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# A 9-Year-Old Female Presenting with a Pelvic Abscess That Mimicked a Septic Hip Joint: A Case Report and Discussion of the Diagnostic Challenges That Were Faced

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## Abstract

When all four Kocher Criteria are satisfied, the diagnosis of septic arthritis has a reported likelihood between 59-99%. However, when physical exam and imaging studies are inconsistent with septic arthritis, alternative diagnoses must be considered. We present to you the case of a 9-year-old female who satisfied all four Kocher Criteria and underwent an extensive workup. She was found to have an abscess along her pelvic sidewall that extended through the greater sciatic foramen into the piriformis muscle and inferiorly along the course of the sciatic nerve. Primary source control was achieved with operative irrigation and debridement, and long-term antibiotic therapy was used for eradication.

**Keywords:** Pediatric hip pain • Kocher criteria • Septic joint • Pelvic abscess • Sepsis

## Introduction

The differential for hip pain in the pediatric population is broad, including transient synovitis, septic arthritis, osteomyelitis, Legg-Calve-Perthes, slipped capital femoral epiphysis, fractures, juvenile idiopathic arthritis or other rheumatologic causes, neoplastic/infiltrative diseases, and referred pain from abdominal pathology such as appendicitis or pelvic abscesses. History and exam are usually sufficient to suggest a couple of likely diagnoses, but occasionally the diagnosis is not as clear, and the provider must consider laboratory and imaging studies to inform their differential diagnosis.

When a child presents with hip pain and systemic symptoms, the early and accurate diagnosis of septic arthritis is essential, as delays in its treatment are associated with increased morbidity. Sequelae of septic arthritis in children include osteonecrosis, growth arrest, and sepsis [1]. The presenting symptoms of septic arthritis have considerable overlap with transient synovitis, a much more benign disease that is typically self-limited. In 1999, Kocher MS [2] attempted to develop a set of predictive diagnostic criteria that could be used to differentiate between the two diagnoses. They reported that when a patient has a history of non-weightbearing, fever >38.5°C, Erythrocyte Sedimentation Rate (ESR) >40 mm/hr, and White Blood Cell (WBC) count >12×10$^9$/L, the predictive probability of septic arthritis is 99.6%. In 2004, Luhmann SJ, et al. [3] attempted to validate the predictive probability of the Kocher Criteria, but in the patient population that they studied they found that when all four criteria were satisfied the predicted probability of the patient having septic arthritis was only 59%. Regardless, septic arthritis is considered a can't-miss diagnosis in a patient who presents with hip pain accompanied by systemic manifestations of illness. In this case study, we present the workup, management, and clinical course of a 9-year-old female who presented with hip pain and met all four Kocher Criteria in whom septic arthritis was ruled out and she was later determined to have a pelvic abscess.

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## Case Presentation

An otherwise healthy 9-year-old female presented with 4-5 days of worsening right hip pain and generalized abdominal pain that was worse in the Right Lower Quadrant (RLQ). Around ten days prior to presentation she had a mechanical ground-level fall landing on her right hip, but she was not complaining of any symptoms from this fall immediately afterwards. For the past 1-2 days she has been unable to ambulate due to pain. The pain is stabbing in quality and located in the right flank/buttock. Associated symptoms include fevers, nausea, one episode of small-volume emesis, and decreased Per Oral (PO) intake. She denies bowel or urinary changes, headaches, dizziness, chest pain, or shortness of breath. Of note, she had a dental infection 2-3 weeks prior for which she was treated with a one-week course of amoxicillin.

On presentation to the Emergency Department, she was febrile to 39.4°C and mildly tachycardic for her age to the 120's-130's. Physical exam was notable for abdominal pain with palpation of the periumbilical and RLQ areas with notable guarding. No tenderness, guarding, or rebound in the Right Upper Quadrant (RUQ), suprapubic area, or left side. Musculoskeletal exam was notable for normal range of motion of the left leg; right leg range of motion was limited by patient discomfort. She was only able to straight leg raise ~30 degrees with exquisite pain and actively tensed against external rotation. She had normal range of motion of the right ankle and right knee. There was no point tenderness of the right hip. She was extremely uncomfortable and unable to attempt to stand. A scattered erythematous rash over the chest and arms was also present. A summary of pertinent laboratory values at the time of presentation is shown in Table 1. Urinalysis was notable for some white blood cells and leukocyte esterase; however, it did not show any bacteria. Blood cultures were drawn.

