INTRAARTICULAR FRACTURES OF THE KNEE JOINT

Tibial plateu fractures

Intercondylar fractures distal Femur

General principles.

Role of arthroscopy.

Minimally invasive surgery

Tibial plateau fractures

Evaluation

1.History - Mechanism

- Energy (High,medium,low)

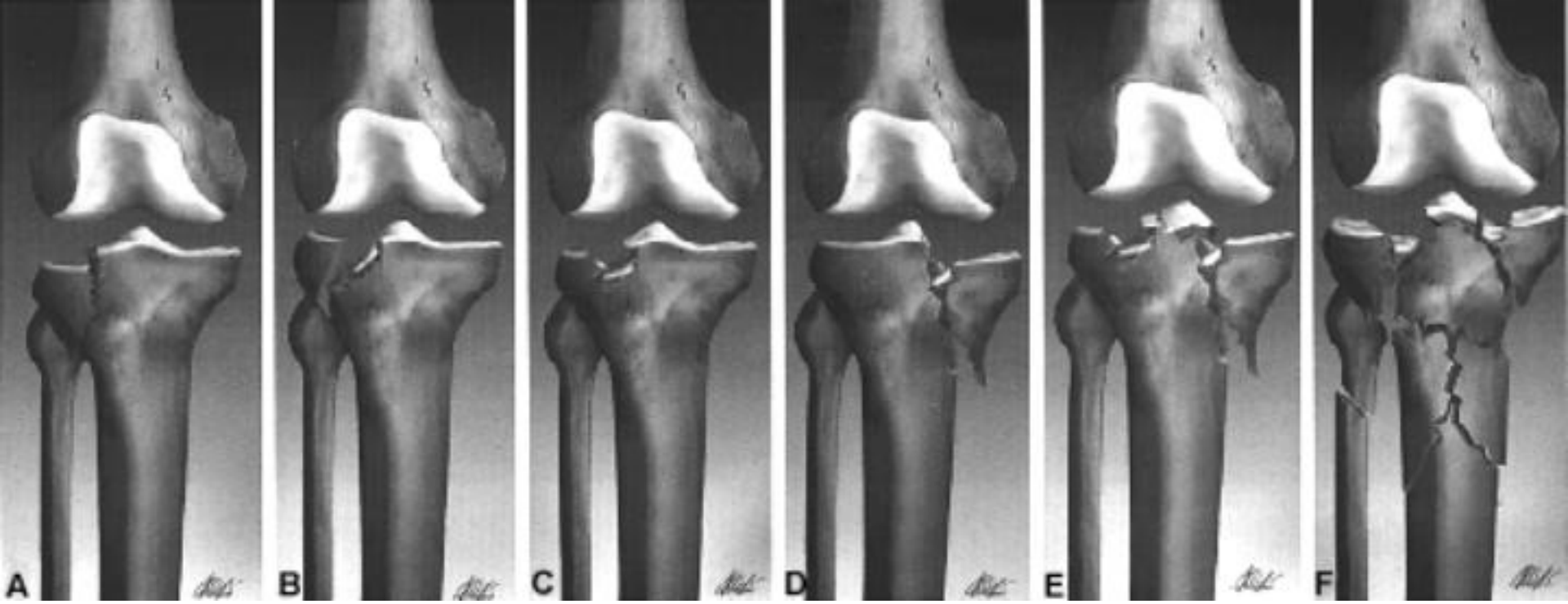
2.Examination

3.X-rays

CT-scan

MRI

CLASSIFICATIONS



Schatzker proposed the classification that groups these fractures into six types:

A is a split fracture of the lateral tibial plateau without articular depression.

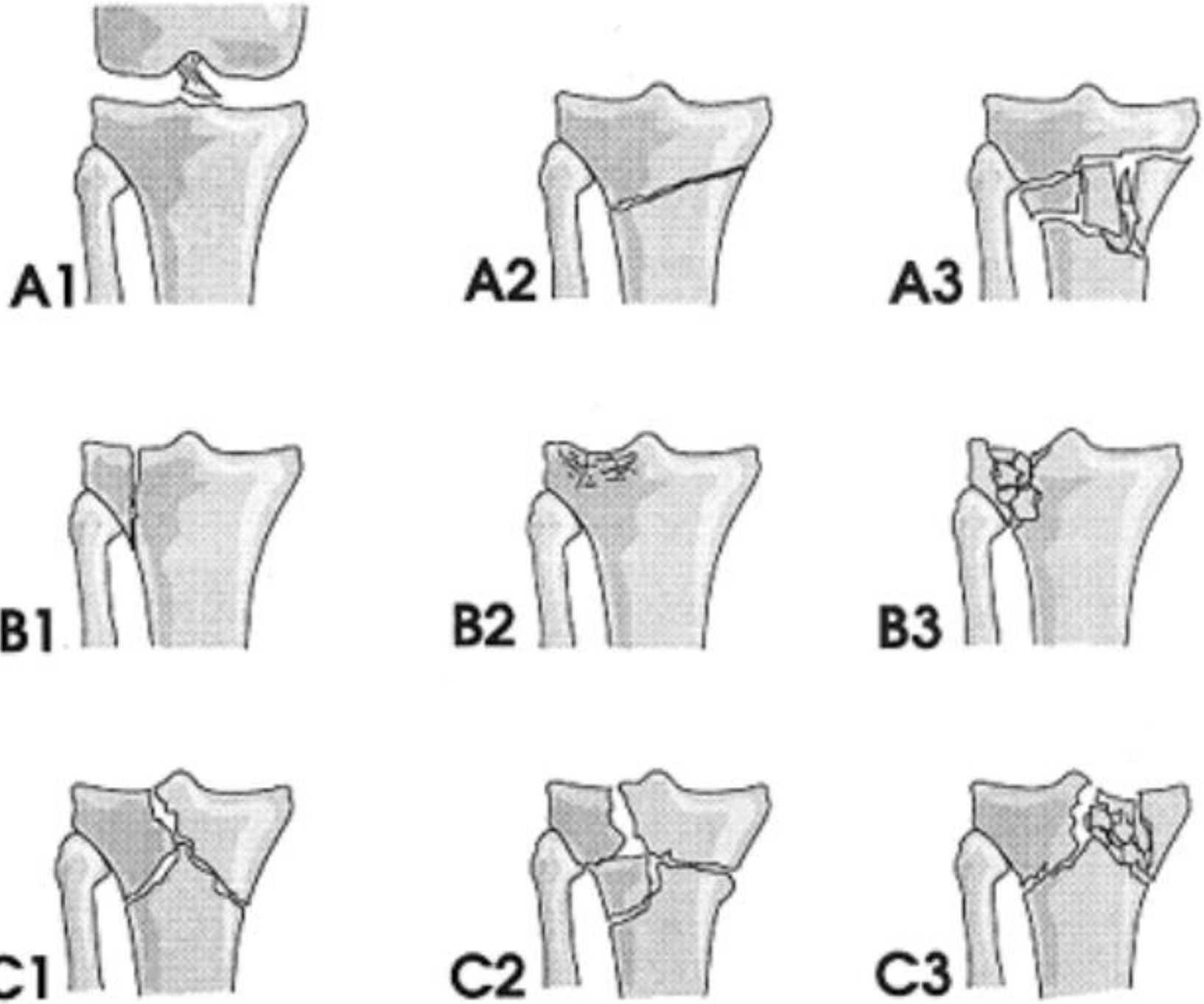
B is a split depressed fracture of the lateral tibial plateau.

C injury is an isolated depression usually central. of the lateral plateau

D is a fracture of the medial plateau.

E is a bicondylar plateau fracture with varying degrees of articular depression and displacement of the condyles.

F is a bicondylar tibial plateau fracture with diaphyseal metaphyseal dissociation


A1
A2
A3
B1
B2
B3
C1
C2
C3

Surgical Treatment

Surgery priorities

- *No infections or soft tissue problems*
- *Stability*
- *Mechanical axis restoration*
- *Articular congruity*

* *Understanding fracture anatomy*.

Understanding fracture anatomy.

- ***Less invasive techniques → stronger emphasis on preoperative planning.***

  X-rays, CT-scans, MRI,Arthroscopy, limited open incision as needed.

* ***Training your mind to convert these spot views into an accurate 3D pictures is very important.***

