

# DISTAL FEMORAL FRACTURES

## CURRENT TREATMENT AND TIMING

AO TRAUMA COURSE – ADVANCED PRINCIPLES OF FRACTURE MANAGEMENT

COPENHAGEN 22-26/4-2018

CARL ERIK ALM

# LEARNING OUTCOMES

EXPLAIN THE KEY ISSUES IN THE TREATMENT  
OF DISTAL FEMUR FRACTURES

DISCUSS TIMING OF SURGERY



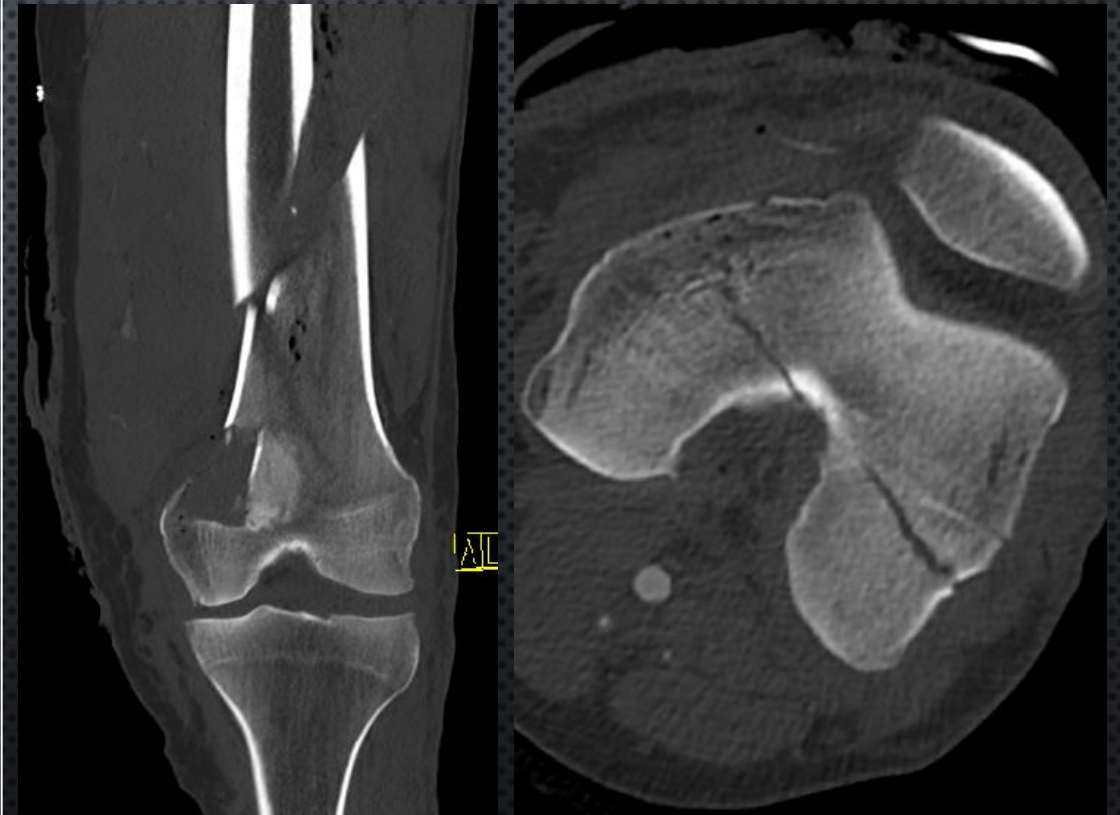
# CHALLENGING FRACTURES

**COMPLEX DISTAL FEMUR ANATOMY**

**POOR BONE QUALITY**

**FRACTURE COMMINATION**

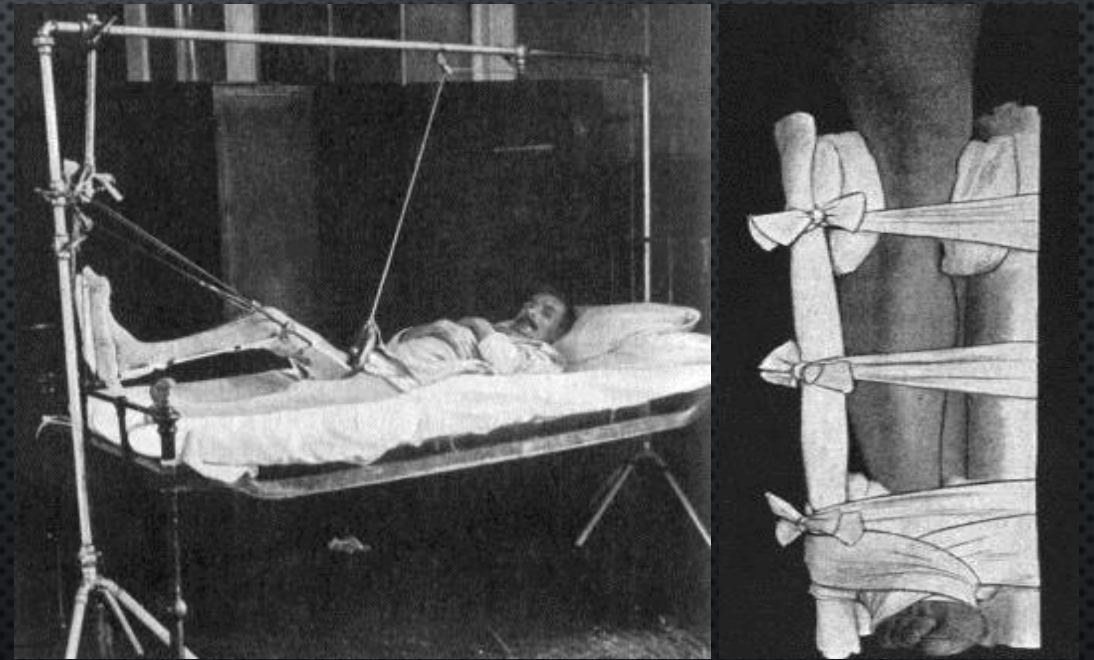
**COMPLICATIONS**



# NONOPERATIVE TREATMENT

COMPLICATIONS ↑↑

IF MEDICALLY FIT → OPERATE

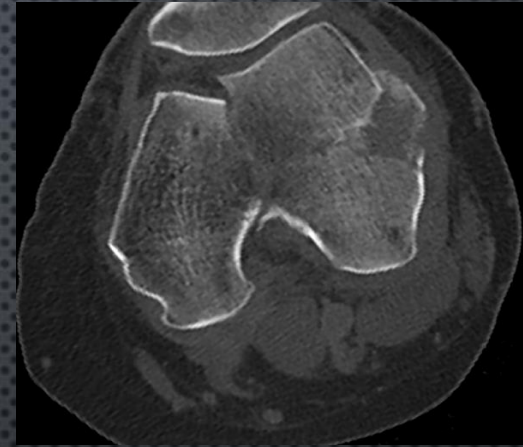


Manual of surgery, sixth edition 1921. Oxford medical publications



