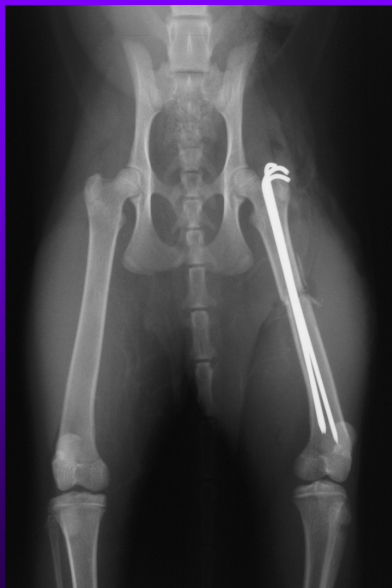


Surgical fracture treatment

Fixation types

II. Intramedullary pinning indication and tips



dr. Diószegi Zoltán



Surgical fixation methods

Internal fixation:

- Cerclage wires
- Pin fixation
- Tension band wire
- Intramedullary pins
- Screws
- Plate osteosynthesis
- Locking plates...

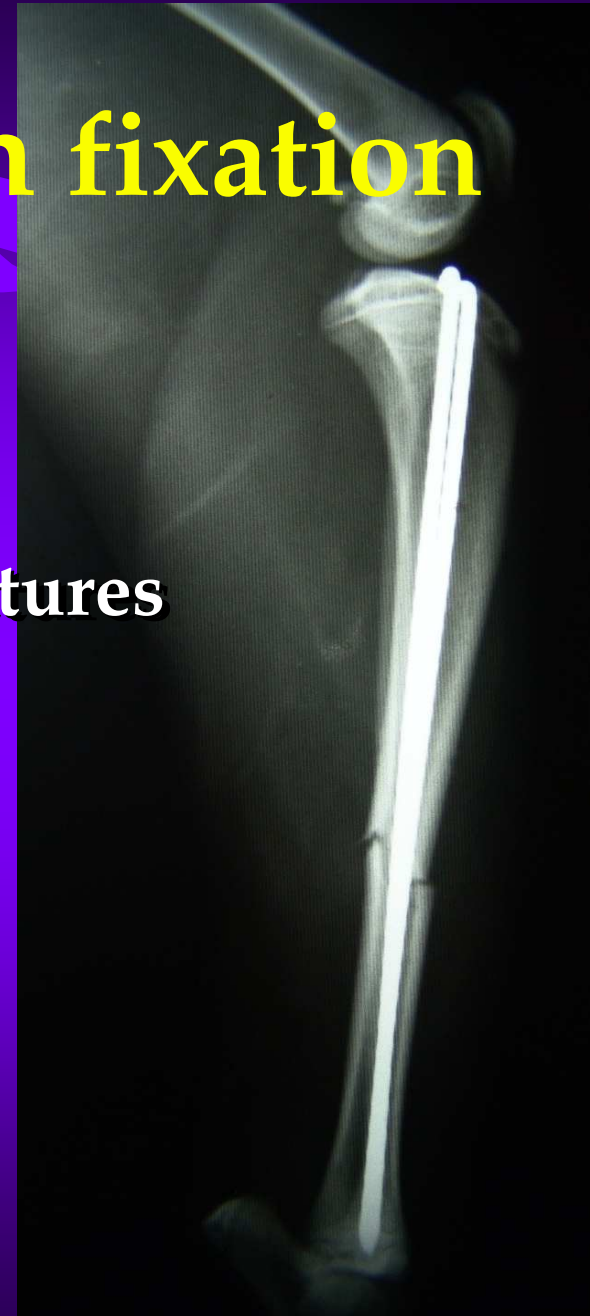
External fixation:

- External skeletal fixation (ESF)

Intramedullary pin fixation

- **Indication:**

- **simple, stable, midshaft fractures**
- **humerus, femur, tibia, ulna,
metatarsus, metacarpus**



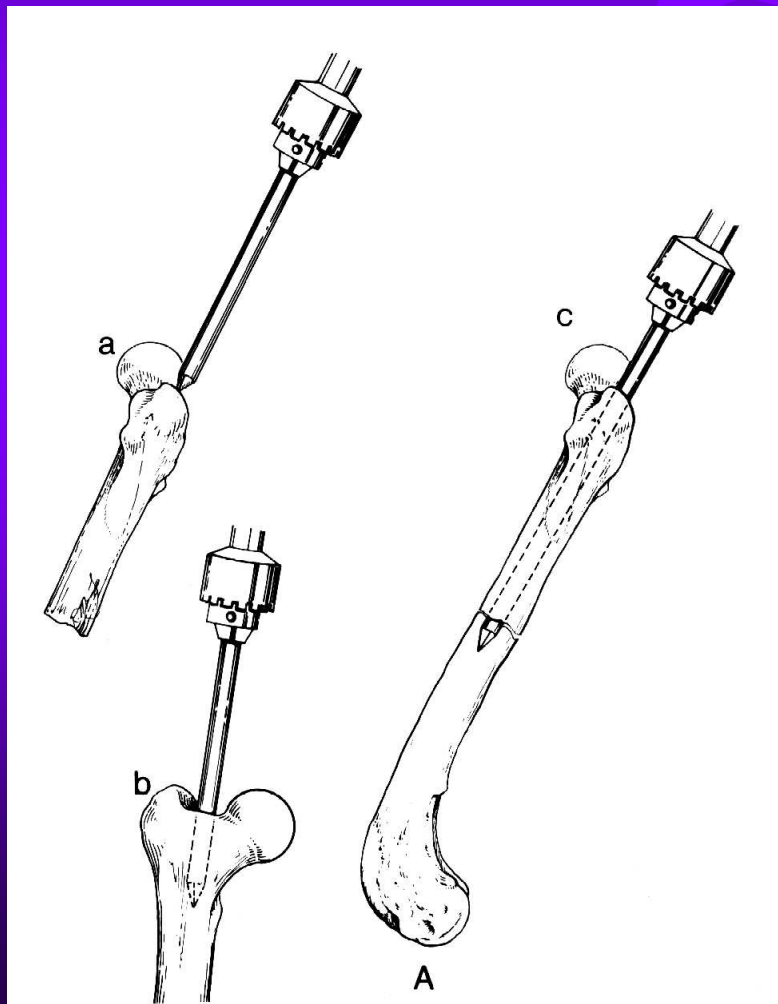
Intramedullary pin fixation

- Principles:
- placed in the medullary cavity
- the pin ends should be bent
- neutralise the bending and shear forces
- not effective against axial forces and torsion

