



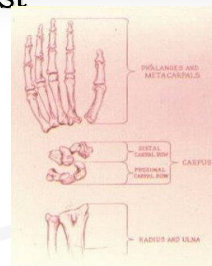
# Wrist and Hand

## Orthopedics and Neurology DX 612

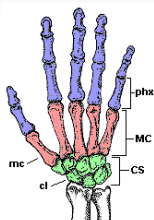
James J. Lehman, DC, MBA, DABCO  
University of Bridgeport College of Chiropractic



# Osteology of the Hand and Wrist



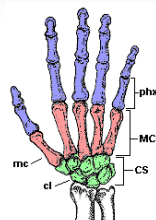
# Four Units of Bone in Hand



- One central fixed unit for stability
- Three mobile units for dexterity and power



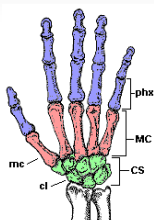
# Central Fixed Unit



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



# Three Mobile Units



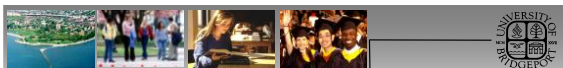
- Phalanges**
- Thumb
  - Index finger
  - Middle, ring, and little fingers



# 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.



## Thumb



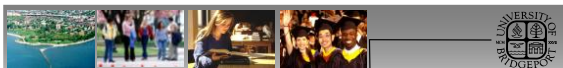
- 1. Powerful pinch
- 2. Grasp
- 3. Fine manipulations



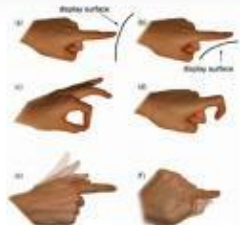
## Human Evolution Refinements in Hand Structure



- 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)



## Index finger



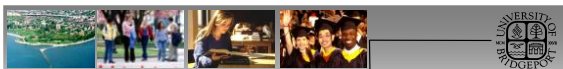
- Precise movements alone or with thumb



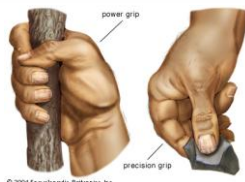
## Pinch Unit



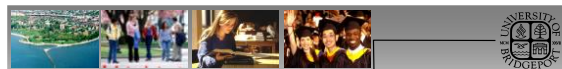
- Used in a variety of ways to hold small objects such as picking up a piece of pasta and writing



## Power grip Middle, Ring, and Little fingers

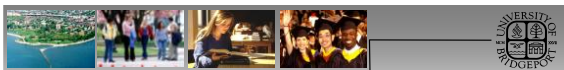


- A fully opposable thumb gives the human hand its unique power grip (left) and precision grip

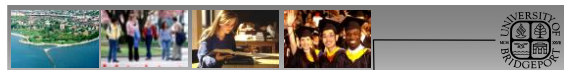
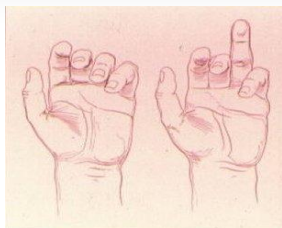


## Attitude of the Hand

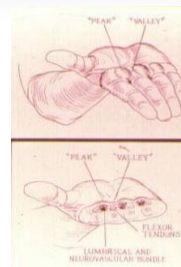




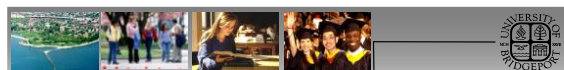
### Tendon Damage



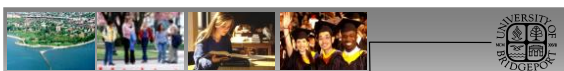
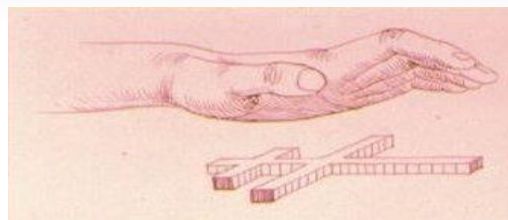
### Contours of the Palmar Surface and the Underlying Anatomy



