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CASE REPORT

Haemophilus Influenzae Empyema in a Two-Month-Old Infant

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ABSTRACT: Empyema can rarely complicate pneumonia in neonates; it has a high morbidity and mortality in this population. We report a two-month-old healthy term male neonate who presented with fever, mild shortness of breath and reduced feeding to a tertiary care hospital in Muscat, Oman, in 2021. Investigations revealed the presence of Haemophilus influenzae empyema. He was managed with video-assisted thoracoscopic surgery and prolonged course of antibiotics. A follow-up at the end of the antibiotic course revealed complete symptom resolution with a repeated chest x-ray showing significant right chest opacity improvement. A baseline immune work-up was done and was reported to be within normal ranges.

Keywords: Empyema; Neonate; Haemophilus Influenzae; Case Report; Oman.

Empyema can rarely complicate pneumonia in neonates.[1] It is defined as a progressive pleural pus build-up which is mainly seen as a complication in patients with pneumonia.[1–5] It carries high morbidity and mortality in neonates.[1,4,5] Empyema can be fatal if sub-optimally treated.[1] Barbosa *et al*. reported three (0.04%) cases of empyema diagnosed out of 7,200 neonatal intensive care unit admissions over 18 years.[2] Risk factors of developing empyema in neonates include premature rupture of the membranes, maternal fever during labour, prematurity, extremely low weight birth, viral infection and immunosuppression.[1]

Case Report

A two-month-old healthy term male infant presented to the emergency department of a tertiary care hospital n Muscat, Oman, in 2021 with a 10-day history of fever and runny nose, associated with mild shortness of breath and feeding difficulty on the day of presentation. He received his birth and two-month vaccinations as per Omani immunisation schedule. On presentation, his temperature was 37.7°C, pulse rate was 150 beats/min, respiratory rate was 30 breaths/min, with saturation of 94% in room air. His chest examination showed reduced air entry on auscultation with a stony dullness percussion over the right-half of his chest. Other systemic examinations were unremarkable. Laboratory investigations showed leukocytosis at 37.1 × 10^9/L with neutrophilia of 24.7 × 10^9/L. The initial chest x-ray (CXR) showed air space opacities in the right lung with silhouetting of the cardiac border and the right hemidiaphragm. The right costophrenic angle was obliterated, suggestive of right pleural effusion [Figure 1]. He was started on intravenous (IV) ceftriaxone and clindamycin for a complicated community-acquired pneumonia. Computed tomography (CT) of the chest was done and showed a large right-sided pleural effusion which appeared to be encysted in apical region, causing compressive atelectasis of the right lung and shift of the cardiomediastinal structures to the contralateral left side. The right lung appeared to collapse with minimal aeration of the anterior segment of the right upper lobe [Figure 2]. A video-assisted thoracotomy done and drained a significant amount of pus, with both bacterial culture and viral studies were reported to be negative. A 16S rDNA polymerase chain reaction (PCR) testing from the pleural fluid was processed and reported positive for *Haemophilus influenzae*. He was managed with IV ceftriaxone and clindamycin and then oral co-amoxyclav for a total of 3–4 weeks. A clinic follow-up at the end of the antibiotic course revealed complete symptoms resolution; a repeated CXR showed significant right chest opacity improvement. A baseline immune work-up was done and was reported to be within normal ranges. Consent for publication was obtained.

Discussion

Medical literature on the clinical and laboratory features, and management of neonatal empyema is very limited.[1] Neonates with empyema have a wide range of symptoms, being asymptomatic to having significant respiratory distress requiring respiratory support.[1,4] These patients can present with pallor, jaundice or poor

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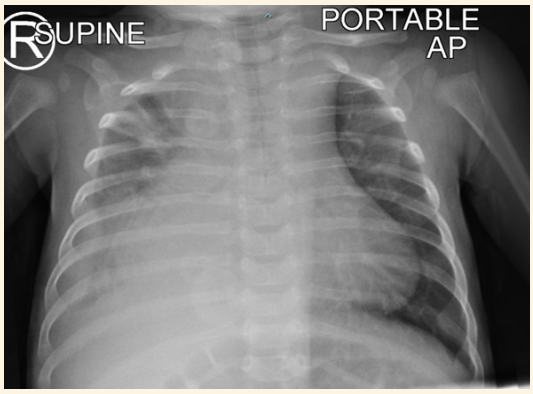

