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Relationship between ultrasonographic findings and subscales of the Knee Injury and Osteoarthritis Outcome Score in patients with early knee osteoarthritis: a multicenter study

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There is no COI to disclose for this presentation.

Introduction

- New concept of “early knee osteoarthritis (early KOA)” has gained attention.
  - Has knee pain during activity but no deformity of the tibiofemoral joint (K-L grade < 2).
  - Minute structural changes in the joint components occur before any abnormal findings.

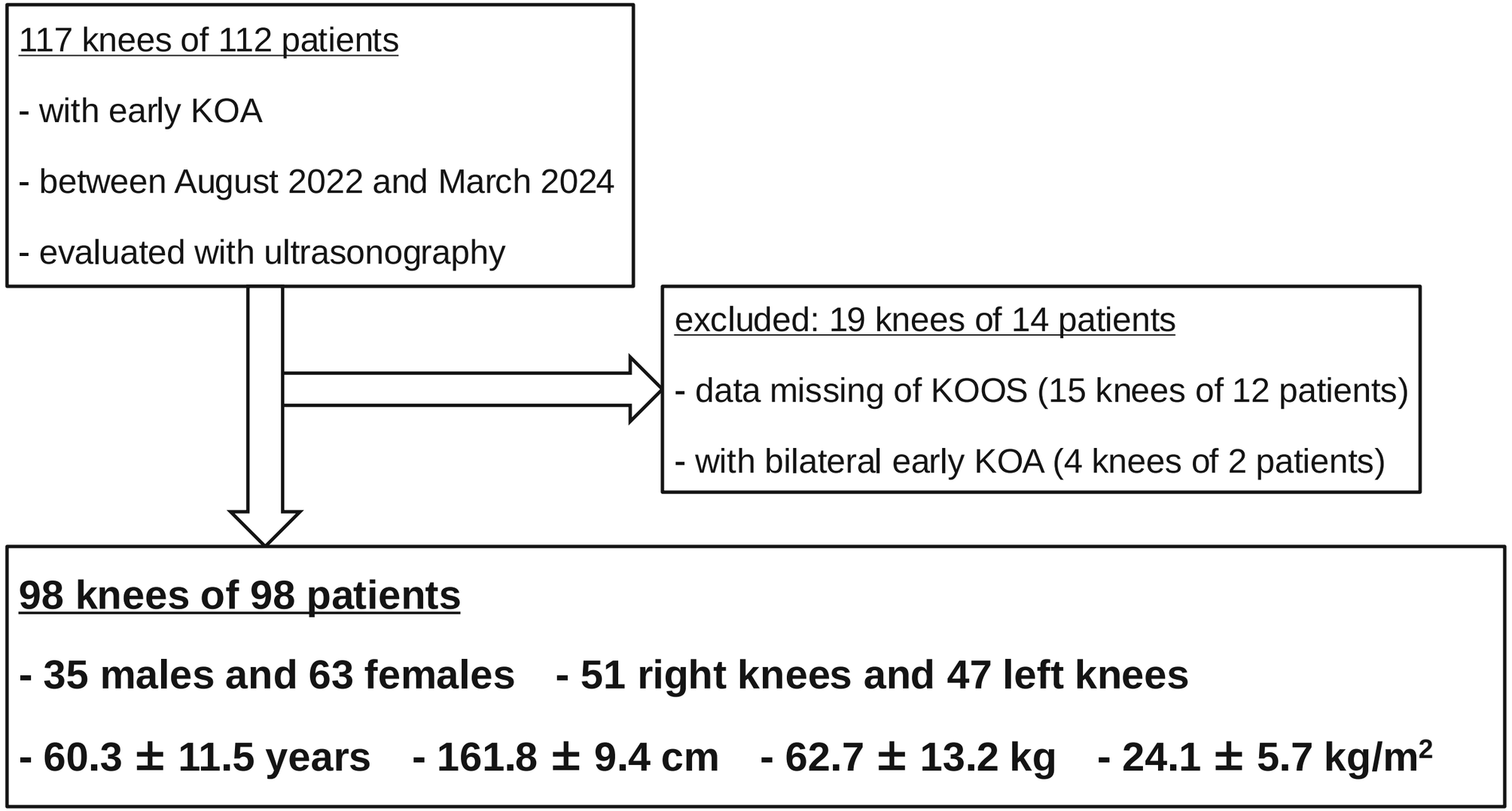
- Ultrasonography is simple, inexpensive, repeatable and good at detecting minute structural changes in joint components.

Ultrasonography may be the gold standard for the diagnosis and treatment of early KOA, but the characteristics and other features of ultrasonographic findings in patients with early KOA have been unknown.