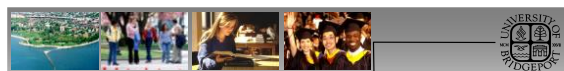
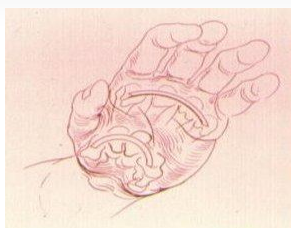
### Three Arches



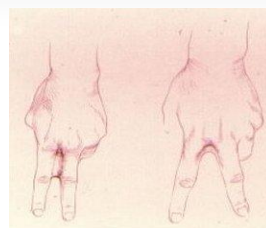
### Intrinsic Muscle Atrophy

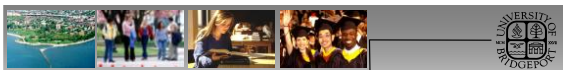


### Two Transverse Arches

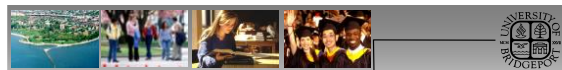
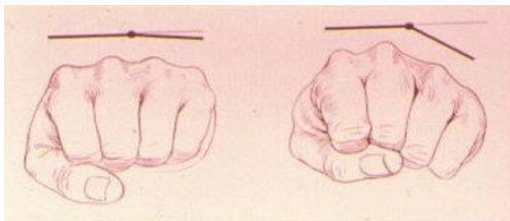


### Syndactyly (webbing)

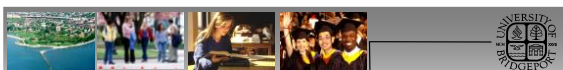




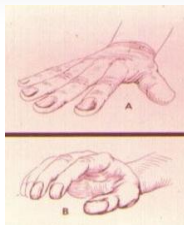
## Normal Metacarpal Joints and Contour



## Inspect Nails and Interphalangeal Joints



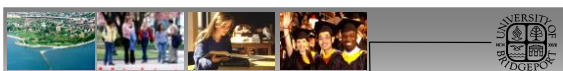
## Spoon and Clubbed Nails



## Clubbing of Fingers

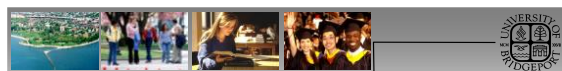


- Check enzyme PGE2
- Genetic cause
- Sign of serious cardio-pulmonary disease



## Nail Pathologies

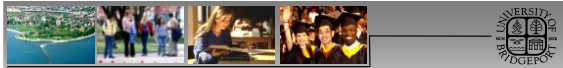
- Hippocratic = clubbing = Chronic respiratory and circulatory diseases
- Koilonychia = spoon = Acromegaly, trauma, syphilis, nutritional deficiencies, hypothyroidism
- Onychophagia = nail biting = neurosis
- Fragilitas unguium = brittle = dietary deficiency and local trauma



## de Quervain's Disease



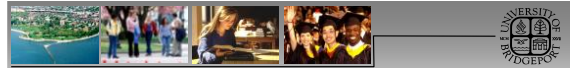
- A painful inflammation of specific tendons of the thumb.
- The swollen tendons and their coverings cause friction within the narrow tunnel or sheath through which they pass.



## de Quervain's Disease Tenosynovitis



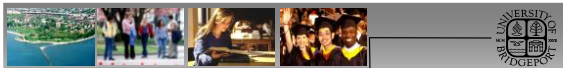
- The result is pain just below the base of the thumb. It is one of the most common types of tendon lining inflammation.



