

WEIGHT LIFTING INJURIES – SHOULDER RELATED

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. Rotator cuff strain/shoulder impingement:

1. Results from mechanical impingement of rotator cuff tendon beneath acromion
2. 3 stages
 - Stage 1-acute inflammation, edema and hemorrhage in rotator cuff
 - Stage 2-fibrosis and tendonitis
 - Stage 3-change in coraco-acromion arch and osteophytosis along anterior portion of acromion

3. Etiology:
 - Lifting heavy objects
 - Improper lifting
 - Over head lifting
 - Repetitive overhead movement of arms
 - Improper technique during chest or shoulder exercises
4. Signs and symptoms:
 - Pain referred to upper arm
 - Pain with arm raising
 - Pain during chest and/or shoulder exercises
 - Atrophy or thinning of shoulder musculature
 - Pain when lifting arm
 - Pain when lowering arm from a fully raised position
 - Weakness when lifting or rotating arm
 - Crepitus or crackling sensation when moving shoulder
 - Shoulder pain radiating down arm
 - Over time pain may become noticeable at rest
5. Diagnosis:
 - X-rays
 - Degenerative changes in acromioclavicular joint
 - Undersurface osteophyte or enthesophyte formation
 - Narrowing of subacromial space
 - Sclerosis and irregularity of greater tuberosity
 - Massive full thickness rotator cuff tears
 - May see secondary degenerative disease of glenohumeral joint
 - Magnetic resonance imaging (MRI) scan:
 - Direct MR arthrography
 - Nears 100% sensitivity and specificity
 - Indirect MR arthrography
 - Requires only intravenous (IV) injection
 - Sensitivity of 62% to 67%
 - Ultrasound:
 - Detect thickness, fluid collections, prominence of cartilage
 - 93% sensitivity 94% specificity in partial thickness tear
6. Treatment:
 - Non-surgical options:
 - Rest and limited overhead activity
 - Sling for comfort
 - Anti-inflammatory medication
 - Steroid injection
 - Strengthening exercise and physical therapy
 - Surgery:
 - If nonsurgical treatment does not relieve symptoms
 - Recent tear that is very painful
 - Tear is in shoulder of dominant arm of an active person
 - Maximum strength in arm is needed for overhead work or sports

- Different approaches are available for surgical repair:
 - Arthroscopic Repair
 - Mini-Open Repair
 - Open Surgical Repair
 - Arthroplasty
 - Shoulder joint replacement
 - Follow up:
 - Return to clinic within two weeks
 - Reassess original clinical impression
 - Determine effectiveness of interventions
 - Rehabilitation programs may need modification
 - Return to clinic within 4 weeks
 - Re-evaluation to facilitate efficient return to sport
 - Orthopedic referral if no relief in 3-6 months
7. Return to play
 - Gradual, stepwise increase in activity
 - Needs full range of motion
 - Scapular stability
 - Needs appropriate strength 80% of uninjured shoulder
8. Prognosis:
 - 60-90% of patients respond to conservative treatment
 - Stage I usually reversible with non operative treatment
 - Stage 2 commonly does not respond to conservative treatment
 - Stage 3 requires surgical intervention
9. Prevention:
 - Proper warm up techniques
 - Specific strengthening techniques
 - Education about early signs of impingement syndrome

II. Distal clavicle osteolysis

1. Presents as pain localized to AC joint
2. Etiology:
 - Overuse phenomenon
 - Repetitive micro-trauma
 - Body attempts to repair
3. Pathology:
 - Resorption of subchondral bone in distal clavicle
 - Disruption of articular cartilage
 - Subchondral cyst formation
 - Evidence of increased osteoclastic activity
4. Prognosis:
 - Self-limited disorder
 - Resolution within 1-2 years with activity modification
5. Signs and Symptom
 - Dull pain over distal end of clavicle and AC joint
 - Insidious aching pain in AC region

