Wrist and Hand Orthopedics and Neurology

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Osteology of the Hand and Wrist

Four Units of Bone in Hand
- One central fixed unit for stability
- Three mobile units for dexterity and power

Central Fixed Unit
- Eight carpal bones tightly bound to the second and third metacarpals

Three Mobile Units
- Phalanges
  - Thumb
  - Index finger
  - Middle, ring, and little fingers

Phalanx or Phalanges
- The term phalanx or phalanges refers to an ancient Greek army formation in which soldiers stand side by side, several rows deep, like an arrangement of fingers or toes.
1. Powerful pinch
2. Grasp
3. Fine manipulations

Primates are hand-to-mouth feeders that pluck and catch items selectively by hand before ingesting them. Without tools, emergent hominins would have relied on the versatility and strength of their hands to collect food and on their teeth and jaws alone to process it. Unless they used tools to (Encyclopædia Britannica)

Precise movements alone or with thumb

Used in a variety of ways to hold small objects such as picking up a piece of pasta and writing

A fully opposable thumb gives the human hand its unique power grip (left) and precision grip

Attitude of the Hand
Tendon Damage

Contours of the Palmar Surface and the Underlying Anatomy

Three Arches

Intrinsic Muscle Atrophy

Two Transverse Arches

Syndactyly (webbing)
Normal Metacarpal Joints and Contour

Inspect Nails and Interphalangeal Joints

Spoon and Clubbed Nails

Nail Pathologies
- Hippocratic = clubbing = Chronic respiratory and circulatory diseases
- Koilonychia = spoon = Acromegaly, trauma, syphilis, nutritional deficiencies, hypothyroidism
- Onychophagia = nail biting = neurosis
- Fragilitas unguium = brittle = dietary deficiency and local trauma

de Quervain’s Disease
- A painful inflammation of specific tendons of the thumb.
- The swollen tendons and their coverings cause friction within the narrow tunnel or sheath through which they pass.

de Quervain’s Disease Tenosynovitis
- The result is pain just below the base of the thumb. It is one of the most common types of tendon lining inflammation.
Pain Distribution

de Quervain’s Disease

- Pain along the back of the thumb, directly over two thumb tendons
- Occurs gradually or suddenly
- Pain may travel into the thumb or up the forearm

Causes of de Quervain’s Disease

- Overuse
- Direct blow to the thumb
- Repetitive grasping
- Rheumatoid arthritis

Incidence of de Quervain’s Disease

- de Quervain's affects women eight to 10 times more often than men

Causes of de Quervain’s Disease

- Gardening, racquet sports and various workplace tasks are some activities that may aggravate the condition.

Finkelstein’s Test
Palpate ECRL & ECRB
Fist Clenched

ECRL & ECRB
Radial Side of Lister’s

Course of Extensor Pollicis Longus Tendon

Palpate Each Tendon in Hand

Ganglia of Wrist

Ganglionic Cysts of the Wrist
- Tendon cyst
- A protuberance filled with gelatinous fluid
- Most frequently located on dorsum of the wrist
Palmar Ganglionic Cyst
- Occasionally develop at the palm side of the wrist, at the radial pulse tunnel.

Extensor Indicis & Extensor Digiti Minimi
Capable of Independent Action

Ulnar Deviation to Palpate Extensor Carpi Tendon

Palpation of Flexor Carpi Ulnaris Tendon

Tunnel of Guyon
Ulnar Nerve and Artery

Situated Between Hook of Hamate and Pisiform
**Ulnar Neuropathy**

* An inflammation of the ulnar nerve
* Motor and sensory innervation to arm and hand
* Numbness, tingling, or pain into the arm and hand on the side of the little finger

**Handlebar Palsy**

Bicyclists call this condition handlebar palsy.

**Causes of Ulnar Neuropathy**

* Bicycling
* Using a computer mouse or typing
* Repetitive movements of the wrist
* Cubital tunnel injury

**Treatment of Ulnar Neuropathy**

* Eliminate cause of irritation (CMT)
* Wrist splints
* Wear padded gloves
* Adjust position of hands on the handlebar
* Anti-inflammatory medicines

**Median Nerve**

Carpal Tunnel Syndrome

* Often the result of a combination of factors that increase pressure on the median nerve and tendons in the carpal tunnel, rather than a problem with the nerve itself. NIH
Median Nerve
Carpal Tunnel Syndrome

- Most likely the disorder is due to a congenital predisposition - the carpal tunnel is simply smaller in some people than in others.

