



7th Advanced Course on Knee Surgery - 2018:

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## ***"Imaging assessment of "Unicomp" candidates!"***

Presenter: Anders Troelsen, MD, ph.d., dr.med., Professor



## *Distribution of the basic primary OA patterns*

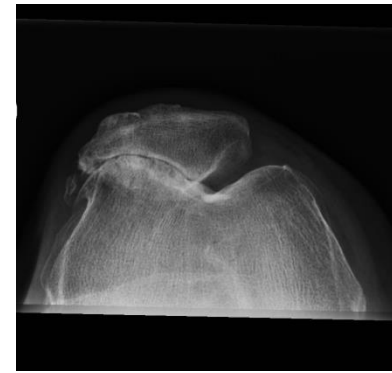
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Medial FT:  
75-85 %



Lateral FT:  
10-15 %



PF:  
5-10 %

## *Radiographic assessment – my starting point*

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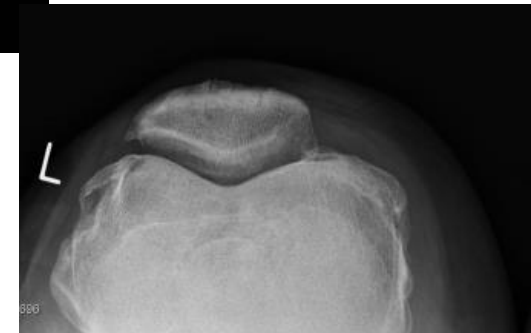


Weight-bearing AP

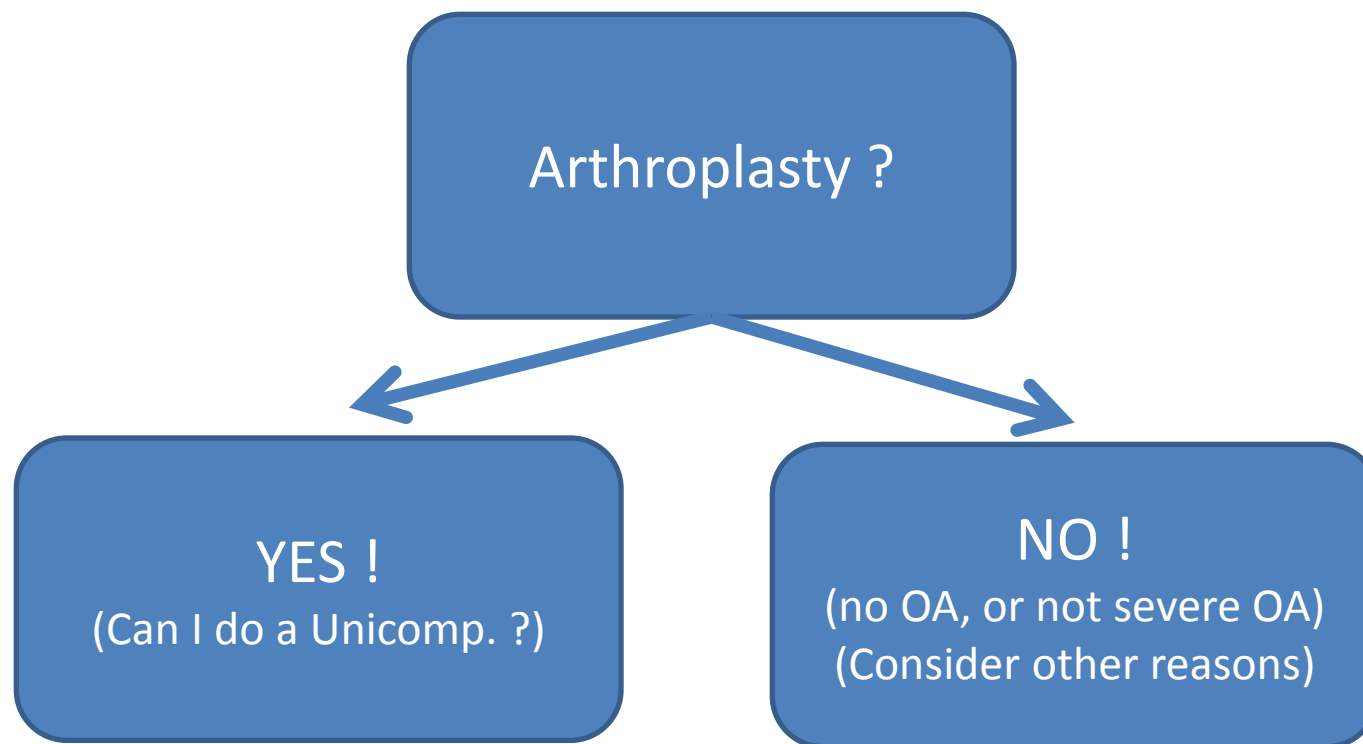


Lateral Weight-bearing

Patella Skyline,  
at 30-(45)° of flex.



