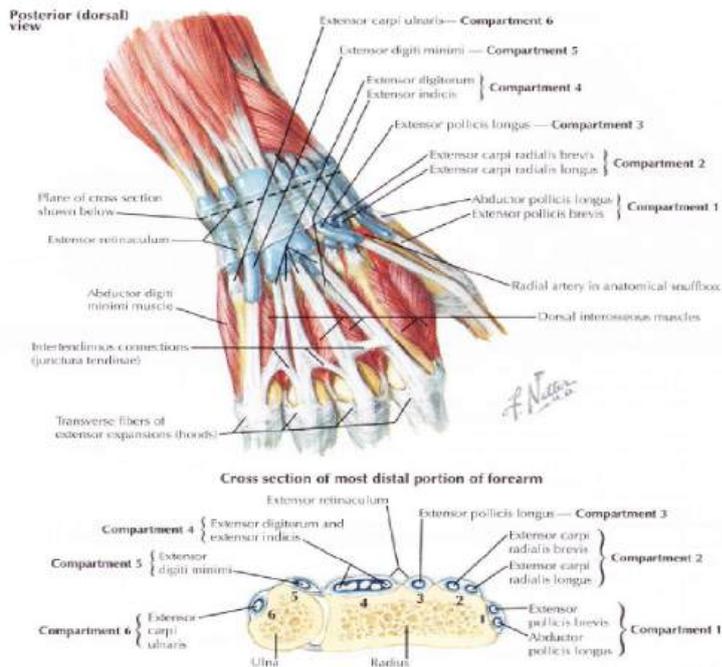
### Ulnar tunnel



*F. Netter M.D.*  
JOHN A. CRAIG

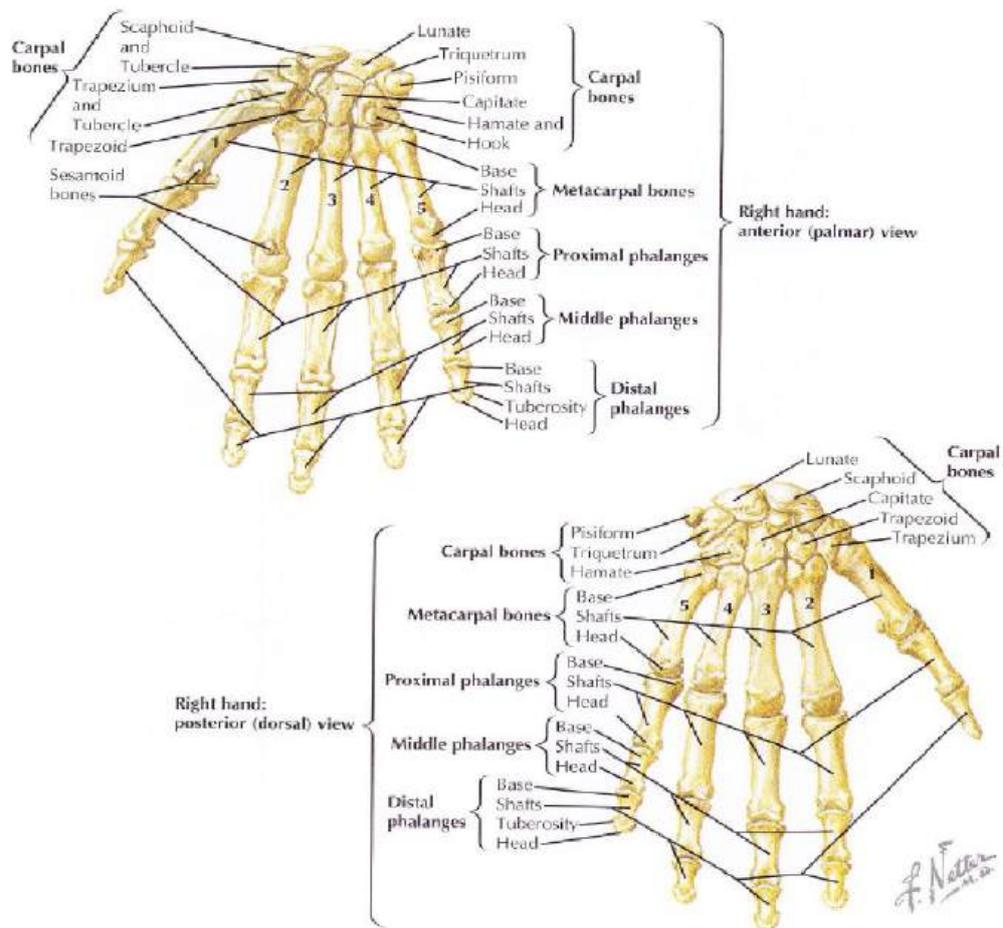


**Gambar C4. Carpal dan Ulnar Tunnel**

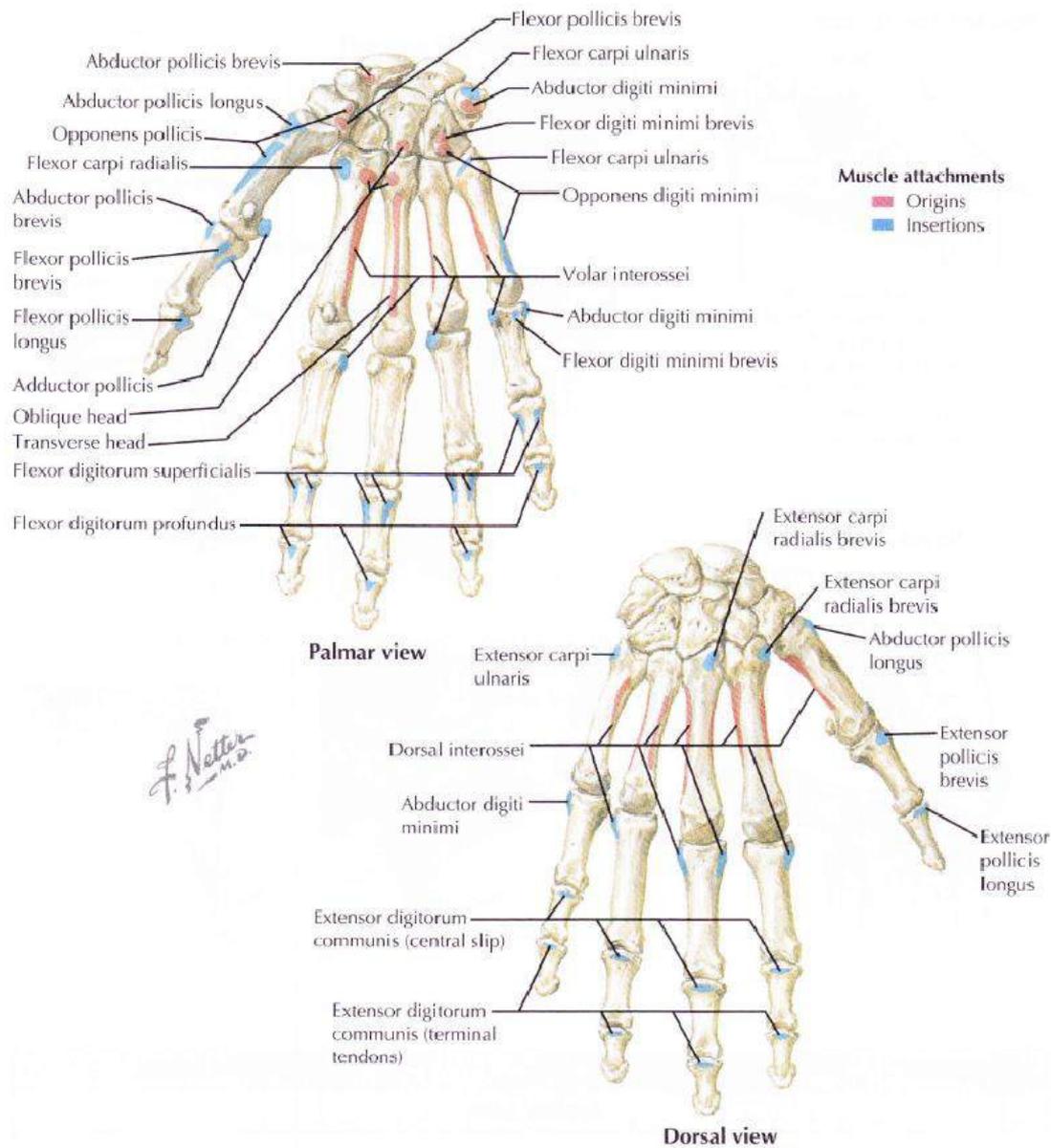


**Gambar C5. Anatomi Otot-otot pada wrist sisi Dorsal**

D. **Manus**

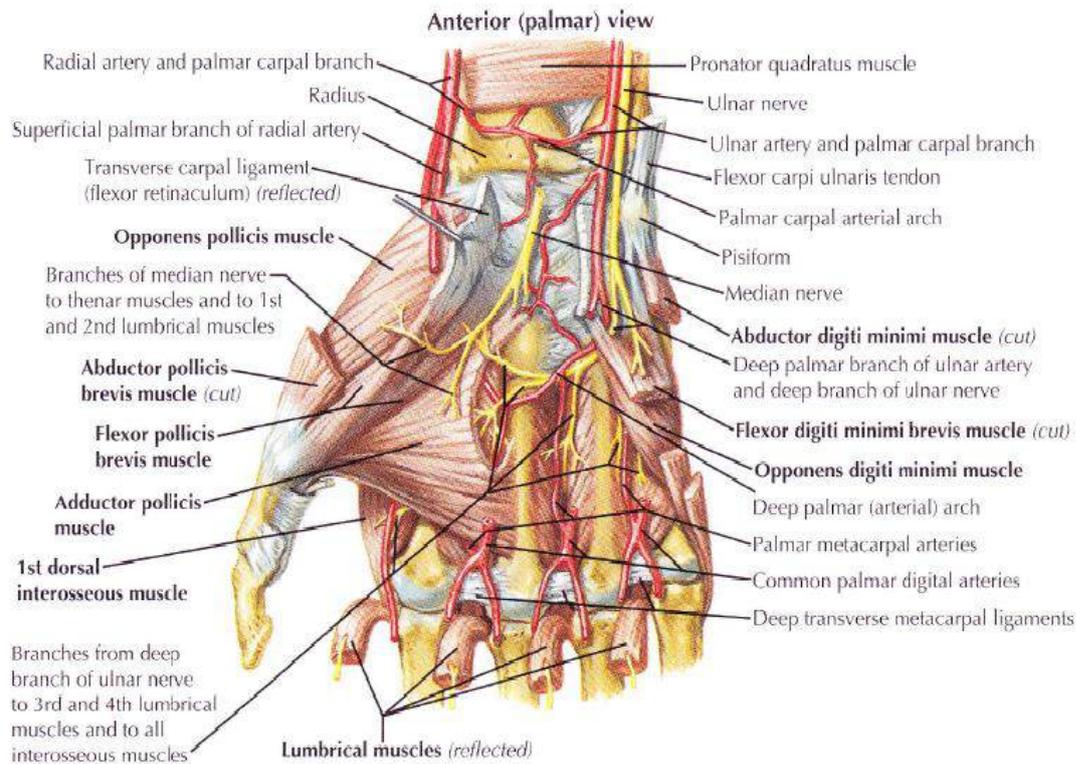


Gambar D1. Anatomi osteologi Manus



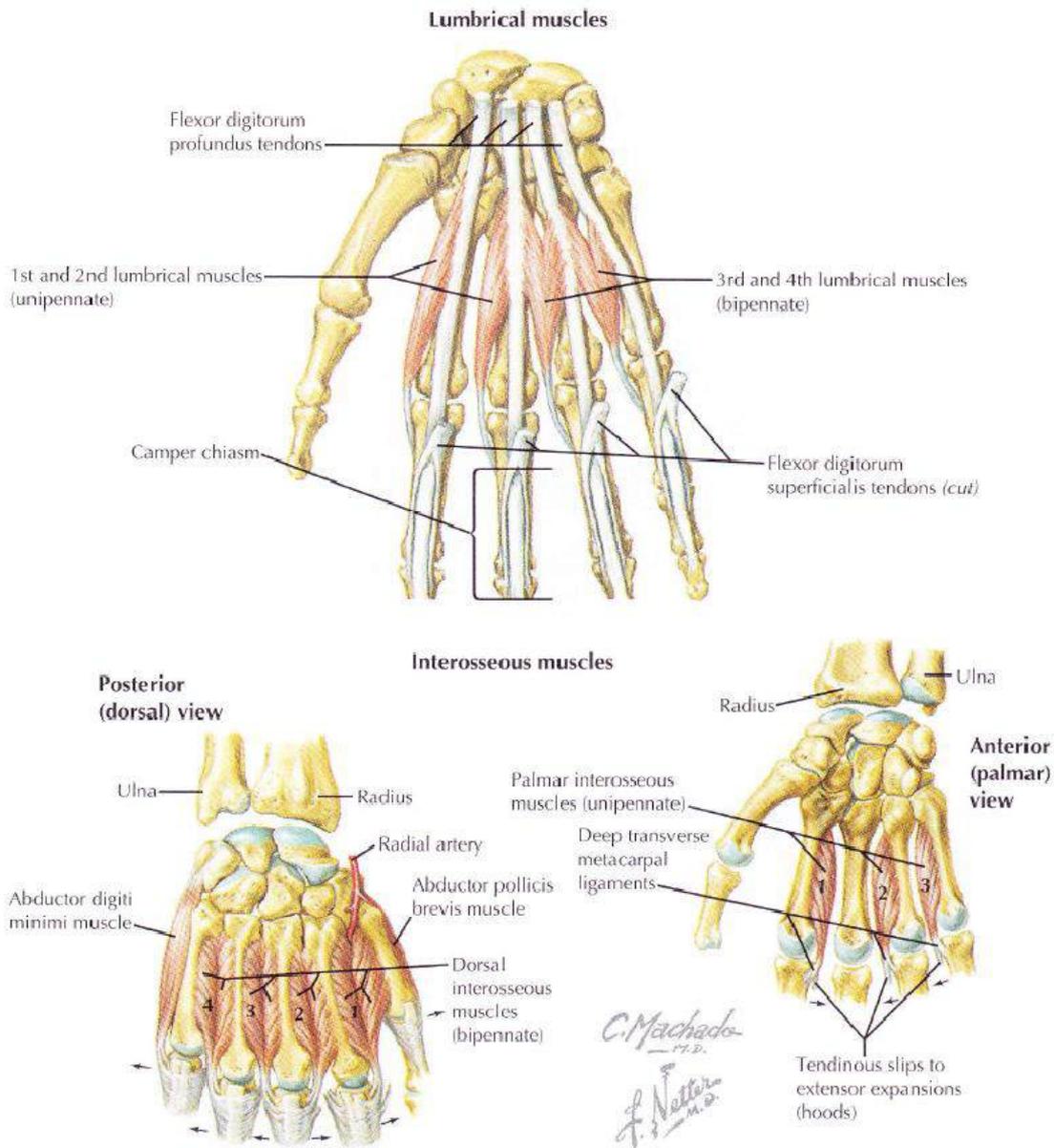
CARPUS	METACARPAL	PHALANGES—DORSAL	PHALANGES—PLANTAR
<b>Trapezium</b> Abductor pollicis brevis Flexor pollicis brevis Opponens pollicis <b>Capitate</b> Adductor pollicis <b>Hamate</b> Flex. digiti minimi brevis Opponens digiti minimi <b>Pisiform</b> Abductor digiti minimi	Dorsal interosseous Palmar interosseous Adductor pollicis Abd. pollicis longus Opponens pollicis Opp. digiti minimi Flexor carpi radialis Flexor carpi ulnaris Ext. carpi rad. longus Ext. carpi rad. brevis Extensor carpi ulnaris	<b>Proximal phalanx</b> Ext. pollicis brevis (thumb) Dorsal interossei Abductor digiti minimi <b>Middle phalanx</b> Extensor digitorum communis (central slip) <b>Distal phalanx</b> Ext. pollicis longus (thumb) Extensor digitorum communis (terminal tendon)	<b>Proximal phalanx</b> Abductor pollicis brevis (thumb) Flexor pollicis brevis (thumb) Adductor pollicis (thumb) Palmar interossei Flexor digiti minimi brevis Abductor digiti minimi <b>Middle phalanx</b> Flexor digitorum superficialis <b>Distal phalanx</b> Flexor pollicis longus (thumb) Flexor digitorum profundus
Lumbricals originate on flexor digitorum profundus [FDP] tendon and insert on the radial lateral bands			

**Gambar D2. Anatomi Origo dan Insertio Otot-otot Manu**



MUSCLE	ORIGIN	INSERTION	NERVE	ACTION	COMMENT
<b>THENAR COMPARTMENT</b>					
Abductor pollicis brevis (APB)	Scaphoid, trapezium	Lateral prox. phalanx (thumb)	Median	Palmar pronation	Primary muscle in opposition
Flexor pollicis brevis 1. Superficial head 2. Deep head	Trans. carpal lig. Trapezium	Base of thumb Proximal phalanx	Median Ulnar	Thumb MPC flexion	Muscle has dual innervations
Opponens pollicis	Trapezium	Lateral thumb MC	Median	Oppose (flex/abduct) thumb	Pronates/stabilizes thumb MC
<b>ADDUCTOR COMPARTMENT</b>					
Adductor pollicis 1. Oblique head 2. Transverse head	1. Capitate, 2nd and 3rd MC 2. 3rd metacarpal	Ulnar base of proximal phalanx of thumb	Ulnar	Thumb adduction and thumb MCP flexion	Test function with <b>Froment's test</b>
<b>HYPOTHENAR COMPARTMENT</b>					
Palmaris brevis [PB]	Transverse carpal ligament [TCL]	Skin on medial palm	Ulnar	Wrinkles skin	Protects ulnar nerve
Abductor digiti minimi [ADQ]	Pisiform (FCU tendon)	Ulnar base of prox. phalanx	Ulnar	SF abduction	Ulnar nerve and artery under it
Flexor digiti minimi brevis [FDMB]	Hamate, TCL	Base of proximal phalanx of SF	Ulnar	SF MCP flexion	Deep to ADQ and nerve
Opponens digiti minimi [ODQ]	Hamate, TCL	Ulnar side 5th metacarpal	Ulnar	Oppose (flex and supinate) SF	Deep to other muscles
<ul style="list-style-type: none"> <li>• Abductor muscles are superficial; opponens muscles are deep</li> <li>• Motor recurrent: branch of median innervates thenar muscle and radial 2 lumbricals</li> <li>• Deep branch at ulnar nerve innervates hypothenar, adductor pollicis, interossei, and ulnar 2 lumbricals</li> </ul>					

**Gambar D3. Anatomi Otot-Otot manus**



MUSCLE	ORIGIN	INSERTION	NERVE	ACTION	COMMENT
<b>INTRINSICS</b>					
Lumbricals 1 & 2	FDP tendons (radial 2)	Radial lateral bands	Median	Extend PIP, flex MCP	Only muscles in body to insert on their own antagonist (FDP). Palmar to deep transverse MC ligaments.
Lumbricals 3 & 4	FDP tendons (medial 3)	Radial lateral bands	Ulnar	Extend PIP, flex MCP	
Interosseous; dorsal (DIO)	Adjacent metacarpals	Proximal phalanx and extensor expansion (lateral bands)	Ulnar	Digit abduction MCP flexion	DAB: Dorsal ABduct Bipennate: each belly has separate insertion
Interosseous; palmar (PIO)	Adjacent metacarpals	Extensor expansion (lateral bands)	Ulnar	Digit adduction	PAD: Palmar ADduct Unipennate

**Gambar D4. Otot-otot instrinsik Manu**

## Fisiologi Anggota Gerak Atas

### A. Shoulder / Bahu

Muscle	Origin	Insertion	Innervation	Action
