

# Medical Management of Shoulder Arthroplasty

Erik Mitchell, DO  
Valley Health Orthopaedics

Rehabilitation Symposium 2019

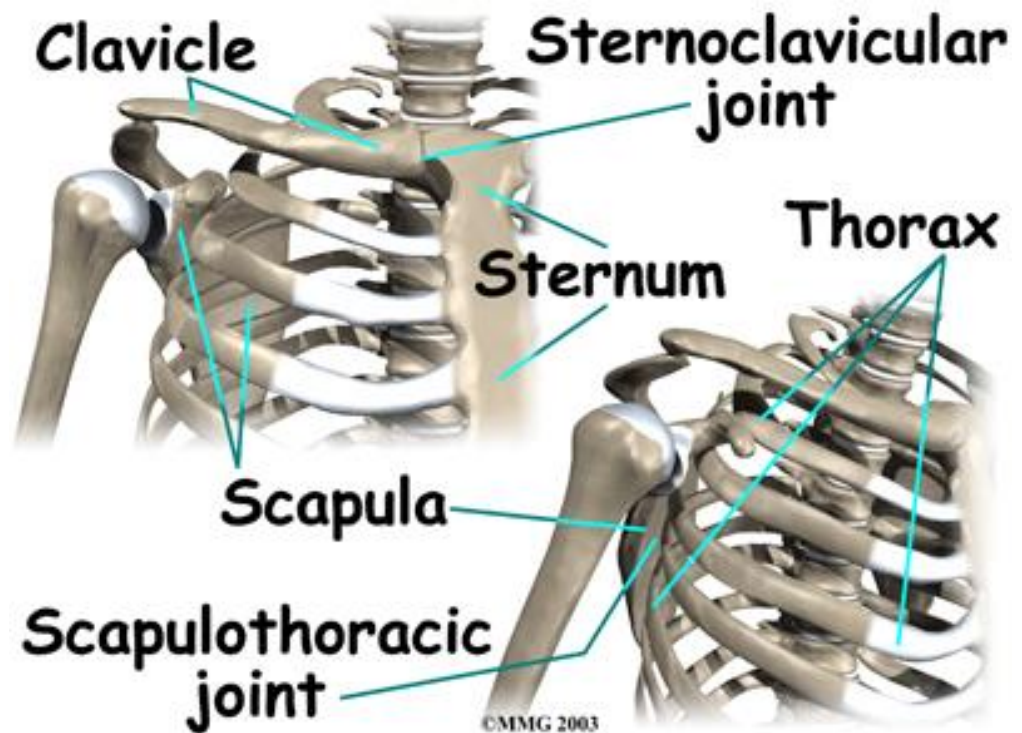


*Healthier, together.*

**Sports Medicine and Arthroscopy**

# Anatomy of the Shoulder

- ◆ Actually 4 joints
  - ◆ Glenohumeral
  - ◆ Acromioclavicular (AC)
  - ◆ Sternoclavicular (SC)
  - ◆ Scapulothoracic
    - ◆ Not truly a joint



# Anatomy of the Shoulder

- ◆ Most motion occurs at GH joint
  - ◆ Ball-and-socket joint
    - ◆ Golf ball on golf tee
      - ◆ Allows for a great deal of motion
      - ◆ Requires soft tissue to provide stability

# Anatomy of Shoulder

- ◆ Rotator cuff
  - ◆ 4 muscles and their tendons: SS, IS, Sub, TM
  - ◆ Tendons coalesce and form a cuff around humeral head
  - ◆ Helps with rotation
  - ◆ Provides a fulcrum for shoulder motion
- ◆ Long head of biceps tendon
  - ◆ One of two tendons of the biceps – not the main one
  - ◆ Enters GH joint in rotator interval (SS/Sub)

# Shoulder Pain

- ◆ Many possible causes
  - ◆ More than one cause can exist at the same time
  - ◆ Can be difficult to distinguish

# Evaluation of Shoulder Pain: History

- ◆ Where does it hurt?
- ◆ When does it hurt?
  - ◆ Time of day?
  - ◆ Activities?
- ◆ Other symptoms
  - ◆ Stiffness?
  - ◆ Weakness?
  - ◆ Grinding?

