Upper Limb Cumulative Trauma Disorders

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What is Ergonomics?

- ERGO= “work”
- NOMICS=“rules” or laws”

Ergonomics literally means “the laws of work”

What is Ergonomics?

- OSHA defines ergonomics as the science of "designing the job to fit the worker, instead of forcing the worker to fit the job."

What is Ergonomics?

- Ideally, ergonomics
  - Makes the job safer by preventing injury and illness
  - Makes the job easier by adjusting the job to the worker
  - Makes the job more pleasant by reducing physical and mental stress
  - Saves money $$$

What are aliases for WMSDs?

- Work-related MSDs go by many other names:
- Repetitive Strain or Stress Injury (RSI)
  - Cumulative Trauma Disorders - CTD
  - Occupational Overuse Syndrome - OO
  - Repetitive Strain Injuries - RSI
  - Repetitive Motion Injury RMI

Ergonomics can help prevent MSDs that are caused or aggravated by working conditions

Cumulative Trauma Disorders (CTDs)

- Cumulative = occurring gradually over a period of weeks, months, or years
- Trauma = bodily injury to nerves, tissues, tendons, or joints
- Disorders = physical ailments or abnormal conditions

Ergonomic Hazards

Ergonomic Hazards are workplace conditions that pose the risk of injury to the musculoskeletal system of the worker.

What characteristics of your job put you at risk for MSDs?

Prolonged, repeated or extreme exposure to multiple WMSD risk factors can cause damage to a worker's body. Risk Factors include:

- Repetition
- Awkward Postures
- Static Postures
- Cold Temperatures
- Excessive Force
- Vibration
- Compression
- Inadequate Recovery

Risk Factors: Repetition

- The majority of CTDs are caused by repetitive motions that would not result in injury if only performed once.
  - Thousands of keystrokes typing
  - Hours of filing, day after day
  - Stamping dozens of papers
  - Frequent lifting
  - Repeated motions with mouse

Risk Factors: Awkward Positions

- Leaning forward at your desk
- Typing with wrists at an odd angle
- Raising shoulders while typing
- Reaching to use mouse
- Twisting neck to look at monitor or phone
- Lifting objects from below waist or above shoulders

Awkward Postures = Postures outside of neutral

Neutral is the optimal position of each joint that provides the most strength and control

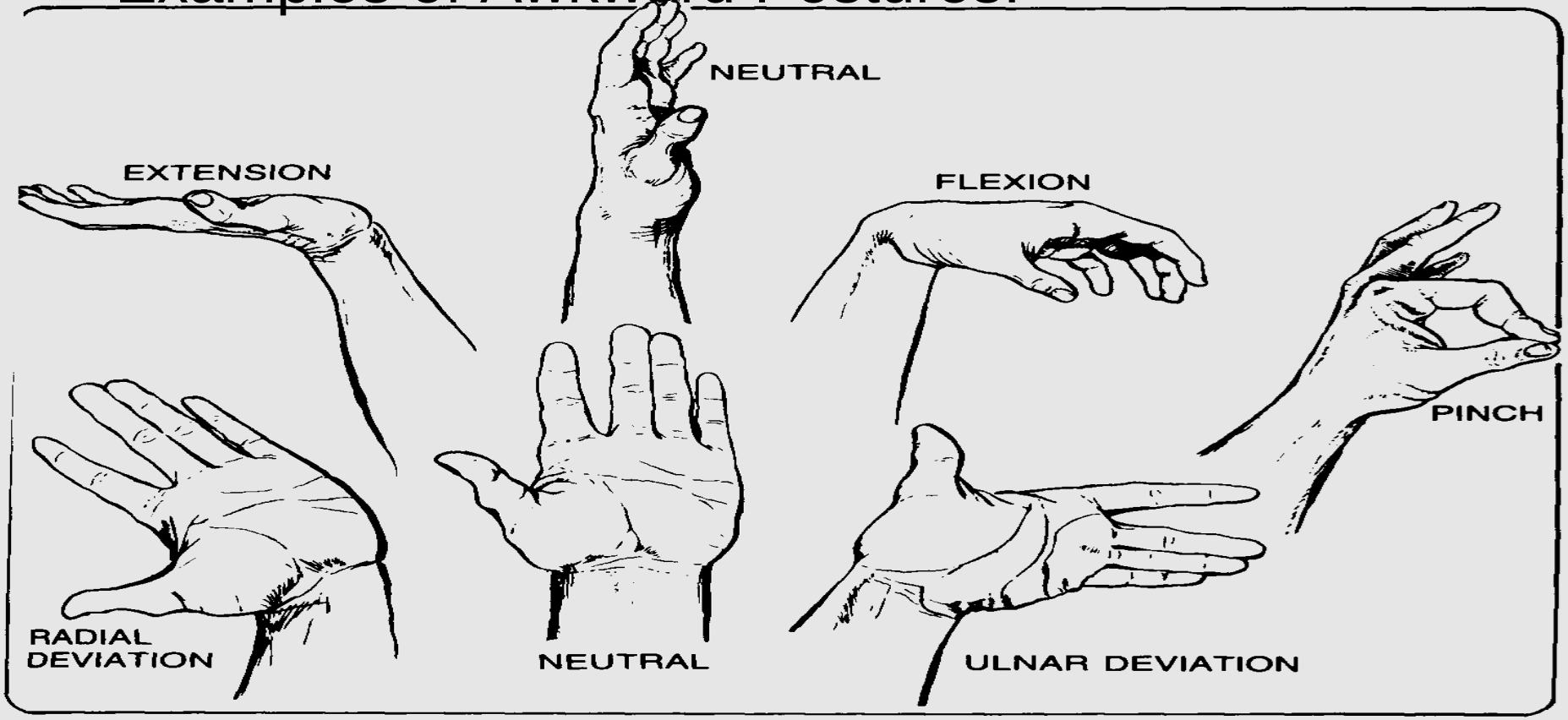
Awkward or unsupported postures that stretch physical limits, can compress nerves and irritate tendons

Before: Lab technician tilts his neck forward to view the screen into a non-neutral posture. He also bends over resting on his forearms to write on the documents.

