Shoulder Arthritis and Fractures

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SJH Family Practice Refresher course

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Normal Anatomy
Normal Anatomy – Ball-and-Socket Joint

- Cartilage
  - Lines ends of bones
  - Cushions impact between bones
  - Provides a smooth gliding surface for movement.

- “Ball-and-Dish”
- Greater Tuberosity
- Lesser Tuberosity
Normal Anatomy – Rotator Cuff

- 4 Muscles
  - 1 in front
  - 1 on top
  - 2 behind
Muscle Action of the Shoulder

- **Deltoid**
  - Wants to pull arm up
  - Requires stable joint

- **Rotator Cuff**
  - Pulls Humeral Head into Glenoid
  - *Establishes stability* of the joint to allow deltoid to elevate the arm
Physical Exam

- Range of Motion (Forward elevate, abduction, external rotation, internal rotation)
  - Stiffness – limited active and passive motion
  - Pseudoparesis – limited active motion, normal passive
  - Pain
    - At extent or during arc
  - Crepitus
- Strength (Pain?)
  - Scapular plane (Supraspinatus)
  - External rotation (Infraspinatus and Teres minor)
  - Internal rotation (Subscapularis)
  - Abduction (Deltoid)
- Tenderness
  - Anterior/posterior joint lines
  - Subacromial space
  - Bicipital groove
  - Acromioclavicular joint
Radiographic Evaluation

- **X-Ray**
  - 4 views (AP, Grashey, Scapular Y (outlet), AXILLARY)
- **X-Ray**
  - Cannot truly rule out a dislocation without an axillary view
- **X-Ray**
  - Many times all that is needed initially based on exam and complaints
- **MRI**
  - Non-arthrogram – Evaluate Rotator cuff
  - Arthrogram – Evaluate labrum
  - IV contrast – Masses or Cysts
- **CT Scan**
  - Best for bony assessment (arthritis, glenoid bone loss after multiple dislocations)
  - Arthrogram can be used to evaluate rotator cuff in patients that cant have MRI
- **Ultrasound**
  - Can be used to assess rotator cuff and biceps tendon
Shoulder Arthritis

- Breakdown of cartilage
- Loss of smooth surfaces
- Loss of joint space
- Bone Spurs
Symptoms

- Pain
  - Progress over time
  - Worse with activity
  - Interferes with sleep
- Loss of motion (active and passive)
- Pain with motion
- Atrophy (wasting) of muscles
- Swelling
- Crepitus (clicking, popping or crunching sound)
- Tenderness to touch
Treatment – non-operative

- Anti-Inflammatories (NSAIDs)
- Cortisone Injection
- Activity Modification
- Viscosupplementation

- Physical Therapy
  - Only with early arthritis
Is there a cure?

- Unfortunately No

Total Shoulder Replacement
Anatomic Shoulder Arthroplasty

- First performed in 1950s for fractures
- Has evolved from the original Neer Prosthesis
When to consider surgery

- Failed non-operative management
- **Quality of Life** Decision
  - Interferes with activities
  - Loss of independence
    - Grooming
    - Bathing
    - Dressing, etc.
  - Interferes with sleep
  - Interferes with work
What to expect

- **90-95% successful**
  - 94% of 262 patients -- Boileau, Walsh, JSES 2003
  - 95% of 133 patients -- Norris, Ianotti, JSES 2002
  - 93% of 88 patients -- Dines, 2005

- **Pain Relief**

- **Improvement in function**
  - Increased range of motion
  - Increased ability to perform activities
  - Improved quality of life

- **Return of Independence**
Return to Sports

- Return to Previous Sports (McCarty AJSM 2008)
  - 71% Improved Participation
  - Swimming, Tennis, & Golf
    - Return to Sports at 3.6 months
    - Return to full participation at 5.8 months

- Return to Golf (Jensen & Rockwood, JSES 1998)
  - 4.5 months until a full round of golf
  - Average improvement of 5 strokes
How long do they last?

- 320 TSA with min 10 year follow-up (Deshmukh, JSES 2005)
  - Average Age 60.3 (range 17-86 years)
  - Implant survival to Revision
    - 98% at 5 years
    - 93% at 10 years
    - 88% at 15 years
    - 85% at 20 years
- 113 TSA (Neer Prosthesis) (Torchia, Cofield, JSES 1997)
  - Implanted 1975-1981
  - Implant Survival
    - 93% at 10 years
    - 87% at 15 years
Can anybody have a shoulder replacement?