# Evaluation of Shoulder Pain: History

- ◆ Function
- ◆ Prior treatment

# Evaluation of Shoulder Pain: Physical Exam

- Tenderness
  - GT
  - Post GH joint
  - AC
  - Biceps groove



# Evaluation of Shoulder Pain: Physical Exam

## ◆ ROM

- ◆ Active & passive

  - ◆ Elevation

  - ◆ Rotation

- ◆ Crepitus

## ◆ Strength

- ◆ Deltoid

- ◆ Rotator cuff

# Evaluation of Shoulder Pain: Physical Exam

- ◆ Neurologic
- ◆ Neck
  - ◆ Can mimic shoulder pathology

# Evaluation of Shoulder Pain – X-rays

● 4 views

# Evaluation of Shoulder Pain – X-rays

● 4 views

● AP



# Evaluation of Shoulder Pain – X-rays

- 4 views
  - AP
  - True AP



# Evaluation of Shoulder Pain – X-rays

- 4 views
  - AP
  - True AP
  - Axillary



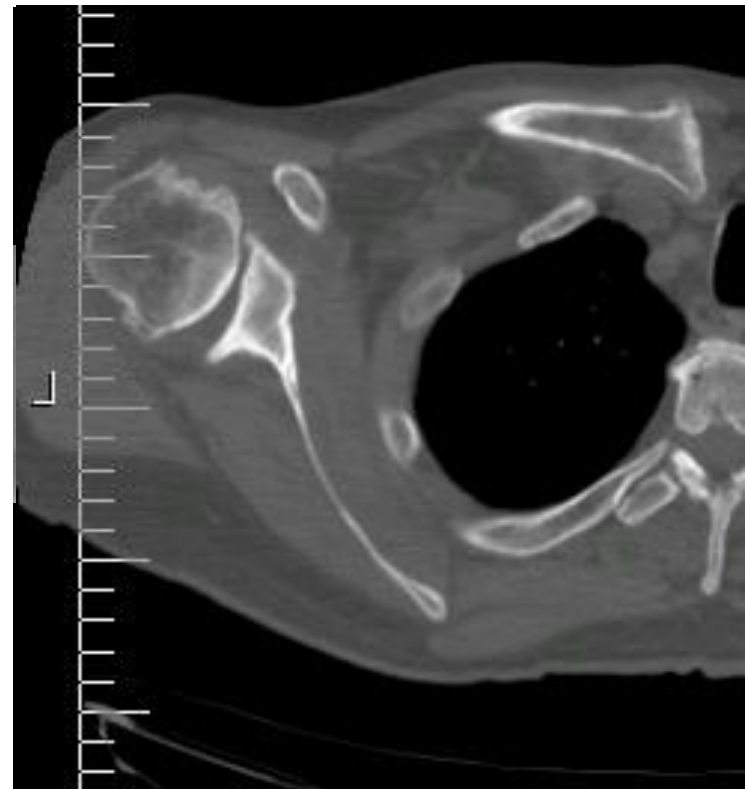
# Evaluation of Shoulder Pain – X-rays

- 4 views
  - AP
  - True AP
  - Axillary
  - Outlet



# Evaluation of Shoulder Pain

- ◆ CT
  - ◆ Bony anatomy
    - ◆ Especially glenoid
  - ◆ Rotator cuff
    - ◆ Limited information





