Chapter 12
Pediatric Musculoskeletal Complaints

Quincy Scott and Keith Gabriel

Pediatric musculoskeletal concerns can be challenging for the clinician because of the age and communication ability of the patient. In addition, pediatric orthopedic conditions are of particular concern to parents and healthcare providers alike, as the presence of growth plates leads to concerns about lifelong consequences to poor healing. There are certainly many pediatric conditions which are best cared for by pediatric orthopedic specialists, but many other conditions can be safely managed in the primary care clinician's office. A reasonable general rule of thumb is to refer pediatric patients with musculoskeletal complaints that are potentially serious, difficult to diagnose, or involve joints or areas which are prone to poor healing or poor outcomes.

Red Flags

Suspected Abuse

Children with multiple injuries, reported mechanisms of injury that do not seem to make sense, or suspicious injuries should be closely evaluated and followed up. Skeletal surveys can be used to determine the presence of past injuries, and if suspicion is high, social agencies or child protection services should be involved.

Q. Scott, DO (✉)
SIU Family Medicine Residency, SIU School of Medicine,
Carbondale, IL 62901, USA
e-mail: qscott@siumed.edu

K. Gabriel, MD
Division of Orthopaedics, Department of Surgery, St. Johns Hospital,
Springfield, IL 627014, USA

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Refusal to Use a Joint/Refusal to Bear Weight

A child who completely refuses to use a joint should be suspected of having a serious condition, such as fracture or a septic joint, until proven otherwise. These patients need careful evaluation to rule out serious pathology.

Musculoskeletal Concerns in a Child with Poor Growth or Development

Patients with musculoskeletal complaints, who also have developmental concerns, are unusually small or large for age or who have systemic symptoms should be carefully evaluated for the presence of systemic disease and metabolic/endocrine problems.

This chapter deals with the most common pediatric musculoskeletal issues encountered in the primary care setting. Many excellent textbooks are available to cover a comprehensive review of pediatric musculoskeletal complaints. A list of suggested reading can be found at the end of this chapter.

Common Clinical Presentations

Slipped Capital Femoral Epiphysis

The "capital" femoral epiphysis refers to the growth plate of the femoral head. If the forces going through the hip are greater than the strength of the epiphysis, the femoral head can slip off the neck, and hence the name slipped capital femoral epiphysis (SCFE). There are two main reasons for a slip to occur: (1) increased load across the joint (usually because of increased body weight, but can also rarely be from repetitive heavy lifting) and (2) weakened epiphysis because of increased activity of the growth plates.

SCFE is reported to have a prevalence of 10.8 cases per 100,000 children and is the most common hip disorder in adolescents (ages 8–15 years of age, with the average range being 12 years for girls as compared to 13.5 years for boys) and most common in children of ages 9–15 who have a high BMI. The presenting complaint is pain and/or limp. Diagnosis is frequently delayed because the patient complains of knee pain rather than hip pain. The pain may be acute, chronic, or acute on chronic (rapid increase in pain after steady low level of pain). The patient might be able to walk in unassisted and walk with crutches or might not be able to walk at all.

Gait must be assessed. Early on, antalgic gait may be the only abnormality, but as the slip progresses, the foot will start to externally rotate. Hip examination should start with the patient sitting, with comparison of the way the legs hang. The hip in

