Some Assembly Required: Joint Replacement

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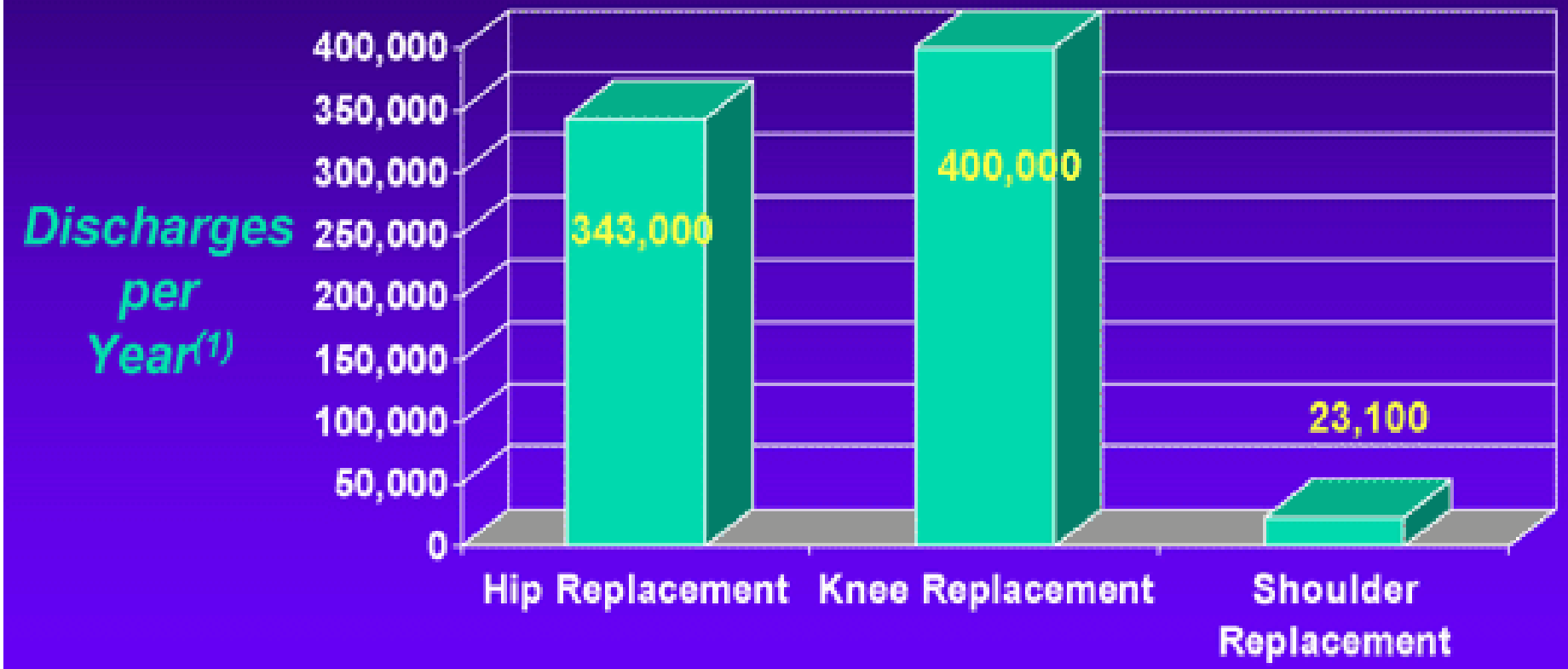
2002 Major Joint Replacement Volume in U.S.



[1] National Center for Health Statistics: National Hospital Discharge Survey 2002
Data extracted and analyzed by AAOS Dept of Research and Scientific Affairs

Total Hip Arthroplasty

- Alternate bearing surfaces
- MIS
- Hip resurfacing

Total Knee Arthroplasty

- State of the Art

Total Shoulder Arthroplasty

- Reverse total shoulder arthroplasty

Patient Management

- Anaesthesia
- Perioperative pain control
- VTE Prophylaxis
- Perioperative planning and discharge
- Long-term results

Arthroplasty

- Latin arth - joint
- Greek plastica - molding

Total Joint Arthroplasty

- First successful THA 1960
- Many improvements
- Over 800,000 done annually in USA
- Highly successful outcomes

Total Joint Arthroplasty

- Osteoarthritis
- Post-traumatic arthritis
- Osteonecrosis
- Inflammatory arthritis

Indications

- Pain
- Disability
- Health status
- Age

Evaluation

- History
- Physical Examination
- Radiographs
- CT, MRI, bone scan, blood tests

Conservative Treatment

- Heat
- NSAID
- Physical therapy

Expectations

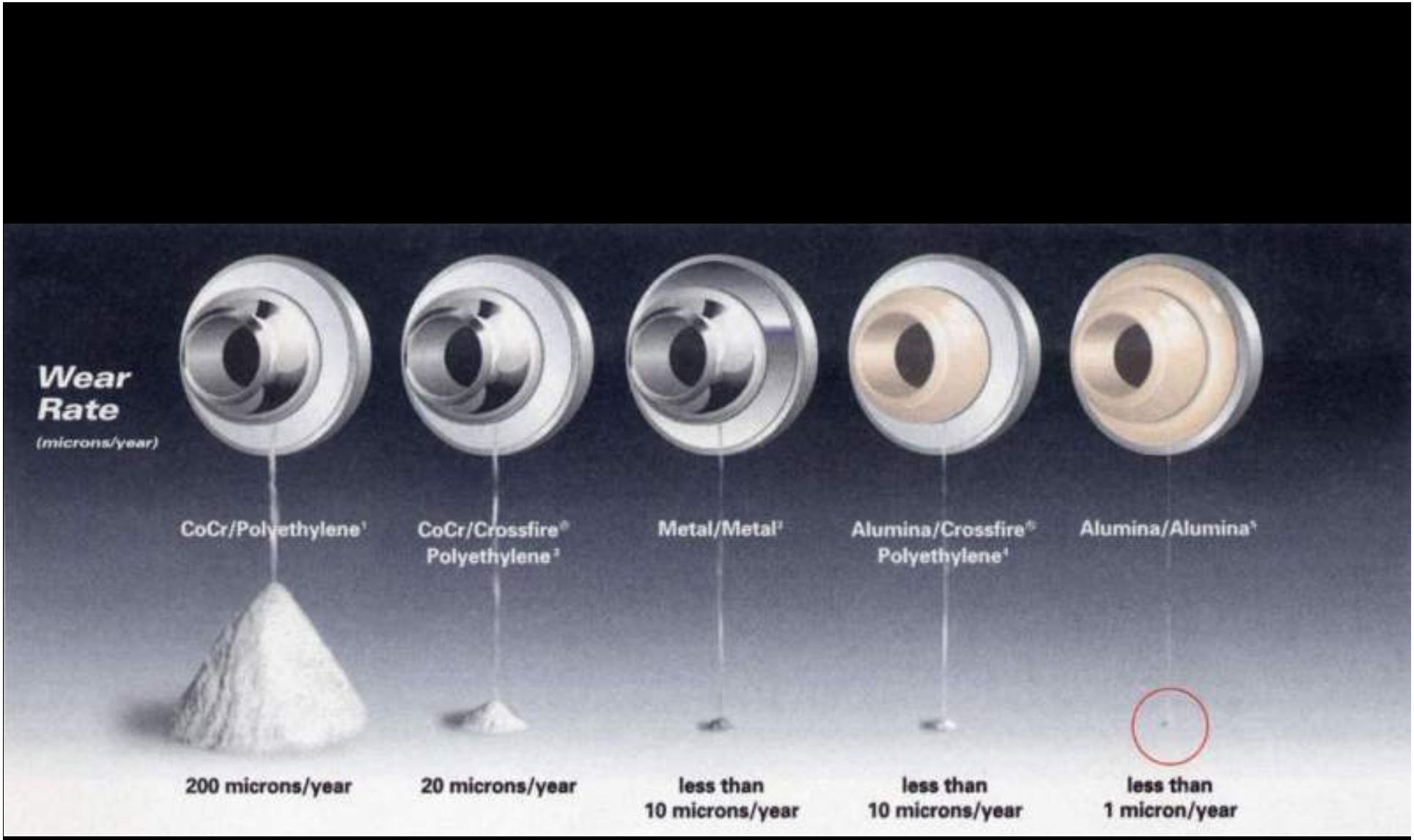
- Excellent pain relief
- Improvements in ADLs
- Increased physical activity

Preoperative Evaluation

- Medical clearance
- Tests
- Blood donation
- Weight loss
- Dental Evaluation
- Urinary evaluation
- Social planning

Alternate Bearing Surfaces

- THA in younger and higher-demand patients
- Long-term fixation of metal implants
- Long-term failure due to PE wear, osteolysis and aseptic loosening.
- Develop bearing surface that can function at high level and prolong life of well-fixed components



Ceramic THA

- Mid-term study has demonstrated efficacy and safety of a ceramic on ceramic bearing surface compared to the standard ceramic/PE surface.
- No failures or complications related to the bearing surfaces.

Ceramic THA

- Improved wear and biocompatibility with a ceramic/ceramic bearing surface may increase implant longevity.
- Further follow-up is indicated to determine the long-term outcome.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Longevity Highly Crosslinked
Polyethylene Surface

Rehabilitation

- FWB immediately
- Range of motion, strengthening exercises
- Progress as quickly as possible

Minimal Invasive Surgery

- Single 3-4 inch incision
- Two 2 inch incisions
- Shorter surgery time
- Less blood loss
- Quicker rehabilitation
- Improved functional outcome

Bicycling while drunk increases risk of serious or fatal injury

Only 5% of injured bicyclists wore safety helmets, raising questions about mandatory helmet laws.

by Louis A. Iovino Jr.
ORTHOPEDICS TODAY correspondent

BALTIMORE – Alcohol intoxication significantly increases the risk of serious or fatal bicycling injury among adolescents and adults, according to recent research.

With more people bicycling over the past two decades, injuries have risen significantly, accounting for

bicyclists. The researchers determined that BAC levels of ≥0.02 g/dL were associated with a sixfold increased risk of serious injury, while BAC levels ≥0.08 g/dL were associated with a 20-fold increased risk. Only 5% of injured bicyclists with a positive BAC wore helmets compared to 35% of bicyclists without positive BAC levels.

According to Li, alcohol may play an even greater role in bicycling injury than determined by their study since they did not collect data on injuries occurring at night, when 56% of fatal and 32% of serious bicycling injuries happen.

The results of this study reinforce statistics showing low helmet usage. "Safety helmets are strongly recommended for all ages of riders," Li said. "However, should helmet laws be extended to include adults? It's a question certainly open for debate."

Mounting data should, however, influence policymakers' decisions concerning bicycling helmet laws in this country. "It would be nice if our study could somehow help improve bicycle safety through a helmet campaign, alcohol intervention and sensible public policies," Li said. ■

For your information:

Li G, Baker SP, Smialek JE, Soderstrom CA. Use of alcohol as a risk factor for bicycling injury. *JAMA*. 2001;285:893-6.

Minimal Incision Surgery

- Major marketing ploy
- No differences in
  - blood loss
  - surgery time
  - pain levels
  - functional outcomes

HipResurfacing

- Younger more active patients
- Higher expectations
- Proven benefit/cost ratio
- Continuing to push the envelope

Theoretical Advantages of Hip Resurfacing

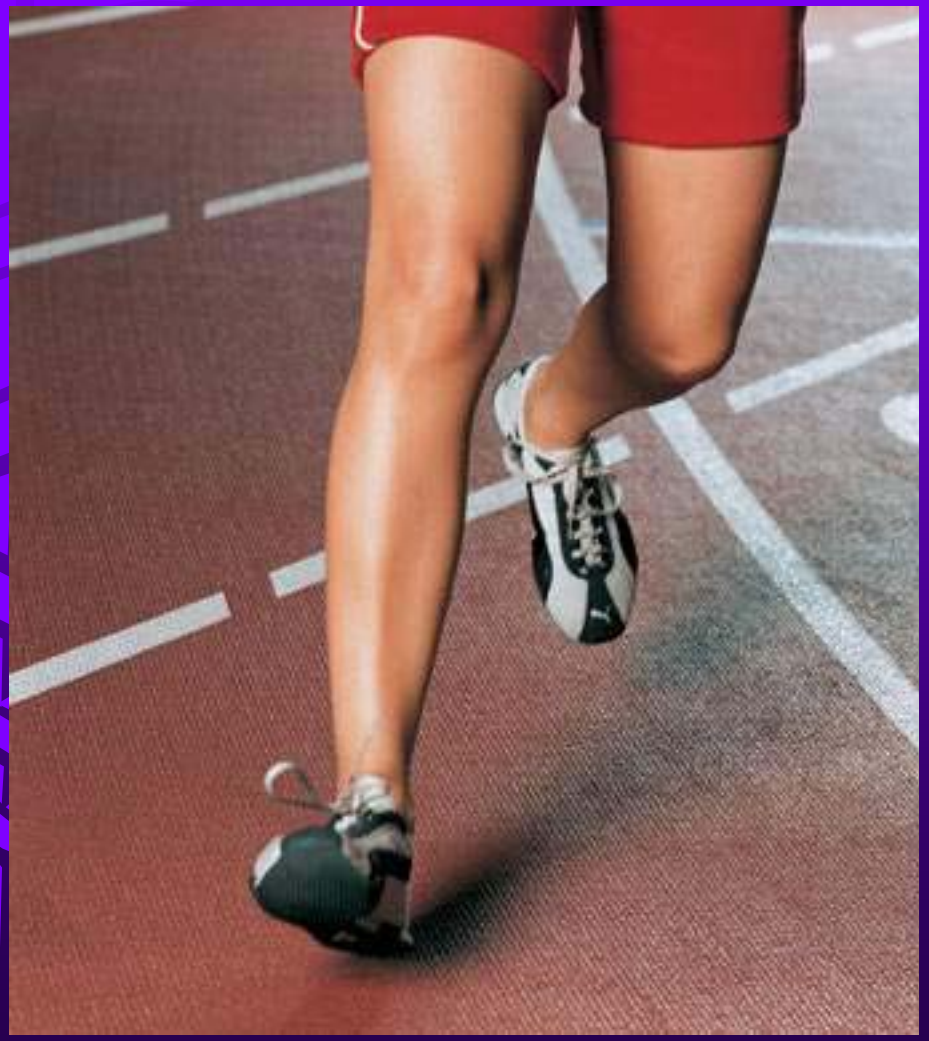
- Minimal bone resection
- Normal femoral loading
- Maximum proprioceptive feedback
- Restores natural anatomy :
  - offset, leg length
  - anteversion
- Minimal risk of dislocation
- Easier revision

Resurfacing THA

- Largest experience with Birmingham
- Used globally since 1997 with more than 100,000 implanted
- Approved by the FDA in March 2006
- Corin 2000 marketed by Stryker approved in Jun 2007

Typical Candidate

- Patients experiencing hip pain due to OA, RA, DDH or AVN
- Adults under age 60 for whom THA may not be appropriate due to an increased level of physical activity
- Active adults over age 60 may be candidates, depending on their bone quality



Patient Selection Criteria

- Hip resurfacing is most appropriate for physically active patients with good bone quality and adequate femoral and acetabular bone stock.
- Such patients will generally be under the age of 65.