# OPERATIVE TREATMENT - **GOAL**

- STABLE CONSTRUCTS THAT ALLOW EARLY MOTION AND WEIGHTBEARING
- ANATOMICAL REDUCTION AND ABSOLUTE STABILITY AT THE JOINT SURFACE
- RESTORATION OF FEMORAL SHAFT LENGTH, AXIS AND ROTATION
- PRESERVATION OF LOCAL BIOLOGY





# OPERATIVE TREATMENT - PLANNING

- **PATIENT CHARACTERISTICS**
  - AGE, DIABETES, SMOKING ETC
- **IMAGING**
  - PLAIN X-RAYS INCLUDING JOINT ABOVE AND BELOW
  - CT WITH 3D RECONSTRUCTIONS
- **FRACTURE CHARACTERISTICS**





# CLASSIFICATION

- **AO 33**

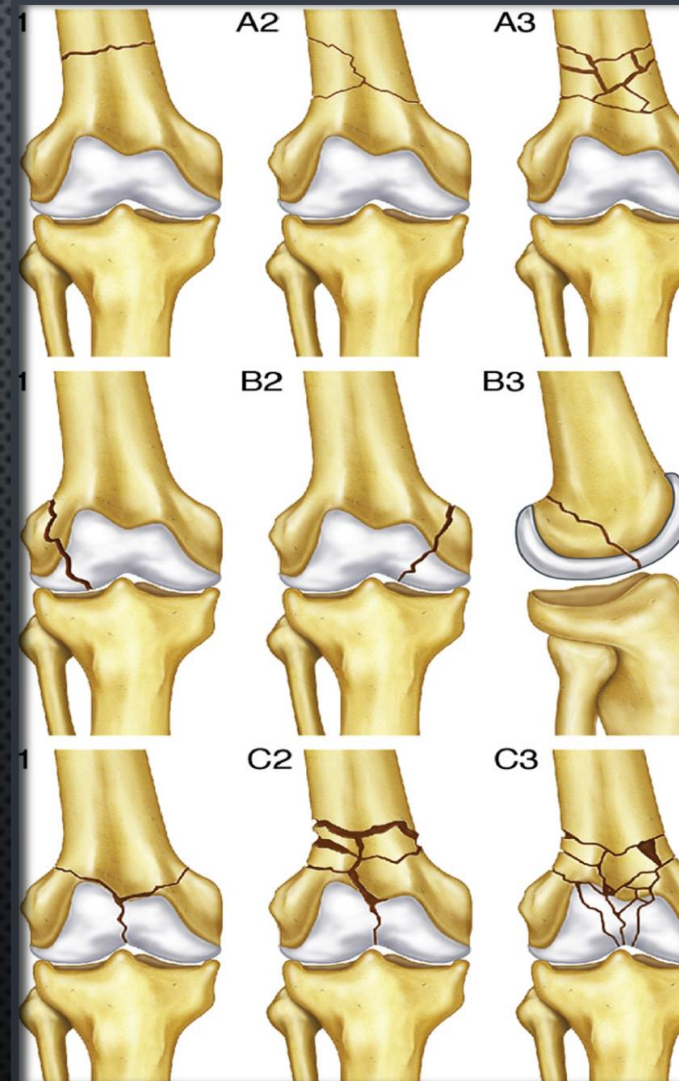
- A – EXTRA ARTICULAR (35-50%)<sup>1,2</sup>
- B – PARTIAL ARTICULAR (18-30%)<sup>1,2</sup>
- C – COMPLETE ARTICULAR (7-18%)<sup>1,2</sup>

