

TIBIAL SHAFT FRACTURES

PROXIMAL, DISTAL, SEGMENTAL

AO TRAUMA COURSE – ADVANCED PRINCIPLES OF FRACTURE MANAGEMENT

COPENHAGEN 22-26/4-2018

CARL ERIK ALM



LEARNING OUTCOMES



NOT

EPIDEMIOLOGY

CLASSIFICATION

SIMPLE SHAFT FRACTURES

COMPLEX TIBIAL FRACTURES - CHARACTERISTICS

HIGH ENERGY

OFTEN POLY TRAUMATIZED PATIENTS

SEVERE SOFT TISSUE INJURIES



INITIAL EVALUATION



DEFINITIVE VS TEMPORARY FIXATION

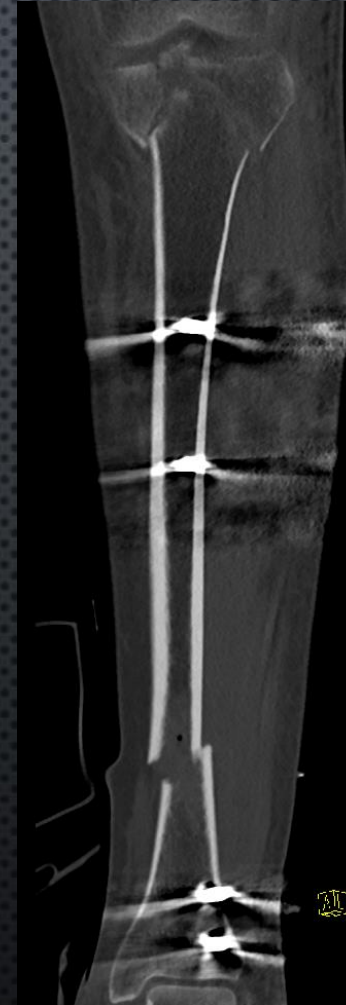


COMPLEX TIBIAL FRACTURES

PLAN YOUR OPERATION...

