

**Acutely Limping Child Up To Age 5
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Singer JJ. The cause of gait disturbance in 425 pediatric patients. <i>Pediatr Emerg Care.</i> 1985;1(1):7-10.	Review/Other-Dx	8,175 children	To give insight into the incidence of nontraumatic gait disturbance; to determine the relative frequencies of the various pathological processes associated with this complaint at a general pediatric facility; to compare the diagnostic accuracy of the admitting diagnosis with that of the eventual diagnosis; and to suggest admission guidelines for children with this chief complaint.	No results listed in abstract.	4
2. Frank G, Mahoney HM, Eppes SC. Musculoskeletal infections in children. <i>Pediatr Clin North Am.</i> 2005; 52(4):1083-1106, ix.	Review/Other-Dx	N/A	Review musculoskeletal infection in children.	Serious musculoskeletal infections in children include osteomyelitis, septic arthritis, pyomyositis, and necrotizing fasciitis. The epidemiology, pathophysiology, and microbiology of each of these infections are reviewed. Specific diagnostic studies and management strategies are discussed. Prompt recognition and treatment is emphasized to prevent potential long-term sequelae.	4
3. Jain N, Sah M, Chakraverty J, Evans A, Kamath S. Radiological approach to a child with hip pain. <i>Clin Radiol.</i> 2013;68(11):1167-1178.	Review/Other-Dx	N/A	To discuss the approach to imaging a child who presents with pain in the hip or with a limp.	No results listed in abstract.	4
4. Offiah AC. Acute osteomyelitis, septic arthritis and discitis: differences between neonates and older children. <i>Eur J Radiol.</i> 2006;60(2):221-232.	Review/Other-Dx	N/A	To discuss the important clinical and radiological differences that in the past have led many authors to consider neonatal osteomyelitis a separate entity from osteomyelitis in the older child.	No results listed in abstract.	4
5. Swischuk LE. Emergency pediatric imaging: changes over the years. Part II. <i>Emerg Radiol.</i> 2005; 11(5):253-261.	Review/Other-Dx	N/A	Review changes that have occurred over the years in emergency pediatric imaging.	Plain films are very important in musculoskeletal radiology but US and MRI have made great strides in allowing a thorough evaluation of musculoskeletal disease.	4

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6. Swischuk LE. The limping infant: imaging and clinical evaluation of trauma. <i>Emerg Radiol.</i> 2007; 14(4):219-226.	Review/Other-Dx	N/A	Review imaging and evaluation of limping infant due to trauma. Article addresses limping in infants to about 3 years of age.	It is difficult to obtain an accurate history from these patients, and thus, imaging becomes of paramount importance. It is important that the individual evaluating the images knows what to look for and what it looks like.	4
7. Sawyer JR, Kapoor M. The limping child: a systematic approach to diagnosis. <i>Am Fam Physician.</i> 2009; 79(3):215-224.	Review/Other-Dx	N/A	To examine a systematic approach to the diagnosis of the limping child.	Limping in a child can have a variety of etiologies. A detailed history and physical examination, in addition to appropriate laboratory tests and imaging, are essential for making a correct diagnosis.	4
8. Frick SL. Evaluation of the child who has hip pain. <i>Orthop Clin North Am.</i> 2006;37(2):133-140, v.	Review/Other-Dx	N/A	To review pertinent history taking, physical examination, laboratory testing, and imaging studies that assist in reaching a correct diagnosis. To also review the diagnostic categories that are important in formulating a differential diagnosis to frame clinical decision making.	No results listed in abstract.	4
9. Katz DA. Slipped capital femoral epiphysis: the importance of early diagnosis. <i>Pediatr Ann.</i> 2006; 35(2):102-111.	Review/Other-Dx	N/A	Review importance of early diagnosis of slipped capital femoral epiphysis.	Diagnosis is confirmed with radiographs (AP and frog-lateral of the pelvis). Therefore, a high index of suspicion for this disorder, and the attainment of appropriate radiographs, should allow for prompt diagnosis and referral for treatment. Treatment is urgent and surgical. Early diagnosis and proper treatment are the mainstays of prevention of adverse sequelae.	4

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10. Aronson J, Garvin K, Seibert J, Glasier C, Tursky EA. Efficiency of the bone scan for occult limping toddlers. J Pediatr Orthop. 1992; 12(1):38-44.	Observational-Dx	50 consecutive occult limping toddlers	To prospectively evaluate the value of acute TTS in limping toddler with no diagnosis after radiographs and clinical evaluation.	TTS proved essential in localizing the lesion in 27 patients (54%). With only two false negatives and one false positive, this test was shown to be highly sensitive, specific, efficient, and predictive, especially as compared with temperature, white blood cell count, ESR, and plain radiography. Because no infections were missed by TTS, patients with a normal TTS could be safely observed as outpatients, saving thousands of health care dollars in this small series.	2
11. Englaro EE, Gelfand MJ, Paltiel HJ. Bone scintigraphy in preschool children with lower extremity pain of unknown origin. J Nucl Med. 1992; 33(3):351-354.	Review/Other-Dx	56 children	To retrospectively assess role of bone scintigraphy in children less than 5 years of age who presented with lower extremity pain and gait abnormalities. 43 plain radiographs, one MRI and two hip US examinations were available for comparison.	30 patients had abnormal bone scans. Abnormalities included evidence of hip synovitis (4), femoral head avascularity (2), various proximal femoral abnormalities (3), knee synovitis (3), toddler's fracture (1), various tibial or fibular abnormalities (4), and various abnormalities of the tarsal bones (16). Tarsal bone abnormalities included 4 with abnormal calcaneal uptake and 9 with abnormal uptake in or adjacent to the cuboid bone. Correlative imaging studies were available for 26 sites, and focal bone findings were noted at only five locations. Tarsal bone abnormalities accounted for over half of the scintigraphic abnormalities in these preschool children with gait abnormalities. Abnormal uptake in/or adjacent to the cuboid bone was common and probably represented stress injury.	4

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12. John SD, Moorthy CS, Swischuk LE. Expanding the concept of the toddler's fracture. <i>Radiographics</i> . 1997; 17(2):367-376.	Review/Other-Dx	N/A	To demonstrate the various types of subtle fractures that occur in the leg and foot of infants and young children along with the mechanisms by which a child can sustain fractures of the metatarsals, talus, cuboid, and calcaneus. The scope of these fractures is discussed, with an emphasis on those that are easily missed at radiography. Also, physical examination and imaging techniques that can facilitate detection of these often elusive fractures are presented.	In addition to the classic toddler's fracture of the tibia, there is a wide variety of subtle fractures that can result from minor injuries to the lower extremity in infants and young children. Many of these fractures are only faintly visible or even occult in their early stages, and detection is facilitated with the use of comparison views and bone scintigraphy.	4
13. Baron CM, Seekins J, Hernanz-Schulman M, Yu C, Kan JH. Utility of total lower extremity radiography investigation of nonweight bearing in the young child. <i>Pediatrics</i> . 121(4):e817-20, 2008 Apr.	Observational-Dx	133 patients 128 controls	Retrospective cohort study to determine the utility of total lower extremity radiographs vs dedicated tibia radiographs in the evaluation of the young child presenting with nonweight bearing without localizing signs.	At initial presentation, fractures were present in 13 study patients (9.8%) and in 23 control patients (17.9%). Total fractures (when including follow-up) were present in 14 study patients (10.5%) and in 26 control patients (20.3%). Fractures were located in the tibia alone in 100% of patients in the study group. Extratibial fracture (metatarsal) was present in 1 patient in the control group (0.7%). Among the study group, additional diagnoses included rickets (n=1), cerebellar ataxia (n=1), and discitis with epidural abscess (n=1). Findings indicate that the diagnostic value of total lower extremity radiography is similar to dedicated tibia radiography in the workup of the nonweight-bearing young child without trauma history or localizing signs. Radiation and cost savings can be realized by reserving additional radiographs for patients with high clinical suspicion and normal findings on dedicated tibia radiography.	3
14. Nazarian LN. The top 10 reasons musculoskeletal sonography is an important complementary or alternative technique to MRI. <i>AJR Am J Roentgenol</i> . 2008;190(6):1621-1626.	Review/Other-Dx	N/A	To show the advantages of musculoskeletal sonography.	No results listed on abstract.	4

