Joint injury and its treatment in overhead athletes

대구가톨릭의대

최 창 혁

Introduction

Throwing requires a precise, coordinated effort to create velocity and accuracy
Injuries in throwing athletes in order (Roger, AJR, 1999) :

Posterosuperior labrum, Supraspinatus tendon, Infraspinatus tendon
Humeral head, Glenoid cavity and rim, Acromioclavicular joint,
AI capsulolabral complex, Biceps tendon, Subscapularis tendon

Shoulder injuries in atheletes

Problems in throwers:

Rotator cuff tendinitis & impingement: Overuse & Eccentric overload
Subtle instabilities
Labral degeneration & tears
Secondary subacromial & parascapular problems

Essentials for thrower's problem

Static stabilizers & Breakdown of technique
Correction of primary pathology could improve secondary pathology

Shoulder injuries in elite football players (Kelly, Am J Sports Med., 2004)

1534 querterback(NFL):
Head injuries: 15.4%,
Shoulder injuries: 233(15.2%)
Contact injury: 82.3% -- ACJ sprain(40%): most common
Throwing motion: 14%-- RC tendonitis(6.1%), biceps tendonitis(3.5%)

Emphasis of sports medicine

Injury prevention & early rehabilitation
Accurate diagnosis
Aggrassive rehabilitation program
Correction of technical errors

Biomechanics of throwing

Proper baseball throwing:Velocity & accuracy

1) Generation of kinetic energy & released through throwing motion
2) Energy dissipation after ball release

Improper transfer of energy

1) Generation of kinetic energy: overuse injuries & fatigue
2) Energy dissipation: tissue injury

Requirement for throwing

1) concentric work to position & move the arm
2) eccentric work to stabilize the shoulder
3) effective depression of humeral head to avoid impingement
4) normal stability to prevent secondary impingement

Mechanism of ACJ injury in athletes

Indirect trauma
Direct trauma: force applied to the acromion with the arm in adducted position
AC ligament -〉 C-C ligament -〉 disruption of deltotrapezial fascia

Classification

Tossy' s classification: type I, II, III
Rockwood' s classification: Additional IV, V, VI

Diagnosis

1. Careful history taking

2. Physical Examination

   1) Inspection: comparison with nonthrowing side
      Muscular hypertrophy
      Atrophy
   2) Pain: over the joint, antero-lateral neck, trapezius- supraspinatus region, antero-lateral deltoid(Gerber, JSES, 1998)
   3) Stiffness
   4) Catching & clicking
   5) Radicular symptoms
   6) Palpation: tenderness
   7) ROM

3. Radiograph: not specific for ACJ pain
   Asymptomatic degeneration:
   joint space narrowing, marginal osteophytes, subchondral cyst

4. USG(Wang, Scand J Med Sci Sports, 2005)
   Diagnostic criteria of degenerative changes
      Cortical irregularities or osteophytes
      Joint bulging〉2 mm by longitudinal scanning(Naredo E, Ann Rheum Dis, 2002)

5. MRI:
   RC & AI capsulolabral complex(Roger, AJR, 1999)
      :highest sensitivity & specificity
   ACJ pain (Walton J JBJS 2004): high sensitive & low specificity
      Asymptomatic in 82%(41/50) of MR changes (Stein, JSES, 2001)

6. Bone scan (Walton J JBJS 2004):
   ACJ pain: High sensitivity & specificity

7. Diagnostic values

   1) Physical examination & Tests(Walton J JBJS 2004)

Sensitive test: ACJ tenderness(96%), Paxinos test(79%),
MRI(85%),Bone scanning(82%)
High degree of confidence: Paxinos test + bone scan

2) Physical tests for chronic lesions(Chronopoulos, Am J Sports Med., 2004)
Sensitivity: Cross body adduction test(77%)
ACJ resisted extension test(72%)
Active compression test(41%)
Specificity: Active compression test(95%)
Overall accuracy: Active compression test(92%)
ACJ resisted extension test(84%)
Cross body adduction test(79%)
→ Combination increased the diagnostic values

3) Relative risk of ACJ arthritis(Stenlund B, Br J Sports Med, 1993)
High sports activity: Rt- 4.6, Lt- 2.8
Combination of high sports activity & load lifting: Rt-12.5, Lt-6.7

Treatment

Conservative

Acute injury: Type I- rest and ice application , within 1 to 2weeks
Type II- KennyHoward sling, sling harness device for 2-3weeks
Type III- sling for 4 weeks, guarded return to sports after 4mos.
Chronic injury: Observation, Steroid injection, Iontophoresis

Operative

1) Associated instability:
Fixation across the acromioclavicular joint
Dynamic muscle transfer
Reconstruction of the ligament
Fixation between the clavicle and the coracoid

2) Little or no instability
Excision of distal clavicle: open or arthroscopic

Decision making (Bradley, Clin Sports Med., 2003)

Type I, II: Nonoperative

Type IV, V, VI: operative
Type III: Controversy
Support nonoperative treatment
Surgery: coracoclavicular fixation
Factors: Occupation, Physical demand, Age
→ surgical treatment for overhead atheletes & manual labors
No correlation between reduction & improvement in pain, strength, or motion
Rehabilitation is emphasized to return to full sports activity

Results

1) Results of survey: 42 team orthopedists(28 major league baseball teams)
Treatment for Hypothetical GIII ACJ separation 1week before the season
: 29(69%): nonoperatively, 13(31%): operate immediately
Actual treatment: 25(60%) orthopedists for 32 pts.
: 20(63%): nonoperatively, 12(37%) operatively
Results:
Nonoperative: normal function & complete relief of pain in16(80%)
normal ROM in 18(90%)
Operative: normal function, pain relief, ROM in 11(92%)

2) Atheletic capacity after operative treatment
(Kruger-Franke, Br. J Sports Med., 1993)
21 athletes with ACJ separation
CC ligament suture w/ PDS augmentation & ACJ fix w/ K-wire
19 pts. Continued previous activity

3) Mumford procedure in atheletes (Cook Am J Sports Med., 1988)
23 atheletes, degenerative changes after GI or II injury
22 satisfied, 16 returned same level of sports activity
most common complaint for not achieving previous level
: decreased bench press strength
Full motion in all atheletes, increased horizontal clavicular motion in 10
Painless crepitation in 5

G. Conclusion

1. Current trends are toward nonoperative management in acute & chronic injury
2. Operative treatment for acute IV, V, VI injury,

Type III operated only when nonsurgical treatment fails. Overhad atheletes & manual labors could be treated operatively..

3. Nonoperative treatment fails, chronic injuries are treated operatively.
   Type I: resection of lateral end of clavicle
   Type II and III: treat associated instability
4. Well organized rehabilitation program is essential for both nonoperative & operative treatment

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