Posterior Instability
What I Have Learned in the Past 25+ Years

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Compendium of our studies
The 10 lessons
I have learned over the last 25 years of research

Definitions

Locked Posterior Dislocation (LPD) <4% of shoulder dislocations
Definable event- ETOH, electric, epilepsy
Recurrent Posterior Subluxation (RPS)
More common, usually overuse
10 – 12% of shoulder instability
Posterior Capsulolabral Complex Lesions (PCLC) Subset seen in throwers- avulsion of PCLC on labral flap tear
Definitions

**Recurrence Posterior Subluxation (RPS)**
More common, usually overuse
10 – 12% of shoulder instability

Pathology - Theories
1. Glenoid retroversion/hypoplasia
2. Chondrolabral retroversion
3. Humeral retroversion
4. Reverse Hill-Sachs
5. Reverse Bankart
6. Capsular attenuation
7. Kim Lesion
8. Reverse HAGL
9. Muscular imbalances (lats/pecs) with ST dyskinesia
10. Usually a combination of the above

PE Unidirectional Post vs. Post/Inf
Hard to differentiate
1. Load/Shift
2. Sulcus (0 deg. Abd)
   - ExRot
   - Neutral
3. Jerk Test
4. Kim Test
5. D-PITT, mod D-PITT
6. Whipple test, mod Whipple
7. Circumduction Test
8. Scapular Dyskinesia
9. GIRD
PE Unidirectional Post vs. Post/Inf

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POST INSTABILITY

Imaging Red Flags

- Significant glenoid bone loss or Big reverse HS
- Glenoid retroversion
- Subluxed & bone loss
- Post Glenoid cartilage analog

Critical findings on MRA in post instability compared to age matched controls

Galvin, Parada et al. AANA 4/14/16
1. Glenoid dysplasia
2. Posterior HH subluxation
3. Increased capsular volume on MRA

✓ All independent radiographic risk factors in pts with labral tears who develop post instability
#1

Etiology in over-hand athletes is frequently different than contact athletes & so is the tx.

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Recurrent Posterior Subluxation

1st Overall Group

2. Common in certain sports:
   - Throwers, tennis players, swimmers, weightlifters
   - Football players (offensive linemen > def. linemen 2005)

   MOI: OVER-HEAD - INDIRECT CONTACT - DIRECT

   Bradley JP, Kayzer P. Shoulder Injuries in Elite Football Players. AJSM 2005

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Post Capsulolabral Lesions


1. Initially tight post/inf capsule (GIRD)
2. Repetitive microtrauma after ball release
3. Progressive tearing of the post/inf labrum
4. Mechanical sx or pain during follow-thru
5. Instability sx not predominant
SLAP Extension
3rd Group  Kibler B, Bradley J  AAOS 2016  AAGS 2017

Initial injury is a 2b SLAP which then extends posteriorly bisecting the post labrum to reveal 2 distinct fiber bands
  One extending to post capsule
  One following the post labrum

They require repair from top to bottom

Dynamic Posterior Instability

Pec major (ant) & Lats (post/inf) vector forces are balanced & cancel each other out
  Initially weak, tight or inactive Pec major (ant vector) which allows
  Lats pulls (post/inf vector) HH out post instability with or without labral tear

Pain at or just before ball release

Causes in Throwers
1. Macro-Trauma (rare) base dive
2. Deceleration / Eccentric Overload- Andrews (Micro-trauma)
3. Post Capsule Contracture — Bachar, Morgan
4. SLAP Extension — Kibler, Bradley, El Attrache
5. Dynamic Post Instability in throwers D-PITT Conway, Bradley
6. Glenoid dysplasia or retro-version
#2

Physical exam: findings that predict a poor response to PT

Circumduction Test
Load & Shift +3
Dynamic post throwers instability test D-PITT

Beware of Hypermobility

Hyperlaxity states
- Beighton criteria 5 of 9
- Ehlers Danlos
- 3 major, 3 minor types
- 5 pts last year
- Genetic testing +
  - Classic (2 pts)
  - Hypermobile (4pts)
  - Vascular (0)
Beware of Bone loss
How much is too much?