## Pain Distribution de Quervain's Disease



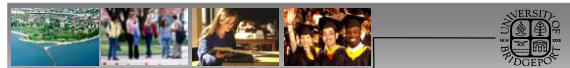
- Pain along the back of the thumb, directly over two thumb tendons
- Occurs gradually or suddenly
- Pain may travel into the thumb or up the forearm



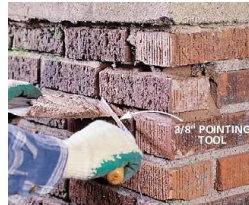
## de Quervain's Disease



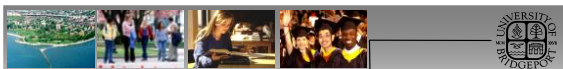
- Thumb motion may be difficult and painful, particularly when pinching or grasping objects.



## Causes of de Quervain's Disease



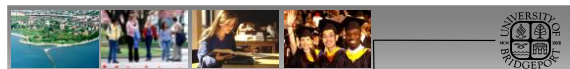
- Overuse
- Direct blow to the thumb
- Repetitive grasping
- Rheumatoid arthritis



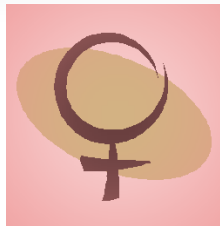
## Causes of de Quervain's Disease



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

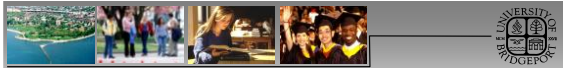


## Incidence of de Quervain's Disease

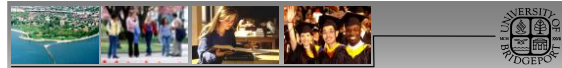
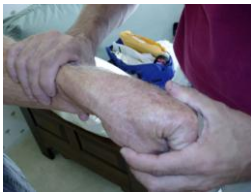


- de Quervain's affects women eight to 10 times more often than men

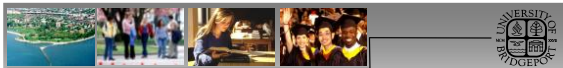




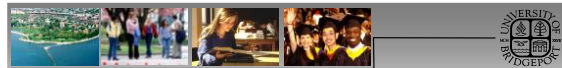
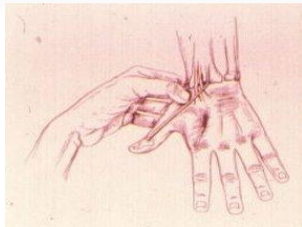
### Finkelstein's Test



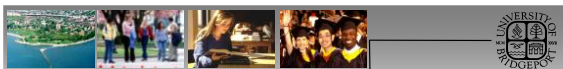
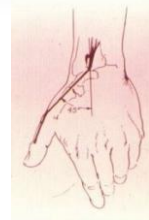
### Palpate ECRL & ECRB Fist Clenched



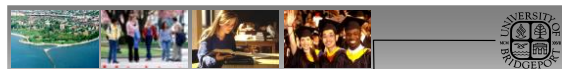
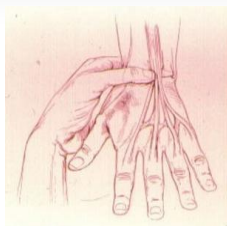
### ECRL & ECRB Radial Side of Lister's



### Course of Extensor Pollicis Longus Tendon

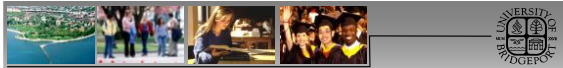


### Palpate Each Tendon in Hand



### Ganglia of Wrist

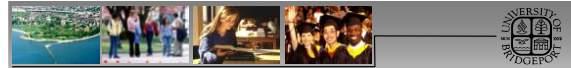




## Ganglionic Cysts of the Wrist



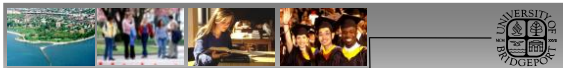
- Tendon cyst
- A protuberance filled with gelatinous fluid
- Most frequently located on dorsum of the wrist



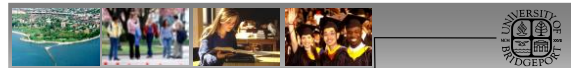
## Palmar Ganglionic Cyst



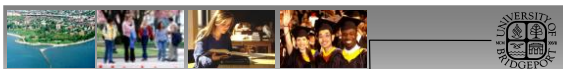
- Occasionally develop at the palm side of the wrist, at the radial pulse tunnel.



