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Novel Ultrasonographic Classification for Early Osteoarthritis of the Knee joint

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Faculty Disclosure Information

We have nothing to disclose.

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Introduction

Definition of Early Knee Osteoarthritis(EKO)[1)]

- **KOOS(Knee injury and Osteoarthritis Outcome Score)**

  At least 2 out of 4 subscales are positive

- **Clinical Findings(at lease 1 required)**

  Joint line tenderness, Crepitus

- **Radiographic findings**

  Kellgren-Lawrence grade 0 or 1

MRI is not included in the criteria!!

MRI unsuitable for routine clinical care because of its high cost and the potential risk of overdiagnosis[2)].

Ultrasonography (US) can detect early and subtle changes in the synovia, menisci, and osteochondral tissues, including osteophytes and articular cartilages, which are well-recognized features of knee OA.

US—a cost-efficient, simple-to-use, convenient, and radiation-free procedure—
is frequently used in clinics as a diagnostic tool to clarify various aspects of knee OA.
We introduce the Knee Early osteoarthritis Noticeable Risk On Kanazawa Ultrasound 8 (KENROKU-8),
a US-based classification system designed for the early detection of knee OA.

Purpose

This study aimed to investigate the association between KENROKU-8 and the Knee injury and Osteoarthritis Outcome Score (KOOS) and examine the validity of KENROKU-8.

Methods

159 patients (55 men, 104 women, Ave age 59.5±11.3 years) were included in this study.

- ✓ Multicenter study
- ✓ With medial knee joint pain
- ✓ K-L grade 0 or 1
- ✓ With no previous ipsilateral lower extremity surgery

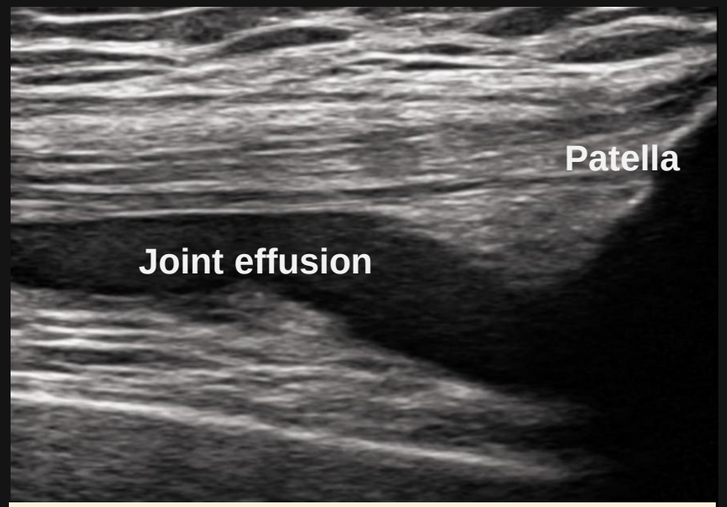
The Knee Early osteoarthritis Noticeable Risk on Kanazawa Ultrasound 8 (KENROKU-8) scoring system

Mode	Findings	Point
B mode	Joint effusion	2
	Medial meniscus extrusion ≥3 mm	2
	Synovial hypertrophy of the suprapatellar bursa	1
	Medial meniscus degenerative tear	1
Doppler mode	Signal flow into the distal femur	2
	Signal flow into the proximal tibia	2
	Signal flow at the MCL bursa	1
	Signal flow at the infra patellar fat pad	1

