Proximal Humerus Fractures

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Professor

Boston University Medical Center

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Disclosures!

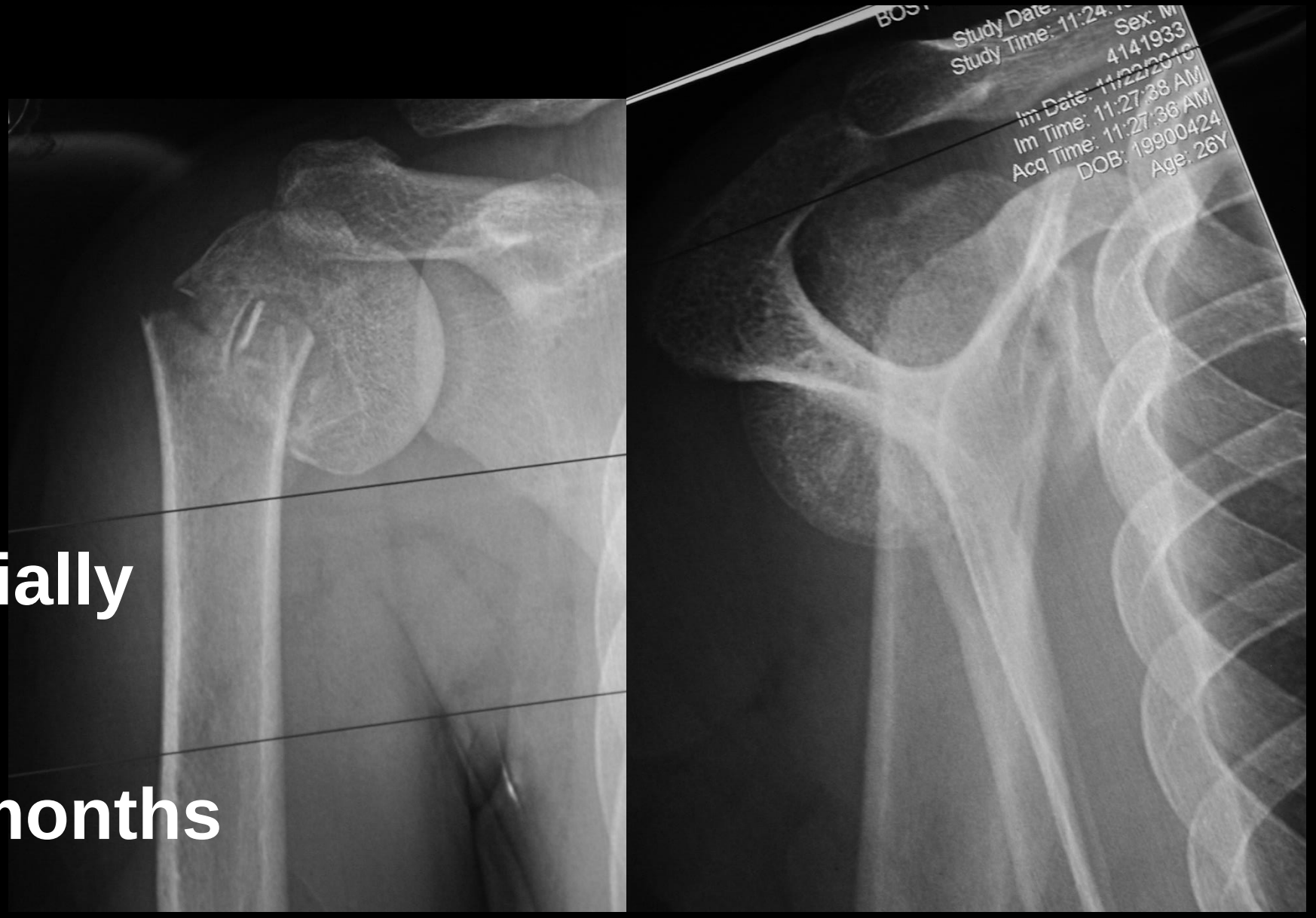
- **Publications:**
  - **Wolters Kluwer Royalties; AAOS; OKU Trauma, ICL Trauma, Tornetta; Op Techn in Ortho Surg, OTA Curriculum, AAOS ROCK**
  - **Journals:; JOT; Specialty editor, CORR, JAAOS, JBJS; Reviewer**
- **Research:**
  - **NIH, OTA, FOT, OREF, DOD**
- **Consultant / Designer**
  - **Smith and Nephew**
- **Boards / Offices**
  - **AAOS**