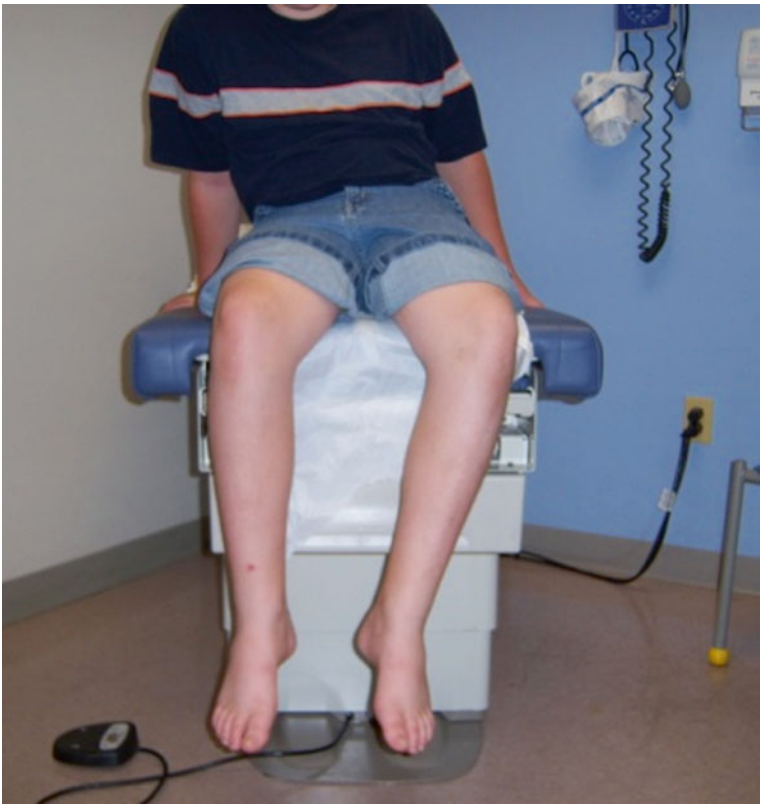


Fig. 12.1 Child with SCFE. Note the increased external rotation of the hip when the leg is hanging

SCFE will usually be excessively externally rotated, which makes the foot appear inward compared to the knee. Range of motion (ROM) can be performed in both sitting and prone positions. Typically, internal rotation will be limited, and external rotation will be increased, although the inflammation of the hip joint (synovitis) can cause guarding and irritability with hip rotation in both directions. While comparing to the unaffected side can be helpful, SCFE can occur bilaterally, so any pain with ROM is significant, even if it is symmetric. As the femoral head slips further, the hip will have progressively more external rotation and lose internal rotation. Hip flexion is decreased and external rotation occurs during attempts to flex the hip. If the patient presents primarily with knee pain, it is important to assess both the hip and knee. Figures 12.1, 12.2, and 12.3 show the position and ROM anomalies seen with SCFE.

With suspected SCFE, immediate X-rays are necessary. An AP pelvis X-ray (visualizes both hips) and frog view should be obtained as long as the patient can walk (see Fig. 12.4). Those who cannot walk can have bilateral cross-table lateral