She was admitted to the pediatric floor for monitoring and was started on Intravenous (IV) ceftriaxone and metronidazole. Blood cultures at this time were positive for Group A Streptococcus. A Computed Tomography (CT) scan of her abdomen and pelvis was obtained with IV and PO contrast. It demonstrated a normal-appearing appendix, moderate wall thickening of the terminal ileum, and asymmetric hypertrophy of the right psoas and iliacus muscle with adjacent free fluid in the right hemipelvis (Figure 1). A small joint effusion in the right hip was noted but there were no other osseous abnormalities (Figure 2). General

**Table 1.** Summary of pertinent laboratory values at the time of presentation and reported reference ranges.

| Test (unit) | Result | Reference Range |
|---|---|---|
| WBC (white blood cells; $\times 10^9$/L) | 21.9 | 3.8 – 10.4 |
| Neutrophils (%) | 94.4 | |
| Hemoglobin (g/dl) | 9.8 | 11.2 – 14.5 |
| Sodium (mmol/L) | 128 | 135 – 145 |
| Potassium (mmol/L) | 4 | 3.5 – 5.3 |
| Chloride (mmol/L) | 92 | 102 – 112 |
| Bicarbonate (mmol/L) | 20 | 22 – 29 |
| BUN (mg/dl) | 12 | 9 – 21 |
| Creatinine (mg/dl) | 0.45 | 0.31 – 0.61 |
| Glucose (mg/dl) | 69 | 70 – 99 |
| ESR (erythrocyte sedimentation rate; mm/hr) | 69 | 3 – 13 |
| CRP (C-reactive protein; mg/L) | 153.4 | 0.0 – 8.0 |

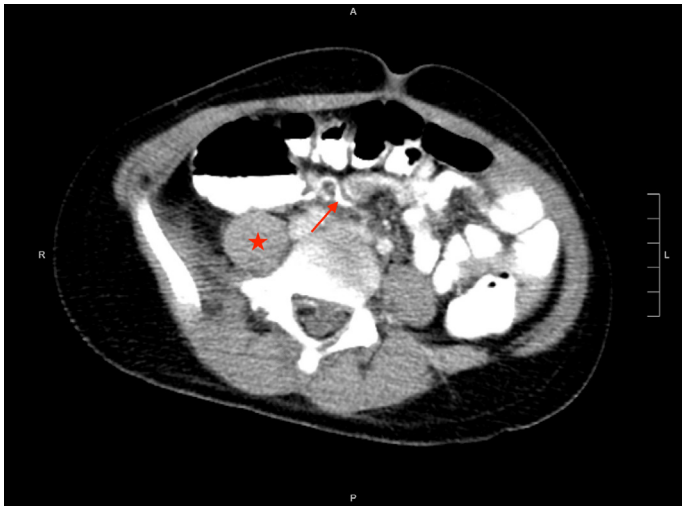


**Figure 1.** Axial CT scan of the abdomen image demonstrating a normal appearing appendix (arrow) and asymmetric hypertrophy of the right iliopsoas muscle (star).

surgery was consulted for further evaluation and recommended transfer to a pediatric surgical specialty center.

After transfer, additional imaging with abdominal ultrasound redemonstrated a normal appendix, non-specific inflammatory changes in the RLQ, a small amount of free fluid, and mild wall thickening of the terminal ileum. No joint effusion in the right hip was noted. Orthopedics was consulted for the concern of a septic hip, which they believed was very unlikely so they decided not to perform an arthrocentesis. The decision was made to obtain an MRI of the pelvis with IV contrast. It demonstrated an extensive loculated fluid collection concerning for an abscess along the right pelvic sidewall, extending into the right piriformis muscle, and tracking inferiorly along the right sciatic nerve (Figures 3 and 4).