Eliminate the Easy Decisions

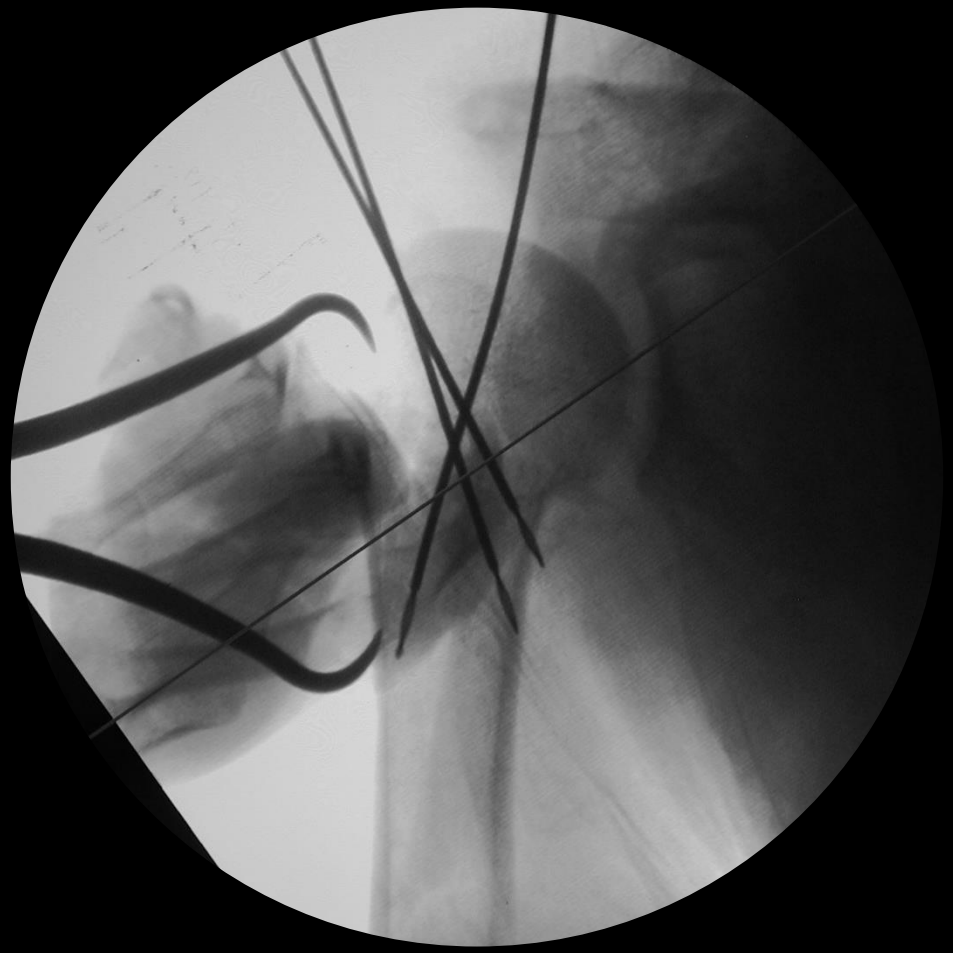
Intraop

Another

- 26 yo
- High Energy
- Not fixed initially
- Sent in at 2 months



Intraop



Healed

Proximal Humerus Fractures

- Low energy fractures
- Majority do well nonoperatively
- Few go on to surgery

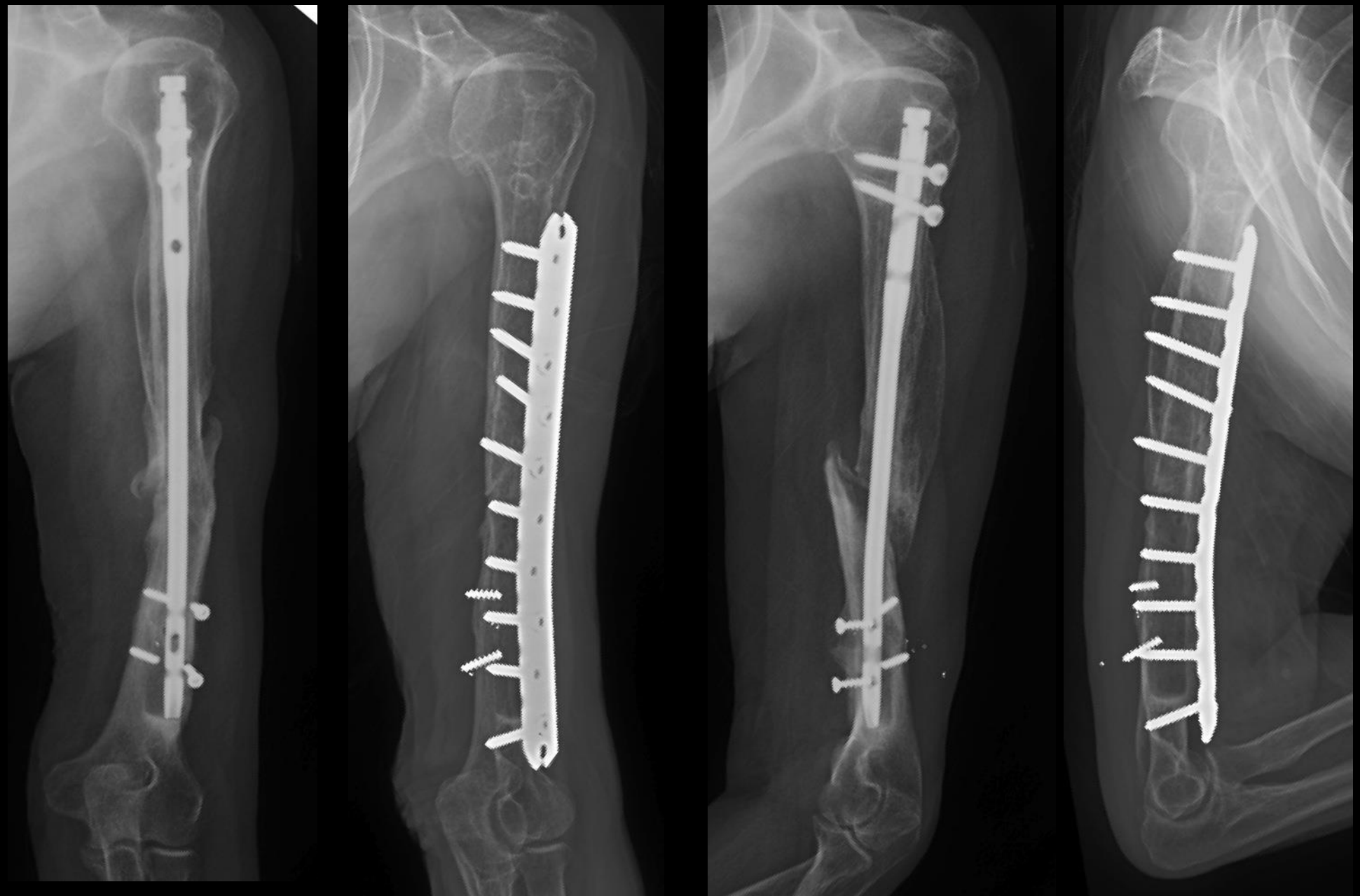
Proximal Humerus Fractures

- Low energy fractures
- Majority do well nonoperatively
- Few go on to surgery

Start with a patient

- 67 Year old woman
- Active
- Lives independently
- Gardening
- Walks
- Nothing much overhead

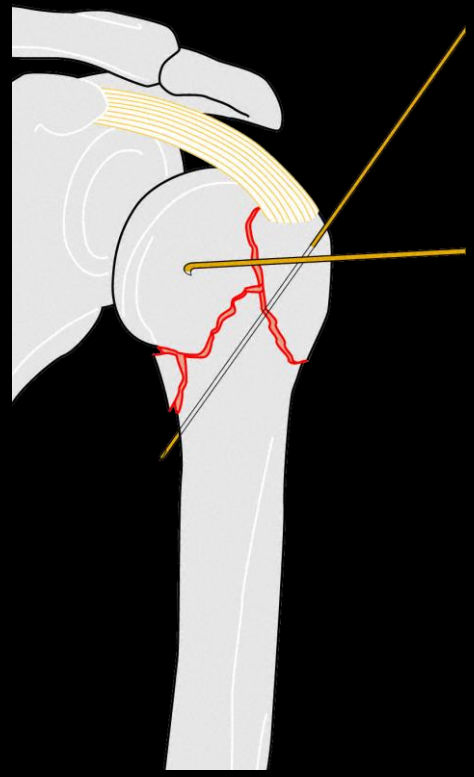
Treated with Nail… Nonunion



Fell Again…

Options?

- Nonop?
- Perc K-Wires?
- Enders or flexible nails?
- Proximal locking nail?
- Locked plating?
- Hemi?
- RSA?

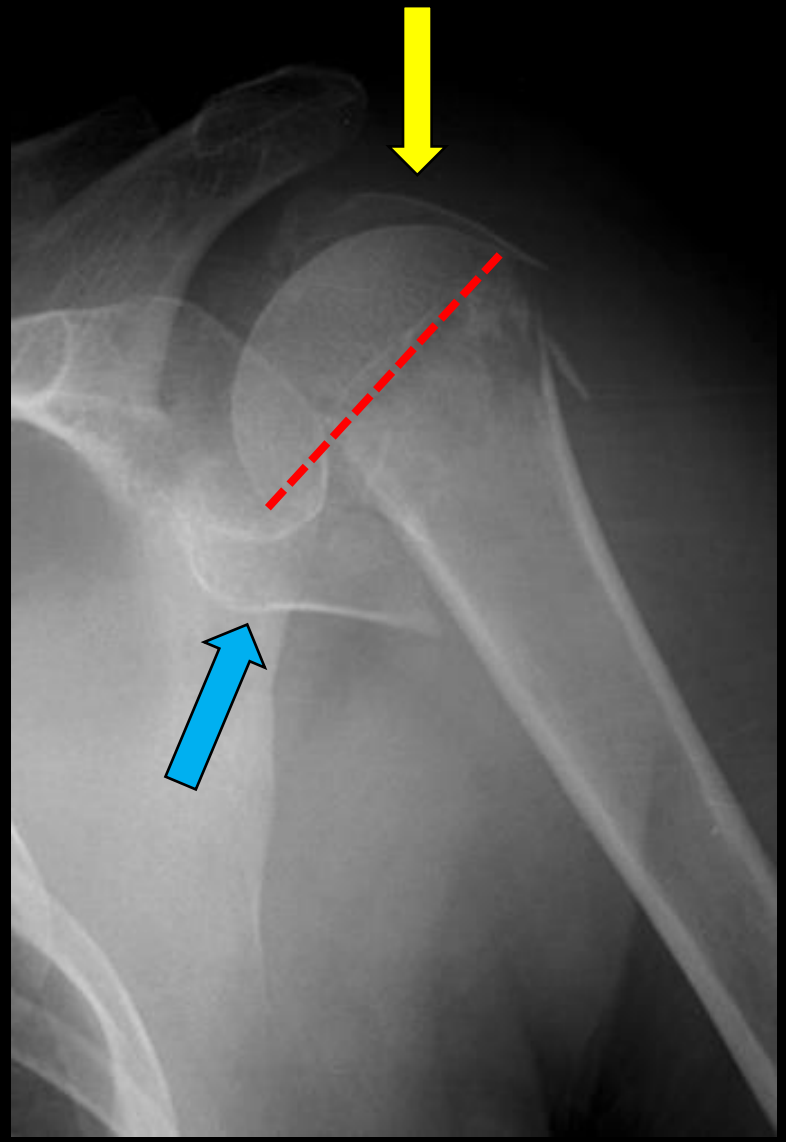


Proximal Humerus Fractures

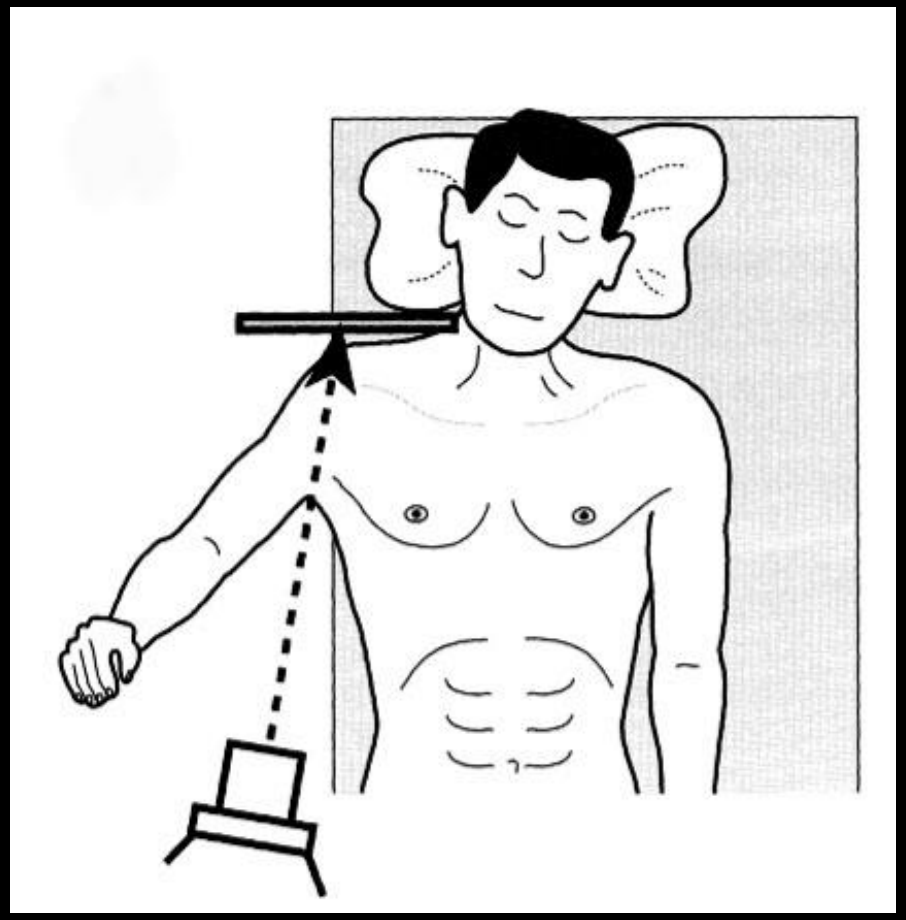
- Extremely common but two kinds...
  - “Osteoporotic fracture”
  - High energy
- Complicating factors
  - Poor bone quality
  - Require early motion
- Difficult to:
  - Get a good reduction
  - Maintain reduction
  - Get a good functional outcome