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15. Flynn JM, Widmann RF. The limping child: evaluation and diagnosis. J Am Acad Orthop Surg. 2001; 9(2):89-98.	Review/Other-Dx	N/A	Review evaluation and diagnosis of the limping child.	Imaging should begin with plain radiography. US is particularly valuable in assessing the irritable hip and guiding aspiration, if necessary.	4
16. Connolly SA, Connolly LP, Drubach LA, Zurakowski D, Jaramillo D. MRI for detection of abscess in acute osteomyelitis of the pelvis in children. AJR Am J Roentgenol. 2007; 189(4):867-872.	Observational-Dx	38 children; 2 blinded reviewers	Retrospectively review the imaging studies and medical records of children who were diagnosed with pelvic osteomyelitis using MRI during a 5-year period to determine how often fluid collections indicative of abscess on MRI occur in pelvic acute hematogenous osteomyelitis and whether clinical parameters can predict the occurrence of such abscesses.	Osteomyelitis involved metaphyseal equivalent sites in every case (n=38), with single bone involvement in 24 (63%) and contiguous bone involvement in the remaining 14 (37%). Fluid collections indicative of an abscess were seen in 21 cases (55%), and abscess drainage was performed in 10 (26%). Univariate analysis of demographic and clinical variables between patients with and without an abscess indicated no significant differences for any variable except ESR (74 +/- 19 vs 56 +/- 24 mm/h; P<0.05, Student's t test). Childhood pelvic acute hematogenous osteomyelitis is relatively uncommon and produces variable signs and symptoms that are often attributed to another process. Study results show the ability of MRI to provide additional information that affected patient management in cases of pelvic abscess. Authors recommend the use of MRI as the imaging technique of choice for any child suspected of having pelvic acute hematogenous osteomyelitis.	3
17. Nadel HR. Pediatric bone scintigraphy update. Semin Nucl Med. 2010; 40(1):31-40.	Review/Other-Dx	N/A	Review some differences in evaluating the skeletal system in children and highlight how hybrid imaging has been incorporated into the evaluation to diagnose musculoskeletal disorders in children.	Bone scintigraphy is a sensitive tool to evaluate the musculoskeletal system in children. Hybrid imaging using CT in combination with conventional bone scan and SPECT improves specificity and diagnostic accuracy. It also improves laboratory efficiency and may save the patient an additional visit to the hospital for a separate cross-sectional imaging study.	4

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18. Cutler L, Molloy A, Dhukuram V, Bass A. Do CT scans aid assessment of distal tibial physeal fractures?. J Bone Joint Surg Br. 86(2):239-43, 2004 Mar.	Observational-Dx	62 consecutive patients	To assess the accuracy of preoperative planning for placement of the screws in distal tibial physeal fractures using either standard radiographs or CT scans.	There was a statistically significant improvement ($P < 0.0001$) in the accuracy of the point of insertion and the direction of the screw on the preoperative plan when CT scans were used rather than radiographs. Authors recommend that CT scans are routinely used in the preoperative assessment and treatment of distal tibial physeal fractures.	3
19. Iyer RS, Chapman T, Chew FS. Pediatric bone imaging: diagnostic imaging of osteoid osteoma. AJR Am J Roentgenol. 2012;198(5):1039-1052.	Review/Other-Dx	N/A	To focus on the various imaging manifestations of osteoid osteoma tumors, while also discussing its clinical presentation, pathogenesis, and treatment.	No results listed on abstract.	4
20. Daldrup-Link HE, Franzius C, Link TM, et al. Whole-body MR imaging for detection of bone metastases in children and young adults: comparison with skeletal scintigraphy and FDG PET. AJR Am J Roentgenol. 2001;177(1):229-236.	Observational-Dx	Thirty-nine children and young adults who were 2--19 years old.	To compare the diagnostic accuracy of whole-body MR imaging, skeletal scintigraphy, and ^{18}F -fluorodeoxyglucose (FDG) positron emission tomography (PET) for the detection of bone metastases in children.	Twenty-one patients exhibited 51 bone metastases. Sensitivities for the detection of bone metastases were 90% for FDG PET, 82% for whole-body MR imaging, and 71% for skeletal scintigraphy; these data were significantly different ($p < 0.05$). False-negative lesions were different for the three imaging modalities, mainly depending on lesion location. Most false-positive lesions were diagnosed using FDG PET.	2

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21. Fritz J, Tzaribatchev N, Claussen CD, Carrino JA, Horger MS. Chronic recurrent multifocal osteomyelitis: comparison of whole-body MR imaging with radiography and correlation with clinical and laboratory data. <i>Radiology</i> . 2009;252(3):842-851.	Observational-Dx	13 children	To describe whole-body magnetic resonance (MR) imaging appearance of chronic recurrent multifocal osteomyelitis (CRMO) and assess the role of MR imaging versus radiography in diagnosis of disease and correlation with clinical findings and laboratory data.	MR imaging depicted 101 ill-defined edemalike osseous lesions. Most frequent anatomic sites were distal femur (21%, 21 of 101), proximal tibia (17%, 17 of 101), and distal tibia and fibula (14% each, 14 of 101). In tubular bones (70 anatomic sites), metaphysis (86%, 60 of 70) and epiphysis (67%, 47 of 70) were involved. Contiguous physeal relationship (89%, 66 of 74), periosteal reaction (48%, 48 of 101), and symmetric involvement (85%, 11 of 13) were present. MR imaging demonstrated multifocality in all patients. There were no extraskelatal abnormalities and no relationship between serum inflammatory markers and number of symptomatic anatomic sites (P = .472). Sensitivity for radiography was 0.13 (70 of 119); physical examination, 0.31 (52 of 299); and serum inflammatory markers, 0.15 (two of 13).	2
22. Mentzel HJ, Kentouche K, Sauner D, et al. Comparison of whole-body STIR-MRI and 99mTc-methylene-diphosphonate scintigraphy in children with suspected multifocal bone lesions. <i>Eur Radiol</i> . 2004; 14(12):2297-2302.	Observational-Dx	16 patients	To compare whole-body STIR MRI and (99m)Tc-methylene diphosphonate planar scintigraphy in the examination of children with suspected multifocal skeletal malignant lesions. Scintigraphy and MRI follow-up were evaluated as gold standard.	139 different lesions observed by both modalities. Baseline whole-body MRI revealed 119 bone lesions in 256 possible sites (46.5%); scintigraphy revealed only 58 lesions (22.6%). Congruence was observed in only four patients (25%). According to the location of the lesion, correlation was observed in 39/139 lesions (28%). In all, 57.5% of the lesions were detected only by MRI and 14.5% of the lesions were detected only by scintigraphy. Whole-body MRI was more sensitive (P<0.001). Of all lesions numbered which could be separated in the initial MRI, whole-body MRI detected 178 lesions in the patients. Whole-body MRI using a STIR sequence is an effective radiation free method for examination of suspected multifocal bone lesions.	3

