

# Pseudomonas pelvic osteomyelitis in a healthy child

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## Abstract

Pediatric pelvic osteomyelitis is a rare entity. The diagnosis is frequently delayed due to difficulty in confirming the diagnosis. To our knowledge, this is the first case report of *Pseudomonas* pelvic osteomyelitis in a previously healthy adolescent boy. The diagnosis was made radiographically and confirmed by culture. The patient was treated with Levofloxacin and Gentamicin resulting in a complete recovery.

## Case Report

A previously healthy 13-year-old boy presented to an outside institution with two months of pain that started in the posterior of his left leg and slowly progressed until the pain encompassed the entire pelvis. He was an avid athlete but had no history of trauma. He had intermittent fevers with maximum temperature of 102° F. A white blood cell count at initial presentation was  $12.4 \times 10^9/L$  and an MRI demonstrated a partial tendon tear with strain in the left obturator adductor, minimus and magnus with no bone involvement. Radiographs of the pelvis and femur were negative. A diagnosis of a torn tendon was made and treatment with non-steroidal anti-inflammatory medications was initiated. Pain continued to progress eventually involving the entire lower abdomen. C-reactive protein and Erythrocyte Sedimentation Rate were elevated at 13.6 mg/L and 113 mm/hour one month into treatment. Computerized Tomography (CT) scan of the abdomen and pelvis with oral and intravenous contrast was negative and a tagged white blood cell scan at six weeks was also negative.

Two months after the initial presentation, the patient was hospitalized for continued pain and a 20-lb weight loss. On admission, the patient was afebrile but exhibited significant pelvic discomfort. Exam of the head, neck, chest and abdomen revealed no abnormalities. Musculoskeletal exam showed decreased flexion at the right knee with moderately decreased internal rotation of the right hip. There was severe tenderness with palpation over the right buttock and right ischial spine.

No fluctuance or overlying skin changes. The patient could not bear full weight on his right leg. Bilateral femur and pelvic radiographs showed focal demineralization surrounding the left hip. Focal periostitis was seen on the left ischium and left inferior pubic ramus. Bone scintigraphy showed increased blood flow, blood pool and delayed radiotracer uptake primarily involving the right ischium and posterior aspect of the right inferior pubic ramus. MRI demonstrated extensive signal abnormality and post-contrast enhancement of bilateral ischiopubic and adjacent soft tissue structures with a small peripherally-enhancing fluid collection medial and posterior to the right ischial tuberosity. CT-guided aspirate revealed purulent material and the biopsy was consistent with an acute osteomyelitis. Culture from the aspirate grew *Pseudomonas aeruginosa* and the patient was treated with Levofloxacin and Gentamicin. Although the patient had improved significantly, there was continued pain at the 6-week follow-up visit so the Levofloxacin was continued to complete a 6 month course. At the 6-months follow-up visit, the patient was asymptomatic and antibiotics were discontinued.

## Discussion

Osteomyelitis of the pelvis is a rare entity in children with an estimated incidence of 1-11% of all hematogenous osteomyelitis.<sup>1</sup> It is difficult to diagnose because of the rarity of infection and difficulty localizing the site of infection. Common misdiagnoses include septic arthritis or synovitis of the hip, appendicitis, cellulitis, pelvic inflammatory disease and nephrolithiasis. There is a general delay in diagnosis with mean duration of illness prior to diagnosis of 11 days.<sup>1,2,4</sup> Pelvic osteomyelitis occurs more frequently in older children (mean age 8.7 years), affects males slightly more and is less likely to present after antecedent trauma.<sup>1,2,6</sup> It usually occurs in a single bone with the ilium<sup>1,3,5,6</sup> being the most affected site.

The most common presenting complaints are fever and pain. Other symptoms include limp or inability to bear weight on affected side. In children non-specific complaints such as anorexia and weight loss can also occur.<sup>2</sup> The most common clinical findings are tenderness, fever, inability to bear weight, antalgic gait and decreased hip range of motion, although this is less severe than in children with septic arthritis.<sup>4</sup>

Common laboratory findings include an elevated ESR and CRP as well as an elevated white blood cell count, however, the diagnosis should not be excluded based on normal laboratory values.<sup>1,3</sup> The most frequently recovered organisms are *Staphylococcus aureus* with up

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to 50% of cultures being negative.<sup>2</sup> Other organisms infrequently found were *H. parainfluenzae*, *Salmonella*, *Group A Streptococcus*, *E. cloacae*, *P. aeruginosa*, and *K. kingae*.

Bone scans are frequently positive earlier in the course of pelvic osteomyelitis as compared with radiographs, however, a negative bone scan does not exclude the diagnosis. MRI may be the most sensitive and specific diagnostic test with sensitivity reported between 82-100% and specificity between 75-96%. MRI generally is positive by day 3-5 of illness.<sup>7</sup> It is also useful in determining the extent of infection and distinguishing between soft tissue infection and bony involvement. Ultrasound may be a non-invasive initial test that can be used to diagnose pelvic osteomyelitis as long as the clinician suspects the diagnosis. In one small study, the overall sensitivity and specificity of ultrasound was 86% and 100% respectively. However, ultrasound is only helpful if the study is specifically directed to look at the deep soft-tissues of the pelvis.<sup>8</sup>

Surgical drainage and debridement may be necessary depending on extent of disease, response to antibiotic therapy and possible development of an extra-osseous abscess but due to the substantial blood flow to the pelvic bones, antibiotics are generally sufficient in treating pelvic osteomyelitis. Most patients were treated for 4-6 weeks.

