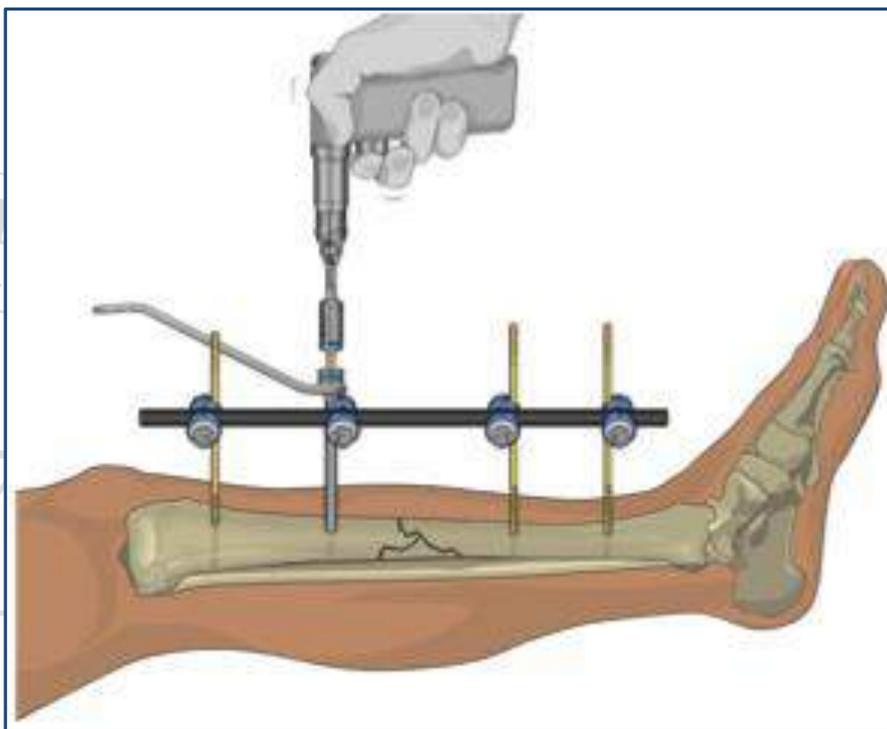


FRACTURE TREATMENT



Presenter:
Dr Tamás Szabó



Fracture treatment

Böhler's Rules

Reduction

Retention(Stabilization)

Rehabilitation



CONSERVATIVE OR OPERATIVE TREATMENT?

Which of the methods I can select from... since there are plenty of them 😊....

Non-operative treatment:

- closed reduction
- splint / cast (circular, open) fixation
- alternatively: brace
- functional therapy

Operative treatment:

- minimal OS (K-wires)
- screw
- rigid fixation (reamed intramedullary nails, plates)
- flexible / dynamic fixation (unreamed intramedullary nails, external fixation)

So much information already at the beginning...

**Let's see some help how to make the *right decision...*
*at the right time...!***



CONSERVATIVE OR OPERATIVE TREATMENT?

A) Biology:

- which method is the best (optimal, ideal) ?
- which of the methods results in the best function?
- time frame?

B) Hospitals:

- conditions: personal (knowledge, training, experience) and instrumental (implants, fluoroscope, navigation, OR) means
- capability to deal with the possible complications
 - If not:* → request help
 - transfer the patient to higher level trauma care center

CONSERVATIVE OR OPERATIVE TREATMENT?

C) Patients:

- general condition
- age, activity, other diseases
- associated injuries: multiple injured patients, priorities
- informed consent: possible complications
- compliance

Summary:

- right indication
- fracture analysis - bone consistency
- patient's condition
- consider the possible treatments and discuss with the patient
- *to achieve the best outcome in the shortest time*

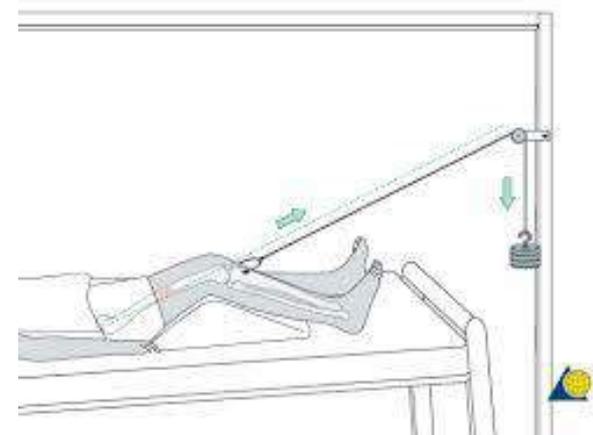
NON-OPERATIVE (CONSERVATIVE) - TREATMENTS

Early physiotherapy (without fixation) – ‘functional treatment’

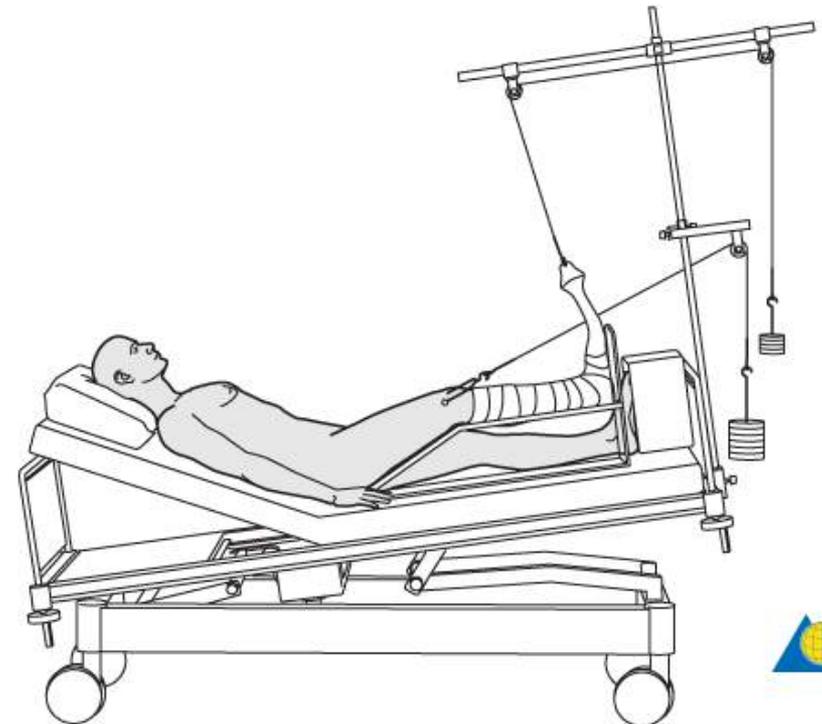
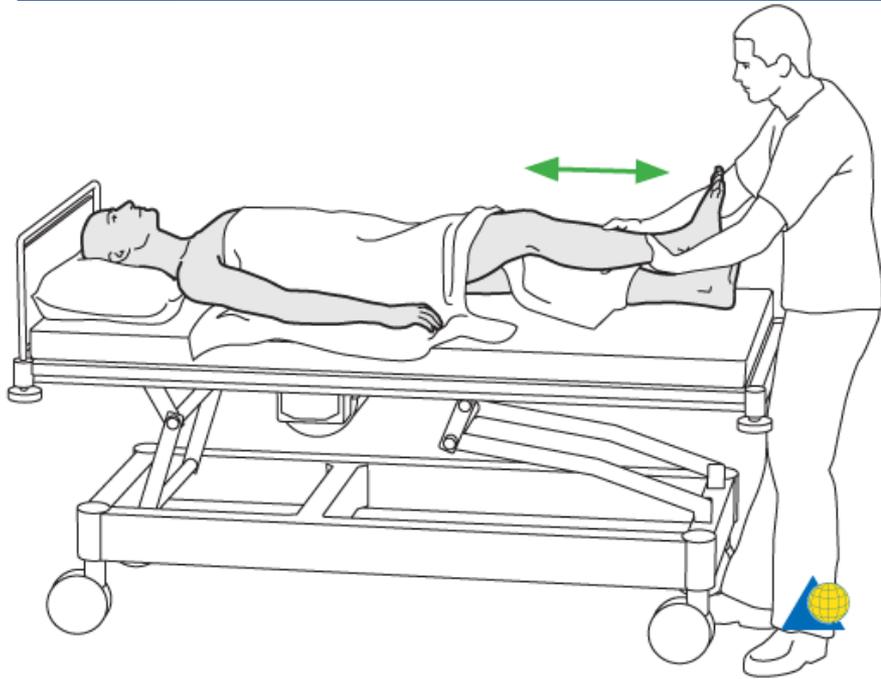
- Early load and muscle contraction promote fracture healing: patella fracture without dislocation (extensor function intact), single rib fracture, os pubis fracture, fracture of proximal-end of the humerus in elderly: Pölchen-therapy, isolated fibular fracture
- Immediate motion exercises, adequate NSAID-therapy

