OSC|12
Ohio Safety Congress & Expo

WELL AT HOME. SAFE AT WORK.

393 Wrapping Your Arms Around Upper Extremity Injuries

James M. Anthony, MD

Wednesday, March 28, 11:15 a.m. to 12:15 p.m.

Ohio | Bureau of Workers' Compensation

Continuing Nursing Education Disclosures

- **Goal:** To educate conference attendees on specific aspects of accident prevention and Ohio's workers' compensation system
- **Learning objectives for session # 393 Wrapping Your Arms Around Upper Extremity Injuries:**
  - Recognize the anatomy of the upper extremity, below the shoulder
  - Describe common injuries of the arm
  - Explain key treatment method
- **Criteria for Successful Completion:** Attend the entire event and complete a session evaluation.
- **Conflict of Interest:** The planners and faculty have **no** conflict of interest.
- **Commercial Support:** There is no commercial support for this event.
- **Continuing Education:** Awarded 0.1 IACET general CEUs and 1.0 RN* contact hour.

*The Ohio BWC (OH-188/01-01-2013) is an approved provider of continuing nursing education by the Ohio Nurses Association (OBN-001-91), an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation.

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Wrapping Your Arms Around Upper Extremity Injuries

Ohio Safety Congress
Columbus, Ohio

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March 28, 2012

Introduction and Program Objectives

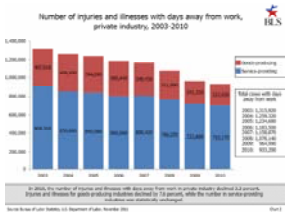
- Overview of Problem
- Limited to problems below the shoulder
- Describe anatomy of the upper extremity
- List common injuries of the upper extremity

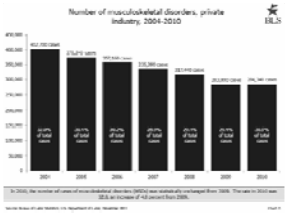
Introduction and Program Objectives

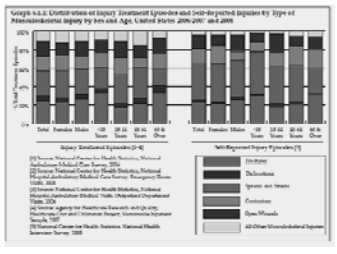
- Cover injury causes and treatments individually
- Indicate Evidence Based treatment options when appropriate
- Compare and contrast surgical vs. nonsurgical treatment options
- Questions and Answers

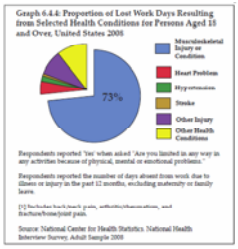
Overview of Problem

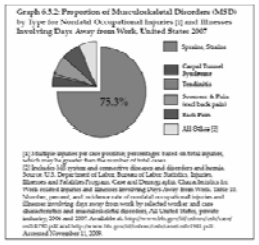
- Upper extremity injuries generate a very high level of burden on American businesses
- One condition – Carpal Tunnel Syndrome – is almost a category by itself
- A disproportionately high number of fractures and tendonitis occur in the upper extremities
- A disproportionately high number of lost work days come from upper extremity injuries
- The number of musculoskeletal injuries and lost work days from injuries has been declining steadily

