

Bibliographic Cite	Literature Type	Level of Evidence	Purpose	Population	Intervention and Outcome Measures	Results/ Recommendations	Study Limitations
Ahn JH, Jeong SH, Kang HW. Risk Factors of False-Negative Magnetic Resonance Imaging Diagnosis for Meniscal Tear Associated With Anterior Cruciate Ligament Tear. <i>Arthroscopy</i> . 2016;32(6):1147-54.	retrospective	low level of evidence	To identify risk factors that predict false-negative magnetic resonance imaging (MRI) diagnosis for meniscal tear coincident with anterior cruciate ligament injury using multivariate logistic regression.;	220 Korean patients included. Inclusion criteria were consecutive patients who underwent arthroscopic anterior cruciate ligament (ACL) reconstruction. Exclusion criteria were no meniscal tear or incomplete tear less than 10 mm in length on arthroscopic examination, delay to surgery from preoperative MRI more than 1 year, delay to surgery from preoperative MRI more than 4 weeks, revisions, fracture histories, and multiple ligament injuries excluding additional medial collateral ligament (MCL) injury. The patients had a mean age of 38.1 SD10.4 years (range, 18 to 53 years). Among the 220 patients, arthroscopy revealed MM tear in 130 patients, LM tear in 61 patients, and simultaneous tear of both medial and lateral menisci in 29 patients. Therefore, 249 meniscal tears (159 MMs and 90 LMs) detected during arthroscopic examination were finally enrolled.	The medical records of consecutive patients who underwent arthroscopic anterior cruciate ligament reconstruction from January 2006 through December 2014 were reviewed. Exclusion criteria were no meniscal tear or incomplete tear less than 10 mm in length, delay to surgery from initial injury more than 1 year, delay to surgery from preoperative MRI more than 4 weeks, revisions, fracture histories, and multiple ligament injuries. According to preoperative MRI diagnosis, the meniscal tears were sorted into true-positive MRI and false-negative MRI groups. Multivariate logistic regression was used to analyze risk factors including age, gender, body mass index, time from injury to MRI, knee instability, concomitant ligament injury, intra-articular effusion, bone contusion, cartilage injury, meniscal tear location, and meniscal tear pattern.	The mean of time from injury (TFI) to MRI diagnosis was 15.4 15.6 weeks (range, 1 to 52 weeks) in the TP group and 4.2 5.7 weeks (range, 1 to 50 weeks) in the FN group (P < .001; 95% CI, 8.156-14.254). As TFI to MRI diagnosis increased, the risk of the false-negative MRI diagnosis decreased (P < .001 in univariate analysis and P < .001 in multivariate analysis). The OR of TFI to MRI diagnosis was 0.850 (95% CI, 0.799-0.904), and the adjusted OR was 0.859 (95% CI, 0.802-0.921). Meniscal tears were located within the anterior one-third (7.6% 19/249), middle one-third (14.5%, 36/249), posterior one-third (62.2%, 155/249), and over one-third of the meniscus (15.7%, 39/249) in all enrolled cases. A significant difference was found in meniscal tear pattern between the TP and FN groups using the c2 test (P < .001). In logistic regression analysis, meniscal tear location within the posterior one-third was a significant risk factor for the false-negative MRI diagnosis in univariate analysis, compared with tear within the anterior one-third as reference (P < .001; OR, 20.141; 95% CI, 4.471- 90.732), and multivariate analysis (P=0.003; adjusted OR, 11.823; 95% CI, 2.272-61.519). Peripheral longitudinal tear pattern was also a significant risk factor (adjusted OR, 3.522; 95% CI, 1.256-9.878). Significant risk factors for false-negative MRI included short time from injury to MRI diagnosis, meniscal tear location within the posterior one-third, and peripheral longitudinal tear pattern.	Patients with indeterminate results from the diagnostic test were excluded or no comment was made about how indeterminate results were handled; Baseline characteristics of the control and experimental groups are different and/or there was no attempt to control for confounding effects;
Blyth M, Anthony I, Francq B, et al. Diagnostic accuracy of the Thessaly test, standardised clinical history and other clinical examination tests (Apley's, McMurray's and joint line tenderness) for meniscal tears in comparison with magnetic resonance imaging diagnosis. <i>Health Technol Assess</i> . 2015;19(62):1-62.	prospective	high level of evidence	To determine the diagnostic accuracy of the Thessaly test and to determine if the Thessaly test (alone or in combination with other physical tests) can obviate the need for further investigation by MRI or arthroscopy for patients with a suspected meniscal tear.	282 UK Patients referred to the knee clinic at Glasgow Royal Infirmary were included. Inclusion criteria: any patient < 18 years, unable to give informed consent, or had previous knee replacement surgery. Mean age 42.6 years, mean BMI 27.8, 64% of knee pathology group was male vs 49% of control group	Main outcome measures: Sensitivity, specificity and diagnostic accuracy of the Thessaly test in determining the presence of meniscal tears. Methods: Participants were assessed by both a primary care clinician and a musculoskeletal clinician. Both clinicians performed the Thessaly test, McMurray's test, Apley's test, joint line tenderness test and took a standardised clinical history from the patient.	When the Thessaly Test was utilised by primary care clinicians it had a sensitivity of 0.66, a specificity of 0.39 and a diagnostic accuracy of 54%. Similar diagnostic accuracy was achieved for the other tests: McMurray's Test 54%, Apley's Test 53%, joint line tenderness Test 54% and clinical history 55%. When used by musculoskeletal clinicians the Thessaly Test had a sensitivity of 0.62, a specificity of 0.55 and diagnostic accuracy of 59%. The diagnostic accuracy of the other tests was McMurray's Test 63%, Apley's Test 58%, joint line tenderness Test 64% and clinical history 69%. Sensitivity of the Thessaly Test was influenced by age and the presence of other knee pathologies when used by primary care clinicians and by the presence of other knee pathologies when used by musculoskeletal clinicians. Using multivariate logistical regression, no physical tests were predictive of MRI diagnosis of meniscal tear in the authors' models for either group of clinicians. The Thessaly test was no better at diagnosing meniscal tears than other established physical tests. The sensitivity, specificity and diagnostic accuracy of all physical tests was too low to be of routine clinical value as an alternative to MRI. Caution needs to be exercised in the indiscriminate use of MRI scanning in the identification of meniscal tears in the diagnosis of the painful knee, due to the low specificity seen in the presence of concomitant knee pathology. Further research is required to determine the true diagnostic accuracy and cost-effectiveness of MRI for the detection of meniscal tears.	High percentage (> 25%) of people who dropped out of the study; Reference standard was inadequate; MRI was utilized as reference standard in this cohort, however, when compared to arthroscopy (in the small number of patients that had both in this cohort) it performed poorly, with a specificity of 0.53 [95% confidence interval (CI) 0.28 to 0.77] and 0.6 [95% CI 0.32 to 0.84] after patients who had previously had knee surgery were removed from the analysis.