Arthroscopic assistance

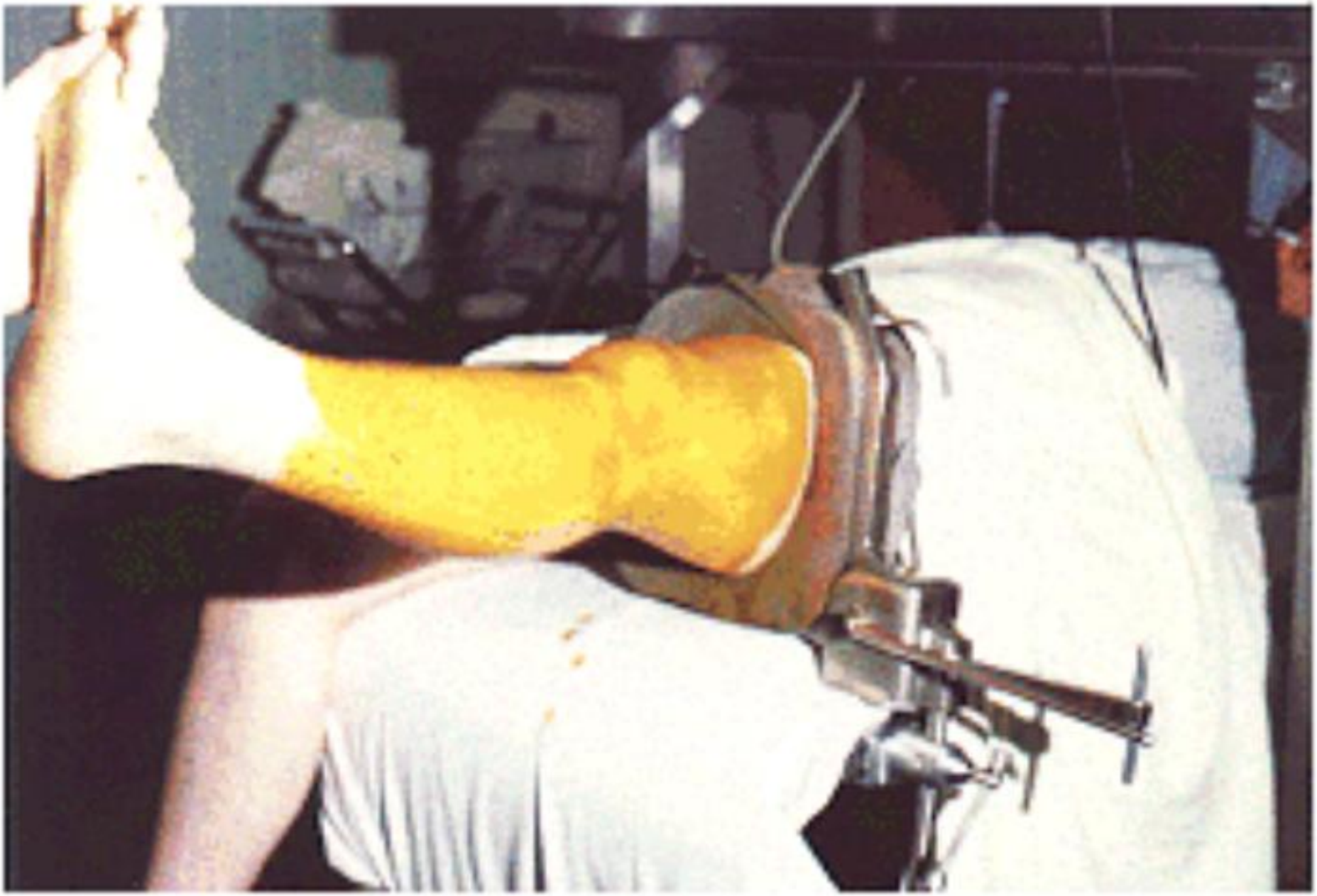
- ***Negatives***

1.↑technical and equipment demands

2. ↑surgical time and theater confusion

3. Arthroscopy complications

4. Fluid extravasation/ compartment syndrome.

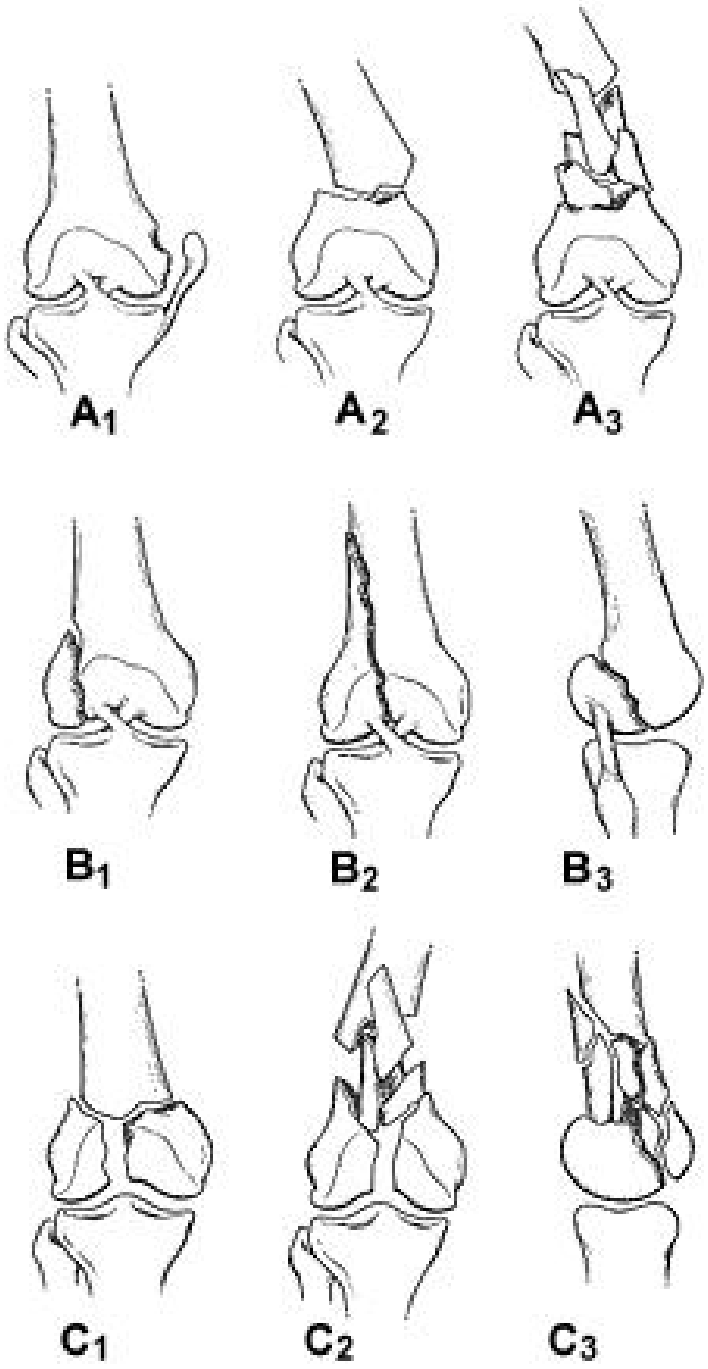


Arthroscopic assistance

- ***Positives***

1. ***Improves visualisation of intraarticular soft tissue pathology.***
2. ***Most helpful in the lower energy types – I, II, III***

Intercondylar Fractures Distal Femur



Classification of supracondylar fractures, identify three general types, each with three subtypes, based on radiographic appearances

surgical decision-making

(1) patient age
(2) the patient's ability to walk
(3) the degree of osteopenia,
(4) the degree of comminution
(5) the condition of the soft tissues
(6) the presence or absence of open wounds
(7) involvement of the joint surfaces and
(8) fracture - isolated injury or one of many injuries.

Implants

- 95° Condylar Blade Plate..
- Dynamic Condylar Screw.
- Condylar Buttress Plate.
- Reamed Intramedullary Nails.
- Supracondylar Femoral Nail - retrograde intramedullary nail
- Flexible and Semi-Rigid Nails
- External Fixation - infrequently;open fractures, particularly type IIIB injuries
- LISS (Less Invasive Stabilization System)
- LCP (Locking Compression Screw)

MIPO (Minimally Invasive Plate Osteosynthesis) - using standard implants

- **Surgical techniques which preserve blood supply,or "biologic fixation" techniques to:**

  a) Improve rates of fracture union

  b) ↓ bone grafting

  c) ↓ incidence of complications – infection and refracture

MIPO

- Basic change in the approach to fracture – these techniques maintain alignment by bridging the fracture without compression
- Minimal exposure and soft tissue stripping and vascular pedicles preserved with fixation at a distance to the fracture side.
- Reported techniques of direct articular reduction and indirect metaphyseal reduction(especially distal Femur).-Better than classic methods.

LISS (Less Invasive Stabilization System) in distal Femur

- Anatomically contoured condylar plates to which the screws interlock
- Biomechanical. Stability is based on the angular stability of the plate screw interface.
- Biological. Preservation of the soft tissue envelope around the fracture.
- Improved exposure of the distal articular surface (Femur).

LISS (Less Invasive Stabilization System) in Proximal Tibial fractures

- **Indications**
- **Proximal Tibial Fractures**
- **Tibial plateau with bicondylar involvement**

Evolution of Internal fixation

- Open anatomical reduction & rigid stable fixation (compression plating) absolute stability–primary bone healing
  = conventional technique–compression principle (ORIF)

- Less invasive "biological plating": indirect reduction & elastic bridge plating
  relative stability–secondary bone healing

- MIPO: minimally invasive plate osteosynthesis
  closed indirect reduction & elastic bridge plating with a submuscularly/subcutaneously inserted internal fixator (eg, LCP, LISS)
  = bridging technique–internal fixator principle

- Conventional plates (DCP, LC-DCP) and screws
- Plates with locking head screws (LISS, PC-Fix)
- Locking compression plates (LCP) with conventional or locking head screws

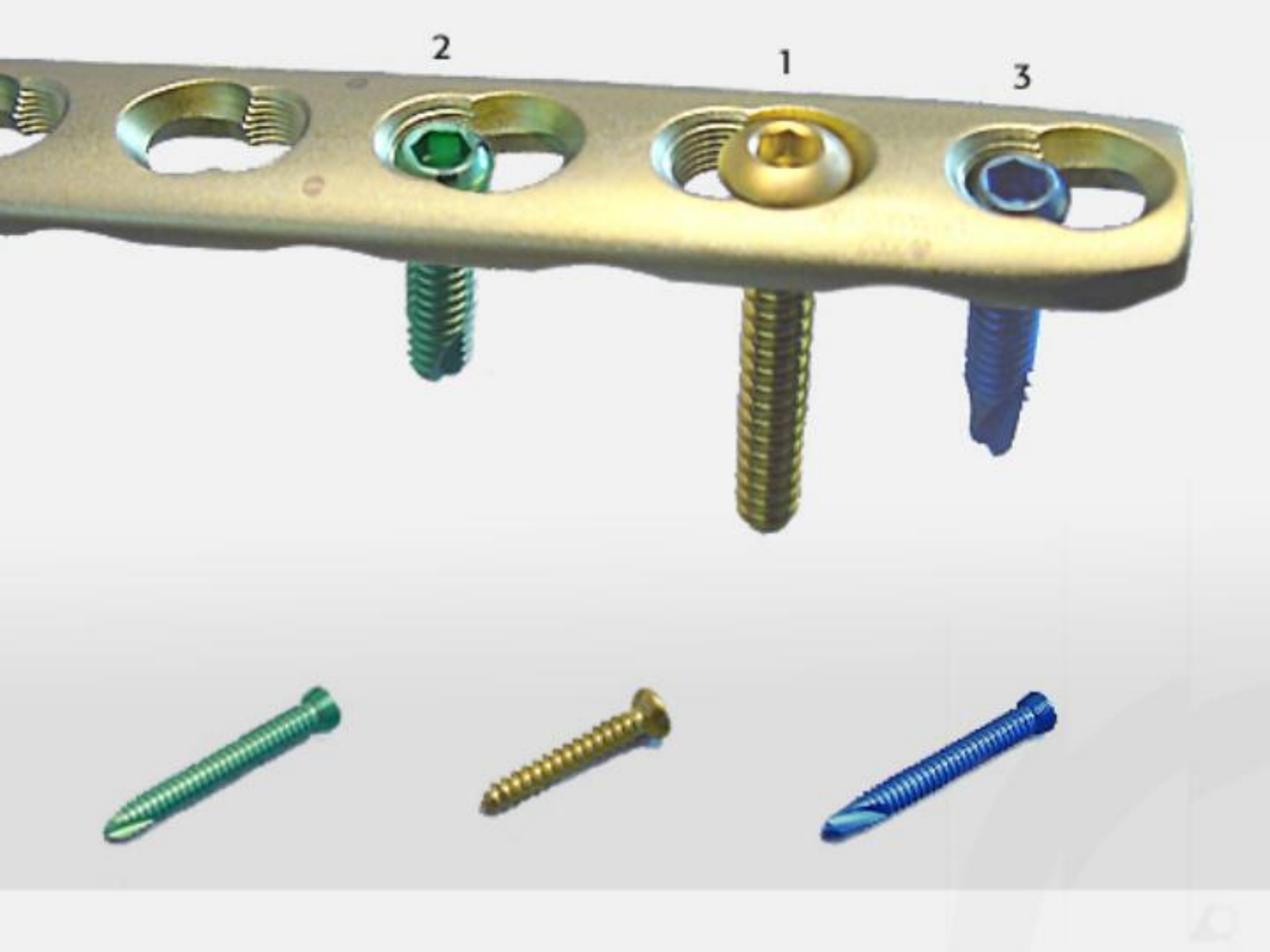
LCP is indicated as conventional plate osteosynthesis and as an alternative method to intramedullary nailing and other fixation techniques especially in case of:

- Extension of the fracture into the joint.
- Metaphyseal fractures.
- Narrow as well as very large medullary canal.
- Pre-existing bone deformity.
- Shaft fractures in children.
- Polytrauma, severe brain or thoracic injury.

- Conventional technique—compression principle.
- Bridging technique—internal fixator principle.
- Combination technique—compression and bridging.

- Direct reduction
  (precise anatomical reduction)

- Indirect reduction
  (precise reduction and alignment are not necessary, it requires meticulous planning)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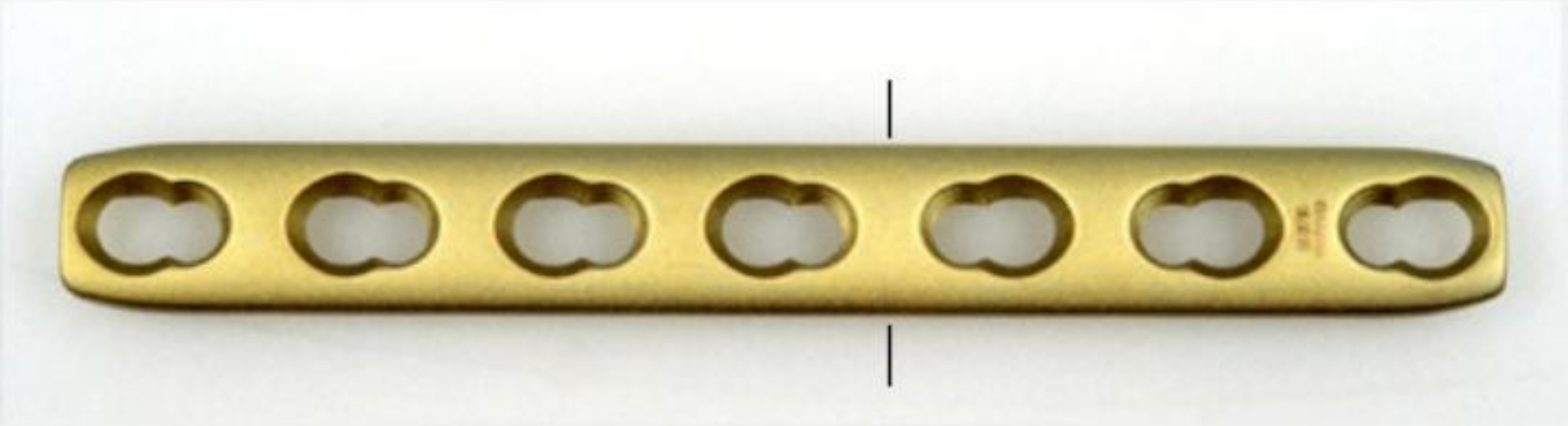

