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INNOVATIONS IN SURGERY AND REHABILITATION FOR COMPLICATED ELBOW FRACTURES

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A Shared Vision COLLABORATION FOR BEST OUTCOMES

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AMERICAN SOCIETY OF HAND THERAPISTS™

Disclosure

David Moss MD
Sarah Doerrer PhD, OTR/L, CHT, CLT

Washington Orthopedics and Sports Medicine
Washington DC

We have no financial relationships to disclose within the past 12 months relevant to my presentation.

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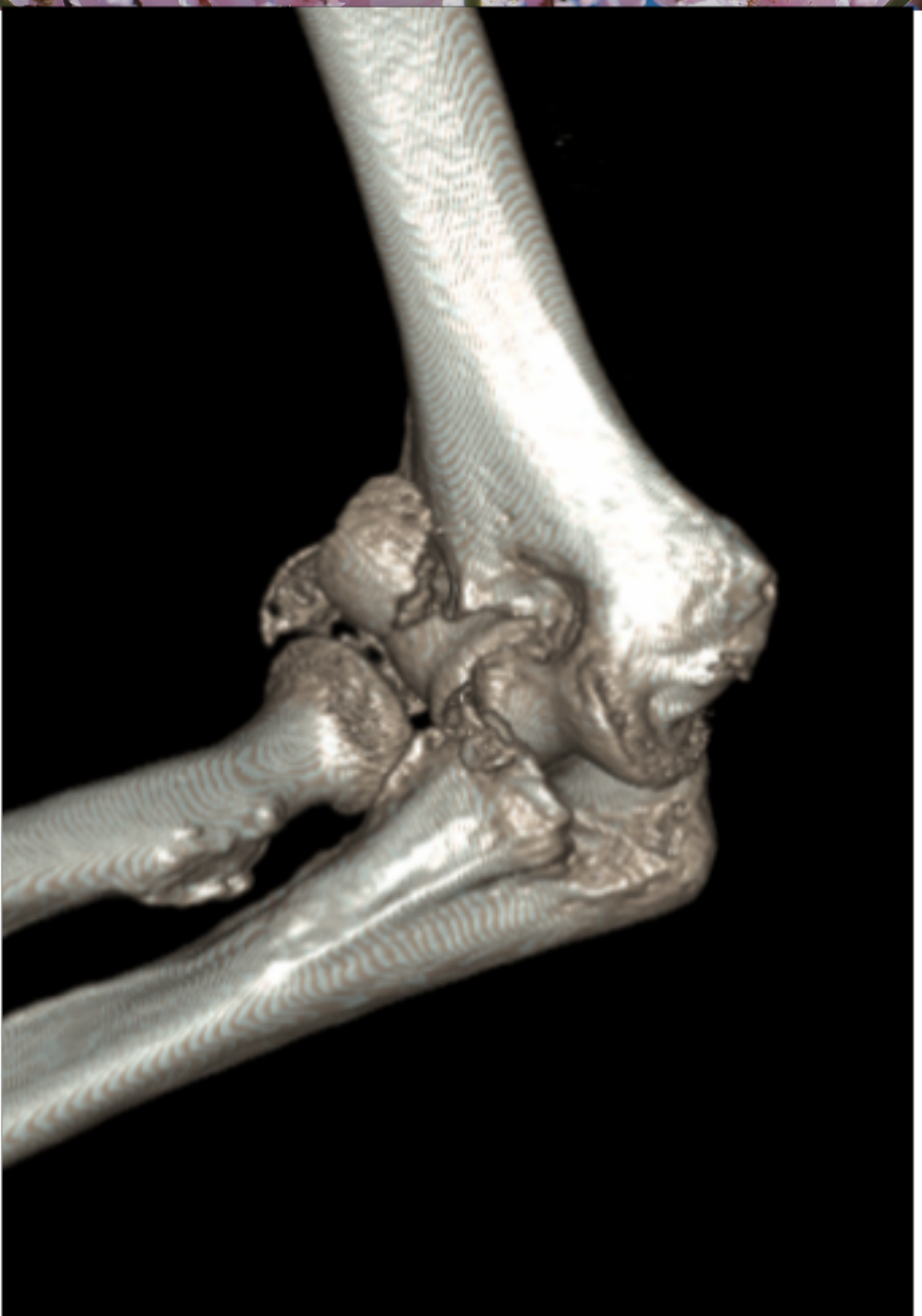
Overview

- Innovating, exciting topics in elbow surgery
  - Distal humerus hemiarthroplasty (DHH)
  - Internal Joint Stablizer (IJS)



Distal Humerus Hemiarthroplasty

Indications

- Unreconstructable distal humerus fractures
- Preferable for very distal fractures
- Poor Bone quality

Previous options

- Inadequate fixation
- "Bag of bones"
- TEA
  - Lifting restrictions <5 pounds
  - Early loosening and implant failure

DHH case presentations

Case #1

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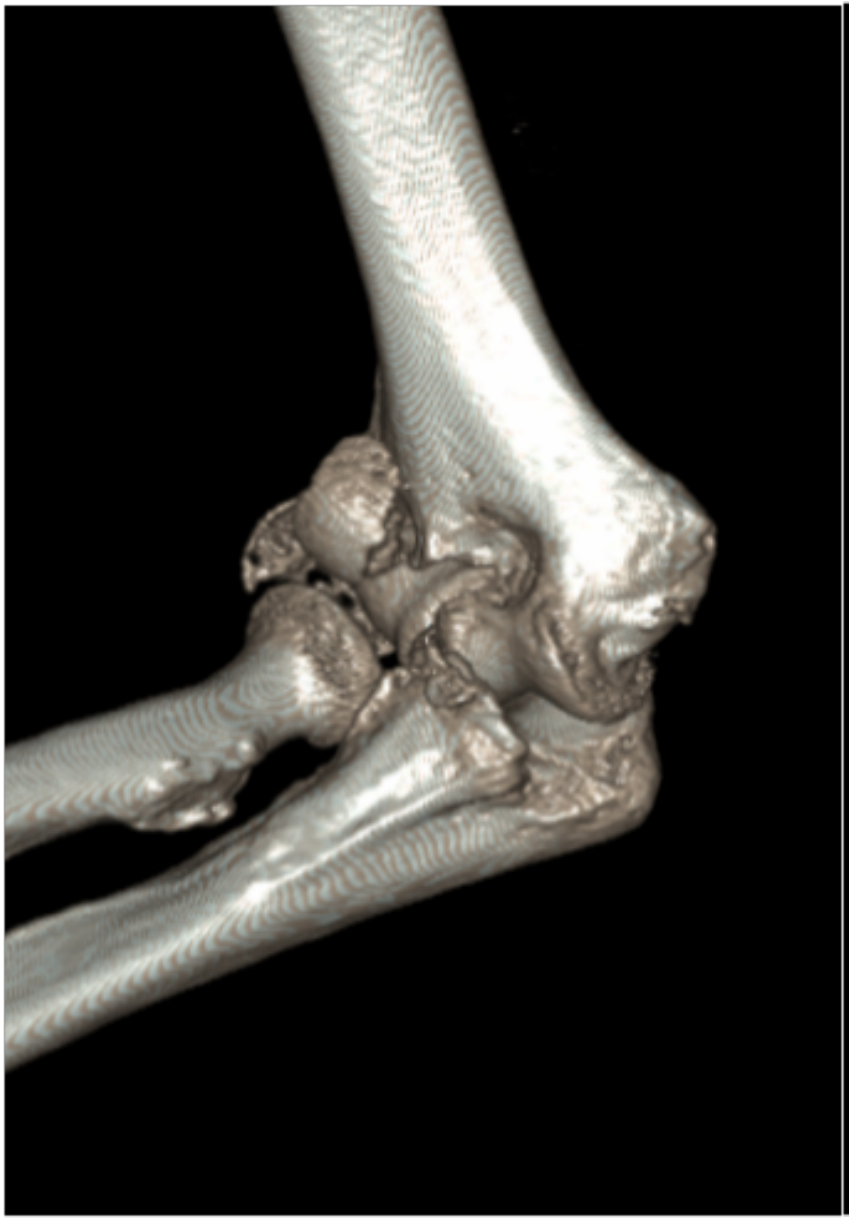
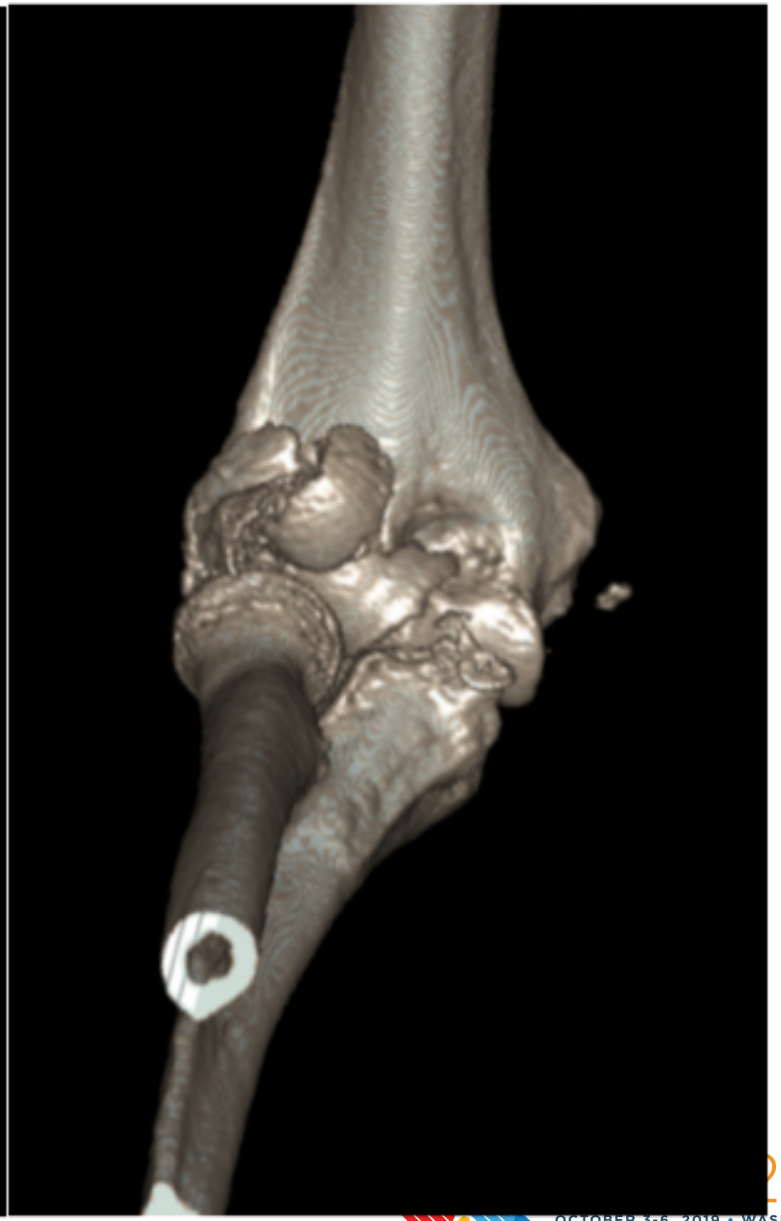
Case #1