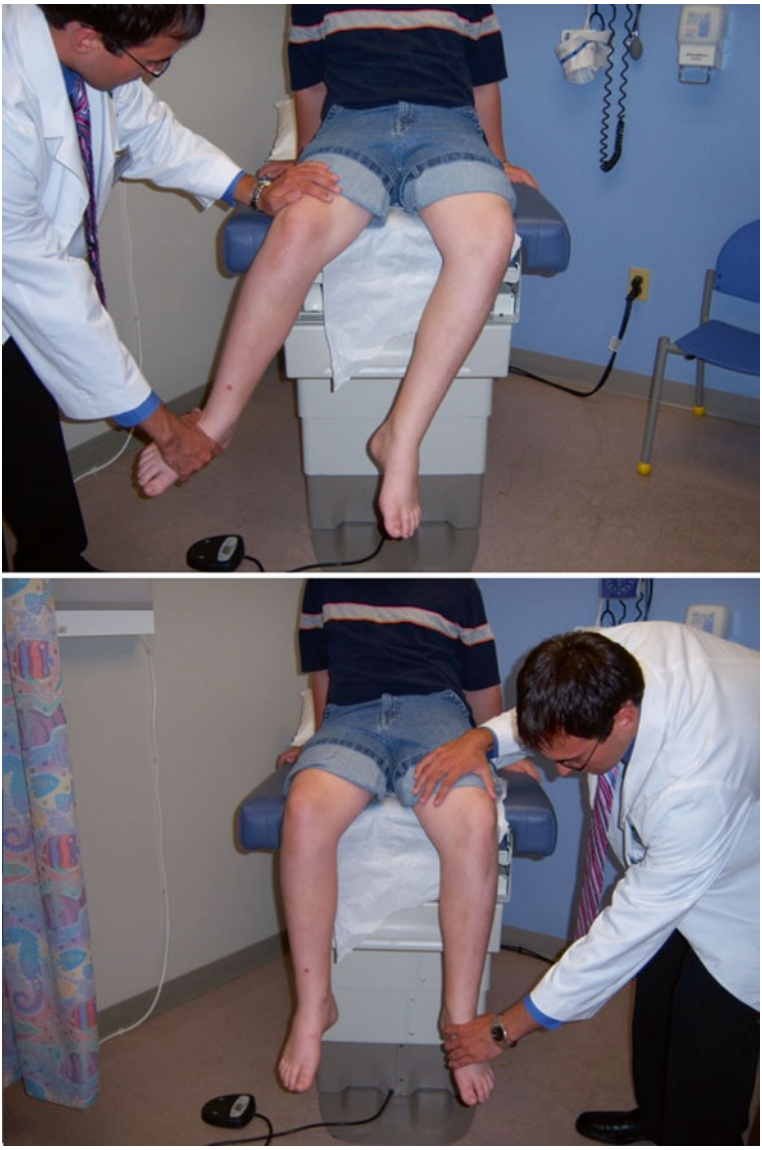


Fig. 12.2 Child with SCFE. Note the decreased internal rotation on testing of the left leg

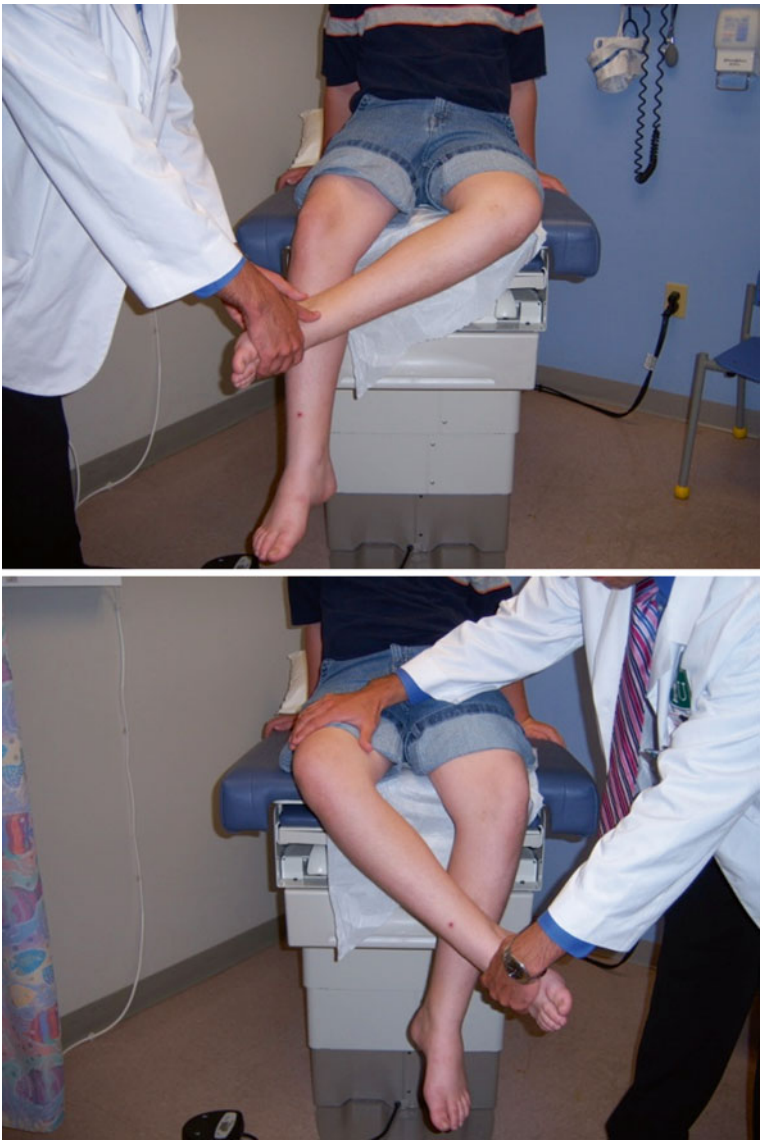


Fig. 12.3 Child with SCFE. Note the increased external rotation of the left leg compared to the right