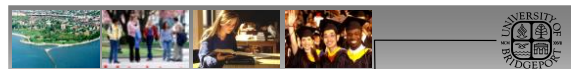
## Extensor Indicis & Extensor Digiti Minimi Capable of Independent Action



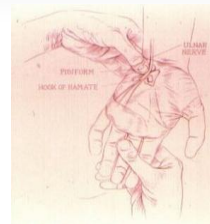
## Ulnar Deviation to Palpate Extensor Carpi Tendon

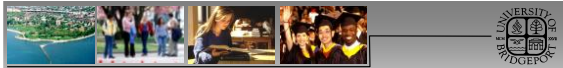


## Palpation of Flexor Carpi Ulnaris Tendon

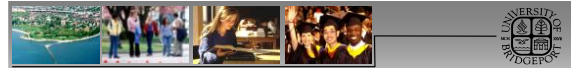
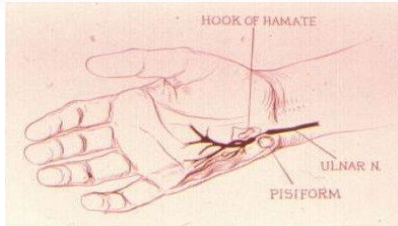


## Tunnel of Guyon Ulnar Nerve and Artery





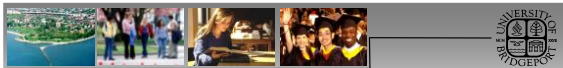
## Situated Between Hook of Hamate and Pisiform



## Ulnar Neuropathy



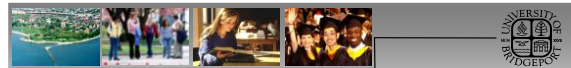
- An inflammation of the ulnar nerve
- Motor and sensory innervation to arm and hand
- Numbness, tingling, or pain into the arm and hand on the side of the little finger



## Handlebar Palsy Ulnar Neuropathy



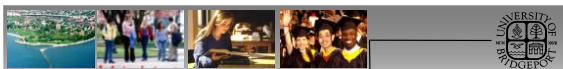
- Bicyclists call this condition handlebar palsy.



## Causes of Ulnar Neuropathy



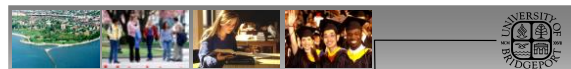
- Bicycling
- Using a computer mouse or typing
- Repetitive movements of the wrist
- Cubital tunnel injury



## Treatment of Ulnar Neuropathy



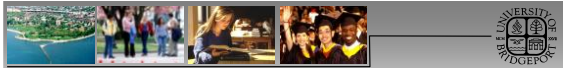
- Eliminate cause of irritation (CMT)
- Wrist splints
- Wear padded gloves
- Adjust position of hands on the handlebar
- Anti-inflammatory medicines



