



Case reports

# Primary osteomyelitis of the acetabulum resulting in septic arthritis of the hip and obturator internus abscess diagnosed as acute appendicitis<sup>☆</sup>

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**Abstract** The misdiagnosis of acute appendicitis is not uncommon. Rarely does infection of the triradiate cartilage imitate this entity. This case highlights an uncommon presentation of acetabular osteomyelitis as acute appendicitis and the severity of its sequelae. Like septic arthritis of the hip, acute appendicitis overtreatment is acceptable in part because of the complications resulting from delayed diagnosis and treatment. However, this case demonstrates the need to consider pelvic osteomyelitis and peripelvic infection in the differential diagnosis of appendicitis.

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Despite computed tomography (CT), magnetic resonance imaging (MRI), and laparoscopy, the misdiagnosis of appendicitis remains 15.5% to 24% [1,2]. Common diagnoses associated with normal appendiceal anatomy include ovarian cysts, mesenteric adenitis, ovarian cystadenoma, perforated diverticulum, gastroenteritis, reactive lymphoid hyperplasia, serosal congestion, and fibrous obliteration [3]. It should be noted that 35% of negative appendectomies are discharged with a diagnosis of unexplained abdominal pain without sequelae [2]. This article discusses an instance of osteomyelitis of the acetabulum involving the physis at the

triradiate cartilage, with development of septic arthritis of the hip joint and abscess of the obturator internus, initially diagnosed and treated as acute appendicitis.

Pelvic osteomyelitis may be a difficult diagnosis to make and is often delayed. Typical signs and symptoms of pain, swelling, warmth, and redness are not easily localized in cases of pelvic osteomyelitis. Pain may be referred to the hip, knee, back, or abdomen. Physical examination maneuvers including the Faber (Patrick) test and pain with compression and distraction of iliac wings may be helpful [4]. Temperature, white blood cell (WBC) count, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) are typically elevated but nonspecific. Radiographs usually do not show bone changes for 7 to 10 days. Deep soft-tissue swelling may be apparent. Computed tomography may demonstrate nonspecific changes early but are useful to detect intramuscular abscesses [3]. Technetium-99m

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diphosphate bone scans are useful in diagnosing multiple lesions, except in neonates and infants, but may be confused with normal physes [4]. Magnetic resonance imaging is 97% sensitive and 92% specific in diagnosing acute musculoskeletal infection and demonstrates early soft tissue and marrow edema [5]. Magnetic resonance imaging is also useful to define the extent of osseous and extraosseous lesions [6].

## 1. Case

A 9-year-old girl presented to the emergency room at an outside institution, a critical access hospital, with right lower quadrant abdominal pain, decreased appetite, and fever of 38.6°C. The patient was diagnosed 1 day prior with a groin strain after swimming for which she underwent a physical therapy session. Her medical history is significant for asthma controlled with fluticasone, montelukast, and cetirizine. Physical examination revealed an overweight female with a mildly distended abdomen, hypoactive bowel sounds, rebound tenderness to palpation in the right lower quadrant, and tenderness over the anterior iliac crest and inguinal ligament. Flexion of the right hip was painful. White blood cell count was 17,100 with 88% neutrophils. Urine analysis was normal.

Abdominal and hip radiographs were unremarkable. Computed tomography of the abdomen and pelvis with oral and intravenous contrast was read as appendiceal enlargement, periappendiceal stranding, and right lower quadrant mesenteric lymph node enlargement consistent with appendicitis.

The patient was taken emergently for appendectomy and was placed on ampicillin/sulbactam. Postsurgical pathology of the appendix demonstrated no atypia, inflammation, or perforation. On postoperative day (POD) 2, the patient was ambulatory and afebrile, and WBC was 8.5 with 70% neutrophils. A Jackson Pratt drain was removed with a total output of 30 mL, and she was discharged home the following morning.

On POD 6, the patient traveled to the east coast with her guardians. The patient used a wheelchair because of difficulty ambulating secondary to hip pain. On POD 9, she presented to the pediatric emergency department of our state designated trauma center, after she spiked a fever of 39.4°C.