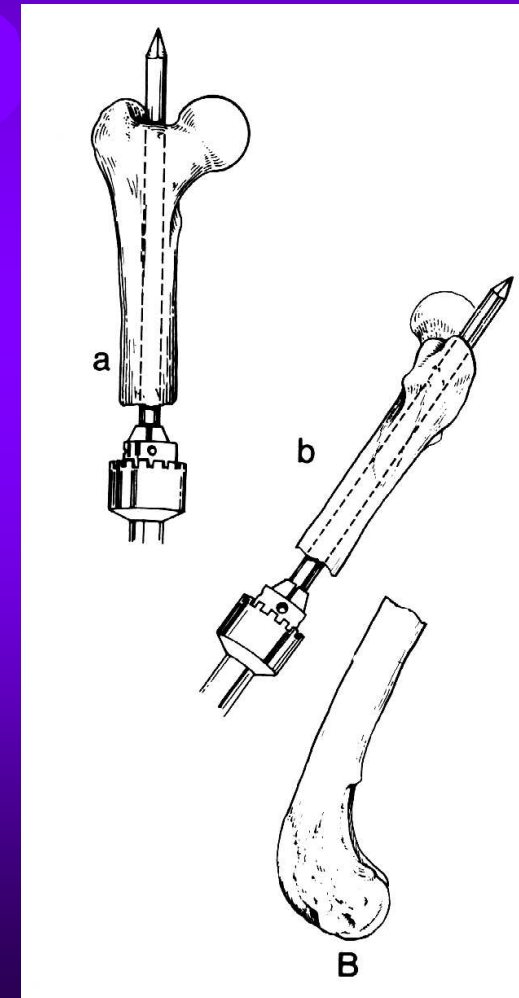


Route of pin insertion

Antegrade

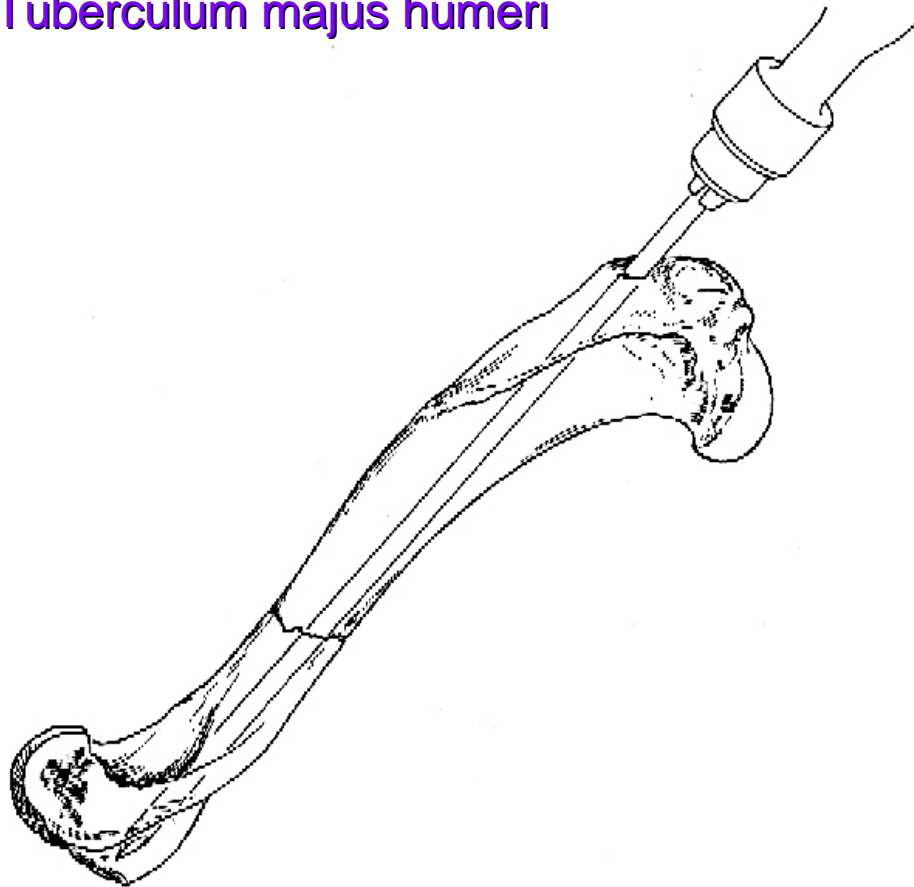


Retrograde

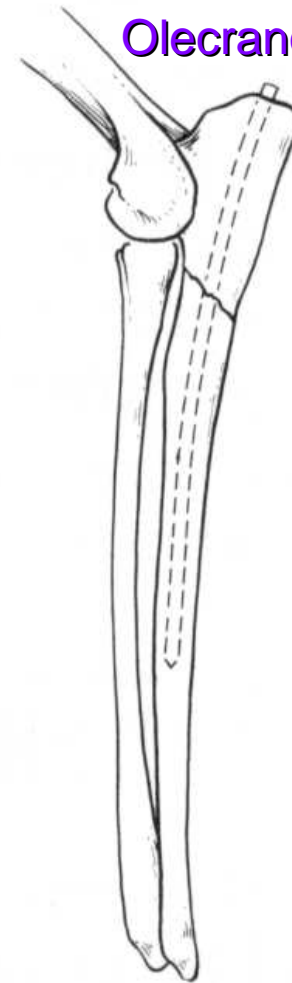


INSERTION POINTS

Tuberculum majus humeri

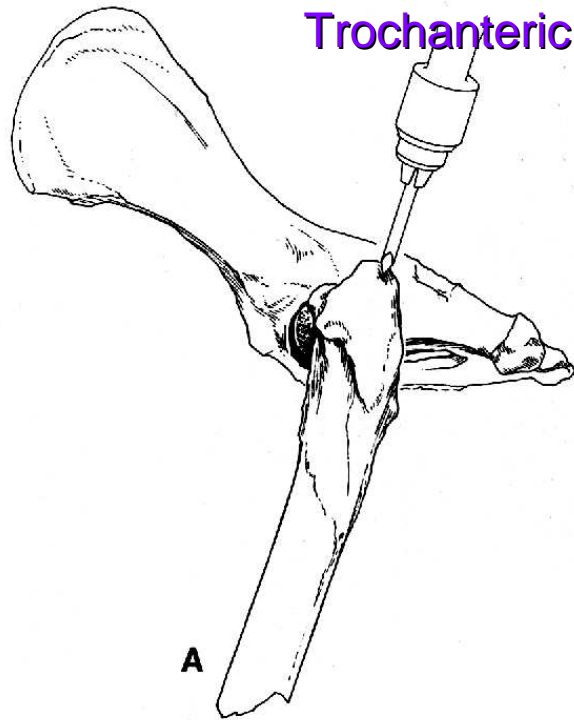


Olecranon

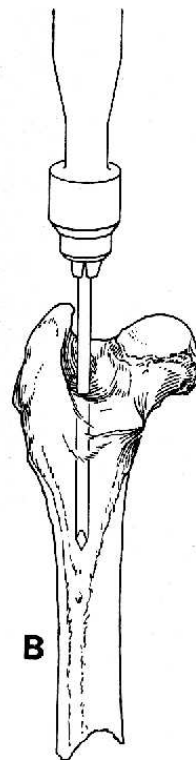


INSERTION POINTS

Trochanteric fossa

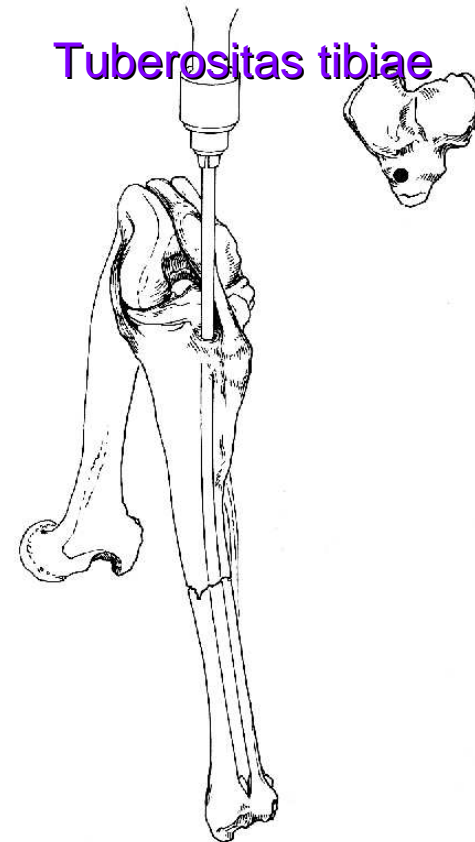


A



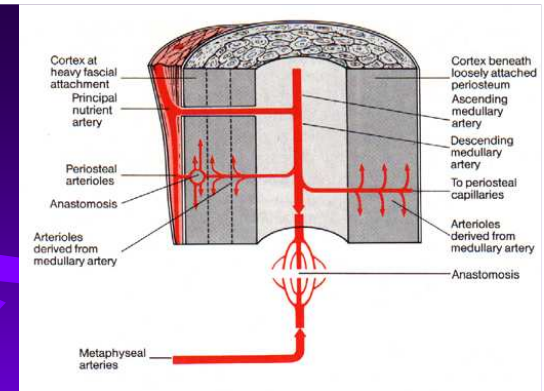
B

Tuberositas tibiae



Pin diameter

- Fill about 60-75 percent of medullary cavity at its narrowest point



Insuffitient stability

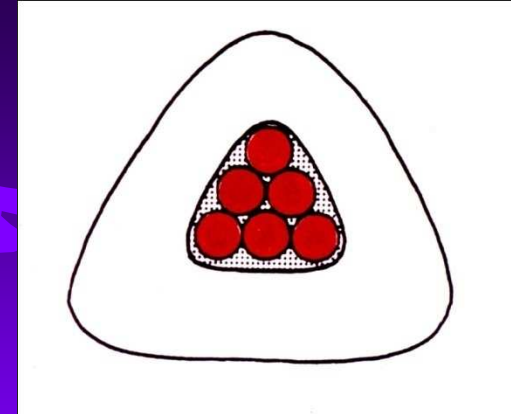