Subscapularis	Subscapularis fossa	Lesser tuberosity of humerus	Upper and lower subscapular nerve	Glenohumeral head depressor; extension, adduction, and medial rotation of humerus
Supraspinatus	Supraspinatus fossa	Superior facet on greater tuberosity	Suprascapular nerve	Abduction, stabilization of glenohumeral joint
Infraspinatus	Infraspinatus fossa	Middle facet on greater tuberosity	Suprascapular nerve	Extension and external rotation
Teres minor	Superior part of lateral border of scapula	Inferior facet on greater tuberosity	Axillary nerve	Extension and external rotation
Teres major	Dorsal surface of inferior angle of scapula	Medial lip of intertubercular groove of humerus	Lower subscapular nerve	Adducts and internally rotates arm
Serratus anterior	External surfaces of lateral parts of ribs 1-8	Anterior surface of medial border of scapula	Long thoracic Nerve	Protracts and rotates scapula and holds it against thoracic wall
Latissimus dorsi	Spinous processes of inferior 6 thoracic vertebrae, thoracolumbar fascia, iliac crest, and inferior 3 ribs	Floor of intertubercular groove of humerus	Thoracodorsal nerve	Extends, adducts, and internally rotates humerus

<i>continued</i> Muscle	Origin	Insertion	Innervation	Action
Deltoid	Lateral one third of clavicle, acromion, and spine of scapula	Deltoid tuberosity of humerus	Axillary nerve	Flexes, abducts, and extends arm
Trapezius	Spinous processes of cervical and thoracic vertebrae	Scapula and acromion	Spinal accessory nerve and branches of ansa cervicalis	Elevates, retracts, and rotates scapula
Levator scapula	Posterior tubercles of transverse processes of C1-C4 vertebrae	Superior part of medial border of scapula	Dorsal scapular nerve	Elevates scapula and tilts glenoid cavity inferiorly by rotating scapula
Rhomboids	Ligamentum nuchae and spinous processes of C7-T5	Medial border of scapula from level of spine to inferior angle	Dorsal scapular nerve	Retracts scapula and rotates it to depress glenoid cavity
Triceps	Superior one third of posterior and lateral surface of humerus, infraglenoid tubercle	Supraposterior surface of olecranon process of ulna and deep fascia of forearm	Radial nerve	Extends forearm at elbow; extension of arm at shoulder
Pectoralis minor	Ribs 3-5 near their costal cartilages	Medial border and superior surface of coracoid process of scapula	Medial pectoral nerve	Stabilizes scapula by drawing it inferiorly and anteriorly against thoracic wall
Coraco-brachialis	Tip of coracoid process of scapula	Middle medial border of humerus	Musculo-cutaneous nerve	Horizontal flexion and adduction of humerus at shoulder
Biceps brachii	Tip of coracoid and supraglenoid tubercle of scapula	Tuberosity of radius and lacertus fibrosis	Musculo-cutaneous nerve	Supinates forearm and when supine flexes forearm
Omoxyoid	Superior border of scapula and suprascapular ligament	Inferior border of hyoid bone	Ansa cervicalis	Functions in swallowing and phonation

Bahu dibentuk oleh lima persendian, yaitu

1. Sendi scapulothoracic
2. Sendi glenohumeral
3. Sendi acromioclavicular
4. Sendi sternoclavicular
5. Sendi scapulohumeral

Ritme scapulohumeral pertama kali disampaikan oleh Codman pada tahun 1934, yang mengacu kepada pergerakan simultan yang berkesinambungan dan menetap pada sendi scapulohumeral dan scapulothoracic yang terjadi pada saat lengan di elevasi. Jika terjadi kondisi abnormal pada sendi bahu, pergerakan scapula pada dinding dada akan terhambat dan tidak dapat mengikuti pergerakan pada sendi glenohumeral

Stabilitas sendi glenohumeral terdiri dari stabilisasi statis dan stabilisasi dinamis. Stabilisasi statis atau pasif meliputi kapsul sendi glenohumeral, ligamen, dan humeral head dan cavitas glenoid. Stabilisasi dinamis meliputi otot-otot rotator cuff dan otot deltoid.

Otot-otot rotator cuff terdiri dari :

1. Muskulus Supraspinatus
2. Muskulus Infraspinatus
3. Muskulus Teres Minor
4. Muskulus Subscapularis

**B. Elbow/Siku**

Sendi siku atau artikulasi cubital terdiri dari tiga persendian, yaitu :

- Sendi Radiocapitellar (Radiohumeral)
- Sendi Ulnotrochlear (Ulnohumeral)
- Sendi Proksimal Radioulnar

Ketiga sendi tersebut dihubungkan oleh satu kesatuan kapsul sendi dan rongga sendi.

