Thinking About Shoulder Instability Surgery
(a.k.a Why do we do what we do?)

Thomas J. Gill
Chief, MGH Sports Medicine
Dept. of Orthopedic Surgery
Massachusetts General Hospital
Boston, MA

“Look, just do an open Bankart. I’ve never have a problem with that, and the patients always do fine. What are you worrying about all this other stuff for?”

- Famous Sports Medicine Surgeon

The Shoulder is not the Knee ...

unique...
Glenohumeral Forces

- 27,000 inch-pounds (Gainor, AJSM, 1980)
  - 4x energy of soccer kick
  - angular velocity 7000 degrees/see

The Shoulder is not the Hip ...

Must work together...

Why are these stable?

Static Elements

- Surface area mismatch
- Conforming joint surfaces
- Similar radius of curvatures
- Glenohumeral Index - 0.6; only 25% “covered”
Static Elements

- Labrum adds breadth and depth to glenoid
- Anchors ligaments to rim
- Variable above equator of glenoid

2.5mm

“Chock-block”

Static Elements

- Articular orientation defines forces across joint
- Humeral and glenoid version

Rotator Interval
Etiologies

Posterior capsular stretch??
Capsular Rupture

Bankart Lx

Repair Issues

- How much to shift capsule?
- Posterior plication routine?
- RI closure as routine?
- How many anchors?
- Where to anchor?

Ligaments

- Arm position determines relative contributions
- SGHL
  - adduction
- MGHL
  - mid-range
- IGHLC
  - abduction
Don’t Forget the Scapula ...

Effect of Scapular Winging

Classification Is Important ...

• Frequency
  » acute, recurrent, fixed
• Etiology
  » traumatic, atraumatic, micro-
    » congenital, neuromuscular
• Direction
  » Ant / Post / Inf / MDI
• Degree
  » Dislocation, subluxation, micro/transient
Shoulder Instability

- Pathology occurs along spectrum of severity
- “Pain” more common than “instability”
- “Dislocators” vs. “Subluxators”

Laxity vs. Instability

- Laxity - passive translation without symptoms
- Instability - excessive translation with AROM, sx

Instability in the Athlete

- Recognize and understand pattern
- Goal: full function, early return
- “Dead-arm syndrome” (Rowe)
  - throwers
- Posterior
  - swimmer, linemen, volleyball
- MDI
  - swimmer, thrower, tennis
Common Pathology

- Bankart
  - 65-100% with trauma
- Hill-Sachs
  - 80% dislocations
  - 25% subluxations
  - > 30% causes issues
  - AP xray in IR
  - Stryker notch view

Pathologic Anatomy in Recurrent Instability

- Loose bodies - 14%
- Rotator cuff tears - 13%
- Posterior labral tears - 10%
- Glenoid avulsion fractures - 4%
  - fracture > 1/3 diameter should be repaired (Detrisac, 1993)
  - West Point view

Loose Capsule

- Repetitive stress from throwing
- 18 / 50 pts with transient subluxation do \textit{not} have Bankart lesions (Giese, 1997)
- Bigliani (1992) and Speer (1994)
  - capsular stretching coexists with Bankart lesions
  - capsule must be stretched for humeral head to dislocate
Rotator Interval

- Rowe and Zarins
- Large opening between anterior border of SS upper border of subscap
- Best assessed open
- Blevins (1995) - isolated closure
- Do not overtighten
  - size of tissue “bites”
  - medial extent of closure

Effect of Age (Neviaser, 1993)

- > 40
  - high incidence of RTC tears
  - more capsular disruptions
- < 20
  - labral tears
  - loose bodies

Shoulder Instability:
History

- Does your shoulder feel loose?
- Have you ever dislocated your shoulder?
  - How many times? What type of trauma was involved?
  - Does someone have to pull on your arm to fix it?
- Do you avoid placing your arm in certain positions?
- Do you have difficulty reaching behind you?
- Does it hurt to open a heavy door?
- Is it difficult to lift a heavy bag?”
Shoulder Instability: History

- Does it hurt to throw?
- Which part of motion?

Shoulder Instability: Physical Exam

- Apprehension test
- Relocation test
- Load test
- Sulcus sign

Shoulder Instability: Imaging

- AP in IR/ER
  » AP alone NOT acceptable
- Axillary view
  » bony Bankart
- Trans-scapular Y-view
- Stryker notch view
  » Hill-Sachs
- West Point view
  » glenoid rim
Shoulder Instability

• Recurrence rate - age dependant
  » > 90% if less than 20 years old
  » < 25% over 40 years old
• Role for early stabilization?
  » Arciero (1995)
  » Kirkley (AOSSM 2002)
• Timing in season
  » brace
  » ? remove from competition

Indications for Surgery

• Initial dislocation in high risk patient (Arciero, 1995)
  » professional athletes
  » mountain climbers
  » construction workers
• Recurrence

Indications for Surgery

• Pain due to recurrent transient shoulder subluxation
  » overhead athlete
  » “dead arm syndrome”
• Results of surgery better following trauma (Rowe, 1956)
Treatment for Instability

- Non-operative
- Arthroscopic
- Open

Key Treatment Issues

- No single structure is responsible for stability
- All pathologic lesions must identified
- EUA…compare!
  - It does matter ...
  - degree
  - Direction
- No “One-size fits all” approach
  - fix what’s wrong

Key Factors

- Etiology
  - traumatic
  - atraumatic
- Chronicity
- Ease of Dislocation
  - activity
  - work
  - sleep
- Ease of Reduction
- Direction / Pattern
  - anterior
  - posterior
  - MDI
- Occupation
- Athlete
  - thrower
  - contact vs. non-contact
- Previous Surgery
Etiology-based Treatment?