## *Can I do an arthroplasty ?*



## *Can I do an arthroplasty ?*

**NO !**

(no OA, or not severe OA)  
(Consider other reasons)

71 year old male  
Unspecific knee pain for 1 year  
Pain during function and at rest



## *Can I do an arthroplasty ?*

**NO !**

(no OA, or not severe OA)  
(Consider other reasons)

Knee examination is uneventful  
Pain from the knee when hip is examined



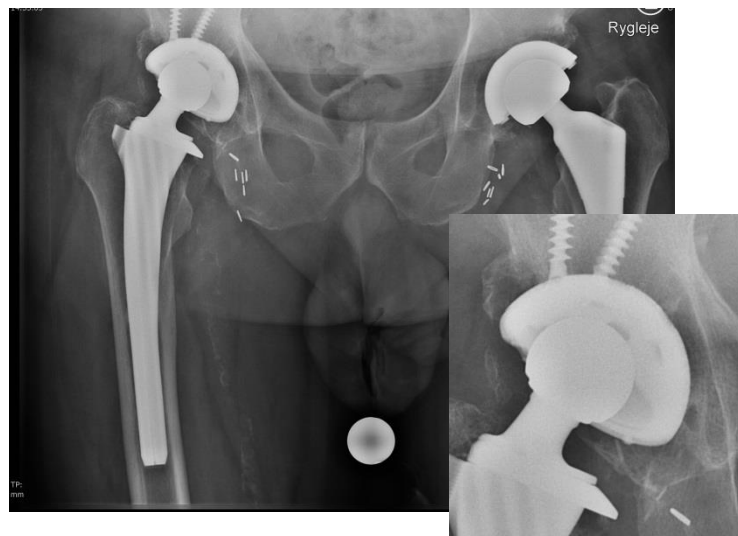
## *Can I do an arthroplasty ?*

NO !

(no OA, or not severe OA)

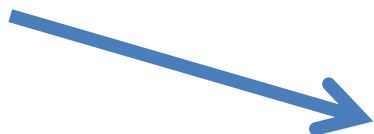
(Consider other reasons)

Knee examination is uneventful  
Pain from the knee when hip is examined



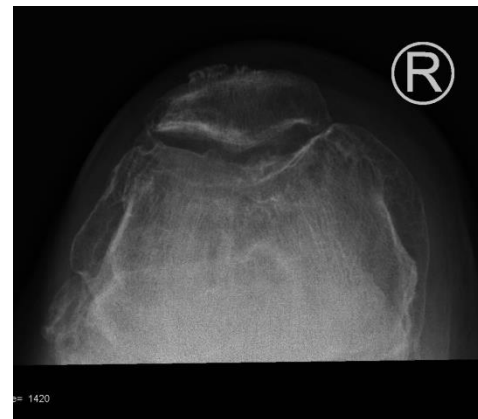
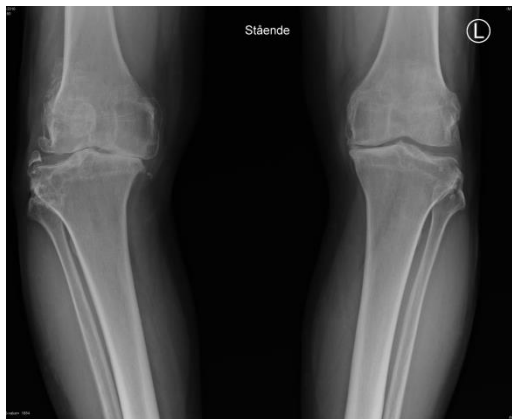
## *Imaging assessment*

Can I do an arthroplasty?  
**YES !**  
(Can I do a Unicomp. ?)



The easy case – TKA for sure !

Case: Male, 61 Y, Right knee

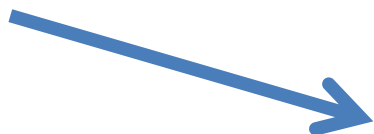


## *Imaging assessment for Unicomp.'s*

Can I do an arthroplasty?

