Fulminant Spread of a Femur Anaerobic Osteomyelitis to Abdomen in a 17-Year-Old Boy

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Abstract

To our knowledge, distant spread of infection in anaerobic osteomyelitis has not been described before. In this article, we report a case of anaerobic osteomyelitis of femur with fulminant spread of infection to the abdomen in a 17-year-old boy with no predisposing medical factors and minimal bone involvement.

Anaerobic osteomyelitis often cannot be distinguished from aerobic osteomyelitis.[1] As anaerobes are the predominant microbial flora in human mucus membranes and skin,[1] it is not wrong to assume that they must be among the common contributors to human infections. With advancements in sampling, delivery, and culture methods, anaerobic microorganisms are increasingly found in cultures of bone infections.[1-6] The incidence of anaerobic microorganisms in bone infections was as high as 33% in recent studies.[1,3,5,7]

To our knowledge, anaerobic osteomyelitis of the femur with fulminant distant spread has not been described before. In this article, we report a case of anaerobic osteomyelitis of a femur with fulminant spread of infection to the abdomen in a 17-year-old boy with no predisposing medical factors and, surprisingly, minimal bone involvement in comparison with soft-tissue involvement. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 17-year-old boy was admitted to the emergency ward with reports of a 3-week history of right thigh pain. Forty days before presentation, the patient sustained a minimal blunt trauma to the thigh while playing soccer. The diagnosed case of soft-tissue trauma was managed conservatively. Three weeks before presentation, the pain started and the boy became nauseated and gradually cachectic.

The patient had no history of any disease or medical condition that would have compromised his immune system or made him susceptible to osteomyelitis, and there was no history of drug or substance abuse.

On admission, he was ill, but not toxic. Blood pressure was 120/75 mm Hg, pulse rate was 90 beats per minute, respiratory rate was 18 breaths per minute, and oral temperature was 37.5°C. He had no erythema or warmness but did have significant swelling over the right thigh. The skin of the thigh was intact. There was tenderness over the anterior surface of the middle of the thigh. The patient could not weight-bear. Neurovascular examination findings for the right lower extremity were normal. There was no tenderness or guarding of the abdomen.

Laboratory data showed severe leukocytosis (white blood cell [WBC] count, 24,000/ μL; 90% polymorphonuclear [PMN] leukocytes) and mild anemia. Erythrocyte sedimentation rate (ESR) was 102 mm/h. Other laboratory results were within normal limits.

A periosteal reaction and a lytic-sclerotic lesion were noticed in the femur (Figures 1, 2). Radiographs showed gas collected near the right femur shaft and

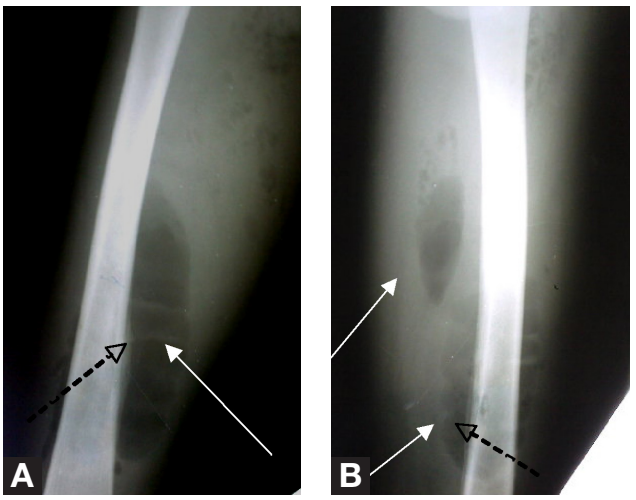

Figure 1. Anteroposterior (A) and lateral (B) radiographs of right thigh show gas in thigh (arrow) and periosteal reaction (dotted arrow).

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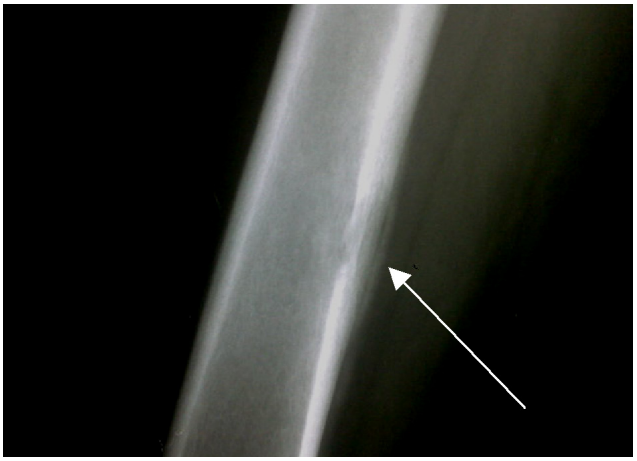

Figure 2. Midshaft femur lesion (arrow).

