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Case Report

Empyema thoracis in a Nigerian neonate: case report and brief literature review

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ABSTRACT

Empyema thoracis (ET) is a significant cause of paediatric hospital admissions and mortality but an infrequent finding in the neonatal period. Our case was a three week old male who presented with respiratory distress and had empyema thoracis. He was managed successfully with antibiotics and chest tube thoracostomy drainage.

Keywords: Empyema thoracis, Neonate, Nigerian

INTRODUCTION

ET which is a pyogenic infection or pus in the pleural space was prior to the antibiotic era a dreaded complication of pneumonia due to its case fatality rate.[1,2] Besides pneumonia there are other causes of ET which include complications from lung surgery, penetrating chest injury, oesophageal rupture, inoculation of pleural cavity after chest tube placement or as an extension from paravertebral or sub-diaphragmatic abscess.[3]

It is a significant cause of paediatric hospital admissions, morbidity and mortality but an infrequent finding in the neonatal period with few case reports made.[1] We hereby reported the case of a three week old male who was successfully managed for empyema thoracis in the neonatal unit of our institution, the Federal Medical Centre, Umuahia Abia State in South East Nigeria.

CASE REPORT

A twenty-one-day old male neonate presented with complaints of pustular skin lesions that started 14 days, high grade persisting fever noticed 10 days, cough started 7 days and breathlessness a day prior to presentation.

His delivery was via an emergency lower segment caesarean section on account of maternal hypertension at 38 weeks. He had a post circumcision bleed at the 9th day of life that necessitated blood transfusion in a private hospital. Breastfeeding was not exclusive. He lives with the parents and an older sibling in a well ventilated 4 room apartment.

Physical examination revealed a child in respiratory distress with intercostal recessions, moderately pale, febrile with axillary temperature of 38.2ºC. There was bulging of the right hemithorax, tachypnoea with a respiratory rate of 78 breaths/minute, SpO2 of 60% in room air, reduced chest excursions, dull percussion notes and absent breath sounds on the right hemithorax. There were no crepitations heard. He had tachycardia of 184 beats/minute with only 1st and 2nd heart sounds heard. Pustular lesions were seen on both arms and the perineal areas. A bedside thoracocentesis was done with about 3 ml frank pus aspirated and sent for analysis using the BACTEC culture system.

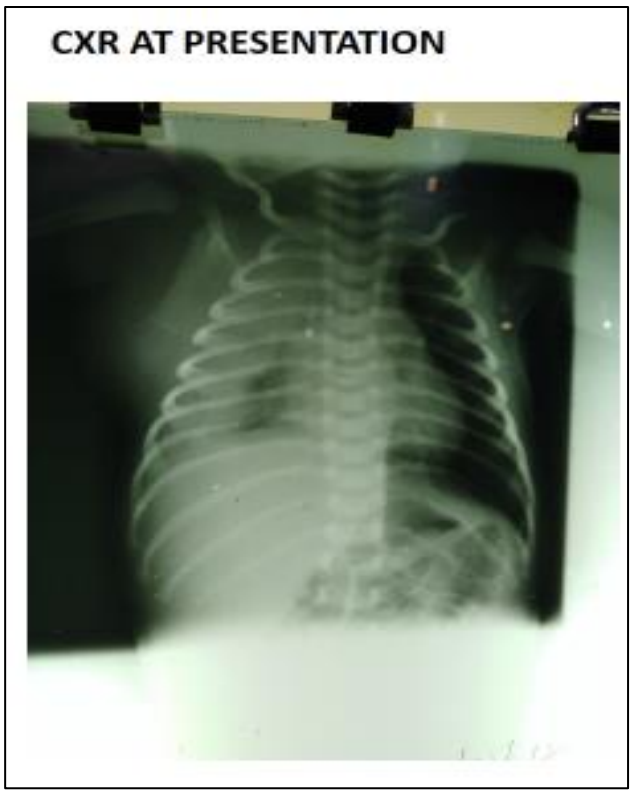

Figure 1: Chest X-ray showing blunting of right costophrenic and cardiophrenic angles with opacification of right hemithorax.

Figure 2: Chest tube *in situ* in the right hemithorax.

A diagnosis of late onset neonatal sepsis with a right sided empyema thoracis was made and he was admitted. Urgent chest X-ray was done which showed a homogenous opacity of the right lung with blunting of the cardiophrenic angle on the right, obliteration of the right costophrenic angle and mediastinal shift to the left (Figure 1). A right chest drain was inserted with about 20 ml retrieved initially and he was commenced empirically on intravenous ceftriaxone at 80 mg/kg/day and flucloxacillin 25 mg/kg/dose 6 hourly (Figure 2). Complete blood count showed total white cell count of 31.94×109/l, neutrophils 56.1%, lymphocytes 24.1%, monocytes 18.1%, eosinophils 0.4% and basophils 1.3%. Hematocrit level was 24% and he was transfused with 20 ml/kg of fresh whole blood. Pleural fluid microscopy culture and sensitivity yielded methicillin-resistant staphylococcus aureus and based on the sensitivity pattern, antibiotics were changed to cefuroxime and ciprofloxacin.

The chest tube drain was removed after 4 days when no further significant collection was noted. He showed good clinical improvement (normal respiratory rate for age, improved air entry on the right lungs, resolution of the fever) and was discharged after spending 13 days on admission (Figure 3).