- OA
- Strong Heavy Male
- Women < 50 years
- Men < 60 years
- High Expectation
- High activity level

Indications

- Primary osteoarthritis.
- Post traumatic OA.
- Secondary OA, e.g. DDH, SCFE, Perthes' disease.
- AVN of the femoral head if remaining bone stock is adequate.
- Inflammatory arthritis if bone quality is adequate.
- Any patient with a deformity of the femur or hardware that would prevent insertion of a stemmed femoral component.
- Patients with a high risk of dislocation.

Conventional THA

Resurfacing THA

Key Benefits

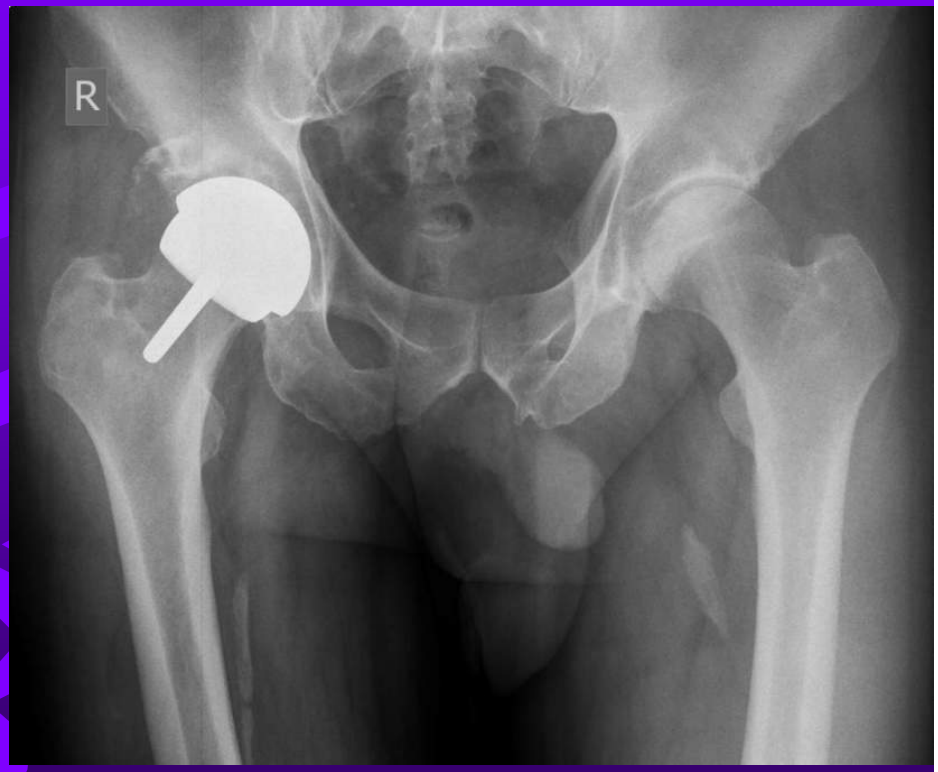
- Large head size
- Alternate bearing surface
- Bone conservation

Bone Conservation

- Revises to a primary
- If patients need revision surgery, they don’t get a revision implant
- The revision procedure would be the same THA they would otherwise have received

Postoperative Therapy

- Rehabilitation protocol similar to THA patients
- Weight bearing as tolerated
- Motion and strengthening exercises and gradual progression to normal activities.



Resurfacing Survivorship

Table HT37: Resurfacing Hip systems requiring revision

Resurfacing Head	*Resurfacing Cup*	*Number Revised*	*Total Number*	*% Revised*	*Observed 'component' years*	*Revisions per 100 observed 'component' years*	*Exact 95%CI*
ASR	ASR	31	753	4.1	1042	3.0	(2.02, 4.22)
Adept	Adept	0	144	0.0	82	0.0	(0.00, 4.47)
BHR	BHR	166	6773	2.5	19585	0.8	(0.72, 0.99)
Bionik	Bionik	1	42	2.4	28	3.5	(0.09, 19.72)
Conserve	Conserve Plus	0	7	0.0	7	0.0	(0.00, 53.17)
Conserve Plus	Conserve Plus	4	59	6.8	134	3.0	(0.81, 7.63)
Cormet	Cormet	8	181	4.4	579	1.4	(0.60, 2.72)
Cormet 2000 (HAP)	Cormet	8	95	8.4	288	2.8	(1.20, 5.48)
Cormet (Bi-Coated)	Cormet	1	130	0.8	132	0.8	(0.02, 4.21)
Durom	Durom	25	564	4.4	927	2.7	(1.75, 3.98)
Icon	Icon	1	51	2.0	50	2.0	(0.05, 11.10)
Mitch TRH	Mitch TRH	0	94	0.0	25	0.0	(0.00, 14.77)
Recap	Recap	2	50	4.0	81	2.5	(0.30, 8.92)
Total		**247**	**8943**	**2.8**	**22961**	**1.1**	**(0.95, 1.22)**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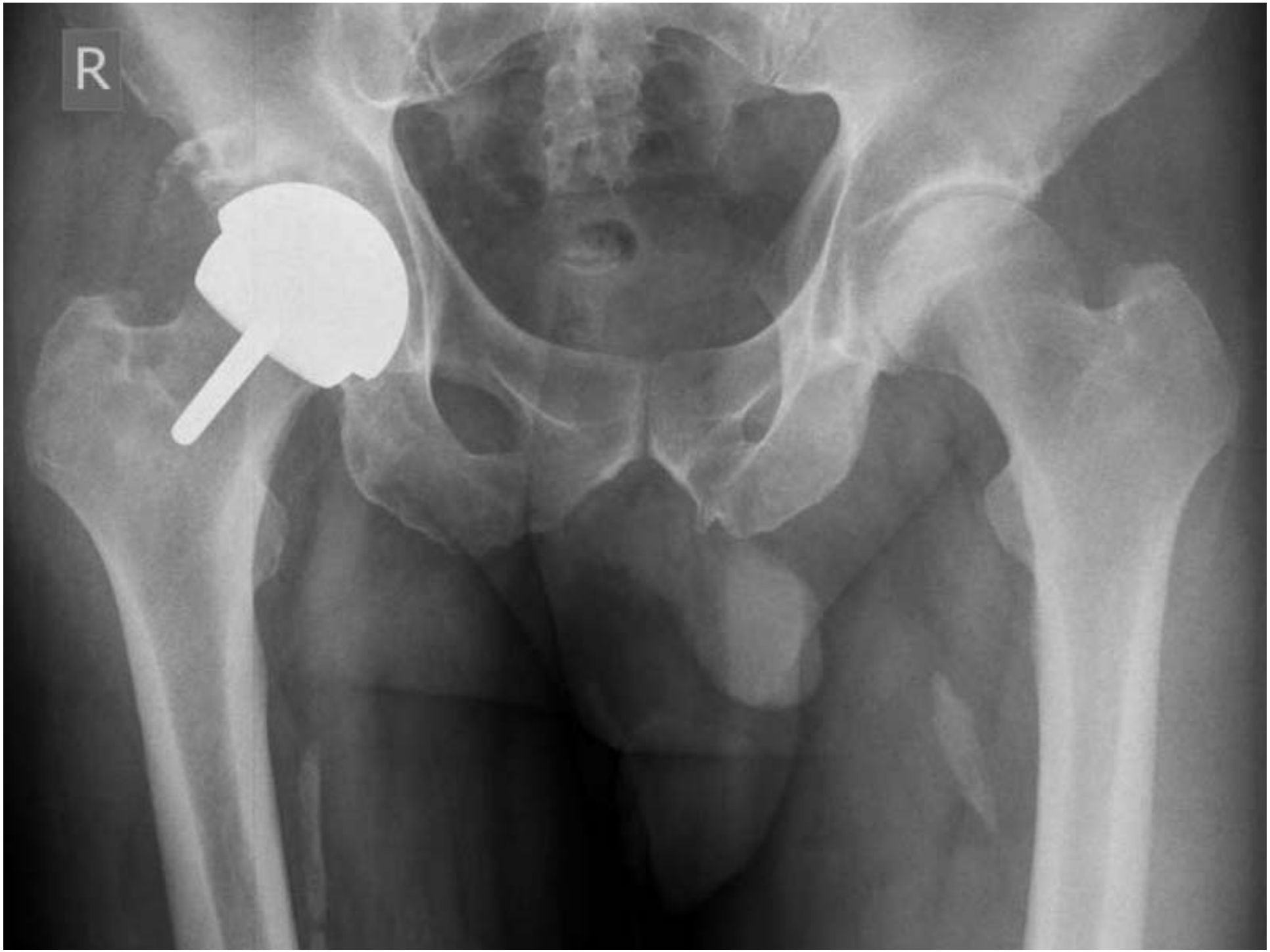
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Resurfacing THA

- Quality of life issues.
- Conservative approach.
- No bridges burned.
- Careful patient selection.
- Meticulous surgical technique.

TKA State-of-the Art

- Posterior cruciate retention
- Posterior cruciate sacrificing
- Both achieve 95%+ success at 10 yrs
- Metal/PE articulation


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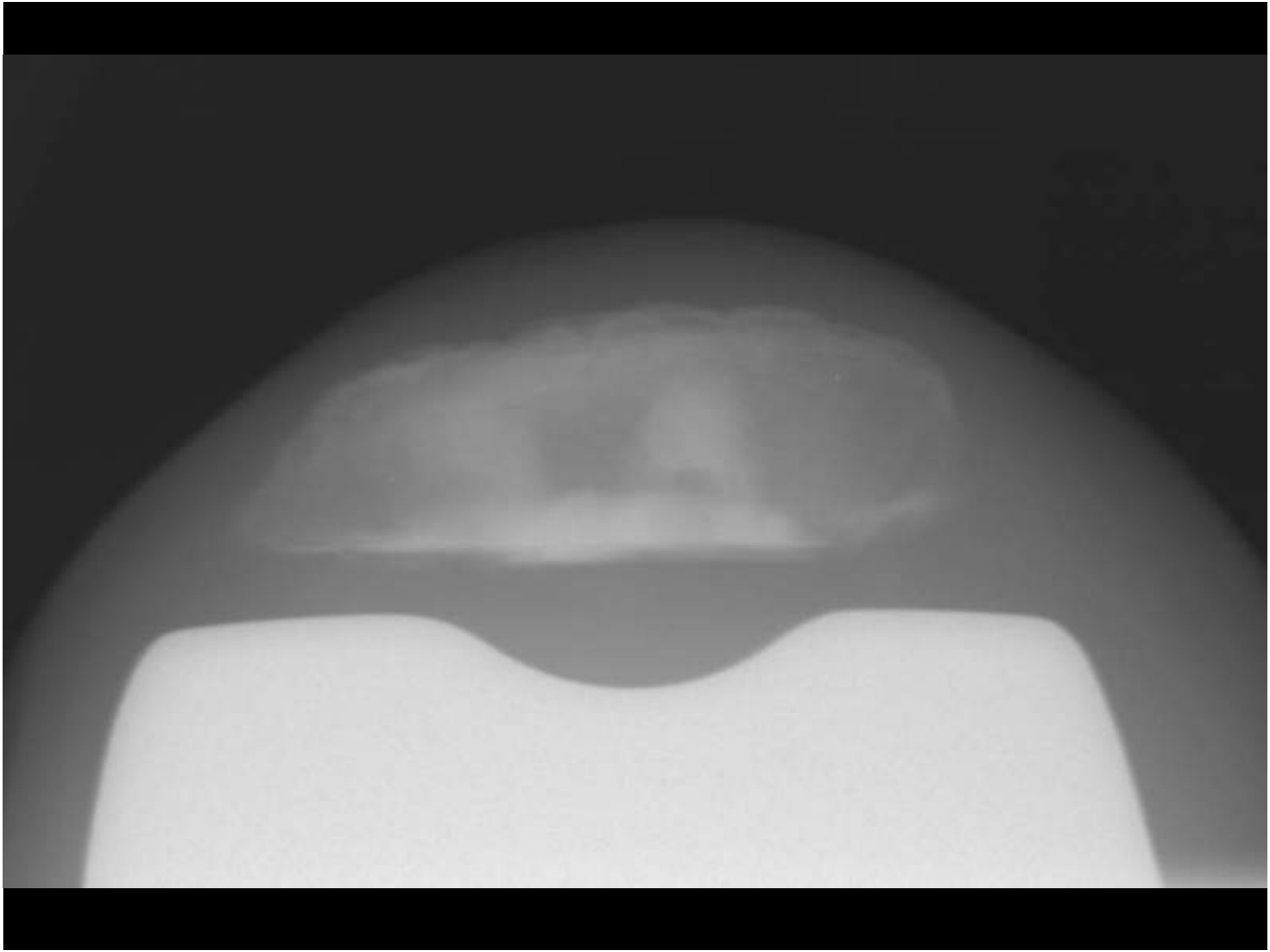