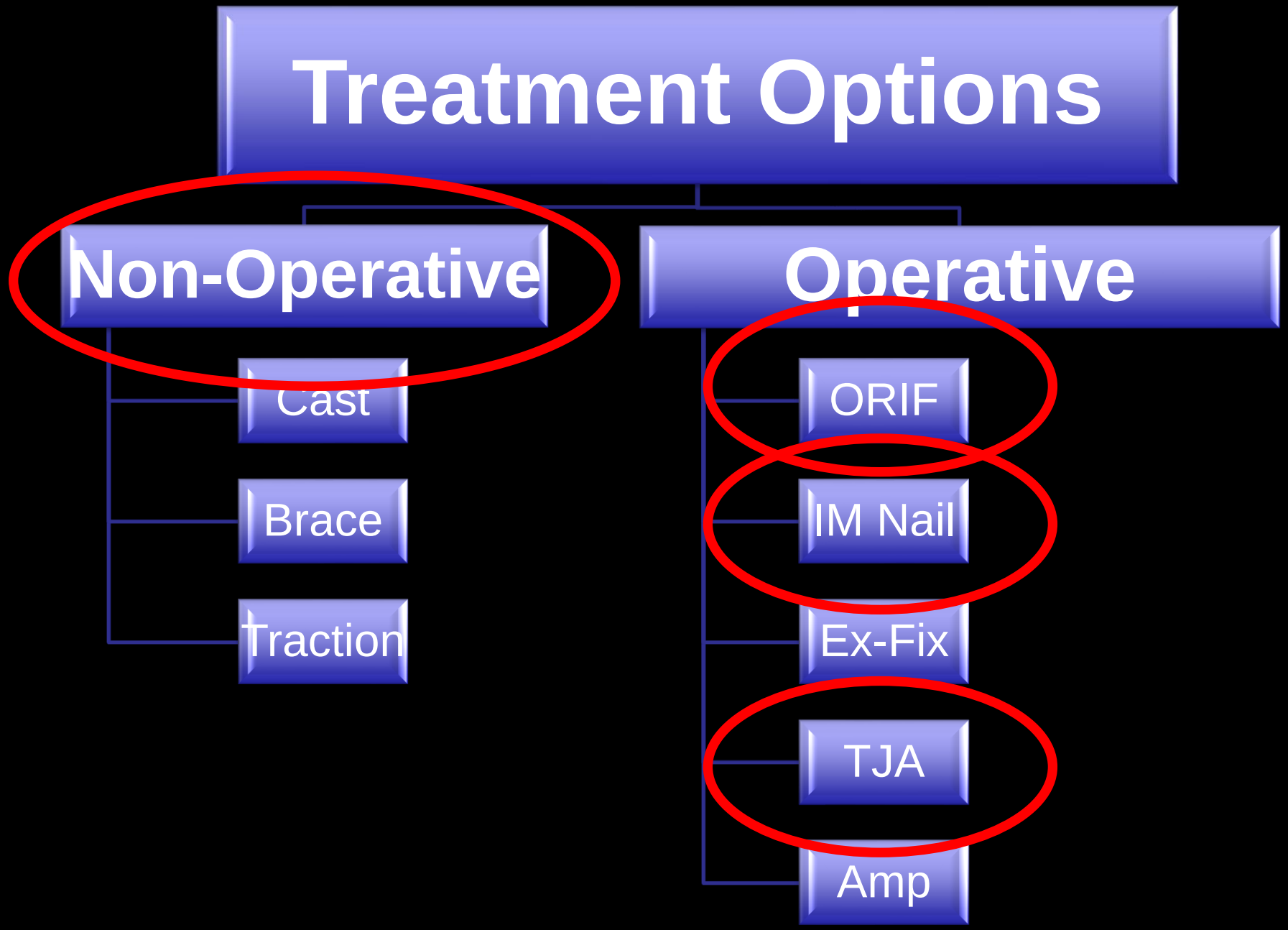
Fracture Assessment

- Fragments
- Displacement
  - Greater tuberosity
  - Lesser tuberosity
  - Head
  - Shaft



Don’t Do It!




Treatment Options
Non-Operative
Operative
Cast
Brace
Traction
ORIF
IM Nail
Ex-Fix
TJA
Amp

Surgical vs Nonsurgical Treatment of Adults With Displaced Fractures of the Proximal Humerus
The PROFHER Randomized Clinical Trial

Amar Rangan, FRCS(Tr&Orth); Helen Handoll, DPhil; Stephen Brealey, PhD; Laura Jefferson, PhD; Ada Keding, MSc; Belen Corbacho Martin, MSc; Lorna Goodchild, MSc; Ling-Hsiang Chuang, PhD; Catherine Hewitt, PhD; David Torgerson, PhD; for the PROFHER Trial Collaborators

The ProFHER (PROximal Fracture of the Humerus: Evaluation by Randomisation) trial – a pragmatic multicentre randomised controlled trial evaluating the clinical effectiveness and cost-effectiveness of surgical compared with non-surgical treatment for proximal fracture of the humerus in adults

Helen Handoll, Stephen Brealey, Amar Rangan, Ada Keding, Belen Corbacho, Laura Jefferson, Ling-Hsiang Chuang, Lorna Goodchild, Catherine Hewitt and David Torgerson

Proximal Fracture of the Humerus Evaluation by Randomization

2015

Patients

- 250 patients >16 yo
  - Mean 66 yo [24-92]
  - 77% Female
- 32 UK NHS hospitals
- 2 yr FU
  - 215 with complete FU

Eligible

- ***Injury within 3 wks***
- ***Displacement enough to consider surgery***

Excluded

- ***Clear indication for surgery***

Proximal Fracture of the Humerus Evaluation by Randomization

Intervention

- *Operative*
  - *ORIF or Hemi-arthroplasty*

vs

- *Non-operative*
  - *Sling*

"Experienced surgeons"

- *Standard rehab*

Proximal Fracture of the Humerus Evaluation by Randomization

Outcomes

- **Oxford Shoulder Score (0 – 48)**
  - **MCID = 5**
- **SF-12**
- **Complications**
- **Subsequent therapy**
- **Mortality**

Proximal Fracture of the Humerus Evaluation by Randomization

Results

- *No difference in Oxford Score*
  - *39.07 surgical vs 38.32 non-op*
- *No difference*
  - *SF-12*
  - *Complications*
  - *Subsequent therapy*
  - *Mortality*

PROFHER 5 year

- 149 patients at 5 years
- Oxford Shoulder Score
- EuroQol 5D-3L
- No Differences

Impact of PROFHER

- Questionnaire
  - BOA members
  - British Elbow and Shoulder Society
- 265 respondents
  - 50% fewer operations
  - 33% No change

My Take

Strengths

- **Randomization**
- **Intent-to-treat analysis**
- **Excellent FU**
- **Broad routine practice**

My Take

Strengths

- Randomization
- Intent-to-treat analysis
- Excellent FU
- Broad routine practice

Limitations

- “Experienced surgeons”??
  - Median 3 procedures at each center
  - 10% by registrars
- Quality of surgery (reduction) not reported
- No reverse shoulder arthroplasty
- Oxford score limitations in trauma patients
- Excluded those with “clear indication for surgery”

Excluded “clear indication for surgery”

- 1250 patients screened
- 250 enrolled (1 of 5 enrolled)

Operative versus non-operative treatment for 2-part proximal humerus fracture: A multicenter randomized controlled trial

Antti P. Launonen[1]*, Bakir O. Sumrein[1], Aleksi Reito[2], Vesa Lepola[1], Juha Paloneva[2], Kenneth B. Jonsson[3], Olof Wolf[3], Peter Ström[3], Hans E. Berg[4,5], Li Felländer-Tsai[4,5], Karl-Åke Jansson[4,5], Daniel Fell[4,5], Inger Mechlenburg[6,7], Kaj Døssing[8], Helle Østergaard[8], Aare Märtson[9], Minna K. Laitinen[1], Ville M. Mattila[1], as the NITEP group

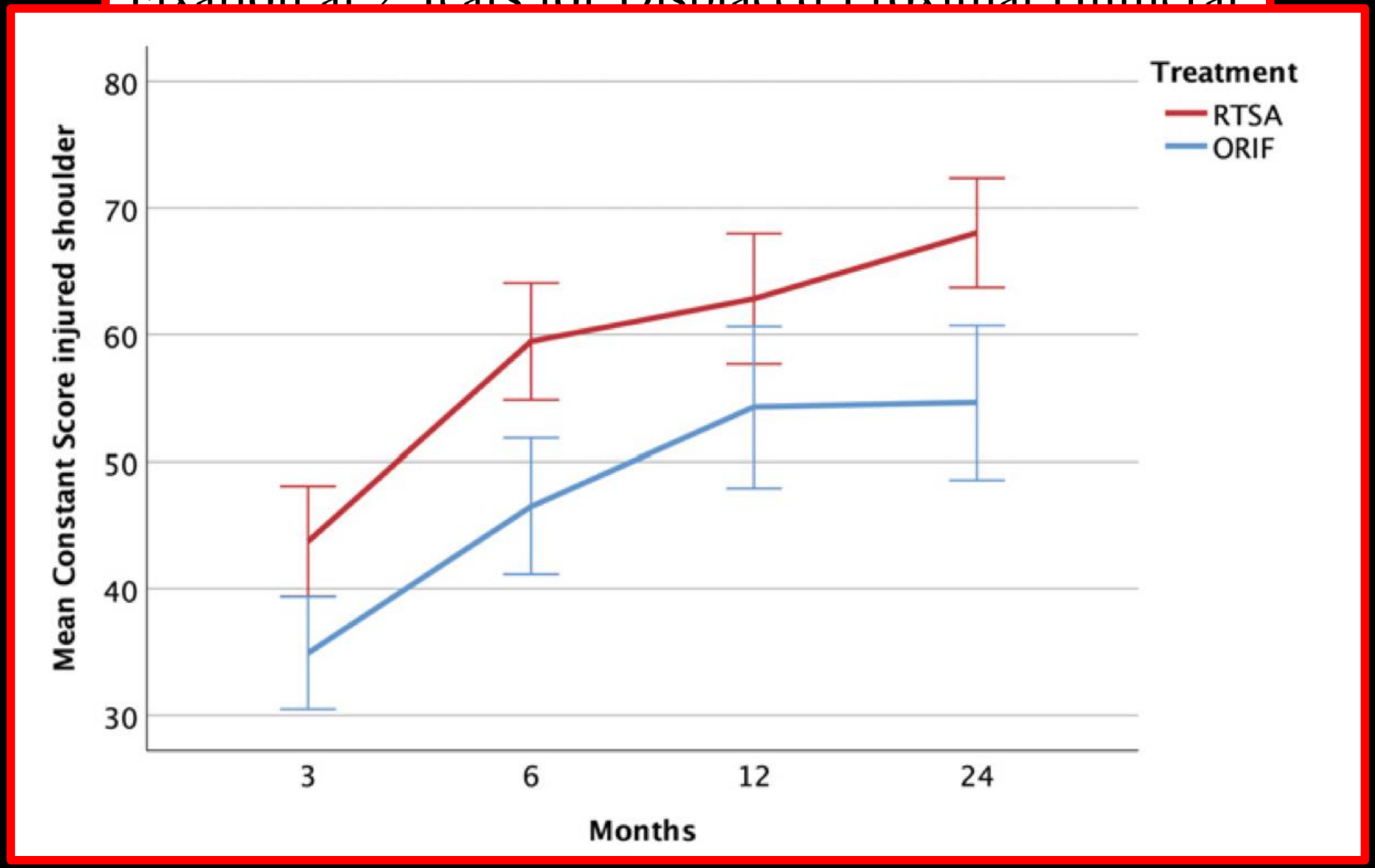
- 88 Pts > 60yo (avg 72); 95% F
  - Locked plate vs Nonop
  - 2 yrs: DASH 18.5 vs 17.4
  - EQ5d, constant, oxford (NO difference)