Insuffitient blood supply

Intramedullary pinning

- Kuentscher-nail
- Steinmann-pin
- Stack pinning
- Rush-pining



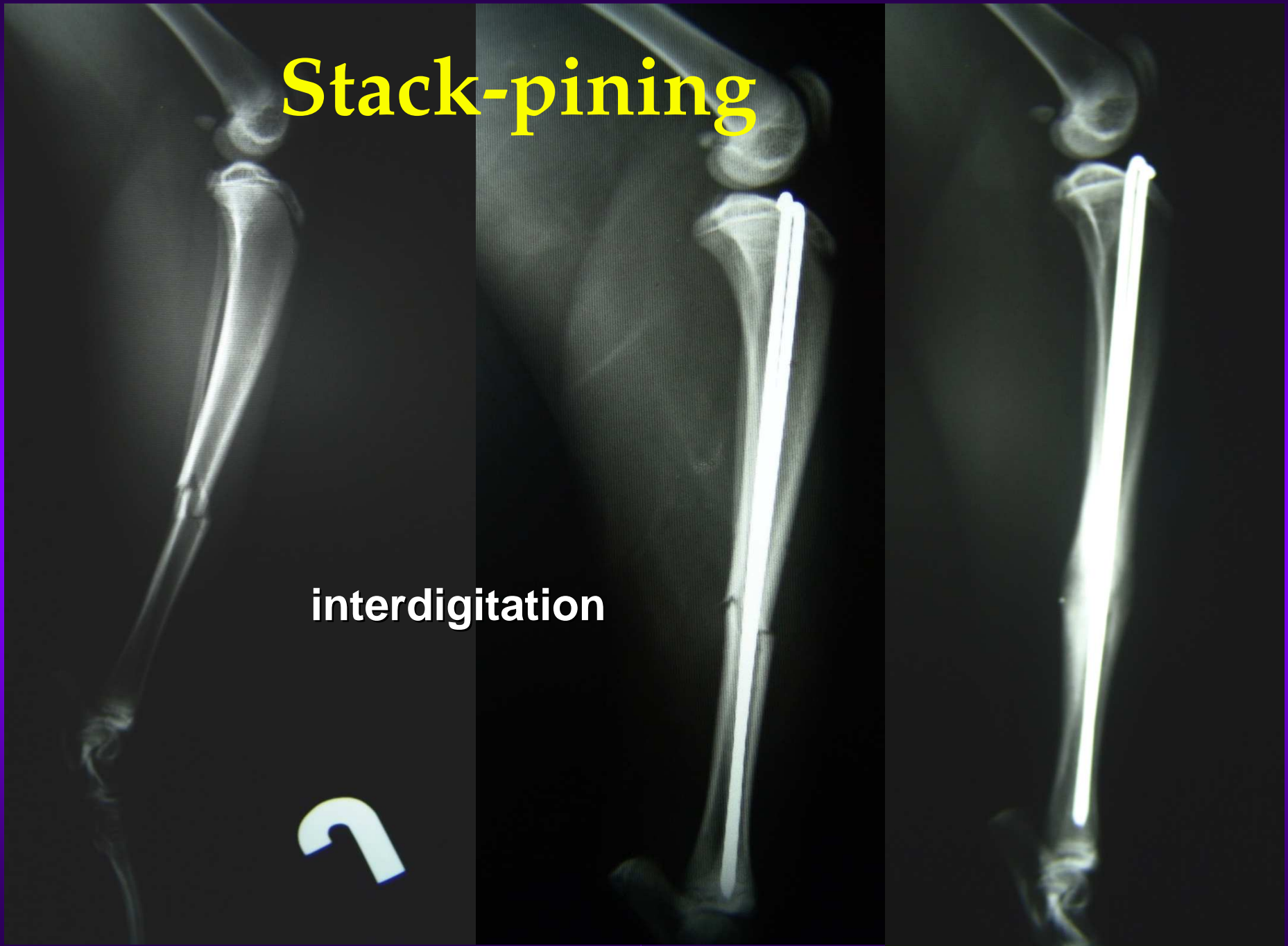
Stack-pining



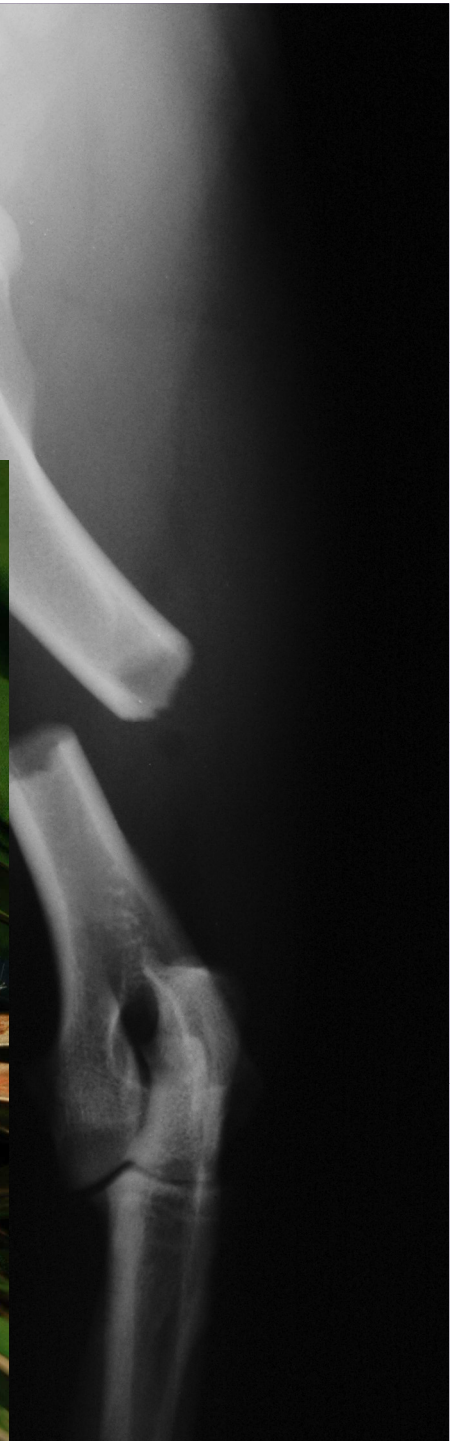
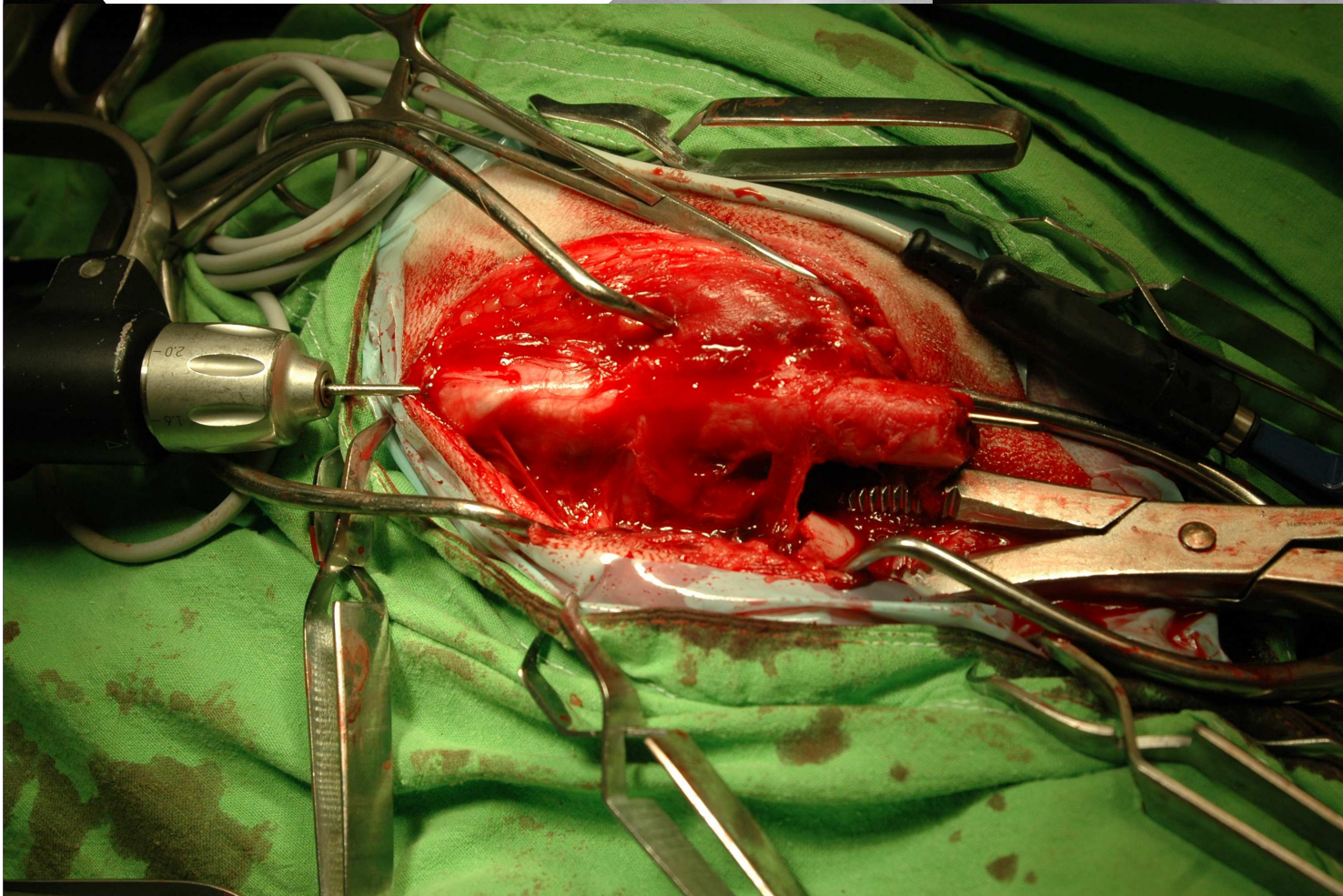
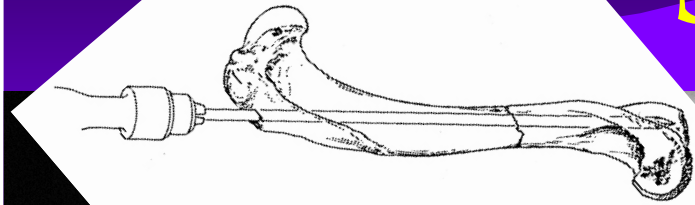
- **2-5 Kirschner-wires**
- **Good against bending and shear, moderate against rotational forces**
- **Bending of protruding ends minimise tissue irritation and loosening**
- **Can be combined with cerclage or ESF**

Stack-pining

interdigitation

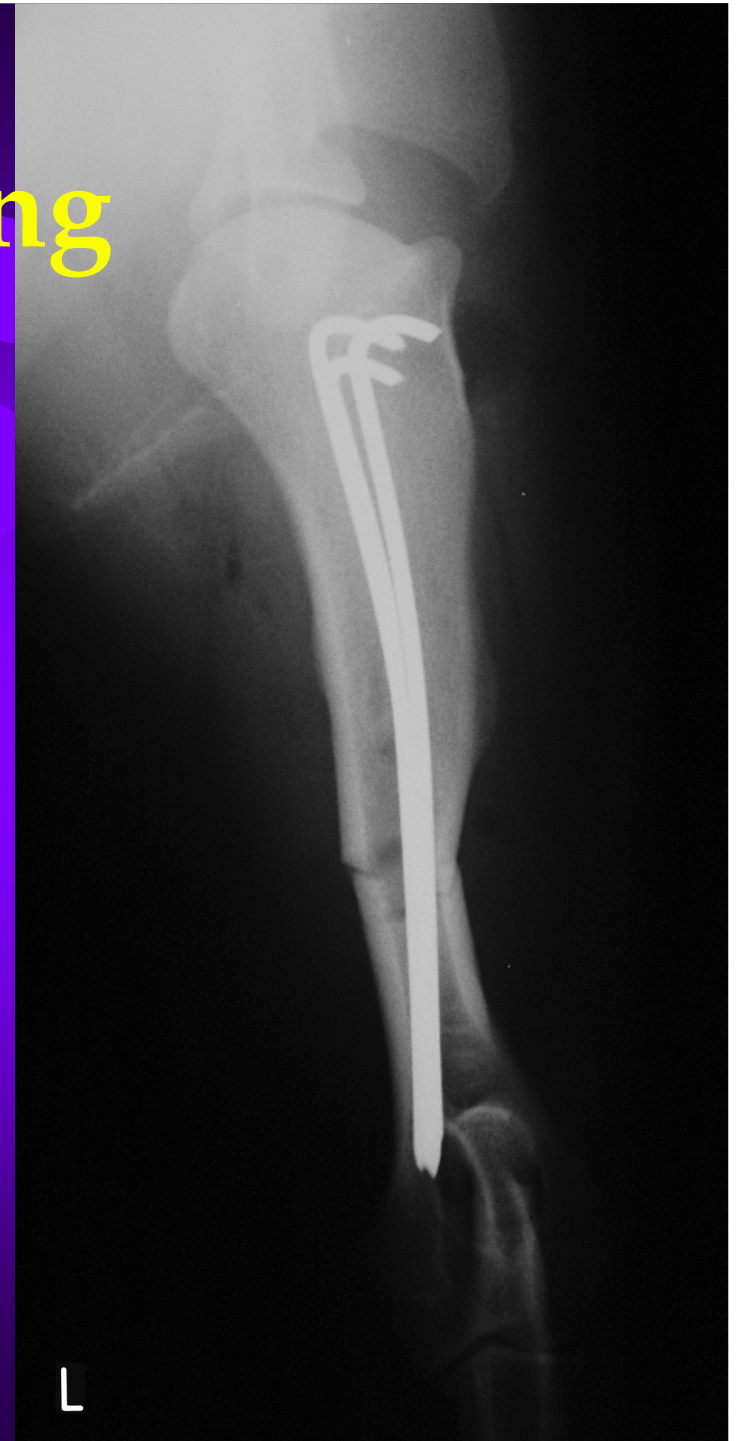
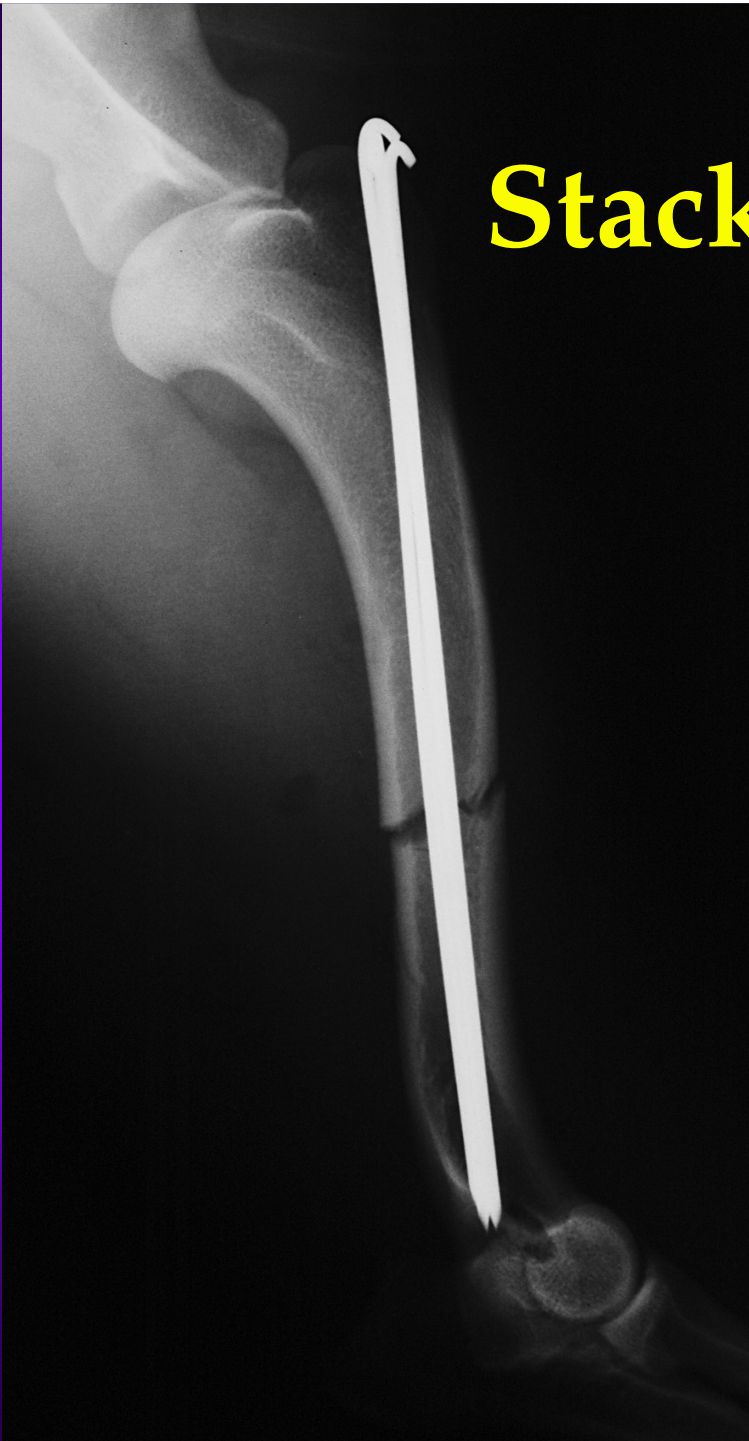