Carotti M, Salaffi F, Di Carlo M, et al. Relationship between magnetic resonance imaging findings, radiological grading, psychological distress and pain in patients with symptomatic knee osteoarthritis. <i>Radiol Med (Torino)</i> . 2017;122(12):934-43.	cross sectional	low level of evidence	To investigate the associations between the structural findings on MRI (bone marrow lesions [BMLs], synovitis, cartilage defects, meniscal lesions), X-ray examination (Kellgren and Lawrence [K/L] grade), and psychological aspects with pain in patients with knee osteoarthritis (KOA).	149 Italian patients were included. The inclusion criteria were the following: an age ≥50 years; a diagnosis of KOA according to the American College of Rheumatology criteria [the presence of unilateral or bilateral knee pain >30 mm (knee discomfort on most days for at least one month in past 12 months) measured by the visual analog scale (VAS— 0–100 mm)]; tibiofemoral OA on posterior-anterior weightbearing semi-flexed knee radiographs (K/L grade ≥2); and a clinical examination confirming knee pain or discomfort referable to the knee joint. Exclusion criteria were represented by: a history of a previous knee injury requiring non-weight-bearing treatment for >24 h or surgery (including arthroscopy); a history of any arthritis (such as chronic inflammatory arthritis, gout, and calcium pyrophosphate dihydrate deposition disease) diagnosed by a rheumatologist; and any contraindication to MRI (including claustrophobia).	In this study, patients with symptomatic KOA were included. Knee radiographs were acquired and scored according to the K/L score. MRI was performed with a 1.5 T whole-body scanner; the presence of the following alterations was collected: BMLs, infrapatellar fat pad (IFP) synovitis, condral defects, and meniscal tears. Knee pain was assessed with Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain subscale. The Mental Component Summary Scale Score (MCS) of the Medical Outcomes Study Short-Form 36 Health Survey (SF-36) questionnaire was used to evaluate psychological impact.	BMLs were detected in 57 (38.3%) subjects of 149 participants (aged 51–81 years, female 75.8%). Cartilage defects were found in 91.9% of patients, IFP synovitis in 37.5%, meniscal lesions in 34.9%. In multiple regression analyses, WOMAC knee pain was significantly associated with the volume of the BMLs (p = 0.0001), IFP synovitis (p = 0.0036), and SF-36 MCS (p = 0.0001), but not with K/L grades, meniscal lesion score, cartilage defect, sex, age, educational level, disease duration and BMI. BMLs were detected in 57 (38.3%) subjects of 149 participants (aged 51–81 years, female 75.8%). Cartilage defects were found in 91.9% of patients, IFP synovitis in 37.5%, meniscal lesions in 34.9%. In symptomatic KOA patients, MRI features, such as larger BMLs, IFP synovitis, and high levels of psychological distress, are associated with greater knee pain. Confirmation of these findings in the prospective studies of KOA is needed.	Readers were not blinded or no comment was made about the blinding of the readers; Single reader or no inter-reader reliability was calculated; Study limitations included a major limitation of conventional radiology is the inability to detect early and subtle OA changes (detection bias). In addition, a potential selection bias is that the cohort was composed of subjects referring to a tertiary rheumatologic center, not reflecting the general population (generalizability). Finally, the difficulty to assess the cross-sectional relationship between MRI findings and knee pain has recently been pointed out, demonstrating the fluctuating nature of BMLs and knee pain, with the latter dependent on the former (internal validity). (Low level of evidence)- downgraded for applicability. (Carotti, 2017).

