WASTING OF SMALL MUSCLES OF THE HAND

CHAPTER OUTLINE

- Localised wasting/ Part of Generalized
- Causes of localized wasting
- Clinical picture
- Neurogenic causes of wasting of small muscles of the hand
- Differential diagnosis
- Diagnostic algorithm

- Clinical anatomy
  - Names of the small muscles
  - Action of lumbricals, interossei
  - Movements of the thumb
  - Claw hand
  - Nerve supply of small muscles of the hand
  - Muscles supplied by ulnar nerve
  - Muscles supplied by Median Nerve
  - Miscellaneous

Wasting of the hand can be a part of generalized wasting
Or it can be localized.
Generalised wasting can be as follows:

Generalised wasting of
Muscles of the body
Small muscle wasting being a part

Physiological

Pathological

In elderly

Malignancy

Thyrotoxicosis

Tuberculosis

AIDS
### LOCALISED WASTING INVOLVING HAND MUSCLES ONLY:

**CAUSES:**

<table>
<thead>
<tr>
<th>Neurogenic</th>
<th>Ischemic</th>
<th>Disuse atrophy</th>
<th>Distal myopathy</th>
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<td></td>
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<td>4. Start in hands, legs or feet. 5. Fasciculation absent. 6. Symmetrical involvement. 7. Age of onset</td>
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Factors, which contribute to small muscle wasting of hand in Rheumatoid

1. Disuse atrophy
2. Vasculitis
3. Peripheral neuropathy
4. Mono neuritis multiplex
5. Entrapment neuropathy – median nerve at wrist, ulnar at elbow, and branches e.g. deep palmar branch of ulnar nerve damaged by subluxation of carpal bones on radius and ulna.

### CLINICAL DIAGNOSIS

**Result of small muscle wasting in hand:**
Flattening of thenar / hypothenar / both
Knuckles prominent
Extensor tendons stand out and
Prominent Guttering at back of the hand due to wasting of interossei
(Flatting of hypothenar with sparing of abductor pollicis brevis - indicates ulnar nerve lesion.)

Test of interossei and lumbricals.
Lumbricals flex MCP joints and extend the DIP joints
Dorsal interossei are abductors (mnemonic DAB)
Palmar interossri are adductors (Mnemonic PAD)

Test the patients ability to flex his MCP joints and extend the DIP joints
Test the ability to adduct and abduct the fingers
Test of 1st dorsal interosseous-ass the patient abduct his index finger against your resistance - The muscle can be seen and felt to contract

How to test the following muscles

1. Abductor pollicis brevis
   The patient is asked to abduct his thumb in a plane at right angles to the palmar aspect of index finger against resistance of your thumb
   The muscle can be felt to contract
   This is the muscle is affected in Carpal tunnel syndrome

2. Adductor pollicis
   Give the patient a book and ask him to grasp it firmly between the thumb and other fingers of both hands. In normal subject the thumb of the affected hand will be flexed.

3. Opponens pollicis
   Ask the patient to touch the tip of all fingers with his thumb. You oppose the movement with your thumb of index finger

Simplest test:
Examine the hand grip - a weak hand grip is an indicator of weakness of small muscles of hand.

Pointers to diagnosis in history and clinical exam

- History from childhood
  1. Polio myelitis
  2. Klumpkes paralysis
- History of neck pain
  1. Cervical spondylosis
  2. Intra or extra medulary tumors
  3. Cervical rib - bony lump may be found
- Fasciculations and brisk tendon reflexes in upper limb
  Amotropc lateral sclerosis
• Associated painful swelling of joints
  Rheumatoid arthritis
• Painless –charcots joints in syrinx

• Trophic changes in hand
  Leprosy
  Syringo myelia
  Cervical rib

• Elbow exam for
  Thickened ulnar nerve
  Signs of old injuries, excessive callous/cubitus valgus

• Sensory exam
  1. No sensory loss –MND
  2. Dissociated sensory loss – Syringo myelia
  3. Injury to ulnar and median nerve
     All modalities of sensation in palm and dorsum of hand lost except over anatomical snuff box
  4. Leprosy – patchy and distal sensory involvement
  5. If hands feel cold think of vasomotor insufficiency produced by cervical rib or thoracic inlet syndrome – hand is blue when dependent and pale when elevated

• Other Signs to look for
  Horneors syndrome on the affected side
  Scar over upper chest from pulmonary surgery
  Tenderness or mass over upper chest due to neoplasm
  Syringomyelia may be associated with syringobulbia
    - may have Horner syndrome, nystagmus, loss of facial sensation

**How to diagnose cervical rib clinically**
By Adsons test – it is also positive in thoracic inlet syndrome
Examiner feels the radial pulse from the back of the sitting patient
Noe the patient is asked to take a deep breath and turn the face to affected side. In presence cervical rib, diminution or obliteration of pulse occurs

In a patient with wasting of small muscles of hand and claw hand - Always palpate for thickened ulnar nerve in elbow and
Look for tropic changes in the fingers.

**Conditions causing fasciculations**
1. Motor neuron disease
2. Syringomyelia
3. Cervical spondylosis
4. Primary muscular atrophy
5. peroneal muscular atrophy
6. Poliomyelitis (when muscles are actively wasting)
7. Thyrotoxic myopathy
8. Carcinomatous myopathy
9. Organophosphorous poisoning
10. Benign

**NEUROGENIC CAUSES OF WASTING OF SMALL MUSCLES OF HAND:**

*Key point to bear in mind*

Small muscles of the hand are supplied by segments C8T1

Hence Causes of wasting includes LMN lesion at any point between C8T1 and muscles including primary muscle degeneration

Lesion can be at 1. Anterior horn cell, 2. nerve root, 3. spinal nerve, 4. In brachial plexus, 5. in peripheral nerve (median or ulnar nerve), 6. in muscles.

<table>
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<tr>
<th>Level of Lesion can be in:</th>
<th>1. Spinal cord lesion at T1 level.</th>
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<tr>
<td>2. Anterior horn cell</td>
<td>3. Roots</td>
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<tr>
<td>4. Lesions of brachial plexus</td>
<td>5. Lesions of peripheral nerves - Median or Ulnar</td>
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**COMMON FIVE CAUSES OF WASTING OF SMALL MUSCLES OF HAND**

- Leprosy
- Motor neuron disease
- Rheumatoid arthritis
- Poliomyelitis
- Thoracic inlet syndrome

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**I. Spinal cord lesion at C8 T1 segment level:**

| Compression of T1 segment due to spondylosis, dumb bell - neurofibroma, tumor |

**II. Lesions of Anterior Horn cells at T1 level:**

<table>
<thead>
<tr>
<th>Motor neuron disease</th>
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<tr>
<td>Syringomyelia</td>
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<tr>
<td>Polio..</td>
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<tr>
<td>Spinal muscular atrophy</td>
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<tr>
<td>Peroneal muscular atrophy.</td>
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**Motor neurone disease:**

1. ✷ No sensory signs
2. ✷ Fasciculations prominent;
3. wasted fibrillatory tongue
4. Combination of UMN and LMN lesion
5. Hyper active reflexes despite wasting and fasciculation in the same muscles.

