

## Internal fixation Rationale of implants

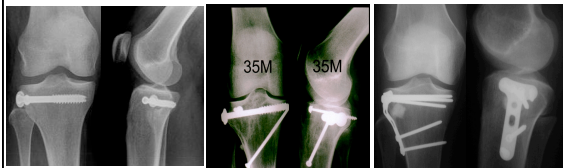
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## Tibial Plateau Fr. Osteosynthesis



## Articular Fractures – Osteosynthesis



Lag screws

Rafting



Anti-glide plate

No advantage of 4,5 mm. plates  
compared to small fragment  
plates

Koval JOT 99



## Characteristics of the LCP system



## AO / Synthes Proximal Posterior Medial Tibia Plate

Application to Sagittal  
Fracture Pattern  
Posterior Medial Tibial  
Pillar



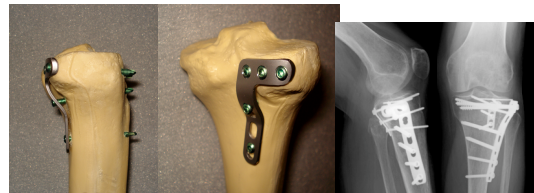
Application to Posterior  
Coronal Shear  
Pattern

Direct Posterior Plating



## Proximal Posterolateral Tibia Plate

- buttress plate, angle stable locking screws (3.5 mm)
- curved more at the proximal lateral edge
- angle of the screws in the tibia plateau horizontal
- distal part of the plate close to the bone

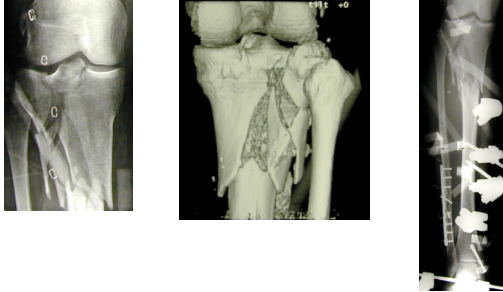


„safe zone“ to ensure „one fits for all“

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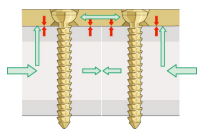
### Combination Articular Fx / Metaphysis / Shaft



### Screw fixation of joint fragments, side plate (locking screws)



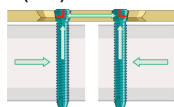
### Mechanics/biomechanics of plate/screw fixation



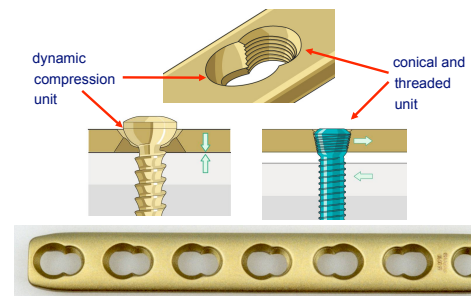
- Plate fixation with conventional screws**
- Screws in tension
  - Plate/bone friction
  - Compression at fracture site
  - Disturbed blood supply

### Plate fixation with locking head screws (LHS)

- Screws in shear
- Noncontact plate
- No compression of fracture
- Preserved blood supply

