Multidirectional Instability of the Shoulder

Brian D. Busconi, MD
Chief of Sports Medicine & Arthroscopy
UMass Memorial Medical Center
281 Lincoln Street
Worcester, MA 01605
busconib@ummhc.org
We can sum up MDI in 3 Slides...
REHAB
REHAB
REHAB
REHABILITACIÓN
RIABILITAZIONE!!!
And if all else fails... 

SURGERY!
Multidirectional Instability

- Spectrum of pathology
- Share common features
How Many MDI’s are True MDI’s???

In My Experience:

70% are actually Uni-Directional at time of OR exam

Only 30% are true MDI’s at time of OR Exam
Multidirectional Instability (MDI)

- Global Instability in 1 or more planes
- Inferior instability is a universal finding
- Anterior-inferior
  - +/- posterior subluxation
- Posterior-inferior
  - +/- anterior subluxation
- Combination

Most symptoms occur in midrange of GH motion
MDI Demographics

- Young patient
  - 2\textsuperscript{nd}-3\textsuperscript{rd} decade
  - Subset of preadolescent pts

- Male = Female
  - Laxity: Female > Male
  - Laxity does \textit{not} imply instability or “pathologic laxity”
**Anatomic Etiology**

- **Hallmark lesions**
  - Redundant inferior capsule
  - Rotator interval deficiency

- **Deficient capsuloligamentous restraints**

- **Recurrent instability**
  - Exacerbates problem
  - Deconditioning of the dynamic stabilizers (RTC, scapular stabilizers)
  - Leads to:
    - *Ineffective concavity compression*
Anatomic Etiology

- Inferior capsule
- IGHL
  - Anterior band
  - Posterior band
Anatomic Etiology

- Rotator Interval
  - SGHL
  - CHL
- Loss of inferior & posterior check rein
- Loss of negative intra-articular pressure
**Anatomic Etiology**

- **Intact labrum**
  - Deepens glenoid 50%
  - Contributes to 20% of stability in AI & PI direction

- **Labral detachment**
  - Compromises concavity-compression

- **Increased GH translation**
  - Type II SLAP tears in cadaveric model*

---

Neuromuscular Etiology

- Glenohumeral and scapulothoracic rhythm
- Proprioception
- Deconditioning of dynamic stabilizers
- Ineffective concavity compression
Varied symptoms

- Pain
- Instability (dislocation/subluxation)
- Looseness
- Weakness
- Parasthesias
- Fatigue
- Popping, clicking, grinding
- Dead arm syndrome
- “Traction paresthesias”
History/Presentation

*Positional Symptoms

- Anterior
  - Abduction/ER
    - Overhead activities
    - Throwing
    - Racquet sports
    - Sleeping w/ arms over head
History/Presentation

- **Positional symptoms**
  - **Inferior**
    - Carrying objects
    - Traction parasthesias
  - **Positional symptoms**
  - **Posterior**
    - Adduction, IR
      - Pitching follow through
    - Bench press
    - Batting (lead arm)
Physical Exam

- Scapulothoracic motion
  - Asymmetry
  - Winging
Physical Exam

- Generalized laxity
  - Elbow hyperextension
  - Genu recurvatum
  - Patellar subluxation
  - Thumb to forearm
  - 19-75% of patients
Hospital Del Mar Criteria for Ligamentous Laxity

*Positive if: 4/10 or higher for men

5/10 or higher for women*

1. passive hyperextension of the MCP Joint of the little finger 90° or more
2. passive apposition of thumb to the flexor aspect of the forearm at less than 21 mm
3. passive elbow hyperextension of 10° or more
4. passive shoulder ER of 85° or more
5. passive hip abduction of 85° or more
Hospital Del Mar Criteria for Ligamentous Laxity

6. hyperextension of the first MTP joint $> 90^0$
7. patellar hypermobility
8. excessive passive ankle dorsiflexion and eversion of the foot with the knee flexed to $90^0$
9. passive knee hyperflexion
10. appearance of ecchymoses after hardly noticed, minimal traumatism

Physical Exam

Sulcus sign

- Inferior laxity
- Adduction/neutral rotation
- Adduction/external rotation

Grade

- 1+=1cm
- 2+=1-2cm
- 3+=>3cm
Provocative tests

- Apprehension Sign
- True apprehension
  “feels like it's gonna come out”
Provocative Tests