Reverse shoulder arthroplasty versus nonoperative treatment for 3- or 4-part proximal humeral fractures in elderly patients: a prospective randomized controlled trial

Yaiza Lopiz, MD, PhD [1] • Borja Alcobía-Díaz, MD [1] • María Galán-Olleros, MD • Carlos García-Fernández, MD • Amanda López Picado, PhD • Fernando Marco, MD, PhD • Show footnotes

- 59 patients > 80 yo
- Constant Score – No Difference
  - RSA 61.7
  - Non-op 55.7 p=0.071
- DASH, SF-12, EuroQol 5D - No difference
- VAS – Better with RSA
  - 1.6 vs 0.9 p=0.011

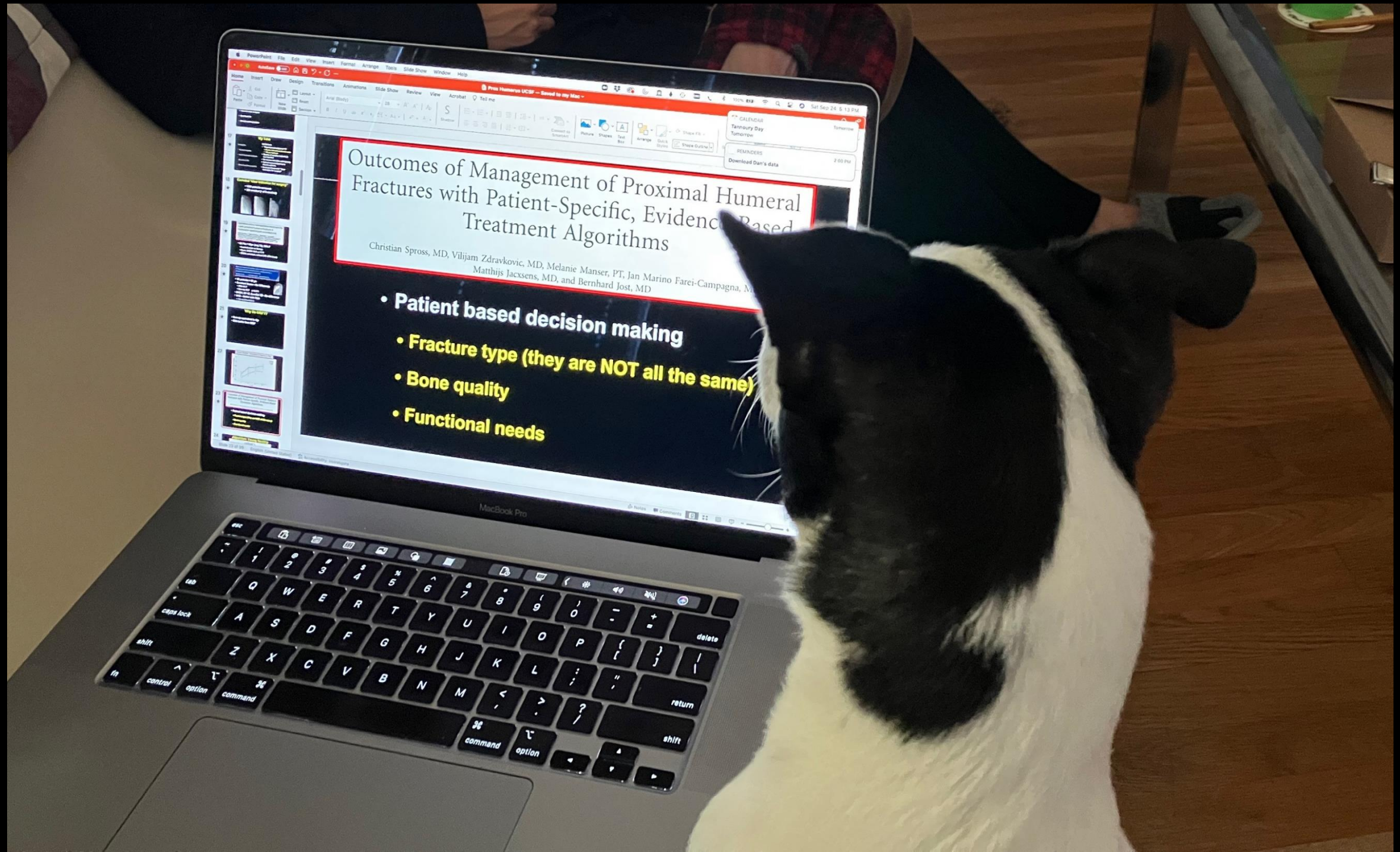
Reverse Shoulder Arthroplasty Is Superior to Plate Fixation at 2 Years for Displaced Proximal Humeral



Outcomes of Management of Proximal Humeral Fractures with Patient-Specific, Evidence-Based Treatment Algorithms

Christian Spross, MD, Vilijam Zdravkovic, MD, Melanie Manser, PT, Jan Marino Farei-Campagna, MD, Matthijs Jacxsens, MD, and Bernhard Jost, MD

- **Patient based decision making**
  - **Fracture type (they are NOT all the same)**
  - **Bone quality**
  - **Functional needs**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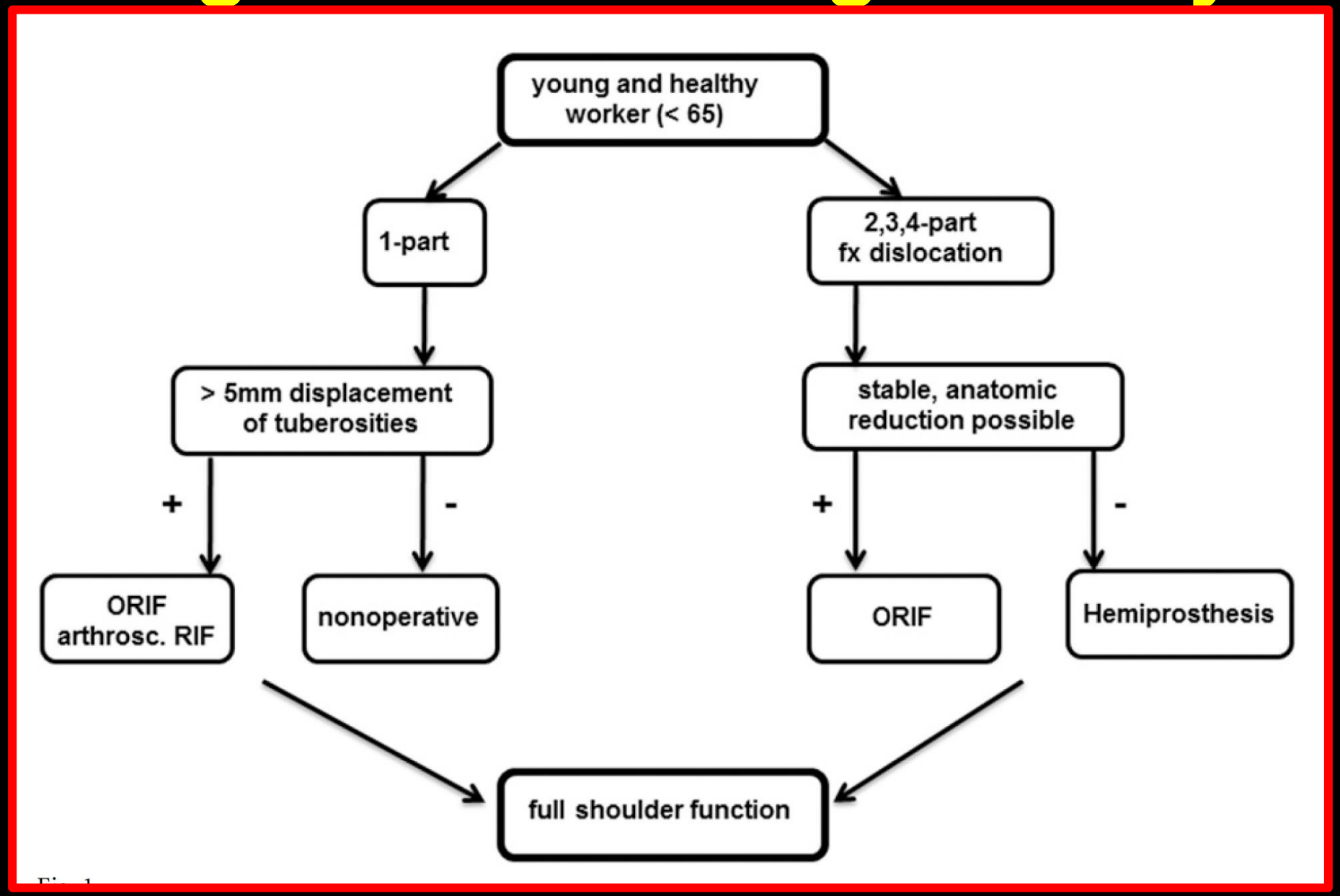
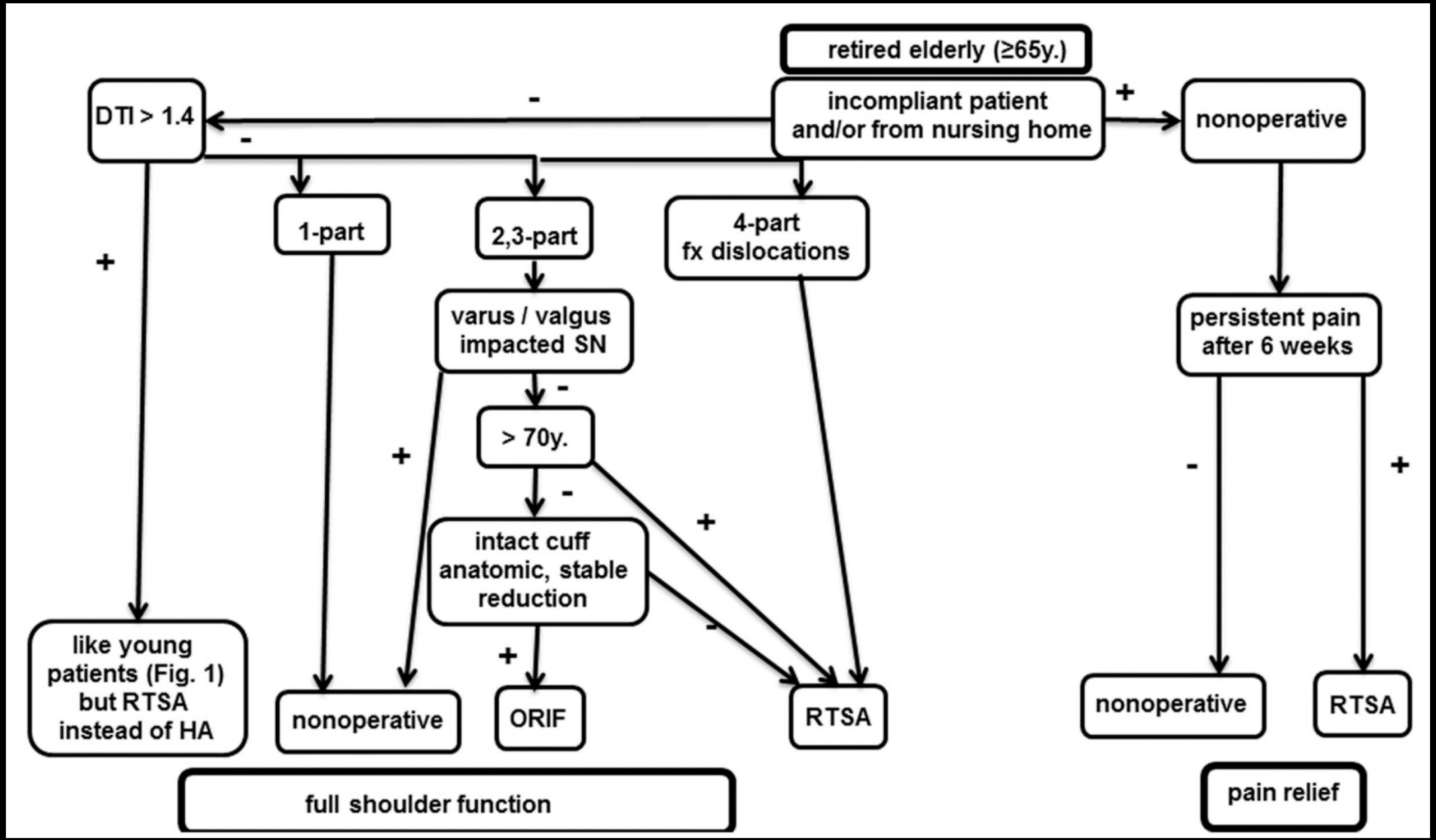
• Fracture type (they are NOT all the same)
• Bone quality
• Functional needs
MacBook Pro