# Evaluation of Shoulder Pain

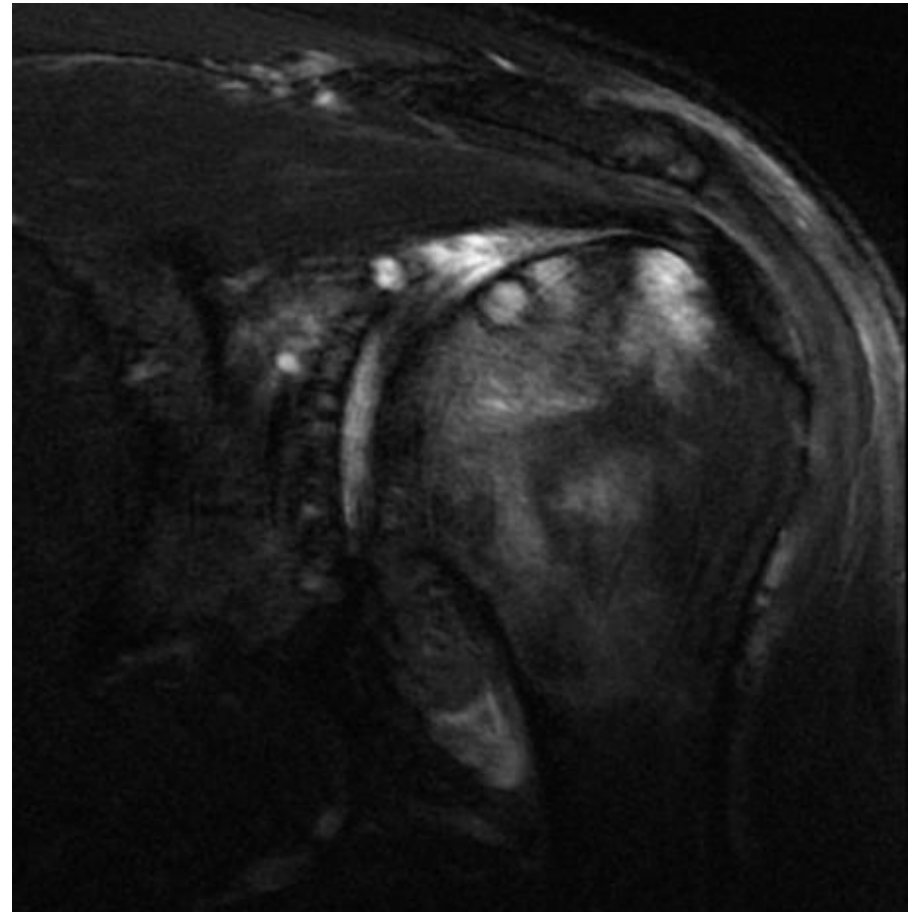
## 💧 MRI

### 💧 Bony anatomy

- 💧 Not as detailed as CT, but usually enough

### 💧 Rotator cuff

- 💧 Detailed information
  - 💧 Integrity
  - 💧 Quality



# Evaluation of Shoulder Pain

- ◆ Ultrasound
  - ◆ Rotator cuff
    - ◆ Cheap, fast, convenient
    - ◆ Operator-dependent
    - ◆ Patients unable to have MRI

# Rotator Cuff-Related Pain

- ◆ Rotator cuff syndrome
  - ◆ Tendinitis
  - ◆ Bursitis
  - ◆ Impingement
  
- ◆ Rotator cuff tears
  - ◆ Partial-thickness
  - ◆ Full-thickness

# Rotator Cuff-Related Pain

- ◆ Tend to feel it on side of the shoulder and arm
- ◆ Worse with overhead and behind back
  - ◆ Putting on coat
- ◆ Worse when lifting objects with extended arm
  - ◆ Grocery bag off backseat
- ◆ Worse at night

# Rotator Cuff-Related Pain

- ◆ Not necessarily a tear
  - ◆ Could be inflammation and impingement
  - ◆ Could be partial-thickness tearing, or small full-thickness tear

# Rotator Cuff-Related Pain

## ◆ MRI

- ◆ Will distinguish tears from tendinopathy
- ◆ Will results change treatment?
  - ◆ Not necessarily an indication for surgery
    - ◆ PT, NSAIDs, +/- cortisone often effective
    - ◆ Reasonable to observe small full-thickness tears

## ◆ Correlate with physical exam

- ◆ Is MRI indicated?
- ◆ Are findings relevant?

# Rotator Cuff Tears

- ◆ Surgical treatment is usually arthroscopic
  - ◆ Small incisions
  - ◆ Outpatient

# Rotator Cuff

- ◆ *Assessment of the cuff has major implications for the treatment of glenohumeral arthritis.*



# Glenohumeral Arthritis

- ◆ Symptoms
- ◆ Types
- ◆ Treatment/Prognosis

# Symptoms of GH Arthritis

- 💧 Pain

  - 💧 Deep

  - 💧 Nighttime

- 💧 Stiffness

- 💧 Crepitus

- 💧 *Decreased function*

# Types of GH Arthritis

- ◆ Arthritis with intact rotator cuff
  - ◆ OA
  - ◆ RA/inflammatory arthritis
  - ◆ Mixed patterns
  - ◆ AVN
  - ◆ Post-traumatic
- ◆ Cuff-deficient arthritis

