

The Limping Child

IN THE URGENT CARE CENTER

Urgent message: The ability to evaluate children presenting with a limp—and to recognize red flags that help distinguish those to treat from those requiring immediate referral—should be within the purview of the urgent care clinician.

Raymond W. Liu, MD, Hadeel Abaza, MD, and Allison Gilmore, MD

Introduction

A limping child without a clear traumatic history or diagnosis is a common presentation to an urgent care center. The broad differential diagnosis can be daunting, with causes that range from relatively benign conditions or injuries to those requiring emergent care.

A careful history and physical exam, in conjunction with an understanding of the age relationship of many diagnoses, can narrow the differential dramatically and inform the decision to treat or refer as needed.

This article will provide a framework for evaluating limping children in the urgent care center, with an emphasis on preventing potentially catastrophic outcomes.

Types of Gait

While determining type of gait is ideal, this is probably beyond the scope of training of the typical urgent care practitioner. Therefore, recent *changes* in gait should be determined whenever possible, whether identified by di-



© Photoresearchers (X-Ray) and Corbis (People). Digital Composite: Tom DePrenda

rect questioning of the patient or reported by the caregiver.

Antalgic gait is the most common gait type seen, resulting from pain in any part of the lower extremity or the back. It is characterized by a shortened stance phase on the affected side, with a resultant increase in the swing phase. In more severe cases, the child refuses any weight bearing. Differential diagnosis of antalgic gait may be categorized according to the patient's age (**Table 1**).

Other, less common, gaits categorized as nonantalgic are beyond the scope of this article.

Patient History

Typically, the history taken from a child is incomplete and supplementation from the caregivers can be helpful.

Any associated trauma should be delineated. If pain is present, it is important to document its location, frequency, duration, and timing.

Acute pain suggests trauma, infection, or malignancy,

Table 1. Differential Diagnosis of Antalgic Gait

<4 years	4 to 10 years	>10 years
<ul style="list-style-type: none"> ■ Toddler’s fracture (tibia or foot) ■ Osteomyelitis, septic arthritis, diskitis ■ Arthritis (juvenile rheumatoid arthritis, Lyme disease) ■ Discoid lateral meniscus ■ Benign or malignant tumor ■ Fracture (especially physeal) 	<ul style="list-style-type: none"> ■ Osteomyelitis, septic arthritis, diskitis ■ Legg-Calvé-Perthes disease ■ Transient synovitis ■ Osteochondritis dissecans (knee or ankle) ■ Discoid lateral meniscus ■ Sever’s apophysitis ■ Accessory tarsal navicular ■ Foreign body in the foot ■ Arthritis (juvenile rheumatoid arthritis, Lyme disease) ■ Benign or malignant tumor 	<ul style="list-style-type: none"> ■ Stress fracture (femur, tibia, foot, pars intra-articularis) ■ Osteomyelitis, septic arthritis, diskitis ■ Slipped capital femoral epiphysis ■ Osgood-Schlatter disease or Sindig-Larsen-Johanssen syndrome ■ Osteochondritis dissecans (knee or ankle) ■ Chondromalacia patellae ■ Arthritis (juvenile rheumatoid arthritis, Lyme disease) ■ Accessory tarsal navicular ■ Tarsal coalition ■ Benign or malignant tumor

Adapted from: Flynn JM, Widmann RF. The Limping Child: Evaluation and Diagnosis. *J Am Acad Orthop Surg.* 2001;9:89-98.

whereas gradually worsening pain can be inflammatory or mechanical.

Pain in the morning is indicative of an inflammatory joint disorder, while pain with activity suggests overuse injuries or articular derangement.

Constant pain and night pain are red flags in the limping child. Constant pain may be due to an intramedullary process such as malignancy or infection. Night pain may also raise the spectre of malignancy. Either of these complaints warrants referral for a more complete work-up of the child.

Medial knee pain or thigh pain in children should be considered to be hip pain until proven otherwise, and occurs due to referred pain via the obturator nerve. Any child with knee pain warrants a full evaluation of the hip, in addition to the knee.

Other important elements in the history of a limping child include recent illness and any history of fever, weight loss, or malaise.

In adolescents, a sexual history should be obtained whenever gonococcal infection of the joints is suspected. Typically, this requires a separate interview of the child without the parents.

Physical Exam

The child should be evaluated both while upright and while lying down. When standing, the examiner can palpate both iliac crests to determine pelvic obliquity in order to detect a limb length discrepancy.

The Trendelenburg test is performed by having the patient stand on one leg. If the pelvis drops toward the opposite leg, then the test is positive, indicating gluteus medius weakness.

To evaluate for abnormal gait, several cycles of walking may be required. This is generally best performed by having the parent assist the child, or having the parent walk a few steps away and encouraging the child to walk to the parent.