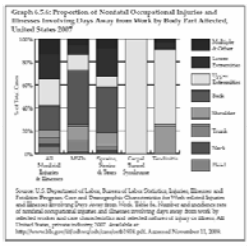


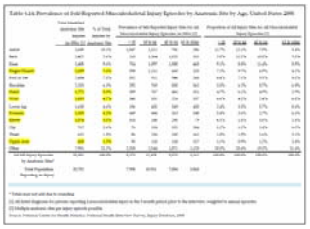




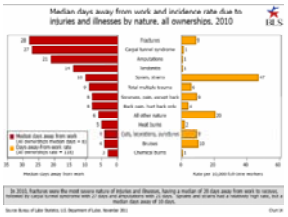


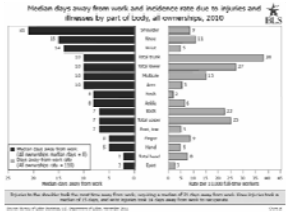


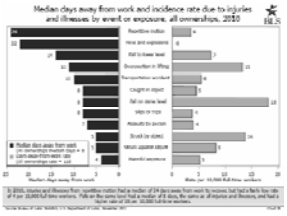




Total of Injuries in upper extremity below shoulder is = *25.8* % of all musculoskeletal injuries







At Mercy OHC – Body Areas Injured 2000 - 2011

- Top 12 areas injured and their percentage of total injuries within the top 12

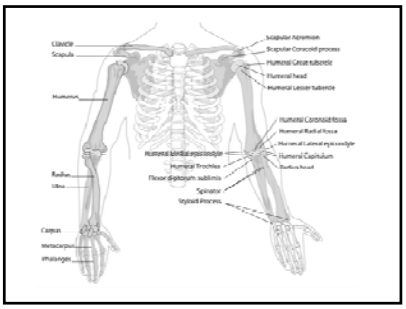
Thumb/Hand/Finger	30.0%	Shoulder/Arm	5.2%
Lumbar Spine	15.4%	Head (not eyes)	5.2%
Eyes	9.4%	Foot/Toes	4.7%
Elbow/Forearm	6.7%	Thoracic (mid) spine	4.7%
Wrist	6.1%	Neck	4.2%
Knee	5.6%	Ankle	2.9%

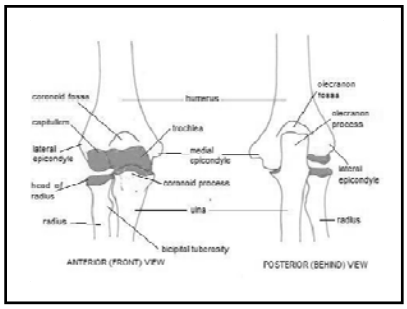
Anatomy of the Upper Extremity

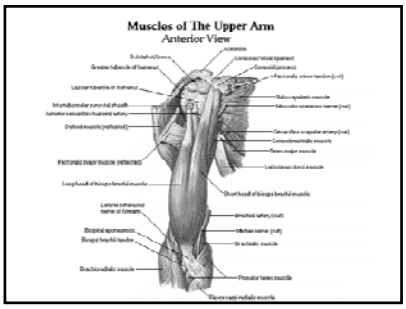
- Our focus today is on the upper extremity below the shoulder, the elbow, and the wrist/hand
- Basic information will be presented with emphasis on areas commonly associated with injury

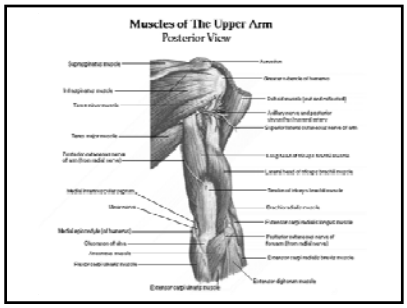
Anatomy of the Upper Extremity

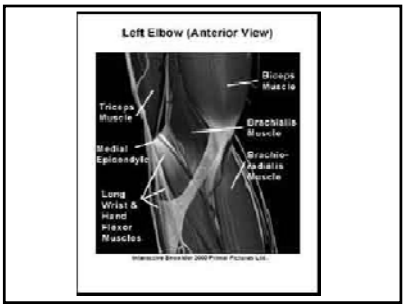
- The upper extremity bones consist mainly of the humerus, radius, ulna, wrist bones (multiple), metacarpals, proximal phalynx, middle phalynx, and distal phalynx

