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Proximal Humerus Fractures: Techniques to Improve Fixation Stability

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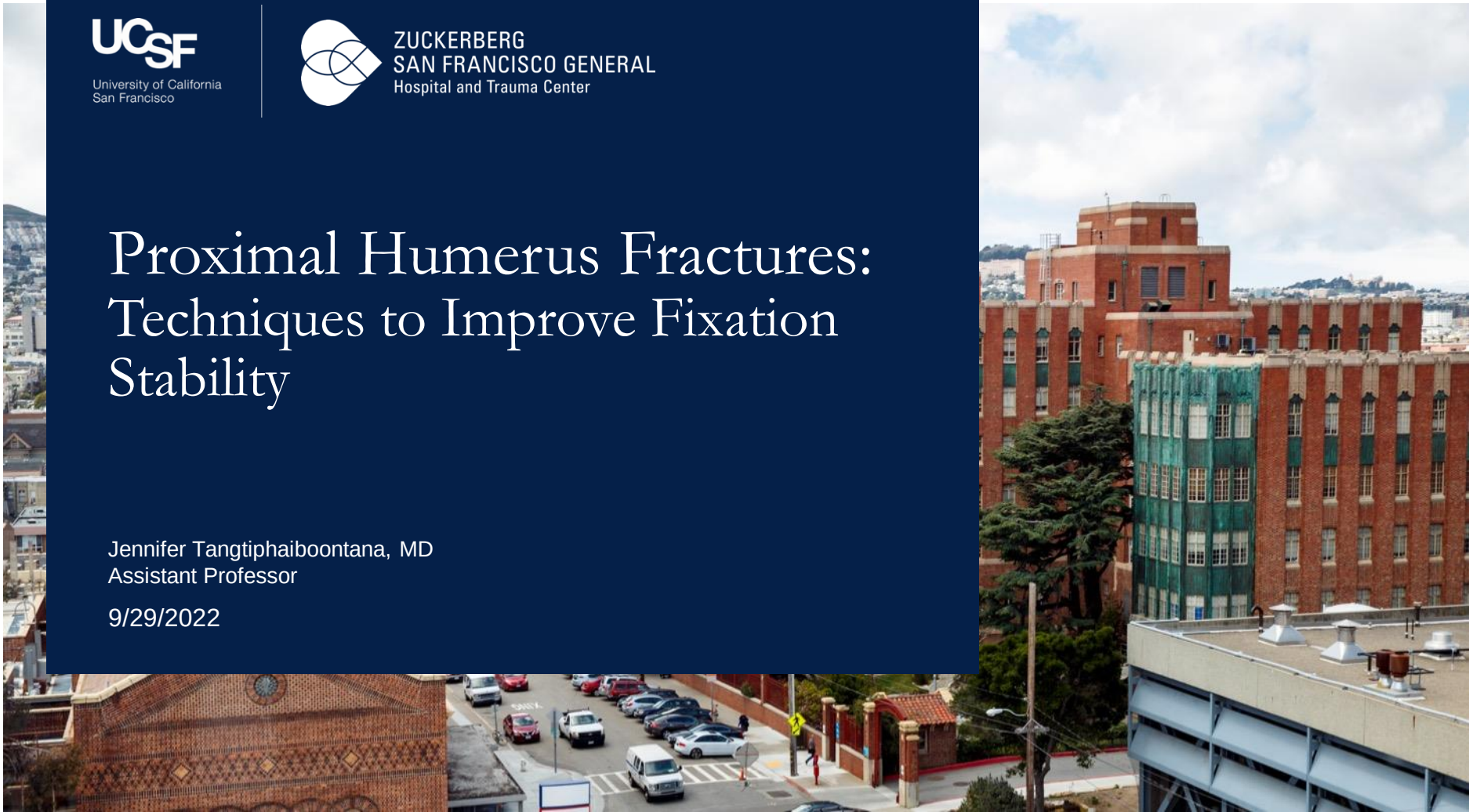

Background

- 6% of all fractures in adults
- 3rd most common osteoporotic fracture population

