

Clinical indications for locked plating

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AO Advanced Principles
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Disclosure: No potential conflicts of interest

Learning objectives

Describe the indications for locking screws

Know the pitfalls of using locking screws

78 year old woman



Preop



Postop

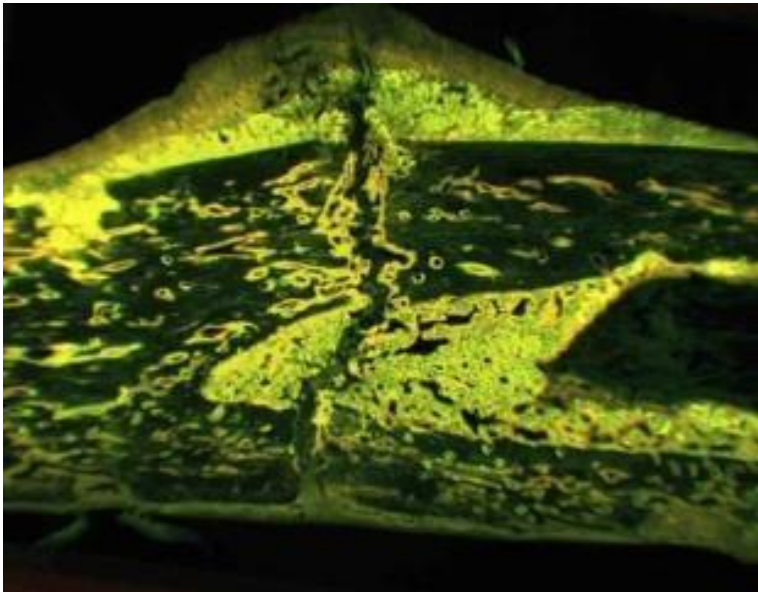


3 mo

