

Jeudis d'Unisanté
La Géronto-traumatologie
CHUV, le 10.12.2020

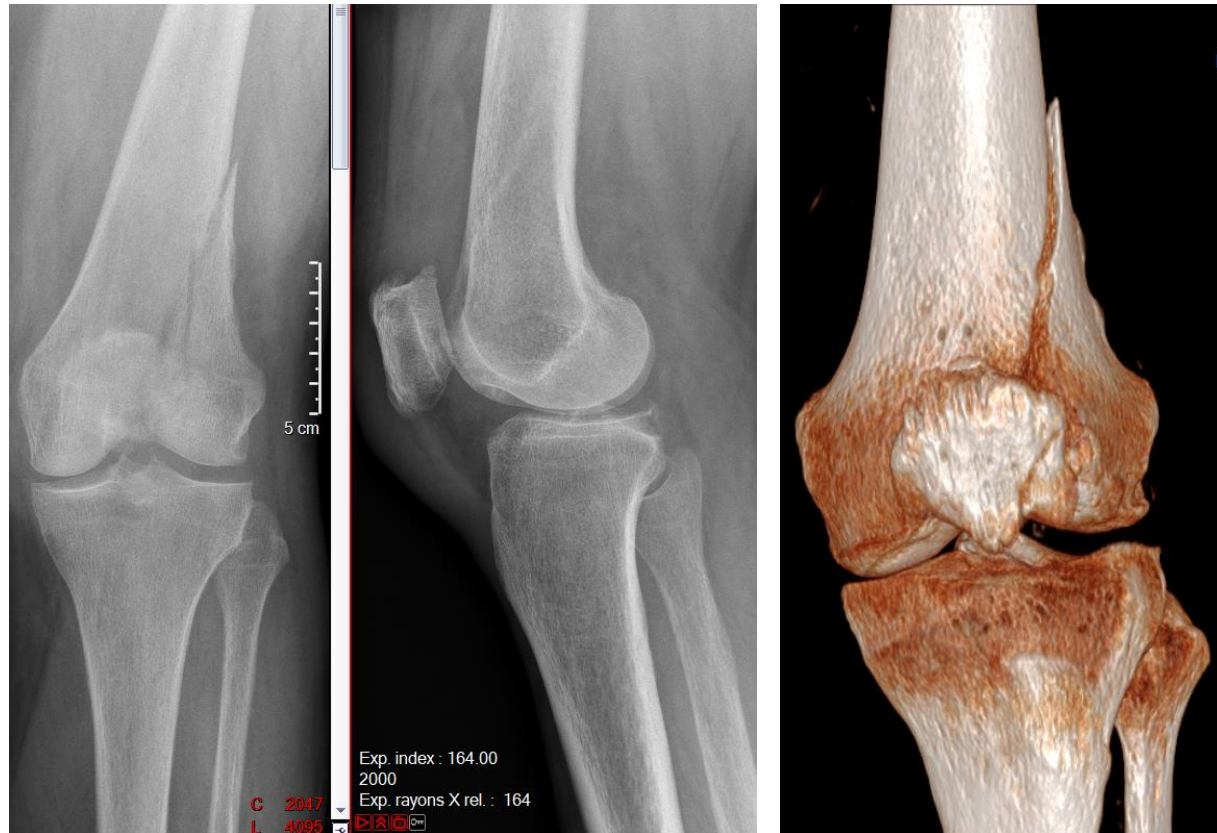
Fractures around the knee in the geriatric population: fix or replace?

Dr. med Eric Thein
Service OTR



Case 1

- ♀ 70 years, AF & MS
- Falls from her height with direct impact on left knee



Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



Treatment options

- Conservative
- **Fracture fixation**
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



Decision for ORIF with lateral plate

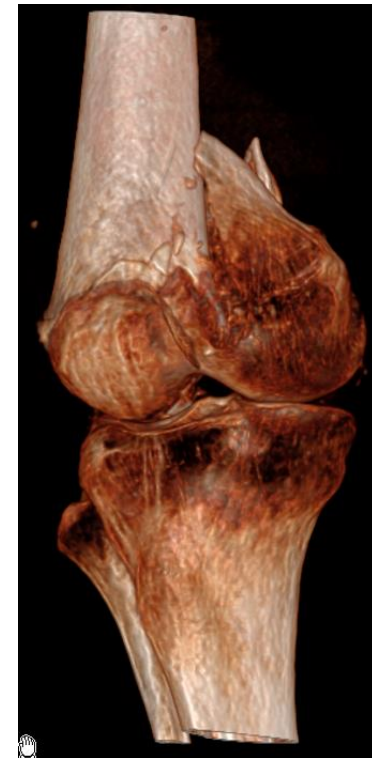


Uneventful healing with good function at latest FU



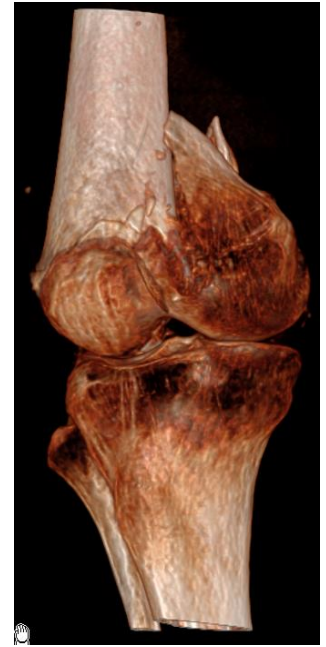
Case 2

- ♀ 91 years, polymorbid, living in a nursing home
- Falls from her height with direct impact on left knee



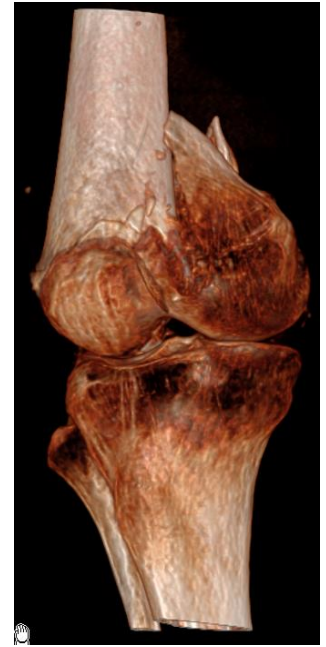
Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



Treatment options

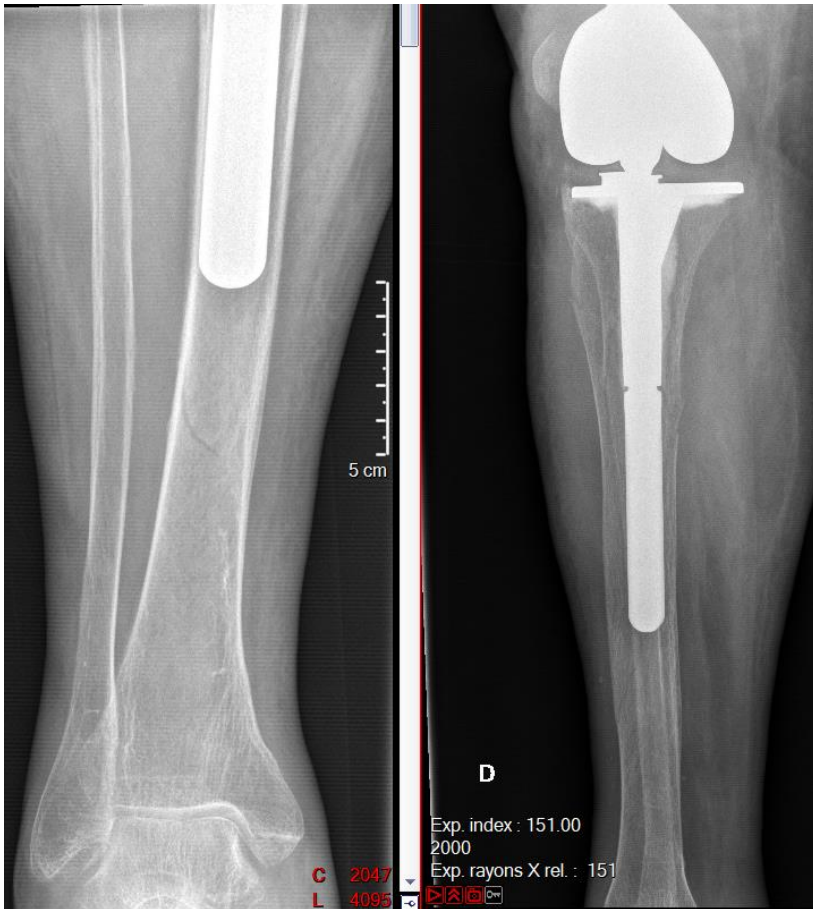
- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – **Distal femoral replacement**
- Amputation



