BILATERAL EMPYEMA THORACIS TREATED BY STAGED THORACOTOMIES

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Pleural effusion is a common finding following pneumonia. It can become infected with accumulation of pus, forming empyema thoracis (ET), which is frequently encountered in childhood. Proper drainage and broad-spectrum antibiotics are the mainstays of treatment. However, operative intervention is another mode of therapy in later stages of the condition. Election of either mode of therapy is a controversial issue, and depends largely on the discipline of the treating clinician. We report a case of bilateral ET treated by operative intervention, and review the current modes of therapy in the literature.

Case Report

A 10-month-old Saudi girl born after a normal term pregnancy and uneventful delivery presented to the pediatric service with high-grade fever, productive cough, shortness of breath, lethargy and poor sucking of two weeks’ duration.

On examination, she was febrile, dehydrated, irritable and underweight. She had a flaring of the ala nasi and subcostal recession, but there was no lymphadenopathy. Examination of the chest revealed reduced air entry bilaterally, bilateral ronchi and a dull percussion note at the base of the right hemithorax. Initial laboratory investigations revealed white cell count of 16.3x10^9/L, with 63% polymorphonuclear forms, hemoglobin of 10.2 g/dL, Westerngren erythrocyte sedimentation rate of 75 mm in the first hour, and blood glucose of 100 mg/dL (normal, 80-110 mg/dL). Other laboratory investigations were normal.

Initial radiographic study of the chest revealed a bilateral homogenous alveolar infiltrate mainly at the lower lobes, with minimal pleural effusion at the right hemithorax (Figure 1). Thoracocentesis revealed a turbid, yellowish aspirate, analysis of which showed pH 7.12, protein 6 g/dL, glucose 30 mg/dL, lactate dehydrogenase 1416 U/L and white cell count 300/mm^3.

The initial working diagnosis was bilateral bronchopneumonia with a right-sided complicated parapneumonic effusion. Initial treatment included chest physiotherapy, antipyretics and broad-spectrum antibiotics (third-generation cephalosporin, ceftriaxone, and gentamycin) covering both gram-positive and negative bacteria. An intercostal tube (ICT) was inserted through the right fifth intercostal space, mid-axillary line under local anesthesia. Around 100 mL of turbid fluid was drained. The pleural fluid culture grew no bacteria, while throat swab grew Klebsiella species sensitive to gentamycin.

One week after initiation of the antibiotics, a follow-up chest radiograph revealed development of a left-sided pleural effusion. Another ICT was inserted at the left hemithorax. Minimal purulent fluid was drained, and bacterial culture revealed Staphylococcus aureus, sensitive to vancomycin, which was added to the antibiotics.

Four weeks after admission, the patient was referred to the thoracic surgical service, where a CT scan revealed bilateral, loculated, pleural effusions with a thickened cortex around both lower lobes (Figure 2).

The decision was made to perform surgical decortication of both lungs for two reasons: 1) persistence of respiratory distress and poor response of the patient to tube drainage and prolonged (>4 weeks) antibiotics treatment; and 2) the CT scan finding of a thickened cortex and a loculated effusion.

At right thoracotomy using muscle sparing technique, a thick empyema cavity with a cortex trapping the lower lobe was noted. The cavity contained thick, cheesy and organized pus. Decortication was performed and the lung expanded to completely fill out the pleural space. The chest was then closed in the usual fashion, using two intercostal tubes. Bronchoscopy was normal. Two weeks later, the second thoracotomy on left hemithorax was performed in the same fashion, and revealed the same findings. The patient made an uneventful recovery, became more active, gained weight and the fever subsided. She was discharged home in good condition.

Two weeks following discharge, the patient was readmitted for recurrence of high-grade fever and white cell count of 22x10^9/L. On examination, there was a mild
FIGURE 1. PA chest x-ray shows right pleural effusion.

FIGURE 2. CT scan of the chest shows bilateral loculated effusion with thickened cortex around the lung.

purulent discharge from the middle part of the left thoracotomy wound, and chest radiograph revealed periosteal reaction around the left fourth to sixth ribs, suggestive of osteomyelitis. The wound swab grew Staphylococcus aureus sensitive to vancomycin. The patient responded dramatically to vancomycin injections as an outpatient for six weeks, with complete resolution of radiological findings (Figure 3). The patient has been followed for one year without any further complications.

Discussion

Bronchopneumonia is a common pediatric problem, usually encountered by pediatricians and primary care physicians. Parapneumonic effusion is a well-known complication of bacterial pneumonia, and should alert physicians, as its incidence can reach 40% of all patients presenting with this infection. Pleural effusion is exudative in early stages and thought to be due to increased pleural capillary permeability, or indirectly due to increased pleural space oncotic pressure. It can become complicated by bacterial invasion, either by contiguous spread or seedling of bacteria secondary to pneumonia, or by direct traumatic inoculation.

In pediatric practice, empyema thoracis is most frequently encountered in infants and preschool children. It is reflected by the following findings in analysis of thoracentesis fluid: pH <7, lactate dehydrogenase >1000 U/L or positive gram stain for bacteria. In the early stage of infection, the pediatrician should aggressively treat the condition with the appropriate antibiotic therapy and proper drainage of the pleural effusion. This prevents progression to late stage of loculation and formation of fibrinous adhesions, which carry high morbidity and make proper drainage more difficult.

Mangete et al. reported 56 patients under 12 years with thoracic empyema, all of whom were treated mainly by closed ICT drainage and appropriate antibiotics. Decortication was only required in one patient, and none of the patients had bilateral empyema (BE). Our reported case was unique in the fact that our patient was an infant, and had bilateral empyema.

Only a few English reports in the last decade have described experiences with BE, and none of the patients in those reports were less than one year old. The first report described BE as a complication of bilateral pneumonia in a 49-year-old female, the second reported BE complicating adult epiglottis in a 34-year-old female, and the third described BE secondary to intravenous drug abuse in a 28-year-old female. Only in the first report was the patient finally treated by staged bilateral thoracotomy and decortication, with a gap of 10 days between the two thoracotomies, a similar situation to our reported case. It is routine in our practice to do diagnostic thoracentesis in all parapneumonic effusion prior to ICT insertion. If pleural aspirate shows frank pus or complicated effusion, ICT should be inserted early, as practiced by others. Pleural fluid should be analyzed and cultured. The most common organism isolated is Staphylococcus aureus, followed by Pneumococci (especially types 1 and 2) and Hemophilus influenzae. Antibiotics should be directed to cover these organisms. If the clinical picture of the patient does not improve, or effusion is not well drained, we advocate CT scan to confirm progression to loculated empyema. If CT scan confirms this late stage with the presence of thickened fibrotic peel, we believe early surgical decortication is indicated. This is the mainstay of therapy by many authors. By this method, the chronically ill child can be converted rapidly to a healthy state, thereby reducing the cost of treatment and abbreviating the hospital stay, in addition to restoring normal lung expansion. However, if CT scan does not
show thick peel, thoracoscopic debridement or fibrinolytic adhesolysis are advocated by many workers.\textsuperscript{3,9,12}

In summary, parapneumonic effusion should be treated aggressively by physicians. Early drainage and proper antibiotics are recommended to prevent progression to late stage of loculation or formation of thick fibrotic peel around the lung. Late-stage bilateral empyema is rare in children, but once it happens, confirmation by CT scan is advisable prior to bilateral staged decortication. Our case underlines how a delay in the management of a simple infection can give rise to a serious complication, which in turn subjects the patient to a major surgery.

Acknowledgement

We would like to thank Dr. Zaid Marinkov for reviewing the manuscript.

References