Dokkyo Medical Journal
4(3): 251-254, 2025

Case Report

Rib Osteomyelitis in an 11-year-old Girl without Fever

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Summary

Rib osteomyelitis in children is rare. Here, we report a case of rib osteomyelitis in an 11-year-old girl who presented with chest pain as the only complaint. Based on physical examination and blood tests, pleurisy was suspected as the initial diagnosis, but contrast-enhanced computed tomography and magnetic resonance imaging confirmed the diagnosis of right rib osteomyelitis. The patient was treated with antibiotics and made a full recovery. Clinical manifestations of acute osteomyelitis include fever and localized pain; however, only 36% of patients with rib osteomyelitis have fever. Pediatricians need to consider rib osteomyelitis in the differential diagnosis of chest pain in children, even in the absence of fever.

Key Words: atopic dermatitis, pediatric infections, rib osteomyelitis

Introduction

Acute osteomyelitis in children is caused by direct infiltration of the bone following trauma, cellulitis, or pyogenic arthritis, or by hematogenous dissemination from a distant site. Most cases of acute osteomyelitis in children are caused by hematogenous spread of infection[1)]. Rib osteomyelitis is a rare condition that is difficult to diagnose. Here, we report our experience of diagnosing and treating a case of rib osteomyelitis in a child without fever.

Case Presentation

The patient was an 11-year-old girl who presented to the emergency department with a 7-day history of worsening right chest pain. She had a history of atopic dermatitis (AD), which was diagnosed at age of 5 years. Steroid ointment had been prescribed for the AD but was not being applied as advised. The patient had no history of immunodeficiency or trauma. The patient's vital signs were assessed, showing a body temperature of 36.8℃, a heart rate of 72 beats per minute, a blood pressure of 101/62 mmHg, and an oxygen saturation (SpO_2) of 98% while breathing room air. The chest pain was exacerbated by inhalation. She had lichenified skin and scratch marks over articular regions and on the trunk, resembling the cutaneous manifestations of AD. No swelling or redness were present at the site of the pain, and no other abnormalities were observed on physical examination.

Blood tests revealed a high normal white blood cell count (10,000 cells/μL, normal: 4,800-10,800 cells/mL) with an elevated neutrophil percentage (77%, normal: 40-60%); an elevated C-reactive protein (CRP) level

Received June 19, 2024; accepted November 23, 2024
https://doi.org/10.51040/dkmj.2024-035
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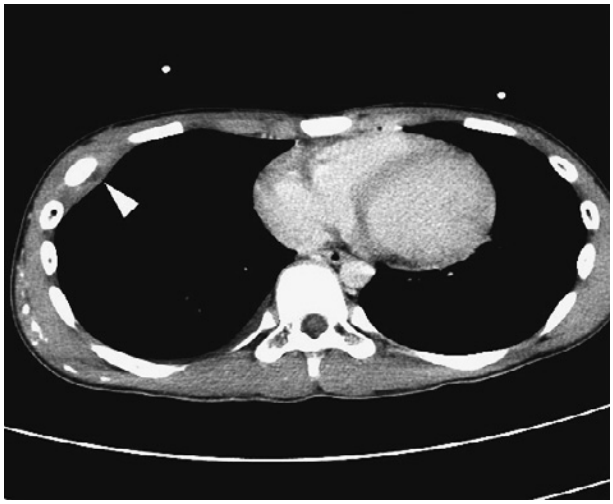

Figure 1 Contrast-enhanced computed tomography showing poor contrast in the subperiosteum of the right fourth rib. There is no evidence of a fracture.

(10.44 mg/dL, normal: 1-10 mg/dL); and normal levels of albumin (4.4 g/dL, normal: 3.4-5.4 g/dL), lactate dehydrogenase (205 U/L, normal: 143-370 U/L); and ferritin (23.2 ng/mL, normal: 7-142 ng/mL). The blood immunoglobulin (Ig)E level was elevated (4320 IU/mL, normal < 200 IU/mL), with normal levels of IgG (1406 mg/dL, normal: 422-1406 mg/dL), IgA (189 mg/mL, normal: 39-246 mg/dL), and IgM (143 mg/mL, normal: 40-251 mg/dL); and an elevated thymus and activation-regulated chemokine (TARC) level (638 pg/mL, normal: < 510 pg/mL), consistent with the patient's history of AD. As the chest pain was exacerbated by inhalation, pleurisy was suspected.

Chest radiography showed no abnormalities. Chest echocardiography was not performed. Contrast-enhanced computed tomography of the chest showed a subperiosteal area of poor contrast in the right fourth rib (Fig. 1) and magnetic resonance imaging (MRI) short TI inversion recovery (STIR) revealed a high-intensity focus on the right fourth rib (Fig. 2A-C), suggestive of rib osteomyelitis.