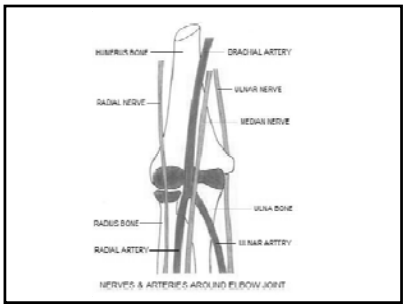


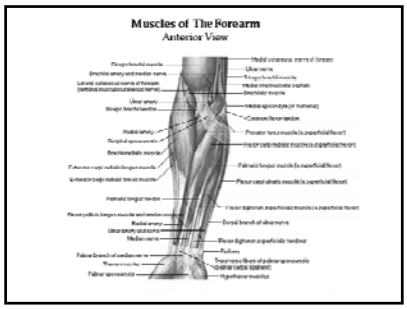


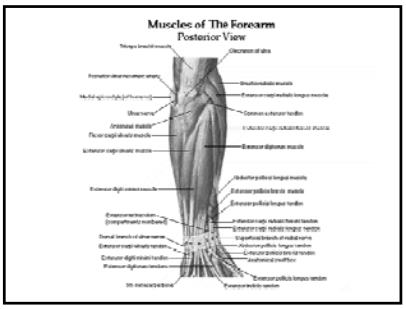


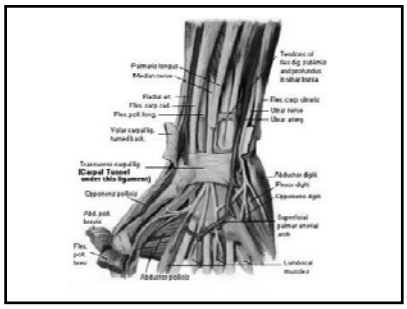


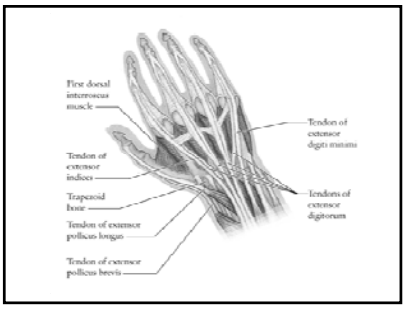






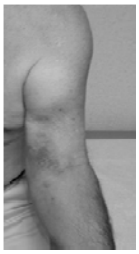


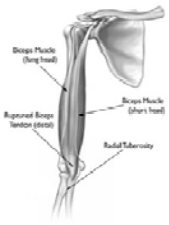




Distal Bicep Tendon Rupture

- Uncommon – less than 5% of biceps tendon ruptures
- Cause – usually when flexed elbow is forced straight while person resists movement (e.g. Lifting a box that is too heavy and your arm forced to straighten)
- Critical to diagnose early and definitively
  - Early repair leads to better results:
    - Better forearm supination strength
    - Better elbow flexion strength
- Smoking, increasing age and steroids make this injury more likely





Distal Bicep Tendon Rupture

- X-rays are often normal (could see bone pulled from the radial tuberosity in some cases)
- MRI provides a definitive diagnosis
- Treatment:
  - NSAIDS for early pain control
  - Surgical correction of tear unless full strength in arm not needed
    - Surgery followed by:
    - Cast immobilization followed by:
    - Physical Therapy/Exercise program
- Light work activities can start soon after surgery
- 2 to 3 months for full recovery and return to heavy lifting

Ulnar Collateral Ligament Tear

- Mainly occurs in throwing athletes and much less commonly a work injury
- Is an injury that causes medial joint pain at the elbow
- Exam is often mistaken for ulnar nerve compression at the elbow
- Joint may not feel unstable when stressing the inside of the joint
- Treatment is surgical for highly competitive throwing athlete but mainly nonsurgical for all others
- MRI with joint contrast material is the definitive way to diagnose this

