WEIGHT LIFTING INJURIES – CHEST/UPPER EXTREMITIES

Background
1. Definition: Injuries that occur during weight lifting
2. Weight lifting injuries usually due to:
   - Improper technique
   - Use of anabolic steroids
   - Improper warm up
   - Immature skeletal system
   - Attempting too much weight too quickly
3. Two categories of injury
   - Acute/traumatic
   - Gradual onset
4. Web sites:
   - National Strength and Conditioning Association (NSCA): http://www.nsca-lift.org/

Pathophysiology
1. The most common injuries seen in weight lifting:
   - Sprains, strains, tendon avulsions, compartment syndrome, overuse syndrome

Incidence/Prevalence:
1. 2.6 injuries per 1000 hours of activity
   - Most common:
     - Low back pain-rate of 0.43 per 1000 hours of activity
     - Shoulder injuries-rate of 0.42 per 1000 hours of activity
   - Risk factors:
     - Improper weight lifting exercises
     - Using too much weight
     - Poor technique
     - Pushing beyond limits/losing control of weight equipment

Morbidity/Mortality:
1. Mostly self-limited
2. Patients usually respond to conservative treatment

I. Biceps tendonitis:
1. Etiology:
   - Occurs shortly after heavy chest, shoulder or dipping lifting exercises
   - Doesn't usually happen during biceps routines
   - Repetitive overhead movement is a factor
   - Associated with rotator cuff disease and impingement syndrome
2. Pathology:
   - Degenerative changes occur without inflammation
In acute cases an inflammatory process may still be a valid explanation

3. Signs and Symptoms:
   - Achy anterior shoulder pain
   - Pain exacerbated by lifting or elevated pushing or pulling
   - Pain with overhead activity or with lifting heavy objects
   - Localized pain vertically along anterior humerus.
   - No history of acute traumatic injury
   - Palpable snap with ROM over bicipital groove
   - Tenderness localizes with arm in 10° of external rotation
   - Special maneuvers
     - Speed test:
       - Anterior shoulder pain with flexion of shoulder against resistance
     - Yergason test:
       - Pain over bicipital groove with forearm supination against resistance
   - A complete evaluation includes a complete neurovascular assessment

4. Differential Diagnosis:
   - Fracture of greater or lesser tuberosity
   - Glenohumeral instability (humeral subluxation)
   - Glenoid labrum tear
   - Inflammatory naturopathy
   - Neoplasm
   - Peripheral nerve entrapment
   - Strain/tear of subscapularis
   - Synovitis

5. Diagnosis:
   - Usually based on history and physical exam
   - X-rays:
     - Standard shoulder x-ray not helpful in confirming the biceps tendinopathy or rupture
     - Radiograph indications:
       - No response to treatment
       - Clinical suspicion or a history of neoplastic disease
     - Recommended to help evaluate of factors that lead to condition or rule out other problems
     - Useful views:
       - Plain radiographs with bicipital groove views
       - Radiographic studies of neck and elbow
     - X-ray findings:
       - Sub-acromial spurring is often seen in impingement syndrome
       - Changes most visible on outlet and anteroposterior impingement views
   - MRI:
     - Expensive and not cost effective as a routine imagine test
     - Indication:
• After unsuccessful rehabilitation
• In cases of suspected rotator cuff injury or labral tear injury
  o Ultrasound:
    ▪ Most variable results
    ▪ Operator dependent
    ▪ Newer technologies have resulted in improved visualization
  o Arthroscopy
    ▪ Indicated when patient is not responding to usual effective treatment
    ▪ Generally not performed for diagnosis alone
    ▪ Indicated when lesions of biceps tendon occur

6. Treatment:
  o Acute Phase
    ▪ Reduce inflammation and swelling
      • Restrict over-the-shoulder movements
      • Ice for 10 -15 min, 2-3 times per day for the first 48 hours
      • NSAIDs for 3-4 weeks
      • Daily weighted, pendulum stretch exercises
      • Transcutaneous electrical nerve stimulation (TENS)
      • Phonophoresis and iontophoresis
      • Local injection of an anesthetic and steroid
    ▪ Orthopedic consultation
      • Symptoms persist longer than 2 months
      • Biceps tendon rupture
  o Recovery Phase:
    ▪ The goal is to achieve and maintain full and painless ROM
    ▪ Physical therapy with weighted, pendulum stretch exercises
  o Maintenance Phase:
    ▪ Begin as soon as patient discomfort is effectively controlled
    ▪ At least 3 weeks after pain has completely resolved.
    ▪ Perform strengthening exercises
    ▪ Start out with low tension followed by a gradual increase in force
    ▪ Flare-ups can occur
    ▪ Monitor patient and adjust activities as progress allows
  o Surgical option
    ▪ After a 6-month trial of unsuccessful conservative care
    ▪ Athlete is young and very active
    ▪ Severe pain after trying the above treatments
    ▪ Cosmetic concern- appearance of a lump in biceps seen with ruptures

7. Complications:
  o Complete rupture of the distal biceps tendon [15]
    ▪ Rare injury
    ▪ Dominant arm of males
    ▪ During fourth to sixth decade of life
  o Simultaneous bilateral rupture of distal biceps tendon
    ▪ Extremely rare occurrence
    ▪ Three cases reported in literature
During recreational weightlifting with preacher curl exercise