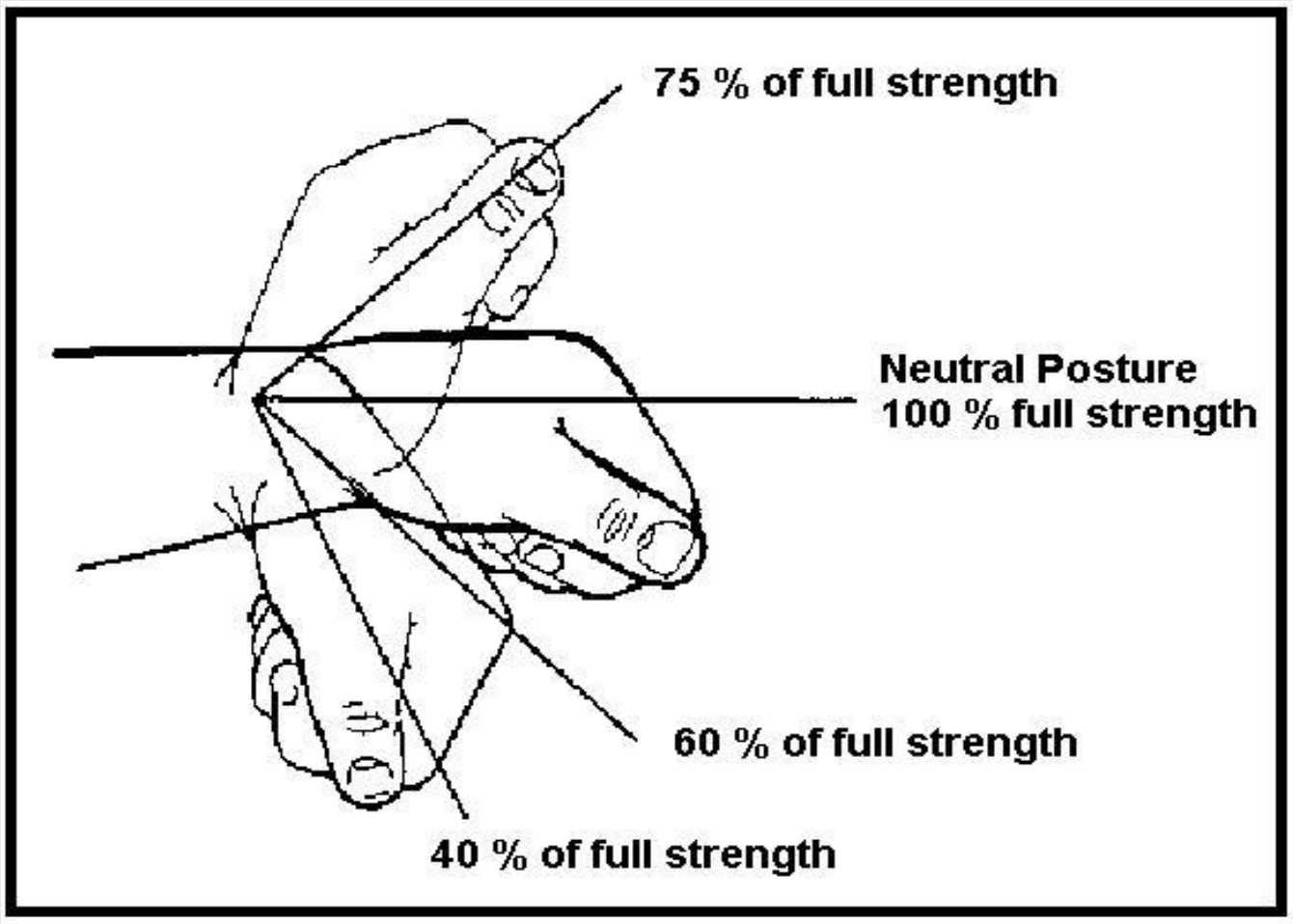
Ergonomic Improvement: Sailor easily views the screen from a neutral posture. The workstation adjusts to accommodate different working heights and users. When standing, work should be about elbow height.

Awkward Postures = Postures outside of neutral

Examples of Awkward Postures:



Wrist Posture and Strength



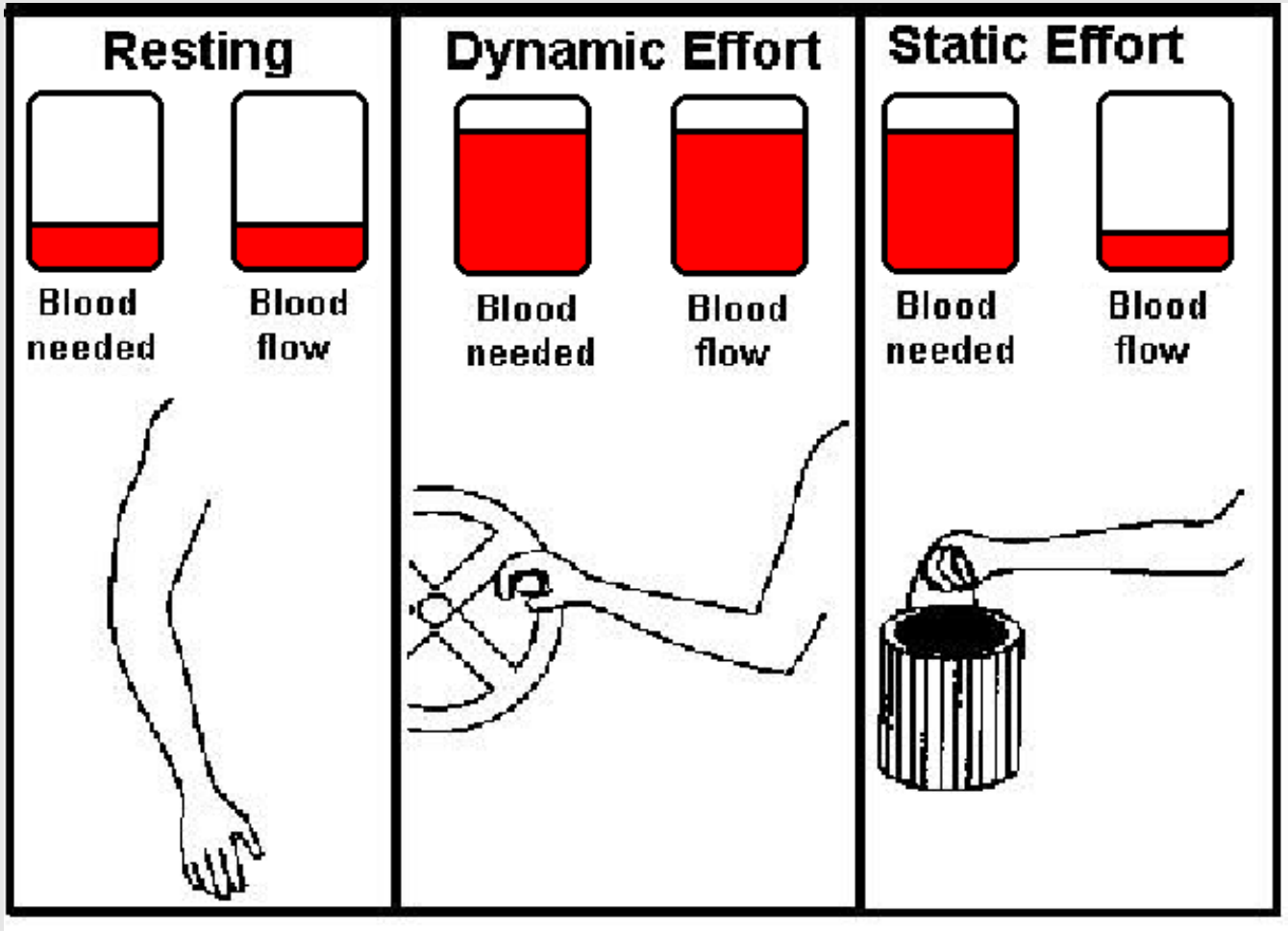
Static Postures = Holding the same position or using the same muscles for extended periods of time

Static postures, or positions that a worker must hold for long periods of time, can restrict blood flow and damage muscles

Before: Mechanic maintains a static posture holding arms and hands elevated while repairing aircraft

Ergonomic Improvement: Creeper supports mechanic and brings him closer to the task

Effects of Dynamic and Static Work



Cold Temperatures

Working in environments below 68 degrees can cause nerve damage.

Working in cold temperatures can adversely affect a worker's coordination and manual dexterity and cause a worker to use more force than is required to perform a task

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Risk Factors: Excessive Force

- Typing with too much force or “pounding” the keys
- Stamping
- Lifting heavy boxes of paper or carrying office equipment
- Using improper grip

Vibration - Single Point

Hand and Arm exposure results from vibrating objects such as power tools.

Examples of vibrating tools
Using vibrating tools or equipment that typically have high vibration levels for more then 30 minutes a day (chain saws, jack hammers, percussive tools, riveting or chipping hammers).
Using tools or equipment that typically have moderate vibration levels for more then 2 hours total per day (jig saws, grinders or sanders).