<p>Deshpande BR, Losina E, Smith SR, et al. Association of MRI findings and expert diagnosis of symptomatic meniscal tear among middle-aged and older adults with knee pain. <i>BMC Musculoskelet Disord.</i> 2016;17:154.</p>	<p>cross sectional</p>	<p>moderate level of evidence</p>	<p>To examine the association between an expert clinician's impression of symptomatic meniscal tears and subsequent MRI in the context of middle-aged and older adults with knee pain.</p>	<p>84 American patients were included. All individuals who presented with unilateral knee pain were eligible for inclusion if they were at least 45 years old, had not seen the surgeon within the preceding year, and had not undergone knee surgery in the past 5 years or total knee arthroplasty at any time. Exclude were patients who had a knee MRI available in the hospital medical record system prior to their clinic visit and participants who underwent MRI greater than 6 months from initial evaluation. 53 (63 %) were female, the mean age was 64 years (SD 9), the mean BMI was 27 (SD 6), and the mean KOOS Pain score was 42 (SD 19).</p>	<p>Patients older than 45 were eligible for this IRB-approved substudy if they had knee pain, had not undergone MRI and saw one of two orthopaedic surgeons experienced in the diagnosis of meniscal tear. The surgeon rated their confidence that the patient's symptoms were due to meniscal tear. The patient subsequently had a 1.5 or 3.0 T MRI within 6 months. We examined the association between presence of meniscal tear on MRI and the surgeon's confidence that the knee pain was due to meniscal tear using a χ^2 test for trend.</p>	<p>24 of 30 subjects (80 %, [95 % CI 63-90 %]) in the high confidence group, 13 of 15 subjects (87 %, [95 % CI 62-96 %]) in the medium confidence group, and 25 of 39 subjects (64 %, [95 % CI 48-77 %]) in the low confidence group had a meniscal tear visible on MRI (p for trend: 0.12) Of the subjects with imaging evidence of meniscal tear, the blinded expert clinician ascribed high confidence of the symptoms being caused by the meniscal tear in 39 %, medium confidence in 21 %, and low confidence in 40 %. Meniscal tears were frequently found on MRI even when an expert clinician was confident that a patient's knee symptoms were not due to a meniscal tear, indicating that providers should use MRI sparingly and cautiously to confirm or rule out the attribution of knee pain to meniscal tear.</p>	<p>Study population was drawn from the practices of two academic orthopedic surgeons highly experienced in the diagnosis of knee problems in this age group. Surgeons commonly had access to knee radiographs prior to the clinical encounter, which may have influenced the confidence level of symptom attribution especially if significant degenerative changes were apparent. We used the surgeon's impression as the gold standard, following practices used in the creation of other classification criteria, but recognize that the reproducibility of a diagnosis of symptomatic meniscal tear remains largely unstudied. Furthermore, MRIs not systematically obtained, but were instead ordered by the clinician in the normal course of clinical practice. Thus, they could potentially be read and documented by any of the hospital's diagnostic radiologists, whose intra- and inter-rater reliability are unknown.</p>
<p>Galea A, Giuffre B, Dimmick S, et al. The accuracy of magnetic resonance imaging scanning and its influence on management decisions in knee surgery. <i>Arthroscopy.</i> 2009;25(5):473-80.</p>	<p>single center prospective study</p>	<p>high level of evidence</p>	<p>To evaluate the impact of preoperative magnetic resonance imaging (MRI) assessment of articular knee pathology on the clinical management of patients presenting with joint line pain.</p>	<p>Part 1: 100 randomly selected British patients with knee pain. Part 2: 618 British patients with knee pain and an initial diagnosis of an arthroscopically treatable lesion. Patients were excluded from the study if their MRI scans were available at the time of initial consultation, if their initial diagnosis was uncertain, or if MRI scans were obtained to exclude other intra-articular pathology with ACL rupture of patellar dislocation. Patients with rheumatoid or any seronegative arthritis were also excluded. Part 2 of the study consisted of 302 men with an average age of 45 years (range = 21 - 80), and 316 women with an average age of 55 years (range = 15 - 93).</p>	<p>A preliminary study on 100 patients was performed to assess the accuracy of specific MRI sequences, using arthroscopy as a gold standard. Six hundred and eighteen consecutive patients with knee symptoms presenting to 2 specialist knee surgeons were then recruited. A clinical diagnosis of an arthroscopically treatable lesion was made in all cases. Clinical assessment data were correlated to subsequent MRI findings, recording any discrepancy and in particular whether or not MRI findings influenced management decisions.</p>	<p>A specificity of 94.3% for detection of articular cartilage lesions. For part 1 of the study, MRI had a sensitivity of 83.2% arthroscopic grade III and IV lesions, sensitivity and specificity were improved to 84.5% and 97.1%. In part 2 of the study, MRI results altered clinical management in 22.8% of the patients. Diagnostic power of MRI sequences when grading chondral surfaces: for patella, trochlea, medial femoral condyle, medial tibial plateau, lateral femoral condyle, and lateral tibial plateau - sensitivity (%) was 93.1, 90.5, 89.8, 58.8, 100, 66.7; specificity (%) was 89.7, 92.7, 93.8, 95.3, 96.3, 95.1; positive diagnostic likelihood ratio: 9.0, 12.4, 14.5, 12.5, 27.0, 13.6; negative diagnostic likelihood ratio (%): 0.08, 0.10, 0.11, 0.42, 0.00, and 0.35. The authors suggest that preoperative MRI scanning identifies a group of patients who have more advanced degenerative joint disease than the clinical assessment and the plain radiographs suggest. This would expedite definitive surgery in patients with advanced osteoarthritis on MRI scans.</p>	<p>Readers were not blinded or no comment was made about the blinding of the readers; Single reader or no inter-reader reliability was calculated</p>