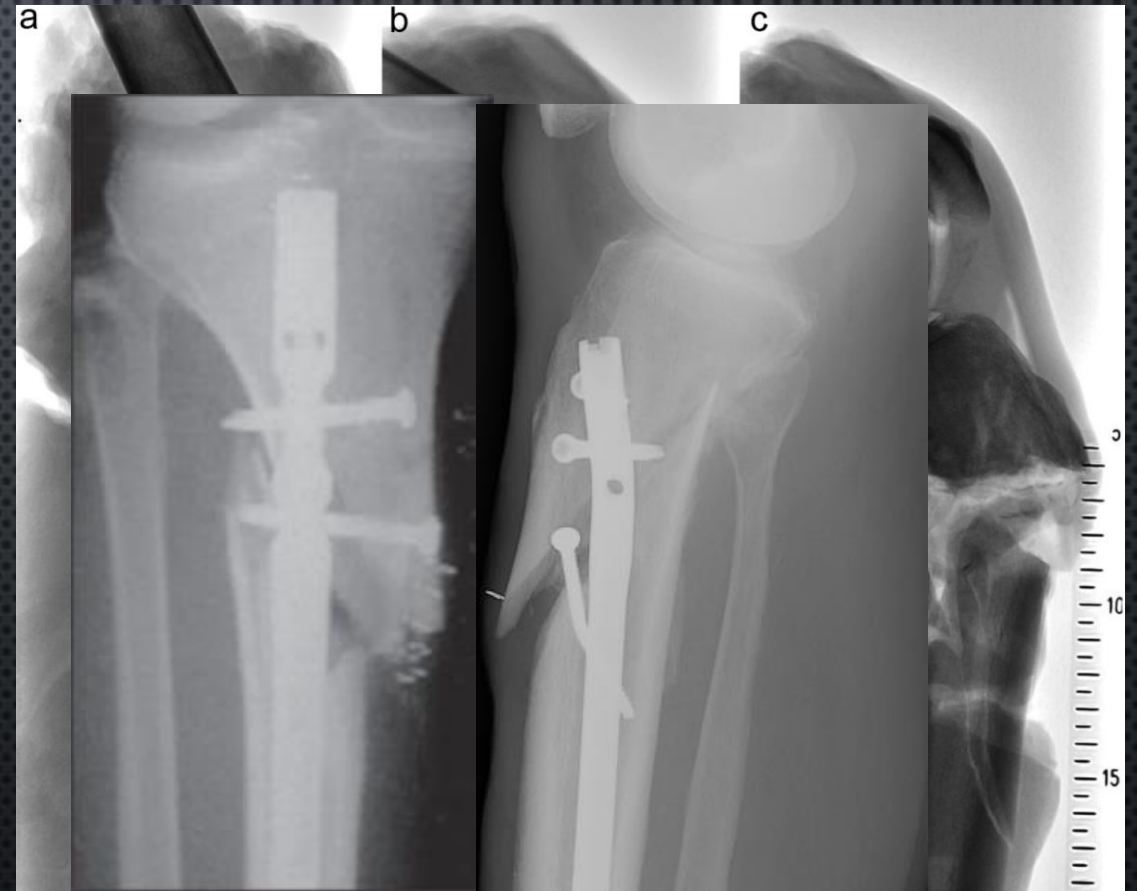
- PLATE/NAIL/CIRCULAR FRAME
- POSITIONING, IMAGING, APPROACH, REDUCTION TOOLS

...AND OPERATE YOUR PLAN!



PROXIMAL FRACTURES

- TECHNICALLY DEMANDING
- DEFORMING FORCES
 - PROCURVATUM
 - VALGUS
- BONY ANATOMY OF PROXIMAL TIBIA



Franke et al. Injury 2016

PROXIMAL FRACTURES – TREATMENT OPTIONS



- **Bhandari et al. JOT 2003. Review.**
 - **Malunion:** IMN > Plate > Frame
 - **Infection:** Plate > Frame > IMN
- **Lindvall et al. JOT 2009 IMN vs MIPPO**
 - **Malunion:** IMN > Plate