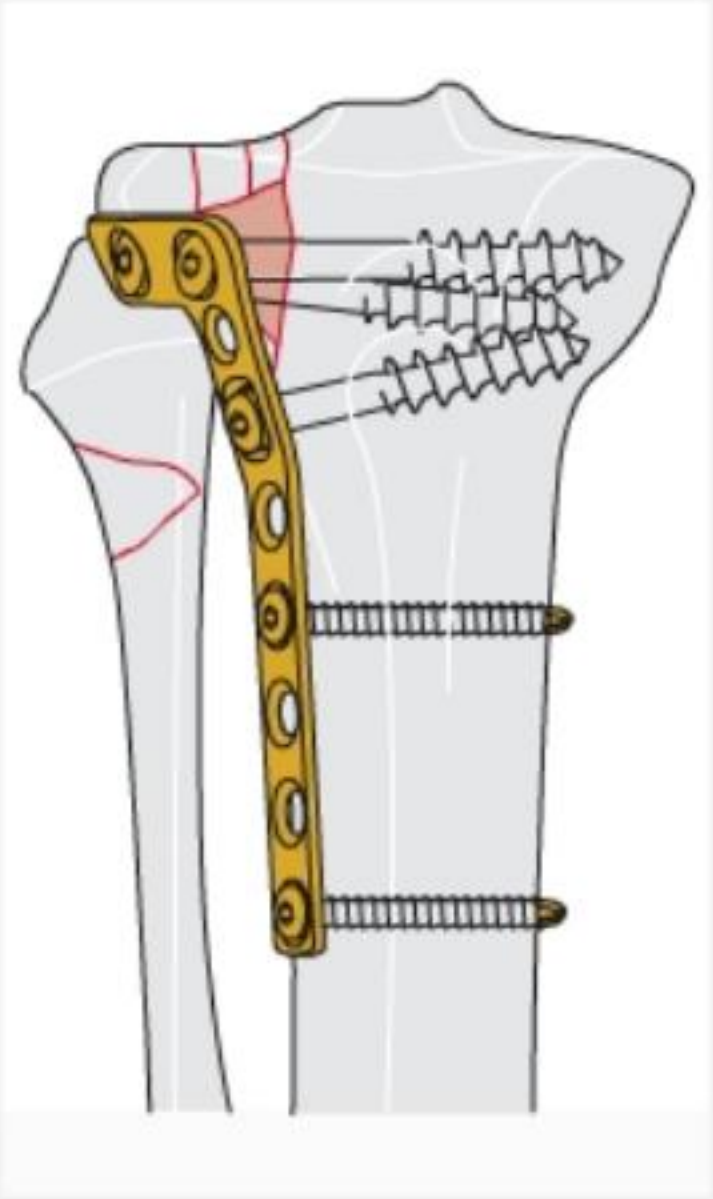

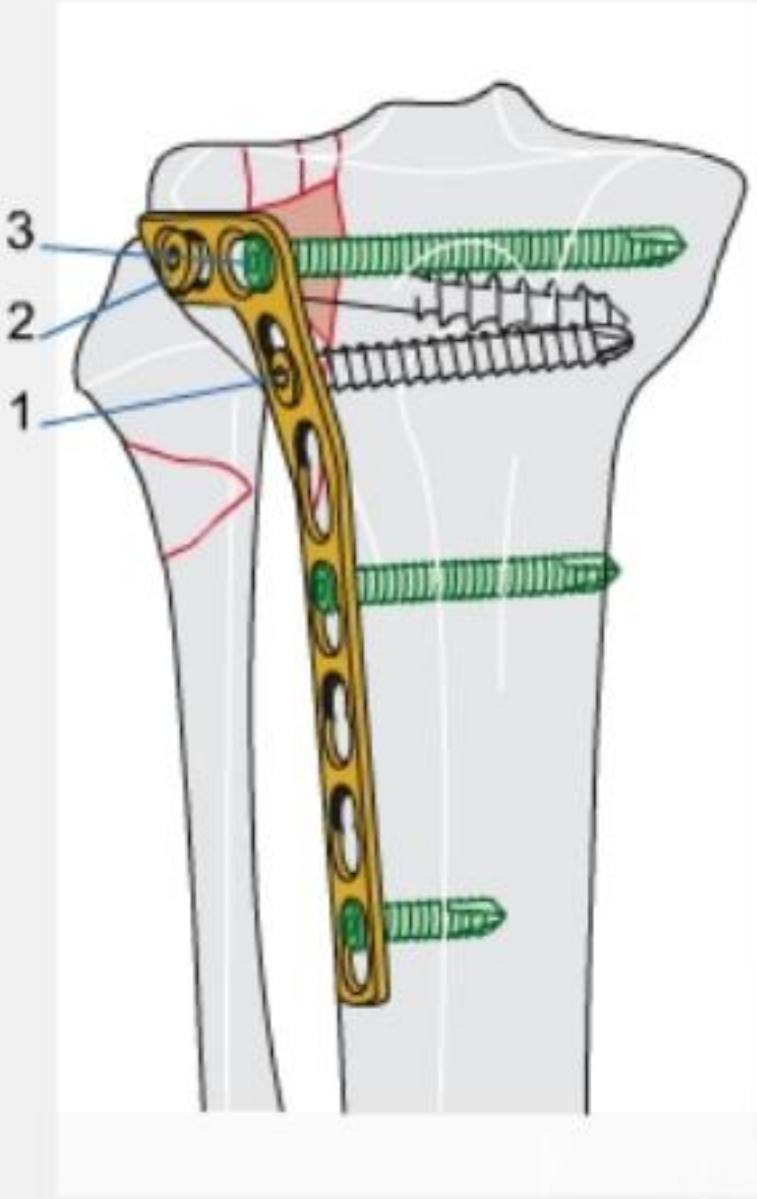
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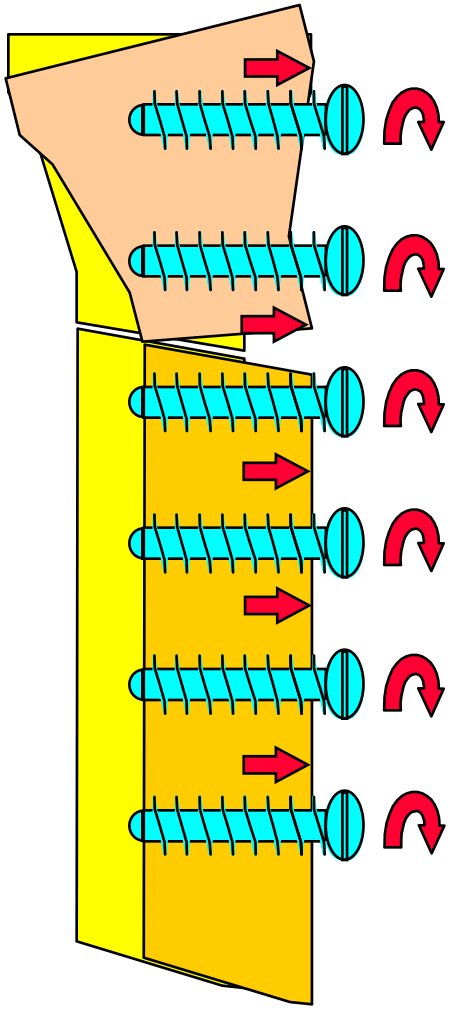
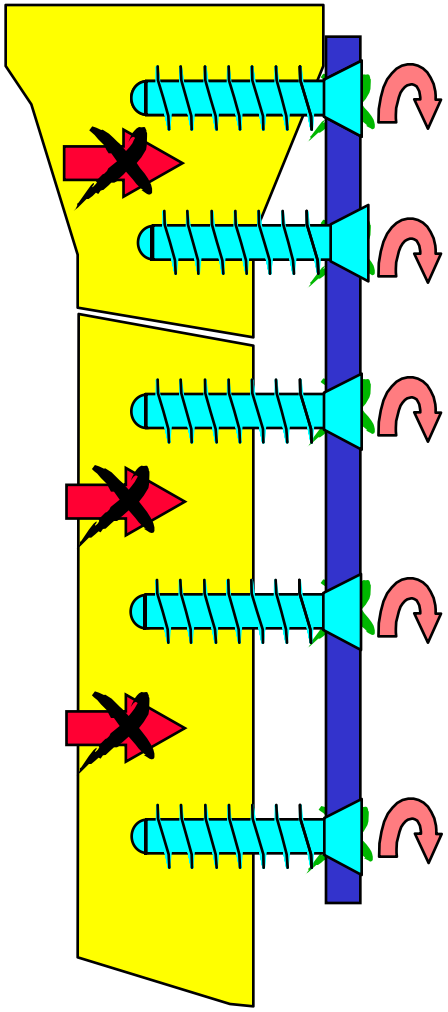
Comparison: Primary Loss of Reduction

Standard Plate

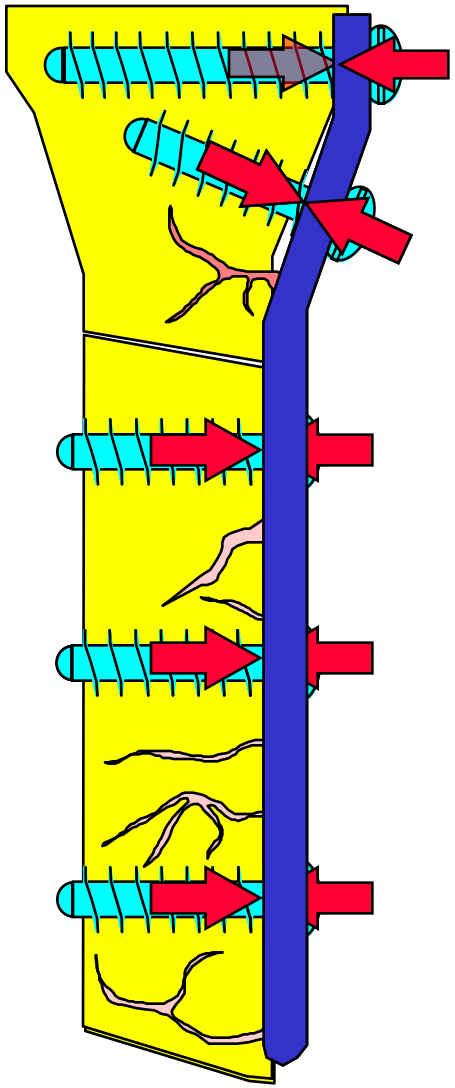


Locked Internal Fixator



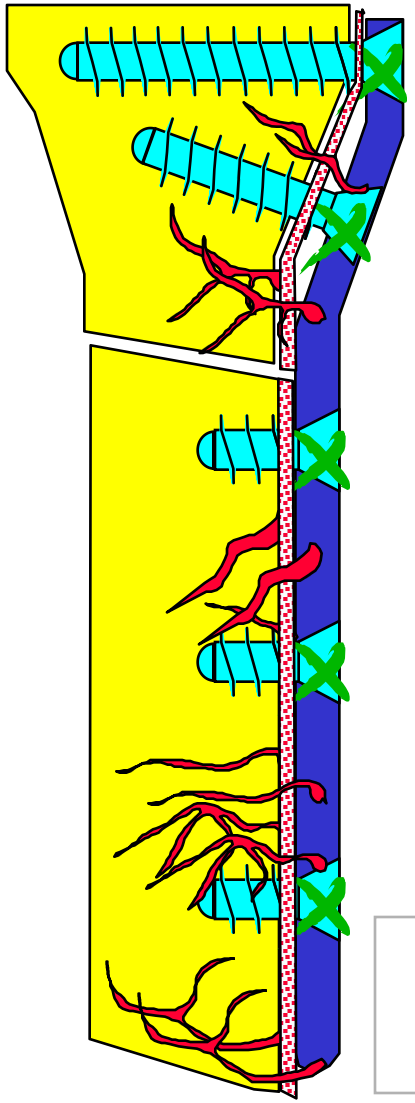
Comparison: Blood Supply to Periosteum

Standard Plate



Plate

Locked Internal Fixator



LIF

Case 1

- Mr N. 30 yrs old

Motorbike accident. 22/07/01

Severely comminuted fracture Tibial plateau and metaphysis. Very swollen leg.