# Cuff-Intact Arthritis – Exam

- ◆ Cartilage wear
  - ◆ AROM/PROM usually decreased and painful
  - ◆ Crepitus
- ◆ Rotator cuff intact
  - ◆ Strength testing usually good
- ◆ “Good engine, bad tires”

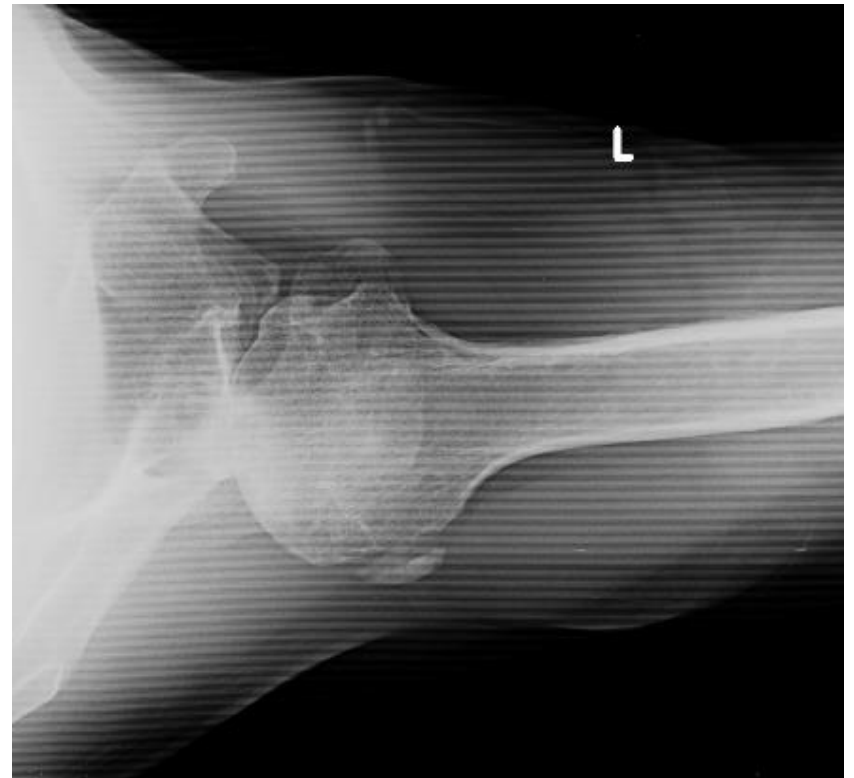
# Osteoarthritis – X-rays

- AP
  - Joint-space narrowing
  - Subchondral sclerosis
  - Osteophytes
    - “Goat-beard”



# Osteoarthritis – X-rays

- Axillary
  - Posterior glenoid wear



# Osteoarthritis – Humeral Head Position

**Centered on AP**



**Posteriorly subluxed on axillary**



# Treatment of Cuff-Intact Arthritis

## 💧 PT

- 💧 Usually not effective
- 💧 Can exacerbate
- 💧 Perhaps effective in early OA with concurrent cuff symptoms

## 💧 NSAIDs



# Treatment of Cuff-Intact Arthritis

## □ Injections

### ■ Steroids

- Short-term

- Limited number of doses

  - Damage to other structures in the joint

  - Risk of infection

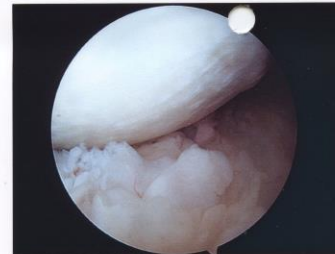
- Contraindications

### ■ Viscosupplementation

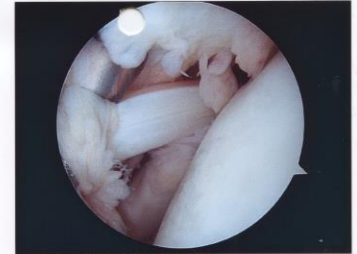
- No evidence of efficacy in shoulder

# Surgery for Cuff-Intact Arthritis

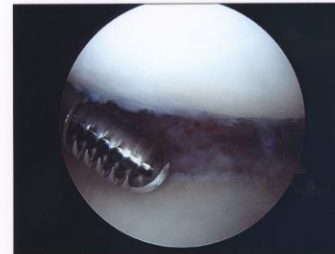
- ◆ Arthroscopy
  - ◆ Debridement/Lavage
  - ◆ Microfracture
  - ◆ Interposition
- ◆ May be appropriate in rare cases only
  - ◆ Young patient (<40)
  - ◆ Early disease