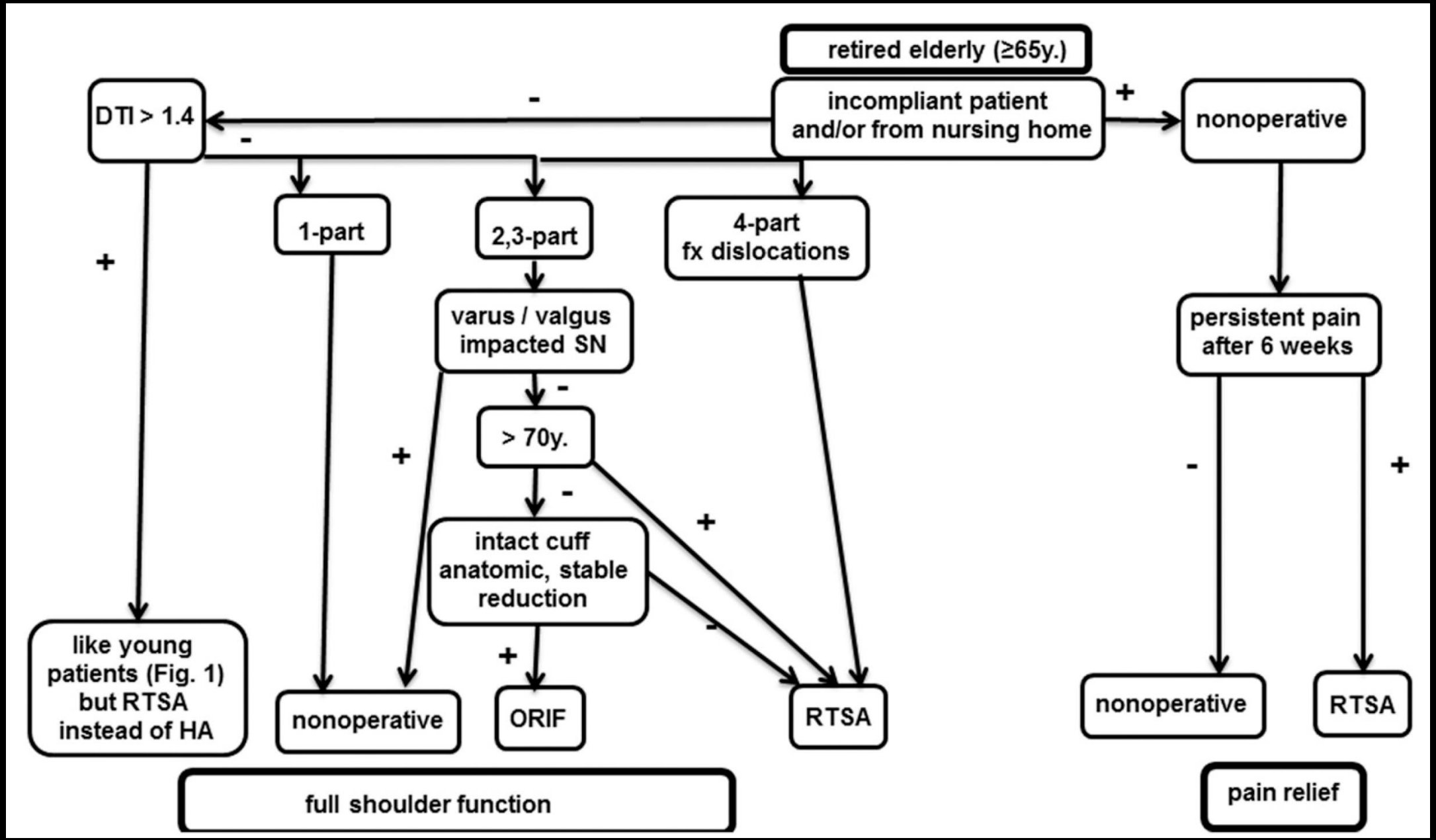
Algorithm: Young Healthy



Algorithm: Older!