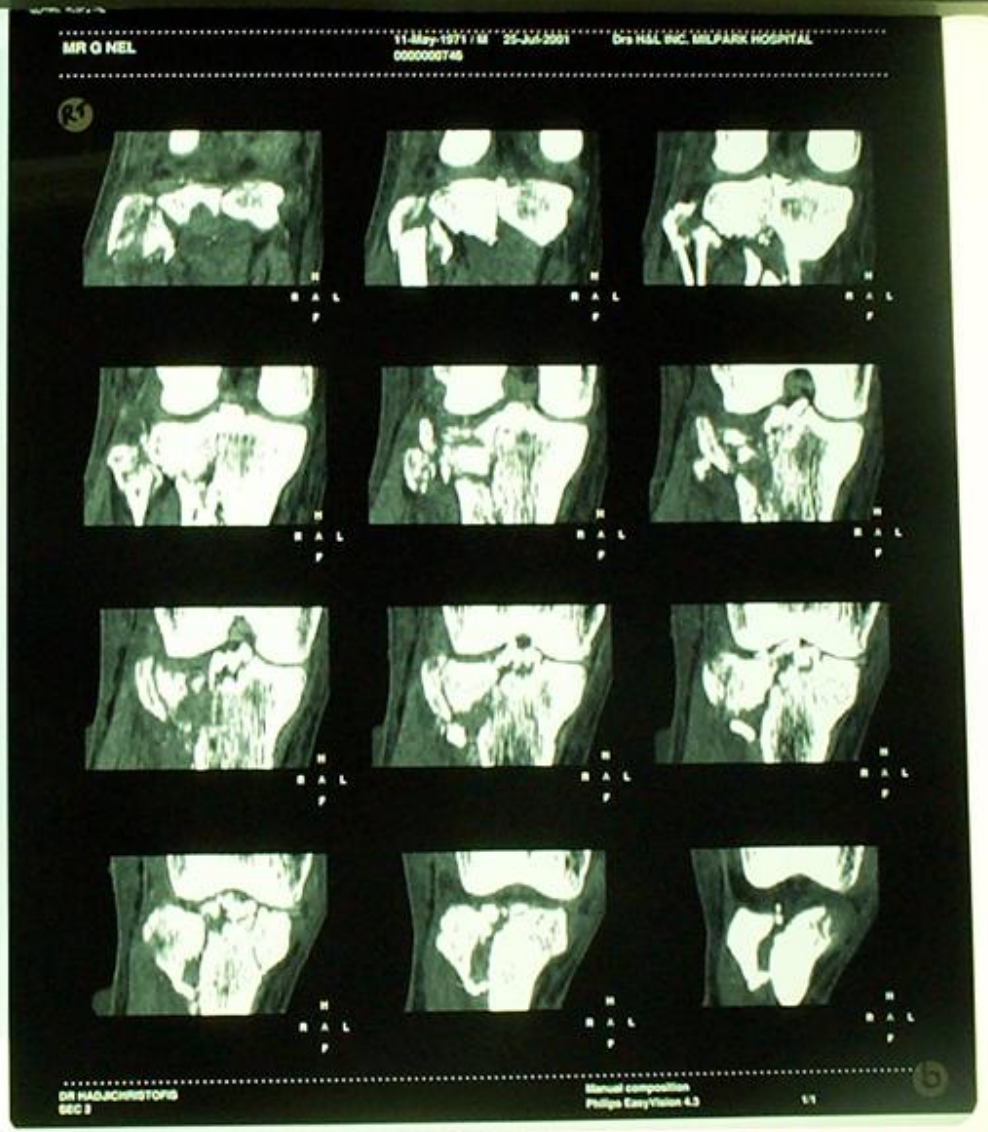
Calcaneal traction

ORIF and bone graft +scope 31/07/01

Removal of plates and screws + scope 31/05/02


2003. 6. 17


R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11-May-1971 / M 25-Jul-2001
Drs H&L INC. MILPARK HOSPITAL
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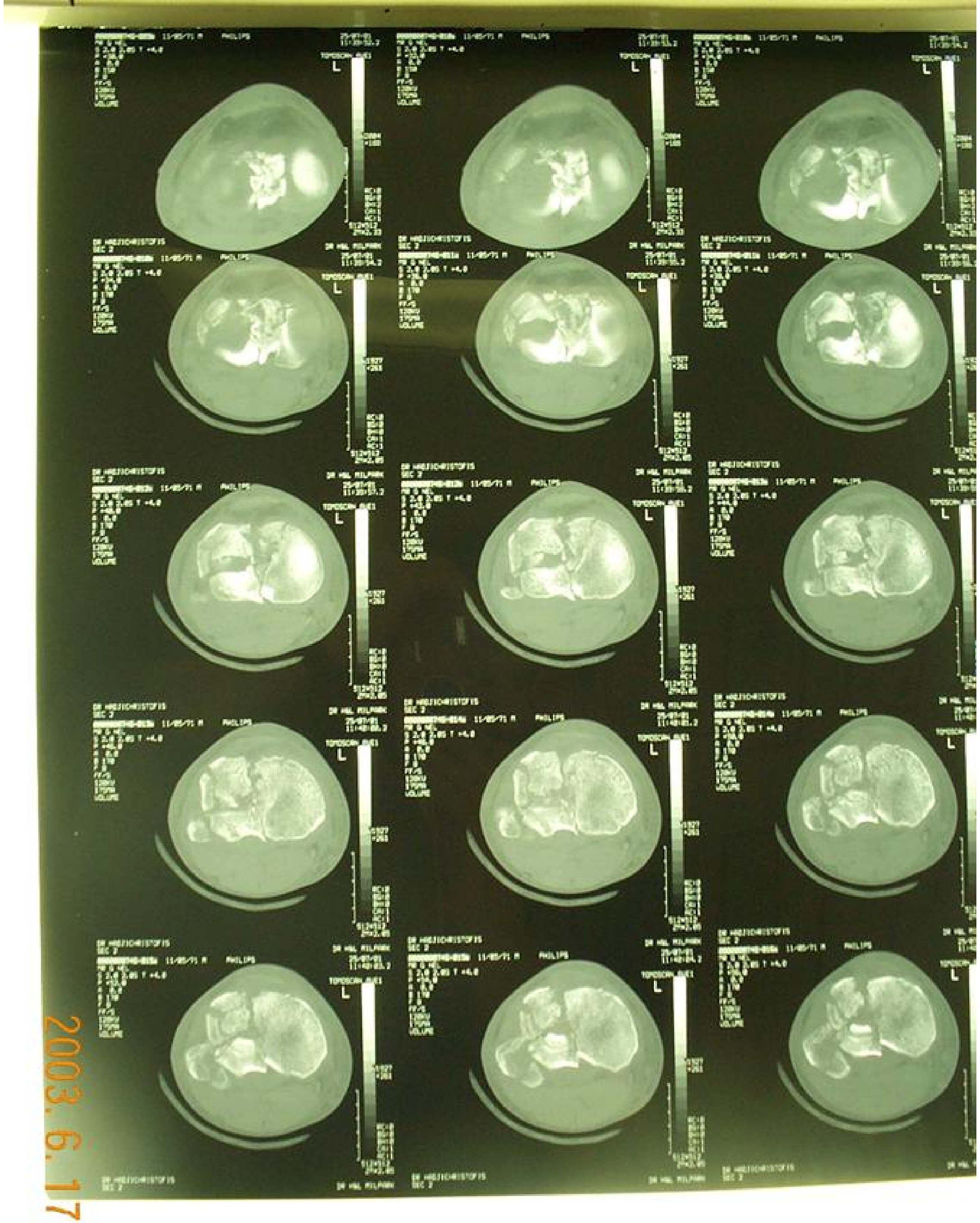
DR HADJICHRISTOFI
SEC 3
Philips EasyVision 4.3

2003. 6. 17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Feldene
Diclofenac sodium 50 mg
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2001. 12. 4


LE JOINT
1999.


1999. 1. 31

Mr Nel 31/05/04

2004. 10. 28

Case 2

- **Mr M. 39 yrs old. Security officer**
- **Fracture – dislocation Lt knee Lateral femoral condyle driven into the Tibial plateau 21/10/04**
- **ORIF 22/10/04**


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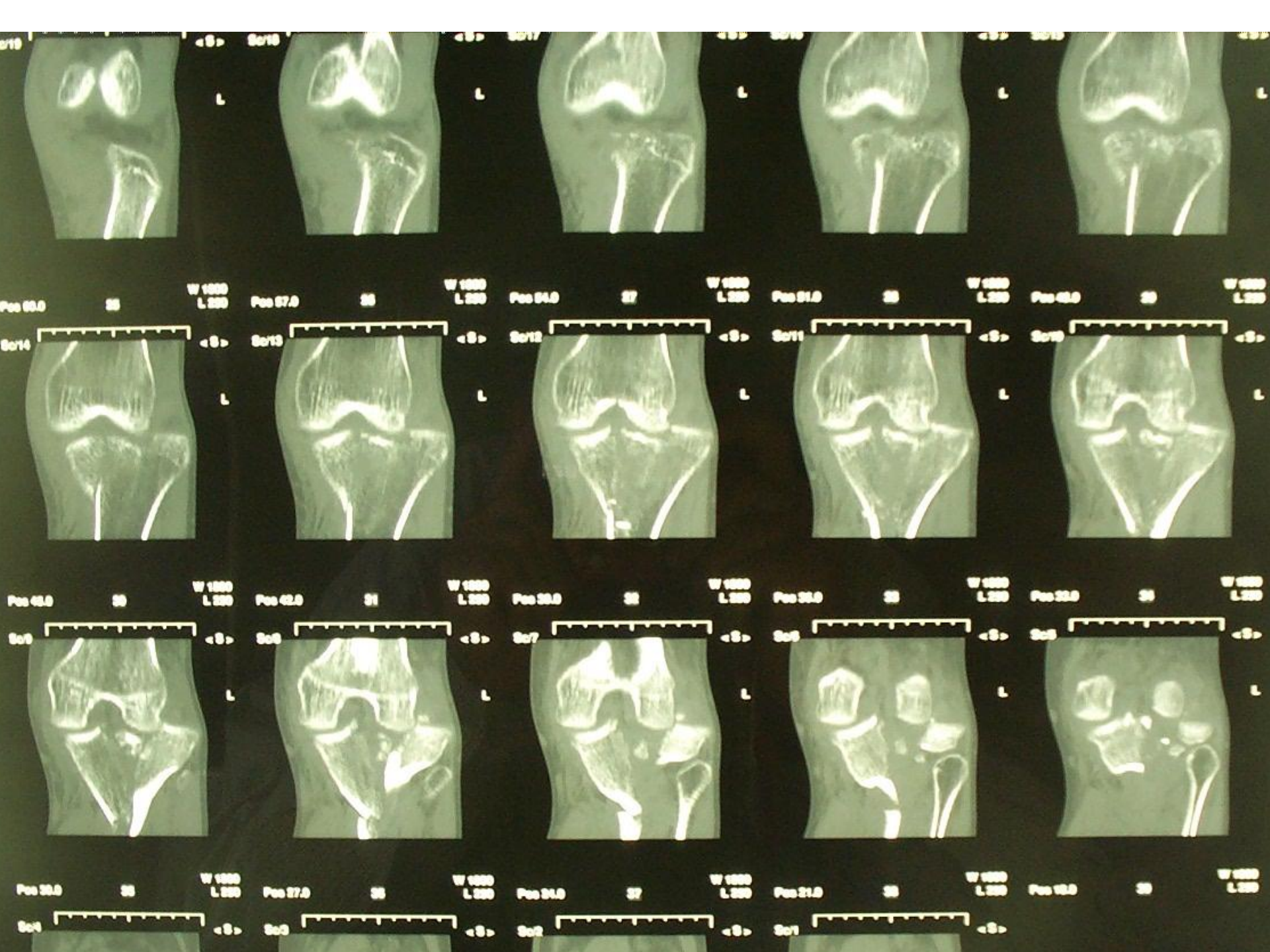

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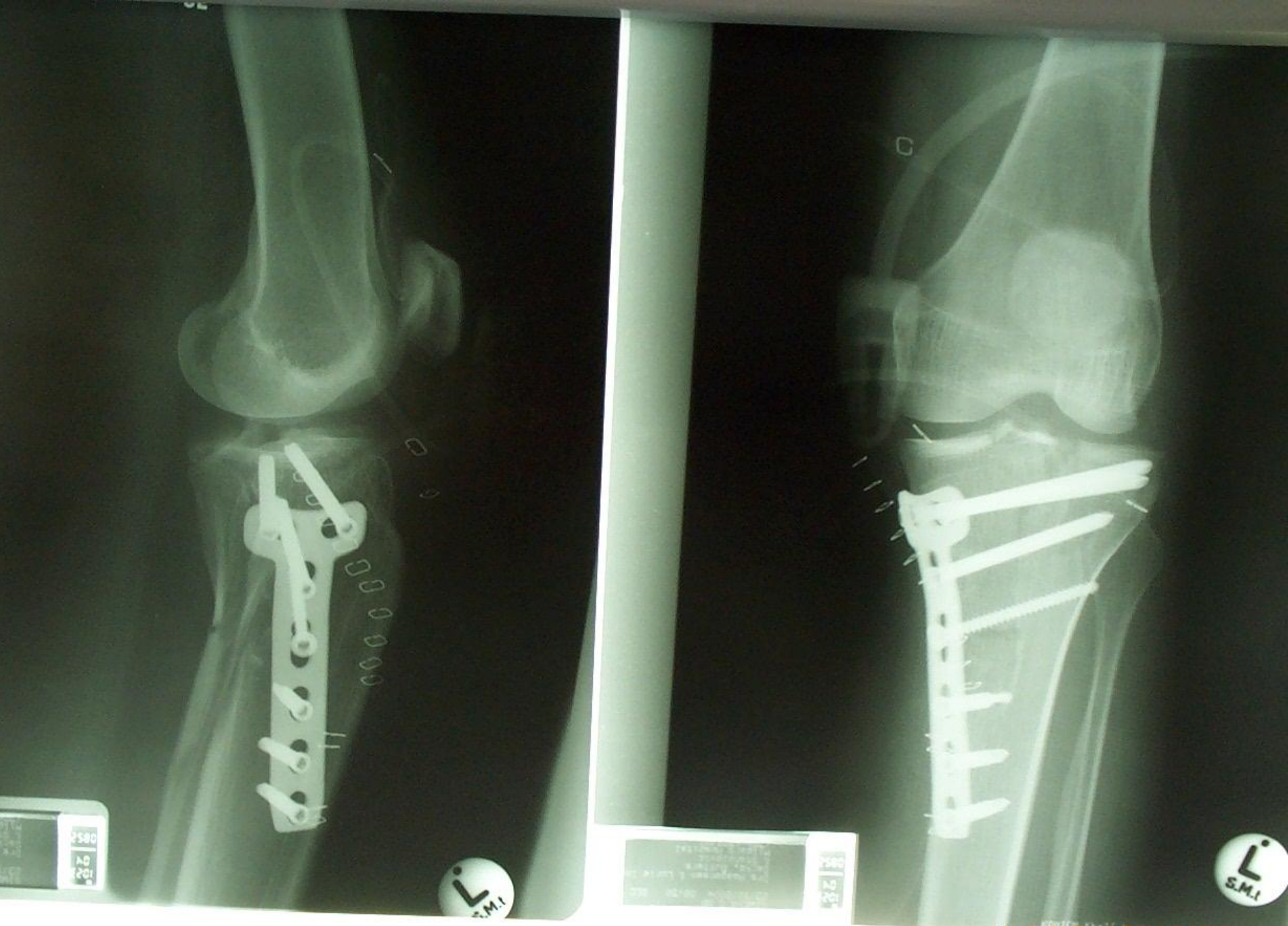
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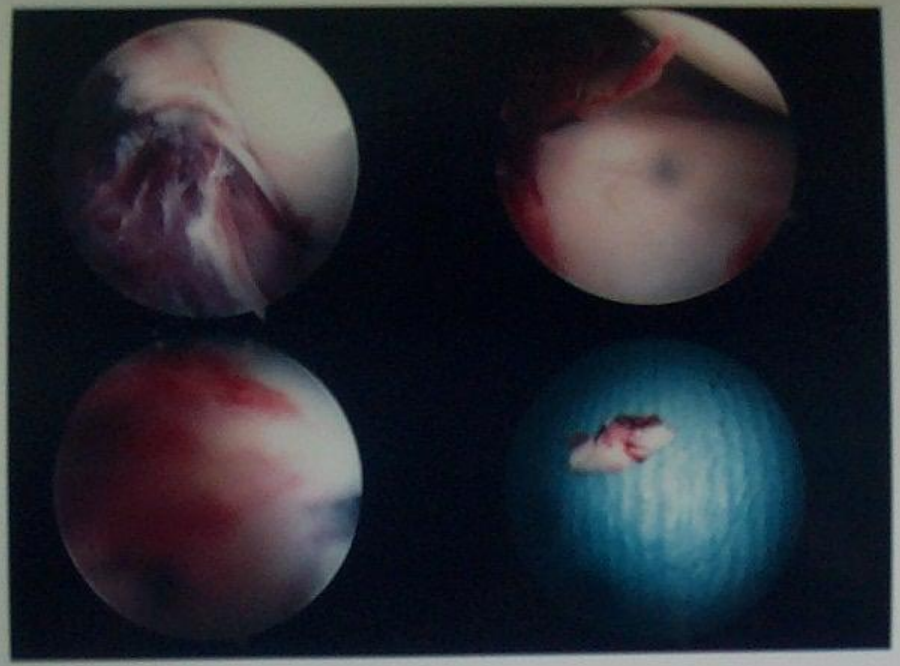


