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Haemophilus influenzae empyema in a 2-month-old-infant

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Abstract

Empyema can rarely complicate pneumonia in neonates. It carries high morbidity and mortality in this population. We report the case of a 2-month-old healthy term neonate who presented with fever, mild shortness of breath and reduced feeding. Investigations revealed the presence of *Haemophilus influenzae* empyema. He was managed with video- assisted thoracoscopic surgery (VATS) and prolonged course of antibiotics. A clinic follow-up at the end of the antibiotic course revealed complete symptoms resolution with a repeated CXR showed 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*

Introduction

Empyema can rarely complicate pneumonia in neonates.[1] It carries high morbidity and mortality in this population.[1,4,5] It is defined as a progressive pleural pus build up, which is mainly seen as a complication in patients with pneumonia.[1-5] Empyema can be fatal if sub-optimally treated.[1] Barbosa M et al reported 3 (0.04%) cases of empyema diagnosed out of 7,200 NICU 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 2-month-old healthy term infant presented to Sultan Qaboos University Hospital emergency department 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 2-month vaccinations as per Omani immunization schedule. On presentation, his temperature was 37.7C, pulse rate was150 b/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 chest. Other systemic examinations were unremarkable. Laboratory investigations showed leukocytosis of 37.1 x 10^9/L with neutrophilia of 24.7x10^9/L. The initial chest x-ray 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 IV ceftriaxone and clindamycin for a complicated community-acquired pneumonia. CT chest was done and showed a large right-sided pleural effusion which appears to be encysted in apical region, causing compressive atelectasis of right lung and shift of the cardiomediastinal structures to 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 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 with 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 has been obtained. Here we discuss the causes and management of empyema in infants.

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 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 optimize the identification of the causative organism and guide targeted therapy.[4,5] Friesen et al reported 2 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] Sarah Collins and her colleagues reported 115 neonates with HI empyema from England and Wales over a 5-year period. 96% had non-typable HI and 30 (26%) of these neonates had pneumonia.[7] No reported cases of neonatal HI empyema from Oman that we can identify.

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

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 (ICD) 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 MRSA colonization 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.[5,4] 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

In 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 optimize the identification of the causative organism and guide targeted therapy.

Conflict of Interest

The authors declare no conflicts of interest.

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Author Contribution:

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

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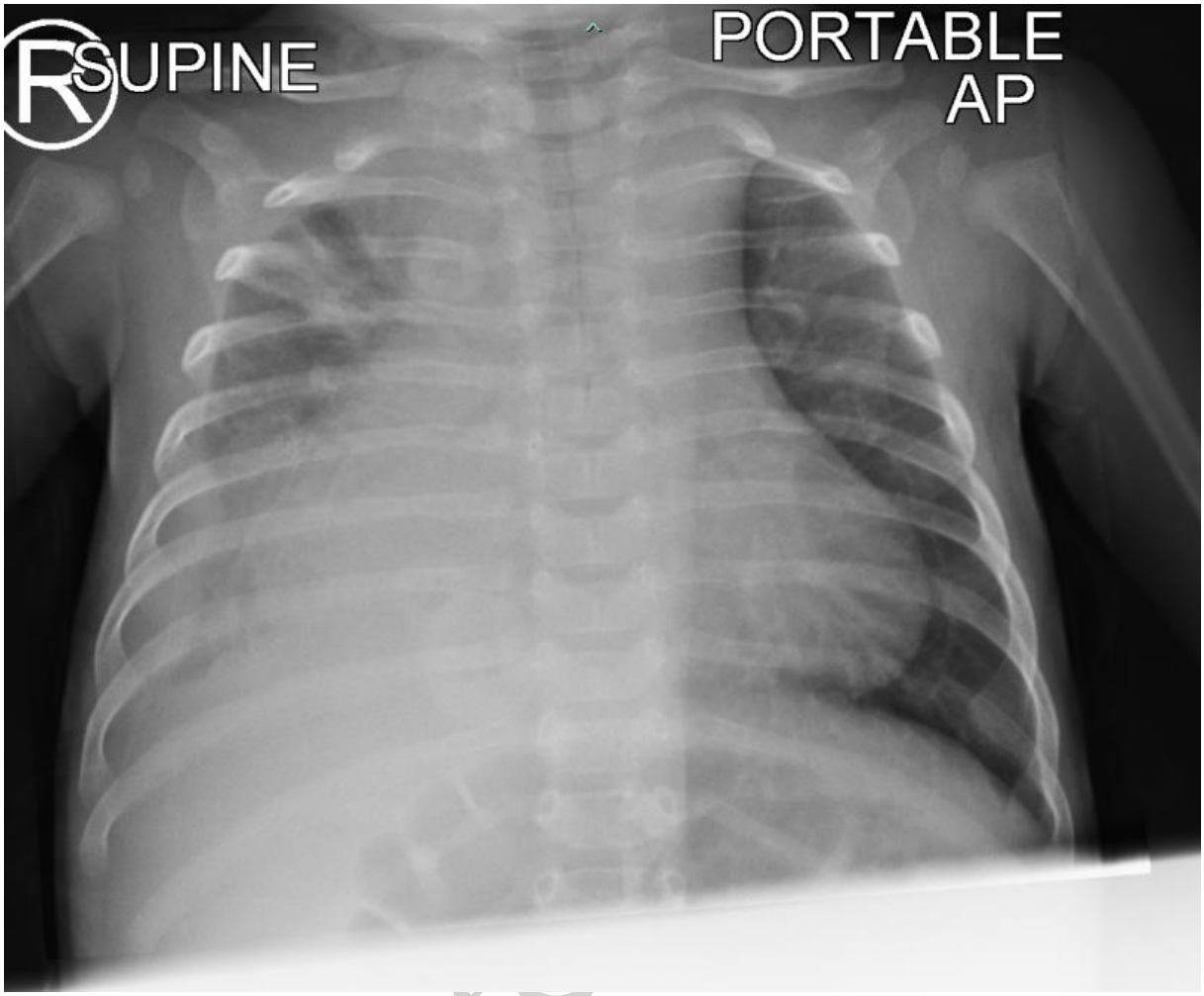

