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A Rare Case of Bilateral Empyema Thoracis

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Abstract:

Empyema Thoracis is an uncommon complication of pneumonia and is an accumulation of infected fluid in the pleural space. Streptococcus pneumonae is the most common organism causing it. An antero-posterior/postero-anterior chest X-ray should be performed in all children in whom empyema is suspected. An ultrasound should be performed on all children with empyema as it is the best technique to differentiate pleural fluid and consolidation, estimate effusion size and grade complexity, demonstrate the fibrinous septations and guide chest drain placement. All children with empyema should receive high dose antibiotic therapy via the intravenous route to ensure pleural penetration. A total 3-6weeks of antibiotic should be given including oral antibiotics. Moderate to large effusions require drainage. Intrapleural urokinase or video-assisted thoracoscopic surgery (VATS) may sometimes require. We report a rare case of bilateral empyema thoracis which improved with bilateral chest tube drainage with antibiotics.

Key Words: Empyema Thoracis, Antibiotics, Chest tube Drainage

Case Study:

A 4yrs female child admitted to our ward complaining of fever for 7days, cough and cold for 7days and hurried respiration for 4days.She was advised oral antibiotics on OPD basis for cough and cold. There was no history of previous hospitalization, contact with tuberculosis, yellowish discolouration, suck rest suck cycle, bleeding manifestation, hematuria, and blood transfusion. Perinatal history was uneventful. Achieved all developmental milestones as per her age. BCG scar was present. Belongs to lower socio economic status. Her weight was 13kg, Height was 92cm.On examination there was some pallor, no icterus, cyanosis, clubbing, Lymphadenopathy or edema with Respiratory Rate 55/min and HR was 112/min.

On inspection tachypnea, bilateral fullness of chest wall, decreased movement. On palpation trachea central, decreased breath sound bilaterally with bronchial breath sound at interscapular area and stony dullness on percussion bilaterally with decreased vocal fremitus and resonance.S1 and S2 heard normally with no murmur. That patient was conscious and oriented without any focal neurological deficit.

Investigation reports revealed neutrophilic leucocytosis, CRP positive, RFT and LFT normal. Sickling test positive, HPLC report revealed Sickle cell Trait. Chest X-ray revealed bilateral effussion with consolidation of lower lobes. Ultrasonography of Chest revealed bilateral moderate collection without loculation. Pleural tapping done first on Rt side serosanguinous fluid came out, hence chest tube was given. Next day pleural tapping done on left side followed by chest tube insertion with parenteral antibiotics. Fluid sent for investigation came out to be exudative type, gram stain and culture was negative. Chest tube removed first on Right side followed by left when fluid drainage was <50ml for 3 consecutive days. There was much improvement clinically and radiologically. A total of 4 weeks antibiotics were given including 2wks parenteral antibiotics.

Picture of the patient with bilateral chest tube *in-situ*

Discussion:

Empyema thoracis, defined as collection of pus in the pleural space. The mortality rate from empyema thoracis remains high and it ranges between 6%-24% (1-4). A significant proportion of pleural space infection complicates community- & hospital – acquired pneumonia. However, a proportion of pleural space infection results from iatrogenic causes; it is also known that pleural infection may develop without pneumonia-so called Primary empyema.

The etiological factors include: pneumonia- viral, bacterial, tubercular, mycotic; postoperative infection; lung abscess; trauma; subphrenic abscess; sepsis; adjacent infections – retropharyngeal or mediastinal abscess; Esophageal perforation; foreign body; cystic fibrosis; endotracheal tumor; instrumentation. Para pneumonic effusions are predominantly exudative and occur in 50-70% of patients admitted with a complicated pneumonia. Host factors that contribute to alteration of pleural permeability, such as noninfectious inflammatory disease, infection, trauma, or malignancy, may allow accumulation of fluid in the pleural space, which becomes secondarily infected(5).The most common bacteria implicated for post pneumonic, non-tubercular empyma are Staphylococcus aureus, Pneumococci, E.coli, Pseudomonas, Klebsiella and anaerobes. Tubercular empyema is common in India and usually associated with lung disease. In 1962, the American Thoracic Society described three stages of empyema, which continue to be applied in the classification of the disease. The progression of pleural fluid collection evolves gradually from stages 1-3 (6).

