PedsCases Podcast Scripts

This podcast can be accessed at www.pedscases.com, Apple Podcasts, Spotify, or your favourite podcasting app.

UPDATED APPROACH TO PEDIATRIC LIMP

Developed by Lexyn Iliscupidez and Dr. Sarah Smith for PedsCases.com.
May 30th, 2025

Introduction:

Hello, my name is Lexyn Iliscupidez, a medical student at the University of Calgary. This podcast was created with the support of Dr. Sarah Smith, a Family Physician in Calgary, Alberta. We have no conflicts of interest to disclose.

Today, we'll be focusing on the approach to pediatric limp, a common presentation in clinic, urgent cares, and emergency departments. This podcast will provide an approach to systematically assess limp, highlighting how to narrow down your differential diagnosis between common and serious causes. This approach is one of many that you can use when diagnosing and managing pediatric limp. We encourage you to use this approach to supplement developing your own unique systematic approach.

Although we note several conditions in this podcast that may present with a limp, note that a limp is NOT a defining feature of these conditions, meaning it is possible for a patient to have any of these conditions, but no limp.

By the end of this podcast, we hope you will be able to

1. Describe a differential diagnosis for limp in children, differentiating between acute and chronic presentations and within that, distinguishing between MSK/traumatic, infectious rheumatological, malignant and developmental etiologies.
2. Take a systematic history for pediatric patients presenting with a limp, including red flags for serious conditions.
3. Conduct a comprehensive physical examination for pediatric limp, while employing strategies to ease the child's anxiety.
4. Identify when it is appropriate to order investigations for a limp versus when it can be diagnosed clinically.

Let's start with a clinical case:
A 15-year-old named Ben comes into your clinic. His parents are worried because, for the past few months, he's been limping on and off, especially after volleyball games. This has been affecting his ability to play, and they're looking for answers.

Now, when a patient like Ben comes in with a limp, where do you start? Let's break it down.

First, what exactly is a limp?
A limp is any abnormality in an individual's gait caused by pain, weakness, or deformity and it can be acute, or it can be chronic. It can even be present from the moment they take their first steps.

Developing an Approach

Let's review the differential diagnosis for limp. Although this is not an exhaustive list, it does cover the more common diagnoses.

The causes for limp are broad so having a structured approach to this presentation can help you take a more focused history and physical exam to narrow the differential. As a good first step, thinking about the timeline is important. An acute limp, classified by limp onset within the past 72 hours to a couple of weeks, could point towards more traumatic, infectious, underlying rheumatological disease or even malignancy presenting itself. The most common traumatic/MSK etiologies include soft tissue strains or sprains, slipped capital femoral epiphysis (SCFE), Legg-Calve-Perthes otherwise known as avascular necrosis (AVN), benign causes like growing pains or Osgood Schlatter disease or, on the other hand, more serious causes like abuse which we will discuss how to take a trauma informed approach during a visit. More common infectious etiologies include septic arthritis, osteomyelitis (bone infection) or cellulitis (skin infection). Post-infectious causes of limp include transient synovitis and reactive arthritis. Rheumatological conditions especially in this population are juvenile idiopathic arthritis (JIA) or inflammatory bowel disease (IBD). Lastly, although less likely but a cannot miss diagnosis is malignancy such as bone tumors, leukemia, or lymphoma.

On the other hand, a chronic limp that has been present for months or even since birth, can make us think of developmental causes like developmental dysplasia of the hip (DDH) or neuromuscular disorders such as cerebral palsy.

Admittedly, there is a lot of overlap and kids can present with more acute-on-chronic conditions. Let's use JIA as an example, this can be present for months with persistent baseline pain, but acute flares can worsen pain and the limp. Throughout this podcast, we will touch on how you can target your visit to assess all of these possible diagnoses.

History
Now that we have a broad differential diagnosis, let's use this to guide us in the right direction for asking targeted questions.