Sendi Ulnotrochlear memungkinkan terjadinya gerakan fleksi dan ekstensi pada sendi siku, sedangkan sendi Radiocapitellar dan proksimal Radioulnar memungkinkan terjadinya gerakan rotasi pada sendi siku berupa pronasi dan supinasi.

**C. Wrist / Pergelangan Tangan**

Sendi pergelangan tangan terdiri dari sendi radiocarpal, sendi ulnocarpal, sendi midcarpal dan sendi distal radioulnar.

STRUCTURE	COMPONENTS	COMMENTS
<b>CARPAL TUNNEL</b>		
Transverse carpal ligament (TCL, flexor retinaculum)	Attachments: Medial: pisiform and hamate Lateral: scaphoid and trapezium	<ul style="list-style-type: none"> <li>• Roof of carpal tunnel, can compress <b>median nerve</b>.</li> <li>TCL is incised in a carpal tunnel release.</li> <li>• Tunnel is narrowest at hook of hamate</li> </ul>
Borders	Roof: transverse carpal ligament Floor: central carpal bones Medial wall: pisiform and hamate Lateral wall: trapezium and scaphoid	<ul style="list-style-type: none"> <li>• See above</li> <li>• Especially capitate and trapezoid</li> <li>• Hook of hamate gives medial wall</li> <li>• Trapezium is primary wall structure</li> </ul>
Contents	Tendons: FDS (4), FDP (4), FPL Nerve: median	<ul style="list-style-type: none"> <li>• 9 tendons within the carpal tunnel</li> <li>• Compressed in <b>carpal tunnel syndrome</b></li> </ul>
<ul style="list-style-type: none"> <li>• Thenar motor branch of median nerve can exit under, through, or distal to the transverse carpal ligament.</li> <li>• A persistent median artery or aberrant muscle can occur in the tunnel and may cause carpal tunnel syndrome.</li> </ul>		
<b>ULNAR TUNNEL / GUYON'S CANAL</b>		
Borders	Floor: transverse carpal ligament Roof: volar carpal ligament Medial wall: pisiform Lateral wall: hook of hamate	<ul style="list-style-type: none"> <li>• Can be released simultaneously with CTR</li> <li>• Continuous with deep antebrachial fascia</li> <li>• Neurovascular bundle is under pisohamate ligament</li> <li>• Fracture can cause nerve compression.</li> </ul>
Contents	Ulnar nerve Ulnar artery	<ul style="list-style-type: none"> <li>• Divides in canal to deep &amp; superficial branches</li> <li>• Terminates as superficial arch around hamate</li> </ul>
<ul style="list-style-type: none"> <li>• Fractures (malunion) or masses (e.g., ganglion cysts #1) can compress the ulnar nerve or artery within the canal.</li> </ul>		

**Gambar C6. Susunan dalam carpal dan ulnar tunnel**

STRUCTURE	FUNCTION		COMMENTS
<b>EXTENSOR COMPARTMENTS</b>			
Extensor retinaculum	Covers the wrist dorsally		Forms six fibro-osseous compartments through which the extensor tendons pass
	<b>Number</b>	<b>Tendon</b>	<b>Clinical Condition</b>
Dorsal compartments	I	EPB, APL	de Quervain's tenosynovitis can develop here
	II	ECRL, ECRB	Tendinitis can occur here
	III	EPL	Travels around Lister's tubercle, can rupture
	IV	EDC, EIP	This compartment split in dorsal wrist approach
	V	EDQ (EDM)	Rupture (Jackson-Vaughn syndrome) in RA
	VI	ECU	Tendon can snap over ulnar styloid causing pain
<ul style="list-style-type: none"> <li>• EIP and EDQ tendons are <b>ulnar</b> to EDC tendons to the index and small fingers, respectively.</li> <li>• 1st compartment may have <b>multiple slips</b> that all need to be released in de Quervain's disease for a full release.</li> </ul>			

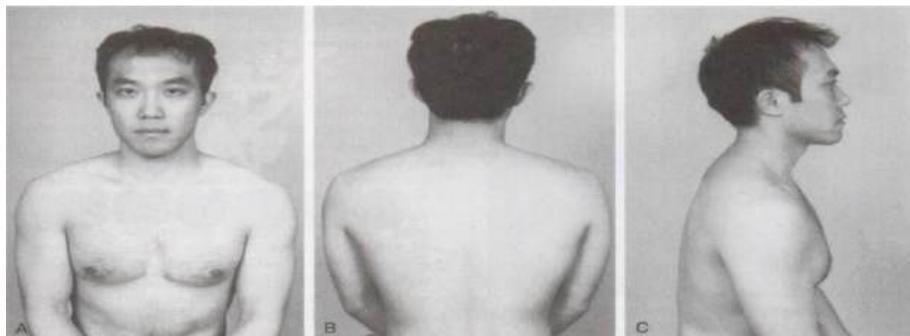
**Gambar C7. Struktur Ekstensor Compartment Wrist**

## Panduan Tata Cara Pemeriksaan Anggota Gerak Atas

### A. Pemeriksaan Shoulder / Bahu

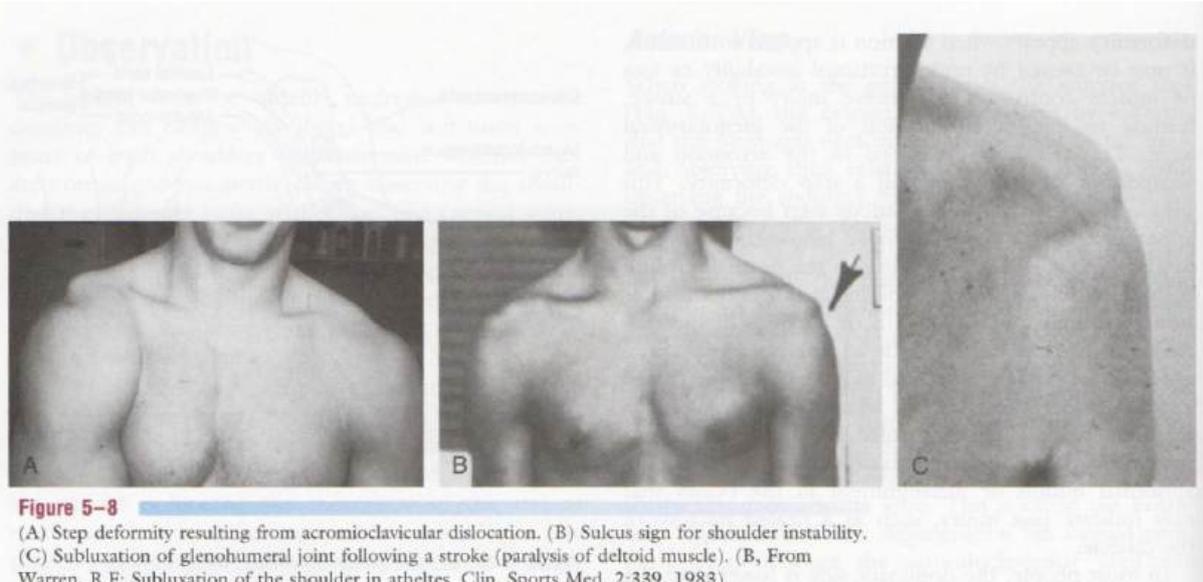
#### 1. Pemeriksaan Look / Inspeksi

Pemeriksaan dilakukan baik pada posisi duduk atau berdiri, pasien diminta membuka baju agar bagian tubuh pasien di atas pinggang dapat diperiksa dengan jelas. Perhatikan pasien pada saat membuka baju, kesulitan dalam membuka baju menunjukkan adanya kelainan. Perhatikan pasien dari depan, samping, dan belakang (**gambar 1**). Dari depan perhatikan posisi bahu simetris, daerah supraclavicular, scar, posisi lengan, penonjolan sendi acromioclavicular, atrofi otot deltoid (**gambar 2**).



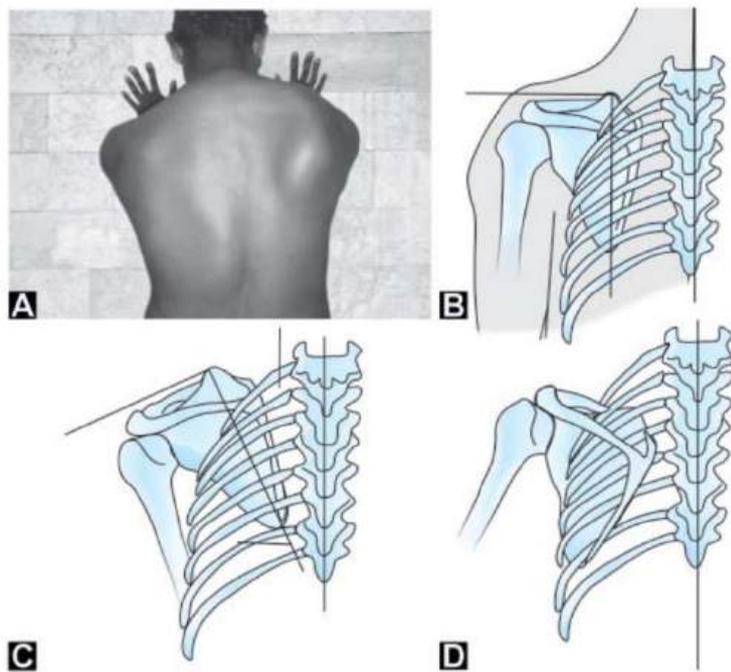
**Figure 5-7**  
Anterior (A), posterior (B), and side (C) views of the shoulder.

**Gambar 1. Pemeriksaan Inspeksi Bahu**



**Gambar 2. Deformitas pada Inspeksi Bahu pada tampak depan**

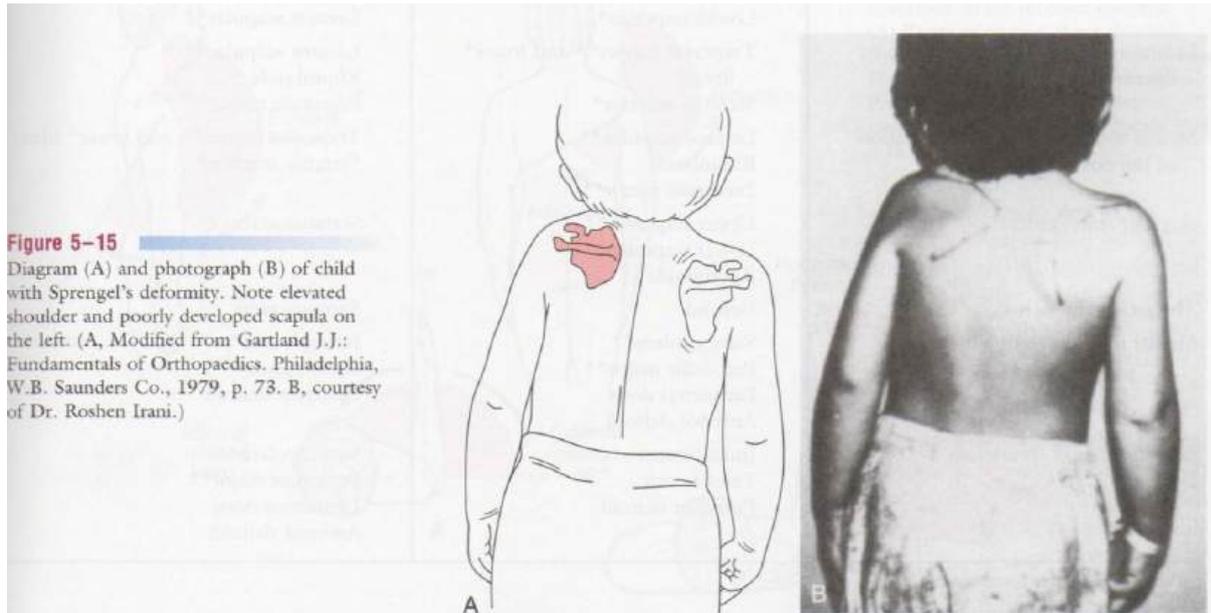
Perhatikan pasien dari belakang, adanya atrofi otot supra dan infraspinatus, winging scapula dengan cara meminta pasien melakukan gerakan mendorong kearah depan menekan dinding (gambar 3)



**Figs 5.2A to D:** Different forms of winged scapula: (A) Winging of right scapula; (B) Normal position of the scapula; (C) Paralysis of the serratus anterior; the scapula migrates superiorly and medially; (D) Paralysis of the trapezius: the scapula migrates inferiorly and laterally (For color version Fig. 5.2A. see Plate 2)

**Gambar 3. Winging Scapula**

*Sprengel's deformity* merupakan kelainan kongenital pada bahu dimana posisi scapula lebih tinggi atau *undescensus scapula* (gambar 4).