- 90 yr old active, healthy female
- FOOSH playing ping pong with her great grandchild





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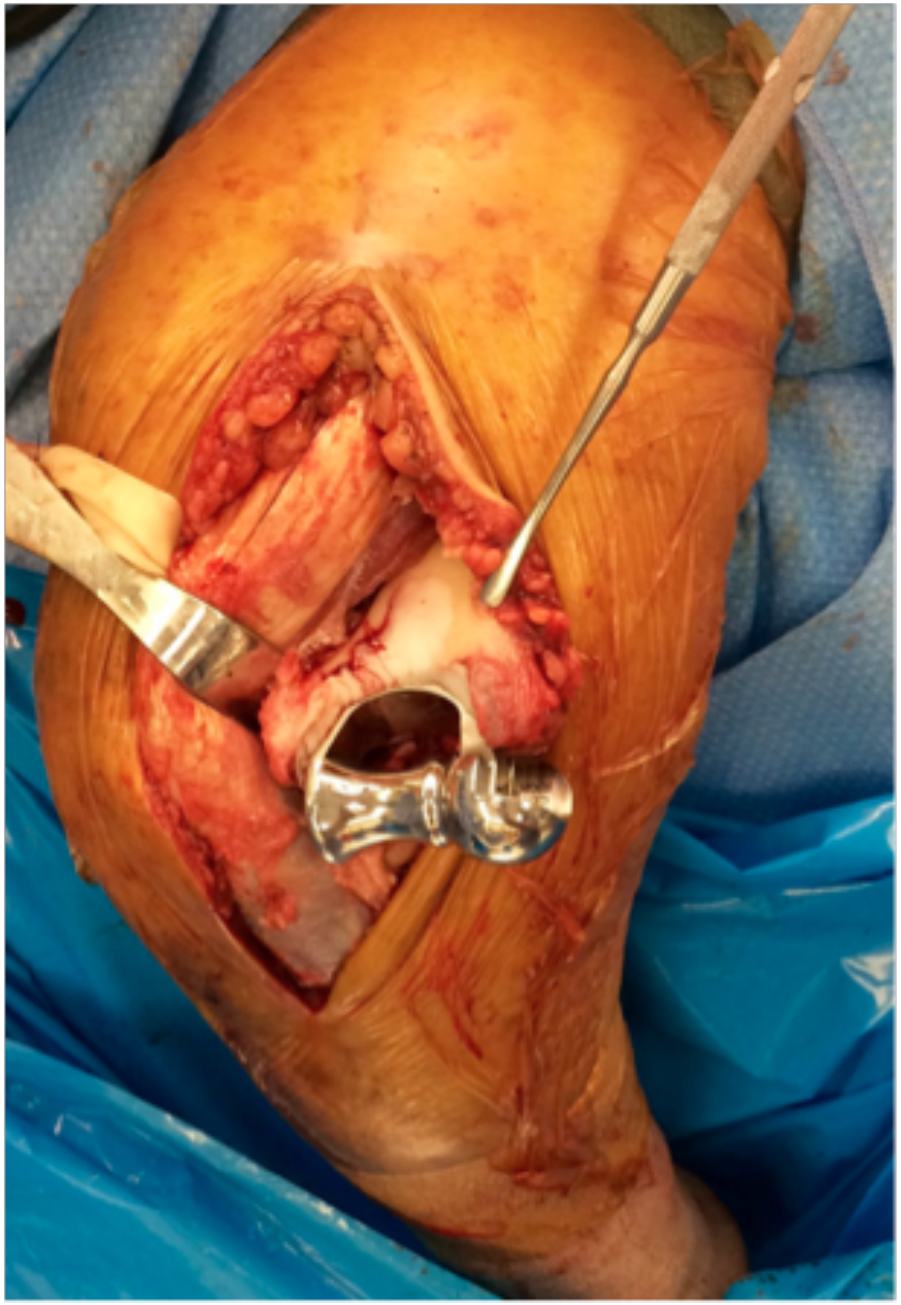
Treatment Options?