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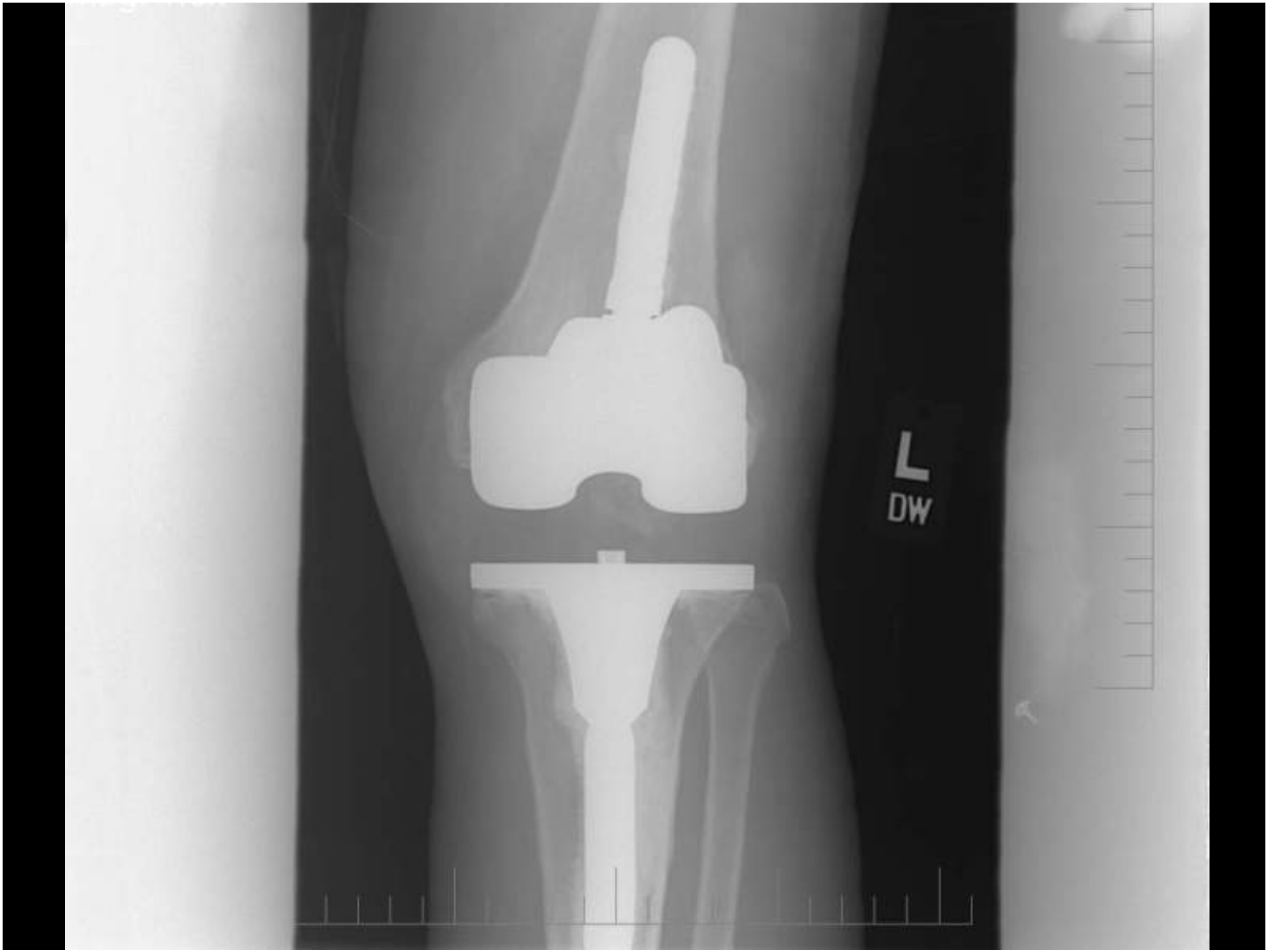
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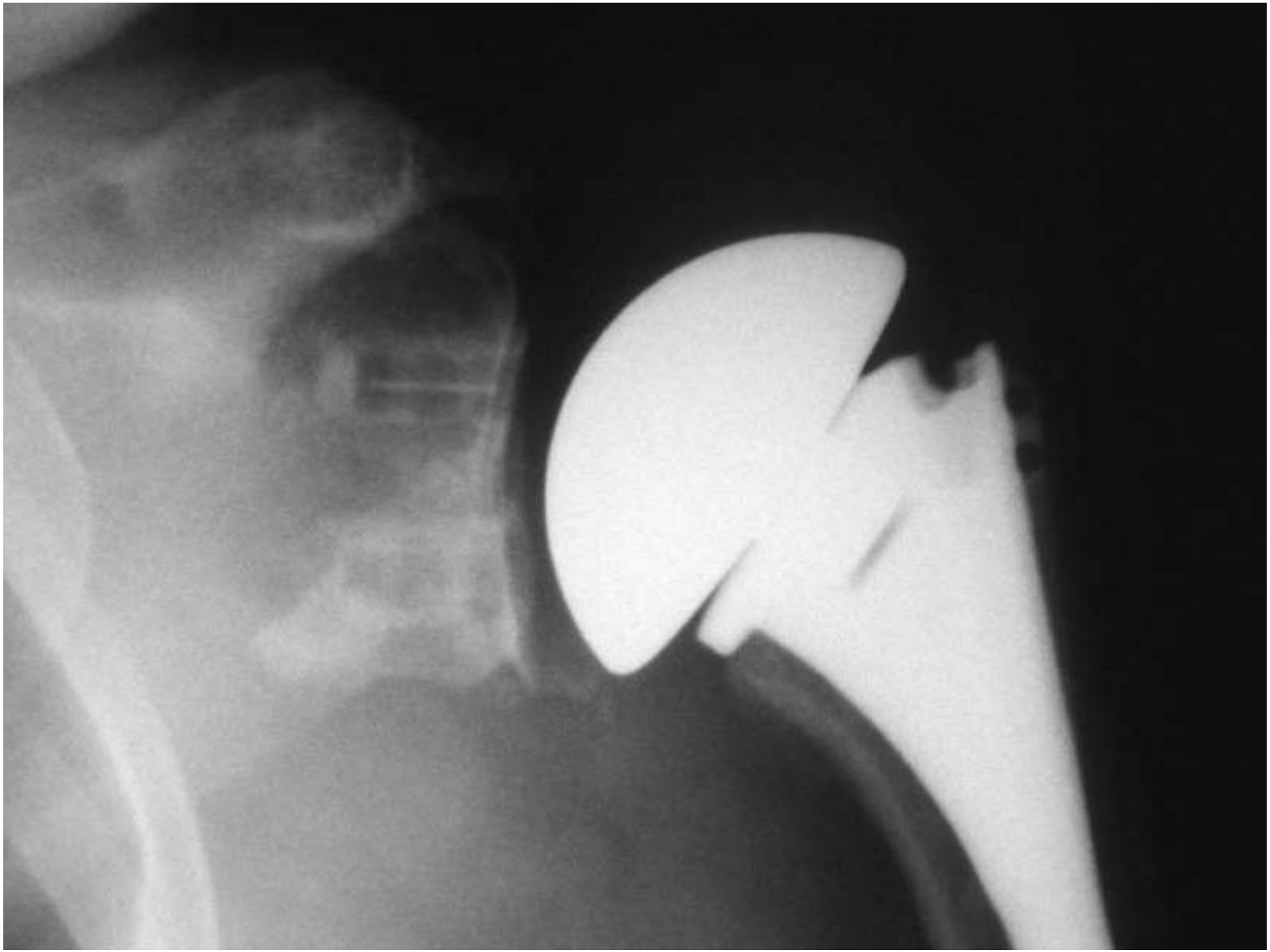

