SUPPLEMENTARY MATERIAL

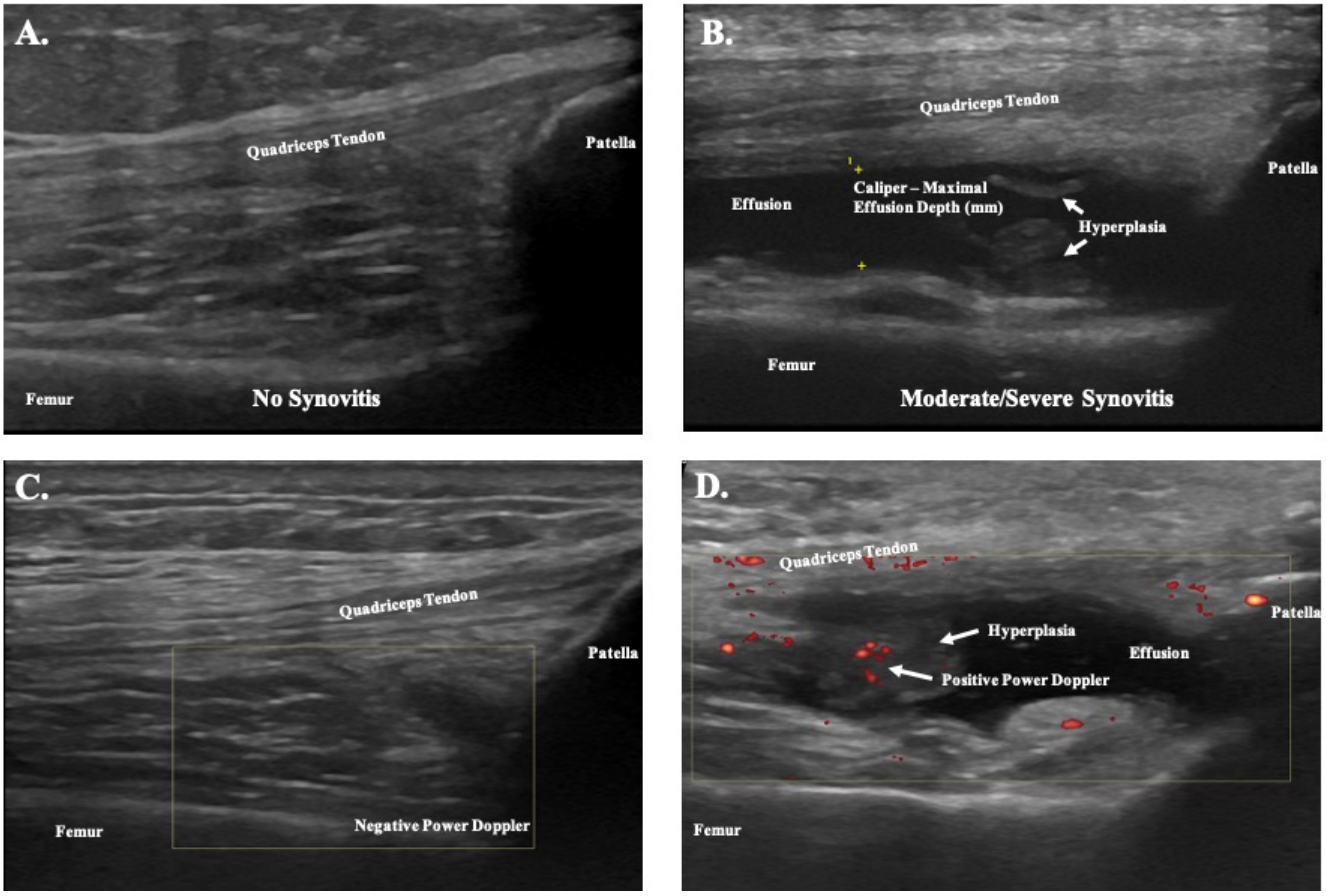

Figure 1. Representative US images demonstrating OMERACT measurements. The top panels show representative images of **(A)** no synovitis (Grade 0) and **(B)** Moderate/Severe synovitis (Grade 2/3). The bottom panels show **(C)** negative and **(D)** positive Power Doppler signal. Anatomical landmarks for patella, quadriceps tendon, and femur are labelled on each image (white). Example of effusion, hyperplasia, Power Doppler, and caliper measurement of maximal effusion depth are also indicated by labels and arrows (white).