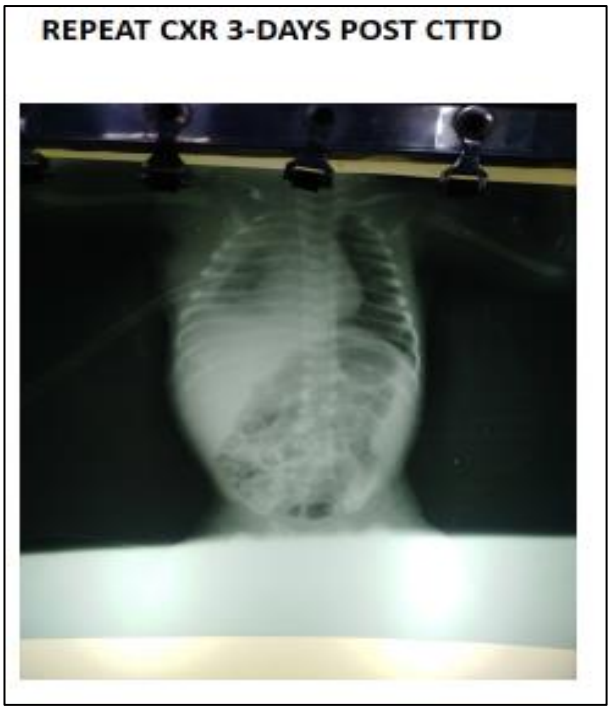

Figure 3: Chest X-ray 3 days post CTTD.

DISCUSSION

ET though an established complication of poorly treated pneumonia is not known to be a common finding in the neonatal period.[4-6] This may not be unconnected to the limited capacity of their pleural space to provide enough exudates and the immaturity of their immune system which may limit their ability to localise infections to the pleural space.[2,6] This notwithstanding a few cases have been reported earlier in the literature.[1,3,6-8]

Due to the rarity of occurrence of ET in neonates, a high index of suspicion is advocated to make prompt diagnosis. This becomes necessary as the classical signs

of stony dullness and tracheal deviation may not be seen in neonates but it is observed to have an excellent prognosis with early diagnosis and treatment.[6,7]

There are various imaging diagnostic tools that can be used to make the diagnosis, however most case reports like ours used chest X-ray only and a few others did chest ultrasound.[8,9] Chest X-ray and chest ultrasound are important both for diagnosis and monitoring the course of pleural effusions. Their relative availability in most health facilities even in Sub-Saharan Africa is a clear advantage.[8,9] Chest echocardiography was used in a few studies to calculate the volume of pleural fluid and for subsequent follow up, but this function can be achieved with the chest ultrasound.[9-11]

Pleural fluid culture though an important diagnostic tool in ET has been reported to have positive bacterial culture yield of 60-80% while blood culture is 13-31%.[12] The commonest causative pathogen from the pleural fluid microscopy among prior reported cases of neonatal ET was *Staphylococcus aureus*, just like in our study.[2,6] Other studies have reported negative bacterial yield in the pleural fluid microscopy.[1,13,14] This perhaps may be due to small sample volume, unsatisfactory conditions of transport and storage which may impair pathogen viability, prior use or abuse of antibiotics and/or the method of culture that was done. The BACTEC culture system was used for the pleural fluid culture of our patient, as this has been found to have a higher yield probability with a shortened average turn-around time compared to the conventional method.[15]

ET in neonates may occur at any time during the neonatal period and even antenatally.[8] Hemmati et al in Iran reported a case of prenatal diagnosis of pleural effusion using the ultrasound done at the last month of pregnancy.[7] Also Shih and colleagues in Taiwan in their study on common aetiologies of neonatal effusions noted that two out of the 21 neonates studied were diagnosed prenatally.[8]

There have been transitions in treatment of ET from the in-between rib blade-puncture method in the Hippocratic times to the use of antibiotics, surgery and fibrinolytics today.[16] Assuredly the key to the successful management of empyema thoracis is said to be based on commencement of effective antibiotic therapy with prompt drainage of the pleural space and lung re-expansion.[17] Although there are no standard treatment protocol for neonatal ET yet, most of the previous reports like ours used antibiotics and chest tube drainage as treatment modalities with good outcomes.[1,3,6,13,14] Controversies still exist as to the duration of antibiotic use, however most clinicians advocate for an average of 3-6 weeks of antibiotics, with the intravenous route recommended in the early stages for enhanced pleural penetration.[3,18] Some other modalities advocated for treatment includes intra-pleural fibrinolytic treatment, video assisted thoracoscopic surgery and thoracotomy decortication.[6,19,20] The wide use of antibiotics and closed thoracostomy drainage in paediatric practice is premised on the belief that children have a greater capacity to reabsorb thickened pleura when compared to adults.[21]

There are varied durations of hospital stay reported in the literature, this however could be attributed to time the chest tube was removed, time of switch from intravenous to oral medication, and/or the presence of other co-morbidities in the neonate.

CONCLUSION

ET is still a rare clinical entity in the neonatal period. Nevertheless clinicians should have a high index of suspicion when assessing a neonate with respiratory difficulty not responding to antibiotics and other supportive treatment.

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