Sometimes limps can be painless, but if it is painful, taking a thorough pain history can give you a lot of information about the underlying cause and help build a foundation for further questioning. OPQRST is an easy acronym to remember and use in practice. Firstly,

1. O for Onset: When did the pain start? Maybe there was there an injury or event

that triggered it?

- Here, it can be helpful to note any recent illnesses and fever. Examples include upper respiratory tract infections, otitis media, bronchiolitis, or gastrointestinal illnesses. These conditions can trigger post-infectious conditions that present with a limp like transient synovitis, or reactive arthritis. Acute fever at the same time as limp could suggest an active infection such as osteomyelitis or septic arthritis. These infections will often present as a systemically unwell patient, meaning significant lethargy, fever, difficulties breathing, poor appetite, nausea, vomiting and tachycardia.

2. P for Provoking and Palliating: What makes it better or worse?
    - For example, pain related to Osgood-Schlatter disease usually gets worse with activity and better with rest.
    - In contrast the inflammatory arthritis associated with JIA is often worse in the morning with morning stiffness and improves with activity.
3. Q for Quality: What does the pain feel like—sharp, dull, or achy can indicate somatic pain, while burning and tingling can indicate neuropathic pain.
4. R for Radiating: Does the pain radiate anywhere?
    - For example, a pain generated in the back may cause referred pain down the back of the leg, and knee pain may actually represent referred pain from hip pathology (eg, SCFE or Legg-Calvé-Perthes disease)
5. S for Scale: How severe is the pain? How is it affecting their daily life including school and extra-curricular activities? How has it affected their overall mood? 6. And T for Timeline:
    - As discussed earlier, acuity is critical in narrowing the differential – has the pain been present for hours, weeks, months?
    - The persistence of pain is also important. Is the pain constant or intermittent? Some conditions have a specific pattern of pain.
        - For example, Juvenile Idiopathic Arthritis (JIA) presents often with morning stiffness, whereas Osgoode Schlatter disease presents with pain during activities and nocturnal pain can be indicative of either benign growing pains or malignancy. If cancerous etiologies are of concern, dig deeper into any systemic symptoms: lymphadenopathy, easy bruising, organomegaly, appetite loss, weight loss, and night sweats.
    - Lastly, age plays a key part. In younger children (9 months to 3 years), consider a toddler's fracture, a tibial fracture caused by twisting around a fixed foot almost exclusive to this age group due to bone composition and coordination. Conversely, with older kids and teens, consider SCFE, where the proximal femoral epiphysis displaces due to disruption of the growth plate and is therefore associated with puberty – commonly seen in those AFAB who have not yet reached menarche or those AMAB who have not reached Tanner Stage 4. Additionally, Osgood-Schlatter disease may be more likely as it is associated with repetitive tendon injury seen in jumping sports.

Make sure you're paying attention to any red flags on history – trust your gut! Screening

for red flags can help rule in or out serious and life-threatening conditions such as non-accidental injury. Concern for non-accidental injury should be raised if the mechanism of injury does not match the presenting complaint, if the mechanism does not fit with what the child is able to do developmentally, if there is delay in seeking care, or there is a history of multiple injuries or a pattern of injuries. Suspicion of non-accidental injury requires mandatory reporting. If you're interested in learning more, please see the "Physical Abuse of Children" podcast on the PedsCases website.

With past medical history, considering the patient population, it's always good to ask about pregnancy and birth history as well as early developmental milestones. If they have a history of damage to brain development in-utero or during labour, cerebral palsy could be likely. Ask the caregiver if there were any concerns regarding walking during infancy, specifically, when did the child start walking? And if possible, ask the patient if they have noticed a limp in the past.

Conducting a review of systems is a good last step in history, as this can ensure you're being thorough and can provide clues to a potential underlying condition unrelated to the limb of concern. Taking a body systems approach can be useful to structure your questions. Start with any neurological symptoms such as weakness, numbness, or ataxia. Nerve compression or other spinal issues can cause neuropathic and radiating pain. The presence of MSK symptoms, such as the feeling of being "stiff", is suggestive of juvenile idiopathic arthritis (JIA). Are there changes to the skin or pain in areas other than the lower limb? Henoch-Schönlein purpura (HSP) is often associated with joint and abdominal pain and often presents with a rash. On the topic of abdominal pain, a concurrent change in bowels could be the only symptoms of a new IBD diagnosis.