- Optimal management is highly debated and controversial

Nonoperative

Shoulder Arthroplasty

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

Proximal humeral fractures: non-operative treatment versus intramedullary nailing in 2-, 3- and 4-part fractures

Surgical Treatment With an Angular Stable Plate for Complex Displaced Proximal Humeral Fractures in Elderly Patients: A Randomized Controlled Trial

Nonoperative management versus reverse shoulder arthroplasty for treatment of 3- and 4-part proximal humeral fractures in older adults

JOURNAL OF SHOULDER AND ELBOW SURGERY

Operative vs. nonoperative treatment for comminuted proximal humeral fractures in elderly patients: a current meta-analysis

Reverse shoulder arthroplasty for treatment of proximal humeral fractures in older adults: a systematic review

THE JOURNAL OF BONE & JOINT SURGERY [BJ]

Reverse shoulder arthroplasty for the treatment of three- and four-part fractures of the proximal humerus in the elderly

A PROSPECTIVE REVIEW OF 43 CASES WITH A SHORT-TERM FOLLOW-UP

Reverse total shoulder arthroplasty for acute proximal humeral fracture: comparison to open reduction–internal fixation and hemiarthroplasty

Reverse shoulder arthroplasty for the treatment of three-part and four-part proximal humeral fractures in the elderly

JOURNAL OF SHOULDER AND ELBOW SURGERY
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Who should we be offering surgery to?

- Displaced 2-part fractures*
- 3-4 part fractures in high demand patients
- Fracture-dislocations
- Open fractures

* Prediction of Nonunion After Nonoperative Treatment of a Proximal Humeral Fracture

Ewan B. Goudie, FRCSEd(Tr&Orth), and C. Michael Robinson, FRCSEd(Orth)

>50% shaft translation + head-shaft angle ≤ 90° → ↑ risk nonunion

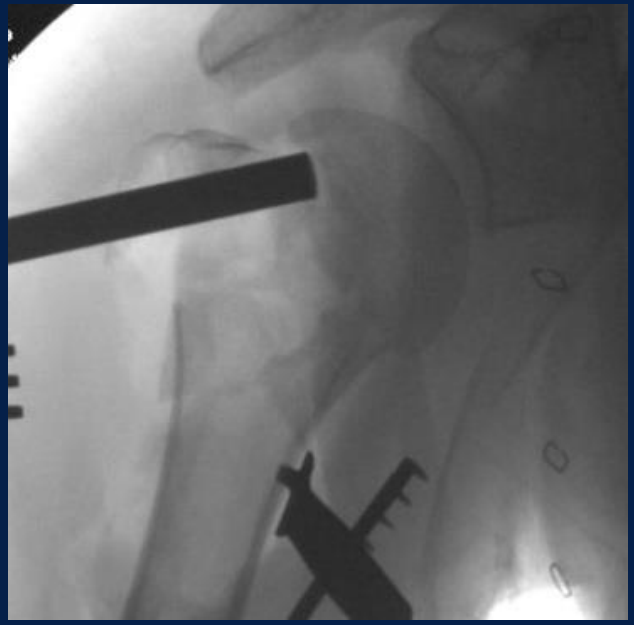
Who should we be fixing?

- Displaced 2-part fractures*
- 3-part fractures in high demand patients with large GT and head fragment
  - Deltoid tuberosity index (DTI) > 1.4
- Open fractures

Tips for Improved Fixation Stability

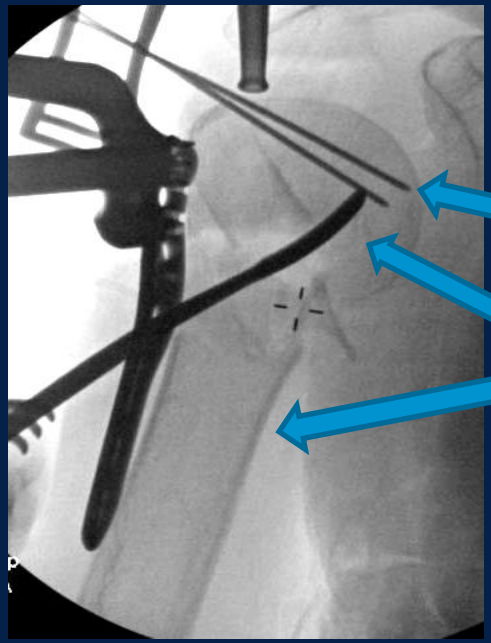
- Reduction goals
  - No varus!
  - Medial calcar support
- Augments
  - Bone graft
  - Calcium phosphate
- Implant position
  - Calcar screw placement
  - Plate position
- Cuff Management