NON-OPERATIVE TREATMENTS – SKELETAL TRACTION

- Indication: (mostly) temporary
- Direction of pulling force: (usually) axial
- System: K-wire – line – pulley – weight
- Site of K (Kirschner)-wires: femur condyles, tuberositas tibiae / calcaneus
- Pulling force: acetabulum fracture: $1/7$ of b.w., femur fracture: $1/10$ of b.w., tibia fracture: $1/20$ of b.w. – max: 3 Kg
- Length: until fracture healing and/or the soft-callus appears



NON-OPERATIVE TREATMENTS – SKELETAL TRACTION

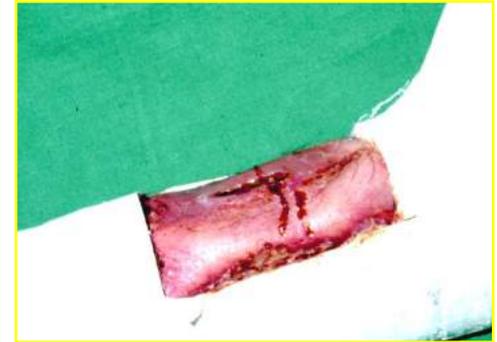


NON-OPERATIVE TREATMENT – CAST FIXATION

- conventional plaster, fiberglass cast fixation
- splint, circular cast (first: always splint or circular cast with open up!)
- Böhler: immobilize the two neighboring joints in functional position
- alternatively: braces



Mistakes



'SEMI-CONSERVATIVE TREATMENT'

Combination fixation devices & cast / brace – *compromises in solution*

Pinning (K-wires) & cast fixation:



OPERATIVE - TREATMENTS

Reduction:

Böhler – rules !!

- closed (fluoroscope)
- open (operative approach)

Stabilization ('retention'):

- screw fixation
- surface of the bone (plates)
- intramedullary (rod/nail)
- external fixation (fixateure externe)
- ORIF = open reduction and internal fixation

Rehabilitation

- physiotherapy: therapeutic plan: goals & time-frame

OPERATIVE - TREATMENTS

Level of Stability:

- load-stable: allows full weight-bearing 😊 😊 😊
- motion-stable: full range of motion of the bone 😊 😊
- `bed-stable` 😊
- unstable - that's not good.. 😞

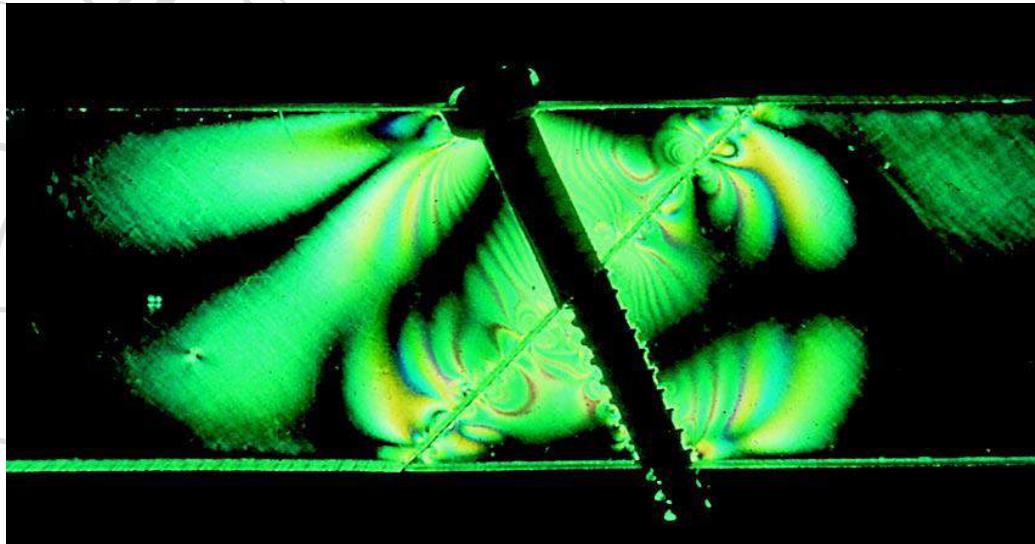
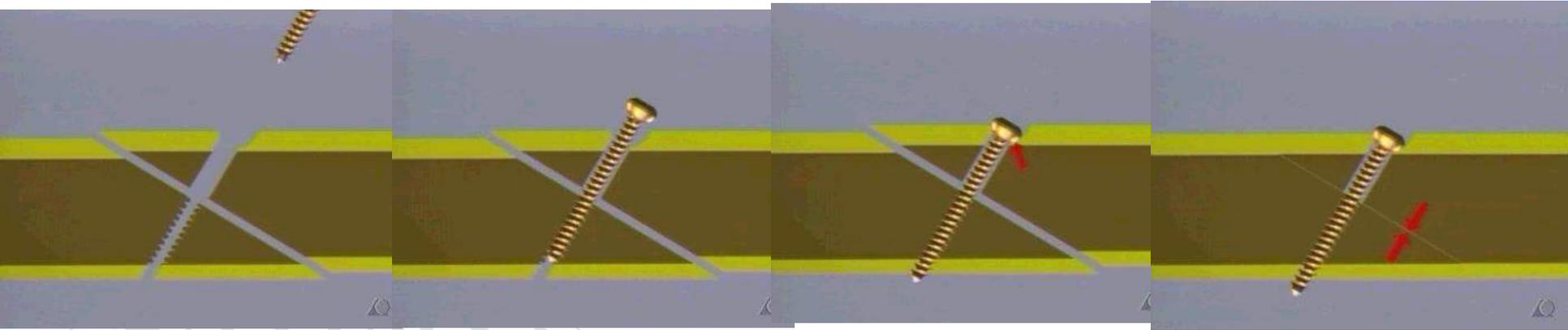
OPERATIVE - TREATMENTS

- screw fixation
- tension band
- intramedullary nailing
- plate osteosynthesis
- external fixation – ‘fixateur externe’
- special devices: periprosthetic fractures

OPERATIVE - TREATMENTS

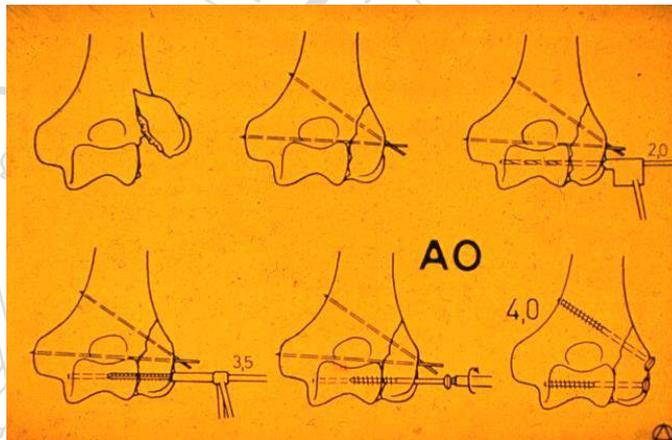
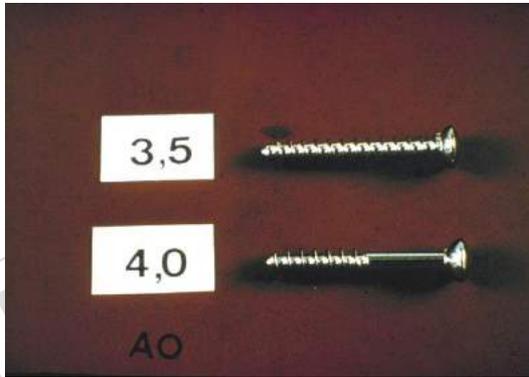
Screw fixation