- ORIF?
- Total elbow arthroplasty?
- Distal humerus hemiarthroplasty



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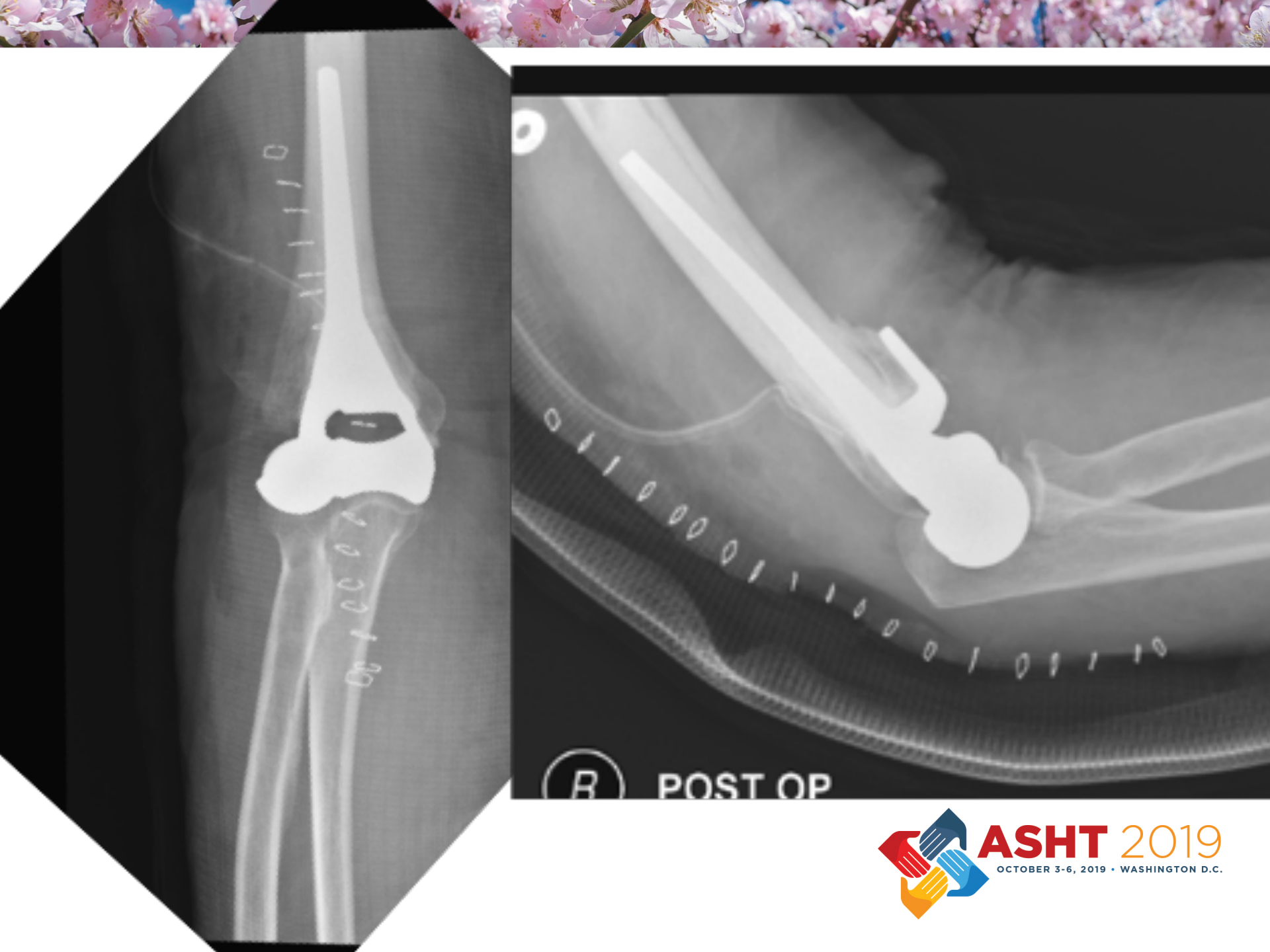

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Case #2

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Case #2

- 70 yr old female
- Psychotherapist
- Fall from standing

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Treatment Options?

- ORIF?
- Total elbow arthroplasty?
- Distal humerus hemiarthroplasty


H

ROM outcome DHH

Case #3

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- 68 yr old female
- Wants to be able to pick up her grandchild

Treatment Options?

- ORIF?
- Total elbow arthroplasty?
- Distal humerus hemiarthroplasty

- ORIF medial column

6 months post DHH

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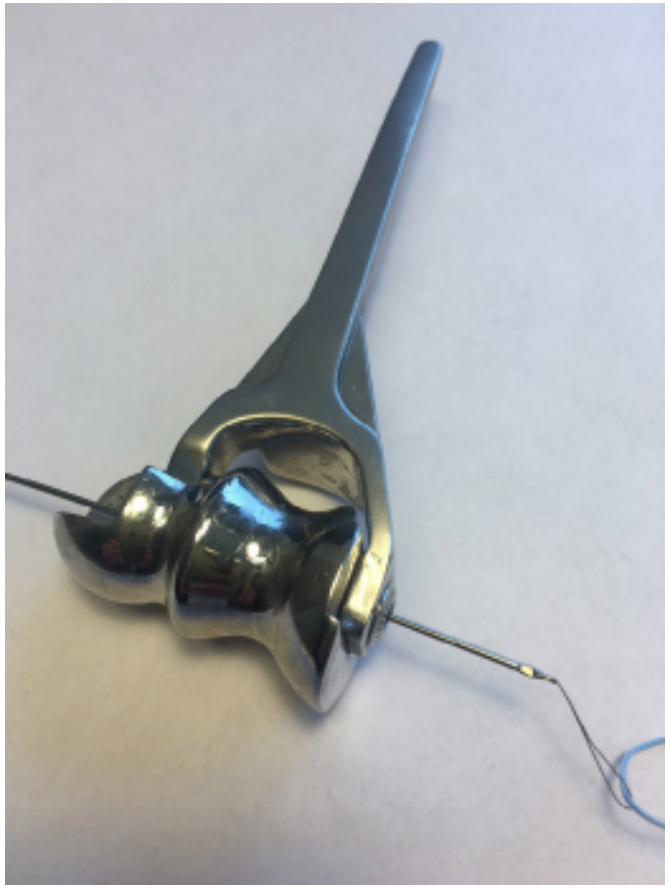
DHH surgical pearls

- Not FDA approved in US
  - Informed surgical consent
- Properly size implant
  - Limited size options in US
  - S, M, L
- Must repair/reconstruct collateral ligaments
  - Not hinged
- Convertible to TEA



Unreconstructable acute distal humeral fractures and their sequelae treated with distal humeral hemiarthroplasty: a two-year to eleven-year follow-up

Geoffrey C.S. Smith, FRACS (Orth)*, Jeffery S. Hughes, FRACS (Orth)

- JSES 2013
- Retrospective study of 26 pts who underwent DHH for intraarticular fxs
- Avg age 62 (29-92yrs)
- Mean follow up 80 months
- 4pts died, 4 revised to TEA for periprosthetic fx or component loosening.
- 6 complications
  - Ulnar neuritis, stiffness, 1 wound necrosis
- Outcome measures ASES, Mayo elbow, DASH, EuroQol
- Good function with little pain
- Mean ROM 116 deg
- No instability
- Ulnar wear on XR in 13 pts
  - Correlated with time from surgery, age did not correlate

Good outcome after elbow hemiarthroplasty in active patients with an acute intra-articular distal humeral fracture

Ali Al-Hamdani, MD[a,*], Jeppe V. Rasmussen, MD, PhD[a], Anne Kathrine B. Sørensen, MD[a], Janne Ovesen, MD, PhD[b], Kenneth Holtz, MD[a], Stig Brorson, MD, PhD, DMSc[c,d], Bo S. Olsen, MD, PhD[a]

- JSES 2019, Denmark
- 24 active patients
- Median age 65 yo (range 47-80)
- Median Oxford Elbow score 40 (range 17-48)
- Median MEPS 85 (range 50-100)
- Median flex/ext: 110° arc (60-140°)
- Median sup/pron: 160° arc (115-180°)
- 7 complications
  - 3 re-operations for stiffness
  - 3 ulnar nerve issues
  - 1 heterotopic ossification
- **Conclusion: DHH provides a good and reliable option for unreconstructable distal humerus fractures, especially in active patients.**

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DHH advantages

- Concentric joint reconstruction
- Joint stability – acute and long term
- Safe, early controlled ROM
- Reliable relief of pain
- No long term lifting restriction!
- Reasonable option for younger and high demand patients