Figure 1: Initial chest x-ray which showed air space opacities in the right lung with silhouetting the cardiac border and the right hemidiaphragm. The right costophrenic angle is obliterated.

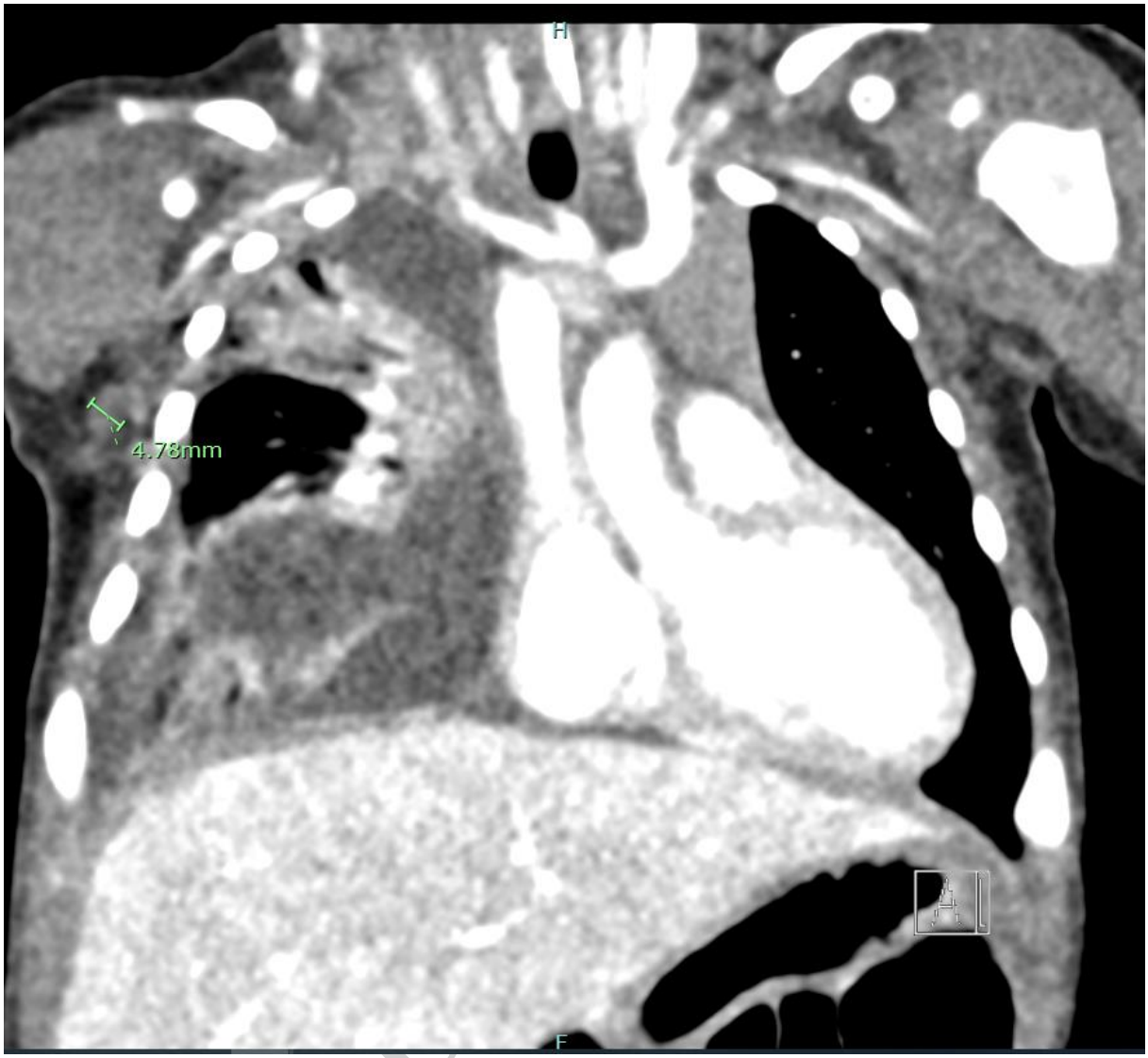

Figure 2: CT chest showing large right-sided pleural effusion which appear to be encysted in apical region, causing compressive atelectasis of right lung and causing shift of cardiomediastinal structures to contralateral left side.