Physical Exam

Once you've gathered a detailed history, it's time for the physical exam. This would be guided by information obtained from the history.

When evaluating a limp, it's important to assess your patient's general appearance by simple observation. Do they appear ill or in significant pain, or are they happy and either cooperative or appropriately fussy with the exam?

Depending on age and past experiences, exams can be scary for kids—help them feel at ease with distractions or by giving parents time to soothe them. Stay patient, and try to assess the most painful area last to make sure they are as comfortable as possible throughout the exam.

Keeping those points in mind, you may need to be flexible with how your conduct your physical exam. If they are moving around, take that opportunity to evaluate their gait. If the child is ambulating, carefully assess their gait and feet, which should be barefoot and with as much of the legs exposed as possible. Assess for extension, stance, swing, pelvis, toe walk, and range of motion. Observing gait can provide clues to developmental dysplasia of the hip (DDH) in children of walking age who present with a limp. They may show limitations in hip abduction, Trendelenburg, or toe-walking. And if they refuse to walk or stand – that tells you a great deal!

The next step in an exam is a focused evaluation of the area or limb associated with

pain and any joints above and below.

Inspect the limb, looking for any signs of bone or joint inflammation like asymmetry, bruising, swelling, redness or deformities. For example, DDH can have a noticeable leg length discrepancy which causes a limp, and Osgood Schlatter may have tenderness/swelling over the tibial tuberosity. Importantly, if non-accidental injury is suspected based on the initial history, assess for bruising or other evidence of trauma. Note as well if their hip is in the FABER (Flexion, Abduction, External Rotation) position – they will often present like this in conditions such as transient synovitis or septic arthritis of the hip as it relaxes the hip joint and decreases intra-articular pressure therefore is most comfortable for them.

After inspection, palpate the affected limb, assessing for signs of bone or joint inflammation like warmth or tenderness.
When evaluating for range of motion, remember that the child is in pain and may not tolerate much movement of their affected limb. If you are able, move the child through active and passive range of motion.

As with history taking, a comprehensive physical exam would assess for associated symptoms if indicated, such as rash which could indicate cellulitis in the context of illness, hepatosplenomegaly, neurological deficits, lymphadenopathy, and other systemic abnormalities.

Investigations
Similarly to the physical exam, your investigations, if any, will be entirely guided by your differential. Sometimes, investigations are not required if you are able to make a clinical diagnosis like with Osgood-Schlatter, or a soft tissue injury to ligaments or muscle. It is important, though, to do investigations to rule out serious causes that may mimic more benign causes if suspected. For example, transient synovitis, a benign condition that commonly affects the hip, can present similarly to septic arthritis. Sometimes we need to order labs to help us figure out which condition is more likely – for this we use the Kocher Criteria. If septic arthritis is likely based on WBCs (>12) and CPR (>20) on bloodwork in the context of a fever and non-weight bearing behaviour, diagnosis will be confirmed with joint aspiration and subsequent culture stain, culture and cell count. The 2-part podcast series on "Septic Arthritis", available on the PedsCases website, can tell you much more about how infection of the joint can lead to a life-threatening disease.

Other investigations may be warranted to rule out other non-MSK related etiologies such as an infectious panel, rheumatological markers like CRP or ANA, a fecal calprotectin in IBD, or taking a closer look at hemoglobin, WBC and platelets if suspicious of malignancy.

Generally, a workup is indicated if the patient is three years of age and younger, shows signs of infection such as fever, joint tenderness with marked limitation of motion, or localized redness, warmth, or swelling, cannot walk, or has a history of chronic or intermittent limp.