1999. 3. 15

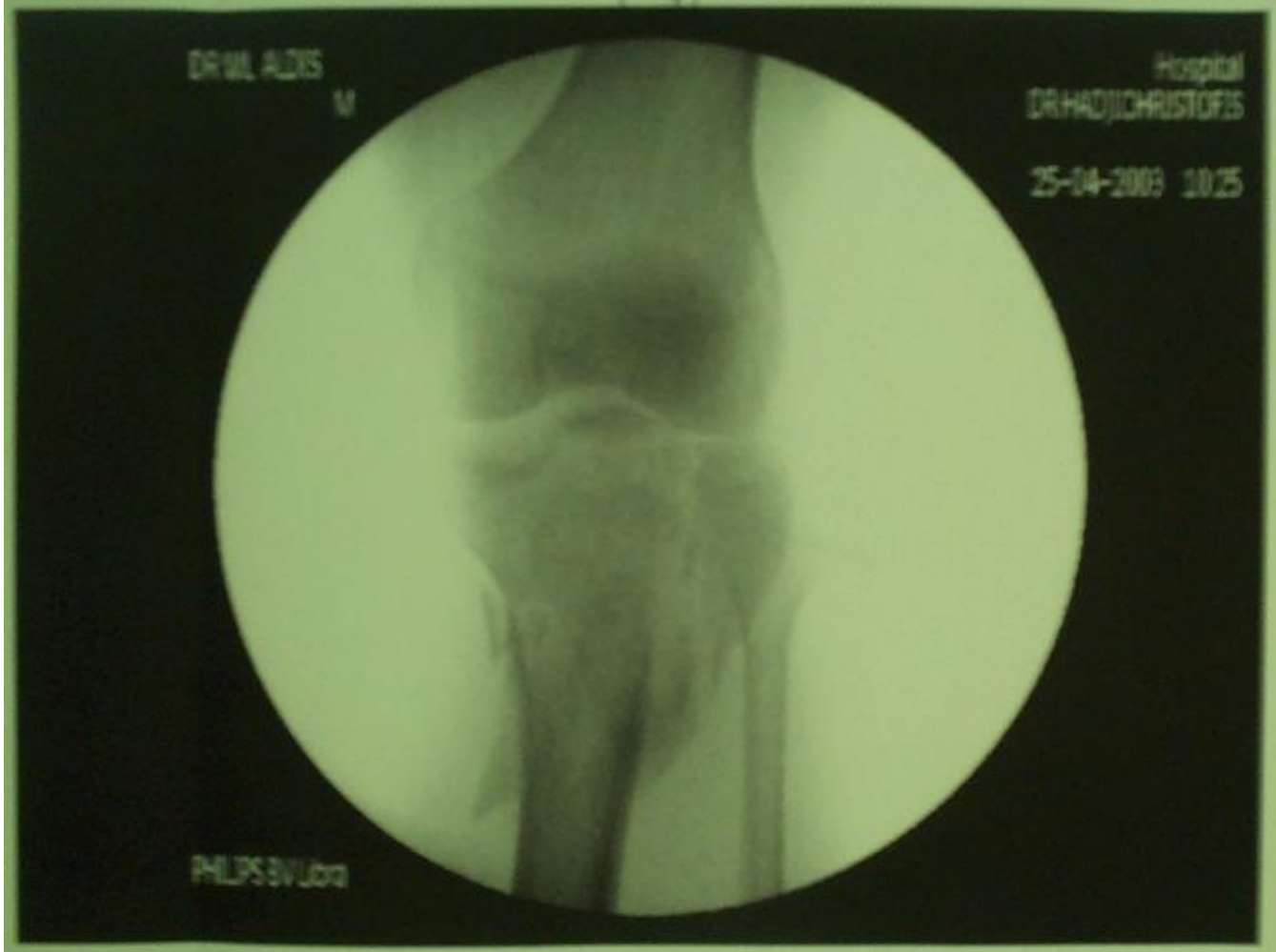

2004. 10. 27


2004. 10. 27


2004. 10. 27

Case 3

- Mr A. 59 yrs old Med. Prof from USA working for WHO in Malawi.
- MVA 17/04/03 Arrived Milpark 19/04/03
- Polytrauma Chest contusion; Laparotomy – Liver laceration; Dislocation Rt knee; Comminuted fracture Tibial plateau Lt;
- Severe blisters Lt leg and knee
- ORIF 25/04/03. Removal 07/01/04


Hospital
DR HADJICHRISTOFIS
25-04-2003 10:25


Hospital
DR HADJICHRISTOFIS
25-04-2003 10:42

1999. 1. 31


DR WL ALEXIS
M
Hospital
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25-04-2009 10:25
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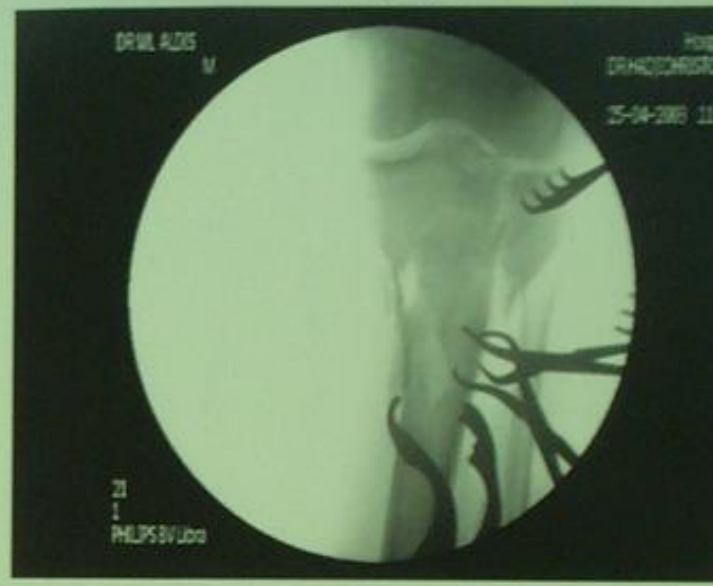
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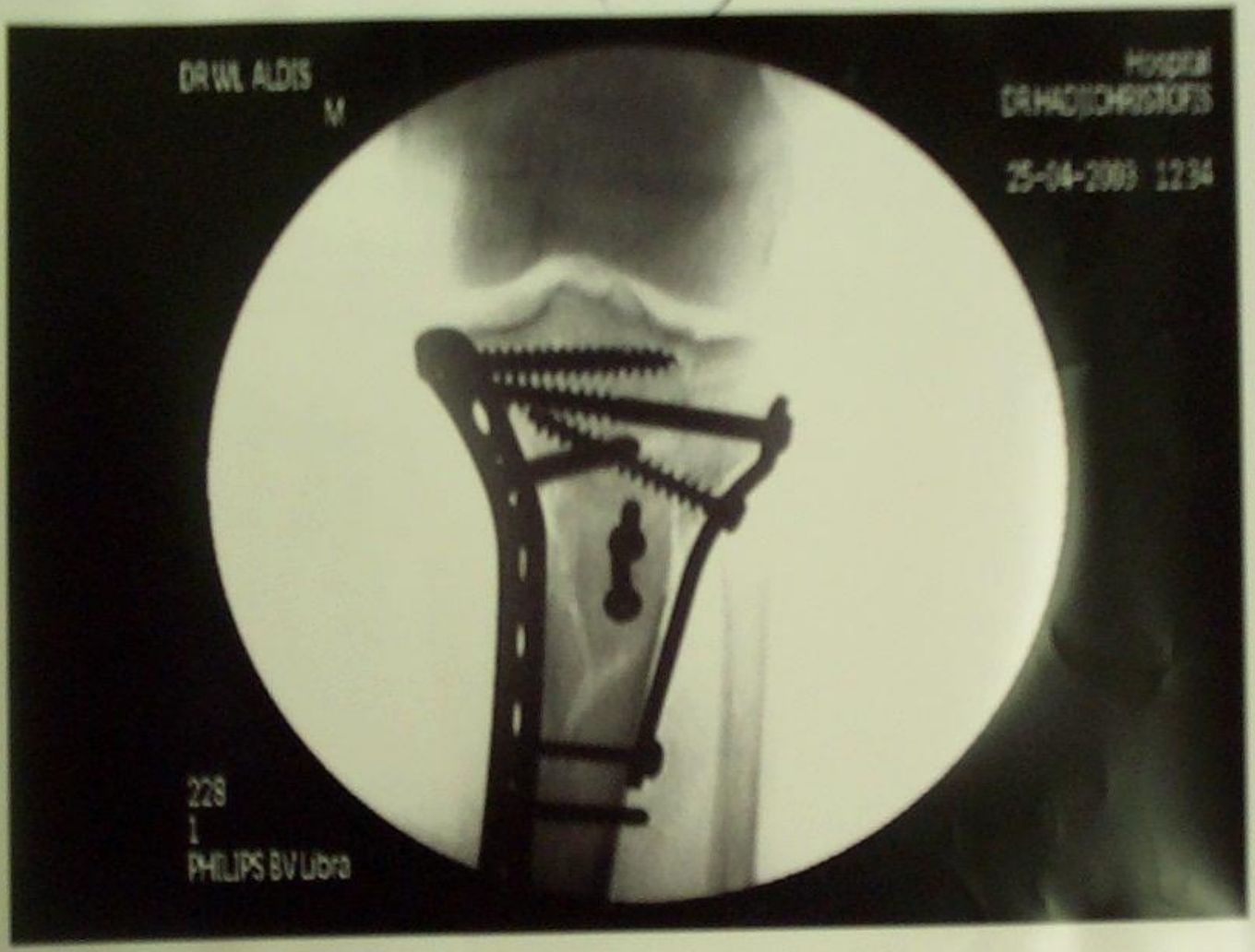
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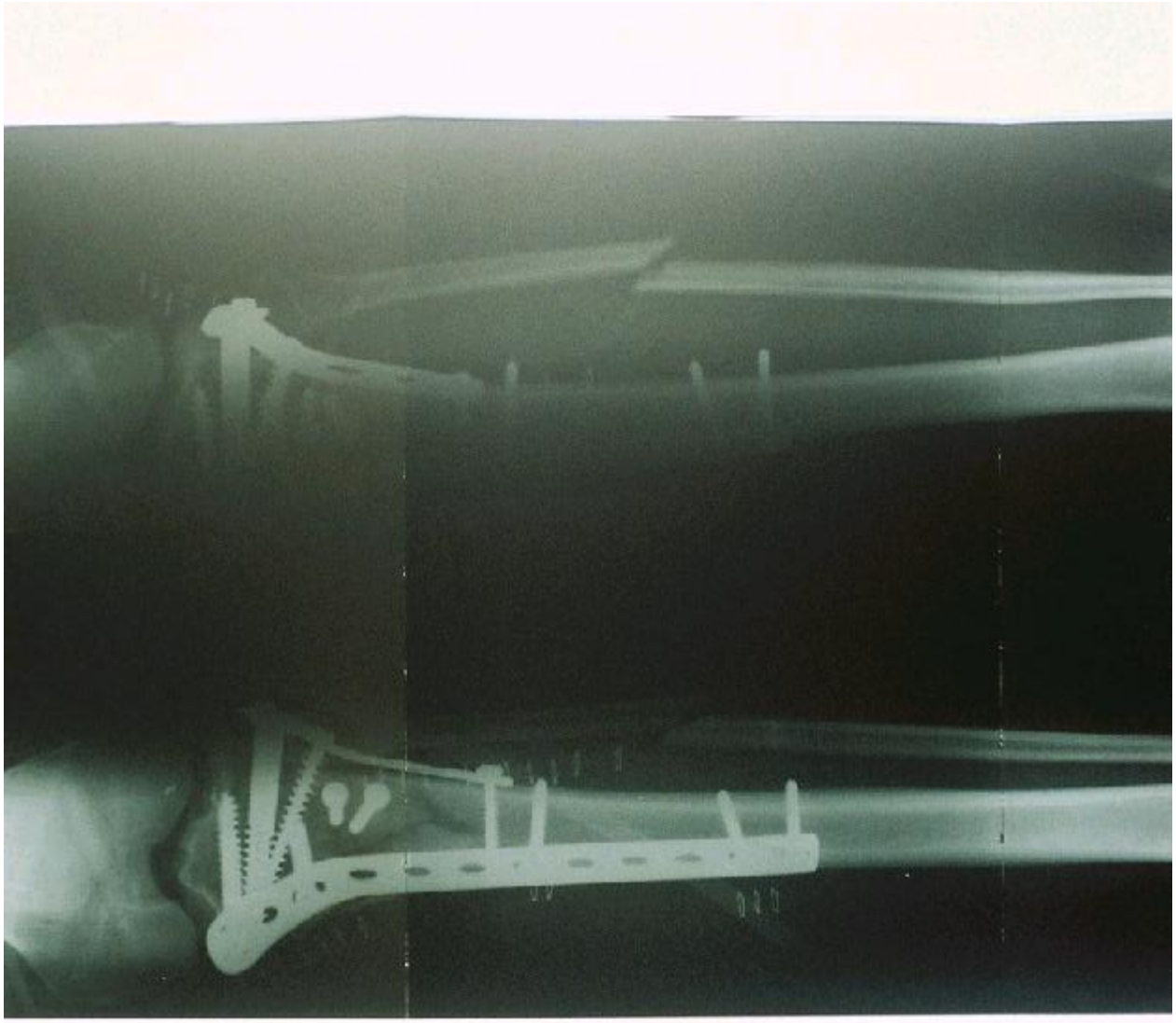

