Glenohumeral Instability
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Overview

- Anatomy
- Biomechanics
- Pathoanatomy
- Physical Exam
- Nonoperative Treatment
- Operative Treatment
- First Time Dislocator/Glenoid Track

Discussion!!!
Anatomy

- Glenohumeral Articulation
- “Like a golf ball on a tee”
- Little inherent stability
  - Pros and Cons
Anatomy

- Scapulothoracic articulation
- No “articular surface”
- More important than you think!
Anatomy

- Coraco-acromial Arch
  - Coracoid
  - Acromion
  - C-A Ligament
- Important for superior stability
Anatomy

- Ligaments
  - Anterior
    - SGHL - 0°
    - MGHL - 45°
    - IGHL - 90°
  - Posterior
    - IGHL - IR
  - Rotator Interval/CH
Anatomy

Muscles

- Glenohumeral
  - Deltoid
  - Supraspinatous
  - Infraspinatous
  - Teres Minor
  - Subscapularis
  - Teres Major
  - Coracobrachialis
Anatomy

Muscles
  - Scapulothoracic
    - Trapezius
    - Rhomboids
    - Levator Scapulae
    - Serratus Anterior
    - Pectoralis Minor
Anatomy

- **Muscles**
  - Multiple Joint
    - Pectoralis Major
    - Latissimus Dorsi
    - Biceps Brachii
    - Triceps Brachii
Anatomy

- **Labrum**
  - Circumferential fibrocarilage
  - Effectively deepens and widens the glenoid
Biomechanics of Shoulder Stability

Goals:

1) Functional ROM with a nondislocatable glenohumeral joint

2) To keep the humeral head CENTERED within the glenoid for as wide a ROM as possible – this creates the greatest mechanical advantage for shoulder girdle musculature
Biomechanics of Shoulder Stability

- Joint Reactive force
  - Gravity
  - Deltoid
  - Rotator Cuff
  - +/- Ligaments
Biomechanics of Shoulder Stability

- Effective Glenoid Arc
  - Glenoid Bone
  - Cartilage
  - Labrum
- Glenoid Center Line
- Balance Stability Angle
Biomechanics of Shoulder Stability

- Effective Glenoid Width
- Effective Glenoid Depth
- Both will effect the effective glenoid arc
The “LAWS”

- The glenohumeral joint will not dislocate as long as the net humeral JRF is directed within the effective glenoid arc.
- The humeral head will remain CENTERED in the glenoid fossa if the glenoid and humeral joint surfaces are CONGRUENT and if the net humeral JRF is directed within the EGA.
Pathoanatomy

- Bones
  - Fracture
  - Dysplasia vs. wear
Pathoanatomy

- Ligaments
  - Checkrein
  - +/- compressive force
  - Buttress
  - Pathology: EDS, stretch, tear
Pathoanatomy

- Muscles
  - Weakness
  - "Scapular Dumping"
Pathoanatomy

- Muscles
  - Asynchrony
Pathoanatomy

- Labrum
- Tear
- “Ring theory”
Pathoanatomy

- Bankart Lesion
- Hill-Sachs defect
Pathoanatomy

- Rotator cuff tear
Pathoanatomy

- Rotator cuff tear after dislocation
- Age > 40 = 30%
- Age > 60 = 80%
Pathoanatomy

- Tuberosity Fracture
Pathoanatomy

- Glenoid Fracture
- “Bony Bankart Lesion”
Pathoanatomy

- Improperly addressed glenoid fracture is probably the #1 reason for failed shoulder reconstructions
Classification of Shoulder Instability

- **Direction**
  - Anterior
  - Posterior
  - Inferior
  - Multidirectional

- **Cause**
  - Traumatic
  - Atraumatic

- **Degree**
  - Dislocation
  - Subluxation

- **Control**
  - Involuntary
  - Voluntary
    - Normal Psychologically
    - Abnormal Psychologically
Evaluation

- **History**
  - Position of dislocation
  - Position of pain
  - Throwers vs Swimmers vs Weight lifters
  - # of dislocations
  - Age of first dislocation
  - Assistance with reduction
  - Previous surgery

- **Physical Exam/Radiology**
  - Determine which of the anatomic structures is contributing to instability
  - Bones
  - Ligaments
  - Muscles
  - Labrum
  - Brain
Physical Exam

- Inspection
- ROM
- Strength
- Neurovascular Exam
- Provocative Tests
- Always check the neck!
- Always check the other shoulder!

