Operative Treatment of Throwing Injury

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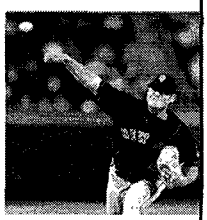
Goal of This Presentation

- To understand common throwing injuries
- To discuss current treatments of throwing injuries

Throwing Motion

- Significant forces across the shoulder
- Injuries to rotator cuff, labrum, capsules
- Overuse produces throwing injuries



Throwing Injuries

- Over External Rotation of GH joint (Late cocking phase)
- Over Internal Rotation (Follow-through phase)
- Over Elevation (Overhead motion)

Throwing Injuries

- Over External Rotation of GH joint (Late cocking phase)
  - Stretching of the anterior capsule-labrum
    - Anterior instability
  - Posterosuperior contact of cuff-labrum
    - Internal impingement
    - SLAP lesion

Throwing Injuries

- Over Internal Rotation (Follow-through phase)
  - Stretching of the posterior capsule-labrum
    - Posterior instability
    - Bennett's lesion (thrower's exostosis)
  - Eccentric overload of posterior cuff
    - Rotator cuff tendinosis
    - ASPTRCT
    - FTRCT
  - Anterosuperior impingement
    - Subscapularis tear

Throwing Injuries

- Over Elevation
  (Overhead motion)
  - Subacromial impingement
    - BSPTRCT
    - FTRCT
  - AC arthritis

Evaluation

- Repeat history
- Repeat physical examination
- Ancillary tests, useful

Clinical Evaluation

- Chief complaint
- Mechanism of injury
- Involved sports, position, and duration
- Prior treatment
- Symptoms
  - Pain: duration, location, initiating position
  - Weakness
  - Instability
  - Mechanical symptoms
  - Loss of motion
  - Neurologic deficit

Standard Radiographic Evaluation

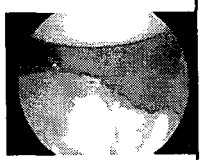
- Plain radiographs
  - AP
  - Axillary
  - Arch
  - Stryker-notch (prn)

Ancillary Tests

- MR-arthrogram
- CT-arthrogram
- EMG
- Isokinetic testing

Anterior Instability of Throwing Athletes

- Repeated stretching-overload to anterior capsule-labrum
- Different from single major traumatic instability
- Over-rotation phenomenon
  - Incomplete labral tear by "peel-off"
  - Commonly extend to inferiorly and posteriorly
  - Capsular laxity



Anterior Instability of Throwing Athletes

- Physical sign, subtle
  - Fulcrum test, no gross apprehension
  - Pain, more common
  - Often overlap signs of SLAP / rotator cuff injuries
- MR-arthrogram, of value

Anterior Instability of Throwing Athletes

Surgical Treatment

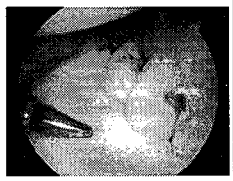
- Goals
  - Stable shoulder
  - Maintenance of external rotation
    - Velocity of throwing

Anterior Instability of Throwing Athletes

Surgical Treatment

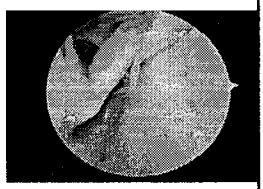
- Open repair / capsular shift
- Arthroscopic repair
  - Suture anchors

❖ Appropriate capsular tensioning



Internal Impingement

- Impingement of the deep surface of the infraspinatus on the posterosuperior glenoid rim
- Gilles Walch



Internal Impingement

- Surgical treatment
  - Arthroscopic debridement
  - Repair of SLAP lesion
  - Thermal-assisted capsular shrinkage (Andrews JR)

Superior Labral Lesion

- Andrews JR in throwing pitchers
- Snyder SJ, SLAP lesion
- 4 classic types
  - Type I: fraying
  - Type II: loss of biceps anchor
  - Type III: bucket-handle tear
  - Type IV: bucket handle extending to biceps tendon
- Associated with PTRCT, instability
- Isolated SLAP, uncommon

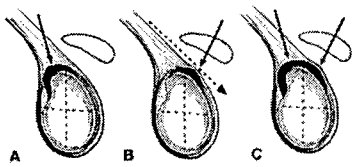
Superior Labral Lesion

Superior Labral Lesion

- Injury mechanism
  - Outstretching injury: Snyder SJ, Classic
  - Traction Maffet MW
  - External rotation: Kim SH
- Diagnostic Tests
  - Compression-rotation test
  - Crank test
  - Anterior slide test
  - O'Brien test / Active compression test
  - Biceps tension test
  - SLAPprehension test
  - Bicep load test I & II