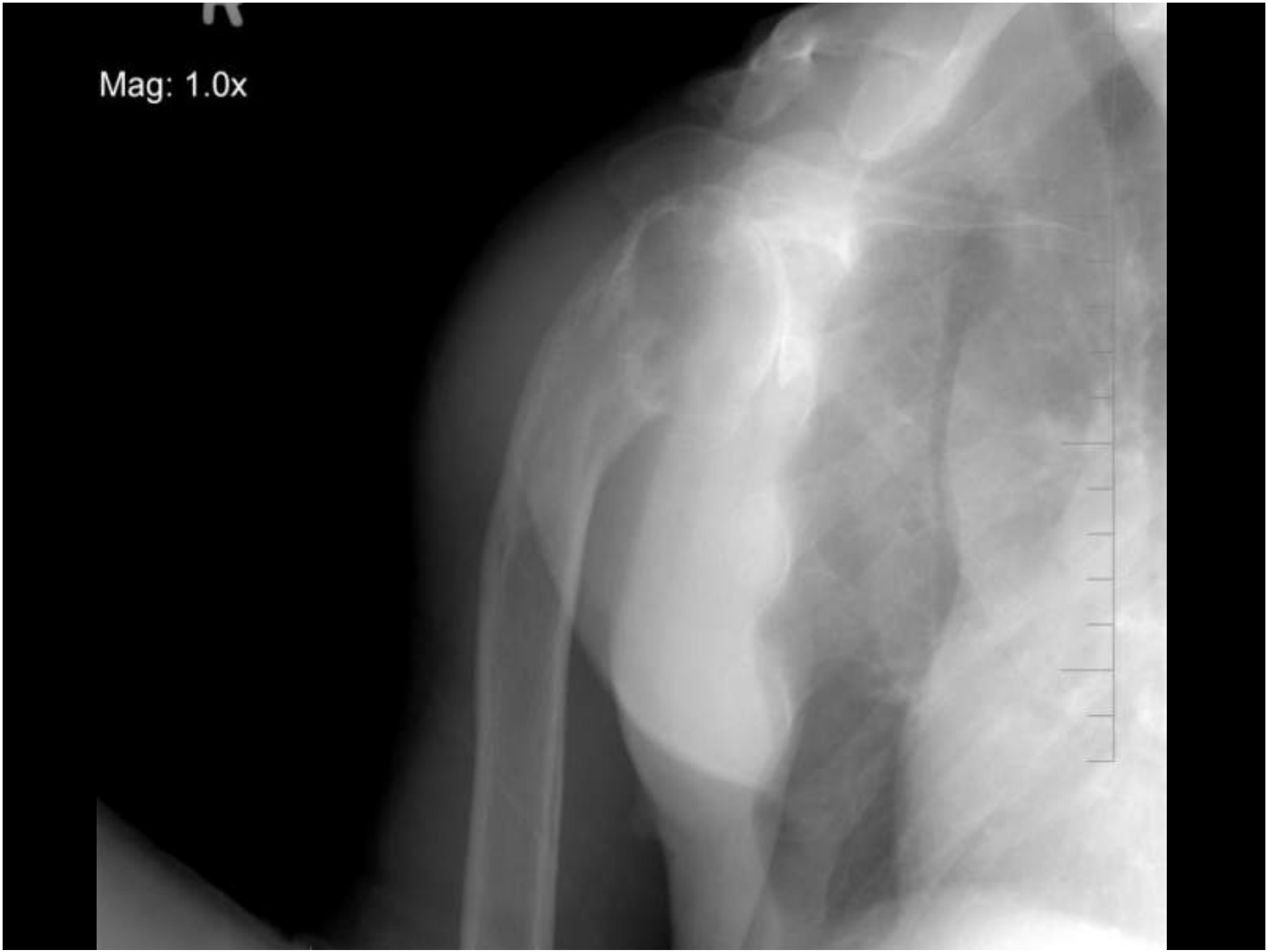
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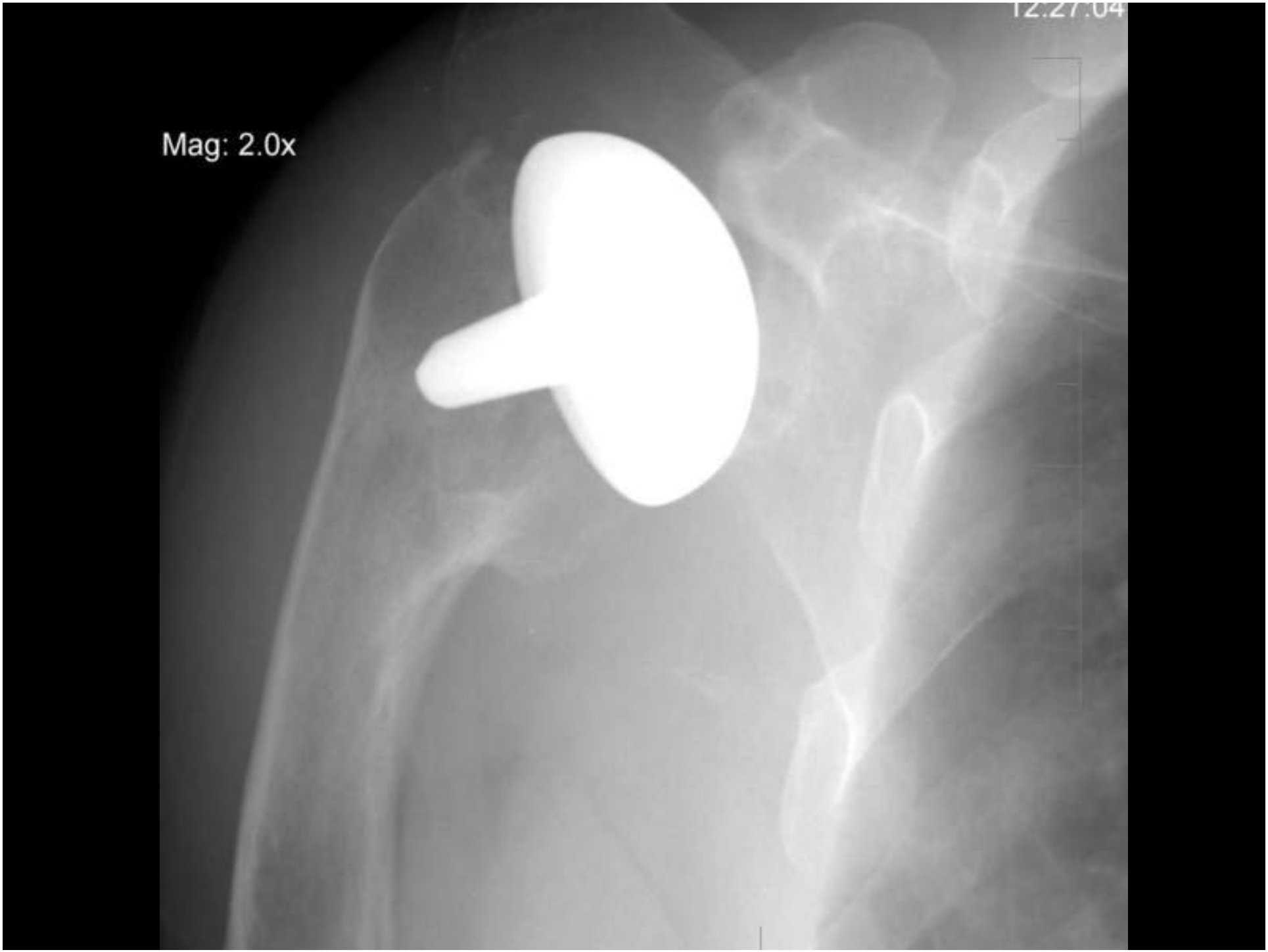
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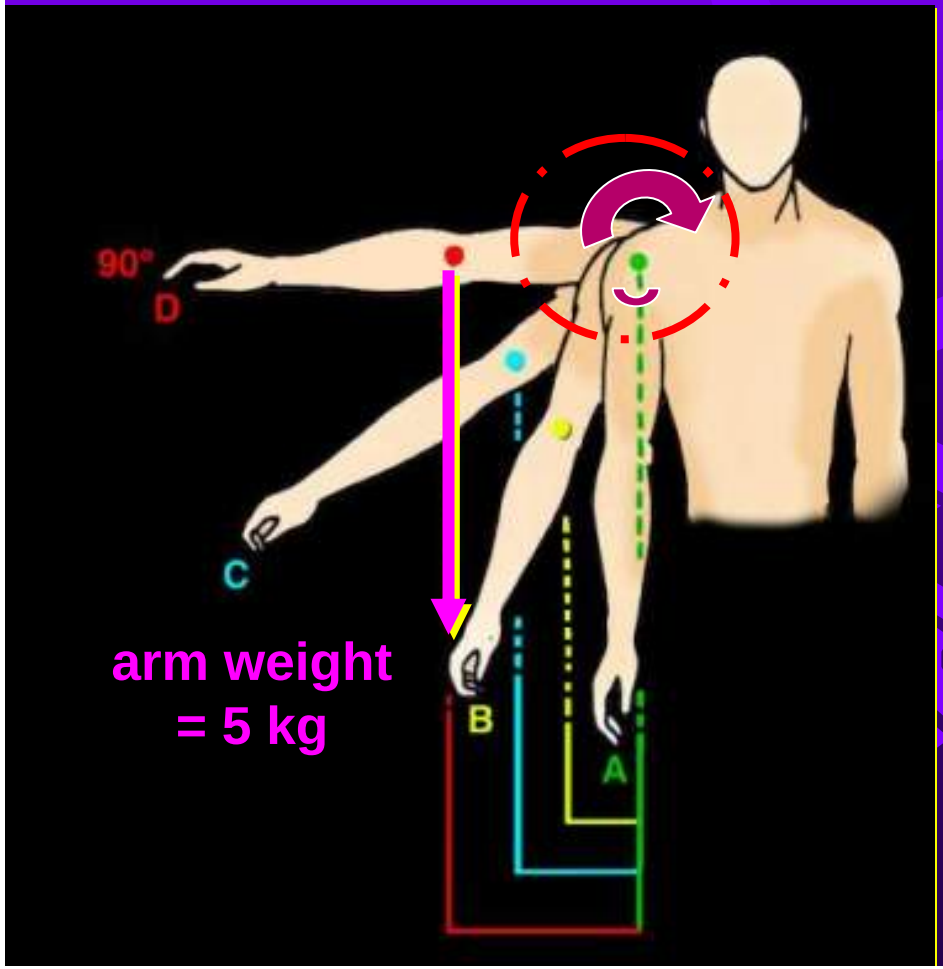
Reverse TSA

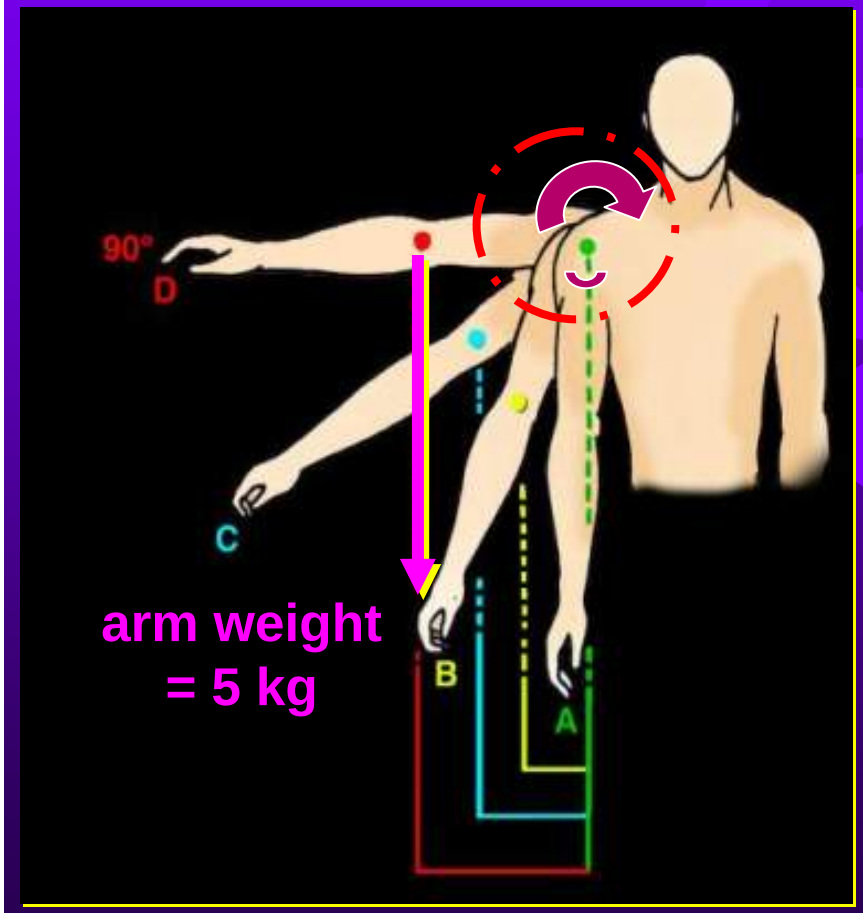
- What is it?
- Why use it?
- Who uses it?
- When should it be used?
- Where can it get you?

Shoulder Biomechanics



- Arm elevation means that the deltoid must counteract effect of arm weight
- The center of rotation is located in the humeral head

Shoulder Biomechanics



- A stable fulcrum is created by the RC
- COR creates ideal moment for deltoid to elevate arm
- RC contributes to abduction >90°

Problem

- Massive rotator cuff tears
- Instability
- Glenohumeral arthritis

Pathology

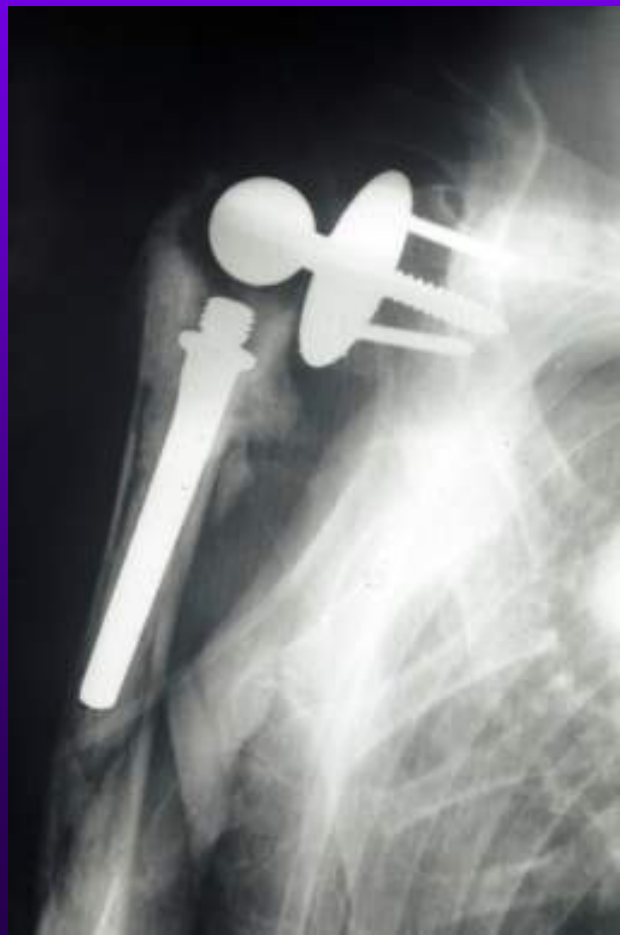
- Weakness
- Instability
- Incongruous joint surfaces
- Bone loss

Treatment Objectives

- Restore stability to GH joint
- Provide smooth articulating surfaces
- Replace bone loss
- Optimize remaining cuff muscles, restoring rotational strength

Reverse TSA

- Kessel, Kölbel, Fenlin, Gerard, Liverpool, Neer & Averill



Reverse TSA

- Kessel, Kölbel, Fenlin, Gerard, Liverpool, Neer & Averill

Reverse TSA

- No reliable surgical solution to restore anatomy prior to reverse TSA
- Unconstrained arthroplasty may resurface arthritic humeral head but instability will remain
- Prosthetic design with increased constraint can potentially help instability

Reverse TSA

- Semi-constrained
- Provides stable fulcrum
- Multiple options for center of rotation
- Ability to maintain anatomic center of rotation
- Fixed angle central lag screw for fixation
- 4 locking 5.0mm peripheral screws

Indications

- Glenohumeral OA with massive cuff tear.
- Failed cuff repairs with static instability.
- Massive irreparable rotator cuff tear.
- Post-traumatic arthritis w/wo static instabilty.
- Malunited and nonunited fractures.
- Primary fracture treatment in the elderly.