Laxity vs. Instability
Treatment

- Non-operative
  - Immobilization
  - Physical Therapy

- Operative
  - Arthroscopic vs. Open
  - Anterior vs. Posterior
  - Bony vs. Soft Tissue
Non-Operative Treatment

- Immobilization
  - Atraumatic Subluxator = none
  - Traumatic Dislocation = 3 weeks
  - Traumatic Dislocation with soft tissue compromise = up to 6 weeks
  - Posterior dislocation = 3 weeks in neutral rotation
  - Consider immobilization in ER for Anterior dislocators
Non-Operative Treatment

- Physical Therapy
- Glenohumeral Protectors
  - Rotator cuff
- Scapular Pivitors
  - Trapezius, Levator Scapulae, Rhomboids, Serratus Anterior, Pectoralis Minor
- Humeral positioners
  - Deltoid
- Power Drivers
  - Pectoralis Major and Latissimus Dorsi
Physical Therapy

Protectors and Pivitors

Positioners

Power Drivers
Physical Therapy

- Core set of exercises
- Designed by Dr. Frank Jobe for overhead athletes
- Confirmed by EMG to work all the muscles essential for stability
- Should be done for injury prevention as well
Physical Therapy

- Ben Kibler MD – “Doctor Scapula”
  - Low rows, pendulums on a ball
- Shirley Sahrmann PhD PT – sleep postures
  - Knowing the postures will guide you to proper rehab of shoulder
Physical Therapy

- **Stages**
  - Rest/pain free
  - ROM
  - Strengthening
  - Endurance
  - Return to sport-specific activities

*May take up to 3-6 months!!*
Operative Treatment

- Arthroscopic Bankart repair/capsulorrhaphy
- Treats anterior inferior labral detachment +/- anterior capsular laxity
Arthroscopic Bankart

- 0-3 weeks – elbow/wrist/hand
- 3-6 weeks – FE to 120, ER to 45 AROM/AAROM
- 6-12 weeks – AAROM/AROM as tolerated, RC and scapular strengthening
- 12 weeks – first passive stretch, functional strengthening (plyometrics and proprioception)
- 24 weeks – consider return to sports
SLAP

- Treats superior labral tear
- Performed Arthroscopically
- Reattaches proximal biceps anchor
SLAP
SLAP

- 0-1 week – salutes, pendulums
- 1-4 weeks – A/AROM FE to 90, ABD to 90
- 4-8 weeks – A/AROM FE to 180, ABD as tolerated, RC and scapular strengthening, NO activities behind the plane of the body, NO active biceps
- 12 weeks – return to weight lifting
- 24 weeks – return to throwing
Rotator Interval Closure

- Used to treat inferior instability
- Component of treatment for MDI
- Can be performed open or arthroscopically
Rotator Interval Closure

- This represents a tightening of the SGHL complex
- Avoid ER past 30° with the arm at 0° of abduction for 6 weeks
Remplissage

- Described by Dr. Wolfe in 2008
- Used to treat small to moderate sized Hill Sachs lesions
Remplissage

- Functional tenodesis of infraspinatous tendon
- Must avoid ER strengthening for 6 weeks
- Must avoid passive IR for 6 weeks
Capsular Shrinkage

- Treats capsular laxity only
- Performed arthroscopically
- Controlled heating of ligament which results in shortening of the ligaments
- Also results in dead, weak tissue for 8-12 weeks
- Controversial
Capsular shrinkage
Capsular Shrinkage

0-4 weeks – immobilizer

4-12 weeks – GENTLE AAROM, No ER, start isometrics progress to resistive

No passive stretch

3-4 - months return to sport
Open Bankart Repair

- Treats anterior inferior labral detachment and capsular laxity
- Performed open
- Requires subscapularis takedown/repair
- May also treat multidirectional instability
Open Bankart Repair

Line of transection

Axillary n.

Capsule/labrum

Subscapularis

Needle

Humeral head

Glenoid
Open Bankart Repair

- 0-3 weeks - immobilizer
- 3-8 weeks – AAROM (goal within 20° of opposite side), isometrics (No IR)
- 8-12 weeks – first passive stretch, cont ROM (goal equal to other side)
- 12 weeks – May start IR strengthening
- 16 weeks – return to noncontact sports
- 6 months – return to contact sports
ACLR

- Treats anterior inferior labral detachment and capsular laxity
- Performed open
- Requires NO subscapularis takedown/repair
- May also treat multidirectional instability
ACLR
ACLR