Compression = soft tissue is compressed between the bone and a hard or sharp object

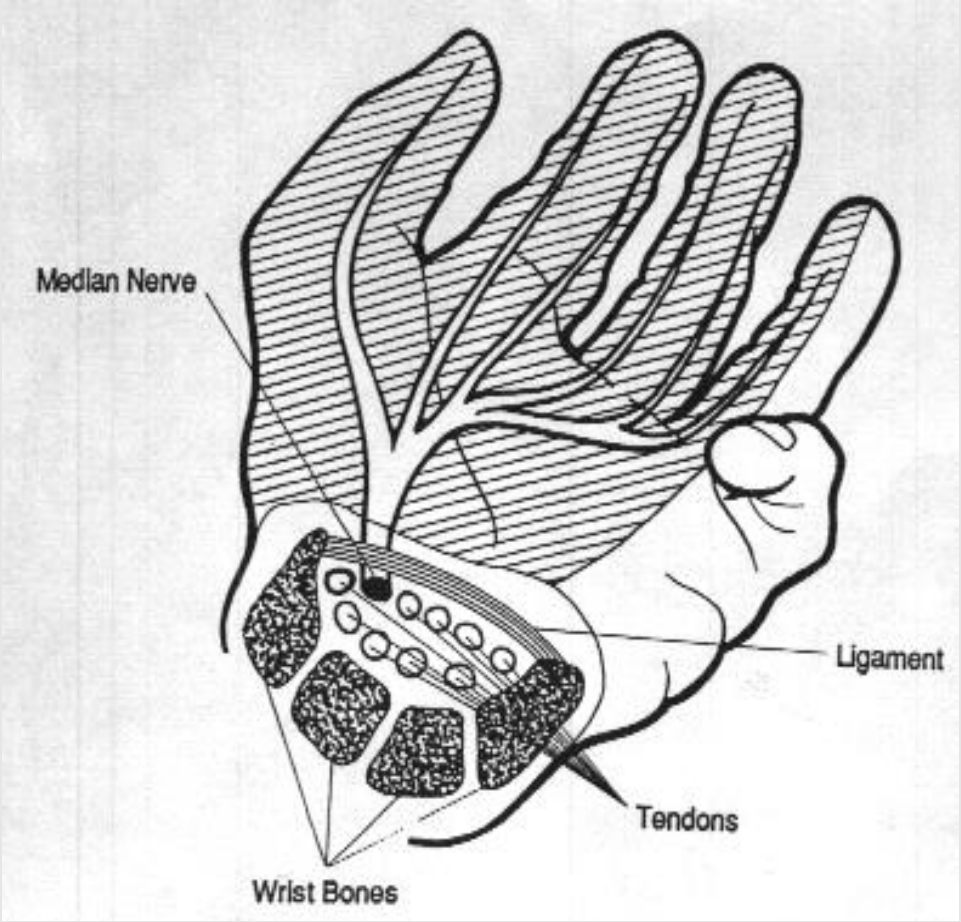
Compression, from grasping or contacting edges like tool handles, can concentrate force on small areas of the body, reduce blood flow and nerve transmission and damage tendons and tendon sheaths

Before: Worker rests his wrists on the sharp tray edges. His wrist is extended into a non-neutral posture.

Ergonomic Improvement: Worker rests her wrists and forearms on a padded surface. Wrist and forearms are in a neutral position.

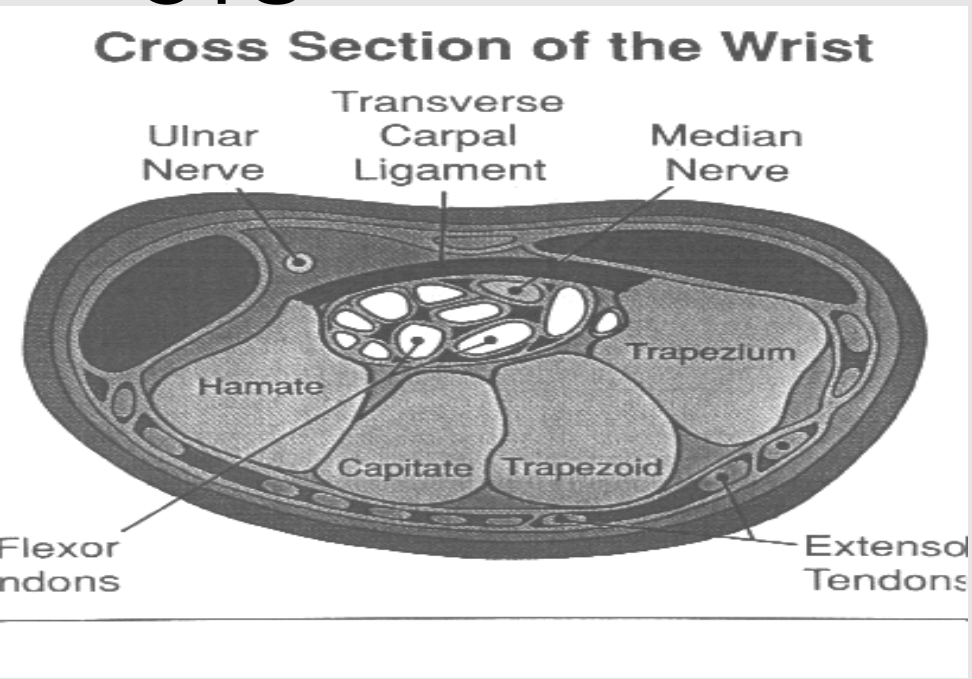
Carpal Tunnel Syndrome

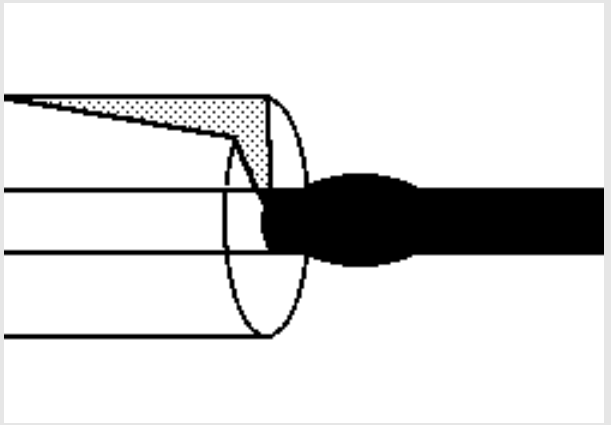
- SYMPTOMS
  - tingling/numbness
  - reduced grip strength
- RISK FACTORS
  - non neutral postures
  - repetition
  - excessive force
  - vibration