SLAP as a Cause of the Dead Arm

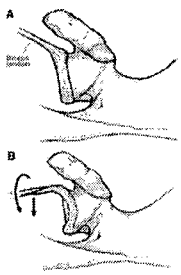
- Type 2 SLAP



- A/S repair returned 87% of these athletes to the preinjury level of performance and velocity

SLAP as a Cause of the Dead Arm

- *The most common* pathologic entities associated with the Dead Arm



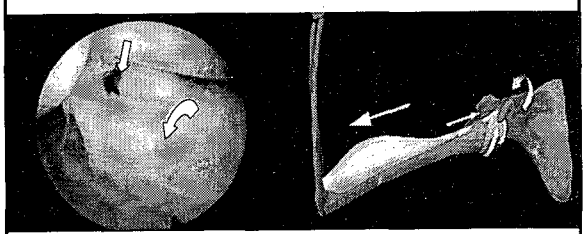
Diagnosis of Type II SLAP

- Biceps load test I: SLAP in anterior instability
- Biceps load test II: SLAP without instability

Mechanism of BLT

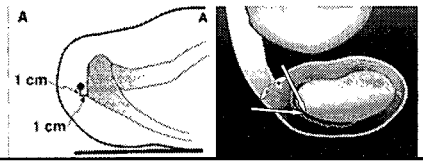
Abd-ER

Shearing of superior labrum-glenoid



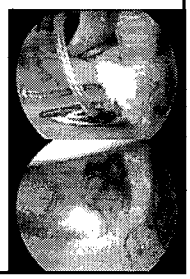
Arthroscopic Repair

- Anterior SLAP:
  Anchor through antero-superior portal
- Posterior SLAP:
  - Anchor through postero-lateral portal
  - (Port of Wilmington: Morgan CD)
  - Punch-pivoting technique
    (Anterior approach: Kim S-H)

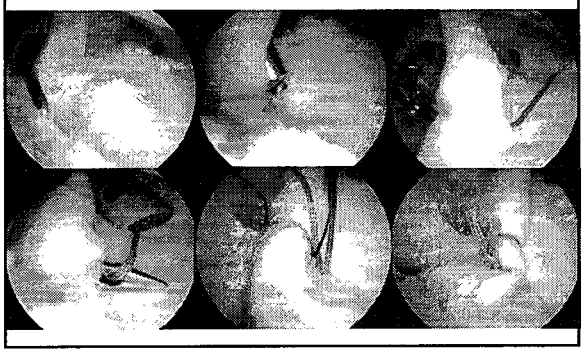


Arthroscopic Treatment

- Debridement:
  - Cordasco: success rate 78% → 63%
- Repair
  - Staple: Yoneda
  - Suture: Field and Savoie
  - Tack: Pagnani
  - Screw: Resch
  - Anchor: Snyder, O'Brien, Kim



Arthroscopic Repair



SMC Results

- 34 patients with Isolated SLAP
  Overhead sports: 18
  Contact sports: 12
  None: 4
- Age: 26 years (16 – 35 years)
- F/U: 33 months (24 – 49 months)

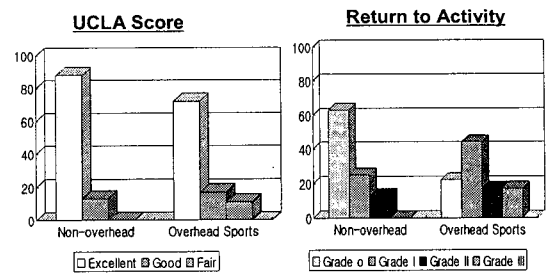
Kim SH, JBJS (Am) 2002

SMC Results

- UCLA score
  Satisfactory: 32 (94%)
  Unsatisfactory: 2 (6%)
- Return to activity:
  Satisfactory 91%

Kim SH, JBJS (Am) 2002

SMC Results



Posterior Instability

- Unidirectional posterior
- Multidirectional posteroinferior

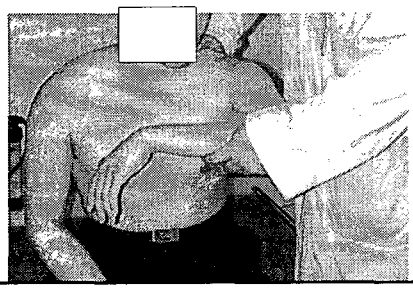
- Less common than anterior instability
- Often missed
- Diagnosis, important
- Can be associated with SLAP lesion
- Capsular laxity + labral lesion, always

Posterior Instability

- Diagnosis
  - Pain / instability on overhead motion
  - Jerk test
  - Inferior sulcus test
  - MRI
  - Arthroscopy

Jerk Test

"Is this your problem?"