She was taken to the operating room by orthopedic surgery with general surgery to assist with washout and debridement of her abscess. A Jackson-Pratt (JP) drain was left in place and removed on postoperative day number two. Intraoperative cultures were obtained which also grew Group A Streptococcus. She remained on IV ceftriaxone and worked with physical therapy until she was cleared for discharge home. At the time of discharge, she was transitioned to oral cephalexin for a total duration of four weeks of antibiotic therapy per recommendations from the infectious disease team. She was seen for follow-up three weeks later and at that time she still had some mild right hip and right lower quadrant pain but was able to ambulate without the use of assistive devices.

## Discussion

Transient synovitis occurs much more commonly than septic arthritis, with a reported incidence of 200 cases per 100,000 children per year [4] compared to 4-5 cases per 100,000 children per year [5], respectively. The true incidence

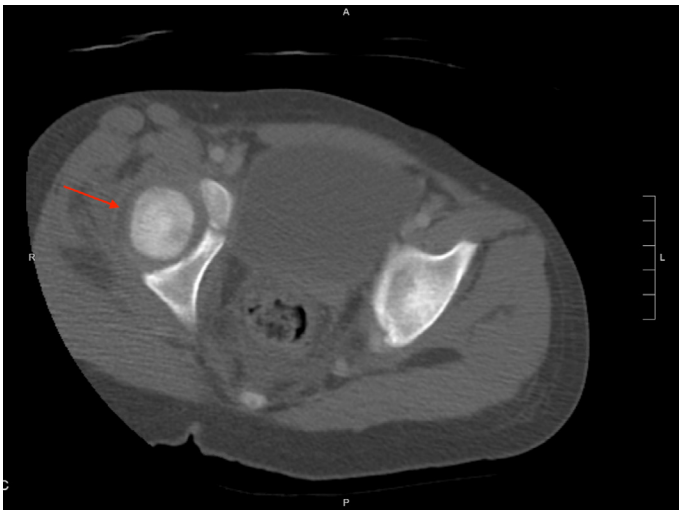


**Figure 2.** Axial CT scan of the pelvis image demonstrating a small joint effusion in the right hip (arrow).

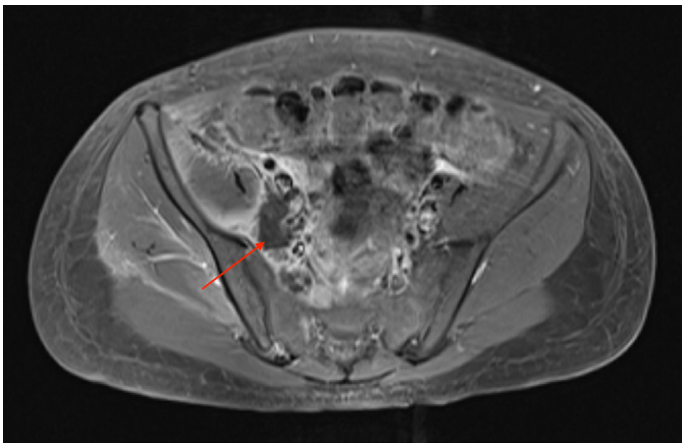

**Figure 3.** Axial post-contrast T1 fat saturated MRI image demonstrating a fluid collection in the right hemipelvis (arrow).

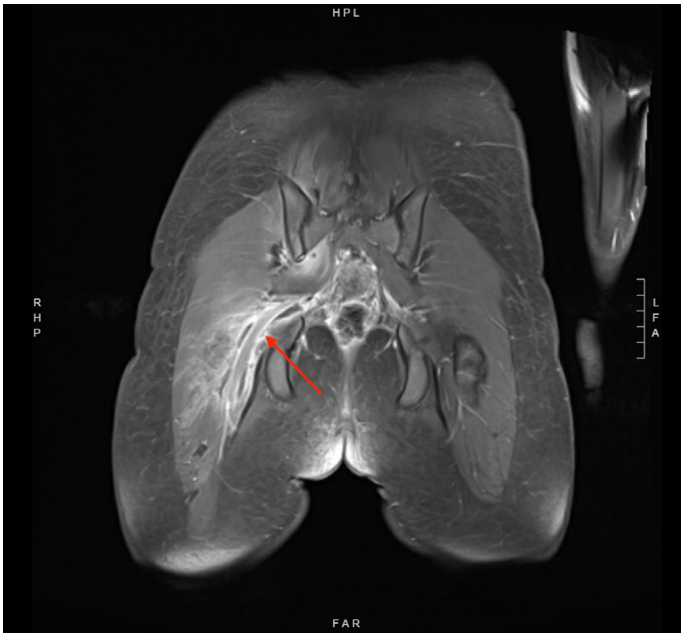


**Figure 4.** Coronal post-contrast T1 fat saturated MRI image demonstrating fluid extension through the greater sciatic foramen and inferiorly along the course of the sciatic nerve (arrow).