NIH

Carpal Tunnel Syndrome
Other contributing factors

- Trauma or injury to the wrist that cause swelling, such as sprain or fracture

Carpal Tunnel Syndrome
Other contributing factors

- Overactivity of the pituitary gland
- Hypothyroidism
- Rheumatoid arthritis

Carpal Tunnel Syndrome
Other contributing factors

- Mechanical problems in the wrist joint
- Work stress
- Repeated use of vibrating hand tools

Carpal Tunnel Syndrome
Other contributing factors

- Fluid retention during pregnancy or menopause
- The development of a cyst or tumor in the canal. In some cases no cause can be identified.

Carpal Tunnel Syndrome
Other contributing factors

- The median nerve arises from the cubital fossa and passes between the two heads of pronator teres.
Median Nerve
Carpal Tunnel Syndrome

- It then travels between flexor digitorum superficialis and flexor digitorum profundus before emerging between flexor digitorum superficialis and flexor carpi radialis.

Distribution of Sensory Changes
Carpal Tunnel Syndrome

- Innervates most of the flexors in forearm except flexor carpi ulnaris and the medial two digits of flexor digitorum profundus, which are supplied by the ulnar nerve.

Phalen’s Test
Carpal Tunnel Syndrome

- Often, the symptoms can be duplicated or worsened by bending the wrist firmly palmward for 60 seconds.

Tinel’s Sign
Carpal Tunnel Syndrome

- Tapping the front of the wrist over the nerve reproduces the pain and paresthesia.

Electrodiagnostic Tests

- The more uncomfortable (and expensive) electrodiagnostic tests which measure nerve function are reserved for the evaluation of questionable diagnoses.

Carpal Tunnel Syndrome Review
Dupuytren’s Disease Contracture

- Dupuytren's disease takes its name from Baron Guillaume Dupuytren, a celebrated French surgeon who first described the condition in 1831.

Dupuytren’s Disease Contracture

- Commonly found in northern European countries and countries with populations of northern European descent.
- Strong familial tendency
- Some propose that the condition is a result of a single dominant gene.

Palmaris Longus

Palpation of Flexor Carpi Radialis Tendon

Palpation of Thenar Eminence

Palpation of Hypothenar Eminence

Dupuytren's Disease takes its name from Baron Guillaume Dupuytren, a celebrated French surgeon who first described the condition in 1831.
Palpation of Palmar Aponeurosis
- The first sign of the disease is often a 'lump' or nodule in the palm of the hand, commonly at the base of the ring or little finger.

Dupuytren’s Disease
- Another sign may be an indentation in the skin, known as a dermal pit, which occurs due to a contraction of the connective tissue fibers.

Dupuytren’s Contracture
- There is sometimes an association with other soft tissue diseases, trauma or surgery.

Dupuytren’s Contracture
- A longitudinal fibrous band, known as a cord, may form.
- Cord may flex the finger joints
- Process tends to be progressive

Dupuytren’s Disease
- Hand function may become compromised as the fingers become more flexed.

Surgical Intervention
- Surgical release of the contracture to regain function should be considered with dysfunction
- There is no cure
- Hand surgeon should be consulted
Trigger Finger

- A trigger finger is a common problem that causes pain and catching.

- Flexor tendons slide through a snug tunnel.
- Tendon irritation narrow canal
- Or tendon thickens
- Finger extension become difficult

- Unknown cause
- More common in women than men.
- Most frequently between 40 to 60 Y/O
- More common with diabetes and rheumatoid arthritis.

- Pain and catching with finger movement
- History, observation and palpation should enable diagnosis
- Radiographs are usually not indicated

Trigger Finger Treatment

- Rest
- Soft tissue treatment
- Stretching
- Moist heat
- OTC NSAIDS for pain
- Finger splints
- Injections
- Surgery.

Osteoarthritis of the Fingers

Degenerative Arthritis

- Most commonly inflicts the joints of the hand
Osteoarthritis of the Fingers
Degenerative Arthritis
- Chronic and progressive articular pathology
- Characterized by deterioration of cartilage along with formation of new bone caused by the disease.