Jerk Test Revisited

- 89 shoulders
  - Painless jerk (Clunk without pain): 54
  - Painful jerk (Clunk with pain): 35
- Nonoperative treatments (Rehab.)

	Painless Jerk Group (54)	Painful Jerk Group (35)
Successful	50 (90%)	5 (16%)
Failure	4 (7%)	30 (84%)

Jerk Test: A Hallmark of Posterior Labral Lesion

- Painless Clunk (Asymptomatic Jerk)
  - Rehab, successful
- Painful Clunk (Symptomatic Jerk)
  - Failure to nonoperative Treatment
  - Invariably has labral lesion
  - Early surgery, recommended

Posterior Labral Lesion

- MR Classification: 3 types (Kim)
  - Type I: Separation without displacement
  - Type II: Incomplete avulsion (cystic lesion)
  - Type III: Loss of contour

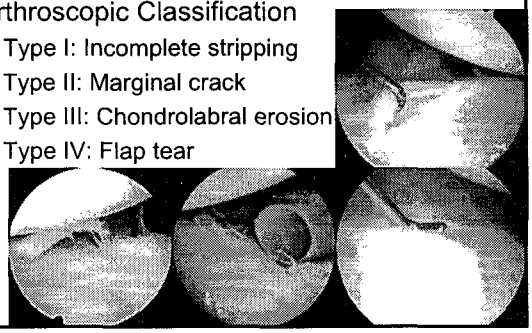
Normal appearance < positive Jerk

JBJS (Am) 2003

Posterior Labral Lesion

6 to 9 O'clock (Rt)

- Arthroscopic Classification
  - Type I: Incomplete stripping
  - Type II: Marginal crack
  - Type III: Chondrolabral erosion
  - Type IV: Flap tear



Posterior Labral Lesion

Kim's Arthroscopic Classification

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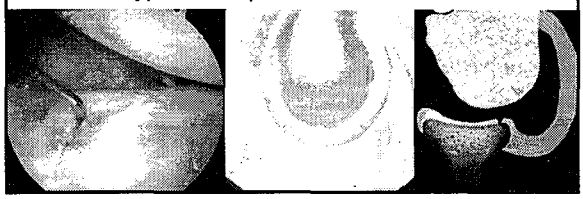

Posterior Labral Lesion

Arthroscopic Classification

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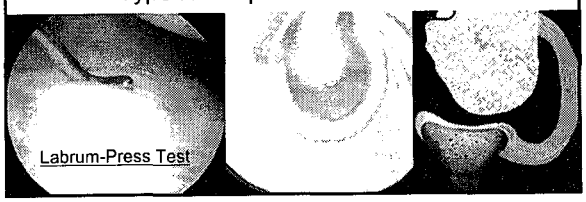

Labrum-Press Test

Posterior Labral Lesion

Arthroscopic Classification

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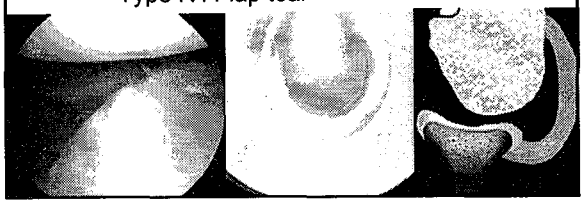

Posterior Labral Lesion

Arthroscopic Classification

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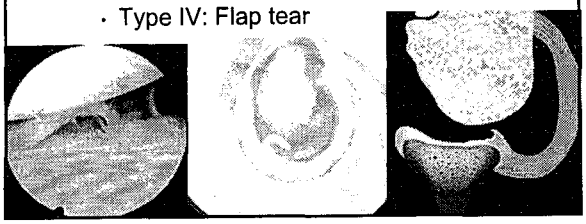


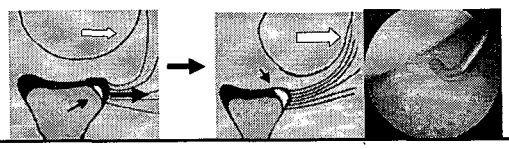
Kim's Lesion: Hypothesis

Caused by Incomplete Force & Excessive Rim-Loading

Normal Capsular Attachment
:Inferior wall of labral triangle

- Less severe posterior force

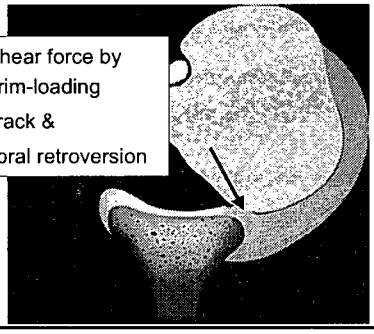
→ Stretch posterior band of IGHL
→ Detach inner portion of posterior labrum
→ Incomplete detachment of labrum, flat labrum



