Anterior Instability with Glenoid Bone Loss
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Speaker Disclosure
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Disclosure Information
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Bony Bankart – How Common?

- Incidence varies between 4% and 50%
- Up to 85% of cases with recurrent dislocations

Glenoid Defects
- Acute with retained bone
- Chronic +/- remaining bone

Why is this important??
Disruption in the Glenoid Arc/Track

Glenoid Bone Loss
• Primary Reason for Failure after Arthroscopic Stabilization
  - Rowe CR (JBJS 1978)
    – Increased failure rate with bone loss greater than 30% (open Bankart)
  - Burkhart, DeBeer (Arthroscopy 2000)
    – Recognized “inverted pear glenoid”
      • Failure of arthroscopic Bankart in contact athlete with bone loss 89% (vs 3.5% without bone loss)
  - P Boileau (JBJS Br 2007)
    – Instability Severity Index Score (ISIS)
**ISIS (Instability Severity Index Score)**

Boileau P JBS Br 2006

- Prognostic Factors:
  - Age at Surgery
    - < 20 = 2 points
    - > 20 = 0 points
  - Sports Participation
    - Competitive = 2 points
    - Recreational = 0
  - Type of Sport
    - Contact or Overhead = 1 point
    - Other = 0
  - Hyperlaxity (Gagey test)
    - Positive = 1 point
    - Normal = 0
  - Hill-Sachs on AP x-ray
    - Visible with ER = 2 points
    - Not visible = 0
  - Glenoid contour on AP x-ray
    - Loss of contour = 2 points
    - No lesion = 0

Patients with a score >6 had a recurrence rate of >70% with arthroscopic Bankart repair.

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**What Are The Issues?**

- Can we quantify the bony defects?
- How much of a bony defect matters?
- How do we address those patients?

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**How can we quantify the bony defects?**

And So Doing Determine What’s Pathologic
How to measure bone loss

- CT → study of choice
  - 3-D CT most accurate method to measure glenoid bone loss (Rerko MA, Bishop J JSES 2012)
- MRI → 3% error using circle method compared to CT/3-D CT (Gyftopoulos S, Jazrawi L AJR 2012)

How to Measure Bone Loss -> “Circle Method”

So.... How Much is Too Much?
Biomechanics of Glenoid Bone Loss

Effect of an Anterior Glenoid Defect on Anterior Shoulder Stability
A Cadaveric Study

Stability ratio statistically significant with greater than 6mm (19%) defect

AJSM, 2009

Effect of bone loss on Bankart Repair

- Burkhart and De Beer, Arthroscopy 2000
  - Without significant bone defect (<25%): 4% recurrence
  - Significant bone defect (>25%): 67% recurrence
  - For contact athletes…
    - Without significant bone defect: 6.5% recurrence
    - With significant bone defect: 89% recurrence

What do we do this this Info?
Estimate the Amount of Glenoid Bone Loss

- XR, CT, MRI, Arthroscopy?

- 0 to 15%
  - Arthroscopic Repair
  - Incorporate Bony Fragment
  - Liberal use of anchors
  - Consider posterior repair (contact athletes)

- 15% to 25%
  - Arthroscopic Repair
  - CAUTION! (>20%)
  - Best with bony fragment that is incorporated
  - Consider posterior repair (contact athletes)

- > 25%
  - OPEN bone augmentation procedures

“Glenoid Track”

Cadaveric Study Examining
The Effect Of Combined Bony Defects
- Glenoid
- Humeral Head

Calculation
- Sagital view to determine glenoid width (best fit circle)
  - 84% of actual
  - = 20.1mm

“Glenoid Track”

- Describes the Hill-Sachs based on
  - Location
  - Size
  - Amount (if present) of glenoid bone loss

- With arm in 60deg abd/max ER
  - Distance from contact area to medial margin of RTC footprint is 84% of glenoid width

Yamamoto et al. JSES 2007

Sagital Oblique MRI
Glenoid Track
Clinically Validated

Discussion

Approximately 13% Hill-Sachs injuries were felt to be at increased risk of glenohumeral engagement with bone loss outside the “glenoid track.” It was these same patients that had a very high rate (20%) of engagement noted during exam under anesthesia. Thus, the “glenoid track” classification correlates with clinical findings and has potential prognostic and therapeutic value. Also, these patients had significantly greater glenoid bone loss than those with lesions within the “glenoid track” (14% vs 7%).

What to do?

Now that we made the diagnosis of glenoid bone loss… what should we do about it?

- Goal is to restore glenoid arc
- Latarjet
- Iliac Crest Bone Graft (ICBG)
- Distal Tibia Allograft
We Know the Goal is to Restore the Arc

- Goal is to restore glenoid arc

What do the Experts Say?

"Never seen a Hill-Sachs so big that a Latarjet wouldn't treat it"

From the Gospel of Burkhart

Acute Glenoid Fracture

Bony Bankart Bridge

- Index dislocation with...
- Acute glenoid rim fx
- < 30 percent defect
- Treatment;
  - Suture bridge technique
  - Arthroscopic fixation fracture fragment – lasso tech
  - Debulk the fragment + arthroscopic bankart
Chronic Bone Loss

- Latarjet
- Iliac Crest bone graft
- Distal Tibial Allograft

Why Latarjet?

- Addresses Bone defect
- Sling Effect
- Good Fixation
- Restores
  - Architecture
  - Arc
  - “Glenoid Track”

Extra-articular

Sling effect from Latarjet
Extends the Bone Surface "Extends the Arc"

Options - Iliac Bone Graft

• An iliac graft is transferred to the anterior rim
What about Distal Tibia Allografts?

- Fresh osteochondral reconstructive option, best for:
  - Salvage of failed Latarjet
  - LARGE (>30%) defects
  - Osteochondral defects

Distal Tibia Allograft

- Fresh osteochondral reconstructive option:

Lastly – Hill Sachs

- How to measure?
  - CT
  - MR
  - Glenoid Track good concept
  - Determine, ant-post, medial-lateral?
  - <20% - Insignificant
  - >40% - Significant
  - 20-40% depends on glenoid
  - Functional apprehension
What about Hill Sachs lesions and combined defects?

- If there are combined bone defects, the authors recommend treating the glenoid first.

Peter Millett and JP Warner

• Glenoid bone grafting procedures effectively lengthens the articular arc of the glenoid
• Although they don’t address humeral head defect directly, they prevent engagement of Hill-Sachs Lesion
• Remplissage is performed with moderate to large Hill-Sachs defects assoc. with glenoid defects of <20% - 25%

**Take Homes Messages:**

**Shoulder Instability with Bone Loss**

- **Soft tissue stabilization** (open or arthroscopic) →
  - Does not treat the bone loss
- **Bone Augmentation** If Glenoid Bone Loss > 20 – 25%
- **Latarjet:**
  - Treats the bone loss
  - Excellent long-term stability outcomes
  - Uncertain long-term durability
  - Emerging techniques are promising (arthroscopic)
- **Distal Tibia Allograft:**
  - Excellent for salvage/revision
  - Excellent for LARGE bone loss
Thank You!

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