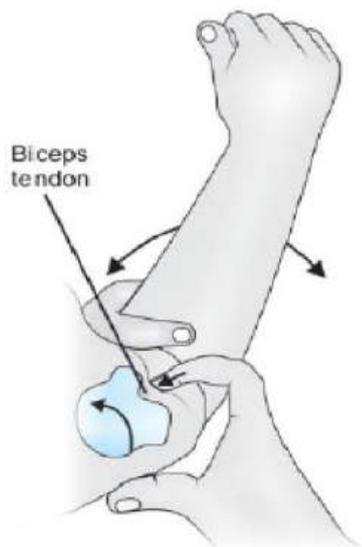
**Figure 5-15**

Diagram (A) and photograph (B) of child with Sprengel's deformity. Note elevated shoulder and poorly developed scapula on the left. (A, Modified from Gartland J.J.: Fundamentals of Orthopaedics. Philadelphia, W.B. Saunders Co., 1979, p. 73. B, courtesy of Dr. Roshen Irani.)

**Gambar 4. Sprengel's deformity**

## 2. Pemeriksaan Feel / Palpasi

Raba perubahan temperatur pada daerah sekitar bahu, tenderness, bengkak, atau iregularitas pada jaringan lunak atau struktur tulang. Dengan posisi pasien duduk, lakukan pemeriksaan dari belakang pasien, lakukan perabaan mulai dari sendi sternoclavicular sepanjang clavicula, sendi acromioclavicular, area subacromial, sudut dari acromion, prosesus coracoid, tendon biceps pada sulcus bicipitalis (**gambar 5**)



**Fig. 5.3:** The long tendon of the biceps is palpated in the bicipital groove with the arm in external rotation

**Gambar 5. Palpasi tendon biceps pada sulcus bicipitalis**

Lakukan perabaan sepanjang spina scapula, dan lakukan perabaan pada cervical spine. Patologi pada rotator cuff dapat ditemukan dengan melakukan perabaan pada bahu dengan posisi lengan ekstensi bahu dan internal rotasi (**gambar 6**).



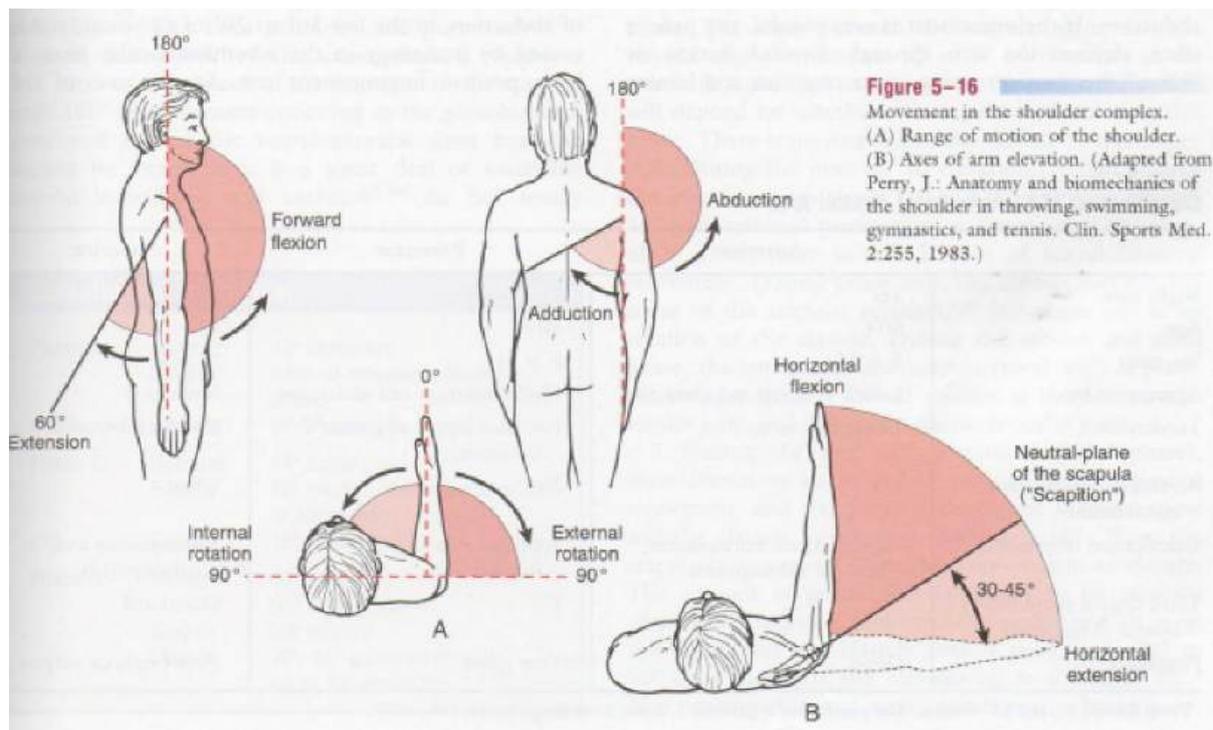
**Fig. 5.4:** The supraspinatus tendon and the subacromial bursa are palpated with the arm in extension

**Gambar 6.** Palpasi pada tenson supraspinatus dan subacromial bursa

### 3. Pemeriksaan Movement (Range of Movement/ROM)

Gerak sendi bahu meliputi gerakan fleksi, ekstensi, abduksi, adduksi, internal rotasi, eksternal rotasi, dan circumductio. Pemeriksaan ROM meliputi aktif dan pasif movement. Aktif movement artinya pasien menggerakkan secara aktif sendi yang diperiksa, sedangkan pasif berarti pemeriksa menggerakkan sendi yang diperiksa. Pemeriksaan aktif movement dilakukan terlebih dahulu sebelum pasif movement

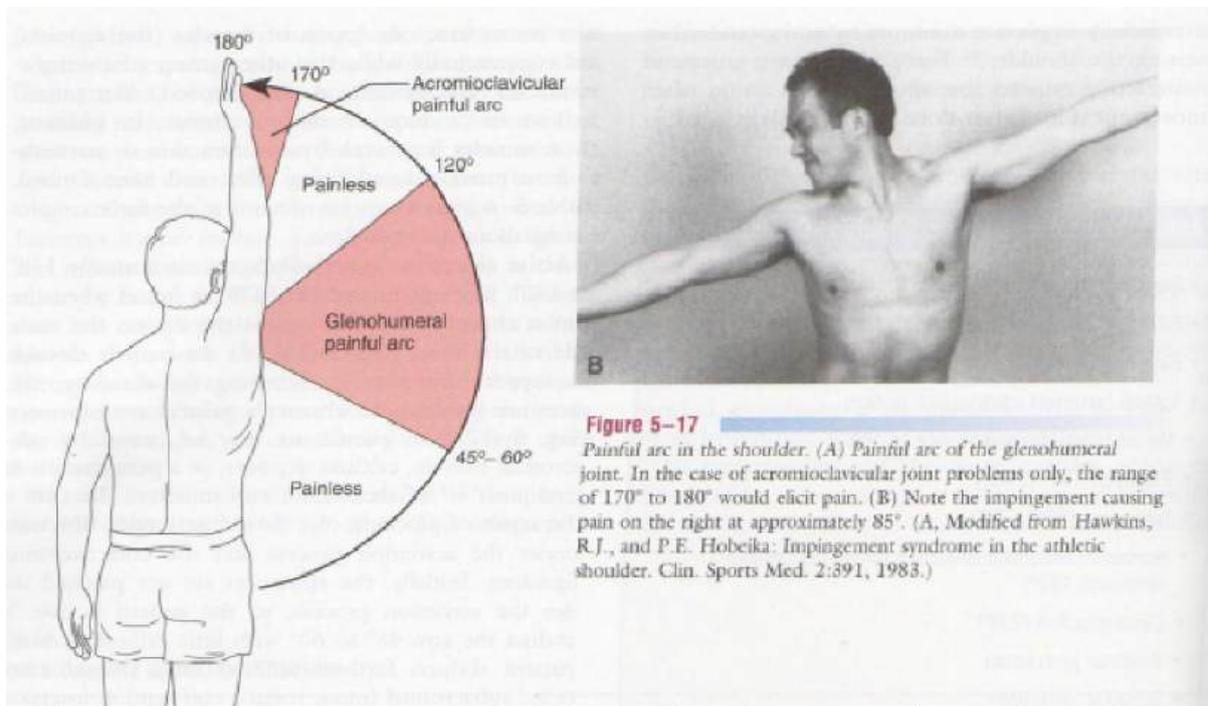
Jika dalam pemeriksaan aktif movement didapatkan ROM yang normal, maka tidak perlu dilakukan pemeriksaan pasif (**gambar 7, 8**).



## Gambar 7. Pergerakan sendi bahu

Active Movements of the Shoulder Complex
• Elevation through abduction (170° to 180°)
• Elevation through forward flexion (160° to 180°)
• Elevation through the plane of the scapula (170° to 180°)
• Lateral (external) rotation (80° to 90°)
• Medial (internal) rotation (60° to 100°)
• Extension (50° to 60°)
• Adduction (50° to 75°)
• Horizontal adduction/abduction (cross-flexion/cross-extension; 130°)
• Circumduction (200°)
• Scapular protraction
• Scapular retraction
• Combined movements (if necessary)
• Repetitive movements (if necessary)
• Sustained positions (if necessary)

## Gambar 8. ROM sendi bahu



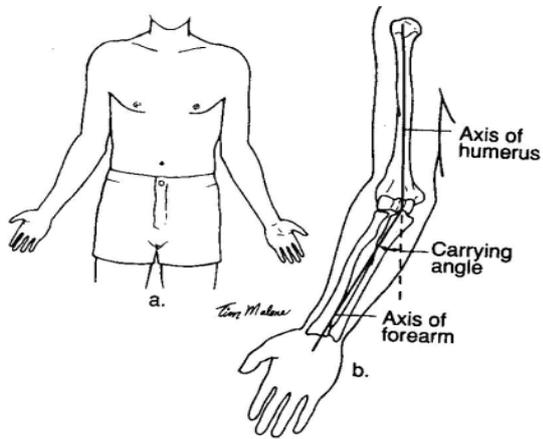
## Gambar 9. Painful arc sendi Bahu

### B. Pemeriksaan Sendi Siku

#### 1. Pemeriksaan Inspeksi / Feel

Pada saat pasien berdiri, dengan posisi pemeriksa berada di depan pasien, pasien diminta memosisikan kedua lengan ekstensi penuh pada sendi siku, dengan lengan berada di samping tubuh pasien dan telapak tangan menghadap ke depan. Evaluasi sudut yang dibentuk antara lengan atas dan lengan bawah pada siku (*carrying angle*). Rentang normal

antara  $10^{\circ}$  sampai  $15^{\circ}$  pada wanita dan  $5^{\circ}$  pada pria (**Gambar B1**). Jika kurang dari  $5^{\circ}$  disebut **cubitus varus** (**gambar B2**) dan jika lebih dari  $15^{\circ}$  disebut **cubitus valgus** (**Gambar B3**).