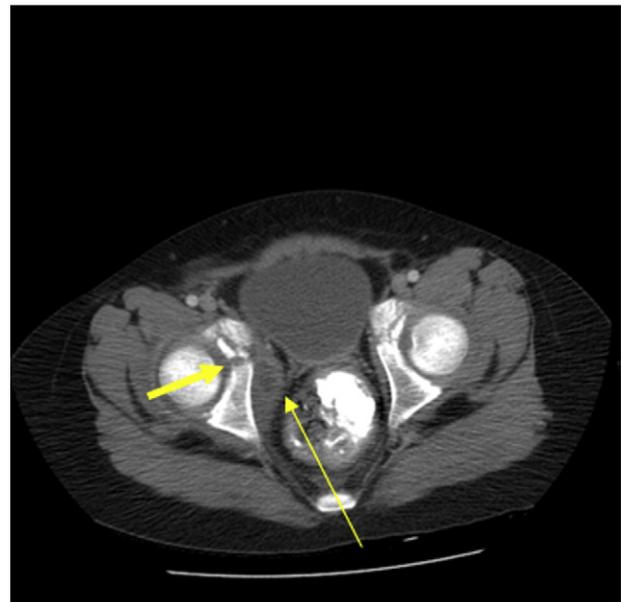
The patient complained of right hip pain and inability to ambulate. On examination, the surgical incision was healing without drainage, and her abdomen was soft. Severe pain with motion of the right hip in any direction was elicited. The patient held the hip in extension and adduction. Temperature was measured as 39.8°C, WBC of 10.7 with 72% neutrophils and 2% bands, ESR of 71 mm/h, and CRP of 187 mg/L. Blood and urine cultures were obtained. Radiographs of the abdomen, hip, and knee were unremarkable. Computed tomography with oral and intravenous contrast of the

abdomen and pelvis revealed a 1.7-cm abscess of the right obturator internus and a small right hip effusion, postsurgical changes of the right lower quadrant subcutaneous fat with 9-mm-diameter lymph nodes. No visceral abnormalities or free fluid in the abdomen were visualized (Fig. 1).

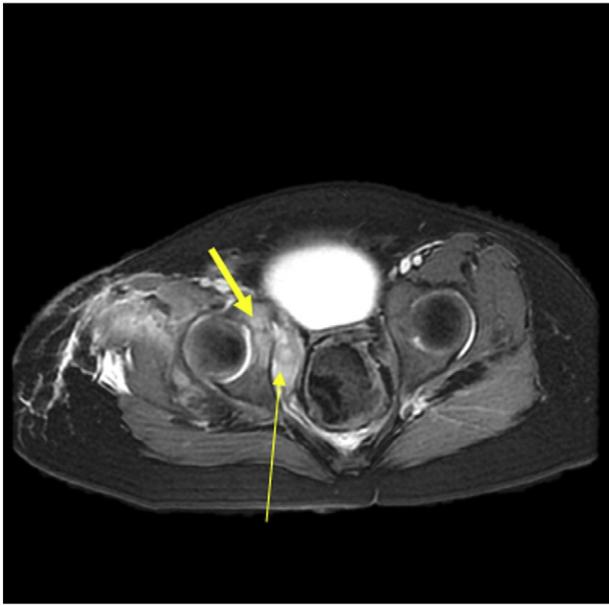
The patient was taken emergently to the operating room for aspiration of the right hip with possible irrigation and debridement. Aspiration of the hip using the anterior approach returned 7 mL of pus. Irrigation and debridement of the right hip were performed using an anterolateral approach. *Staphylococcus aureus* was isolated from blood and intraoperative cultures. Urine culture demonstrated 50,000 colonies/mL *Escherichia coli*.

Postoperatively, the patient stabilized and remained febrile with a maximum temperature of 39.3°C, WBC 11.4 with 64% neutrophils, ESR 100 mm/h, and CRP 120 mg/L on POD 12 of the index procedure. Magnetic resonance imaging of the abdomen and pelvis, with and without intravenous contrast, demonstrated osteomyelitis of the acetabulum with a sinus tract into a 2-cm abscess of the obturator internus (Fig. 2). The patient returned to the operating room for irrigation and debridement of right obturator internus abscess and medial wall of the acetabulum. Surgical pathology revealed acute and chronic inflammatory infiltrates with acute osteomyelitis.

