

Osteomyelitis in a Paediatric Patient with Sub-periosteal Abscess, Septic Pulmonary Emboli and Pneumothorax: A Case Report

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ABSTRACT

Osteomyelitis is an inflammatory disorder affecting bone and adjacent tissue that primarily arises from pyogenic bacteria, often involving the metaphysis of long bones in pediatric patients through hematogenous spread with the common pathogen being *Staphylococcus aureus*. Complications such as pathological fractures, sinus formation, and abscesses, may occur. Septic pulmonary embolism (SPE), a rare complication, can lead to infarctions and abscesses in pulmonary vessels. Pneumothorax secondary to SPE can also occur, emphasizing the importance of considering these complications in patients with features of sepsis.

Keywords: Abscess; Osteomyelitis; Pneumothorax; Pulmonary Embolism; *Staphylococcus Aureus*

INTRODUCTION

Osteomyelitis, an inflammatory condition affecting bone marrow and surrounding tissue, is typically instigated by pyogenic bacteria. It predominantly affects the metaphysis of long bones in pediatric patients through hematogenous dissemination, with femur involvement at 25%, tibia at 24%, and humerus at 13%. Trauma is also considered a predisposing factor, as it can lead to bleeding in the metaphyseal capillary network, facilitating bacterial colonization and bone infection.¹

Bacterial osteomyelitis commonly manifests as monofocal bone disease, though multifocal cases are possible. Symptoms include severe

inflammation, fever, acute pain, swelling, skin hyperemia, and local hyperthermia.^{2,3}

Complications may include pathological fractures, sinus formation, sequestrum development, and persistent abscesses with deep venous thrombosis and thromboembolic events more prevalent with causative organisms like methicillin-resistant *Staphylococcus aureus* (MRSA) or Pantone-Valentine leukocidin *Staphylococcus aureus* (PVL-SA). Septic pulmonary embolism have been known to be associated with spontaneous pneumothorax in cases involving *Staphylococcus aureus*.^{4,5}

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CASE REPORT

We report a case of a 13-year-old male child, referred to our hospital for chest computerized tomography (CT) scan evaluation due to complaints of acute shortness of breath and features of septicemia. The patient underwent the study revealing mild to moderate hydropneumothorax in the left pleural

cavity (Figure 1a), accompanied by consolidation of the lower lobe and partial collapse of the upper lobe of the left lung. Multiple nodular opacities with irregular margins were observed scattered in the right lung (Figure 1b), predominantly in the upper and middle lobes, some exhibiting cavitation (Figure 1c).