Lateral & Medial Epicondylitis

- Names of these conditions are misleading
- "Tennis Elbow" = lateral epicondylitis
- "Golfer's Elbow" = medial epicondylitis
- Very common condition(s)
- Cause – Most frequently associated with repetitive use of the arm at the wrist. Just as likely to occur from frequent use of a screwdriver as it is from playing tennis or golf.
- Painters, Plumbers, and Carpenters are particularly prone to these conditions

Lateral & Medial Epicondylitis

- Diagnosis is primarily made by the history and the physical exam
- MRI can assess severity of the condition and confirm it but is not necessary to predict the success of a treatment program. X-rays do not show this but might help to rule out other causes of pain including arthritis
- Primary treatment consists of:
  - NSAIDs and/or oral cortisone (prednisone)
  - Counterforce brace
  - Reduction of activities and rest/ice
  - Injection of the area just distal to the epicondyle
  - Gently stretching and forearm strengthening exercises
  - Consider formal physical therapy wi or w/o iontophoresis
- Surgery should only be considered after a 6 month to a year trial of conservative nonsurgical treatment

Olecranon Bursitis

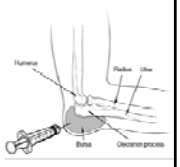
- Can be secondary to trauma, inflammation, or infection
- Often a hard direct blow to the "point" of the elbow will cause this
- X-rays are needed to rule out a fracture of the olecranon process of the elbow
- A bursa aspiration can be both diagnostic and therapeutic
- Sometimes cortisone is injected into the bursa sack after aspiration

Olecranon Bursitis

- Think of possible infection in the bursa. This is the most commonly infected bursa in the body
- Look for warmth and redness
- Treatment can consist of:
  - Avoid activities that place direct pressure on the elbow
  - Elbow pads
  - Medications: mainly NSAIDS
  - Aspiration of the bursa and injection with cortisone
  - RARELY is surgery needed

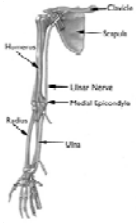
Olecranon Bursitis

- When the bursa is aspirated, many believe that a culture and sensitivity should be done in case infection becomes evident
- The bursa can be aspirated more than one time if it reaccumulates
- If not infected, a compression dressing can be used over the elbow



Cubital Tunnel Syndrome / Ulnar nerve entrapment at the elbow

- This is the second most common nerve compression in the upper extremity (second to Carpal Tunnel Syndrome)
- Causes:
  - Unknown
  - Activities causing repetitive use of elbow being flexed or keeping it flexed
  - Leaning on the elbow
  - Direct blow to the medial side of the elbow
  - Cysts or swelling pressing on the nerve



Cubital Tunnel Syndrome / Ulnar nerve entrapment at the elbow

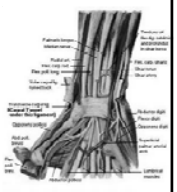
- Symptoms:
  - Feeling of hand "falling asleep" over the 5th finger and closest half of the 4th finger
  - Weakening of the grip
  - Reduced finger coordination
  - Muscle wasting in the hand is a late sign and cannot be reversed
- Diagnosis:
  - Tap the elbow over the "funny bone" area and see if numbness occurs in the 5th/4th digits
  - See if nerve slides out of the groove with elbow flexion
  - Try to reproduce symptoms with neck movements
  - EMG/NCV study to assess the nerve function

Cubital Tunnel Syndrome / Ulnar nerve entrapment at the elbow

- Treatment:
  - Nonsurgical
    - Modify activity in the workplace to limit elbow flexion and any direct pressure on the ulnar nerve
    - Nighttime elbow splint
    - NSAIDS
    - Steroid injection – **DO NOT USE** because of risk of damaging the nerve
    - Bracing or splinting
    - Nerve Gliding exercises
    - Formal Occupational Therapy for initial treatment and progression to a home exercise program
  - Surgical
    - Cubital Tunnel Release
    - Ulnar nerve anterior transposition
    - Medial Epicondylectomy
    - Outcomes are generally good for all procedures