- **No other satisfactory option available.**

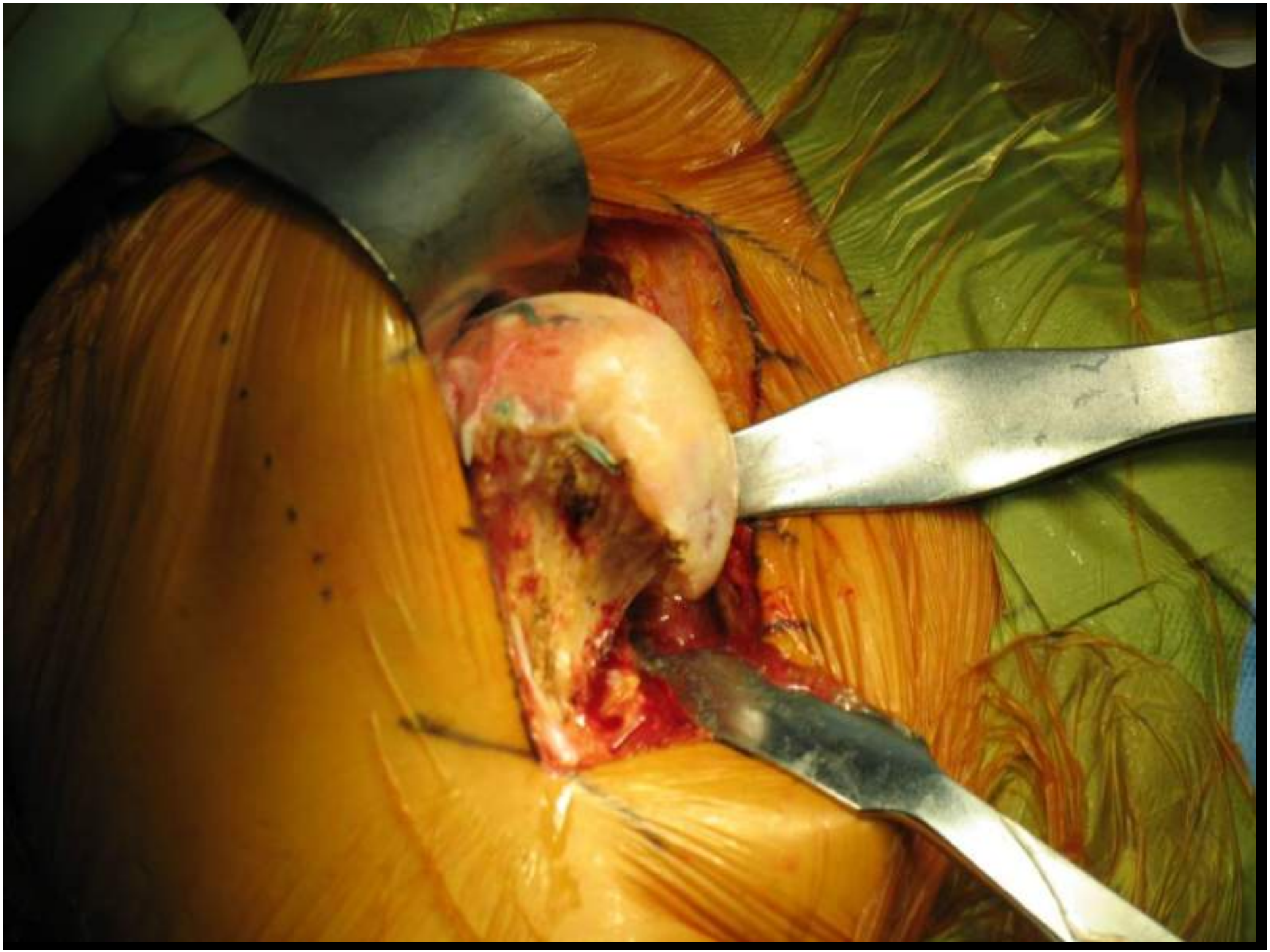
Indications

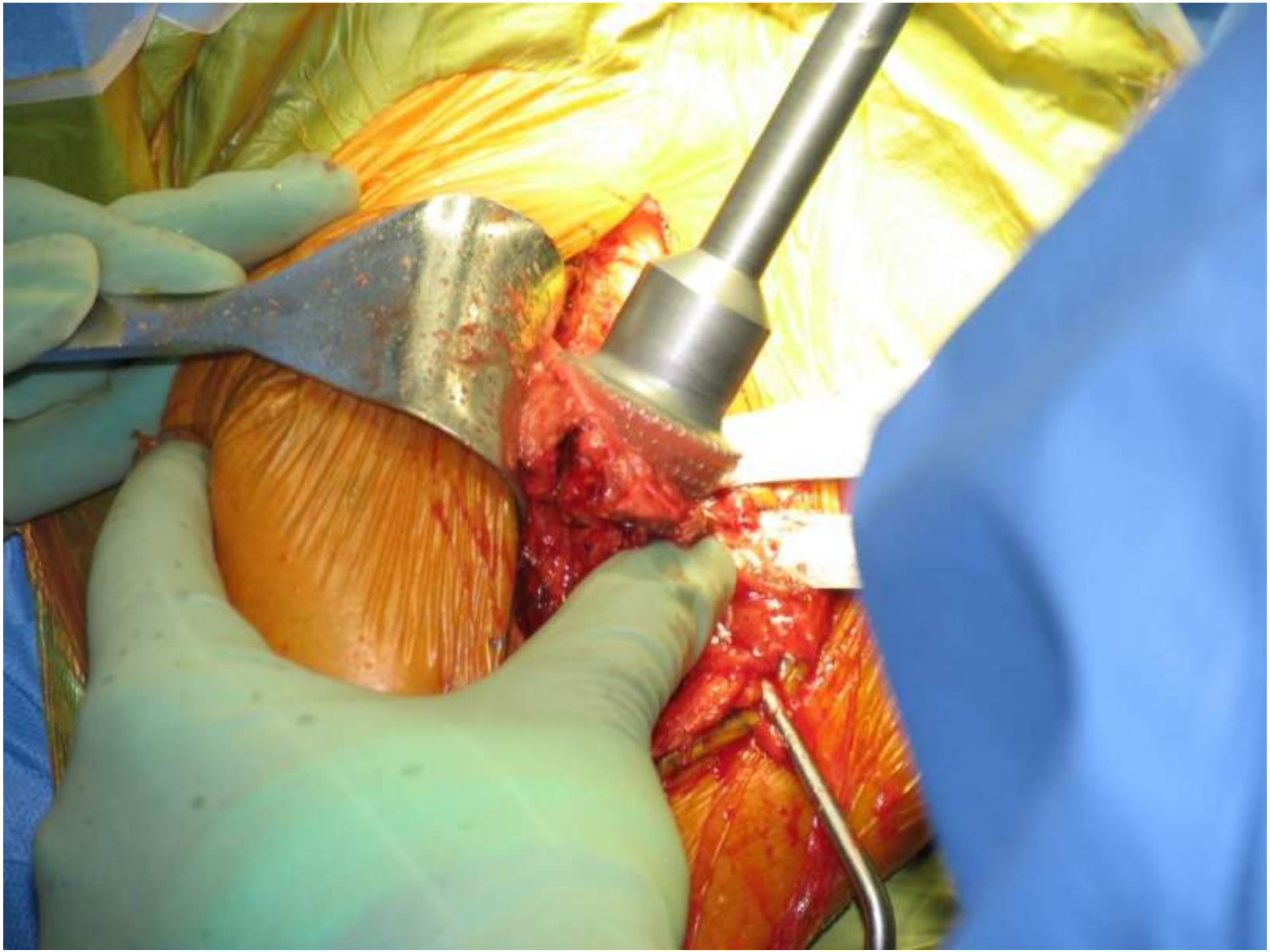
- Failed hemiarthoplasty.
- Prosthetic instability.
- Rotator cuff insufficiency.
- Glenoid bone reconstruction.
- Rheumatoid shoulder.
- Neoplasm.

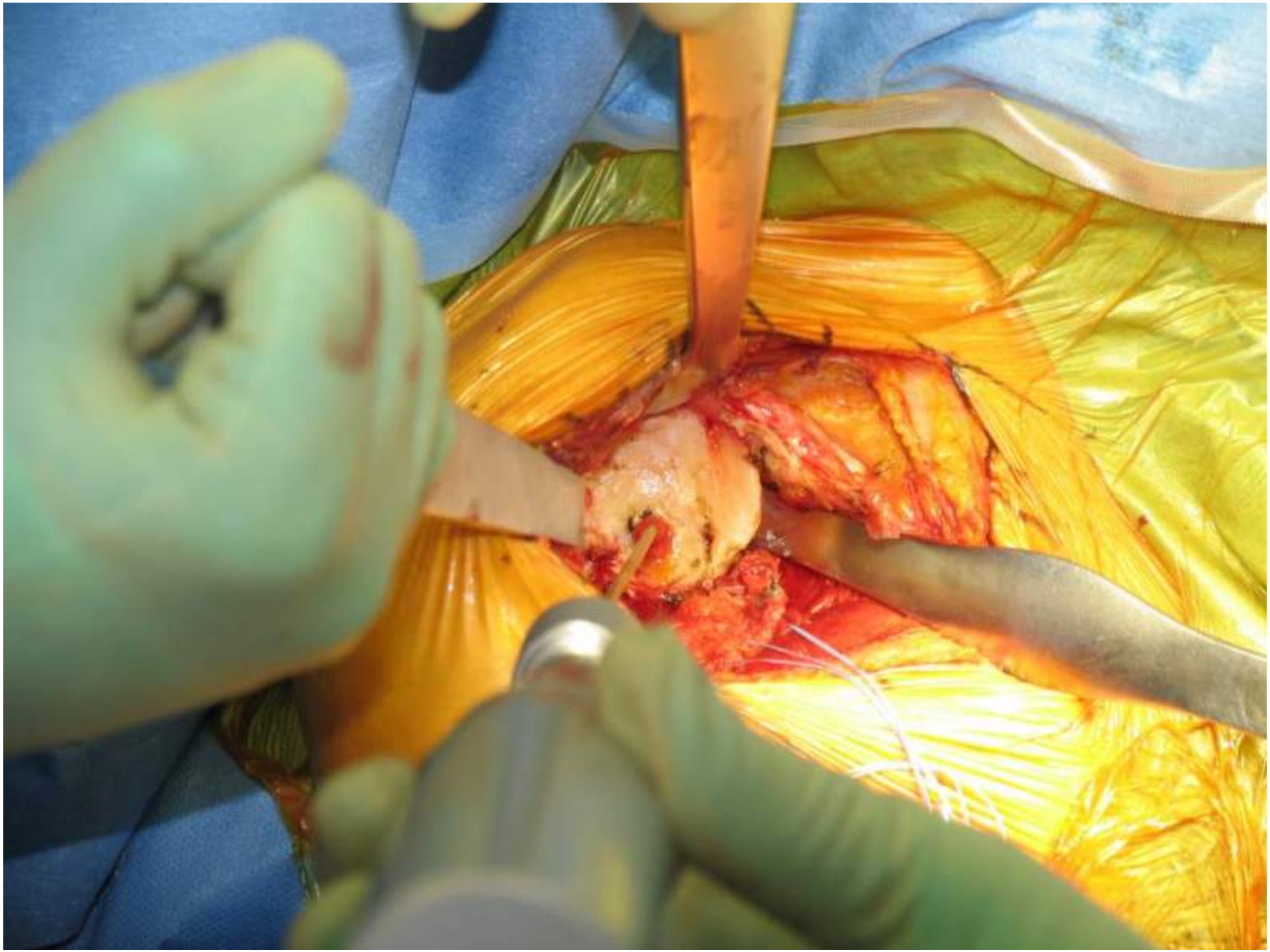
- No other satisfactory option available.

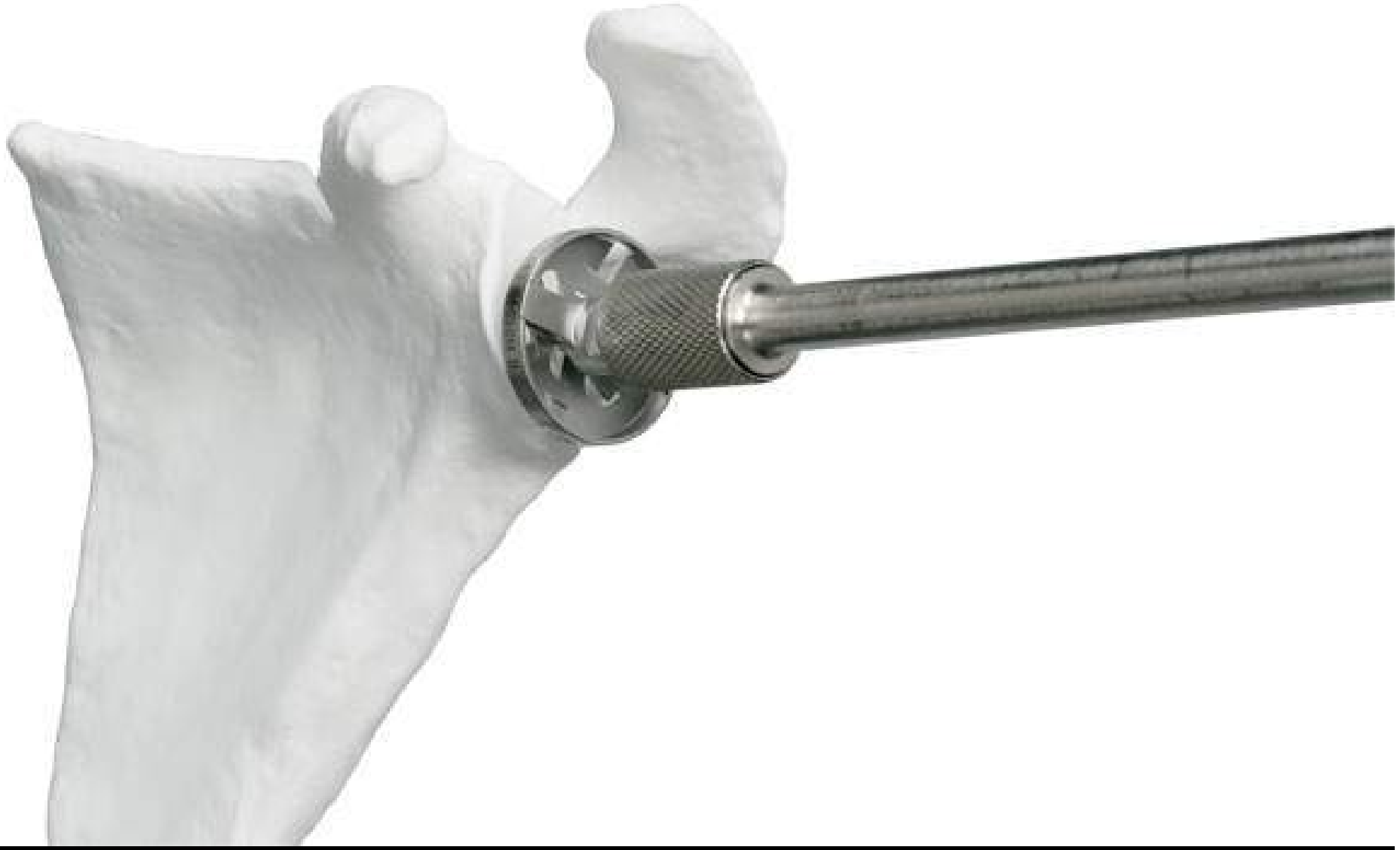
Surgical Lessons

- Place glenoid baseplate low and tilt inferiorly.
- Inferior capsular release important.
- Bone graft on glenoid behind baseplate for wear.