**Syringomyelia:**

- **Sensory:** Dissociated sensory loss is an early sign/main sign.
  (Intact vibration and position sense, impaired pain and temperature sense).
- **Motor:** Can have upper limb wasting and lower limb spasticity. More extensive wasting of arm muscles
- **Pyramidal:** Involvement common.
- **Reflexes** usually absent.
  Fasciculation.: Slight -fasciculations not prominent
- Trophic changes common/burns scars
- Deformed Charcot’s joints in elbow and shoulder
- Other signs to look for:
  - of syringobulbia: horner’s, nystagmus, loss of facial sensation.

**Polio:**

- **a.** Acute onset
- **b.** Rapid course
- **c.** Paralysis occurs within 24 hrs - Non-progressive
- **d.** Patchy, Asymmetrical Flaccid paralysis
- **e.** Childhood or young age-below 25.
- **f.** Lower limbs >upper limbs
- **g.** Quadriceps, Peronei, tibial group most affected

**Spinal muscular atrophy:**

- Develops in infancy/adolescence or early adult life.
- Proximal muscle involvement
- But slower progression.
- More benign course.

**Peroneal muscular atrophy:**

- Peculiar distribution of wasting
- Wasting begins in lower limb before upper limb
- Wasting begins distally in lower limb stops abruptly at mid thigh causing inverted Champaign bottle appearance in lower limb
  
  Wasting of small muscles of the hand may be present
- Sensory impairment present
- Usually familial
- Onset in childhood.

**III. Root Lesions:** (causing Hand wasting)
<table>
<thead>
<tr>
<th>A. T1 compression by disc lesion.</th>
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<tr>
<td>B. Pachy meningitis due to Cysticercosis of spinal cord:</td>
</tr>
<tr>
<td><em>May closely resemble Motor neuron diseases</em></td>
</tr>
<tr>
<td><em>Can be even indistinguishable</em></td>
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<tr>
<td>C. Cervical Spondylosis:</td>
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<tr>
<td>Cervical spodylosis affecting C8T1</td>
</tr>
<tr>
<td>(Mnemonic : CS) C stands for- commonly C5 C6 affected</td>
</tr>
<tr>
<td>S –stands for- Significant hand muscle wasting uncommon;</td>
</tr>
<tr>
<td>➢ Usually affects higher roots C5, C6; so</td>
</tr>
<tr>
<td>➢ significant wasting of small muscles of hand is uncommon</td>
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<tr>
<td>➢ Spastic weakness of lower limbs without sensory loss.</td>
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<tr>
<td>➢ Course is very slow.</td>
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<tr>
<td>➢ No signs above the level of the lesion, cervical collar</td>
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<td>➢ Xray changes are very characteristic.</td>
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<thead>
<tr>
<th>D.. Syphilitic amyotrophy due to meningomyelitis:</th>
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<tr>
<td>In meningo myelitis, a loss of subpial myelinated fibres occurs</td>
</tr>
<tr>
<td>This allegedly gives rise to radicular pain and amyotrophy of hands.</td>
</tr>
<tr>
<td>Mnemonic ARP</td>
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<tr>
<td>A-for Argyl Robertson Pupil+; R-Root pain+; P-for Positive VDRL/FTAAB</td>
</tr>
</tbody>
</table>

| ➢ Pupillary changes +ve |
| ➢ Root pain + |
| ➢ VDRL /FTAAB +ve. |
| ➢ Sensory changes sometimes |
| ➢ Pyramidal signs often slight |

<table>
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<tr>
<th>E. Cervical cord tumor: tumor at C8T1 level</th>
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<tbody>
<tr>
<td>➢ Involves roots / anterior horn cells</td>
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<tr>
<td>➢ Can cause UMN lesion in L. Limb and LMN lesion in Upper limb.</td>
</tr>
<tr>
<td>➢ Sensory changes +</td>
</tr>
<tr>
<td>➢ Pain</td>
</tr>
<tr>
<td>➢ Other ascending and descending tracts involved</td>
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<tr>
<td>➢ CSF -changes of Spinal block.</td>
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<tr>
<th>IV. Lesions of Brachial Plexus</th>
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<tr>
<td>A. Pancoats tumor</td>
</tr>
<tr>
<td>B. Thoracic outlet obstruction</td>
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</table>
### A. Pancoast’s tumor:
- chest signs,
- tenderness /mass /scar (due to pulm.surgery) over upper chest
- lymph nodes ,
- clubbing
- Horner’s
- cachexia

### B. Thoracic outlet obstruction

#### B1. Cervical rib or scalenus Anticus Syndrome.
6. Causes lesion of lower trunk, **medial cord** of plexus
7. Wasting of some or all the muscles supplied by Ulnar nerve. (Including muscles of forearm and small muscles of the hand.)
8. And of muscles supplied by Median Nerve.
9. Pain and sensory loss occurs along C8T1 segments.

#### B2. Cervical rib:
- Symptoms provoked by particular posture or movement.
- e.g. Sleeping on the limb, cleaning the windows, etc.
- Supra clavicular bruit may be found.
- But Raynauds and other vascular manifestations are rare in the presence of prominent neurological features.

#### B3. Trauma; causes Klumpke’s paralysis:

#### Traction injury

**Mechanism**; violent traction of the arm
- (e.g. the patient who tries to stop himself falling from a tree by grabbing a passing branch; or motor cycle injury
- The same damage in obstetric practice produces klumpke’s paralysis.
- Birth injury to T1, its anterior roots and spinal nerve.

- **Features of Klumpkky’s**
  - Wasting and paralysis of all small muscles of hand
  - Clawing of all the fingers
  - Cannot make a fist
  - Cannot abduct or adduct the digits
Cannot oppose the thumb.
Plus

- Loss of sensation along-
  - medial aspect of the arm
  - Medial fore arm
  - Ulnar side of palm
  - Last one and 1/2 digits

If T1 root affected possibly Horner’s syndrome.

**Note:** Similar picture in hand occurs in combination of ulnar and median nerve lesion but in addition there is involvement of pronator teres and flexor carpi ulnaris.

Other Causes: D. T1 Vertebral body collapse;

- Can cause T1 spinal nerve lesion.

**E. Extra dural lesions like carcinoma or reticulosis**

### IV. Lesions of peripheral nerve (Ulnar or Median)

- Peripheral motor Neuropathy.
  
  Note; difference between ulnar nerve lesion and T1 root lesion: In T1 root lesion there is no sensory loss affecting the hand.