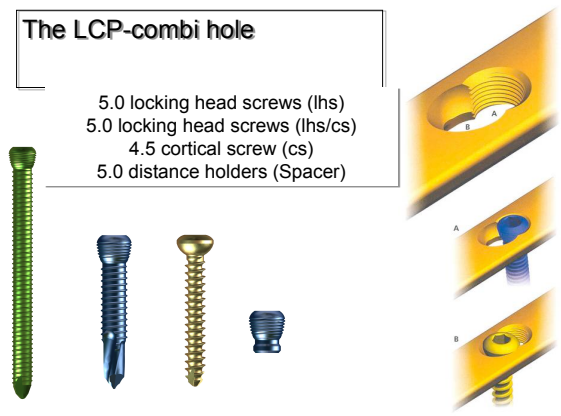


### Locking compression plate (LCP)

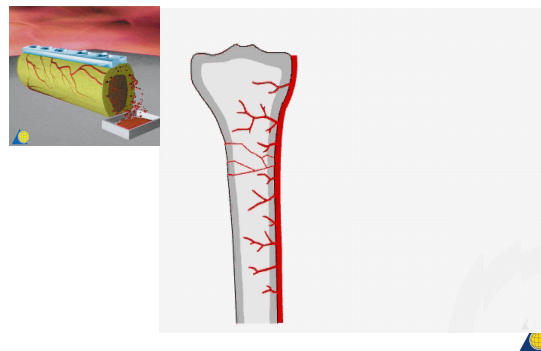


### The LCP-combi hole

- 5.0 locking head screws (lhs)
- 5.0 locking head screws (lhs/cs)
- 4.5 cortical screw (cs)
- 5.0 distance holders (Spacer)

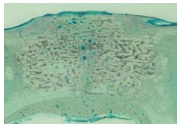


### Locking Compression Plate

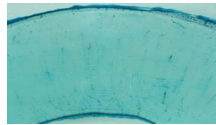


## Biological advantages

- Reduced compression of the periosteum
- Protects blood supply to the bone
- Callus formation/bone healing under the plate



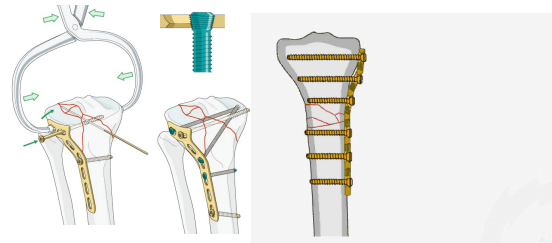
bone after plating with a DCP



bone after plating with a LCP

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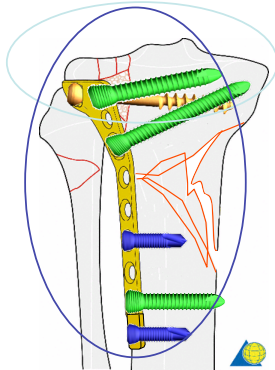
## Functions of locking head screws (LHS)



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## Compression and bridging with LCP

Compression



Bridging

New AO Standard

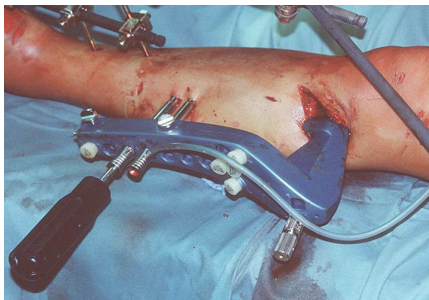
## Bridging osteosynthesis



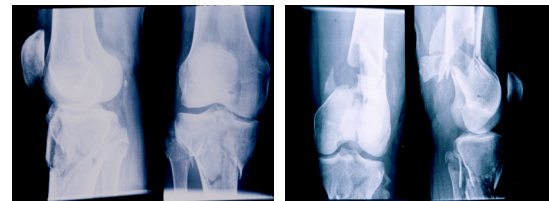
long plates  
elastic fixation  
prevention of stress peaks

LISS System  
AO Foundation  
C2 Proximal Tibial Fracture  
AO Foundation  
LISS System