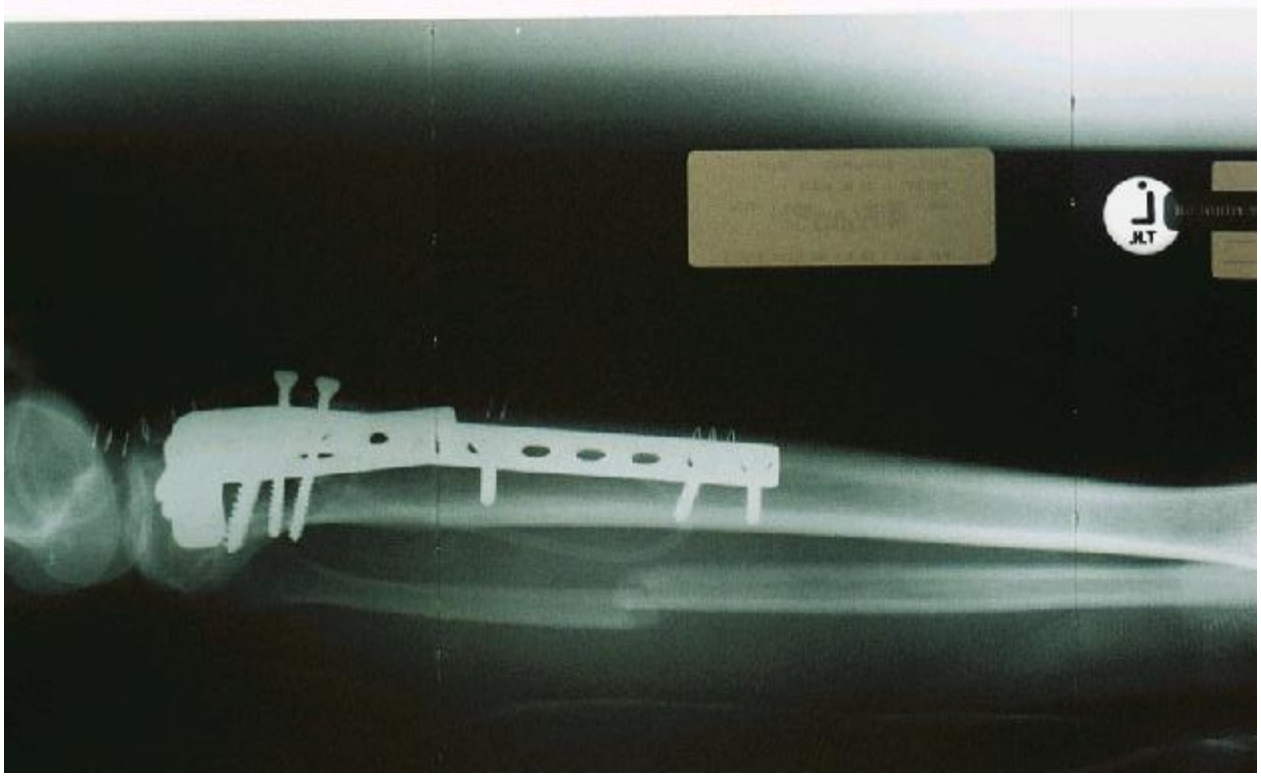
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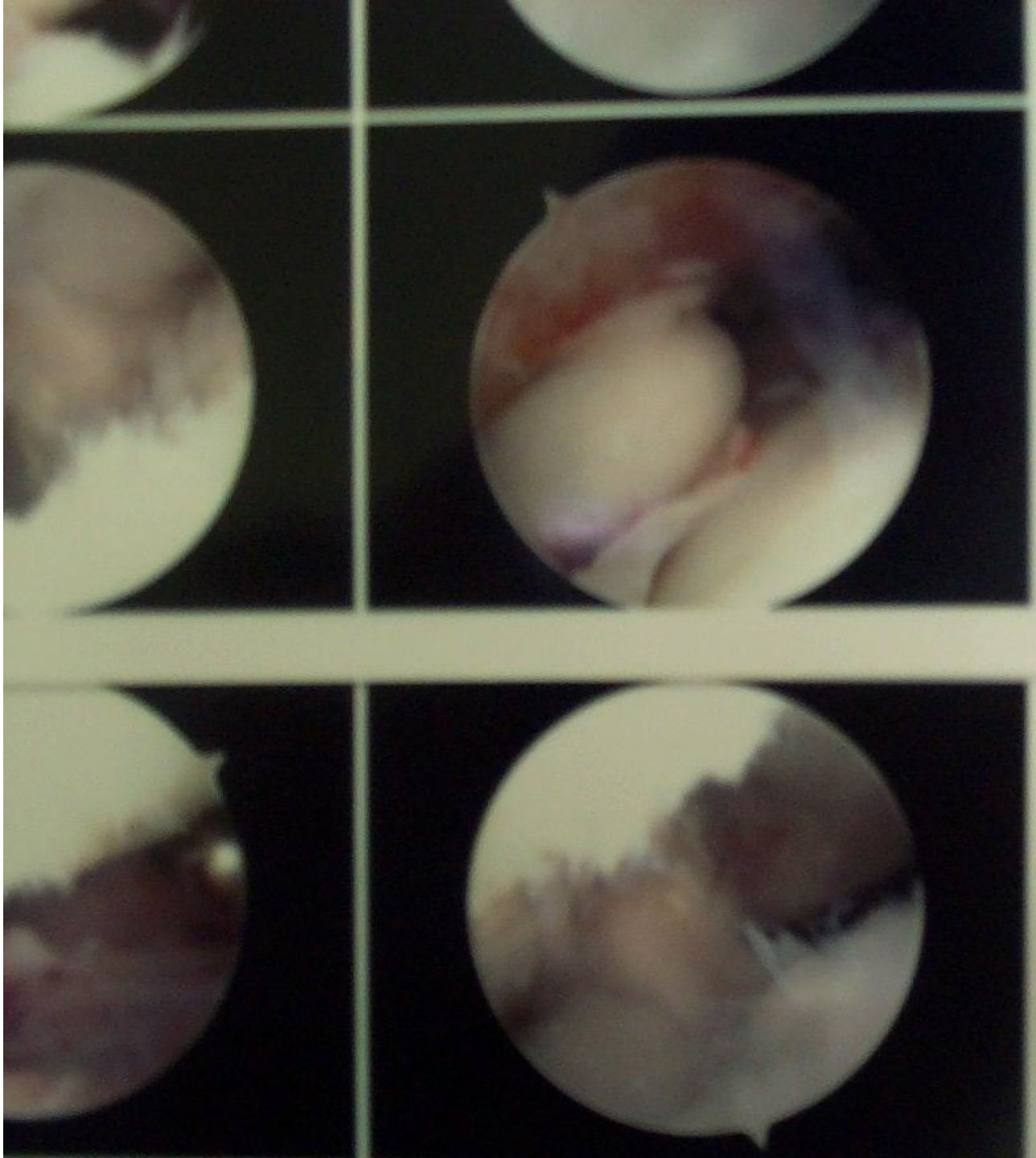
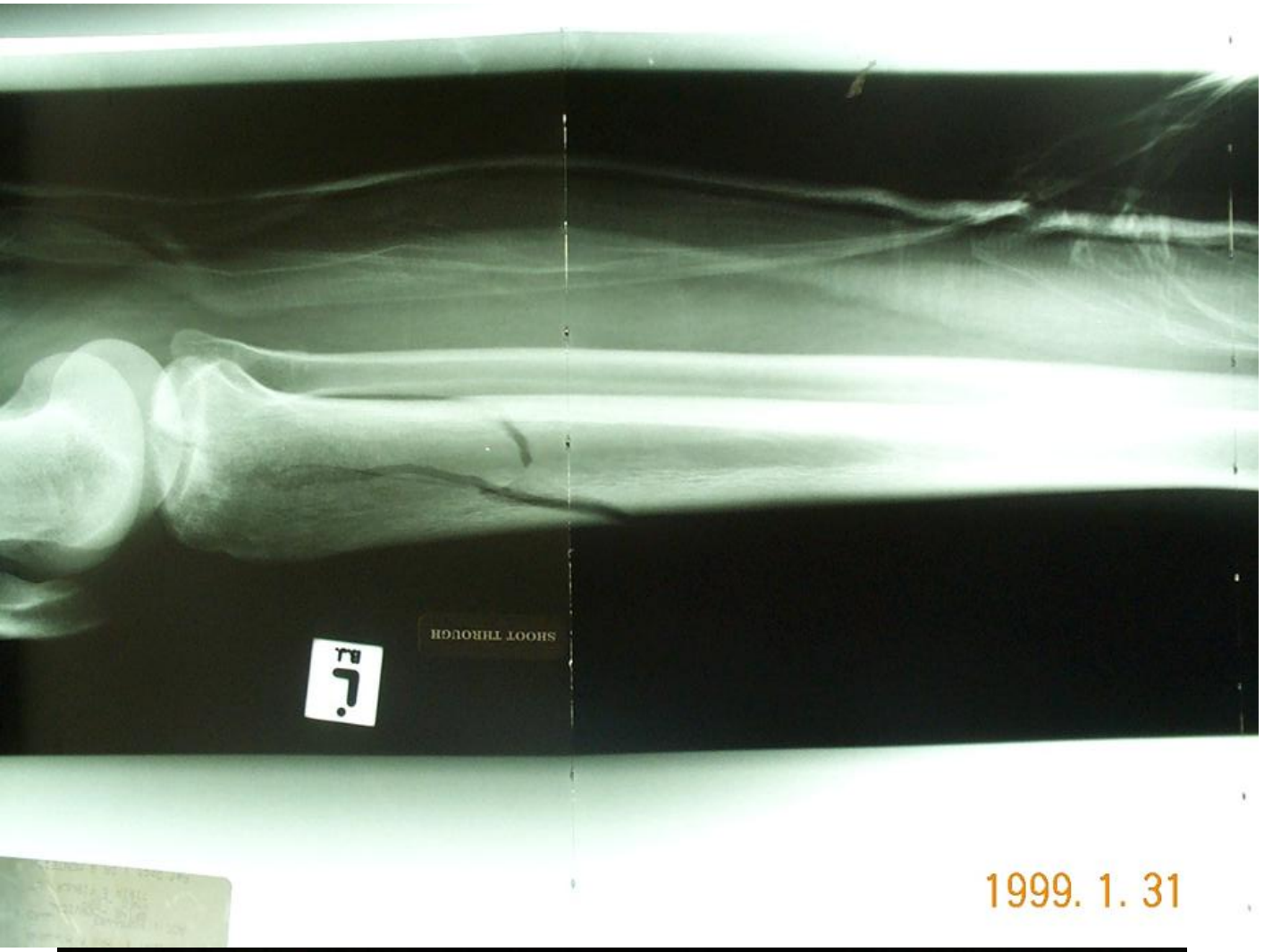