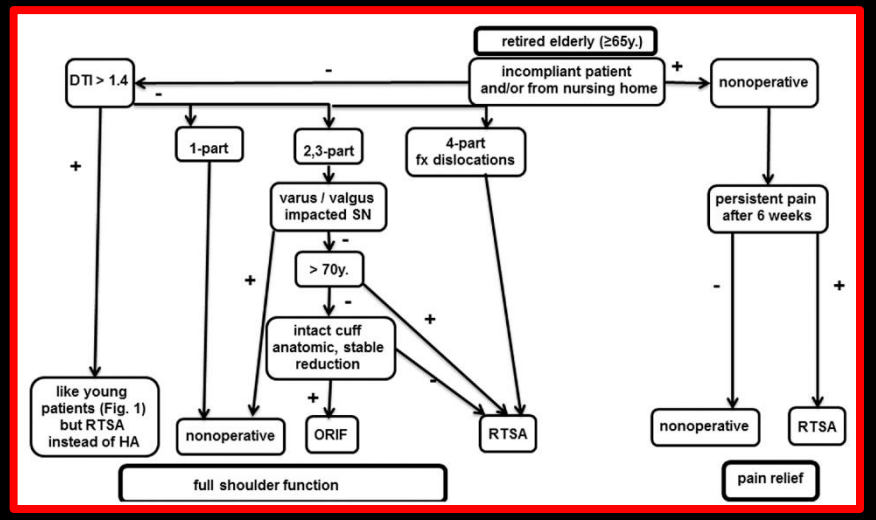


Algorithm: Elderly



What Did They Do

- 226 Nonop
- 65 ORIF
- 39 RSA
- 4 Hemi



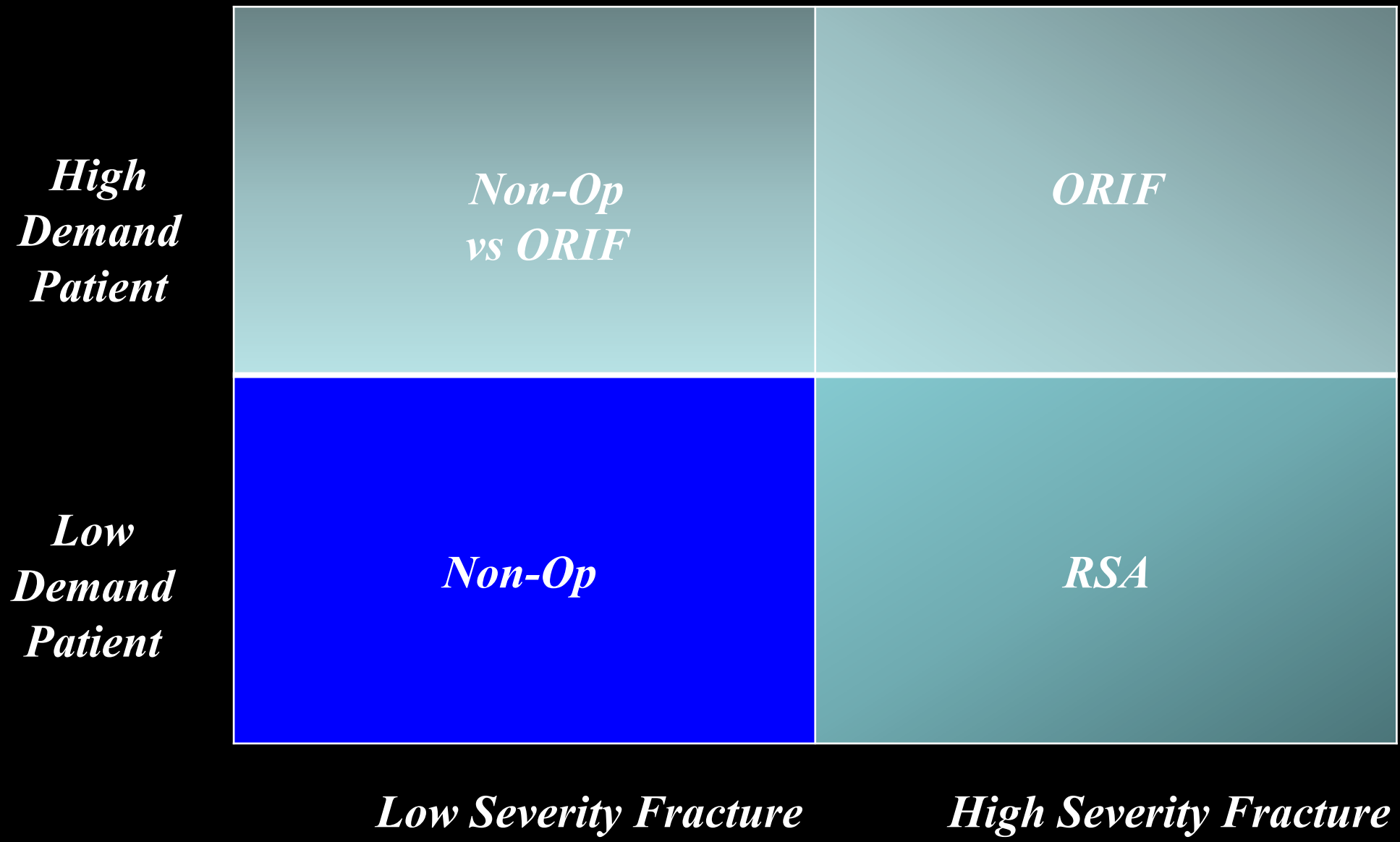
- Constant, EQ5D, Subjective Shoulder Value
- Complications
- *90% normal shoulder scores*
- *Normal EQ5D*
- *Minimized operative complications*

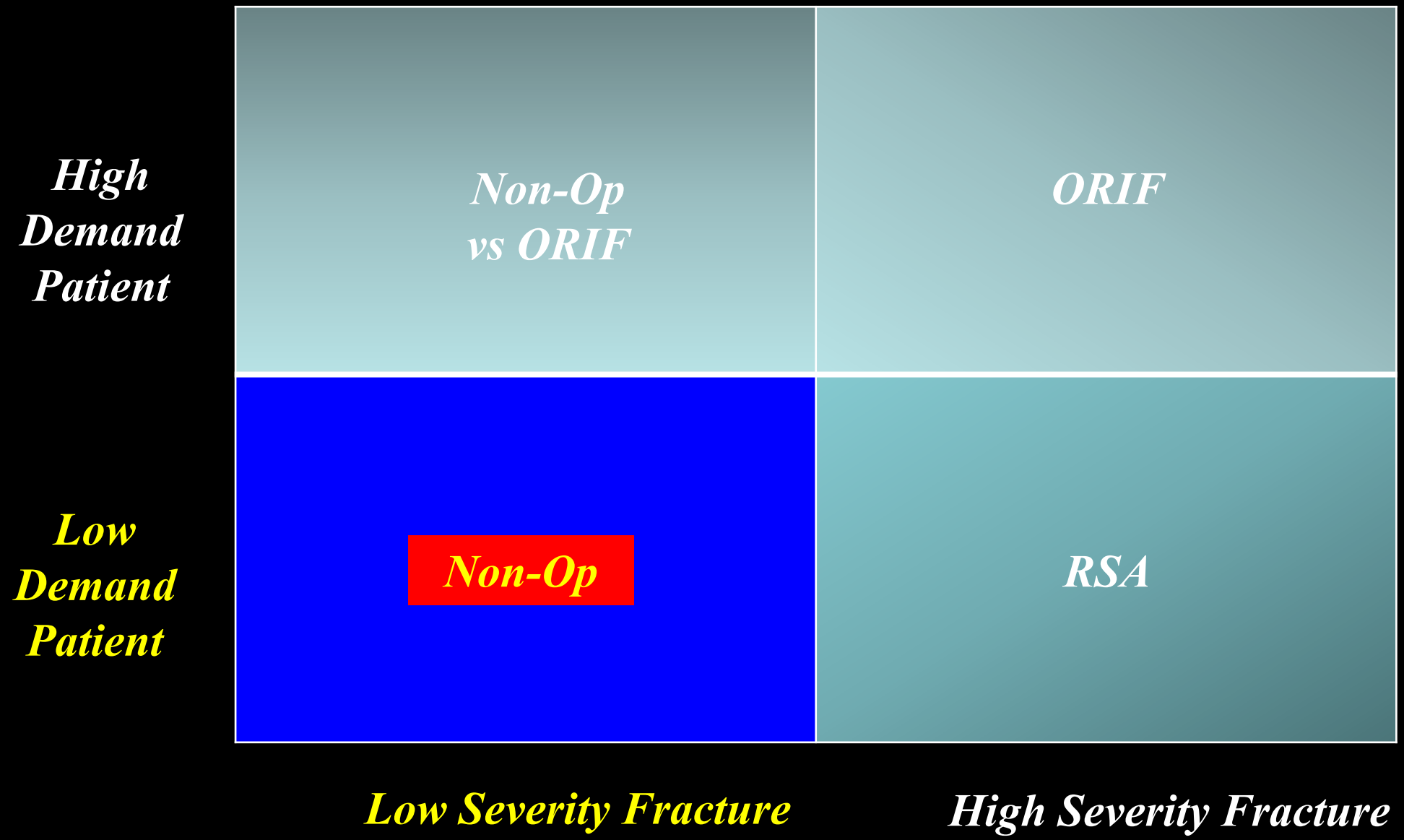
Spectrum of Injury (Outcomes)

Spectrum of Patients (Expectations)

Treatment Principles

- Patient factors crucial in decision making
  - Age (physiologic)
  - Cognitive status
  - Activity level
  - Trauma mechanism


High Demand Patient
Low Demand Patient
Non-Op vs ORIF
ORIF
Non-Op
RSA
Low Severity Fracture
High Severity Fracture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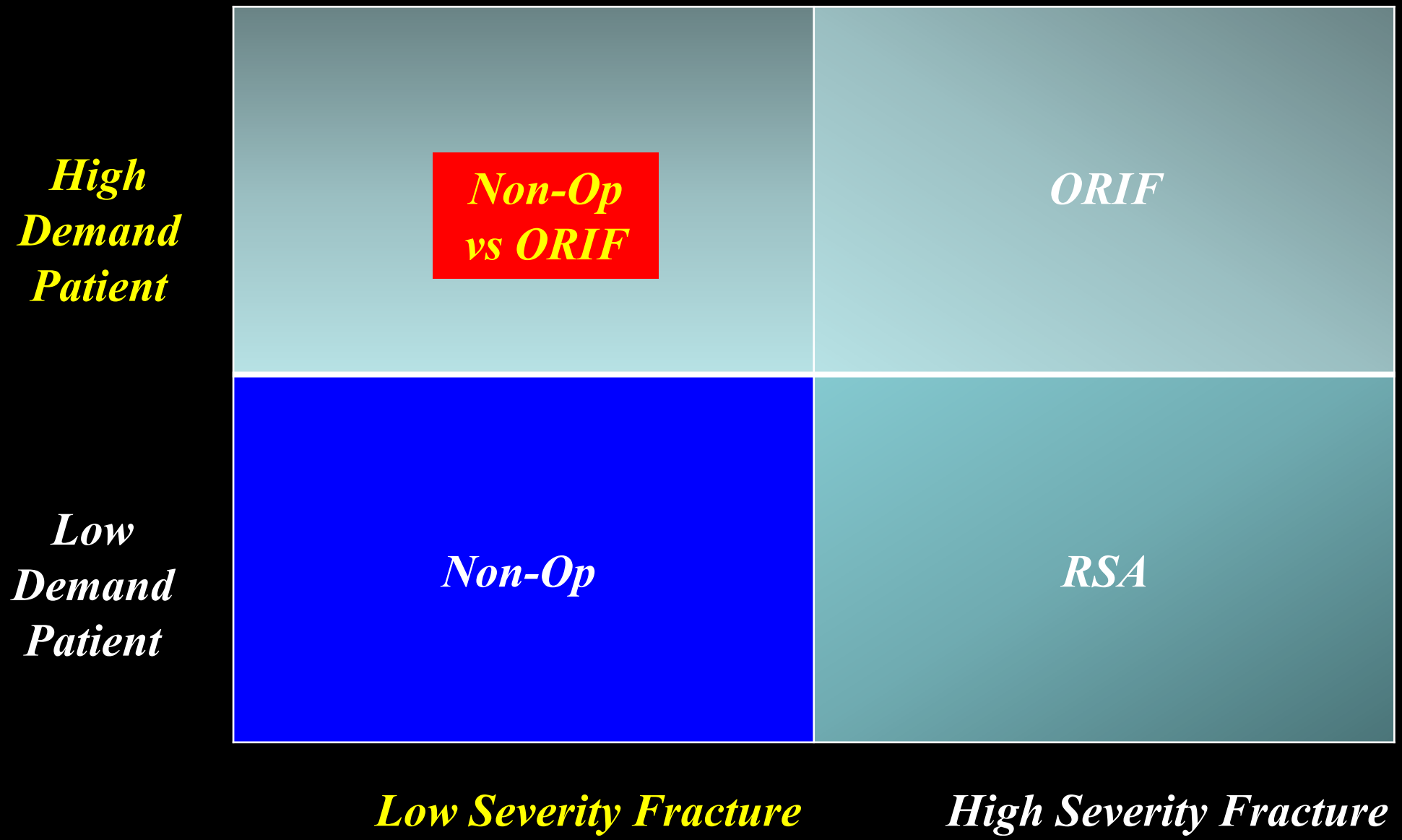
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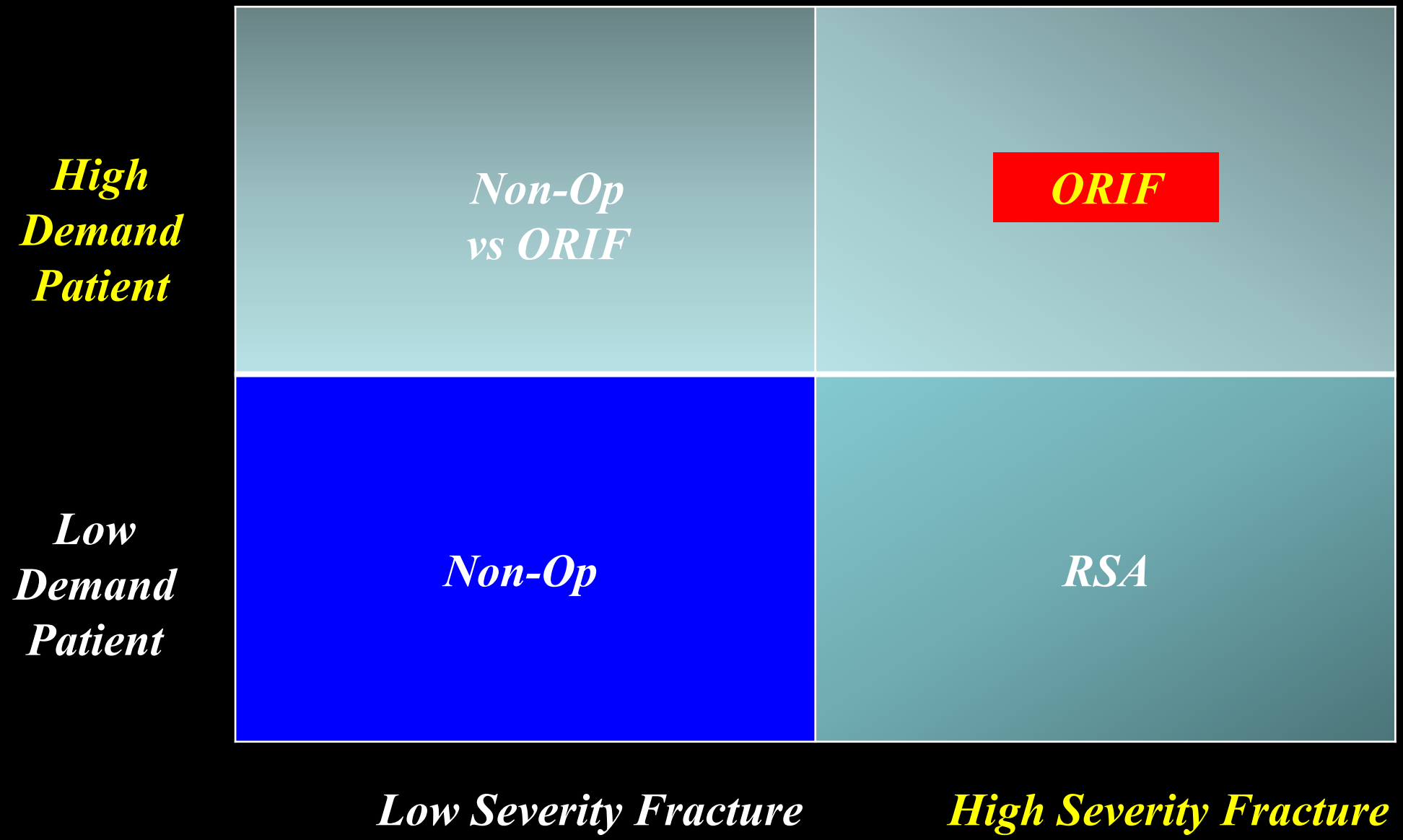
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Non-Op vs ORIF
ORIF
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High Severity Fracture

