CASE REPORT

Neonatal osteomyelitis of the first rib causing lung abscess

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SUMMARY

Rib osteomyelitis (OM) is a rare disease that occurs in ~1% or less of all haematogenous OM. Acute OM of the rib has rarely been reported and its treatment is difficult. Prompt recognition and aggressive treatment will reduce mortality and morbidity in a new born.

BACKGROUND

Owing to its seriousness, acute haematogenous osteomyelitis (OM) in infancy and childhood is a challenge to the paediatrician and paediatric surgeon. Of all haematogenous OM, Rib OM is a rare disease that occurs in ~1% or less patients. Acute OM is uncommon in neonates, and most frequently involves the humerus and femur. There are <50 reported cases of OM of the rib in the paediatric age group. Only two cases of OM rib are reported in neonates; none in the first rib. There are no guidelines on the treatment of OM of the rib in a new-born.

CASE PRESENTATION

A 28-day-old infant boy was referred from a peripheral hospital with swelling over the left side of the chest (figure 1) and decreased movements of the left arm. This was associated with high-grade fever and excessive crying. There was no reported history of trauma. The child had a history of multiple small superficial abscesses in the scalp and lower chest wall which was treated conservatively at the peripheral hospital. There was no history suggestive of umbilical sepsis. Perinatal history revealed a normal vaginal delivery at term performed at a peripheral hospital. There was no history of umbilical catheterisation. Clinical examination revealed an adequately nourished infant with a tender swelling measuring 5×4 cm² over the left upper chest which was fluctuant. Examination also revealed multiple small abscesses over the scalp.

INVESTIGATIONS

Complete blood picture revealed total leucocyte count of $28.5 \times 10^3/L$ with peripheral smear showing 62% neutrophils with toxic changes and 10% band forms. Ultrasensitive C reactive protein (CRP) was >184.9 mg/L. Blood culture, as well as pus culture, revealed *Staphylococcus aureus* sensitive to amoxicillin-clavulanic acid, cloxacillin, amikacin, cotrimoxazole, erythromycin, gentamycin, tetracycline/doxycycline, clindamycin, cefazolin/cefadroxil, ciprofloxacin/ofloxacin, but resistant to ampicillin.

Ultrasonography of the thorax was suggestive of abscess/haematoma. Chest X-ray showed cortical irregularity of the left first rib suggestive of OM; however, the lung fields were unremarkable. CT scan of thorax revealed a multiloculated, peripherally enhancing collection with internal septae in the left anterolateral chest wall and irregularity of the first rib suggestive of chest wall abscess formation with OM of the first rib.

In view of the multiple abscesses, the child was evaluated by the neonatologist and screened for primary immunodeficiencies, but was negative.

TREATMENT

The baby was admitted to the neonatal intensive care unit and was empirically started on intravenous ampicillin (100 mg/kg/day) and amikacin (15 mg/kg/day) and was taken up for incision and drainage of the multiple abscesses under general anaesthesia (GA). Intraoperatively, the chest wall abscess was drained with a transverse incision. The abscess was located in the subcutaneous space. Inspection of the abscess cavity did not reveal communication to the ribs or intrathoracic extension. Hence it was decided against surgical debridement of the first rib in favour of long-term antibiotics for the treatment of rib OM.

Based on culture and sensitivity, intravenous ampicillin was discontinued and switched over to intravenous vancomycin (15 mg/kg/dose Q8H) for 14 days. After an uneventful postoperative period, the baby was discharged home on oral amoxicillin-clavulanic acid (30 mg/kg/day of amoxicillin) for a period of 4 weeks.

The child was readmitted 2 weeks later with high-grade fever and cough. On examination, the child was tachypnoeic (respiratory rate of 36/min) with dullness on percussion and decreased air entry in the left upper zone.

Chest X-ray showed homogenous opacity in left upper and mid zone with cortical irregularity of the first rib suggestive of OM of first rib with empyema (figure 2). CT scan of the thorax revealed coalescing abscess involving the apicoposterior segment of the left upper lobe with adjacent consolidatory changes, left pleural effusion and extension of the abscess to the left first rib with associated osteomyelitic changes (figure 3). The patient was initiated on intravenous cefotaxime (100 mg/kg/day) and intravenous amikacin (15 mg/kg/day). Blood culture was negative on second admission.

