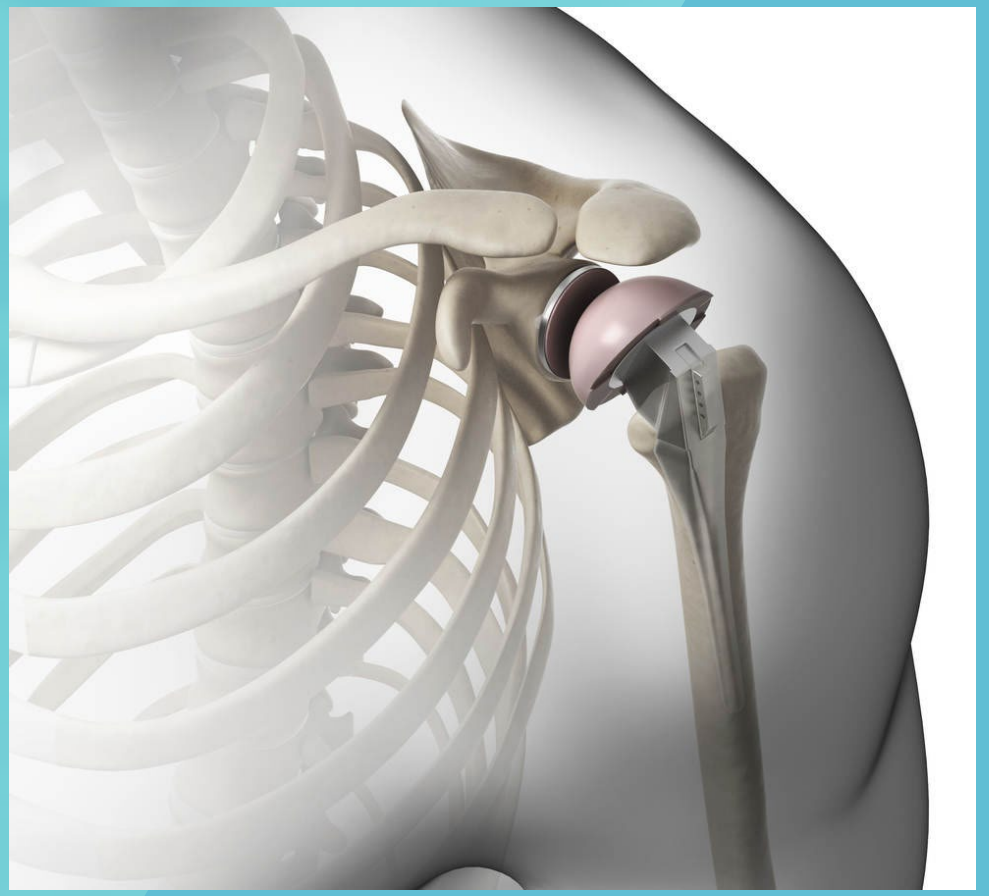
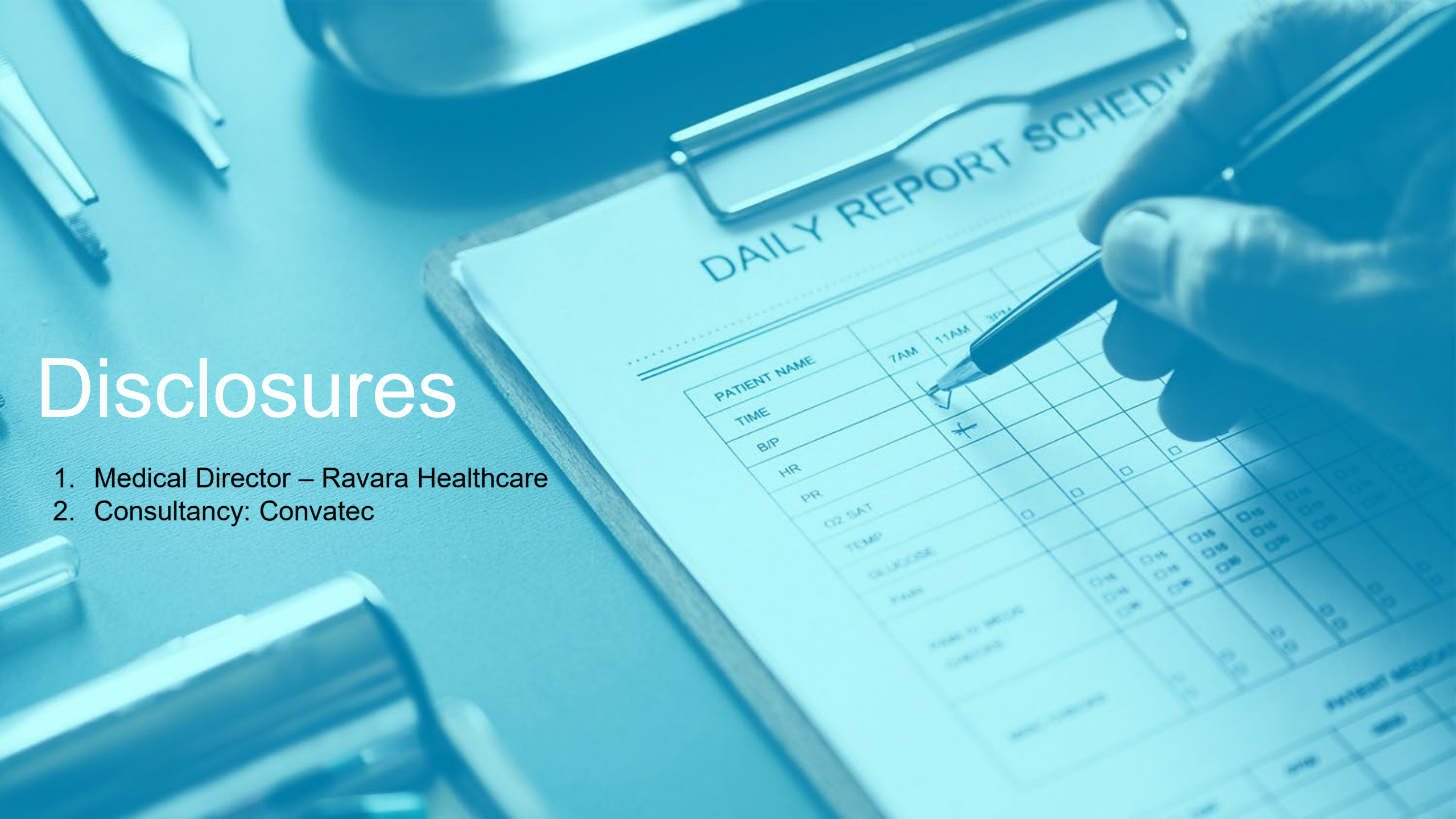
SHARP CME

Innovations in Shoulder Replacement

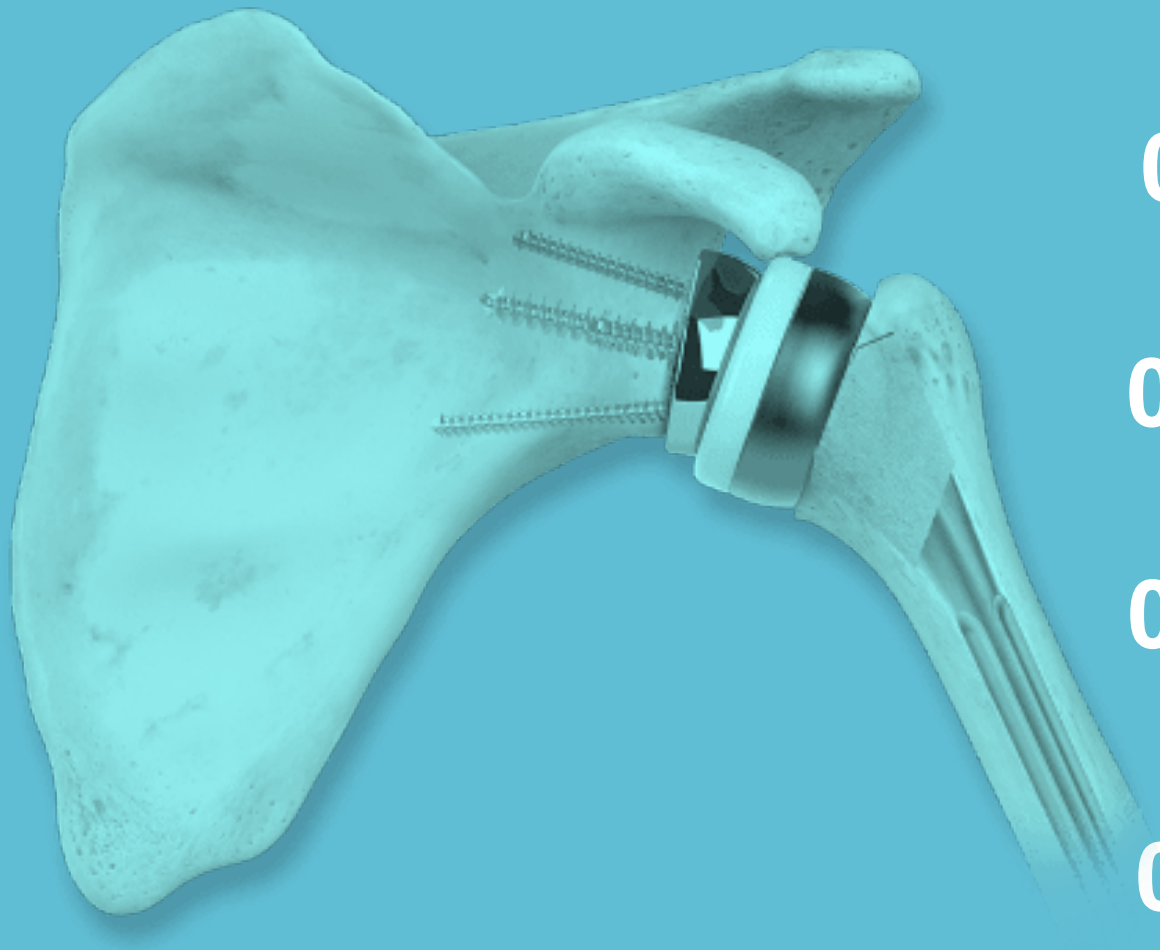
Mark Schultzel MD
Synergy Orthopedic Specialists Medical Group
October 28, 2020





Disclosures

1. Medical Director – Ravara Healthcare
2. Consultancy: Convatec



Agenda

01 “Arthur Itis”, the Local Guy

All about the disease that afflicts so many of our patients, nuances in the shoulder

02 Shoulder Replacement Is a Thing?

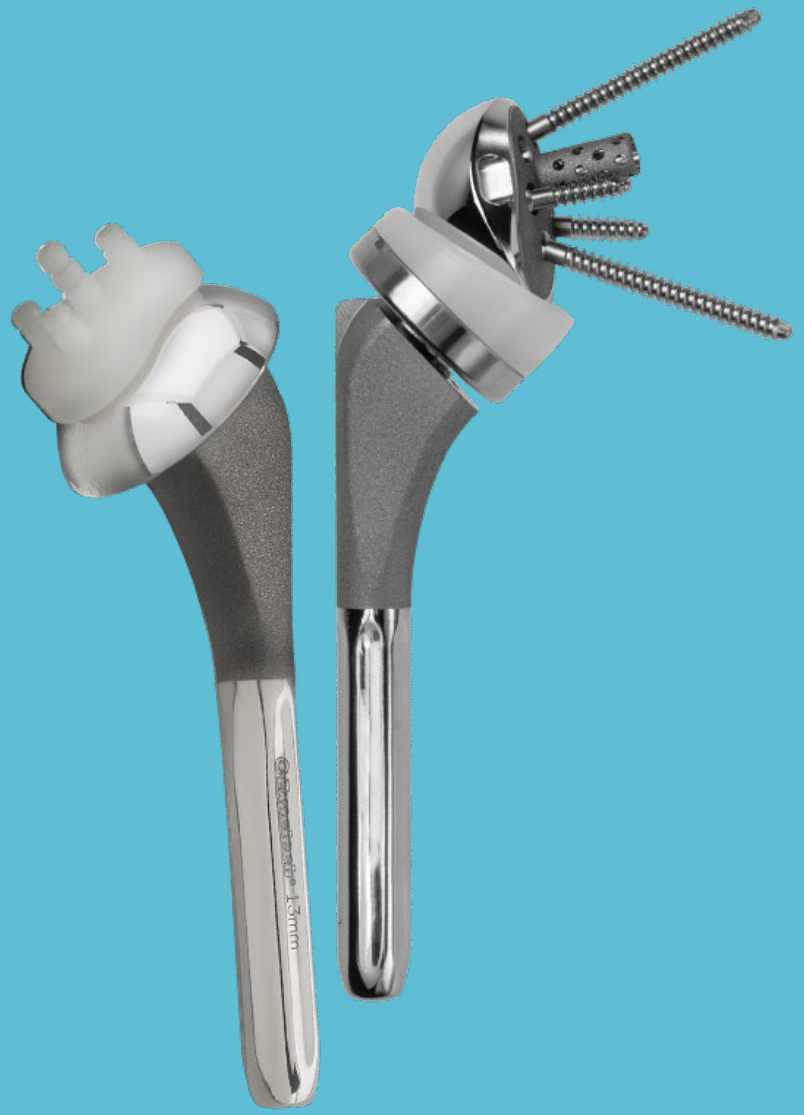
Why we use shoulder replacements, indications for surgery

03 Innovation Meets Preparation

How to get patients to the OR safely, reduce complication rates, and get great results; new innovations in planning/technique

04 Rehab and Recovery

What patients should expect as they recover from surgery



Educational Objectives

1. Diagnose shoulder arthritis and to consider various available treatment options.
2. Recognize indications for shoulder replacement.
3. Recognize medical clearance for surgery and risk stratification when it comes to shoulder replacement
4. Summarize new advances in shoulder replacement techniques and technologies
5. Describe expected post-op course and recovery for patients undergoing shoulder replacement surgery.

Synergy Orthopedic Specialists
medical group

A Bit About Me

Mark Schultzel MD

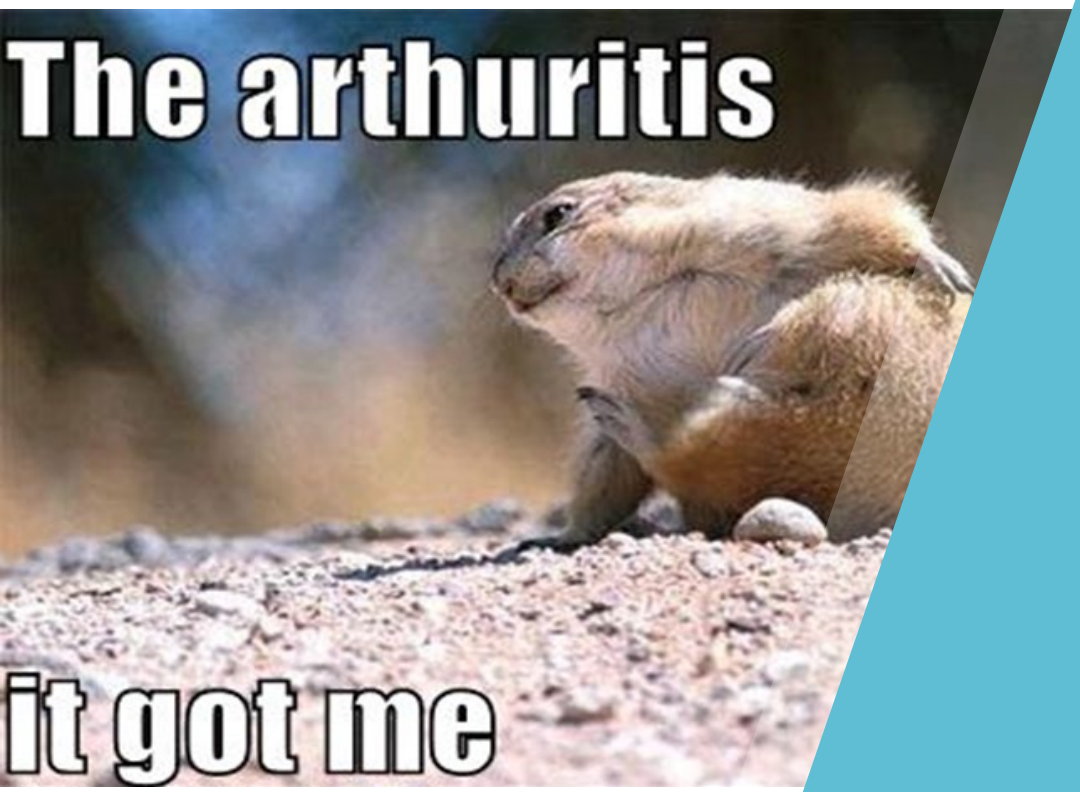
Education:

- Undergrad: UC San Diego ’05: BS: Biology, BA: Psychology
- Medical School: UCSD ‘09
- Residency: UMKC ‘15
- Fellowship: Kerlan-Jobe Orthopedic Clinic ’16: Shoulder and Elbow Surgery
- Other: E-MBA, UCSD Rady School of Management ‘21

Activities:

- Team Physician: USA Kendo Team, US Olympic Committee
- Exchange Fellowship Committee – American Shoulder Elbow Surgeons
- Emerging Leader/Social Media Committee – American Orthopedic Association
- Shoulder and Elbow Exam Committee/Emerging Professional – American Academy of Orthopedic Surgeons

All About Shoulder Arthritis



Glenohumeral Arthritis:

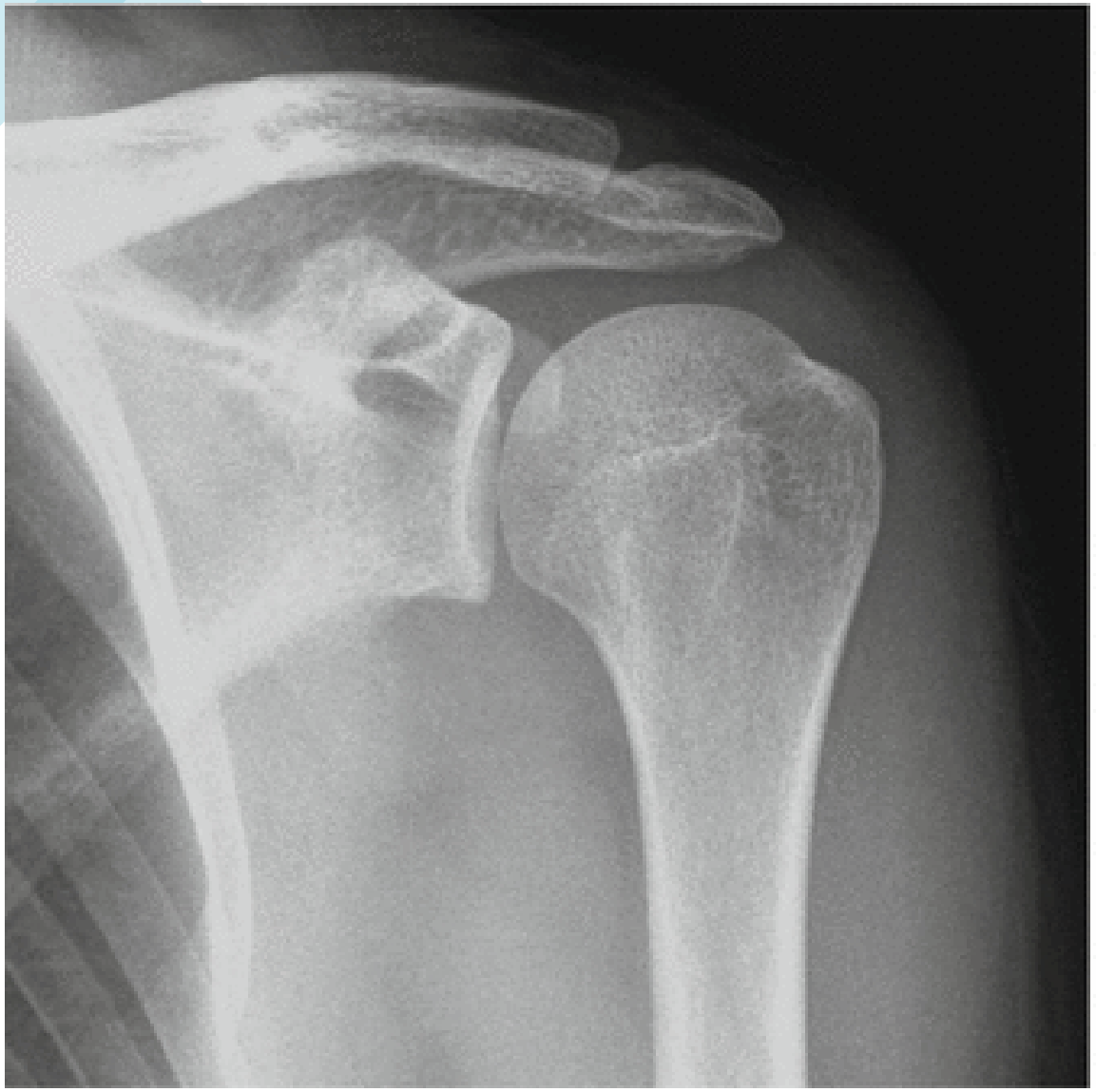
- Damage to articular surfaces of humerus/glenoid

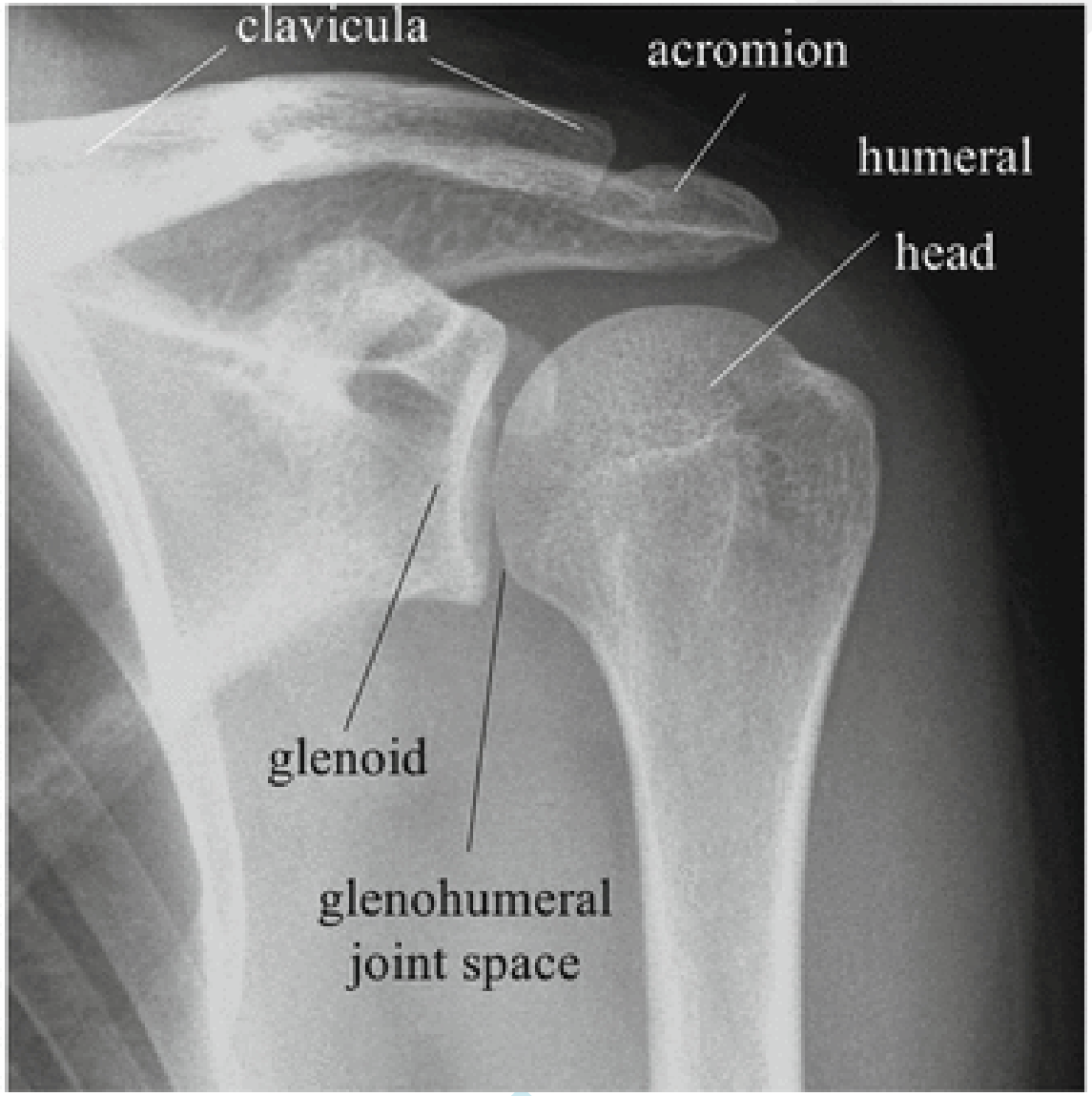
Etiology:

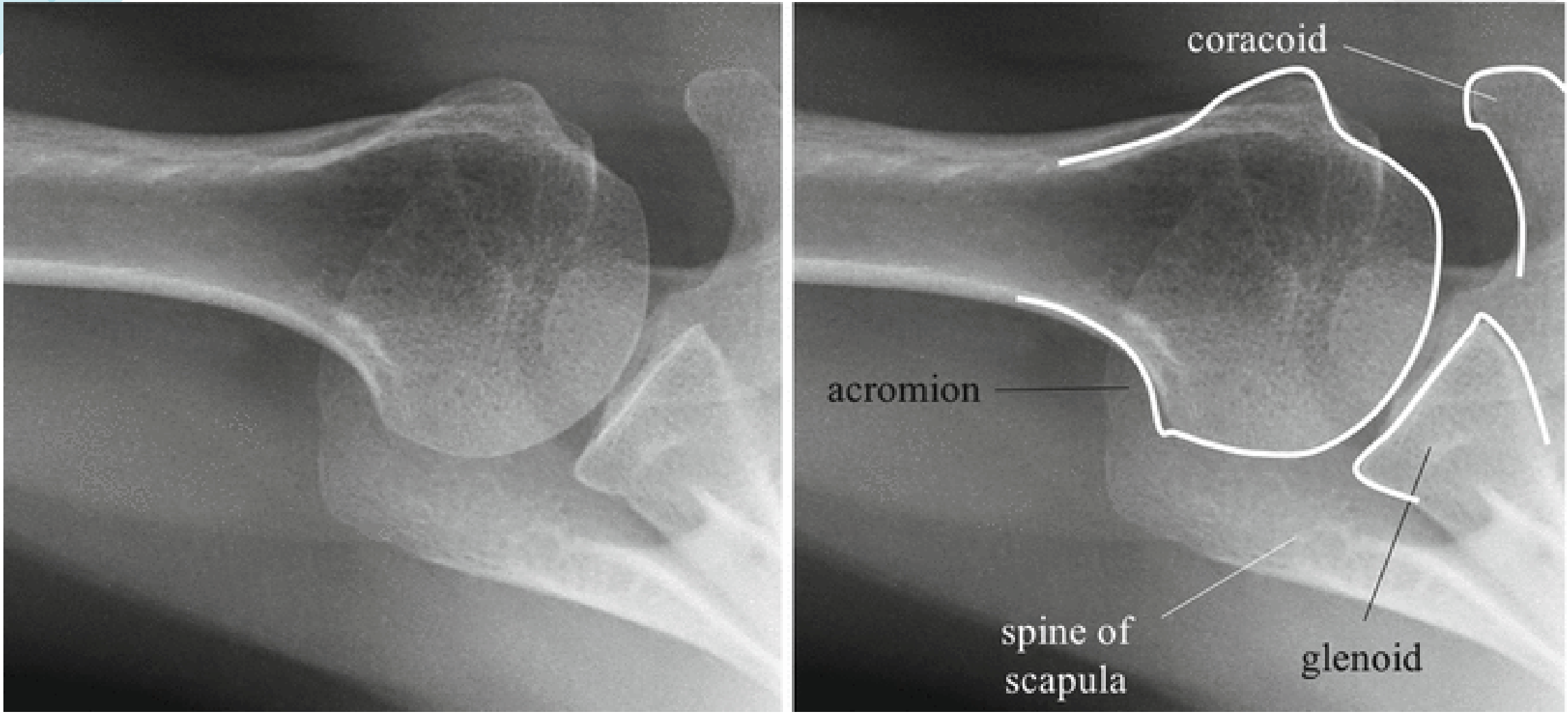
- Primary osteoarthritis
- Secondary arthritis
  - post-traumatic
  - arthritis of dislocation
  - inflammatory/crystalline arthritis
  - osteonecrosis
  - neuropathic (Charcot Arthropathy)
  - rotator cuff arthropathy

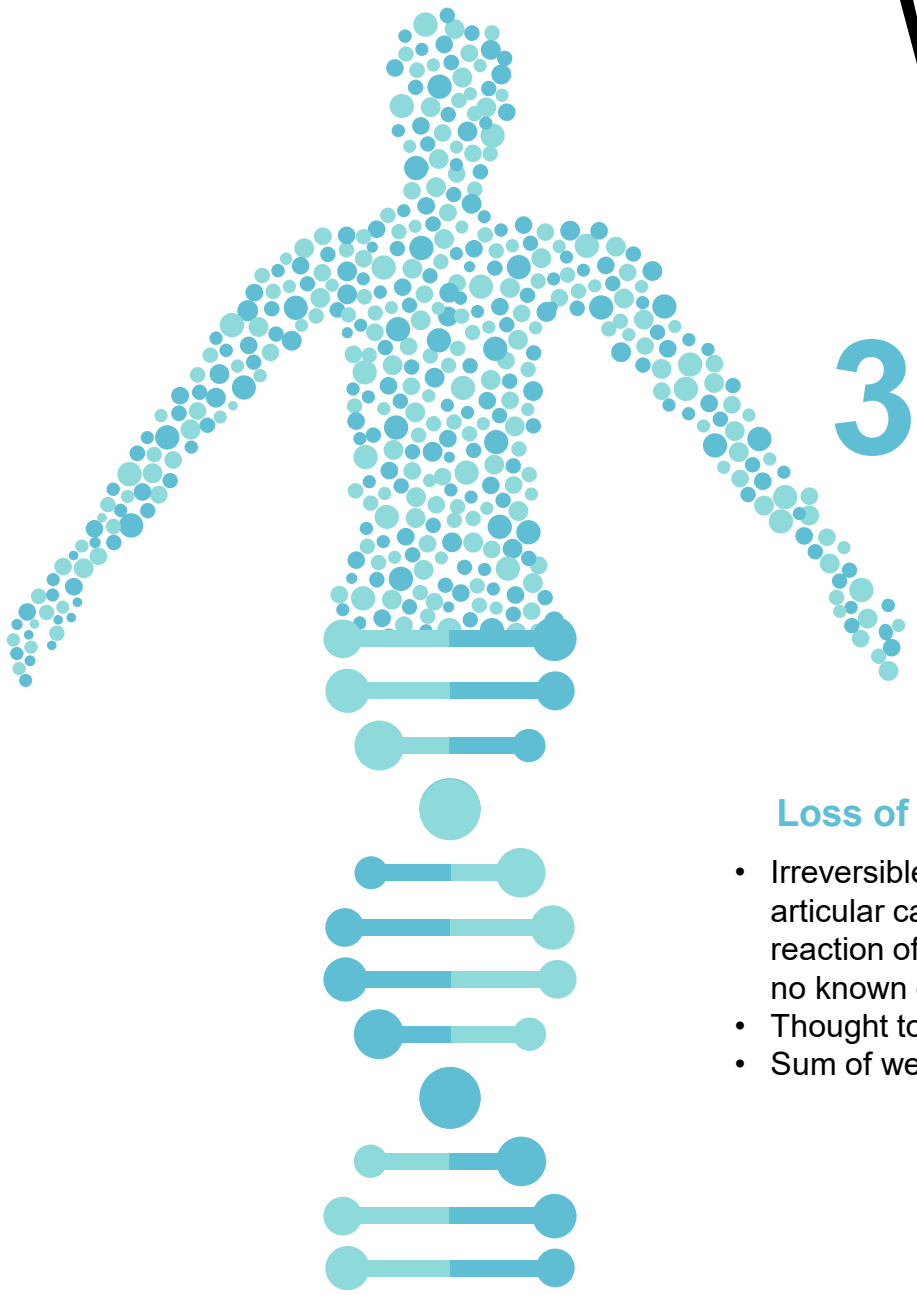
Incidence:

- Increases with age
- More common in women
- Risk more than doubles in patients with dislocation history




clavicula
acromion
humeral
head
glenoid
glenohumeral
joint space


coracoid
acromion
spine of scapula
glenoid



What causes shoulder arthritis?