Figure 3. Anteroposterior radiograph of proximal thigh shows gas in upper thigh and inguinal area.

upper thigh (Figures 1, 3). Magnetic resonance imaging (MRI) showed a large abscess and a gas collection in the thigh (Figure 4). Computed tomography showed a lesion in the femoral shaft as well as a gas collection (Figure 5).

The patient was diagnosed with a soft-tissue abscess, probably caused by osteomyelitis, and was transferred immediately to the operating room.

In the operating room, the abscess was approached through a standard long lateral incision. A collection of pus and brownish fluid with a foul odor was found (Figure 6). The amount of bone destruction was small compared with the extent of soft-tissue involvement (Figure 7). Specimens were obtained for aerobic and anaerobic cultures and pathologic examination.

Fluid (500 cc) was drained, and necrotic bone was curetted. There was no sign of necrotizing fasciitis. The wound was copiously irrigated with normal saline containing gentamicin, was left open, and was dressed with a large bulk of wet gauze. After consulting with our infection specialist, we started intravenous ciprofloxacin and clindamycin.

The next morning, the patient's temperature rose as high as 38.8°C, he became toxic, and reported abdominal pain. Examination revealed emphysema, tenderness, and guarding in the right lower quadrant. After consulting with our surgeon, we had the patient transferred to the operating room. His abdomen was opened with 2 incisions, a transverse incision in the right lower quadrant and another in the right inguinal. Pus was found in the abdominal wall, the peritoneum, and the retroperitoneum. The abdomen

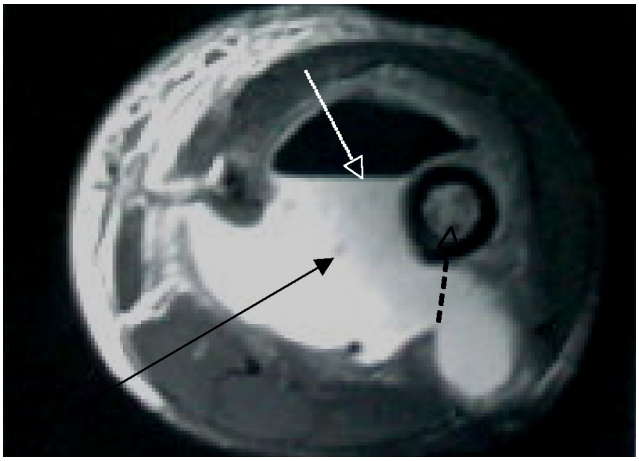

Figure 4. Axial magnetic resonance imaging of right thigh shows large abscess (arrow), air-fluid level (dotted white arrow), and gas in medulla (dotted black arrow).

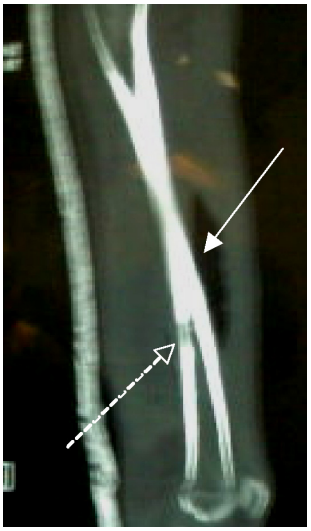

Figure 5. Sagittal computed tomography of right thigh shows gas in thigh (arrow) and cortical lesion (dotted arrow).

was drained and thoroughly irrigated. Culture specimens were obtained.

Nothing grew in the aerobic culture, but the anaerobic culture showed growth in *Bacteroides* species. The blood culture was negative. The antibiotics were changed to imipenem and penicillin G, per order of the infection specialist.

Pathology reported osteomyelitis in specimens acquired from the femoral shaft bone, severe soft-tissue inflammation, and necrosis without sign of necrotizing fasciitis.

The patient's wound was debrided and irrigated 7 more times over the next 10 days. The wound was closed in the final operation, after no pus or necrotic tissue remained.

Intravenous antibiotics were continued for 2 weeks. During that period, the patient's clinical condition was good. He had no fever and was using a wheelchair. The antibiotics were then changed to oral ciprofloxacin and clindamycin, and he was discharged from the hospital.