15, 20, 25, 30%
4.35, 5.8, 7.25, 8.7mm
WE DON'T KNOW!
No clear answer from the biomechanical or clinical data in the literature

200 post repairs decreased bony width was predictive of poorer outcomes not bone loss

Is there a % glenoid bone loss that is significant

- 121 MRIs from our operated 2 yr F/U surgical group using circle concept for bone loss
- 27 had bone loss

There was no correlation between bone loss & poorer results

CT study probably better with new software
Posterior Shoulder Instability with Glenoid Bone Loss: Morphology of Posterior Bone Defects
Provencher M, Jones J, Arner J, Bradley J. AANA 2017

Conclusions
- A loss of posterior bony concavity
- Inc. slope anterior to post
- Version increase
- Characteristically gradual from sup to inferior

“This pattern of bone loss is distinct from anterior glenoid bone loss, which is more abrupt with a steep declination”

Glenoid Bone Loss in Post Instability: Outcomes after Arthroscopic Treatment
Hines A, Bottoni C, Tokish J. SOMOS Meeting 2014

- 32 pts prospectively studied
- WOSI, SANE scores
- No association between bone loss & revision, recurrences of symptoms or return to full activity
- Did not separate Throwers

“Glenoid bone loss does not carry the same implication or risk of worsened outcome, ...as its anterior counterpart”

Watch for Excessive Retroversion
Mauro C, Bradley J. AJSM 2016

How much is too much?
15, 20, 25, 30 degrees

WE DON’T KNOW!
- No clear answer from the biomechanical or clinical data in the literature

200 pts. Inc retroversion DID NOT predict a poor result
The Effect of Glenoid Version & Width on Outcomes of Arthroscopic Posterior Shoulder Stabilization

Mauro C, McClincy M, Bradley J. AJSM 2016

- 200 pts prospectively studied F/U mean 24 mths
- ASES, standard pain, function & stability scores pre & post
- 118 MRA done at UPMC reviewed
- However wider glenoids had better pain & ASES scores post op
- Dec bony width was predictive of poorer outcomes post op
- No sig diff in scores for bony or chondrolabral version post op

Risk Factors for Post Instability in Young Athletes

Owens B, et al AJSM 2013

- Prospective cohort study 714 athletes followed 4 yrs
- 46 instability episodes / posterior
- 7.7 non injured, 17.6 (4.4-22.6) injured for every 1 deg of int retroversion is 17% risk of subsequent post shoulder instability
- No sig diff in height, width, depth or RI measurements
- Most sig risk factor is increased glenoid retroversion

Beware of Scapular Dyskinesis

ST dyskinesis
- 3 types (I,II,III)
- The types are not pathology specific
- Protects shoulder from post subluxations
- C/O Dr. Ben Kibler
Evaluate scapular dyskinesis
Myers J, Bradley J, AJSM 2005

Inc. protraction is common in healthy throwers but...
post cuff muscles get weakened/inhibited

Lax post. capsule can not constrain action of the Lats - IR, horz add which pull HH out post.

#3
Labral tears & Retroversion (both bony & chondrolabral) are common….not rare

What about Labral Lesions?

- 100 pts. confirmed by arthroscopy
- 30 complete detachments of labrum
- 27 incomplete
- 43 patulous capsule

57% had a labral lesion
MRI Results: Retroversion
AllPts
Chondrolabral
- All cases with retroversion
  - 10.7 deg. SD 3.5
  - 5.4 deg. control
Bony Glenoid
- All cases with retroversion
  - 7.1 deg. SD 3.1
  - 3.5 control group

Both groups were statistically sig.

MRA Lesions in Pitchers
Bradley, Lesniak, McClincy 2010
- 16 pitchers in our group, 161 shoulders
- Chondrolabral version 11.5 vs. 10.7 (5.4 control)
- Bony version 8.4 vs. 7.1 (3.5 control group)
- Kim 3 (12pts) Kim 2 (4pts)

Pitchers were worse

#4
Posterior pathology is rarely isolated it comes in combinations.
- SLAPs, PRCT, RHAGLs, post glenoid DJD
Pathology

> 540 pts in our current prospective study group 40% have additional pathology that needs to be addressed

PRCT

Slap VIII

#5

Over-Hand athletes have poorer outcomes & RTS
Methods
Goal: Compare outcomes of capsulolabral repair between throwers & non-throwers

48 Throwing Athletes
- 34 Males (71%)
- 38 (78%) High School
- Average Age 17.8 years
- Follow-up 37 months

48 Non-Throwing Athletes
- 34 Males (71%)
- 36 (73%) High School
- Average Age 17.6 years
- Follow-up 37 months

Results – Return to Sport

Throwers:
85% RTP
60% Same level

Non-Throwers:
87% RTP
70% Same level

“In the end a little loose is always better than too tight in over-hand athletes”
Contact athletes have better outcomes & RTS.