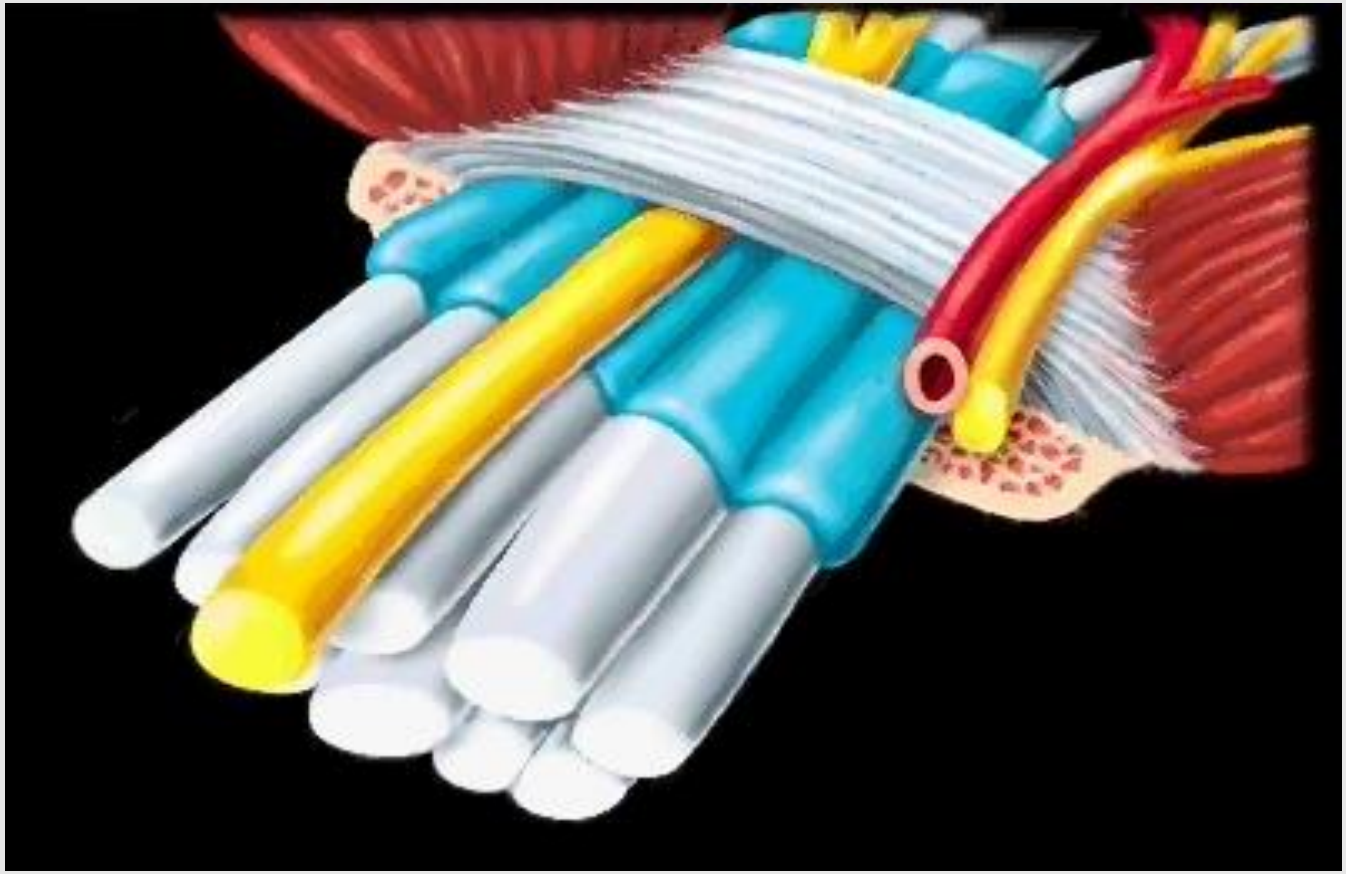
CTS - Anatomical Causes

- wrist is bound by bones and ligaments
- this limited space contributes to the effects of CTS





CTS - Anatomical Causes



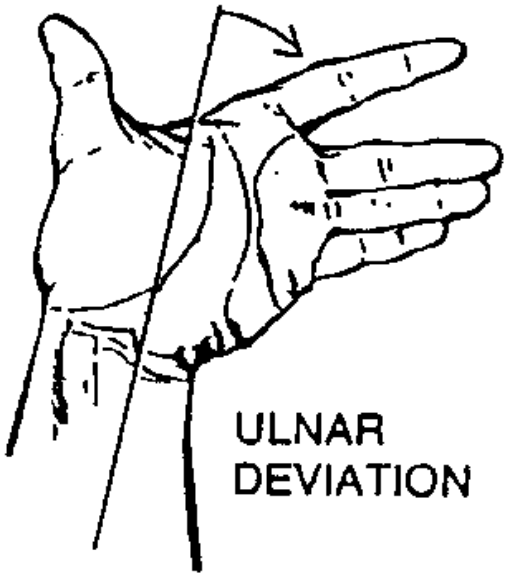
CTS - Physiological Causes

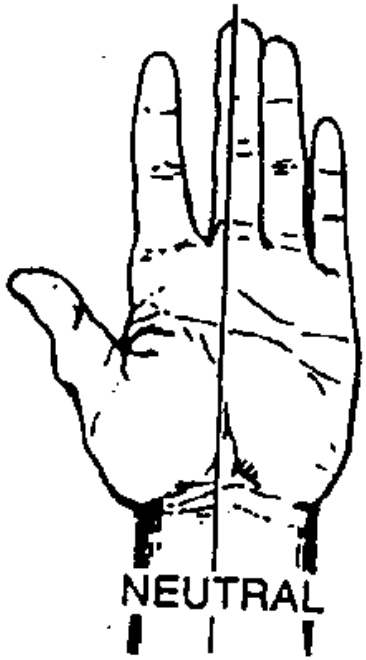
- neuropathic conditions
  - diabetes, alcoholism
- inflammation
  - infection, arthritis
- change in fluid balance
  - pregnancy, obesity, hormone fluctuations

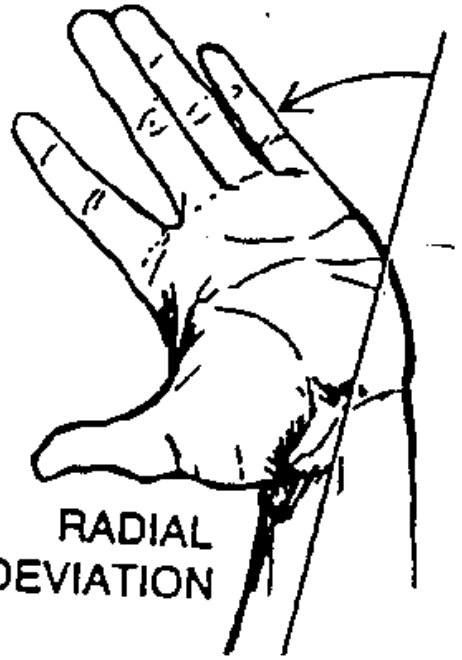
CTS - Mechanical Causes

- flexion/extension of wrist
  - friction of tendon during movements
- force of tendon median nerve
  - inflammation of tendon putting pressure on the nerve
- vibration
  - limits blood flow to the hands causing “starving” of the area
- mechanical stress
  - banging of palm on hard surfaces

Awkward Postures







CTS - Symptoms

Characterized by:

- pain and numbness in hands
- tingling and coldness of hands
- edema (increased fluid) of fingers
- atrophy (reduction in size) of thumb muscles

CTS - Treatments

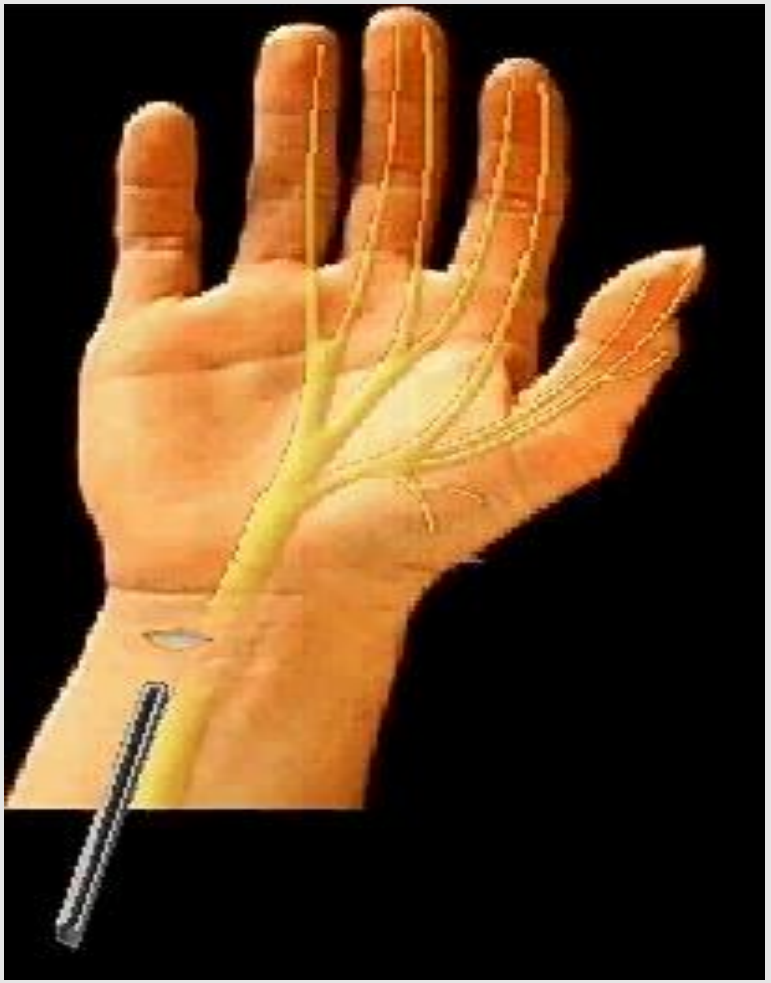
- Conservative Measures
  - splinting in a neutral posture coupled with injection of steroids