- Glenoid loosening in total shoulder arthroplasty: Association with rotator cuff deficiency
- 7 Cases of Failed TSA
- Av f/u 30 mths (14-44)
- 6/7 had irreparable rotator cuff tears
- 1/7 developed a tear within 1 year of surgery
Loss of Stable Fulcrum

- Rotator cuff dysfunction
- Inability to neutralize deltoid deforming force
What can be done to treat arthritis in setting of rotator cuff dysfunction?
Reverse Shoulder Arthroplasty

Introduced in the US in 2004
Expanded Total Shoulder Arthroplasty Indications

- Pain and Loss of Function seen together with rotator cuff dysfunction:
  - Classic Cuff Tear Arthropathy
  - Irreparable rotator cuff tear with arthritis
  - Irreparable rotator cuff tear with anterior-superior escape (no arthritis)

For the first time, patients without arthritis routinely treated with arthroplasty.
Rotator Cuff Tear Arthropathy

- Instability
- Breakdown of cartilage
- Loss of smooth surfaces
- Loss of joint space
- Bone erosion
- Bone Spurs
Symptoms

- Pain
  - Progress over time
  - Worse with activity
  - Interferes with sleep
- Instability
- Loss of Motion (Active)
- Atrophy (wasting) of muscles
- Swelling
- Crepitus (clicking, popping or crunching sound)
- Tenderness to touch
Common Finding -- Pseudoparesis

- Described by Werner (JBJS 2005)

With Instability  
Without Instability
Treatment – non-operative

- Anti-Inflammatories (NSAIDs)
- Cortisone Injection
- Physical Therapy
  - Deltoid Re-Training
- Activity Modifications
When to consider surgery

- Failed non-operative management
- Quality of Life Decision
  - Interferes with activities
  - Loss of independence
    - Grooming
    - Bathing
    - Dressing, etc.
  - Interferes with sleep
  - Interferes with work
Complications

- Infection
- Wound problems
- Excessive blood loss
- Injury to nerves and blood vessels
- Failure of Subscapularis Repair
- Mechanical Failure of Device
- Fracture
- Weakness
- Stiffness
- Subluxation or dislocation of the prosthesis
- Requirement for additional surgery
- Anesthetic risks
Post-operative Rehabilitation
RCR, TSA, RSA

- Phase 1 -- Healing (0-6 weeks)
  - Shoulder Immobilizer
  - Pendulum exercises only
  - Pool therapy
Post-operative Rehabilitation
RCR, TSA, RSA

- **Phase 2 – Stretching** (6-12 weeks)
  - Stretching
  - Sling when out of house
  - Begin to use arm
    - Golf putt, no swing
  - No lifting
  - PT if necessary (RCR)
Post-operative Rehabilitation
RCR, TSA, RSA

- Phase 3 – Strengthening (3 months+)
  - Strengthening
  - Activities as tolerated at 6 months
  - PT if necessary
Shoulder Arthroplasty Rate Growing

- Shoulder Replacement increased 7.9% from 2010-2011
  - Hip/Knee Implants increased 3% between 2009-2010
- “The number of shoulder replacements has increased significantly because of the introduction of reverse shoulders which account for over 25% of procedures.”
Proximal Humerus Fractures
Challenging Problem - Variability

- Common Injury
  - 5% of injuries to appendicular skeleton
  - One of the most common osteoporotic fractures
  - Adults (most common 65-75 y/o)

- Variable fracture patterns
- Variable patient types
- Variable treatment options
- Paucity of high quality data
- Suboptimal outcomes
- Experience/Ability Matters!
Trends and Variation in Incidence, Surgical Treatment, and Repeat Surgery of Proximal Humeral Fractures in the Elderly

By John-Erik Bell, MD, MS, Brian C. Leung, MD, Kevin F. Spratt, PhD, Ken J. Koval, MD, James D. Weinstein, DO, MS, David C. Goodman, MD, MS, and Anna N.A. Tosteson, ScD

Investigation performed at Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire

The marked regional variation in the rates of surgical treatment highlights the need for better consensus regarding optimal treatment of proximal humeral fractures.
Fracture Variability

- Fracture types behave differently
- High interobserver variability
Treatment Options

- Nonoperative
- External fixation
- ORIF – Locking plates
- Nails
- Hemiarthroplasty
- Reverse
Op vs Nonop

Internal fixation versus nonoperative treatment of displaced 3-part proximal humeral fractures in elderly patients: a randomized controlled trial

Per Olerud, MD, Leif Ahrengart, MD, PhD, Sari Ponzer, MD, PhD, Jenny Saving, MD, Jan Tidermark, MD, PhD

Displaced proximal humeral fractures: operative versus non-operative treatment—a 2-year extension of a randomized controlled trial