- Worsening pain with athletic or work activity
 - Pain triggers: bench press and related exercises
 - Point tenderness over affected AC joint
 - Cross-chest maneuvers elicit pain
 - Crepitus may be present
 - Glenohumeral joint range of motion is full
6. Differential Diagnosis:
- Metabolic (hyperparathyroidism)
 - Autoimmune (rheumatoid arthritis)
 - Neoplastic (multiple myeloma)
 - Consider inflammatory disease in bilateral cases
7. Treatment:
- Conservative management
 - Avoid provocative maneuvers
 - Modify weight training techniques
 - Ice massage
 - Nonsteroidal anti-inflammatory drugs (NSAID)
 - Corticosteroid injections-little long-term relief
 - Symptoms often return with resumption of previous activity
 - Surgical intervention: Distal clavicle resection can provide good results
 - If conservative treatment fails
 - Patients who refuse to limit activities
 - Point tenderness of AC joint
 - Postoperative care:
 - Early passive ROM
 - Pendulum exercise
 - Active range of motion is usually started first week after surgery
 - Follow up 1-2 weeks post surgery
8. Return to play criteria:
- No swelling/pain with functional activity
 - Isokinetic strength that is 80% of opposite rotator cuff
 - Full active and passive range of motion
 - Scapula is stable through full range of motion
 - Pain-free activities of daily living (ADLs)

II. Suprascapular neuropathy:

1. Etiology:
- Nerve conduction impairment as a result of stretch and compression
 - Uncommon cause of shoulder pain and weakness
 - Causes:
 - Traction injury
 - Transverse scapular ligament
 - Spinoglenoid ligament
 - Direct trauma to nerve
 - Sports involving overhead motion
2. Pathology:

- Nerve edema, ischemia, microenvironment changes
- Nerve entrapment
- Ganglion cyst formation
- 3. Signs and symptoms:
 - Most common symptom is shoulder pain
 - Pain is deep, diffuse, dull
 - Localized pain in posterolateral shoulder girdle
 - Radiating pain
 - Medially upward to neck
 - Laterally to upper arm
 - Weakness or muscle loss
 - Worsening pain with cross-body adduction of ipsilateral upper limb
- 4. Differential diagnosis:
 - Adhesive capsulitis
 - Axillary neuropathy
 - Degenerative arthritis of acromioclavicular or glenohumeral joints
 - Ganglion or cyst from glenohumeral joint
 - Idiopathic upper trunk brachial plexopathy (Parsonage-Turner syndrome)
 - Stinger injury
 - Neurapraxic injury of C6
 - Upper trunk of brachial plexus
 - Stress fractures of first ribs or scapula
 - Subacromial bursitis
 - Tumors (including Pancoast tumor)
- 5. Diagnosis:
 - Diagnosis is often one of the exclusion
 - X-ray
 - Plain radiography of shoulder and cervical spine
 - Rule out other pathology
 - Nerve conduction and electromyography
 - Confirmatory test
 - Nerve conduction study
 - Increased latency
 - Electromyography
 - Increased spontaneous activity
 - Fibrillation
 - Positive sharp wave
 - Polyphasic activity
 - Decreased amplitude of evoked potential
 - Changes occur 2-3 weeks after injury
 - Invasive, technique dependent
 - MRI
 - Best for soft tissue evaluation
 - 91% sensitivity, 93% specificity, 92% accuracy for labral lesions
 - Ultrasonography
 - Excellent and inexpensive

- Identifies ganglion cyst and mass lesions
 - Effective for evaluation of scapular muscle denervation
6. Treatment:
- Acute Phase:
 - Conservative initial treatment:
 - Recommend a period of 6-8 month non-operative treatment
 - Preferred treatment for distal nerve injury
 - Non-operative treatment for ganglion cyst has higher rate of failure
 - Simple program of exercises
 - Scapular stabilization
 - Rotator cuff strengthening
 - Physical therapy
 - Avoidance of precipitating activities
 - Nerve blocks
 - Anti epileptics (AEDs), such as GABA analogue
 - Neurontin (gabapentin) may be helpful in some cases of neuropathic pain
 - Surgical procedure indicated for:
 - Proximal suprascapular nerve injury
 - Secondary to ganglion cyst
 - Suprascapular nerve entrapment
 - Recovery phase:
 - Goal of recovery phase:
 - Maintain active range of motion in shoulder girdle
 - Improve scapular stabilization and strengthen rotator cuff
 - Interventions:
 - Concentric and eccentric isotonic exercises [23]
 - Emphasize sport-specific movement patterns
 - Maintenance phase:
 - Rehabilitation program including Physical Therapy
 - Longitudinal follow-up
7. Return to Play:
- When able to perform appropriate skills without provoking symptoms
 - Satisfactory results within 6-8 months in most cases
8. Prognosis:
- Most cases respond favorably to either conservative treatment programs or, when indicated, surgical intervention

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