## Palpation of Ulnar Artery



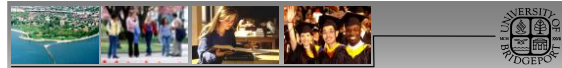




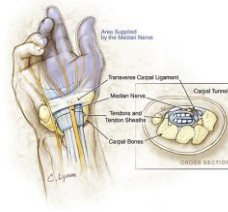
## Median Nerve Carpal Tunnel Syndrome



- 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

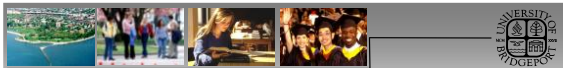


## Median Nerve Carpal Tunnel Syndrome



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

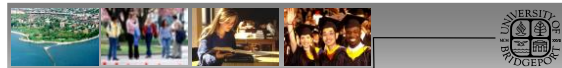
NIH



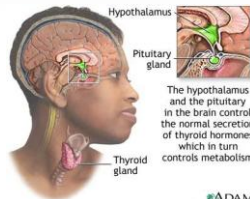
## Carpal Tunnel Syndrome Other contributing factors



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

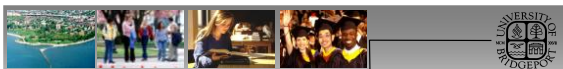


## Carpal Tunnel Syndrome Other contributing factors



- Overactivity of the pituitary gland
- Hypothyroidism
- Rheumatoid arthritis

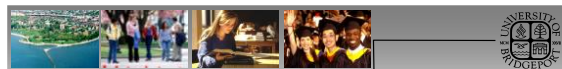
ADAM



## Carpal Tunnel Syndrome Other contributing factors



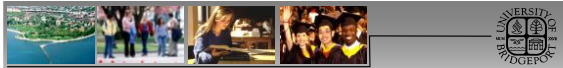
- Mechanical problems in the wrist joint
- Work stress
- Repeated use of vibrating hand tools



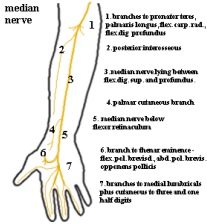
## Carpal Tunnel Syndrome Other contributing factors



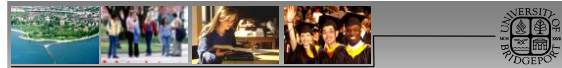
- Fluid retention during pregnancy or menopause
- The development of a cyst or tumor in the canal. In some cases no cause can be identified.



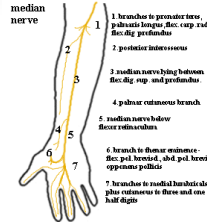
## Median Nerve Carpal Tunnel Syndrome



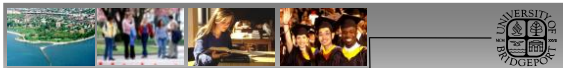
- The median nerve arises from the cubital fossa and passes between the two heads of pronator teres.



## 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

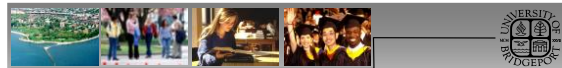


## Distribution of Sensory Changes Carpal Tunnel Syndrome



Figure 3: The median nerve, which is involved in carpal tunnel syndrome, gives sensation to the thumb, index, long and ring fingers on the palm side. Tingling in this area is rarely a symptom of ulnar nerve entrapment.

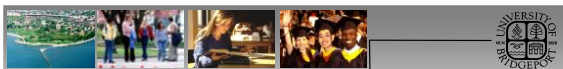
- Innervates most of the flexors in forearm except flexor carpi ulnaris and the medial two digits of flexor digitorum profundus, which are supplied by the ulnar nerve.



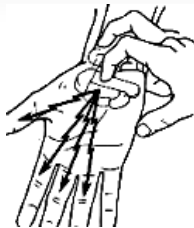
## Phalen's Test Carpal Tunnel Syndrome



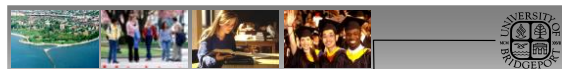
- Often, the symptoms can be duplicated or worsened by bending the wrist firmly palmward for 60 seconds



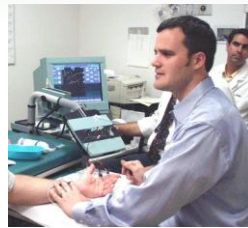
## Tinel's Sign Carpal Tunnel Syndrome



- 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

