

3<sup>rd</sup> Advanced Course in  
Knee Surgery  
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## Imaging assessment in unicompartamental FT & FP arthrosis


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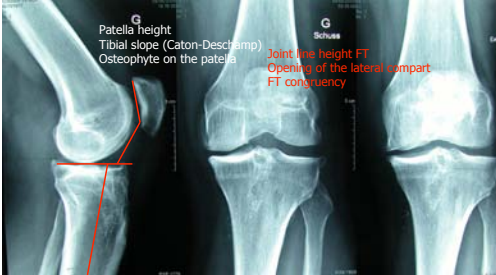



## Imaging (FT)

- Loading radiographs
- AP in extension
- AP at 30° flexion (schuss)
- Lateral at 30° of flexion
- Axial at 30° of flexion
- Full-length standing radiographs



## Imaging (FT)



## OA evaluation

- Classification:
  - Ahlbäck
  - Dejour
  - Kellgren and Lawrence
  - Menkes

Ahlbäck *Acta Radiol* 1968  
Kellgren & Lawrence *Ann Rheum Dis* 1957  
Dejour *Journées Lyonnaises du Genou* 1995  
Menkes *J Rheumatol* 1991

## OA evaluation

- Kellgren-Lawrence
  - Grade 0: Normal radiographs
  - Grade I: Dubious osteophytes
  - Grade II: Osteophytes, no joint line change
  - Grade III: Osteophytes, joint line narrowing
  - Grade IV: Sclerosis, loss of the joint line

Kellgren JH, Lawrence JS: Radiological assessment of osteoarthritis *Ann Rheum Dis* 1957

## OA evaluation

- Kellgren-Lawrence
  - Grade 0: Normal radiographs
  - Grade I: Dubious OA
  - Grade II: Minor OA
  - Grade III: Certain OA
  - Grade IV: Evolved OA

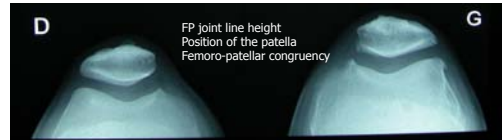
Kellgren JH, Lawrence JS: Radiological assessment of osteoarthritis *Ann Rheum Dis* 1957

## OA evaluation

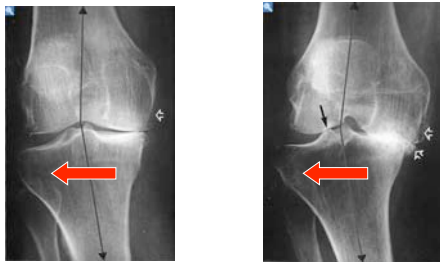
- Kellgren-Lawrence
  - Radiographs done in extension (no schuss)
  - Form of OA with joint line narrowing before osteophyte appearance are not taken into account

Kelgren JH, Lawrence JS: Radiological assessment of osteoarthritis *Ann Rheum Dis* 1957

## Imaging (FT)



## Imaging (FT)



## Imaging (FT)

- Bipodal AP
- No more monopodal
  - Overstimulation of the deformation



## Long-standing X-rays

- Beware feet rotation
  - May induce 5° of error in mechanical axis
  - Alignment posterior condyle on lateral fluoroscopic image
  - Less than 2° error
- Magnification 4.6 (1.8)%

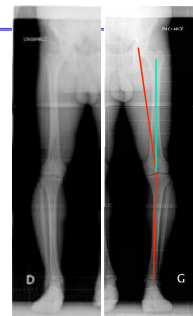


Odenbring et al *COOR* 1993

Hankemeier et al *Comput Aided Surg* 2006

## Imaging (FT)

- Bipodal AP
  - Two shots centered on each knee
- Mechanical axis (HKA)



## Full-length standing X-rays

- Measurement of mechanical axis:
  - Variability  $0.62^\circ$  in the radiological technique
  - Variability  $1.02^\circ$  in the measurement

Huang et al *J Chin Med Assoc* 2004

- Reproducibility ICC: 0.99 (n=4)

Rauh et al *Orthopedics* 2004

## Full-length standing X-rays

- Assessment of mechanical axis
- Supine fluoroscopy versus standing full-length radiographs
  - Absolute difference of 13.4 mm
  - Increase discrepancy correlated with:
    - Increase BMI
    - Deviation  $> 2\text{cm}$

Sabharwal & Zao *J Bone Joint Surg* 2008

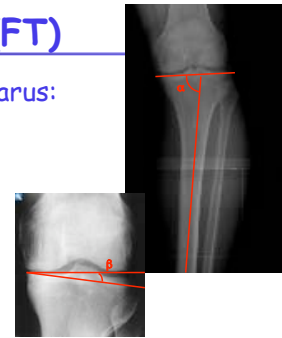
## Full-length standing X-rays

- "Intraoperative fluoroscopy with the use of electrocautery cord is a useful tool for assessing alignment in patients with a normal BMI and mechanical axis of  $< 2\text{cm}$ "

Sabharwal & Zao *J Bone Joint Surg* 2008

## Imaging (FT)

- Constitutional varus:  $90^\circ - \alpha$
- Intra-articular deformation



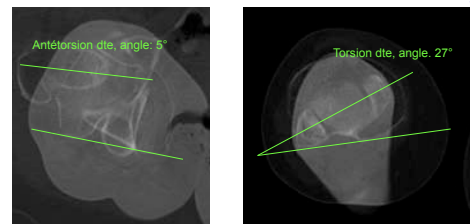
## Specific cases

- Femoral or tibial fracture



## Specific cases

- Rotational deformation Ct-scanning



## Imaging (FP)

- Loading radiographs
- Lateral at 30° of flexion
- Axial at 30° of flexion AP in extension
- AP at 30° flexion (schuss)
- Long standing radiographs

## Imaging (FP)

- Ct-scanning
  - Patellar tilt
  - Femoro-patellar relation
  - TT-TG
  - Rotational deformation

## Imaging (FP)

- AP



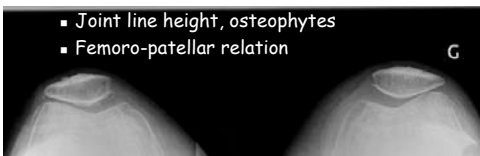
## Imaging (FP)

- Lateral view at 30°
  - Patellar height
  - Trochlea assessment



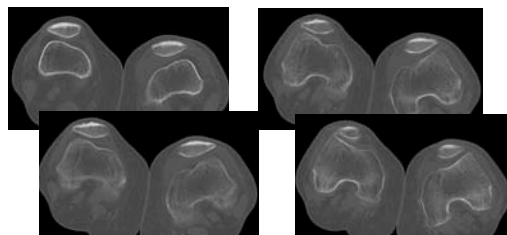
## Imaging (FP)

- Axial view at 30°
  - Joint line height, osteophytes
  - Femoro-patellar relation



## Ct imaging (FP)

- Femoro-patellar joint



### Ct imaging (FP)

- TT-TG

TT-TG = 11 mm  
Distance : 11mm  
Angle 90°

TT-TG = 17 mm  
Distance : 17mm  
Angle 90°

### Ct imaging (FP)

- Rotational deformation

Antétorsion gche, angle: 10°

Antétorsion dte, angle: 5°

### Ct imaging (FP)

- Rotational deformation

Torsion gche, angle: 26°

Torsion dte, angle: 27°

### Take home message

- Routine protocol
- Loading radiographs
- Good and reliable radiology center
- Spend some time studying your radiographs

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