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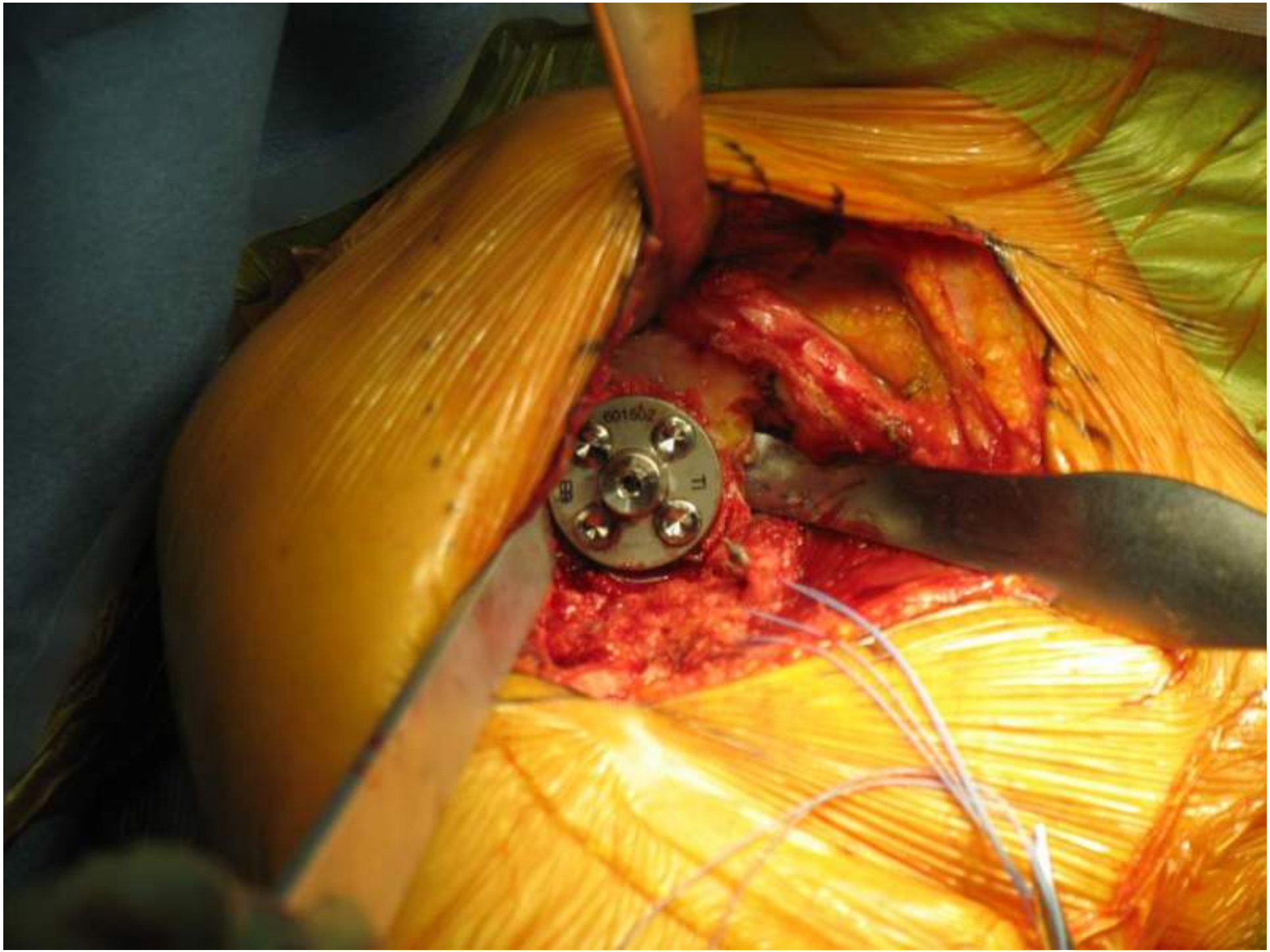
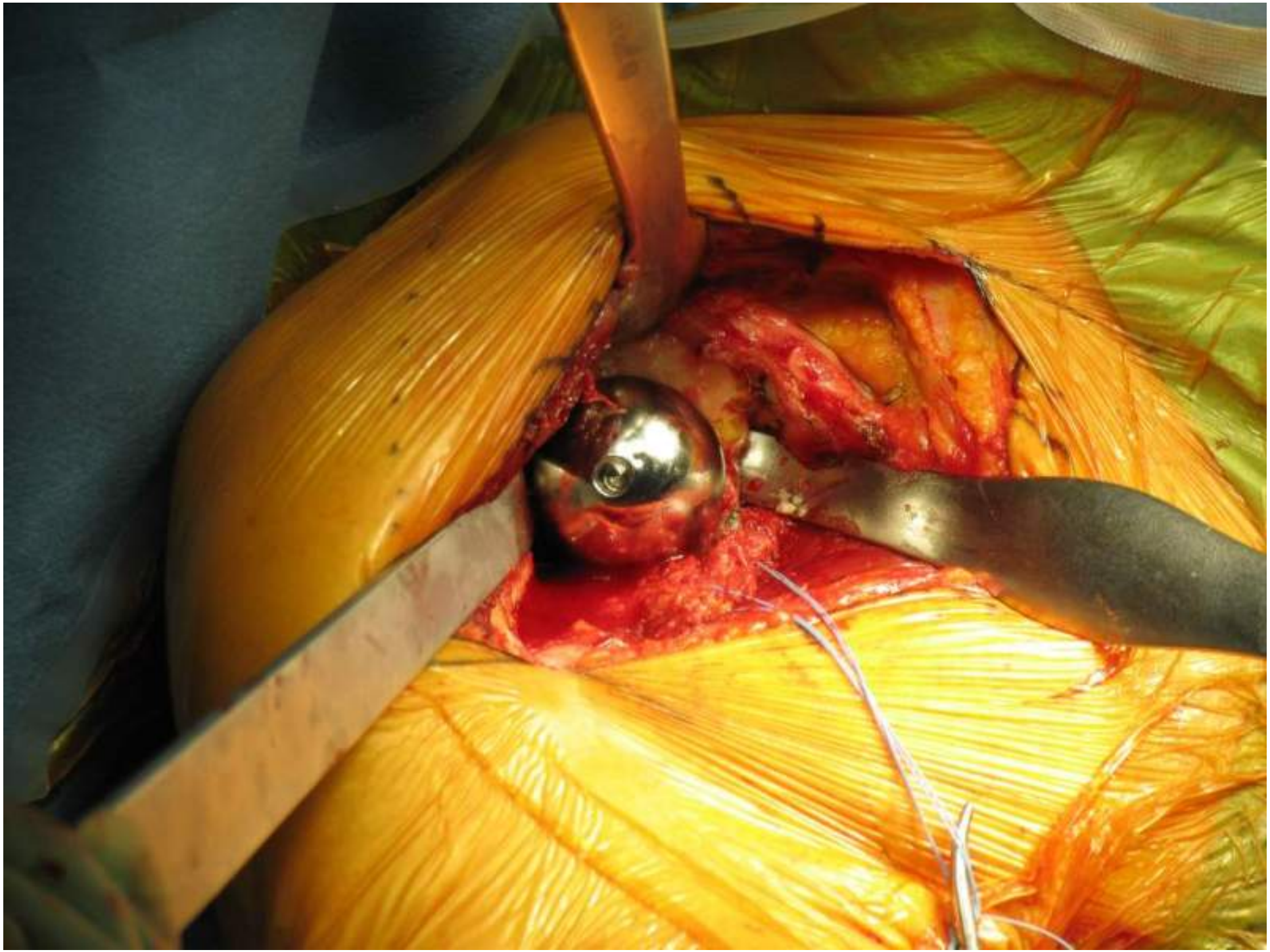




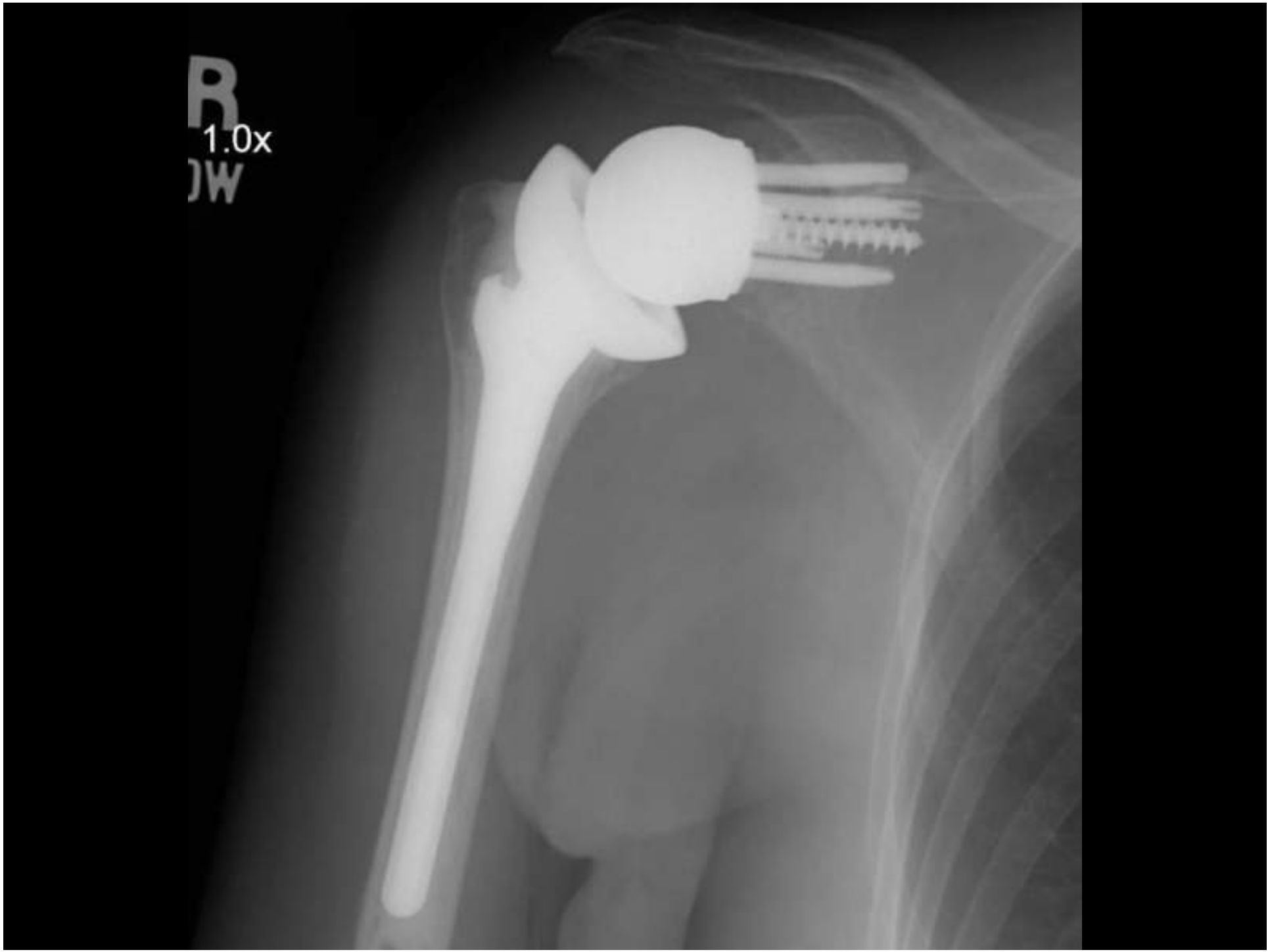
Postoperative Protocol

- Much less intense than conventional TSA.
- Sling for 4-6 weeks depending on indication.
- Passive pendulums and Codmans followed by AAROM.
- After sling, often ADLs and no formal PT.

Clinical Results

- Pain significantly less.
- ASES, Constant scores increased.
- Patient satisfaction high.