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Supplementary Table 1. Multivariate logistic and linear regression model estimates for ICOAP intermittent and constant pain sensitivity analyses (n=410 knees)

Variable	Odds Ratios	Robust Standard Errors	95% CIs
Model 1: Intermittent pain (No/Yes)			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	0.80	0.22	0.47 to 1.35
Moderate/Severe	1.10	0.34	0.60 to 2.01
Maximal Effusion Depth (mm)	0.99	0.03	0.92 to 1.05
Model 2: Constant pain (No/Yes)			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	1.13	0.30	0.67 to 1.90
Moderate/Severe	**1.86***	**0.55**	**1.04 to 3.32**
Maximal effusion depth (mm)	**1.10***	**0.04**	**1.03 to 1.18**

Variable	β coefficient	Robust Standard Error	95% CIs
Model 1: Intermittent pain subscale score			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	-2.82	3.27	-9.26 to 3.63
Moderate/Severe	3.99	3.70	-3.30 to 11.28
Maximal effusion depth (mm)	0.51	0.44	-0.36 to 1.38
Model 2: Constant pain subscale score			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	2.59	3.41	-4.11 to 9.29
Moderate/Severe	**8.19***	**3.92**	**0.48 to 15.89**
Maximal effusion depth (mm)	**1.37***	**0.47**	**0.46 to 2.29**

Adjusting for age, sex, BMI, and radiographic stage (early/late)

*Indicates significance at the 5% level

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Supplementary Table 2. Multivariate logistic regression model estimates for ICOAP intermittent and constant pain (n=453 knees)

Variable	Odds Ratios	Robust Standard Errors	95% CIs
Model 1: Intermittent pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	1.51	0.40	0.89 to 2.55
Hyperplasia			
Absent	Reference	Reference	Reference
Present	0.94	0.23	0.58 to 1.53
Effusion			
Absent	Reference	Reference	Reference
Present	1.01	0.25	0.62 to 1.63
Model 2: Constant pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	0.93	0.23	0.58 to 1.50
Hyperplasia			
Absent	Reference	Reference	Reference
Present	1.25	0.30	0.78 to 1.99
Effusion			
Absent	Reference	Reference	Reference
Present	1.13	0.26	0.71 to 1.77

Adjusting for age, sex, BMI, and radiographic stage (early/late)
*Indicates significance at the 5% level

Supplementary Table 3. Multivariate linear regression model estimates for ICOAP intermittent and constant pain scores (n=453 knees)

Variable	β coefficient	Robust Standard Error	95% CIs
Model 1: Intermittent pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	3.83	3.01	-2.09 to 9.75
Hyperplasia			
Absent	Reference	Reference	Reference
Present	2.00	2.95	-3.79 to 7.78
Effusion			
Absent	Reference	Reference	Reference
Present	0.20	2.98	-5.67 to 6.06
Model 2: Constant pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	-0.56	3.26	-6.96 to 5.84
Hyperplasia			
Absent	Reference	Reference	Reference
Present	4.58	3.07	-1.46 to 10.62
Effusion			
Absent	Reference	Reference	Reference
Present	2.04	3.09	-4.04 to 8.12

Adjusting for age, sex, BMI, and radiographic stage (early/late)
*Indicates significance at the 5% level

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Supplementary Table 4. Multivariate logistic model estimates for secondary analyses (early-/late-stage OA)

Early-stage OA (KL ≤ 2) (n=214 knees)			
Variable	**Odds Ratio**	**Robust Standard Error**	**95% CIs**
Model 1: Intermittent pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	1.24	0.49	0.58 to 2.69
Hyperplasia			
Absent	Reference	Reference	Reference
Present	0.96	0.33	0.52 to 1.80
Effusion			
Absent	Reference	Reference	Reference
Present	1.15	0.38	0.60 to 2.18
Model 2: Constant pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	1.05	0.41	0.49 to 2.25
Hyperplasia			
Absent	Reference	Reference	Reference
Present	1.81	0.61	0.93 to 3.52
Effusion			
Absent	Reference	Reference	Reference
Present	1.81	0.64	0.91 to 3.61
Late-stage OA (KL ≥ 3) (n=239 knees)			
Variable	**Odds Ratio**	**Robust Standard Error**	**95% CIs**
Model 3: Intermittent pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	1.55	0.58	0.75 to 3.23
Hyperplasia			
Absent	Reference	Reference	Reference
Present	0.80	0.31	0.38 to 1.72
Effusion			
Absent	Reference	Reference	Reference
Present	0.73	0.27	0.36 to 1.52
Model 4: Constant pain (No/Yes)			
Power Doppler			
Absent	Reference	Reference	Reference
Present	0.91	0.29	0.49 to 1.68
Hyperplasia			
Absent	Reference	Reference	Reference
Present	0.87	0.31	0.44 to 1.73
Effusion			
Absent	Reference	Reference	Reference
Present	0.75	0.26	0.39 to 1.46