The principles of absolute and relative stability applies regardless of implant

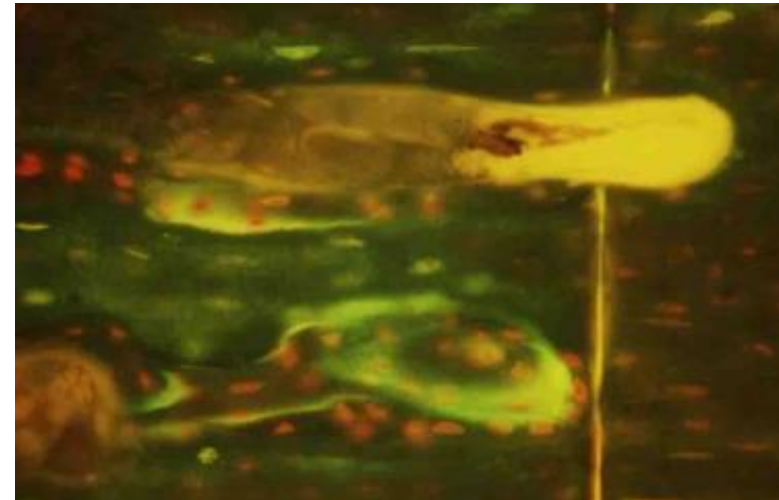
- **Relative stability**

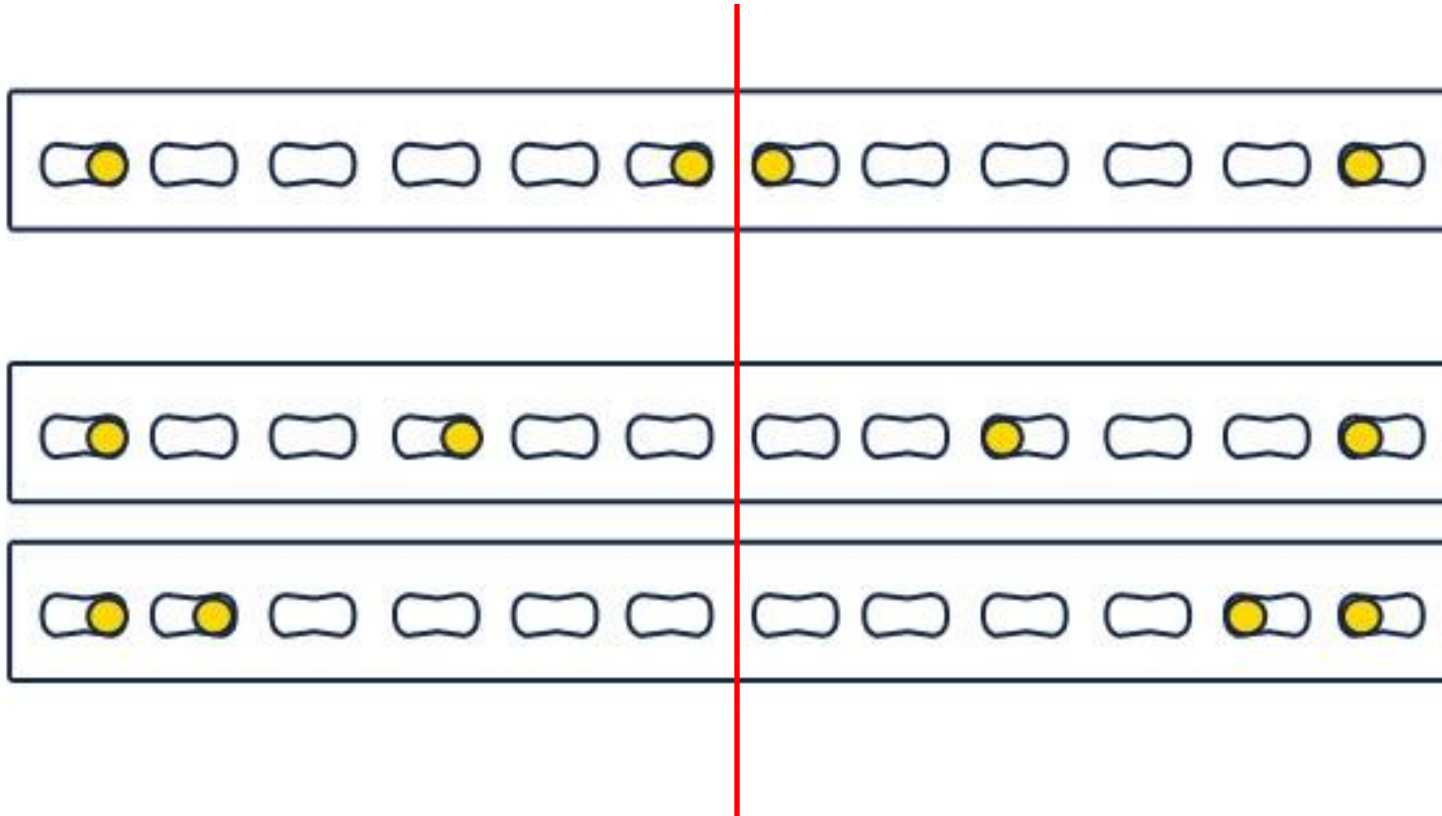
- Callus formation



- **Absolute stability**

- Compression osteosynthesis
- Direct bone healing





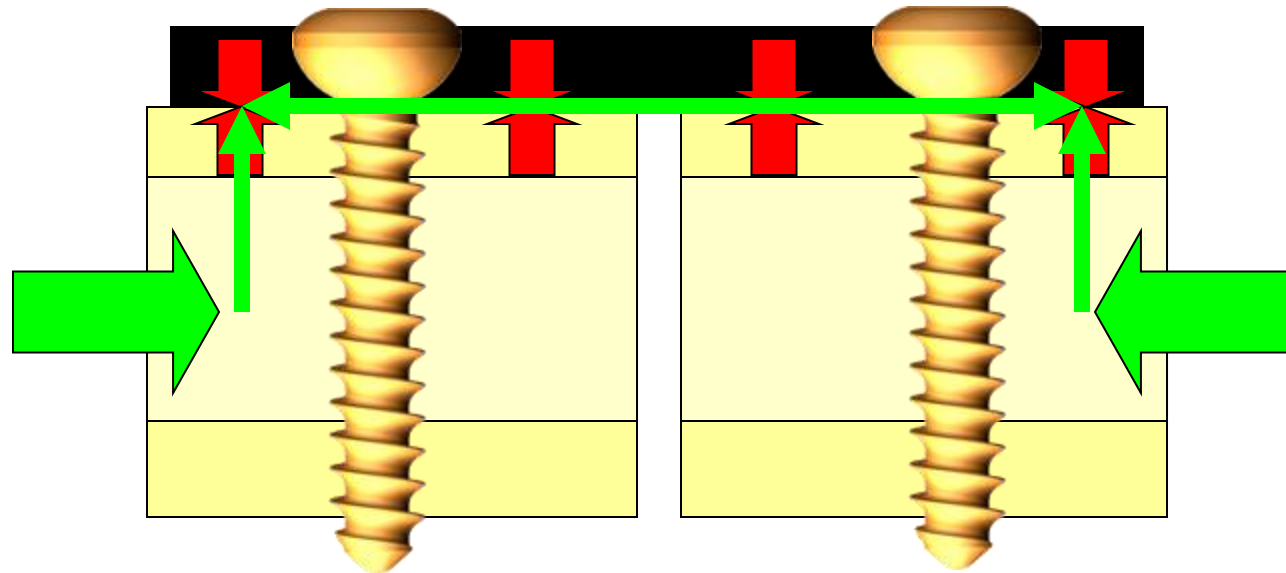
Absolute
stability

Relative
stability

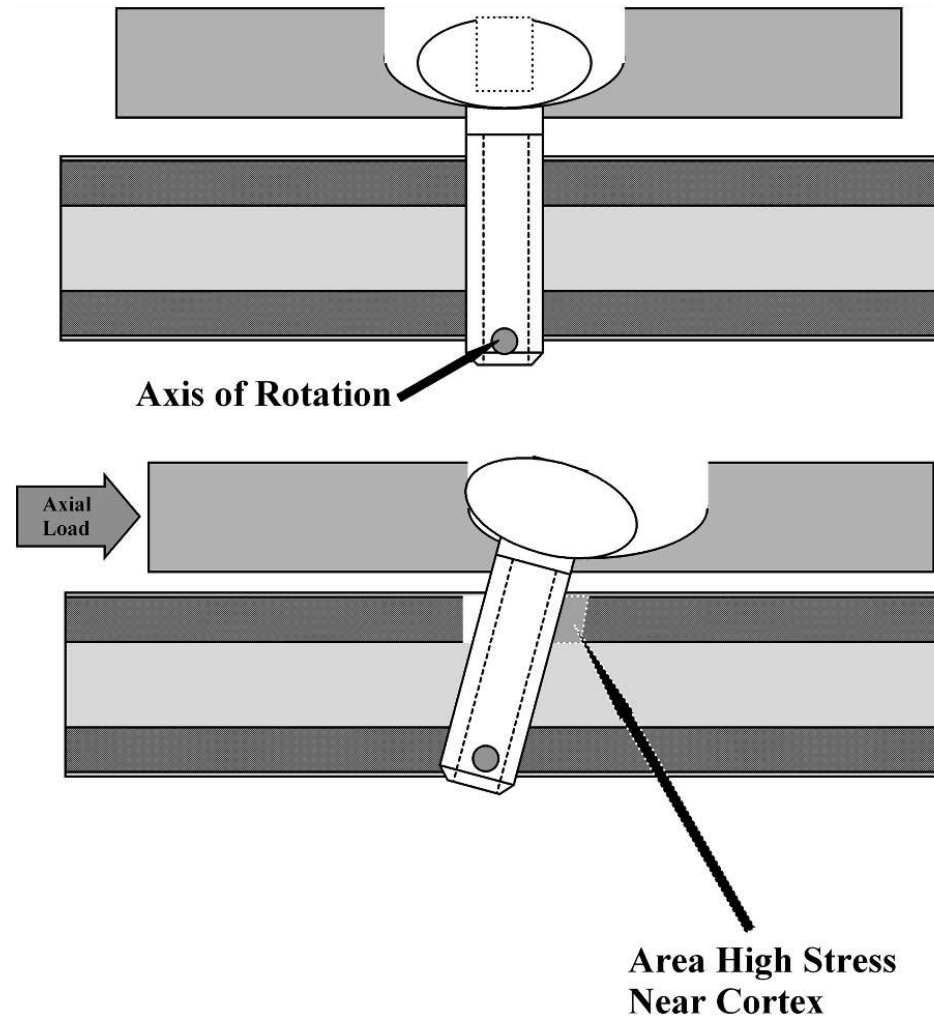
Traditional plates

Stability through:

- Compression of the plate to bone Bone/plate friction
- Dependent on screw purchase/bone quality

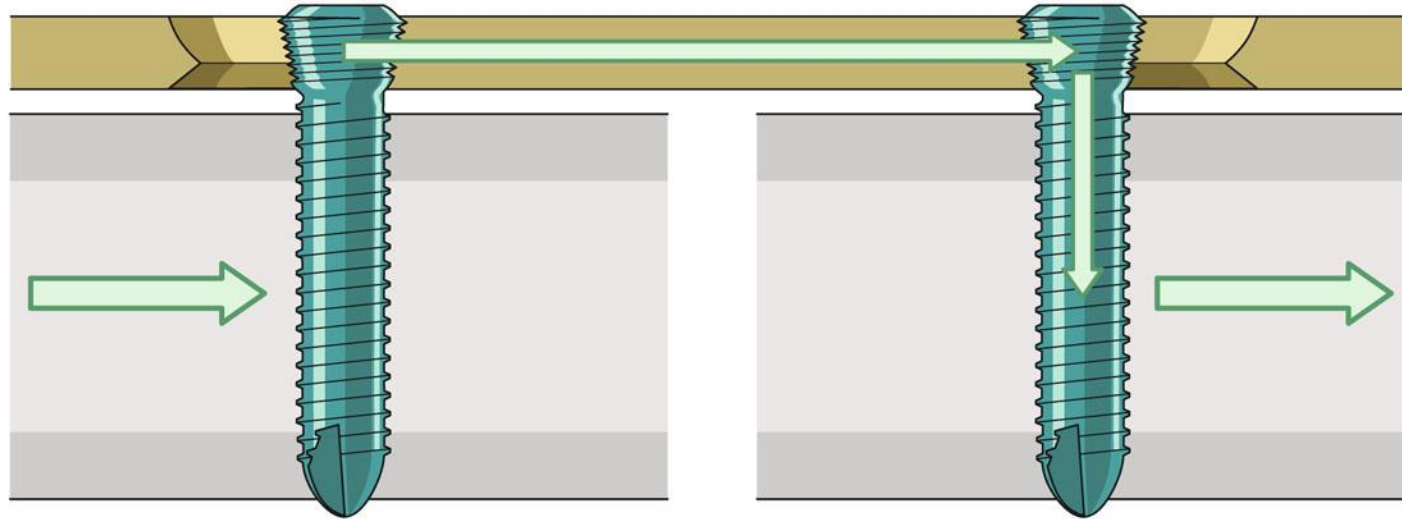


Failure of conventional screws

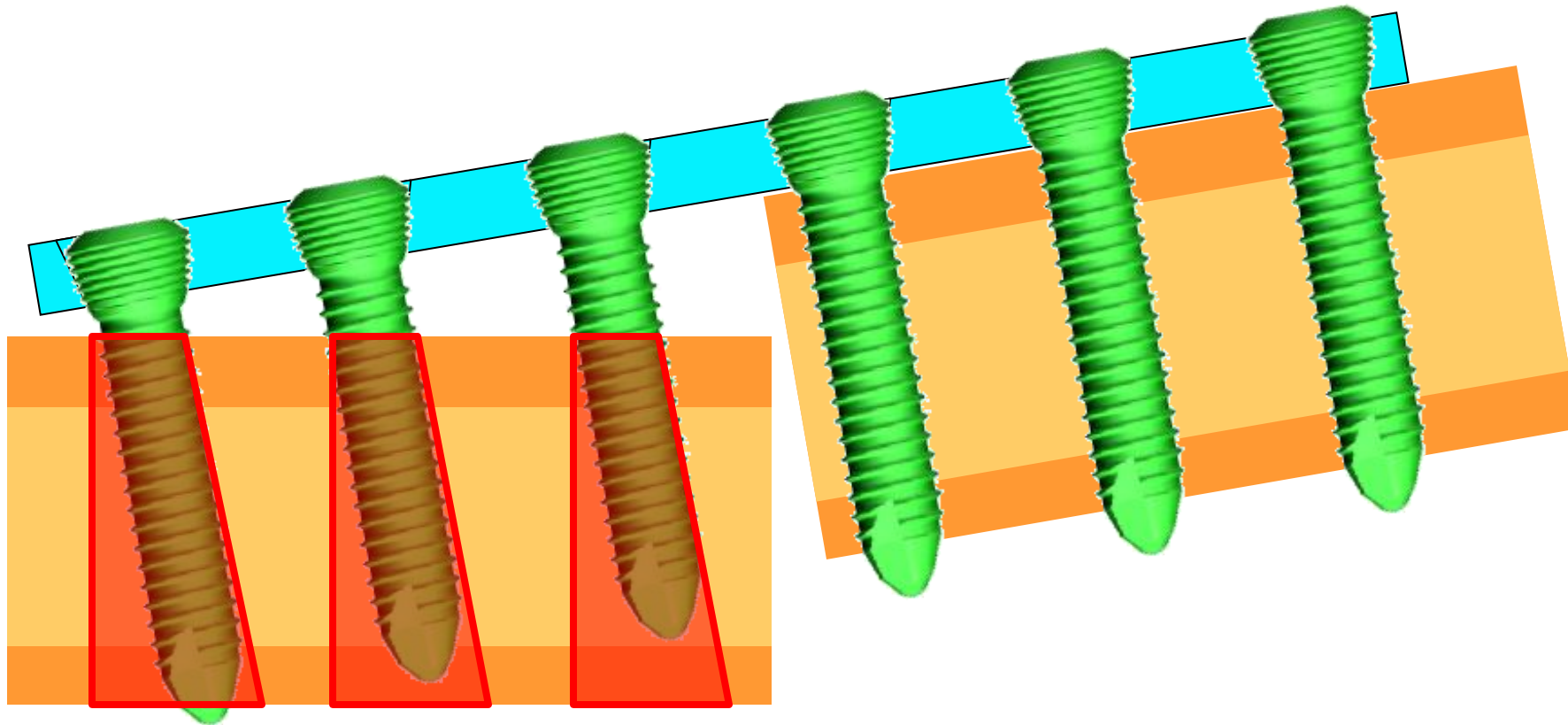