High Demand Patient

Low Demand Patient

Non-Op vs ORIF

ORIF

Non-Op

RSA

Low Severity Fracture

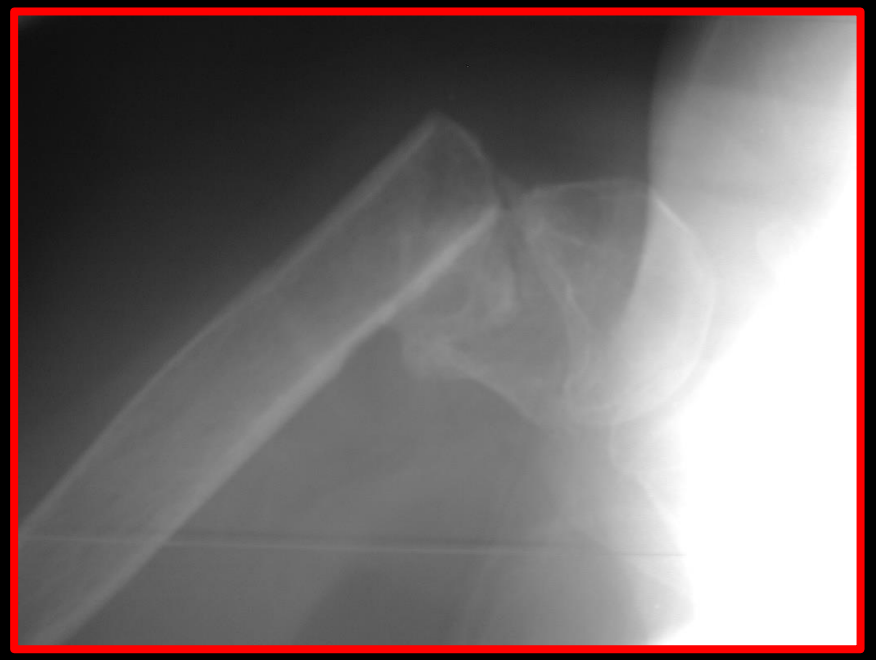
High Severity Fracture

One Exception: Anterior Translation

- Angulation has been evaluated
- Little on translation
- Hypothesized
  - Substantial anterior translation
  - More symptomatic
  - Possibly from biceps

Purpose

- To evaluate the effect of translation on the outcomes of proximal humerus fractures treated closed
- Need for surgery
- Symptomatic malunion

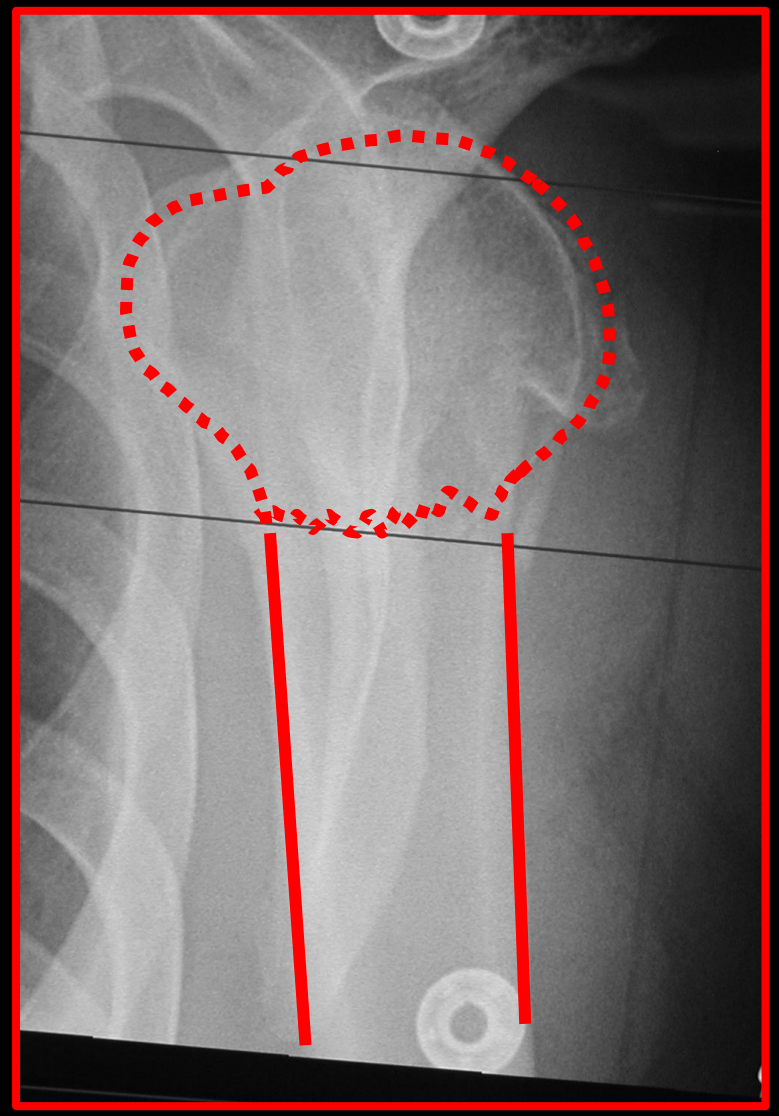


Methods

- Retrospective study
- Low energy proximal humerus fractures
- Skeletally mature adults
- Treated nonoperatively
- 5 Centers

Variables

- Injury mechanism
- Number of parts
- Anterior – posterior translation
- Medial – lateral translation
  - Percentage on standing films