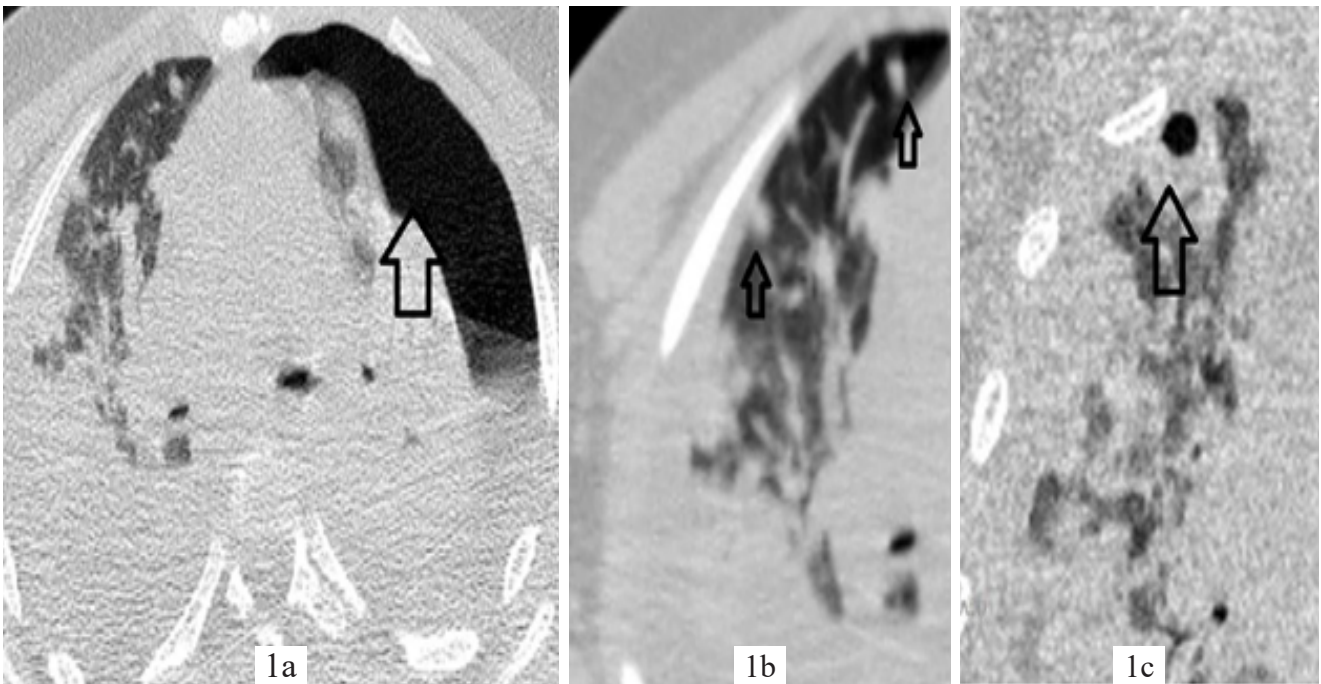


Figure 1; HRCT images a) Axial section showing mild to moderate hydropneumothorax in the left pleural cavity. **b)** Axial section showing multiple nodular opacities with irregular margins scattered in the right lung. **c)** Coronal section showing cavitation in the right upper zone

Following management of the pneumothorax in the emergency department with a drainage tube in the left hemithorax, the patient, who had a history of right lower limb pain, redness, tenderness, and swelling since a week underwent x-ray of the right lower leg as possibility of osteomyelitis was considered.

X-ray showed slightly altered trabecular pattern of the proximal tibial metaphysis with periosteal reaction (Figure 2). In the background of sepsis a provisional diagnosis of osteomyelitis was made.



Figure 2: Xray image showing the altered trabecular pattern of the proximal tibial metaphysis with periosteal reaction

To evaluate the full burden of the diagnosis, the patient underwent an MRI of the right lower leg. Which revealed diffuse marrow edema in both the proximal and distal tibial metaphysis (Figure 3a), as well as the entire diaphysis. Other findings included a focal cortical breach in the medial aspect of the proximal metaphysis (Figure 3b), periosteal elevation with subperiosteal collection (Figure

3c), edema in leg muscles (more prominent in the distal aspect), minimal collection in intermuscular and fascial planes, and subcutaneous edema with localized collection in the medial aspect of the leg. With the features described above, a diagnosis of osteomyelitis with subperiosteal abscess was made.



Figure 3 (STIR sequence MRI images); a) Coronal section of tibia showing diffuse marrow edema in both the proximal tibial metaphysis. **b)** Axial section of tibia showing focal cortical breach in the medial aspect of the proximal metaphysis. **c)** Coronal section of distal tibia showing periosteal elevation with subperiosteal collection

DISCUSSION

Acute hematogenous osteomyelitis typically involves the developing skeleton, predominantly affecting highly vascularized bone regions. It is

classified as acute if symptoms persist for less than two weeks, with incidence rates ranging from 8-10 per 100,000 in developed nations to as high as 80 per 100,000 in developing countries. Staphylococcus aureus is the most prevalent pathogen, followed

by *Kingella kingae*, *Streptococcus pyogenes*, and *Streptococcus pneumoniae*. The metaphysis is the usual primary site of infections as metaphyseal spongiosa contains abundant blood vessels with leaky endothelium and sluggish flow that end in capillary loops. An infection can also reach the subperiosteal space, probably from the metaphyseal focus but also possibly by means of direct seeding and subsequently disseminate through the vascularized cambium.⁶

Septic pulmonary embolism (SPE) is a rare complication of osteomyelitis where infected clots from a primary infection site can cause infarctions and focal abscesses in the pulmonary blood vessels; carrying a mortality rate of 10%-20%. While pneumothorax resulting from SPE is even uncommon, however, it can occur as was present in our case. Even despite receiving appropriate treatment for the infection after hospitalization, there is a possibility of pneumothorax formation. Thus it is important to take a proactive approach and consider the possibility of septic pulmonary embolism and pneumothorax in patients presenting with shortness of breath in the background of osteomyelitis.⁷

CONCLUSION

In short, septic pulmonary embolism (SPE) is a rare but serious complication of osteomyelitis, with potential mortality. Our case underscores the need to consider SPE and pneumothorax in osteomyelitis patients with breathing issues, even after treatment. Healthcare providers must stay alert and act swiftly to improve patient outcomes.

CONFLICT OF INTEREST

None

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None

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