Locking plates

Force goes through the plate



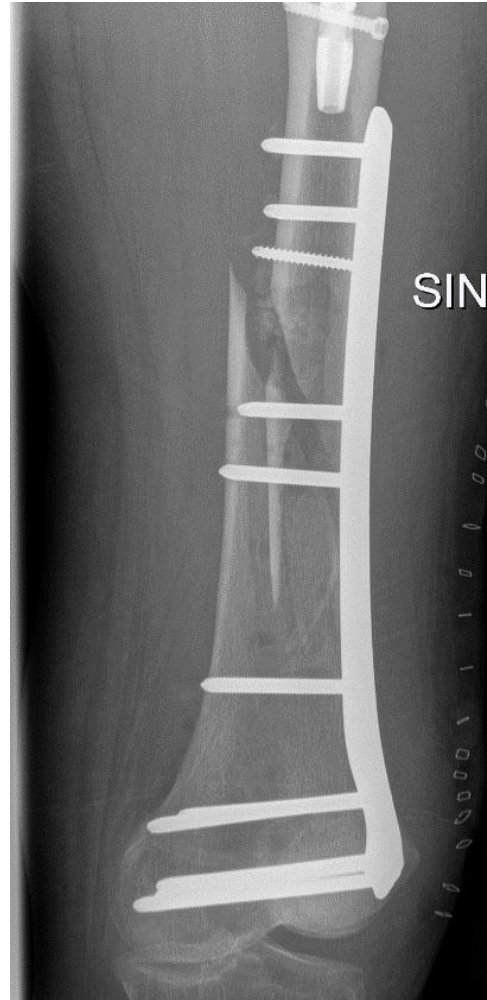
Higher resistance to axial, torsional and bending loads



Locking screws

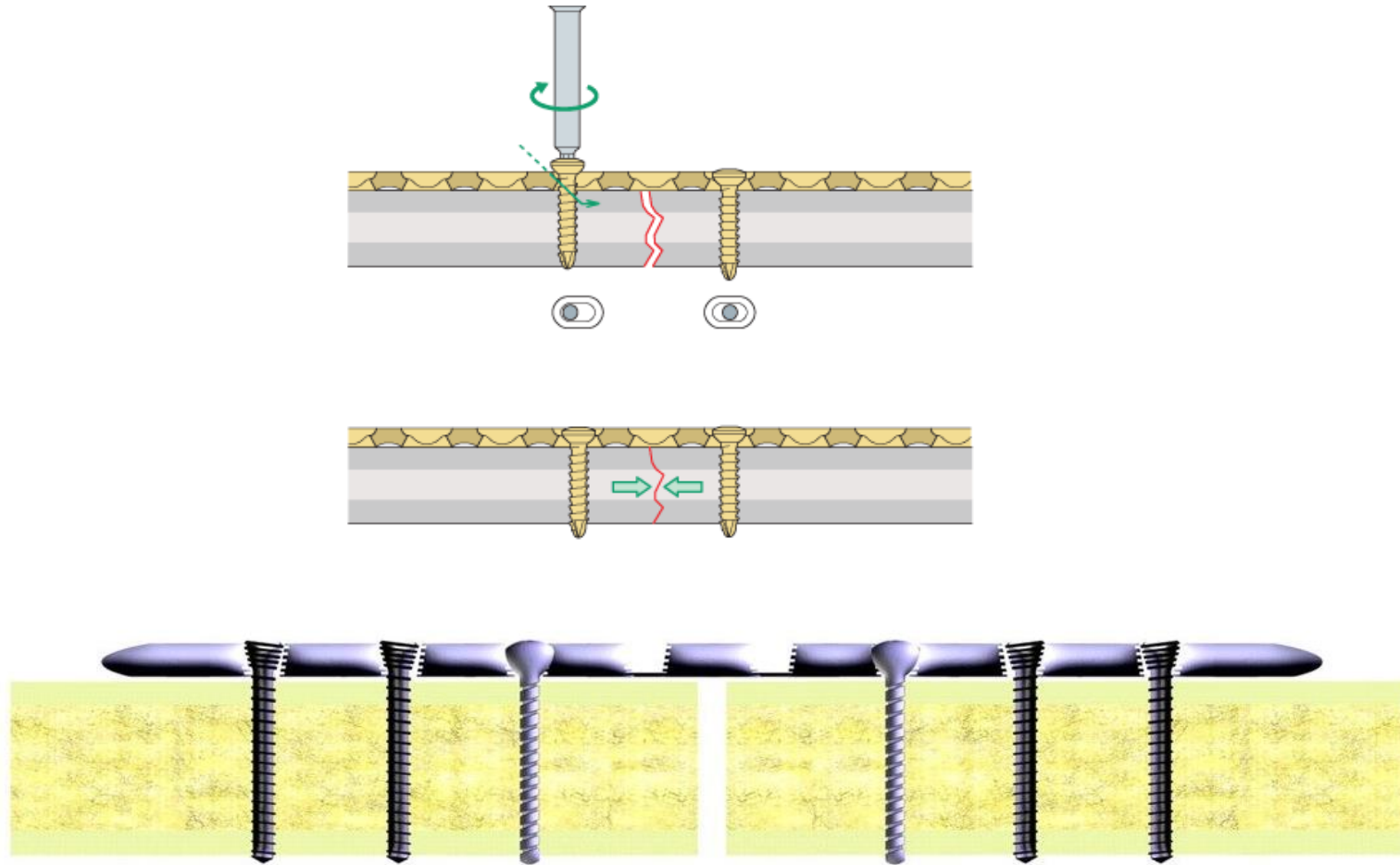
Can never be used:

- As a lag screw
- For compression



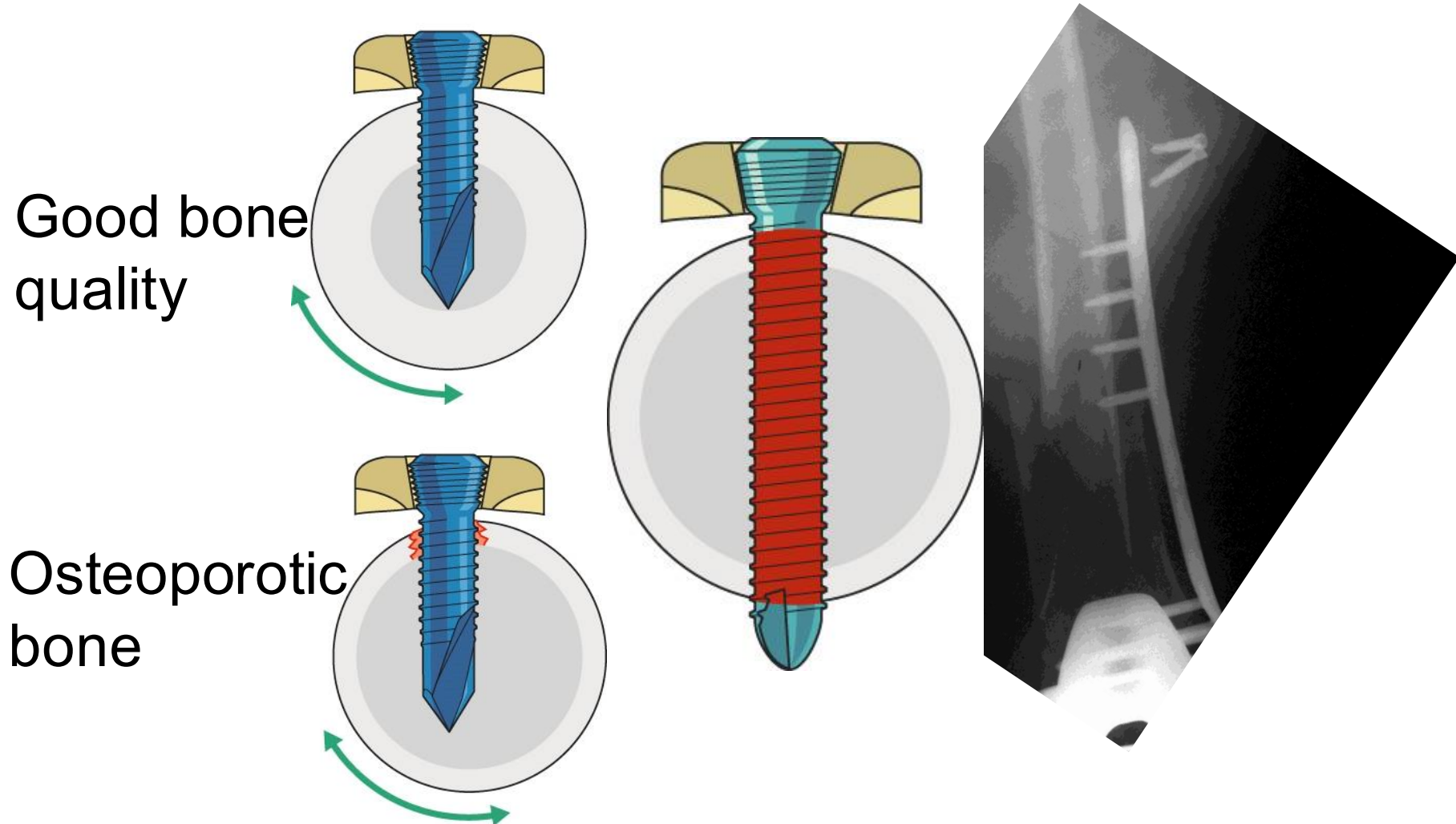
“Non-union machine”

Principle: Lag (compress) before lock



Osteoporotic bone and working length

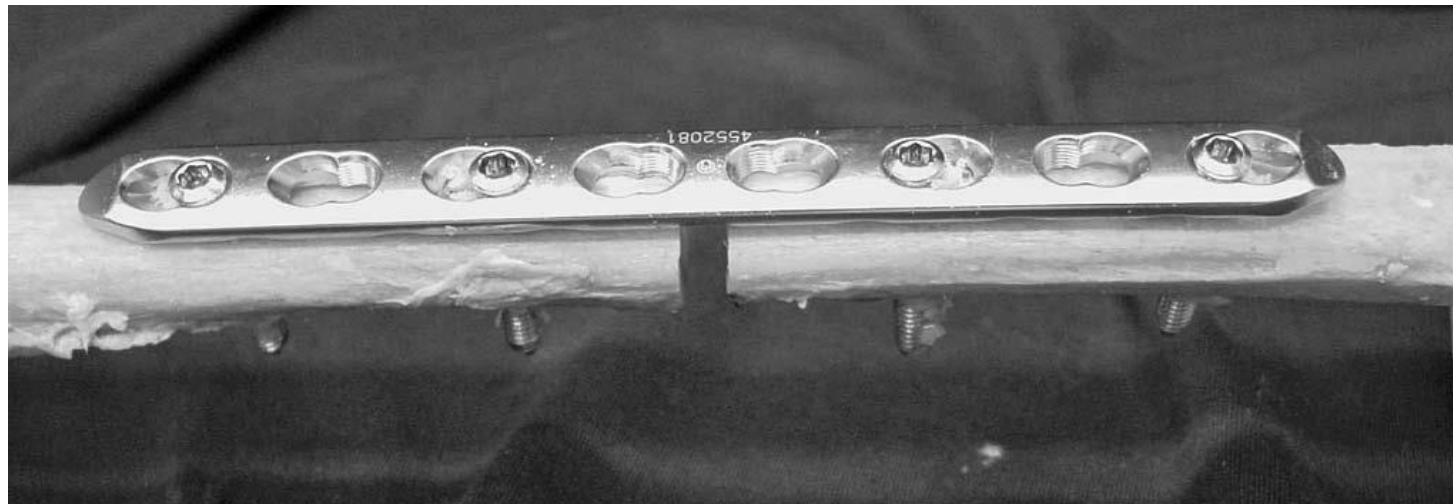
Gautier E et al (2003)



How many locking screws are enough??