Distal Humerus Hemiarthroplasty Rehab Pearls

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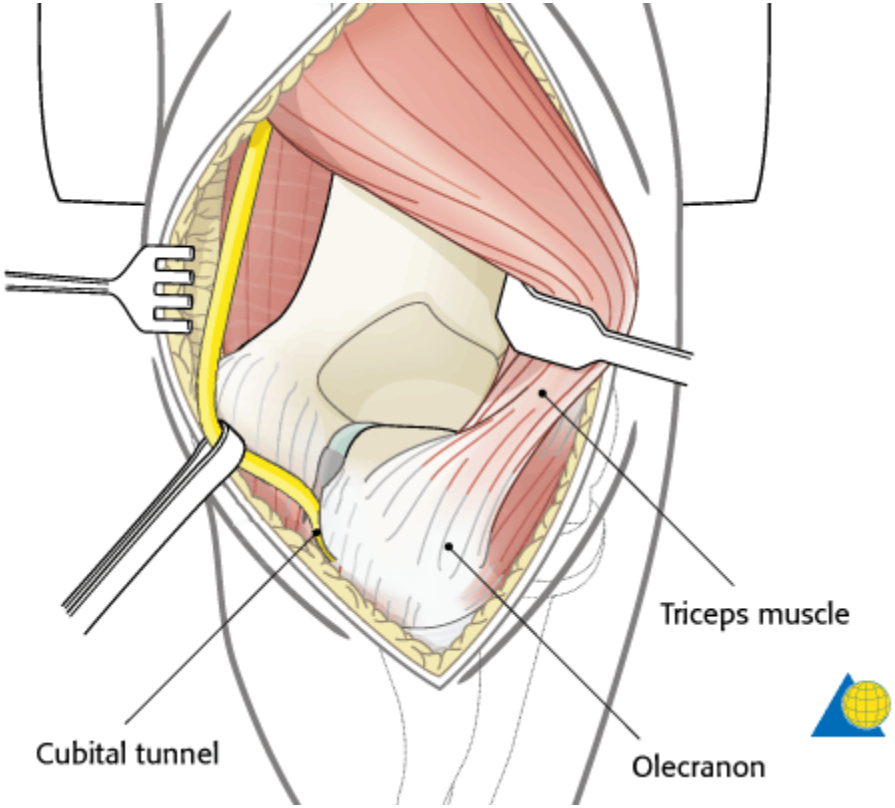
Protect collaterals

- Hinged elbow brace
- Overhead supine rehab protocol
  - Depending on surgical approach

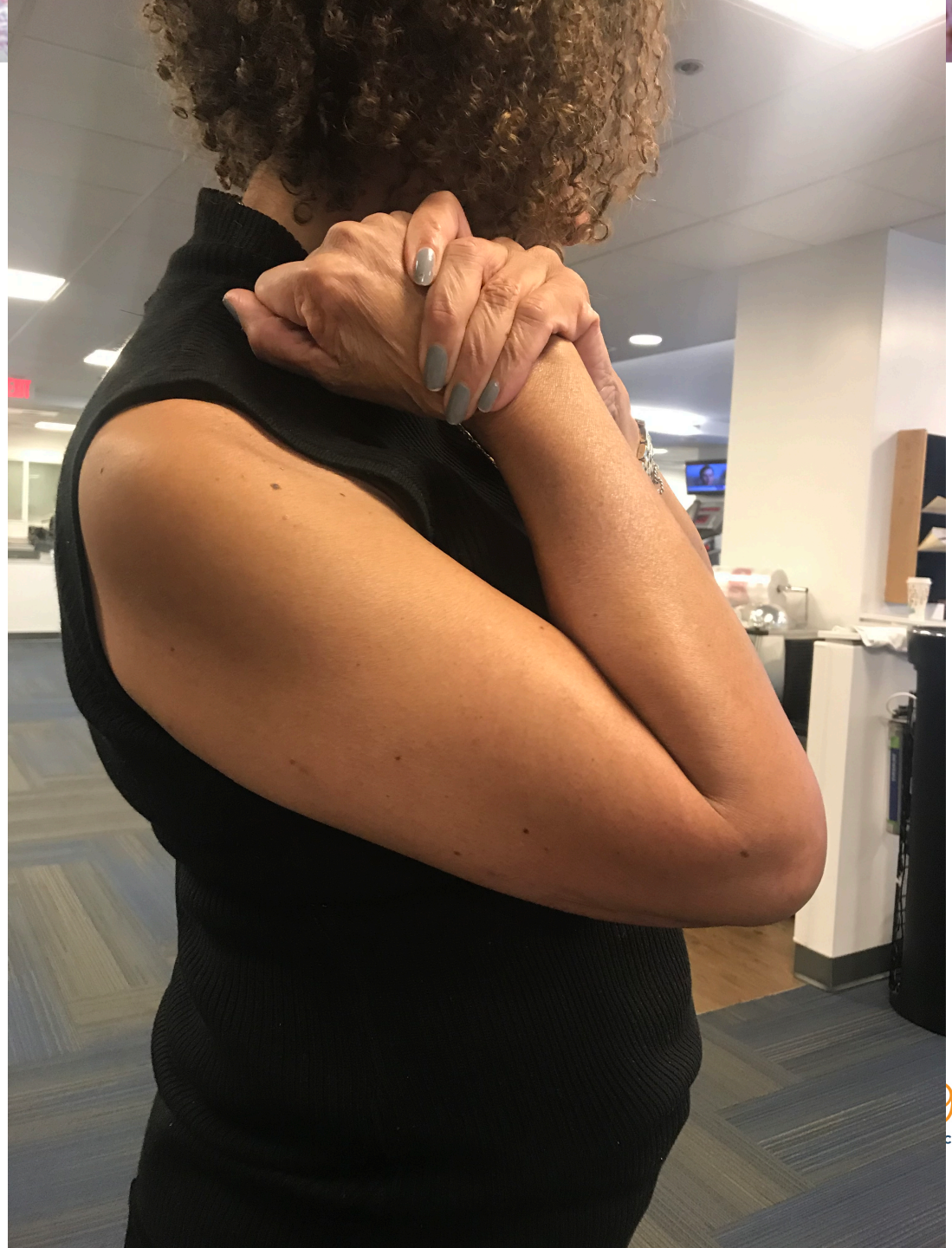
Protect Extensor Mechanism

- Understand surgical approach
  - Olecranon osteotomy
  - Triceps reflection
  - Triceps sparing



Open communication between surgeon and therapist is critical to success

DHH end range flexion



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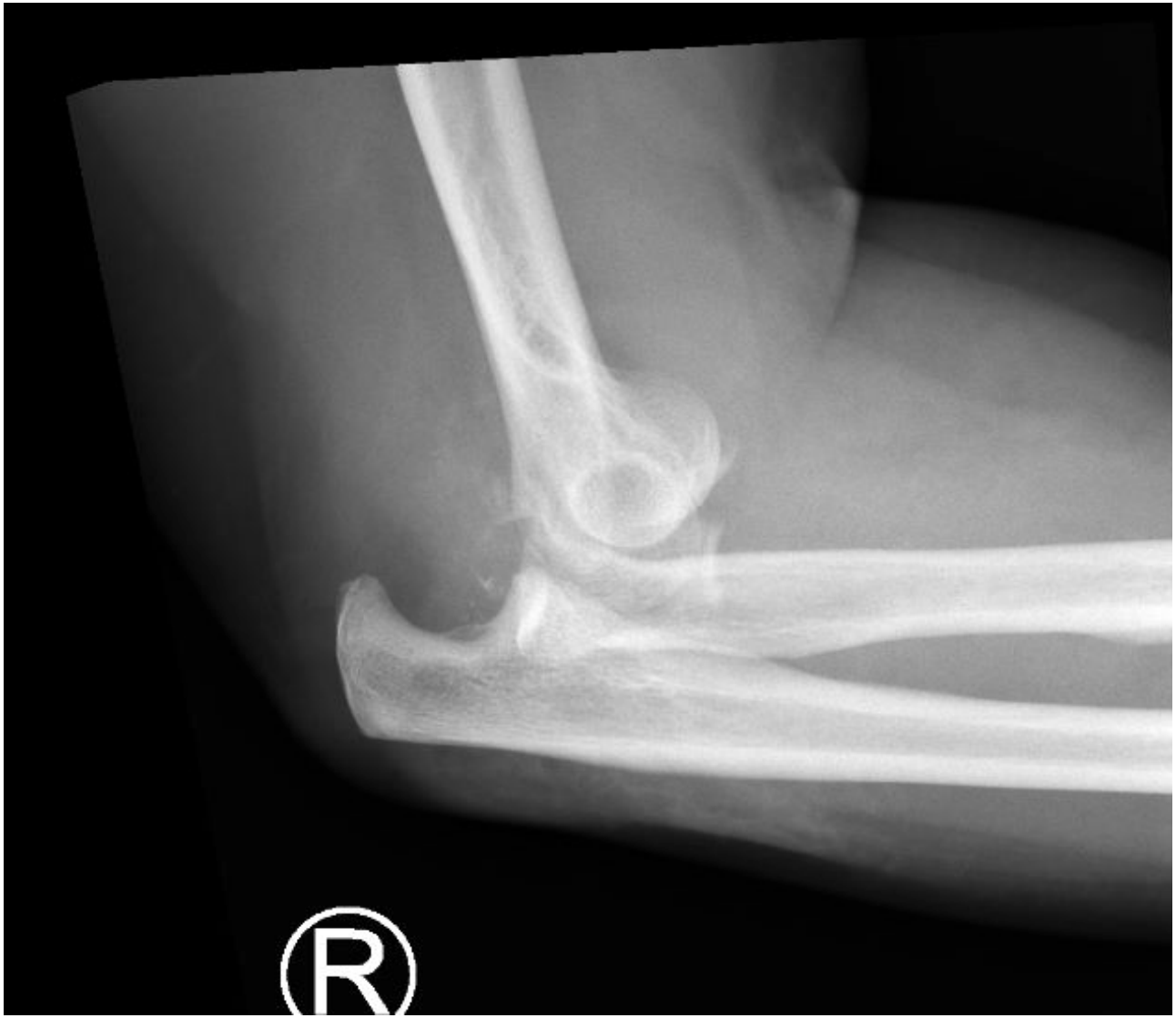
Elbow instability - IJS