- **PERIPROSTHETIC FRACTURES (28%)<sup>1</sup>**

- INTACT OR LOOSE IMPLANT
- BONESTOCK
- FRACTURE PATTERN

1. ELSOE ET AL (2018)

2. KAHN ET AL (2017)

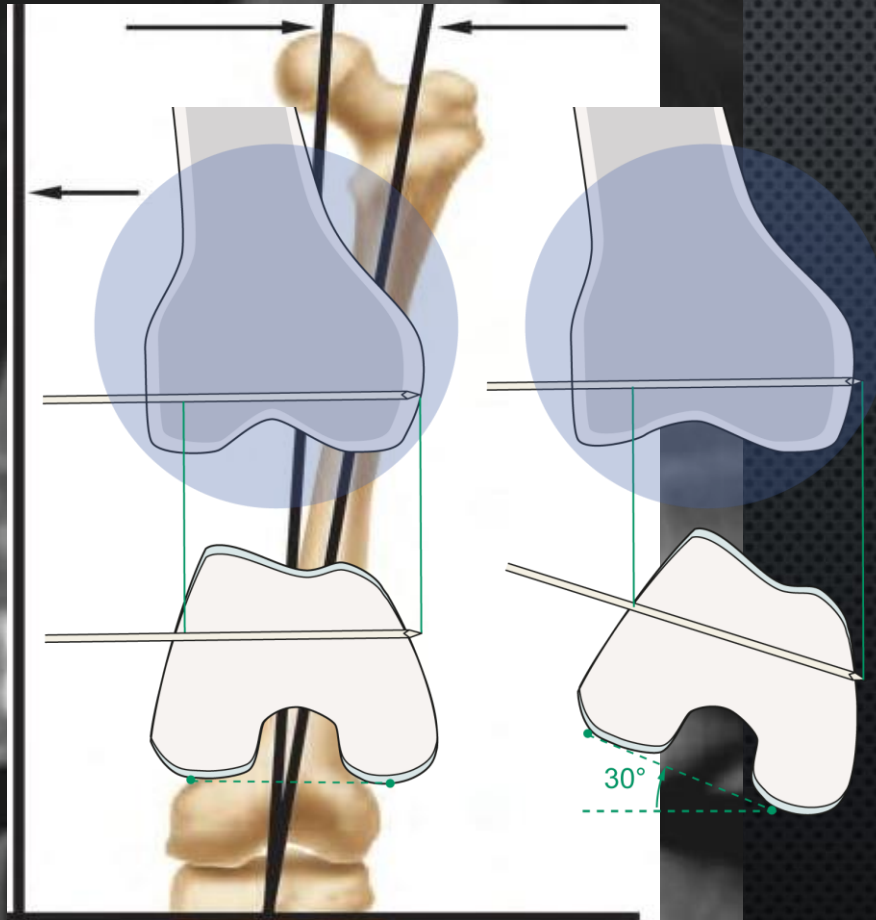
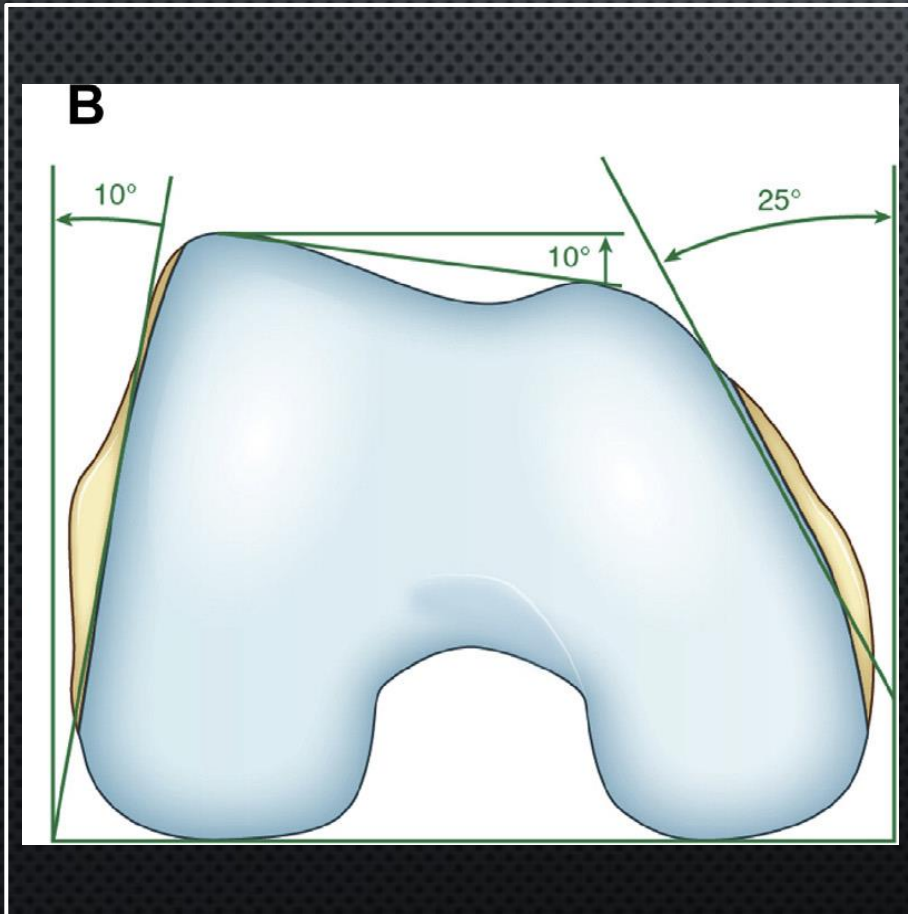