CTS - Treatments - Surgery

- open procedure - increased visibility and ability to control bleeding , reduced risk due to variable anatomy of median nerve

CTS - Treatments - Surgery

- closed procedure - reduced post operative pain and scaring, increased recovery, reduced visibility during procedure



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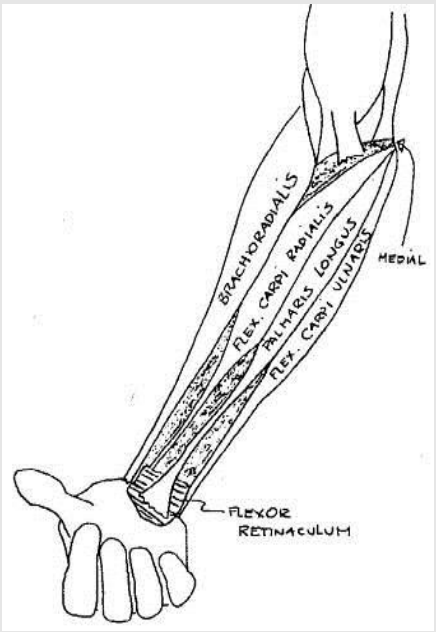
Epicondylitis

- referred to as “Tennis Elbow”
- elbow contains muscle insertions with unsheathed tendons that insert on a common tendon
- occurs in the medial and lateral epicondyles



Epicondylitis

- problems arise since there are large muscle groups inserting on small areas
- is a form of tendonitis
- As the wrist is flexed or the hand used to grip, the muscles contract and pull against the tendons. For example, the force placed on the flexor muscles during a golf swing pulls on the tendons at the medial epicondyle.

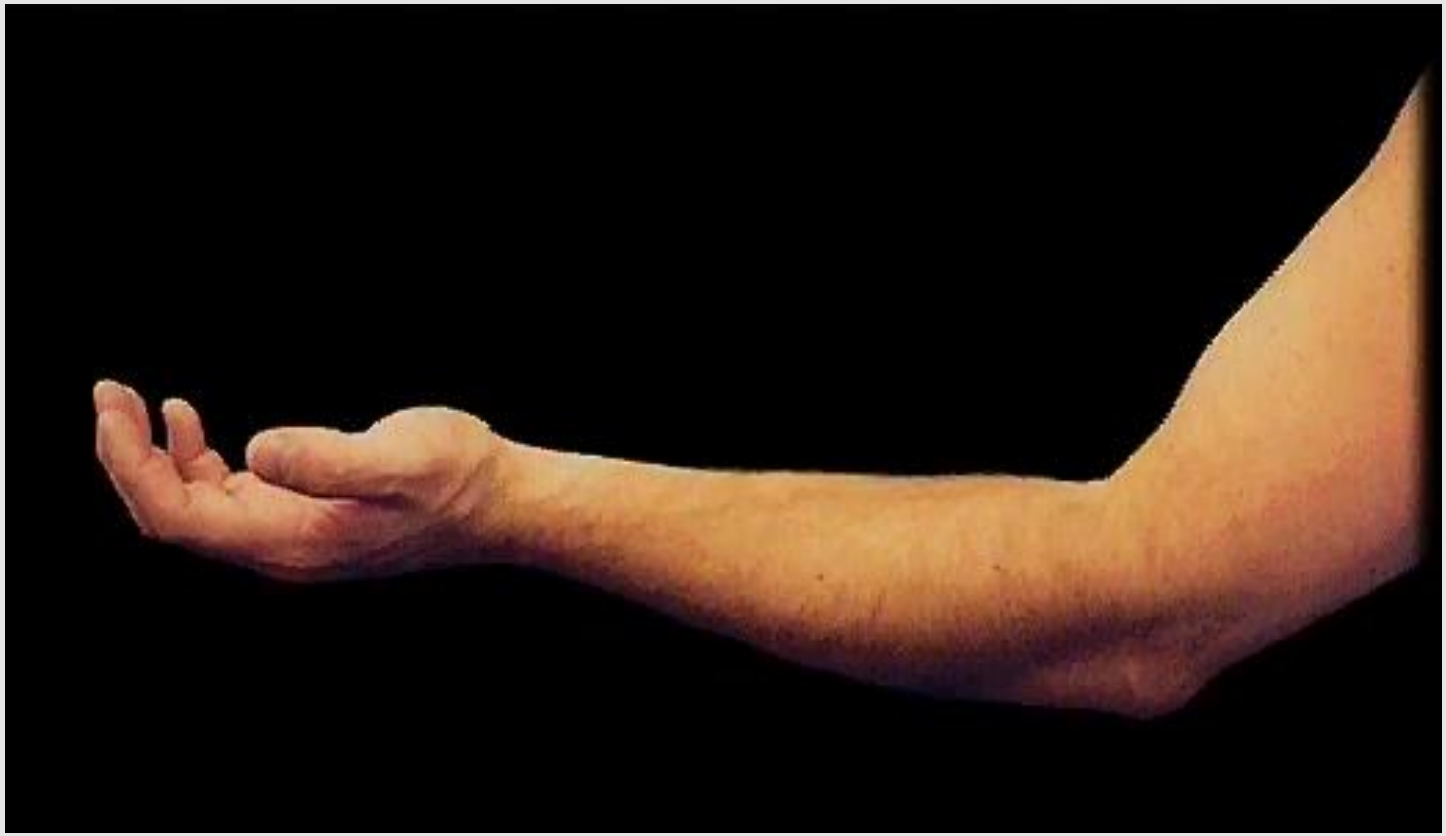
Epicondylitis - Causes

- repeated supination and pronation (rotation) of the forearm especially when linked with forceful actions
- repeated forceful wrist extension
- vibration
- repeated forceful extension of wrist

Epicondylitis - Symptoms

- tendon attachments become irritated and can lead to rupture of muscle fibers
- pain localized over the elbow joint which moves into the forearm and eventually into the fingers
- pain is of a dull aching nature that sharpens upon motion using the extensor muscles