With the child lying down, evaluate for any asymmetry and areas of swelling and erythema. When possible, try to deter-

mine the point of maximal tenderness; this localizes the site for imaging and possible aspiration. If the exam is limited by clothing, the child should change into a hospital gown.

The bilateral hips, knees, and ankles should be taken through range of motion (**Figure 1**) to observe the following:

- A hip that is held in a flexed and externally rotated position raises concern of a septic joint; as such, emergent referral is indicated.
- A decrease in internal rotation of the hip suggests pathology.
- The plantar feet in ambulators and the shins in crawlers should be carefully examined for injuries or foreign bodies.
- A positive FABER (flexion, abduction, external rotation of hip) may suggest sacroiliac pathology.
- In addition, the patellofemoral joint should be examined in cases of adolescent knee pain.

Imaging

When the site of concern can be localized by swelling or tenderness, plain radiographs in orthogonal views should be obtained. If images cannot be obtained in the urgent care setting, referral to the ED or orthopaedist is indicated.

For any bony injury, the joint above and below should be included in the imaging. In addition, the urgent care provider should be aware that certain conditions (e.g.,

Figure 1. Examination of hip rotation in a child.



In the supine position, the hips are (A) in neutral, (B) externally rotated, (C) and internally rotated with limited internal rotation of the right hip demonstrated. D-F depict a similar sequence in the prone position.

intra-abdominal issues presenting with limp/gait disturbances) may masquerade as bony injuries, thus increasing the risk of drawing erroneous conclusions.

In younger children where a site of concern cannot be identified, the entire lower extremity should be imaged.

For a child requiring radiographs of the hip, obtaining anterior-posterior (AP) and frog lateral views of the pelvis is preferable to unilateral hip films, since it allows comparison with the normal side (**Figures 2A and 2B**).

In early osteomyelitis or septic arthritis, radiographs most commonly appear normal.

The earliest radiograph finding in osteomyelitis is lo-

cal soft tissue swelling, which may occur within three days, rather than seven days for the earliest bony changes (**Figure 3**).

Radiographs in septic arthritis may demonstrate >2 mm of hip joint space widening; in one study, a displaced or blurred fat pad was seen in all cases of septic arthritis.¹

Ultrasound can be useful in children where septic hip infection is a concern. A 5% rate of false negative results has been reported for early septic arthritis;² thus, children in whom there is a clinical suspicion should be referred for close observation or aspiration.

Figure 2. A 14-year-old boy with four months of right anterior thigh and knee pain.



(A) If radiographs of only the right hip are ordered, this subtle SCFE can be missed. (B) An AP pelvis allows comparison to the opposite side, and more clearly demonstrates widening of the physis and subtle displacement of the epiphysis, seen by using Klein's lines. (C) A frog lateral view more clearly demonstrates the displacement of the epiphysis. This child was referred to an orthopaedist, who treated with pinning of the right hip.

If an effusion is discovered, often the same radiologist can perform a diagnostic aspiration under ultrasound guidance. If clinical suspicion is high, then operative treatment should be not delayed for either an ultrasound or an ultrasound guided aspiration.

Ultrasound can also be useful in diagnosing osteomyelitis and detecting a subperiosteal abscess.

Bone scan has a low sensitivity for joint infection, but can be useful for detecting osteomyelitis, especially in cases of the pelvis and spine where the infectious site may not be well localized. However, the availability and time requirements for bone scan typically preclude its use in the urgent care center.

Advanced imaging is usually best directed by an orthopaedic consulting team. Computed tomography (CT) scans can be useful when cortical changes are seen on radiographs, and for diagnosing an osteoid osteoma. Mag-

netic resonance imaging (MRI) scans are more useful for soft tissue changes, abscesses, stress fractures, and most tumors (**Figure 3**).

Laboratory Tests

Whenever infection is a concern, test for white blood cell (WBC) count with differential, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP). If such tests cannot be performed in the urgent care clinic, emergent referral is indicated.

Although WBC can be normal in bone and joint infections, an increase in neutrophils on the differential is more sensitive.

Huttenlocher and Newman reported that an ESR >50 mm/h with a new onset limp was associated with a clinically important diagnosis in 77% of children,³ while Scott et al found an elevated ESR in 91% of pa-

Figure 3. A 12-year-old boy with a few weeks of left thigh pain and occasional fevers over the past week.



(A) This AP view of the knee demonstrates a lytic lesion (arrow) in the distal femur. (B) MRI demonstrates a large subperiosteal abscess posteriorly (arrow), as well as signal changes in the bone marrow and soft tissue changes along the length of the femur. The child was taken to surgery for drainage of the abscess and a cortical window to allow drainage from the femur.

tients with osteomyelitis.⁴ CRP can be more useful in an acute time period, and can increase within six hours of disease onset. In appropriate geographical regions, a Lyme titer should also be considered

If there is clinical concern for a septic joint, then an aspiration is warranted. A WBC >50,000/L or >75% polymorphonuclear cells is suggestive of infection.