<p>Hare KB, Stefan Lohmänder L, Kise NJ, et al. Middle-aged patients with an MRI-verified medial meniscal tear report symptoms commonly associated with knee osteoarthritis. <i>Acta Orthop.</i> 2017;88(6):664-9.</p>	<p>cross sectional</p>	<p>moderate level of evidence</p>	<p>The authors investigated whether symptoms commonly considered to be related to meniscus injury were associated with early radiographic signs of knee osteoarthritis.</p>	<p>199 multinational patients were included. Participants were between 35 and 65 years old with an MRI verified degenerative medial meniscal tear, at least 2 months' duration of knee pain and no previous significant trauma, found eligible for arthroscopic partial meniscectomy. Only patients with no or mild knee osteoarthritis (OA), Kellgren and Lawrence grade 0-2 (Kellgren and Lawrence 1957, Schiphol et al. 2011) were included. The average age of the 199 patients was 48 years and 41% were women. 36% of the patients had early radiographic knee OA. The 4 most commonly reported symptoms were frequent knee pain, lack of confidence in knee, pain when pivoting/ twisting, and pain when walking up or down stairs. All 4 symptoms were reported by more than 80% of the patients.</p>	<p>Authors included individual baseline items from the Knee injury and Osteoarthritis Outcome Score collected in 2 randomized controlled trials evaluating treatment for an MRI-verified degenerative medial meniscal tears in 199 patients aged 35-65 years. Each item was scored as no, mild, moderate, severe, extreme, and at least "mild" considering the symptoms present. Early radiographic signs of osteoarthritis, defined as a Kellgren and Lawrence grade of at least 1, were seen in 70 patients.</p>	<p>Early radiographic signs of osteoarthritis were associated with an increased risk of self-reported swelling, catching, and stiffness later in the day; the odds ratio was 2.4 (95% CI 1.2-4.9), 2.3 (1.2-4.3), and 2.3 (1.1-5.0), respectively. At least monthly knee pain, pain during stair walking and when twisting on the knee, and lack of confidence in knee was present in at least 80% of the patients. Middle-aged patients with a degenerative medial meniscus tear reported symptoms commonly associated with knee osteoarthritis. Frequent knee pain, presence of lack of confidence in the knee, and clicking did not distinguish those with a meniscal tear alone from those with early radiographic knee OA. The authors' findings support the notion that symptoms reported by those with a degenerative meniscal tear represent early signs of knee osteoarthritis.</p>	<p>Non-consecutive recruitment; Readers were not blinded or no comment was made about the blinding of the readers; Cross-sectional study using 2 RCT baseline characteristics has potential to introduce selection bias to results</p>
<p>Heffernan EJ, Moran DE, Gerstenmaier JF, et al. Accuracy of 64-section MDCT in the diagnosis of cruciate ligament tears. <i>Clin Radiol.</i> 2017;72(7):611.e1-e8.</p>	<p>prospective</p>	<p>low level of evidence</p>	<p>To evaluate the accuracy of non-arthrographic 64-section multidetector computed tomography (CT) in the assessment of cruciate ligament tears. A secondary goal was to determine its accuracy in the diagnosis of additional soft-tissue injuries around the knee.</p>	<p>40 American Patients who underwent same-day magnetic resonance imaging (MRI) and 64-slice multidetector CT (MDCT) of the knee. No defined exclusion criteria. The mean age was 35.7 years with an age range of 15-65 years, 27 males and 13 females.</p>	<p>Forty consecutive outpatients underwent same-day magnetic resonance imaging (MRI) and 64-slice multidetector CT (MDCT) of the knee in this prospective study. MDCT images were independently evaluated for integrity of the anterior (ACL) and posterior cruciate ligaments (PCL), medial and lateral meniscus, and medial and lateral collateral ligaments. Recognized secondary signs of ACL tears were also documented. MRI images were subsequently assessed by two radiologists and a consensus reached.</p>	<p>The sensitivity of MDCT for ACL tears was 87.5-100%, with a specificity of 100%. The presence of one or more secondary signs of ACL tears on MDCT had a sensitivity of 50-87.5% with a specificity of 100%. The sensitivity of MDCT for PCL tears was 0-25% with a specificity of 100%. The sensitivity for meniscal tears was 9.1-23.1% with a specificity of 96.3-100%. Interobserver agreement was very good (kappa=0.920) for the diagnosis of ACL tears based on primary signs alone or based on a combination of primary and secondary signs. There was poor interobserver agreement for the diagnosis of PCL tears. Interobserver agreement was very good for the diagnosis of medial meniscal tears. 64-section MDCT has very high sensitivity and specificity for ACL tears and, as on MRI, secondary signs, such as buckling of the PCL, are also useful in their diagnosis. MDCT has a low sensitivity for other soft-tissue injuries at the knee; however, its high specificity indicates that apparent PCL, meniscal, and collateral ligament tears can reliably be treated as true-positive findings.</p>	<p>Patients with indeterminate results from the diagnostic test were excluded or no comment was made about how indeterminate results were handled; small sample size from a single center, no defined exclusion criteria</p>

<p>Herman AM, Marzo JM. Popliteal cysts: a current review. Orthopedics. 2014;37(8):e678-84.</p>	<p>physician review</p>	<p>low level of evidence</p>	<p>This review discusses the anatomy and etiology of popliteal cysts, describes the common clinical presentations, reviews the differential diagnoses, and provides guidance for proper diagnostic imaging. It also provides a comparison of current conservative, minimally invasive, and invasive treatment options, along with a discussion of results.</p>	<p>n/a</p>	<p>n/a</p>	<p>Plain radiographs are simple and readily available, but provide limited information; they may help in identifying associated articular disorders, such as loose bodies in the cyst or general findings of osteoarthritis and inflammatory arthritis. Ultrasound (U/S) has quickly become a popular replacement for arthrography in imaging for the presence of popliteal cysts. It is readily available, relatively inexpensive, and noninvasive, involves no exposure to radiation and allows assessment of the cyst. However, it is not sensitive to intra-articular lesions, and so further imaging is needed to confirm the presence of an associated internal derangement. MRI is considered the gold standard in visualizing and characterizing masses about the knee. An MRI can confirm the cystic, unilocular nature of the benign popliteal cyst; evaluate its relationship to anatomic structures in the joint and surrounding tissue; and delineate associated intra-articular pathologies. Ultrasound is the reasonable choice for quickly assessing a potential popliteal cyst. However, MRI follow-up may be necessary to confirm the cyst and diagnose coexistent knee joint pathology. Overall, U/S and MRI have proven to be consistent and accurate in the confirmation of popliteal cysts, with MRI becoming the modern imaging modality of choice.</p>	<p>n/a</p>