Kim's Lesion: Hypothesis

Caused by Incomplete Force & Excessive Rim-Loading

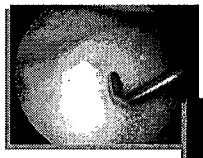
- Posterior shear force by excessive rim-loading
- → Marginal crack &
- → Chondrolabral retroversion

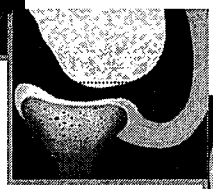


Kim's Lesion

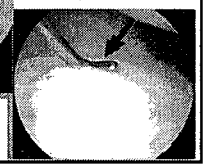
1. Marginal crack

Incomplete & Concealed Avulsion of Posteroinferior Labrum





3. Loose inside



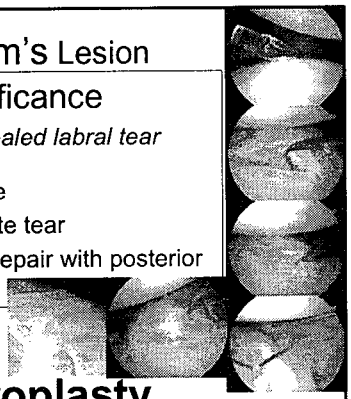
2. Chondrolabral Retroversion

Kim's Lesion

Clinical Significance

Do not miss concealed labral tear

- → Probe & palpate
- → Make a complete tear
- → Suture anchor repair with posterior band of IGHL

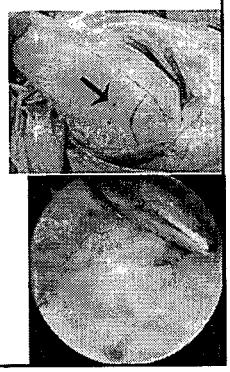


Labroplasty

Surgical Technique

Portals

- Posterior: *1cm lateral* to standard posterior portal
- Anterosuperior portal
- Anterior midglenoid portal



Surgical Technique

- Include posterior band of IGHL
- South-North direction shift
- Re-establish labral bump
- Capsular shift up to biceps root
- Close posterior portal

Traumatic Unidirectional Posterior

- 27 shoulders (25M / 2F) / Age: 21 years (14-33)
- All in sports activity / Trauma: All patients
- 26/27 stable, 1 recurrence
- Shoulder scores
  UCLA Excellent 21, Good 5, Fair 1
- 24 (89%) > 90% of activity return
- Pain VAS improved (5 to below zero)
- IR loss < 1 vertebral level

JBJS (Am) August 2003

MDI / Posteroinferior Instability

New Thoughts

- Capsular redundancy + Labral lesion (≅100%)
- Chondrolabral retroversion
  - Tear
  - Kim's lesion
  - Erosion
- Kim procedure: AS Capsulolabroplasty = Posteroinferior labroplasty + Balanced superior shift of the inferior capsule + RI closure

(Am J Sports Med. In-press)

Multidirectional Posteroinferior Instability

SMC Results

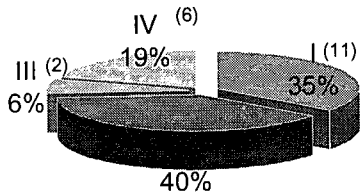
- 31 patients
- Kim procedure:
  - Capsulolabroplasty
  - Balanced capsular shift
  - RI closure
- FU: 51 months (34-68 months)
- Age: 23 years (19-28 years)

(Am J Sports Med. In-press)

Multidirectional Instability

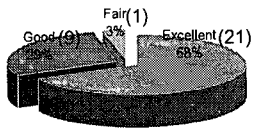
SMC Results

17 patients: minor trauma
All had posteroinferior labral lesion



Multidirectional Instability

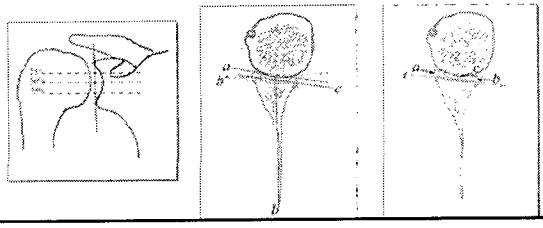
Rowe Score



- All stable except one recurrence
- 28 patients (90%) > 90% of activity
- ROM deficit: ER: 2° , IR: 1 vertebral level