- Traumatic, labral tear
  - arthroscopic Bankart
  - ? Contact athlete
- Atraumatic, no labral tear
  - capsular shift
  - arthroscopic plication
  - arthroscopic Bankart

Chronicity

- Acute, few dislocations
  - good capsular tissue
  - arthroscopic repair
- Chronic, multiple episodes
  - capsular tissue poor
  - be prepared to convert to open
  - must do shift, either open or arthroscopic

Direction / Pattern

- Anterior
- Posterior
  - quality of capsule
  - ? labral tear
  - ? lateral decubitus
- MDI
  - if arthroscopic, must do circumferential repair
  - don’t forget rotator interval!
**Occupation**

- Most - arthroscopic
- Iron worker / construction - consider open

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**Previous Surgery**

- **Must** get old Operative Report!
- Xrays
  - hardware
  - osseous defects
- Know why it failed
- Be prepared to open…

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**Ease of Dislocation**

- Arthroscopic
  - large force required
  - patient can control
- Consider Open
  - minimal force
  - reaching
- …beware of “dislocates in my sleep”!!
Ease of Reduction

- “If it goes in easily, it goes out easily”

Case Example

- 32 yo woman with 2 failed Bankart repairs and 7 previous anterior dislocations
- Apprehensive with any position of arm over head….

Bony Anatomy

- Remember, bone loss is additive...

Glenoid Loss

Hill-Sachs
Importance of Bone Stock

Bristow: Historical solution to glenoid bone loss

A Current Solution

- Glenoid reconstruction with ICBG
Glenoid Reconstruction
(Gill, Warner 2003)

- 12 patients
- Follow-up 2 to 5 years
- ASES
- No recurrent dislocations
- No non-unions
- 12/12 would do again

Outcome at 2 Years

Hill-Sachs: How much is too big?
Hill-Sachs Treatment

- Seldom required
- Connolly Procedure
- Matched HH allograft

“Absolute” Indications for Open Approach

- Bony Bankart
- Capsular rupture
- Large Hill-Sachs lesion
  - doubles recurrence (3% to 6%)
  - bone graft
  - rotational osteotomy
  - transplant IS tendon

Modifications for Throwers: Open

- Transverse capsular incision (Zarins)
- “Anatomical capsular shift” (Andrews, 1993)
  - splits subscap in middle-third
  - capsule is incised vertically close to humerus
    - beginning on anatomical neck above MGL
  - inferior limit determined by severity and direction
Anchors vs. Bone Tunnels

- Advantages
  - easy to use
  - precise repair on glenoid rim/articular surface
  - restore “bumper effect”
  - pull-out 90N vs 98N for drill holes (Wolf, 1993)

- Disadvantages
  - ? less surface area for healing

Guiding Principle...

Restoration of Normal Anatomy

Open Bankart Results

- Gill (2000)
  - 12 year f/u
  - 52/56 G/E
  - 55 returned to occupation
  - 3 had recurrent dislocation, each > 3 years post-op due to new trauma
  - 54 would have Bankart procedure again

- Rowe (1979)
  - 97% G/E
  - 69% had full ROM
  - 2% re-dislocated

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  - 12 year f/u
  - 52/56 G/E
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Shoulder Instability: Arthroscopic vs. Open

- Kim, 2001
  - 89 shoulders
  - Rowe, UCLA scores
  - 3 - 4 year f/u
  - 2 recurrences in each group
  - Arthroscopic group better p<0.05
  - No difference in ROM, return to sport

Arthroscopic Stabilization

- Must be “same” as open procedure
- Mobilize Bankart lesion
- Prepare anterior / inferior rim
- Put anchors on articular surface!
- Shift pouch superiorly / laterally
- Strong fixation – double loaded anchors

Arthroscopic Bankart Technique
Probe Repair

Arthro Bankart +/- Heat
(Gill, Warner, AAOS 2002)

• 28 patients
• 2 year follow-up
• Prospective
• ASES outcomes
• … no difference

Complication of Heat
Patient Considerations

“It should be remembered that the capsule of the shoulder joint is normally a lax, and not a tense, structure.”

- ASB Bankart

• Patients prefer a more loose shoulder with full motion
  » Beware overlap capsulorraphy / shift procedure
  » Direct correlation between ROM and clinical outcome

Patient Considerations

• Rehabilitation - essential
  » most patients wish they had worked harder during initial post-operative periods

Complications of Surgery for Recurrent Instability (Gill, 1999)

• Recurrent instability
• Neurovascular injury
• Loss of motion
• Retained hardware
Common Causes of Failure

- Persistent instability
- Renewed instability
- Postoperative pain
- Restricted ROM
- Wrong plan ...!

Boston’s “Big Dig”, 2009

Arthroscopic Repairs:

*Don’t try to put “round pegs” in “square holes”....*

- Must diagnose the etiology of the instability

Glenoid Fracture
Glenoid Dysplasia

When in doubt, think about biomechanics...
No “Right” or “Wrong” Approach

Open  Arthroscopic

Four Steps to Success, Regardless of Technique...

1) Perform layer-by-layer anatomical dissection
2) Identify the pathological condition
3) Correct the lesion
4) Return all tissues to correct anatomic location

- CR Rowe, 1988

Muchos Gracias…
Viva Barcelona!

VS.

Champions Cup, 2011