# Added Utility of Magnetic Resonance Imaging in Preoperative Assessment for Medial Unicompartmental Knee Arthroplasty

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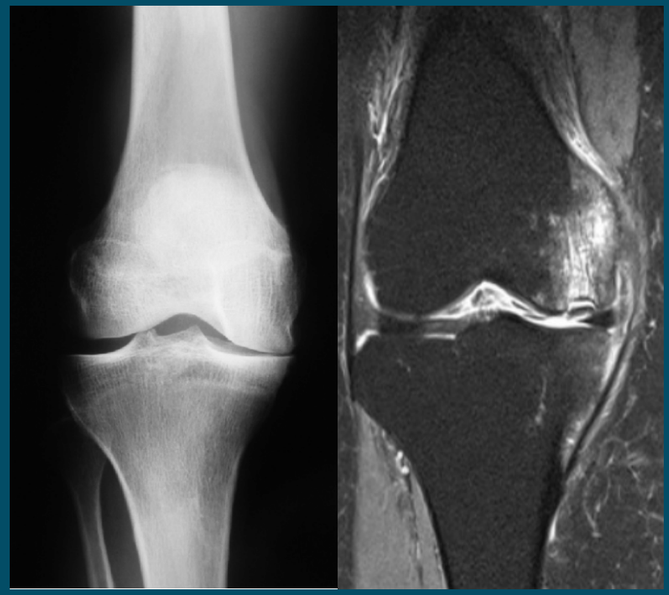
# Faculty Disclosure Information

- Nothing to disclose

# MRI for pre-operative assessment of medial UKA patients

- For medial UKA, patient selection using correct indications can optimise post-surgical outcomes.
- The current gold standard is K-L scores from knee radiographs
- MRI may allow for more accurate assessments of cartilage damage
- MRI can detect additional abnormalities not visible on radiographs i.e. subchondral bone marrow oedema



*K-L, Kellgren-Lawren*, unicompartmental knee arthroplasty,

# Study aims

1. To evaluate the utility of MRI for pre-operative assessment of medial UKA patients by comparing disease severity of the medial, lateral and patellofemoral compartments assessed using MRI compared with radiographs

2. To investigate associations of these two assessments with post-operative clinical outcomes

*MRI,* magnetic resonance imaging; *UKA*, unicompartmental knee arthroplasty,

# Study methods

- Multi-surgeon, retrospective study of prospectively collected outcomes at two tertiary centres
- Study period: January 2017 to December 2021
- Patients undergoing primary medial UKA cases for osteoarthritis were included
- Implants used: Restoris MCK (Stryker Orthopaedics, 64%), Oxford UKA (Zimmer Biomet, 23%), Persona Partial Knee (Zimmer Biomet, 11%) and ZUK (Smith and Nephew, 2%).

Inclusions
- Unilateral primary TKA
- Pre- & post-op OKS available
- At least 1 year follow-up
- Pre-op X-ray cartilage loss graded with K-L
- Pre-op MRI cartilage loss graded with ICRS

Exclusions:
- 113 cases: no pre-op MRI scans
- 63 cases: no pre-op OKS
- 11 cases: no post-op OKS
- 1 case: concurrent repair of meniscal tear

- **Key outcomes: Pre-op cartilage loss on MRI, patient-reported OKS**

*ICRS, International Cartilage Repair Society, K-L, Kellgren-Lawren; MRI,* magnetic resonance imaging; *OKS,* Oxford Knee Score; *UKA*, unicompartmental knee arthroplasty

# Study patients: 88 primary UKAs

| | |
|---|---|
| **Total** | |
| **Knees** | 88 |
| **Patients** | 85 |
| **Gender** | 56.8% male |
| **Age (y), mean ± SD** | 64.1 ± 8.8 |
| **BMI, mean ± SD** | 29.7 ± 5.3 |
| **ASA status** | |
| **1** | 8.0% |
| **2** | 70.5% |
| **3** | 19.3% |
| **3** | 2.3% |
| **Follow-up time (y), mean ± SD** | 3.2 ± 1.1 |



*ASA,* American Society of Anesthesiologists; *BMI,* body mass index; *SD,* standard deviation; *UKA*, unicompartmental knee arthroplasty, *y,* years

# Study findings: K-L (X-ray) vs ICRS (MRI) scoring

- In the medial compartment, all patients (100%) with less severe radiographic K–L scores (1–3) were assessed to have the most severe MRI ICRS scores (4).

