Upper Extremity Over-Use Syndromes and Ergonomics

Review of Common Nerve Compression and Tendinitis Syndromes
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Thoracic Outlet Syndrome

- Thoracic outlet syndrome is characterized by compression of the brachial plexus affecting motor movements and sensation in your shoulder, arm and hand. In the majority of thoracic outlet syndrome cases, the symptoms are neurologic.
Thoracic Outlet
Brachial Plexus

- To longus colli and scalene muscles (C5, 6)
- Dorsal scapular nerve (C5)
- To phrenic nerve
- To subclavius muscle (C5, 6)
- Middle trunk
  - Suprascapular nerve (C5, 6)
  - Anterior divisions
    - Lateral pectoral nerve (C5, 6, 7)
    - Posterior cord
      - Musculocutaneous nerve (C5, 6, 7)
      - Axillary nerve (C5, 6)
      - Radial nerve (C5, 6, 7, 8, T1)
      - Median nerve (C5, 6, 7, 8)
        - Ulnar nerve (C7)
        - Lower subscapular nerve (C5, 6)
- Thoracodorsal (middle subscapular) nerve (C6, 7)
- Posterior divisions
  - Medial pectoral nerve (C8, T1)
  - Medial brachial cutaneous nerve
  - Medial antebrachial cutaneous nerve (C8)
- Medial cord
  - Upper subscapular nerve (C5, 6)
Thoracic Outlet Syndrome

Thoracic outlet syndrome symptoms can vary, depending on which structures are compressed. They often include:

- Numbness or tingling in your fingers
- Pain in your shoulder and neck
- Ache in your arm or hand
- Weak grip
Thoracic Outlet Syndrome

Repetitive activity such as a job that requires:

• Working at desk or workstation for extended periods
• Working on an assembly line
• Stocking shelves and repeatedly lifting things above your head

Baseball pitchers and swimmers, from years of repetitive movements.
Thoracic Outlet Syndrome

- Traumatic event also can cause internal changes that then compress the nerves in the thoracic outlet.
- Pressure on your joints from carrying around an oversized bag or backpack.
- Congenital problems may include a cervical rib or an abnormally tight fibrous band connecting the spine to a rib.
- Poor posture of shoulders, holding head in a forward position can cause compression in the thoracic outlet area.
Thoracic Outlet treatment

- Exercises that strengthen posterior shoulder girdle muscles and improve posture.
- Review body awareness in good posture
- Instruct in frequent breaks
Chin Tuck
Keeping the back upright, slowly pull the head straight back.
Keep the jaw and the eyes level.
Hold for 4-5 slow breaths.
Slowly return the head to the neutral position.
Corner Chest Stretch
Stand facing the corner of a room. Raise your arms to shoulder height and place your forearms, elbows, and hands against each wall. Lean inward to stretch your chest muscles and hold for a count of 15. Repeat for a total of 10 to 12 reps.
Carpal Tunnel Syndrome
Peripheral neuropathy of the upper extremity and results from compression of the median nerve beneath the transverse carpal ligament.

- experience a burning wrist pain, which may radiate either proximally to the shoulder and neck region or distally into the fingers.
- onset of paresthesia in the thumb, index finger, middle finger, and the radial aspect of the fourth finger
Carpal tunnel
Thenar atrophy

- In severe or chronic cases, muscle atrophy of the thenar eminence may be present.
Carpal Tunnel Syndrome

Physical examination:
- Tinel sign: percussion at volar wrist that evokes sharp tingling

- Phalen maneuver: extreme flexion of the wrist to test for dysesthesia

Sensory nerve function:
- decreased 2 point discrimination >6mm
- Decreased sensitivity to monofilament testing >2.83
- Nerve Conduction, EMG
Carpal Tunnel Syndrome

Surgical post care:
- Resting orthotic
- Wound care
- Tendon glide
- Scar mobilization
- Functional retraining for pinch
- Task modification if needed
Carpal Tunnel Syndrome

Non-surgical interventions:
- Neutral orthotic
- Nerve and tendon gliding exercises
- Work/leisure modification
- Modified pinch/grasp
Carpal Tunnel Syndrome - Ergonomics

- Maintain a neutral wrist position; Avoid bending, extending or twisting the wrist during activities
- Minimize repetition; Periodically rest the hands briefly during repetitive or stressful activities
- Slow down the activity
- Use the least amount of force necessary to do the job
- Use a light grip on tools, pens, the mouse
- Find tools or gadgets that help make the job easier
- Avoid using a sustained pinch or grip, especially if the wrist is not in a neutral position
- Avoid positioning the wrist in a bent position (towards the palm of the hand) for any length of time (for example, when sleeping)
- Alternate work activities
- Alternate hands during the work activity if possible
- Work from the shoulder and don't isolate finger or wrist movement
Wrist and Forearm Stretch
Sit or stand with the back upright. Keeping the shoulders low and relaxed, extend the right arm straight out in front of you with the fingers facing downward. Place the left hand across the back of the right hand and gently pull it toward you. Hold for 4-5 slow breaths. Feel the stretch in the top of the wrist and forearm. Slowly return to the initial position.
Wrist and Forearm Stretch
Sit or stand with the back upright. Keeping the shoulders low and relaxed, extend the right arm straight out in front of you. Point the fingers upward and place the left hand across the bottom of the right hand and gently pull it toward you. Hold for 4-5 slow breaths. Feel the stretch in the bottom of the wrist and forearm.
- **Bilateral Wrist Stretches**
- Sit on the edge of your chair and place the elbows on the desk about shoulder width apart.
- Keep the back upright and the feet flat on the floor.
- Bring the palms together and slowly lower the wrists toward the desk until stretching in the bottom of the wrists and forearms is felt.
- Hold for 4-5 slow breaths.
TENDINITIS INJURIES
Wrist Flexor Carpi Ulnaris Tenosynovitis (wrist/little finger side)

• More commonly seen than FCR tenosynovitis

• Presents with pain along the front little finger side of the wrist with activities that require repetitive wrist flexion in ulnar deviation.