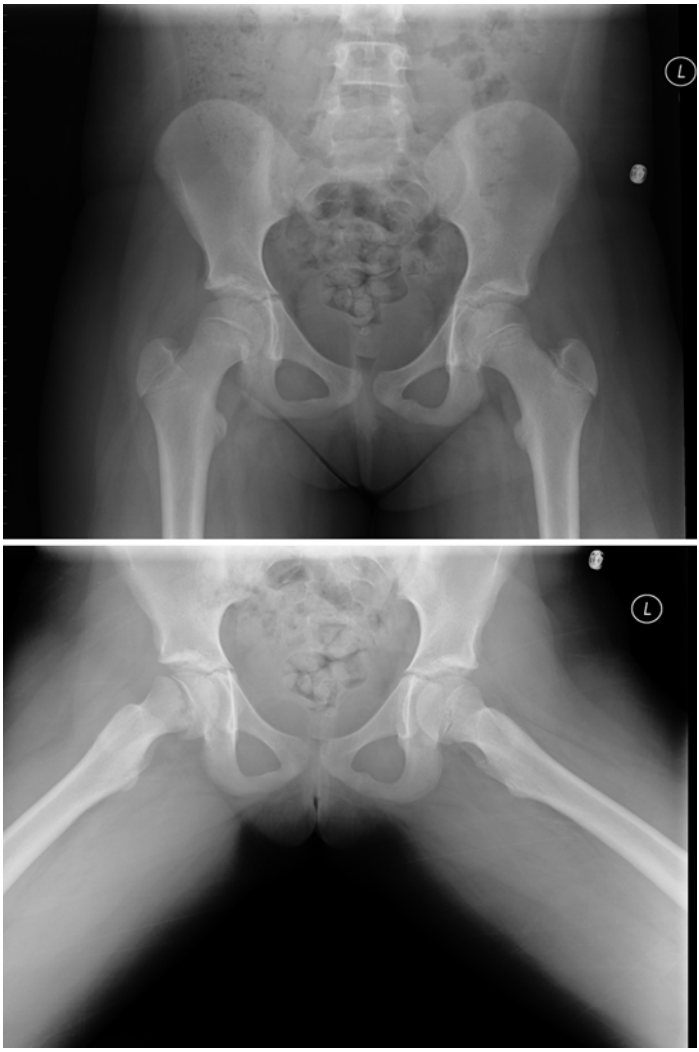


Fig. 12.4 X-ray findings in SCFE. Note that the SCFE is not obvious in AP view; lateral or frog-leg view is required to see the anomaly

views instead. X-rays should be read immediately, and if SCFE is diagnosed or suspected, the patient should be made non-weight bearing and an immediate consultation with an orthopedic surgeon should be made. Surgery is usually performed within 24 h. For cases with equivocal X-ray results, phone consultation with the orthopedist is recommended as it is possible to catch the disorder in the "pre-slip" phase. With surgical intervention, outcomes are excellent. Delayed treatment can lead to hip deformity or avascular necrosis of the femoral head, necessitating multiple surgeries and early arthroplasty.

Bowlegs and Knock-Knees

Bowlegs (genu varum) and knock-knees (genu valgum) are common reasons for parents to request evaluation of their children. The vast majority of these children do not require any intervention, as their condition simply represents normal childhood growth and development. Babies are generally born with mild bowing of the tibia that becomes more noticeable when they begin walking and then usually resolves around 2 years of age. The legs then begin to have a knock-knee appearance, which usually peaks around age 3–4 and resolves by age 6–8.

Genu Varum (Bowlegs)

In toddlers 2 years of age and younger with normal height and weight, and who have no red flags, the bowing is likely physiologic and should resolve spontaneously. If red flag conditions are present (Table 12.1), referral to a pediatric orthopedist should be made. Conditions such as rickets, skeletal dysplasia, Blount's disease, and others must be considered.