- Decision to do a distal femur replacement



- Initial uneventful FU, returns to her home
- Another fall 2 months later...



Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

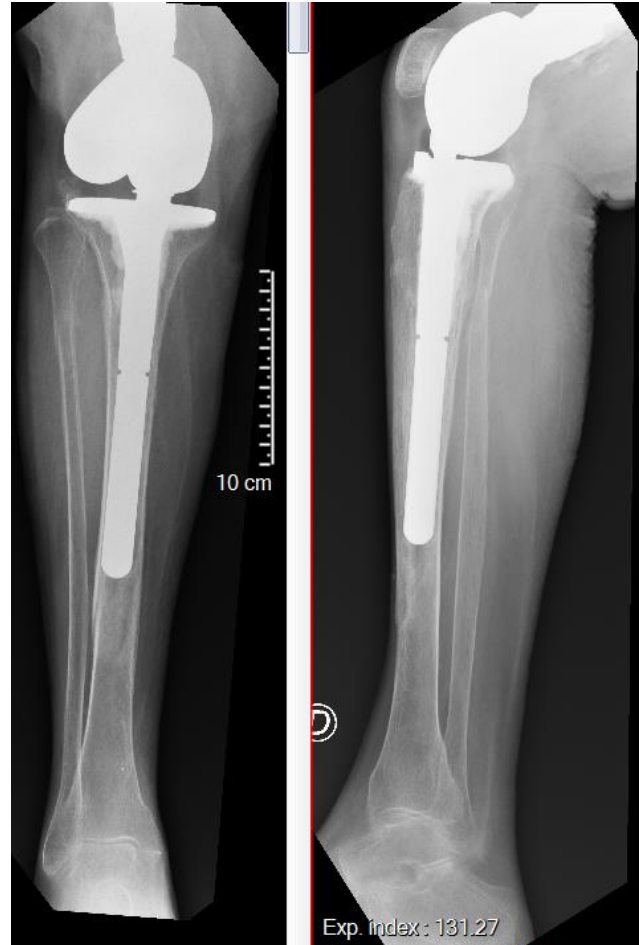


Treatment options

- **Conservative**
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



- Conservative treatment by long-leg cast
- Uneventful healing...so far...



Case 3

- ♀ 66 years, polymorbid
- St. p. AD right knee for infected TKR
- Clinical & radiological signs of DJD
- Stumbles with direct impact on left knee
=> medial plateau impaction fracture



Decision for TKR: patient happy until...



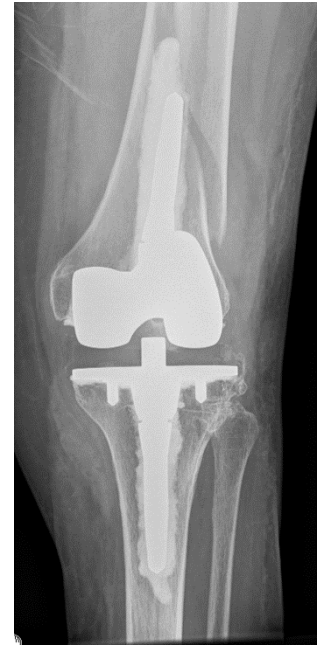
... 3 years later: falls again...



Periprosthetic distal femur fracture

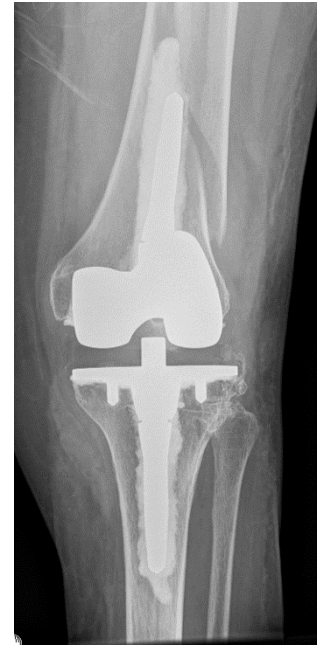
Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

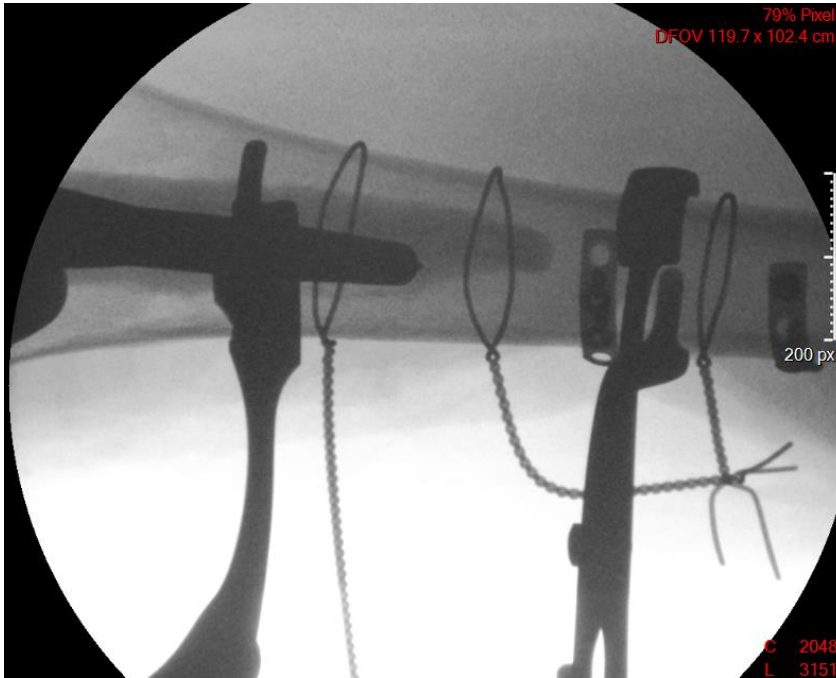


Treatment options

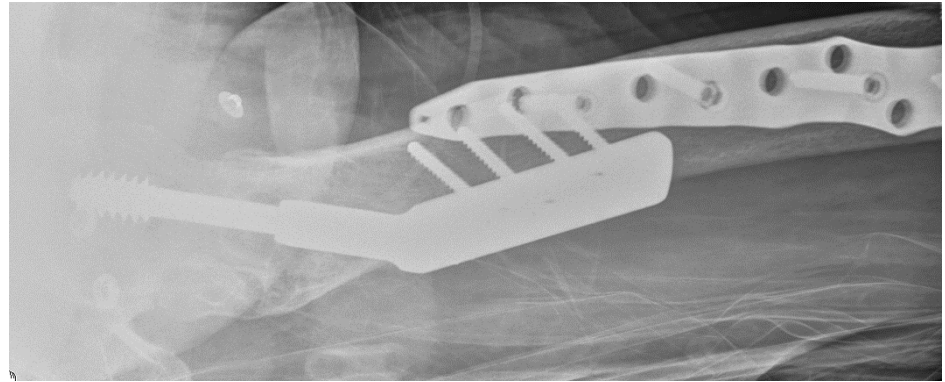
- Conservative
- **Fracture fixation**
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