Reduction- Valgus pattern



Courtesy of Dr. Utku Kandemir

Reduction – Varus pattern



1. K-wire joysticks
2. Cuff sutures
3. Elevator
4. Arm abduction

Courtesy of Dr. Utku Kandemir

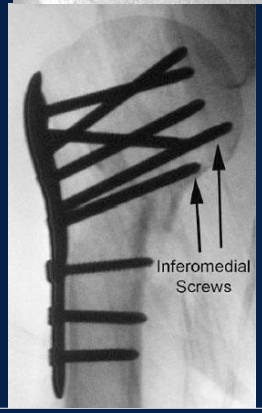
Reduction – Medial Calcar Support

- Anatomic reduction of medial cortex
- Bony apposition
- Position of inferomedial calcar screws

Defining optimal calcar screw positioning in proximal humerus fracture fixation

Eric M. Padegimas, MD[a], Benjamin Zmistowski, MD[a], Cassandra Lawrence, MD[b], Aaron Palmquist, BA[c], Thema A. Nicholson, MS[d], Surena Namdari, MD, MSc[d,*]

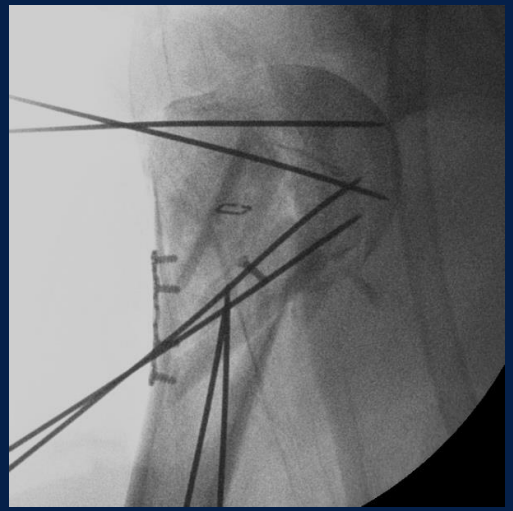
- Screw distance < 12mm or within bottom 25% of humeral head prevents fixation failures



Augmentation Options

$CaPO_4$ Cement

Bone Graft



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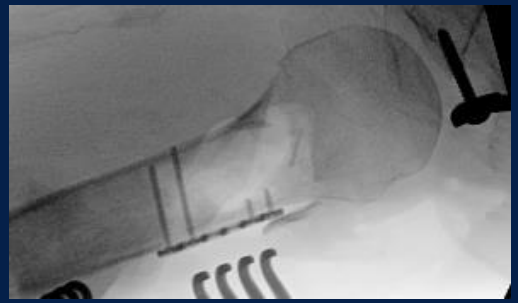
Augmentation – Iliac Crest



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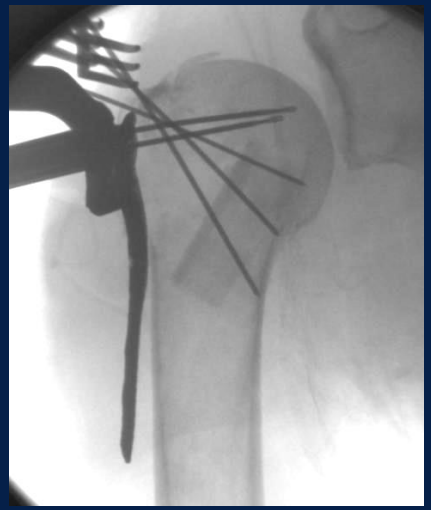
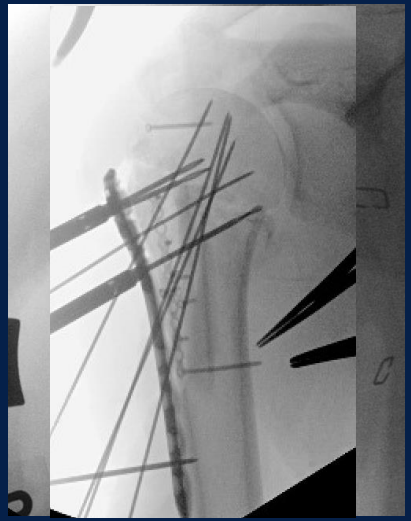
Augmentation – Fibular strut