- Relocation Sign (Jobe)
- Instability or Labral Tear
Physical Exam: Laxity

- load-shift test
- anterior
- posterior
Load and Shift Exam Under Anesthesia
Radiographic Exam

- AP
- West Point
Further Imaging

**CT**
- Fx/avulsions
- Head/glenoid defects
- Glenoid version

**MRI**
- +/- Gadolinium
  - Capsulolabral pathology
  - Biceps
  - SLAP tears
  - Rotator Cuff
Non-Surgical Management

1st line treatment
- Pain relief
  - NSAIDS
  - Cryotherapy
  - Brief immobilization
- PT
  - Strengthen/retrain RTC & scapular stabilizers
  - Proprioceptive feedback
  - Restore concavity compression
- Burkhead & Rockwood
  - 88% satisfactory results

Non-Operative Treatment

Phase I (0-10 weeks)
- Progressive resistance exercises
- < 90 degrees abduction

Phase II (>10 weeks)
- Scapulothoracic & glenohumeral retraining
- GH proprioceptive retraining
- Overhead activities

Improvement w/n 3 months
Wait up to 6 months

If non-operative treatment fails...
“Instability Severity Index Score”
10 point score

- <20 y.o.
- competitive/contact sports
- hyperlaxity
- Hill-Sachs on AP/ER radiograph
- loss of sclerotic glenoid contour

If > 6pts.: 70% recurrence with arthroscopic repair

Balg, Boileau JBJS Br 2007
Surgical Management

Goals:
- Restore anatomy
  - Reduce capsular redundancy
  - Close Rotator Interval
  - Reinforce capsule

- Open Inferior Capsular Shift
- Arthroscopic Capsular Shift
- Treatment of associated pathology
Open Shoulder Stabilization
Advantages of Open Shift

- Adjust capsular tension
- Reduces capsular volume
- Lateral “T” capsulotomy
- “Greater shift”
- Axillary nerve exposure
- Thickens capsule
- Bankart easily repaired
Inferior Capsular Shift Technique

- Deltopectoral
- Clavipectoral released lateral to pink stripe
- Subscapularis off:
  - start inferior above circumflex and separate muscle from capsule
  - work proximal
- Close rotator interval
Inferior Capsular Shift Technique

- Lateral ‘T’ capsulotomy
- Axillary nerve exposure
- ‘bifid’ IGHL attachment must be released
- Avoid “east-west” shift
- Inferior capsule is to be shifted superior eliminating redundant pouch
Inferior Capsular Shift Technique

- anchors inferiorly - poor tissue
- Place medial plication suture
- Shift superior capsule and use inferior leaf sutures to repair
- Strong subscap repair
Complications:

- Recurrence
- Axillary nerve injury
- Iatrogenic posterior subluxation
- “east-west’ shift
- Stiffness
Open Inferior Capsular Shift

- Neer & Foster, *JBJS* 62-A(6), 1980
  - 39/40 satisfactory results
  - Limited follow up

  - 94% (46/49) good or excellent results
  - 96% (47/49) stable
  - 61 month follow up (24-132 months)
Results in contact athletes

- 53 shoulders; 47 patients
- 85-92% G/E
- Return to sports
  - 82% for anterior repairs
  - 75% for posterior
  - 17% for bilaterals

Choi, Ogilvie-Harris  Br J Sports Med 2002
Results in athletes:

- 68 shoulders; 63 patients
- All anteroinferior instability
- 94% G/E results
- 92% return to sport
- 75% at same level
- only 5 of 10 throwers

Bigliani, Kurzweil, Schwartzbach et al AJSM 1994
Results: Open Inferior Capsular Shift

- Althcek et al. JBJS. 1991
  - subjective result, and stability
  - All throwing athletes experienced decreased velocity
- 42 shoulders (40pts)
  - Athletes with MDI
  - Open inferior capsular shift
  - Avg f/u 3 years
- Results
  - 40/42 (95% excellent)
Arthroscopic Shoulder Stabilization
MDI Tx Options

Capsulorrhaphy (capsular plication)
Vs
“Combi-Stitch” (capsular plication with labral imbrication)
Vs
“Combi-Repair” (capsular plication with labral repair)