Results: F/U of 44.7 months
Sig. improvements (P > .01) were seen between pre & postop evaluations in ASES score; subjective scores of stability, ROMs, strength, pain, & function.
E/G results (ASES score > 60; stability < 6) were achieved in 93% RTS & 79% RTS same level.

96.5% of FB players were satisfied

“In the end too tight is always better than too loose in contact athletes”
Arthroscopic Tx is better than Open especially in over-hand athletes

Arthroscopic Stabilization is preferred:
WHY?
- Allows for labral repair & capsular plication
- Can address other concomitant pathology
  - PRCT
  - SLAPs
  - Capsular tears
  - HAGLs
- Lower recurrence & revision rates
- Improved perioperative morbidity
- Patient satisfaction
- Better RTS & level

2013 Prospective Study
Bradley J. McCleny M. AJSM 2013

200 Athletes Post Instability mean FU 36 mons.
Labral repair +/- anchors +/- cap plication no RIC
ASES, stability, pain, function, scores all statistically
significant improvement <.001

True for contact, throwers & total groups
93% G-E ASES
90% RTS 64% at same level 26% lower level
4.5% failures

Anchor group sig greater ASES > .001 & RTP > .05
<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Open Stabilization (Soft Tissue Procedures)</th>
<th>Arthroscopic Stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent Instability</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Ability to address concomitant pathology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perioperative Morbidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to Sport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cosmesis</td>
<td></td>
<td></td>
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</tbody>
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**#8**

The rotator interval rarely needs to be closed

**Rotator Interval Closure**

The Addition of RIC after Arthroscopic repair of either Ant or Post shoulder instability

Aircast Award basic science AJSM 2008

**Conclusions**

1. RI closure after ant instab. repair improves ant stab no effect on post instab ER- sig. dec (39% vs. intact)
2. RIC in post instab had no effect on post translation

“This study calls into ? the need for ARIC in the setting of post instability.”
When in doubt, use suture anchors

Posterior Instability
Failures 1st 100 pts.

Contact athletes
4/5 had capsular plication without anchors (51 pts)

Over-Hand Athletes
3/3 had capsular plication without anchors (27 pts)

You are only as good as your physical therapist
Indications for Surgery

1. Failed rehab > 6 months
2. Large labral or flap tear on MRA
3. Post glenoid bone loss > 5mm (15%)
4. RHAGL or post capsular rents
5. Unable to RTS same level

 Failures: Sutures vs Tape
Arner J, Bradley J 2017 just completed

Sutures: RTP 90.2%
   17% failure

Tapes:   RTP 93.5%
   9% failure

What about Revisions

297 Athletes (all job) Post mean FU 5.3 yrs
Labral repair +/- anchors +/- cap plication no RIC
ASES, stability, pain, function, scores all statistically significant improvement <.001
19 revisions
Risk Factors: FEMALE (0.0001)
   DOMINANT shoulder (0.006)
   CONCOMITANT RC injury (0.029)
   3 or FEWER ANCHORS (0.048)
   Smaller glenoid bone width (0.0003)

Revision risk was 6.4% at 8.9 yrs for overall population
What about Revisions

Bender J, Amor J, Vyas D 2017 submitted

**WHAT DID NOT MATTER!**

1. Age
2. Type of sport (no throwers in the 297)
3. Contact vs noncontact
4. Level of sport
5. Repair type (Capsule, labrum vs capsule-labral repair)
6. Bone loss

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**What about Revisions**

ALL CONTACT ATHLETES

Bender J, Amor J, Vyas D 2017 submitted

186 Post - min 2yr follow mean 13 yr flu
Lateral repair +/- anchors +/- plication no RIC
11 revisions RTS revision 50% No rev 93.7%

**Risk Factors**

- ONLY SMALLER GLENOID BONE WIDTH (0.0005)
- Cartilage, labral & bony version
- Labral injury & width
- Capsular injury
- Level of sport

Revision risk was 5.9% at 12 yrs for contact athletic population

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**Post Instability of the Shoulder: A Systematic Review & Meta-analysis of Clinical Outcomes**

DeLong J, Bender J AJSM 2015

1035 publications 807 assessed 53 unique arthr open
- Well defined outcome studies are lacking
- Arthroscopic Tx is effective & reliable for outcome scores, satisfaction & RTP
- Throwers are less likely to RT pre-injury level vs. contact or overall athletic population
- Suture anchors result in less recurrences & revisions in young adults

Arthroscopic repairs better than open for satisfaction, stability, recurrence, RTS & RTS same level