Loss of Containment by Chondrolabral Retroversion

- Chondrolabral glenoid version
- Labral height
- Glenoid depth

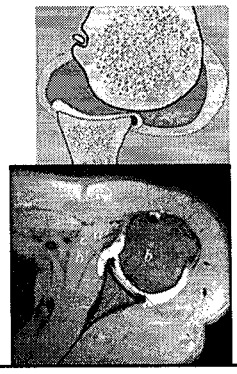


Chondrolabral Retroversion

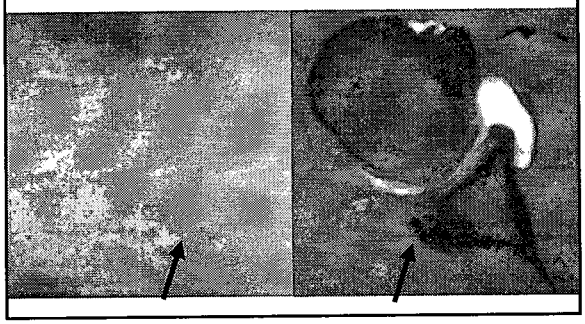
Type II and IV lesions

MDI	7.1°
Normal control	2.3°

in inferior one-third of glenoid



Bennett's Lesion



Rotator Cuff Injuries in Throwers

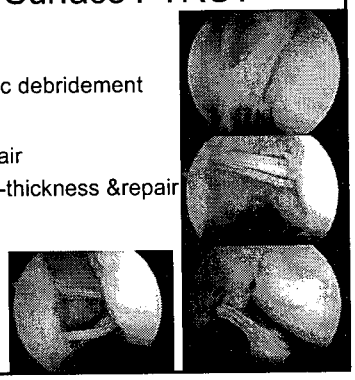
- Tensile versus compressive
- Partial-thickness versus full-thickness
- Primary versus secondary

Rotator Cuff Injuries in Throwers

- Tendinosis
  - Young athletes
  - Overuse
  - Rehabilitation
- Partial-thickness tears
  - Articular surface
    - Tensile failure
    - Internal impingement
  - Bursal surface
    - Subacromial impingement

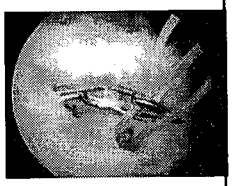
Articular Surface PTRCT

- < 50%: Arthroscopic debridement
- > 50%
  - Trans-tendon repair
  - Conversion to full-thickness &repair



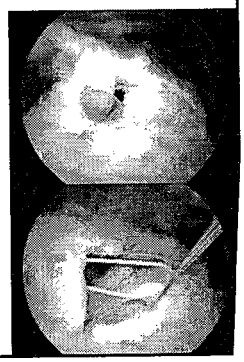
Bursal Surface PTRCT

- Old athletes
- Operative Treatment
  - Arthroscopic debridement
  - ASD & acromioplasty
  - Arthroscopic repair
  - Mini-open repair



Full-thickness RCT

- AS repair
- Mini-open repair
- Biceps lesion
- SLAP



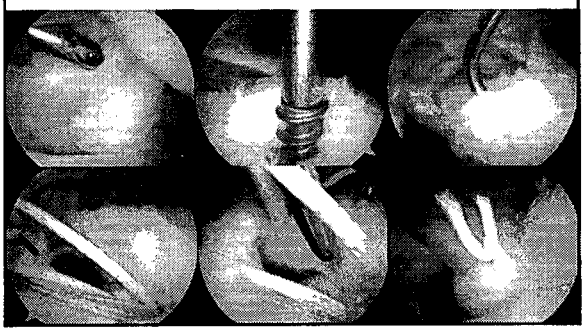
Subscapularis Tear

Subscapularis Tear

Intrarticular Approach

Subscapularis Tear

Subacromial Approach



Summary

- Operative Treatment of Throwing Injuries
  - Anterior instability
  - SLAP lesion
  - Posterior instability
  - Rotator cuff disease

The 8th SMC Shoulder Symposium

Date June 10-12, 2004

Venue Samsung Medical Center, Seoul, Korea

Comprehensive Review on Shoulder Surgeries

Arthroscopic Technique

Live Surgeries

Satellite Workshops
Luncheon Symposium

Official Language

Registration www.shoulderscope.com

Program Director

The 8th SMC Shoulder Symposium

June 10 -12, 2004

Samsung Medical Center
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