32.8% **of patients over 60 years of age suffer from shoulder arthritis**

- Patients perceive that the impact of shoulder OA is comparable with that of chronic medical conditions such as congestive heart failure, diabetes, and acute myocardial infarction.
- The prevalence of shoulder OA increases with age and women appear to be more susceptible than men

Loss of Articular Cartilage

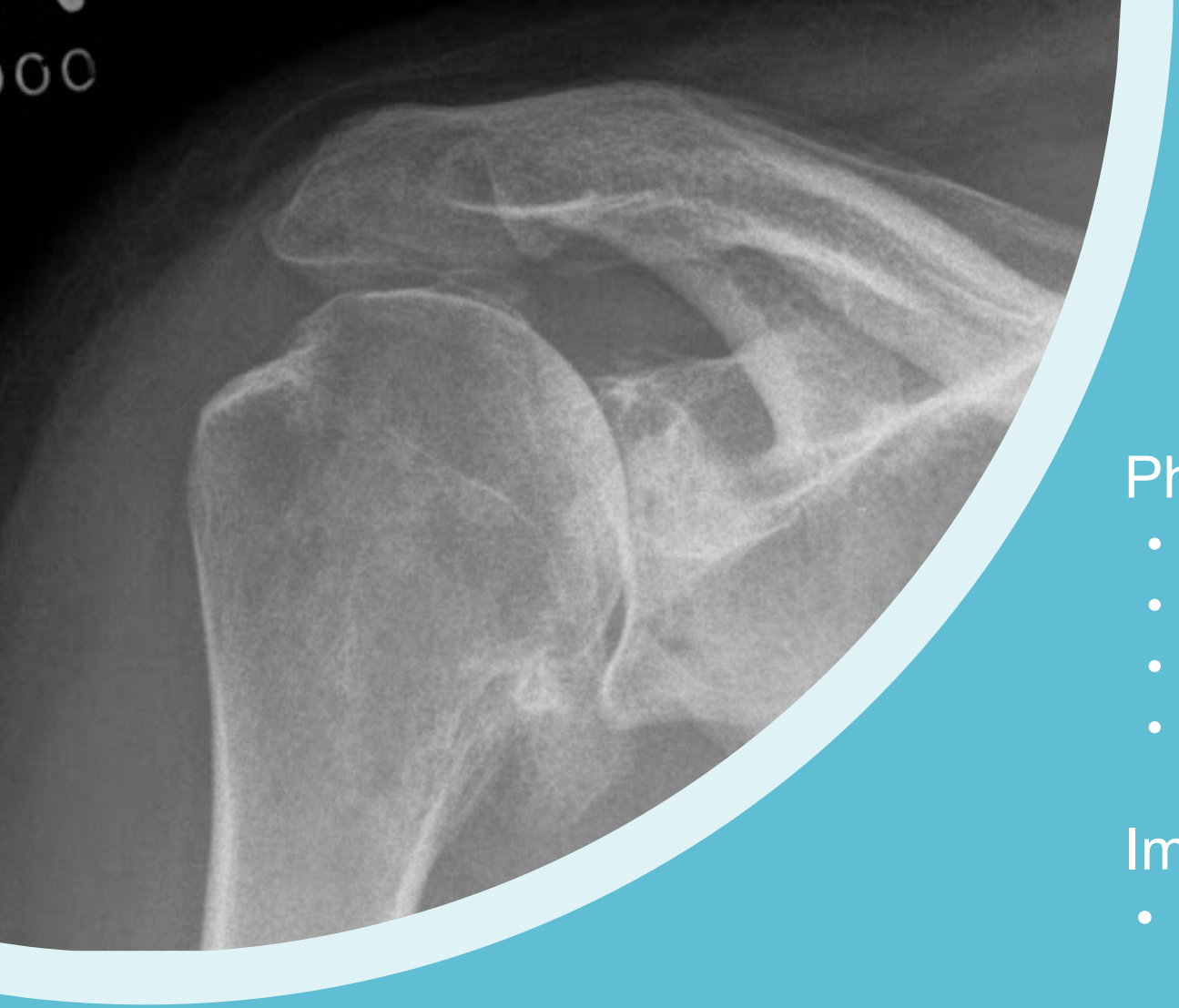
- Irreversible progressive loss of articular cartilage with hypertrophic reaction of the subchondral bone; no known cause
- Thought to have genetic component
- Sum of wear/injury to joint over time

Acquired Deformity

- Thinning/absence of cartilage leads to:
  - Flattening
  - Osteophytes
  - subchondral cyst formation
  - posterior humeral subluxation
  - glenoid deformity

Rotator Cuff Injury

- loss of the concavity due to compression effect
- decreased range of motion and shoulder function
- humeral head migration
- instability with possible recurrent dislocations



What are the signs of Arthritis?

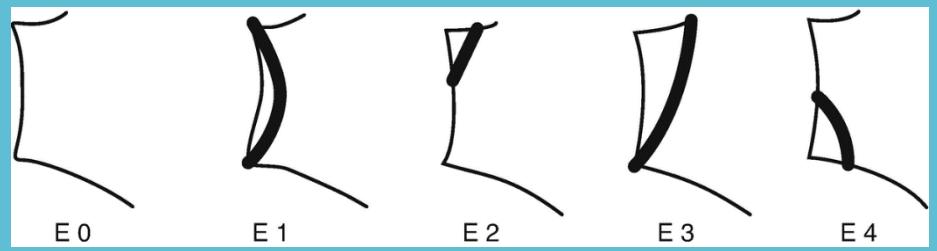
Physical Exam

- Pain, especially with use
- Stiffness, loss of motion
- Occasional swelling warmth, due to effusion
- Night pain

Imaging:

- Thinning of cartilage (bones getting closer together)
- Sclerosis (whiter color along articular surfaces)
- Osteophytes (bone spurs)
- Subchondral cyst formation (more apparent on CT/MR)

Favard



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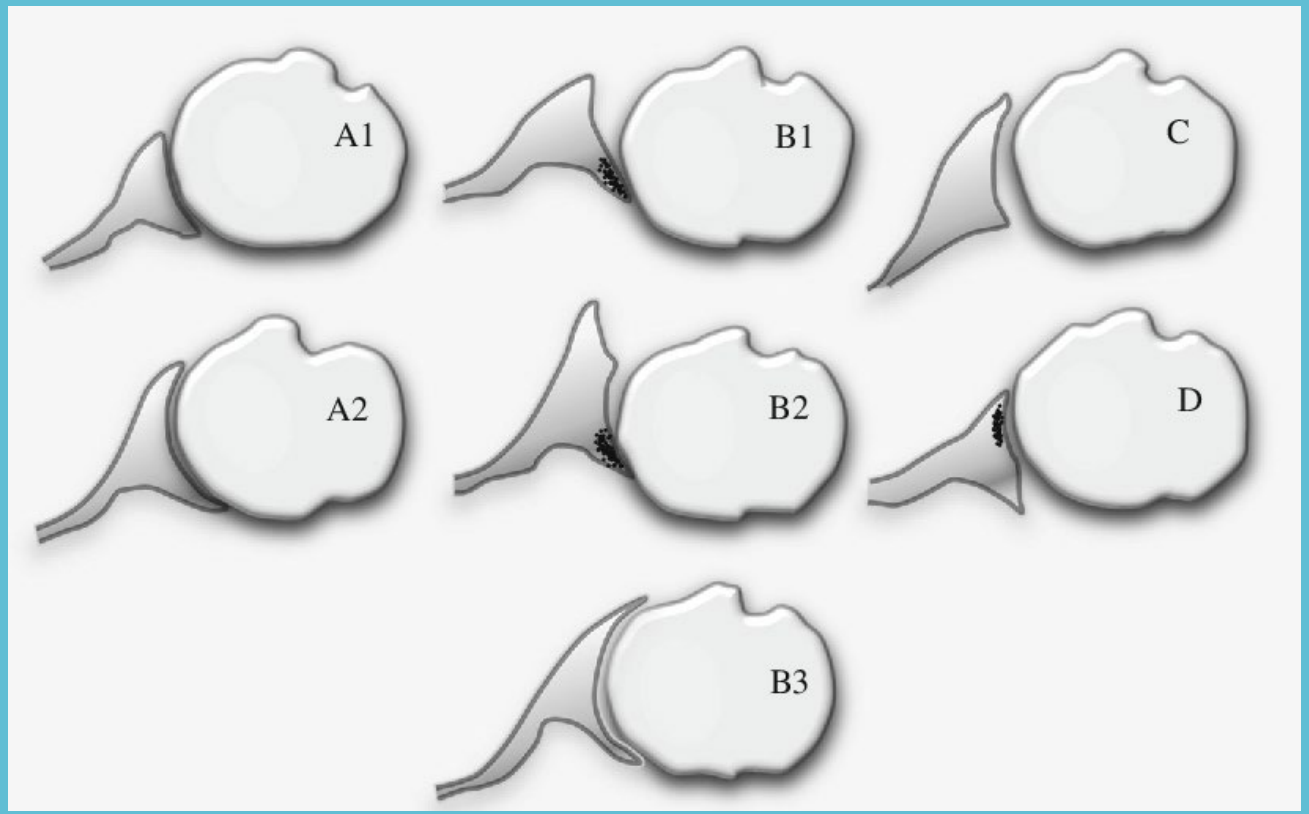

Hamada

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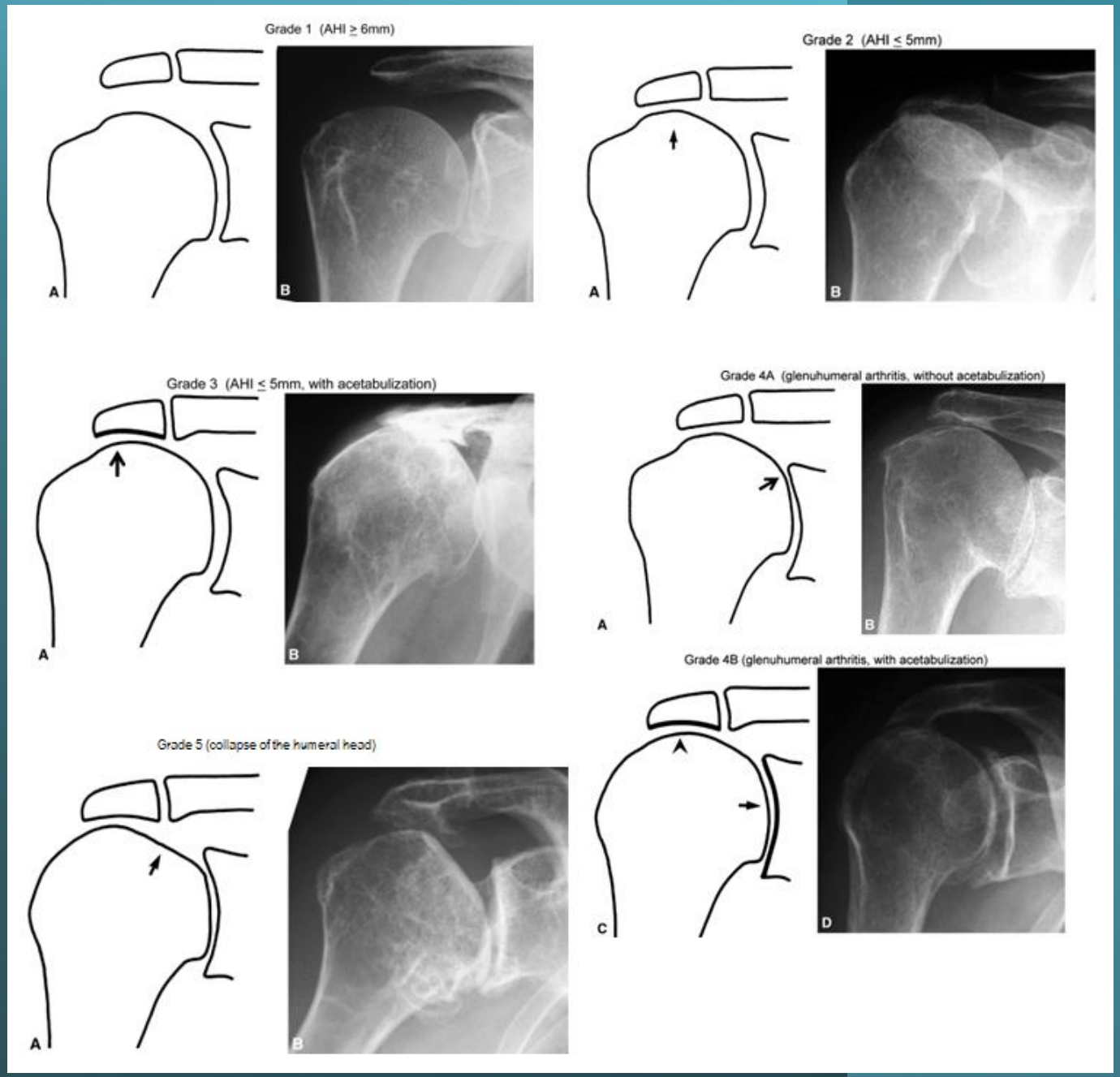

Grade 1 (AHI ≥ 6mm)
A
B
Grade 2 (AHI ≤ 5mm)
A
B
Grade 3 (AHI ≤ 5mm, with acetabulization)
A
B
Grade 4A (glenuhumeral arthritis, without acetabulization)
A
B
Grade 4B (glenuhumeral arthritis, with acetabulization)
C
D
Grade 5 (collapse of the humeral head)
A
B

Arthritis Treatment Options

Non-operative:

- Medications
- Physical Therapy
- Injections
- Bracing

Operative:

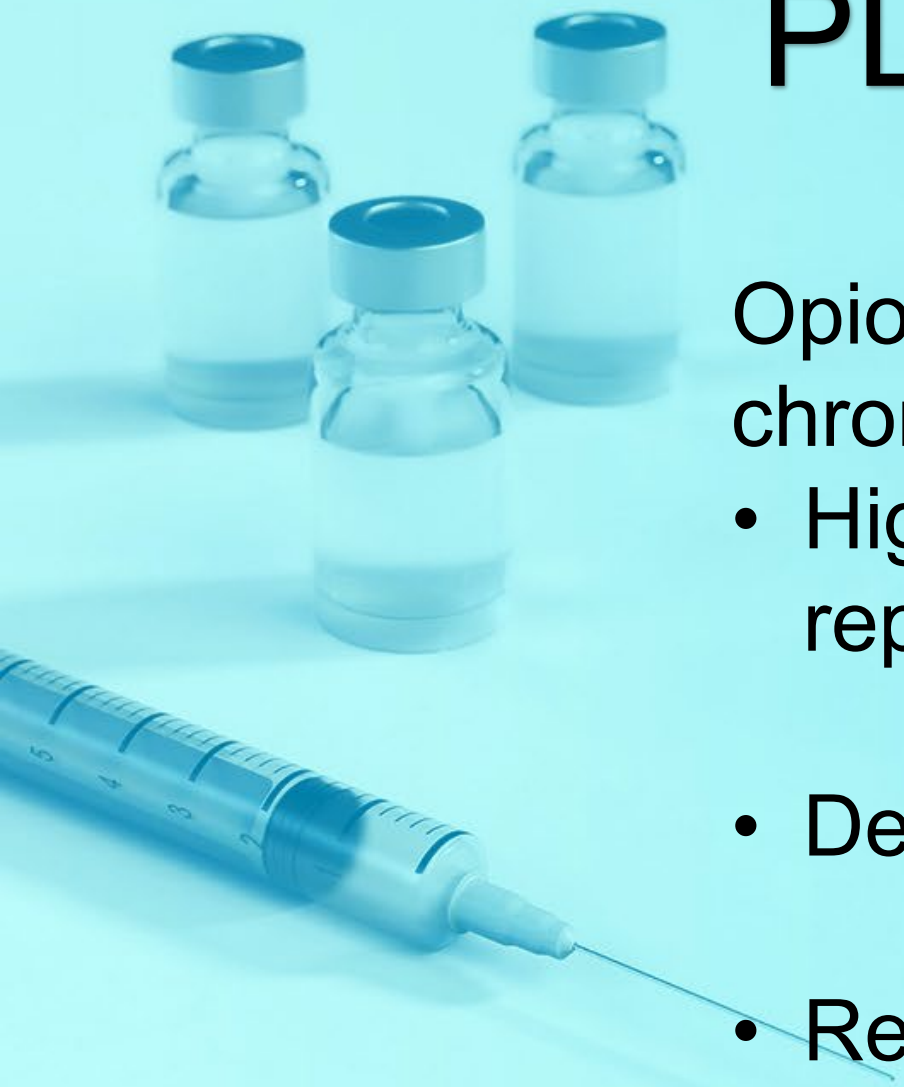
- Total Shoulder Replacement
- Reverse Shoulder Replacement
- Hemi-arthroplasty
- Cage RSA
- Balloon Arthroplasty

Non-Operative

Arthritis Treatment Options

Medications:

- Tylenol
- NSAID's
  - PO: Meloxicam, Diclofenac, Ibuprofen, Celebrex, etc
    - Always Rx PPI with PO meds!
    - Avoid in CKD, anti-coagulated
  - Topical: Diclofenac gel
    - Safe in patients receiving anticoagulation
- CBD
  - Available as topical and sublingual



PLEASE AVOID OPIOIDS

Opioid use is a major challenge in patients with chronic arthritis:

- Higher pain scores after shoulder replacement
- Decreased functional outcomes after surgery
- Recommendations are to wean off prior to any surgical intervention

Blevins MP, et al. *Pain Medicine*. 2019;doi:10.1093/pm/pnz083.

B

Shoulder Surgery Unit

READING

Reading Shoulder Unit

Mr Stephen A Copeland, FRCS
Consultant Orthopaedic Surgeon

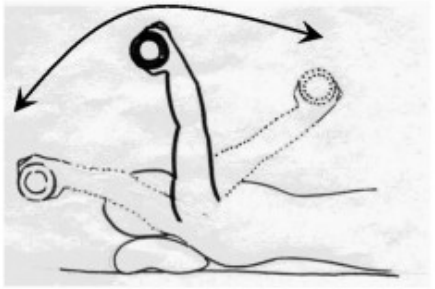
Mr Ofer Levy, MD MCh (Orth)
Consultant Orthopaedic Surgeon

6. As you get more confidence in controlling your shoulder movement, gradually increase the amplitude of movement until your arm will move from the side of your thigh to above your head, touching the bed, and return.

   Keep the movement smooth and continuous for 5 minutes or until fatigue.

7. As you get more confidence in controlling your shoulder movement, a lightweight e.g. a tin of beans or small paperweight, should be held in the affected hand.

   Repeat as above (5 and 6).



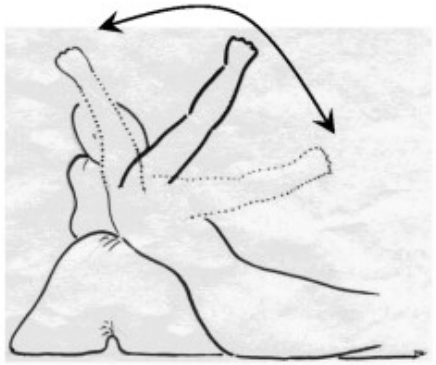
8. Having more confidence in controlling your shoulder movement gradually go from lying down to sitting and eventually standing.

   At this stage you may recline the head of your bed or put some pillows underneath your back to recline your position.

   Repeat the same exercise again, this time against some gravity.

   Start again from holding your arm in the upright position with its own strength.

   Repeat as above (5, 6, and 7).