The most common complication of pelvic osteomyelitis is abscess formation in adjacent musculature. Other complications that have been reported include fusion of the sacroiliac joint and deep vein thrombosis in a protein-C-deficient patient.<sup>1</sup> Persistent infection due to chronic osteomyelitis or chronic recurrent multifocal osteomyelitis generally resolves with long-term antibiotics. Follow up should be long enough to identify complications such as growth abnormalities and chronic recurrent infections.<sup>4</sup> Long-term prognosis is generally good provided prompt and adequate duration

of antibiotic therapy.<sup>3,6</sup>

In conclusion, pelvic osteomyelitis is a rare condition in children. However, clinicians should suspect this diagnosis especially in a school-aged child who presents with fever, pain, limp, and/or inability to bear weight (Table 1).<sup>1-9</sup> If the diagnosis is suspected, the initial non-invasive test to consider is a bone scan. Once confirmed, a biopsy with culture should be sent to direct antibiotic therapy. Most patients with acute disease improve with no complications after 4-6 weeks of antibiotic therapy. Adequate follow-up is needed to ensure that the patient remains free of long-term sequelae.

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**Table 1. Summary of published pediatric pelvic osteomyelitis cases series.**

| Review, N                     | Demographics                                    | Presentation                                                              | Treatment                                                             | Pathogen                                                                                                                                                                                                                                                          | Outcomes                                                                     |
|-------------------------------|-------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Kumar, 2010, n=23             | Male 65%<br>Mean age NA<br>Range 1m-13y9m       | Limp 100%<br>Fever 65%                                                    | Debridement 30%<br>IV abx 100% mean 18.7d<br>then PO abx for 1-12 wks | Blood cx:<br>Negative 70%<br>MSSA 22%<br>MRSA 4%<br>Salmonella 4%                                                                                                                                                                                                 | NA                                                                           |
| Klein, 2007, n=31             | Male 61%<br>Mean age 8y11m<br>Range 1.5m-17y9m  | Pain 90%<br>Fever 71%<br>Limp 29%<br>Weight loss/anorexia 3%              | IV abx 97% (4-6 wks)<br>PO abx 3% (4 wks)                             | Blood cx:<br>Negative 59%<br>MSSA 33%<br>MRSA 4%<br><i>K. kingae</i> 4%<br>Tissue cx:<br>Negative 59%<br>MSSA 27%<br><i>E. cloacae</i> 5%<br><i>P. aeruginosa</i> 5%<br>Salmonella 5%                                                                             | Complete resolution 97%<br>Avascular necrosis of femoral head 3%             |
| Weber-Chrysochoou, 2007, n=19 | Male 72%<br>Mean age 8.0 y<br>Range 9 m-15y7m   | Limp 100%<br>Fever 84%<br>Hx of trauma 58%<br>Local swelling/erythema 21% | Abx 100%                                                              | Blood cx:<br><i>S. aureus</i> 41%<br>Tissue cx:<br><i>S. aureus</i> 42%<br><i>S. pneumoniae</i> 8%                                                                                                                                                                | Complete resolution 100%                                                     |
| Davidson, 2003, n=64          | Male 63%<br>Mean age 11 y6m<br>Range 1y2m-17y6m | Pain 95%<br>Limp 48%<br>Fever 47%<br>Hx of trauma 20%                     | IV Abx 97%<br>(avg 4 wks)<br>I/D 8%                                   | Source unspecified<br>Negative 50%<br><i>S. aureus</i> 41%<br><i>S. pneumoniae</i> 3%<br><i>H. parainfluenzae</i> 2%<br>Salmonella 2%<br>GAS 2%<br>Polymicrobial 2%                                                                                               | Complete resolution 97%<br>Persistent infection 3%<br>Other complications 5% |
| Zvulunov, 2003, n=146         | Male 75%<br>Mean age 8.1 y<br>Range NA          | Hx of trauma 17%                                                          | NA                                                                    | Blood cx:<br><i>S. aureus</i> 47%<br><i>S. pneumoniae</i> 2%<br>HiB 1%<br>GAS 1%<br>Tissue cx:<br><i>S. aureus</i> 47%<br><i>S. pneumoniae</i> 2%<br>HiB 1%<br>GAS 1%<br>Salmonella 6%<br>Gram-negative bacteria 3%<br><i>M. tuberculosis</i> 1%<br>Micrococci 1% | Recurrent osteomyelitis 2%<br>Permanent deformity 1%                         |
| Hammond, 2001, n=16           | Male 75%<br>Mean age 7.0y<br>Range 7m-13.0y     | Limp 100%<br>Fever 88%<br>Hx of trauma 31%                                | IV Abx 94%<br>(3-7 wks)<br>IV Abx+I/D 6%                              | Blood cx:<br>Negative 18%<br><i>S. aureus</i> 36%<br>GAS 27%<br><i>S. pneumoniae</i> 9%<br>Fusobacterium 9%                                                                                                                                                       | Complete resolution 100%                                                     |
| Totals, n=299                 | Males 206 (69%)                                 | Limp 112 (73%)<br>Fever 81 (53%)<br>Trauma 51 (21%)                       |                                                                       |                                                                                                                                                                                                                                                                   | Resolution 268 (97%)                                                         |

Y, years; M, months; Hx, history; IV, intravenous; Abx, antibiotics; wks, weeks; d, days; cx, culture; MRSA, methicillin-resistant *Staph aureus*; MSSA, methicillin-sensitive *Staph aureus*; NA, not applicable; Hib, *H. influenzae* type B; GAS, Group A *Streptococcus*.