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:
   - 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. 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

Return to play
- Gradual, stepwise increase in activity
- Needs full range of motion
- Scapular stability
- Needs appropriate strength 80% of uninjured shoulder

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

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
o Worsening pain with athletic or work activity
o Pain triggers: bench press and related exercises
o Point tenderness over affected AC joint
o Cross-chest maneuvers elicit pain
o Crepitus may be present
o Glenohumeral joint range of motion is full

6. Differential Diagnosis:
o Metabolic (hyperparathyroidism)
o Autoimmune (rheumatoid arthritis)
o Neoplastic (multiple myeloma)
o Consider inflammatory disease in bilateral cases

7. Treatment:
o 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
o 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:
o No swelling/pain with functional activity
o Isokinetic strength that is 80% of opposite rotator cuff
o Full active and passive range of motion
o Scapula is stable through full range of motion
o Pain-free activities of daily living (ADLs)

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

2. Pathology:
2. Nerve edema, ischemia, microenvironment changes
   o Nerve entrapment
   o Ganglion cyst formation

3. Signs and symptoms:
   o Most common symptom is shoulder pain
   o Pain is deep, diffuse, dull
   o Localized pain in posterolateral shoulder girdle
   o Radiating pain
     ▪ Medially upward to neck
     ▪ Laterally to upper arm
   o Weakness or muscle loss
   o Worsening pain with cross-body adduction of ipsilateral upper limb

4. Differential diagnosis:
   o Adhesive capsulitis
   o Axillary neuropathy
   o Degenerative arthritis of acromioclavicular or glenohumeral joints
   o Ganglion or cyst from glenohumeral joint
   o Idiopathic upper trunk brachial plexopathy (Parsonage-Turner syndrome)
   o Stinger injury
     ▪ Neuroparaxic injury of C6
     ▪ Upper trunk of brachial plexus
   o Stress fractures of first ribs or scapula
   o Subacromial bursitis
   o Tumors (including Pancoast tumor)

5. Diagnosis:
   o Diagnosis is often one of the exclusion
   o X-ray
     ▪ Plain radiography of shoulder and cervical spine
     ▪ Rule out other pathology
   o 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
   o MRI
     ▪ Best for soft tissue evaluation
     ▪ 91% sensitivity, 93% specificity, 92% accuracy for labral lesions
   o Ultrasonography
     ▪ Excellent and inexpensive
Identifies ganglion cyst and mass lesions
Effect for evaluation of scapular muscle denervation

6. Treatment:
   o 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
   o 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
   o Maintenance phase:
     ▪ Rehabilitation program including Physical Therapy
     ▪ Longitudinal follow-up

7. Return to Play:
   o When able to perform appropriate skills without provoking symptoms
   o Satisfactory results within 6-8 months in most cases

8. Prognosis:
   o Most cases respond favorably to either conservative treatment programs or, when indicated, surgical intervention

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