Instability in the Contact Athlete: Arthroscopic vs. Open/Latarjet

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Is Open Stabilization for Dinosaur Surgeons Only?

Arthroscopic Stabilization Advantages:
- Smaller incisions.
- Less trauma to subscapularis.
- Less pain.
- Easier rehab.
- ??? Technically easier ???

My personal experience
- Have been doing 100% arthroscopic cuff repairs for several years.
- Published 1st paper on arthroscopic stabilization in 1993. (18 years ago!)
- Still do most of my stabilizations open.

Why?
- Arthroscopic cuff repair=Open cuff repair.
- Arthroscopic stabilization=/=Open stabilization.
- Most of my instability patients are contact athletes.

Why Not Do Everyone Thru The Scope?

Advantages of open techniques:
- Can free capsule from subscapularis to precisely tension capsule without adherence.
- Can better visualize and tension rotator interval.
  - Open RI closure is NOT the same as arthroscopic.
- Can double thickness of repair by overlapping capsule.
- Can optimally position arm for repair.
- Can address bony lesions.

Surgical Outcomes of Open Stabilization:
- Wirth & Rockwood (JBJS, 1996)
  - 3% failure
- Gill (JBJS, 1997)
  - 3/60 failed (5%)
- West Point (Uhorchak, AJSM, 2000)
  - High failure rate in cadets (22%)

Open vs Scope

EBM: Meta-Analyses
- Freedman, AJSM, 2004:
  - Recurrence: Open 10%, Scope 20%
- Mohtadi, Arthroscopy, 2005:
“Open repair has a more favorable outcome with respect to recurrence and return to activity.”

Lenters, Matsen, JBJS, 2007:
“Arthroscopic not as effective as open in preventing recurrent instability or enabling patients to return to work.”

Recurrence Rates (Open vs Arthroscopic)
Cole & Warner (JBJS, 2000)
Scope: 24% (discrete Bankart lesion, well-defined GH ligaments)
Open: 18% (only patients with “thin capsular tissue.”)

Hubbell et al (AJSM, 2004)
Arthroscopic: 60% recurrence rate.
Open: no recurrences.

Randomized trials: Open vs Scope
Fabbriciani et al (Arthroscopy, 2004):
60 patients randomized to open or scope.
No failures in either group.
44 patients excluded on the basis of arthroscopic findings.

Bottoni et al, AJSM, 2006:
32 scope, 31 open: Outcomes similar.
No recurrent dislocations
2 failures in open group, 1 in scope group
Mean Op Time:
Scope-59 mins
Open-149 mins!!!!!! (That’s 2½ hrs.)

Shoulder Strength After Open Versus Arthroscopic Stabilization
Hiemstra et al, AJSM, 2008:
No side-to-side isokinetic strength deficits between open and arthroscopic stabilization at 1 year after surgery.

Rhee et al, AJSM, 2007:
Muscle strength equal between open and scope groups at 12 months.
Open group recovered more slowly than scope group.

Subscapularis Function after Open Stabilization
Sachs et al, AJSM, 2005:
23% had an “incompetent subscapularis” with clinical testing.
(Positive lift-off test)
Only one case documented by MRI.
Reportable case prior to this paper.
Greis et al, JSES, 1996.
**Contact Athletes**

**Surgical Outcomes in Contact Athletes (Arthroscopic):**
Results have generally been disappointing.

Burkhart & DeBeer, *Arthroscopy, 2000*

- 101 Contact Athletes
- 14/101 failed (14%)
- 89% with “bony defects” (8/9)
- 7% without bony defect (6/92)

Mazzocca & Romeo *(AOSSM, 2002)*

- 15% failure in collision athletes

Survey of NFL & NHL (Montgomery)

- NFL: 12% failure (3/26)
- NHL: 45% failure (6/11)

**Surgical Outcomes in Collision Athletes (Open vs Arthroscopic):**

Hubbell et al, *AJSM, 2004*

- Arthroscopic: 60% recurrence rate.
- Open: No recurrences.

Rhee et al, *AJSM, 2006*

- Scope: 25%
- Open: 12.5%

**Surgical Outcomes in Contact Athletes (Open)**

Our Experience (Pagnani & Dome, *JBJS, 2002*):

- 58 American Football Players:
  - 3% recurrence rate (2 post-op subluxations, no dislocations).
  - 52/58 returned to sport. (Only 1 discontinued due to recurrence.)
  - Minimal ROM loss.

**Contact Athletes-Summary**

Consider an open technique in contact athletes.