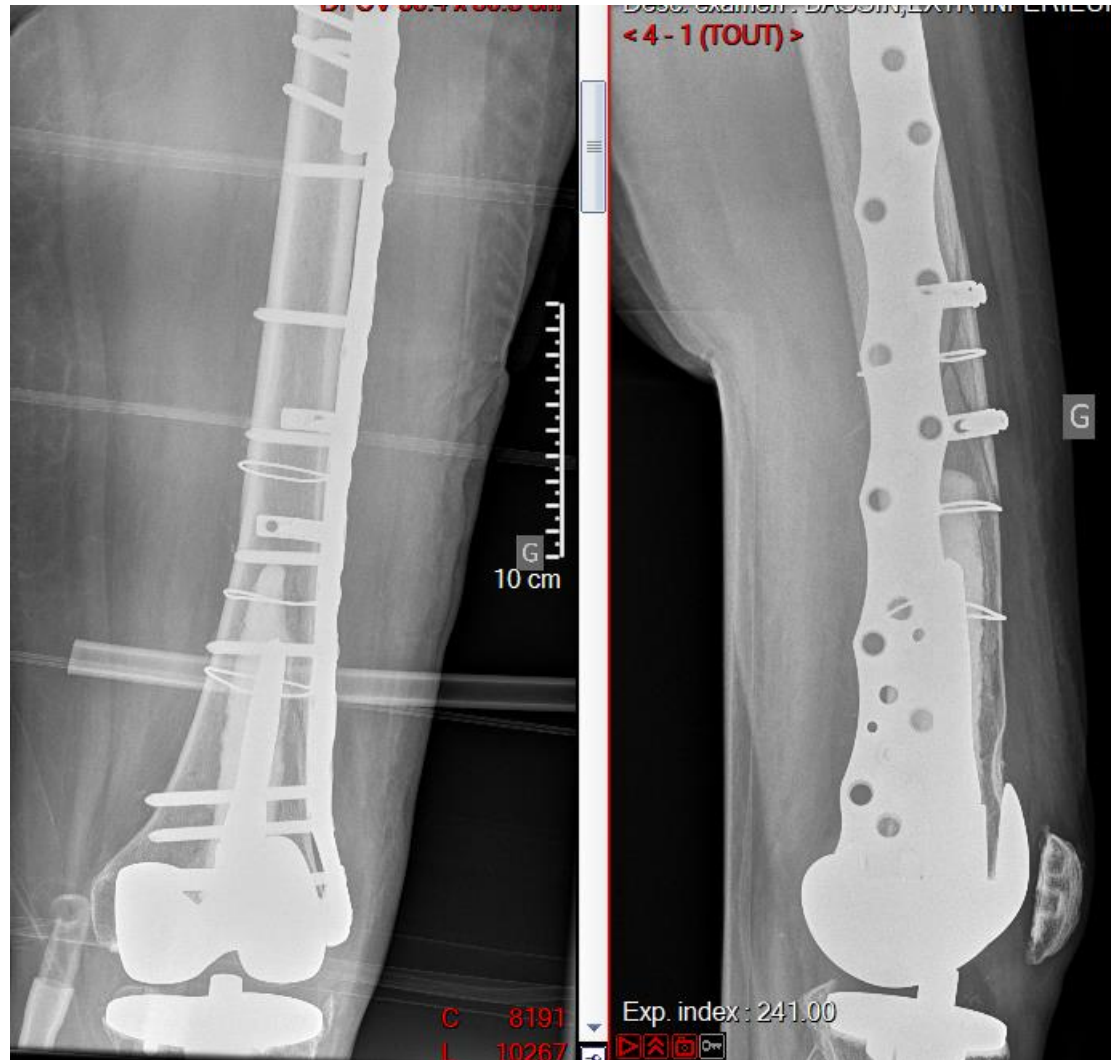
Decision for ORIF



Post-op X-Rays



6 week FU



Another year later

- Spontaneous pain (no trauma)
- Can't walk anymore



- What now?



Treatment options

- Conservative
- MR & Re-osteosynthesis +/- bone grafting
- MR & Revision TKR +/- OS
- MR & Distal femur replacement
- Amputation

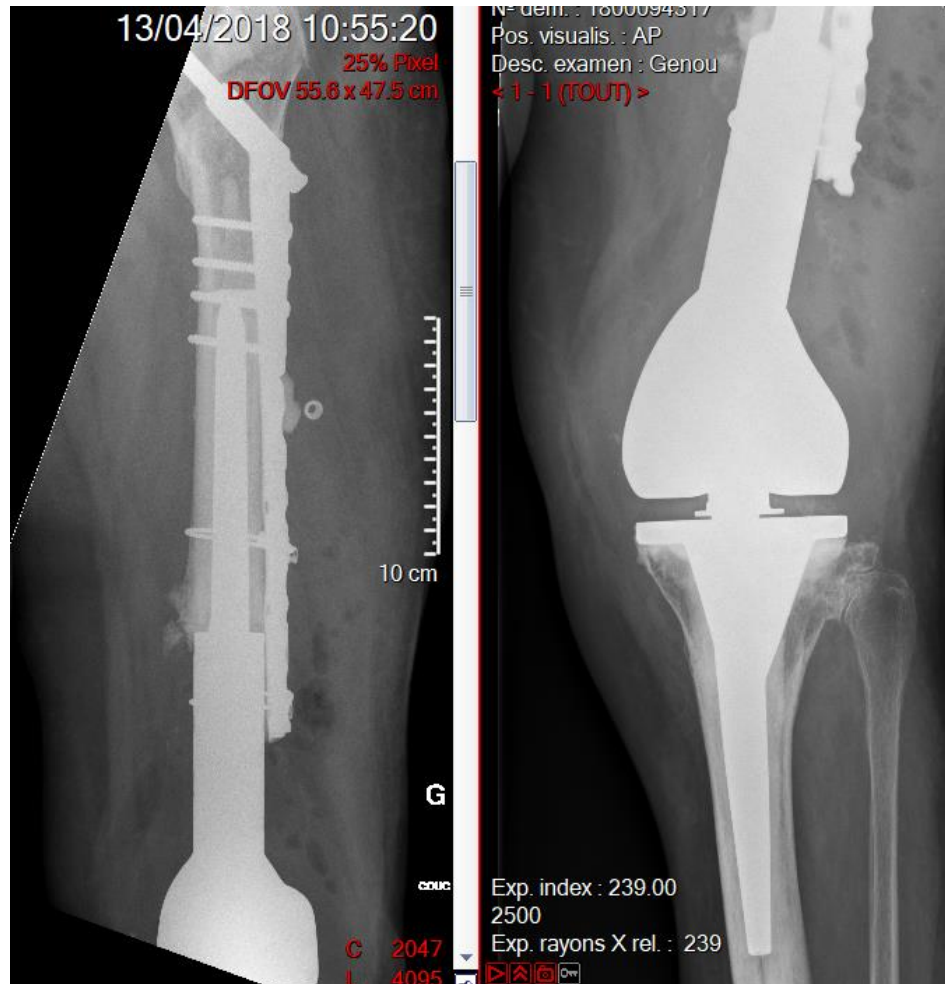


Treatment options

- Conservative
- MR & Re-osteosynthesis +/- bone grafting
- MR & Revision TKR +/- OS
- **MR & Distal femur replacement**
- Amputation