<p>Kopka M, Mohtadi N, Naylor A, et al. The use of magnetic resonance imaging in acute knee injuries can be reduced by non-physician expert clinics. Phys Sportsmed. 2015;43(1):30-6.</p>	<p>retrospective</p>	<p>low level of evidence</p>	<p>The goal of this study is to present an audit of patients seen in a dedicated Acute Knee Injury Clinic (AKIC) to determine the frequency and appropriateness of MRI utilization.</p>	<p>611 consecutive Canadian patients with knee injuries were included. To be eligible for inclusion, patients had to have suffered a new knee injury within 4 weeks of their referral. Those with chronic knee conditions, open injuries, those younger than 14 years, and those with severe medical comorbidities were excluded. The mean age was 38 years (age range 14–81 years). The control group consisted of 142 patients from the remaining 469 who had not had an MRI ordered.</p>	<p>A retrospective review identified all patients who had an MRI and a randomly selected control group without MRI. The MRI was classified based on whether it was ordered by the AKIC team or by an external clinician. The consensus-based 'Indications for Urgent MRI in Acute Soft Tissue Knee Problems' were applied to both groups. An MRI was considered appropriate if any of the indications were met.</p>	<p>The overall MRI utilization rate was 23% (142/611). Of the MRIs performed, 32% (46/142) met the indications. About 94% (33/35) of the MRIs ordered by the AKIC experts met the indications, compared to only 12% (13/107) of those ordered externally. No patients in the control group met the indications. Diagnoses were similar between groups. Injury to the ACL was the most common diagnosis, with slightly higher incidence in the MRI group (53.5% compared to 43.0% in the control group; Chi-square: $P = 0.096$). These results suggest that application of guidelines by experts in knee evaluation can significantly reduce expensive MRI utilization in patients with acute knee injuries without negatively impacting the appropriate diagnosis and disposition.</p>	<p>Readers were not blinded or no comment was made about the blinding of the readers; sample from a single center and retrospective study design</p>
<p>Kostov H, Arsovski O, Kostova E, et al. Diagnostic assessment in anterior cruciate ligament (ACL) tears. Pril (Makedon Akad Nauk Umet Odd Med Nauk). 2014;35(1):209-18.</p>	<p>single center prospective</p>	<p>high level of evidence</p>	<p>The aim of this study was to compare findings from clinical examinations, MRI scans and arthroscopy in ACL injury of the knee in order to assess the diagnostic significance of both examination findings.</p>	<p>All patients attending the authors' clinic with knee pain from 2009 to 2013 underwent systematic and thorough clinical assessment. Of 103 patients with knee problems arthroscopy ACL tears was diagnosed in 73. All these patients underwent therapeutic arthroscopic knee surgery. The clinical diagnosis was evaluated and confirmed during this procedure.</p>	<p>All patients attending our clinic with knee pain from 2009 to 2013 underwent systematic and thorough clinical assessment. Of 103 patients with knee problems arthroscopy ACL tears was diagnosed in 73. All these patients underwent therapeutic arthroscopic knee surgery. The clinical diagnosis was evaluated and confirmed during this procedure.</p>	<p>With the Lachman clinical examination there was 92% sensitivity, 100% specificity, 100% PPV, and 86% NPV for diagnosis of ACL tears. From the pivot shift clinical examination for ACL tears: 62% sensitivity, 98% specificity, 98% PPV, and 67% NPV. For ACL rupture on MRI: 83% sensitivity, 88.37% specificity, 93% PPV, 74.5% NPV. According to these findings the authors conclude that a positive anterior drawer test and a positive Lachman clinical examination test is more accurate for predicting, i.e. diagnosis of ACL tear. On the other hand, MRI scan findings showed less accuracy for predicting, i.e. diagnosis of ACL tear. According to many studies of clinical examination tests compared (correlated) with arthroscopy, the accuracy of predicting ACL tears depends on the level of the skilled orthopaedic or trauma surgeon's hands. Based on these findings, the authors feel that MRI, except in certain circumstances, is an expensive and unnecessary diagnostic test in patients with suspected meniscal and ACL pathology.</p>	<p>Readers were not blinded or no comment was made about the blinding of the readers Single reader or no inter-reader reliability was calculated; Baseline characteristics of the control and experimental groups are different and/or there was no attempt to control for confounding effects; small size of study population; arthroscopy is not always 100% accurate; effectiveness of physical examination is dependent on experience and skill of clinician</p>
<p>Mustonen AO, Koivikko MP, Haapamaki VV, et al. Multidetector computed tomography in acute knee injuries: assessment of cruciate ligaments with magnetic resonance imaging correlation. Acta Radiol. 2007;48(1):104-11.</p>	<p>retrospective cohort</p>	<p>low level of evidence</p>	<p>To evaluate whether non-contrast multidetector computed tomography (MDCT) for suspected acute knee fractures can also be used to evaluate cruciate ligament pathology.</p>	<p>42 Finnish patients were included. Knee injuries with MDCT in the acute phase (within a week, mean within 24 hours) were included provided they had a subsequent MRI within 4 weeks (mean 6 days). Only the injured knee was studied. All patients with previous knee surgery were excluded. 22 of the patients were male, and the mean age was 39 years (17–65).</p>	<p>Patients underwent four-section MDCT. The images were independently evaluated at clinical workstations by four radiologists. They assessed the integrity (normal or torn) and the best slice direction (axial, sagittal, or coronal) for visualization of the cruciate ligaments. Magnetic resonance imaging (MRI), performed within 4 weeks (mean 6 days) in relation to MDCT, was considered the gold standard.</p>	<p>When MDCT was compared to MRI, the interobserver proportion of agreement for intact ACL was good (0.73) and for intact PCL excellent (0.96), while agreement for a torn cruciate ligament was fair (torn ACL = 0.41; torn PCL = 0.54) For ACL abnormality, the following mean values of MDCT were observed: sensitivity 58%, specificity 86%, accuracy 77%, PPV 67%, and NPV 83%. For PCL abnormality, the respective values were: sensitivity 25%, specificity 96%, accuracy 88%, PPV 54%, and NPV 90%. MDCT can detect an intact ACL and PCL with good specificity, accuracy, and negative predictive value. The assessment of torn ligaments is unreliable.</p>	<p>Non-consecutive recruitment; Retrospective design, small sample size</p>