Figure 1: Initial chest x-ray of a two-month-old male infant showing air space opacities in the right lung with silhouetting the cardiac border and the right hemidiaphragm. The right costophrenic angle is obliterated.

feeding.[1] The mean age of presentation of empyema in one study was 13.5 days (6–38 day).[1]

Streptococcus pneumoniae, *Haemophilus influenzae* and *Staphylococcus aureus* are the most common causative organisms of empyema in children. Drained pus should be sent for biochemistry, microscopy, Gram stain, culture and molecular testing to optimise the identification of the causative organism and guide targeted therapy.[4,5] Friesen and Cho reported two cases and reviewed another 86 cases of neonatal *H. influenzae* from the literature. They found that 79.6% of these cases were due to non-typeable *H. influenzae* strains. Most of these infections were associated with maternal complications, prematurity, low birthweight and early onset sepsis.[6] Collins *et al.* reported 115 neonates with *H. influenzae* empyema from England and Wales over a five-year period; 96% had non-typable *H. influenzae* and 30 (26%) of these neonates had pneumonia.[7] No reported cases of neonatal *H. influenzae* empyema have been identified from Oman.

Managing empyema starts with accurate diagnosis through plain x-ray followed by lung ultrasound (US) to obtain further details and characterise the fluid.[3] Although Kurian *et al.* showed that CT chest did not provide additional useful information compared to chest ultrasound in their study, chest CT has a role in complicated cases and particularly in immunocompromised children where it can reveal other serious clinical problems.[8,9] Bacterial culture enables the detection of living bacteria only.[10] Giving empiric antibiotics can cause the sterilisation of pleural culture which makes it difficult to identify the offending organism. Molecular testing such as targeted PCR or broad range 16S rDNA PCR have the advantage of detecting viable and non-viable organisms in such cases.[10]

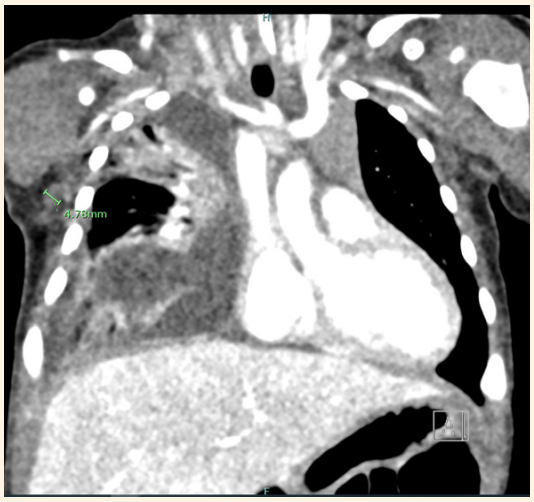

Figure 2: Computed tomography of the chest of a two-month-old male infant showing large right-sided pleural effusion which appeared to be encysted in apical region, causing compressive atelectasis of the right lung and causing shift of cardiomediastinal structures to the contralateral left side.

The therapeutic course depends on the severity of the empyema and the type of the causative micro-organism. Antibiotics and pus drainage, using intercostal chest tube or video-assisted thoracic surgery (VATS), are the mainstay of treatment.[3] A combination therapy of third generation cephalosporin and vancomycin in areas with high rates of methicillin-resistant *S. aureus* colonisation is the recommended empiric therapy.[1] Giving antibiotics for 3–4 weeks after adequate drainage of the pus is reasonable and has shown to be effective.[1,4] VATS is more effective for multiloculated empyema.[4,5] Follow-up with a repeat chest x-ray after 4–6 weeks is highly recommended.[1,5] The prognosis is excellent after proper treatment with no long-term complications in the majority of neonates reported in the literature.[1]

Conclusion

Early identification of effusion, immediate initiation of antibiotics and prompt chest tube insertion are the key for successful treatment of this condition. Molecular testing of the pus is highly recommended in children with culture negative empyema to optimise the identification of the causative organism and guide-targeted therapy.

AUTHORS' CONTRIBUTION

HR and LY conceptualised the idea. SY and RF drafted the manuscript while HR and LY revised the manuscript. All authors approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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