Epicondylitis - Symptoms



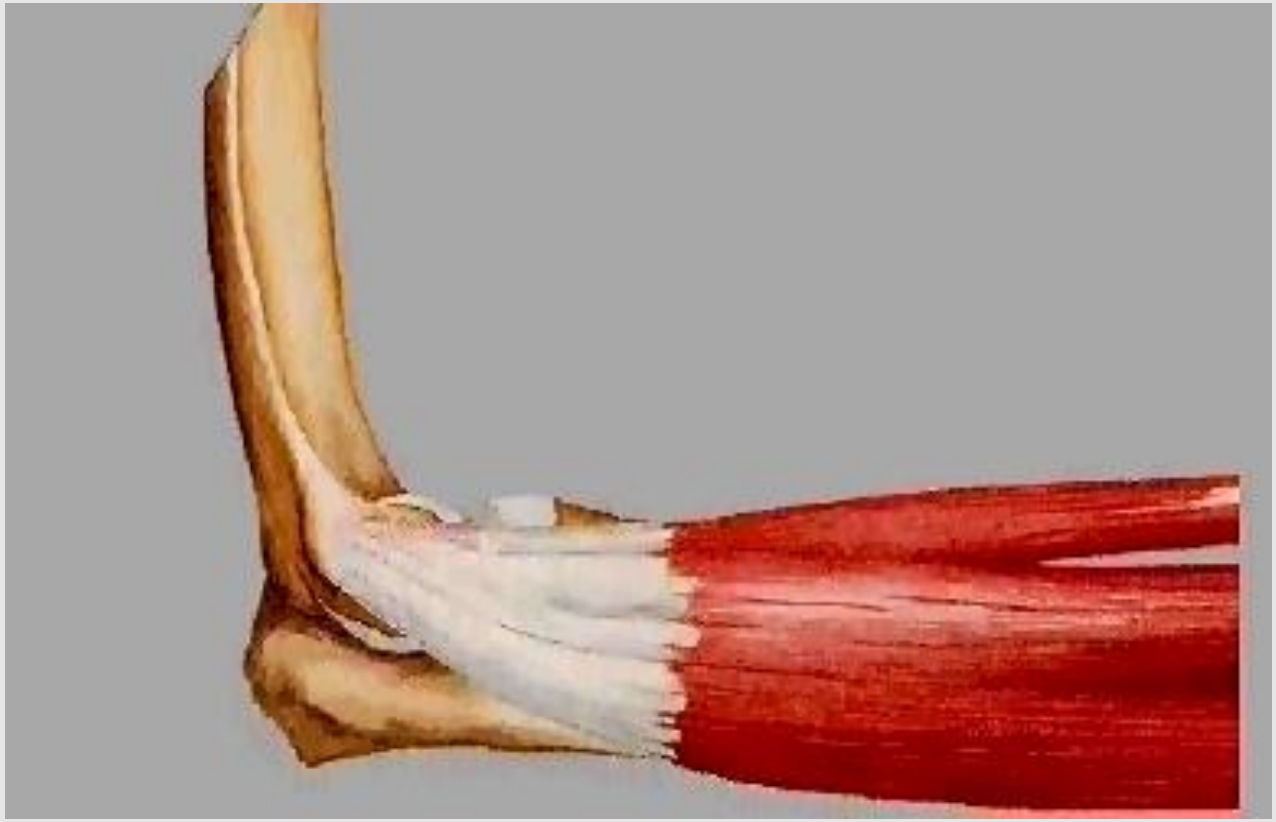
Epicondylitis - Treatments

- Conservative Measures
  - injection of corticosteroids into area of tenderness
  - anti-inflammatories
  - ice - reduce size of blood vessels, and slow inflammation
  - exercise - early on - isometrics to maintain muscle use, as pain lessens more vigorous exercises are used to increase muscle strength
  - rest - splint may be used

Epicondylitis - Treatments

- Surgical Measures
  - fasciotomy to remove degenerative tissue and reattach tendon to bone while attempting to preserve normal resting length of muscle
  - tendons that attach to epicondyle are released and allowed to loosen through a small incision on the epicondyle
  - tendons then split to reveal angiofibroblastic tendinosis in tendon
  - tissue is removed as are bone spurs that have formed giving fresh bed of bone for tendon to re-attach to
  - The split in the tendon is then sutured and takes 3 months to reach maximum healing.

Epicondylitis - Treatments



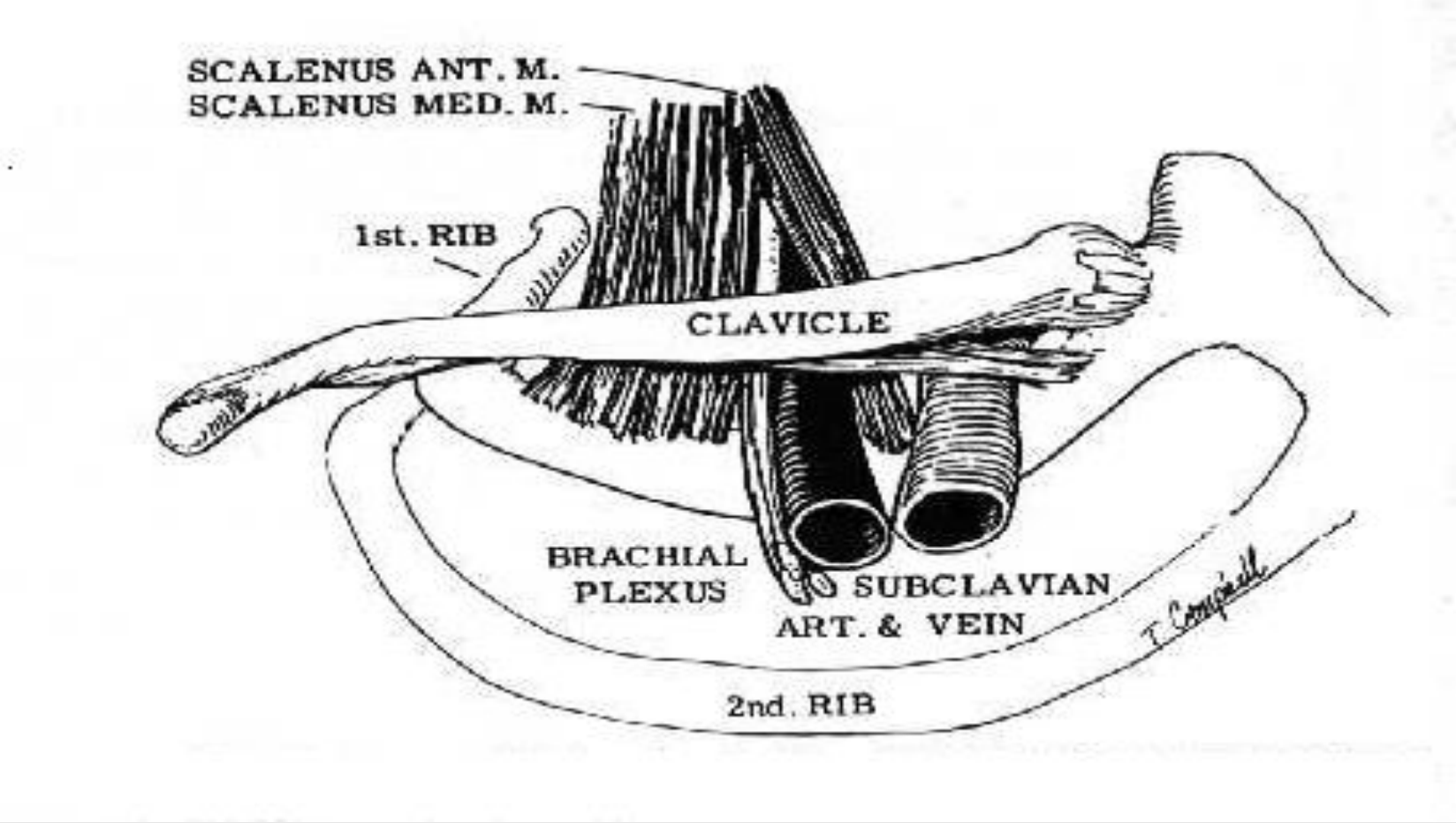
Thoracic Outlet Syndrome

- involves the shoulder and upper arm
- affects blood flow and nerve supply
- general term for compression of the nerves and blood vessels between the neck and the shoulder
- It is extremely difficult to prove that the diagnosis of TOS is correct, since there is no test that has a high degree of accuracy in showing the problem
- diagnosis is made after all other causes of the symptoms have been ruled out

TOS - Anatomy

- nerves and blood vessels that run into the arm and hand start at the side of the neck
- exit from side of spine through openings in vertebrae called foramen
- nerve roots join to form nerves
- nerves travel between 2 muscles in the neck, over the top of the rib cage, under the collar bone, through the armpit and down the arm to the hand
- area where nerve and blood vessels leave the neck is known as the Thoracic Outlet

