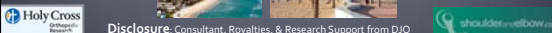


4-Part Fracture... save or replace

Jonathan C. Levy, MD
Chief of Orthopedics
Program Director, ASES Fellowship
Holy Cross Hospital
Fort Lauderdale, Florida USA

Disclosure: Consultant, Royalties, & Research Support from DJO



Caution

- Decision to operate remains a grey area
 - Several studies that suggest non-operative treatment can have similar outcomes to surgery
 - Those studies may have critical design flaws
 - Not all fractures behave the same way
 - Not all patient's represent those included in the study
 - Be a doctor -- treat the patient... but use the literature and your skills to guide you
- This talk is about Surgical Management
(I like to operate on fractures)

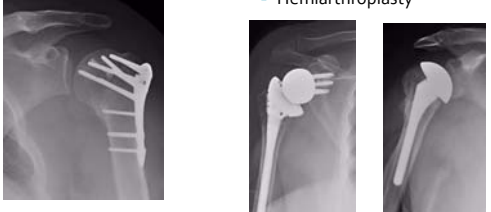
Key Players

- Patient Factors
 - Patient Age
 - Functional Demands
 - Comorbidities
 - Delay in presentation
- Bone Factors
 - Bone Quality
 - Comminution
 - Tuberosity Appearance
- Surgeon Factors
 - Comfort with procedure
 - Experience with fractures
 - Comfort with back-up options



Overview


- When to Save (Fix)
 - ORIF
- When to Replace
 - RSP
 - Hemiarthroplasty



The slide contains two columns of X-rays. The left column shows a single X-ray of a proximal humerus fracture treated with ORIF (Open Reduction Internal Fixation), showing multiple locking plates and screws. The right column shows two X-rays: the first shows a Reverse Shoulder Prosthesis (RSP) with a ball on the humerus and a socket on the glenoid, and the second shows a Hemiarthroplasty with a ball on the humerus and a natural glenoid.

4 Part Proximal Humerus Fractures


- 3 & 4 Part Fractures
 - 13% of all Proximal Humerus Fractures
- Treatment Options
 - Non-operative
 - ORIF
 - Arthroplasty



The slide features two X-rays of proximal humerus fractures. The top X-ray is labeled '71 yo F' and shows a complex fracture involving the tuberosity and the proximal humeral shaft. The bottom X-ray is labeled '62 yo F' and shows a similar complex fracture with significant displacement and comminution.

When to fix (save)...


- 1. When you just have to...
 - Young Patients
 - 40 year old male
 - Posterior Fx-Disloc



The slide displays several X-rays. On the left, there are two X-rays of a young patient's shoulder, one showing a fracture and another showing the shoulder after surgery. On the right, there are two X-rays of a 40-year-old male, one showing a posterior fracture-dislocation and another showing the shoulder after surgical repair with a locking plate.

When to fix (save)...

- 1. When you just have to...
 - Young Patients
 - 34 year old male
 - Axillary N Palsy

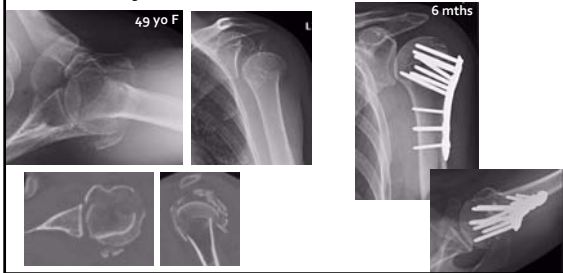


30 yo M

3 years

When to fix (save)...

- 1. When you just have to...
 - Young Patients
 - 49 yo F with RA




49 yo F

6 mths

When to fix (save)...

- 2. When you can...
 - Manageable fragments
 - 72 yo F; dominant arm



72 yo F

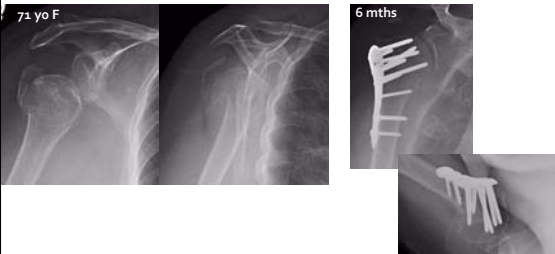
1 year

When to fix (save)...

- 2. When you can...
 - Manageable fragments

71 yo F; dominant arm

6 mths




When to fix (save)...

- 2. When you can...
 - Manageable fragments

68 yo F; dominant arm

4 mths




When to fix (save)...

- 2. If you think you can...
 - Reduction of Greater Plus Head Split

69 yo F

6 mths



When to fix (save)...

