

Differential Diagnosis of Acute, Post-traumatic Knee Pain

Acute Post-traumatic Pain			Collected Cases
Cause	Clinical Features	Imaging Findings	
Patellar fracture or contusion	Pain along the fracture site; swelling from effusion; MOI: fall onto the patella versus transient dislocation of the patella with avulsion fracture	Discontinuous cortex, displaced bone fragment, and joint effusion on XR, CT, and MR; abnormal marrow SI on MR	9 fractures; 2 contusions
Femur fracture or contusion	Pain along the femur; swelling from effusion; inability to bear weight; MOI: fall or direct blow	Discontinuous cortex and displaced bone fragment on XR, CT, and MR; abnormal marrow SI on MR	4 fractures; 1 contusion
Tibial fracture or contusion	Pain along the tibia; swelling from effusion; inability to bear weight; MOI: fall versus twisting injury with avulsion	Discontinuous cortex, displaced bone fragment and joint effusion on XR, CT, and MR; abnormal marrow SI on MR	5 contusions; 14 fractures
Fibular fracture or contusion	Pain along the fibula; swelling from effusion; inability to bear weight; MOI: fall versus twisting injury with avulsion	Discontinuous cortex, displaced bone fragment and joint effusion on XR, CT, and MR; abnormal marrow SI on MR	2 contusions
Dislocation of the patellofemoral joint	Swelling from effusion; pain along the medial patella or lateral femoral condyle; MOI patella “popping out” often with the knee in flexion	Discontinuous cortex and displaced bone fragment on XR, CT, and MR (when accompanied by an avulsion fracture); joint effusion on XR, CT, and MR; cartilage defect and/or abnormal subchondral marrow and/or medial retinacula SI in the medial patella and lateral femoral condyle on MR	6
Knee dislocation at the femur/tibia	Pain and deformity of the knee; MOI: rare injury generally requiring extensive force	Displaced bones on XR, CT, and MR	1

Cruciate ligament tear	Swelling from effusion; pain at the ligament location; laxity of the knee joint; MOI: twisting or clipping injury	Discontinuous cortex and displaced bone fragment on XR, CT, and MR (when accompanied by an avulsion fracture); posteriorly displaced femur relative to the tibia (ACL) and/or joint effusion on XR, CT, and MR; discontinuity on CT-arthrogram; abnormal SI or discontinuity of the ligament and/or abnormal subchondral bone marrow SI on MR	7 ACL; 2 PCL
Collateral ligament tear	Swelling; pain at the ligament location; laxity of the knee joint; aggravation of pain by valgus (medial) or varus (lateral) stress; relief of pain with diagnostic block MOI: twisting or clipping injury	Discontinuous cortex and displaced bone fragment on XR, CT, and MR (when accompanied by an avulsion fracture); abnormal SI or discontinuity of the ligament on MR	6
Tendon tear	Pain of the involved tendon; MOI: twisting injury	None on XR; discontinuous tendon on MR or CT; abnormal SI in the tendon or muscle on MR	4 quadriceps; 3 patellar; 2 popliteal
Meniscal tear	Pain of the involved meniscus; swelling from effusion; MOI: twisting injury	Joint effusion on XR, CT, and MR; displaced meniscus or abnormal SI reaching the articular surface on two consecutive MR cuts	5
Meniscal contusion			3
Post-traumatic bursitis			3
Patellar retinacular tear			2
ABBREVIATIONS			
ACL = anterior cruciate ligament ; CT = computed tomography; MOI = mechanism of injury; MR = magnetic resonance; SI = signal intensity; XR = plain film radiography			

Differential Diagnosis of Knee Pain (Not Acute, Post-traumatic)