Conditions in All Age Groups

Transient synovitis

Transient synovitis is the most common cause of acute

hip pain in children between 3 and 10 years of age.

The postulated mechanism is an inflammatory joint reaction to a viral or bacterial infection occurring elsewhere in the body, although this remains unproven. Parents often report an upper respiratory or ear infection one to two weeks earlier, and children complain of unilateral hip or groin pain.

Typically, patients lack any significant fever or systemic illness. The examiner will be able to obtain some passive range of motion of the joint, and the child is usually able to bear some amount of weight. Laboratory

tests and radiographs tend to be normal.

Treatment is symptomatic, with symptoms usually resolving within 48 hours.

Septic arthritis

Septic arthritis can have a similar presentation to transient synovitis, and it is often difficult to clinically differentiate between the two. However, with septic arthritis the child usually refuses to bear weight and does not allow range of motion of the hip, tending to hold the hip in flexion and external rotation; this allows maximum volume within the hip joint. Lab studies are elevated.

Kocher et al found that a child with at least three out of four predictors (fever >38.5°C, refusal to bear weight, ESR >40 mm/h, and WBC >12,000/L) had a 93% or higher probability of septic arthritis (**Table 2**).⁵

Blood cultures are positive in 50%, with *Staphylococcus aureus* being the most common organism. Radiographs do not demonstrate bony changes until seven days or more, though ultrasound can demonstrate a joint effusion more acutely.

Septic arthritis is ruled out by aspiration, with WBC typically ranging from 80,000/L to 200,000/L. Antibiotics should be delayed until aspiration or surgical drainage to aid in future antibiotic therapy. Treatment is emergent surgical irrigation, in order to prevent irreversible cartilage damage.

In certain geographical regions, Lyme disease should be considered. Lyme disease most commonly affects the knee, one to two joints, and peaks at age 7.

Osteomyelitis

Osteomyelitis in children occurs most commonly via hematogenous spread to the relatively static blood supply in the metaphysis. When it occurs in isolation, the clinical presentation is often more mild than that seen with septic arthritis. Often, the child can ambulate,

though with an antalgic gait.

Careful palpation may reveal maximal tenderness over the metaphyseal region of the bone. Passive range of motion may be limited, though not as dramatically as in a septic joint.

Diagnosis can be confirmed with a bone scan or MRI.

Antibiotics are the mainstay of treatment in isolated osteomyelitis. In children with sickle cell anemia, *Salmonella* should be considered.

Osteomyelitis can be associated with a subperiosteal abscess or a septic joint. An abscess forms when the magnitude of the bone infection generates excessive pressure. Abscesses are diagnosed by ultrasound, MRI, or direct aspiration as preferred by the orthopaedics consulting team.

Treatment is surgical irrigation and windowing of the cortex to relieve pressure. Again, antibiotics should be withheld until an aspiration or surgical culture is obtained.

In the proximal femur, distal tibia, proximal humerus, and proximal radius the metaphysis is intraarticular, and thus these joints are susceptible to a combined os-

Table 2: An Algorithm for Predicting the Probability of Septic Arthritis Based on History of Fever, Non-Weight Bearing, ESR, and WBC

History of fever	Non-weight bearing	ESR >40 mm/h	Serum WBC >12,000 cells per mm ³	Predicted probability of septic arthritis (%)
Yes	Yes	Yes	Yes	99.8
Yes	Yes	Yes	No	97.3
Yes	Yes	No	Yes	95.2
Yes	Yes	No	No	57.8
Yes	No	Yes	Yes	95.5
Yes	No	Yes	No	62.2
Yes	No	No	Yes	44.8
Yes	No	No	No	5.3
No	Yes	Yes	Yes	93.0
No	Yes	Yes	No	48.0
No	Yes	No	Yes	33.8
No	Yes	No	No	3.4
No	No	Yes	Yes	35.3
No	No	Yes	No	3.7
No	No	No	Yes	2.1
No	No	No	No	0.1

Adapted from: Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. *J Bone Joint Surg Am.* 1999;81:1662-1670.)

teomyelitis and septic arthritis.

Children tend to present with a more severe septic arthritis picture; treatment is surgical irrigation and a possible cortical window.

Diskitis

Diskitis is inflammation of the disk space, often due to infection.

Incidence peaks at age 7. Children present with sudden-onset back pain, refusal to walk, irritability, and sometimes fever. Parents may report that when bending over, toddlers keep their spines straight and bend through the knees and hips. The child often looks unwell, but neurological exam is generally normal.

Staphylococcus aureus is the most common organism; due to this and the location of the infection, antibiotics may be administered without obtaining an aspiration.

Radiographs can be negative for the first few weeks, and can show disk space narrowing and erosion of the end plates. MRI confirms the diagnosis acutely and can evaluate for an abscess, which would necessitate surgical drainage.