Stack-pining





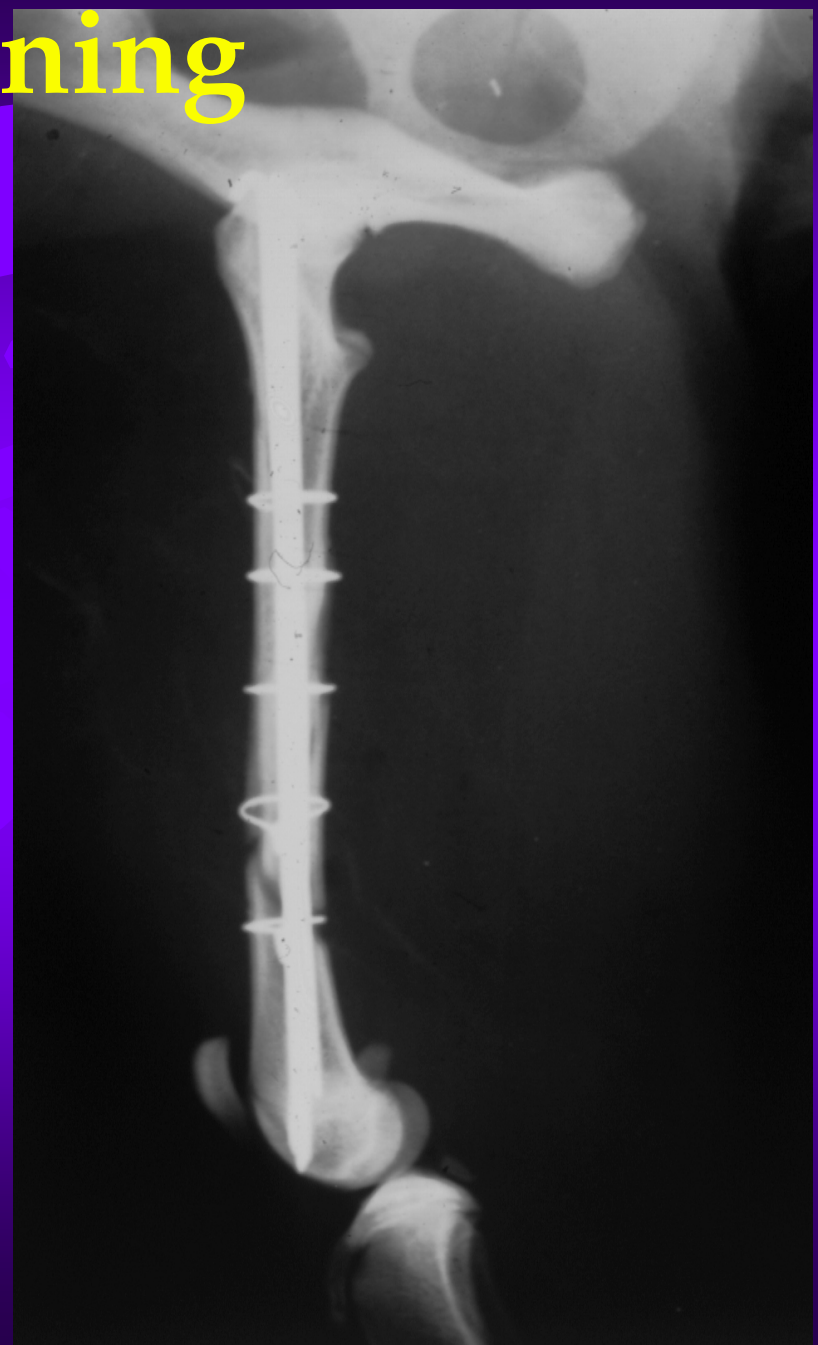
Stack-pining



Stack-pining



Stack-pinning

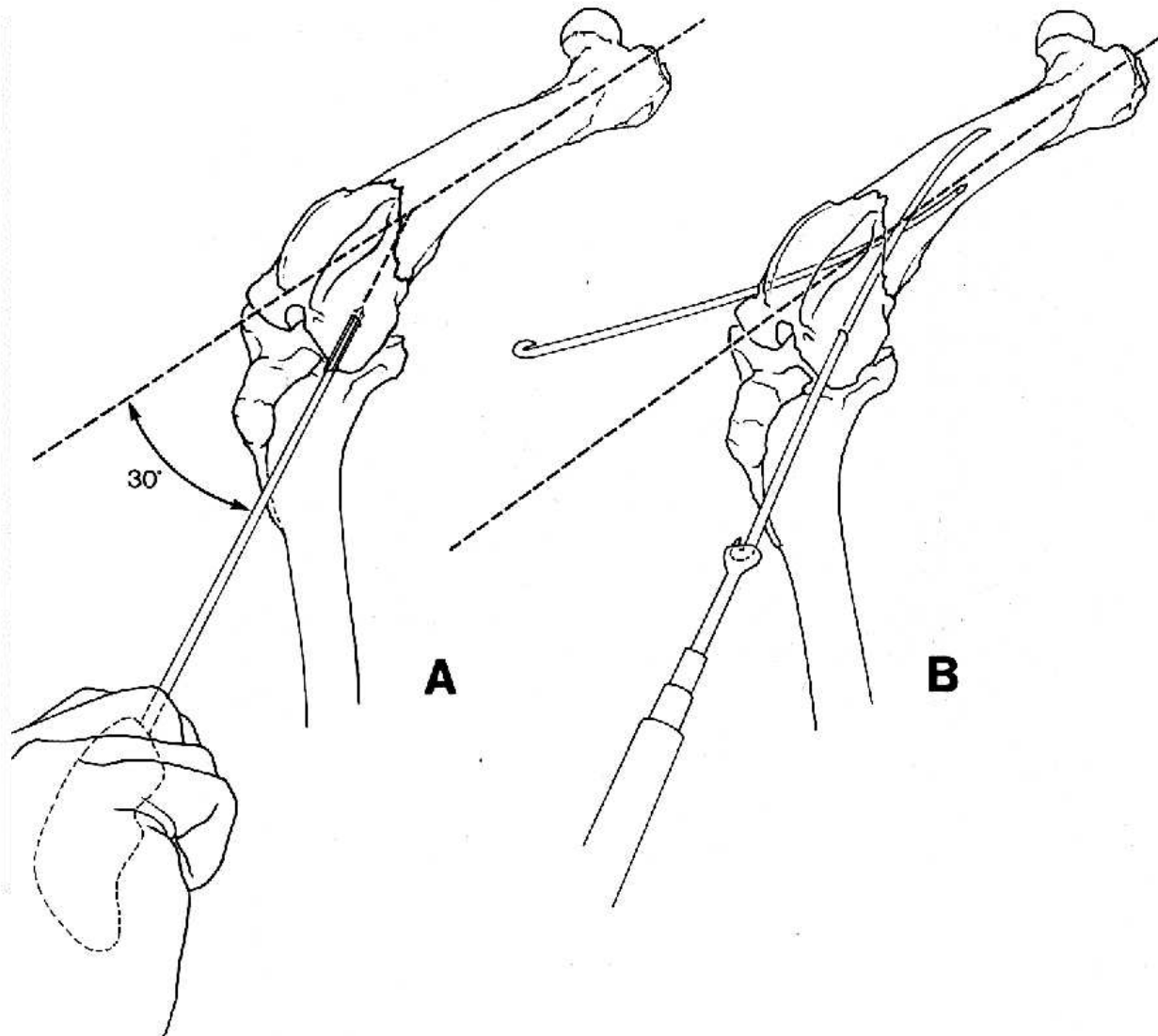
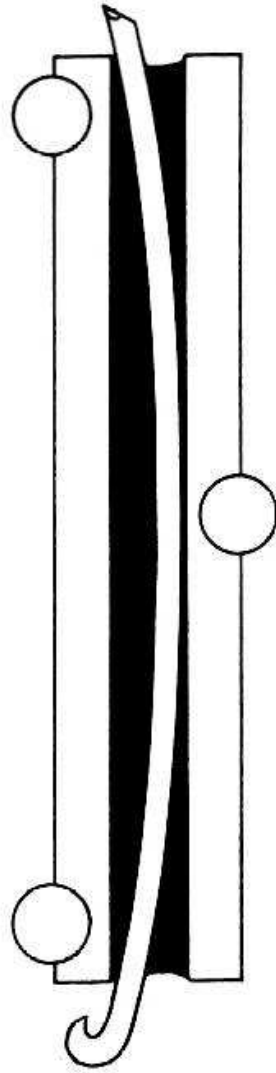