Start first without any weights and progress to use the same lightweight you used before in the lying down position.

Email: yslstudio@btinternet.com

Non-Operative

Arthritis Treatment Options

- Physical Therapy:
  - Reading Shoulder Unit
  - Levy O, et al. The role of anterior deltoid reeducation in patients with massive irreparable degenerative rotator cuff tears. J Shoulder Elbow Surg. 2008
    - Deltoid re-education useful for patients with both shoulder arthritis and irreparable cuff tears!

Arthritis Treatment Options

Injections:

- Steroid injections (cortisone)
  - Must wait 3 months minimum between treatments
  - Watch A1c: MUST BE < 8.0
  - Variable success based on anatomy, disease, aim

- Hyaluronic Acid
  - Limited successful research; not covered by most insurances

- PRP
  - Some research to suggest that leukocyte-poor helpful in arthritis
  - Not covered by insurance

Arthritis Treatment Options

Injections:

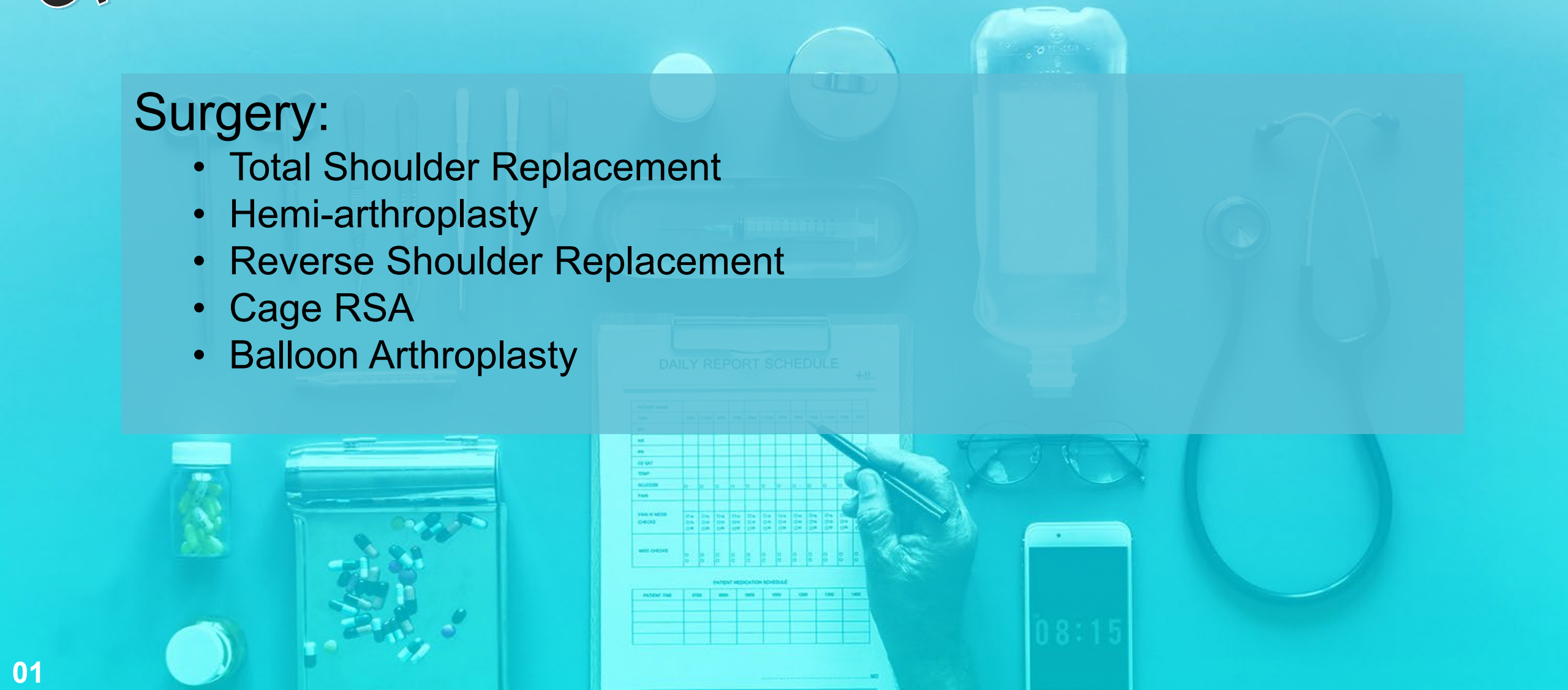
- What about stem cells?
  - NO proven science that this works
  - NO FDA regulation
  - Very expensive, with no sterility controls
  - Unable to inject differentiation factors in US currently
  - High infection risk

- Future products:
  - Injectable fat

Operative Arthritis Treatment Options

Surgery:

- Total Shoulder Replacement
- Hemi-arthroplasty
- Reverse Shoulder Replacement
- Cage RSA
- Balloon Arthroplasty

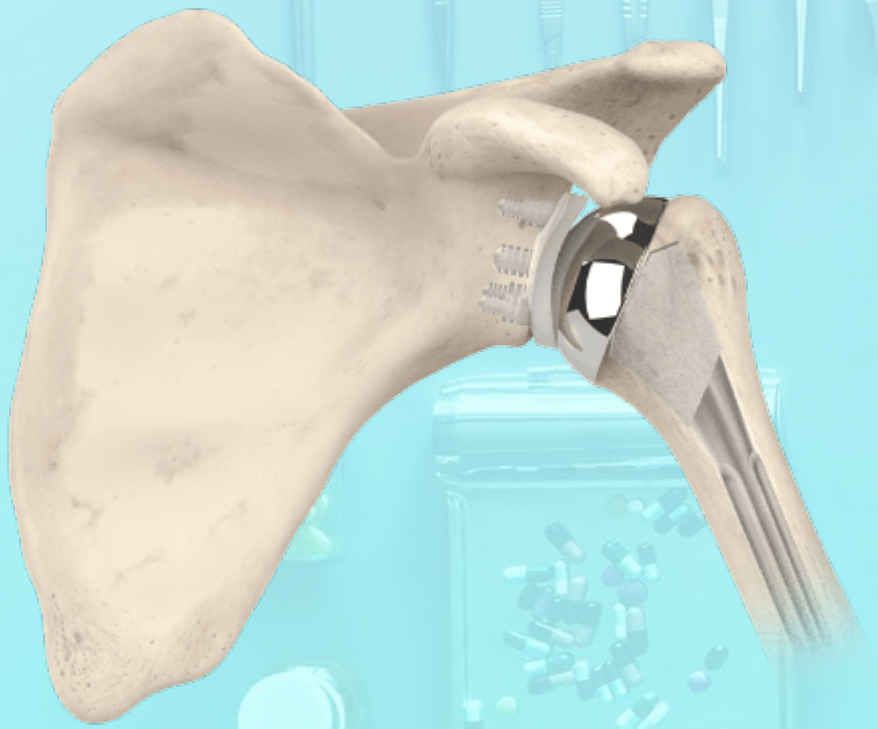


TSA

hemi

RSA

Shoulder Replacements Exist?

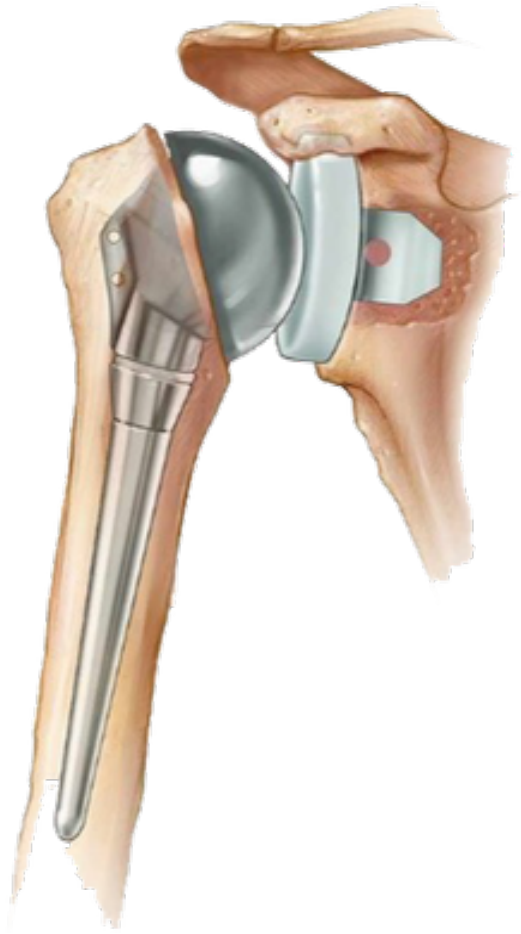


Yes, they sure do!

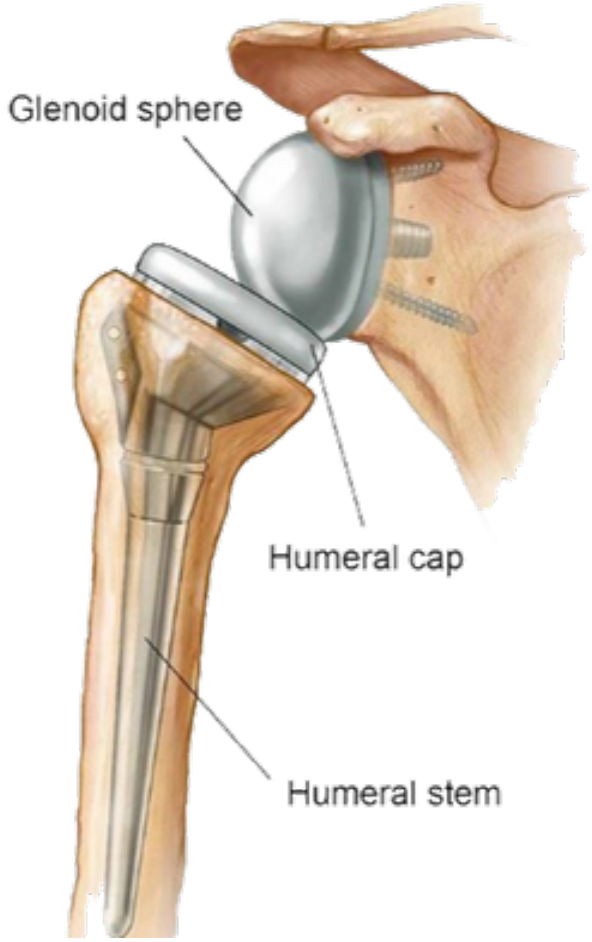
Indications For Surgery

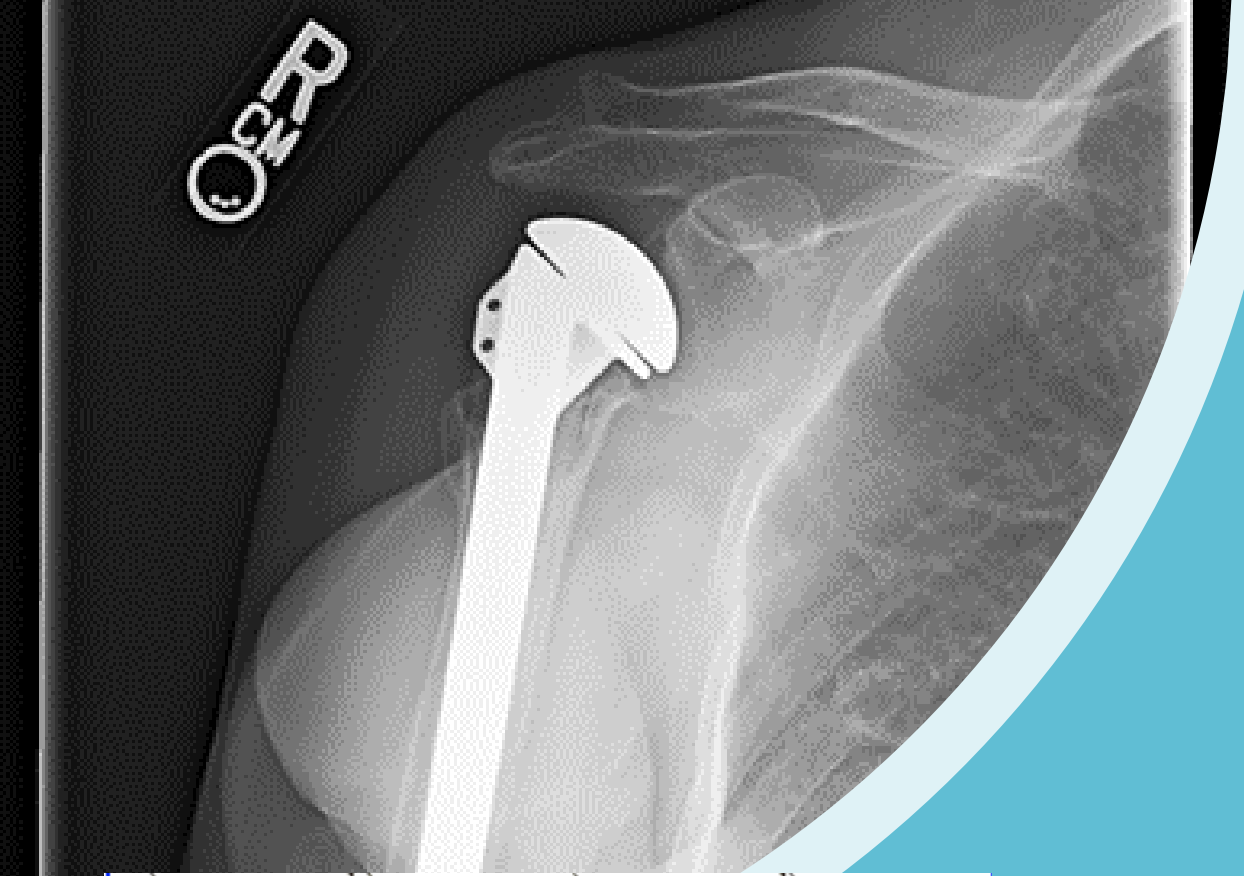
- Pain on exam and at rest
- Loss of motion, stiffness
  - With or without weakness
- Difficulties with ADL's, arm function
- Pain that interferes with sleep
- Have tried and failed all non-operative treatments
- Medically able to undergo surgical procedure and post-op rehab
- Patient desires the operation
- MUST have a functional deltoid

Total shoulder arthroplasty

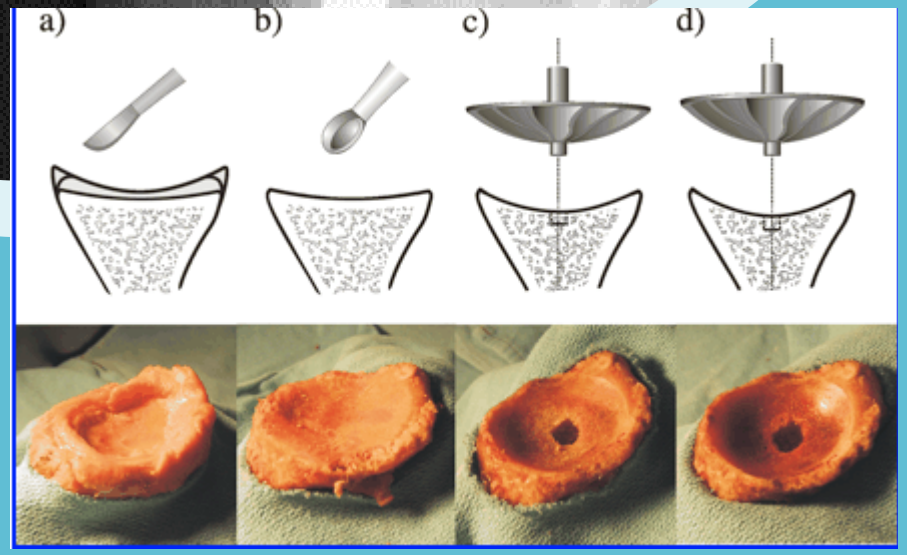


Reverse shoulder arthroplasty



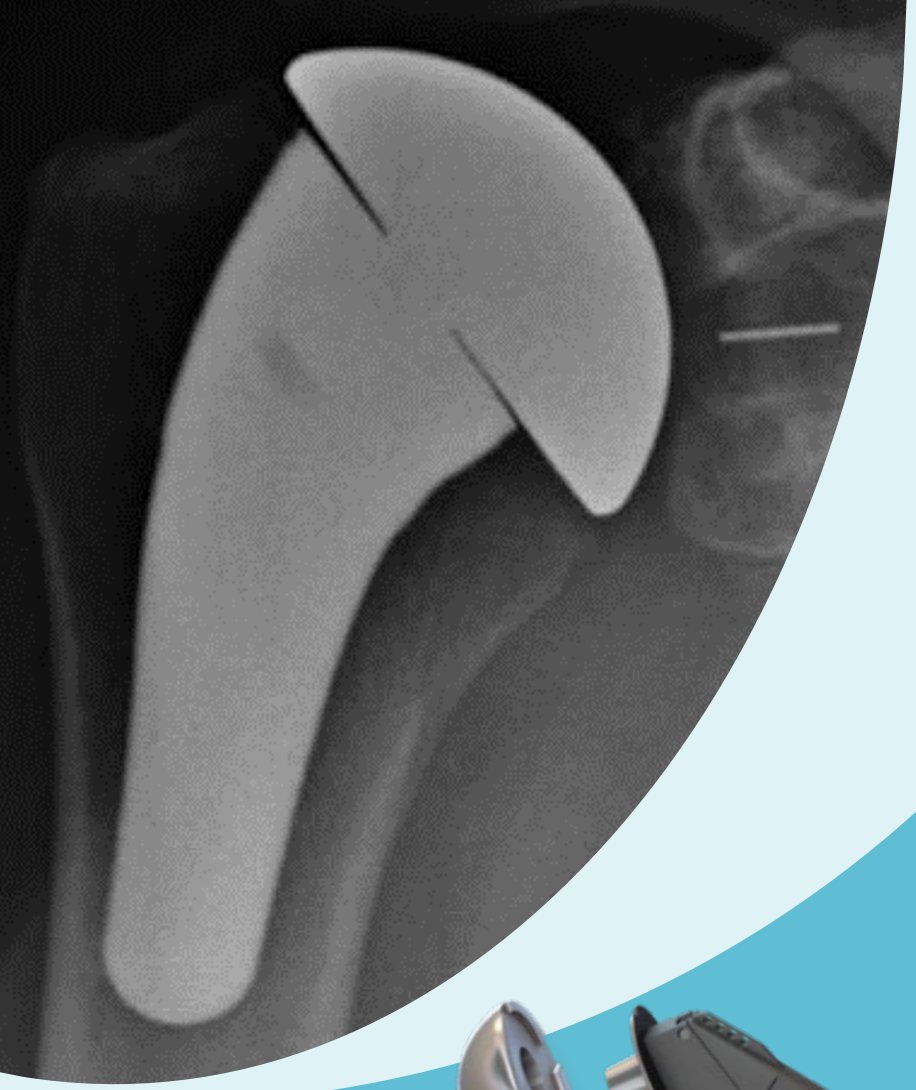


Total, Hemi, or Reverse?