- Sirveaux JBJS 2000, Frankle JBJS 2005, Werner JBJS 2005, Boileau JSES, 2005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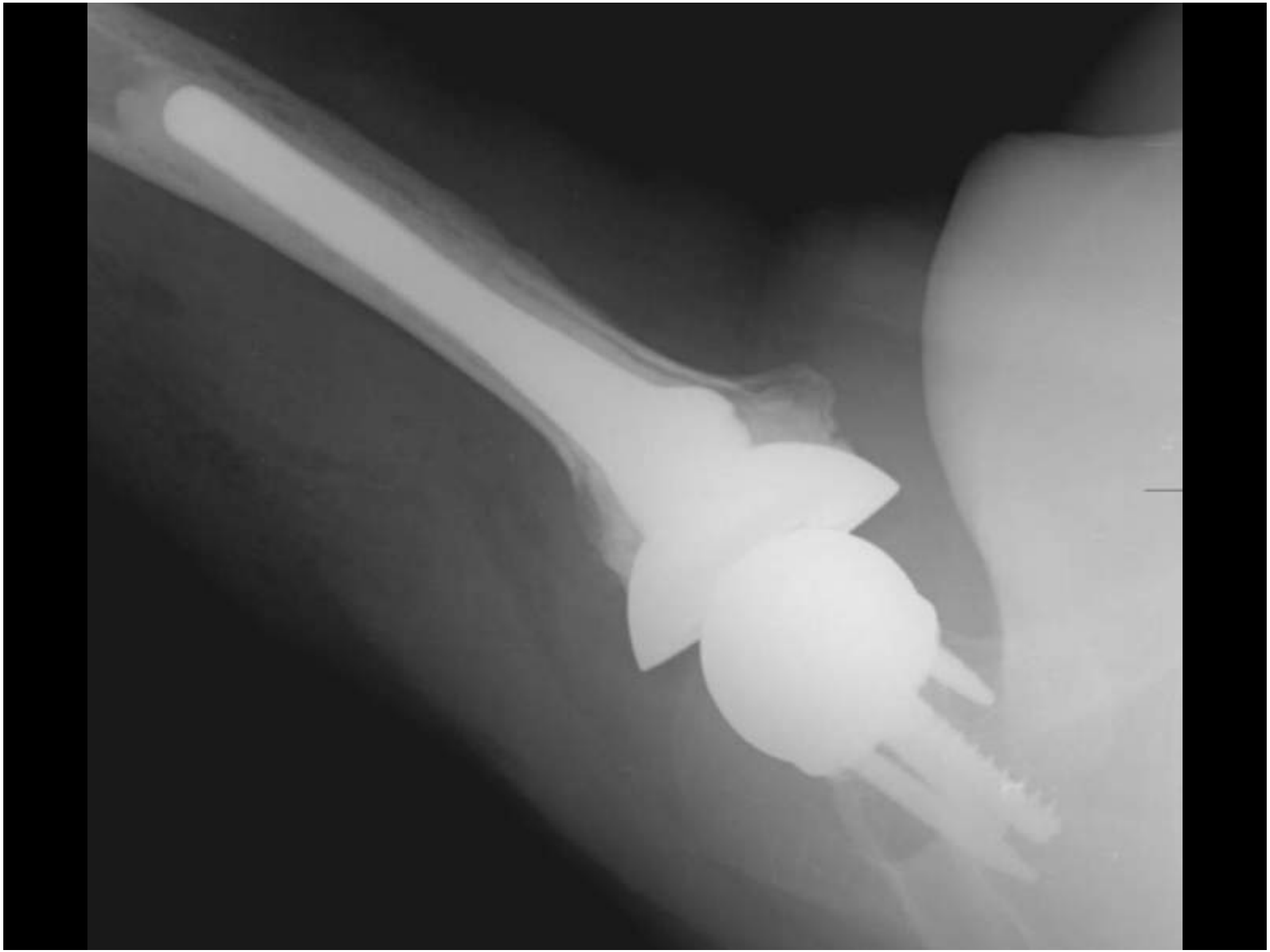


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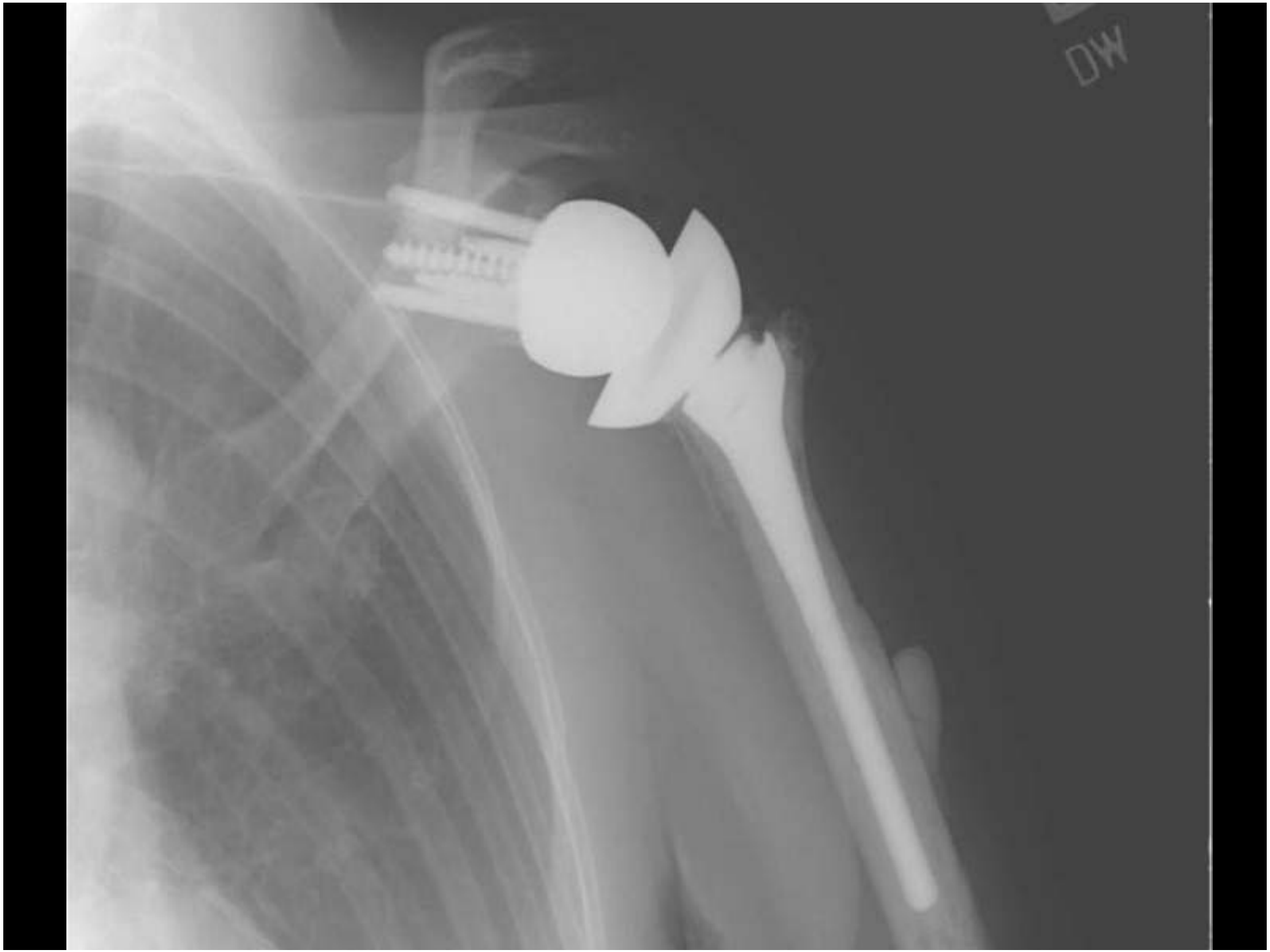
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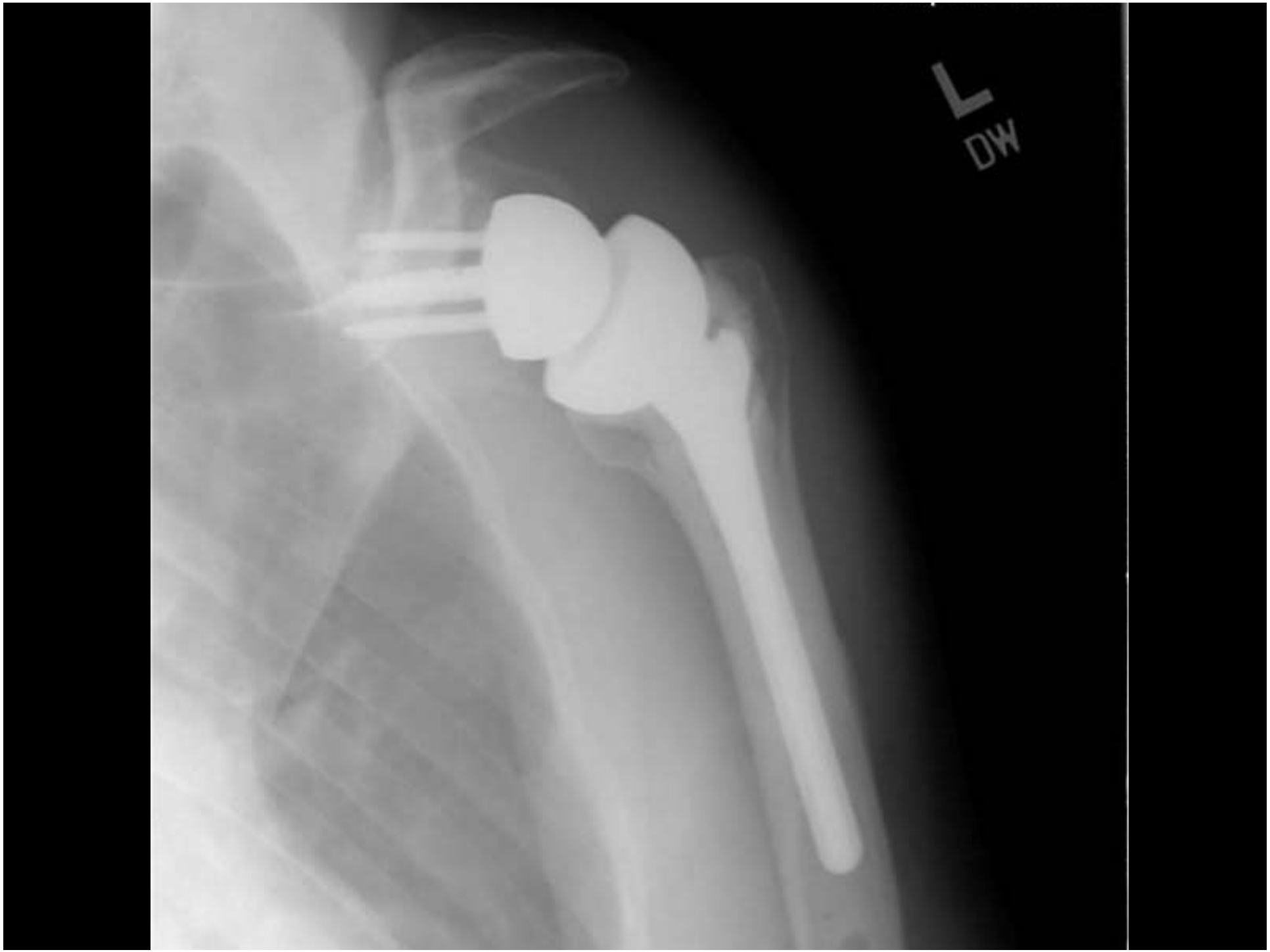
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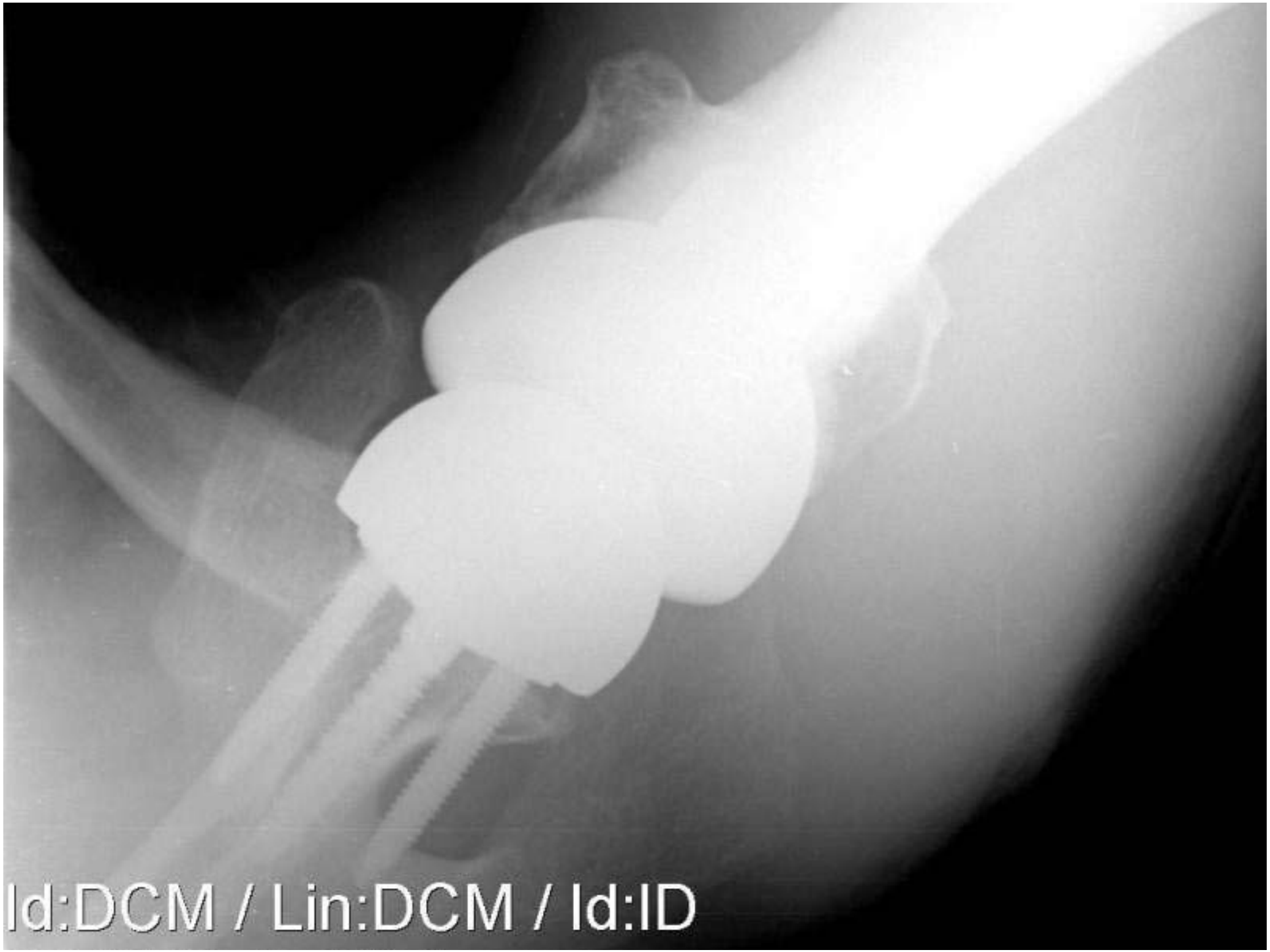
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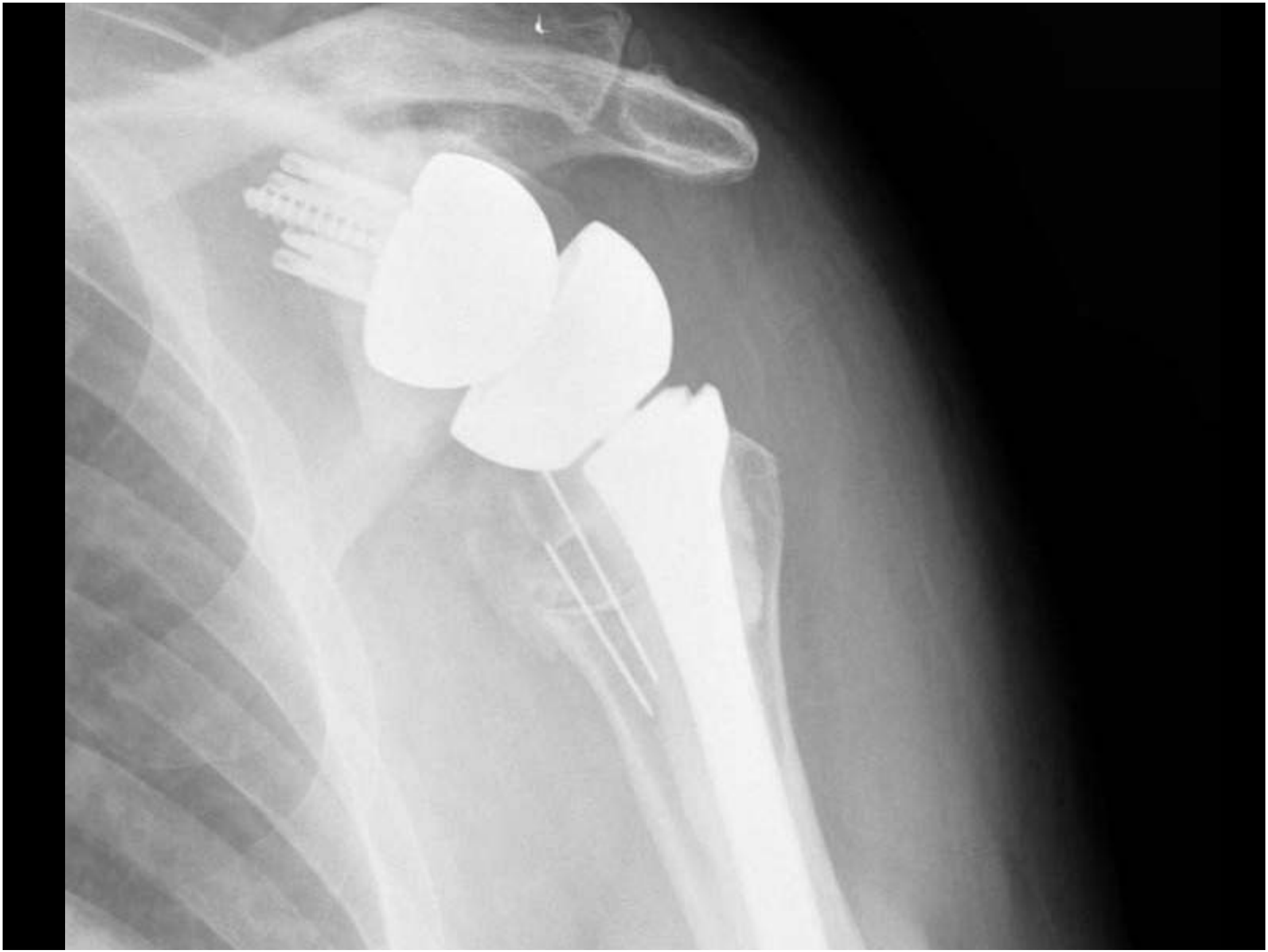
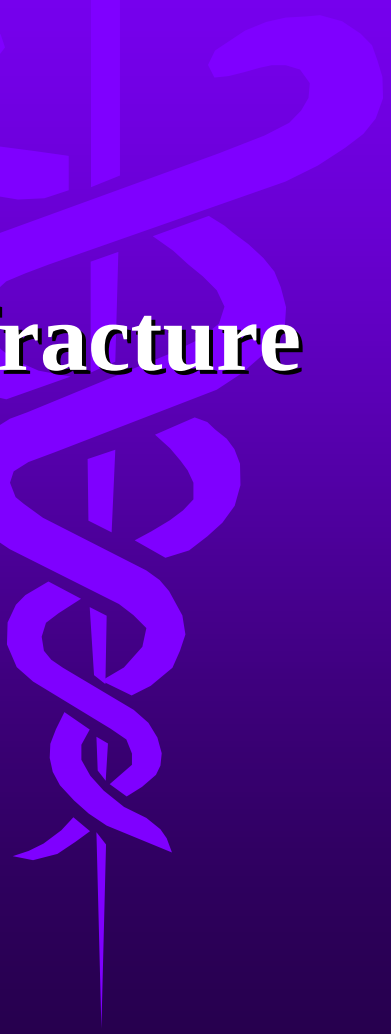