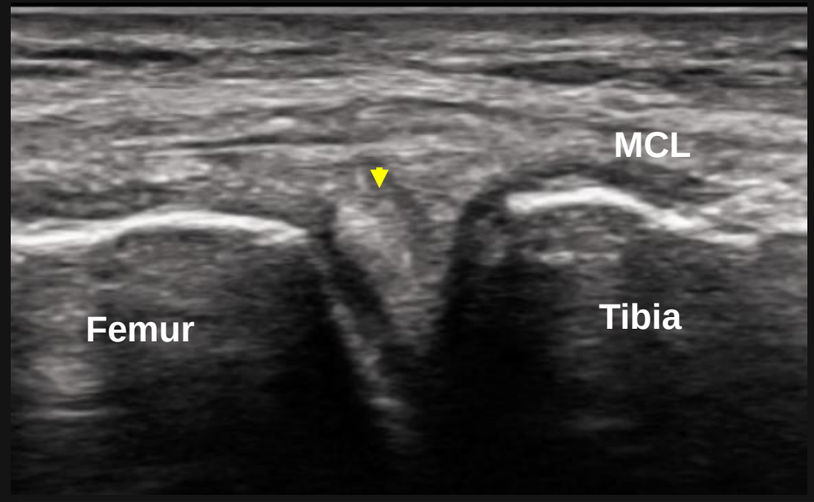
US assessment

《B mode》

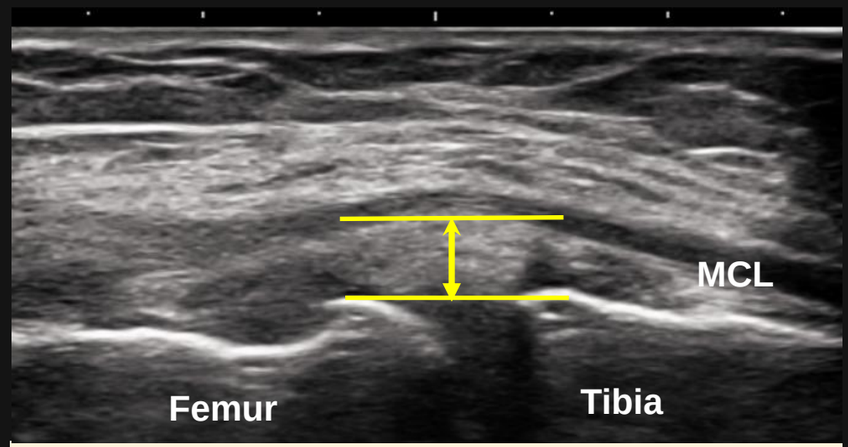
- Joint effusion (≧4mm)
- Medial meniscus degenerative tear
- Medial meniscus extrusion (MME) ≥ 3mm [3)]
  - supine position with 0-degree flexion (unloaded)



Joint effusion
Synovial hypertrophy



Medial meniscus degenerative tear



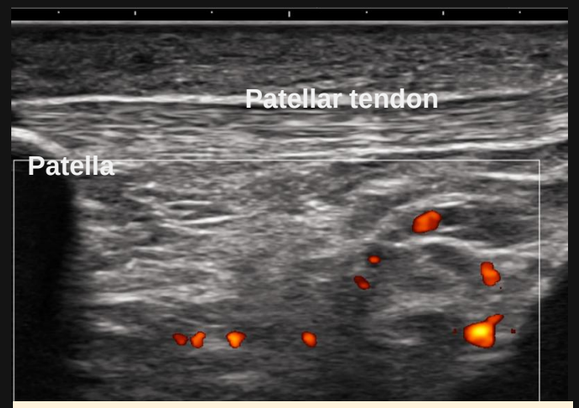
Medial meniscus extrusion ≥ 3mm

US assessment

《Doppler mode》

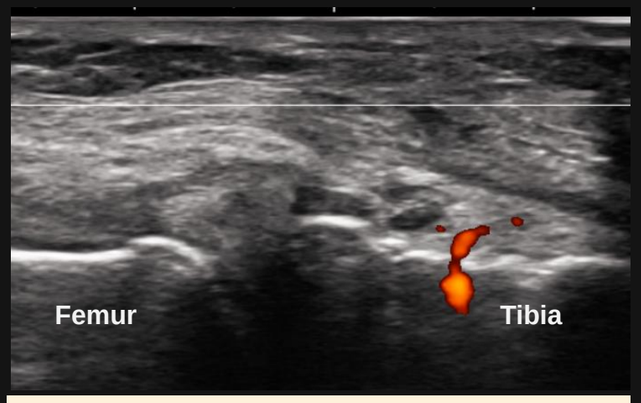
- Doppler signal
  - at the MCL bursa [4),5)]
  - at the Infrapatellar fat pad
  - into the femur [6)]
  - into the tibia [6)]