Case 4

- **Mrs M. 43 yrs old. MVA.**
- **Fracture Tibial plateau schatzker 6.**
- **Very unstable fracture**


SHOOT THROUGH
1999. 1. 31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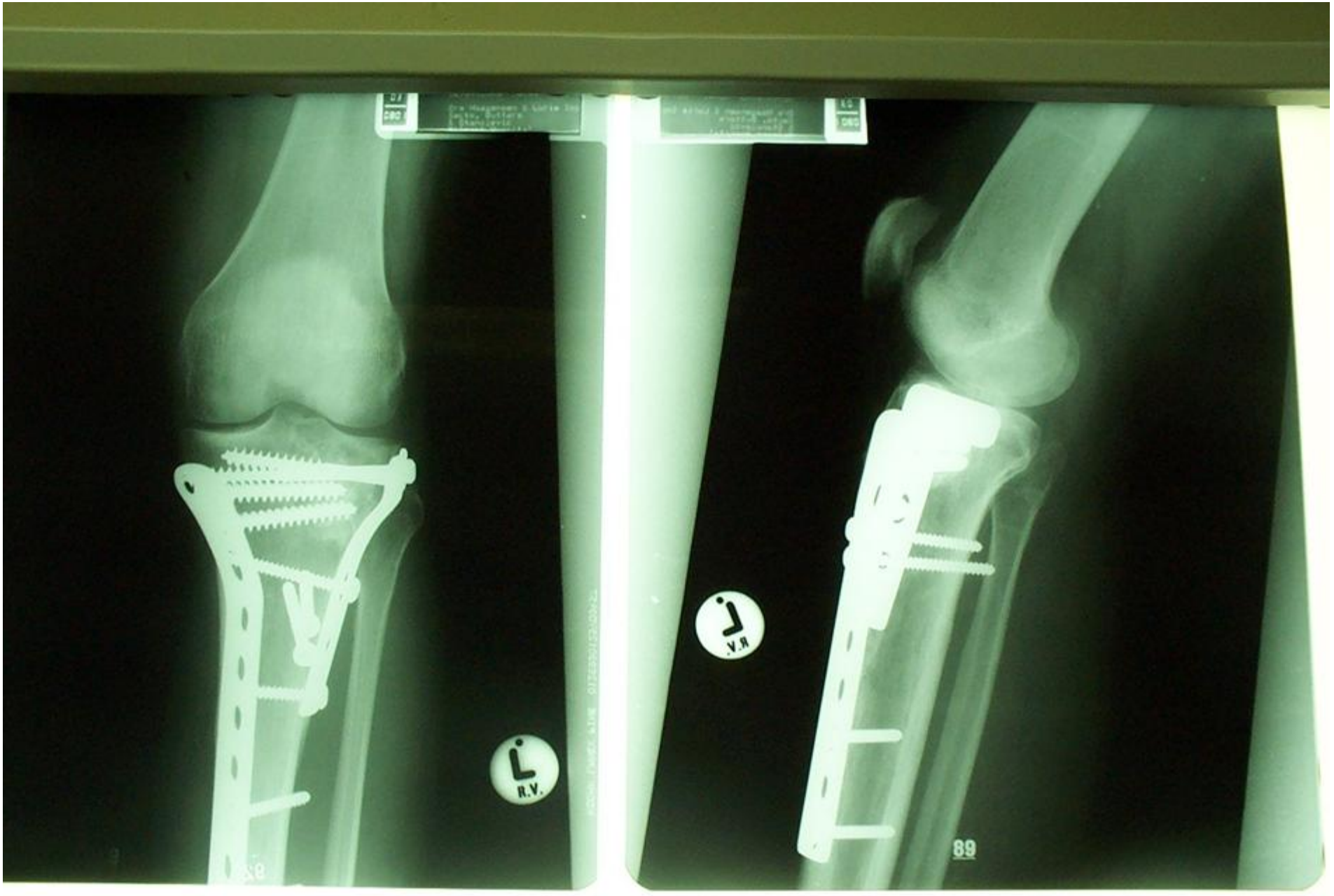


Mrs Mok.

1999. 1. 31


THE ANKLE JOINT
2003. 9. 2


2003. 9. 2

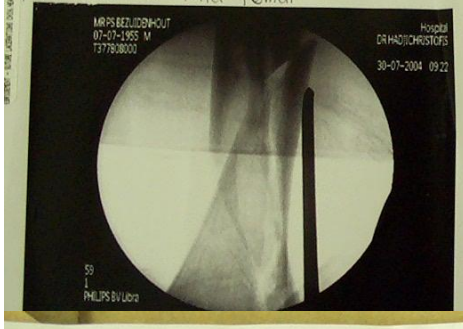
Case 5

- Mr B. Aeroplane crash 08/07/04
- Polytrauma. Injury Lt shoulder; Fracture Pelvis; Fracture Rt Radius – Ulna; Fracture Lt femur with Perforating wound Lt knee; Comminuted fracture Talus; Compartment syndrome Lt thigh
- Extensive fasciotomy +Ext. Fix 08/07/04
- Exchang of fixator to LCP – 30/07/04

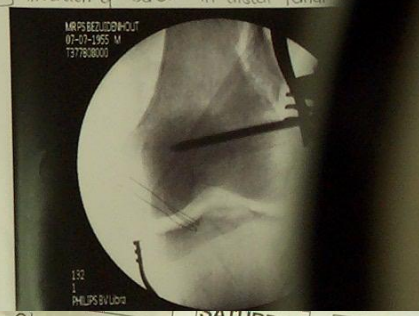

PHILIPS BV Libra
2004. 10. 28


2004. 10. 28

2 Control AP Mid-femur



4 Insertion of screw in distal femur



5 Screws & Plate in Proximal femur

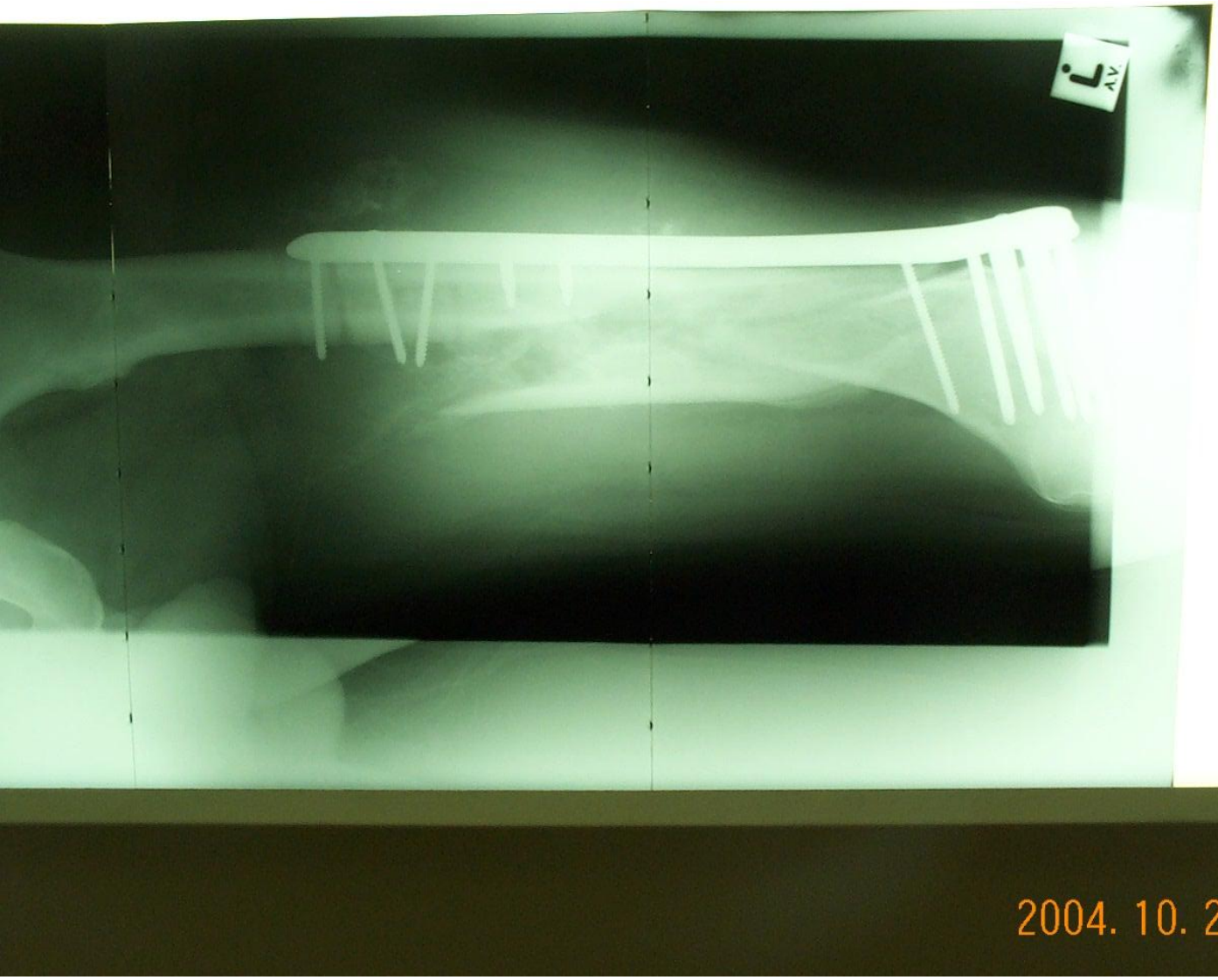
7 Plate & Screws at fracture site

6

8 Plate & screws at distal femur

SATURDAY

2004 10 28


2004. 10. 28


Celestone® Soluspan®
GUIDE TO INTRA-ARTICULAR INJECTION TECHNIQUES
THE ELBOW
THE WRIST
THE SHOULDER
THE FINGER JOINTS
2004. 10. 29


THE ANKLE JOINT
2004. 10. 29


THE FINGER JOINTS
THE KNEE JOINT
THE HIP
THE FOOT
THE ANKLE JOINT
2004. 10. 29


2004. 10. 29

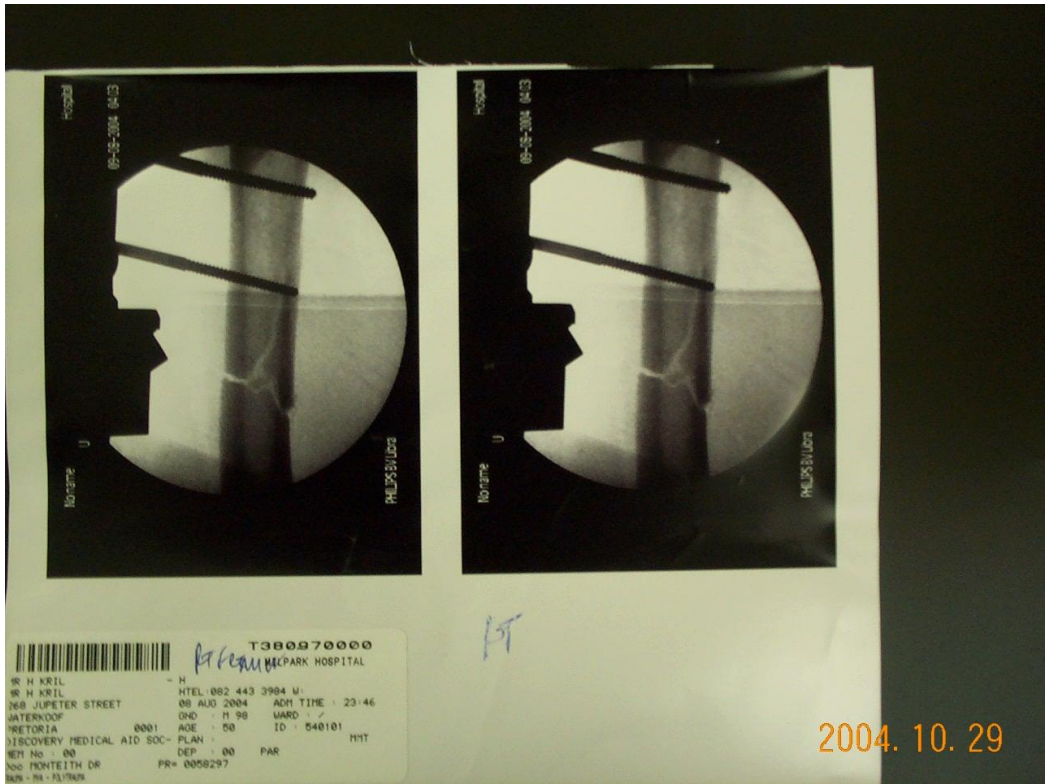
Case 6

- **Mr K . MVA 08/08/04. Polytrauma**
- **Fracture Rt Femur midshaft compound Gr III a; Fracture Rt distal Femur intraarticular with perforating wound through the knee. Fracture dislocation Rt elbow with comminuted fracture of the Olecranon**
- **Severe swelling Rt thigh**