Hemi-arthroplasty:

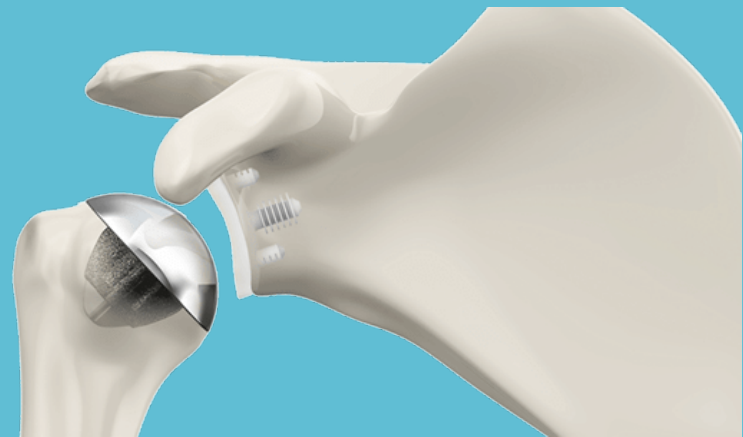
- Originally for humeral-only arthritis or proximal humerus fractures
- Ream-and-Run Technique
- Rarely performed anymore, as failure, revision rates are high

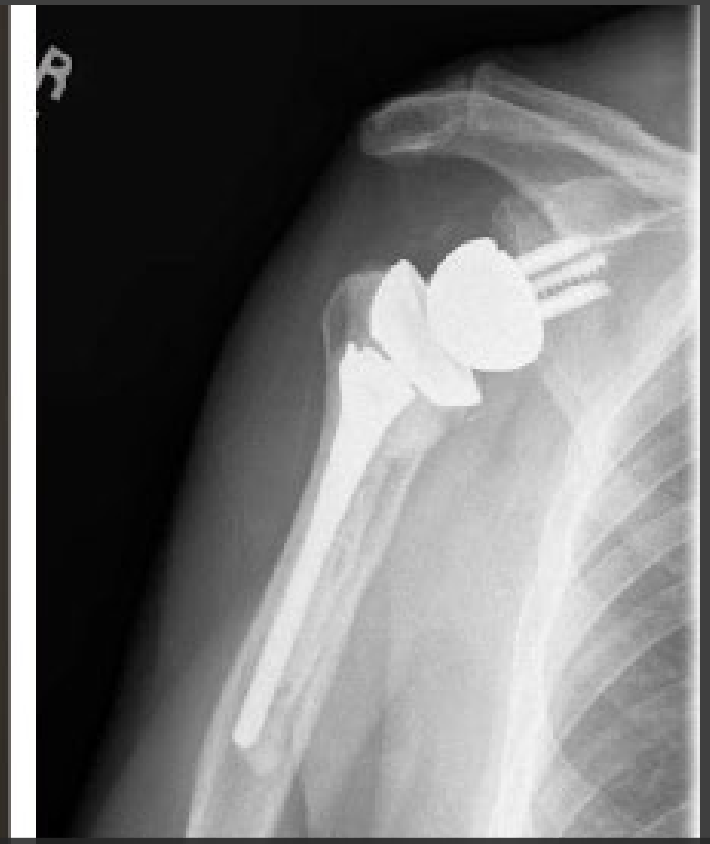


Total, Hemi, or Reverse?

Total Shoulder Arthroplasty:

- Indicated for arthritis involving both glenoid AND humerus
- Rotator cuff MUST BE INTACT
- Glenoid should be less than B2*
- Stemless designs now exist

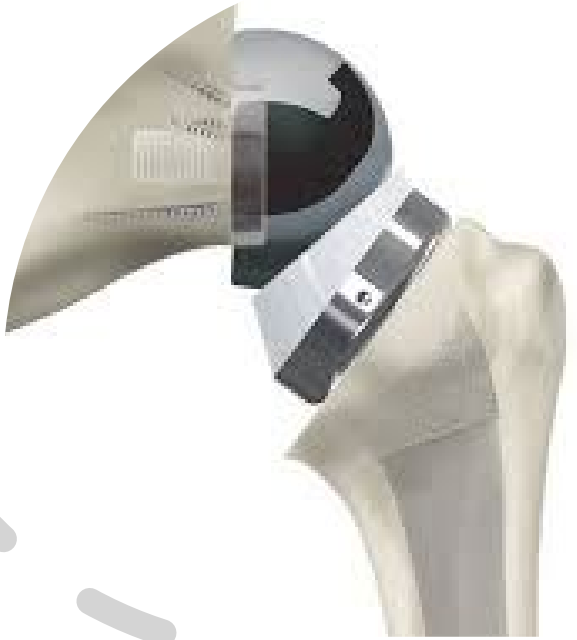




Total, Hemi, or Reverse?

- Reverse Shoulder Replacement:
  - Indicated for Rotator cuff arthropathy, proximal humerus fractures, arthritis in advanced age (> 75), B2 or greater glenoids
  - Becoming more common than traditional total shoulder replacement

Onlay or Inlay?



Onlay: Humeral tray sits on top of humerus

- Pro: less risk of fracture when making cuts
- Cons:
  - more difficult to reduce (increased fracture risk)
  - Lengthens arm (increased plexopathy risk)

Inlay: Humeral tray sits flush with top of humerus

- Pro: much easier to reduce, less risk of nerve injury
- Cons:
  - Greater risk of metaphyseal fracture in coring process

Innovation Meets Preparation

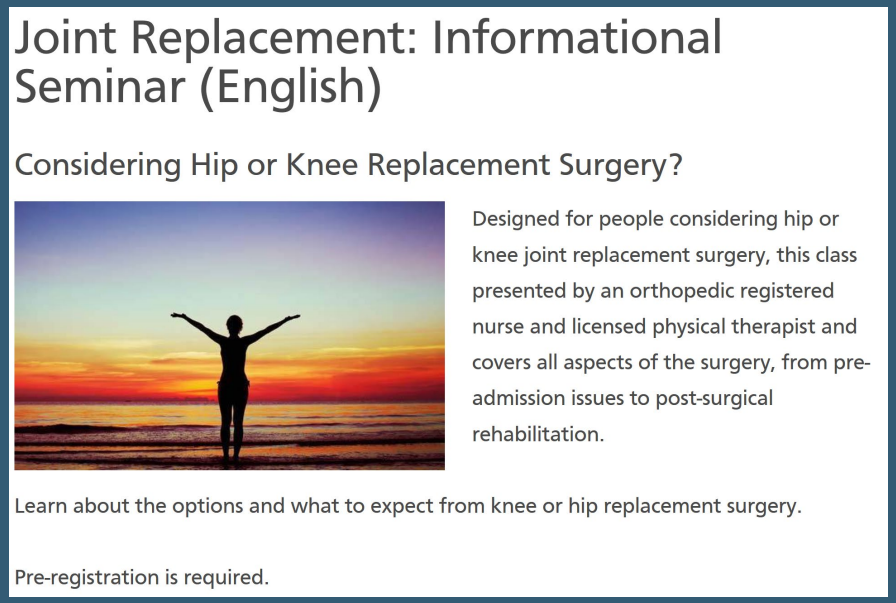
- Goal: minimize risk of complications
- Patients should be healthy, and with minimal or manageable medical comorbidities.
- “Ideal candidate”:
  - Aged 75 or below
  - BMI < 30, or < 35 in some cases
  - No medical comorbidities
  - Active and athletic lifestyle
- In the absence of the “ideal candidate”, think of this as selecting out majority
  - Whoever makes the cut is appropriate for surgery

Who should NOT have shoulder replacement

Exclusion criteria:

- The obvious ones:
  - BMI > 37.5
  - DM with HbA1c > 7.5
  - Infection history (joints, frequent UTI)
  - Tobacco use
  - History of major medical issues: bleeding disorders, ESRD 3-5; COPD, VTE history, liver cirrhosis, OSA
  - High ASA score
  - Severe osteopenia
- The overlooked ones:
  - Limited social/family resources (e.g. lives alone)
  - Wound-healing comorbidities (HCV, auto-immune disorders, auto-arthridities, poor nutrition)
  - Fall risk
  - Timed Up and Go Test > 10 seconds
  - Poor dentition/oral infections
  - Poor comprehension

Patient Education


Joint Replacement: Informational Seminar (English)

Considering Hip or Knee Replacement Surgery?

Designed for people considering hip or knee joint replacement surgery, this class presented by an orthopedic registered nurse and licensed physical therapist and covers all aspects of the surgery, from pre-admission issues to post-surgical rehabilitation.

Learn about the options and what to expect from knee or hip replacement surgery.

Pre-registration is required.

"Joint School":

- Detailed patient/family education program
- Provides clear instructions
  - Describes expectations for patients and caregivers
  - Discusses home environment
  - Discusses pre-op/post-op instructions
- Assesses actual level of social support patient has
- Finds clarity between patient/physician expectations
- Gives insight into surgery and recovery experience
- Provides resources for what to do if something goes wrong

Social Support and Environmental Factors

Social Support:

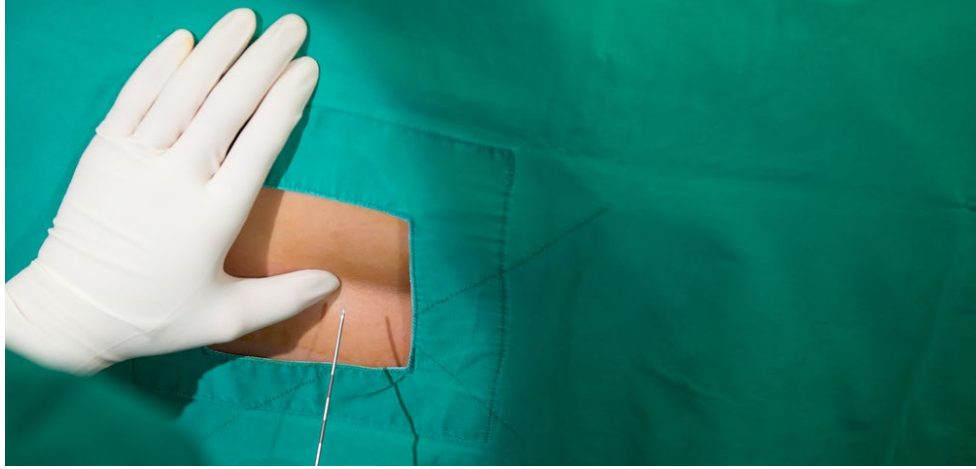
- Who is taking care of the patient?
  - Patient needs full access to medical staff both pre-/post-op
    - “Total Joint Coordinator”
  - Assess patient and pre-order home health PT, DME needs ahead of time

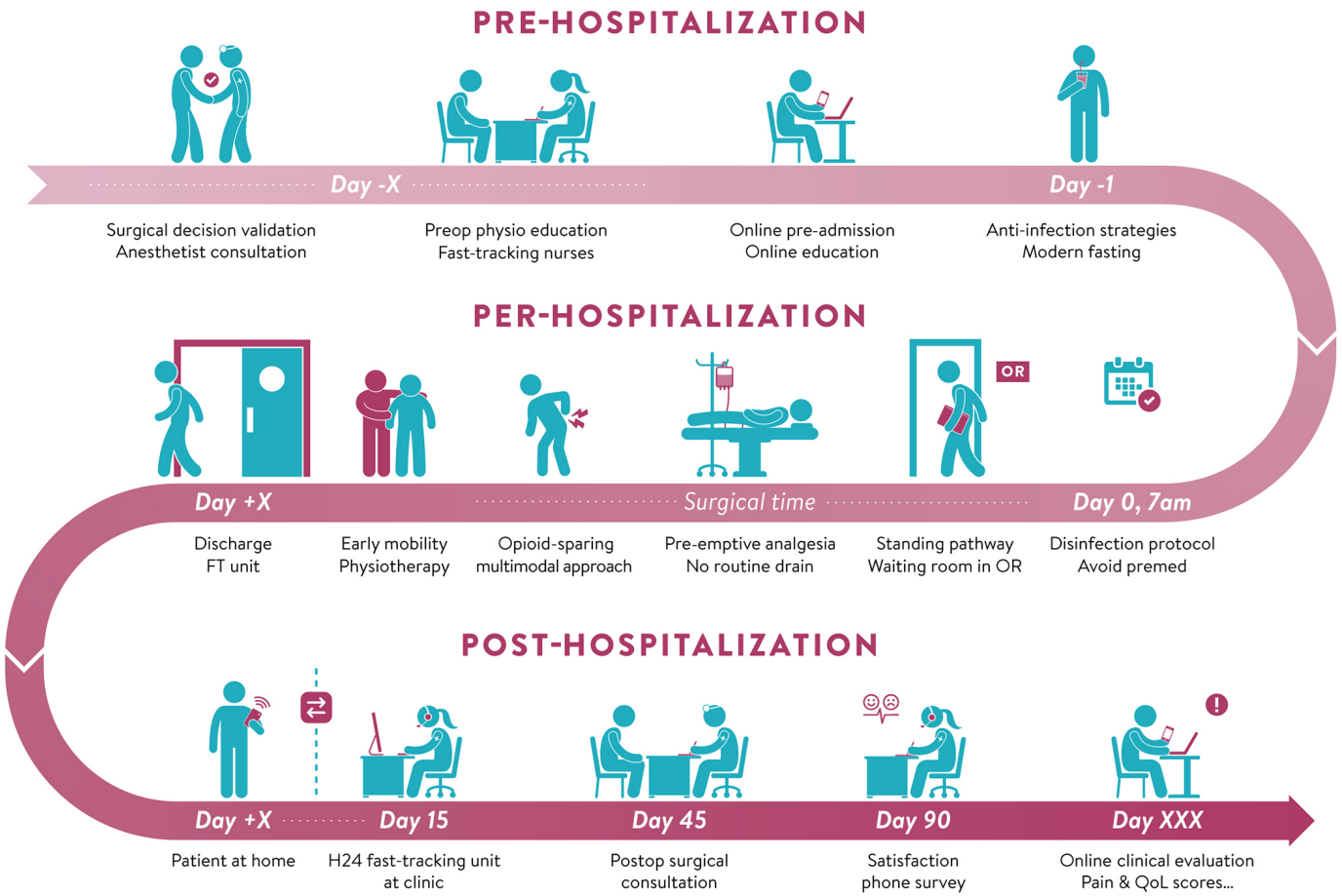
Environmental Factors:

- How can we decrease fall risk/manage post-op issues?
  - Assess who is at home; make arrangements for caregivers if patients lacks a social system
  - Use PT for gait and balance training (“prehab”) to reduce fall risk

Are you using the latest evidence-based protocols?