MCL bursa



Infrapatellar fat pad

Into the femur



Into the tibia

Results

Height	162.2 ± 9.3cm
Body weight	62.4 ± 14.0kg
Duration of knee pain	11.3 ± 16.1 month

《B mode》	Joint effusion (n, %)	59 (37%)
	Synovial hypertrophy of the suprapatellar bursa (n, %)	15 (9%)
	Medial meniscus degenerative tear (n, %)	98 (62%)
	Medial meniscus extrusion ≥ 3mm	38(24%)
《Doppler mode》	Doppler Signal at the medial collateral ligament bursa (n, %)	77 (48%)
	Doppler Signal at the infra patellar fat pad (n, %)	62 (39%)
	Doppler Signal through the femur (n, %)	37 (23%)
	Doppler Signal through the tibia (n, %)	48 (30%)

Results

The average KENROKU-8 score was 3.9 ± 2.6 points

The average KOOS subscale scores were as follows: symptoms, 68.8 ± 18.8; pain, 63.4 ± 17.6; activities of daily living (ADL), 78.4 ± 15.3; sports, 49.6 ± 25.4; and quality of life (QOL), 42.1 ± 18.8.

Correlation analysis between the KENROKU-8 score and KOOS subscales

	Symptom	Pain	ADL	Sports	QOL
US score	-.329**	-.292**	-.216**	-.181*	-.013

**: p < .01, *: p < .05

Discussion (Strength and Limitation)

- The strength of this study is its prospective multicenter collaborative design. Despite being a multicenter study, it is valuable to note the KENROKU-8 score showed a weak negative correlation with three KOOS subscales: symptoms, pain, and ADL.
  We believe that this classification can gain wider adoption and contribute to the advancement of early diagnosis and treatment of knee OA.

- This study has several limitations.
  First, as this was a multicenter prospective collaborative study, inter- and intra-observer reproducibility could not be evaluated.
  This should be addressed in future research. However, it is worthwhile to note that the evaluation method is simple and can be easily conducted.
  Second, the study lacked longitudinal data. This study utilized cross-sectional evaluations at the initial visit, and whether this classification is useful for determining treatment strategies remains unclear.

Conclusion

This multicenter prospective study evaluated the utility of the novel US-based classification system, KENROKU-8, for the detection of early knee OA.

The results showed that the KENROKU-8 score exhibited a weak negative correlation with KOOS subscales (symptoms, pain, and ADL), indicating its usefulness in the objective assessment of early knee OA.

This classification system is a simple and convenient method that can be assessed in approximately 2 minutes in an outpatient clinic, especially in cases where X-ray findings show no abnormalities.

Further studies with larger cohorts, investigation of MRI cut-off values, and evaluation of treatment-related decision-making using the system are anticipated.

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Reference

1) Luyten FP, Bierma-Zeinstra S, Dell'Accio F, Kraus VB, Nakata K, Sekiya I, Arden NK, Lohmander LS. Semin Arthritis Rheum. 2018 Feb;47(4):457-463.
2) Li X, Roemer FW, Cicuttini F, MacKay JW, Turmezei T, Link TM. Ther Adv Musculoskelet Dis. 2023 Mar 14;15:1759720X231158204.
3) Furumatsu T, Fujii M, Kodama Y, Ozaki T. A giraffe neck sign of the medial meniscus: Journal of Orthopaedic Science 2017;22:731–6.
4) Nakase J, Yoshimizu R, Kimura M, Kanayama T, Yanatori Y, Tsuchiya H. Knee. 2022;38:1-8. https://doi.org/10.1016/j.knee.2022.06.001
5) De Maeseneer M, Shahabpour M, Van Roy F, Goossens A, De Ridder F, Clarijs J, et al. AJR Am J Roentgenol. 2001;177:911-7.
6) Takemoto N, Takata Y, Shima Y, Goshima K, Shimozaki K, Kimura M, Kanayama T, Demura S, Nakase J.J Med Ultrason (2001). 2025 Jan;52(1):149-155.
7) Mizuno Y, Takata Y, Shima Y, Goshima K, Kuroda K, Kanayama T, Ishida Y, Takemoto N, Nishimura M, Sengoku T, Demura S, Nakase J.J Med Ultrason (2001). 2025 Jan;52(1):139-148.