Cause	Clinical Features	Imaging Findings	Collected Cases
Bone Abnormalities			
Primary and metastatic bone tumors	History of malignancy; pain at the location of the tumor (may be poorly localized); night pain; severe pain not relieved by rest	Destroyed bone cortex, absent trabeculae, associated soft tissue mass on XR, CT, and MR; increased (with blastic) versus decreased (with lytic) bone density on XR, CT; abnormal bone marrow SI with MR	1
Avascular necrosis	History of steroid use or alcohol abuse; pain at the location of the AVN (may be poorly localized)	Increased bone density on XR, CT; abnormal contour on XR, CT, and MR; abnormal marrow SI with “double line” on MR	6
SPONK			4
Bipartite patella			1
Articular Abnormalities			
Osteoarthritis	Pain with motion alleviated with rest; tenderness over the joint; prior trauma; osteoarthritis of other joints	Osteophytes, joint space narrowing, subchondral sclerosis or cysts, joint effusion on XR, CT, and MR; focal articular cartilage defects on MR, CT-arthrography, and MR-arthrography	10
Rheumatoid arthritis	Loss of motion; morning stiffness; positive RF; positive anti-CCP; rheumatoid arthritis of other joints	Loss of joint space, erosions, and joint effusion on XR, CT, and MR; abnormal marrow SI MR	
Crystal arthropathy	Acutely painful joint; crystals on joint aspiration; arthropathy of other joints	Chondrocalcinosis and/or soft tissue calcifications on XR, CT, MR; secondary osteoarthritis on XR, CT, and MR	9
Septic arthritis	Fever and chills; swelling; elevated WBC, ESR, or CRP	Swelling from joint effusion, loss of joint space, periostitis (with osteomyelitis) on XR, CT, and MR; abnormal marrow SI on MR	2
Patellofemoral syndrome	Anterior knee pain reproduced by compression of the patella into the femoral trochlea	Cartilage loss; abnormal cartilage or subchondral bone marrow signal on MR	2
Osteochondritis dessicans	Medial femoral condyle pain	Contour abnormality or focal lucency on XR and CT; abnormal	3

		SI on MR	
Extra-articular Soft Tissue Abnormalities			
Tendinopathy	Pain of the affected tendon (e.g., anterior with quadriceps tendon)	None on XR; swelling, increased SI, or discontinuity of the tendon and/or peritendinous fluid on MR	
Bursitis	Tenderness and swelling over the bursa (prepatellar or anserine) with normal knee range of motion	None on XR; increased fluid in the bursa on MR	3
Baker's cyst (popliteal cyst)	Palpable cyst in the medial popliteal fossa; limited range of motion	Swelling; fluid collection on MR; abnormal SI over the gastrocnemius following cyst rupture on MR; associated internal derangement (e.g. meniscal tear, extensive articular cartilage abnormality) on MR	5
Iliotibial band syndrome	Lateral pain; palpable or audible snapping; overuse especially running	None on XR; increased SI on MR	
Deep venous thrombus	Pain in the calf; risk factors for DVT (prior DVT, immobilization, hypercoagulable status)	None on XR; filling defect and lack of compressibility on US	
Infection of the soft tissue			1
Villonodular synovitis	Decreased range of motion	Erosions with chronic disease on XR; soft tissue lesions in the joint space on MR	1
KNEE PAIN WITH NO IMAGING FINDINGS ON KNEE IMAGING STUDIES			
Lumbar spine disease (e.g. disc herniation, spinal stenosis); sacroiliac joint strain or inflammation; referred hip pain (trochanteric bursitis, tendinopathy, piriformis syndrome, osteoarthritis, AVN of the femoral head); femur tumor, stress fracture, or Paget's disease; aortoiliac insufficiency			
ABBREVIATIONS			
CCP = cyclic citrullinated peptide; CPPD = calcium pyrophosphate dehydrate crystal deposition disease; CRP = c-reactive protein; CT = computed tomography; ESR = erythrocyte sedimentation rate; MR = magnetic resonance imaging; RF = rheumatoid factor; WBC = white blood cell count; XR = plain film radiography			

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