Complications

- Must separate primary and revision cases.
- Overall 16% complication rate.
- Revision rate 3X primary rate.
- Rates similar to conventional TSA.
- Humble learning curve.

Complications

- Instability
- Infection
- Postoperative fracture

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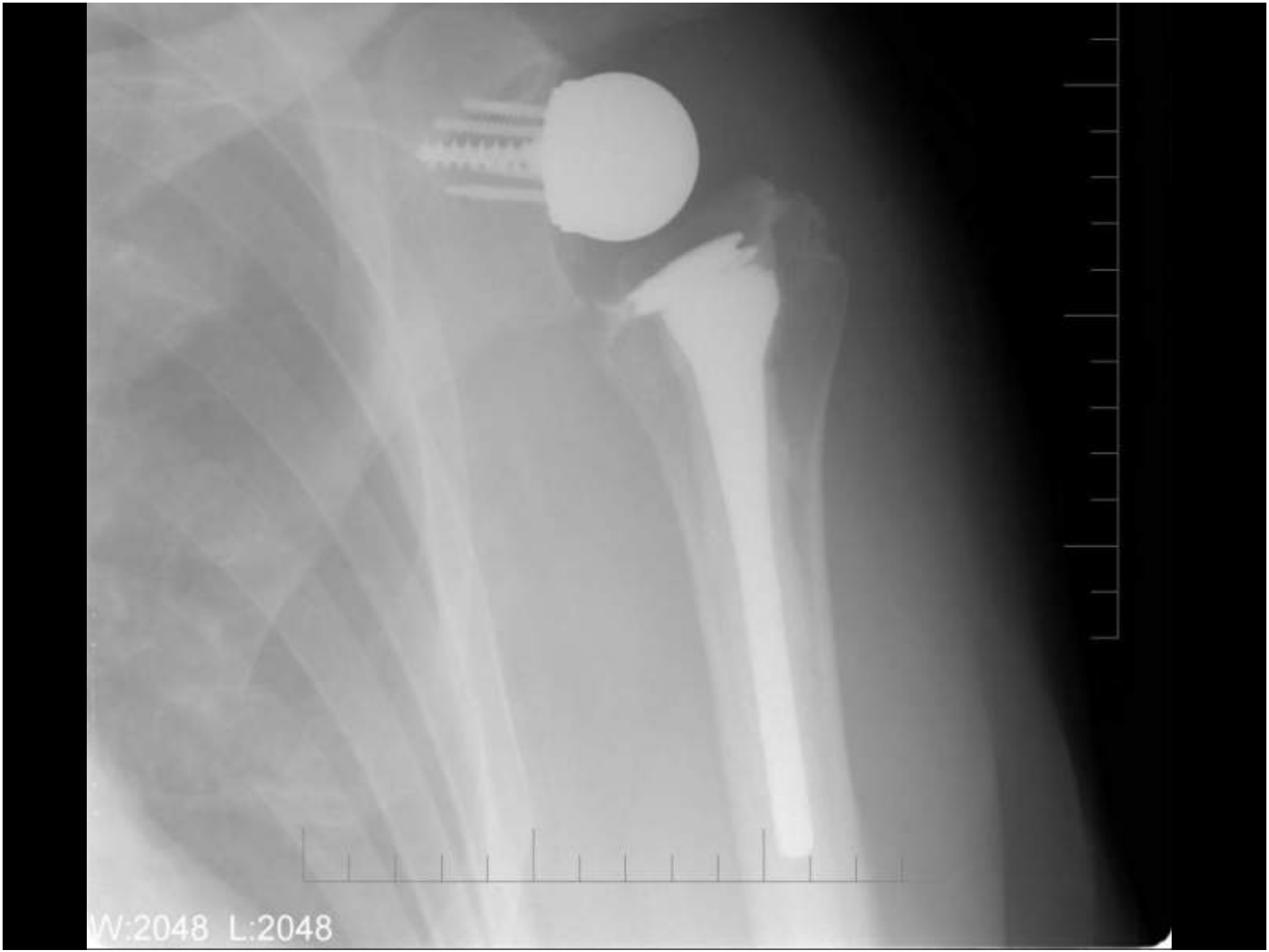
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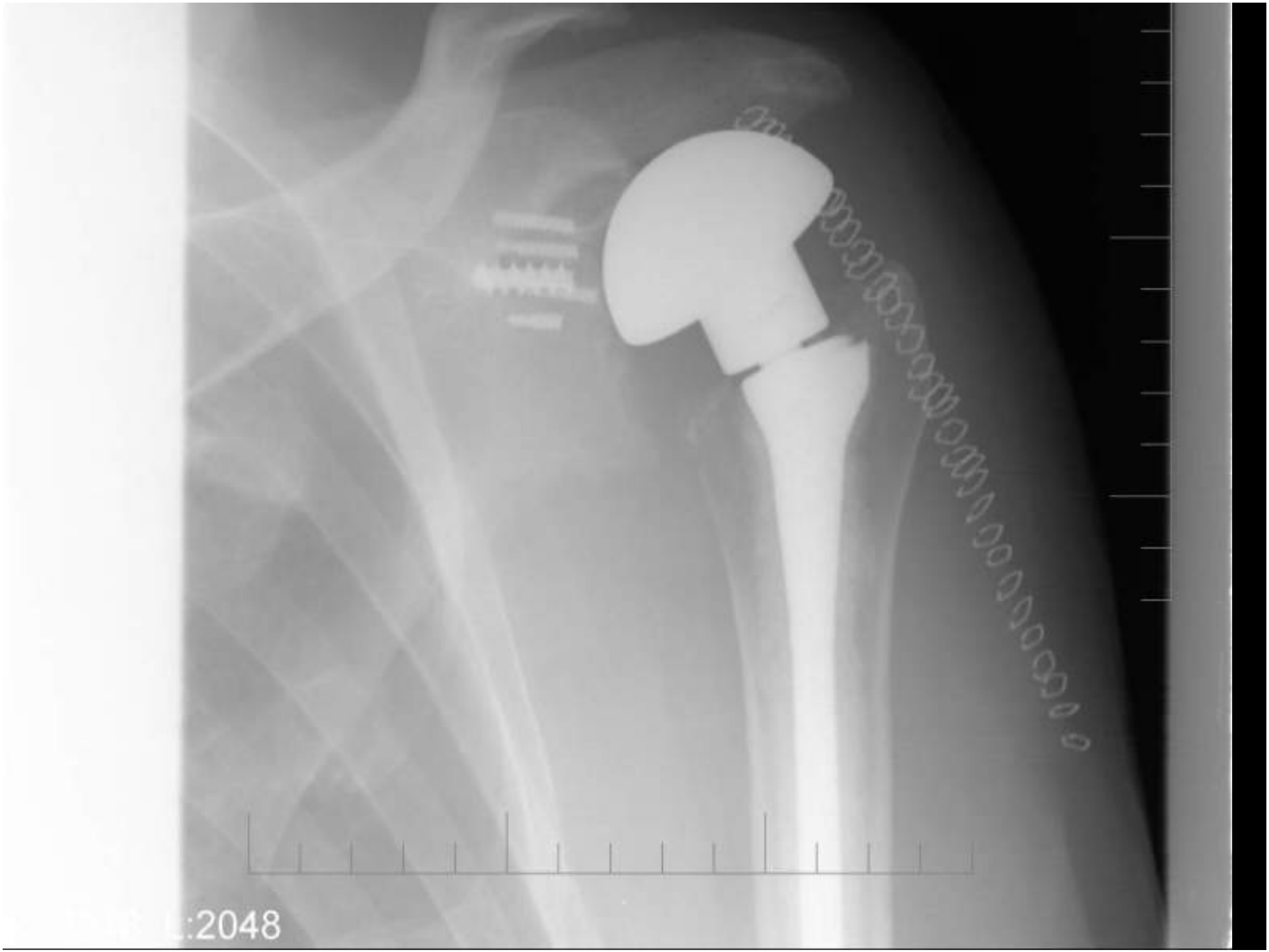
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Survivorship

- Survivorship 98% at 7 years with RSP.
- Survivorship 91% at 10 years with Delta III.

Patient Management

- Anaesthesia
- Perioperative pain control
- VTE Prophylaxis
- Long-term results

Anaesthesia

- General
- Regional
- Blocks - sciatic, femoral, lumbar plexus, interscalene

Pain Management

- Multimodal pain management
- Anaesthesia blocks
- Cox 2 NSAIDs
- Long acting narcotics

Venous Thromboembolism

- All THA and TKA need prophylaxis
- Guidelines recommend LMWH, warfarin or anti-Xa agents.
- Minimum 2 weeks
- Consider extended prophylaxis (4weeks) in patients with increased risk factors

Long-term results

- Cost-benefit ratio high
- Quality of life issues
- THA 85% doing well at 20 years
- TKA 90% doing well at 20 years
- TSA >90% doing well at 20 years