- **Causes of individual peripheral nerve lesion:**
  1. Trauma,
  2. acute compression, (coma, anesthesia, deep sleep)
  3. chronic compression, (entrapment)
  4. Acute ischemia (collagen vascular disease, diabetes)

#### IV A. Ulnar nerve lesions:

**Level of lesion**

Can occur

- At elbow
- At wrist

**i) At elbow or below the elbow; Causes**

- **Fracture** of humerus or elbow joint.
  
  Usually Injury - immediate.
  Occasionally delayed for Yrs,
  - occurring after the development of Cubitus Valgus.
  - Named Tardive ulnar palsy.

- **Arthritis** of elbow causing osteophytic outgrowths.
  
  Charcot’s joint.

- **Ganglion** at the elbow
**Cubital tunnel Syndrome:**
Ulnar nerve entrapped between 2 heads of flexor Carpi ulnaris.
Symptoms: Pain and paresthesia along the distribution of the nerve

**At the wrist:**
- Injury by cuts
- Carpal tunnel syndrome-entrapment neuropathy
  - common site of entrapment –Median nerve –carpal tunnel  ‘Ulnar -elbow
- Diabetes- causing damage to deep palmar branch of ulnar nerve.
- Similar involvement in occupational diseases, which cause-pressure on outer aspect of the palm-compression neuropathy
  (hypothenar muscles escape in this)(No sensory loss)

**IV B. Median Nerve lesion: C6C7C8T1**
Median nerve may be damaged at any point along its course, The site indicated by the nature of motor and sensory dysfunction. Complete interruption above the elbow produces paralysis of all the muscles innervatedClinically the only common lesion is carpal Tunnel Syndrome.

**Lesions:**
- Trauma
- Peripheral neuropathy.
- Carpal Tunnel syndrome
  - Isolated wasting of abductor pollicis brevis indicates median nerve lesion in carpal tunnel syndrome
  - Sparing of abductor pollicis brevis indicates ulnar nerve lesion in carpel tunnel syndrome

  - Median nerve lesion in carpal tunnel: causes Paralysis of thenar muscles
  - Inability to oppose the thumb
  - So “Ape thumb”occurs
  - I.e;thumb is rotated in the plane of the fingers

- Pronator Syndrome:
  - Compression of median nerve as it passes through, Pronator teres muscle.
  - Median nerve supplies pronator muscle.
- Kinked by fibrous edge of Flexor Digitorum Superficialis.
V. Distal Myopathy.

**Important features:**
- Familial / Hereditary
- Fasciculation absent.
- Symmetrical involvement.
- Adult onset
- Progressive wasting

**Dystrophia Myotonica:**
Less common
Fore arm muscles wasting > hand muscle wasting.

**Differential Diagnosis:**
Points, which help in differentiating the causes;

1. **Sensory** findings:
   - Nil in MND and Myopathy

2. **Characteristic distribution:**
   - Ulnar nerve lesion
   - Median nerve lesion
   - T1 nerve root lesion.

3. **Tendon reflexes:**
   *Preserved* in Myopathy, ulnar nerve, and Median nerve lesions.
   - Lost or depressed in
   - Spinal cord lesion,
   - Root lesion,
   - Brachial plexus lesion,
   - Peripheral nerve Lesion.

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**Diagnostic Algorithm in small muscle wasting:**
Sensory findings: nil; 
1. MND 
2. Myopathy 
3. T1 root lesion.

Characteristic distribution: Ulnar nerve lesion 
preserved; Median nerve lesion 
Lost 

Tendon reflexes lost /depressed 
1. Spinal cord lesion 
2. Root lesion 
4. Peripheral nerve lesion.

A. Which are the small muscles of the hand
Muscles whose origins and insertions are within the hand
1. Muscles of Thenar eminence,
2. Muscles of Hypothenar and
3. Lumbricals,
4. Interossei,
5. Palmaris brevis.

B. **Muscles of thenar:** Act on the thumb:
   • Rotate first metacarpal on trapezium.
   • Responsible for the opposability of the thumb.
   • Flex and abduct MP joint of the thumb.
   
   - Opponens pollicis brevis
   - Abductor pollicis brevis
   - Flexor pollicis brevis

C. **Muscles of Hypothenar:** Act on the little finger
   They act on MP joint of the little finger.
   - Opponens Digiti minimi
   - Flexor digiti minimi
   - Abductor digiti minimi

D. **Action of lumbricals:**
   Lumbrical is sole flexor of MP joint – metacarpo phalangial joint

E. **Action of Interossei:**
   1. Palmar – (3 in number---Adduct theMP joint of fingers 2,4,5)
   2. Dorsal (4 in number) --- A bduct digits 2,3,4 – **Fanning of fingers**
   3. Interossei are innervated by ulnar nerve
   4. Also act as flexors of MP joint

**Making a fist:**
   - Interossei: Prime flexors of MP joints.
     Especially active in flexing the MP joint when IP joints are in position of flexion- Making a fist.
   - Lumbricals: **Flex MP joint** while simultaneously **extending IP joint.**

**Movements of the thumb:**
Properties:
Plane of the thumb rotated (lies at ) 90 degrees to the axis of the fingers.
**Movements:**
Flexion: Thumb moves across the palm.
Extension: Thumb moves away from the palm.
Abduction: thumb moves away from the hand towards you.
Adduction: movement of the thumb towards the hand.
Opposition: flexion and rotation of the thumb to touch the pads of other fingers.

**Nerve supply of small muscles of hand: root value C8T1**

Global wasting of the hand indicates:
LMN lesion originating at C8T1

Median and Ulnar nerve lesion:

10. Isolated wasting of abductor pollicis brevis indicates median nerve lesion in carpal tunnel syndrome

11. Sparing of abductor pollicis brevis indicates ulnar nerve lesion in carpal tunnel syndrome

**Muscles supplied by Ulnar nerve (in hand);**

All interossei
lumbicals 3rd and 4th
adductor pollicis brevis
flexor pollicis brevis, Palmaris brevis

Plus hypothenar muscles –

(Flexor digiti minimi,
abductor digitiminimi,
opponens digit minimi)

**Movements** (brought out by ulnar nerve)
adduction and abduction of the fingers (interossei)
adduction of the thumb (adductor pollicis)

**Muscles supplied by median nerve: mnemonic: LOAF**

- 2 radial Lumbricals
- Opponens pollicis
- Abductor pollicis brevis
- Outer head of Flexor pollicis brevis
- Some times 1st dorsal interosseus.

**Root value:**
ulnar C8 T1
Median C6C7C8 T1

*(radial nerve and its branches supply all extensors in the arm.)*

**Claw hand (main-en-griffe) – features:**

- Claw hand is a condition that causes curved or bent fingers, which make the hand appear like claw of an animal.
- Hyper extension of MCP joints and flexion of PIP and PIP
- Long extensor muscles hyper extend the MCP joint
• Long flexor muscle flex the PIP AND DIP joints
• Intrinsic muscles of hand must be markedly paralysed to produce claw hand
• Hyper extension at MCP joint caused by unopposed action of extensor digitorum profundus- long extensors of the fingers-unopposed by lumbricals)

Pseudo claw hand (Mimicking claw hand)
Surgical conditions like
1. Debuycrine’s contracture
2. Volkmann’s ischemic contractures
3. Post –burn contracture
WASTING OF THE SMALL MUSCLES OF THE HAND

BACK girish

What are the muscles of hand?