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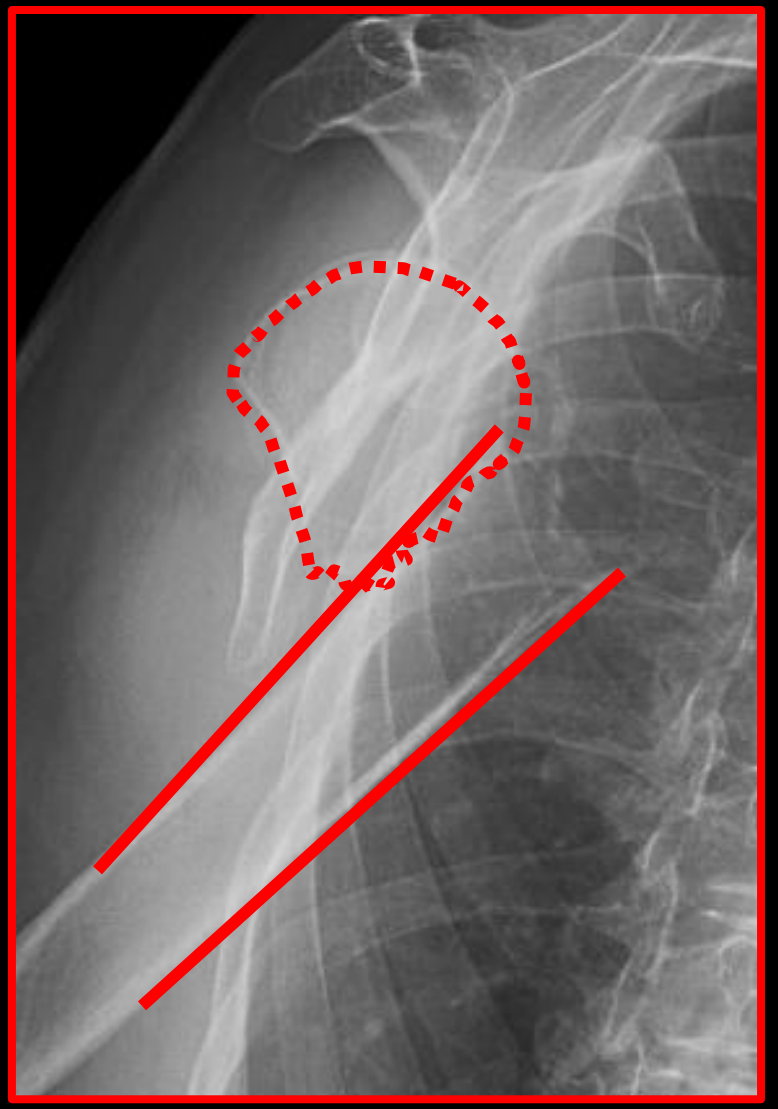
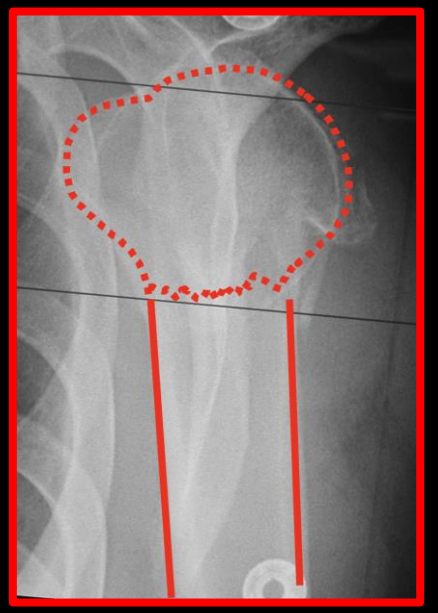
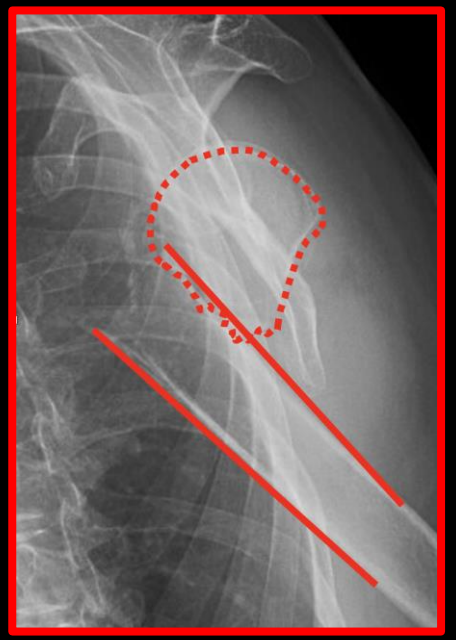


Methods

- Outcomes:
  - Need for surgery
  - Symptomatic malunion
- Analysis
  - Compare anterior translation with no or posterior translation
  - Compare ≥80% translation with <80%
- Standard statistics p <0.05





Patients

- 210 (152 F: 58M)
- Avg age 64 (21-99)
- 112 Left; 98 Right
- BMI 27
- 171 (81%) Fall
- FU avg 231 days
  - Range 84 – 1944 days

Need for Surgery

- 9 Patients (4%) went on to surgery
- 8 Nonunion
- 1 Malunion

- 5 Medial and 4 lateral translation (NS)
- 100% had anterior translation (p=0.012)

Translation

	Anterior Translation	No or Posterior Translation	Total
Healed	116	85	201
Surgery	9	0	9
Total	125	85	210

Translation

	Anterior Translation	No or Posterior Translation	Total
Healed	116	85	201
Surgery	9	0	9
Total	125	85	210

Anterior Translation

	≥ 80% Translation	<80% Translation	Total
Healed	5	114	119
Surgery	6	3	9
Total	11	117	128

Symptomatic Malunion

- 26 (12%)
- 24 Anterior translation
- 2 Posterior translation
- *p = 0.0001*

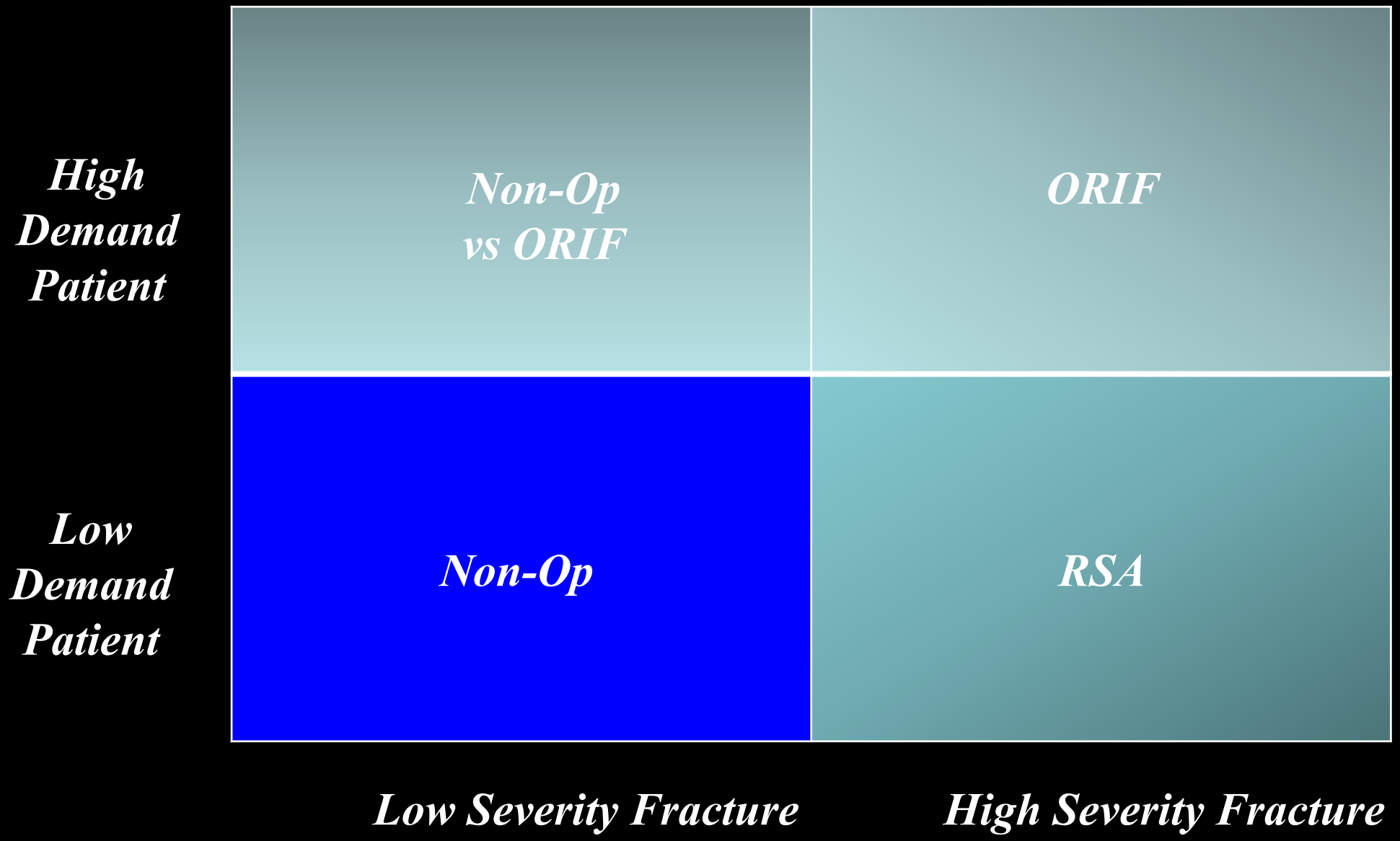
Recommendations

- Even in the group that would typically be treated nonoperatively
- ≥ 80% anterior translation
  - Considered a risk for
  - Nonunion
  - Need for surgery

Another

Healed

Back to the Grid for All Esle



Back to My Nice Lady

Options?

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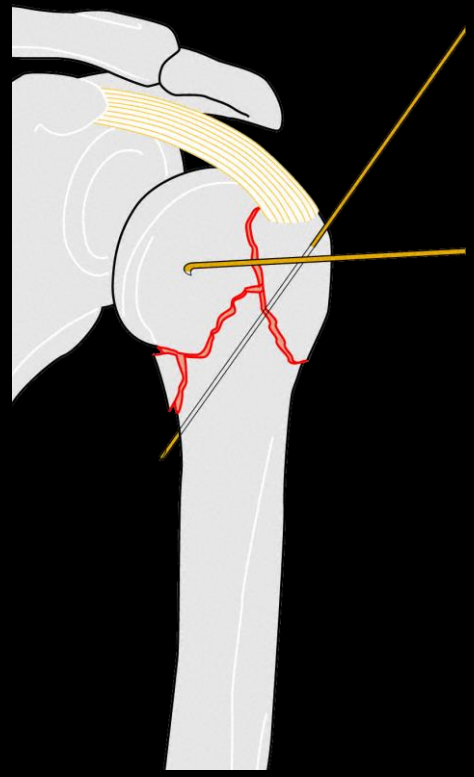
- Perc K-Wires?
- Enders or flexible nails?
- Proximal locking nail?
- Locked plating?
- Hemi?
- RSA?



What Did I Do??

NOTHING!!!

Conclusions

- **Individualize treatment**
  - **Fracture severity**
  - **Patient needs / goals**
  - **Surgeon experience**

Non-Op vs ORIF	***ORIF***
Non-Op	***RSA***

Thank You

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