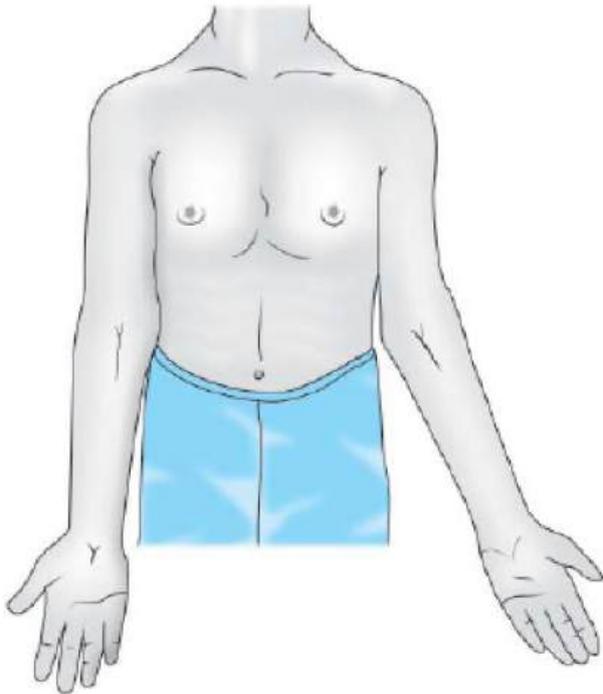


**Gambar B1. Carrying angle pada siku**



**Fig. 6.1: Cubitus varus**

**Gambar B2. Cubitus Varus**



**Fig. 6.2:** Cubitus valgus of left arm

### **Gambar B3. Cubitus Valgus**

Perhatikan ada tidaknya benjolan, scar, warna kulit, atrofi otot pada sisi radial atau sisi ulnar dari lengan bawah. Pasien diminta melakukan fleksi pada sendi siku sampai tangan menyentuh bahu, perhatikan penonjolan tulang pada medial dan lateral epicondyle, ujung olecranon.

Dari samping, perhatikan siku pada posisi ekstensi penuh, ada tidaknya hiperekstensi atau ketidakmampuan mencapai ekstensi maksimal



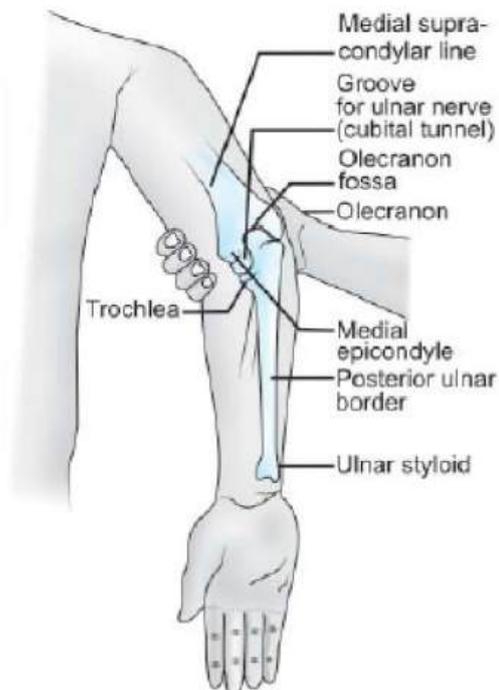
**Gambar B4. Olecranon bursitis**



**Gambar B5. Rheumatoid nodule**

## 2. Pemeriksaan Palpasi / Feel

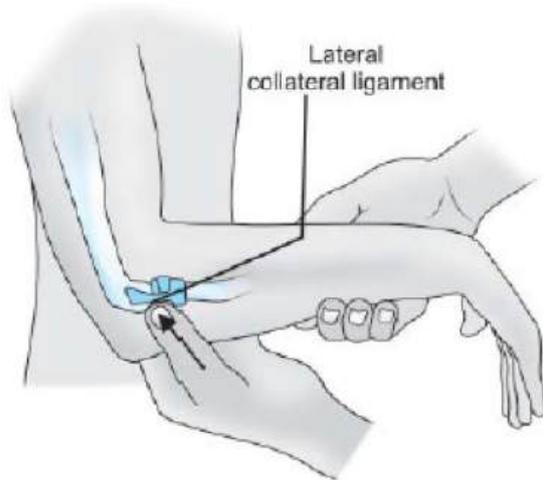
Lakukan pemeriksaan palpasi pada daerah yang menimbulkan keluhan pada pasien, dan perhatikan ekspresi wajah pasien. Lakukan pemeriksaan mulai dari sisi medial (**Gambar B6**)



**Gambar B6. Palpasi pada sisi medial siku**

Nyeri tekan pada sisi medial dengan melakukan tahanan pada gerakan fleksi pergelangan tangan dengan posisi lengan supinasi. Hal ini menunjukkan kemungkinan adanya medial epicondylitis (Golfer's Elbow) atau injuri pada medial epicondyle. Saraf ulnaris dapat dipalpasi dibelakang medial epicondyle pada cekungan antara medial epicondyle dan olecranon. Tinel's sign merupakan pemeriksaan perkusi pada saraf ulnaris yang mencetuskan sensasi nyeri. Evaluasi nyeri tekan pada olecranon dan radial head. Evaluasi pada radial head dapat

dilakukan dengan melakukan posisi fleksi 90<sup>0</sup> sendi siku dengan melakukan pronasi dan supinasi pada lengan bawah, 2.5 cm sebelah distal dari lateral epicondyle (**Gambar B7**).



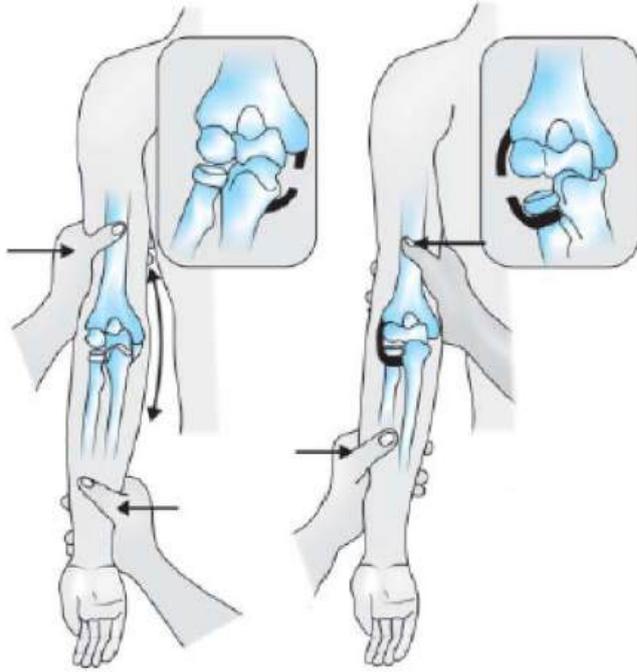
**Gambar B7. Palpasi pada daerah Radial Head**

Nyeri pada lateral epicondyle dapat terjadi akibat lateral epicondylitis (Tennis Elbow), dilakukan pemeriksaan Cozen's test dimana siku fleksi 90<sup>0</sup> dengan lengan bawah pronasi dan dilakukan tahanan pada gerakan ekstensi wrist (**Gambar B8**).



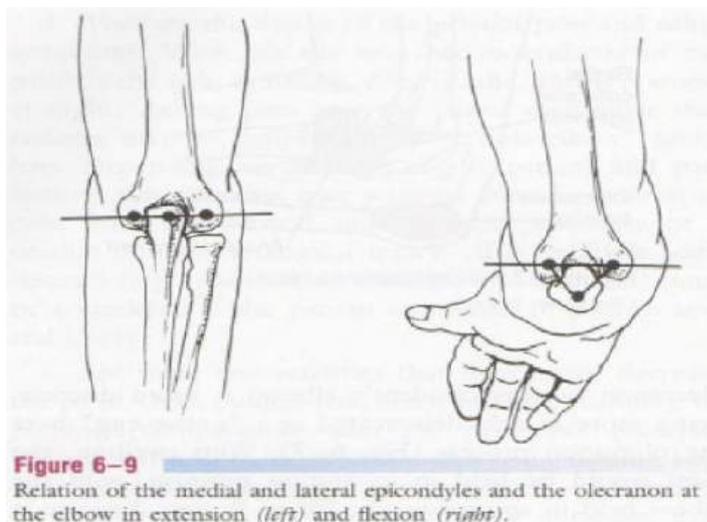
**Gambar B8. Cozen's Test**

Stabilitas pada sendi siku dapat dievaluasi dengan pemeriksaan Varus dan valgus stres test. Pada Valgus stress test lengan bawah pada posisi supinasi dilakukan stress test untuk mengevaluasi ligamen medial collateral, sedangkan varus stress test digunakan untuk mengevaluasi ligamen lateral collateral (**Gambar B9**).



**Gambar B9. Valgus dan varus stress test**

Pada posisi fleksi siku  $90^{\circ}$ , evaluasi jarak antara tiga titik penonjolan tulang, yaitu medial epicondyle, lateral epicondyle, dan olecranon dari arah belakang pasien dengan menggunakan ibu jari, jari tengah, dan jari telunjuk pemeriksa secara berurutan. Dalam kondisi normal ketiga titik tersebut akan membentuk segitiga sama sisi dan bentuk ini akan berubah jika terjadi dislokasi siku, fraktur epicondyle dan condylar humerus, tetapi tidak berubah pada fraktur supracondylar humerus. Pada posisi ekstensi siku, ketiga titik ini membentuk garis lurus (**gambar B10**)



**Gambar B10. Hubungan ketiga titik penonjolan tulang pada siku**

Panjang lengan atas diukur dari sudut posterior acromion sampai lateral epicondyle, sedangkan panjang lengan bawah diukur dari lateral epicondyle sampai ke ujung radial styloid.

### 3. Pemeriksaan Movement

Pada saat pasien dalam posisi duduk, lakukan pemeriksaan aktif dan pasif movement pada kedua sendi siku untuk mengevaluasi range of movement sendi siku. ROM untuk fleksi penuh  $0-135^{\circ}$ , sedangkan ekstensi penuh  $0^{\circ}$  sampai minus  $5^{\circ}$ .



**Gambar B11. Pemeriksaan Ekstensi Siku**



**Gambar B12. Pemeriksaan fleksi siku**

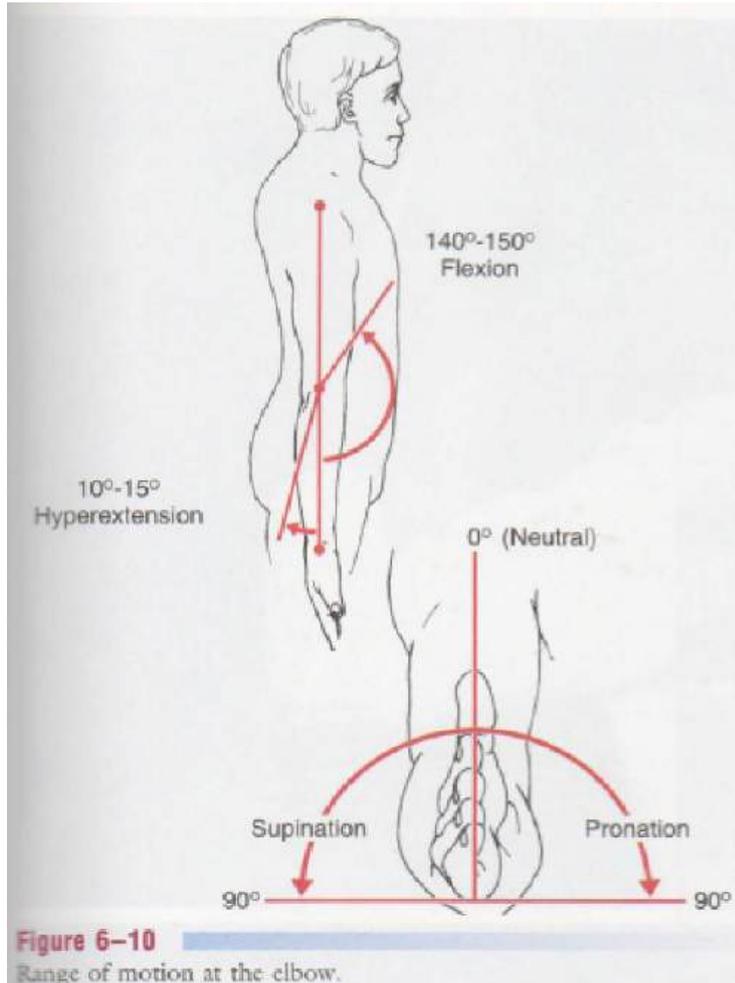
Active Movements of the Elbow Complex
• Flexion of the elbow ( $140^{\circ}$ to $150^{\circ}$ )
• Extension of the elbow ( $0^{\circ}$ to $10^{\circ}$ )
• Supination of the forearm ( $90^{\circ}$ )
• Pronation of the forearm ( $80^{\circ}$ to $90^{\circ}$ )
• Combined movements (if necessary)
• Repetitive movements (if necessary)
• Sustained positions (if necessary)