(A) Thenar muscles -
(i) Abductor pollicis brevis
(ii) Flexor pollicis brevis, and
(iii) Opponenes pollicis

(B) Adductor pollicis.

(C) Hypothenar muscles -
(i) Abductor digiti minimi,
(ii) Flexor digiti minimi, and
(iii) Opponens digiti minimi

(D) Palmaris brevis (superficial muscle of hand).

(E) Palmar and dorsal interossei.

(F) Lumbricals.

Nerve supply of these muscles:

(I) Median nerve supplies,
1) Thenar muscles
2) Two lateral lumbricals
3) Sometimes 1st dorsal interosseous muscle

(II) Ulnar nerve supplies
1) Hypothenar muscles.
2) All palmar and dorsal interossei.
3) Two medial lumbricals.
4) Two heads of adductor pollicis
5) Medial head of flexor pollicis brevis (thenar muscle).
6) Palmaris bervis.

N.B - Ulnar nerve supplies all the small muscles of hands excepting the thenar muscles and the two lateral lumbricals.

Clinical Diagnosis of Wasting of Small muscles of Hands:

1) Flattening of palm due to wasting of thenar and hypothenar muscles.
2) Knuckles will be prominent.
3) Flexor - extensor tendons will stand out.
4) The interosseous space in the dorsum of hand will be hollowed or depressed due to wasting of interosseal and lumbricals.

**Test of Interossei and Lumbricals:**

Test the patient's ability of flex his MCP joints and to extend the DIP joints. Remember, the palmar interossel are adductors and dorsal interossei are abductors of fingers.

Test of 1st dorsal interosseous - Ask the patient to abduct his index finger against your resistance. The muscle can be seen and felt to contact.

**How to test these small Muscles?**

(i) Abductor pollicis brevis - The patient is asked to abduct his thumb in a plane at right angles to the palmar aspect of Index finger, against resistance of your thumb. The muscle can be felt to contract. This muscle is affected first in carpal tunnel syndrome.

(ii) Adductor pollicis - Give the patient a book and ask him to grasp it firmly between the thumb and other fingers of both hands. In a normal subject the thumb of the affected hand will be flexed.

(iii) Opponens pollicis - Ask the patient to touch the tip of all the fingers with his thumb. You can oppose the movement with your thumb or index finger, or you can ask the patient to swing the thumb across the palm.

**Common causes of wasting of the small muscles of hand:**

The small muscles of hand are supplied by c9 and T1 segments of the spinal cord. The causes of wasting, therefore, include lesions in the lower motor neurons at any point between these spinal segments and the muscles, together with certain other conditions in which primary muscle degeneration of reflex muscular wasting occurs.

(a) Lesion in the anterior horn cells -
1) Acute anterior poliomyelitis
2) Motor neurone disease (amyotrophic lateral sclerosis)
3) Syringomyelia.
4) Intracamedullary tumors like glioma, ependymoma.

(b) Lesion in the nerve root (anterior roots) -
1) Extramedullary lesion as in patchy arachnoiditis.
2) Leptomeningitis (syphilitic) - Rare
3) Cervical spondylosis

(c) Lesion in the spinal nerve - Klumpke's paralysis from birth injury.

(d) Lesions in the brachial plexus -
1) Cervical rib
2) Thoracic inlet syndrome
(e) Lesion in the median and ulnar nerve -
1) Injury.
2) Peripheral neuropathy from leprosy, lead neuritis etc.
3) Peroneal muscular atrophy (usually follows wasting of legs and feet).
4) Carpal tunnel syndrome.

(f) Muscle disease and others -
1) Distal myopathy of Gower's.
2) Myotonia dystrophica, rarely.
3) Volkmann's ischemic contracture.
4) Peripheral vascular disease.

(g) Reflex wasting (due to disuse atrophy) - Rheumatoid arthritis, post-paralytic.

N.B - Common five causes of wasting of the small muscles of hands are,
1) Leprosy
2) Motor neurone disease
3) Rheumatoid arthritis
4) Poliomyelitis
5) Thoracic inlet syndrome.

**How to diagnose cervical rib clinically?**

By Adson's test - This test is also positive in thoracic inlet syndrome. The examiner feels the radial pulse from the back of the sitting patient. Now the patient is asked to take a deep breath and to turn the face (not flexion) to the affected side. In the presence of cervical rib, there will obliteration or diminution of pulse.

**Identification points for an aetiological diagnosis :**

1) History from childhood -
   i) Poliomyelitis.
   ii) Klumpke's paralysis

2) If complains of neck pain -
   i) Cervical spondylosis
   ii) Intra - or extramedullary tumor
   iii) Cervical rib (may be associated with bony lump).

3) If associated with fasciculation and brisk tendon reflexes in upper extremities -
   Amyotrophic lateral sclerosis.

4) Associated with painful swelling of joints - Rheumatoid arthritis.

5) If there is trophic change in hand -
   i) Leprosy
   ii) Syringomyelia
   iii) Cervical rib etc
6) Examine the elbow for signs of old injuries like excessive callus, cubitus valgus etc. (for nerve injury) or for thickened ulnar nerver (leprosy).

7) If there is:
1) No sensory loss - MND.
2) Dissociation of sensory loss - syringomyelia.

N.B - Wasting of the small muscles of hands may be associated with claw hand. Emaciation produces wasting of the small muscles of hands and feet along with the wasting of other muscles in human body.

**CLAW HAND**

**Describe the Claw Hand Deformity :**

Claw hand or 'main en griffe' is a condition where the metacarpophalangeal (MCP) joints are hyperextended, and the PIP and DIP joints are flexed.

We know that the lumbricals are the main flexors of the first phalanx and the interossei are the sole extensors of the middle and distal phalanges. When the lumbricals are paralysed, there is hyperextension at MCP joints and when the interossei and paralysed, the PIP and DIP joints are flexed. So claw hand is produced by the paralysis of interossei and lumbricals.

Enumerate the common aetiologies :

The interossei and lumbricals are supplied by the T1 segment of the spinal cord through the ulnar and median nerves. So any lesion of T1 segment or of the nerves will produce the claw hand deformity.

1) True claw hand :
   a) Combined lesion of ulnar and median nerves by injury or leprosy. It is obvious that only ulnar nerve affection will produce ulnar claw hand.
   b) Cervical rib or thoracic inlet syndrome.
   c) Klumpke's paralysis.
   d) Motor neurone disease, syringomyelia, intramedullary tumors etc.

   N.B - Actually the diseases which produce wasting of the small muscles of hands may show some degree of claw deformity.