8. Return to play:
   - When discomfort and pain are controlled effectively
   - Some authors recommend waiting 3 weeks after pain has completely resolved

9. Prevention:
   - Similar to prevention of rotator cuff injuries
   - Include warm-ups before exercise
   - Use passive stretching and strengthening exercises
   - Avoidance of painful activities
   - Proper biomechanics

10. Prognosis:
    - Dependent upon degree of injury
    - Most patients do well with treatment
    - Significant number of patients develop degenerative changes
    - Spontaneous rupture of biceps tendon occurs in 10% of patients

II. Rupture of the pectoralis major muscle:

1. Etiology:
   - Very rare injury, 150 cases reported[21]
   - Results from violent eccentric contraction of muscle
   - 50% of cases occur in athletes, classically in weight lifters
   - Most cases happen during bench press
   - Most common mechanisms:
     - Excessive tension on a maximally contracted pectoralis major muscle
     - Weightlifting, specifically bench-pressing

2. Pathology:
   - Tendon ruptures usually occur near insertion into greater tubercle
   - Excessive contraction of muscle fiber

3. Signs and Symptoms:
   - Pain, deformity, weakness are nearly always present
   - Weakness, deformity is minimal when arm is relaxed at side
   - Obvious weakness, deformity when the muscle contracts.
   - May be limited motion early on
   - Visible deformity by pressing hands together in front of body

4. Diagnosis:
   - Diagnosis can usually base on history and physical examination
   - MRI indication:
     - If diagnosis remains unclear
     - To determine operative versus non-operative management
     - To provide information on exact location and degree of involvement

5. Treatment:
   - Conservative treatment
     - Indication:
       - Medial rupture of pectoralis muscle
       - Muscle belly tear
       - Partial injuries at musculo-tendinous junction
o Surgical treatment
  • indication
    • Complete rupture or distal injury
    • If athletes desires return to heavy weight lifting
6. Rehabilitation:
  o Elbow exercises immediately
  o Isometric rotator cuff and pectoralis major strengthening at 2 weeks
  o Progressive physiotherapy
7. Prognosis:
  o Early diagnosis and treatment within 3 to 8 weeks has better prognosis
  o 96% successful surgery repair in acute phase
  o Most cases recover rapidly after initial injury
8. Return to play:
  o Once achieved full strength and range of motion
  o Typical return is 6 months following a pectoralis major repair

III. Elbow tendon strain:
1. Etiology:
  o More than 25 percent of all sports-related injuries
  o Acute injuries usually are related to falls
  o Chronic injuries occur with repetitive motion
    • Heavy lateral pull-downs, especially with palms facing away
    • Pull-ups and chin-ups
2. Pathology:
  o Microtrauma
  o Chronic inflammation
  o Tissue degeneration
  o Tissue necrosis and ultimately tendon rupture
3. Signs and symptoms:
  o Odd dull pain in elbow
  o A complete examination of elbow, neck, shoulder and wrist is necessary
    • Biceps tendonitis
    • Triceps tendonitis
      • Posterior elbow pain with repetitive elbow extension
      • Pain with forceful extension
      • Tenderness of triceps tendon superior to olecranon
      • increased pain with extension
    • Anterior capsule strain
      • Anterior pain with passive extension
      • Hyperextension stress testing
      • Antecubital fossa tenderness
    • Radial Tunnel syndrome
      • Pain with compression of radial nerve at radial tunnel
      • Worsening pain with repetitive pronation and supination
      • Night pain may be present
    • Ulnar Nerve Entrapment
• Medial elbow pain
• Distal paresthesias
  o Ulnar aspect of forearm
  o Ring and little fingers (fourth and fifth digits)
• Weak grip
• Hand fatigue and clumsiness
• Positive Tinel's sign
• Hypothenar atrophy
• Index pinch weakness

4. Diagnosis:
   o Clinical judgment should prevail
     ▪ Imaging studies are insensitive
   o Plain radiographs:
     ▪ Standard views including AP, true lateral, oblique, stress view
     ▪ Radial head should articulate with capitellum
     ▪ A line bisecting the proximal radial shaft should always pass through the capitellum on any radiographic view.
   o MRI
     ▪ Helpful in identifying soft tissue masses, articular cartilage anatomy, ligament rupture, chondral defect
   o CT scan
     ▪ Delineates complex osseous anatomy
   o Bone scan
     ▪ Sensitive but not specific
   o Electromyography and nerve conduction studies
     ▪ Evaluate suspected nerve compression syndrome
   o Arthrography
     ▪ Evaluate articular surface and identifies loose bodies or capsular defects

5. Treatment:
   o Conservative treatment
     ▪ Generally treat using PRICEMM
     ▪ Protection, Rest, Ice, Compression, Elevation, Medication, Modalities/Physical therapy
     ▪ Initial control of inflammation
     ▪ Short term activity modification
     ▪ Rehabilitation exercise program
   o Surgical indication:
     ▪ Nerve entrapment
     ▪ Intra-articular pathology
     ▪ Refractory lesions

6. Return to Play:
   o When symptoms resolve
   o When athlete regains full extension, strength and ROM

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