Even the zealots do an open procedure in athletes with bony defects of the humeral head or glenoid.

**ARTHROSCOPIC STABILIZATION; SURGICAL TECHNIQUE**

**Arthroscopic Bankart Repair**

Interscalene block, awake patient

Beach-chair.

Portals:

- Posterior
- Low anterior
- Anterolateral (rotator interval)
Scope in posterior portal
   Confirm Bankart lesion
   Drive-through sign
   Hill-Sachs lesion,
Move scope to anterolateral portal
   Free anteroinferior capsule with rasp
   Debride glenoid to bleeding bone.
   Place most inferior anchor thru anterior portal.
      On glenoid edge but not on articular surface.
Move sutures to posterior portal.
Suture passer thru anterior portal.
Pass one limb of suture thru inferior capsule
      Goal: superior and medial shift.
Sliding knot
Half-hitches with alternate posts.
      Knots away from joint surface.
Place additional anchors and repeat.

Arthroscopic Capsular Plication: Biomechanics and Indications:
Reduces glenohumeral translation.
   (Alberta et al, JBJS, 2006)
Diminishes capsular volume.
   (Kaplan et al, Arthroscopy, 2006; Sekiya et al, Arthroscopy, 2007)
Restricts ROM.
   (Gerber et al, JBJS, 2003; Shaefer et al, JBJS, 2008)
Drive-through not eliminated after Bankart repair
Sulcus sign
Clinical instability in absence of Bankart lesion.

Arthroscopic Capsular Plication: Technique
   Same positioning and portals
   Scope stays in posterior portal
   Introduce suture passer thru anterior portal
   Pass thru inferior capsule
      1.5 cm grab of capsule shortens 3-4 mm after plication.
   Retrieve nitinol wire thru anterolateral portal
   Shuttle suture (OrthoCord) back thru anterior portal
   Retrieve anterior limb thru anterolateral portal
   Tie with sliding and half hitches

Repeat with more inferior suture.

Add superior sutures.
   Do not pass above equator of glenoid.
**Sulcus Sign: additional options**

Rotator interval closure
- Not the same as open
- Problems with external rotation loss

Additional posterosuperior placation sutures.
- At equator or above.
- Add posterolateral portal
- Scope in anterolateral portal.
- Passer thru posterolateral portal. (percutaneous)
- Retrieve Nitinol wire from anterior portal.
- Shuttle suture
- Retrieve both ends of suture from posterior portal
- Sliding/half hitch knots.

**OPEN STABILIZATION: SURGICAL TECHNIQUES:**

Scope before Open Procedure
- Folded sheets taped to armboard. (align with arm prior to sitting patient up.)
- Beach-chair
- SLAP lesions.
- Posterior pathology.
- Cuff pathology.
- Planning for open procedure
  - Is there a Bankart lesion?
- Lower head of bed, pull out arm board.

**OPEN BANKART REPAIR:**

2 assistants:
- Surgeon starts standing in axilla.
- 2nd assistant on opposite side of table
- Incision along anterior axillary crease
- Identify cephalic vein. Develop deltopectoral interval.
- Incise clavipectoral fascia just lateral to conjoined tendon.
- Musculocutaneous N.
- Self-retaining retractors
  - “Hands free”
- Arm position is key
Subscapularis takedown (except in throwers). (Surgeon moves to lateral arm)
Close rotator Interval

Horizontal Capsulotomy, Expose Bankart lesion
Prepare glenoid neck \(\rightarrow\) roughen to bleeding bone

Place suture anchors.
Use inferior capsular flap to repair Bankart lesion. Keep head reduced!

2 jobs of 1st assistant:
1) reduce head.
2) maintain arm position. (45 abduction, 45 ER)
Pass sutures thru superior flap to double thickness of repair and eliminate excess capsular laxity. Keep head reduced! Reattach subscapularis.

**Special Situations:**

**Markedly Enlarged Rotator Interval**
- Shift capsule superolaterally, +/- Bankart repair.
- Close Rotator Interval.

**Capsular Laxity, +/- Bankart Lesion**
- Tension capsule with “T-plasty” capsulorrhaphy.
- Easier (and more anatomic) to base “T” laterally.
Bony Defects of Humeral Head/Glenoid

High recurrence rates after arthroscopic Bankart repair in patients with bony defects of the glenoid and humeral head.