**Gambar B13. Aktif movement pada siku**

## Passive Movements of the Elbow Complex and Normal End Feel

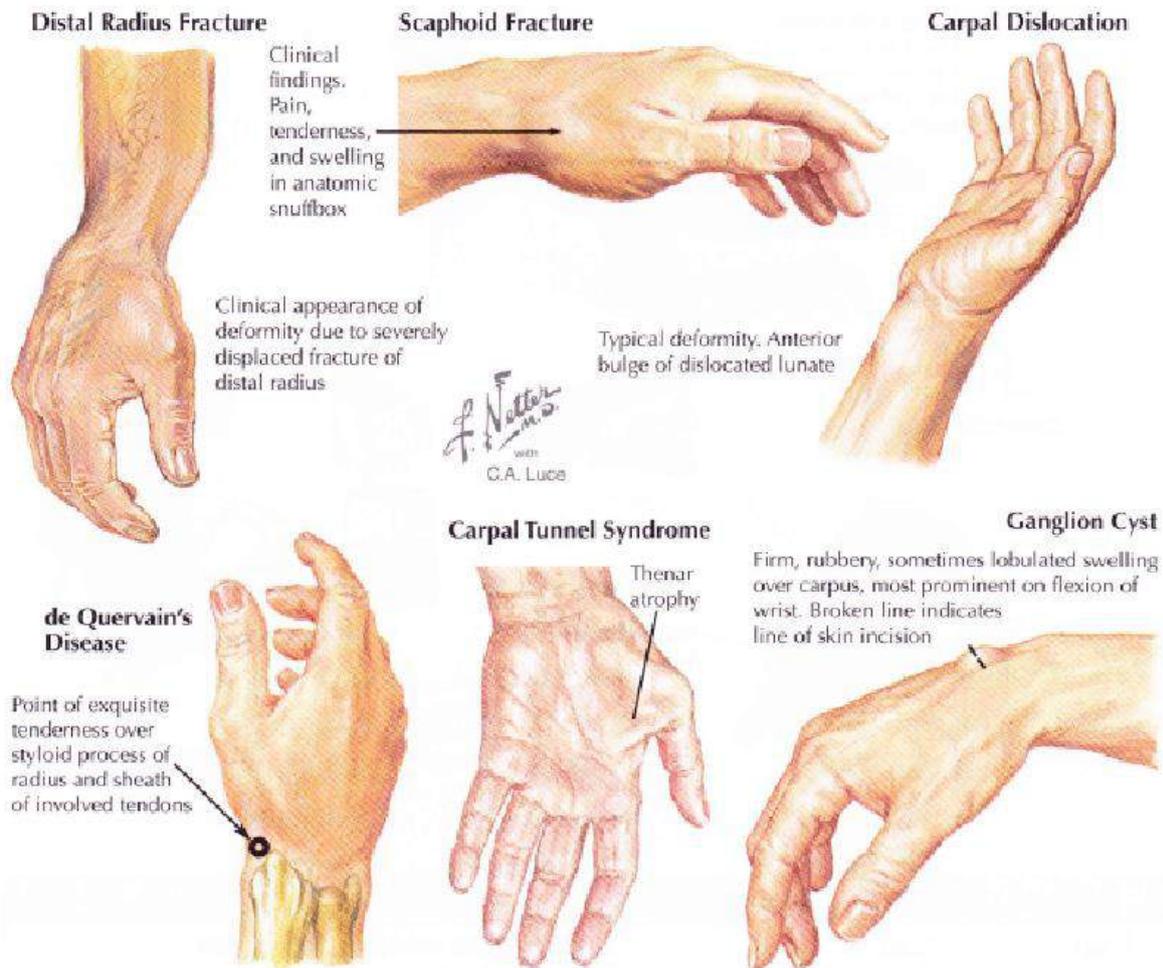
- Elbow flexion (tissue approximation)
- Elbow extension (bone-to-bone)
- Forearm supination (tissue stretch)
- Forearm pronation (tissue stretch)

**Gambar B14. Pasif movement pada siku**



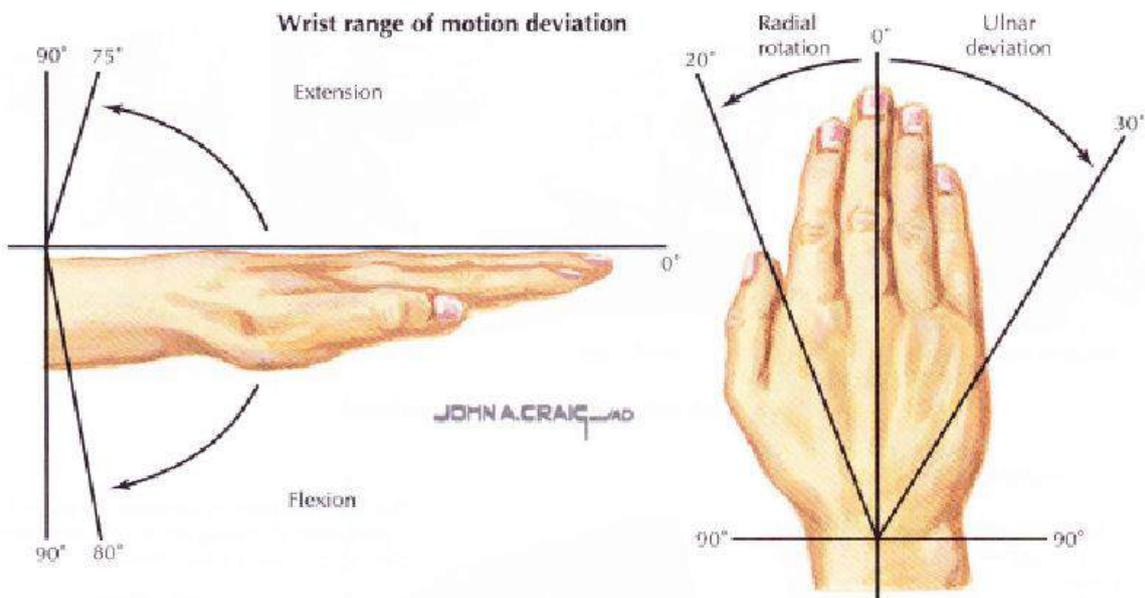
**Gambar B15. ROM pada sendi siku**

### C. Pemeriksaan sendi pergelangan tangan



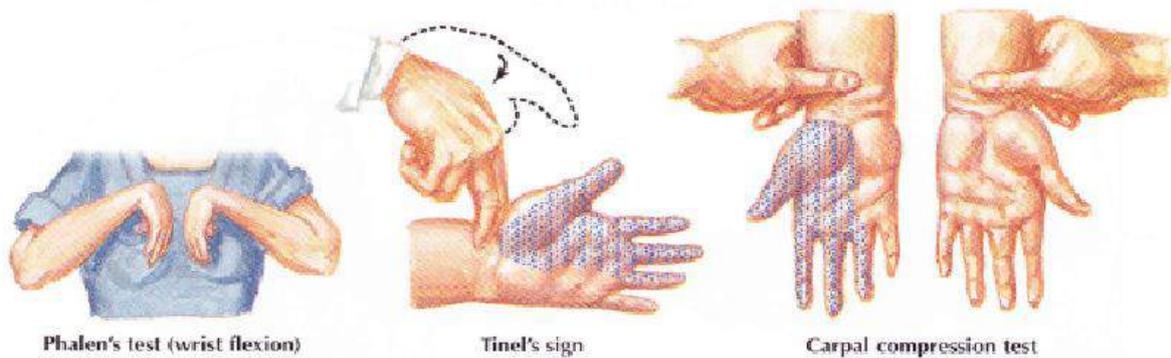
EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>INSPECTION</b>		
Gross deformity	Bones and soft tissues	Fractures, dislocations: forearm and wrist
Swelling	Especially dorsal or radial Diffuse	Ganglion cyst Trauma (fracture/dislocation), infection
Wasting	Loss of muscle	Peripheral nerve compression (e.g., CTS)
<b>PALPATION</b>		
Skin changes	Warm, red Cool, dry	Infection, gout Neurovascular compromise
Radial and ulnar styloids	Palpate each separately	Tenderness may indicate fracture
Carpal bones	Both proximal and distal row  Proximal row Pisiform	Snuffbox tenderness: <b>scaphoid fracture</b> ; lunate tenderness: Kienböck's disease Scapholunate dissociation Tenderness: pisotriquetral arthritis or FCU tendinitis
Soft tissues	6 dorsal extensor compartments  TFCC: distal to ulnar styloid Compartments	Tenderness over 1st compartment: <b>de Quervain's disease</b> Tenderness indicates TFCC injury <b>Firm/tense compartments = compartment synd.</b>

**Gambar C8. Pemeriksaan pada Wrist**



EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>RANGE OF MOTION</b>		
Flex and extend	Flex (toward palm), extend opposite	Normal: flexion 80°, extension 75°
Radial/ulnar deviation	In same plane as the palm	Normal: radial 15-25°, ulnar 30-45°
Pronate and supinate	Flex elbow 90°, rotate wrist	Normal: supinate 90°, pronate 80-90° (only 10-15° in wrist; most motion is in elbow)
<b>NEUROVASCULAR</b>		
<b>Sensory</b>		
Lateral cutaneous nerve of forearm (C6)	Lateral forearm	Deficit indicates corresponding nerve/root lesion
Medial cutaneous nerve of forearm (T1)	Medial forearm	Deficit indicates corresponding nerve/root lesion
Posterior cutaneous nerve of forearm	Posterior forearm	Deficit indicates corresponding nerve/root lesion
<b>Motor</b>		
Radial nerve (C6-7)	Resisted wrist extension	Weakness = ECRL/B or corresponding nerve/root lesion
PIN (C6-7)	Resisted ulnar deviation	Weakness = ECU or corresponding nerve/root lesion
Ulnar nerve (C8)	Resisted wrist flexion	Weakness = FCU or corresponding nerve/root lesion
Median nerve (C7)	Resisted wrist flexion	Weakness = FCR or corresponding nerve/root lesion
Median nerve (C6)	Resisted pronation	Weakness = pronator teres or corresponding nerve/root lesion
Musculocutaneous (C6)	Resisted supination	Weakness = biceps or corresponding nerve/root lesion
<b>Reflex</b>		
C6	Brachioradialis	Hypoactive/absence indicates corresponding radiculopathy
<b>Pulses</b>		
	Radial, ulnar	Diminished/absent = vascular injury or compromise (perform Allen test)

**Gambar C9. Pemeriksaan ROM Wrist dan Neurovaskular**



Provocative tests elicit paresthesias in hand.



EXAMINATION	TECHNIQUE	CLINICAL APPLICATION / DDX
<b>SPECIAL TESTS</b>		
Durkan carpal compression	Manual pressure on median nerve at carpal tunnel	Reproduction of symptoms (e.g., tingling, numbness); median nerve compression ( <b>most sensitive</b> test for carpal tunnel syndrome [CTS])
Phalen test	Flex both wrists for 1 minute	Reproduction of symptoms (e.g., tingling); median n. compression (CTS)
Tinel	Tap volar wrist (CT/TCL)	Reproduction of symptoms (e.g., tingling); median n. compression (CTS)
Finkelstein	Flex thumb into palm, ulnarly deviate the wrist	Pain in 1st dorsal compartment (APL/EPB tendons) suggests <b>de Quervain's tenosynovitis</b>
"Piano key"	Stabilize ulnar and translate radius dorsal and volar	Laxity or subluxation (click) indicates instability of DRUJ
Watson (scaphoid shift)	Push dorsally on distal pole of scaphoid, bring wrist from ulnar to radial deviation	A click or clunk (scaphoid subluxating dorsally over rim of distal radius) is positive for carpal instability ( <b>scapholunate dissociation</b> )
Allen test	Occlude both radial and ulnar arteries manually, pump fist, then release one artery only	Delay or absence of "pinking up" of the palm and fingers suggests arterial compromise of the artery released

Gambar C10. Tes Khusus pada Wrist

## D. Pemeriksaan Manus

### Rheumatoid arthritis

Boutonniere deformity of index finger with swan-neck deformity of other fingers



### Osteoarthritis

Heberden's nodes seen in index and middle finger distal interphalangeal joints. Bouchard's nodes seen in proximal interphalangeal joints of the ring and small finger.