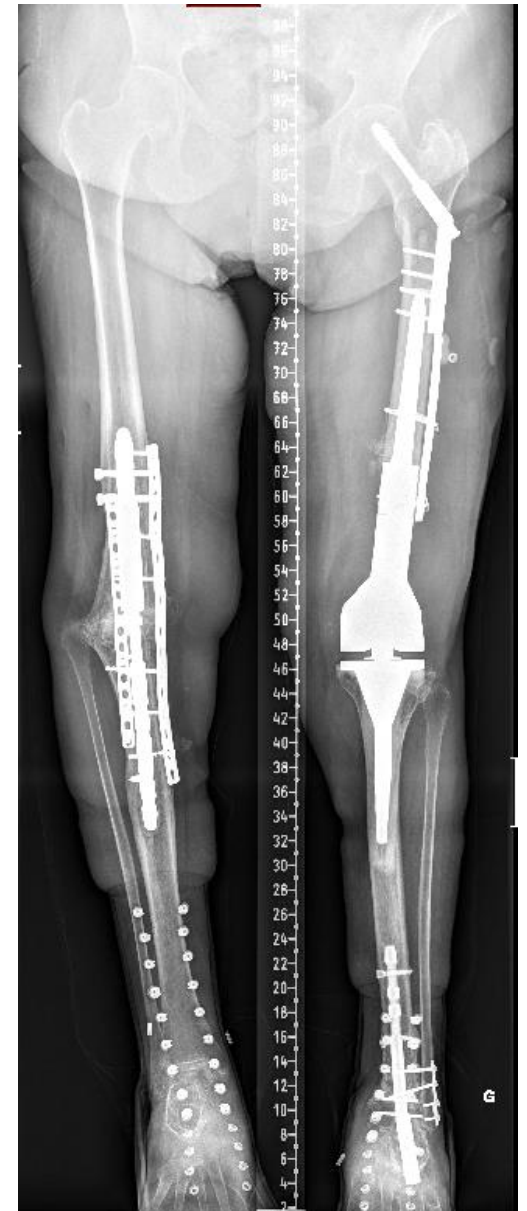
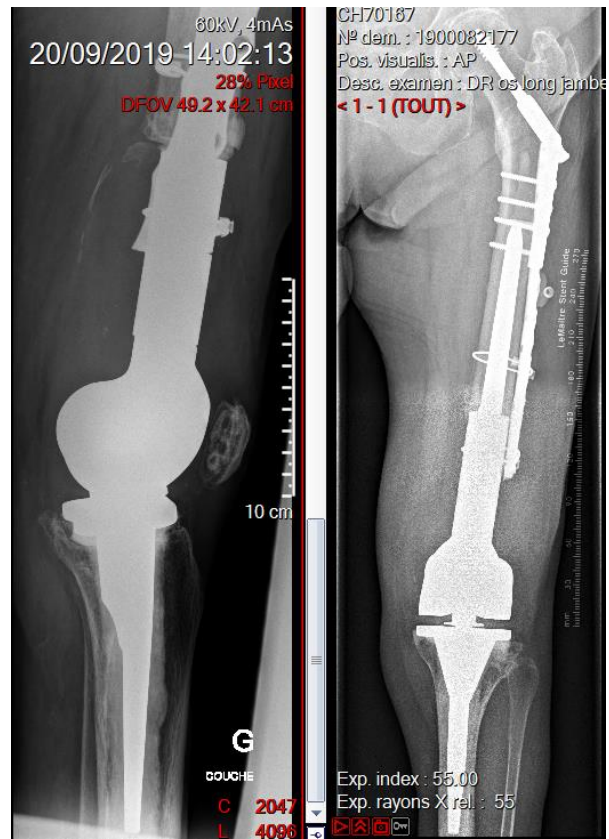