- 0-3 weeks – salutes, pendulums, AAROM within defined zone
- 3-6 weeks – start RC, scapular strengthening, ROM as tolerated
- 8 weeks – first passive stretch
- 12-16 weeks – return to noncontact sports
- 5-6 months – return to contact sports
Bristow/Latarjet

- Used primarily for treatment of bony defects in glenoid or humeral head
- Transfer of coracoid process to anterior glenoid
- Works as a mechanical AND functional block to dislocation
Bristow/Latarjet

2. Exposure of the coracoid process, coracoacromial
Bristow/Latarjet
Bristow/Latarjet

- 0-2 weeks – pendulums, salutes
- 2-6 weeks – AAROM FE to 175, ER to 30
- 6-12 weeks – AROM as tolerated, RC and scapular strengthening
- NO passive stretch
- 3-4 months – return to noncontact sports
- 6 months – return to contact sports
Humeral Head Allograft

- Used to treat “Engaging” Hill Sachs Lesion
Humeral Head Allograft
Humeral Head Allograft

- If done in isolation (rare), must start ROM early
- If done through muscle splitting technique, can start AROM immediately
- Otherwise, therapy usually dictated by concurrent soft tissue procedures.
Glenoid Allograft

- Used to treat bony Bankart or glenoid deficiency
- Utilizes Tibial Plafond
Glenoid Allograft

- Pre-op evaluation usually will require 3D CT.
Glenoid Allograft

- Must cut distal Tibial allograft to match defect
Glenoid Allograft

- Final result MUST be congruent and must be loaded appropriately
- High risk of graft resorption
Glenoid Allograft

- If done in isolation (rare), must start ROM early
- If done through muscle splitting technique, can start AROM immediately
- Otherwise, therapy usually dictated by concurrent soft tissue procedures
Capsulolabral Allograft Reconstruction

- Used primarily for deficient/absent anterior soft tissue structures (think failed shrinkage)
- Achilles, Semitendinosis, and Tibialis Anterior grafts have all been used
- High failure rate (greater than 50%)
- Salvage procedure
- Last step before fusion
Capsulolabral Allograft Reconstruction

- Usually held in neutral rotation for 6 weeks
- Limited motion for 12 weeks – FE to 90, ABD to 90, ER to 30
- Massive muscular atrophy to deal with after initial 12 weeks
Putti-Platt

- Used to address anterior capsular laxity
- Does not address labral pathology
- Shortens subscapularis muscle
- 20% failure rate
Putti-Platt

- 0-3 weeks – immobilize
- 3-4 weeks – pendulums, AAROM FE and ABD
- 4-6 weeks – AAROM with limit on external rotation to neutral
- 6 weeks – ROM as tolerated, strengthening
- 5 months – return to sports
- Expect loss of up 30° of ER
First Time Dislocator

- What imaging do you need?
  - MRI vs. CT
  - Arthrogram?
  - The answer is CT arthrogram with 3D Reconstructions

- Should they have surgery or not?
  - Does labral tear matter? Does bone loss matter?
  - The answer is that bone loss rules
  - Consider glenoid track
Glenoid Track

The glenoid track is a method of evaluating bipolar bone loss and determining which surgery should be done.
Glenoid track

- First step was to identify normal anatomy
- Articulation in abduction/ER
- 83% of the width of the glenoid is necessary for stability
Next step was to use glenoid measurement and compare it to measured Hill Sachs defect.
Next step was to evaluate combined defects
Glenoid track
Glenoid Track
Glenoid Track

The last step was to determine a treatment paradigm

- < 25% glenoid bone loss AND on track lesion = arthroscopic Bankart repair
- < 25% glenoid bone loss AND off track lesion = Bankart repair PLUS remplissage
- >25% glenoid bone loss AND on track lesion = Latarjet
- >25% glenoid bone AND off track lesion = Latarjet +/- humeral head allograft
But Wait.....

- Long term results
  - Latarjet – 20 year followup with redislocation rate of 5%, 20% had early arthritis
  - Remplissage – 10 year followup with redislocation of 11%
  - Arthroscopic Bankart repair alone – 5 year followup with redislocation rate of 15%
Complications
Complications

- Casulorraphy
- Arthropathy
Complications

- Subacromial Decompression
- Lose superior buttress
- Increase instability
- Teenagers DO NOT get subacromial impingement
Summary

- Shoulder instability can be multifactorial.
- There are many different surgical procedures to address it.
- Each procedure requires different therapy.
- DON’T BE AFRAID TO ASK!!!!
THANK YOU!!!