Purpose

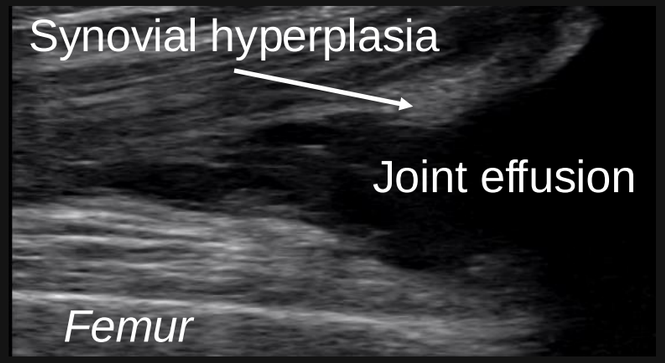
To identify characteristic ultrasonographic findings in patients with early KOA defined as K-L grade < 2 with medial knee pain and tenderness, and to determine the relationship between these findings and the KOOS subscale.

Materials and Methods: participants recruitment



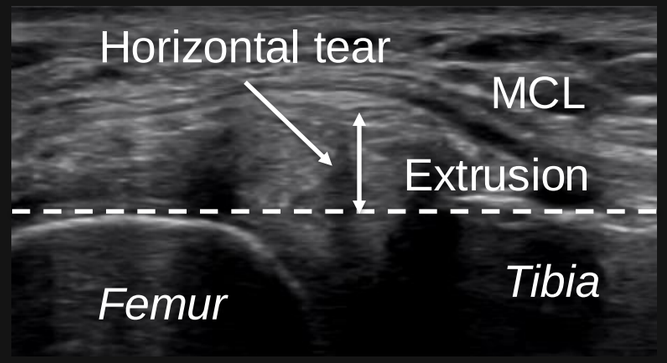
Materials and Methods: ultrasonographic findings

Synovial hyperplasia and joint effusion



Positive: longest diameter < 4mm

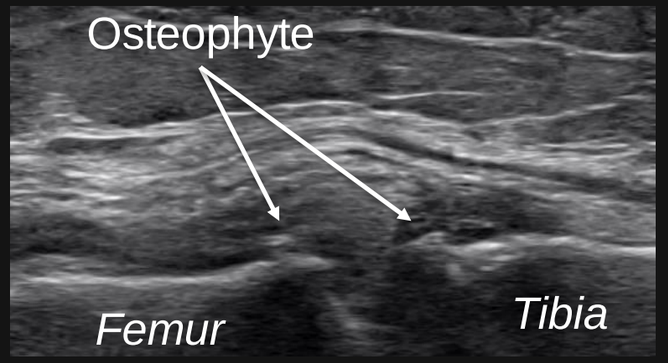
Horizontal tear of MM and MM extrusion



Positive: low echo in MM

Extrusion: distance between tibial plateau and meniscus limbus

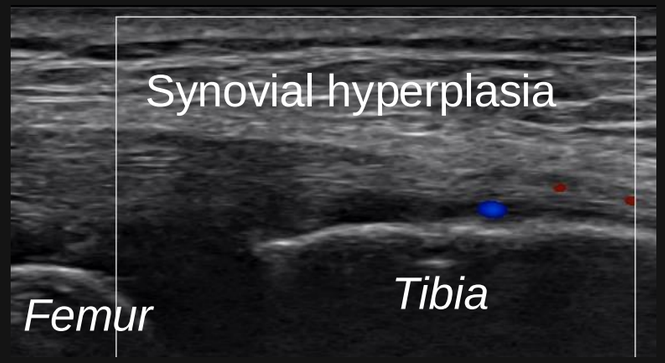
Osteophyte of the medial condyle



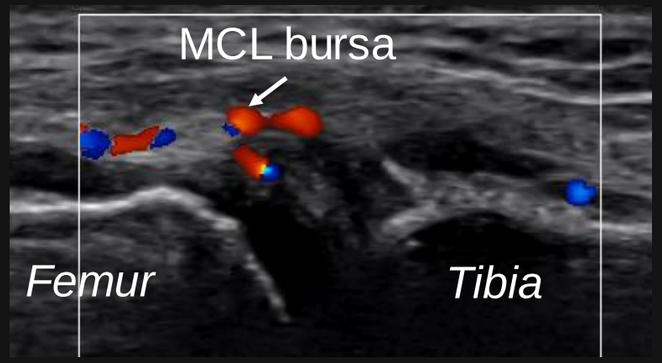
Positive: presence of osteophytes and cartilage osteophytes

Blood flow signals

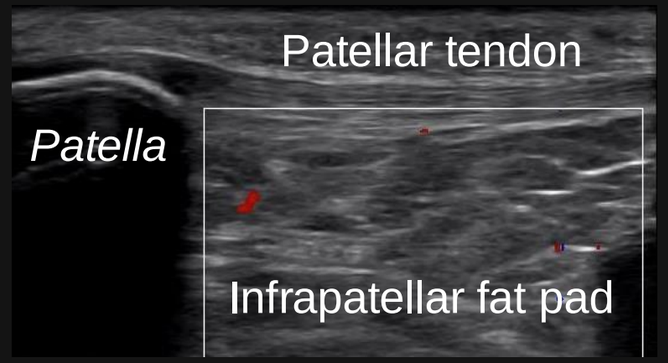
In synovium of suprapatellar bursa



In MCL bursa



In infrapatellar fat pad



Degree of blood flow signals was evaluated in four levels: absent, mild, moderate, marked or severe.