Cortical screw, medullar screw, compression screw (lag screw)



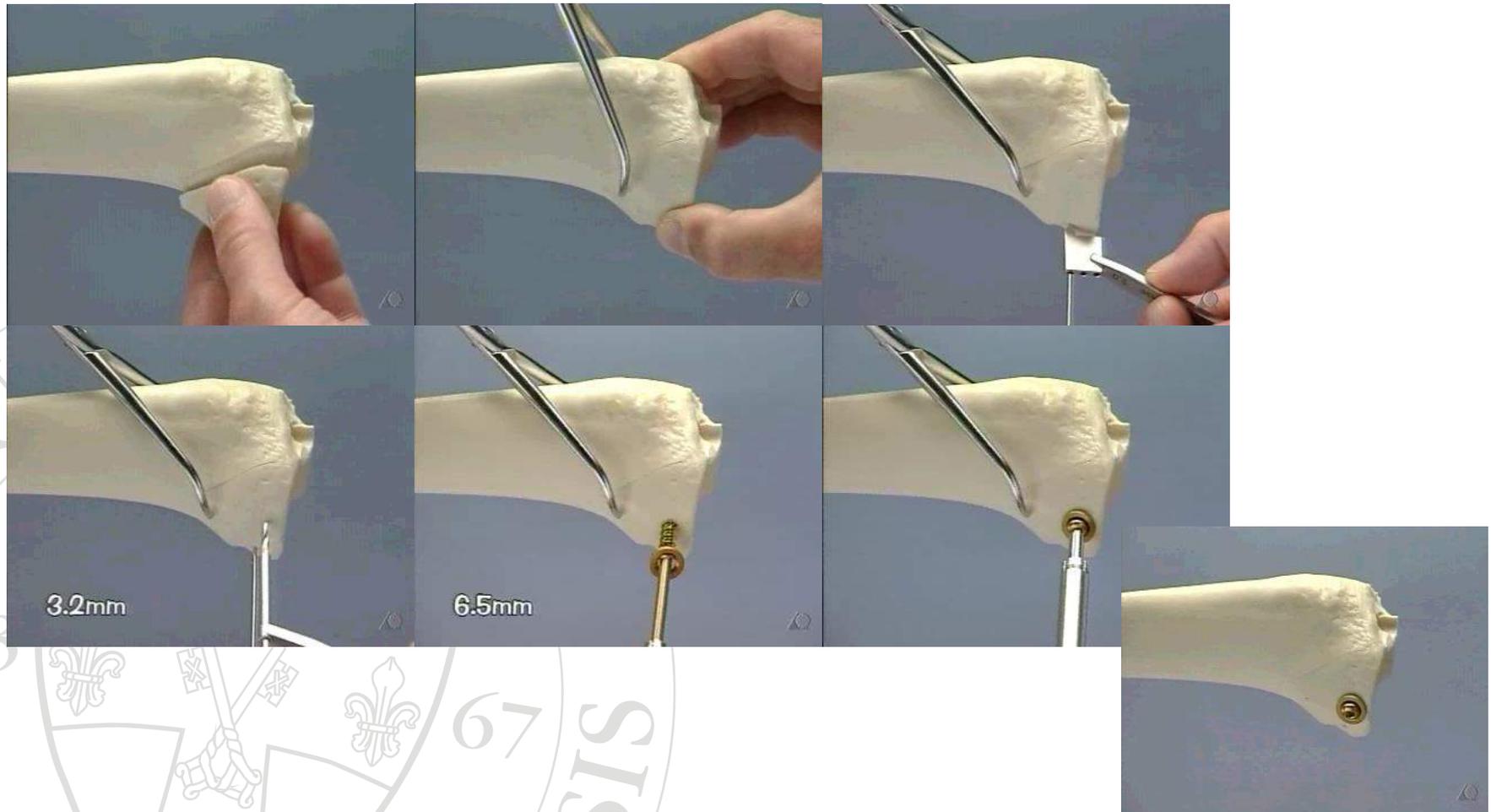
OPERATIVE - TREATMENTS

Screw fixation tools



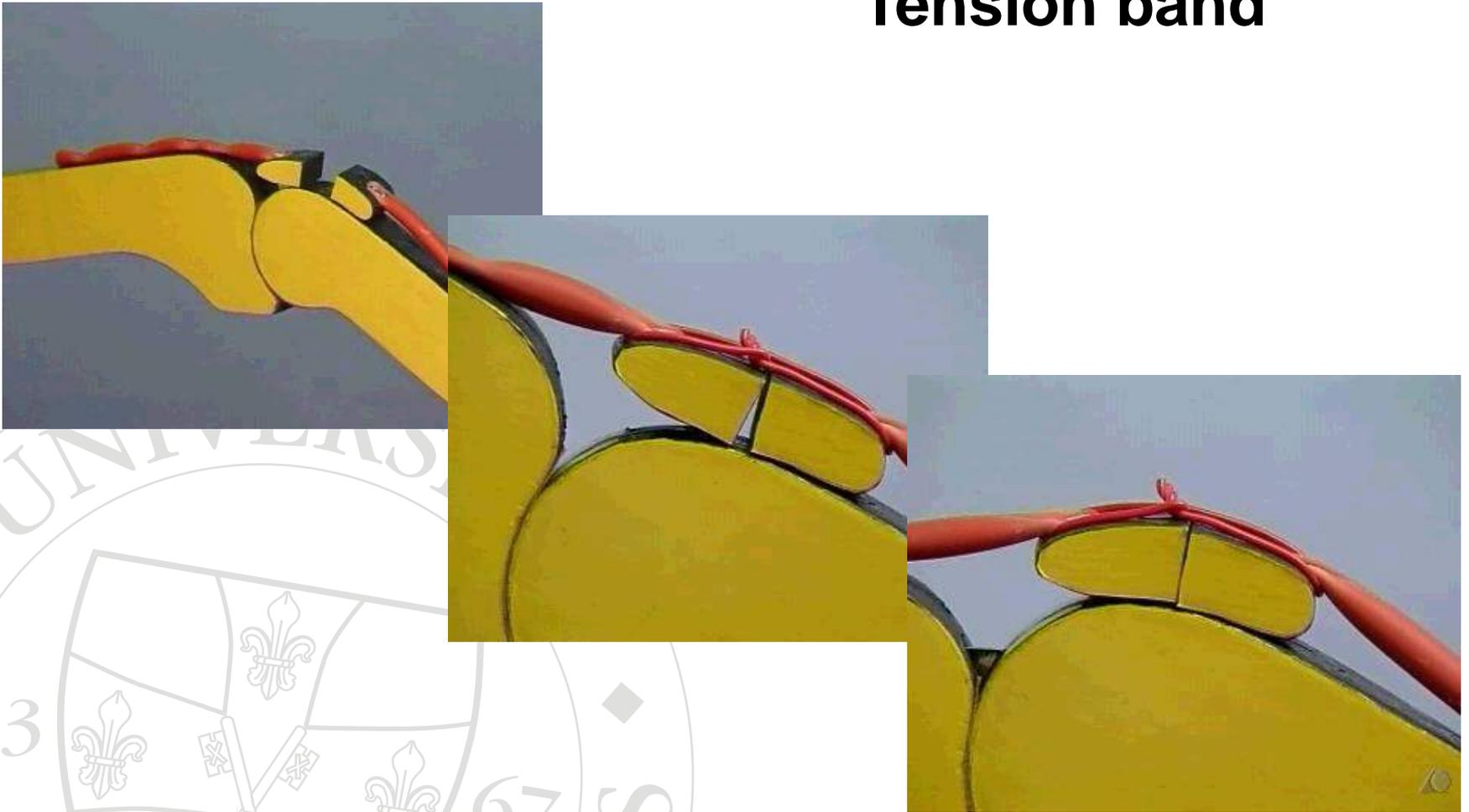
OPERATIVE - TREATMENTS

Steps of screw fixation



OPERATIVE - TREATMENTS

Tension band

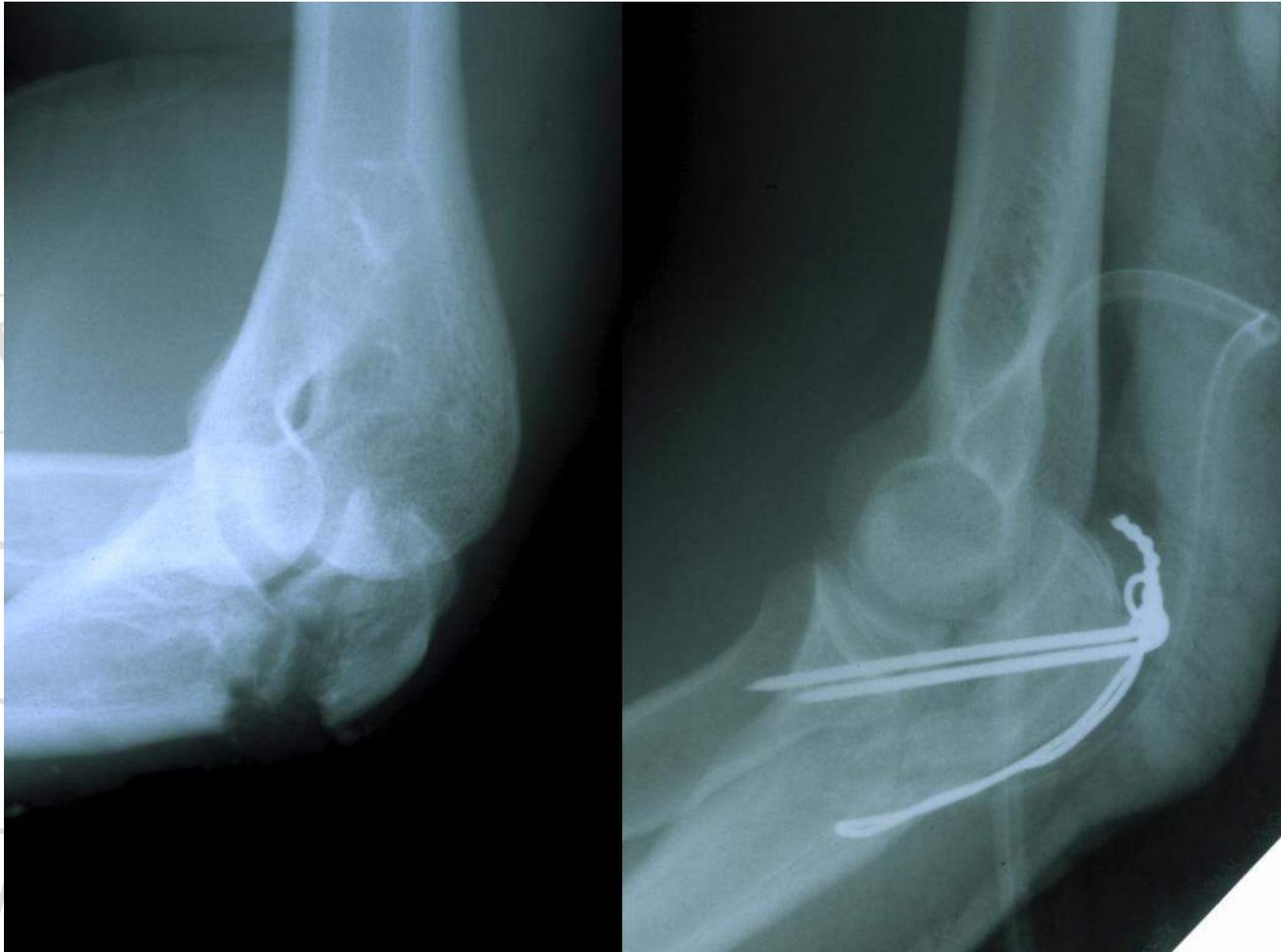


Indication: olecranon fracture, patella fracture, AC-dislocation, lateral clavicle fracture

OPERATIVE - TREATMENTS

Tension band

Olecranon fracture



OPERATIVE - TREATMENTS

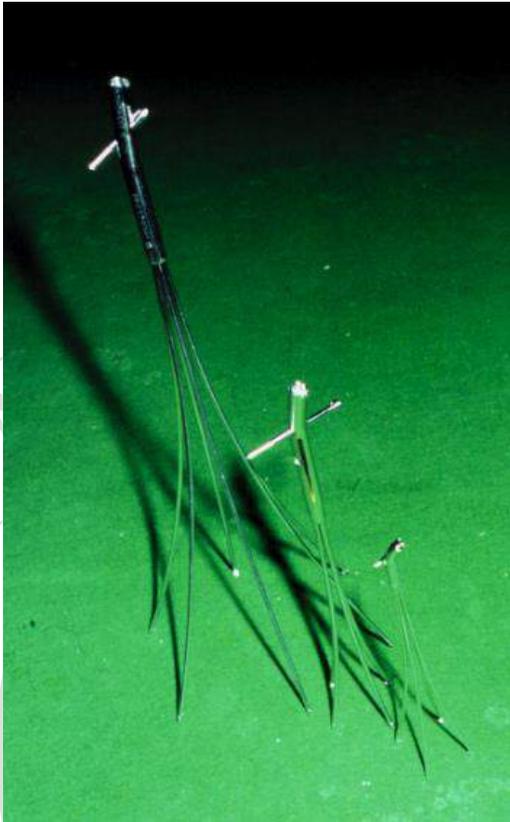
Tension band



Patella fracture

OPERATIVE - TREATMENTS

Intramedullary fixation devices



Marchetti-Vicenzi nail



Gamma-nail (IMHS, PFNA, etc)

OPERATIVE - TREATMENTS

Intramedullary fixation devices



Intramedullary nails (rods): unreamed femoral/humeral/tibial locking nail: UFN, UHN, UTN
reamed / unreamed Küntsher-nail (traditional)

OPERATIVE - TREATMENTS

Plate fixation



Fig. 3.2.2-12: Anatomically shaped plates (4.5 system):
a) Condylar plate 95° to stabilize fractures of the proximal and distal femur.
b) Angled blade plate 120° for valgization osteotomy of the femur.
c) Condylar buttress plate for the distal femur (left and right).
d) T-plate 4.5 for proximal humerus and proximal tibia.
e) Lateral tibial head buttress plates.
f) Tibial head buttress plate (right and left).
g) Cobra head plate for arthrodesis of the hip.
h) Angled blade plate for varization of the femur.
i) Dynamic condylar screw for proximal and distal femur (side plate and screw separate).
j) T-plate 3.5 (oblique angled) for distal radial fractures.