2) Mimicking (pseudo) claw hand :
   These are basically surgical conditions like :
   a) Dupuytren's contracture.
   b) Volkmann's ischaemic contracture.
   c) Post-burn contracture.

**Aetiological differentiation by sensory function :**

1) Motor neurone disease, either amyotrophic lateral sclerosis or progressive muscular atrophy - No sensory loss.
2) Injury to the ulnar and median nerve -
i) All modalities of sensation in the palm and dorsum of hand are lost.
ii) In the dorsum of the hand, a small area escapes sensory loss (over the base of thumb and the first interosseous space) as it is supplied by radial nerve.
3) Leprosy - Patchy and distal sensory involvement
4) Syringomyelia - Dissociated sensory loss i.e. loss of pain and temperature sensation with preservation of fine touch sensation.

**Hands feels cold : What will you think?**

It is the vasomotor insufficiency produced by the presence of cervical rib. Thoracic inlet syndrome or due to severe form of vasculitis. The hand feels colder than the normal side. The affected hand becomes pale when elevated and becomes blue when dependent for some time.

**What is Wrist Drop?**

(A) Definition: Paralysis of the extensor of wrist. There will be difficulties in extension of wrist and fingers. In an attempted extension of fingers, there will be flexion of MCP joints and extension of interphalangeal joints due to unopposed action of lumbricals and interossei.

(B) Method of testing: Ask the patient to make a fist and try to flex the wrist foreibly against his effort to maintain the posture. Normally, it is almost impossible to flex the wrist overcoming the patient's wrist extensors. But in wrist drop, patient's wrist will be very easily flexed by the examiner.

(C) Aetiology:
1) Radial nerve palsy
2) Lead neuropathy, and
3) Other peripheral neuropathies

Identification points for an aetiological diagnosis:

Same as described in the chapter on "Wasting of the small muscles of hands"

* Never forget to palpate the ulnar nerve in the elbow and to examine trophic changes in the fingers in a patient with claw hand or wasting of the small muscles of hands. Gireesh.com

1) Flattening of palm due to wasting of thenar and hypothenar muscles. 2) Knuckles will be prominent. 3) Flexor - extensor tendons will stand out. ...

www.gireesh.com/FAQ.htm - 145k - Cached - Similar pages

**ANATOMY OF BRACHIAL PLEXES**

**5 Roots (Ventral Rami)**

- C5
- C6
- C7
- C8
- T1
- Long Thoracic Nerve C5, C6, C7
- Dorsal Scapular Nerve C5

3 Trunks

- Superior Trunk
  - Suprascapular Nerve C5, C6
  - Nerve to Subclavius C5, C6
- Middle Trunk
- Inferior Trunk
  - Inferior branch roots C8 and T1 go around the first rib and the inferior trunk itself rests on top of the first rib.

3 Divisions

- There are 3 ventral divisions
- There are 3 dorsal divisions

3 Cords

- Lateral Cord
  - Lateral Pectoral Nerve C5, C6, C7
- Posterior Cord
  - Lower Subscapular Nerve C6
  - Thoracodorsal Nerve C6, C7, C8
  - Upper Subscapular Nerve C5, C6
- Medial Cord
  - Medial Pectoral Nerve C8, T1
  - Medial Cutaneous Nerve to Forearm C8, T1
  - Medial Cutaneous Nerve to Arm T1

Terminal Branches

- Axillary C5, C6
  - Comes from the posterior cord
- Median Nerve C(5), C6, C7, C8, T1
  - Comes from the lateral and medial cords
- Musculocutaneous Nerve C(4), C5, C6, C7
  - Comes from the lateral cord
- Radial Nerve C5, C6, C7, C8, T1
  - Comes from the posterior cord
- Ulnar Nerve C(7), C8, T1
  - Comes from the medial cord
**WASTING OF SMALL MUSCLES OF HAND**

(classified according to site of pathology)

<table>
<thead>
<tr>
<th>Cord Lesions Affecting Anterior Horn Cells at T1 Level:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>motor neurone disease</strong></td>
</tr>
<tr>
<td>Friedreich's ataxia</td>
</tr>
<tr>
<td>syringomyelia</td>
</tr>
<tr>
<td>cord compression</td>
</tr>
<tr>
<td>polio</td>
</tr>
<tr>
<td>meningovascular syphilis</td>
</tr>
<tr>
<td>Charcot-Marie-Tooth disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T1 Root Lesions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>cervical spondylosis</td>
</tr>
<tr>
<td>'dumb-bell' neurofibroma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brachial Plexus Lesions (Lower Cord - T1):</th>
</tr>
</thead>
<tbody>
<tr>
<td>cervical rib</td>
</tr>
<tr>
<td>Pancoast tumour</td>
</tr>
<tr>
<td>Klumpke’s paralysis (traumatic)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peripheral Nerve Lesions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>median and ulnar nerve lesions</td>
</tr>
</tbody>
</table>
**muscle disease / other:**

- disuse atrophy
- rheumatoid arthritis

**Wasting of the hand muscles due to T1 lesion**


The muscles of the hands are wasted (involving the thenar and hypothenar eminence). The power of the hands is decreased. The sensation over the T1 dermatome is abnormal.

Other signs to look for:

- Horner's syndrome on the affected side
- scar over the upper chest from pulmonary surgery
- tenderness or mass over the upper chest due to neoplasm (for example Pancoast's tumour from apical lung cancer).

**Syringomyelia**

The main feature being dissociation of sensation with intact vibration and joint position senses but impaired pain and temperature sensation. You are likely to be asked to concentrate on the sensory examination.

In advanced cases, there is wasting of the small muscles of the hands with deformed (Charcot's) joints in the elbow and shoulder. The power of the involved muscles are weak. The reflexes are usually absent. Sensory examination shows impaired pain and temperature sensation but normal vibratory and joint position sensation.

Other signs to look for:

- syringomyelia may involve the brain stem and give rise to syringobulbia. Patient may have Horner's syndrome, nystagmus (fine rotary) and loss of facial sensation usually start form behind and converge on the nose and upper lip). Motor cranial nerves involvement are rare.
1 Interossei = Prime flexors of M.P. joints. Especially active in flexing the M.P. joints when the I.P. joints are in a position of flexion *(making a fist)*.