Materials and Methods: KOOS evaluation and Statistical analysis

☐ KOOS evaluation

- ✓ Japanese version of KOOS was used for survey at initial medical examination.
- ✓ Five subscales (Symptom, Pain, ADL, Sports, and QOL)

☐ Statistical analysis

- ✓ Positive rate (%) of each ultrasonographic findings were calculated.
- ✓ Mild, moderate, and severe were judged as positive in evaluation of blood flow signals.
- ✓ Normality of continuous variables was checked with Shapiro-Wilk test.
- ✓ Association between ultrasonographic findings and KOOS subscales was observed by calculating Pearson's and Spearman's correlation coefficients.
- ✓ Significance level was set at $p < 0.05$.

Results: summary of ultrasonographic findings

	negative and positive	positive rate (%)
Synovial hyperplasia in the suprapatellar bursa	89 and 9	9.2
Knee joint effusion	60 and 38	38.8
Horizontal tear of the medial meniscus	39 and 59	60.2
Osteophyte of the medial condyle of femur	51 and 47	48.0
Osteophyte of the medial condyle of tibia	38 and 60	61.2
	absent, mild, moderate, marked or severe	positive rate (%)
Blood flow signals in the suprapatellar bursa	68, 21, 7, 2	30.6
Blood flow signals in the MCL bursa	53, 23, 14, 8	45.9
Blood flow signals in the infrapatellar fat pad	74, 18, 5, 1	24.5
	mm; mean ± SD	-
MME in supine position	2.69 ± 1.19	-
MME in upright position	3.12 ± 1.23	-
Amount of change in MME	0.43 ± 0.85	-

Results: summary of scores about KOOS

	Mean ± SD (points)	Median	Minimum	Maximum
Symptoms	65.0 ± 19.3	67.9	14.3	100
Pain	59.2 ± 18.5	58.3	8.3	94.4
ADL	73.5 ± 17.0	75.8	27.0	100
Sports	44.3 ± 26.0	40.0	0	100
QOL	39.7 ± 22.3	37.5	6.3	100

Results: correlation coefficients

* $p < 0.050$, ** $p < 0.010$

	Symptom	Pain	ADL	Sports	QOL
Synovial hyperplasia in the suprapatellar bursa	−0.224*	−0.230*	−0.292**	−0.290**	−0.208*
Knee joint effusion	−0.366**	−0.233*	−0.309**	−0.213**	−0.194
Horizontal tear of the medial meniscus	−0.031	0.022	−0.045	−0.003	0.015
Osteophyte of the medial condyle of femur	−0.104	−0.159	−0.036	−0.050	−0.092
Osteophyte of the medial condyle of tibia	−0.002	0.112	0.159	0.082	0.051
Blood flow signals in the suprapatellar bursa	−0.142	−0.138	−0.132	−0.102	−0.098
Blood flow signals in the MCL bursa	0.018	−0.166	−0.044	0.014	0.049
Blood flow signals in the infrapatellar fat pad	0.006	−0.001	0.026	0.081	0.107
MME in supine position	−0.140	−0.194	−0.197	−0.161	−0.188
MME in upright position	−0.339**	−0.334**	−0.270**	−0.246*	−0.263**
Amount of change in MME	−0.156	−0.121	−0.069	−0.085	−0.084

Discussion

- **Study of patients with KOA using ultrasonography, including patients with early KOA:**
  Synovial hyperplasia observed in 1/4 patients and joint effusion observed in 1/2 patients.
  - Each parameter was present at higher rate than in this study.
  - Shorter duration of disease in patients with early KOA may be related.

- **Relationship between supine MME and knee symptoms**
  in patients with KOA has been reported.
  - This study revealed association between not supine but upright MME and KOOS subscales.
  - This may be related to fact that most of daily activities are standing movement.

- **There are many causes of knee symptoms, including pain.**
  - It is unlikely that a single ultrasonographic finding would affect KOOS subscales.
  - Small number of significant correlation coefficients obtained suggests a complex relationship with a lot of factors not examined in this study.

Conclusion

KOOS subscale scores in patients with early KOA were significantly associated with synovial hyperplasia of the suprapatellar bursa, joint effusion, and amount of MME in the upright position.

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