Adjusting for age, sex, and BMI
*Indicates significance at the 5% level

Supplementary Table 5. Multivariate linear model estimates for secondary analyses (early-/late-stage OA)

Early-stage OA (KL ≤ 2) (n=214 knees)			
Variable	**β coefficient**	**Robust Standard Error**	**95% CIs**
Model 1: Intermittent pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	0.84	4.32	-7.68 to 9.35
Hyperplasia			
Absent	Reference	Reference	Reference
Present	1.09	3.68	-6.17 to 8.35
Effusion			
Absent	Reference	Reference	Reference
Present	-0.18	3.90	-7.87 to 7.51
Model 2: Constant pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	0.66	4.52	-8.24 to 9.56
Hyperplasia			
Absent	Reference	Reference	Reference
Present	6.60	3.60	-0.49 to 13.69
Effusion			
Absent	Reference	Reference	Reference
Present	5.53	3.65	-1.67 to 12.72
Late-stage OA (KL ≥ 3) (n=239 knees)			
Variable	**β coefficient**	**Robust Standard Error**	**95% CIs**
Model 1: Intermittent pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	5.00	4.27	-3.42 to 13.41
Hyperplasia			
Absent	Reference	Reference	Reference
Present	2.04	4.85	-7.52 to 11.60
Effusion			
Absent	Reference	Reference	Reference
Present	-0.39	4.69	-9.63 to 8.84
Model 2: Constant pain subscale score			
Power Doppler			
Absent	Reference	Reference	Reference
Present	-0.55	4.74	-9.89 to 8.80
Hyperplasia			
Absent	Reference	Reference	Reference
Present	2.98	5.41	-7.68 to 13.64
Effusion			
Absent	Reference	Reference	Reference
Present	-0.78	5.28	-11.19 to 9.63

Adjusting for age, sex, and BMI

*Indicates significance at the 5% level

Supplementary Table 6. Multivariate linear regression model estimates for KOOS pain and US measures of inflammation

Variable	β coefficient	Robust Standard Errors	95% CIs
Model 1: KOOS Pain (n=453 knees)			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	-3.48	2.52	-8.42 to 1.46
Moderate/Severe	**-10.54***	**2.63**	**-15.70 to -5.38**
Maximal effusion depth (mm)	**-1.30***	**0.30**	**-1.89 to -0.72**
Model 2: KOOS Pain - Early-stage OA (KL ≤ 2) (n=214 knees)			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	-2.98	3.37	-9.62 to 3.67
Moderate/Severe	**-12.70***	**3.92**	**-20.43 to -4.97**
Maximal effusion depth (mm)	**-1.44***	**0.51**	**-2.44 to -0.44**
Model 3: KOOS Pain - Late-stage OA (KL ≥ 3) (n=239 knees)			
Synovitis Grade			
None	Reference	Reference	Reference
Mild	-4.00	3.84	-11.56 to 3.56
Moderate/Severe	**-9.12***	**3.71**	**-16.43 to -1.81**
Maximal effusion depth (mm)	**-1.21***	**0.36**	**-1.92 to -0.50**

Model 1: Adjusting for age, sex, BMI, and radiographic stage (early/late)
Model 2 and 3: Adjusting for age, sex, and BMI
*Indicates significance at the 5% level
CI, confidence interval; KL, Kellgren-Lawrence grade; KOOS, Knee Injury and Osteoarthritis Outcome Score; mm, millimetre; n, number; OA, osteoarthritis

Supplementary Table 7. Multivariate linear regression model estimates for KOOS pain (n=453 knees)

Variable	β coefficient	Robust Standard Errors	95% CIs
Model 1: KOOS Pain			
Power Doppler			
Absent	Reference	Reference	Reference
Present	-2.82	2.29	-7.32 to 1.68
Hyperplasia			
Absent	Reference	Reference	Reference
Present	**-6.07***	2.33	-10.65 to -1.49
Effusion			
Absent	Reference	Reference	Reference
Present	-4.08	2.30	-8.59 to 0.44

Adjusting for age, sex, BMI, and radiographic stage (early/late)
*Indicates significance at the 5% level

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