- Pain management:
  - ERAS protocol
  - Nerve blocks: Exparel
- Blood conservation
  - TXA
- Wound management
  - Drain or no drain
  - Waterproof dressings
- Mobilization
  - Early ambulation
- VTE prophylaxis
  - ASA, Lovenox, Warfarin, Eliquis, Pradaxa
  - SCD’s





ERAS Protocol

Goals of ERAS:

- Opioid-sparing yet improved pain control
- Complication reducing
- Faster recovery
- Better outcomes

Important factors:

- Modern fasting/hydration
- Multimodal pain control
- Education-centered
- Frequent follow-up with patients

My Protocol:

Treating patients as if they're family…

Initial consultation:

- Discuss selection criteria for surgery
- Discuss medical/dental clearances
- Discuss sling use, NWB and rehab requirements

Surgery Scheduling:

- Coordinates with my surgery scheduler (a.k.a. "Joint Coordinator")
- Patient must attend "Joint School" at hospital, bring caregivers to school as well
- Medical clearance
- Dental clearance
- Pre-hab begins
- DME/home-health PT ordered for post-op
- All medications given at pre-op visit: use ERAS protocol

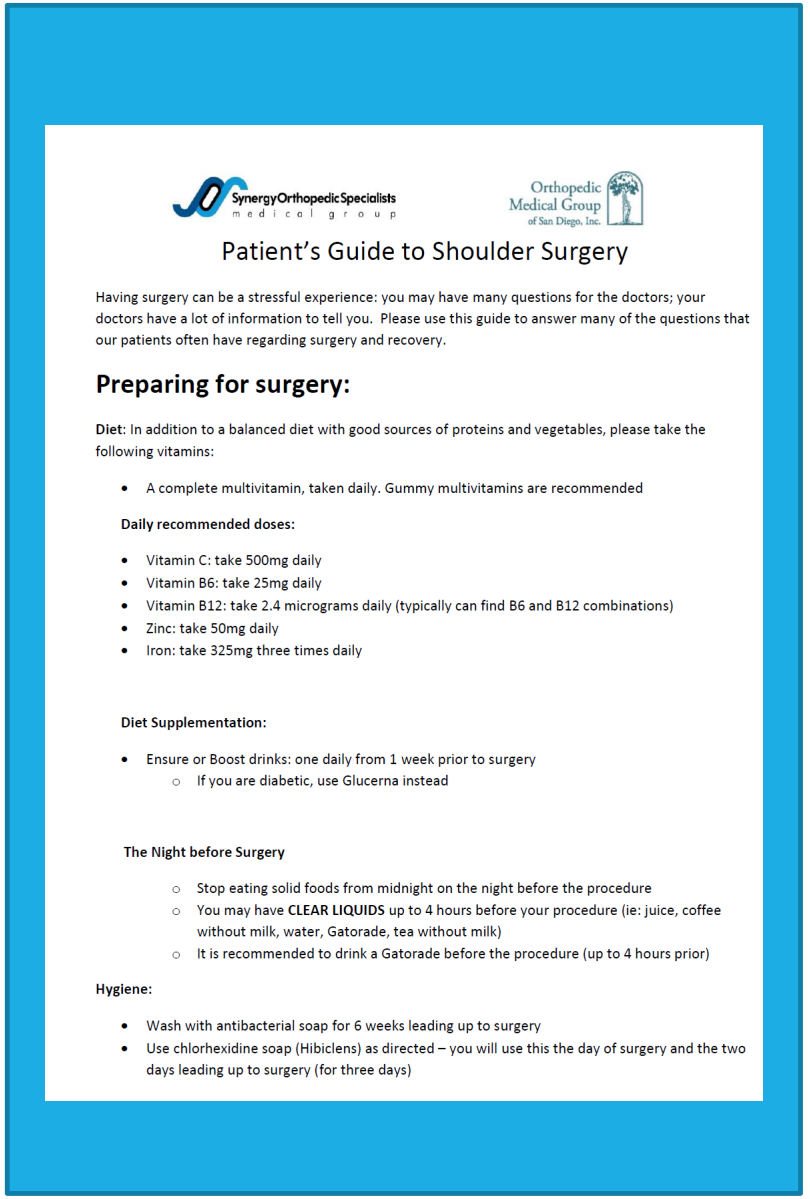
Day of Surgery:

- Anesthesia: Regional block (Exparel preferred)
- Consistent surgical team/anesthesiologist/implant rep used

My Protocol: Pre-op Planning

Pre-op Scheduling:

- labs: CBC, CMP, Vit-D, prealbumin, albumin, CRP, ESR, coags, HbA1c, UA/UCx
- pre-op imaging:
  - Templating Xrays if TKA/THA
  - Computer templating/3D modeling CT if TSA
- Medical clearance: CXR, EKG, cards/pulm if needed
- Dental clearance: all dental work completed with letter from their dentist
  - MUST be done min 1 month *prior* to surgery; no procedures for 3 months after surgery
- Patient attends “Joint School”
- Give pre-op packed on scheduling as well, have patient review
- DME/home health needs assessed - order abduction sling, arrange home PT



Synergy Orthopedic Specialists medical group

Orthopedic Medical Group of San Diego, Inc.

Patient’s Guide to Shoulder Surgery

Having surgery can be a stressful experience: you may have many questions for the doctors; your doctors have a lot of information to tell you. Please use this guide to answer many of the questions that our patients often have regarding surgery and recovery.

Preparing for surgery:

Diet: In addition to a balanced diet with good sources of proteins and vegetables, please take the following vitamins:

- A complete multivitamin, taken daily. Gummy multivitamins are recommended

Daily recommended doses:

- Vitamin C: take 500mg daily
- Vitamin B6: take 25mg daily
- Vitamin B12: take 2.4 micrograms daily (typically can find B6 and B12 combinations)
- Zinc: take 50mg daily
- Iron: take 325mg three times daily

Diet Supplementation:

- Ensure or Boost drinks: one daily from 1 week prior to surgery
  - If you are diabetic, use Glucerna instead

The Night before Surgery

- Stop eating solid foods from midnight on the night before the procedure
- You may have **CLEAR LIQUIDS** up to 4 hours before your procedure (ie: juice, coffee without milk, water, Gatorade, tea without milk)
- It is recommended to drink a Gatorade before the procedure (up to 4 hours prior)

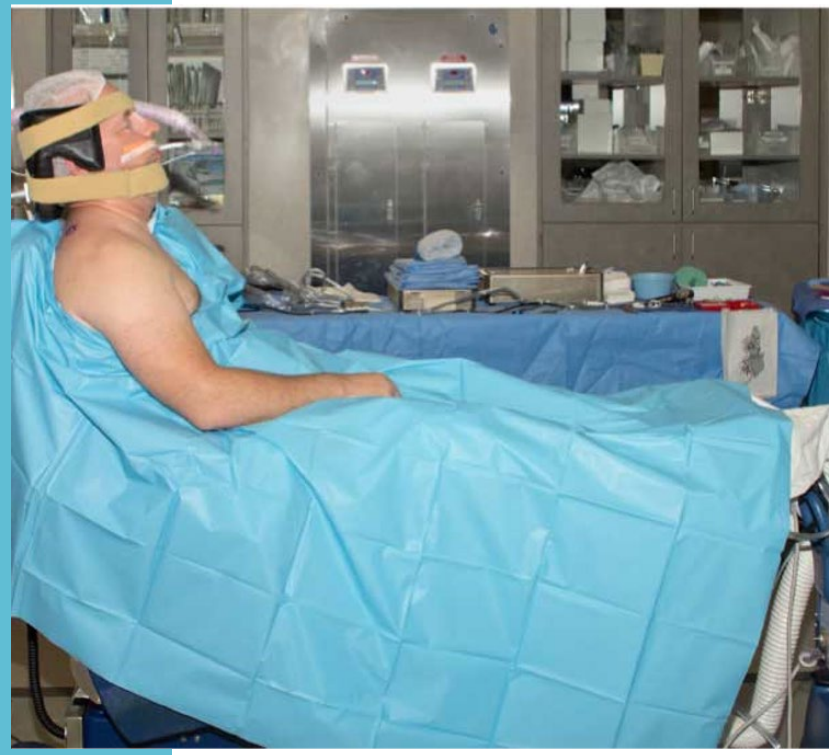
Hygiene:

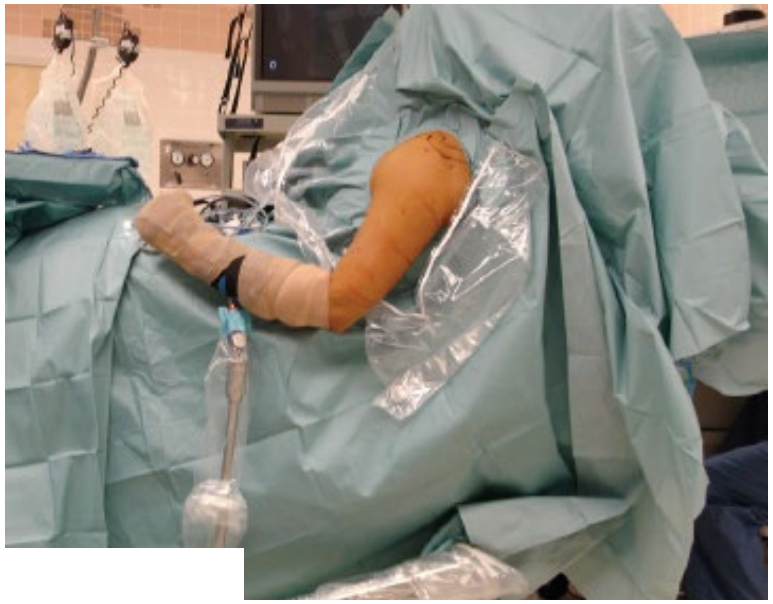
- Wash with antibacterial soap for 6 weeks leading up to surgery
- Use chlorhexidine soap (Hibiclens) as directed – you will use this the day of surgery and the two days leading up to surgery (for three days)

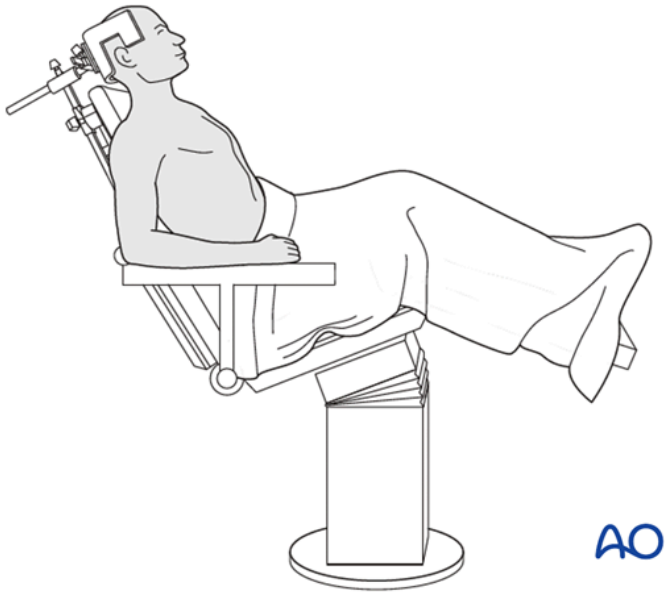
What am I Worried About?

Medical Clearance

- The Beach Chair:
  - Risk of falls
  - Risk of Hypotension when head elevated
  - Neck Injury
  - Extubation

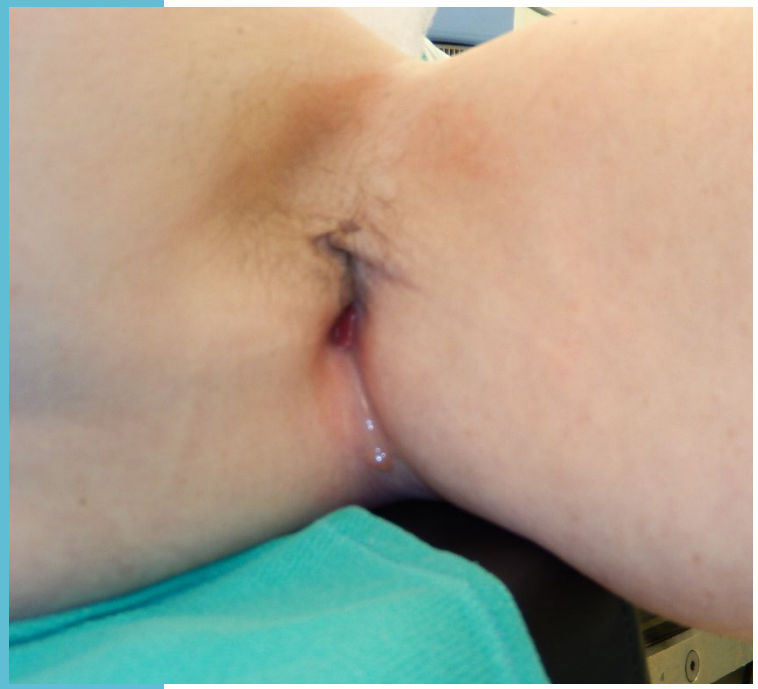


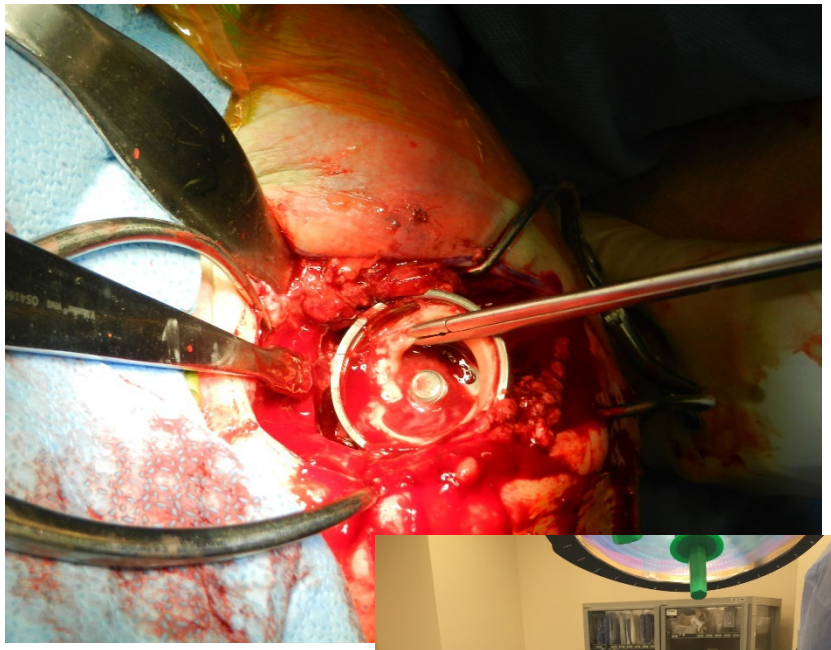




What am I Worried About?

Medical Clearance



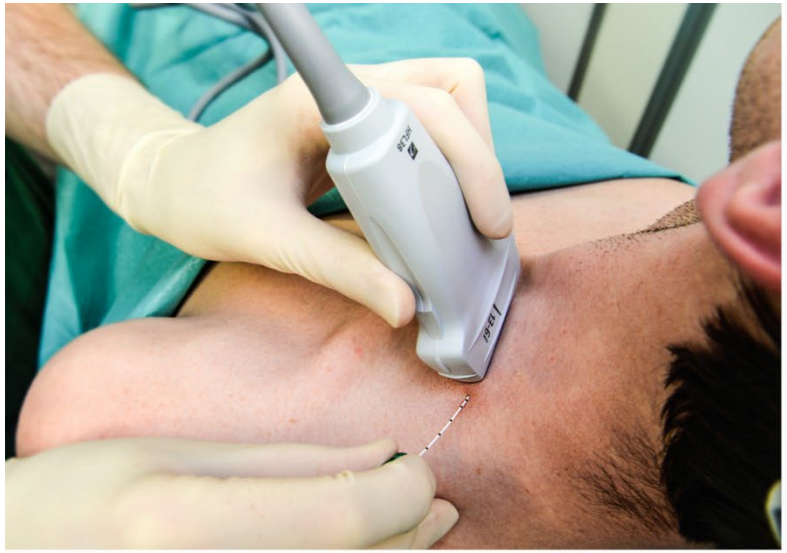


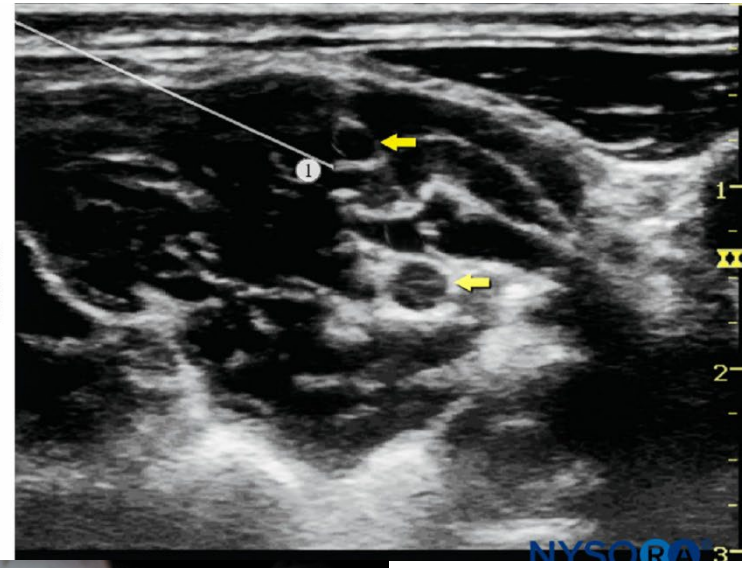
- Infection:
  - Dental Infection Risk
  - UTI Risk
  - C. Acnes prevention
  - Spacesuits

What am I Worried About?