# OPERATIVE TREATMENT - OPTIONS



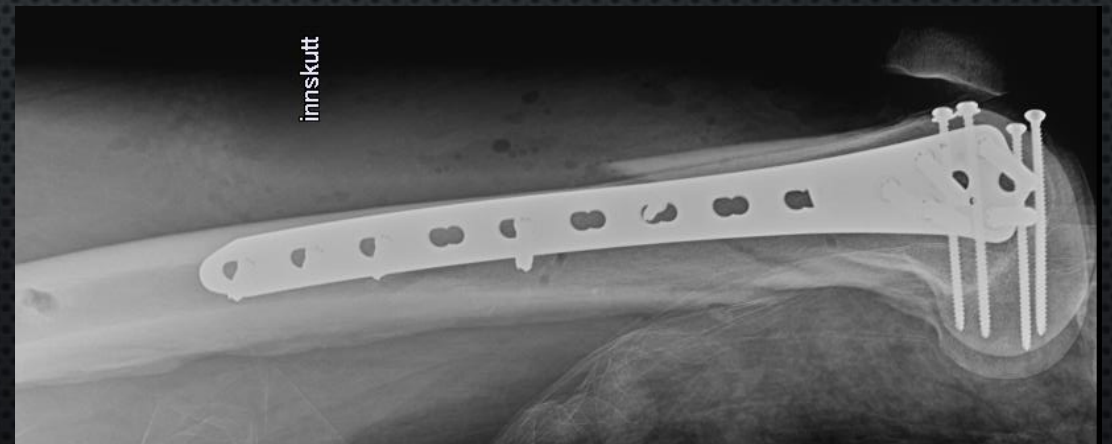


# ANATOMY OF DISTAL FEMUR WHY IT IS IMPORTANT?



# MODERN PLATING SYSTEMS

- ANATOMICAL
- IMPROVED FIXATION IN OSTEOPOROTIC BONE
- DESIGNED TO FACILITATE FRACTURE REDUCTION AND MIPO
- INDICATIONS
  - A AND C-TYPE FRACTURES.
  - PERIPROSTHETIC FRACTURES