Bicortical screws are preferred

- Two bicortical locking screws on each side in an osteoporotic humerus fracture model *[Hak JOT 2010]*
- Three bicortical on each side in finite element and synthetic models *[Lee 2014, Freeman 2010]*



Clinical indications for locked screws

1. Periarticular fractures
 - Metaphyseal bone
 - Short end segment
2. (Very) Poor bone quality
 - Diaphyseal bone with severe osteoporosis



Periarticular fractures



Metaphyseal bone

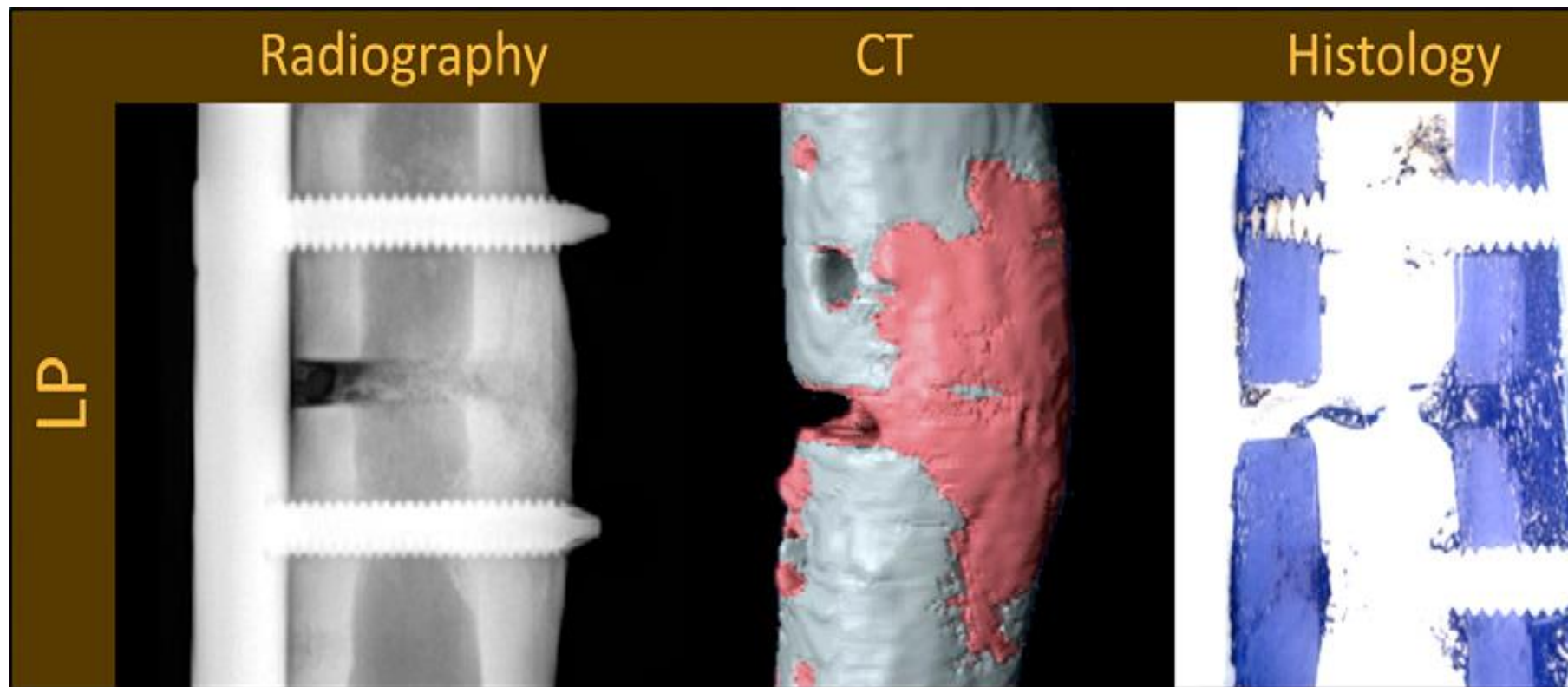


Short end segment

Fracture healing – locking plates

Higher rate of delayed union