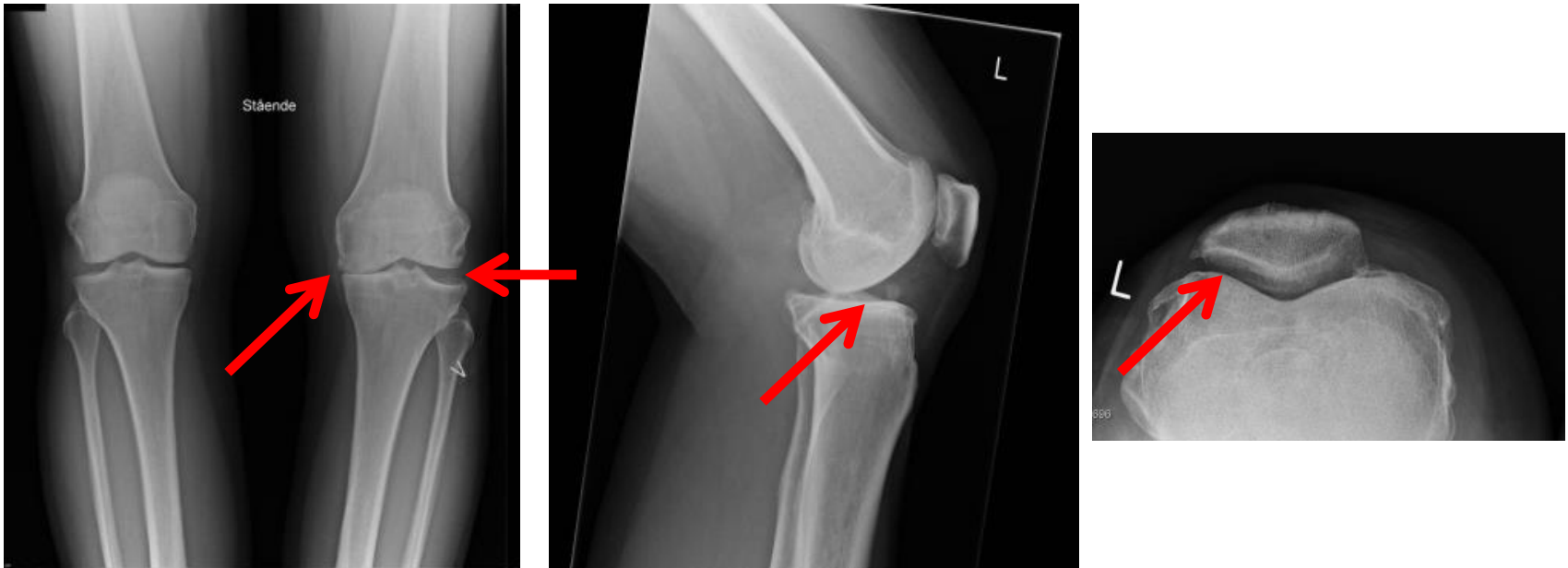
**YES !**

(Can I do a Unicomp. ?)



## *Basic imaging assessment – medial comp.*

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## *Supplemental imaging assessment – Stress x-ray*

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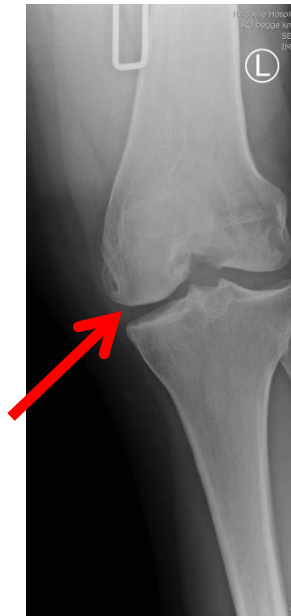
Varus / Valgus stress x-ray:

- *Knee flexed 20°*
- *X- tube angled 10°*
- *X-ray beam parallel with Tib. joint surface*
- *Avoid knee rotation (patella central)*



## *Supplemental imaging assessment – medial comp.*

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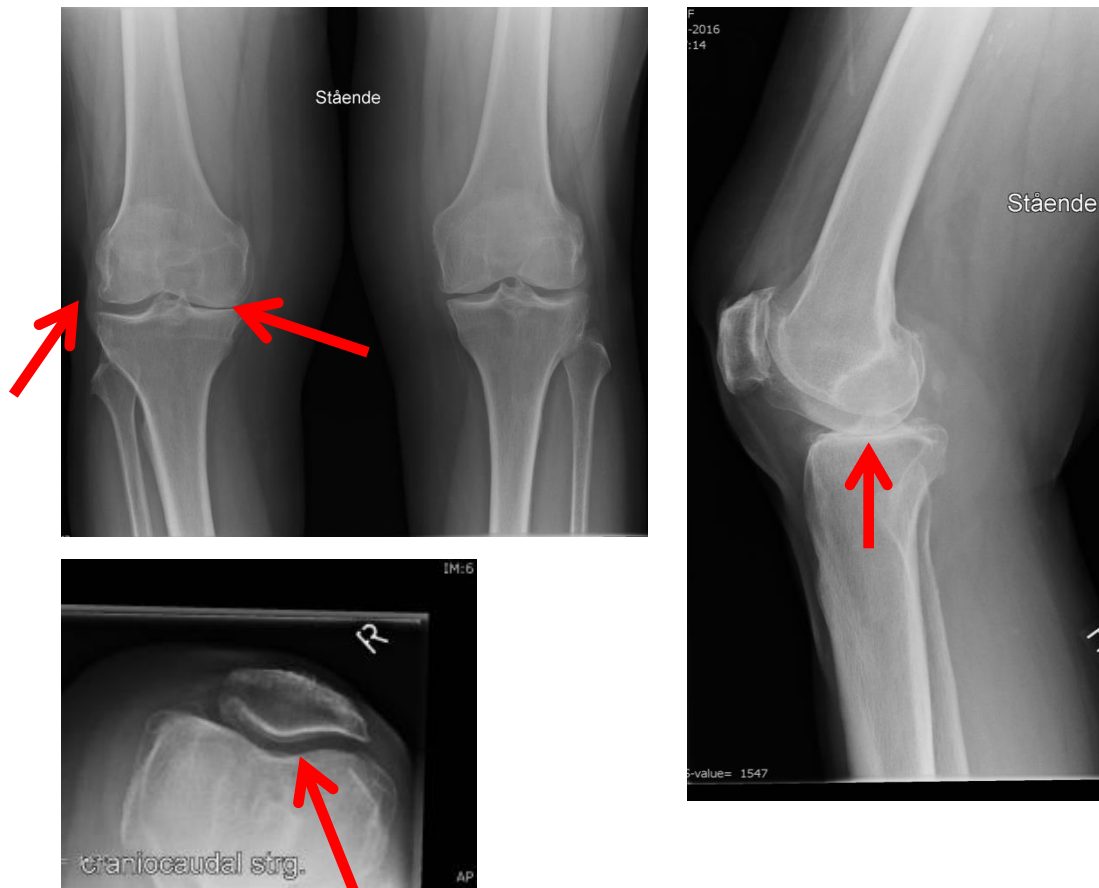
Valgus stress x-ray:

*Preserved lateral compartment?*

*MCL status / correctable deformity?*

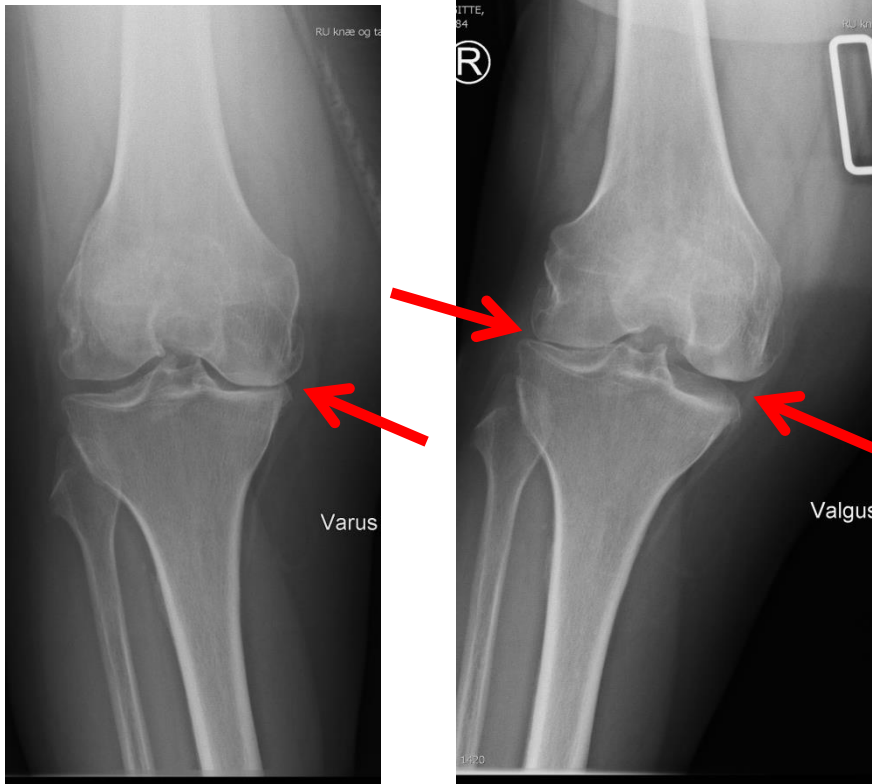
## *Supplemental imaging assessment – medial comp.*

Case: Female, 58 Y, Right knee.



## *Supplemental imaging assessment – medial comp.*

Case: Female, 58 Y, Right knee.



Varus stress

Valgus stress

Varus stress:

*Bone-on-bone medial comp.*

Valgus stress x-ray:

*Preserved lateral compartment??*

*MCL status / correctable deformity*

# Supplemental imaging – medial comp.

Clin Orthop Relat Res (2013) 471:3998–4003  
DOI 10.1007/s11999-013-3212-3

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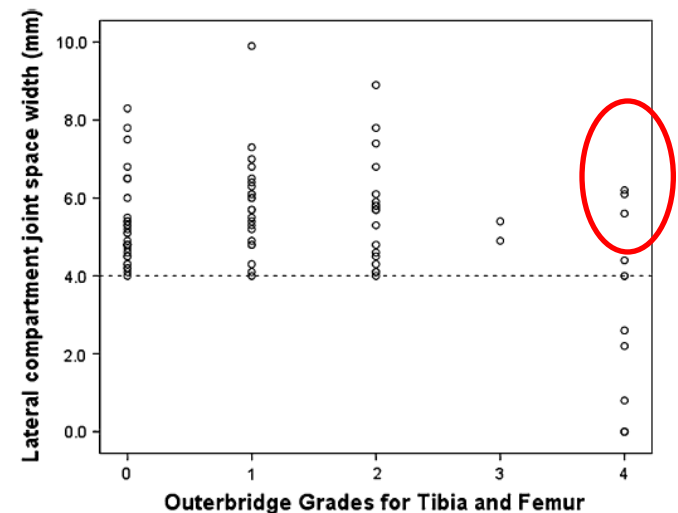
## CLINICAL RESEARCH