We did partial MR & Distal femur replacement



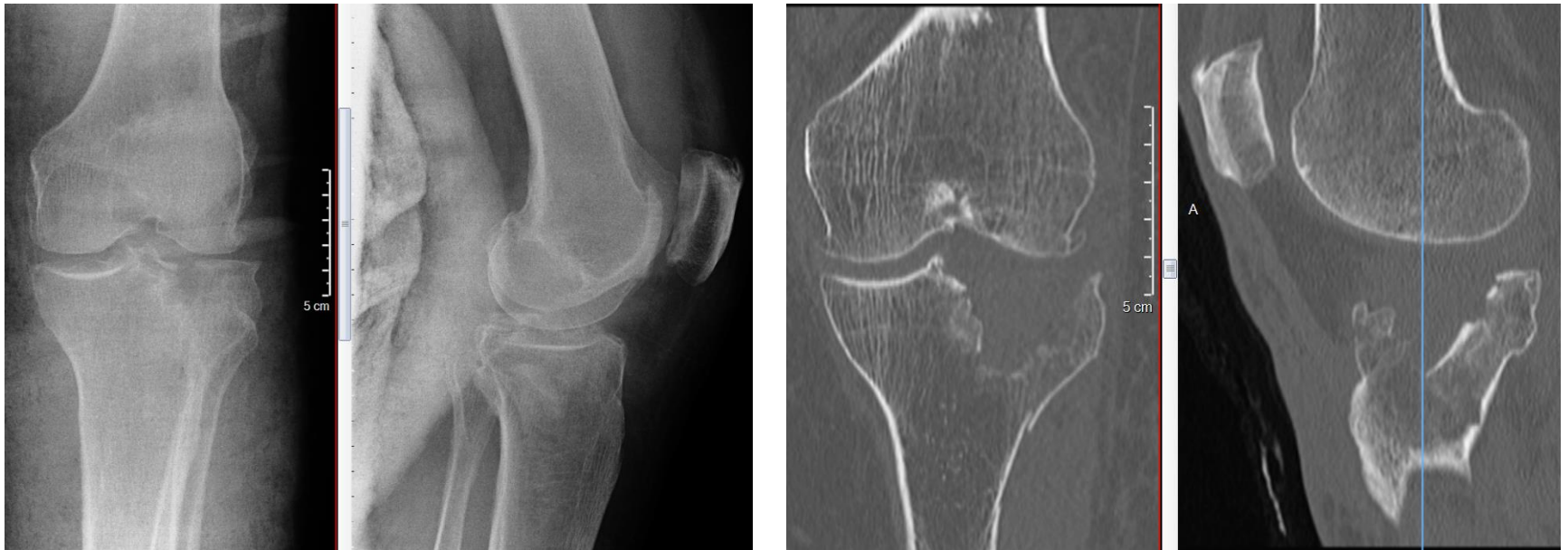
At latest FU

- No pain
- FE 100-0-0°



Case 4

- ♀ 72 years, good health
- Skiing accident
- Valgus stress left knee



- Lateral plateau split-depression fracture

Treatment options



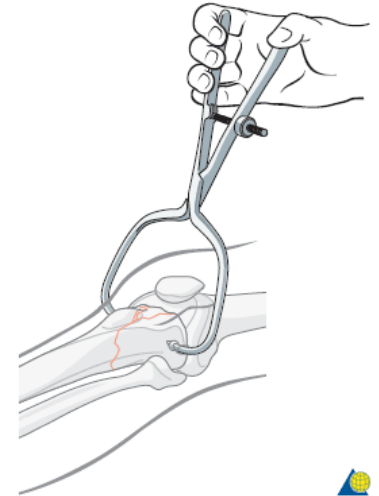
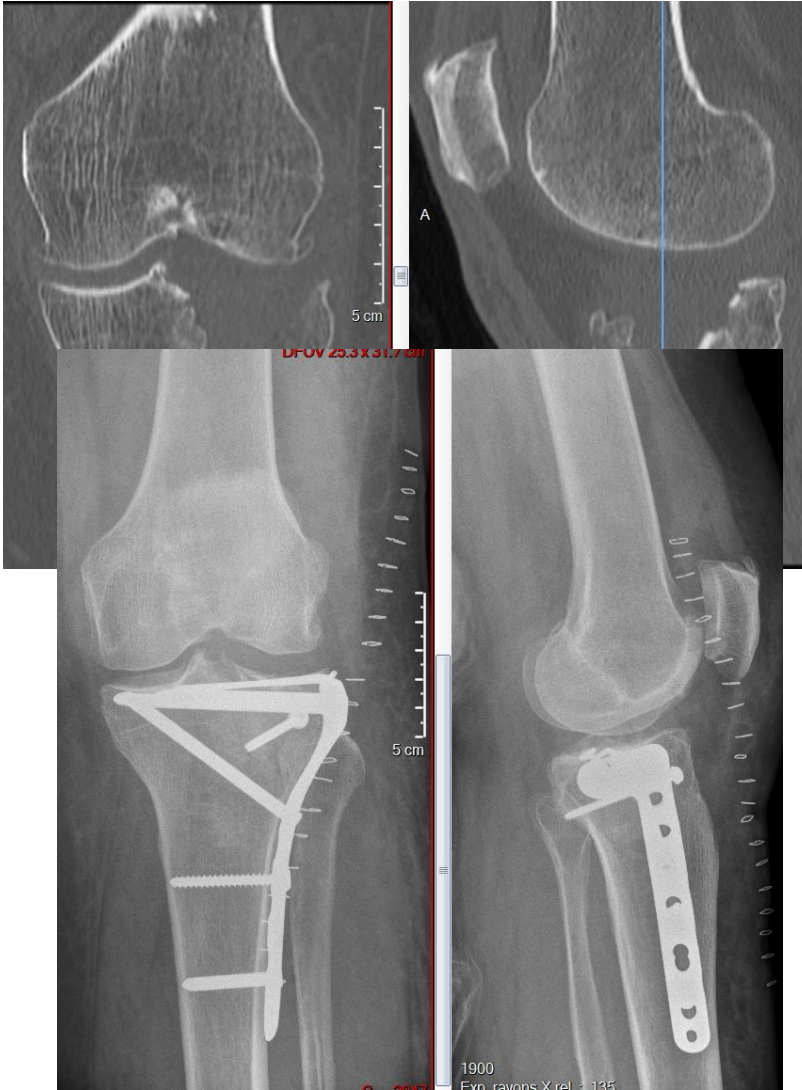
- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

Treatment options

- Conservative
- **Fracture fixation**
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



• ORIF + bone grafting

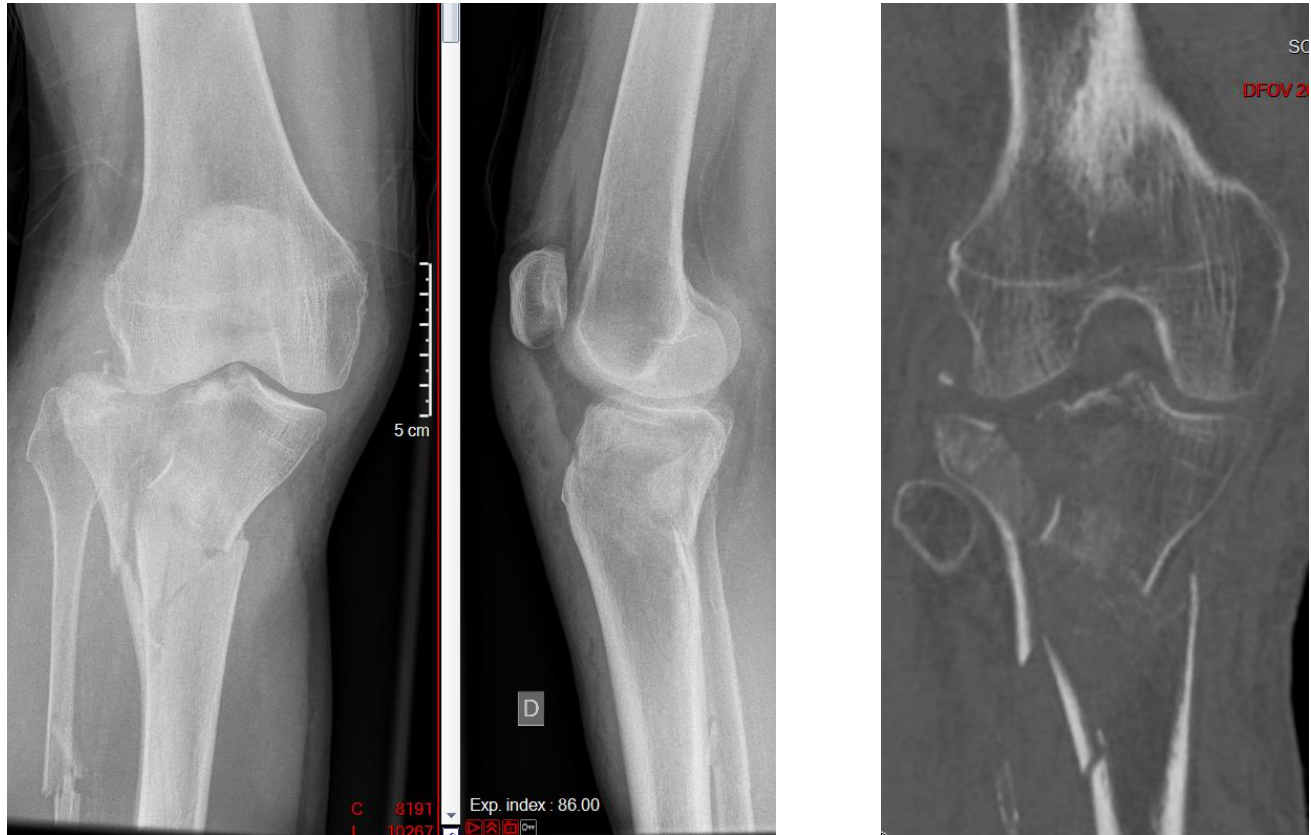


- At latest FU (2,5 years)