Treatment is intravenous antibiotics. If a child does not respond to antibiotics, a more uncommon organism should be suspected.

Leukemia

Leukemia peaks at ages 2-5 years. Children can present initially with musculoskeletal pain.

Laboratory tests demonstrate an increased ESR and WBC, and a decreased hematocrit. Physical examination may demonstrate lymphadenopathy and/or hepatosplenomegaly, and patients can have a low-grade temperature.

Radiographs and bone scan are usually negative, though radiographs may show osteoporosis or metaphyseal bands.

Suspicion of leukemia warrants an oncology consult.

Pauciarticular juvenile rheumatoid arthritis

Pauciarticular juvenile rheumatoid arthritis peaks at age 2, and occurs more commonly in females. Larger joints are more likely to be affected.

Patients present with pain, limp, joint swelling, stiffness, erythema, warmth, and fever.

Laboratory studies are often normal, though an antinuclear antibody (ANA) test is positive in half of patients.

Treatment can be managed through an outpatient rheumatology clinic.

Conditions in Toddlers (Ages 1-3 Years)

Toddlers can present diagnostic challenges, due to their inability to effectively verbalize complaints. Normal gait in a toddler is wide based, with increased hip and knee flexion and increased cadence. Gait sometimes needs to be visualized at a distance due to the toddler's anxiety.

Toddlers' fractures

"Toddlers' fractures" often present with a history lacking any remarkable traumatic event. Affected toddlers—often new walkers—present with difficulty or refusal to bear weight.

Careful and systematic palpation may reveal maximal tenderness over the tibial shaft, which is the most common site of a toddler's fracture. Radiographs can be very subtle.

Any child with a suspected fracture should be splinted, with plans for follow-up radiographs with an orthopaedist in seven to 10 days to look for periosteal new bone formation.

Developmental dysplasia

Aside from the infectious and traumatic concerns already discussed, most presentations of limping toddlers are nonurgent and can be treated on an outpatient basis, either in the urgent care setting or in the ED.

Developmental dysplasia of the hip can present with Trendelenburg gait when unilateral, or waddling gait when bilateral. Be vigilant for the classic "4 Fs" (female child, first born, frank breech, and family history). The physical exam may reveal asymmetric skin folds, extremity shortening, and limited hip abduction. Plain films demonstrate a shallow acetabulum, with or without subluxation or dislocation of the femoral head.

Patients should be seen by a pediatric orthopaedic surgeon within one to two weeks.

Cerebral palsy

Cerebral palsy presents with a spastic gait due to muscle imbalance. Parents may report toe-walking, dragging the leg, or limping.

Examination may reveal spasticity, limited range of motion, hyperreflexia, and clonus.

The toddler should be referred to a pediatric neurologist and pediatric orthopaedist.

Muscular dystrophy

Muscular dystrophy presents with progressive proximal muscle weakness, with the main types being the severe Duchenne and mild Becker types.

Tussionex[®] Pennkinetic[®]

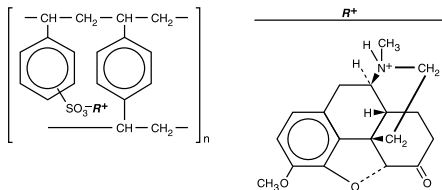
(hydrocodone polistirex and chlorpheniramine polistirex)
Extended-Release Suspension

Rx Only

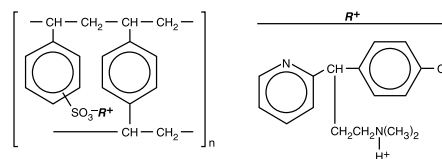
TU1186-0807
4000622

DESCRIPTION: Each teaspoonful (5 mL) of TUSSIONEX Pennkinetic Extended-Release Suspension contains hydrocodone polistirex equivalent to 10 mg of hydrocodone bitartrate and chlorpheniramine polistirex equivalent to 8 mg of chlorpheniramine maleate. TUSSIONEX Pennkinetic Extended-Release Suspension provides up to 12-hour relief per dose. Hydrocodone is a centrally-acting narcotic antitussive. Chlorpheniramine is an antihistamine. TUSSIONEX Pennkinetic Extended-Release Suspension is for oral use only.

Hydrocodone Polistirex: Sulfonated styrene-divinylbenzene copolymer complex with 4,5 α -epoxy-3-methoxy-17-methylmorphinan-6-one.



Chlorpheniramine Polistirex: Sulfonated styrene-divinylbenzene copolymer complex with 2-[p-chloro- α -(2-(dimethylamino)ethyl)-benzyl]pyridine.



Inactive Ingredients: Ascorbic acid, D&C Yellow No. 10, ethylcellulose, FD&C Yellow No. 6, flavor, high fructose corn syrup, methylparaben, polyethylene glycol 3350, polysorbate 80, pregelatinized starch, propylene glycol, propylparaben, purified water, sucrose, vegetable oil, xanthan gum.