After 1 year, the patient was not having any problems related to this episode. His walking was normal, and the damages to the right femur had resolved without any consequences.

Discussion

More than 800 cases of anaerobic osteomyelitis have been reported in the English-language literature.[1] With

Figure 6. Right thigh, drained abscess.

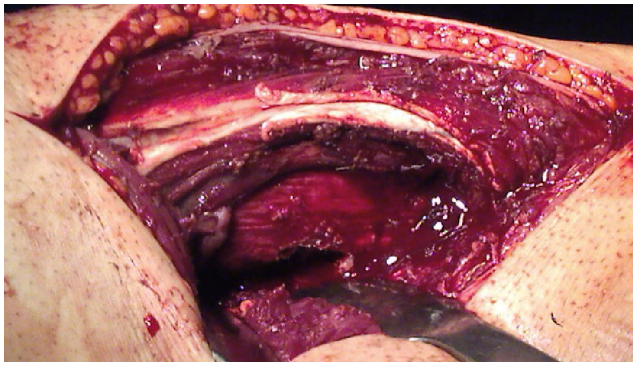

Figure 7. Right thigh, relatively small cortical lesion.

advancements in sampling, delivery, and culture methods, anaerobic microorganisms are increasingly found.[1] In most cases, anaerobes are mixed with facultative or aerobic bacteria.[1,2,6,7] Polymicrobic aerobic-anaerobic infections are known to be more pathogenic.[2]

The most common organisms responsible for anaerobic bone infections are gram-positive cocci, *Bacteroides* species, *Fusobacterium* species, and *Clostridium* species,[1-3,5,6] though the incidence of each is slightly different in each study.

Anaerobic osteomyelitis should be suspected in cases involving foul-smelling exudates and sloughing of necrotic tissue, gas in soft tissues, or black discharge from a wound.[1] In cases of bone infected with anaerobic microorganisms, joints may become involved.[1]

Predisposing factors in anaerobic infections include diabetes mellitus,[1,3-5] vascular insufficiency,[1,3-5] previous fractures,[3,4] trauma,[3-5] chronic sinusitis,[3] bites,[3,5] and chronic renal failure.[3]

Reported incidence of concomitant soft-tissue involvement has been as high as 49%,[1] and that of concomitant fracture has been as high as 28% to 48%.[1]

There may be no manifestations of inflammation during early stages of anaerobic infection,[1] but erythema, warmth, swelling, fever, and elevated pulse rate are recognized later.[1] Pain is usually severe, throbbing, and constant.[1]

Laboratory findings may include elevated WBC counts with increased levels of PMN leukocytes.[1] ESR and C-reactive protein levels are higher than normal.[1] Blood cultures are positive in early stages.[1]

On radiographs, an early manifestation is soft-tissue edema 3 days to 5 days after infection.[1] A periosteal reaction is not found until 10 days to 14 days after initiation of infection.[1] MRI is 92% to 100% sensitive for early detection of osteomyelitis[1,3] and can be used to differentiate cellulitis from osteomyelitis, as well as acute from chronic osteomyelitis.[1] Three-phase technetium-99m bone scan may be positive before bony changes are visible on radiographs.[1]

Management of anaerobic osteomyelitis involves symptom treatment, antibiotic use, sufficient drainage, and necrotic tissue debridement.[1,2] Surgery is performed to obtain specimens for culture and pathology, to drain pus, and to debride necrotic tissue.[1,2]

To our knowledge, anaerobic osteomyelitis of the femur has spread as far as the hip joint.[1] In our patient's case, an abdominal report arose only the week before admission, and on examination, there were no signs or symptoms of abdominal involvement. After the first operation, the patient had pain, tenderness, guarding, and emphysema in the right lower quadrant, and pus in the abdominal wall, the peritoneum, and the retroperitoneum. A specimen from the abdomen tested positive for anaerobic culture, *Bacteroides* species—same as the thigh specimen culture.

We think previous trauma was the predisposing factor in our patient's case. The aggressive course noted here is not expected in anaerobic osteomyelitis, particularly in the absence of past medical problems. As was shown in this case, however, other sites may become involved, and any clue should be carefully considered so it will not be missed.

To our knowledge, the English-language literature does not include any reports of similar cases. Given that our patient had none of the diseases or medical conditions that can accelerate the spread of infection from a relatively small bone lesion, his case is worth noting. We can conclude that, though he lacked those diseases and conditions, fulminant aggravation and spread of anaerobic osteomyelitis should be considered, and, on diagnosis, management and drainage should be promptly initiated.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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