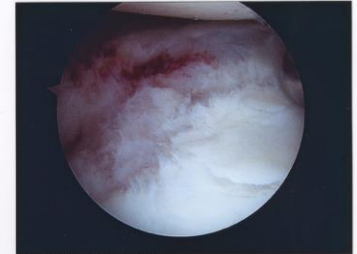
9. 2011-10-26 1139



10. 2011-10-26 1140



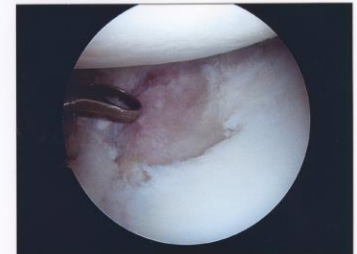
11. 2011-10-26 1141



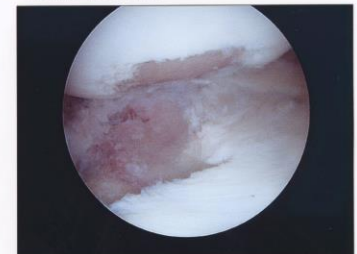
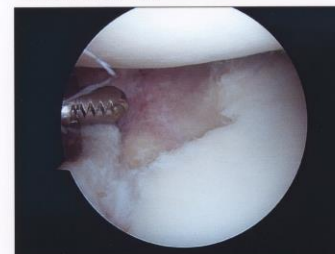
12. 2011-10-26 1154



13. 2011-10-26 1159



14. 2011-10-26 1200



# Treatment of Cuff-Intact Arthritis

## 💧 Surgery

### 💧 TSA

- 💧 Standard of care for OA of GH joint
- 💧 Excellent results
- 💧 Long lifespan
- 💧 Restoration of function/activity level
- 💧 Low rate of complication



# Principles of Shoulder Arthroplasty

## Clinical Goals

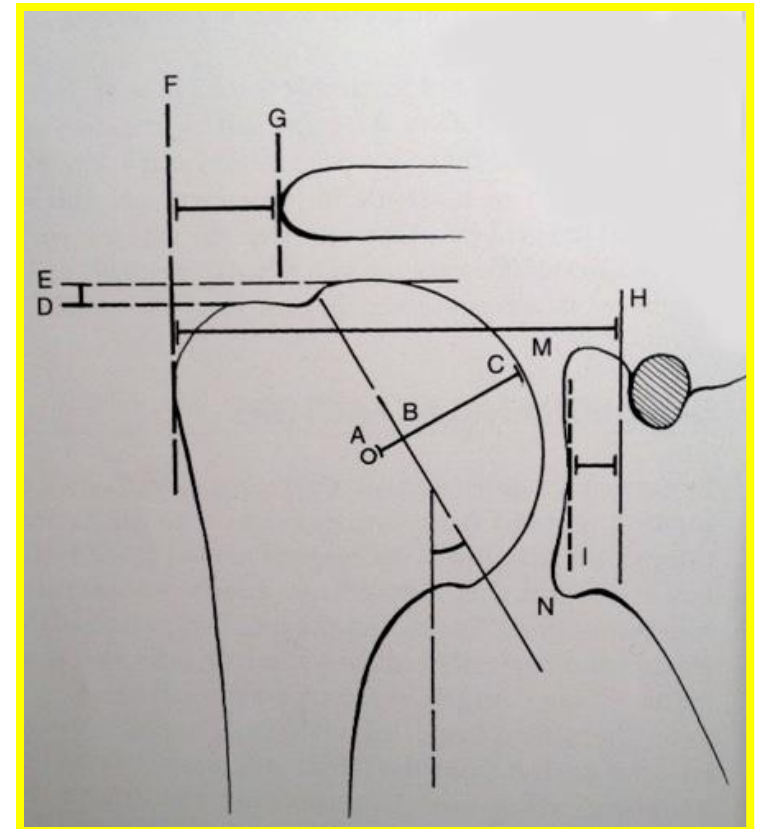
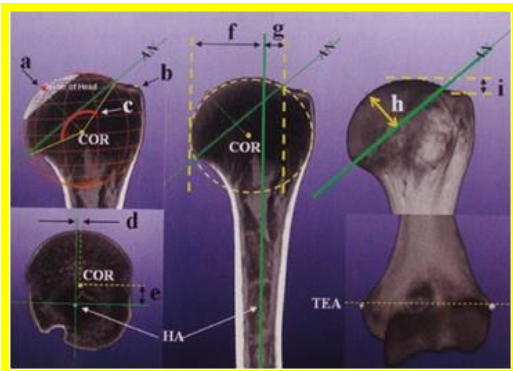
- ◆ Relieve pain
- ◆ Improve function
- ◆ Avoid complications
  - ◆ Shoulder stiffness
  - ◆ Shoulder weakness
  - ◆ Persistence of pain
  - ◆ Component loosening
  - ◆ Rotator cuff tears