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23. Aquino MR, Tse SM, Gupta S, Rachlis AC, Stimec J. Whole-body MRI of juvenile spondyloarthritis: protocols and pictorial review of characteristic patterns. <i>Pediatr Radiol.</i> 2015;45(5):754-762.	Review/Other-Dx	N/A	To provide a protocol and pictorial review of characteristic patterns for whole body MRI of juvenile spondyloarthritis.	No results stated in abstract.	4
24. Weiss PF, Chauvin NA, Roth J. Imaging in Juvenile Spondyloarthritis. <i>Curr Rheumatol Rep.</i> 2016;18(12):75.	Review/Other-Dx	N/A	To provide an update on the use of imaging in the assessment of juvenile spondyloarthritis (JSpA) disease manifestations.	No results listed in abstract.	4
25. Littooi AS, Kwee TC, Enriquez G, et al. Whole-body MRI reveals high incidence of osteonecrosis in children treated for Hodgkin lymphoma. <i>Br J Haematol.</i> 2017;176(4):637-642.	Review/Other-Dx	24 patients	To prospectively determine the incidence of osteonecrosis in children treated for Hodgkin lymphoma according to a uniform Hodgkin protocol using whole-body MRI.	Whole-body MRI was performed in all 24 included patients (mean age 15.1 years, 12 girls) both before treatment and after 2 cycles of chemotherapy, and in 16 patients after completion of chemotherapy. Osteonecrosis was identified in 10 patients (41.7%, 95% confidence interval: 22.0–61.4%), with a total of 56 osteonecrotic sites. Osteonecrosis was detected in 8 patients after 2 cycles of OEPA (vincristine, etoposide, prednisone, doxorubicin), and in 2 additional patients after completion of chemotherapy. Epiphyseal involvement of long bones was seen in 4 of 10 children. None of the patients with osteonecrosis had any signs of bone collapse at the times of scanning.	4
26. Naranje S, Kelly DM, Sawyer JR. A Systematic Approach to the Evaluation of a Limping Child. <i>Am Fam Physician.</i> 2015;92(10):908-916.	Review/Other-Dx	N/A	To provide a systematic approach to the evaluation of a limping child.	No results listed in abstract.	4
27. Halsey MF, Finzel KC, Carrion WV, Haralabatos SS, Gruber MA, Meinhard BP. Toddler's fracture: presumptive diagnosis and treatment. <i>J Pediatr Orthop.</i> 2001;21(2):152-156.	Review/Other-Dx	39 children	To evaluate how frequently the diagnosis is correct and to determine if there were any differentiating characteristics with respect to history, gait, or physical examination	A total of 16 (41%) toddler's fractures was confirmed on follow-up radiographs. Comparing the children who demonstrated a toddler's fracture with those who did not, no particular characteristic was found that could predict the outcome.	4

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28. Oudjhane K, Newman B, Oh KS, Young LW, Girdany BR. Occult fractures in preschool children. J Trauma. 1988; 28(6):858-860.	Review/Other-Dx	500 consecutive radiographic exams	To retrospectively analyze radiographic examinations of acutely limping infants and toddlers.	100/500 (20%) had a fracture as the underlying etiology. Although the most common sites of involvement were the tibia/fibula (56 cases) and femur (30 cases), fractures in the pelvis and feet, notably the metatarsals (11 cases), also were seen. Authors recommend obtaining radiographs of the pelvis and both lower extremities including the feet, when occult trauma is suspected and the exact area of injury cannot be pinpointed clinically.	4
29. Tenenbein M, Reed MH, Black GB. The toddler's fracture revisited. Am J Emerg Med. 1990;8(3):208-211.	Review/Other-Dx	N/A	To review one emergency department's experience with 37 cases of toddler's fracture	No results listed in abstract.	4
30. Dunbar JS, Owen HF, Nogrady MB, McLeese R. Obscure Tibial Fracture of Infants--the Toddler's Fracture. J Can Assoc Radiol. 1964;15:136-144.	Review/Other-Dx	1 case	To describe the etiopathology, diagnosis and therapeutic management of these fractures.	No results listed in abstract.	4
31. Pierce D, Mangona KL, Bisset G, Naik-Mathuria B. Computed Tomography in the Evaluation of Pediatric Trauma. Clinical Pediatric Emergency Medicine. 2015;16(4):220-229.	Review/Other-Dx	N/A	To review the use of computed tomography (CT) for the purpose of injury evaluation in pediatric trauma patients.	No results listed on abstract.	4

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32. Quartuccio N, Fox J, Kuk D, et al. Pediatric bone sarcoma: diagnostic performance of (1)(8)F-FDG PET/CT versus conventional imaging for initial staging and follow-up. AJR Am J Roentgenol. 2015;204(1):153-160.	Observational-Dx	64 patients	To compare the diagnostic performance of (18)F-FDG PET/CT and conventional imaging for staging and follow-up of pediatric osteosarcoma and skeletal Ewing sarcoma.	A total of 412 lesions were characterized by imaging in 64 patients (20, osteosarcoma; 44, Ewing sarcoma). For osteosarcoma patients PET/CT was available only at follow-up, where it proved more accurate than conventional imaging for the detection of bone lesions (accuracy, 95% vs 67% for CT and 86% for MRI) and complementary to CT in evaluating lung nodules (sensitivity, 84% vs 94%; specificity, 79% vs 71%) with diagnostic benefit in 18% of examinations. In patients with Ewing sarcoma, PET/CT tended to perform better during follow-up than at initial staging (accuracy, 85% vs 69%). For lung findings, PET/CT was more specific than CT but was less sensitive. The diagnostic benefit of PET/CT was greater at staging (28%) than during followup (9%). On a per-patient basis, PET/CT provided diagnostic benefit in 21 of 44 patients with Ewing sarcoma and nine of 20 patients with osteosarcoma at least once during clinical management.	3
33. Weinberg ER, Tunik MG, Tsung JW. Accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults. Injury. 41(8):862-8, 2010 Aug.	Observational-Dx	212 children and young adults	To determine the accuracy of clinician-performed point-of-care ultrasound for the diagnosis of fractures in children and young adults presenting to an acute care setting.	Point-of-care ultrasound was performed on 212 children and young adults with 348 suspected fractures. Forty-two percent of all bones imaged were non-long bones. The prevalence rate of fracture was 24%. Overall: sensitivity-73% (95% CI: 62-82%), specificity-92% (95% CI: 88-95%); long bones: sensitivity-73% (58-84%), specificity-92% (86-95%); non-long bones: sensitivity-77% (58-90%); specificity-93% (87-97%); age > or =18 years: sensitivity-60% (39-78%), specificity-92% (87-96%); age <18: sensitivity-78 (65-87%), specificity-93% (87-95)%. Majority of errors in diagnosis (>85%) occurred at the ends-of-bones.	2

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34. Johnson K. Imaging of juvenile idiopathic arthritis. <i>Pediatr Radiol.</i> 2006; 36(8):743-758.	Review/Other-Dx	N/A	Review different imaging modalities available, their role and limitations and the various disease features that the radiologist should be aware of. An approach to the imaging of the child with joint disease and in the monitoring of disease complications is also discussed.	No results stated.	4
35. Lanni S, Martini A, Malattia C. Heading toward a modern imaging approach in juvenile idiopathic arthritis. <i>Curr Rheumatol Rep.</i> 2014;16(5):416.	Review/Other-Dx	N/A	To review modern imaging approach in juvenile idiopathic arthritis.	No results listed in abstract.	4
36. Malattia C, Consolaro A, Pederzoli S, et al. MRI versus conventional measures of disease activity and structural damage in evaluating treatment efficacy in juvenile idiopathic arthritis. <i>Ann Rheum Dis.</i> 2013;72(3):363-368.	Review/Other-Dx	40 patients	To compare the American College of Rheumatology paediatric (ACRp) response criteria and conventional radiography with MRI findings in a cohort of patients with juvenile idiopathic arthritis.	ACRp90 responders showed a significantly higher decrease in MRI synovitis score (median change -4) than non-responders (median change 0), ACRp30-50 responders (median change 0) and ACRp70 responders (median change -1) (p=0.0006, Kruskal-Wallis test). Non-responders showed significantly higher radiographic progression than ACRp90 responders (pB=0.016). The MRI synovitis score showed a greater responsiveness to change (SRM 1.69) compared with the majority of ACR core set of variables. MRI erosion scores were less responsive than conventional radiography in detecting destructive changes (RE <1). MRI follow-up revealed no signs of inflammation in four out of 24 wrists with clinically inactive disease.	4

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37. Malattia C, Damasio MB, Basso C, et al. Dynamic contrast-enhanced magnetic resonance imaging in the assessment of disease activity in patients with juvenile idiopathic arthritis. <i>Rheumatology (Oxford)</i> . 2010;49(1):178-185.	Observational-Dx	21 patients	To determine the capability and reliability of dynamic contrast-enhanced MRI (DCE-MRI) in the assessment of disease activity in juvenile idiopathic arthritis (JIA).	In patients with wrist arthritis, REE correlated with the wrist swelling score (r(s) = 0.72), ESR (r(s) = 0.69), pain assessment scale (r(s) = 0.63) and childhood HAQ (r(s) = 0.60). In patients with hip arthritis, ME correlated with the hip limitation of motion (r(s) = 0.69). Static MRI synovitis score based on post-gadolinium enhancement correlated with MV (r(s) = 0.63) in patients with wrist arthritis and with ME (r = 0.68) in those with hip arthritis. The inter-reader agreement assessed by intra-class correlation coefficient (ICC) for ME, MV and REE (ICC = 0.98, 0.97 and 0.84, respectively) was excellent.	2
38. Ahlawat S, Fayad LM. De Novo Assessment of Pediatric Musculoskeletal Soft Tissue Tumors: Beyond Anatomic Imaging. <i>Pediatrics</i> . 2015;136(1):e194-202.	Review/Other-Dx	N/A	To present recent advances in MRI methodology that enable a comprehensive clinical assessment of musculoskeletal tumors in the pediatric population.	No results listed in abstract.	4
39. Browne LP, Mason EO, Kaplan SL, Cassady CI, Krishnamurthy R, Guillerman RP. Optimal imaging strategy for community-acquired Staphylococcus aureus musculoskeletal infections in children. <i>Pediatr Radiol</i> . 2008; 38(8):841-847.	Observational-Dx	199 children (160 underwent MRI and 35 underwent bone scintigraphy)	Retrospective review was performed to appraise the diagnostic efficacy of imaging practices performed for community-acquired Staphylococcus aureus osteomyelitis and its complications in children.	Sensitivity of MRI and bone scintigraphy for community-acquired Staphylococcus aureus osteomyelitis was 98% and 53%, respectively. In all discordant cases, MRI was correct compared to bone scintigraphy. Extrasosseous complications of community-acquired Staphylococcus aureus osteomyelitis detected only by MRI included subperiosteal abscesses (n=77), pyomyositis (n=43), septic arthritis (n=31), and deep venous thrombosis (n=12). MRI is the preferred imaging modality for the investigation of pediatric community-acquired Staphylococcus aureus musculoskeletal infection because it offers superior sensitivity for osteomyelitis compared to bone scintigraphy and detects extrasosseous complications that occur in a substantial proportion of patients.	2

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40. Karmazyn B, Loder RT, Kleiman MB, et al. The role of pelvic magnetic resonance in evaluating nonhip sources of infection in children with acute nontraumatic hip pain. <i>J Pediatr Orthop.</i> 2007; 27(2):158-164.	Observational-Dx	33 children	Retrospectively identify children with acute hip pain who underwent pelvic MR to examine the role of pelvic MR in evaluating nonhip sources of infection.	On MR examination, 18 (55%) of 33 children had hip joint effusion, whereas 19 (58%) of 33 children had other abnormalities, including pyomyositis (n=15), osteomyelitis (n=12), and sacroiliitis (n=3). <i>Staphylococcus aureus</i> was cultured from 13 (68%) of these 19 children. Compared with MR, sensitivity for bone and soft tissue abnormalities was 30% for pelvic radiography (n=26) and 71% for bone scintigraphy (n=8). Elevated ESR, >30 mm/h was the clinical finding that best predicted pelvic osteomyelitis or pyomyositis. Pelvic MR should be performed to rule out pelvic osteomyelitis or pyomyositis in children with acute hip pain, ESR of more than 30 mm/h, and no evidence of septic hip.	3
41. Kumar J, Ramachandran M, Little D, Zenios M. Pelvic osteomyelitis in children. <i>J Pediatr Orthop B.</i> 2010; 19(1):38-41.	Review/Other-Dx	23 patients	Review cases of pelvic osteomyelitis in an attempt to improve diagnostic accuracy at a tertiary referral centre. Case notes were reviewed to examine clinical, pathological and radiological variables attributable to pelvic osteomyelitis, as well as subsequent management of the disease.	MRI performed in the most recent cases was found to be a useful investigation in the diagnosis and management of pelvic osteomyelitis.	4

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42. Karmazyn B, Kleiman MB, Buckwalter K, Loder RT, Siddiqui A, Applegate KE. Acute pyomyositis of the pelvis: the spectrum of clinical presentations and MR findings. <i>Pediatr Radiol.</i> 2006; 36(4):338-343.	Review/Other-Dx	20 children	Retrospectively identify children who were evaluated by MR and diagnosed with acute pelvis pyomyositis to summarize the clinical and MR findings in children with acute pelvic pyomyositis.	15/20 children had secondary pyomyositis associated with osteomyelitis (n=13), septic hip (n=4) or sacroiliitis (n=4); all were previously healthy except for one child with leukemia. 7 of the children with secondary pyomyositis underwent bone scintigraphy; three (43%) did not show pelvic abnormalities. <i>Staphylococcus aureus</i> was cultured in 13/15 (87%) children. 5/20 children had primary pyomyositis. Three had underlying disease and two others were engaged in vigorous physical activity. Bone scintigraphy (n=2) were negative. Cultures were positive for <i>Staphylococcus aureus</i> in 3/5 (60%) children. Septic hip should be the first diagnostic consideration in children with fever and acute hip pain. Pyomyositis should be considered if arthrocentesis is negative or there is clinical suspicion of infection outside the hip joint. MR is the preferred imaging modality for evaluating foci of pyomyositis, muscle abscesses, and additional foci of infection within the pelvis.	4
43. Kim J, Jaramillo D. Imaging of acute hematogenous osteomyelitis and septic arthritis in children and adults. In: Medina LS, Blackmore CC, eds. <i>Evidence-Based Imaging: Optimizing Imaging in Patient Care.</i> New York: Springer; 2006:591.	Review/Other-Dx	N/A	Book chapter.	N/A	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
44. McPhee E, Eskander JP, Eskander MS, Mahan ST, Mortimer E. Imaging in pelvic osteomyelitis: support for early magnetic resonance imaging. <i>J Pediatr Orthop.</i> 2007;27(8):903-909.	Review/Other-Dx	23 children	To present imaging findings in children with suspected pelvic osteomyelitis with emphasis on MRI abnormalities and to propose an anatomical classification based on the patterns of pelvic involvement.	Abnormalities on the MRI included soft tissue inflammation and bone edema. These findings were bright on T2 and short inversion time Short T1 inversion recovery (STIR) images and enhanced after gadolinium administration. Five distinct patterns of pelvic involvement were observed, each corresponding to a cartilaginous epiphysis or apophysis. These were the sacroiliac joint, triradiate cartilage, pubic symphysis, ischium, and iliac apophysis. One patient had a noninfectious cause of presentation with a deep vein thrombosis, whereas another was diagnosed with Hodgkin lymphoma in addition to osteomyelitis of the ischium.	4
45. Arthurs OJ, Gomez AC, Heinz P, Set PA. The toddler refusing to weight-bear: a revised imaging guide from a case series. <i>Emerg Med J.</i> 2009; 26(11):797-801.	Review/Other-Dx	3 children	Case series of non-weight-bearing children in whom there was a delay in making the diagnosis of lumbosacral discitis are presented. All patients underwent conventional radiography and US, but diagnoses were made on spinal MRI, with two patients undergoing bone scintigraphy before this.	The mean delay was 15.6 days (range 13-20) from presentation at the hospital to MRI. All three patients made a good clinical recovery with intravenous antibiotics. These cases are presented in order to heighten the awareness of this disease entity and its imaging findings, and suggest new guidelines for the appropriate radiological investigations in this clinical setting.	4
46. Lim S, Sinnathamby W, Noordeen H. Refusal to walk in an afebrile well toddler. <i>Postgrad Med J.</i> 2002;78(923):568, 570.	Review/Other-Dx	N/A	To present the case of an afebrile toddler refusing to walk.	No abstract available.	4
47. Tyagi R. Spinal infections in children: A review. <i>J Orthop.</i> 2016;13(4):254-258.	Review/Other-Dx	N/A	A review of spinal infections in children.	No results listed in abstract.	4
48. van den Heuvel R, Hertel M, Gallagher J, Naidoo V. A toddler who refused to stand or walk: lumbar spondylodiscitis. <i>BMJ Case Rep.</i> 2012;2012.	Review/Other-Dx	1 case	To discuss a case report of lumbar spondylodiscitis to illustrate a paediatric diagnostic challenge from a general practitioner (GP) and hospital specialist point of view and with the aim to avoid delay in diagnosis in similar cases.	No results listed in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
49. Guillerman RP. Osteomyelitis and beyond. <i>Pediatr Radiol.</i> 2013;43 Suppl 1:S193-203.	Review/Other-Dx	N/A	To focus on the imaging characteristics of osteomyelitis, septic arthritis and pyomyositis and the differentiating features of potential mimics of infection.	No results listed in abstract.	4
50. Averill LW, Hernandez A, Gonzalez L, Pena AH, Jaramillo D. Diagnosis of osteomyelitis in children: utility of fat-suppressed contrast-enhanced MRI. <i>AJR Am J Roentgenol.</i> 2009; 192(5):1232-1238.	Observational-Dx	78 skeletally immature children and adolescents	To retrospectively determine whether the use of fat-suppressed contrast-enhanced MRI, compared with unenhanced MRI alone increases reader confidence in the diagnosis of osteomyelitis and its complications in children.	Osteomyelitis was clinically diagnosed in 40 cases (51%). There was no significant difference between the sensitivity and specificity of unenhanced MRI (P=1.0) and those of contrast-enhanced MRI (P=0.77) for the diagnosis of osteomyelitis. Nonetheless, there was a significant (P<0.001) increase in confidence in the diagnosis of osteomyelitis and its complications. This increase in confidence was most pronounced for the diagnosis of abscess (46%). The addition of contrast enhancement was least useful in findings deemed definitely absent on unenhanced MR images. Although it does not increase the sensitivity or specificity of the diagnosis, use of contrast-enhanced MRI does increase reader confidence in the diagnosis of osteomyelitis and its complications in cases in which bone or soft-tissue edema is found on unenhanced images. In the clear absence of edema on unenhanced images, however, contrast enhancement is not needed.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
<p>51. Kan JH, Young RS, Yu C, Hernanz-Schulman M. Clinical impact of gadolinium in the MRI diagnosis of musculoskeletal infection in children. <i>Pediatr Radiol.</i> 2010; 40(7):1197-1205.</p>	<p>Observational-Dx</p>	<p>90 gadolinium -enhanced MRIs</p>	<p>To compare diagnostic utility of non-contrast with contrast MRI in the evaluation of pediatric musculoskeletal infections.</p>	<p>Pre- and post-contrast diagnosis of osteomyelitis sensitivity was 89% and 91% (P=1.00) and specificity was 96% and 96% (P=1.00), respectively; septic arthritis sensitivity was 50% and 67% (P=1.00) and specificity was 98% and 98% (P=1.00), respectively; cellulitis/myositis sensitivity was 100% and 100% (P=1.00) and specificity was 84% and 88% (P=0.59), respectively; abscess for the total group was 22 (24.4%) and 42 (46.6%), respectively (P<0.0001). Abscesses identified only on contrast sequences led to intervention in eight additional children. No child with a final diagnosis of infection had a normal pre-contrast study. Intravenous gadolinium should not be routinely administered in the imaging work-up of nonspinal musculoskeletal infections, particularly when pre-contrast images are normal. However, gadolinium contrast significantly increases the detection of abscesses, particularly small ones that might not require surgical intervention.</p>	<p style="text-align: center;">3</p>

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
<p>52. Browne LP, Guillerman RP, Orth RC, Patel J, Mason EO, Kaplan SL. Community-acquired staphylococcal musculoskeletal infection in infants and young children: necessity of contrast-enhanced MRI for the diagnosis of growth cartilage involvement. <i>AJR Am J Roentgenol.</i> 2012;198(1):194-199.</p>	<p>Observational-Dx</p>	<p>25 patients</p>	<p>To assess the diagnostic efficacy of contrast-enhanced and unenhanced MRI sequences for the diagnosis of community-acquired <i>S. aureus</i> extremity skeletal infection in infants and young children.</p>	<p>Community-acquired <i>S. aureus</i> skeletal infections were noted in 34 extremity sites in 25 patients, five of whom had more than one site of disease. The affected skeletal sites were metaphyseal or metadiaphyseal bone marrow only in 16 cases (47%), unossified growth cartilage only in nine cases (26%), and both the unossified growth cartilage and metaphyseal or metadiaphyseal bone marrow in nine cases (26%). In seven of the nine cases of isolated involvement of the unossified growth cartilage, the cartilage appeared normal on unenhanced sequences and the diagnosis was made only by the demonstration of hypoenhancing or nonenhancing foci in the cartilage after gadolinium-based contrast agent administration. In five of the nine cases of infection of both the unossified growth cartilage and metaphyseal or metadiaphyseal bone marrow, neither the cartilage nor bone marrow appeared abnormal on unenhanced sequences. Therefore, 12 cases of skeletal infection would have been missed without the inclusion of contrast-enhanced sequences. Follow-up extremity radiographs were available for 10 patients, eight (80%) of whom exhibited growth disturbances.</p>	<p>2</p>

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
53. Darge K, Jaramillo D, Siegel MJ. Whole-body MRI in children: current status and future applications. <i>Eur J Radiol.</i> 2008;68(2):289-298.	Review/Other-Dx	N/A	To review the current status and future of WB-MRI in children.	WB-MRI is a sensitive method for imaging the entire body in a short time. It is a reliable alternative to conventional imaging for detecting metastatic disease, especially skeletal metastases. An important advantage of this technique is the absence of ionizing radiation. For young patients in particular, undergoing serial longitudinal follow-up examinations, WB-MRI offers a radiation free alternative to scintigraphy and CT for diagnosis, staging and monitoring.	4
54. Karmazyn B. Imaging approach to acute hematogenous osteomyelitis in children: an update. <i>Semin Ultrasound CT MR.</i> 2010;31(2):100-106.	Review/Other-Dx	N/A	To discuss the current multimodality imaging approach for early diagnosis of acute hematogenous osteomyelitis (AHOM), and evaluation of complications to guide treatment.	No results listed in abstract.	4
55. Davis JT, Kwatra N, Schooler GR. Pediatric whole-body MRI: A review of current imaging techniques and clinical applications. <i>J Magn Reson Imaging.</i> 2016;44(4):783-793.	Review/Other-Dx	N/A	To review the more common current whole-body MRI techniques in children and the primary pathologies for which this imaging modality may be most useful to the radiologists and referring clinicians.	No results stated in abstract.	4
56. Nguyen A, Kan JH, Bisset G, Rosenfeld S. Kocher Criteria Revisited in the Era of MRI: How Often Does the Kocher Criteria Identify Underlying Osteomyelitis? <i>J Pediatr Orthop.</i> 2017;37(2):e114-e119.	Review/Other-Dx	71 patients	To evaluate the incidence of osteomyelitis (OM) in patients who have 3 or 4 positive Kocher criteria.	There were a total of 71 patients with 3 or 4 positive Kocher criteria. Of these, 22.5% (n=16) had a diagnosis of SA and 47.9% (n=34) had a diagnosis of OM. Of the 71 patients, 52.1% (37/71) had a hip effusion on US. When an effusion was identified, 18.9% (7/37) had isolated SA, 18.9% (7/37) had isolated OM, and 24.3% (9/37) had combined SA and OM. When no effusion was identified, a total of 18/34 (52.9%) had underlying OM.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
57. Caird MS, Flynn JM, Leung YL, Millman JE, D'Italia JG, Dormans JP. Factors distinguishing septic arthritis from transient synovitis of the hip in children. A prospective study. <i>J Bone Joint Surg Am.</i> 2006; 88(6):1251-1257.	Observational-Dx	53 children	Prospective collection of data to determine factors distinguishing septic arthritis from transient synovitis of the hip in children.	Fever, an elevated C-reactive protein level, an elevated ESR, non-weight-bearing, and an elevated serum white blood-cell count were predictors of septic arthritis. The probability of septic arthritis was estimated to be 98% when five predictors were present, 93% when four predictors were present and 83% when three predictors were present.	3
58. Volberg FM, Sumner TE, Abramson JS, Winchester PH. Unreliability of radiographic diagnosis of septic hip in children. <i>Pediatrics.</i> 1984;74(1):118-120.	Review/Other-Dx	N/A	To analyze the radiographs of 19 pediatric patients with aspiration-proven bacterial infections of the hip.	The hip radiograph was abnormal in all neonates showing lateral subluxation. The radiograph was negative in eight of ten children more than 1 year of age.	4
59. Laine JC, Denning JR, Riccio AI, Jo C, Joglar JM, Wimberly RL. The use of ultrasound in the management of septic arthritis of the hip. <i>J Pediatr Orthop B.</i> 2015;24(2):95-98.	Review/Other-Dx	N/A	To assess septic arthritis of the hip in a pediatric population.	The need for MRI to further evaluate the patient for adjacent infection before treatment is debatable. Once an effusion is confirmed on ultrasonography, we have found that septic arthritis of the hip does not need advanced imaging before arthrotomy and debridement. Patients who fail to clinically respond to an initial hip arthrotomy and appropriate antibiotics may benefit from an MRI for the identification of concomitant infections that may require surgical intervention.	4
60. Plumb J, Mallin M, Bolte RG. The role of ultrasound in the emergency department evaluation of the acutely painful pediatric hip. <i>Pediatr Emerg Care.</i> 2015;31(1):54-58; quiz 59-61.	Review/Other-Dx	N/A	To focus on differentiating between transient synovitis and septic arthritis of the hip.	No results listed in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
<p>61. Luhmann SJ, Jones A, Schootman M, Gordon JE, Schoenecker PL, Luhmann JD. Differentiation between septic arthritis and transient synovitis of the hip in children with clinical prediction algorithms. J Bone Joint Surg Am. 2004; 86-A(5):956-962.</p>	<p>Observational-Dx</p>	<p>163 patients with 165 hips</p>	<p>To apply a clinical algorithm retrospectively to determine its predictive value. The clinical prediction algorithm, developed by Kocher et al is based on 4 clinical variables: history of fever, non-weight-bearing, an ESR of ≥ 40 mm/hr, and a serum white blood-cell count of $>12000/\text{mm}^3$ ($>12.0 \times 10^9/\text{L}$).</p>	<p>Patients were classified as having true septic arthritis (20 hips), presumed septic arthritis (27 hips), or transient synovitis (118 hips). If the four independent multivariate predictors of septic arthritis proposed by Kocher et al were present, the predicted probability of the patient having septic arthritis was 59% in this study, in contrast to the 99.6% predicted probability in the patient population described by Kocher et al. Statistical analyses demonstrated that the best model to describe this study's patient population was based on three variables: a history of fever, a serum total white blood-cell count of $>12000/\text{mm}^3$ ($>12.0 \times 10^9/\text{L}$), and a previous health-care visit. When all three variables were present, the predicted probability of the patient having septic arthritis was 71%. Application of the algorithm proposed by Kocher et al or of this study's three-variable model does not appear to be valid at other institutions.</p>	<p>4</p>

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
62. Gordon JE, Huang M, Dobbs M, Luhmann SJ, Szymanski DA, Schoenecker PL. Causes of false-negative ultrasound scans in the diagnosis of septic arthritis of the hip in children. J Pediatr Orthop. 2002; 22(3):312-316.	Observational-Dx	132 children	US scans of the hip were performed in children with hip pain during an 18-month period to evaluate the hip for the presence of an effusion.	73 of these patients were followed up long enough to ascertain the presence or absence of septic arthritis. The remaining 59 patients were discharged with diagnoses other than septic arthritis but could not be located to confirm the ultimate accuracy of the diagnosis. Four patients were initially determined to have no effusion but subsequently were diagnosed with septic arthritis (false-negative rate of 5%). Two had inadequate initial US examinations, 2 had US that even on retrospective review did not reveal an effusion. Both of these children had had symptoms for <24 hours, and one had a contralateral hip effusion. Authors recommend using the negative results of an US scan as evidence of the absence of septic arthritis in children with caution when symptoms have been present for <24 hours or when bilateral disease exists.	4
63. Palestro CJ, Love C, Miller TT. Infection and musculoskeletal conditions: Imaging of musculoskeletal infections. [Review] [95 refs]. Baillieres Best Pract Res Clin Rheumatol. 20(6):1197-218, 2006 Dec.	Review/Other-Dx	N/A	To review imaging of musculoskeletal infections.	MRI is sensitive, provides superb anatomic detail, does not use ionizing radiation, and is rapidly completed. This technique is especially valuable for septic arthritis, spinal osteomyelitis, and diabetic foot infections. Among the radionuclide procedures, three-phase bone imaging is readily available, and very accurate in unviolated bone. Labeled leukocyte imaging should be used in cases of 'complicating osteomyelitis' such as prosthetic joint infections. This test is also useful in unsuspected diabetic pedal osteomyelitis and the neuropathic joint. Gallium imaging is a useful adjunct to MRI in spinal infection. FDG-PET will likely play an important role, especially in the evaluation of spinal infection.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
64. Pineda C, Espinosa R, Pena A. Radiographic imaging in osteomyelitis: the role of plain radiography, computed tomography, ultrasonography, magnetic resonance imaging, and scintigraphy. <i>Semin Plast Surg.</i> 2009;23(2):80-89.	Review/Other-Dx	N/A	To review the role of plain radiography, computed tomography, ultrasonography, magnetic resonance imaging, and scintigraphy in osteomyelitis.	No results listed in abstract.	4
65. Termaat MF, Raijmakers PG, Scholten HJ, Bakker FC, Patka P, Haarman HJ. The accuracy of diagnostic imaging for the assessment of chronic osteomyelitis: a systematic review and meta-analysis. <i>J Bone Joint Surg Am.</i> 2005; 87(11):2464-2471.	Meta-analysis	23 studies	Systematic review and meta-analysis was performed to determine the accuracy of current imaging modalities in the diagnosis of chronic osteomyelitis. The value of each imaging technique was studied by determining its sensitivity and specificity compared with the results of histological analysis, findings on culture, and clinical follow-up of more than six months.	Pooled sensitivity demonstrated that FDG-PET was the most sensitive technique, with a sensitivity of 96% (95% CI, 88%-99%) Pooled specificity demonstrated that bone scintigraphy had the lowest specificity, with a specificity of 25% (95% CI, 16%-36%) FDG-PET has the highest diagnostic accuracy for confirming or excluding the diagnosis of chronic osteomyelitis. Leukocyte scintigraphy has an appropriate diagnostic accuracy in the peripheral skeleton, but FDG-PET is superior for detecting chronic osteomyelitis in the axial skeleton.	Inadequate
66. West AT, Marshall TJ, Bearcroft PW. CT of the musculoskeletal system: what is left is the days of MRI? <i>Eur Radiol.</i> 2009;19(1):152-164.	Review/Other-Dx	N/A	To review the history of CT technology, the technical factors involved and a number of current applications, as well as looking at future areas where CT may be employed.	No results listed in abstract.	4
67. Monsalve J, Kan JH, Schallert EK, Bisset GS, Zhang W, Rosenfeld SB. Septic arthritis in children: frequency of coexisting unsuspected osteomyelitis and implications on imaging work-up and management. <i>AJR Am J Roentgenol.</i> 2015;204(6):1289-1295.	Review/Other-Dx	162 children	To evaluate the demographic distribution of septic arthritis and osteomyelitis in children and to explore optimal imaging guidelines for these patients.	One hundred sixty-two children who underwent 177 MRI examinations were diagnosed with acute musculoskeletal infection. One hundred three patients were included in the septic arthritis category, of whom 70 (68%) had septic arthritis with osteomyelitis. Seventy-four (42.1%) patients had isolated osteomyelitis without septic arthritis. Children under 2 years old were more likely to have septic arthritis (either isolated or with osteomyelitis) than isolated osteomyelitis compared with older children ($p = 0.0003$).	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
68. Connolly LP, Connolly SA, Drubach LA, Jaramillo D, Treves ST. Acute hematogenous osteomyelitis of children: assessment of skeletal scintigraphy-based diagnosis in the era of MRI. <i>J Nucl Med.</i> 2002; 43(10):1310-1316.	Observational-Dx	213 children	Retrospective study to assess how effective skeletal scintigraphy is by looking at how often MRI is requested after skeletal scintigraphy, how often diagnoses made with skeletal scintigraphy are changed after MRI, and how often the ability of MRI to show an abscess affects management of acute hematogenous osteomyelitis.	Diagnosis was made using skeletal scintigraphy without referral for MRI in 179 (84%) of the children, including 79 (92%) of 86 with a final diagnosis of acute hematogenous osteomyelitis. Treatment and diagnosis were accomplished without referral for MRI in 146 (69%) of all cases and 46 (53%) of the acute hematogenous osteomyelitis cases. Abscesses that required drainage were found in 3 (6%) of 48 cases of major-long-bone acute hematogenous osteomyelitis. Each of these 3 had exhibited a slow therapeutic response before MRI. Drainable abscesses were found in 5 (20%) of 25 cases affecting the pelvis, which was the other preponderant location of acute hematogenous osteomyelitis. These were found with pelvic foci both when MRI was performed at diagnosis and when MRI was performed during treatment. An imaging strategy in which skeletal scintigraphy is the first test used when acute hematogenous osteomyelitis is suspected but radiographs are negative remains highly effective. MRI should be performed after skeletal scintigraphy shows major-long-bone acute hematogenous osteomyelitis if treatment response is slow. Skeletal scintigraphy is also an appropriate first test for suspected radiographically occult pelvic acute hematogenous osteomyelitis.	4
69. Wang E, Ma L, Edmonds EW, Zhao Q, Zhang L, Ji S. Psoas abscess with associated septic arthritis of the hip in infants. <i>J Pediatr Surg.</i> 2010; 45(12):2440-2443.	Review/Other-Dx	2 infants	To describe psoas abscess with concomitant septic hip arthritis in 2 infants, 3 and 7 months old.	These 2 cases demonstrate the first known reports of concurrent psoas abscess and septic hip arthritis in infancy. MRI is a valuable method to identify these concurrent pathologic conditions.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
70. Kim EY, Kwack KS, Cho JH, Lee DH, Yoon SH. Usefulness of dynamic contrast-enhanced MRI in differentiating between septic arthritis and transient synovitis in the hip joint. <i>AJR Am J Roentgenol.</i> 2012;198(2):428-433.	Observational-Dx	18 patients	To show the usefulness of dynamic contrast-enhanced MRI (DCE-MRI) and to determine the optimal time window in MRI for differentiating between septic arthritis and transient synovitis in painful hip joints.	Six of seven patients with septic arthritis in the hip joint had decreased enhancement during the early phase of DCE-MRI. The enhancement difference between the two patient groups was statistically significant (p = 0.0498). The time at the maximal difference in the signal intensity between two time-signal intensity curves of both femoral heads was approximately 3.5 minutes. The area under the receiver operating characteristic curve for predicting septic arthritis was 0.792.	3
71. Yang WJ, Im SA, Lim GY, et al. MR imaging of transient synovitis: differentiation from septic arthritis. <i>Pediatr Radiol.</i> 2006; 36(11):1154-1158.	Observational-Dx	67 patients	To describe the MRI findings of transient synovitis and to determine whether the MRI characteristics can differentiate this disease entity from septic arthritis. Clinical findings and MRI of 49 patients with transient synovitis (male/female 36/13, mean age 6.1 years) and 18 patients with septic arthritis (male/female 10/8, mean age 4.9 years) were retrospectively reviewed.	MRI findings of transient synovitis were symptomatic joint effusion, synovial enhancement, contralateral joint effusion, synovial thickening, and SI alterations and enhancement in surrounding soft tissue. Among these, SI alterations and enhancement in bone marrow and soft tissue, contralateral joint effusion, and synovial thickening were statistically significant MRI findings in differentiating transient synovitis from septic arthritis. The statistically significant MRI findings in transient synovitis are contralateral (asymptomatic) joint effusions and the absence of SI abnormalities of the bone marrow. It is less common to have SI alterations and contrast enhancement of the soft tissues. The statistically significant MRI findings in septic arthritis are SI alterations of the bone marrow, and SI alterations and contrast enhancement of the soft tissue. Ipsilateral effusion and synovial thickening and enhancement are present in both diseases.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
72. Blickman JG, van Die CE, de Rooy JW. Current imaging concepts in pediatric osteomyelitis. <i>Eur Radiol.</i> 2004; 14 Suppl 4:L55-64.	Review/Other-Dx	N/A	Review current imaging concepts in pediatric osteomyelitis. Role of the radiologist as well as the usefulness of each modality is examined. Authors also review the different clinical scenarios such as acute, subacute and chronic, as well as specific forms of osteomyelitis. The most useful imaging findings to look for and their significance are assessed and their usefulness is evaluated in each case.	Close cooperation between clinicians and imagers remains the key to early and adequate diagnosis of pediatric osteomyelitis.	4
73. Hryhorczuk AL, Restrepo R, Lee EY. Pediatric Musculoskeletal Ultrasound: Practical Imaging Approach. <i>AJR Am J Roentgenol.</i> 2016;206(5):W62-72.	Review/Other-Dx	N/A	To review some of the common indications for pediatric musculoskeletal ultrasound examination, with emphasis given to imaging technique, normal anatomy, and the spectrum of pathologic findings seen in the pediatric population.	No results stated in abstract.	4
74. Trusen A, Beissert M, Schultz G, Chittka B, Darge K. Ultrasound and MRI features of pyomyositis in children. <i>Eur Radiol.</i> 2003;13(5):1050-1055.	Observational-Dx	12 children	To describe the ultrasound and MRI features of pyomyositis (PM) in children.	A retrospective analysis of 12 children with PM (2 girls and 10 boys; age range 1-13 years) admitted to our hospital between 1998 and 2002 was carried out. All children had a US exam and 8 children underwent MRI. Children with osteomyelitis and accompanying myositis were excluded from this study. In all patients who had MRI (n=8) the infected muscles were found to have the following features: hyperintensity on the T2-weighted images, diffuse borders and contrast enhancement. In the pelvis (n=4), only one PM could be detected with US, in the other 3 cases only US of the hip joint was performed based on the clinical symptoms. In the extremities (n=8) US always revealed an altered echogenicity of the affected muscles as well as fluid collection in 5 cases.	3