of transient synovitis may be even higher assuming some cases are not severe enough to seek medical treatment. Whenever a child presents with fever and a painful joint, septic arthritis must be quickly ruled out, and transient synovitis is usually a diagnosis of exclusion. Typically, septic arthritis affects younger children under the age of four [6], while transient synovitis commonly affects older children between the ages of 3-10 [4].

In this case, it was recognized that septic arthritis was a concern, and orthopedic surgery was appropriately consulted. Although she met all four Kocher Criteria with a refusal to bear weight, fever >38.5°C (39.4°C), WBC count >12×$10^9$/L (21.9×$10^9$/L), and ESR >40 mm/hr (69 mm/hr), upon examination she was able to tolerate full passive range of motion of the hip in flexion. She was observed resting her leg in full extension, but patients with a septic hip typically rest their leg in slight flexion and abduction as this position reduces the amount of stretch on the hip capsule which helps to alleviate pain. Additionally, this patient was 9 years old, which is older than the typical age for a patient with septic arthritis. Based on these findings, orthopedic surgery felt strongly that she did not have a septic joint and did not recommend an arthrocentesis. They believed that the cause of her hip pain was due to an extra-articular process and recommended continued workup for abdominal and pelvic etiologies.

Plain radiographs, CT of the abdomen and pelvis, and abdominal ultrasound all failed to confirm the diagnosis, and ultimately the abscess was found on MRI. Its extension into the piriformis muscle, one of the short external rotators of the hip, explains why she was able to tolerate flexion but not internal/external rotation of the hip. The Kocher Criteria are relatively non-specific, and if present they signal an acute infection or inflammation, but they are not specific to intra-articular pathology such as septic arthritis.

Why and how she developed an abscess along her pelvic sidewall and into her piriformis muscle is an interesting question that we can only hypothesize answers for. Was the recent history of dental infection related or is it a red herring? What role, if any, did the fall play in the pathogenesis of her condition? Was she bacteremic first which led to the formation of an abscess, or did she develop the abscess first which later caused her to become bacteremic? Her blood cultures and intraoperative wound cultures both grew Group-A Streptococcus, but beyond the clear correlation between the abscess and her bacteremia it is difficult to make any conclusions about causation based on this information.

Group A Streptococcus is commonly found on the skin and in the mouth. When it invades a wound on the skin it can cause cellulitis, erysipelas, and impetigo. It is also responsible for causing pharyngitis, but it is not commonly associated with dental infections. Abscesses can be divided into primary and secondary based on their pathogenesis. Primary abscesses occur as a result of hematogenous or lymphatic spread from a distant area and are typically accompanied by risk factors for immunodeficiency [7]. Secondary abscesses occur as a result of direct spread of infection from an adjacent structure. In the case of psoas abscesses, they may be secondary to other abdominal pathologies such as ileocolitis and appendicitis [7].

Our patient had no known medical history and did not have any signs of a superficial infection overlying the affected hip. Given her significant right-sided and periumbilical tenderness on abdominal exam, it is possible that she did have an intraabdominal pathology that was already resolved by the time she presented and was not detected on imaging. However, this scenario still would not explain why the abscess was located in her piriformis and not her psoas. Any potential explanation has its limitations, and it is still unclear what the exact sequence of events was that led to the formation of a pelvic abscess in an otherwise healthy 9-year-old patient.

## Conclusion

The likelihood of having septic arthritis when four out of four Kocher Criteria are present is somewhere between 59-99% [2,3]. However, this case demonstrates the importance of considering alternative diagnoses even when one seems very likely based on the information available at the time. The orthopedic surgery team felt confident enough based on their physical exam to rule out septic arthritis, so that this patient was not subjected to any unnecessary procedures.

## Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

## Data Availability

The peer-reviewed publication data used to support the findings of this study are included within the article. These prior studies are cited at relevant places within the text as references [1-7].

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