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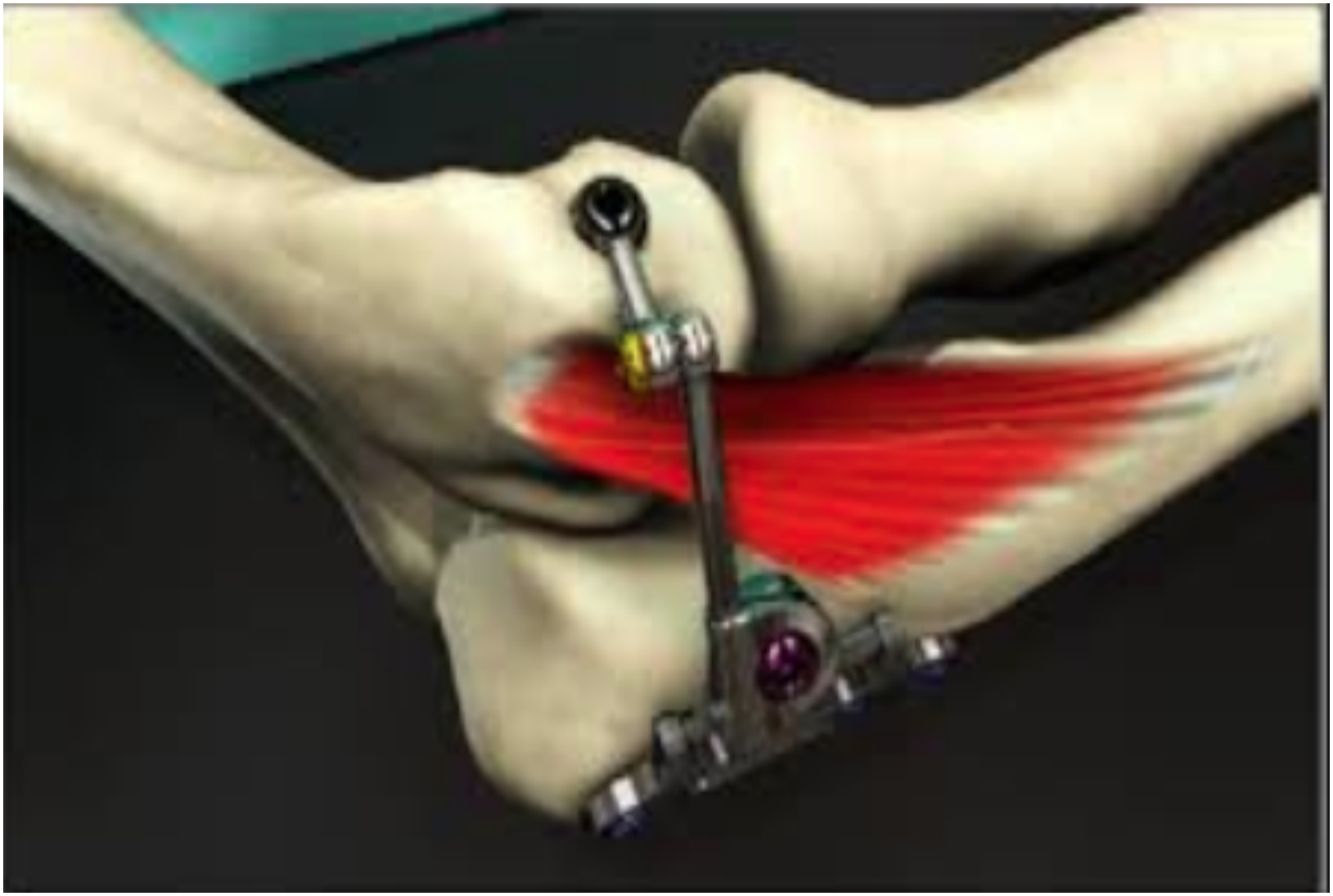
Indications

- Terrible triad
  - Posterior elbow dislocation
  - Radial head fracture
  - Coronoid fracture
- Historically terrible outcomes
  - Recurrent instability
  - Stiffness
  - High non-union rates
  - Pain and disability



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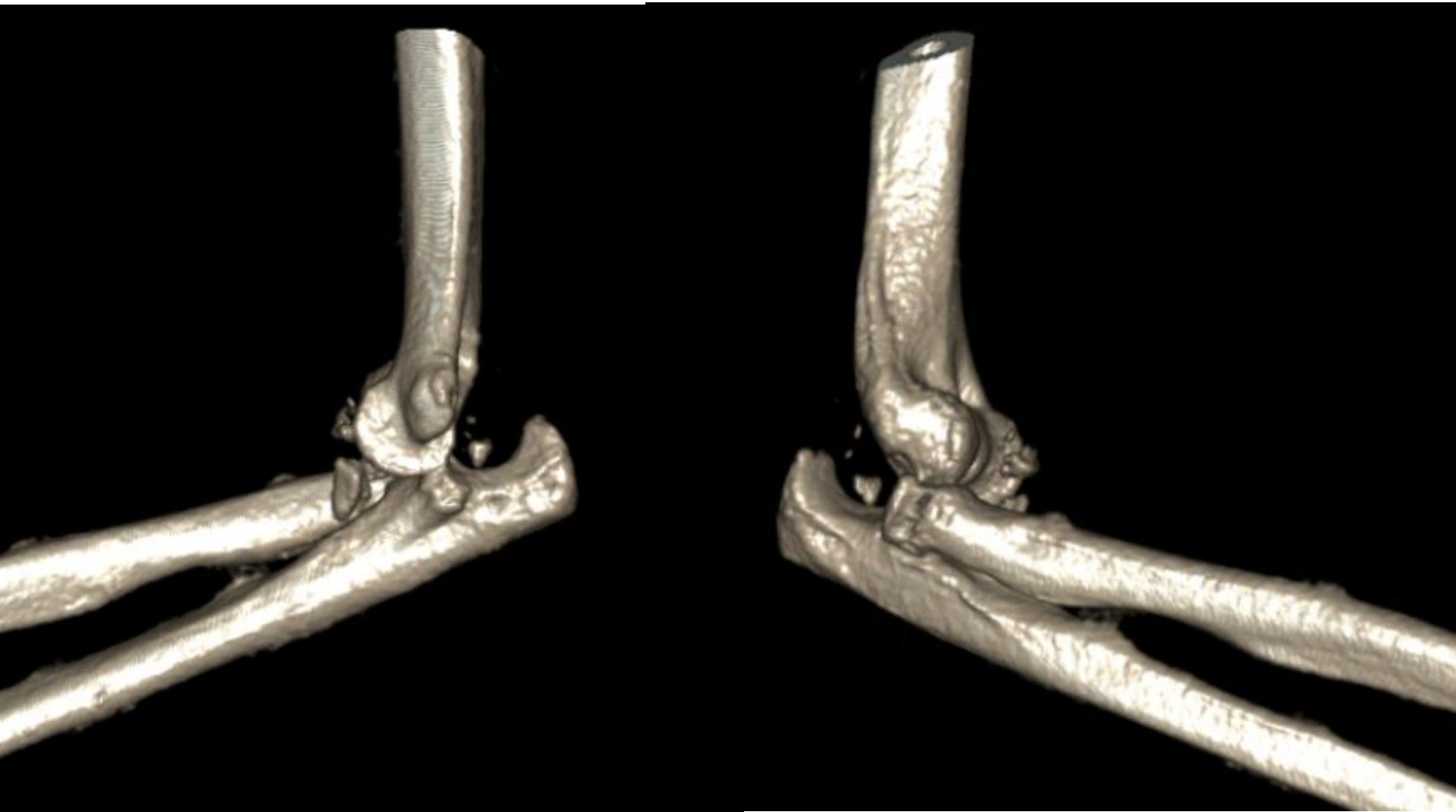
IJS case presentation