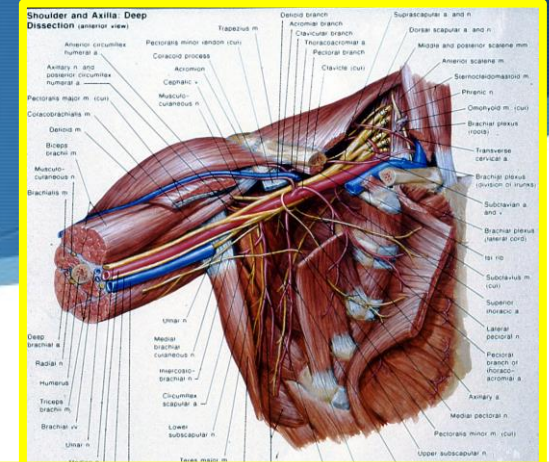
# Principles of Shoulder Arthroplasty

## Technical Goals

- ◆ Anatomic reconstruction of the articular surfaces
- ◆ Proper soft tissue balancing
- ◆ Restoration of normal glenohumeral kinematics



# The Principles of Shoulder Arthroplasty Exposure



## Controlled The Environment

**Know** where the bleeders are located

- Cephalic
- “Three sisters”

**Know** where the nerves are located

- Axillary
- Musculocutaneous
- Radial

**Know** your hang-ups

- Capsuloligamentous releases
- Osteophytes are located

**Correct retractors**



# The Principles of Shoulder Arthroplasty Positioning

- ◆ Beach chair/semi elevated position
- ◆ Head secured, eyes protected
- ◆ Scapula exposed
  - Allows arm extension
- ◆ Adherent plastic drapes
  - Create a sterile barrier



# Principles of Shoulder Arthroplasty

## Reproducing Anatomy

- ◆ Must understand what is normal
  - ◆ Not a ball on a stick
- ◆ Resect only the anatomic portion of the humeral head
- ◆ Humeral head prosthesis
  - ◆ Covers osteotomy site
  - ◆ Restore native height, version, offset





# Total Shoulder Arthroplasty

- What do we do?
  - Incision in front of shoulder
  - Detach one muscle: subscapularis
    - Repaired at the end
  - Releases
    - Remove scar, adhesion, thick and stiff capsule, osteophytes



# Total Shoulder Arthroplasty

- ◆ Replace humeral head
  - ◆ Humeral stem (usually titanium)
  - ◆ Cobalt-chrome head
- ◆ Reshape and resurface glenoid
  - ◆ All-polyethylene
  - ◆ Cement



# Total Shoulder Arthroplasty

## □ Recovery

- 1-2 days in the hospital
- PT begins right away
  - Gentle at first
  - External rotation limited so subscap can heal
- Sling
  - All the time for 2 weeks
  - Can remove when at home from 2-6 weeks
  - Discontinue at 6 weeks

# Total Shoulder Arthroplasty

## □ Recovery

- Can use right away for gentle activities
  - Eating
  - Holding a piece of paper
  - Anything you can do in a sling
- No driving for 6 weeks
- Golf
  - Chip/putt at 6 weeks
  - Long-game at 12 weeks
  - 18 holes at 6 months

# Total Shoulder Arthroplasty

## ◆ Functional expectation

- ◆ Full range of motion
- ◆ Excellent pain relief
- ◆ Daily activities
- ◆ Golf, tennis, swimming