- In the lateral and PF compartments, 20 (43%) and 7 (78%) patients with mild K–L scores (0 and 1) were assessed to have more severe ICRS scores (3 and 4), respectively

| Score | K-L score n (%) | ICRS score n (%) |
|---|---|---|
| **Medial compartment** | | |
| 0 | 1 (1.1) | - |
| 1 | 1 (1.1) | - |
| 2 | 3 (3.4) | - |
| 3 | 34 (38.6) | - |
| 4 | 49 (55.7) | 88 (100%) |
| **Lateral compartment** | | |
| 0 | 20 (22.7) | 2 (2.3) |
| 1 | 29 (33.0) | 17 (19.3) |
| 2 | 37 (42.0) | 25 (28.4) |
| 3 | 2 (2.3) | 22 (25.0) |
| 4 | 0 (0) | 22 (25.0) |
| **Medial facet, PF compartment** | | |
| 0 | 1 (1.6) | 21 (23.9) |
| 1 | 8 (13.1) | 7 (8.0) |
| 2 | 20 (32.8) | 11 (12.5) |
| 3 | 29 (47.5) | 10 (11.4) |
| 4 | 3 (4.9) | 29 (44.3) |

100%

43%

78%

*ICRS, International Cartilage Repair Society; K-L, Kellgren-Lawren; MRI, magnetic resonance imaging; PF, Patellofemoral*

# Study findings: Medial & lateral compartments

- No associations were found between imaging scores and OKS at early or late follow-up

| Patients | n (%) | OKS change, early mean ± SD | p-value | OKS change, late mean ± SD | p-value |
|---|---|---|---|---|---|
| **Medial compartment** | | | | | |
| **K-L score** | | | 0.67[a] | | 0.12[a] |
| **0** | 1 (1.1) | - | | - | |
| **1** | 1 (1.1) | -9 | | 13 | |
| **2** | 3 (3.4) | -1 | | 19.0±1.4 | |
| **3** | 34 (38.6) | 14.0±9.5 | | 18.9±7.5 | |
| **4** | 49 (55.7) | 13.0±7.6 | | 21.9±9.1 | |
| **Lateral compartment** | | | | | |
| **K-L score** | | | 0.72[b] | | 0.24[b] |
| **0** | 20 (22.7) | 13.4±9.4 | | 18.3±9.6 | |
| **1** | 29 (33.0) | 11.1±9.6 | | 19.7±8.1 | |
| **2** | 37 (42.0) | 13.1±8.4 | | 22.3±8.1 | |
| **3** | 2 (2.3) | 18.5±7.8 | | 21.5±3.5 | |
| **ICRS score** | | | 0.91 | | 0.51 |
| **0** | 2 (2.3) | 8 | | 17.0±5.7 | |
| **1** | 17 (19.3) | 12.3±10.4 | | 21.1±8.8 | |
| **2** | 25 (28.4) | 13.5±8.4 | | 21.2±7.8 | |
| **3** | 22 (25.0) | 13.9±7.9 | | 22.0±6.8 | |
| **4** | 22 (25.0) | 11.8±9.9 | | 18.2±10.3 | |

[a]t-test of K-L grades 3 and 4, [b]ANOVA of K-L grades 0-2
*early: 6 weeks, late: ≥ 1 year*
*ICRS, International Cartilage Repair Society; K-L, Kellgren-Lawren*; *OKS,* Oxford Knee Score; *SD,* standard deviation

# Study findings: Patellofemoral compartment

- No association between imaging scores and OKS were found at early (6 week) or late (≥1 year) follow-up

| Patients | n (%) | OKS change, early mean±sd | p-value | OKS change, late mean±sd | p-value |
|---|---|---|---|---|---|
| **Patellofemoral compartment** | | | | | |
| **K-L score** | | | 0.26[a] | | 0.14[a] |
| **0** | 1 (1.6) | - | | 14 | |
| **1** | 4 (6.6) | 4.7±4.9 | | 16.7±6.7 | |
| **2** | 22 (36.1) | 10.4±9.7 | | 18.7±7.7 | |
| **3** | 30 (49.2) | 14.1±8.6 | | 22.3±8.5 | |
| **4** | 4 (6.6) | 14.3±8.5 | | 27.0±10.2 | |
| **ICRS score** | | | 0.11 | | 0.12 |
| **0** | 12 (13.6) | 7.2±8.4 | | 15.6±6.3 | |
| **1** | 22 (25.0) | 12.1±7.9 | | 19.5±8.9 | |
| **2** | 22 (25.0) | 17.4±9.0 | | 23.7±8.5 | |
| **3** | 21 (23.9) | 13.1±10.2 | | 21.1±7.3 | |
| **4** | 11 (12.5) | 13.0±7.8 | | 21.1±9.6 | |