# COMPLICATIONS



# RISK FACTORS



1. Ricci et al. JOT 2014
2. Henderson et al JOT 2011

# ORIF/MIPO – HOW TO GET IT RIGHT

## CORONAL ALIGNMENT

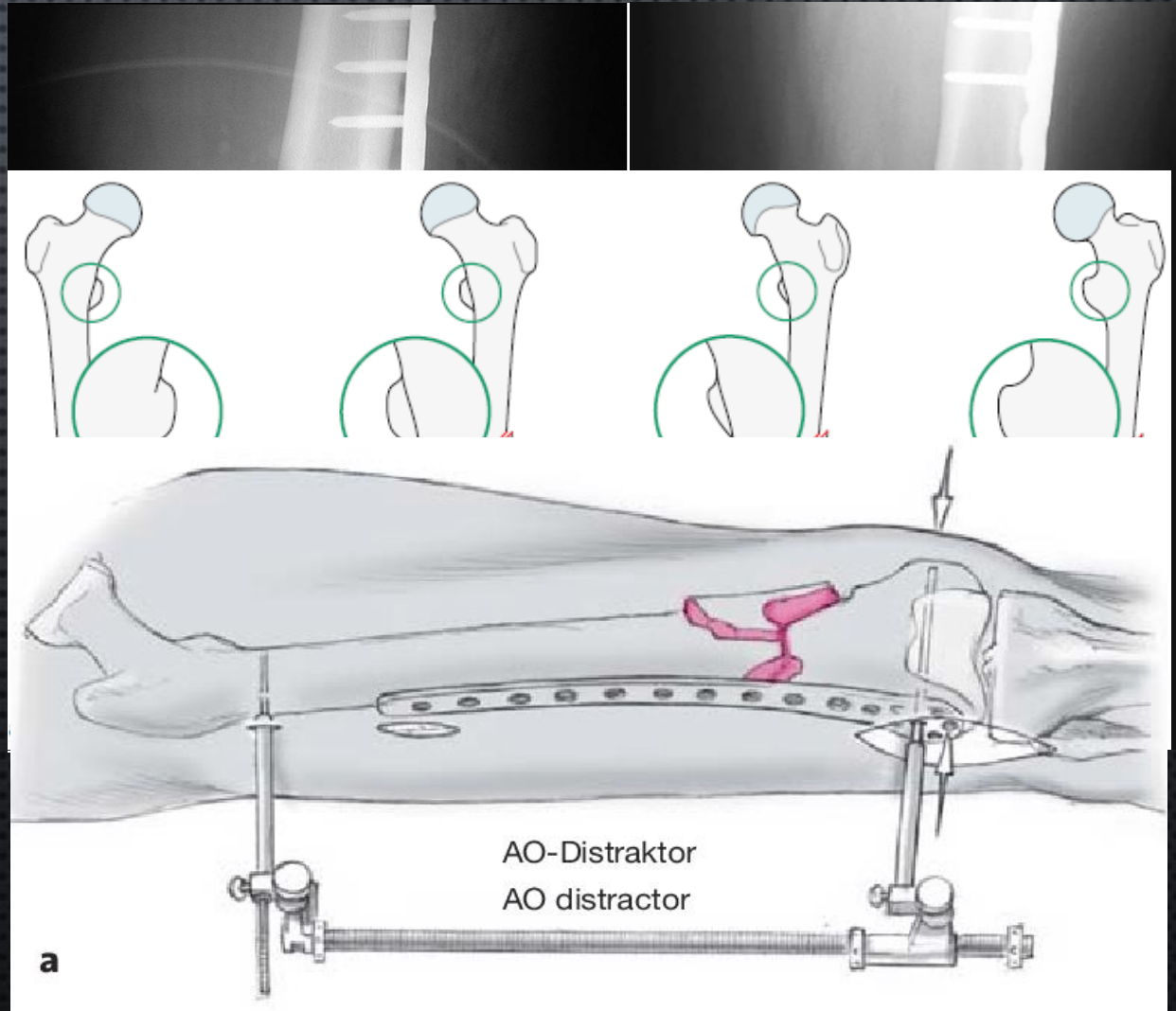
USE YOUR IMPLANT  
AO-ALIGNMENT ROD

## ROTATION

NON INJURED SIDE AS TEMPLATE  
FLUOROSCOPY

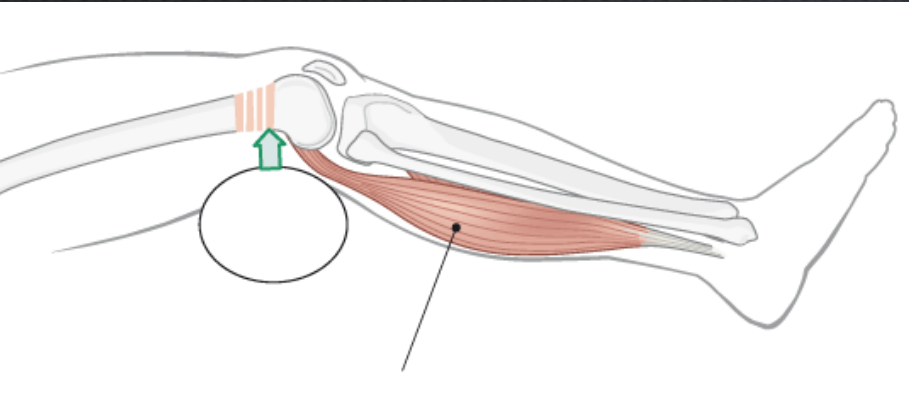
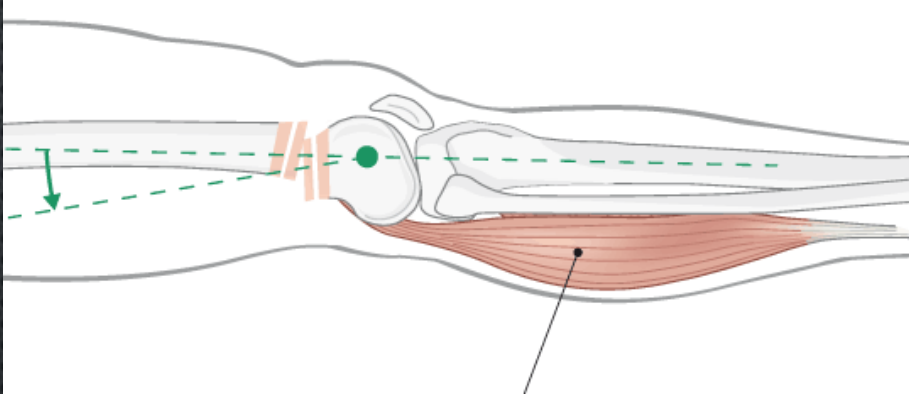
## LENGTH

MEASURE CONTRALATERAL SIDE PREOP  
FEMORAL DISTRACTOR

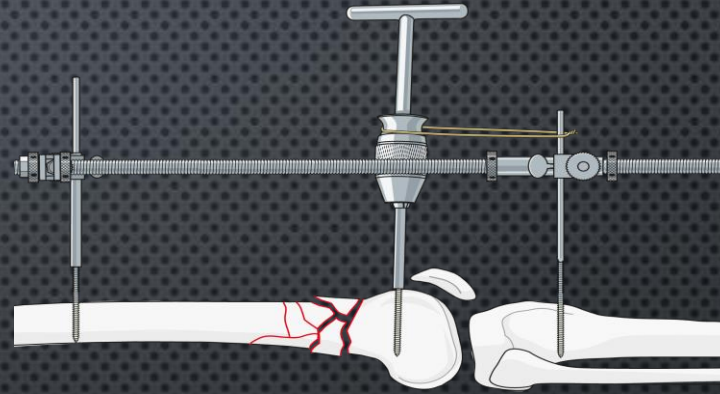




# ORIF/MIPO – HOW TO GET IT RIGHT



FLEXION DECREASES RECURVATUM



UNIVERSAL DISTRACTOR

# MEDIAL AUGMENTATION

- MEDIAL COMINUTION/DEFECT INCREASES RISK OF NON UNION<sup>1</sup>
- ADDITIONAL MEDIAL PLATE AND STAGED BONE GRAFTING PROVIDES INCREASED STABILITY AND PROMOTES UNION<sup>2</sup>
- NON CONSENSUS REGARDING CRITICAL DEFECT OR TIMING OF MEDIAL PLATING<sup>3</sup>