• The pain is exacerbated by wrist flexion and wrist deviation towards the little finger side against resistance

Flexor Carpi Radialis Tenosynovitis (wrist/thumb side)

• FCR tenosynovitis presents as pain, tenderness, and crepitus just in back of the wrist crease overlying the FCR tendon or at the base of the thenar eminence.

• The pain may radiate proximally and is increased with passive extension and resisted flexion of the wrist.
Epicondylitis ("Tennis" or "golfer’s" elbow)

• Aching pain at outside or inside of elbow

• Increased pain with resisted extension or flexion of the elbow.

• Pain with repetitive, forceful gripping.

• Difficult to perform push and pull activities with the elbow held straight
Different stages of Overuse Syndromes

Early

- Fatigue characterized by increased aching and tiredness during the activity.
- The symptoms usually subside with overnight rest.
- This stage should be construed as a warning to protect the affected body part.
• Persistence of the discomfort into the next day, with earlier onset of fatigue during the workday.

• It is a sign that injury is developing, and steps should be taken immediately to reduce the strain on the affected part.

• The affected part should be rested more frequently, and the work process or sport should be redesigned to avoid the offending motion.
End Stage

• In the third clinical stage of overuse syndromes, chronic aching, fatigue, and weakness persist despite rest of the affected part.

• Most difficult to treat. Slow recovery.
Treatment of Overuse Syndromes

• Resting the affected body part for at least 2 weeks. Ice and elevation.

• Doctor may prescribe Non-steroidal anti-inflammatory agents (NSAIDs) and corticosteroids (usually as a local injection) can limit the inflammatory response and decrease pain. The injection should be followed with rest, a protected motion program, and a slow-graded return to activity.

• Treatment also can include splinting to limit movement to a pain-free range. Helps patients avoid re-injury.

• Rehabilitation to follow, slowly increasing from isometrics to low weight and repetitions.
What is Ergonomics?

• The science of fitting the work space to the human body in order to reduce injury risk or making the work space as user-friendly as possible.

• A basic ergonomic evaluation of the work space includes the following measures: changing tools, designing machinery to do highly repetitive tasks, changing work posture, and controlling environmental conditions.
Posture & Activity

• Use the positioning suggestions to help you find a good posture that feels comfortable and supportive.

• Posture should be fluid and not stiff. When working, flow out from this position of good posture to perform activity and then return to it when the activity is completed.

• It is good for circulation to shift your movements and "fidget".

• Use the activity suggestions to minimize the stress of repetitive activity on the body.
Positioning in the Chair

• The chair should have a 5-point base for stability & safety.

• Your feet should be flat on the floor – Use a foot rest if necessary.

• Your knees should be slightly lower than your hips.

• The back rest should support your lower spine.

• Hold your head directly over shoulders. Don't let your head fall forward.

• Hold your shoulders directly over the elbows. Don't let your shoulders round forward.

• The elbows should be slightly open greater than 90 degrees.

• Do not lean on the elbows or wrists.
Reaching & Lifting

• Reach for objects by turning the body and facing the object. Don't twist in the chair to perform activity or reach for objects.

• Use both hands when reaching for heavy objects and face the object squarely.

• Support the object from underneath.

• Keep frequently used objects within your immediate work space.
  • Arms length distance in reach
  • Between eye-level and hip-level
Work space

- **Lighting**: Keep your work area well lit to avoid eyestrain. Reduce glare allowing you to see the true colors of your project.
- **Floor covering**: if you stand a great deal of the time, get in an anti-fatigue mat to improve circulation in your lower limbs.
- **Work surfaces**: Having your work or sewing table tilted slightly toward you may help to reduce stress on the back and shoulders as you're sitting upright.
Work space

Chair

- Try to find a chair with gently sloped front edge to help prevent the chair's edge from pressing into the backs of the sewer's legs. Good back support with arm supports may be beneficial. Learn and use adjustments.

- Chair height set so knees bent 90 degrees and feet flat on floor, you may need a footrest and backrest.
Work space

- Cutting table height set 2-4" below bent elbow
- Ironing board height set 4-6" below bent elbow
- Consider slightly tilting sewing machine table towards you.
- Set up room with efficient triangle of ironing, sewing cutting table if possible.
- Have adjustable tables to change heights.
Ergonomic Quilt/Sewing tools

Consider ergonomic tools, Keep tools, scissors sharp – use your thimbles, pads and other hand savers.
Breaks

- Quilt is repetitive so limit yourself to 50 minutes of quilting/sewing in an hour's time
- Take a break for 10 minutes in each hour of quilting
- Do not Push through to “get it done”
- Exercise/Stretch during your breaks
Posture - general

- Maintain/ reposition to good posture
- Keep the wrist loose – not at extremes of motion
- Keep fluid motions, change posture – not static
Thank You!