PROXIMAL FRACTURES – TIPS AND TRICKS

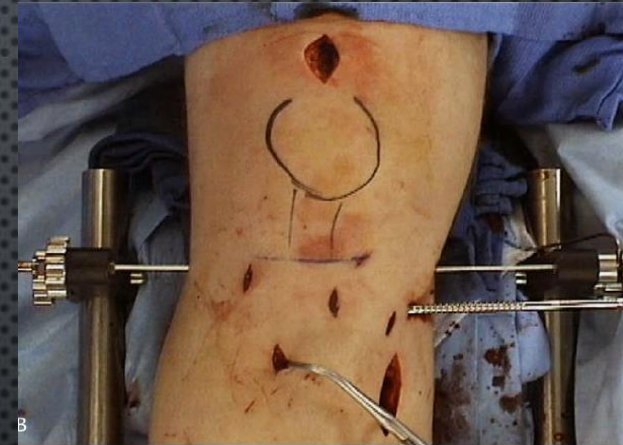
Semiextended nailing

Entry point

Distractor/ex.fix

Blocking pins/screws

Unicortical plate



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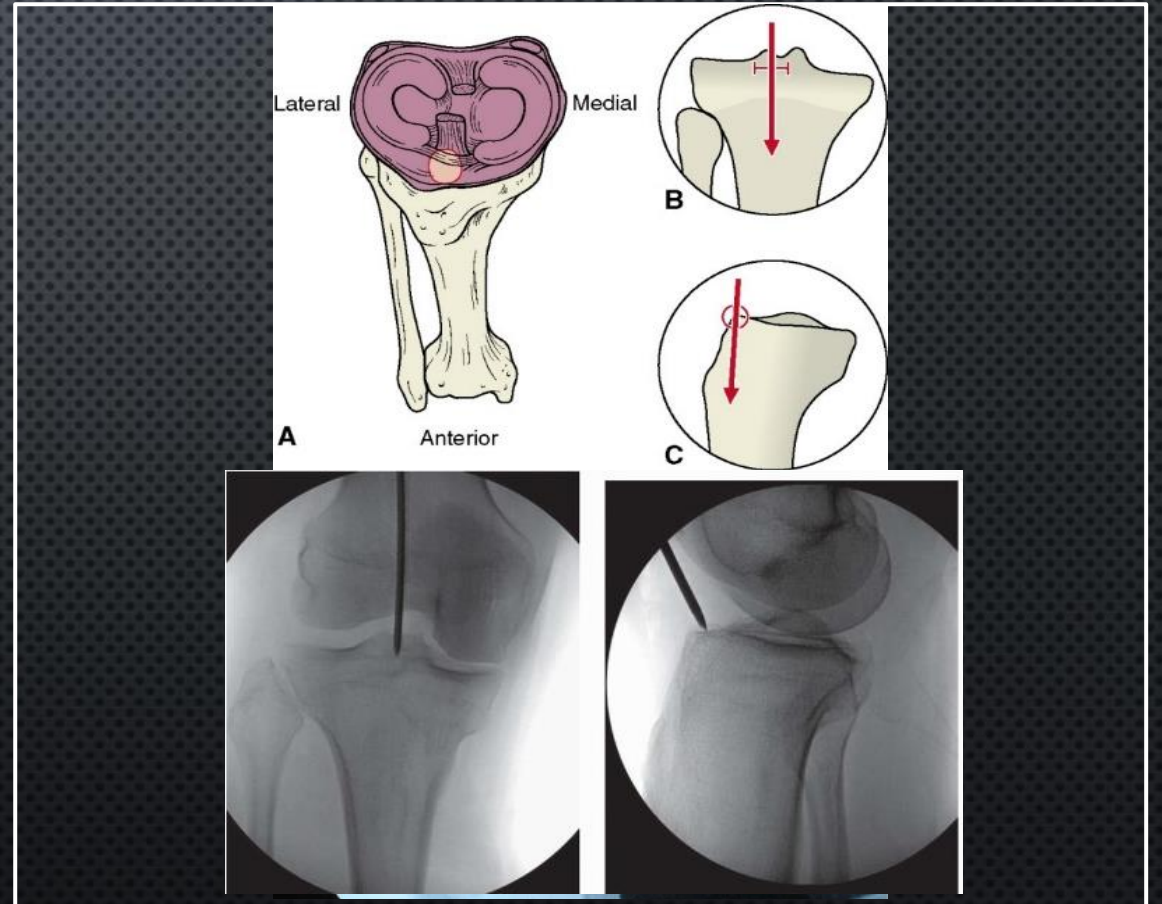
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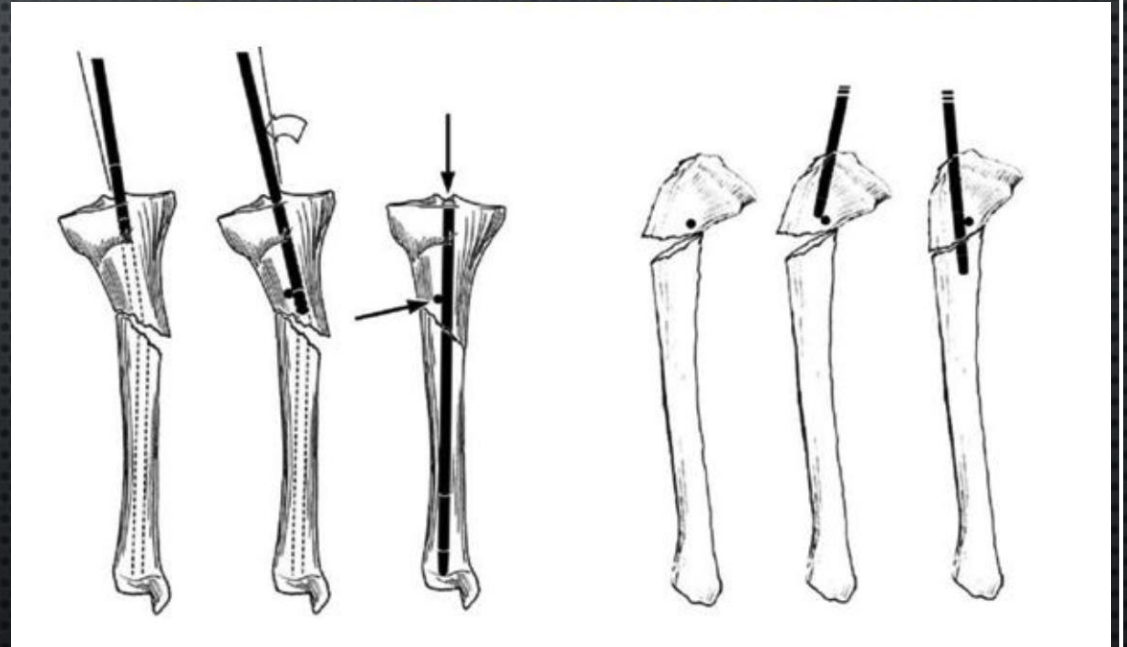
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COMBINED FRACTURE PATTERNS