1. RICCI ET AL. JOT 2013

2. SWENTIK ET AL. JOT 2015

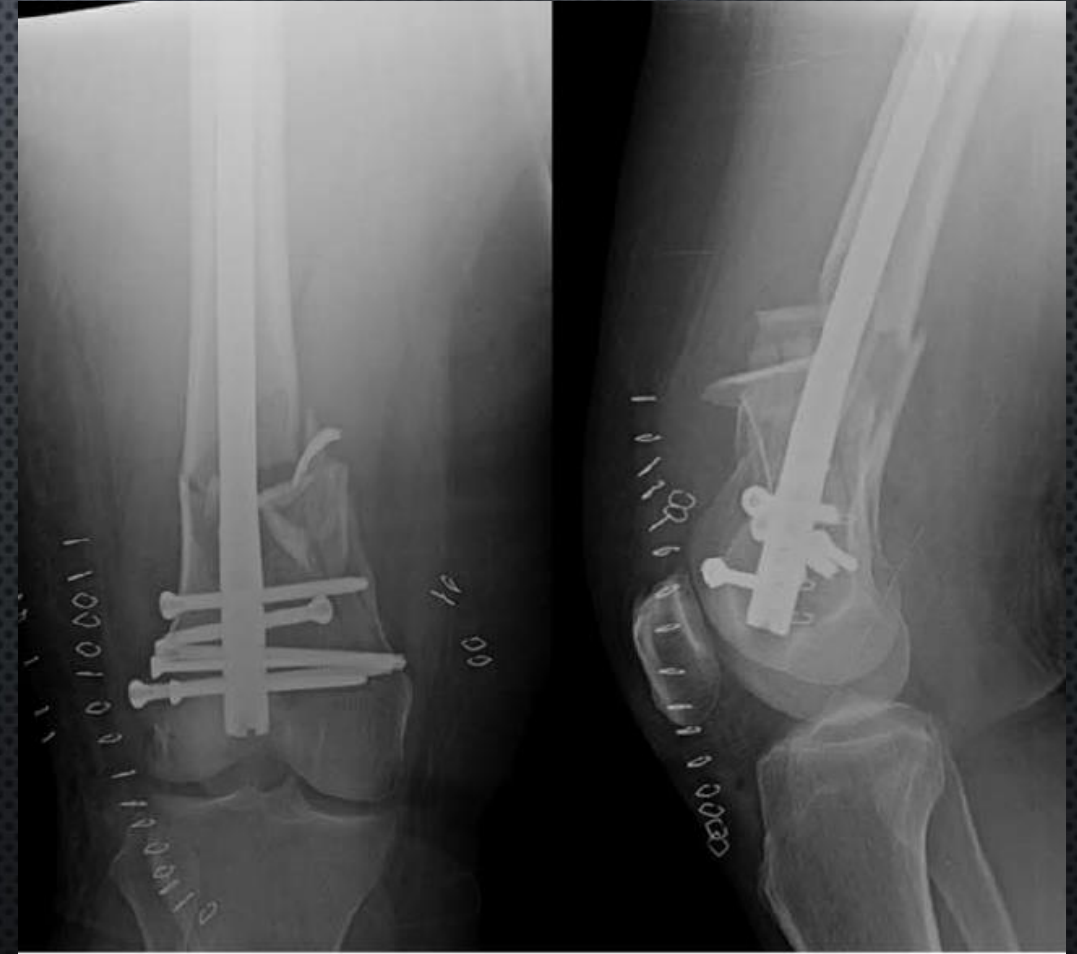
3. DUGAN ET AL. INJURY 2013



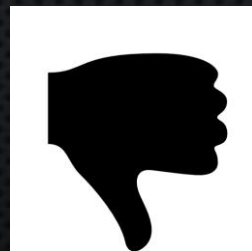
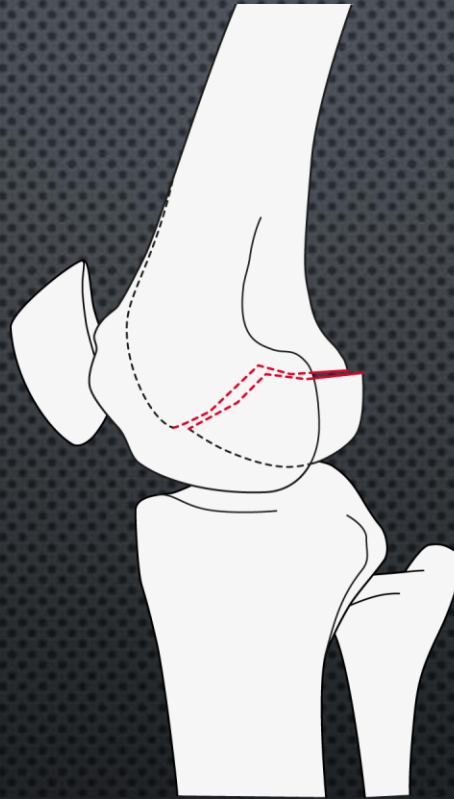