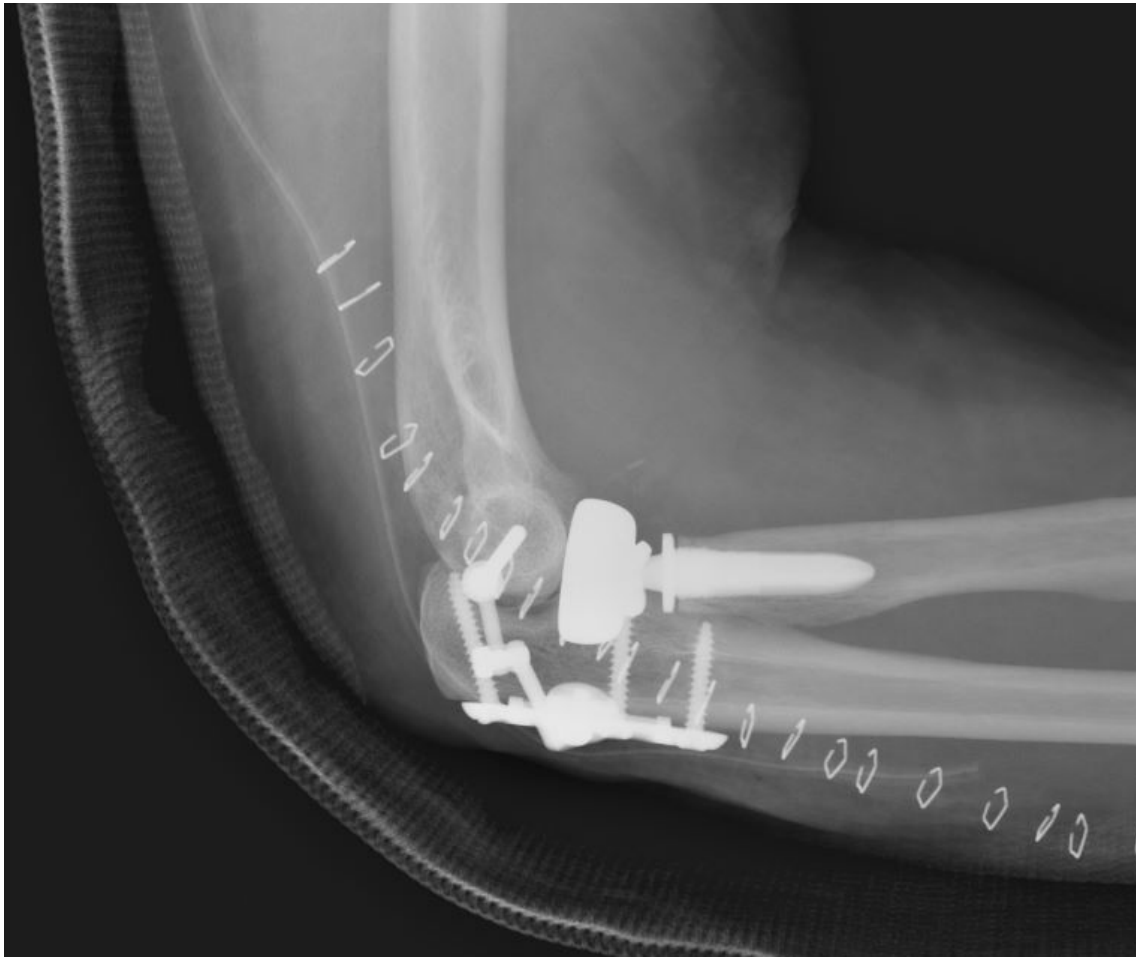
IJS case presentation



POD #1 - reduced

POD #6 – re-dislocated

Second operation - IJS



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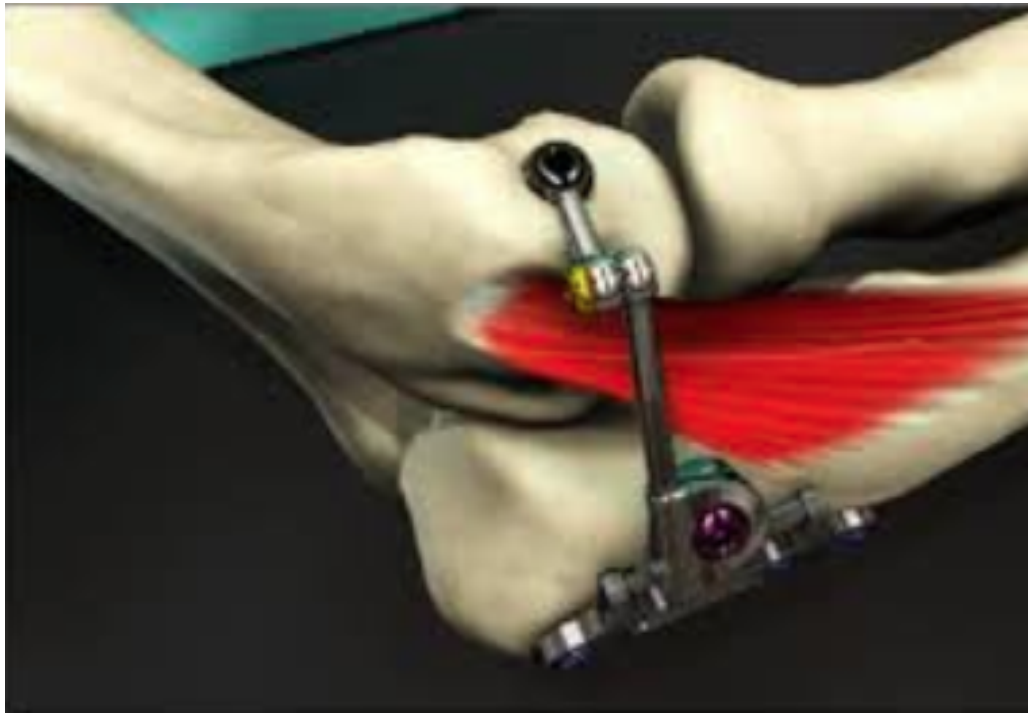
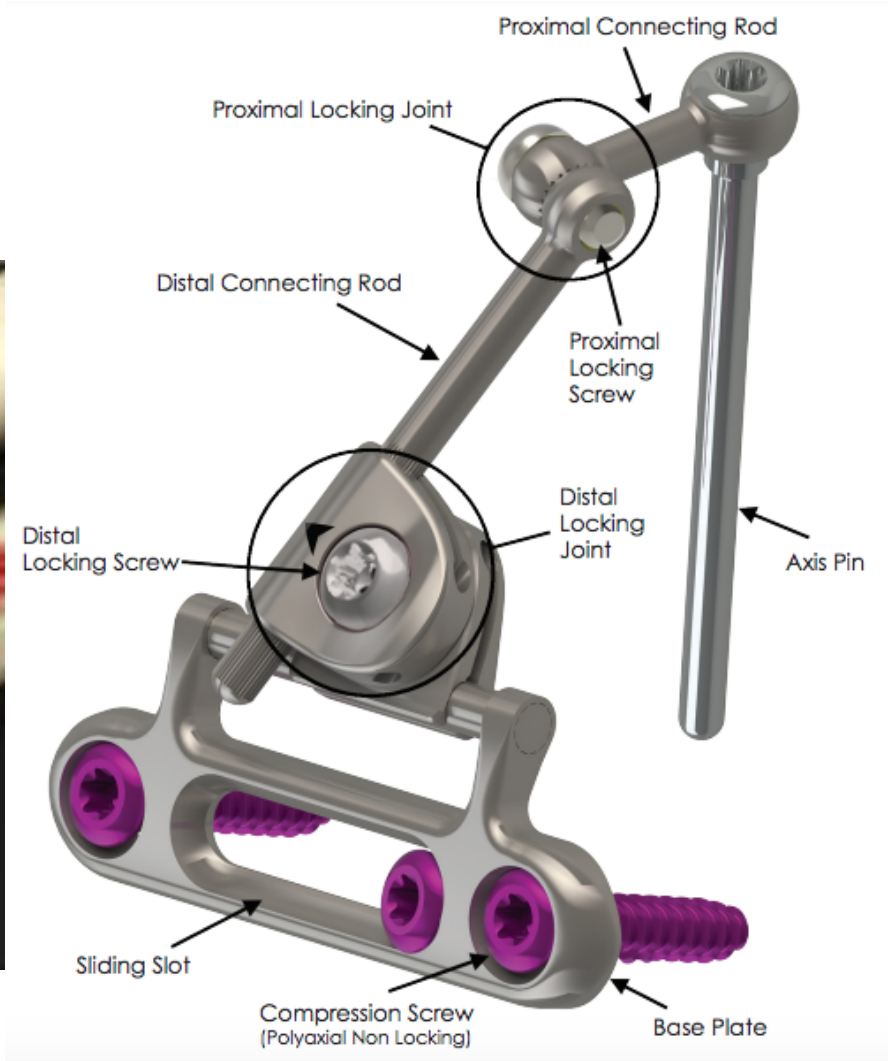
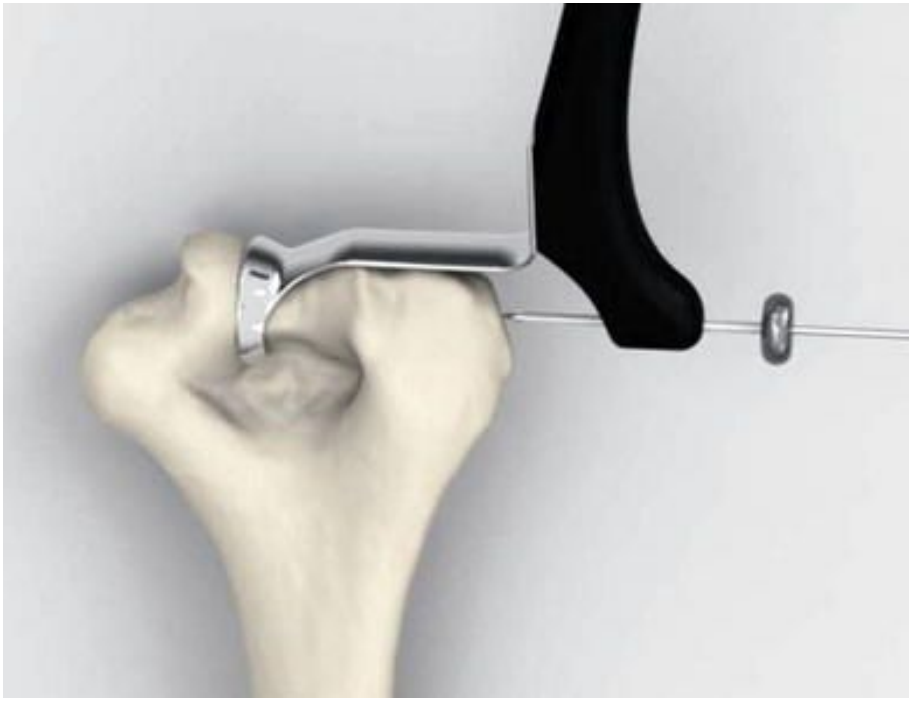




4 months later - IJS removal

IJS surgical pearls

- Concentric pin axis in trochlea
- Adequate exposure to place base plate on proximal ulna



IJS advantages

- Stable elbow
  - Early ROM
- Internal
  - No pin care
  - Mitigates infection risk
  - Patient can bathe
  - Mechanical advantage – decreased bone to clamp/hinge distance

SCIENTIFIC ARTICLE

Treatment of Traumatic Elbow Instability With an Internal Joint Stabilizer

Kristen M. Sochol, MD,* Steven M. Andelman, MD,* Steven M. Koehler, MD,*
Michael R. Hausman, MD*

- 2019 JHS, New York
- 20 patients, retrospective review
- Average 48 yo (17-74 range)
  - 9 acute instability
  - 11 chronic instability

Results/Critique

- Staged re-operation in 11 patients
  - 9 - single arthroscopic contracture release
  - 2 - two arthroscopic contracture releases
- MEP 85/100
- Early outcomes analysis
- No control group
- Viable option for difficult problem

ROM Outcome IJS

Internal Joint Stabilizer rehab pearls

- Avoid varus elbow stress, use hinged elbow brace
- Overhead protocol in supine
- Surgeon should identify safe ROM parameters based in intra-op ROM findings