Subsequently, the child underwent left thoracotomy approach and drainage of lung abscess and decortication, along with left supraclavicular

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Figure 1 A 28-day-old male infant with swelling over the left side of the chest suggestive of abscess.

approach and subperiosteal excision of first rib under GA. The child recovered uneventfully in the postoperative period and was prescribed long-term oral antibiotics (cotrimoxazole 8 mg/kg/day for 6 weeks) on discharge based on culture and sensitivity.

OUTCOME AND FOLLOW-UP

The patient was followed up with clinical evaluation and CRP estimation. The child remained asymptomatic at 6 months and 1-year follow-up with no fever or swelling at the site and radiological review performed at 1 year showed no signs of OM.

DISCUSSION

Owing to its seriousness, acute haematogenous OM in infancy and childhood is a challenge to the paediatrician and paediatric surgeon.¹ Neonatal OM presents with few clinical signs despite multiple sites of involvement. Rib OM is a rare disease that occurs in ~1% or less of all haematogenous OM.² Acute OM is uncommon in neonates,³ and most frequently involves the humerus and femur.⁴ There are <50 reported cases of OM of the rib in paediatric age group. Only two cases of OM rib are reported in neonates; none were reported in the first rib.

Figure 2 Chest X-ray showing a homogenous opacity in left upper and mid zone with cortical irregularity of the first rib likely suggestive of osteomyelitis of first rib with empyema.

Figure 3 CT scan of the thorax showing coalescing abscess involving apicoposterior segment of left upper lobe with adjacent consolidatory changes and extension of the abscess to left first rib with associated osteomyelitic changes.

Staphylococcus aureus is the commonest causative organism (45%);⁵ *Salmonella* species is a major causative organism in those with haemoglobinopathies. Predisposing factors for acute OM in neonates are prematurity, omphalitis, umbilical catheterisation, prolonged hospitalisation, pneumonia or meningitis.^{3 6 7}

Premature infants with umbilical catheter and severely ill full-term infants constitute a high-risk group for OM; signs are more overt, with multifocal infection and joint involvement and severe skeletal deformities. The patients in the low-risk group may have milder disease with few clinical signs.⁸ The usual clinical presentation of rib OM is a patient with fever accompanied by an abscess or draining sinus that fails to heal. OM may also present with multiple soft tissue abscesses.

Radiographic examination is essential for the diagnosis and follow-up of OM, particularly limb deformities. Radiological changes usually occur after 1–2 weeks.³ Bone scans should be reserved for situations in which the clinical and radiographical findings are equivocal.⁸

Successful treatment of OM includes surgical drainage, removal of the necrotic bone and prolonged antibiotic therapy. In most patients with OM, early antibiotic therapy produces the best results. Antimicrobials must be administered for a minimum of 4 weeks (ideally, 6 weeks) to achieve an acceptable rate of cure.⁹ Surgical debridement in patients with chronic OM can be technically demanding.¹⁰ The quality of debridement is the most critical factor in successful management. Surgical debridement is not necessary when haematogenous OM is diagnosed early. Current treatment recommendations rarely require surgical debridement. However, if antibiotic therapy fails, debridement (or repeated debridement) and another 4–6-week course of parenteral antibiotic therapy are essential.⁹ Children with acute OM should receive 2 weeks of initial parenteral antibiotic therapy before they are given an oral agent.^{9 11}

Complete skeletal survey is indicated in any infant with OM at one site to seek additional silent areas of involvement.¹² Septic arthritis often accompanies OM.⁴ Lung abscess and empyema may result from rib OM as illustrated in our case. The diagnosis of lung abscess may be established by chest

radiographs; however, CT scans are most valuable.¹³ Lung abscesses may be treated effectively with appropriate intravenous antibiotic therapy and percutaneous catheter drainage of the abscess. Surgical resection of the lung abscess by segmental resection or lobectomy is recommended for chronic, large and thick-walled abscesses or for those few patients who do not respond to intensive antibiotic therapy or percutaneous drainage.¹⁴

Prompt recognition and aggressive treatment of neonatal rib OM are important to reduce morbidity and long-term consequences.

Learning points

- ▶ Neonatal osteomyelitis (OM) is relatively rare and presents with few clinical signs despite multiple sites of involvement. If missed, neonatal OM can have devastating, lifelong consequences for the growing infant.
- ▶ *Staphylococcus aureus* is the commonest causative organism.
- ▶ Rib OM may cause lung abscess or empyema.
- ▶ Prompt recognition and aggressive treatment will reduce mortality and morbidity in a new-born.

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