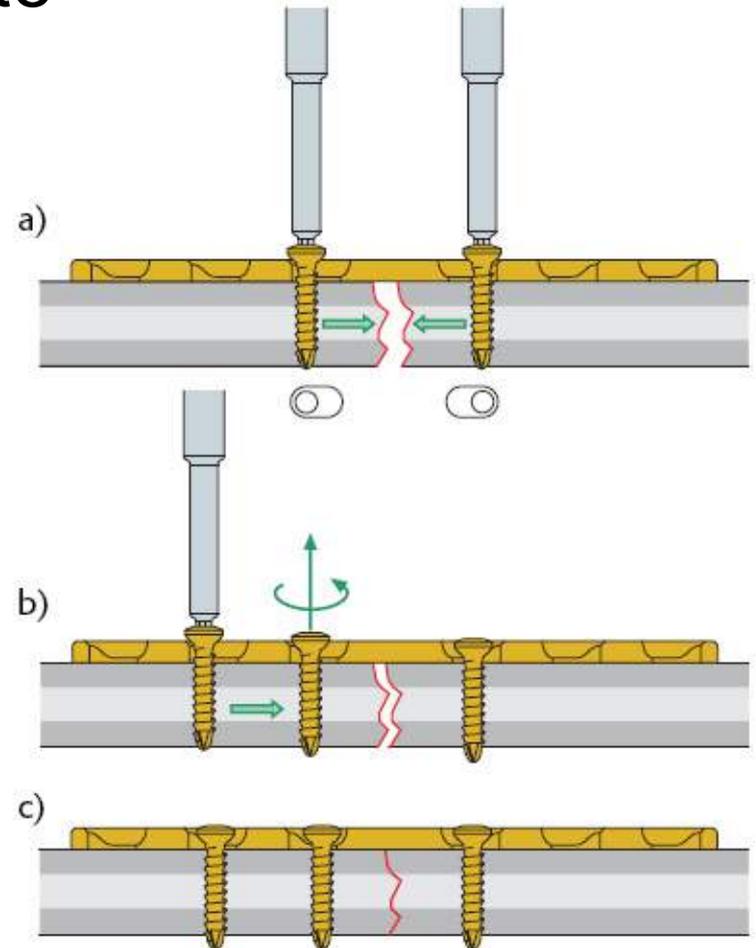


OPERATIVE - TREATMENTS

Reconstruction plate

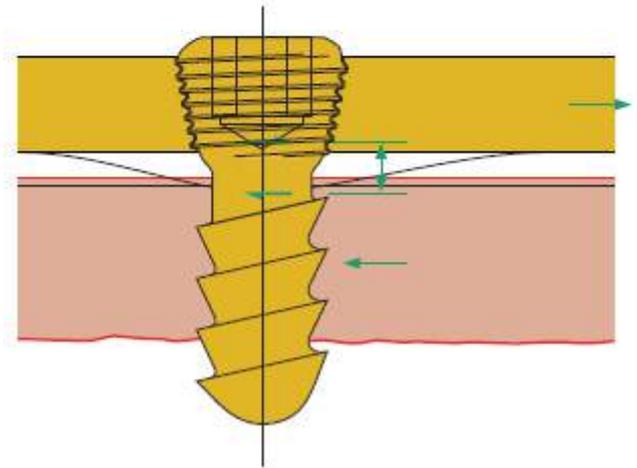
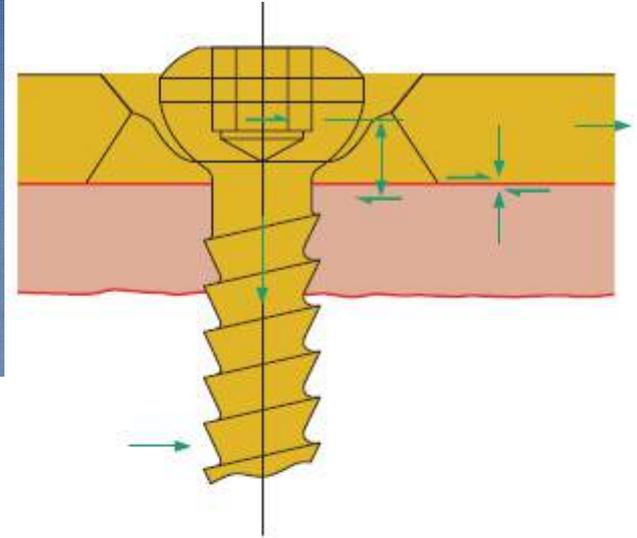
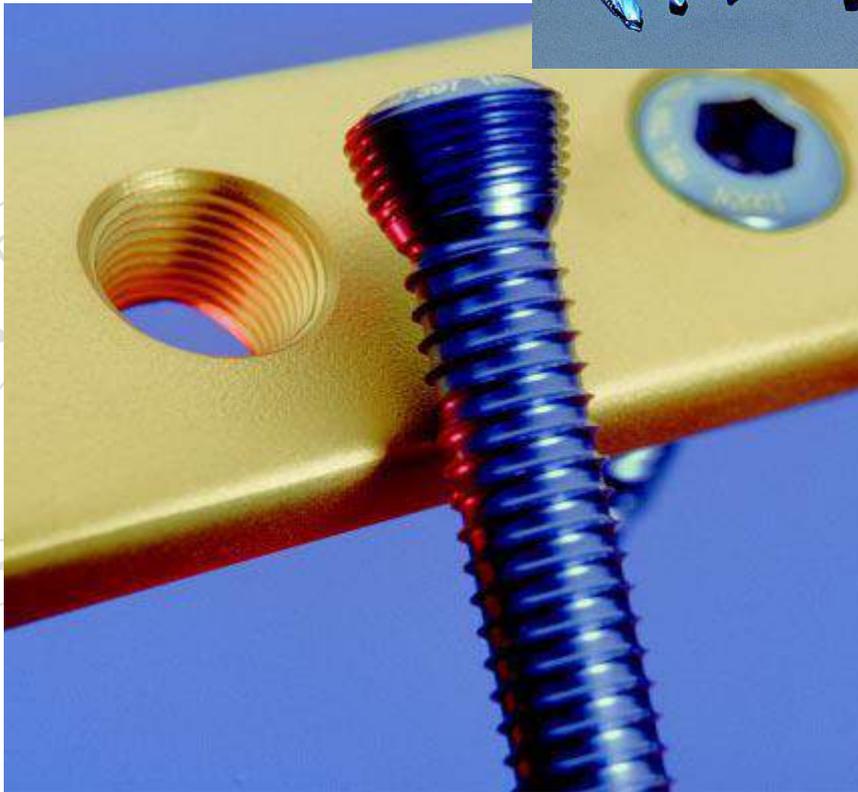
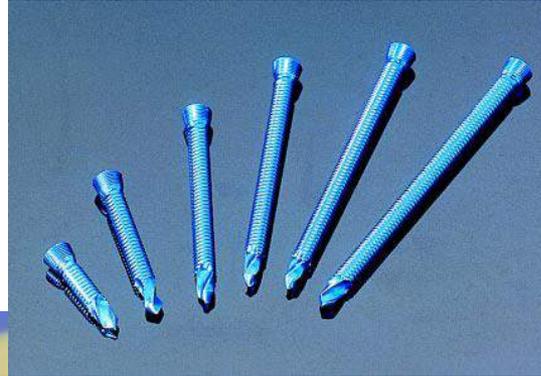
DC (dynamic compression)-plate

KFI DC - plate



OPERATIVE - TREATMENTS

Locking screw



OPERATIVE - TREATMENTS

Locking Compression Plate (LCP) (Fixateur interne)