Burkhart & De Beer (Arthroscopy, 2000)
Boileau et al (JBJS, 2006)

External rotation restricted after capsular repair with large glenoid defect. (Itoi et al)

Bony Defects: Hill-Sachs Lesion
Engaging vs Non-Engaging
Bony Glenoid Defect
“I Inverted Pear” Glenoid

Historical Results of Open Stabilization without Bone Block:

Rowe et al (JBJS, 1978):
Glenoid rim lesions: 2% recurrence rate
5% recurrence with moderate or large H-S compared with 3.5% overall.

Bigliani et al (AJSM, 1998):
12% recurrence with glenoid rim lesions.

Gill et al (JBJS, 1997)
Presence of large H-S doubled recurrence from 3% to 6%.

Open Stabilization without Bone Block (Pagnani, AJSM, 2008)
Determine recurrence rates with open anterior stabilization without bony augmentation in patients with defects of the glenoid and/or humeral head.
Assess influence of bone loss on post-operative external rotation after open capsular repair.

119 consecutive patients with recurrent instability.
87 had Hill-Sachs lesions. (84%)
28 “engaging” lesions. (27%)
9 large Hill-Sachs lesions. (Rowe classification)

14 patients had glenoid rim deficiency
4 severe (>20%) defects of the glenoid, Largest Defect: 30%
**Recurrence Rates:**
- Patients with Hill-Sachs lesions: 2% (2/87)
- Large Hill-Sachs: 11% (1/9)
- “Engaging” Hills-Sachs: 4% (1/28)

**Recurrence Rates (cont’d):**
- Glenoid deficiency: None
- Contact Athletes:
  - Athletes with Hill-Sachs lesions: (3%)
  - “Engaging” (5%)

**ROM Loss**
- Large (>20%) defects of the glenoid
  - Mean loss of 7 degrees of ER.
- Large Defects of Humeral Head
  - Mean ER loss of 4 degrees.

Our results suggested that bone-block or grafting procedures do not appear to be necessary in the majority of patients with bone loss. Our findings also suggest an inherent difference between open and arthroscopic capsular repair procedures.

**Glenoid Bony Defect**
Consider bone graft/bone block if more than 1/3 of glenoid is deficient.

**BRISTOW PROCEDURE:**
- Split subscap (2/3-1/3), T-shaped capsulotomy

(Osteotomize 1.5 cm of tip of coracoid (medial to lateral).
Do not pre-drill.)

Graft <5 mm medial and inferior.
Tip anterior.
Avoid overhang or medialization

LATARJET PROCEDURE: Better than Bristow for larger defects.
“Triple blocking effect”
Osseous extension of glenoid
Tethering of inferior 1/3 of SSC which is prevented from sliding superiorly with abduction and ER.
CA ligament sewn to capsule

Take most of coracoid.

Keep >1cm lateral stump of CA ligament to sew to capsule.
Rotate coracoid on its side with tip facing inferiorly. Orient inferior (deep) surface to fill defect and match glenoid concavity.
Fix coracoid to glenoid with 2 screws.  
Sew CA ligament stump to lateral capsule.  
Close subscap loosely to maintain ROM.

High reported incidence of recurrent subluxation.  
Graft inside or outside of capsule?

Bristow/Latarjet Procedures  
Up to 50% coracoid non-union rate. (Hovelius, AOS, 1983)  
Fairly low recurrence (0-14%).  
Motion loss, high re-operation rate (15%), arthritis.  
Screw problems, revision difficult.

Iliac Crest Bone Graft for Glenoid Bone Loss  
Warner, AJSM, 2006  
12 patients: “Severe” glenoid loss 18-35 mm.  
No recurrences, all had bony union.  
12’ ER loss
Auffarth AJSM, 2008
47 patients, >5 mm of bone loss.
No recurrences.
1 graft fracture
X-ray evidence of arthritis in 50% at mean 7.5 years.

ARTHROSCOPIC LATARJET:
Investigational.
Boileau (AAOS, 2010): 47% complication rate

Hill-Sachs Defect:
Options:
Ignore
Disimpact and bone graft
Transfer of infraspinatus or latissimus into defect (reverse McLaughlin)
Humeral head allograft
Hemiarthroplasty

Osteochondral Allograft for Hill-Sachs Defect (Miniaci, Sekiya, Gerber)
>25%, >1 cm deep.
Failure of soft tissue repair.

Summary:
“Less invasive” not always better.
Despite advances in technology, some inherent advantages of open techniques which may be impossible to duplicate with scope.
Rotator interval closure.
Free capsule from subscapularis.
Double capsular thickness.
Optimally position arm and tension repair.
Address bony lesions.

REFERENCES:


