ACR Appropriateness Criteria® Limping Child—Ages 0 to 5 Years

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The appropriate imaging for pediatric patients (ages 0-5 years) being evaluated for limping depends on the clinical presentation, specifically, the presence of signs of infection, any localization of pain, and history of or suspected trauma. Common diagnoses causing limping in children are briefly reviewed, and recommended imaging techniques are discussed, including toddler's fracture, transient synovitis, septic arthritis, Legg-Calvé-Perthes disease, and osteomyelitis.

The ACR Appropriateness Criteria® are evidence-based guidelines for specific clinical conditions that are reviewed every 2 years by a multidisciplinary expert panel. The guideline development and review include an extensive analysis of current medical literature from peer-reviewed journals and the application of a well-established consensus methodology (modified Delphi) to rate the appropriateness of imaging and treatment procedures by the panel. In those instances in which evidence is lacking or not definitive, expert opinion may be used to recommend imaging or treatment.

Key Words: Appropriateness criteria, limping child, hip pain, toddler's fracture, transient synovitis, septic arthritis

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SUMMARY OF LITERATURE REVIEW

A limping child can be a diagnostic dilemma for clinicians [1-10]. The role of radiology in the evaluation varies depending on the clinical presentation, signs, and symptoms. In general, the differential diagnosis of limping depends on the patient's age, the presence of signs of infection, any localization of pain, and a history of trauma [11]. The presence of fever, elevated white blood count, elevated erythrocyte sedimentation rate (ESR), or elevated C-reactive protein may suggest infection. Increased heart rate may be a sign of infection but may also be explained by the presence of pain. The presence of erythema, swelling, or maximal tenderness may help localization. Physical maneuvers and signs such as the Trendelenburg test, Galeazzi sign, Patrick (flexion, abduction, and external rotation) test, pelvic compression test, and psoas sign may also help localize pain [12]. A detailed analysis of gait can also suggest the diagnosis [11].

Many articles discussing clinical evaluation and differential diagnoses have been written, with several clinical algorithms proposed [1,10,13-15], but there are no pro-

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The ACR seeks and encourages collaboration with other organizations on the development of the ACR Appropriateness Criteria® through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply individual or society endorsement of the final document.

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Variant 1. Nonlocalizable pathology by clinical evaluation (no concern for infection)

Radiologic Procedure	Rating	Comments	Relative Radiation Level
X-ray lower leg	8	Tibia/fibula only.	☢
Ultrasound hip	6	Toxic synovitis and septic arthritis usually present with localizing symptoms.	O
X-ray pelvis and leg and foot	5	May be considered as secondary investigation after negative tibia/fibula examination.	☢☢
X-ray lumbar spine	5	Frontal and lateral views.	☢☢
^{99m}Tc 3-phase bone scan lower thoracic spine to distal lower extremities	5		☢☢☢
MRI lower thoracic spine to lower extremities without contrast	5	Superior to bone scan for soft tissue pathology. Data for contrast administration in this scenario are limited. Sedation risks should be considered.	O
MRI lower thoracic spine to lower extremities without and with contrast	5	Superior to bone scan for soft tissue pathology. Data for contrast administration in this scenario are limited. Use contrast if needed based on evaluation of noncontrast MRI findings. Sedation risks should be considered. See statement regarding contrast in text under "Anticipated Exceptions."	O

Note: Rating scale: 1, 2, and 3 = usually not appropriate; 4, 5, and 6 = may be appropriate; 7, 8, and 9 = usually appropriate.

spective studies using imaging algorithms for evaluation of a limping child.

To provide clear and helpful recommendations, the differential diagnosis can be narrowed down by clinical scenarios: (1) trauma, (2) no trauma and no signs of infection, and (3) possible presence of infection. These scenarios, when paired with the ability to localize the pain, allow a radiologic algorithm to help guide appropriate imaging (see Variants 1-3).

Scenario 1: Trauma

The most common etiology of acute limping in children is traumatic injury [1]. Clinical examination and history may allow localization of the pain or injury to a specific area, which can target the radiologic examination. Targeted radiographs in 2 or 3 planes of the area of concern are appropriate in this scenario. Unfortunately, particularly in small children, it is common that the pain cannot be accurately localized to one focal area.

Variant 2. Localized pathology by clinical evaluation (no concern for infection)

Radiologic Procedure	Rating	Comments	Relative Radiation Level
X-ray area of interest	9		NS
MRI area of interest without contrast	6	Sedation risks should be considered.	O
MRI area of interest without and with contrast	6	Use contrast if needed based on evaluation of noncontrast MRI findings. Sedation risks should be considered. See statement regarding contrast in text under "Anticipated Exceptions."	O
Ultrasound area of interest	5	Consider for palpable soft tissue mass or suspected joint effusion. Provides only limited data for evaluation of osseous abnormalities.	O
CT area of interest without contrast	3		Varies
CT area of interest with contrast	2		Varies
CT area of interest without and with contrast	1		Varies

Note: Rating scale: 1, 2, and 3 = usually not appropriate; 4, 5, and 6 = may be appropriate; 7, 8, and 9 = usually appropriate.