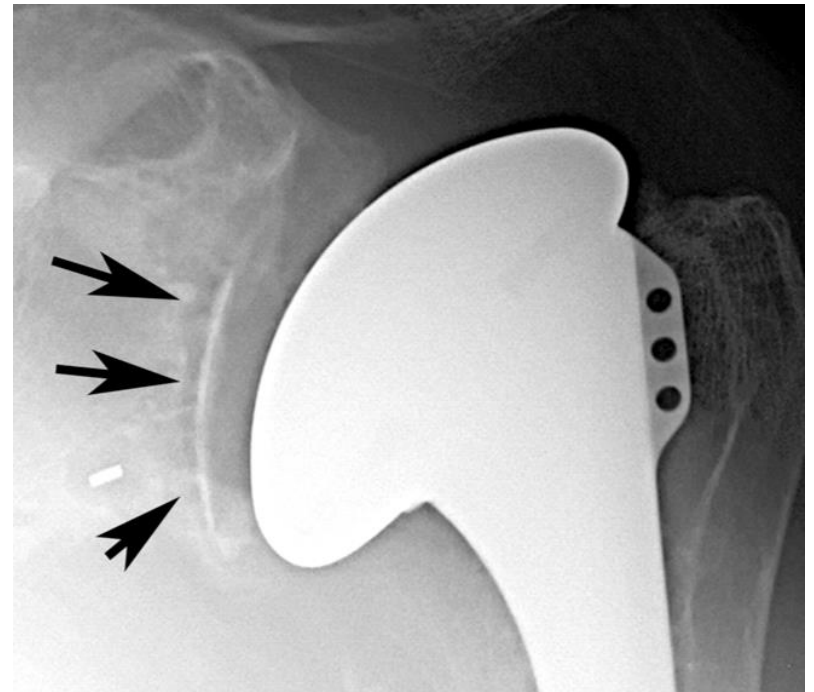
## ◆ Permanent restriction

- ◆ Heavy lifting (>50 lbs)
- ◆ Hard, sudden forces
  - ◆ Boxing, martial arts
  - ◆ Jackhammer

# Total Shoulder Arthroplasty

## 💧 Lifespan

- 💧 Loosening of the glenoid most common mode of failure
  - 💧 Rocking forces
  - 💧 Poly wear
- 💧 Can see “lucent lines” around anchorage



# Total Shoulder Arthroplasty

## 💧 Lifespan

- 💧 Expect very little lucency for about 10 years
- 💧 Can see more each year
  - 💧 Does not always correlate to comfort/function
  - 💧 Lucency does not equal failure
- 💧 Management of symptomatic loosening
  - 💧 Glenoid removal
  - 💧 Glenoid revision

# Cuff-Intact Arthritis Take-Home Points

- ◆ NSAIDs, lifestyle modification
- ◆ TSA gold standard of surgical treatment
  - ◆ Predictably good results
  - ◆ Durable



# Cuff-Deficient Arthritis

- ◆ Sometimes called “cuff arthropathy”
- ◆ Rotator cuff torn or incompetent
  - ◆ Competent cuff keeps humeral head centered, provides fulcrum for motion
  - ◆ Incompetent cuff allows “escape” of humeral head

# Cuff-deficient Arthritis - Presentation

## 💧 Pain

- 💧 Similar to OA

## 💧 Pseudoparalysis

- 💧 Can't lift arm
- 💧 +/- ER lag
- 💧 PROM often preserved (ie: not truly stiff like OA)

# Cuff-deficient Arthritis - Presentation

- ◆ Cartilage wear
  - ◆ Motion usually decreased and painful
- ◆ Rotator cuff not intact
  - ◆ Strength testing shows weak elevation
    - ◆ May show weak ER “Hornblower sign”
- ◆ “Bad engine, bad tires”

# Cuff-deficient Arthritis

- ◆ Joint-space narrowing
- ◆ Anterosuperior escape
  - ◆ High-riding humeral head
  - ◆ Decreased acromiohumeral distance
  - ◆ “Acetabularization” of acromion
- ◆ Humeral osteophytes less typical



# Cuff-Deficient Arthritis

- ◆ TSA insufficient
  - ◆ Does not restore fulcrum
  - ◆ Does not improve motion/function
  - ◆ Rocking force on glenoid leads to early loosening and failure