- Prevent varus collapse
- Provide medial support

- Prevent valgus collapse
- Fill lateral bone void

Courtesy of Dr. Utku Kandemir

Augmentation – Fibular strut

Journal of Shoulder and Elbow Surgery
www.elsevier.com/locate/ymse

Improved outcomes for proximal humerus fracture open reduction internal fixation augmented with a fibular allograft in elderly patients: a systematic review and meta-analysis

Suhas P. Dasari, MD*, Benjamin Kerzner, BS, Luc M. Fortier, BA, Parker M. Rea, BS, Blake M. Bodendorfer, MD, Jorge Chahla, MD, PhD, Grant E. Garrigues, MD, Nikhil N. Verma, MD

- 10 studies, 802 patients
- Locked plating vs locked plating with fibular allograft
- Fibular allograft group had better radiographic outcomes, ASES scores, and lower rates of major complications
- No differences in rates of revision surgery

Plate Position - Coronal plane

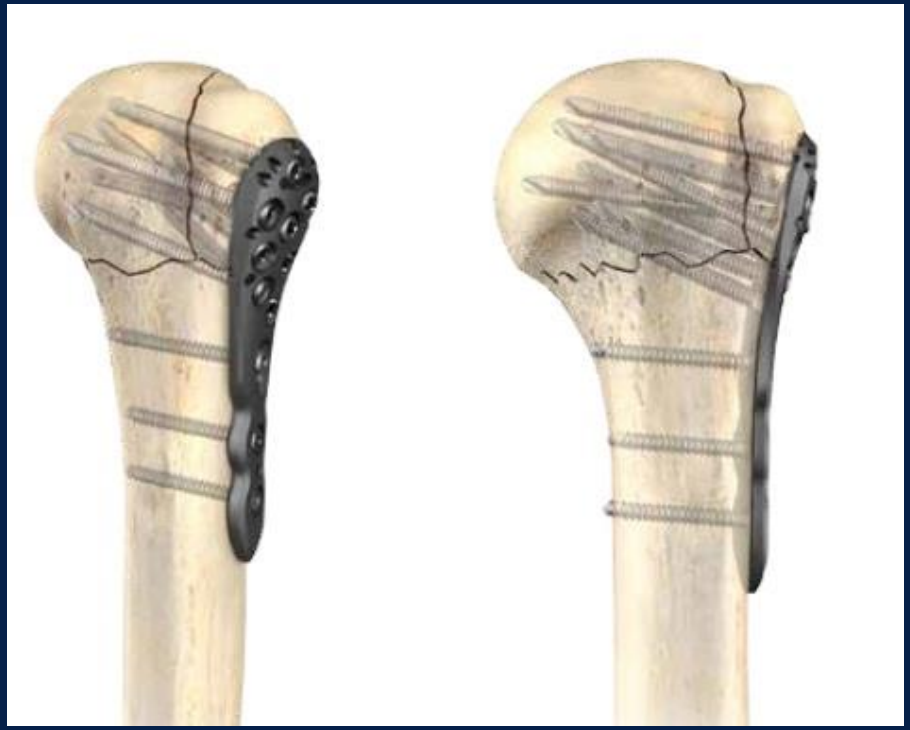


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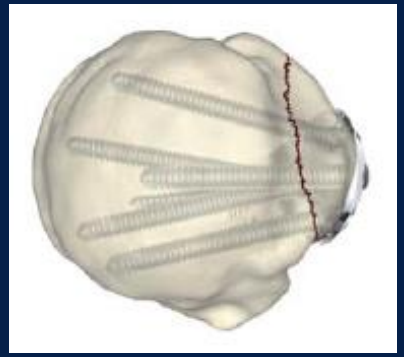
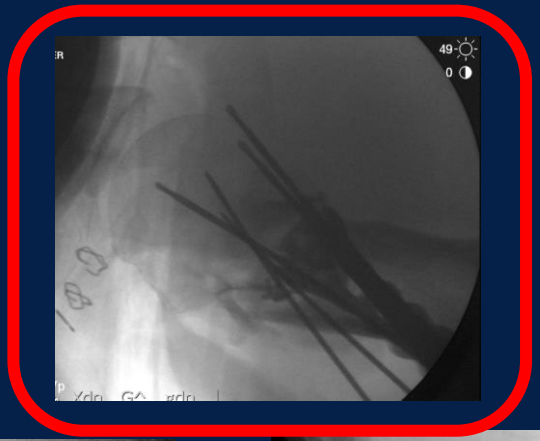
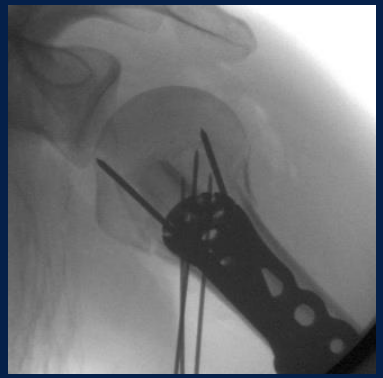
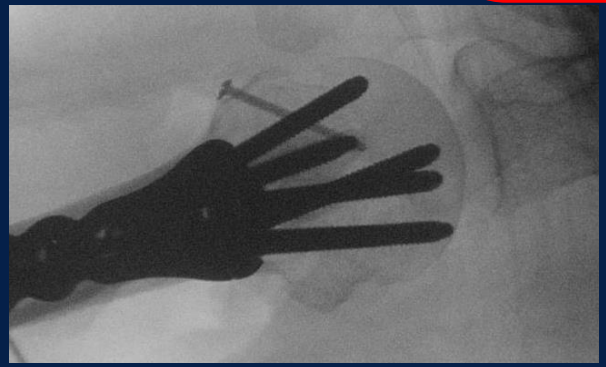
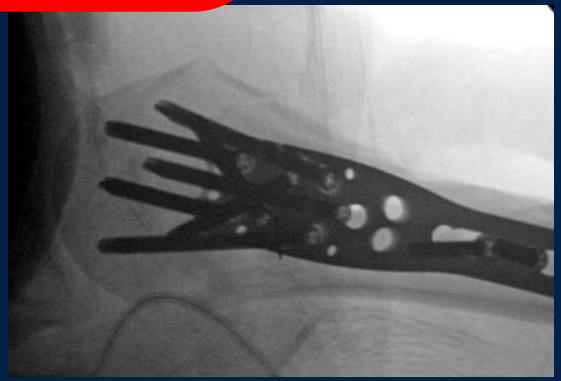
Plate Position - Transverse plane











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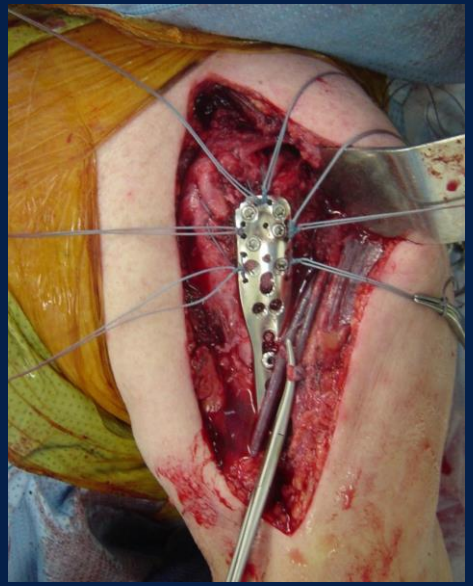
Cuff Management

Tuberosity nonunion/malunion or “escape” → poor outcomes



Sutures

Tuberosity Based Plate

Tips for Improved Fixation Stability

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Thank you

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