### The Value of Valgus Stress Radiographs in the Workup for Medial Unicompartmental Arthritis

Wenzel Waldstein MD, Jad Bou Monsef MD,  
Johannes Buckup MD, Friedrich Boettner MD

#### Lateral stress x-ray:

- *Severe OA in Lat. Comp. may go undetected on valgus stress X-ray*



**Fig. 2** A scatterplot illustrates the relationship between lateral compartment joint space width on valgus stress radiographs and intraoperative cartilage assessment (Outerbridge grading scale) of the lateral compartment for the entire cohort (n = 91). All knees with an Outerbridge Grade of 0, 1, 2, or 3 maintained a joint space width of 4 mm or more.

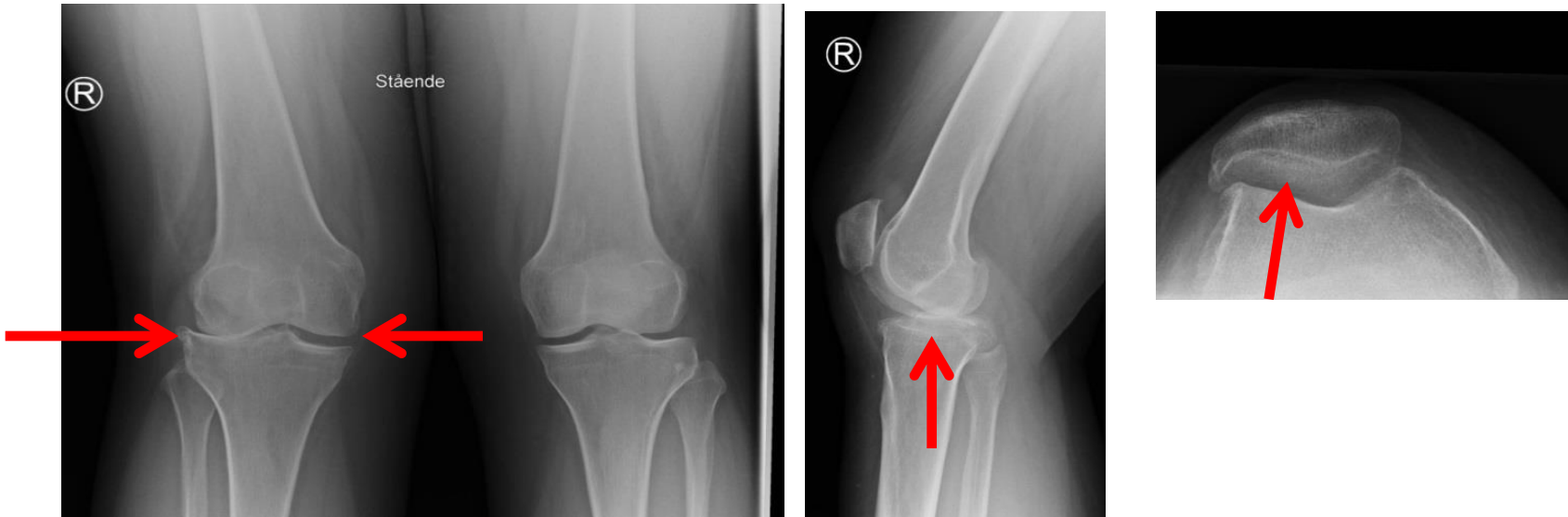
## *Supplemental imaging – Rosenberg/Schuss view*

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Rosenberg view:

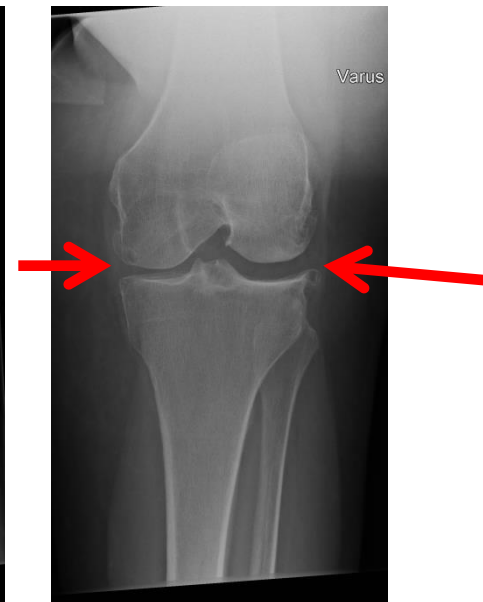
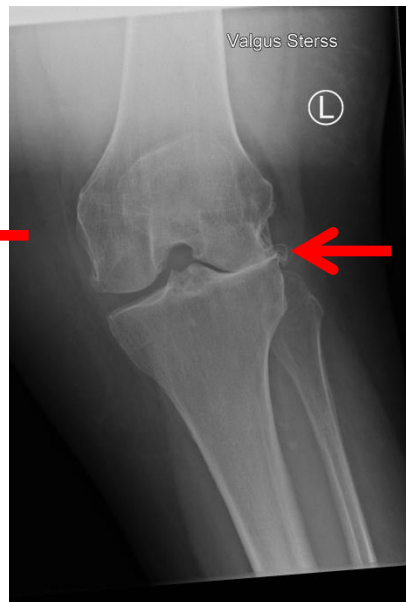
- *Looking for cartilage loss / bone-on-bone*
- *Weight-bearing PA*
- *Knee flexed 45°*
- *X- tube angled 10° (pointing slightly down)*