Case 5

- ♀ 75 years, IDDM
- Fell from her height with direct impact right knee



Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

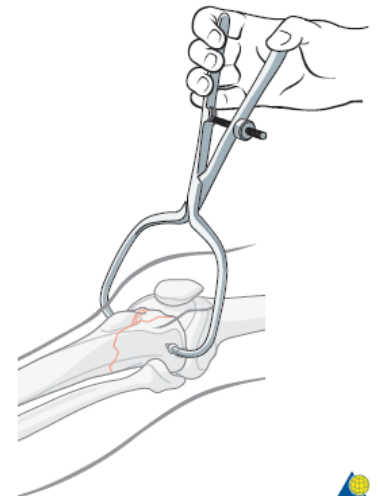


Treatment options

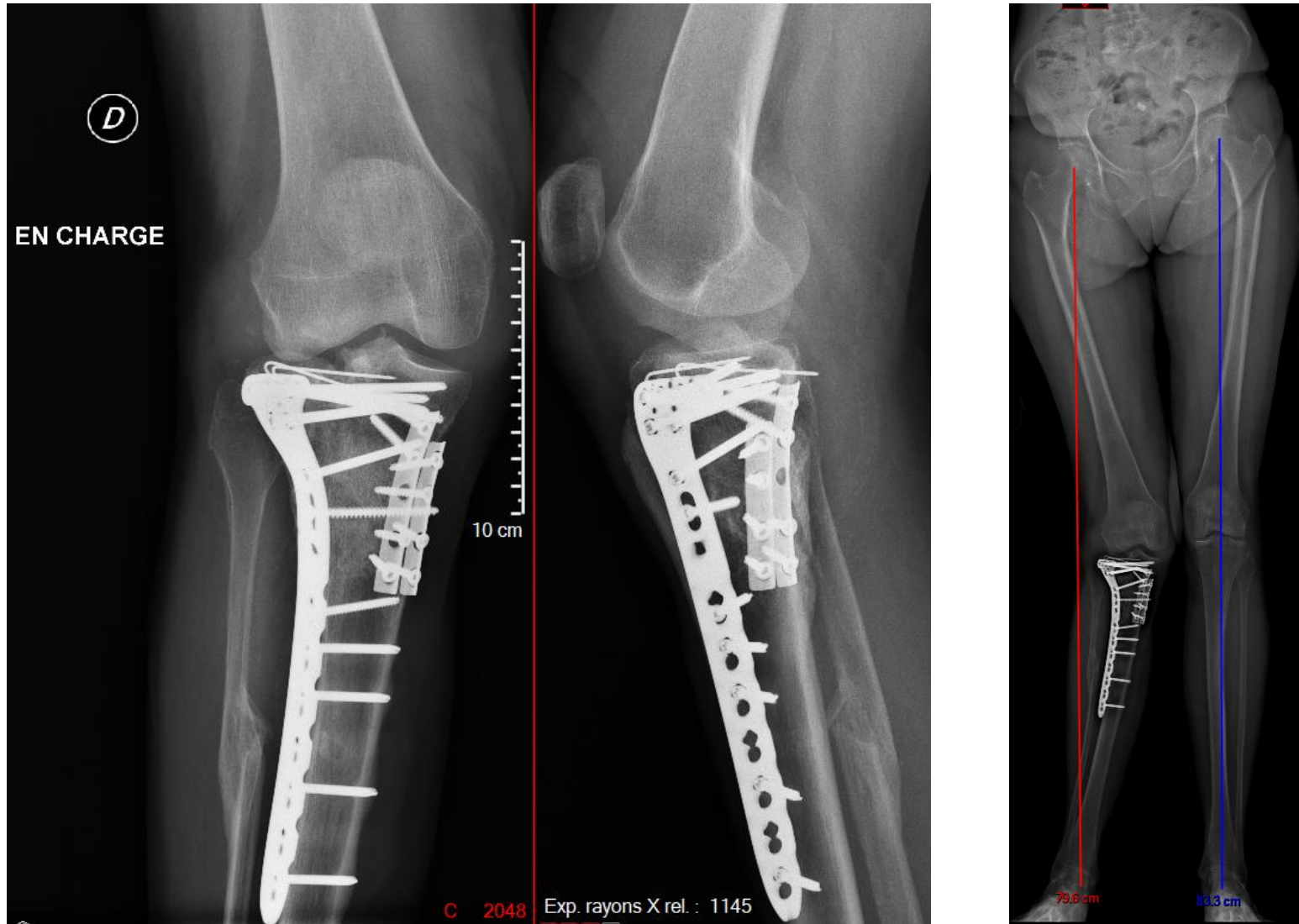
- Conservative
- **Fracture fixation**
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



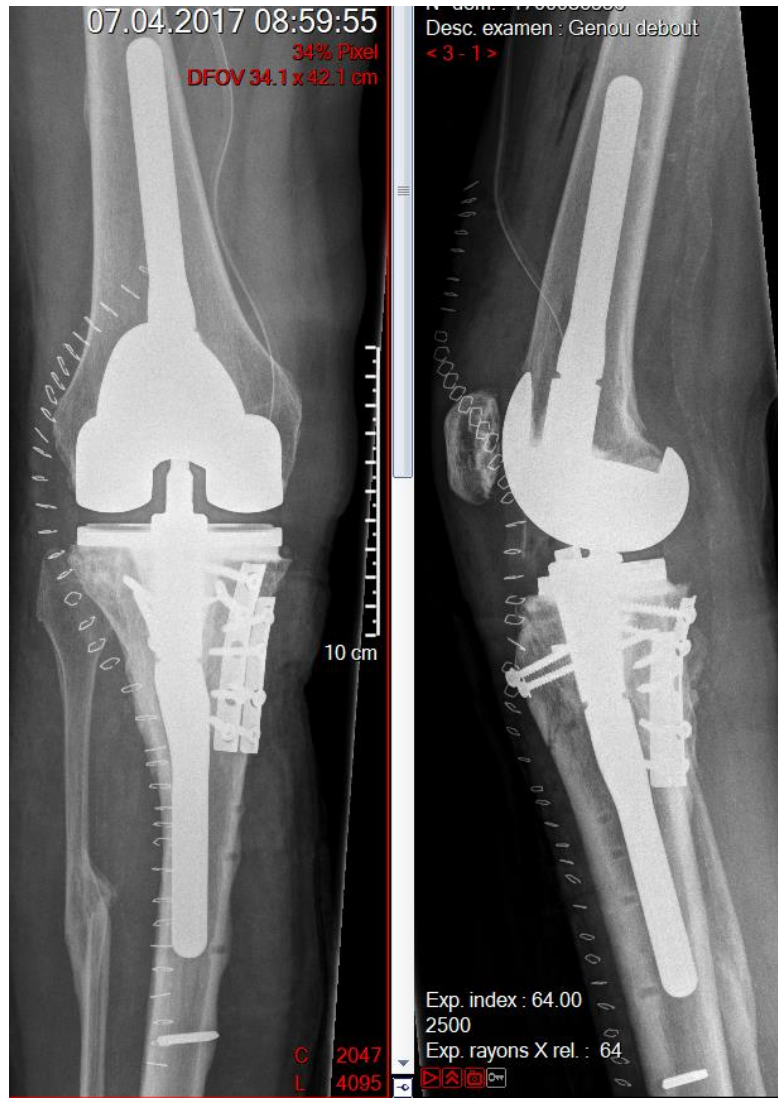
- Spanning external fixator
- ORIF + bone grafting