Carpal Tunnel Syndrome

- Most common nerve compression syndrome in the upper extremity
- Causes:
  - Anything that causes direct compression of the median nerve at the wrist by reducing the size of the carpal tunnel
  - Tendonitis of the flexor tendons
  - Repetitive overuse trauma
  - Rheumatoid arthritis
  - Tumors
  - Medical Conditions such as low thyroid or diabetes
  - Obesity
  - Pregnancy



Carpal Tunnel Syndrome

- Symptoms:
  - Numbness in the hand into the thumb, index finger, middle finger, and radial half of the ring finger (or some combination of those)
  - Often worse at night
  - Dropping objects
  - Pain or numbness made worse by activities that require repetitive use of the wrist (flexed and extended), prolonged flexion of the wrist, or prolonged extension of the wrist (driving or reading)
  - Pain can sometimes radiate up the arm as far as the shoulder
- Diagnosis
  - Inspect the hand for thenar atrophy (usually a late sign) and weakness of the hand (thumb opposition or abduction against resistance)
  - Phalen test
  - Tinel Sign

Carpal Tunnel Syndrome

- Diagnosis (cont.):
  - Durkan carpal compression test
  - Sensory abnormalities of the normally affected fingers
  - Loss of two point discrimination of the finger tips of thumb, index, middle, or ring fingers
  - X-rays of the wrist to rule out other causes or if wrist motion is limited
  - EMG/NCV testing of the upper extremity to look for findings consistent with nerve compression at the wrist
  - USE CAUTION WHEN INTERPRETING THESE BECAUSE:
    - Abnormal EMG/NCV can be found in people with no symptoms
    - Normal EMG/NCVs can be found in 5 to 10% of patients with Carpal Tunnel Syndrome
  - Diagnosis is generally made on clinical grounds and the EMG/NCV is just used to confirm the diagnosis

Carpal Tunnel Syndrome

- Treatment:
  - Splinting the wrist (especially at night if numbness occurs during the night)
  - NSAID medication
  - Consider a cortisone injection into the Carpal Tunnel … This may be repeated once
  - Work modification to limit repetitions of wrists or to avoid excessive flexion of the wrist or forceful awkward positions of the wrist
  - Surgery is often necessary for patients with "fixed" sensory loss and especially if thenar atrophy is present
  - Referral to a certified hand specialist (usually an Occupational Therapist) for nonsurgical treatment in more difficult cases

Scaphoid (Navicular) Fracture of the Wrist

- The small wrist bone most likely to break
- Located on the thumb side of the wrist
- Causes:
  - Fall on an outstretched hand, with the weight landing on the palm
  - Wrist sprain or distal radius fracture also caused by this
  - Occurs in all ages with Men 20 to 30 most often affected

Scaphoid (Navicular) Fracture of the Wrist

- Symptoms:
  - Pain and swelling at the base of the thumb
  - Reduced grip strength
  - Pain lasting for more than a week after a "wrist sprain"
- Diagnosis:
  - Tenderness over the "anatomical snuff box"
  - Swelling on the radial side of the wrist
  - Pain lasting beyond 1-2 weeks
  - Often normal initial x-rays
  - MRI can find it sooner but repeat X-rays often only thing needed

Scaphoid (Navicular) Fracture of the Wrist

- Treatment:
  - Even if no fracture is seen initially, treat with a thumb spica splint pending further investigation
  - Long term immobilization as much as, in some cases, 24 weeks in a long arm thumb spica cast is needed for proper healing
  - More commonly, thumb spica cast for 6 – 8 weeks
  - MRI might be needed to assess for complete healing

Scaphoid (Navicular) Fracture of the Wrist

- Treatment:
  - Surgery might be needed if fracture is displaced or in areas of greater risk (waist or proximal pole)
  - Ongoing research into the best surgical approach with minimally invasive methods being explored
  - Given the long immobilization and risk for nonunion, physical therapy might be necessary before return to full unrestricted activity