Medical Clearance

- Pain Control:
  - Block contraindicated in severe COPD
  - Pre-op opioid use lends to poor results
  - Falls post-op





My Protocol: Pre-op to Surgery

Pre-op visit: typically 2 weeks prior to surgery

- Review pre-op packet
- Nasal swab for MRSA; Bactroban if positive
  - Nasal iodine for all patients
- Review consent
- Review ERAS protocol and medications
- Review pre-op bathing techniques
  - Chlorhexadine wipes
  - Benzoyl peroxide

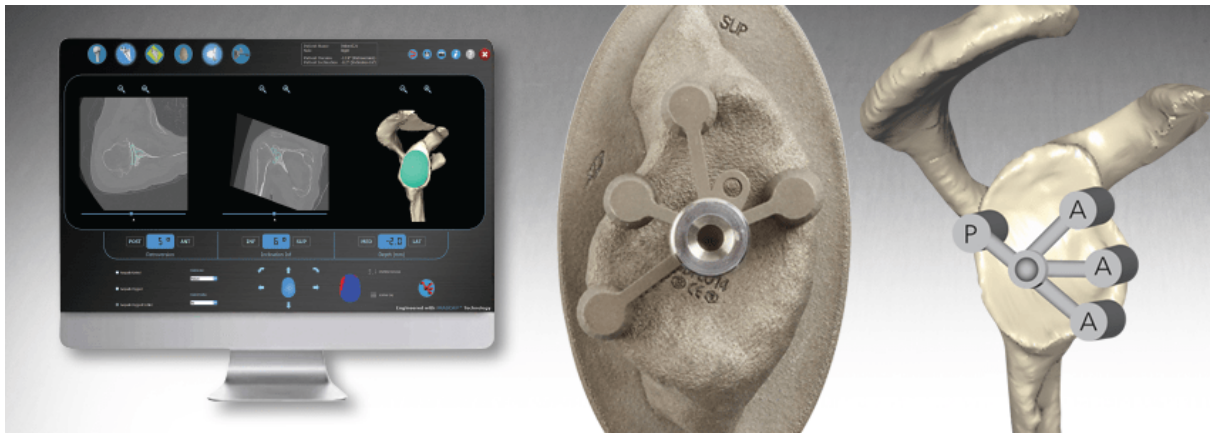
Day of surgery:

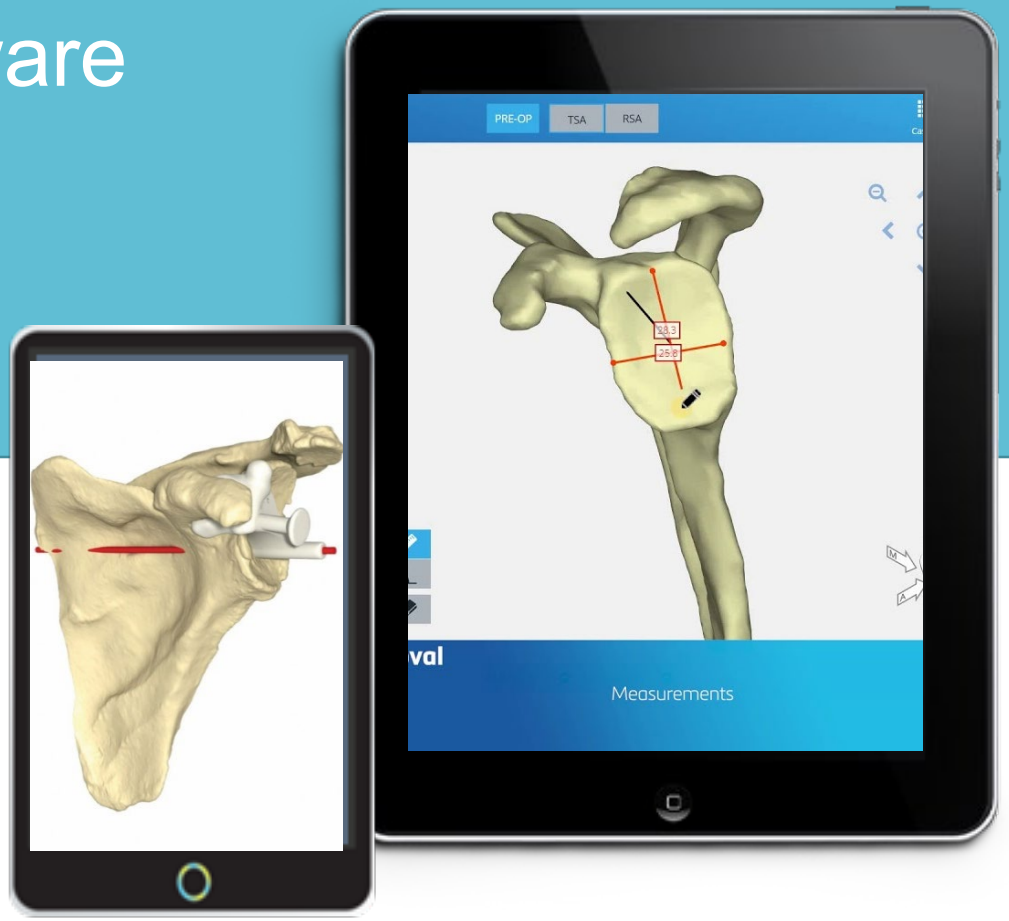
- Modern fasting:
  - Consume enhanced recovery drink 2 hours prior scheduled check-in

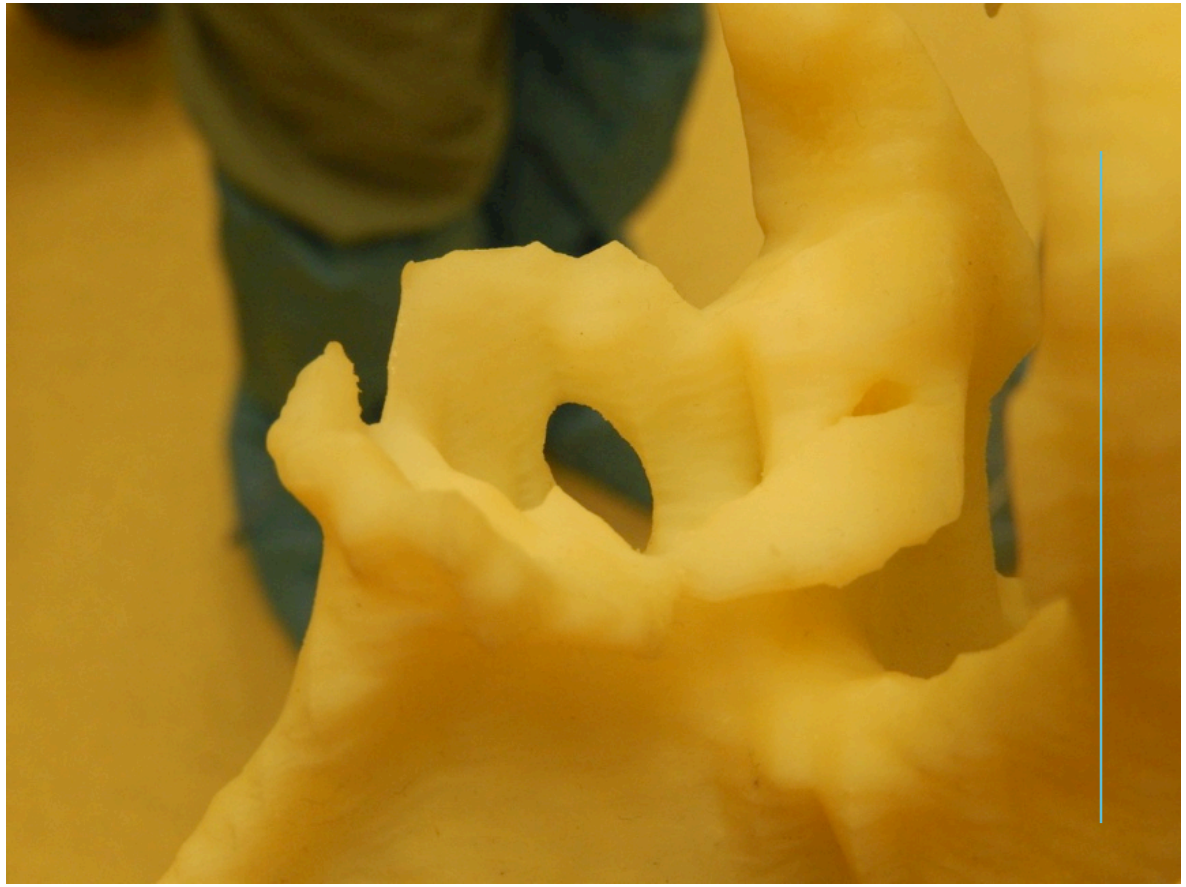
Pre-op Planning

3D Printing and Templating Software

- Major technological advance
- Allows for planning to determine where to place parts, their size, etc
- Can assess anatomy in 3-D
- Utilizes CT scan







My Protocol:

Treating patients as if they're family…

During Procedure:

- TXA used during case
- Prep with alcohol, hydrogen peroxide and Chloraprep
- Pre-planned/templated with radiographs/computer modeling available
- Meticulous hemostasis at closure
  - If drain, adhere to allow for easy removal by home health nurse or patient
- Coverage with waterproof dressing
- ERAS meds

Post-op:

- Continue ERAS
- Mobilization by PT and nurse once awake and alert
- Two calls from clinic/hospital on discharge home: 2 hours after arrival, 6 hours after arrival
- F/u call from Joint Coordinator on POD#1
- Clinic f/u at 1 week for dressing change and ROM check
- Clinic f/u at 2 weeks for suture/staple removal and XR
- Clinic f/u at 6 weeks for XR, ROM check

My Protocol: During and After Surgery

During procedure/post-op:

- Utilize multimodal analgesia
  - Regional blocks
  - Meds: Mobic, Gabapentin, pre-dose opioids, PO steroid taper, venlafaxine

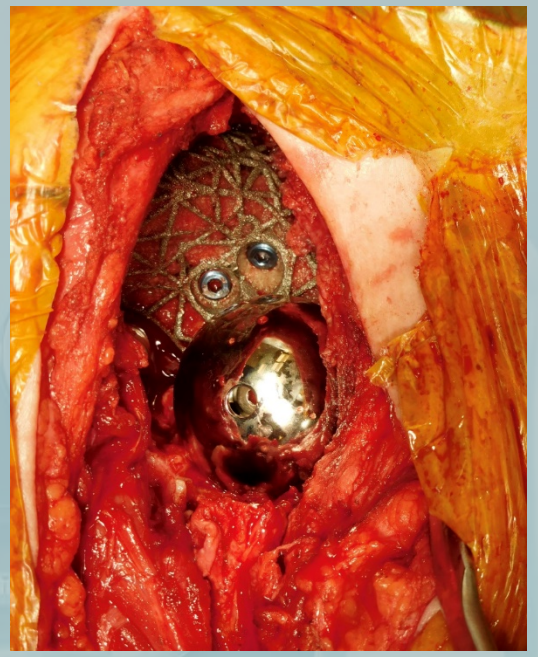
- Decrease infection risk
  - Pre-op Chlorhexadine/benzoyl peroxide
  - IV antibiotics (Ancef + Clinda or Clinda + Vanc)
  - Post-op Doxycycline if revision case (to cover for C. acnes)
  - Intra-op betadine wash

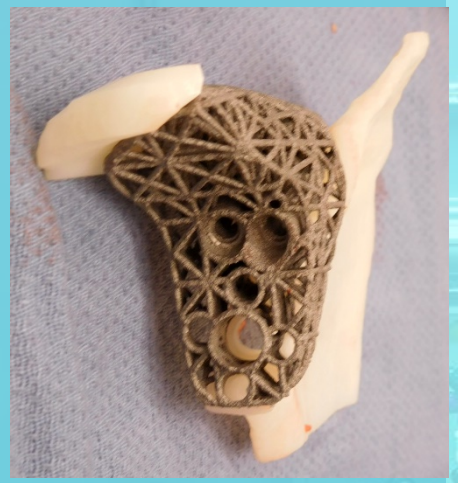
- Minimize PONV:
  - Steroids, Benadryl, scopolamine patch

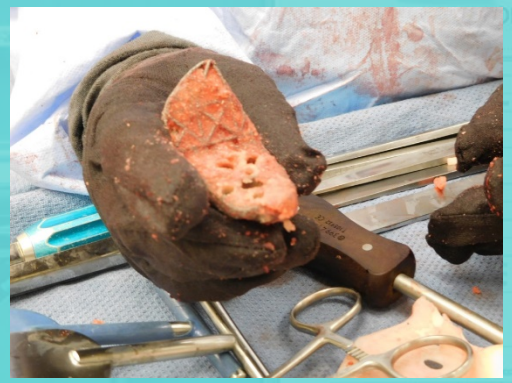
- Minimize blood loss:
  - Hypotension during case
  - TXA – 2 doses (pre-cut and at closing)
  - Thrombin gel foam
  - Drain?

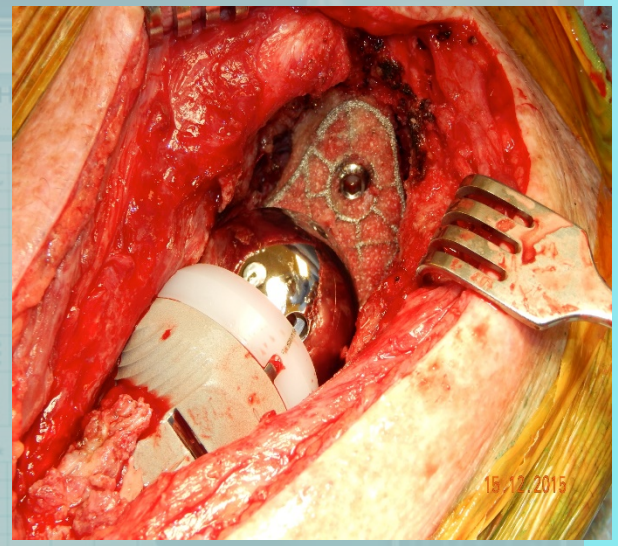
- Post-op Recovery:
  - Early ambulation – patient should ambulate within 12 hours
  - Early refeeding – resumption of diet as soon as possible
  - Minimize post-op narcotics