CLINICAL PHARMACOLOGY: Hydrocodone is a semisynthetic narcotic antitussive and analgesic with multiple actions qualitatively similar to those of codeine. The precise mechanism of action of hydrocodone and other opiates is not known; however, hydrocodone is believed to act directly on the cough center. In excessive doses, hydrocodone, like other opium derivatives, will depress respiration. The effects of hydrocodone in therapeutic doses on the cardiovascular system are insignificant. Hydrocodone can produce miosis, euphoria, and physical and psychological dependence.

Chlorpheniramine is an antihistamine drug (H₁ receptor antagonist) that also possesses anticholinergic and sedative activity. It prevents released histamine from dilating capillaries and causing edema of the respiratory mucosa.

Hydrocodone release from TUSSIONEX Pennkinetic Extended-Release Suspension is controlled by the Pennkinetic System, an extended-release drug delivery system, which combines an ion-exchange polymer matrix with a diffusion rate-limiting permeable coating. Chlorpheniramine release is prolonged by use of an ion-exchange polymer system.

Following multiple dosing with TUSSIONEX Pennkinetic Extended-Release Suspension, hydrocodone mean (S.D.) peak plasma concentrations of 22.8 (5.9) ng/mL occurred at 3.4 hours. Chlorpheniramine mean (S.D.) peak plasma concentrations of 58.4 (14.7) ng/mL occurred at 6.3 hours following multiple dosing. Peak plasma levels obtained with an immediate-release syrup occurred at approximately 1.5 hours for hydrocodone and 2.8 hours for chlorpheniramine. The plasma half-lives of hydrocodone and chlorpheniramine have been reported to be approximately 4 and 16 hours, respectively.

INDICATIONS AND USAGE: TUSSIONEX Pennkinetic Extended-Release Suspension is indicated for relief of cough and upper respiratory symptoms associated with allergy or a cold in adults and children 6 years of age and older.

CONTRAINDICATIONS: TUSSIONEX Pennkinetic Extended-Release Suspension is contraindicated in patients with a known allergy or sensitivity to hydrocodone or chlorpheniramine.

The use of TUSSIONEX Pennkinetic Extended-Release Suspension is contraindicated in children less than 6 years of age.

WARNINGS: Respiratory Depression: As with all narcotics, TUSSIONEX Pennkinetic Extended-Release Suspension produces dose-related respiratory depression by directly acting on brain stem respiratory centers. Hydrocodone affects the center that controls respiratory rhythm and may produce irregular and periodic breathing. Caution should be exercised when TUSSIONEX Pennkinetic Extended-Release Suspension is used postoperatively and in patients with pulmonary disease, or whenever ventilatory function is depressed. If respiratory depression occurs, it may be antagonized by the use of naloxone hydrochloride and other supportive measures when indicated (see OVERDOSAGE).

Head Injury and Increased Intracranial Pressure: The respiratory depressant effects of narcotics and their capacity to elevate cerebrospinal fluid pressure may be markedly exaggerated in the presence of head injury, other intracranial lesions, or a pre-existing increase in intracranial pressure. Furthermore, narcotics produce adverse reactions, which may obscure the clinical course of patients with head injuries.

Acute Abdominal Conditions: The administration of narcotics may obscure the diagnosis or clinical course of patients with acute abdominal conditions.

Obstructive Bowel Disease: Chronic use of narcotics may result in obstructive bowel disease especially in patients with underlying intestinal motility disorder.

Pediatric Use: In pediatric patients, as well as adults, the respiratory center is sensitive to the depressant action of narcotic cough suppressants in a dose-dependent manner. Benefit to risk ratio should be carefully considered, especially in pediatric patients with respiratory embarrassment (e.g., croup) (see PRECAUTIONS).

PRECAUTIONS: General: Caution is advised when prescribing this drug to patients with narrow-angle glaucoma, asthma, or prostatic hypertrophy.

Special Risk Patients: As with any narcotic agent, TUSSIONEX Pennkinetic Extended-Release Suspension should be used with caution in elderly or debilitated patients and those with severe impairment of hepatic or renal function, hypothyroidism, Addison's disease, prostatic hypertrophy, or urethral stricture. The usual precautions should be observed and the possibility of respiratory depression should be kept in mind.

Information for Patients: As with all narcotics, TUSSIONEX Pennkinetic Extended-Release Suspension may produce marked drowsiness and impair the mental and/or physical abilities required for the performance of potentially hazardous tasks such as driving a car or operating machinery; patients should be cautioned accordingly. TUSSIONEX Pennkinetic Extended-Release Suspension must not be diluted with fluids or mixed with other drugs as this may alter the resin-binding and change the absorption rate, possibly increasing the toxicity.

Keep out of the reach of children.

Cough Reflex: Hydrocodone suppresses the cough reflex; as with all narcotics, caution should be exercised when TUSSIONEX Pennkinetic Extended-Release Suspension is used postoperatively, and in patients with pulmonary disease.