On POD 17, the patient was afebrile for 24 hours and ambulating with physical therapy. The patient remained afebrile the rest of her hospital stay with WBC 8.9 with 67% neutrophils, ESR 100 mm/h, and CRP 24 mg/L. On POD 21, she was discharged home with a peripherally



**Fig. 1** Axial CT scan with intravenous contrast demonstrates a hypodense collection within right obturator internus muscle (long arrow) consistent with abscess. Also noted is asymmetrical lucency and irregularity in the triradiate cartilage (short arrow).



**Fig. 2** Axial T2-weighted fat-saturated MRI demonstrates postarthrotomy appearance with decreased joint effusion and round dark rim abscess within right obturator internus (long arrow). Increased signal medial right acetabulum around the triradiate cartilage, consistent with osteomyelitis (short arrow).

inserted central catheter line, receiving rifampin and vancomycin. At 3-month follow-up, the patient was having no problems with hip pain or function.

## 2. Discussion

Pelvic osteomyelitis has a variable presentation, which contributes to its misdiagnosis. Laboratory data such as WBC, ESR, and CRP, usually helpful in the diagnosis of osteomyelitis, may be unremarkable in cases of pediatric pelvic osteomyelitis [7]. Fever was present in only 35% of cases of pediatric pelvic osteomyelitis reviewed by Klein and Leach [7]. Beaupre et al. established three symptoms with which iliac osteomyelitis presents as lumbar disc, abdominal, and gluteal syndromes [8]. The lumbar disc syndrome presents with low back pain along with hip and thigh pain. Tenderness over the sacroiliac joint and with lateral pelvic compression was often present along with a painful straight leg raise. The gluteal syndrome is characterized by buttock pain and palpable mass representing subgluteal abscess. The abdominal syndrome presented similar to acute appendicitis as spread of inflammation involves the iliac fossa and Beaupre and Carroll [8] reported 1 of 20 cases of iliac osteomyelitis undergoing appendectomy.

Pelvic osteomyelitis is rare, which adds to its delay in diagnosis. Zvulunov et al [9] report an average delay of 12 days resulting in permanent disability in 3.4% of cases reviewed. It is thought to account for 1% to 11% of cases

of hematogenous osteomyelitis [9]. In adults, osteomyelitis of the pelvis often results from postoperative gynecological infection [10]. In children, its etiology is unknown with history of minor trauma in 13 of 64 cases of reported pelvic osteomyelitis in children according to Davidson et al [10]. In this case reported, the diagnosis of pelvic osteomyelitis was delayed further by the patient's favorable response to antibiotics administered for the diagnosis of acute appendicitis.

With a 17% frequency of misdiagnosis of appendicitis, pelvic osteomyelitis must be considered in the differential diagnosis of the acute abdomen and septic arthritis of the hip [9]. Fever, hip pain, and intolerance of bearing weight are common presentations of appendicitis, ischiopubic abscesses, obturator abscesses, and septic arthritis of the hip [11]. Takemoto and Strongwater [11] recommend MRI to rule out septic arthritis of the hip and to diagnosis and define the extent of peripelvic infection.

Viani et al [12] described 14 cases of obturator internus abscess in the pediatric population that commonly presented with fever, hip pain, and a limp where MRI and CT were diagnostic. Three cases were complicated by ischial osteomyelitis. Although obturator internus abscess may mimic septic arthritis of the hip, it may also play a role in the development of hip infection. Simons et al [13] describe the obturator internus as a conduit for transmission of infection from the pelvis to the hip as it passes through the lesser sciatic foramen to the greater trochanter. Therefore, an abscess of the obturator internus would make the posterior capsule of the hip joint vulnerable to infection by this mechanism [13]. The incidence of joint involvement with osteomyelitis of the acetabulum in pediatric patients is 66% [14].

Emergent treatment of septic arthritis of the hip is necessary because timing is the most important predictor of outcome [15]. Although the criterion standard is open irrigation and debridement of the hip, El-Sayed [16] reports 20 cases of effective arthroscopic drainage of acute uncomplicated pediatric pyogenic hip infection. In this series, the hip was drained in an open fashion immediately upon presentation, and further imaging was performed after the patient remained febrile as discussed by Kocher et al [17] in their use of a clinical practice guideline for pediatric septic arthritis treatment. This case demonstrates the need to consider pelvic osteomyelitis and peripelvic abscess in the differential diagnosis of acute appendicitis. Additional imaging is indicated in patients symptomatic after appendectomy especially with normal pathology of surgical specimens.

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