JOHN A. CRAIG AD

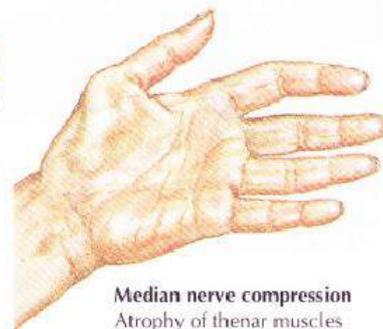
F. Netter M.D.



Rotation displacement of ring finger. All fingers should point toward scaphoid when clenched



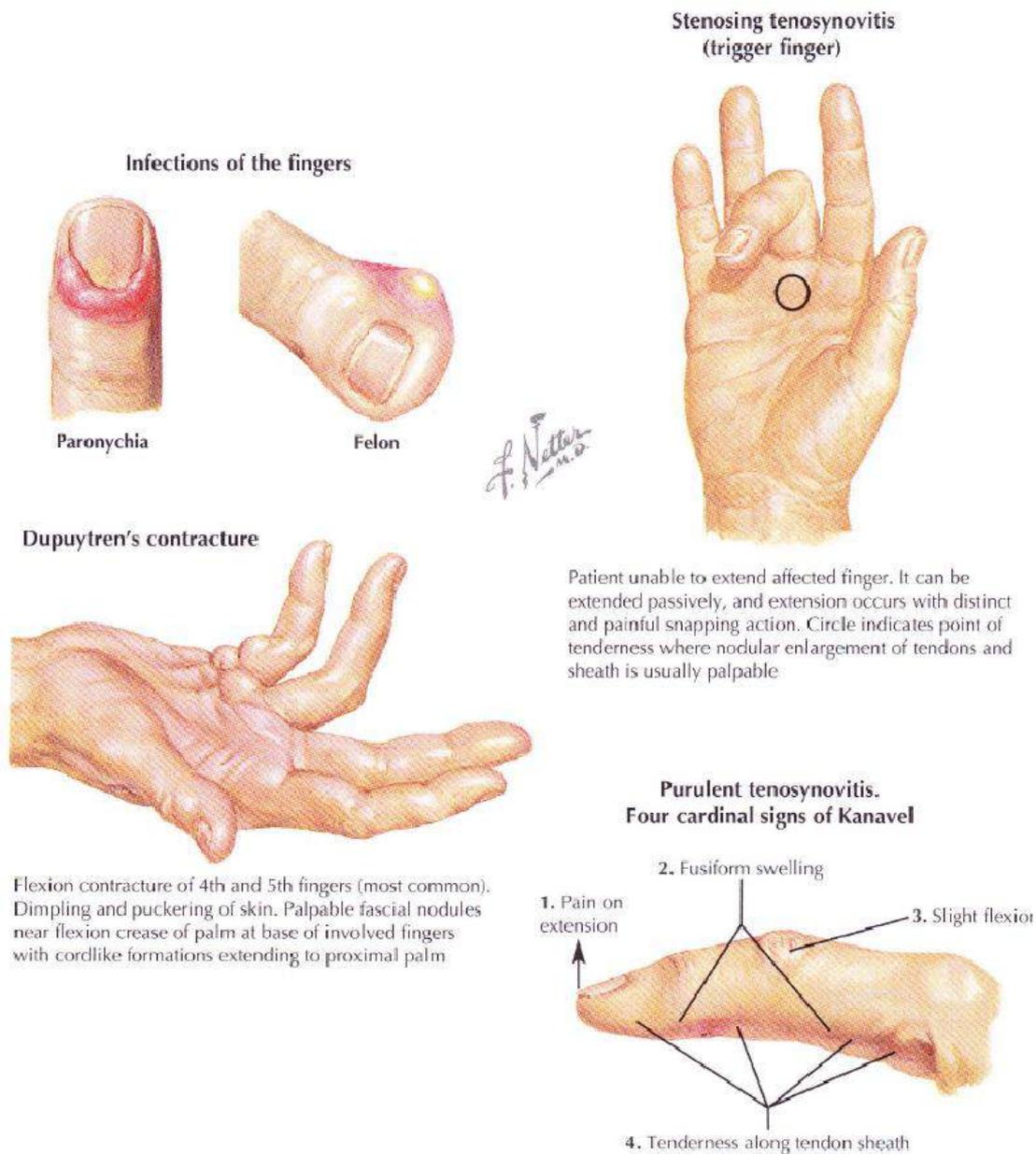
Ulnar nerve compression  
Interosseous muscle wasting from ulnar nerve compression



Median nerve compression  
Atrophy of thenar muscles due to compression of median nerve

EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>INSPECTION</b>		
Gross deformity	Ulnar drift/swan neck, boutonniere Rotational or angular deformity	Rheumatoid arthritis Fracture
Finger position	Flexion Rotation of digit	Dupuytren's contracture, <b>purulent tenosynovitis</b> Fracture (acute), fracture malunion
Skin, hair, nail changes	Cool, hairless, spoon, etc	Neurovascular disorders: Raynaud's, diabetes, nerve injury
Swelling	DIPs PIPs MCPs Fusiform shape finger	Osteoarthritis: <b>Heberden's nodes</b> (at <b>DIPs</b> : #1), Bouchard's nodes (at PIPs) Rheumatoid arthritis Purulent tenosynovitis
Muscle wasting	Thenar eminence Hypothenar eminence/intrinsics	Median nerve injury, <b>CTS</b> , C8/T1 pathology Ulnar nerve injury (e.g., cubital tunnel syndrome)

## Gambar D5. Inspeksi Manus

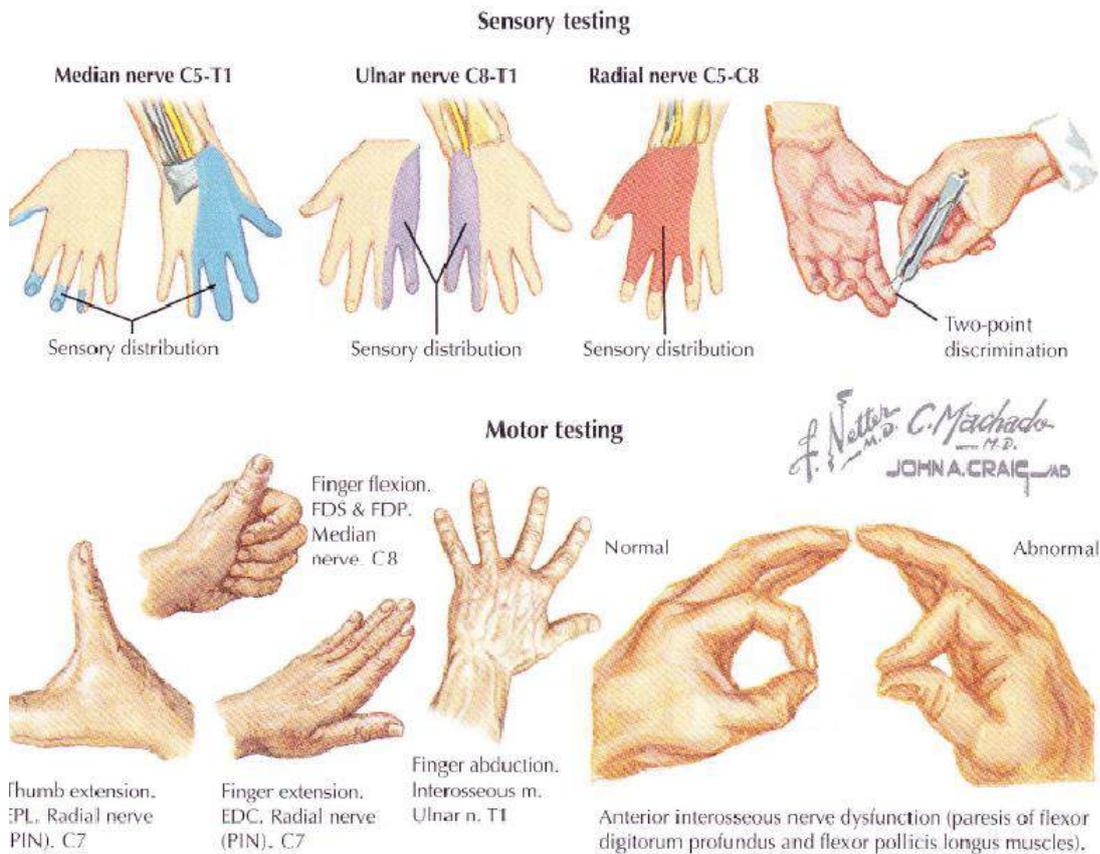


Flexion contracture of 4th and 5th fingers (most common). Dimpling and puckering of skin. Palpable fascial nodules near flexion crease of palm at base of involved fingers with cordlike formations extending to proximal palm

Patient unable to extend affected finger. It can be extended passively, and extension occurs with distinct and painful snapping action. Circle indicates point of tenderness where nodular enlargement of tendons and sheath is usually palpable

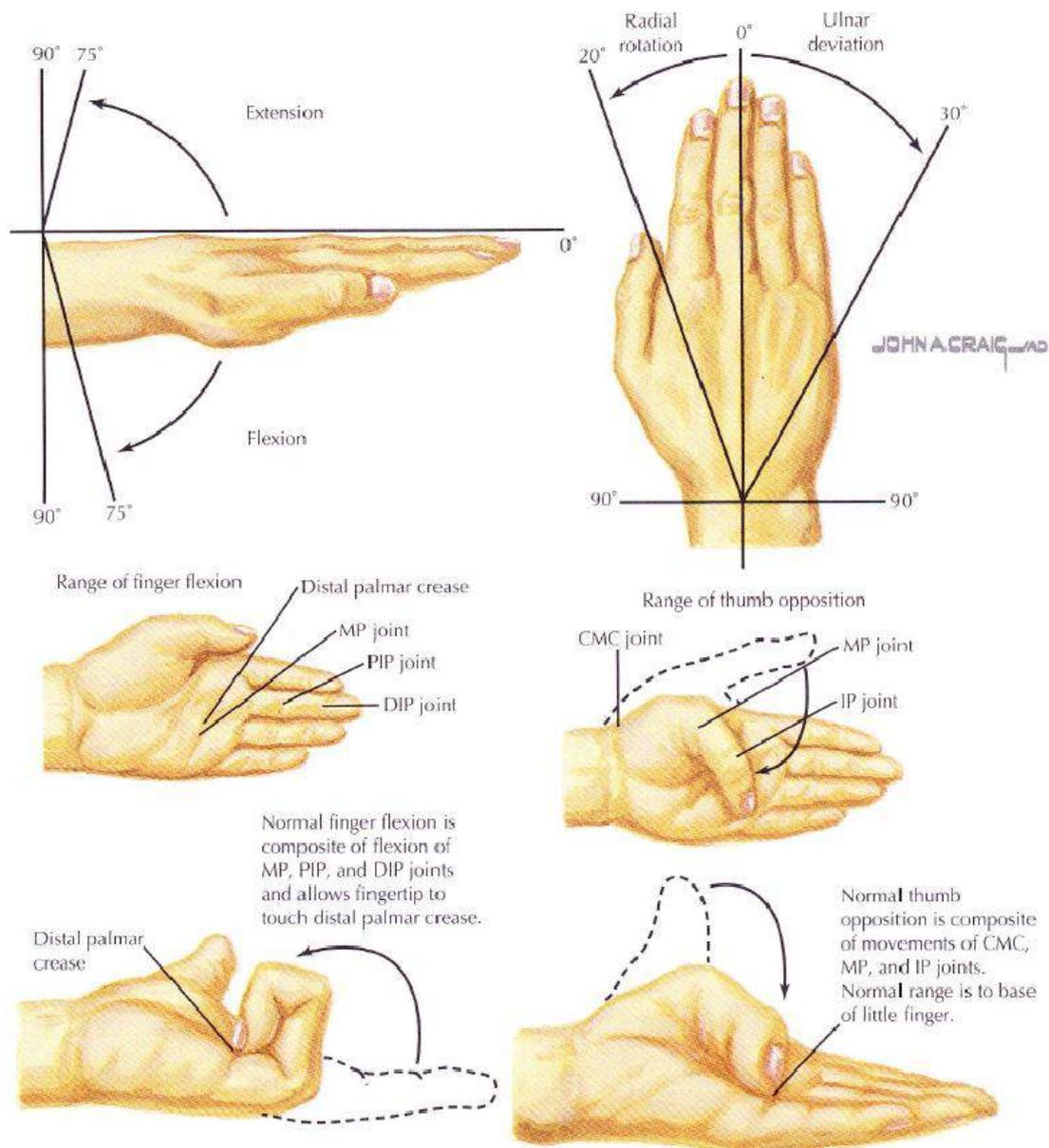
EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>PALPATION</b>		
Skin	Warm, red Cool, dry	Infection Neurovascular compromise
Metacarpals	Each along its length	Tenderness may indicate fracture
Phalanges and finger joints	Each separately	Tenderness: fracture, arthritis Swelling: arthritis
Soft tissues	Thenar eminence Hypothenar eminence Palm (palmar fascia)  Flexor tendons: along volar finger All aspects of finger tip	Wasting indicates median nerve injury Wasting indicates ulnar nerve injury Nodules: Dupuytren's contracture; snapping A1 pulley with finger extension: trigger finger Tenderness suggests purulent tenosynovitis Tenderness: paronychia or felon