Rush-pining



- 2 relat. thin Kirschner-wires
- Epi- and metaphysis fractures
- moderate stability against bending and rotational forces
- Can be combined with cerclage or ESF

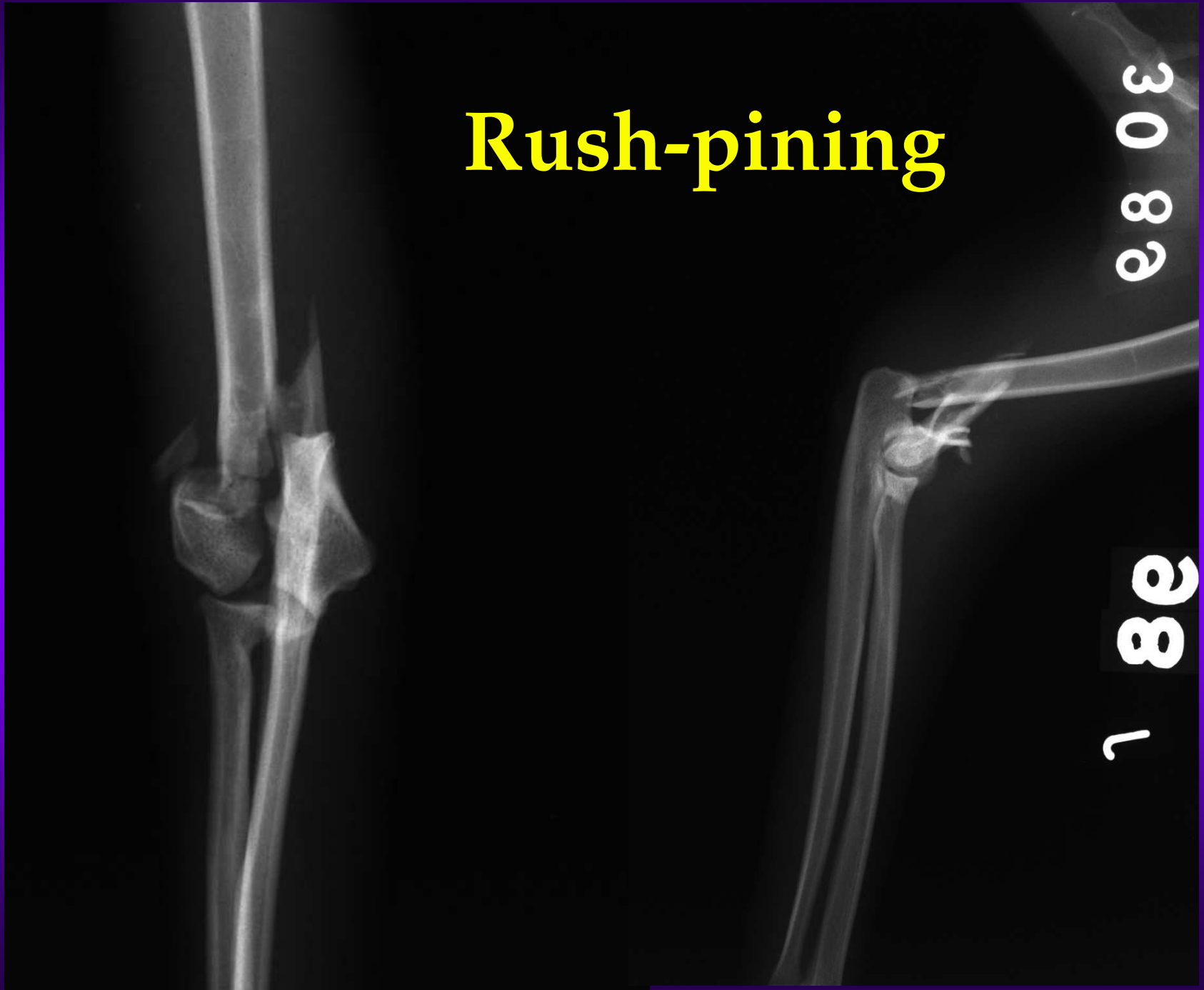
Rush-pining



Cadaver femur Rush-pining



Rush-pining



Rush-pining



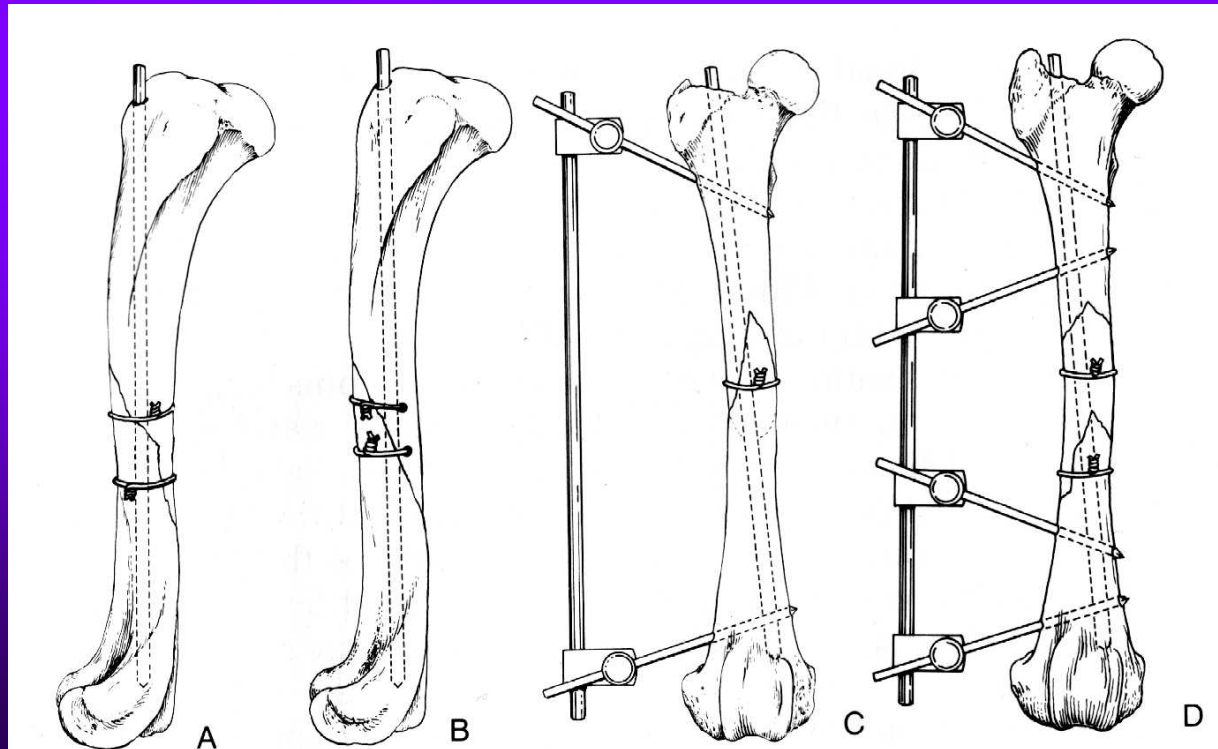
Rush-pining healed



Auxilliary fixations with pins

If i.m. pin does not provide adequate stability

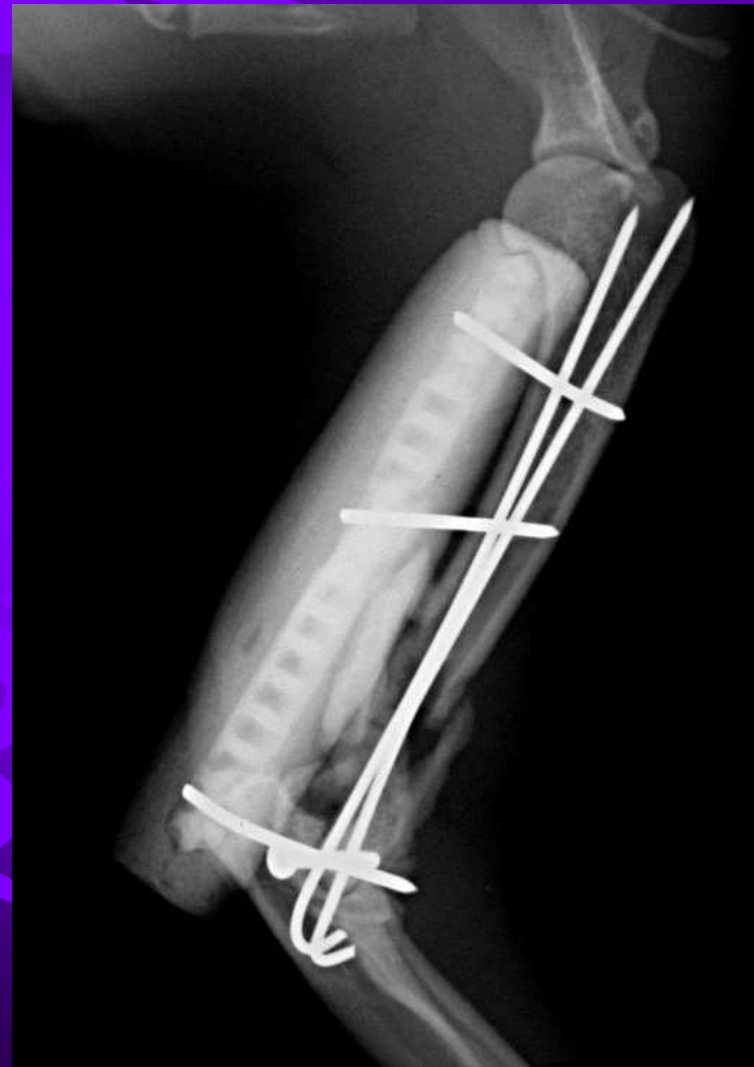
- Cerclage
- Hemicerclage
- ESF



