

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:
 - American Academy of Pediatrics Policy Statement: Strength Training by Children and Adolescents:
<http://aappolicy.aappublications.org/cgi/reprint/pediatrics;121/4/835.pdf>
 - National Strength and Conditioning Association (NSCA):<http://www.nscalift.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
 - Ultrasound:
 - Most variable results
 - Operator dependent
 - Newer technologies have resulted in improved visualization
 - 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:
 - 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
 - Recovery Phase:
 - The goal is to achieve and maintain full and painless ROM
 - Physical therapy with weighted, pendulum stretch exercises
 - 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
 - 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:
 - Complete rupture of the distal biceps tendon [15]
 - Rare injury
 - Dominant arm of males
 - During fourth to sixth decade of life
 - 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

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

III. Elbow tendon strain:

1. Etiology:
 - More than 25 percent of all sports-related injuries
 - Acute injuries usually are related to falls
 - Chronic injuries occur with repetitive motion
 - Heavy lateral pull-downs, especially with palms facing away
 - Pull-ups and chin-ups
2. Pathology:
 - Microtrauma
 - Chronic inflammation
 - Tissue degeneration
 - Tissue necrosis and ultimately tendon rupture
3. Signs and symptoms:
 - Odd dull pain in elbow
 - 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
 - Ulnar aspect of forearm
 - 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:

- Clinical judgment should prevail
 - Imaging studies are insensitive
- 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.
- MRI
 - Helpful in identifying soft tissue masses, articular cartilage anatomy, ligament rupture, chondral defect
- CT scan
 - Delineates complex osseous anatomy
- Bone scan
 - Sensitive but not specific
- Electromyography and nerve conduction studies
 - Evaluate suspected nerve compression syndrome
- Arthrography
 - Evaluate articular surface and identifies loose bodies or capsular defects

5. Treatment:

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

6. Return to Play:

- When symptoms resolve
- When athlete regains full extension, strength and ROM

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