The patient was treated with intravenous cefotaxime (200 mg/kg/day). On the fifth day, the CRP level had decreased to within the normal limit (1.04 mg/dL), the right chest pain had improved, and blood culture results were negative; therefore, the antibiotic was changed to intravenous cefazolin (40 mg/kg/day). The patient's favorable response to antibiotic therapy supports the diagnosis of rib osteomyelitis. After 2 weeks of intravenous antibiotic therapy, the antibiotic treatment was changed to oral cefalexin (100 mg/kg/day) for 4 weeks. Follow-up blood tests and MRI, performed 42 days after the patient's presentation to the emergency department, showed no evidence of inflammation. AD may have been a risk factor for osteomyelitis in this case, so we instructed the patient and her parents on the treatment of AD. The patient's skin condition improved with appropriate application of topical corticosteroid ointment. The patient has been followed up for 2 years and has not experienced a recurrence of osteomyelitis.

Discussion

Rib osteomyelitis in children is rare, accounting for less than 1% of all reported cases of osteomyelitis[1]. Clinical manifestations of acute osteomyelitis include fever and localized pain. However, in many cases, the clinical manifestations of pediatric osteomyelitis are nonspecific and are not accompanied by pyrexia[2] with fever being reported in only 36% of cases of rib osteomyelitis[3]. Chest pain is reported to be present in only 13% of patients, and back pain is present in 10%. Irritability and anorexia, and localized draining sinuses have also been reported as clinical manifestations[3].

Bone tumors should be included in the differential diagnosis of rib osteomyelitis. However, in the present case, the imaging findings were strongly indicative of osteomyelitis. The subsequent improvement in MRI findings following treatment with antibiotics only further corroborated the diagnosis. A biopsy was not conducted, as the patient's pain rapidly resolved after the initiation of antimicrobial therapy. Surgical intervention, including biopsy, may be warranted in instances where symptoms do not improve following antimicrobial treatment and when imaging studies do not definitively exclude the possibility of a bone tumor. In this case, the patient had chest pain but was afebrile, consistent with the clinical manifestations of rib osteomyelitis. Therefore, pediatricians should consider rib osteomyelitis in the differential diagnosis of chest pain in children, even in the absence of fever.

Acute osteomyelitis in children can be caused by direct infiltration from trauma or cellulitis; however, in this case, the patient had no history of trauma, and cel-

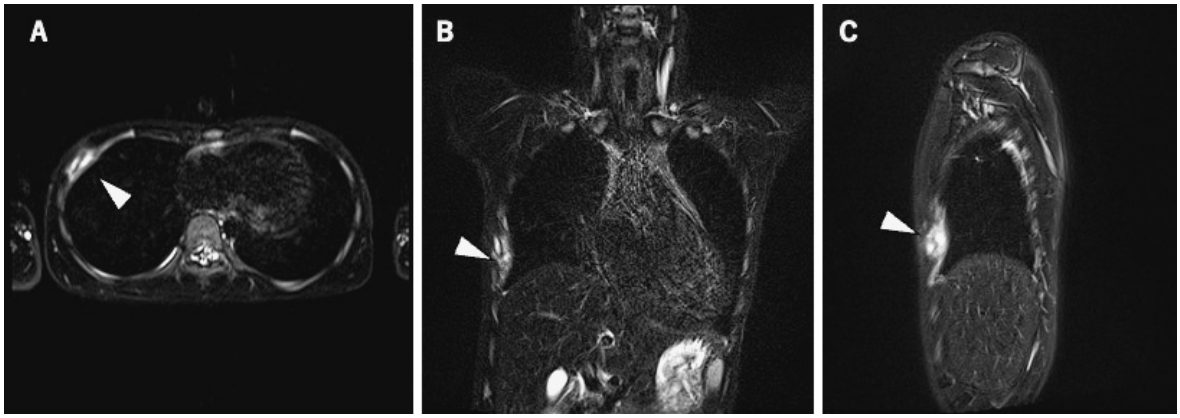

Figure 2 Chest magnetic resonance imaging short TI inversion recovery frontal view (**A**, axial; **B**, coronal; and **C**, sagittal section), showing a high intensity focus in the subperiosteum and bone marrow of the right fourth rib. There is no evidence of cellulitis.

lulitis was ruled out because of the absence of local swelling and redness of the skin over the affected rib. AD has been reported to be a risk factor for osteomyelitis, because of the reduced barrier function which cause hematogenous infection[4-7]. In this case, the patient had a scattered skin rash with scratch marks, indicating that her AD was poorly controlled; therefore, AD may have been a risk factor in this case.

In conclusion, we have described a case of rib osteomyelitis without fever. Although rib osteomyelitis is rare, children with chest pain should be investigated for osteomyelitis even in the absence of fever, particularly if skin lesions are present.

Acknowledgments

We would like to thank Editage (www.editage.com) for English language editing.

Funding source

This work did not receive any funding.

Author Contributions

Tomohiro Otaka collected the data and drafted and revised the manuscript. Yuji Fujita, Junpei Ishii, Yuya Takaiwa, George Imataka, and Shigemi Yoshihara contributed to the interpretation of the data and critically revised the manuscript for important intellectual content. All authors have approved the final manuscript and to be accountable for all aspects of the work.

Informed Consent

Informed consent for publishing this case report was obtained from the patient's parents.

Conflict of Interest Disclosure

The authors declare no conflict of interest.

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