- Early ROM (Typically 30-130°, extension > 90° in pronation, pronosupination at 90°)
- Manual therapy
- Open communication between surgeon and therapist is critical to patient success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21600

Rehabilitation for a Complicated Elbow Fracture

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Communication with the Surgeon

What does the evidence say about Elbow Fracture Rehabilitation?

Active motion and pronation help to stabilize a LCL-deficit elbow (Kovacevic, Vogel, & Levine,2015: Manocha, Kusins, Johnson, &King,2017)

For unstable elbows, the challenge is finding the balance between early motion for preventing stiffness and maintaining stability (Szekeres, Chinchalkar, & King, 2008)

What does the evidence say about Elbow Fracture Rehabilitation?

Zheng, Liv, Song, & Fan (2018) found that individuals who suffer a high energy injury develop the most severe elbow stiffness

Avoid stress to healing tissue over a certain limit (Fusaro, 2014)

The Elbow Checklist

Read the operative report

Understand patient restrictions and if possible speak to the surgeon

Do a thorough examination.

The Elbow Checklist- Examination

Joints of the elbow

- Proximal radioulnar joint, Radiocapitellar joint, Ulnahumeral joint

Ligaments of the elbow

- Annular ligament and LCL, MCL

Important muscle groups

- Extensor mass, flexor mass, biceps, brachioradialis, triceps, pronator teres, supinator

How does a elbow joint become contracted?