Drug Interactions: Patients receiving narcotics, antihistaminics, antipsychotics, anti-anxiety agents, or other CNS depressants (including alcohol) concomitantly with TUSSIONEX Pennkinetic Extended-Release Suspension may exhibit an additive CNS depression. When combined therapy is contemplated, the dose of one or both agents should be reduced.

The use of MAO inhibitors or tricyclic antidepressants with hydrocodone preparations may increase the effect of either the antidepressant or hydrocodone.

The concurrent use of other anticholinergics with hydrocodone may produce paralytic ileus.

Carcinogenesis, Mutagenesis, Impairment of Fertility: Carcinogenicity, mutagenicity, and reproductive studies have not been conducted with TUSSIONEX Pennkinetic Extended-Release Suspension.

Pregnancy: Teratogenic Effects – Pregnancy Category C

Hydrocodone has been shown to be teratogenic in hamsters when given in doses 700 times the human dose. There are no adequate and well-controlled studies in pregnant women. TUSSIONEX Pennkinetic Extended-Release Suspension should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nonteratogenic Effects: Babies born to mothers who have been taking opioids regularly prior to delivery will be physically dependent. The withdrawal signs include irritability and excessive crying, tremors, hyperactive reflexes, increased respiratory rate, increased stools, sneezing, yawning, vomiting, and fever. The intensity of the syndrome does not always correlate with the duration of maternal opioid use or dose.

Labor and Delivery: As with all narcotics, administration of TUSSIONEX Pennkinetic Extended-Release Suspension to the mother shortly before delivery may result in some degree of respiratory depression in the newborn, especially if higher doses are used.

Nursing Mothers: It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk and because of the potential for serious adverse reactions in nursing infants from TUSSIONEX Pennkinetic Extended-Release Suspension, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use: Safety and effectiveness of TUSSIONEX Pennkinetic Extended-Release Suspension in pediatric patients under six have not been established (see WARNINGS).

Geriatric Use: Clinical studies of TUSSIONEX did not include sufficient numbers of subjects aged 65 and over to determine whether they respond differently from younger subjects. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

This drug is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function.

ADVERSE REACTIONS: Central Nervous System: Sedation, drowsiness, mental clouding, lethargy, impairment of mental and physical performance, anxiety, fear, dysphoria, euphoria, dizziness, psychic dependence, mood changes.

Dermatologic System: Rash, pruritus.

Gastrointestinal System: Nausea and vomiting may occur; they are more frequent in ambulatory than in recumbent patients. Prolonged administration of TUSSIONEX Pennkinetic Extended-Release Suspension may produce constipation.

Genitourinary System: Ureteral spasm, spasm of vesical sphincters, and urinary retention have been reported with opiates.

Respiratory Depression: TUSSIONEX Pennkinetic Extended-Release Suspension may produce dose-related respiratory depression by acting directly on brain stem respiratory centers (see OVERDOSAGE).

Respiratory System: Dryness of the pharynx, occasional tightness of the chest.

DRUG ABUSE AND DEPENDENCE: TUSSIONEX Pennkinetic Extended-Release Suspension is a Schedule III narcotic. Psychic dependence, physical dependence, and tolerance may develop upon repeated administration of narcotics; therefore, TUSSIONEX Pennkinetic Extended-Release Suspension should be prescribed and administered with caution. However, psychic dependence is unlikely to develop when TUSSIONEX Pennkinetic Extended-Release Suspension is used for a short time for the treatment of cough. Physical dependence, the condition in which continued administration of the drug is required to prevent the appearance of a withdrawal syndrome, assumes clinically significant proportions only after several weeks of continued oral narcotic use, although some mild degree of physical dependence may develop after a few days of narcotic therapy.

OVERDOSAGE: Signs and Symptoms: Serious overdose with hydrocodone is characterized by respiratory depression (a decrease in respiratory rate and/or tidal volume, Cheyne-Stokes respiration, cyanosis), extreme somnolence progressing to stupor or coma, skeletal muscle flaccidity, cold and clammy skin, and sometimes bradycardia and hypotension. Although miosis is characteristic of narcotic overdose, mydriasis may occur in terminal narcosis or severe hypoxia. In severe overdose apnea, circulatory collapse, cardiac arrest and death may occur. The manifestations of chlorpheniramine overdose may vary from central nervous system depression to stimulation.

Treatment: Primary attention should be given to the reestablishment of adequate respiratory exchange through provision of a patent airway and the institution of assisted or controlled ventilation. The narcotic antagonist naloxone hydrochloride is a specific antidote for respiratory depression which may result from overdose or unusual sensitivity to narcotics including hydrocodone. Therefore, an appropriate dose of naloxone hydrochloride should be administered, preferably by the intravenous route, simultaneously with efforts at respiratory resuscitation. Since the duration of action of hydrocodone in this formulation may exceed that of the antagonist, the patient should be kept under continued surveillance and repeated doses of the antagonist should be administered as needed to maintain adequate respiration. For further information, see full prescribing information for naloxone hydrochloride. An antagonist should not be administered in the absence of clinically significant respiratory depression. Oxygen, intravenous fluids, vasopressors and other supportive measures should be employed as indicated. Gastric emptying may be useful in removing unabsorbed drug.

DOSAGE AND ADMINISTRATION

Shake well before using.

Adults and Adolescents \geq 13 Years of Age

5 mL (1 teaspoonful) every 12 hours; do not exceed 10 mL (2 teaspoonfuls) in 24 hours.

Children 6-12 Years of Age

2.5 mL (1/2 teaspoonful) every 12 hours; do not exceed 5 mL (1 teaspoonful) in 24 hours.

It is important that TUSSIONEX be measured accurately. A household teaspoonful is not an accurate measuring device and could lead to overdose, especially when half a teaspoon is to be measured. It is strongly recommended that an accurate measuring device be used. A pharmacist can provide an appropriate measuring device and can provide instructions for measuring the correct dose. Please ask a pharmacist for advice.

This medicine is not intended for children under 6 years of age (see CONTRAINDICATIONS).

HOW SUPPLIED: TUSSIONEX Pennkinetic (hydrocodone polistirex and chlorpheniramine polistirex) Extended-Release Suspension is a gold-colored suspension.

NDC 53014-548-67 473 mL bottle

For Medical Information

Contact: Medical Affairs Department

Phone: (866) 822-0068

Fax: (770) 970-8859

Storage:

Shake well. Dispense in a well-closed container.

Store at 20-25°C (68-77°F); excursions permitted to 15-30°C (59-86°F) [see USP Controlled Room Temperature].

TUSSIONEX Pennkinetic Extended-Release Suspension

Manufactured for:
UCB, Inc.
Smyrna, GA 30080



TUSSIONEX and PENKINETIC are trademarks of UCB, Inc., or its affiliates.

© 2007, UCB, Inc., Smyrna, GA 30080.

All rights reserved. Printed in the U.S.A.

TU1186-0807

Evaluation may reveal a Trendelenburg gait due to weak hip abductors, a Gower's sign where the toddlers "walk" up their legs using their arms due to proximal weakness, and pseudohypertrophy of the calves.

These toddlers should be referred to a pediatric neurologist.

Conditions in the Child (Ages 4-10 Years)

Older children are better able to provide a patient history and, generally, do not have secondary gain. Parents should be questioned about recent growth spurts, as growing pains are a common cause in this age group.

Physeal fractures/Salter-Harris I fractures

Physeal fractures are more common in older children. Salter-Harris I fractures, which are fractures through the growth plate only, can be difficult to diagnose on radiographs if they are nondisplaced.

If a child has a history of trauma, and examination demonstrates tenderness in the region of the growth plate, then the extremity should be immobilized with a splint even with negative radiographs.

Follow-up radiographs with an orthopaedist in one to two weeks will demonstrate periosteal new bone formation if a physeal fracture did occur.

Legg-Calvé-Perthes disease

Legg-Calvé-Perthes disease is avascular necrosis of the femoral head, typically in children ages 4-8 years. It is more common in males than in females, by a ratio of approximately 4:1.

Initially, children present with a painless limp, although with time pain can develop.

Examination demonstrates limited range of motion and an antalgic gait. AP and frog lateral radiographs of the pelvis should be ordered, and may demonstrate subchondral sclerosis, subchondral fracture, or flattening of the femoral head, though they may remain negative early in the disease.

Children should follow up with a pediatric orthopaedist within a few weeks.

Patients with pain should be placed on limited activities until their symptoms resolve.

Discoid lateral meniscus

A discoid lateral meniscus often affects children at between 8 and 12 years of age. History reveals limping, knee

“SCFE in an adolescent requires emergent surgery and non-weight bearing on the affected hip.”

swelling, painful clicking, and decreased range of motion in extension. Symptoms are exacerbated with activity.

Examination demonstrates lateral joint-line tenderness, knee effusion, and painful clicking in the knee. Radiographs may be normal, or may show a wide lateral joint space, a flat lateral femoral

condyle, and cupping of the lateral tibial plateau. Diagnosis is confirmed with MRI.

Patients should follow up with an orthopaedist.

Leg length discrepancies

Leg length discrepancies can present as a limp in the urgent care center. Typically, these become apparent between the ages of 4 and 10 years. Patients may present with a toe-walking or vaulting gait.

Examination is best done by placing blocks under the shorter limb and feeling the iliac crests to determine whether the pelvis is level. Arthrograms and scanograms are specialized radiographs that are best performed through a pediatric orthopaedic clinic.