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75. Azam Q, Ahmad I, Abbas M, Syed A, Haque F. Ultrasound and colour Doppler sonography in acute osteomyelitis in children. <i>Acta Orthop Belg.</i> 2005;71(5):590-596.	Review/Other-Dx	55 children	To evaluate how ultrasound might be useful in early diagnosis of osteomyelitis in the paediatric age group.	55 children with osteomyelitis of limbs were subjected to sonographic examination including colour Doppler study. The sonographic machine used was a LOGIC-500, using a linear multifrequency transducer (7-9 MHz). Ultrasound guided aspiration was performed in all cases showing sub-periosteal accumulation of fluid, and the aspirate was sent for culture and sensitivity report. Surgical drainage was undertaken in all patients in which a sub-periosteal abscess was demonstrated. Anechoic fluid accumulation contiguous with bone was highly suggestive of osteomyelitis, whereas presence of soft tissue between the bone and the fluid suggested a non-osseous origin of the fluid. Sub-periosteal accumulation of fluid was seen in 42 cases (76.3%). A subperiosteal abscess with periosteal reaction was demonstrated in 35 children (63.63%). Colour Doppler study revealed increased vascular flow within or around the affected periosteum in all cases. Concurrent involvement of a joint was noted in 13 cases	4
76. Koulouris G, Morrison WB. MR imaging of hip infection and inflammation. <i>Magn Reson Imaging Clin N Am.</i> 2005;13(4):743-755.	Review/Other-Dx	N/A	To review MRI of hip infection and inflammation.	MRI is the ideal modality for demonstrating the manifestations and sequelae of the infective and inflammatory conditions common to the hip. Combining clinical history and results and other imaging modalities yields a higher degree of specificity.	4
77. Booth TN, Iyer RS, Falcone RA, Jr., et al. ACR Appropriateness Criteria(R) Back Pain-Child. <i>J Am Coll Radiol.</i> 2017;14(5S):S13-S24.	Review/Other-Dx	N/A	Evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for back pain in a child.	No results stated in abstract.	4

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78. American College of Radiology. ACR Appropriateness Criteria® Radiation Dose Assessment Introduction. Available at: https://www.acr.org/-/media/ACR/Files/Appropriateness-Criteria/RadiationDoseAssessmentIntro.pdf .	Review/Other-Dx	N/A	Guidance document on exposure of patients to ionizing radiation.	No results stated in abstract.	4

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
 - a. The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
 - b. The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
 - c. The study is an expert opinion or consensus document.
- Meta-analysis
 - a. *Good quality* – the study design, methods, analysis, and results are valid and the conclusion is supported.
 - b. *Inadequate quality* – the study design, analysis, and results lack the methodological rigor to be considered a good meta-analysis study.

Abbreviations Key

Dx = Diagnostic

Tx = Treatment