<p>Nguyen BJ, Burt A, Baldassarre RL, et al. The prognostic and diagnostic value of 18F-FDG PET/CT for assessment of symptomatic osteoarthritis. Nucl Med Commun. 2018; 39(7):699-706.</p>	<p>single center prospective</p>	<p>low level of evidence</p>	<p>To assess the clinical significance of increased fluorine-18-fluorodeoxyglucose (18F-FDG) uptake on PET/CT in joints for evaluation of symptomatic osteoarthritis (OA) and prediction of progression.</p>	<p>Seventy-nine patients agreed to participate in the study, complete the WOMAC survey, and undergo PET/CT imaging that included the knees. Four patients were excluded because of bone metastases. One patient was excluded because of an overactive bone marrow observed on image analysis, which obscured the SUV findings within the joint space. One patient was excluded because of elevated glucose levels of at least 200 mg/dl before PET/CT imaging. Eight patients were excluded because of inadequate questionnaire information or incomplete imaging. The final study group consisted of 65 patients (39 females, 26 males; mean age of 57, range: 18–82 years; mean weight: 77.39 ± 18.09 kg; mean height: 1.67 ± 0.01 m; mean joint K/L: 0.76 ± 0.84; mean joint SUV: 1.17 ± 0.51). A total of 130 knee joints and 130 hip joints were assessed. A total of 124 AC and 124 GH joints were evaluated.</p>	<p>Shoulder, hip, and knee joints were imaged in 65 patients undergoing routine 18F-FDG PET/CT imaging. Patients completed the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire to assess joint pain, stiffness, and physical function. Standardized uptake values (SUVs) were measured in hip, knee, acromioclavicular (AC), and glenohumeral (GH) joints. Scout PET/CT images were evaluated for OA using the Kellgren and Lawrence (K/L) system. Patients were followed-up for 5 years to determine the progression of OA on the basis of follow-up imaging or surgical intervention.</p>	<p>SUV of knee ($r=0.309$, $P=0.0003$), hip ($r=0.260$, $P=0.0027$), AC ($r=0.186$, $P=0.0313$), and GH ($r=0.191$, $P=0.0271$) joints correlated with WOMAC overall scores. Furthermore, SUV of knee ($r=0.410$, $P<0.0001$), hip ($r=0.203$, $P=0.0199$), and AC ($r=0.364$, $P<0.0001$) joints correlated with K/L scores. The area under the receiver operating characteristic curves for SUV were 0.734 (knee), 0.678 (hip), 0.661 (AC), and 0.544 (GH) for symptomatic OA detection based on WOMAC overall z-score greater or equal to 2. Compared with K/L score (hazard ratio (HR)=0.798, $P=0.5324$), age (HR=0.992, $P=0.8978$), and WOMAC overall score (HR=1.089, $P=0.1265$), only SUV (HR=5.653, $P=0.0229$) was an independent predictor of OA progression in the knees. The authors conclude that 18F-FDG PET/CT may be helpful with localization of painful abnormalities in the inflamed regions of the joints, which could potentially be used to direct individualized treatment in moderate and severe OA. Furthermore, SUV measurement on 18F-FDG PET/CT could serve as an inflammation activity index in the knees that may be predictive of outcomes and progression rate of OA.</p>	<p>The main limitation of this study was related to the method of anatomical assessment of bony changes of the joints using CT scout images, particularly for the knees, as the CT scout images are nonweight bearing. Although the K/L grading system of knee joints was originally developed for radiographic images, few patients enrolled in the study had radiographs of the joints initially available for review on Picture Archiving and Communication System. Furthermore, only coronal PET/CT images were used for measuring SUV in the joint spaces. Nevertheless, coronal images are the easiest to use to localize the region of highest 18F-FDG uptake in the joint space.</p>

<p>Patel NK, Bucknill A, Ahearne D, et al. Early magnetic resonance imaging in acute knee injury: a cost analysis. <i>Knee Surg Sports Traumatol Arthrosc.</i> 2012;20(6):1152-8.</p>	<p>Randomized control trial</p>	<p>high level of evidence</p>	<p>Acute knee injury is common, and MRI is often only used when non-operative management fails because of limited availability. The authors investigated whether early MRI in acute knee injury is more clinically and cost-effective compared to conventional physiotherapy and reassessment.</p>	<p>46 British patients were included - 23 in MRI group, 23 in control group. Patients with indirect twisting injuries of the knee sustained within 1 week of presentation, suspected to have internal derangement (meniscal, cruciate/collateral ligament and osteochondral injuries) by the ED without a fracture on plain films were included in the study. Exclusion criteria were age less than 18 years, high velocity mechanism of injury, contraindications or intolerance of MRI, knee surgery within the past year, and patients who were vulnerable or unable to give informed consent. There were no significant age or sex differences between the two groups. In the MRI group, mean age was 29 years, and 78% were men. In the control group, mean age was 30 years, and 65% were men.</p>	<p>All patients with acute indirect soft tissue knee injury referred to fracture clinic were approached. Recruited patients were randomized to either the MRI group: early MRI within 2 weeks or the control group: conventional management with physiotherapy. Patients were assessed in clinic initially, at 2 weeks and 3 months post-injury. Management costs were calculated for all patients until surgical treatment or discharge.</p>	<p>Pain score was lower for the MRI than the control group at follow up, 2.3 +/- 2 vs. 3.4 +/- 2.2 (p=0.047). Activity limitation score was better for the MRI group than the control group: 3.2 +/- 1.7 vs. 4.1 +/- 1.4 (p=0.038). Satisfaction score was better for the MRI group than the control group: 2 +/- 2.7 vs. 3.4 +/- 2.7 (p=0.037). Early MRI in acute knee injury facilitates faster diagnosis and management of internal derangement at a cost comparable to conventional treatment. Moreover, patients had significantly less time off work with improved pain, activity limitation and satisfaction scores.</p>	<p>Readers were not blinded or no comment was made about the blinding of the readers; Not all patients received the reference ("gold") standard or patients received different reference standards;</p>
<p>Picerno V, Filippou G, Bertoldi I, et al. Prevalence of Baker's cyst in patients with knee pain: an ultrasonographic study. <i>Reumatismo.</i> 2014;65(6):264-70.</p>	<p>retrospective</p>	<p>low level of evidence</p>	<p>The objectives of this study are to investigate the prevalence of Baker's cyst (BC) in patients with knee pain, and to assess the correlation between BC and severity of osteophytes and joint effusion.</p>	<p>399 Italian patients were included. To be eligible for inclusion, patients had to be aged older than 18 and presenting with knee pain. Patients with rheumatoid arthritis or other inflammatory conditions or with history of joint surgery or recent trauma were excluded. The study sample consisted of 299 women, 100 men in the age range 18- 89 years (mean 56.2, SD 16.3 years). 293 patients (73.43%) showed US signs of osteophytosis of the knee, 251 (62.9%) joint effusion and 102 (25.56%) BC. 99 (33.8%) patients with osteophytosis also had BC. Only three patients had BC without US signs of osteoarthritis.</p>	<p>Patients underwent an ultrasonographic exam of the knees to assess the presence of marginal femorotibial osteophytosis, joint effusion and BC. A dichotomous score was assigned to each item (1 present, 0 absent) and severity of US signs of osteoarthritis and joint effusion were also graded semiquantitatively. Collected data were processed using logistic regression analysis to evaluate the correlation between degree of osteophytosis and joint effusion and BC. Patients affected by inflammatory joint conditions or with history of joint surgery or recent trauma were excluded.