Sprained Wrist

- Sprained wrists appear to be very common but "simple" sprained wrists are considered by some to be very rare
- My experience is that simple sprained wrists are rare and often the diagnosis is found when looking further
- Causes:
  - Falling onto an outstretched hand especially with the wrist very extended (sound familiar)
  - Could be caused by a forceful twisting of the wrist by a drill that catches or other causes of forceful twists

Sprained Wrist

- Symptoms:
  - Wrist pain and swelling
  - Difficulty gripping or twisting objects
  - Reduced strength picking up heavy parts/objects
- Diagnosis:
  - I believe this is almost a diagnosis of exclusion. When you think of all the more serious injuries that can occur in the wrist, they will need to be ruled out if the symptoms do not subside fairly quickly.
  - Wrist is likely tender and swollen with normal plain film wrist X-ray (with Scaphoid views)

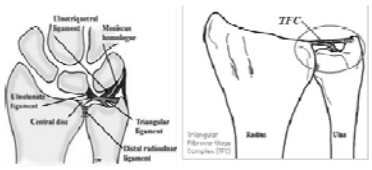
Sprained Wrist

- Treatment:
  - NSAIDS
  - ICE
  - Splinting
  - Activity modification / work restrictions
  - Expect fast recovery
  - If that doesn't happen, suspect alternative diagnoses

Sprained Wrist

- Consider injury to the triangular fibrocartilege if the pain is on the ulnar side
- Consider occult fracture of the Scaphoid if the pain is on the radial side (snuff box)
- Consider nerve entrapment if numbness is prominent
- Consider tendonitis if mechanism of injury is less traumatic and more from repetition
- Consider finger/thumb sprain if pain is more distal and over knuckles
- Consider complete tears or disruptions of specific wrist ligaments if pain or weakness worsens

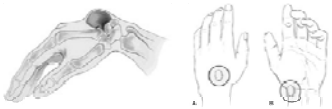
Triangular Fibrocartilege Complex



Quick Thumbnail Review
Interesting or Common Injuries/Conditions

- Ganglion Cyst of the Wrist
- Sprained Thumb
  - Gamekeeper's thumb (torn ulnar collateral ligament)
- De Quervain's Tendinitis/Tendinosis
- Trigger Finger
- Mallet Finger

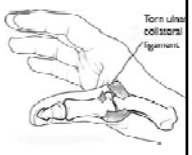
Ganglion Cyst of the Wrist



- Fairly common
- Causes – unknown - grows out of a joint
- Common among gymnasts so there is some solid evidence that trauma to wrist contributes to them
- May go away on their own (often do) with rest
- X-ray to rule out other conditions
- May require surgery if very bothersome

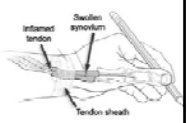
Sprained Thumb

- Can occur in other ligaments but sprains of the ulnar collateral ligament seems to be most common – so called "Gamekeeper's Thumb"
- May require surgery if complete tear
- Requires thumb-spica splint for 6-8 weeks if no surgery – 3 weeks continuous
- If not treated properly, this can lead to chronic instability, weakness and eventually arthritis



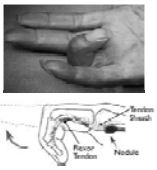
De Quervain's Tendinitis / Tendinosis

- Tendons around the base of the thumb are irritated or squeezed
- Pain especially when the thumb is brought into a fist
- May be caused by overuse and associated with pregnancy and arthritis
- Severely painful
- Catching or snapping
- Treat with splinting, NSAIDs, activity modification, steroids mainly in injection form



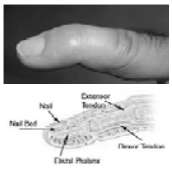
Trigger Finger

- Inability to straighten finger back out after flexing it
- Cause is unknown but more common with diabetes, rheumatoid arthritis, women, and activities that strain the hand
- Treatment is rest, ice, NSAIDs, steroid injection (? X2) and possibly surgery