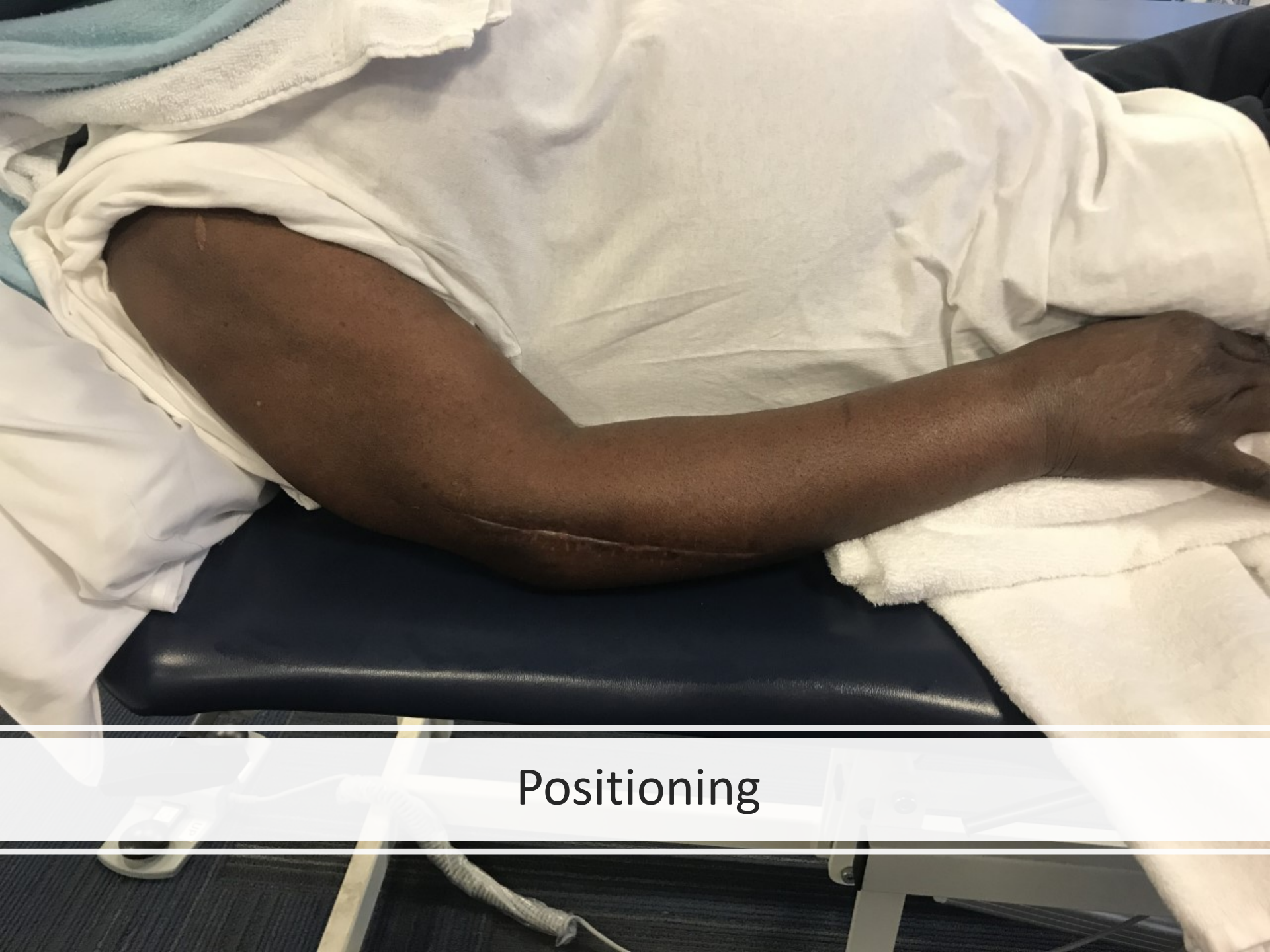
Charalambo& Morrey (2012)

Intrinsic Contracture

- Intra-articular adhesions, loss of cartilage, gross joint distortion

Extrinsic contracture

- Soft tissue contracture
- Heterotrophic ossification



Positioning

Additional Treatment Pearls

- Manual Therapy and overhead protocol!!!!
- Use of wrist orthosis during treatment
- Pay attention to the ulnar nerve
- Do not start weights too early, focus on strengthening at 12 weeks post op
- Do not forget about the shoulder (bicep tendonitis/impingement syndrome)
- It is a recipe (not too much, not too little)

Elbow extension- Gravity assisted/active assisted extension

Elbow extension- Gravity assisted/active assisted extension

Elbow flexion- Gravity assisted flexion

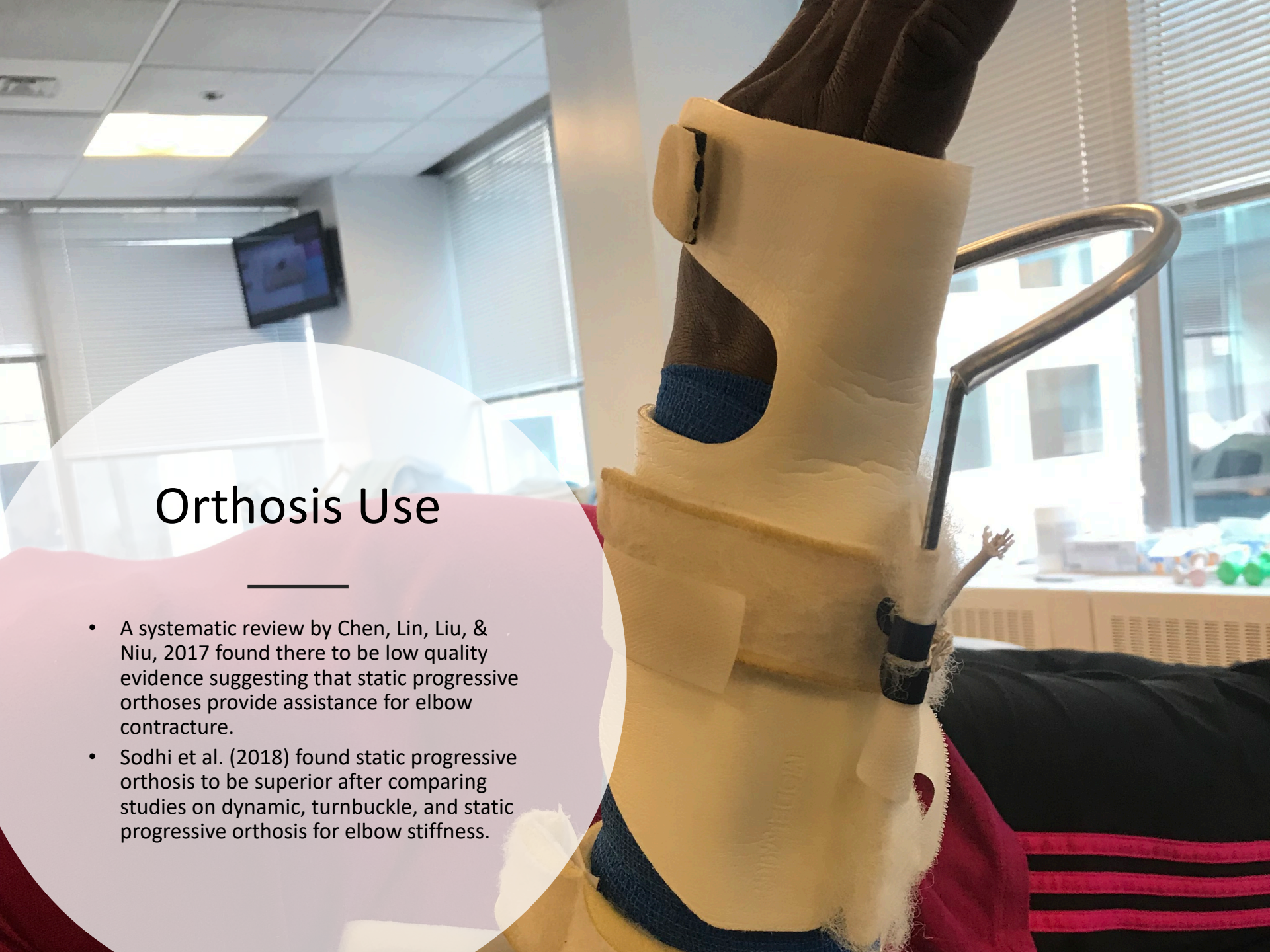
Progression

- Progress your patients starting with reaching to the opposite shoulder or to the top of the head, then make a goal to get to mouth, and finally moving to the back of the head. Functionally, a HEP should start with trying to clean under opposite armpit, then to some self-feeding, and finally to washing hair.

Supination/ Pronation

Exercise that incorporates elbow flex/ext with sup/pron

Use occupation as part of your rehab



Orthosis Use

- A systematic review by Chen, Lin, Liu, & Niu, 2017 found there to be low quality evidence suggesting that static progressive orthoses provide assistance for elbow contracture.
- Sodhi et al. (2018) found static progressive orthosis to be superior after comparing studies on dynamic, turnbuckle, and static progressive orthosis for elbow stiffness.

Progression to PROM and Strengthening

Summary

- Some exciting new techniques and implants to treat complex elbow injuries
- Basic biomechanical principles, surgical principles, and therapy principles still apply
- Close relationship between therapist and surgeon is critical to optimize results

Contact Info

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