Genu Valgum (Knock-Knees)

Children aged 2–6 who are of normal height and weight, who are otherwise healthy, and who have no red flags most likely have physiologic knock-knees, which should resolve spontaneously. If red flags are present (Table 12.2), referral to a pediatric orthopedist should be made.

Table 12.1 Red flags for bowlegs

Age >2 years
Decreased calcium and vitamin D intake (dietary) or lack of sun exposure
Family history of short stature, adult bowlegs, severe kidney disease, or neurofibromatosis
Child with short stature, underweight, or significant overweight
Severe tibia deformity (look for dimple on the apex of the bow) and/or small, deformed foot
Unilateral deformity or significant asymmetry
"Thrust" during gait (knee looks like it's buckling)

Table 12.2 Red flags for knock-knees

Age >6 years
Past history of or symptoms of endocrine, renal, or metabolic disorders
Family history of skeletal dysplasia
History of lower extremity fracture
Severe deformity
Unilateral deformity or significant asymmetry, child with short stature or underweight

Imaging to evaluate alignment should be done using full-length X-rays that include hips to ankles on a single view. Laboratory testing includes calcium, phosphorus, and 1,25-OH vitamin D levels if rickets are suspected and BUN and creatinine if renal disease is suspected or if knock-knees are present in an older child.

In most cases, reassurance and parental education are the only treatment needed, as most of these children have physiologic angulation. Those with endocrinologic, renal, or metabolic disorders require treatment of their underlying conditions. Children with bowlegs who require orthopedic management are sometimes managed with braces; bracing is generally not helpful for knock-knees. In both conditions, surgery can be performed to help "guide" growth while the growth plates are still open, but if the deformity is severe, or if skeletal maturity has been reached, osteotomy is used to manually realign the bones. Untreated deformity can lead to early arthritis.

Intoeing

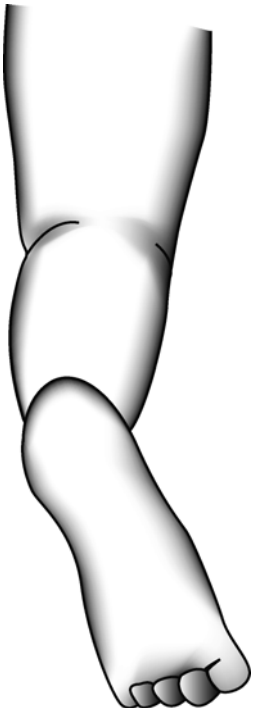
Intoeing is another common concern for which parents bring children in for evaluation. While many times, intoeing is physiologic and will resolve spontaneously, evaluation must be performed to determine if the cause is rotational deformity at the hip (femoral anteversion), tibia (internal tibial torsion), or the foot (metatarsus adductus). Based on expert consensus (Strength of Recommendation, SOR) level C, with the tools of taking a complete history and physical with a torsional profile, intoeing should be able to be correctly diagnosed. No standard guideline has been reported.

Femoral Anteversion

If the hips are rotated inward, the patellae will point toward each other when the patient stands and walks. This is usually due to increased femoral anteversion, which is common in young children and generally improves throughout childhood. Parents will complain that the child trips often, especially around age 2–4; this also improves with time. On examination, the child will have demonstrable increased internal rotation of the hips compared to external rotation (see Fig. 12.5). Unless the deformity is severe or the child is older than 8 years, referral is not warranted. Braces and special shoes do not help this condition, and even in older children, if the anteversion is asymptomatic, surgery is usually not indicated. Occasionally, children will complain of pain in the hip, knee, ankle, or foot, which is generally managed with symptom control, physical therapy, or orthotics. Surgery is only performed as a last resort. According to Staheli, LT, surgery may be needed if the child is older than eight years old, there is a severe deformity with disability, the anteversion is greater than 50°, the deformity is greater than three standard deviations, and the risks of the surgery are understood by the family.