Asymmetric callus



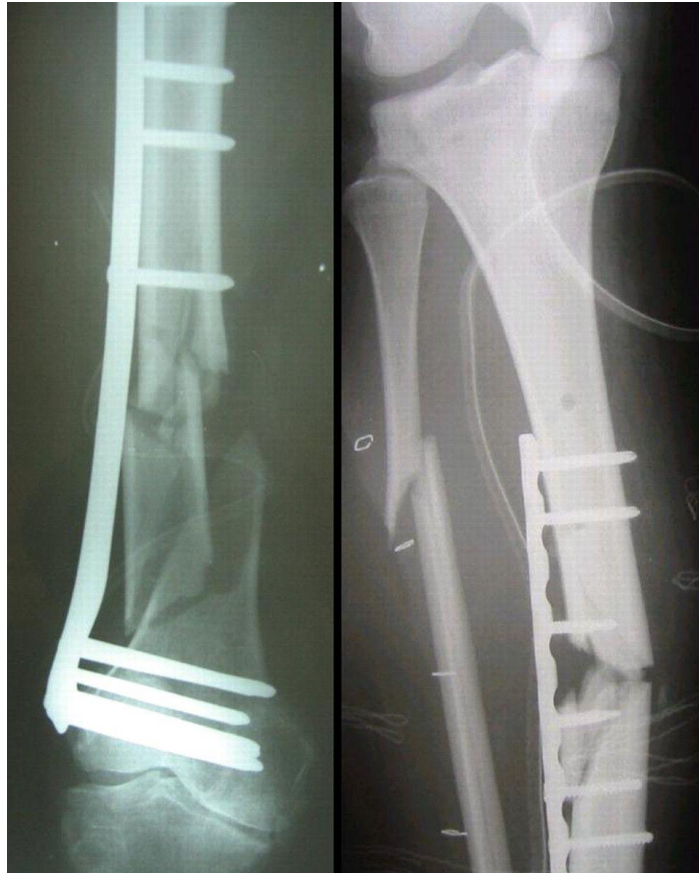
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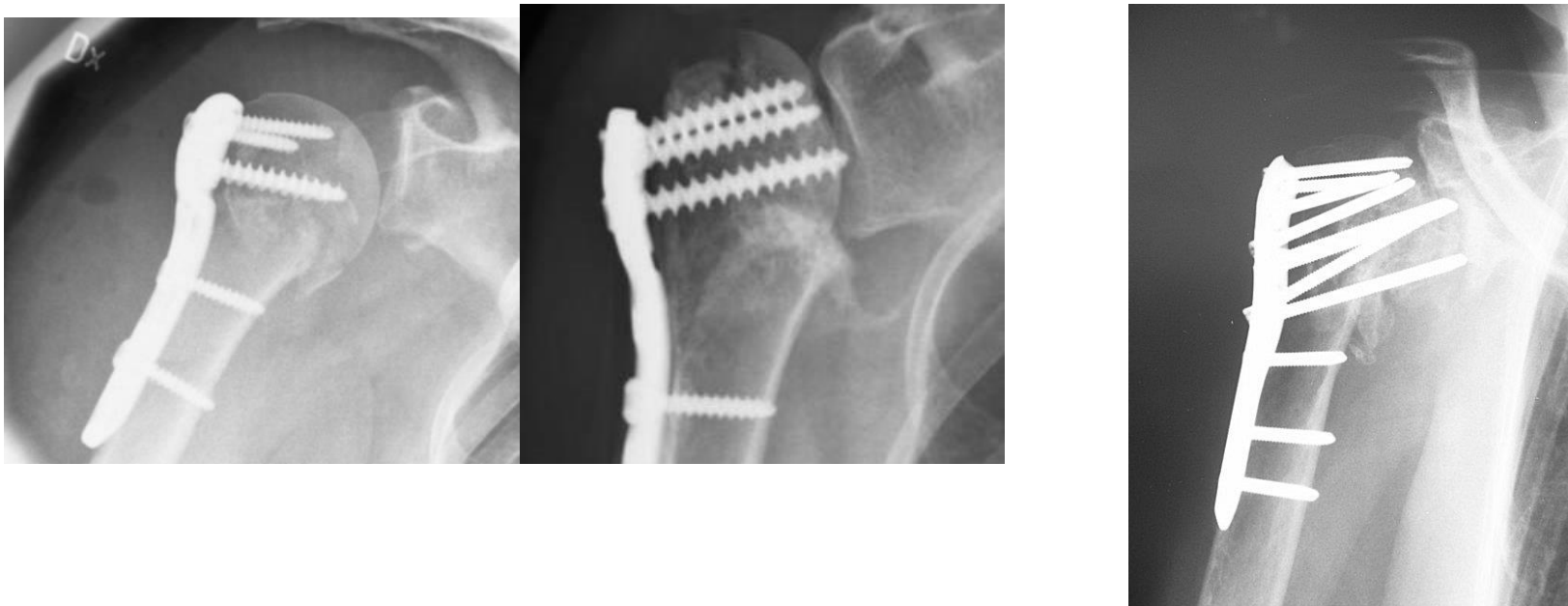
memegenerator.net

Locked plate cannot compensate for poor surgical technique



OID= Open Internal Decoration

Locking technology cannot compensate for inadequate biological conditions



20-30% complication rate in the elderly

PFLP for unstable proximal femur fractures – 41% major treatment failure



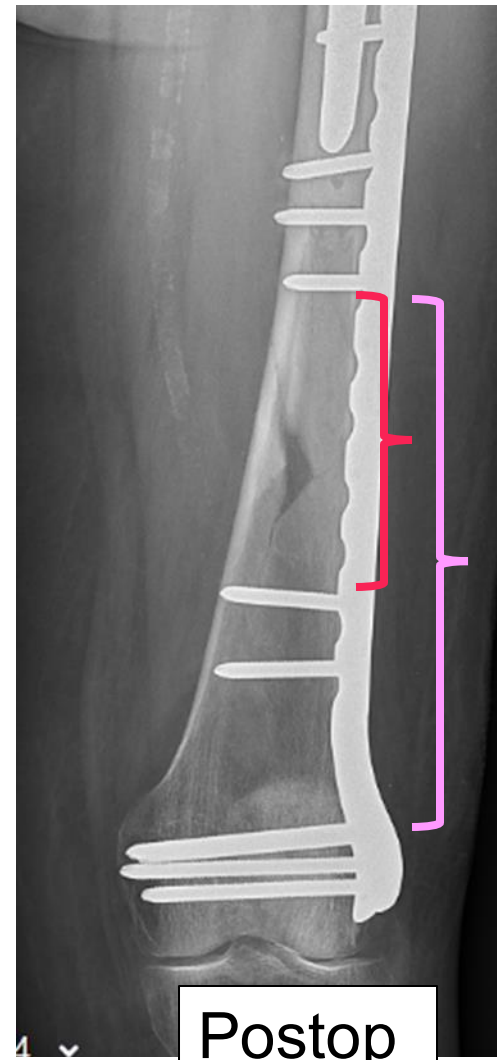
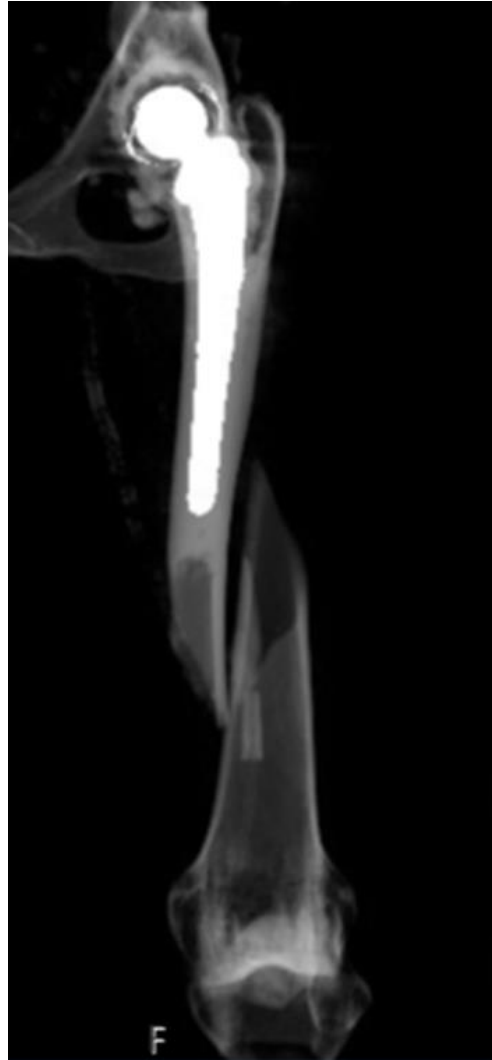
[Collinge JOT 2016]