COMBINED PLAFOND/SHAFT FRACTURE

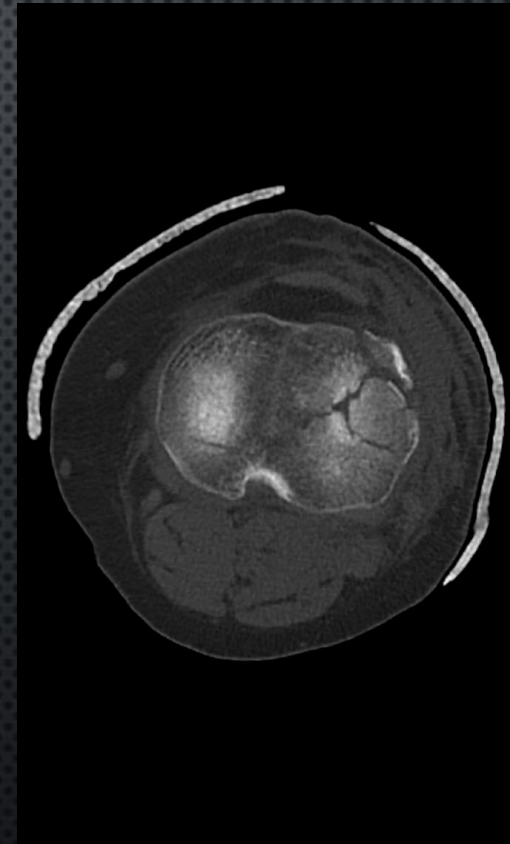
UNCOMMON

THOROUGH PLANNING

TREAT EACH INJURY SEPERATIVELY

FIX ARTICULAR FRACTURE FIRST

- KUBIAK ET AL. JOT 2008
 - 3 % OF ALL TIBIAL SHAFT FRACTURES
 - EXCELLENT RESULTS



SEGMENTAL FRACTURES

COMPLETELY ISOLATED INTERCALATED FRAGMENT
SEPARATED BY TWO DISTINCT FRACTURE LINES

UNCOMMON

HIGH ENERGY . **OPEN** >> CLOSED

- ↑ **TIME TO UNION** (MEAN 34 W)
- ↑ **INFECTION**. UP TO 30%
- ↑ **NONUNION**. 15-50%

TERAA ET AL. CORR 2013



SEGMENTAL FRACTURES

- DIFFICULT TO RESTORE AND CONTROL LENGTH, AXIS AND ROTATION
 - **USE NONINJURED SIDE** AS TEMPLATE
 - **DISTRACTOR** FOR LENGTH
 - **AO- ALIGNMENT ROD**
 - **UNICORTICAL PLATES** (IF OPEN)



