ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Relationship Between Patient-Reported Outcome Measures (Proms) And MRI Abnormalities In Early Knee Osteoarthritis

Kentaro Fujita,MD

Department of Orthopaedic Surgery, Kanazawa University Hospital, JAPAN

Faculty Disclosure Information

- There is nothing to disclosure

The definition of early knee osteoarthritis[1)] (KOA)

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

MRI is not recommended as an aid to identify or define early OA

1. KOOS ≤85% in at least 2 out of these 4 categories

- pain(9items)
- stiffness and other symptoms (7items)
- function and daily living (4items)
- quality of life(4items)

2. Clinical examination:

joint line tenderness or crepitus

3. Knee radiographs

Kellgren & Lawrence (KL) grade of 0 or 1

Introduction

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Early diagnosis and treatment of KOA are required to reduce the health care burden[2)]

It is important to understand the pathogenesis of early KOA using MRI

Purpose

To elucidate the association between MRI abnormalities and patient-reported outcomes (KOOS) in patients with early KOA

Participants

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Medial knee joint pain

K–L grade ≤ 1

Nonrandomized, prospective, multicentor clinical trial

2018 — 2023

157 knees

Exclusion

history of ipsilateral lower extremity surgery

Age (years)	Sex (knees)	
59.1 (±12.1)	male	63
	female	94

MRI abnormalities*

ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

The following items evaluated in WORMS[3] were investigated

① cartilage abnormalities
② bone marrow lesions (BMLs)
③ subchondral bone cysts (BMC)
④ subchondral bone attrition (SBA)
⑤ osteophytes
⑥ joint effusion**
⑦ medial meniscus tears***
⑧ medial collateral ligament (MCL) bursitis
⑨ medial meniscus extrusion (MME)>2mm

＊The MRI images were interpreted twice by the speaker, with a two-week interval.

＊＊Medial meniscus injuries included horizontal, transverse, flap, and dorsal root tears.
Horizontal tears were defined as Mink classification 3 or higher, while those classified as 2 or lower were considered normal.

＊＊＊Joint effusion was considered abnormal if graded as 1 or higher.

Statistics

- **Mann-Whitney U test** was used to compare the mean values of each of the five KOOS subscales between two groups, categorized by the presence or absence of each MRI lesion.
- We performed **multiple regression analysis** with the five KOOS subscales as outcome variables and age, BMI, and MRI lesions (significant in the Mann-Whitney U test) as explanatory variables. Statistical significance was set at $p < 0.05$.

High prevalence of cartilage abnormalities, osteophytes, and MCL bursitis

	Presence (knees)	Absence (knees)	Prevalence (%)
cartilage abnormalities	148	9	94.2
medial meniscus tears	131	26	83.4
joint effusion	122	35	77.7
osteophytes	118	39	75.2
MCL bursitis	115	42	73.3
MME>2mm	108	49	68.8
SBA	93	69	59.2
BMLs	67	97	42.7
BMC	29	140	18.5

Significant in the Mann-Whitney U test

Patients with

BMLs→ significantly lower KOOS Pain/ADL

Meniscal tear → significantly lower 5 KOOS subscales

BML	KOOS Symptom	KOOS Pain	KOOS ADL	KOOS Sport	KOOS QOL
presence	61.40	53.86	70.01	41.27	38.64
absence	68.02	62.28	76.36	46.00	39.82
P-value	0.057	**0.004**	**0.027**	0.294	0.723

Meniscal tear	KOOS Symptom	KOOS Pain	KOOS ADL	KOOS Sport	KOOS QOL
presence	63.36	56.19	72.04	42.02	37.34
absence	74.44	71.26	81.79	53.85	49.30
P-value	**0.007**	**<0.001**	**0.003**	**0.043**	**0.004**

Significant in the Mann-Whitney U test

Patients with

Joint effusion → significantly lower KOOS Symptom/ADL
MME>2mm → significantly lower KOOS Symptom/Pain

Joint effusion	KOOS Symptom	KOOS Pain	KOOS ADL	KOOS Sport	KOOS QOL
presence	63.09	57.40	72.10	42.30	38.60
absence	72.54	63.17	79.07	49.86	41.86
P-value	**0.017**	0.07	**0.032**	0.196	0.572

MME >2mm	KOOS Symptom	KOOS Pain	KOOS ADL	KOOS Sport	KOOS QOL
presence	62.80	56.45	72.04	41.39	38.05
absence	70.48	63.60	77.19	49.69	42.11
P-value	**0.022**	**0.048**	0.0788	0.064	0.304

Significant in the Multiple regression analysis

KOOS Symptom	Regression coefficient (β)	95%CI	P-value
Age	0.344	(0.068-0.621)	**0.009**
Joint effusion	-8.061	(-14.77-0.532)	**0.068**

KOOS Pain	Regression coefficient (β)	95%CI	P-value
Meniscus tear	-12.701	(-20.750- -4.652)	**0.002**
BMLs	-7.362	(-13.028- -1.695)	**0.011**

KOOS Sport	Regression coefficient (β)	95%CI	P-value
Age	0.3660	(0.009-0.722)	**0.045**

KOOS Symptom	Regression coefficient (β)	95%CI	P-value
Age	0.303	(0.017-0.590)	**0.038**
Meniscus tear	-11.968	(-21.096- -2.841)	**0.011**

Discussion

Cartilage abnormalities were present in almost all cases (94%)

- Hada, et al. reported that all patients with early KOA had cartilage lesions[4)]

We propose that the pathogenesis of early KOA involves cartilage abnormalities

Joint effusion, medial meniscus tear, MME>2mm and BMLs were associated with knee symptoms

- Torres, et al. noted that joint effusion correlated best with knee pain[5)]

- There have been reports that meniscal lesions, BMLs, and joint effusion are associated with each other[6)7)]

Conclusion

Medial meniscus tears, joint effusion, MME and BML were associated with KOOS

Early treatment targeting these lesions might be key in preventing the progression of KOA

references

1) Luyten FP, et al. Toward classification criteria for early osteoarthritis of the knee. Semin Arthritis Rheum. 2018 Feb;47(4):457-463.

2) Losina E, et al. Pharmacologic regimens for knee osteoarthritis prevention: can they be cost-effective? Osteoarthritis Cartilage. 2014 Mar;22(3):415-30.

3) Peterfy CG, et al. Whole-Organ Magnetic Resonance Imaging Score (WORMS) of the knee in osteoarthritis. Osteoarthritis Cartilage. 2004 Mar;12(3):177-90.

4) Hada S, et al. The degeneration and destruction of femoral articular cartilage shows a greater degree of deterioration than that of the tibial and patellar articular cartilage in early stage knee osteoarthritis: a cross-sectional study. Osteoarthritis Cartilage. 2014 Oct;22(10):1583-9.

5) Torres L, et al. The relationship between specific tissue lesions and pain severity in persons with knee osteoarthritis. Osteoarthritis Cartilage. 2006 Oct;14(10):1033-40.

6) Lo GH, et al. Strong association of MRI meniscal derangement and bone marrow lesions in knee osteoarthritis: data from the osteoarthritis initiative. Osteoarthritis Cartilage. 2009 Jun;17(6):743-7.

7) Wang X, et al. Association between MRI-detected knee joint regional effusion-synovitis and structural changes in older adults: a cohort study. Ann Rheum Dis. 2016 Mar;75(3):519-25