Mallet Finger (Baseball Finger)

- The extensor tendon is damaged where it attaches to the last finger bone
- Can not straighten out the tip of the finger
- Needs splinted with exaggerated extension for 6 - 8 weeks then gradually eliminate splint
- Surgery to be considered with large fracture fragment or poor joint alignment or failure of splint



Emerging Trends for Injury Management

- Get the diagnosis right and allow that to evolve properly
  - Initial diagnosis, especially through ER, is often incomplete or an initial estimate
  - Most diagnoses are made over time where treatment intervention can be assessed and more specific diagnoses become clear
  - Diagnostic tests might be necessary to define the more specific diagnosis, but may still not be necessary
  - MRI's are not photorealistic images of all structures within an area and do not show the area "dynamically". An MRI is a series of "static" magnetic images interpreted by a radiologist
  - Most MCOs and TPAs do not allow ANY diagnosis to be added without Industrial Commission review thus delaying needed treatment, adding costs, and frustrating employers by "losing" so many cases at the IC level.

Emerging Trends for Injury Management

- Once a diagnosis can be properly defined, be aggressive with treatment and return-to-work
  - Appropriate and rapid treatment and early return-to-work have been shown to improve outcomes and shorten claims/costs
  - Direct costs might be more, but indirect costs can be much less depending on type of injury
  - Direct costs might not be more if the rapid treatment shortens the duration of injury symptoms

Emerging Trends for Injury Management

- An example of how this all comes together:
  - A 42 y/o worker complained of severe pain in the forearm and wrist after packing boxes with small parts.
  - The worker has been doing this type of work for only 2 months.
  - The worker was sent to the ER at 7 PM when the symptoms became unbearable and production was affected
  - The ER diagnosed a "sprain/strain" of the wrist and referred the worker to Occupational Health the next morning
  - The worker really cannot describe any specific accident at work except that the quota for parts had been increasing due to a large customer order

Emerging Trends for Injury Management

- Physician review and management
  - The worker presented to Occupational Health with a large area of swelling from the wrist and into the forearm. The swelling was on the thumb side of the forearm.
  - The exam demonstrated marked crepitation (a crunchy sound and feeling) in the area of swelling when the thumb and wrist is moved
  - The exam was painful with active movement
  - The diagnosis of acute tendonitis was made and the worker was given a cortisone injection under the large swollen tendon sheath. Ice and movement restrictions were recommended.
  - Follow-up scheduled in 1 week

Emerging Trends for Injury Management

- Physician review and management
  - The worker returns in one week and the area of swelling is virtually gone
  - The crepitation noted was also mostly gone but not completely
  - The worker reported that work restrictions were followed and they were happy that they could still help in the production area
  - The worker reported that pain was reduced significantly

Emerging Trends for Injury Management

- Physician review and management
  - The worker is placed on a noncortisone antiinflammatory and continued work restrictions
  - Occupational Therapy (hand/wrist) therapy was ordered and started within 2 days. 5-10 treatments were ordered and custom splint if needed
  - A two week follow-up is scheduled

Emerging Trends for Injury Management

- Physician review and management
  - The worker returns in 2 weeks and all swelling and crepitation is gone
  - The medication is controlling the pain and restricted duty work is going well
  - The worker is returned to full duty and Occupational Therapy is recommended to conclude after 6 treatments
  - The Occupational Therapist reviews proper wrist/hand mechanics and assists the worker in methods of doing their job with less stress on the tendons and muscles
  - The worker is scheduled in 3 weeks for a final visit after having been returned to full duty to assure recovery
  - No reoccurrence is noted after one year

QUESTIONS & ANSWERS

Wrapping Your Arms Around
Upper Extremity Injuries

Ohio Safety Congress 2012

Columbus, Ohio

James Anthony, MD
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Lorain, Ohio