Interphalangeal joints of the hand may show articular space narrowing with marginal osteophytes.

Heberden’s Nodes
Osteoarthritis of Fingers
- Final common pathway for all the afflictions, abuse, and injuries of affected joints.

Heberden’s Nodes or Arthropathy
- This is a common problem.
- Affects roughly half the adult population to some extent.

Radiographic Examination
Osteoarthritis of the Fingers
- Routine laboratory tests for inflammation are usually normal in osteoarthritis
- AP and lateral radiographic projections of the involved proximal interphalangeal joints are probably the most important diagnostic procedure for this disease.

Osteoarthritis of the Fingers
- The condition evolves slowly, and is characterized by gradual development of joint pain, stiffness, and limitation of motion.
Degenerative Arthritis or Degenerative Joint Disease

The terms degenerative arthritis (or degenerative joint disease) may be more precise than osteoarthritis because degeneration of cartilage is the most prominent pathologic change.

Surgical Intervention

Thumb Implant

If nonsurgical treatments fail
Arthroplasty may be indicated

Rheumatoid Arthritis

A form of arthritis that causes pain, swelling, stiffness and loss of function in your joints.
It can affect any joint but is common in the wrist and fingers.
More women than men get rheumatoid arthritis.

Swan-neck Deformity

Rheumatoid Arthritis
It often starts between ages 25 and 55. You might have the disease for only a short time, or symptoms might come and go. The severe form can last a lifetime.

Ulnar Drift

Rheumatoid Arthritis
Drift of the fingers away from the direction of the thumb at the MP joint (ulnar drift).
Due to tissue damage of capsules, ligaments, and tendons.

Rheumatoid Arthritis
RA is an autoimmune disease
Unknown causes
Genes, environment and hormones might contribute
Surgical Interventions
Rheumatoid Arthritis

- Arthroscopy, which removes debris or inflamed tissue in a joint through a small lighted instrument.
- Synovectomy, to remove inflamed joint tissue.

- Finger and hand surgeries, to correct joint problems in the hand.

Cervical Spine

- What are your diagnoses?

Cervical Subluxations
Rheumatoid Arthritis

- Cervical spine fusion for C1 and C2 instability

- Cervical Spine. The anterior edge of the odontoid process (O) is abnormally separated from the posterior margin of the arch of the atlas (A) in this lateral roentgenogram of the cervical spine of a patient with rheumatoid arthritis. Subluxations of the lower cervical vertebral bodies (arrows) are also visible.

Treatment and Prognosis
Rheumatoid Arthritis

- Treatments include medications, lifestyle changes and surgery.
- With proper treatment, a strategy for joint protection and changes in lifestyle, patients may live a long, productive life with this condition.

http://www.mayoclinic.com/health/rheumatoid-arthritis/DS00020
“Boutonniere” Deformity
Avulsion of Extensor Digitorum Communis Tendon

- This is usually due to an injury, although it can develop in inflammatory disorders such as rheumatoid arthritis.
- Some people are born with a mild boutonniere posture of most or all of their fingers.

Mallet Finger
Avulsion of Distal Extensor Digitorum Communis

- Mallet finger, also known as baseball finger, is an injury to the fingertip caused by a blow to the end of the finger.
- The tendon that straightens the tip of the finger is injured and you may lose the ability to straighten your finger.
Mallet Finger Treatment

- RICER
  - Rest
  - Ice
  - Compression
  - Elevation
  - Referral

Paronychia

- Acute paronychia develops over a few hours when a nail fold becomes painful, red, and swollen.
- Yellow pus may appear under the cuticle.

Paronychia

- Paronychia infections of the nail fold can be caused by bacteria, fungi, and some viruses.
- This type of infection is characterized by pain, redness and swelling of the nail folds.

How to Avoid Paronychia Infections

- Avoid dishwashing
- Should you leave it up to the man of the house?

How to Cause Paronychia Infections

- Male multi-tasking
Hand Washing

- In order to kill enough germs, hands must be lathered up and rubbed together under running water for at least 20 seconds. If soap and water aren’t available, hands can be cleaned using an alcohol based hand sanitizer.