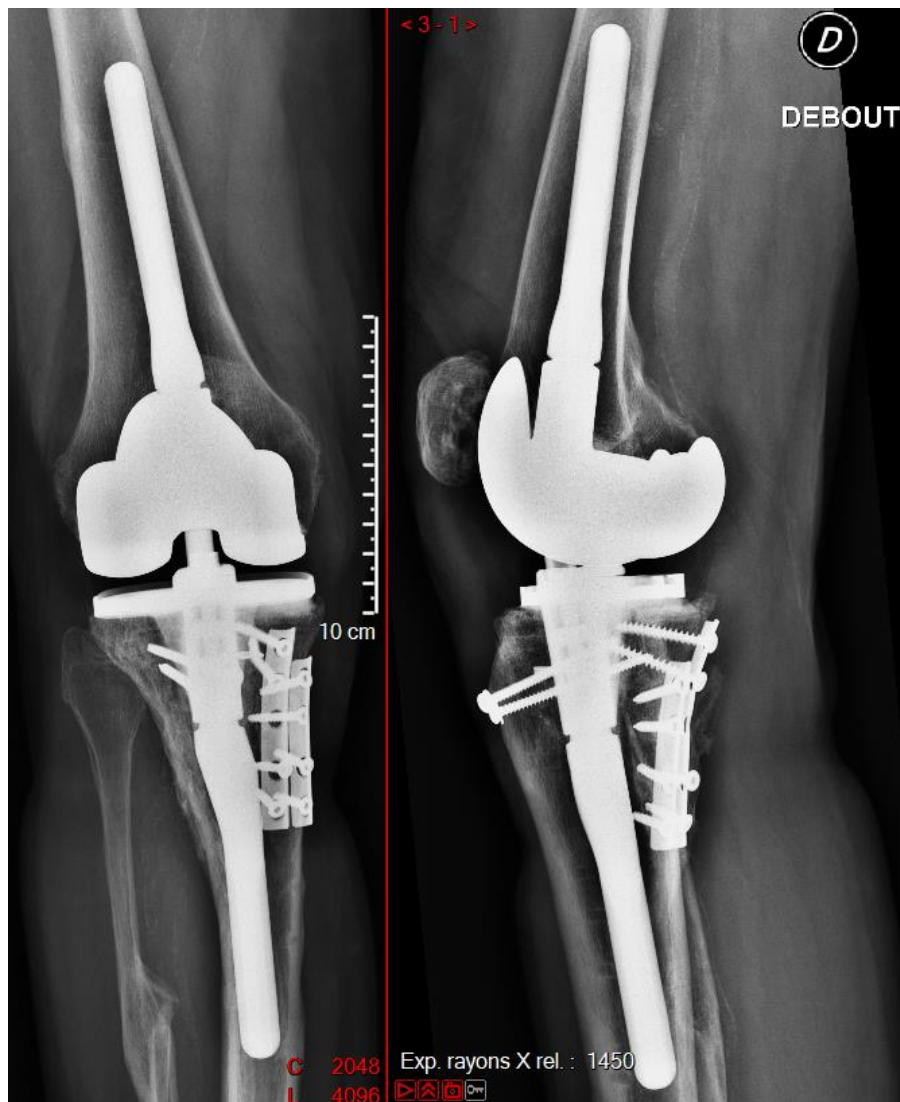
- At 1 year FU: FE 120-5-0°, no pain!!!



- Decision for a TKR



- At latest (3 year) FU: no pain, FE 140-0-0°



Case 6

- 85 years, AHT
- Radiological & clinical signs of DJD
- Fell from her height with direct impact right knee



Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

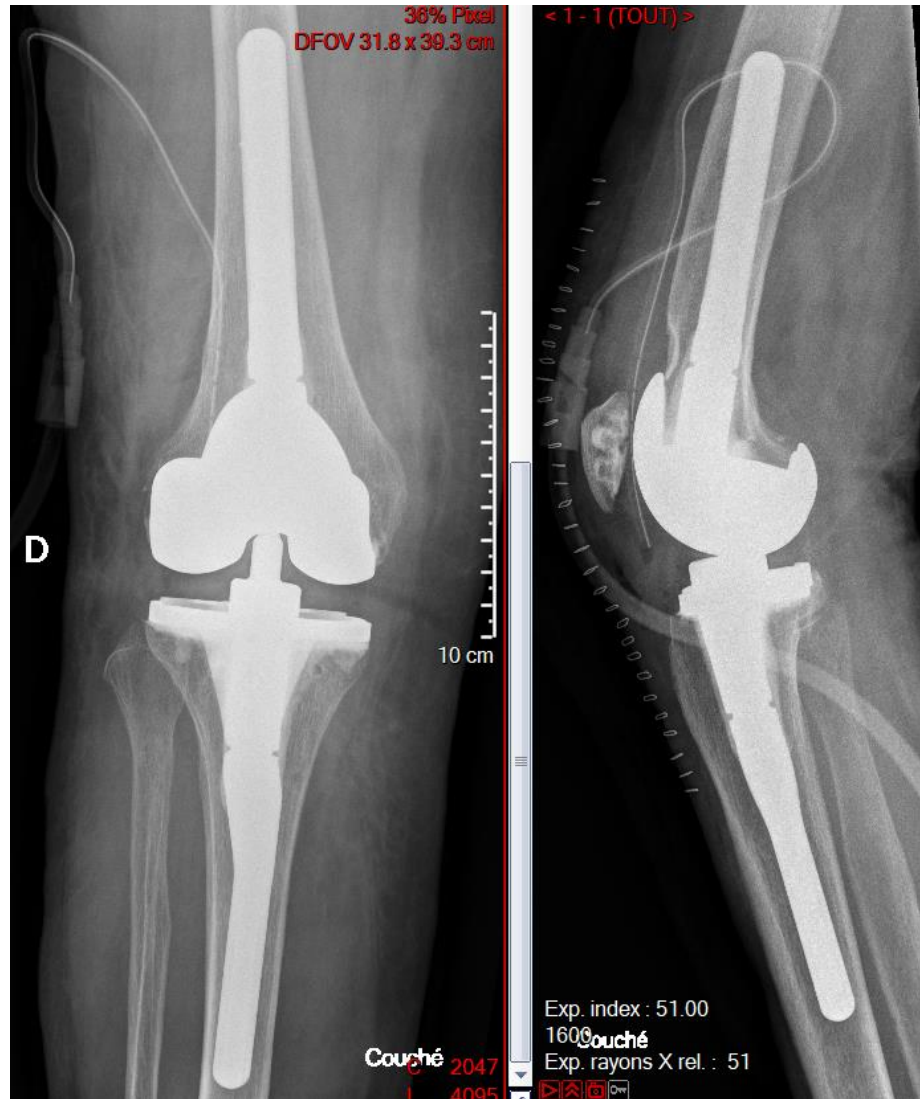


Treatment options

- Conservative
- Fracture fixation
- **Primary Total Knee Replacement**
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation



- Decision for primary TKR



- Uneventful FU at 1 year no pain & FE 135-0-0°



Geriatric fractures around the knee

- Frail & polymorbid population
- High rate of local & systemic complications during the treatment phase
- Perioperative morbidity up to 65%
- Loss of independence up to 60%
- 1-year mortality up to 35%

P Myers et al: J Orthop Trauma 2018

GB Moloney et al: Injury 2016

A Loosen et al: Geriatric Orthopedic Surgery & Rehabilitation 2019

Treatment goals

- Uncomplicated fracture union
- Restoration of alignment
- Painfree limb
- Return to preinjury level of function

Treatment goals

- Uncomplicated fracture union
- Restoration of alignment
- **Painfree limb**
- **Return to preinjury level of function**

=> accurate history of prefracture function
to help guide goals & prognosis

More information...