1. Exudative stage. The pleural inflammation results in increased permeability and a small fluid collection. This stage lasts only 24-72hrs.

2. Fibrinopurulent stage. It is characterized by the invasion of the organism into the pleural space, progressive inflammation, and polymorphonuclear (PMN) leukocyte invasion. There is an accumulation of protein and fibrinous material with formation of fibrin membranes, which forms partitions or loculation within the pleural space. This stage lasts for 7-10 days.

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3. Organization stage. A thick pleural peel is formed by resorption of fluid and as a result of fibroblast proliferation. The lung parenchyma becomes entrapped, forming a fibro thorax. This stage usually occurs within 2-4weeks after the initial presentation.

Child with empyema presents with fever, malaise, cough, tachypnoea. Chest pain and diarrhoea may be a feature. Child often lies on the affected side to minimize pain and to improve ventilation. Scoliosis of the affected side may be present. Chest examination reveals decreased breath sounds, decreased chest expansion and stony dullness on percussion. Chest X-ray demonstrate blunting of the costophrenic angle and in some cases there may be complete white out affected lung. Mediastinal shift do occur to the opposite side. Ultrasound is the central investigation in the management of paediatric empyema.It is non-invasive which is cheap, easy to perform and is able to differentiate pleural fluid from consolidation.

Ultrasound is also able to demonstrate the presence of fibrinous septation within pleural collections and stage the complexity of the empyema. CT Scans should not be done routinely in empyema; however they have a role in complicated cases if a child fails to respond to treatment. Blood should be sent for culture. WBC count and C-reactive protein should be done on initial canulation. Pus cells in the pleural fluid together with a high albumin and Lactate Dehydrogenase supports the diagnosis of empyema.A lymphocytosis should raise suspicion of a malignancy or tuberculosis. All pleural fluid should be sent for culture and microscopy and molecular study if available.Supportive therapy includes supplemental oxygen, antipyretics and attention to hydration and fluid balance. All children with empyema needs antibiotic therapy.For better pleural penetration high dose via intravenous route in the early stage of disease are recommended.It is recommended that the intial empirical choice of antibiotics should cover at least Streptococcus pneumonae and Staphylococcus aureus .Intravenous benzylpenicillin is a cheap and excellent drug in the majority of cases but has limited cover against Staphylococcus aureus and so the addition of Cloxacillin is recommended.

Other alternatives include co-amoxyclav or a cephalosporin, such as Ceftriaxone, with the addition of Cloxacillin.For Community acquired MRSA, Lincomycin or Clindamycin as first choice of antibiotics. Vancomycin and Linezolid remains as Second line antibiotics. Once a child become afebrile for 72hrs, intravenous can be changed to oral antibiotics. Total duration should be from 3-6 weeks including oral antibiotics. Drainage of pleural fluid is an essential for moderate to large pleural effusion.

The options available for definitive drainage are : chest drain insertion alone or with instillation of fibrinolytics; video assisted thoracoscopic surgery (VATS) and open thoracotomy. The instillation of fibrinolytics such as urokinase or tissue plasminogen activator (alteplase) through chest drains shortens hospital stay when compared with chest drain usage alone. Bilateral empyema is a rare phenomenon, accounting for 0.3-7.7%.The most common cause of bilateral empyema in adults is tuberculosis, whereas in children it is pyogenic empyema (7).Bilateral empyema is associated with immune compromised, esophageal perforation, central venous lines. Simultaneous treatment of both sides should be advocated as it removes the infected material; also, a better and early improvement can be achieved (8).

Conclusion:

Empyema thoracis is a cause of high mortality. The pleural fluid should be drained in all patients with exudative pleural effusion and in those who have frank pus in the pleural space. Patients who do not improve should be referred to the surgeon for further management. Intrapleural fibrinolysis is a more economic treatment option compared with VATS and should be the primary treatment of choice in children.

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