2 Lumbricals = Flex the M.P. joints while simultaneously extending the I.P. joints. Used mainly with the *precision grip*

**REFERENCE_GROSS ANATOMY**

1. **Thenar** Responsible for opposability of thumb
   1. Flex and abduct M.P. joint of thumb
   2. Rotate 1st. metacarpal on trapezium
2. **Interossei**
   1. Palmar (3 in number) Adduct the MP joint of fingers 2,4,5
   2. Dorsal (4 in number) Abduct digits 2, 3, 4
   3. Interossei innervated by ulnar nerve
   4. also Act as flexors of MP joint

**. MOVEMENTS OF THE THUMB** (Chart 3)

A. **Properties**
   1. Plane of thumb rotated 90° to the axis of the fingers

B. **Movements**
   1. Flexion - thumb moves across the palm
   2. Extension - thumb moves away from the palm
   3. Abduction - thumb moves away from hand towards you
   4. Adduction - movement of thumb towards hand
   5. Opposition - flexion and rotation of thumb to touch pads of other fingers

**Claw hand** is a condition that causes curved or bent fingers, which makes the hand appear like the *claw* of an animal. See also *claw foot* ...

medlineplus medical encyclopedia

---

**Wasting of small muscles of hand GP notebook**

In the hand, the median nerve supplies the lateral two lumbricals, opponens pollicis, abductor pollicis brevis, and flexor pollicis brevis; the remainder are served by the ulnar nerve.
Wasting of the interossei (prominent guttering of the back of the hand), of the web space between thumb and index finger, and softening and flattening of the hypothenar eminence with sparing of abductor pollicis brevis indicates an ulnar nerve lesion.

**Isolated wasting of abductor pollicis brevis** indicate median nerve lesion in carpal tunnel syndrome.

Global wasting of hand indicate median and ulnar nerve lesion; probably, with damage to T1 root.

**More extensive arm wasting may indicate** any of the following: syringomyelia of MND; bilateral, symmetrical wasting indicate peripheral neuropathy.

More detailed information on causes of wasting of the small muscles of the hand is given in the aetiology section.

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*If ulnar nerve is divided below mid-forearm, ulnar claw hand is produced; (low ulnar nerve lesions);*
- w/ this lesion, 4th & 5th fingers are hyperextended at MP joints by long extensors but flexed at interphalangeal joints;
- this posture is sometimes called hand of benediction;
- if ulnar nerve lesion is above midforearm, clawing of ulnar two fingers does not occur, because extrinsic muscles producing IP joint flexion are also denervated (see high ulnar nerve lesion);
- in complete claw hand, produced by low lesion of median nerve & ulnar nerves, MP joints are extended & interphalangeal joints flexed by still-functional extrinsics;
- references **Ulnar Nerve** - Wheeless' Textbook of Orthopaedics

*if ulnar nerve lesion* is above midforearm, clawing of ulnar two fingers does not ... in complete claw hand, produced by low lesion of median nerve & ulnar ...
ULNAR NERVE

Ulnar nerve: Anatomy

- Formed by: C8 and T1 ± C7 roots
- Axons pass through
  - Lower trunk & medial cord of brachial plexus
  - Ulnar groove @ elbow
  - Cubital tunnel under flexor carpi ulnaris
  - Guyon's canal: Between pisiform & hamate bones in hand
- Branches: All distal to elbow
  - Forearm
    - Flexor carpi ulnaris (FDU)
    - Flexor digitorum profundus (FCP) (4th & 5th fingers)
    - Palmar cutaneous sensory to proximal ulnar palm
    - Dorsal ulnar cutaneous to 5th & ulnar side of 4th finger
  - Hand: All motor
    - Palmaris brevis
    - Interossei
    - Lumbricals (3rd & 4th)
    - Flexor pollicis brevis
- Anomalies
  - Martin-Gruber anastomosis (10% to 44% of normals)
    - Branches from median to ulnar nerve in forearm
    - Innervate: 1st dorsal interosseus, Adductor pollicis, Abductor digiti minimi
  - Riche-Cannieu anastomosis
    - Connections between deep ulnar & median nerves in hand

Ulnar nerve: Lesions
Partial ulnar nerve lesion
Clawing of 2 medial fingers due to weakness of lumbricals III & IV

- Axilla & upper arm: Uncommon
  - Causes
    - Compression: Sleep; Crutches; Tourniquets
    - Mass: Aneurysm of brachioaxillary artery; Schwannoma
  - Clinical
    - Involvement of forearm muscles: FCU & FDP
    - Associated damage to median & ulnar nerves

- Elbow
  - Causes
    - Bony deformities
      - Old fractures
      - Arthritis: Osteo; Rheumatoid
      - Shallow ulnar groove
        - Valgus deformity - congenital or 2° to lateral epicondyle fracture
      - Paget's disease
    - Trauma: Acute, Chronic
      - Anesthesia
      - Pressure with elbow flexed
    - Soft tissue masses: In condylar groove or cubital tunnel
    - Anconeus Epitrochlearis
      - Anomalous muscle; 2% of ulnar neuropathies
      - Requires surgical decompression of nerve
    - Ulnar nerve prolapse
      - Nerve rolls out of ulnar groove
      - Predisposes to repetitive trauma
    - Leprosy
    - Idiopathic
      - ? entrapped in ulnar groove or cubital tunnel
    - Clinical features
      - Pain: Maximal at elbow
      - Paresthesias & numbness: Ulnar sensory distribution
        - Evoked by Tinel's: Light tapping over elbow
      - Weakness
        - Ulnar-innervated hand muscles weak: Especially 1st dorsal interosseus
        - Forearm muscles relatively spared

- Forearm
  - Trauma
- Hematoma in forearm muscles: Hemophiliacs
- Dialysis shunts: Ischemia

- Wrist & Hand
  - 4 sites
    - Guyon's canal
      - Sensory loss & weakness in all ulnar hand muscles
      - Mass (ganglion, lipoma, synovial cyst), External pressure
    - Distal to Guyon's canal
      - Weakness in all ulnar hand muscles; Normal sensation
      - External pressure; Compression: Ligament; Tumor
    - Hook of hamate
      - Spares hypothenar eminence; Normal sensation
      - External pressure; Compression: Ligament; Ganglion
    - Superficial terminal branch
      - Sensory loss only
      - Fracture of hook of hamate (ununited); Ulnar artery aneurysm

MEDIAN NERVE www.neuro.wustl.edu/neuromuscular/nanatomy/median.htm
- 10k - Cached - Similar pages

Nerve lesions
Median nerve lesion. Sensory supply. lateral palm and lateral fingers ... Ulnar nerve lesion. Sensory supply. medial palm; 5th finger and medial half of ... www.aic.cuhk.edu.hk/web8/peripheral_nerve_lesions.htm - 28k - Cached - Similar pages

Nerve lesions
Median nerve lesion. Sensory supply. lateral palm and lateral fingers ... Ulnar nerve lesion. Sensory supply. medial palm; 5th finger and medial half of ... www.aic.cuhk.edu.hk/web8/peripheral_nerve_lesions.htm - 28k - Cached - Similar pages

The ulnar nerve may be damaged at any point in its distribution. The most common sites are behind the elbow and in the hand; less frequent are lesions in ... www.gpnotebook.co.uk/cache/-1845100529.htm - 4k - Cached - Similar pages

Median nerve lesion

Sensory supply
  - lateral palm and lateral fingers

Sensory loss
• as above

Area of pain

• thumb, index and middle fingers
• often spreads up forearm

Reflex arc

• finger jerks

Motor deficit

• wrist flexors
• long finger flexors (thumb, index and middle)
• pronators of forearm
• abductor pollicis brevis