Rush-pin & cerclage



Rush-pin & ESF



Intramedullary pinning

Advantages

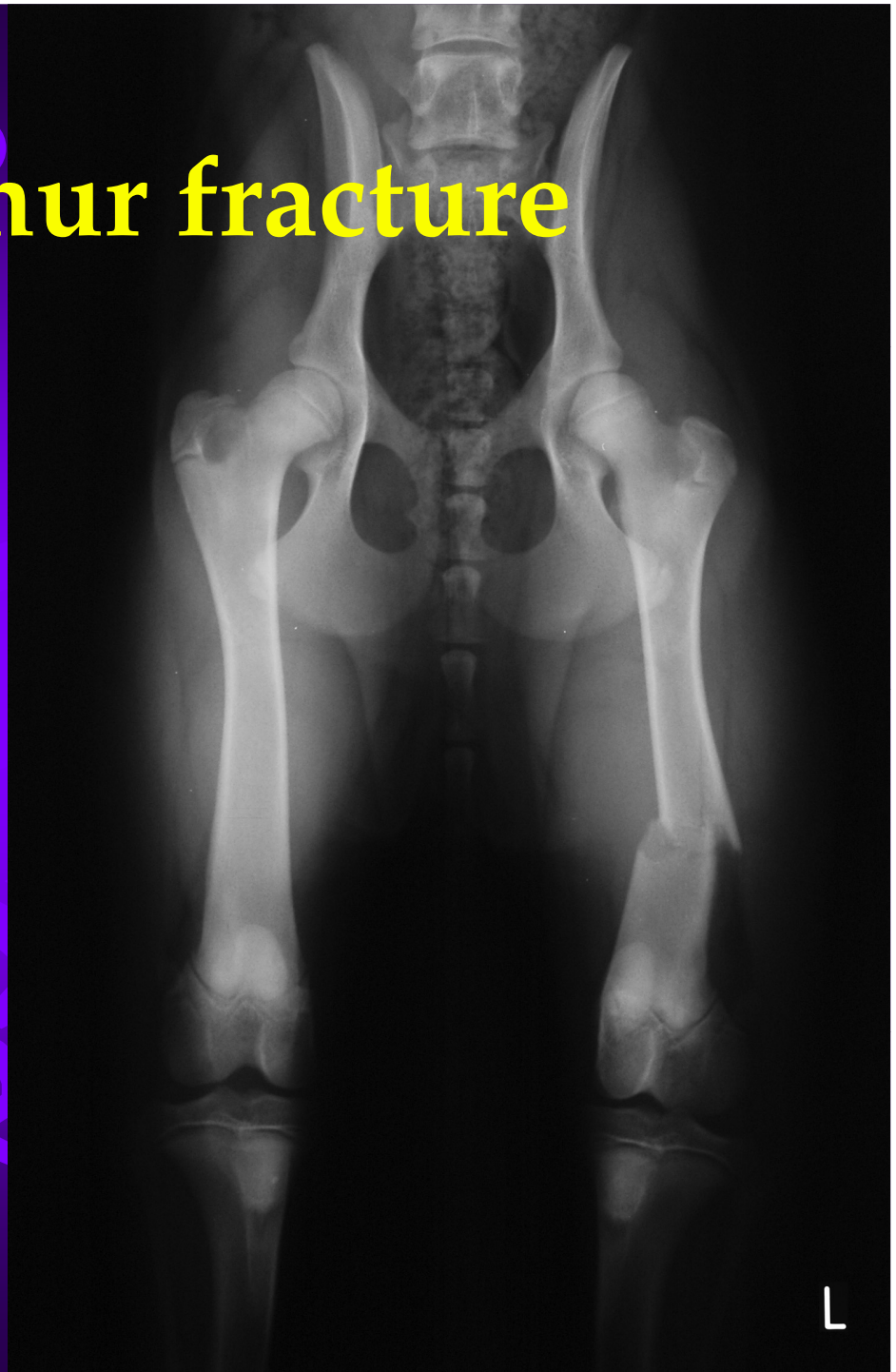
- **simple technique**
- **few special instruments**
- **cheap implants**
- **simple implant removal**
- **Less soft tissue damage**
- **Good callus building**
- **Quick healing**

Intramedullary pinning

Disadvantages

- **Limited indications**
- **Lower stability against rotation and axial load**

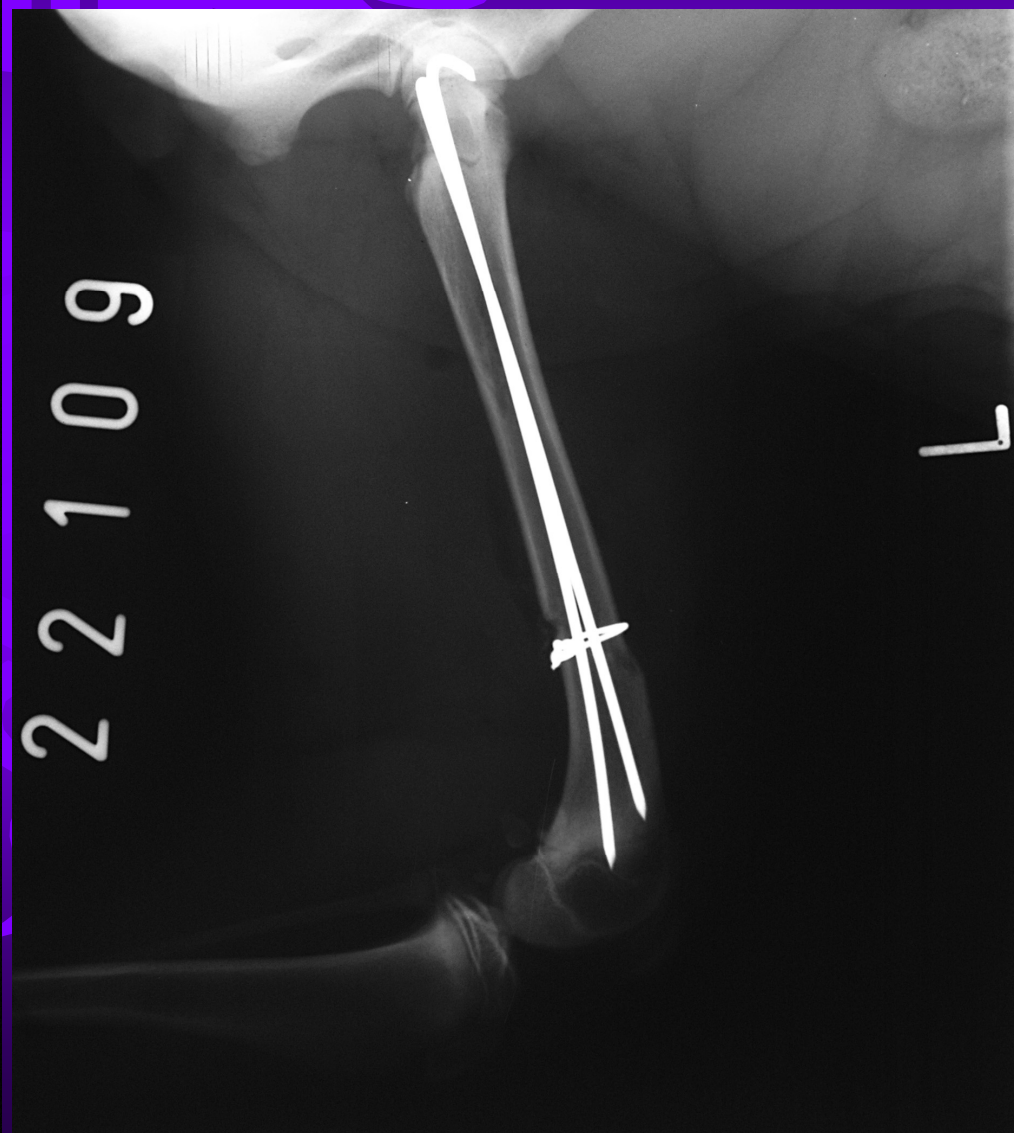
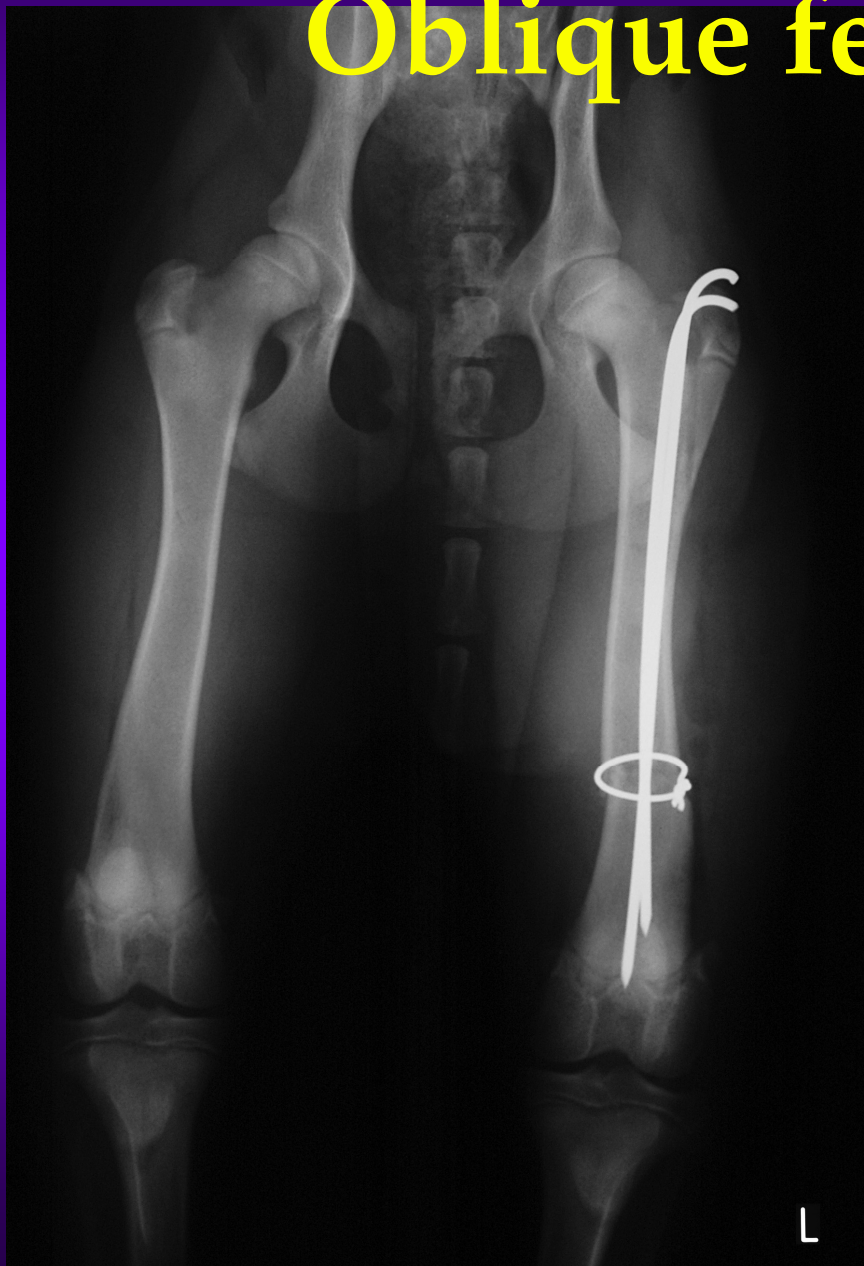
Oblique femur fracture