Fig. 12.5 Femoral anteversion

Fig. 12.6 Internal tibial torsion



Tibial Torsion (Most Common Cause of Intoeing)

This is the most common cause of intoeing; it equally affects males and females and is usually not symmetrical by affecting the left side more than the right. If the hips are aligned normally with the patellae facing forward, but the feet are turned inward despite normal foot exam, the cause is likely internal tibial torsion. With the patient prone and the knees flexed, the foot will be turned inward relative to the thigh (see Fig. 12.6). Tibial torsion is sometimes associated with some bowing of the tibia as

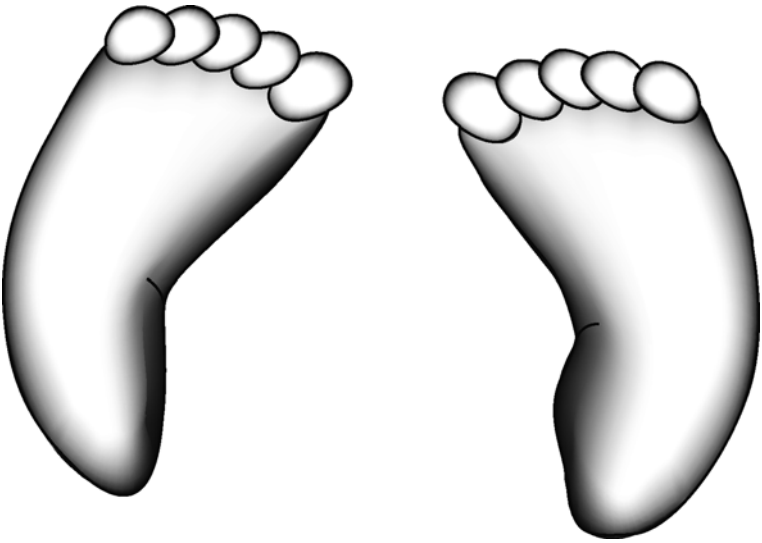


Fig. 12.7 Metatarsus adductus

well. If no bowing is present, this condition usually spontaneously improves with age; if it does not resolved by age 6, referral should be made. If there is significant bowing present, referral at or after the age of 2 should be made. Tibial torsion is not correctable with shoes or braces; surgery is performed only as a last resort.

Metatarsus Adductus

This condition is known to be the most common congenital foot deformity, occurring in one out of 1,000 births. In this condition, the legs are aligned properly, but the foot itself is shaped like a kidney bean when viewed from the bottom (see Fig. 12.7). This is commonly seen in infancy, and if the deformity is flexible (the forefoot can be realigned with only mild pressure), it usually does not require any treatment. With a flexible adductus, correcting stretching exercises performed by parents are helpful, and referral can be delayed unless it persists beyond 3 months of age; some advocate continued stretching exercises for up to 6 months before referral. Those with a rigid deformity should be referred as soon as the condition is identified. Those who require treatment may be treated with casting, orthotic shoes, or surgery.

Back Pain in Children and Adolescents

Back pain in a pediatric patient that lasts over a day or two should be viewed as a red flag. A high index of suspicion for pathology should be suspected when children and adolescents present with a compliant of low back pain. The differential

diagnosis should include muscle strain, disk disease, spondylolysis, scoliosis, and Scheuermann's kyphosis as well as sickle cell disease, tumor, and infection. A number of patients with malignancy present with back or lower extremity pain. These patients should be examined for hyperreflexia, tufts of hair or dimples between buttocks, or any neurological weakness. These patients should be evaluated with CBC, BMP, CRP, UA, and AP and lateral radiographs of the LS spine. Multiple lumbar X-ray views are considered an expert consensus (Strength of Recommendation, SOR) level C. These patients should be closely followed until a definite diagnosis is found, or they should be referred.

Adolescents with back pain often develop spondylolysis and present with pain on back extension. If these patients have any red flags described in the LS chapter, proper workup should be done. If pain persists, AP and lateral X-ray views should be done. Oblique views in these patients are NOT recommended. A SPECT-CT scan or referral should be considered in this group of patients. Unlike in adult patients, an MRI may not be the best first investigation in adolescents with back pain.

Suggested Readings

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