- 3. and...If tuberosities heal right and AVN sets in...
 - Reduction of Greater Plus Head Split

69 yo F

6 mths 24 mths 12 mths

...and if you think you can't...

- Greater Tuberosity in pieces

72 yo F

3 mths

...and if you think you can't...

- Previous Cuff Repair

78 yo M

24 mths

...and if you think you can't...

- Severe OA
- 78 yo F

Black and Tan

- Cement kills bone
 - Thermal bone necrosis has been related to thicker cement mantles (Janssen JOR 2012)
 - Temperature reaching over 55 degrees C when the mantle is 7mm thick (Li, J Biomech Eng 2003)
 - The highest thermal damage is seen at the bone-cement interface (Li, 2003)
- Technique
 - Limit the cement near fracture level
 - Pack bone graft around proximal stem

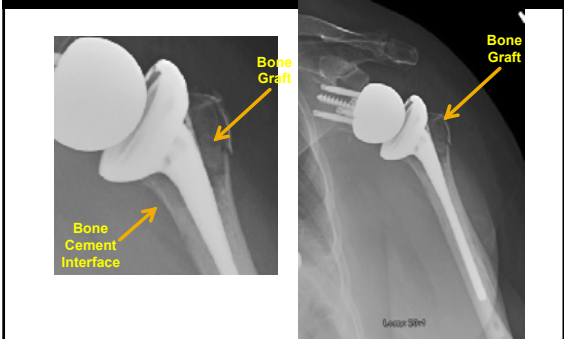
Black and Tan

- Place cement restrictor
- Cement into canal with cement gun
- Remove proximal 2-3cm of cement
- Pack this 2-3cm with cancellous bone from humeral head
- Implant small stem
 - Size 6 or 8

Black and Tan



Black and Tan



...and if you think you can't...



...and if you think you can't...

- Older with Good Tuberosity
- 75 yo M
- Humeral head is shell

4-Part Fracture Principles

- Always prefer to fix fracture
 - Especially True for Younger Patients
- Tuberosity Reduction/Healing is Key
 - True for ORIF/Hemi > RSA
 - For ORIF – Even if develops AVN – salvage with good arthroplasty
 - I rely less on the Hertel criteria (medial calcar segment <8mm or integrity of medial hinge)
- Tuberosity appearance often dictates treatment
 - Comminution leads to ORIF>Hemi in younger patients
 - Comminution leads to RSA>Hemi in older patients
- Hemiarthroplasty
 - Younger patients with fractures I can't fix
 - Older patients with good greater tuberosity
- RSP
 - Older patients with poor bone quality
 - Previous known irreparable rotator cuff tear
 - Severe pre-fracture arthritis

Fracture Trends (Medicare)

- From 2009 – 2012
- ORIF Unchanged (green line)
- RSP (blue line) **3 fold increase** in Medicare utilization
- 11% to 28% (Lavy, SES 2015)

	2009	2010	2011	2012
RSA	4527	3936	3545	2968
HA	934	1200	1607	2118
ORIF	3223	2609	2801	2594

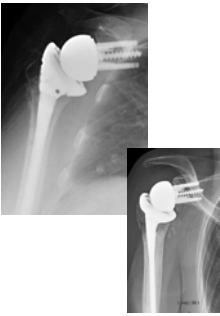
Hemiarthroplasty trends...

- Hemiarthroplasty for Fracture in Elderly Population
 - Poor functional outcomes
 - Unreliable Results
 - Antuna JSES 2008
 - Boileau JSES 2002
 - Goldman JSES 1995
 - Smith JSES 2007
- Popularity of Hemiarthroplasty for Fracture in the elderly seems to be dwindling...




Reverse Shoulder Prosthesis

- RSP has gained reputation as **more reliable** option for treating complex 3 and 4 part fractures in the elderly
 - Cuff et al JBJS 2013
 - Mata-Fink et al JSES 2013
 - Wang et al Int Orthop 2015



AAOS ICL#245



Mark Mighell – hold 'em (ORIF)

Mark Frankle – fold 'em (Arthroplasty)

Richard Hawkins -- walk away (non-op)

AAOS 2016 Annual Meeting
Society for Orthopaedic Trauma & Shoulder Society

New and Hot Topics

Three- and Four-Part Proximal Humerus Fractures – The Gambler Edition #245

Moderator: Jonathan C. Levy, MD
Wednesday, March 2, 1:30 - 3:30 PM

Surgical management of complex three- and four-part proximal humerus fractures has improved with new technologies such as locked plates and the reverse shoulder arthroplasty. The goal of this ICL is to better understand when to hold 'em (fx), when to fold 'em (arthroplasty), and when to walk away (nonsurgical management).

Thank You

Jonathan C. Levy, MD
Holy Cross Orthopaedic Institute
Fort Lauderdale, Florida
(954) 958-4800
jonathan.levy@holy-cross.com