OPERATIVE - TREATMENTS

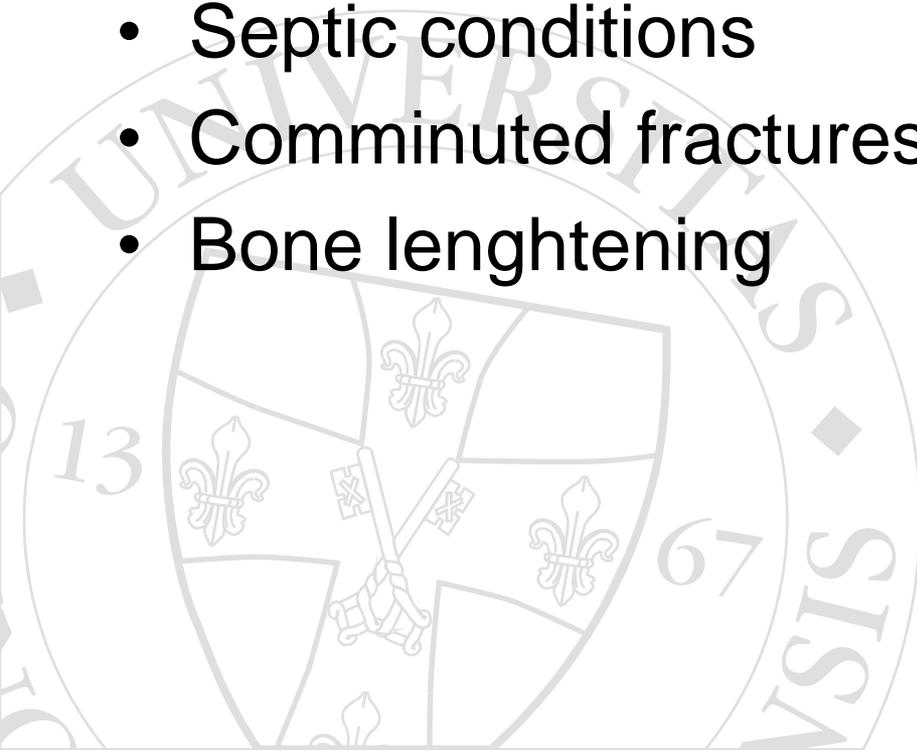
Fixateur externe



Fixateur externe

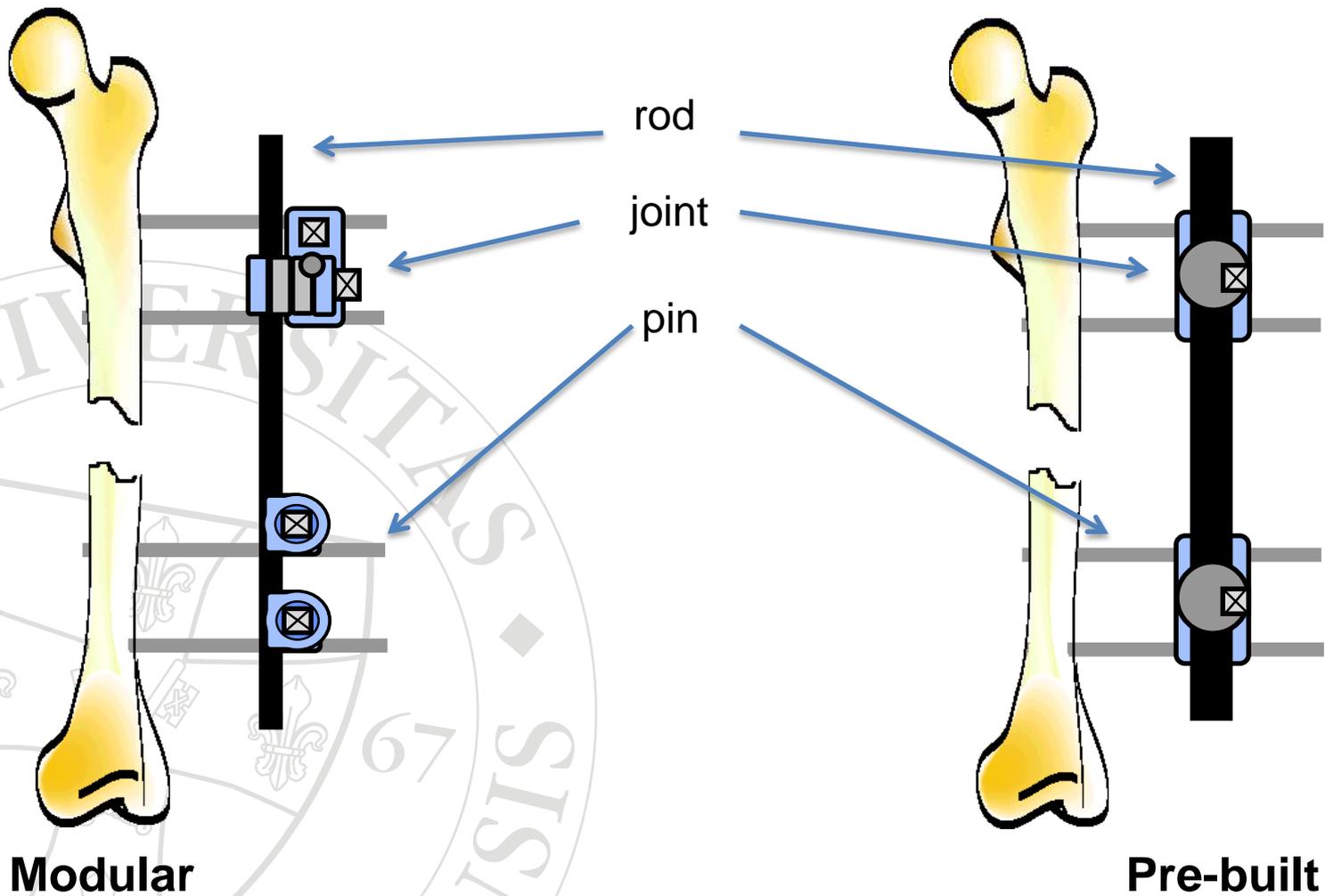
Indications

- Open fractures
- Septic conditions
- Comminuted fractures
- Bone lengthening



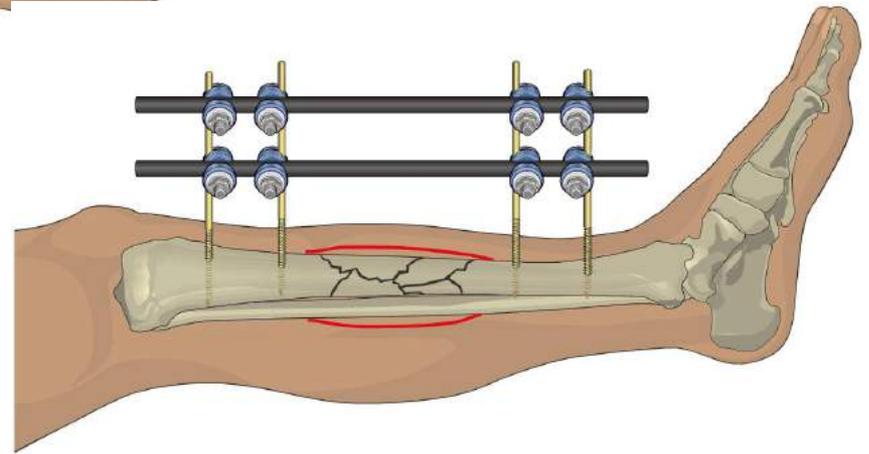
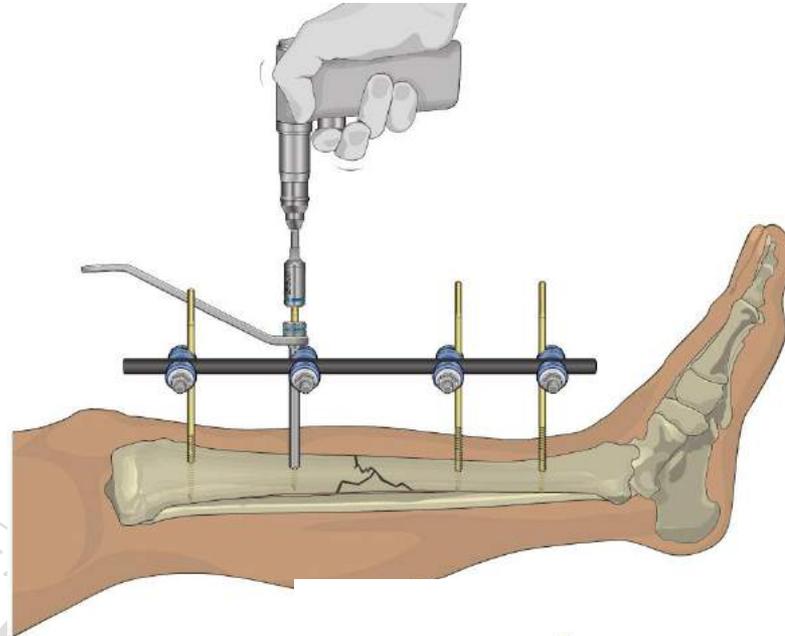
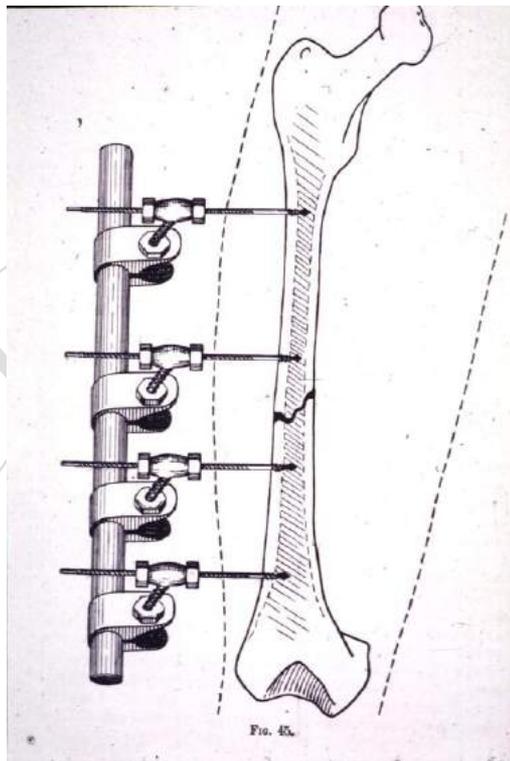
OPERATIVE - TREATMENTS