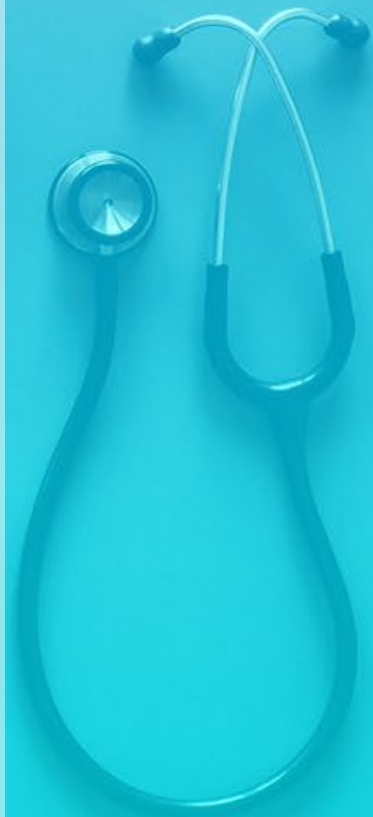
New Innovations



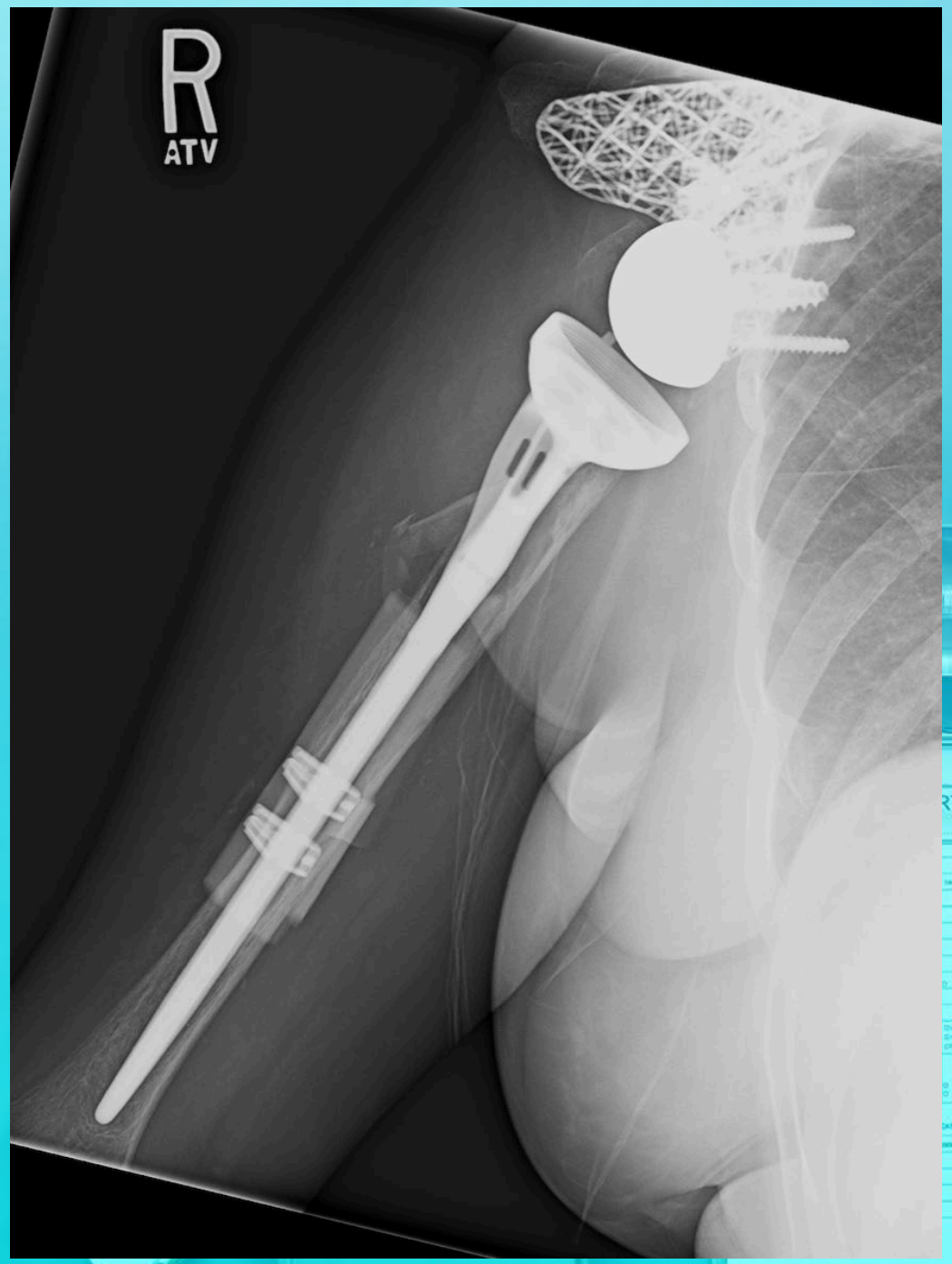








The Cage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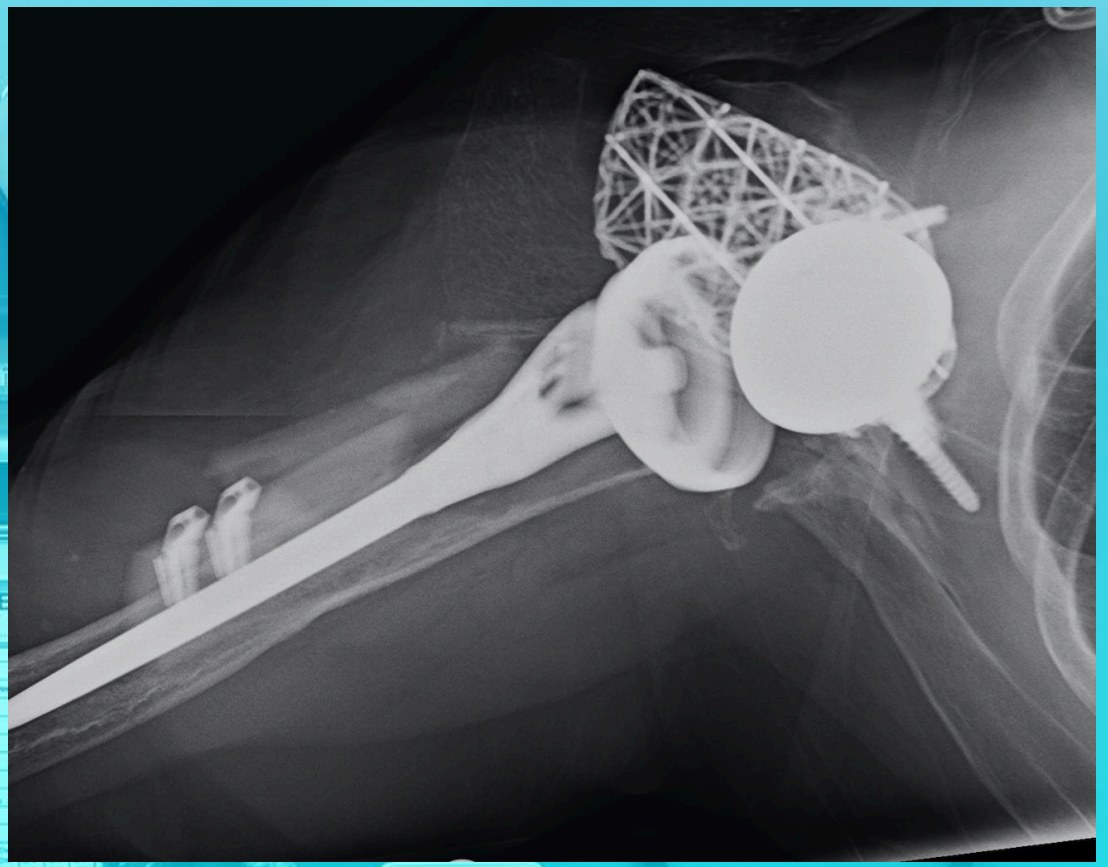
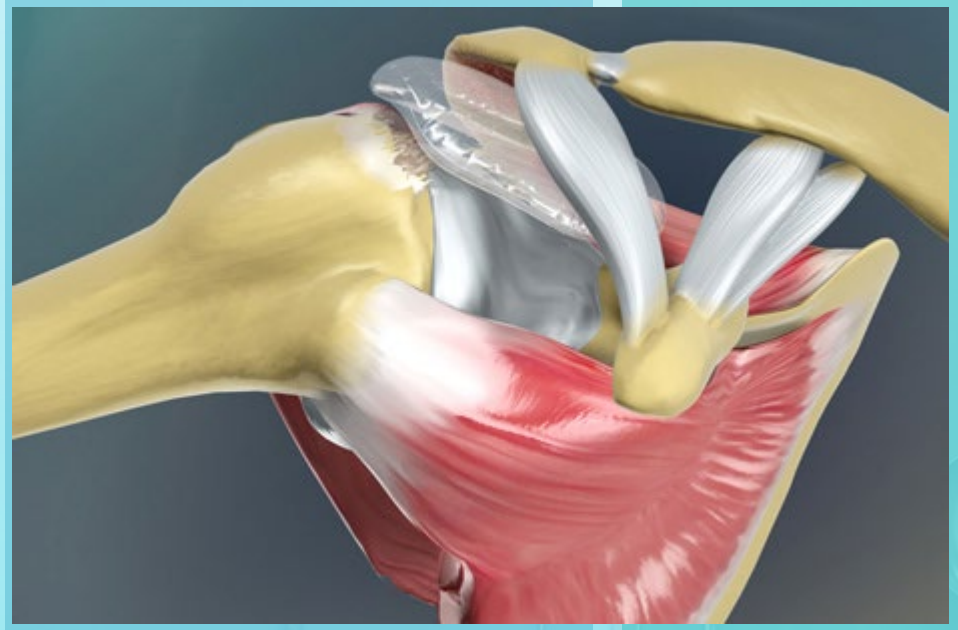
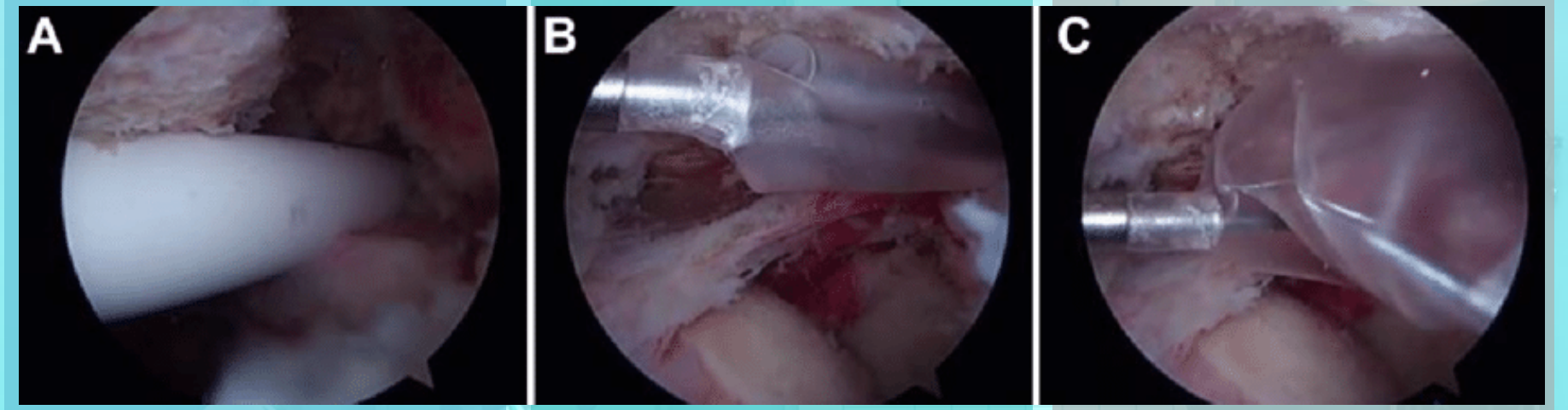
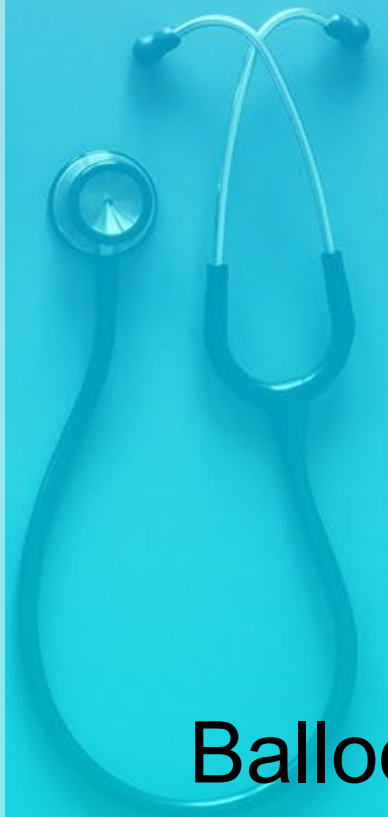


New Innovations







Balloon Arthroplasty

What to Expect Post-op

Sling Use: A Necessary Evil

- 6 weeks in total
- NWB to the operative side
- No external rotation for 3 months with TSA
- Elbow ROM at 2 weeks
- Table slides at 4 weeks
- Expect elbow pain from sling and wrist swelling
- Neck strap on sling tends to exacerbate chronic neck issues
- Patients tend not to enjoy the abduction pillow

Pain Control

- Exparel block tends to last under 72 hrs
- Expect pain requiring opioids for 3-4 days
- Majority of my patients are off opioid meds by POD#5
- Avoid NSAID's x 6 weeks
- Ice frequently – don't put directly on skin if block active

General Health

- Expect daily walk, use of IS machine
- No heavy exercise/sweating for first 2 weeks
- Use constipation/nausea meds as needed
- Anticoagulation for 1 month with chemical + mechanical DVT ppx

My Protocol: Post-op

Post-op visits:

- Calling the patient:
  - Follow-up by MA/Joint Coordinator to see how patient is doing
  - Review post-op medications
- Home Health/PT needs
  - Daily PT updates
- Remove dressing at 1 week in clinic, allow air drying
  - Can alternatively be done by home health nurse or home health PT
- 2-week follow-up:
  - XR in clinic, suture removal
- 6-week follow-up:
  - Update on ERAS meds
    - Discontinuation of post-op VTE prophylaxis
    - Lifting of travel restrictions
    - Discontinuation of sling
    - Start of formal PT
  - XR in clinic
- 3-month follow-up:
  - ROM check
  - XR if needed
  - Lifting of dental/procedural restrictions

Do’s and Don’ts

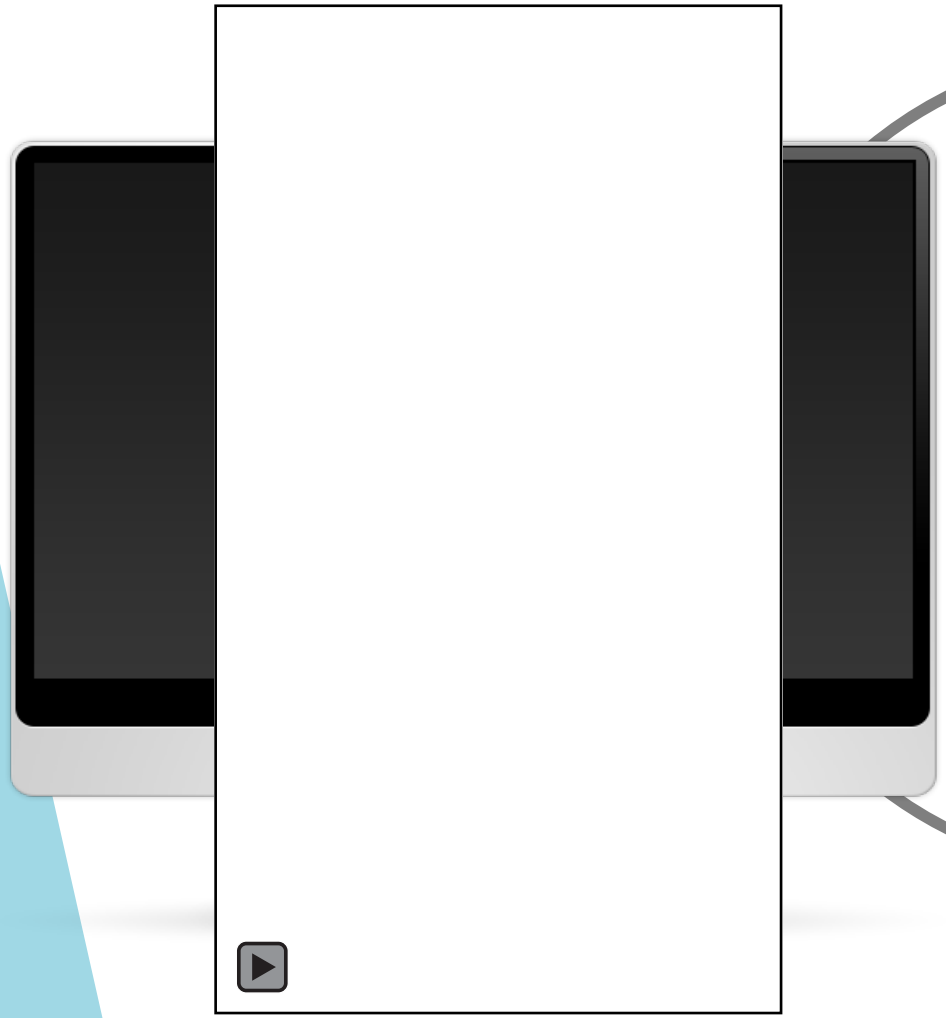
DO:

- Follow the Physical Therapists instructions
- Avoid extremes of ABER
- Follow the post-op protocol for dental and other procedures
- See your surgeon annually for xrays

DON’T:

- Overdo it
- Lift over 25 lb overhead in the operative arm
- Participate in repetitive heavy lifting
- Push self out of chair using shoulder, especially at first 2 months

Results (RSA)



My practice

Average Forward Flexion 155-165

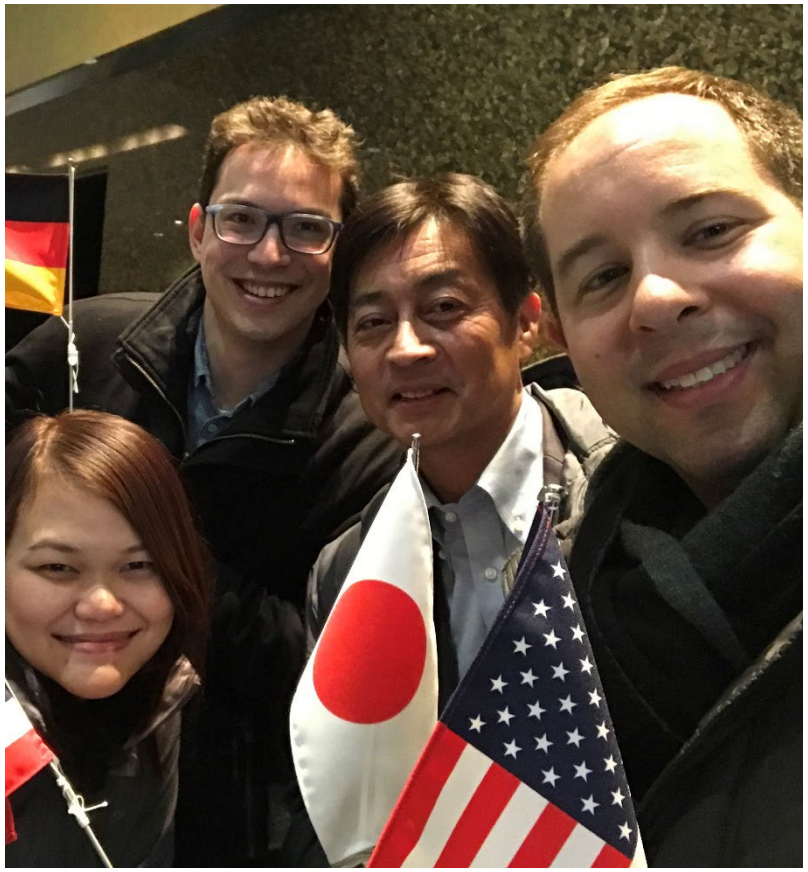
- Dependent on pre-op deltoid strength
- Dependent on neck-shaft angle of prosthesis
- Can reach overhead, reach top of head
- Average FF in general pop is ~125

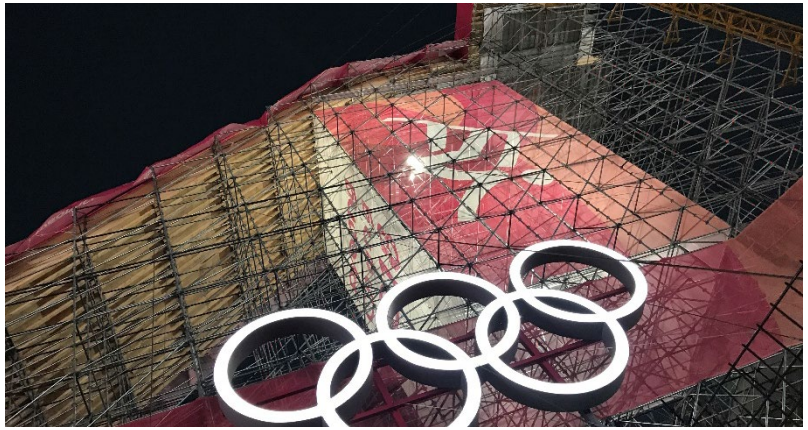
Improvements in VAS/ASES/Constant Scores

- Average VAS: 8 → 2.1
- ASES: 36 → 92.5
- Constant: 22.5 → 78

Difficulties:

- Internal rotation can be difficult due to device design
- May be difficult to reach buttocks
- Important to discuss this with patients for realistic expectations





Questions?

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Thank You!

Synergy Orthopedic Specialists
medical group