AO

LCP – too stiff?

In distal femur plates:

- Short plate associated with high rates of non union
- Roll of proximal screw type?



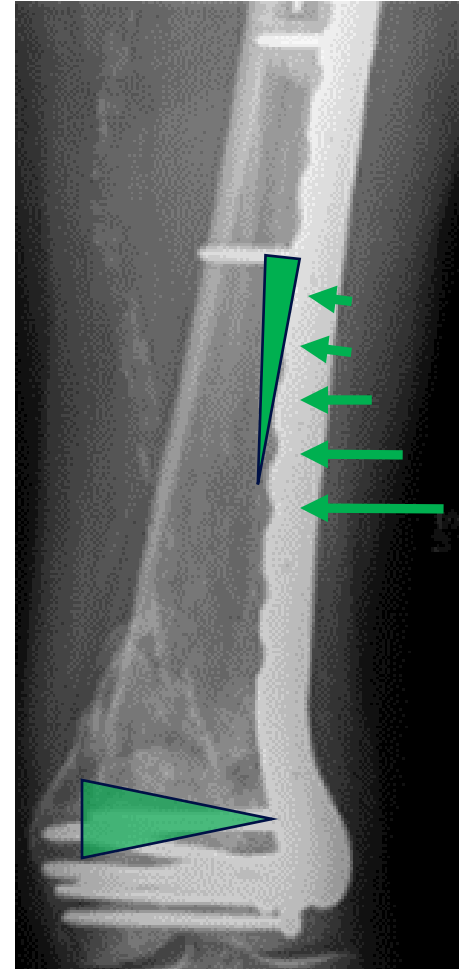
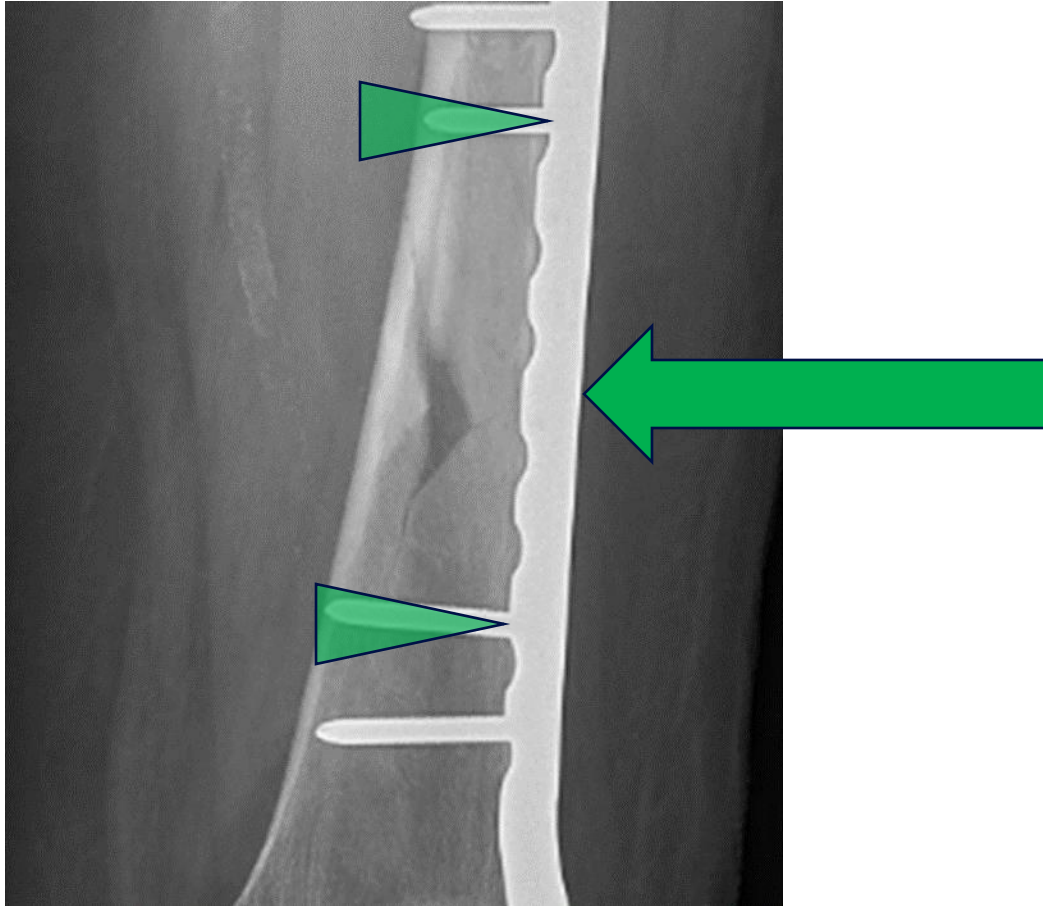
Postop



2 mo postop

LCP plates – Hybrid fixation possible

LCP in metaphyseal bone, cortical screws in diaphyseal



Take-home messages

- Basic principles of **absolute and relative stability** apply
 - Plan according to basic principles
- «Lag before lock»