Fixateur externe



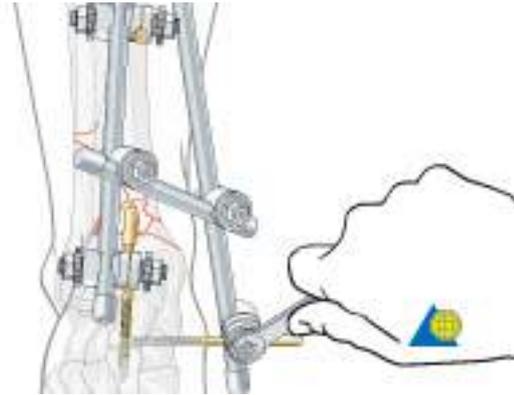
OPERATIVE - TREATMENTS

Raoul Hoffmann
1881 - 1972



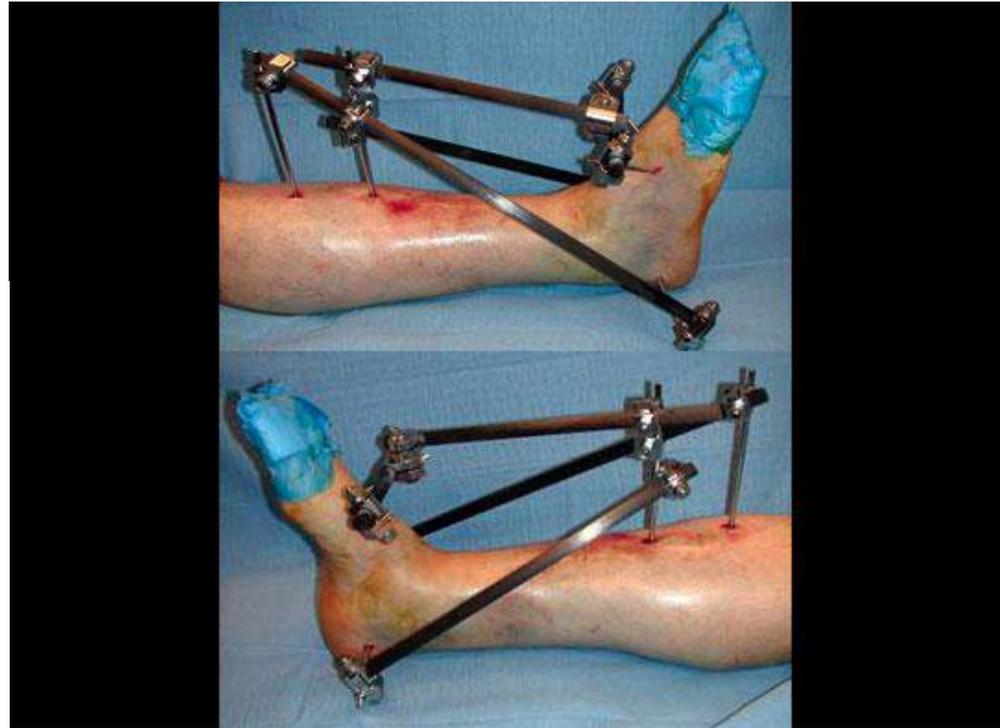
Unilateral fixateur externe

OPERATIVE - TREATMENTS



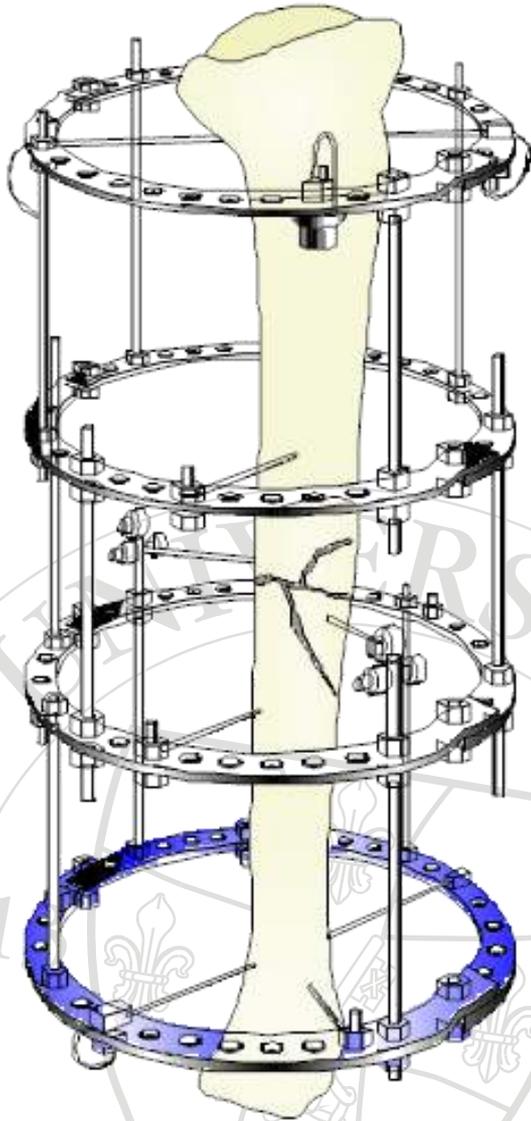
Bridging fixateur externe

Fixateur externe



Triangular fixateur externe

OPERATIVE - TREATMENTS



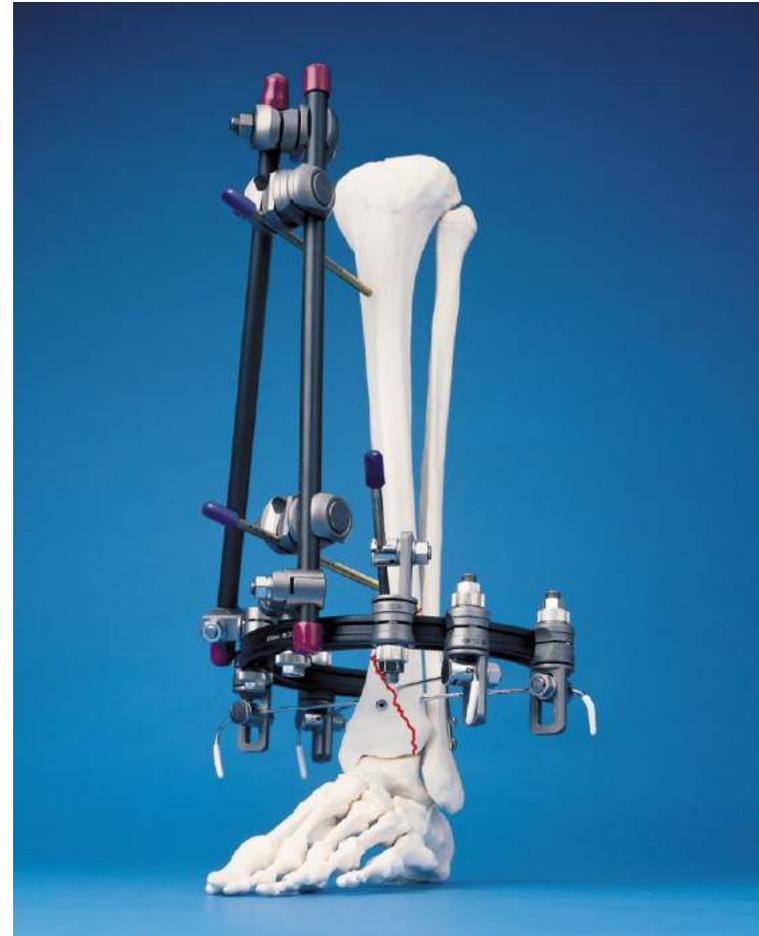
Ilizarov ring fixateur

OPERATIVE - TREATMENTS

Fixateur externe



Hibrid fixateur externe



OPERATIVE - TREATMENTS

 **SYNTHES**[®] Instruments and implants approved by the AO Foundation



Locking plate + attachment plates: Synthes



Cable ready plate: Zimmer



Periprosthetic fractures



Operative or non-operative treatment?