Oblique femur fracture



Oblique femur fracture



Intramedullary pinning complications:

- **Tissue irritation**
- **Pin loosening and migration**

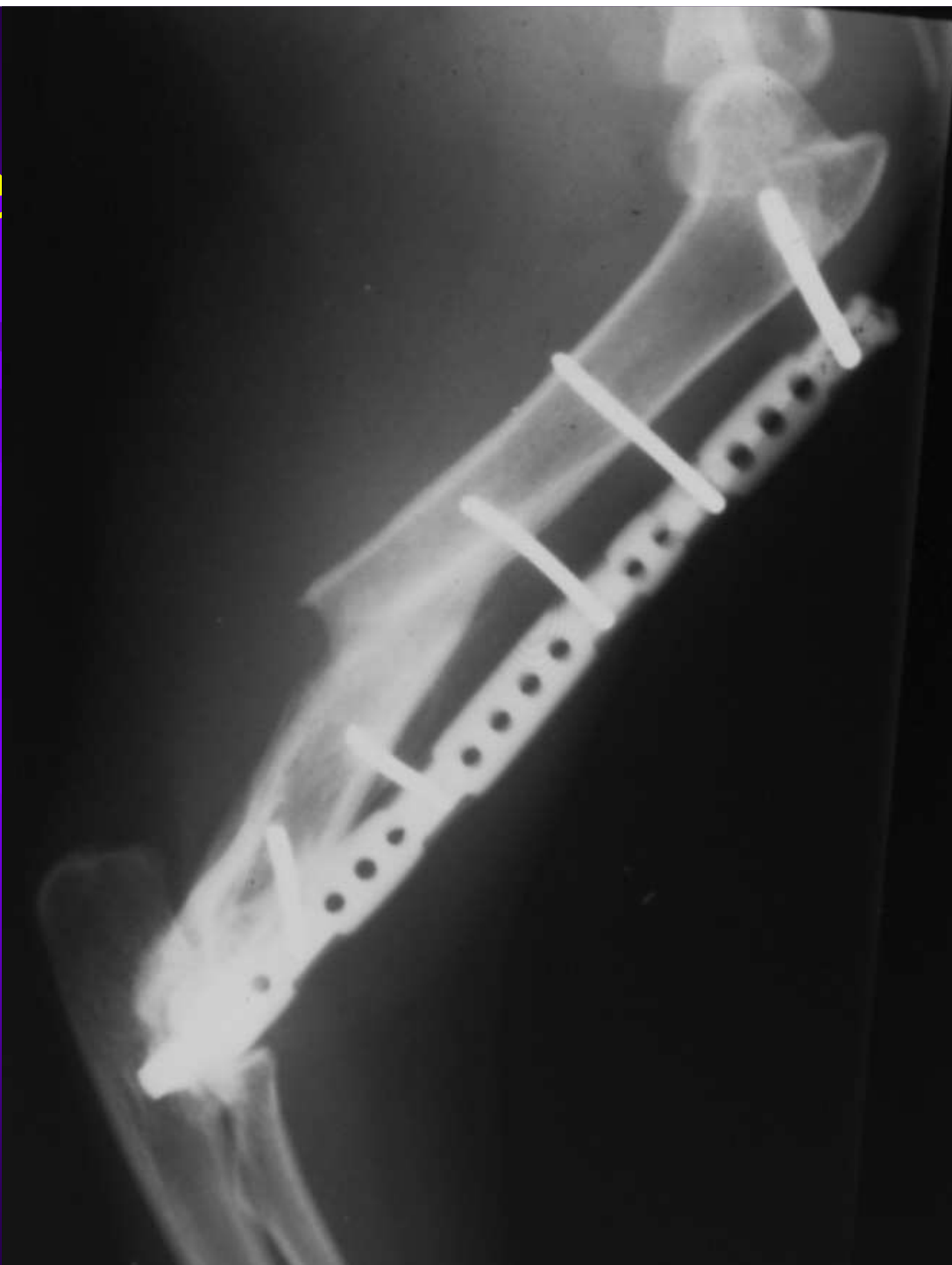
Good indication



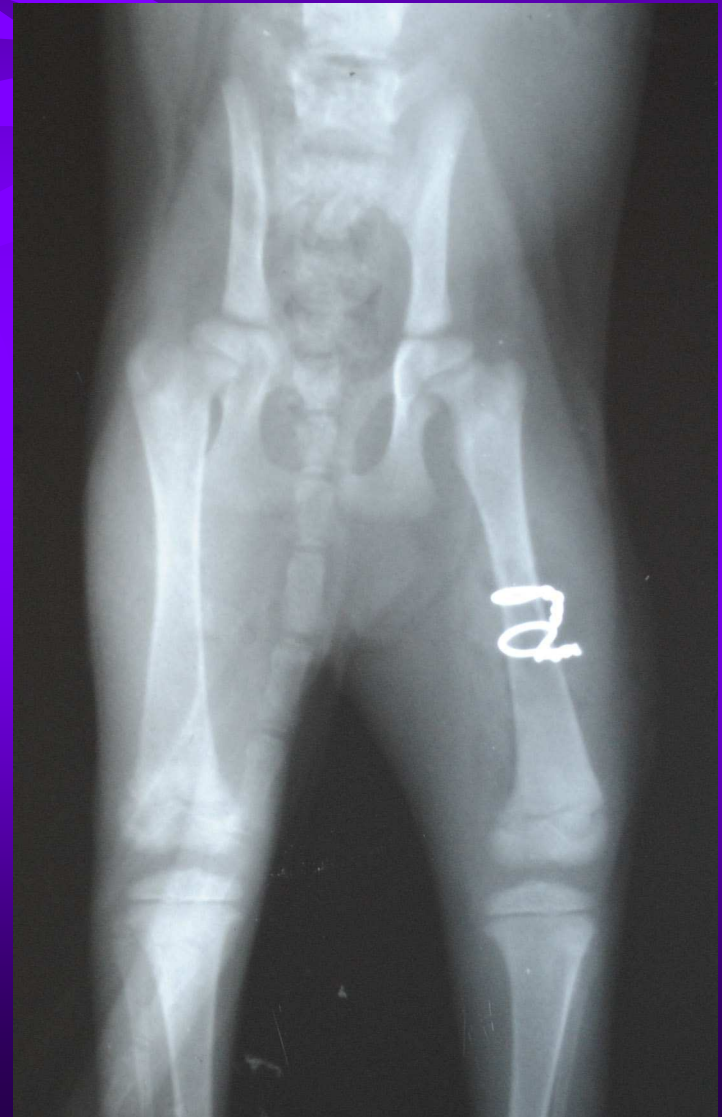
Poor indication



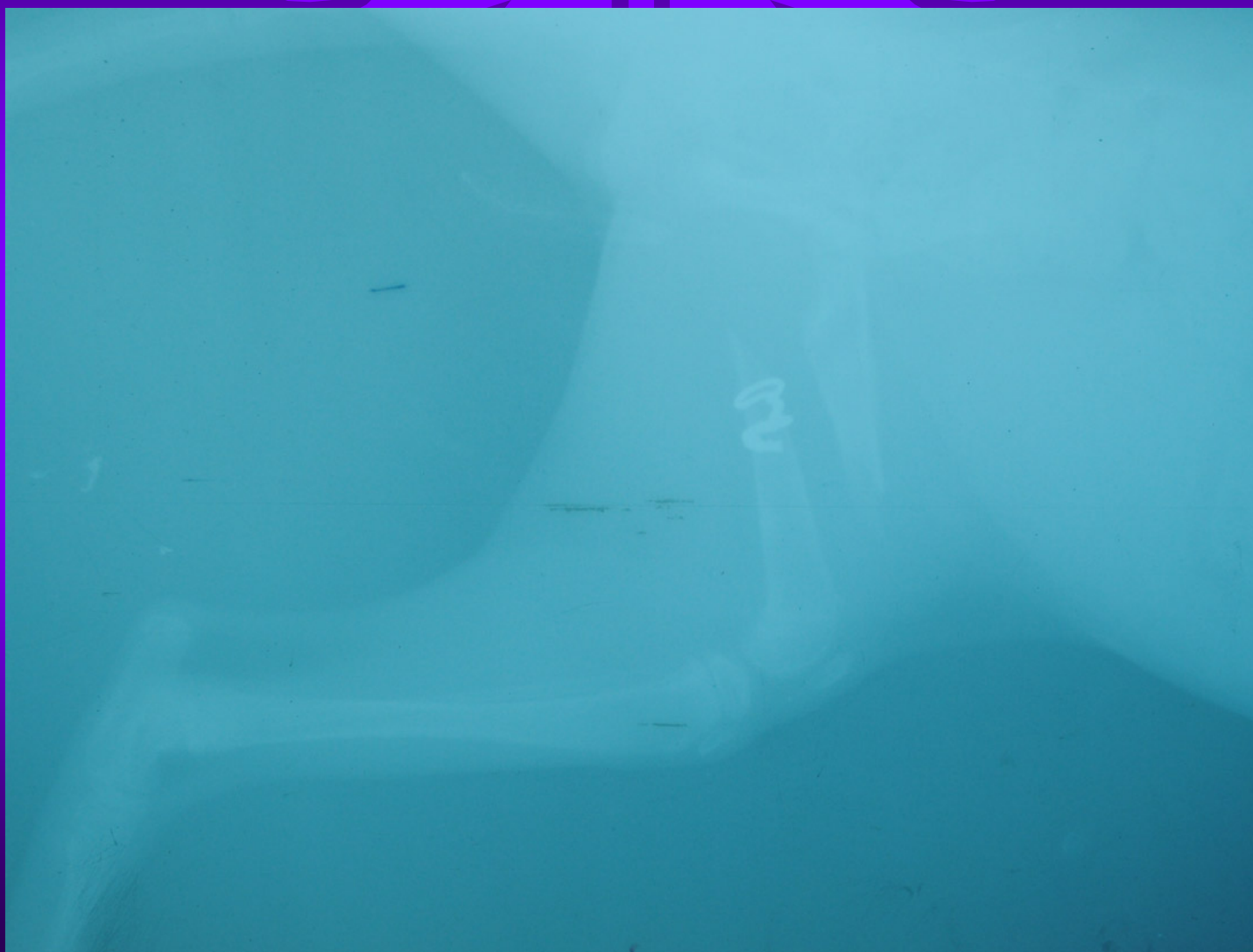
Bre



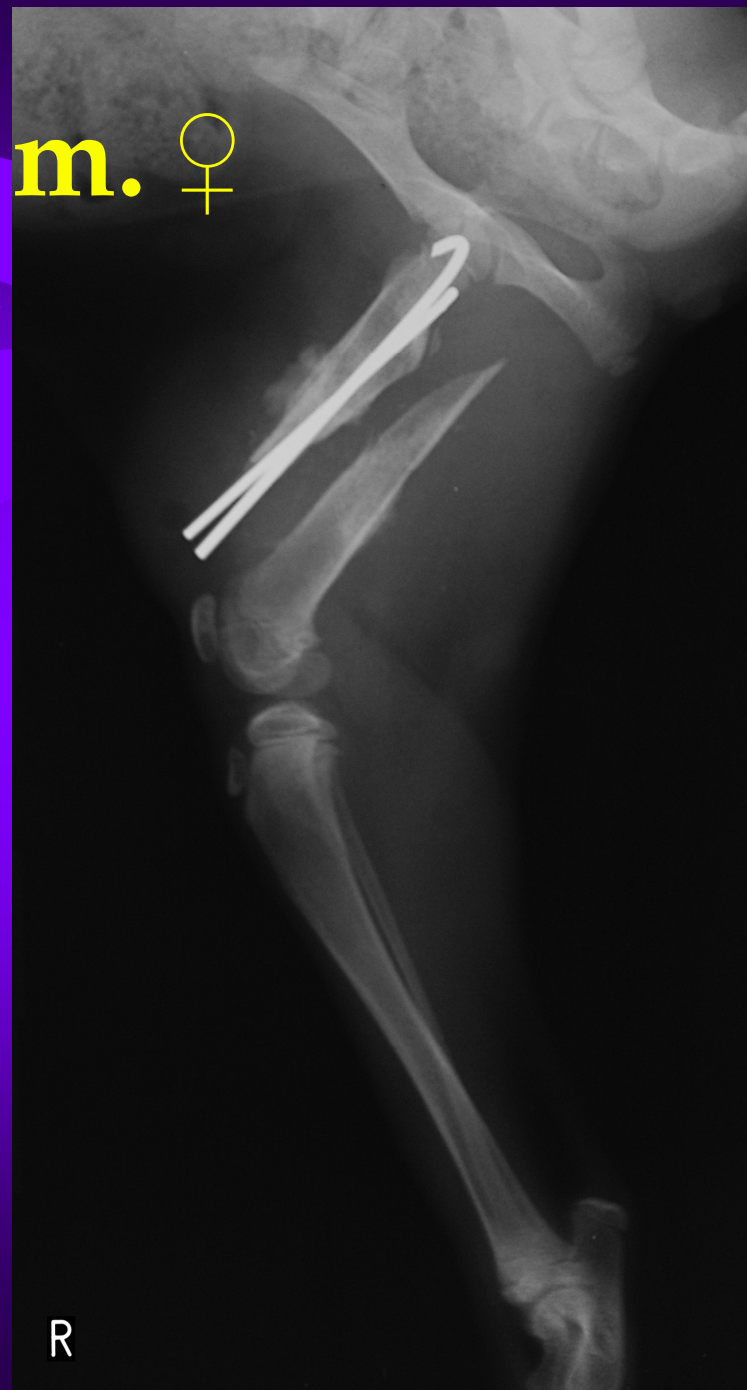
Fanny, cat 3 m. ♀



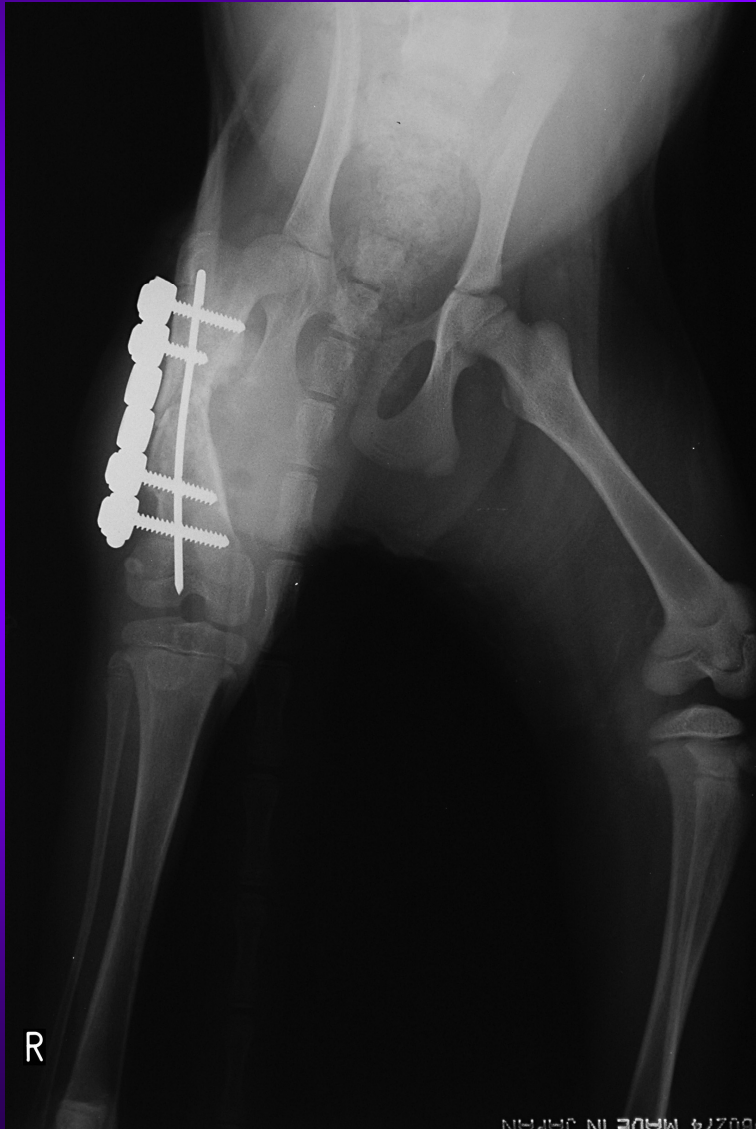
Fanny, cat 3 m. ♀



Fanny, cat 3 m. ♀



Solution



Implant removal