# INTRA MEDULLARY NAILING

- MINIMALLY INVASIVE. SOFT TISSUE FRIENDLY
- LOAD SHEARING DEVICE
- SOFT TISSUES INTACT — FASCILITATES INDIRECT REDUCTION
- IMPROVED DESIGN EXTENDS INDICATION
- COMPARABLE RESULTS TO PLATING



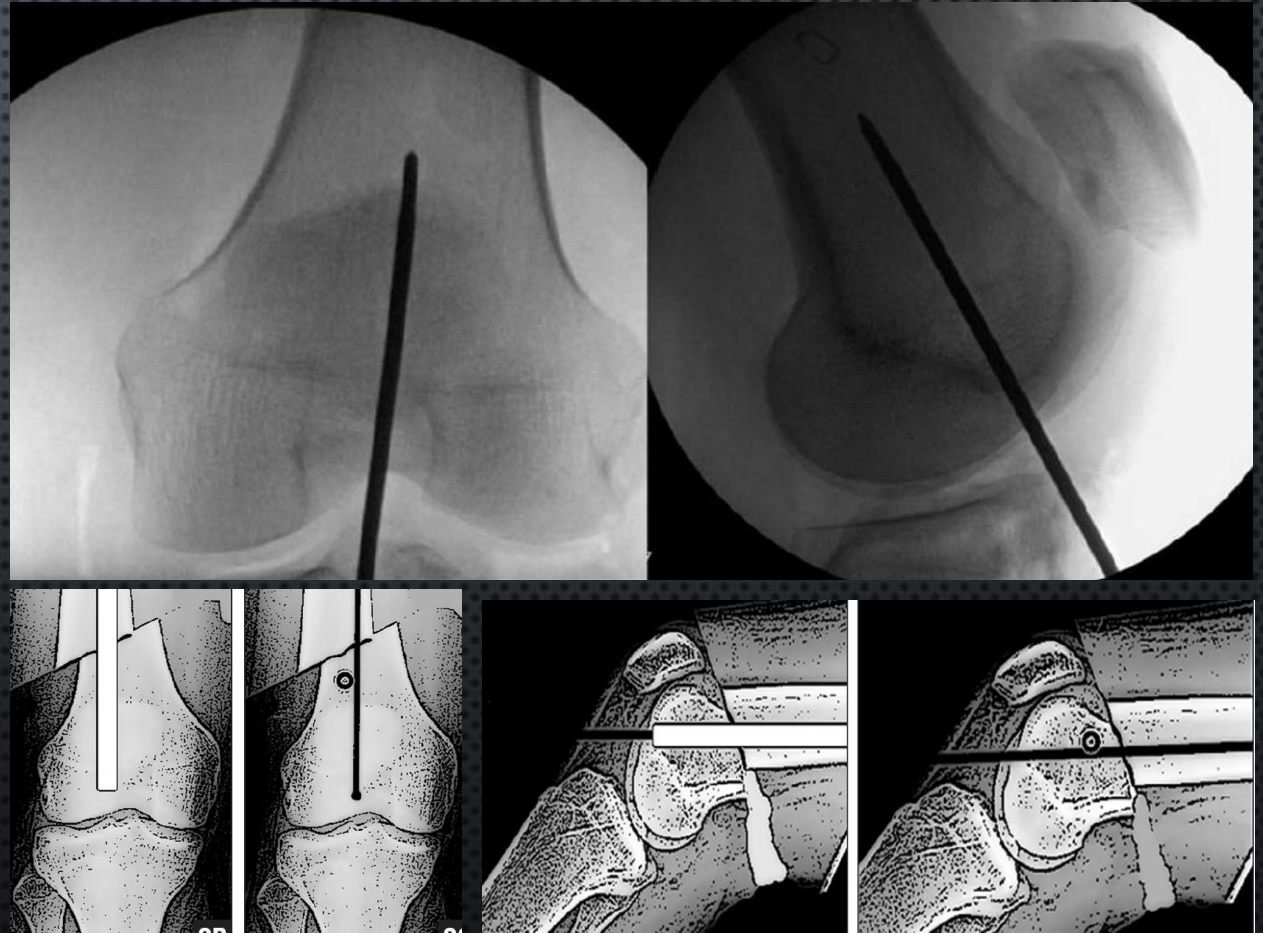
# IM NAILING - INDICATION





# IM NAILING – TIPS AND TRICKS

- REDUCE ARTICULAR FRACTURE FIRST
- CAREFULLY PLANNED PLACEMENT OF SCREWS
- CORRECT ENTRY POINT
- BLOCKING/«MISS A NAIL» SCREWS