</p>	<p>Logistic regression showed a positive correlation between presence of BC and severity of osteoarthritis and between BC and degree of effusion. Specifically, the Odds Ratio for presence of BC increased by about 1.42 (CI 95%: 1.03/1.96) for each grade in the osteoarthritis severity score, whereas for each grade in the degree of joint effusion the Odds Ratio increased by about 1.82 (CI 95%: 1.29/2.57). A correlation was also found between increasing age and prevalence of BC (Odds Ratio 1.39 CI 95%: 1.04/1.87). Gender proved to be an independent factor with regard to the presence of BC. The data shows a prevalence of BC of 25.8% in a population of patients with knee pain, and suggest that BC is positively related to osteoarthritis and joint effusion. Ultrasonographic examination of knee is worthwhile in patients with painful osteoarthritis or evidence of effusion.</p>	<p>Non-consecutive recruitment; Readers were not blinded or no comment was made about the blinding of the readers; Single reader or no inter-reader reliability was calculated;</p>
<p>Sohn DW, Bin SI, Kim JM, et al. Discoid lateral meniscus can be overlooked by magnetic resonance imaging in patients with meniscal tears. <i>Knee Surg Sports Traumatol Arthrosc.</i> 2018; 26(8):2317-2323.</p>	<p>retrospective</p>	<p>low level of evidence</p>	<p>To calculate the sensitivity, specificity and accuracy of MRI in diagnosing the presence of discoid lateral meniscus (DLM) for different types of tear. Additionally, the authors sought to elucidate factors for non-detection of discoid meniscus on preoperative MRI.</p>	<p>156 cases (144 patients) were eligible for the study. There were 78 knees (70 patients) in DLM group and 78 knees (74 patients) in non-DLM group on arthroscopy. The non-discoid group comprised 30 male and 48 female knees with a mean age of 51 years (range 18-75). The discoid tear group comprised of 35 male and 43 female knees, with a mean age of 45 years (range 18-76). Of 78 knees of DLM, complete type of discoid meniscus was 40 and incomplete was 38.</p>	<p>The presence of DLM on MRI was determined by an orthopaedic surgeon and a radiologist, who were blinded to the arthroscopic findings. The presence of discoid meniscus on MRI was determined by coronal and sagittal measurements, considering the tear pattern of lateral meniscus. The tear pattern was categorized into six types based on arthroscopic findings: horizontal, longitudinal, radial, combined radial, degenerative, and complex tear. The sensitivity, specificity, and accuracy of MRI were calculated for each type of lateral meniscus tear. In addition, we analysed the reason for non-detection of discoid meniscus on preoperative MRI.</p>	<p>The sensitivity for determining the presence of discoid meniscus was 58% for radial tear, 57% for combined radial tear, and 65% for longitudinal tear, whereas the specificity was 100% for all tear groups. In the presence of radial or longitudinal tear, the accuracy of MRI was significantly lower than having no radial and longitudinal tear (p < 0.001). The presence of discoid meniscus was not recognized on MRI because of large radial tear (12 knees), deformed bucket-handle tear (6 knees), and inverted flap tear (3 knees). The authors conclude that MRI was not successful in determining the presence or absence of DLM in radial tear, combined radial tear, and longitudinal tear. When there are large radial tear, deformed bucket-handle tear, and inverted flap tear in lateral meniscus, it is recommended to consider the possibility of DLM. This information can help to make accurate diagnosis of DLM, which allows appropriate surgical planning and facilitates patient's information on poor prognosis of DLM.</p>	<p>There are several limitations in this study. First, selection bias can occur because of exclusion of patients with no lateral meniscus tear, no preoperative MRI, and previous surgery of lateral meniscus. Inclusion was based on MRIs of patients who underwent operation, which does not represent the general patient population. Second, this study includes single surgeon judgement of arthroscopic findings. The final result of arthroscopy can be biased by the senior surgeon's opinion. However, this is compensated by the use of a standard and predetermined recording scheme.</p>
<p>Subhas N, Patel SH, Obuchowski NA, et al. Value of knee MRI in the diagnosis and management of knee disorders. <i>Orthopedics.</i> 2014;37(2):e109-16.</p>	<p>single center prospective case series</p>	<p>high level of evidence</p>	<p>The primary objectives of this study were to determine how frequently knee magnetic resonance imaging (MRI) changes (1) diagnosis, (2) diagnostic confidence, and (3) management. A secondary objective was to correlate these changes with specific patient/physician characteristics and develop a prediction model using these characteristics.</p>	<p>93 American patients were included. Patients of 3 orthopedic surgeons and 3 sports medicine physicians for whom a pre-MRI survey form was completed for suspected internal derangement of the knee and who had an MRI study were included in the study. Patients who did not return for follow-up after their MRI were excluded from the study. The mean age of patients included in the study was 43 +/- 16.4 years (range 14 - 82). The study included 48 women and 45 men.</p>	<p>Six orthopedic specialists prospectively completed surveys when ordering knee MRI (n=93). Pre-MRI surveys recorded history, symptoms, signs, diagnosis, diagnostic confidence, and planned management. Post-MRI surveys recorded diagnosis, confidence, and planned management. Changes in diagnosis, management, and diagnostic confidence were correlated with patient/physician characteristics using chi-square and logistic regression tests. A multiple variable model was created with the most significant variables from the univariate analysis, and a c-index was used for cross-validation.</p>	<p>The frequency with which MRI results changed the primary diagnosis was 29.3% (95% CI 20 - 38.6). MRI increased confidence level of ordering physician by 10.6% (95% CI, 6.9 - 14.3). MRI changed management in 25.3% of patients (95% CI, 16.4, 34.2). Statistically significant predictors of change were age, ligament pathology, and medial-sided pain (p<0.20). Characteristics that affected change in diagnosis: lateral joint line pain (p=0.012) and lateral joint line tenderness (p=0.006). Knee MRI is a valuable test that alters the diagnosis and management of knee disorders and improves the physician's confidence in the diagnosis in a small but significant subset of patients, even when a highly specialized physician performs the clinical evaluation. In particular, knee MRI should be strongly considered in patients who have lateral joint line pain or tenderness and in patients with a clinical diagnosis of a lateral meniscus tear. An evidence-based model using patient history, symptoms, and physical examination findings can be created to predict the likelihood of MRI to change patient management. Use of such a model may improve the use of knee MRI in patients with internal derangement.</p>	<p>Single reader or no inter-reader reliability was calculated; Not all patients received the reference ("gold") standard or patients received different reference standards; Baseline characteristics of the control and experimental groups are different and/or there was no attempt to control for confounding effects</p>