## *Basic imaging assessment – lateral comp.*



## *Supplemental imaging assessment – lateral comp.*

Case: Female, 73 Y, Left knee.



Valgus stress:

*Bone-on-bone lateral comp.*

Valgus stress

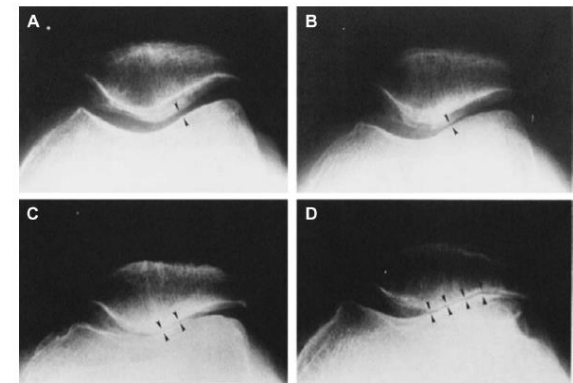
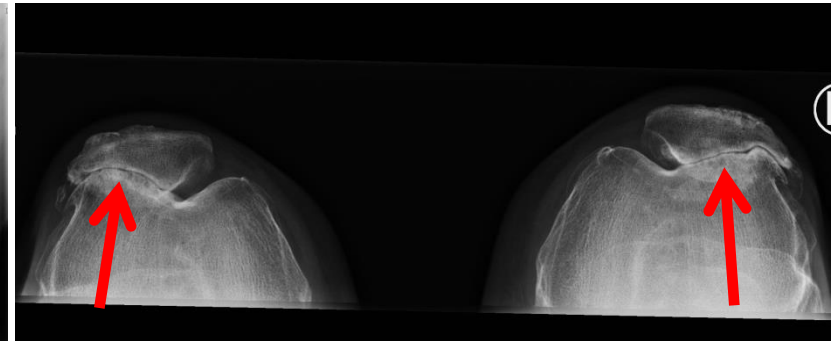
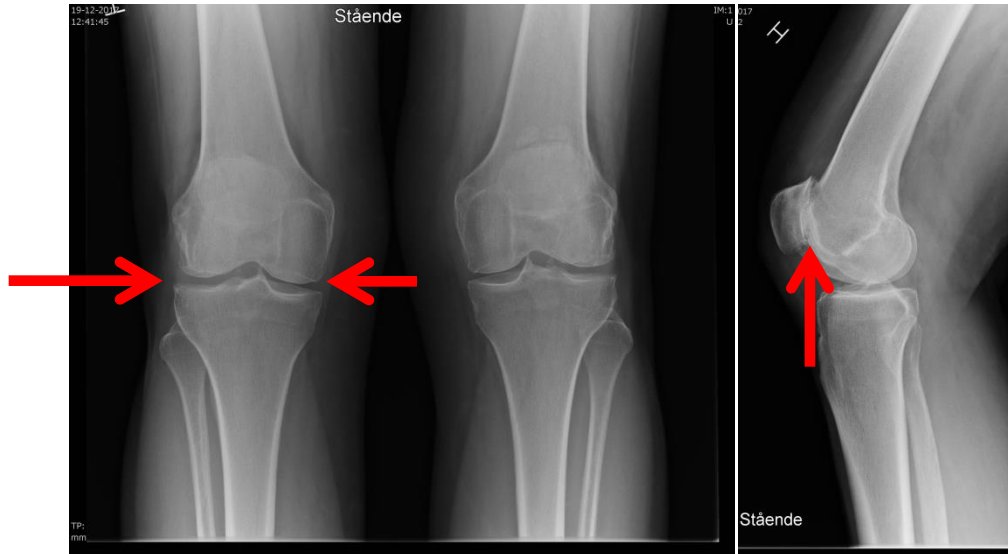
Varus stress

Varus stress x-ray:

*Preserved medial compartment*

*LCL status / correctable deformity*

# Basic imaging assessment – Patello-Femoral comp.



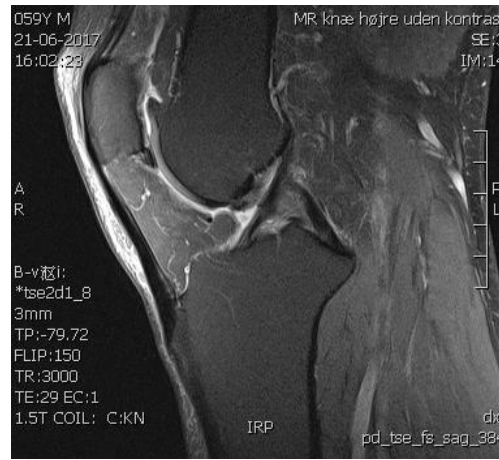
**Fig. 1.** (A-D) Iwano classification from "Roentgenographic and Clinical Findings of Patellofemoral Osteoarthritis," Iwano et al. [14]. Roentgenographic stage of patellofemoral osteoarthritis. (A) Stage 1. Joint-space narrowing is mild. The narrowest part of the joint space (arrowheads) is more than 3 mm; (B) Stage 2. Joint-space narrowing is moderate. The narrowest part of the joint space (arrowheads) is less than 3 mm, but there is no bony contact; (C) Stage 3. Joint-space narrowing is severe. A partial bony contact below one-quarter of the joint surface is present (arrowheads); (D) Stage 4. Joint-space narrowing is very severe. The bony joint surfaces entirely touch each other (arrowheads). Stage 0 is normal; stage 1 is mild, in which the joint space is at least 3 mm; stage 2 is moderate, in which the joint space is less than 3 mm, but there is no bony contact; stage 3 is severe, in which partial bony contact less than one-quarter of the joint surface is present; and stage 4 is very severe, in which the joint bony surfaces entirely touch each other.

Ref.: Iwano et al, CORR, 1990

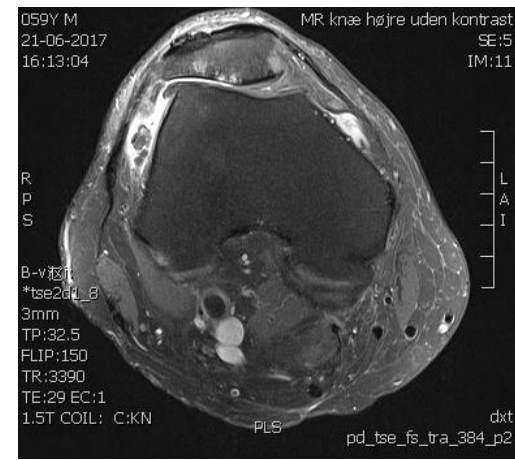
## *Supplemental imaging - MRI – PF comp.*



Healthy cartilage in FT compartments

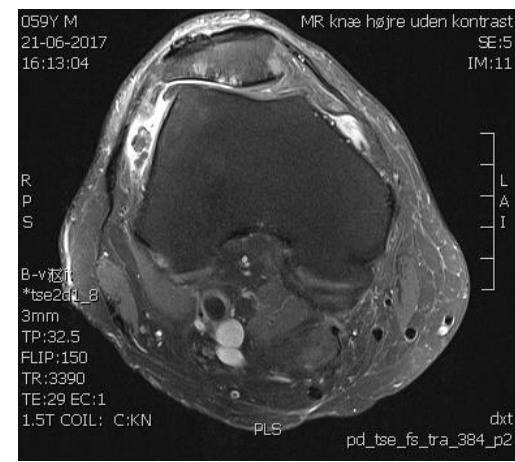
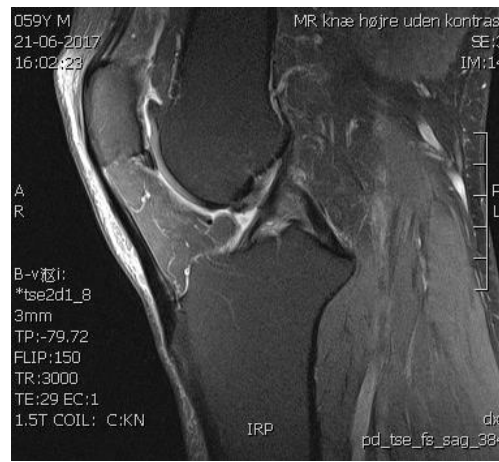


Intact ACL



Verification of severe OA in PF joint

## *Supplemental imaging - MRI – Lateral comp.*



In post-traumatic lateral compartment OA:

- Healthy cartilage in medial FT and PF compartment
- ACL intact

# Supplemental imaging - CT arthrography



Contents lists available at ScienceDirect

The Knee



## Wear patterns in anteromedial osteoarthritis of the knee evaluated with CT-arthrography

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### ABSTRACT

**Objective:** To analyze the value of CT-arthrography imaging in the diagnosis of knee osteoarthritis and to facilitate the selection of partial versus total knee replacement.

**Methods:** A retrospective study of 100 patients that had either medial unicompartmental knee replacement (UKR) (N=50) or total knee replacement (TKR) (N=50). One observer measured lower limb mechanical alignment and osteoarthritis patterns of the knee in each compartment with radiographs, CT-arthrography and full leg standing radiographs.