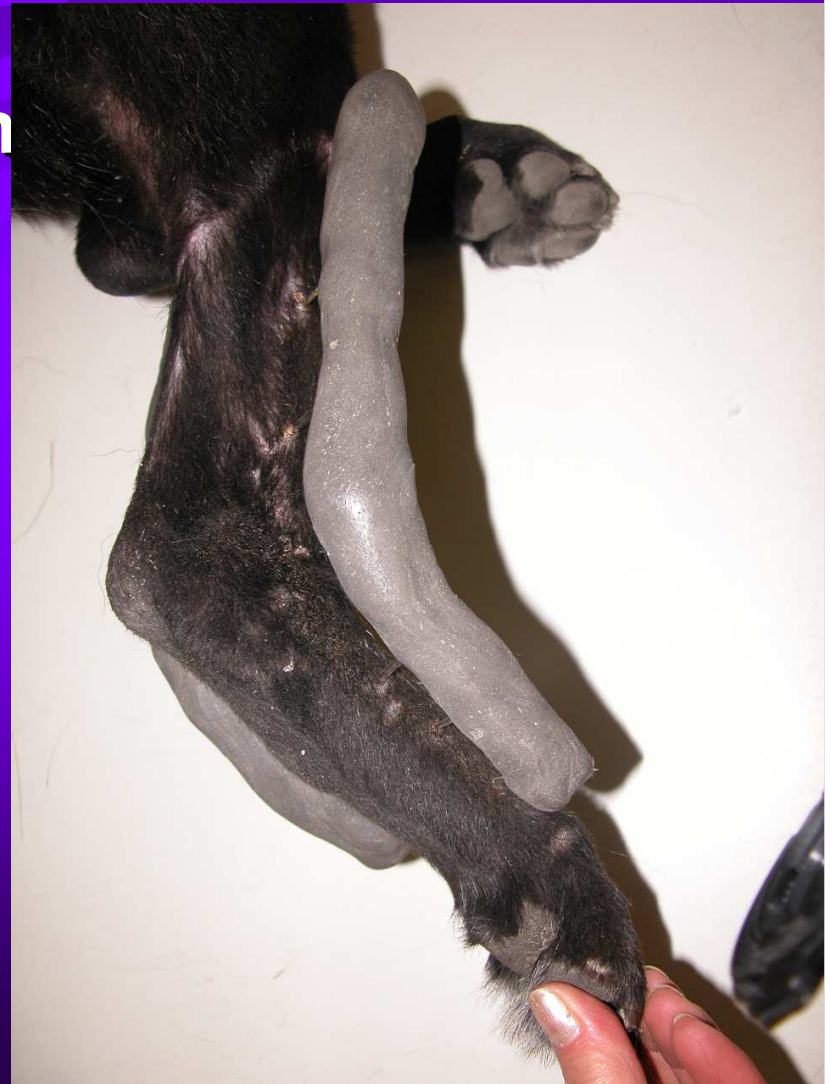
Why?

- **Severe complications**
 - **implant failure**
 - **septic inflam.**
- **Healed bone: prevention of**
 - **stress protection**
 - **pin migration**

Implant removal When?



ation



Implant removal

When?



- **At complete bone healing, confirmed by X-ray**

Inmature animal

4-8 weeks

Adult animal

3-6 months

Implant removal

When?

- Time of bone healing depends
 - age
 - fract. type
 - stability of fixation
 - location, breed etc.

Pactical Training