Conditions in the Adolescent (Ages 11-16 Years)

Adolescents can provide a complete history, but may overstate or understate symptoms for secondary gain. Occasionally, they should be questioned separately from their parents (for example, to obtain a sexual history when gonococcal infection is suspected).

Slipped capital femoral epiphysis

Slipped capital femoral epiphysis (SCFE) is displacement of the proximal femoral epiphysis from the metaphysis. It is more common in obese, African-American males, generally between ages 12 and 15 years.

Adolescents with SCFE present with a limp and pain in the groin, or referred pain to the inner thigh or medial knee. An endocrine work-up should be considered for girls <10 years of age, boys <12 years of age, or children with small height or weight for their age.

Examination demonstrates painful range of motion of the hip, with limited internal rotation and obligate external rotation of the hip when it is passively flexed. AP and frog lateral radiographs of the pelvis demonstrate displacement of the epiphysis (**Figure 2**). Klein's line is drawn along the lateral border of the femoral neck, and should pass through the epiphysis in a normal femur.

SCFE in an adolescent requires emergent surgery and

Urgent Care Medicine Medical Professional Liability Insurance

The Wood Insurance Group, a leading national insurance underwriter, offers significantly discounted, competitively priced Medical Professional Liability Insurance for Urgent Care Medicine. We have been serving the Urgent Care community for over 20 years, and our UCM products were designed specifically for Urgent Care Clinics.

Our Total Quality Approach includes:

- Preferred Coverage Features
 - Per visit rating (type & number)
 - Prior Acts Coverage
 - Defense outside the limit
 - Unlimited Tail available
 - Exclusive "Best Practice" Discounts
- Exceptional Service Standards
 - Knowledgeable, friendly staff
 - Easy application process
 - Risk Mgmt/Educational support
 - Fast turnaround on policy changes
 - Rapid response claim service



THE WOOD
INSURANCE
GROUP

4835 East Cactus Road, Suite 440
Scottsdale, Arizona 85254
(800) 695-0219 • (602) 230-8200
Fax (602) 230-8207

E-mail: davidw@woodinsurancegroup.com
Contact: David Wood Ext 270

non-weight bearing on the affected hip to avoid further displacement and the catastrophic development of avascular necrosis.

Osteochondral defects

Osteochondral defects most commonly affect the lateral portion of the medial femoral condyle.

Patients typically present with knee pain, occasionally with mechanical symptoms such as popping or locking. The lesion can often be seen on radiographs, but may require an MRI for diagnosis.

Management varies, depending on patient age and the characteristics of the lesion. Patients should be given crutches and placed on protective weight bearing and instructed to see an orthopaedist.

Overuse syndromes

Overuse syndromes are common causes for knee pain in adolescents.

Osgood-Schlatter disease is overuse at the tibial tubercle apophysis. Physical examination demonstrates point tenderness at the apophysis, and radiographs may show fragmentation of the tibial tubercle. Overuse can also occur in the patellar tendon and at the inferior pole of the patella.

Treatment consists of short-term rest and anti-inflammatories. The majority of adolescents will resolve as they approach maturity. Patients who fail conservative treatment, as demonstrated by return visits to urgent care, should be evaluated by an orthopaedist.

Summary

The limping child can be a daunting diagnostic problem in the urgent care setting.

Recognition of abnormal gait can be useful for narrowing the differential, as can a careful history and physical examination.

Diagnoses that can result in serious complications if missed include infections and malignancy in all age groups, toddler's fractures in toddlers, physeal fractures in older children, and slipped capital femoral epiphysis in adolescents.

Septic joint infections need emergent surgical drainage in order to avoid irreversible cartilage damage.

Depending on the presentation, patients with malignancies may need admission or outpatient treatment, with prompt referral to a pediatric oncologist.

Fractures need to be immobilized with protected weight bearing to avoid displacement.

Slipped capital femoral epiphysis requires protected weight bearing and urgent referral for surgical pinning, in order to prevent further displacement and catastrophic avascular necrosis. ■

References

1. Jung ST, Rowe SM, Moon ES, et al. Significance of laboratory and radiographic findings for differentiation between septic arthritis and transient synovitis of the hip. *J Pediatr Orthop.* 2003;23:368-372.
2. Gordon JE, Huang M, Dobbs M, et al. Causes of false-negative ultrasound scans in the diagnosis of septic arthritis of the hip in children. *J Pediatr Orthop.* 2002;22:312-316.
3. Huttenlocher A, Newman TB. Evaluation of the erythrocyte sedimentation rate in children presenting with limp, fever, or abdominal pain. *Clin Pediatr.* 1997;36:339-344.
4. Scott RJ, Christofersen MR, Robertson WW Jr, et al. Acute osteomyelitis in children: A review of 116 cases. *J Pediatr Orthop.* 1990;10:649-652.
5. Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: An evidence-based clinical prediction algorithm. *J Bone Joint Surg Am.* 1999;81:1662-1670.