Causative lesions

• carpal tunnel
• direct trauma to wrist

**Ulnar nerve lesion**

Sensory supply

• medial palm
• 5th finger and medial half of ring finger

Sensory loss

• as above but often none at all

Area of pain

• ulnar supplied fingers and palm distal to wrist
• pain occasionally occurs along course of nerve

Reflex arc

• nil

Motor deficit
• all small hand muscles except APB. However injury at elbow seems to preferentially affect first dorsal interosseus muscle
• flexor carpi ulnaris (clinical evidence of involvement unusual)
• finger flexors (medial 2 fingers). Again clinical involvement unusual

Causative lesions

• elbow: trauma, bed rest, # olecranon
• wrist: local trauma, ganglion of wrist joint

---

**Median nerve: Anatomy**

• Formed by
  - C5 to C7 roots from lateral cord of brachial plexus
  - C8 and T1 roots from medial cord
• Branches
  - Forearm: Muscular branches
    - Pronator teres
    - Flexor carpi radialis
    - Flexor carpi sublimis
  - Anterior interosseus (motor): Anatomy & Exam
    - Flexor pollicis longus
    - Flexor digitorum profundus to 2nd & 3rd fingers
    - Pronator quadratus
  - Palmar cutaneous
    - Sensory to skin over thenar eminence
  - Terminal motor
    - Abductor pollicis brevis
    - Opponens pollicis
    - ± Flexor pollicis brevis
    - 1st & 2nd lumbricals
  - Terminal sensory
- Sensory to palmar surface of thumb, 2nd, 3rd & lateral 1/2 of 4th finger

- Anomalies
  - Martin-Gruber anastomosis (10% to 44% of normals)
    - Branches from median to ulnar nerve in forearm
    - Innervate: 1st dorsal interosseus, Adductor pollicis, Abductor digiti minimi
  - Riche-Cannieu anastomosis
    - Connections between deep ulnar & median nerves in hand

**Median nerve: Lesions**

<table>
<thead>
<tr>
<th>Normal hand</th>
<th>Median nerve lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb is perpendicular to plane of palm</td>
<td>Thumb is externally rotated into plane of palm. Thenar eminence is wasted.</td>
</tr>
</tbody>
</table>

- Axilla
  - Crutch compression
  - Missle injury
  - Anterior shoulder dislocation

- Upper arm
  - Stab wounds: ± brachial artery injury
  - Sleep palsy: Near pectoralis major tendon
  - Tourniquets
  - Fracture: Humerus shaft

- Elbow
  - Supracondylar spurs & ligaments (Struthers)
  - Fracture
    - Humerus supracondylar: Children; Anterior interossius distribution
    - Medial epicondylar
  - Elbow dislocation
  - Injection injury
  - Pronator teres syndrome
    - Pain in volar forearm exacerbated by repeated pronation
    - Little weakness or sensory loss

- Anterior interosseus: Syndrome
  - Fracture: Radius midshaft
  - Excessive exercise
  - Idiopathic
- Stab wound
  - Anomalies: Muscle; Fibrous bands; Course of nerve deep to pronator teres
  - Weakness also seen with
    - Brachial neuritis
    - Supracondylar fractures
    - Proximal neuroma or other median nerve lesions
    - Tendon rupture: FPL & FDP in rheumatoid arthritis
- Median neuropathy in forearm
  - Bleeding into flexor compartment
    - Hemophiliacs; Anticoagulants; Brachial artery puncture
  - A-V fistula for dialysis: Pain common; Onset days to weeks after surgery
- Carpal tunnel syndrome
  - Causes
    - Idiopathic: ? Related to
      - Congenital smallness of carpal tunnel
      - Hand activity: Repetitive; Amount
      - More common in dominant hand
    - Reduced space in carpal tunnel
      - Tenosynovitis: Rheumatoid arthritis or suppurative
      - Bone: Fracture; Osteophyte; Dislocation; Exostosis
      - Mass: Ganglion; Gouty tophi; Hematoma
    - Susceptibility of nerve to pressure
      - Hereditary Liability to Pressure Palsies
      - Diabetic Neuropathy
      - Renal failure
      - Other polyneuropathies
    - Systemic disorders
      - Pregnancy: Often resolves after delivery
      - Endocrine: Hypothyroidism; Acromegaly
      - Multiple myeloma; Amyloidosis
      - Osteochondritis dissecans
    - Hereditary
      - Carpal tunnel syndrome
        - Dominant
          - Onset: < 2nd decade; Pain in lateral fingers
          - Bilateral
          - Anatomy
            - Wrist X-rays: Narrow carpal tunnel
            - Thick transverse carpal ligament
      - Amyloidosis
      - Mucopolysaccharidosis
      - Mucolipidosis
      - HNPP
  - Acute
    - Wrist fractures, dislocations (lunate bone, hyperextension), hematomas
- Pyogenic infections: tenosynovitis
- Rheumatoid arthritis: Acute exacerbation
- Excessive unaccustomed manual work
  - Palmar cutaneous branch
    - Transverse incisions at wrist for carpal tunnel surgery
    - Anomalous palmaris longus muscle
    - Ganglion from blunt trauma to wrist
- Clinical features
  - Epidemiology
    - Female: Male:: 3:1
    - Age peak: 40 to 60 years
    - Dominant hand 1st; May become bilateral
  - Pain
    - Episodic
    - Temporal: Worse at night initially; Later during day also
    - Location: Arm, forearm, wrist, hand & fingers
    - Repetitive or sustained activity: Exacerbates pain
  - Paresthesias
    - Palmar thumb, 2nd & 3rd fingers
    - Finger tips
  - Weakness: After sensory
    - Abductor pollicis brevis (APB): Most common
    - Opponens pollicis
  - Electrodiagnostic
    - Slow sensory conduction across transverse carpal ligament: Most sensitive
    - Later changes: Long motor latency; Low CMAP; Denervation in APB
  - Systemic work-up: Thyroid; Blood sugar; Sed rate; CBC
  - Treatment
    - Splinting
    - Corticosteroid injections
    - Surgical decompression: Complete section of transverse carpal ligament
      - Primary treatment in acute carpal tunnel syndrome
      - Avoid in pregnancy
- External link: Ortho-u

This characteristic appearance of the hand resulting from a distal lesion of the ulnar nerve is known as clawhand. Treatment involves excision of the fibro...
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If you have any comments or criticisms please do not hesitate to contact us.

Wasted Hand
In the hand, the median nerve supplies the lateral two lumbricals, opponens pollicis, abductor pollicis brevis, and flexor pollicis brevis; the remainder are served by the ulnar nerve.