TOS - Anatomy


SCALENUS ANT. M.
SCALENUS MED. M.
1st. RIB
CLAVICLE
BRACHIAL PLEXUS
SUBCLAVIAN ART. & VEIN
2nd. RIB

TOS - Symptoms

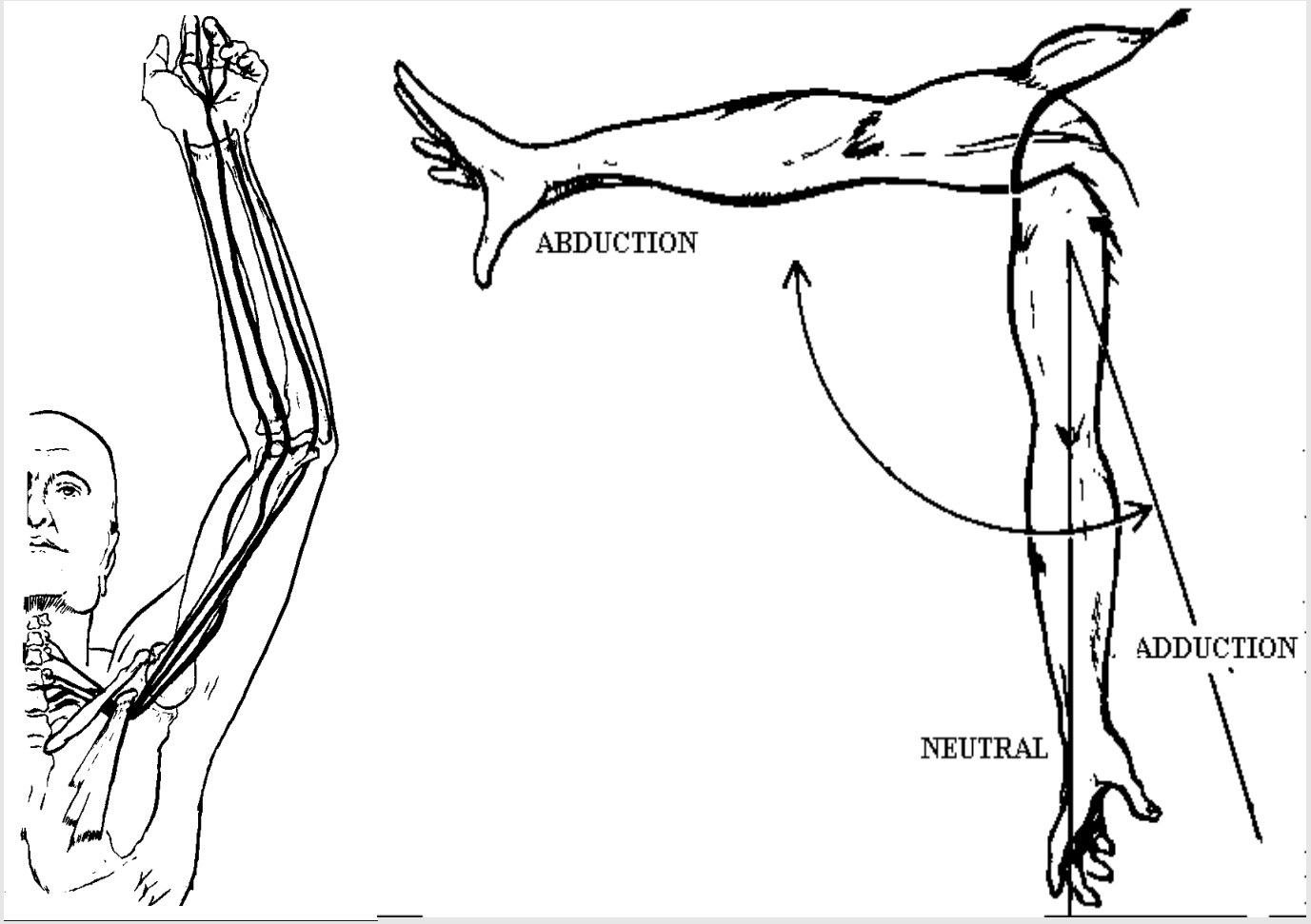
- similar to CTS
- pain and numbness in neck and arm region
- pain and numbness may extend down to hands
- symptoms due to the compression of the nerves and blood vessels