09/08/04 Debr. Ext. Fix Rt Femur and Knee, ORIF Rt elbow. 18/08/04 Exchange Fixator – internal fixation

2004. 10. 29

2004. 10. 29



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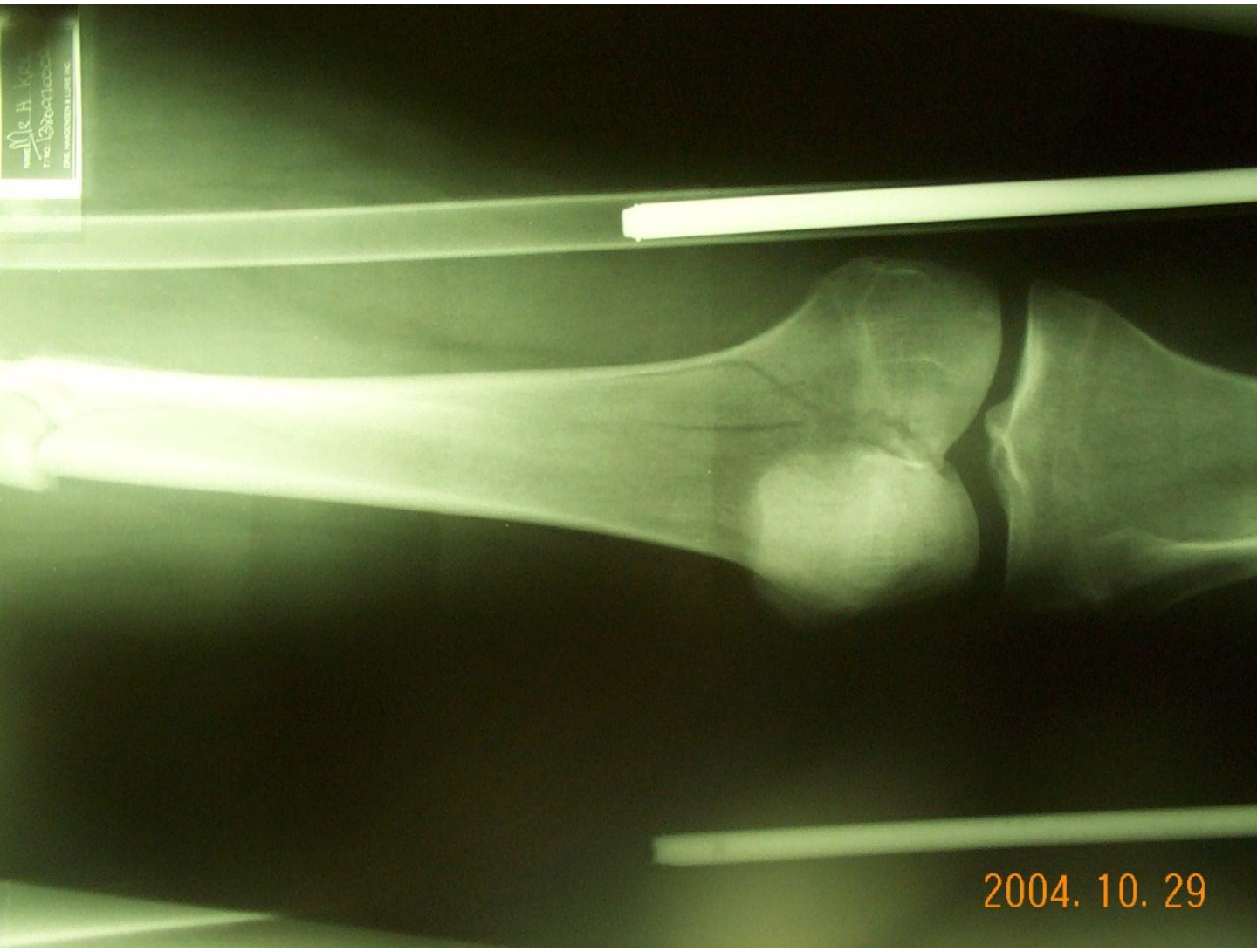
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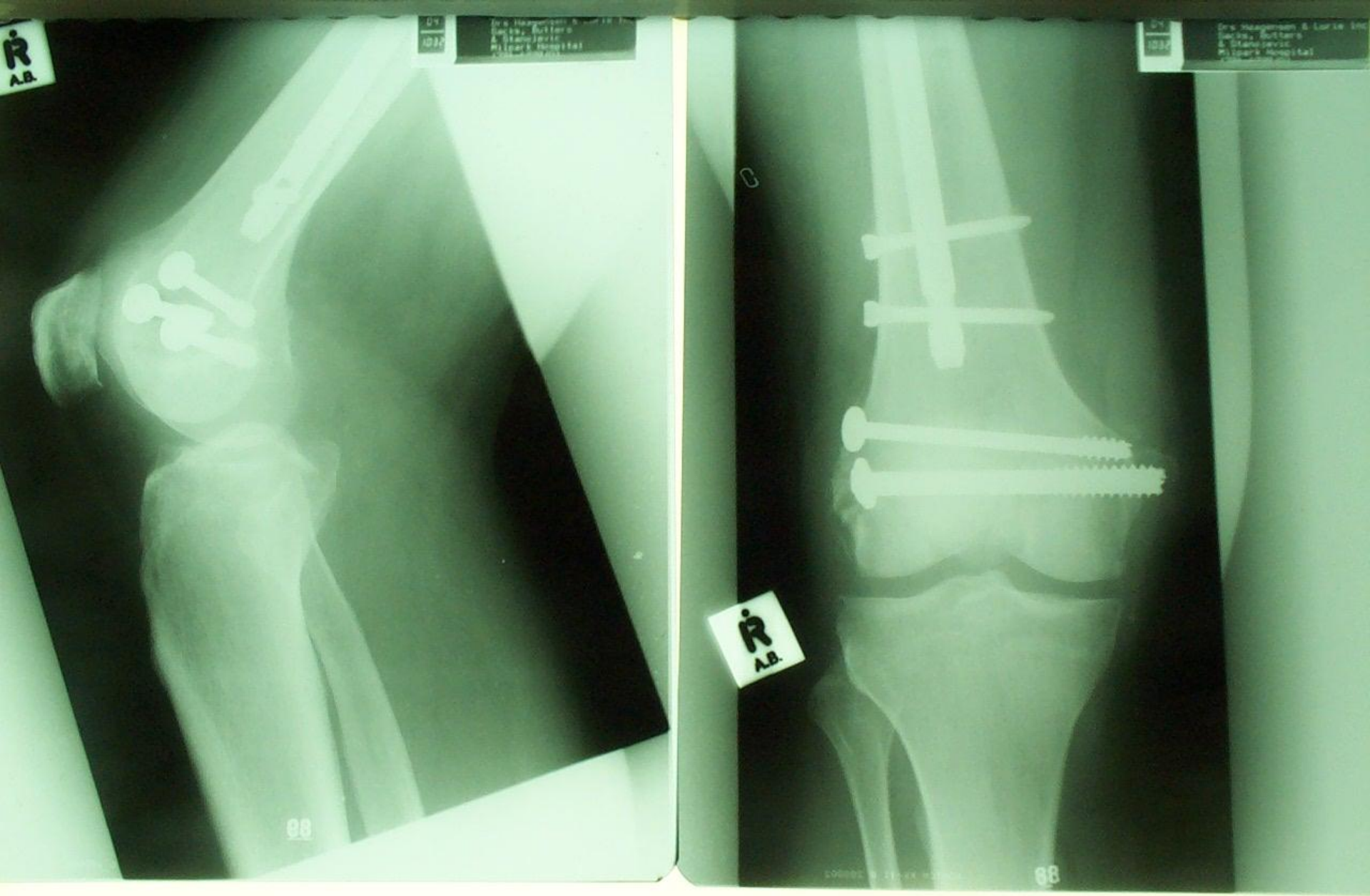


2004. 10. 29


Feldene Oplos-tablet
2004. 10. 29

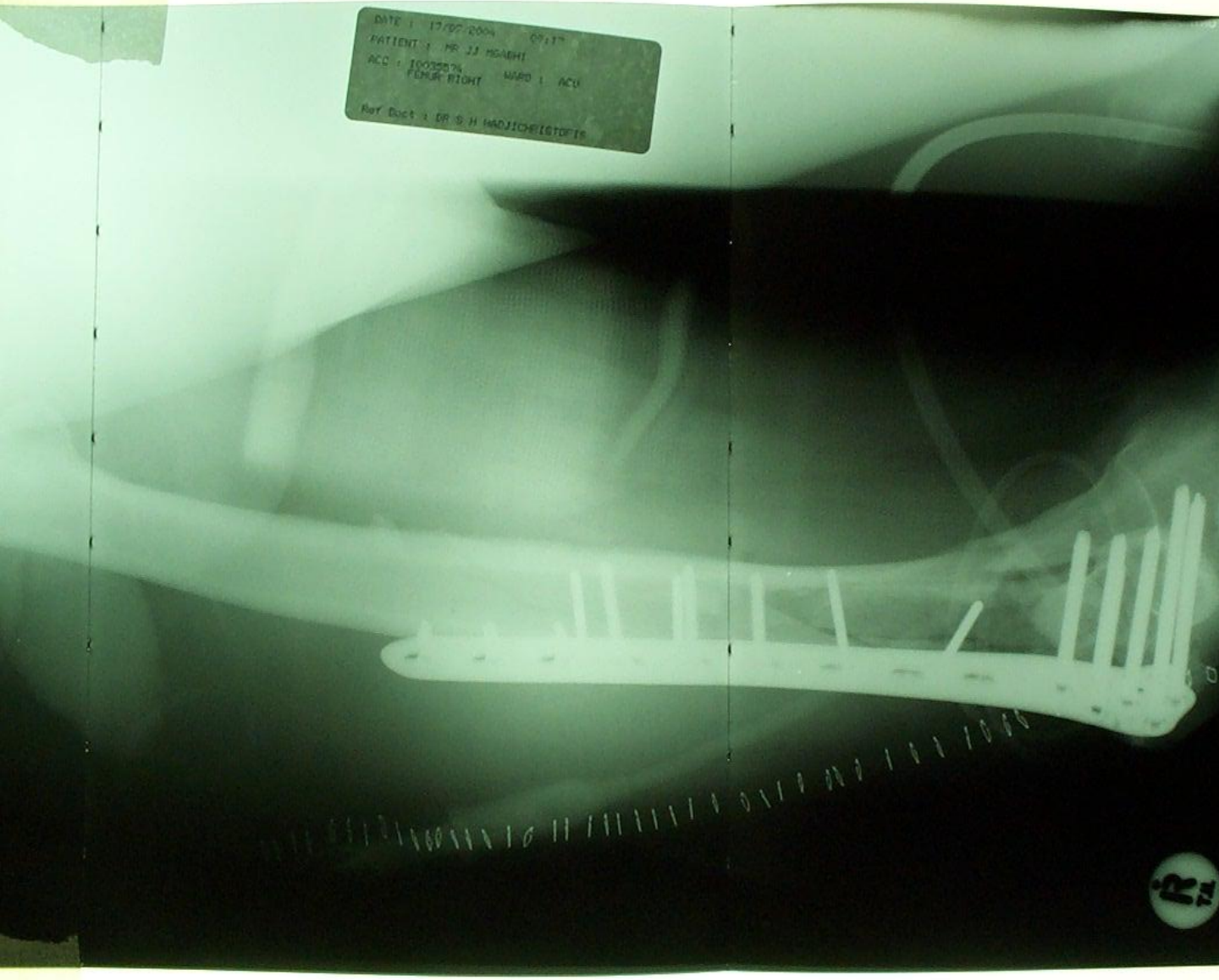
Case 7

- **Mr M. 53 yrs old. Motorbike accident 12/07/04. Fracture Rt Femur and Rt calcaneus. 3 days in K hospital. Transferred to Milpark Hosp. 16/07/04.**
- **ORIF Femur 17/07/04**
- **ORIF Calcaneus 30/07/04**


T.D.M.
2004.


SHOOT THROUGH


SHOOT THROUGH
2004. 7. 21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PATIENT : MR JJ MSABHI
ACC : 1003587%
FEMUR RIGHT WARD : ACU
Ref Doct : DR S H HADJICHRISTOFIS


1999. 1. 31


Feldene Dispersible
1999. 1. 31

Conclusion

- **MIS demands preop planning**
- **Arthroscope – an extension of your eyes**
- **Visualization of the fracture does not mean open exposure**
- **One must have mental 3D image of the fracture prior to manipulation and internal fixation**

Conclusion

- **Liganentotaxis does not reduce depressed fragments; need to be elevated**
- **Fracture fixation dictated by soft tissue status,bone quality,comminution and fracture pattern.**
- **Arthroscopic assisted fr. Surgery is safe but technically demanding.**
- **Arthroscopy helps to identify and treat associated intraarticular soft tissue injuries and confirm reduction**

Conclusion

- **Distal Femur and proximal Tibia - intraarticular knee fractures are excellent sites for Minimally invasive plate osteosynthesis (MIPO)**
- **New plates and instruments are available**