Anterior vs Posterior
Arthroscopic Capsular Plication

- Arthroscopic
  - Decreased morbidity
  - Single approach for anterior or posterior instability
  - Visual confirmation of decreased capsular laxity
  - Avoidance of subscapularis detachment
  - Address additional pathology (labrum, rotator cuff, long head biceps)
Arthroscopic Capsular Plication

- Plication magnitude inversely related to volume of capsule reduced
  - Flanigan et al. Arthroscopy, 2006
    - 5mm plication → 16.2% volume reduction
    - 10mm plication → 33.7% volume reduction

- Multiple pleats allow incremental volume reduction
  - Proceed from inferior to superior to facilitate visualization

- Arthroscopic techniques just as effective as open technique in decreasing capsular volume
Results: Arthroscopic Plication

Gartsman et al. Arthroscopy 2001
- 47 pts MDI
- 44/47 (94%) good/excellent results on Rowe criteria
- Significant improvement in ASES, UCLA, constant scores
- 22/26 (85%) returned to desired sporting level

Baker et al. AJSM 2009
- 43 shoulders (40pts)
- 91% full or satisfactory ROM
- 98% normal or slightly decreased strength
- Significant improvement ASES, WOSI scores
- 86% returned to desired sporting level
Can the labrum be used as a suture anchor?

Provencher et al. Arthroscopy. 2008

- Cadaveric study
  - Anteroinferior & posteroinferior plication with 2 suture anchors vs plications to intact labrum
  - Loaded to failure

- Results
  - Suturing capsular pleats directly to labrum exhibits similar fixation strength to that of suture anchor fixation
  - Less rigid (greater displacement) higher with plication to labrum alone
    - Displacement of 1.5mm may be expected

- Concerns of in vivo shear stress, suture tear through, and propagation may make anchor fixation preferable
Multidirectional Instability: Anterior Labral Repair/Suture Shuttling Technique
Portal Utilization: Go back door!

Utilization of the posterior portal in anterior surgery

- Excellent for anchor placement at 6 o’clock
- Excellent for passing of multiple sutures in ant-inf GHL
- Less stressful
- Use long cannulas 7-8mm in width
Re-tensioning the IGHL
Getting to 6 o’clock position

Option #1:
- View from ASP
- ‘O’ PDS placed from AIP

“combi” stitch: capsule plication and labrum
- Shuttling with posterior portal

right shoulder
Scope anterosuperior
Need adequate number of fixation points
Posteroinferior Multidirectional Instability: “Kim lesion”

- Incomplete, concealed avulsion of the posteroinferior labrum in posterior MDI

Kim et al, Arthroscopy 2004
Arthroscopic Posterior Capsulorrhaphy

- Start with scope posterior
- or
- Start with scope anterior: optimum posterior portal for instrumentation
**Posterior Capsulorrhaphy**

- Posterior-inferior plication
  - “Mattress-plication stitch”
  - reduces capsular redundancy
  - builds up labrum
- Anterior inferior plication
  - balances IGHL
- Rotator interval closure
Arthroscopic Posterior Combi-Repair

- Suture anchors
  - Start scope posterior
  - Switch scope to ASP
  - Twin posterior portals
  - Twin anterior portals
  - ‘O’ PDS shuttle nonabs. suture

- **Combination plication, labral repair**
‘O’ PDS placed with capsular tuck using Spectrum
1st posterior anchor placed @ 7 o’clock
1st post-inf anchor tied
Finished capsulolabral reconstruction

Posterior labral repair

Anterior labral repair
No clear clinical evidence exists to prove that RI closure adds stability to MDI shoulder.

Mologne et al. AJSM 2008
- Cadaveric study
- 14 specimens stressed in:
  - Controlled state
  - After anterior or posterior instability repair with suture anchors
  - Addition of rotator interval closure

Results
- Addition of RI did not improve posterior or inferior stability.
- Anterior stability improved
- External rotation significantly reduced with RI closure

Conclusion:
- RI closure may add to certain cases of anterior instability (tension at 30 degrees of external rotation)
Post Operative Care

**Bracing**
- **6 weeks**
  - Slight abduction, neutral rotation
  - Gentle isometric exercises
  - Elbow ROM
- **6-12 weeks**
  - Brace d/c’d
  - ROM exercises
    - Restrict ER for Ant repair
    - Restrict IR for Post repair
  - Proprioceptive feedback
- **12 weeks**
  - Strengthening
  - Sport specific Rehab

THANK YOU