**Results:** All patients had Kellgren-Lawrence grade IV osteoarthritis of the medial femorotibial joint with a mean (SD) varus alignment of the lower limb (172° (3.5°) HKA-angle). Zone mechanical axis distribution showed strong correlation with HKA-axis. Arthritis patterns were different for patients selected for UKR or TKR. UKR patients had anteromedial osteoarthritis and wear of the medial facet of the patella in contrast to TKR patients who had medial osteoarthritis associated with diffuse or lateral patellofemoral wear and wear of the central or posterior zones of the lateral compartment. Medial facet wear of the patella is related to more important varus alignment of the lower limb (Kennedy zone 0 and 1).

**Conclusion:** CT-arthrography imaging can show lesions that are not visible on plain or stress radiographs because of central or posterior localization with surrounding intact cartilage. Patients who develop tri-compartmental osteoarthritis despite varus alignment have probably other risk factors than their mechanical alignment and should be considered candidates for TKR.

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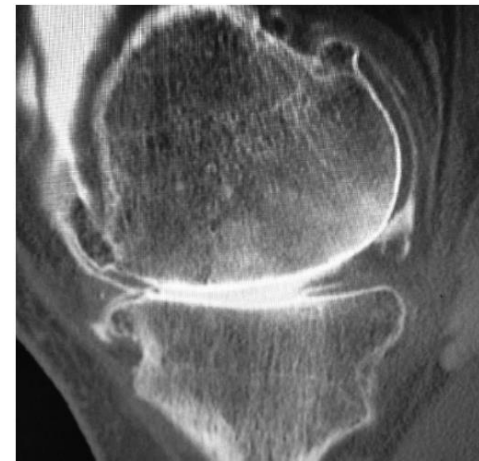


Fig. 1. Anteromedial arthritis pattern with bone on bone wear and intact posteromedial cartilage.

## CT arthrography in knee OA:

- Detailed information about location of cartilage defects that may go undetected on X-ray.
- It's role compared with MRI remains undetermined

## *Supplemental imaging - Long Leg Standing*

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Long Leg Standing X-ray supplemental to standard x-rays:

- Previous femoral osteotomy.
- Previous prox. tibial osteotomy with gross overcorrection.
- Previous fracture of tibia or femur with malalignment.
- Congenital or nutritional disease affecting long bones (deformity).
- If leg alignment looks “funny” but the short x-ray is uneventful.

*Conclusion - .....to identify these....*

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## *Conclusion - .....You need these*

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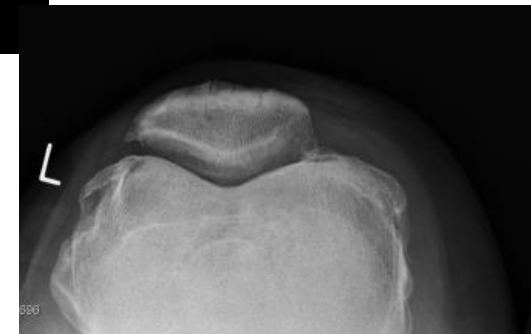


Weight-bearing AP



Lateral Weight-bearing

Patella Skyline,  
at 30-45° of flex.



## *Conclusion - ....and in selected cases these...*



# Conclusion - ....it's evidence based...



## ■ KNEE

### Radiological Decision Aid to determine suitability for medial unicompartmental knee arthroplasty

#### DEVELOPMENT AND PRELIMINARY VALIDATION

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J. B. Adams,  
C. R. Oosthuizen,  
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#### Aims

An evidence-based radiographic Decision Aid for meniscal-bearing unicompartmental knee arthroplasty (UKA) has been developed and this study investigates its performance at an independent centre.

#### Patients and Methods

Pre-operative radiographs, including stress views, from a consecutive cohort of 550 knees undergoing arthroplasty (UKA or total knee arthroplasty; TKA) by a single-surgeon were assessed. Suitability for UKA was determined using the Decision Aid, with the assessor blinded to treatment received, and compared with actual treatment received, which was determined by an experienced UKA surgeon based on history, examination, radiographic assessment including stress radiographs, and intra-operative assessment in line with the recommended indications as described in the literature.

#### Results

The sensitivity and specificity of the Decision Aid was 99% and 98%, respectively. Excluding knees where a clear pre-operative plan was made to perform TKA, i.e. patient request, the sensitivity was 93% and specificity 96%. The false-positive rate was low (2.4%) with all affected patients readily identifiable during joint inspection at surgery.

In patients meeting Decision Aid criteria and receiving UKA, the five-year survival was 99% (95% confidence intervals (CI) 97 to 100). The false negatives (3.5%), who received UKA but did not meet the criteria, had significantly worse functional outcomes (flexion  $p < 0.001$ , American Knee Society Score - Functional  $p < 0.001$ , University of California Los Angeles score  $p = 0.04$ ), and lower implant survival of 93.1% (95% CI 77.6 to 100).

#### Conclusion

The radiographic Decision Aid safely and reliably identifies appropriate patients for meniscal-bearing UKA and achieves good results in this population. The widespread use of the Decision Aid should improve the results of UKA.

Cite this article: *Bone Joint J* 2016;98-B(10 Suppl B):3-10.