Wasting of the interossei (prominent guttering of the back of the hand), of the web space between thumb and index finger, and softening and flattening of the hypothenar eminence with sparing of abductor pollicis brevis indicates an ulnar
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More extensive arm wasting may indicate any of the following: syringomyelia of MND; bilateral, symmetrical wasting indicate peripheral neuropathy.

More detailed information on causes of wasting of the small muscles of the hand is given in the aetiology section.

**Links:**

- [aetiology](#)

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**GP note book:** The **median nerve** is formed by the union of the lateral and medial cords of the brachial plexus and carries fibres derived from the 6th, 7th and 8th cervical and the 1st thoracic spinal segments. It lies close to the brachial artery in the upper arm and passes under the transverse carpal ligament as it approaches the palm of the hand.

It carries both motor and sensory fibres:

- **motor:**
  - supplies all the muscles on the front of the forearm except flexor carpi ulnaris and the ulnar half of flexor digitorum profundus
  - four small muscles of the hand are supplied the median nerve; the mnemonic LOAF is useful:
    - lateral two lumbricals
    - opponens pollicis
    - abductor pollicis brevis
    - flexor pollicis brevis

- **sensory** - skin of hand - palmar aspect of the radial three and one half fingers and nail beds of radial three and one half fingers

The clinical features of an ulnar nerve lesion at the elbow include:

- wasting of the flexor carpi ulnaris and the ulnar half of the flexor digitorum:
is apparent on the inner aspect of the flexor surface of the forearm
- weakness of flexor carpi ulnaris causes the hand to deviate to the radial side as the wrist is flexed

- wasting of the small muscles of the hand except the thenar eminence and the first two lumbricals

- clawing of the ring and little fingers (main en griffe):
  - loss of the 3rd and 4th lumbricals and all the interossei results in:
    - hyperextension of the metacarpophalangeal joints
    - flexion of the interphalangeal joints

- paralysis of the hypothenar muscles:
  - abolishes abduction of the little finger

- paralysis of the interossei:
  - abolishes abduction and adduction of the fingers

- paralysis of the adductor pollicis:
  - weakens adduction of the thumb which is most evident when a piece of paper is grasped in a pincer grip between thumb and index finger (Froment's sign)

- numbness and tingling:
  - over the two ulnar fingers and the ulnar border of the palm

Links:

- Froment's sign

Froment's sign is a test for ulnar nerve palsy which specifically tests the action of adductor pollicis.

The patient is asked to hold a piece of paper between the thumb and a flat palm as the paper is pulled away. Normally an individual will be able to hold the paper there with little or no difficulty. However, the patient with an ulnar nerve palsy will flex the thumb to try to maintain a hold on the paper.

Charcot-Marie-Tooth disease is an autosomal dominant condition characterised by slowly progressive sensorimotor neuropathy. It is the most commonly inherited peripheral neuropathy in the UK.

Lifespan is normal. Disability is usually mild.

Links:

- genetics
- clinical features
There are two clinically distinct types of Charcot-Marie-Tooth disease:

- **type I:**
  - a demyelinating sensorimotor neuropathy
  - early onset, typically in the first decade
  - presentation with walking difficulties and pes cavus
  - associated deformities include equinovarus foot and kyphoscoliosis
  - wasting occurs:
    - distally before proximally
    - in the legs before the arms
  - distal wasting may produce the classical inverted champagne bottle deformity
- **there is generalised areflexia**
  - there may be cerebellar ataxia of the arms
  - respiratory muscles may be weak
  - nerve conduction is slowed to less than 38 m/sec
  - peripheral nerves may be palpably thickened

- **type II:**
  - an axonal sensorimotor neuropathy
  - later onset, in the second decade or later
  - weakness and wasting are less marked
  - usually there is areflexia in the legs only
  - structural deformities are less common
  - nerve conduction is slow but always more than 38 m/sec
  - there is no palpable thickening of peripheral nerves

The **lumbrical muscles** are intrinsic muscles in the fingers that allow flexion at the metacarpophalangeal joints, while maintaining extension at the interphalangeal joints.

**Structure**

There are four of these small worm-like muscles on each hand. These muscles are unusual in that they do not attach to bone, instead attaching proximally to the tendons of flexor digitorum profundus and distally to extensor expansions on the dorsal surface (back of) the hand.

---

**Nerve Supply Of Upper Limb**

Posted by **writetoarnab** on 19-Jul-2006

846 people have seen this mnemonic.

**FLEXOR COMPARTMENTS (of ARM, FOREARM, HAND) - 3 nerves, each supplies muscles proximally, & skin distally, as follows:**

1. **MUSCULOCUTANEOUS NERVE:** all flexor MUSCLES of UPPER ARM - biceps, brachialis, coracobrachialis (proximally), SKIN of FOREARM - as lateral cutaneous nerve of forearm (distally)

2. **MEDITAN NERVE:** all flexor MUSCLES of FOREARM (EXCEPT 2: FCU & ulnar part of FDP - supplied by ulnar nerve), SKIN of HAND - radial 3 1/2 fingers
3. ULNAR NERVE: all intrinsic MUSCLES of HAND (EXCEPT 2: thenar muscles & first two lumbricals - supplied by median nerve)

DISTAL MYOPATHY: Autosomal recessive
2nd/3rd decade
foot drop & then progressive weakness of the leg

MY NOTES
Distal myopathy

Distal Muscular Dystrophies:

"A heterogeneous group of genetic disorders characterized by progressive MUSCULAR ATROPHY and MUSCLE WEAKNESS beginning in the hands, the legs, or the feet. Most are adult-onset autosomal dominant forms. Others are autosomal recessive.

Syndrome of Segmental Sensory Dissociation with Brachial Amyotrophy ... The term meningomyelitis refers to combined inflammation of meninges and spinal ... www.accessmedicine.com/content.aspx?aID=978421 - Similar pages

In meningomyelitis, there occurs a subpial loss of myelinated fibers and gliosis ... which allegedly gives rise to radicular pain, amyotrophy of the hands, ... www.accessmedicine.com/content.aspx?aID=973314 - Similar pages

Causes of individual peripheral nerve lesion; (handbk neuro anatomy369)
1. Trauma, 2. acute compression (coma, coma, anesthesia, deep sleep) 3. chronic compression (entrapment) 4. Acute ischemia (collagen vascular disease, diabetes)

Movements (BROUGHT OUT BY ULNAR NERVE)
adduction and abduction of the fingers (interossei)
adduction of the thumb (adductor pollicis)
flexion and adduction at the wrist (interossei)

1 HAND 1 Introduction - evolution of the hand-anatomy explained thr evolution-easy to follow. anatomy thr google - ask wasting of thenar and hypothenar muscles
File Format: PDF/Adobe Acrobat - View as HTML.
3 HYPOTHENAR muscles are mostly mirror images of the thenar muscles, all innervated ... atrophy, leading to wasting and flattening of the thenar eminence.
medicalsciences.med.unsw.edu.au/somsweb.nsf/resources/ANAT313104/$file/FA1-15-