## LISS (less invasive stabilization system) proximal tibia



## LISS System Femur & Tibia



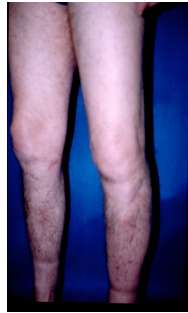
right side  
tibial plateau Fx C2

left side  
distal femur Fx C2  
proximal tibia Fx C2

N., W., 23 y., MHH



### LISS System Femur & Tibia

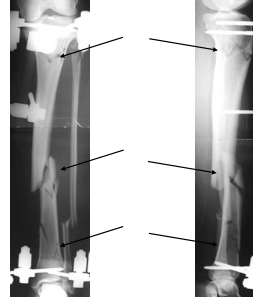


6 mo.  
postop

N., W., 23 y., MHH



### 42-year-old, complex tibial shaft fracture C3, open



### 42-year-old, complex tibial shaft fracture C3, open



5 months postop



### Multifragmentary proximal tibial fracture, 41-C2

83-year-old woman (with osteoporosis), hit by car as pedestrian



#### Articular fracture

Principle: absolute stability  
Method: interfragmentary compression  
Technique: conventional plating (ORIF)

#### Multifragmentary metaphyseal fracture

Principle: relative stability  
Method: splinting  
Technique: MIPO

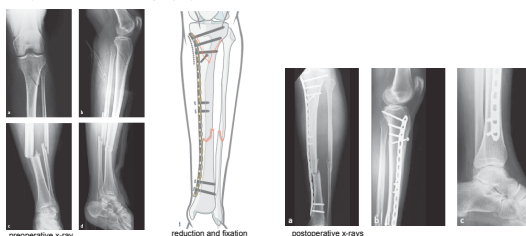
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Case from Michael Wagner, Wien



### Open tibial shaft fracture, 42-C2 (slide 1 of 2)

50-year-old man, skiing injury



#### Simple metaphyseal fracture

Principle: absolute stability  
Method: compression  
Technique: ORIF

#### Multifragmentary shaft fracture

Principle: relative stability  
Method: locked splinting  
Technique: less invasive

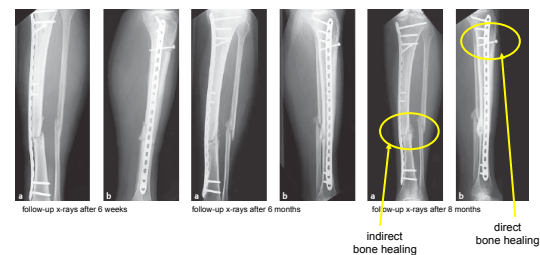
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Case from Christian Ryf, Davos



### Open tibial shaft fracture, 42-C2 (slide 2 of 2)

50-year-old man, skiing injury



indirect  
bone healing

direct  
bone healing

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Case from Christian Ryf, Davos





### Summary/take-home message

**Compression plating** after anatomical reduction in articular and simple fractures.

**Splinting/bridge plating** in multifragmentary fractures to minimize amount of additional trauma (MIPO).

**Locking head screws** always with locking compression plates; better fixation, convenient in osteoporosis, technical and biological reasons.

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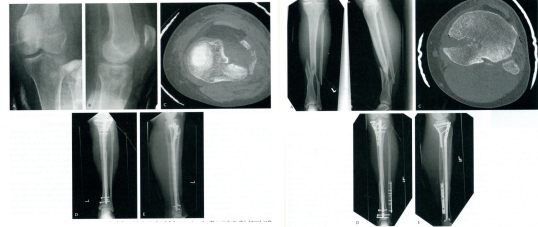


### Proximal tibia fractures - nailing

Unicondylar tibial plateau fracture and shaft fracture

Screw / plate osteosynthesis and nail

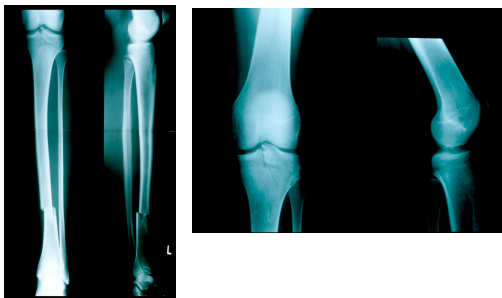
*Kubiak JOT 2008, Josten Unfallchirurg 2009*



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### Proximal tibia fractures - nailing



### Proximal tibia fractures - nailing