<p>Wylie JD, Bakarewich CA, Working ZM, et al. Findings Associated With Knee Pathology on MRI in Patients Without Osteoarthritis. <i>J Am Acad Orthop Surg.</i> 2017;25(11):780-6.</p>	<p>retrospective</p>	<p>low level of evidence</p>	<p>The authors conducted a retrospective study in patients with minimal or no radiographically evident knee osteoarthritis to determine whether presenting signs and symptoms were predictive of knee pathology that was evident on MRI and could be treated with nonarthroplasty knee surgery or could alter nonsurgical treatment.</p>	<p>Included were patients with knee pain whose presenting episode was documented in the study center's record system. Examinations ordered by outside healthcare providers, surgeons not trained in orthopedic sports medicine, patients with a Helgen-Lawrence(KL) OA grade > 1, findings from imaging studies performed at outside institutions, medical records without documented history and demographic information, and patients who had physical examinations before the knee MRI were excluded from the study. 434 American patients were ultimately included. The study population ranged in age from < 30 to >60 years. 235 men and 199 women were included in the study. 259 had a history of an acute injury.</p>	<p>Authors reviewed records of patients for whom sports medicine orthopaedic surgeons had ordered an MRI of the knee. Univariate analysis identified factors that were associated with positive MRI findings (e.g., surgically treatable lesion, meniscal tear) or a finding that could alter treatment. Multivariate logistic regression was used to determine independent predictors of evidence of pathology on MRI.</p>	<p>Evidence of ligamentous instability on physical exam had the highest univariate association with positive MRI findings (OR, odds ratio, 9.98; 95% confidence interval, 4.70 to 21.16). Significantly more surgeries were performed in patients with positive MRI results (71% versus 14.4% respectively; OR, 13.1; 95% CI, 7.8 to 21.9, p<0.001). 64.7% of MRIs had findings positive for knee pathology. Univariate analysis showed that male sex, history of acute injury, shorter duration of symptoms, subjective instability, mechanical symptoms, effusion, evidence of ligamentous instability on physical exam, and joint line tenderness had statistically significant association with positive MRI findings. Specific aspects of patient history and physical examination are associated with evidence of knee pathology on MRI. In patients without osteoarthritis, positive findings on knee MRI could be associated with a number of presenting signs and symptoms, and this information could aid physicians in deciding which patients should undergo knee MRIs. Additional prospective research is needed to validate the relationships discovered in the study.</p>	<p>Not all patients received the reference ("gold") standard or patients received different reference standards; Baseline characteristics of the control and experimental groups are different and/or there was no attempt to control for confounding effects.</p>

<p>Yeo Y, Ahn JM, Kim H, et al. MR evaluation of the meniscal ramp lesion in patients with anterior cruciate ligament tear. <i>Skeletal Radiol.</i> 2018; 47(12):1683-1689.</p>	<p>retrospective</p>	<p>low level of evidence</p>	<p>To evaluate diagnostic performance of MR imaging findings for diagnosis of a ramp lesion in a patient with an ACL-deficient knee.</p>	<p>The inclusion criteria were consecutive MR imaging examinations of the knee performed at our institution or outside the hospital and then requested evaluation to our institution; arthroscopy performed within 6 months after MR imaging; and an arthroscopically proven ACL tear. The exclusion criteria were previous knee surgery, age younger than 16 years, an extensive medial meniscus tear, such as a bucket handle tear or a multiligamentous injury that could affect interpretation of MR scans, and MR imaging with an inadequate sequence or poor MR image quality. Seven study patients had ramp lesion at arthroscopy and the 71 control patients did not. All seven patients in the study group were male and were of mean age 37.3 (range, 19–52) years. Five of the affected knees were on the right side and two were on the left.</p>	<p>The presence of the following six features on magnetic resonance images were recorded: complete fluid filling between the posterior horn of the medial meniscus and the capsule margin; edema affecting the posterior capsule; irregularity of the medial meniscus at the posterior margin; fluid at the periphery of the medial meniscus; the corner notch sign; and a vertical tear at the medial meniscus. Findings at arthroscopy served as the reference standard. Diagnostic accuracy, sensitivity, and interobserver agreement were calculated.</p>	<p>Seven ramp lesions were noted on arthroscopy (9%). Findings of irregularity at the posterior margin ($p = 0.001$) and complete fluid filling between the posterior horn of the medial meniscus and the capsule margin ($p = 0.004$) on magnetic resonance imaging were significantly associated with the presence of a ramp lesion. With the irregularity at the posterior margin, sensitivity was 86% and specificity was 79%. Complete fluid filling sign showed sensitivity of 57% and specificity of 92%. Concordance of the two readers for the six magnetic resonance imaging features was fair to very good ($\kappa = 0.38-0.91$). The authors conclude that irregularity at posterior margin and complete fluid filling were most sensitive findings for detecting of a ramp lesion on magnetic resonance imaging.</p>	<p>First, the study had a retrospective rather than a prospective design. Second, some degree of selection bias may have been introduced by only including patients in whom arthroscopy was performed. Third, the sample size was rather small. Fourth, different MR protocols were used, which was unavoidable because the hospital receives referrals from throughout the country, and cases with poor image quality or limited image sequences were excluded during the patient selection process. Finally, only patients with an ACL tear were evaluated for the presence of a ramp lesion. It is necessary to confirm that the same MR findings are seen in ramp lesions with posteromedial corner injury or degenerative injury without ACL tear.</p>
---	----------------------	------------------------------	--	---	---	---	---