- Patients « biological » age
=> ASA-Score, Deyo-Charlson Index
- Patients level of activity
- Case history / preinjury symptoms



Singh J. A. et al, Acta Orthopaedica 2013
Mittlmeier T. et al, Orthopäde 2016

Treatment options

- Conservative
- Fracture fixation
- Primary Total Knee Replacement
- Revision Total Knee Replacement – Distal femoral replacement
- Amputation

Conservative

- Pros: ↓ surgical risks
- Cons: ↑ risks of immobilization
- Un- or minimally displaced fractures
- Non-ambulating patients
- Patients unfit for surgery

Fracture fixation

- 3 problems
- ↓ bone mineral density => impaired primary fixation strength
- Immediate full weight & mobilization => increased stress on fixation
- Cellular & physiologic changes => impaired healing potential => ↑ healing time

Ab-Lazid R et al: Pullout strength of cancellous screws in human femoral heads depends on applied insertion torque, trabecular bone microarchitecture and areal bone mineral density. J Mech Behav Biomed Mater. 2014

Tarantino U et al: Fracture healing in elderly patients: new challenges for antiosteoporotic drugs. Aging Clin Exp Res 2013

=> Complication rates up to 41%

- Loss of fixation/ Implant loosening
- Non-union with implant breakage
- Malunion
- Wound healing problems
- Infection



=> Revision rates up to 29%

Solutions

- Stiffer constructs to better resist against mechanical failure
 - Nail-plate
 - Double plating
- Structural allografts
- Cement augmentation
 - PMMA
 - Calcium phosphate
 - Calcium sulfate



Posttraumatic arthritis

- 27 – 60 % at long term FU
- Poor correlation between clinical & radiological result
- Almost always asymptomatic
- Conversion to TKR: 0 – 8%!
- Higher complication & revision rates but similar degree of satisfaction after 2° TKR

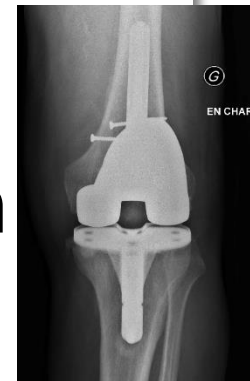


Frattini M et al: Chir Organi Mov 2009
Scott C.E.H. et al: Bone Joint J 2015
Su EP et al: Clin Orthop Relat Res 2004

Primary Total Knee Replacement

Pros:

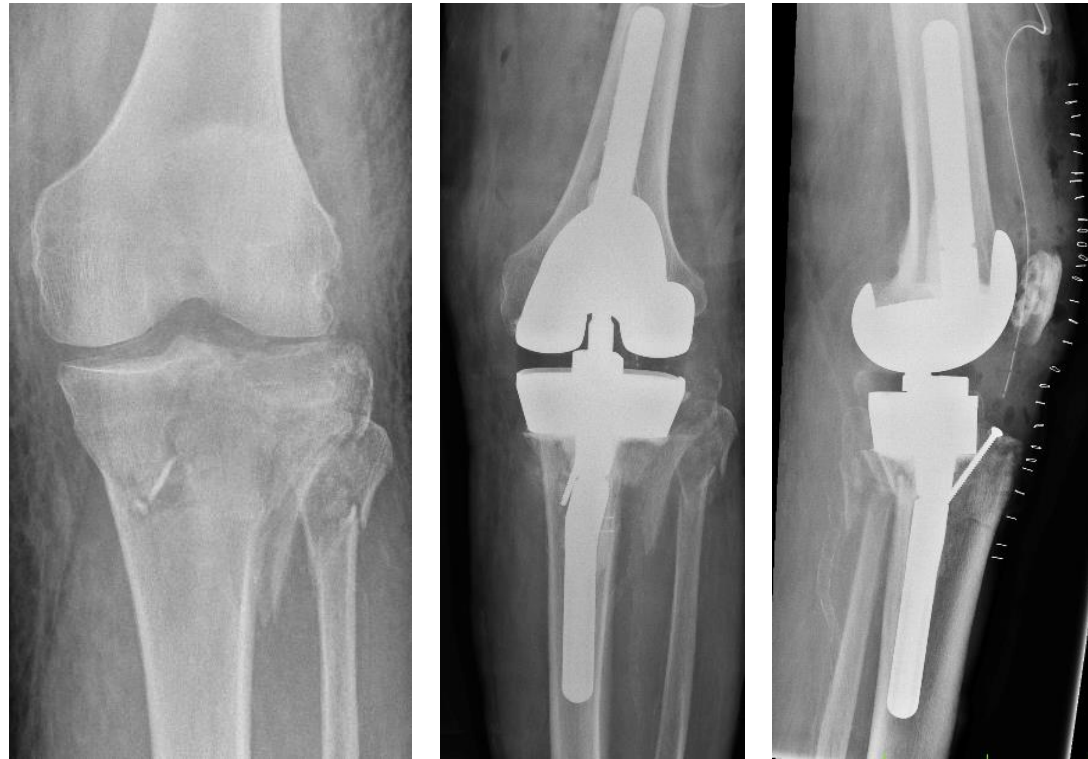
- Good mechanical support due to long stems and cement
- Early immediate full weight-bearing
- Restoration of knee motion
- Faster return to pre-injury level
- Two problems dealt with one operation



Primary Total Knee Replacement

Cons:

- Difficult technique with extensive bone resection



Primary Total Knee Replacement

Cons:

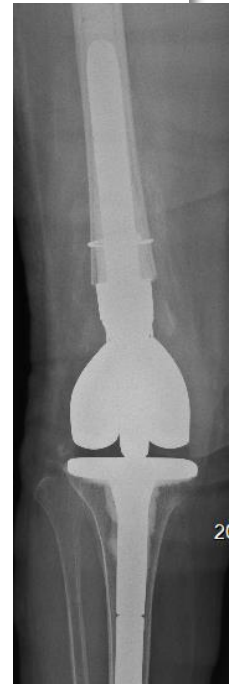
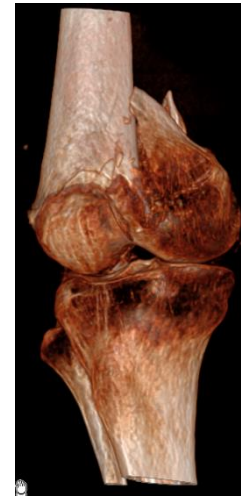
- Difficult technique with extensive bone resection
- Often in combination with OS



Primary Total Knee Replacement

Cons:

- Difficult technique with extensive bone resection
- Often in combination with OS
- Loss of stabilizing soft tissues
- Massive, constraint or hinged implants
- ↑ Early loosening, ↑ infection



Revision Total Knee Replacement

- Periprosthetic fracture with inadequate distal bone stock and/or loose implant
- Failed primary treatment
- Often in combination with ORIF
- «Younger» patient

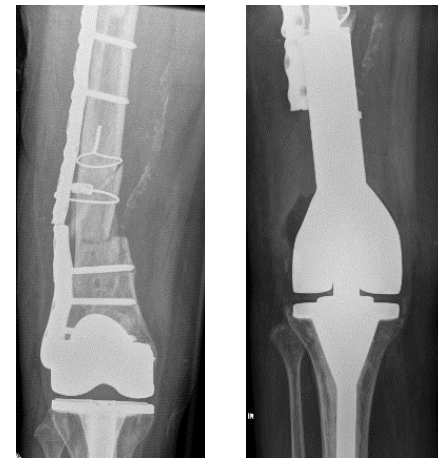


Abbas A. et al, J Arthroplasty 2014

Chen A. F. et al, J Arthroplasty 2013

Distal Femoral Replacement

- Distal femur fracture
- Periprosthetic fracture
- Poor bone stock – unreconstructable fracture - loose implant
- Failed primary treatment
- «Older» patient



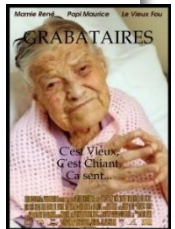
Windhager R et al: Int Orthop 2016

Berend KR et al: Clin Orthop Rel Res 2009

Jassim SS et al: Injury 2014

Take Home Messages

- Challenging, complex lesions with high complication, morbidity & mortality rates
- Patient tailored treatment after thorough anamnestic & diagnostic workup



- Immediate weightbearing as tolerated & early mobilization
- Weak correlation between clinical & radiological results