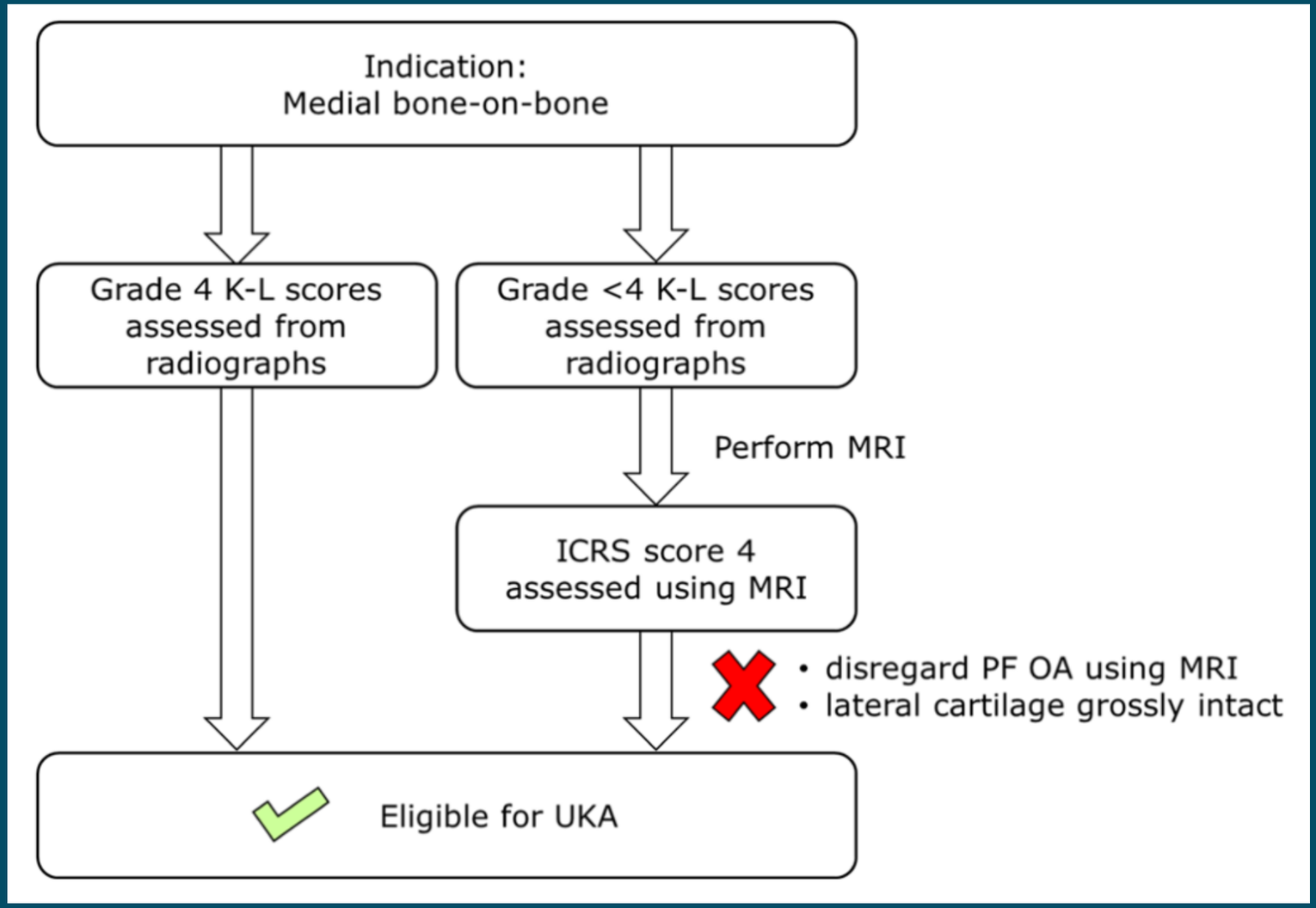
- Further analysis with medial or lateral facets of the patellofemoral compartment similarly showed no association of imaging scores with early or late OKS

[a]t-test of K-L grades 2 and 3
*early: 6 weeks, late: ≥ 1 year*
*ICRS, International Cartilage Repair Society; K-L, Kellgren-Lawren*; *OKS,* Oxford Knee Score; SD, standard deviation

# Conclusions

- The study findings suggest that for medial UKA, cartilage thickness loss in the medial compartment can be more accurately assessed using MRI compared with standard radiographs
- The findings support the use of MRI for additional assessment of symptomatic patients without a clear bone-on-bone diagnosis medially from radiographs
- However, evidence of disease in the PF compartment assessed using MRI should not be considered a contraindication for medial UKA

# Proposed additional MRI assessment step for improved medial UKA patient selection




*ICRS, International Cartilage Repair Society; K-L, Kellgren-Lawren; MRI, magnetic resonance imaging; OA, Osteoarthritis; PF, Patellofemoral; UKA, Unicompartmental knee arthroplasty*

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