# Reverse Shoulder Arthroplasty (RSA)

- Orientation of glenohumeral joint is reversed
  - Glenosphere fixed to scapula with screws
  - Polyethylene socket fixed to humeral stem



# Reverse Shoulder Arthroplasty (RSA)

- Orientation of glenohumeral joint is reversed
  - Glenosphere fixed to scapula with screws
  - Polyethylene socket fixed to humeral stem



# Reverse Shoulder Arthroplasty (RSA)

- Same surgical approach/exposure
  - Releases
  - Subscap detachment/repair





# Reverse Shoulder Arthroplasty (RSA)

- Reversed articulation more constrained
  - Substitutes for dynamic stabilization of cuff
  - Restores fulcrum
- COR moved inferior and medial
  - Tensions deltoid
  - Lengthens lever arm



# Reverse Shoulder Arthroplasty (RSA)

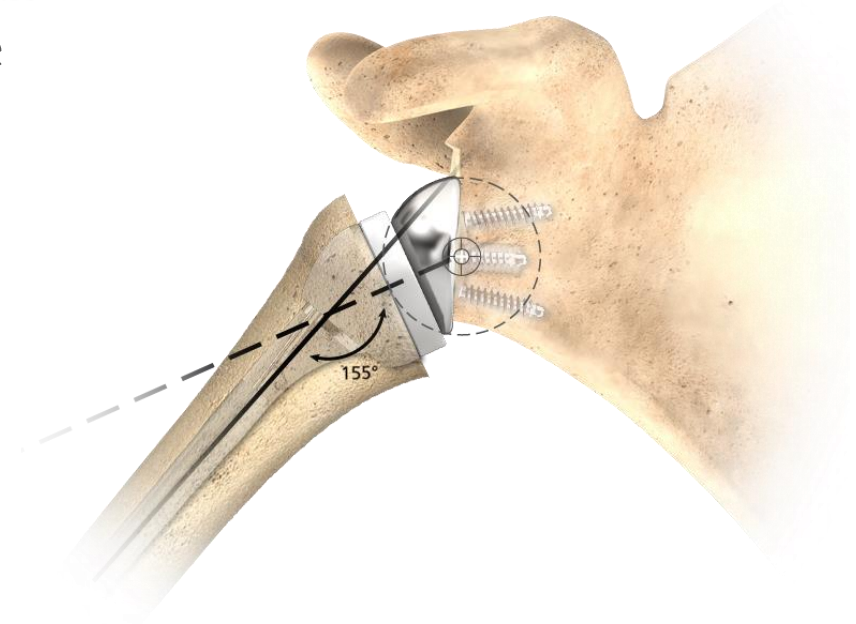
- Can restore physiologic forward elevation in cases of pseudoparalysis
- Does not restore external rotation
- Stability comes at a cost
  - Different functional expectations



# The Principles of Shoulder Arthroplasty

## Reverse Total Shoulder Arthroplasty

- Medialized center of rotation on the face of the glenoid
  - Minimize shear force at implant interface
- Diverging screws with central post
  - Metaglene baseplate fixation
- 155 degree humeral neck resection
  - Provides stability



# Reverse Shoulder Arthroplasty (RSA)

- ❑ Relatively recent innovation
  - ❑ Therefore less information about lifespan
- ❑ Higher rate of complications
- ❑ Technically more challenging
  - ❑ Techniques improving rapidly
- ❑ Revision???



# Reverse Shoulder Arthroplasty (RSA)

- ◆ Recovery similar to TSA
  - ◆ Short hospital stay
  - ◆ No PT in the beginning
- ◆ Goal is pain relief and functional ROM



# Summary

- ◆ There are many possible causes of shoulder pain
- ◆ PT, NSAIDs, +/- cortisone may be appropriate
- ◆ Some causes of pain can be treated with arthroscopic surgery
  - ◆ Rotator cuff
  - ◆ Biceps
  - ◆ AC joint

# Summary

- ◆ GH arthritis can inhibit function and interrupt daily life
- ◆ If conservative management fails, arthroplasty can have excellent results
- ◆ Status of the rotator cuff affects what kind of arthroplasty is appropriate

Thank you



*Healthier, together.*

**Sports Medicine and Arthroscopy**