## Gambar D6. Palpasi Manus



EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>NEUROVASCULAR</b>		
<b>Sensory</b>		
Radial nerve (C6)	Dorsal thumb, web space	Deficit indicates corresponding nerve/root lesion
Median nerve (C6-7)	Radial border, index finger	Deficit indicates corresponding nerve/root lesion
Ulnar nerve (C8)	Ulnar border, small finger	Deficit indicates corresponding nerve/root lesion
<b>Motor</b>		
Radial nerve/PIN (C7)	Finger MCP extension Thumb abduction/extension	Weakness = Extensor digitorum or nerve lesion Weakness = APL/EPL or nerve/root lesion
Median nerve (C8) AIN	Finger PIP flexion Index finger DIP flexion Thumb IP flexion	Weakness = FDS or corresponding nerve/root lesion Weakness = FDP or AIN nerve lesion Weakness = FPL or corresponding nerve/root lesion
Motor recurrent branch	Thumb opposition	Weakness = APB, OP, 1/2 FPB or nerve lesion; (CTS)
Ulnar nerve (deep branch) (T1)	Finger abduction Thumb adduction	Weakness = Dorsal/volar interosseous or nerve lesion Weakness = Adductor pollicis or nerve/root lesion
<b>Reflex</b>		
Hoffman's	Flick MF DIPJ into flexion	Pathologic if thumb IPJ flexes: <b>myelopathy</b>
<b>Vascular</b>		
Capillary refill Allen's test	Squeeze finger tip Occlude both radial & ulnar arteries, then release one	Color (blood) should return in less than 2 seconds Hand should "pink up" if artery that was released AND arches are patent. Failure to "pink up" = arterial injury
Doppler	Arches, digital borders	Use if presence of pulses/patent vessels is in question

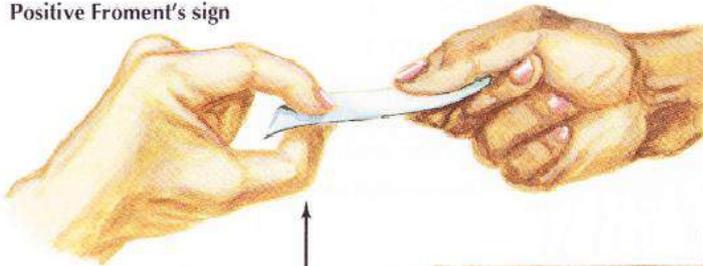
**Gambar D7. Pemeriksaan Neurovaskular Manus**



EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>RANGE OF MOTION</b>		
<b>Finger</b>		
MCP joint	Flex 90°, extend 0°, adduct/abduct 0-20°	Decreased flexion if casted in extension (collateral ligaments shorten)
PIP joint	Flex 110°, extend 0°	Hyperextension leads to swan neck
DIP joint	Flex 80°, extend 10°	All fingers should point to scaphoid at full flexion
<b>Thumb</b>		
CMC joint	Radial abduction: flex 50°, extend 50° Palmar abduction: abduct 70, adduct 0°	Motion is in plane of palm Motion is perpendicular to plane of the palm
MCP joint	In plane of palm: flex 50°, extend 0°	
IP joint	In plane of palm: flex 75°, extend 10°	
Opposition	Touch thumb to small finger base	Motion is mostly at CMC joint

## Gambar D8. Pemeriksaan ROM Manusk

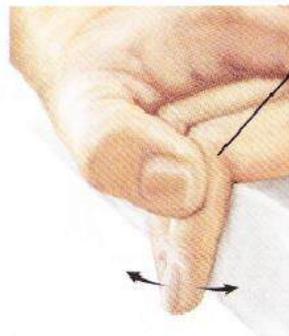
### Positive Froment's sign



When pinching a piece of paper between thumb and index finger, the thumb IP joint will flex if the adductor pollicis muscle is weak (ulnar nerve paralysis).

*Netter M.D.*  
K. Marzetti  
JOHN A. CRAIG, MD

### Elson test

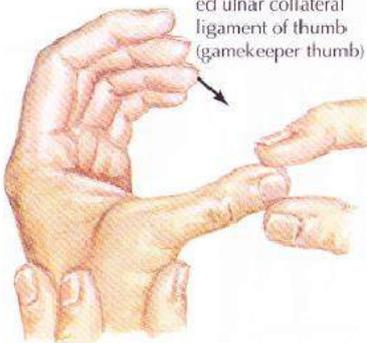


Normal intact central slip

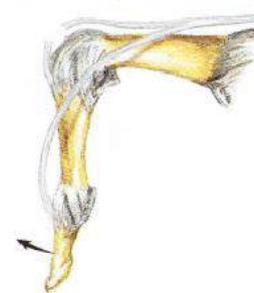


### Thumb instability test

Stress test for ruptured ulnar collateral ligament of thumb (gamekeeper thumb)



Abnormal ruptured central slip



EXAMINATION	TECHNIQUE	CLINICAL APPLICATION
<b>SPECIAL TESTS</b>		
Profundus test	Stabilize PIPJ in extension, flex DIPJ only	Inability to flex DIP alone indicates <b>FDP pathology</b>
Sublimus test	Extend all fingers, flex a single finger at PIPJ	Inability to flex PIP of isolated finger indicates <b>FDS pathology</b>
Froment's sign	Hold paper with thumb and index finger, pull paper	If thumb IP flexion is positive, suggest adductor pollicis weakness and/or ulnar nerve palsy
CMC grind test	Axial compress and rotate CMC joint	Pain indicates arthritis at CMC joint of thumb
Finger instability test	Stabilize proximal joint, apply varus and valgus stress	Laxity indicates collateral ligament injury
Thumb instability test	Stabilize MCPJ, apply valgus stress in extension and 30° of flexion	Laxity at 30°: <b>ulnar collateral ligament</b> injury Laxity in extension: accessory collateral ligament and/or volar plate injury
Bunnell-Littler test	Extend MCPJ, passively flex PIPJ	Tight or inability to flex PIPJ, improved with MCPJ flexion indicates <b>tight intrinsic muscles</b>
Elson test	Flex PIPJ 90° over table edge, resist P2 extension	DIPJ rigidly extending (via <b>lateral bands</b> ) indicates <b>central slip</b> injury (boutonnière)

## Gambar D9. Spesiat Tes pada Manusk

Hal-hal yang harus diperhatikan pada pemeriksaan anggota gerak atas adalah:

1. Universal Precaution ( penggunaan APD)
2. Perkenalan diri dan menjelaskan setiap pemeriksaan yang akan dilakukan dan tujuannya
3. Jangan menambah cedera pada pasien (First Do No Harm)

**Alat-alat yang dibutuhkan**

1. Goniometer
2. Manekin atau Probanus
3. Meteran
4. LCD Projector
5. White Board
6. Reflex Hammer

**Checklist :**

**CHEK LIST PEMERIKSAAN ANGGOTA GERAK ATAS**

NO	ASPEK YANG DILAKUKAN	BOBOT	NILAI		
			0	1	2
1	Salam dan memperkenalkan diri ke pasien				
2	Meminta ijin akan memeriksa pasien				
3	Sendi bahu				
	a. Look <ul style="list-style-type: none"><li>· Benjolan (+)</li><li>· Fistule (-)</li><li>· Deformitas (-)</li></ul>				
	b. Feel <ul style="list-style-type: none"><li>· Temperature kulit</li><li>· Nyeri tekan</li></ul>				
	c. Move <ul style="list-style-type: none"><li>· Fleksi &amp; ekstensi</li><li>· Abduksi &amp; aduksi</li><li>· Internal rotasi &amp; eksternal rotasi</li></ul>				
4	Sendi siku				
	a. Look <ul style="list-style-type: none"><li>· Deformitas , valgus</li><li>· Pembekakan (-)</li><li>· Sikatrix (-)</li></ul>				

	<b>b. Feel</b> <ul style="list-style-type: none"> <li>· Temperature kulit</li> <li>· Nyeri tekan</li> </ul>				
	<b>c. Move</b> <ul style="list-style-type: none"> <li>· Fleksi &amp; ekstensi</li> <li>· Pronasi &amp; supinasi</li> </ul>				
<b>5</b>	<b>Sendi pergelangan tangan</b>				
	<b>a. Look</b> <ul style="list-style-type: none"> <li>· Benjolan (+)</li> <li>· Deformitas (-)</li> <li>· Pembekakan (-)</li> <li>· Fistule (-)</li> </ul>				
	<b>b. Feel</b> <ul style="list-style-type: none"> <li>· Temperature kulit</li> <li>· Nyeri tekan</li> </ul>				
	<b>c. Move</b> <ul style="list-style-type: none"> <li>· Dorsofleksi</li> <li>· Palmarfleksi</li> <li>· <i>Radial deviation</i></li> <li>· <i>Ulnar deviation</i></li> </ul>				
<b>6</b>	<b>Jari tangan</b>				
	<b>a. Look</b> <ul style="list-style-type: none"> <li>· Nekrosis (+)</li> <li>· luka (+)</li> <li>· Pembekakan (+)</li> </ul>				
	<b>b. Feel</b> <ul style="list-style-type: none"> <li>· Temperature kulit</li> <li>· Nyeri tekan</li> </ul>				

	<p>c. <b>Move</b></p> <ul style="list-style-type: none"> <li>· <i>Finger flexion &amp; extension</i></li> <li>· <i>Thumb flexion &amp; extension</i></li> <li>· <i>Thumb abduction</i></li> <li>· <i>Thumb opposition (base of little finger)</i></li> </ul>				
	<b>JUMLAH (A)</b>				
<b>Ket: nilai 0 : tidak dilakukan, nilai 1: dilakukan tidak sempurna, nilai 2: sempurna</b>					
NO	PENILAIAN PERFORMANCE	NILAI			
		1	2	3	4
1	<b>Komunikasi</b>				
2	<b>Sikap professional</b>				
3	<b>Performance selama pemeriksaan</b>				
4	<b>Kualitas teknik pemeriksaan</b>				

## **DAFTAR PUSTAKA**

**Netter's Concise Orthopaedic Anatomy, 2<sup>nd</sup> Edition, 2010, Saunders Elsevier, Philadelphia**

**C Rex; S Rajasekaran; Charles SB Galasko, Clinical Assesment and Examination in Orthopedics, 2<sup>nd</sup> Ed., Jaypee Brothers Medical Publishers, New Delhi; Panama; London, 2012**

**David J. Magee, Orthopedic Physical Assesment, 4<sup>th</sup> Ed., Saunders Elsevier, St. Louis, 2006**