Tore Fjæstad, Margrethe Oye Hole

Hemiarthroplasty versus nonoperative treatment of displaced 4-part proximal humeral fractures in elderly patients: a randomized controlled trial

Per Olerud, MD, Leif Ahrengart, MD, PhD, Sari Ponzer, MD, PhD, Jenny Saving, MD, Jan Tidermark, MD, PhD

Surgical Treatment With an Angular Stable Plate for Complex Displaced Proximal Humeral Fractures in Elderly Patients: A Randomized Controlled Trial

Tore Fjæstad, MD, Margrethe O. Hole, PT, Inger Anette Hynås Hovden, MD, Judith Blücher, MD, and Knut Stromsøe, MD, PhD

Hemiarthroplasty for Humeral Four-part Fractures for Patients 65 Years and Older

A Randomized Controlled Trial

Harm W. Boons MD, Jon H. Goosen MD, PhD, Susan van Grinsven MSc, Job L. van Susante MD, PhD, Corné J. van Loon MD, PhD
Operative versus nonoperative treatment of proximal humeral fractures: a systematic review, meta-analysis, and comparison of observational studies and randomized controlled trials

910 Op v. 833 Non-Op
No Difference in Outcomes
Higher complication and reoperation rate with operative management
Higher nonunion rates with nonoperative
Why Do We Operate?

- No difference between Operative and Nonoperative management
- 100\% Forward elevation
- Poor scores on outcomes measures
- How did we use to measure outcomes for Cuff Tear Arthropathy?
  - Limited Goals Criteria → then came the reverse
- As a profession we are trying to do better
- Occasionally we do
- We have improved some → Room for more
- We don't know how to make the right choice
My Tenets of Management
Know your tools and comfort level

“The Surgeon is the method”

Do a good operation

Get it right the first time

First opportunity is best opportunity

My Tenets of Management
My Tenets of Management

- Patient/Fracture Specific – Shared decision making
  - Age – Physiologic > Biologic
    - Comorbidities
  - “ACTIVITY” LEVEL
  - Patient Motivation
  - Fracture pattern/characteristics
    - Greater Tuberosity
  - Time from injury
  - Smoking/EtOH/Drug Use
My Tenets of Management

- Three questions
  - Will the fracture heal without surgery?
  - Can the fracture be fixed?
  - Will improving the alignment/environment improve function?
    - Worth the risk?
- 66 y/o RHD female, healthy, BMI 26
Nonoperative

- Active treatment not passive
- Battle between fracture healing and stiffness
- Follow patients closely

- Shoulder immobilizer
- 1 week – Start pendulums
- 2 weeks – Assess for displacement, continue
- 4 weeks – Start PT, gentle motion
- 6-8 weeks – D/C sling, light activity, advance motion
63 y/o RHD Female

- No overhead sports/hobbies
- “Active” with housework
ORIF

- Always preferred if fixable
  - Have your tools available
- CT helpful to evaluate tuberosity fragments
- Timing
  - As early as possible
  - Book within 2-3 days
- Therapy
  - Immobilizer pendulums
  - Start gentle PT 2-3 weeks
  - Passive and Supine Active Assisted

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**Does the timing of surgery for proximal humeral fracture affect inpatient outcomes?**

Mariano E. Menendez, MD, David Ring, MD, PhD*

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**Timing of surgery for open reduction and internal fixation of displaced proximal humeral fractures.**

Siebenbürger. G1, Van Deelen D1, Heijlen T1, Haastert E1, Rücker W1, Öckerl B2.
69 y/o RHD Healthy Female

- Very active, hit by car while riding bike
- Presented 1 week after injury
Reverse

- Older patients
- Poor bone quality
- Comminuted tuberosity
- Humeral head split
- Fracture dislocations
- Delayed presentation
- Therapy
  - Immobilizer pendulums
  - Start gentle PT 2-3 weeks
    - Passive and Supine Active Assisted
Comparison of Hemiarthroplasty and Reverse Shoulder Arthroplasty for the Treatment of Proximal Humeral Fractures in Elderly Patients

Derek J. Cuff, MD, and Derek R. Pupello, MBA

- ASES, SST, Patient satisfaction lower in hemiarthroplasty group
- Forward elevation RSA (139°) > HA (100°)
- Tuberosity healing RSA 83% > HA 61%
- Similar complication rates
Hemiarthroplasty

- Young patients
- Unreconstructable fractures
  - Humeral head split
- Large greater tuberosity fragment
  - Non-comminuted
- Highly dependent on tuberosity healing
- Less reliable than reverse
Thank You

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