

Correlation between Tenosynovitis MRI score and echocardiographic findings in patients with early knee osteoarthritis



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Faculty Disclosure Information

Nothing to disclosures.

Background

- ✓ Early knee osteoarthritis is the stage where symptoms first appear that are beyond the natural effects of aging.

H Madry, et al. Knee Surg Sports Traumatol Arthrosc, 2016

- ✓ There is no internationally agreed upon definition of early knee OA.

I Sekiya, et al. Joint Surg 40 (7) , 2021

the 1st International Conference
on Early Knee Osteoarthritis

1. KOOS項目 : 2 つ以上 (85%以下)

- 1) 痛み(9項目)
- 2) ここ1 週間の膝の症状(7項目)
- 3) 日常動作の困難さ(7項目)
- 4) 生活の質(4項目)

2.臨床所見(1 つ以上)

- 1) 関節裂隙の圧痛、の臨床所見
- 2) 雑音

3.単純X 線像

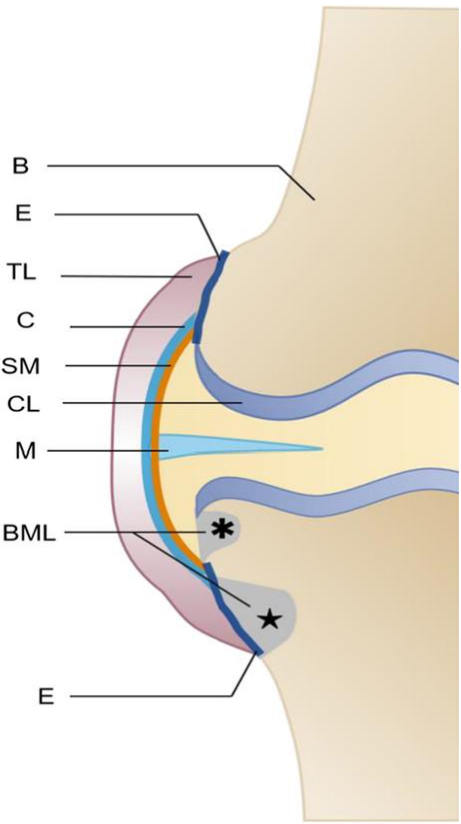
KL grade 0~1

F P Luyten, et al. Semin Arthritis Rheum, 2018

Background

- ✓ The **synovio-entheseal complex (SEC)**, a complex at the attachment site of tendons or ligaments to the synovium, is strongly involved in the development of OA.

M Benjamin, et al. ARTHRITIS & RHEUMATISM, 2007
J G Møller, et al. RMD Open, 2022



- ✓ The medial collateral ligament is known to function as the **SEC** of the knee joint.

B Lee, et al. European Radiology, 2023

B : bone
E : entheses
TL : tendons/ligaments
C : capsule
SM : synovial membrane
CL : cartilage
M : meniscus
BML : bone marrow lesions
BE : bone erosion

Background

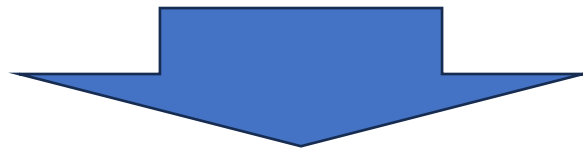
- ✓ Inflammation of the MCL attachment site in the knee joint (**tenosynovitis**) may be involved in the pathology of osteoarthritis of the knee.
- ✓ Tsukamoto et al. evaluated **tenosynovitis** on osteoarthritis of the knee by using **MRI** .

Tsukamoto et al. J.Jpn.Orthop.Assoc.97 (2) , 2023

→ Is it possible to more easily evaluate tenosynovitis using **US** ?

Purpose · Hypothesis

- ✓ To investigate the correlation between MRI scores and US findings in **Tenosynovitis**



- ✓ MRI scores and US findings of **Tenosynovitis** correlate

Method

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

162 cases (Male: 64 cases, Female: 98 cases)

MRI score

Score \	Intra-ligament	Peri-ligament	Bone marrow edema	Bursitis	Ligament thickening	Enthesophyte	Bone erosion
0	No hypersignal	No hypersignal	No edema	0~0.25cm	None	None	None
1	≤25%	Mild	1~33%	0.25~0.5cm	Mild	Small	Small
2	25~50%	Moderate	34~66%	0.5~1.0cm	Moderate	Medium	Medium
3	50% <	Severe	67~100%	1.0cm ≤	Severe	Large	Large

US findings

- Medial meniscus extrusion:MME (mm)
- blood flow signal (0-3)



Correlation test

- Synovial hyperplasia (0 or 1)
- Joint edema(0 or 1)
- Medial meniscus horizontal tear (0 or 1)
- Bone spurs(0 or 1)



Cochran-Armitage test
($p < 0.05$)

Correlation coefficient							
MRI \ US	MME 0° (mm) (N=162)	MME 90° (mm) (N=95)	Standing MME (mm) (N=159)	MME of flexion varus stress (mm) (N=59)	Synovial blood flow signal (0-3) (N=160)	MCL capsule blood flow signal (0-3) (N=154)	IPFP blood flow signal (0-3) (N=154)
Intra-ligament	0.180	-0.055	0.179	-0.286	-0.110	-0.051	-0.123
Peri-ligament	0.112	-0.142	0.073	-0.251	0.083	0.121	-0.22
Bone marrow edema	0.144	0.352	0.258	0.174	0.060	0.036	-0.10
Bursitis	0.161	0.139	0.202	0.096	0.017	0.095	0.069
Ligament thickening	0.216	0.204	0.172	0.173	0.079	0.130	-0.038
Enthesophyte	0.232	0.166	0.296	-0.030	0.043	0.032	-0.057

P value (Cochran-Armitage test)

MRI \ US	Superior capsule synovial hyperplasia	Joint effusion	Medial meniscus horizontal tear	Osteophyte of femur	Osteophyte of tibia
	(N=154)	(N=161)	(N=149)	(N=155)	(N=155)
Intra-ligament	0.306	0.602	0.132	0.470	0.0737
Peri-ligament	0.942	<0.05	0.429	0.655	0.290
Bone marrow edema	0.244	<0.05	0.0867	<0.05	0.811
Bursitis	0.284	<0.05	0.292	0.21	0.477
Ligament thickening	0.172	<0.05	0.460	0.0981	0.168
Enthesophyte	0.194	<0.05	0.932	<0.05	0.222

Discussion · Conclutuion

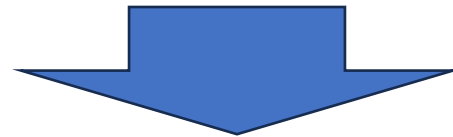
- ✓ As knee OA progresses, the MME pregress.

A Ichiba, et al. J Exp Orthop, 2023

- ✓ Joint effusion on US and MRI shows positive correlation with pain symptoms in knee osteoarthritis

M Hall, et al. Osteoarthritis Cartilage, 2014
P T Wu, et al. Osteoarthritis and cartilage, 2012

MME and edema on US are associated with synovitis findings on MRI.



The above may be a basis for deciding to MRI to patients with early OA.

Refarence

- H Madry, et al. Knee Surg Sports Traumatol Arthrosc, 2016
- I Sekiya, et al. Joint Surg 40 (7) , 2021
- F P Luyten, et al. Semin Arthritis Rheum, 2018
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