TOS - Symptoms

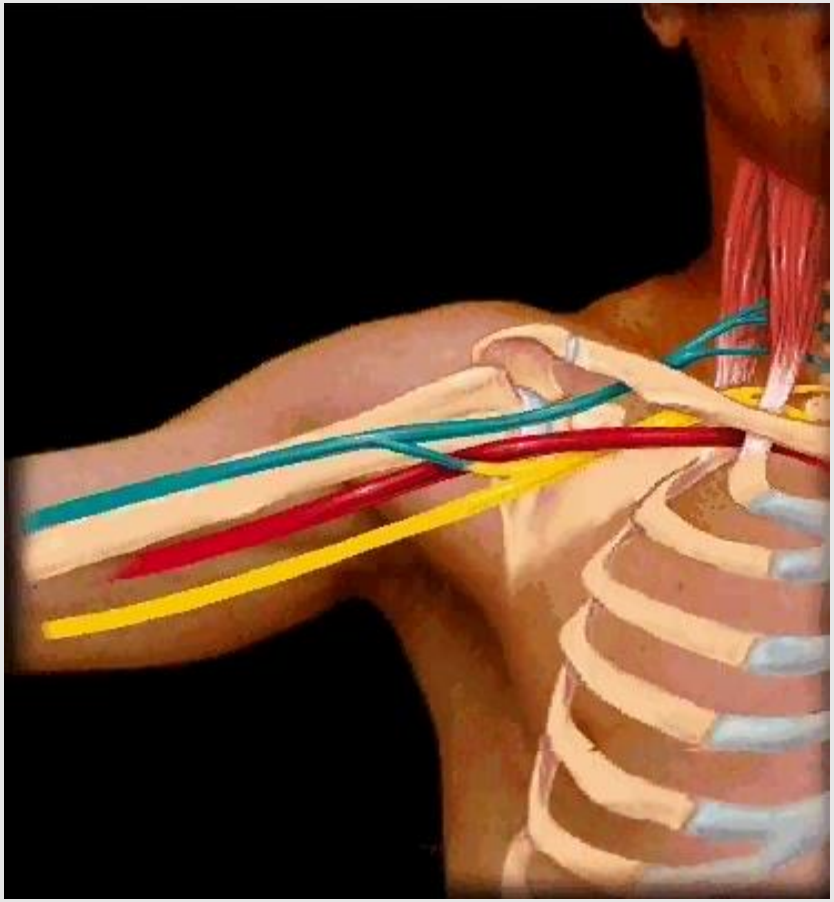
TOS - Causes

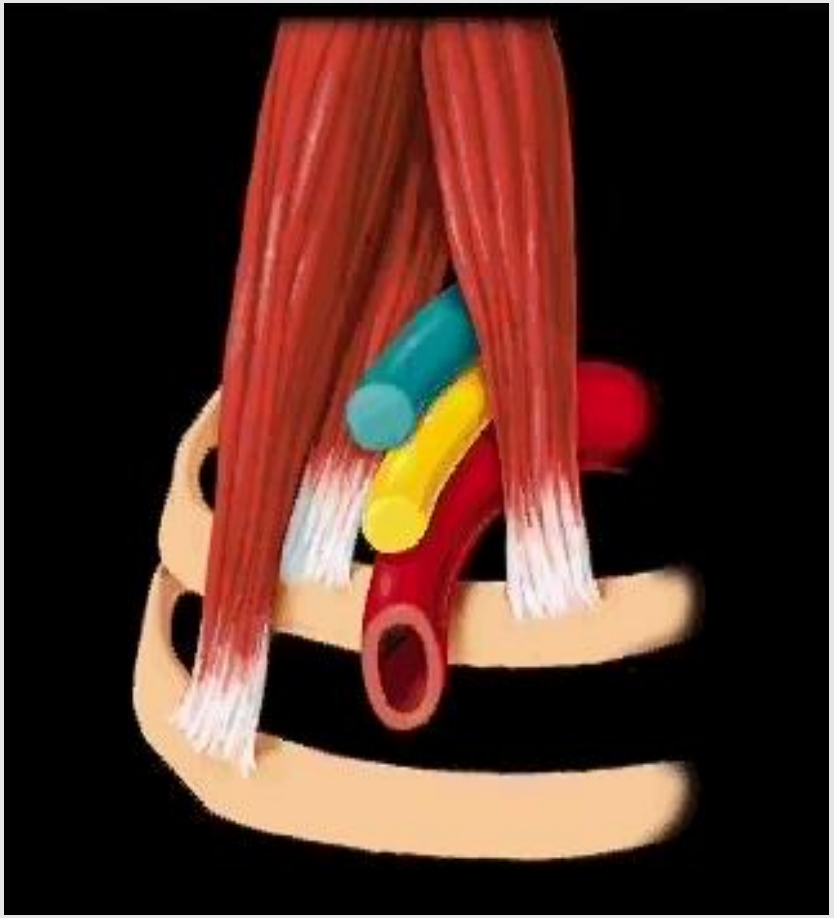
- extreme rotation of the arm above the shoulder
- muscles and tendons deprived of blood flow and nerve supply
- this slows the recovery of muscles and limits the duration of muscle activity

TOS - Awkward Postures



TOS - Awkward Postures





TOS - Treatment

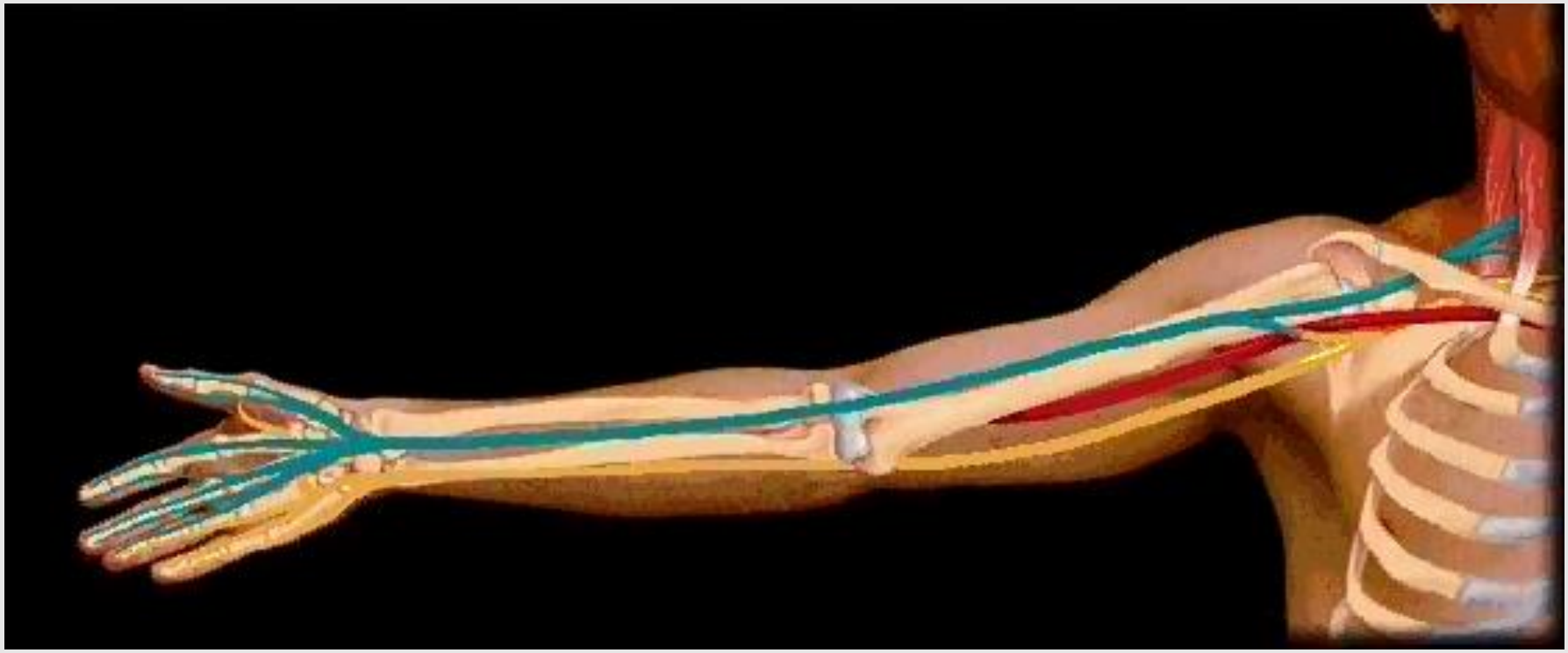
- Conservative
  - stretching and exercise

TOS - Treatment

- Surgery
  - done as a last resort
  - directed at removing the source of compression on the nerves. If there is an extra rib present it is removed
  - normally consists of releasing the constricting elements and scar tissue
  - done through an incision under the arm where the nerves run

TOS

- based on the fact that TOS and CTS have similar symptoms, one has been misdiagnosed as the other in the past

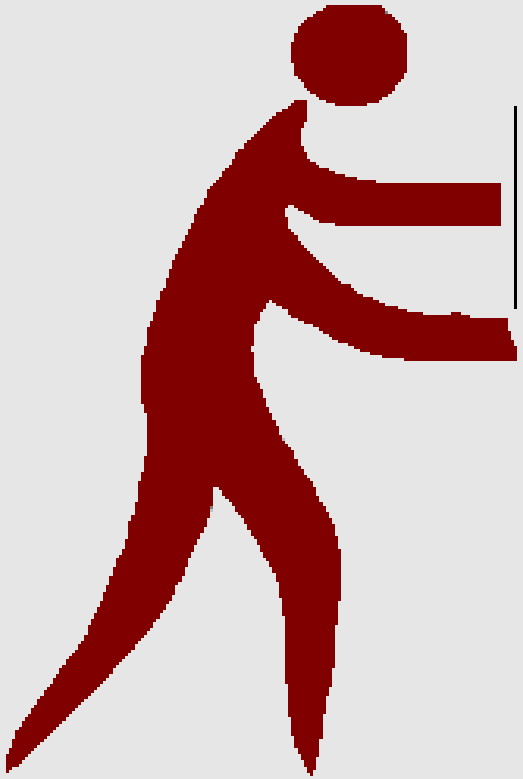


Can Personal Factors Contribute to MSDs?

Some people are at greater risk of developing MSDs due to personal factors

- Age and Gender
- Hobbies
- Previous Injuries
- Physical Condition
- Medical conditions (diabetes and arthritis)
- Pregnancy
- Obesity
- Medications
- Smoking
- Fatigue

What should you do if you experience a MSD Sign or Symptom?



If you experience signs or symptoms of MSDs, report it to a supervisor, industrial hygienist or safety professional

If pain or discomfort does not go away when you leave work or interferes with you carrying out normal activities, see an occupational health nurse or physician

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How do you Avoid MSDs? Work Smarter, Not Harder!

- Work in neutral postures
- Reduce excessive force & repetition
- Keep everything in easy reach and at proper heights
- Keep warm
- Minimize static unsupported postures and pressure points

•Use proper lifting techniques and lift aides
•Ask for assistance with difficult tasks
•Take micro-breaks (stand, stretch, change tasks)
•Maintain a comfortable environment

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For More Information Contact your Local OHCOW Clinic

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