J Korean Fract Soc. 2013

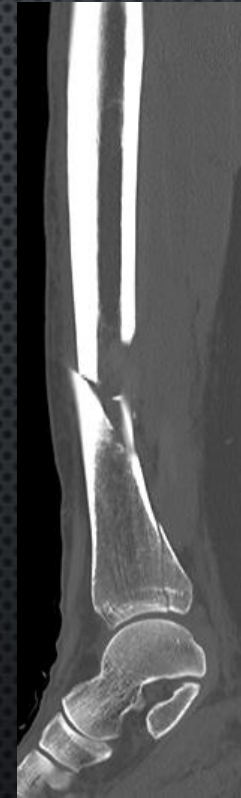
DISTAL FRACTURES



DISTAL FRACTURES

SUSPECT INTRAARTICULAR
INVOLVEMENT

SECURE ARTICULAR FRACTURE PRIOR
TO NAILING



DISTAL FRACTURES – REDUCTION

AIM: RESTORE LENGTH, AXIS AND ROTATION
MAINTENANCE OF REDUCTION DURING HEALING

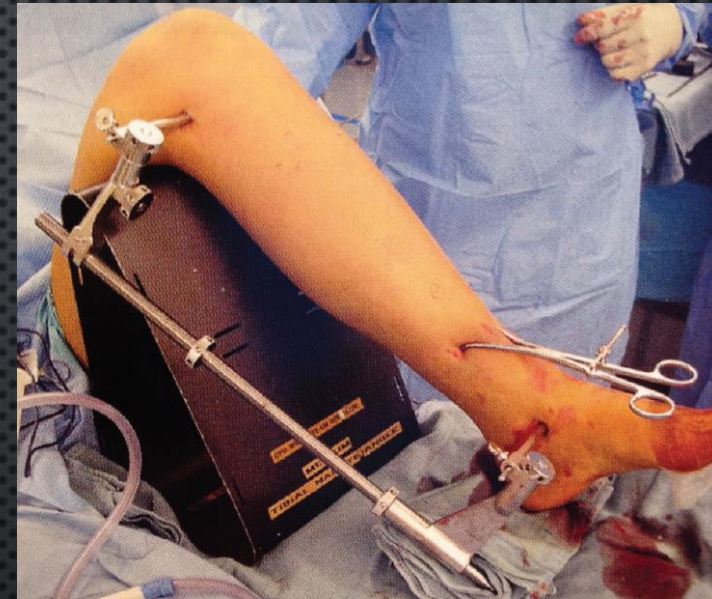
POINTED REDUCTION FORCEPS

MULTIPLANAR AND ANGULAR STABLE LOCKING

DISTRACTOR/EX.FIX

SEMIEXTENDED NAILING

BLOCKING PINS/SCREWS



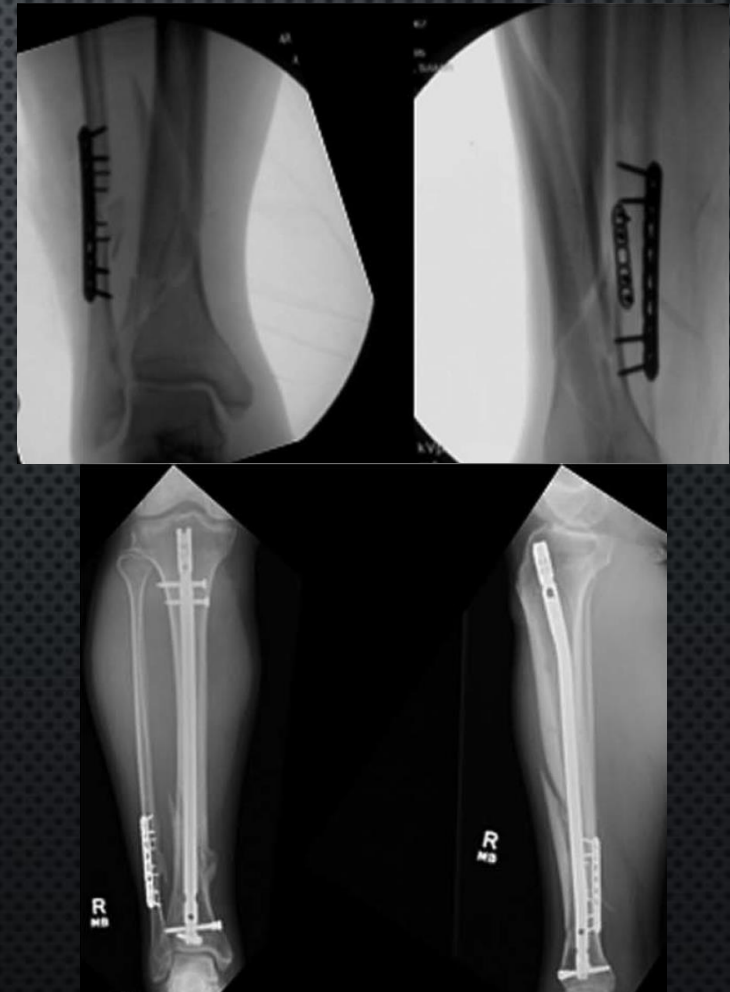
37 mm



«FIBULA FIXATION REDUCTION AID OR NONUNION GENERATOR»?

- **FIBULA FIXATION**
 - «ALWAYS» IF **PART OF ANKLE FRACTURE** WITH SYNDESMOSIS RUPTURE
 - «NEVER» IF **COMPROMIZED SOFT TISSUES, DIABETIC** ETC
 - **BETTER ALIGNMENT**
 - **HIGHER RATE OF NONUNION**

TORINO ET. AL JOT 2016



DISTAL FRACTURES - PLATING

PLATE VS NAIL. VALLIER ET AL. JOT 2011. ↓ MALALIGNMENT, ↑ UNION RATE WITH PLATES



CAREFUL SOFT TISSUE HANDLING. APPLY AO-PRINCIPLES.

RESPECT THE SOFT TISSUES

- SOFT TISSUES — GUIDES INITIAL TREATMENT DECISIONS
- SOFT TISSUES — GUIDES REDUCTION STRATEGY
- SOFT TISSUES — GUIDES FINAL TREATMENT

- **COMPROMISED SOFT TISSUES FAVOURS**
 - TEMPORARY FIXATION, INDIRECT REDUCTION TECHNIQUES AND MINIMALLY INVASIVE FINAL FIXATION



TAKE HOME MESSAGES

- **COMPLEX TIBIA FRACTURES ARE OFTEN ACCOSIATED WITH SEVERE SOFT TISSUE INJURIES**
- **RESPECT THE SOFT TISSUES**
- **USE AN IMPLANT YOU ARE FAMILIAR WITH AND RESTORE LENGTH AND ALIGNMENT**