## PLATE VS NAIL - SUMMARY

### LOCKED PLATE

A&C FRACTURES

PERIPROSTHETIC

SOFT TISSUE FRIENDLY

LOAD BEARING

### NAIL

A FRACTURES

«SIMPLE» C FRACTURES

SOME PERIPROSTHETIC

SOFT TISSUE FRIENDLY

LOAD SHARING

COMPARABLE CLINICAL RESULTS

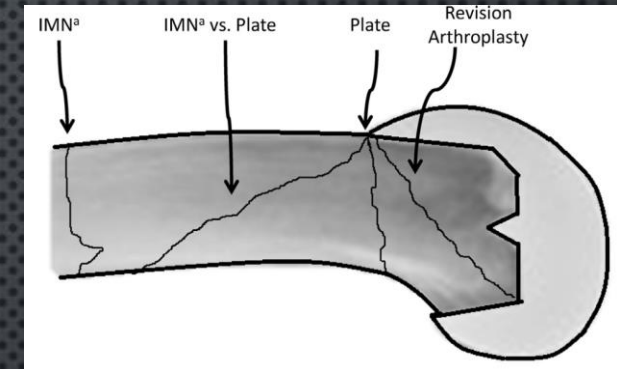
INDICATION FOR PLATE MORE VERSATILE





# PERIPROSTHETIC FRACTURES

- **STABLE IMPLANT?**
- FRACTURE LOCATION. **BONE STOCK.**
- **AMENABLE TO NAILING?**
- TREATMENT OPTIONS
  - **REVISION ARTHROPLASTY**
  - **OSTEOSYNTHESIS**
    - RETROGRADE NAIL
    - LOCKED PLATING





# TIMING





# TIMING – HIGH ENERGY TRAUMA

- ATLS
- ASSOCIATED INJURIES?
- THOROUGH DEBRIDEMENT
- FIXATION
  - REDUCE AND FIX THE ARTICULAR SURFACE
  - SPANNING EXTERNAL FIXATION
  - DELAYED DEFINITIVE FIXATION





# OPEN FRACTURES

OTA HIGHLIGHT PAPER  
ORIGINAL ARTICLE

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## A Comparison of More and Less Aggressive Bone Debridement Protocols for the Treatment of Open Supracondylar Femur Fractures

*William M. Ricci, MD,\* Cory Collinge, MD,† Philipp N. Streubel, MD,‡ Christopher M. McAndrew, MD,\* and Michael J. Gardner, MD\**

### COMPARISON OF TWO DIFFERENT APPROACHES TO BONE DEBRIDEMENT IN OPEN DISTAL FEMORAL FRACTURES

- NO DIFFERENCE IN INFECTION RATE
- SIGNIFICANTLY MORE SECONDARY PROCEDURES IN THE «MORE AGGRESSIVE» GROUP
- ALL FRACTURES WENT ON TO HEAL



# TIMING - LOW ENERGY TRAUMA

FRAGILE PATIENTS. COMPARABLE WITH THE HIP FRACTURE POPULATION  
CONFLICTING EVIDENCE REGARDING TIMING OF DISTAL FEMORAL FRACTURE  
TREATMENT

No association between surgical delay and mortality following distal femoral fractures. A study from the danish fracture database collaborators



Anne Marie Nyholm\*, Henrik Palm, Thomas Kallemose, Anders Troelsen, Kirill Gromov, DFDB collaborators<sup>1</sup>

Clinical Orthopaedic Research Hvidovre, Department of Orthopaedics, Copenhagen University Hospital Hvidovre, Denmark

Clin Orthop Relat Res (2011) 469:1188–1196  
DOI 10.1007/s11999-010-1530-2

CLINICAL RESEARCH

## Mortality After Distal Femur Fractures in Elderly Patients

**Philipp N. Streubel MD, William M. Ricci MD,  
Ambrose Wong BS, Michael J. Gardner MD**

ORIGINAL ARTICLE

## Patient Mortality in Geriatric Distal Femur Fractures

*Philip Myers, DO,\* Patrick Laboe, MD,† Kory J. Johnson, DO,‡ Peter D. Fredericks, MD,§  
Renn J. Crichlow, MD,\* Dean C. Maar, MD,\* and Timothy G. Weber, MD\**

# TIMING - LOW ENERGY TRAUMA

- CONSIDERATIONS
  - TECHNICALLY DEMANDING PROCEDURE
  - ADEQUATE PREOP PLANNING
- RECOMMENDATIONS — BEST AVAILABLE EVIDENCE
  - «PLANNED» SURGERY WITHIN 48H





# TAKE HOME MESSAGES

- KNOWLEDGE ABOUT DISTAL FEMUR ANATOMY IS IMPORTANT FOR A FAVORABLE OUTCOME
- PRIPROSTHETIC FRACTURES ARE INCREASING
- LOCKED PLATES HAVE A WIDER SPECTRUM OF INDICATIONS THAN NAILS
- THE RESULTS WITH NAILS AND PLATES ARE COMPARABLE
- DISTAL FEMUR FRACTURES IN ELDERLY PATIENTS ARE URGENT AND SHOULD BE FIXED WITHIN 48H

# CASE

72Y W. BILATERAL KNEE  
PROSTHESIS, OBESE

FALL FROM STANDING

POD1

COMMENTS?

6W PO

NO TRAUMA