Imaging Studies
Certain differentials may require imaging, such as SCFE which calls for X-Ray of the AP and frog-leg lateral views of both hips showing widened and irregular physeal plate, displaced both medially and posteriorly. While an X-Ray may be a reasonable starting point for osteomyelitis, it may appear normal as the lytic changes often seen with this disease are not visible for up to 14 days. Therefore, a strong clinical suspicion for this condition may warrant an MRI for definitive diagnosis because of its increased sensitivity. Similarly, in Legg-Calve Perthes disease/AVN, a bone scan or MRI is preferred earlier in the disease to demonstrate decreased blood flow whereas an X-Ray is more useful later on to assess delayed remodeling of the femoral head.

Take Home Points

Let's apply what we've learned to Ben, our clinical case.

His painful limp started 4 months ago. At first, presented as a dull ache during volleyball practice, but then became more intense, preventing him from competing in games. The pain gets better when he sits and rests but just when he thinks it's better, he tries to play the next day and pain returns. The quality of the pain is localized aching and throbbing pain in the anterior right knee, with no radiation of pain elsewhere. There is no significant past medical history.

On your physical exam, you note that initially, his gait appears normal and the limp becomes apparent after he squats and jumps. He tells you there is pain just below his kneecap, and when you look, you can appreciate some swelling. Palpation of his tibial tuberosity is moderately painful.

Due to these clinical findings and his athletic history, you determine investigations and imaging are not necessary and confidently diagnose him with Osgood-Schlatter disease.

The key learning points of this podcast were:

1. A limp is an abnormal gait caused by pain, weakness, or deformity, which can be acute or chronic and may be present from early development.
2. The differential diagnoses are broad as kids will often present with non-specific symptoms but having a systematic approach can help narrow it down. Starting with the acuity versus chronicity of the limp is a good place to start.
3. On history, characterizing pain, addressing systemic symptoms while keeping in mind the age of the patient can help narrow the differential. The physical exam should assess general appearance, gait, joint function, and signs of inflammation or systemic disease, adapting to the child's comfort and developmental stage.
4. Have a high index of suspicion for red flags. Indicators such as incongruent injury mechanisms, systemic symptoms, or signs of infection (e.g., fever, localized warmth) require immediate attention and further investigation.
5. Diagnostic workup, including bloodwork and imaging, is guided by the differential diagnosis but often diagnoses are made clinically.

Developed by Lexyn Iliscupidez and Dr. Sarah Smith for PedsCases.com.
May 30th, 2025

References

1. Luhmann JD. Evaluating the child with a limp. Leawood (KS): American Academy of Family Physicians; 2023 May. Available from: https://www.aafp.org/pubs/afp/issues/2023/0500/evaluating-child-with-limp.html
2. Tan A, Al-Jarrah A, Ilgen S, O'Hagan K, Cooper C. Approach to the limping child. Can Fam Physician. 2016 Mar;62(3):222–4. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4799062/
3. Canadian Paediatric Society, Infectious Diseases and Immunization Committee. Osteoarticular infections in children. Ottawa (ON): Canadian Paediatric Society; 2018 Nov. Available from: https://cps.ca/en/documents/position/osteoarticular-infections-in-children
4. UpToDate. Evaluation of limp in children. Waltham (MA): UpToDate. Available from: https://www.uptodate.com/contents/evaluation-of-limp-in-children?source=most Viewed_widget#H568855148
5. UpToDate. Differential diagnosis of limp in children. Waltham (MA): UpToDate. Available from: https://www.uptodate.com/contents/differential-diagnosis-of-limp-in-children
6. UpToDate. Approach to hip pain in childhood. Waltham (MA): UpToDate. Available from: https://www.uptodate.com/contents/approach-to-hip-pain-in-childhood?search=Overview+of+the+causes+of+limp+in+children&topicRef=6460&source=related_link
7. MacPherson, P, Ellsworth J. Evaluation of a Limp. PedsCases. 2019 Mar 31. Available from: https://www.pedscases.com/evaluation-limp

Developed by Lexyn Iliscupidez and Dr. Sarah Smith for PedsCases.com.
May 30th, 2025