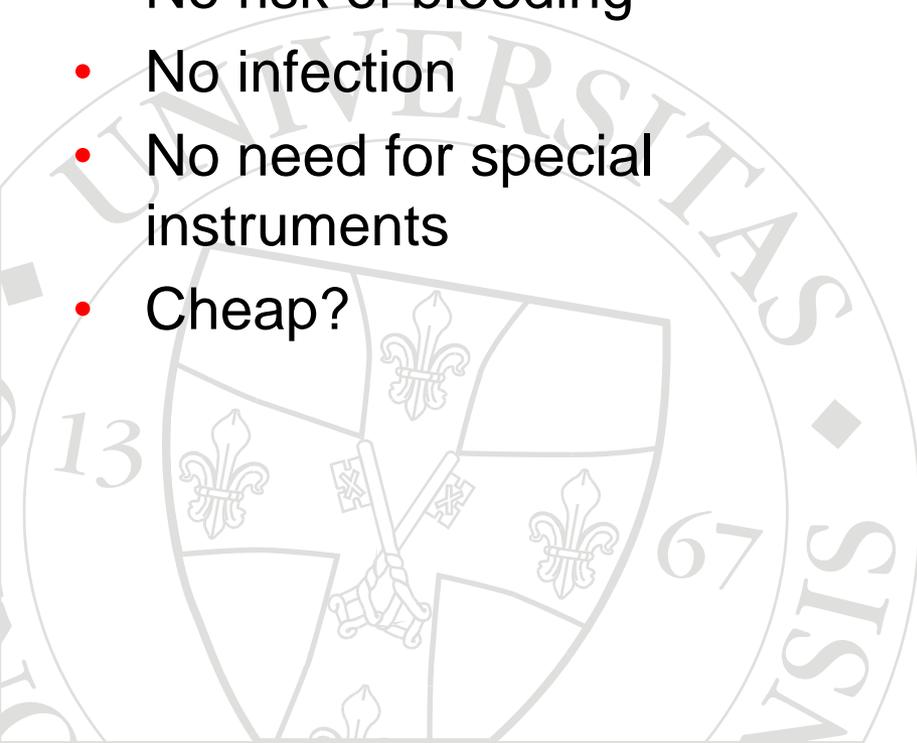
Advantage

- **Non-operative:**

- No anaesthesia
- No risk of bleeding
- No infection
- No need for special instruments
- Cheap?

- **Operative:**

- Anatomical fracture reduction
- Stable fixation, no need for extra fixation(plaster)
- Early physiotherapy
- Faster recovery



Operative or non-operative treatment?

Disadvantage

- **Non-operative:**

- Non-anatomical reduction
- Long immobilization
- Weakness, atrophy,
- Stiffness
- Slow

- **Operative:**

- Invasive
- Anaesthesia
- Risk of bleeding
- Risk of infection
- Special instruments
- Expensive (?)
- Special knowledge

QUIZ

How would you treat this fracture?

SUMMARY:

- 89 years old patient
- history of hypertension
- ischemic cardiac disease



QUIZ

How would you treat this fracture?

SUMMARY:

- 89 years old patient
- history of hypertension
- ischemic cardiac disease



Early functional treatment – Pölchen - therapy

QUIZ

How would you treat this fracture?

SUMMARY:

- 31 years old patient
- no history of any diseases
- favorite sport: tennis



QUIZ

How would you treat this fracture?

SUMMARY:

- 31 years old patient
- no history of chronic diseases
- favorite sport: tennis



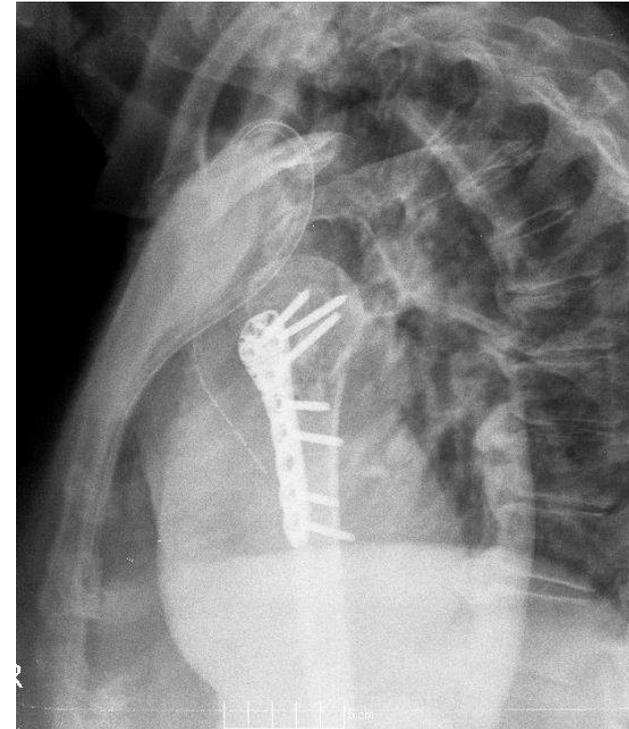
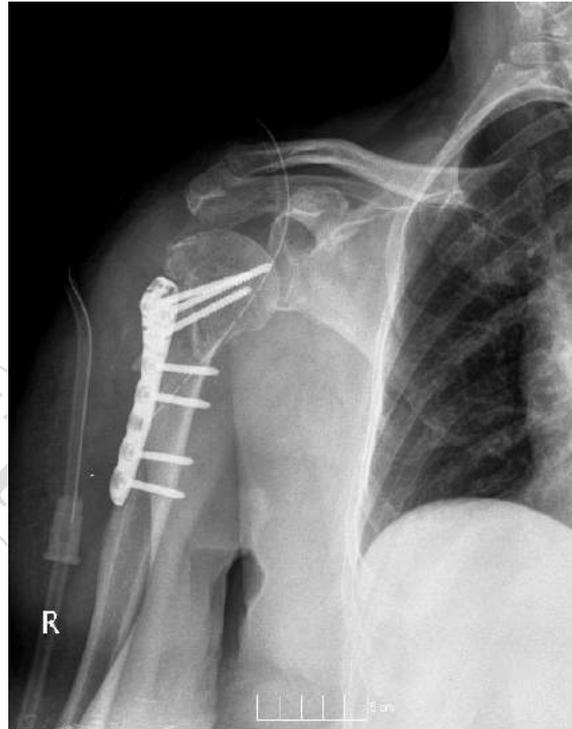
Operative treatment – ORIF: plate or nail

QUIZ

How would you treat this fracture?

SUMMARY:

- 31 years old patient
- no history of chronic diseases
- favorite sport: tennis



Operative treatment – ORIF: plate or nail

'Take home messages'

- Risk / benefit & cost / benefit
- Purpose – correct indication
- Fracture type, classification, bone consistency
- Correct (available) method
- Length of treatment (cost / benefit!!)
- Consider alternative treatment methods
- Informed consent – talk to the patient

SUMMARY

If you are interested in, please, check the following links for further information:

1.

www.aotrauma.org: AO Surgery Reference & Online Education

2.

www.wheelessonline.com - Wheeles' Textbook of Orthopaedics

THANKS FOR YOUR ATTENTION!



CONSERVATIVE OR OPERATIVE TREATMENT?

There is a fracture...
I need to fix it...

OK.. Let's start at the
basics.. Where is the
fracture?.. To whom the
fracture belongs?.. etc



Funny conversation between the trauma surgeon and anesthetist registrar

<http://www.youtube.com/watch?v=3rTsvb2ef5k>