Successful Transthoracic Drainage of a Large Pneumatocele in a Premature Infant

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Abstract:

Pulmonary pneumatocele is an unusual complication of bacterial pneumonia in the neonatal period. They usually develop during the recovery phase, and generally resolve spontaneously within several weeks [1], We present a premature newborn that developed a large pneumatocele secondary to staphylococcus aureus pneumonia that was treated successfully with a test tube inserted into the pneumatocele. This resulted in complete resolution of the pneumatocele in four days.

Introduction:

Pneumatoceles are known to occur in neonates with bacterial pneumonia. They have been reported in association with the infection by several organisms including Staphylococcus aureus, Escherichia coli, klebsiella pneumoniae, Streptococcal pneumoniae, Hemophilus influenzae and enteobacter cloacae infection. The following report describes a premature infant with staphylococcus aureus pneumonia complicated by a large pneumatocele that was treated successfully by transthoracic drainage using a small chest tube.

Case Report:

A premature female neonate, second triplet, born by cesarean section at 29 weeks gestation. Birth weight was 1300 gm, Apgar score were 6 and 8 at 1 and 5 minutes respectively. The baby was admitted to the Neonatal Intensive Care Unit with moderately severe respiratory distress syndrome that required mechanical ventilation. The respirator settings were: peak inspiratory pressure 20 cm H₂O, positive end expiratory pressure was 4 cm H₂O, the respirator rate 5 per minute and inspired oxygen 0.75. A sepsis work up was performed, and she was started on intravenous ampicillin and gentamicin. On the second day of hospitalization, the chest radiograph showed bilateral pulmonary interstitial emphysema and pneumothorax on the left side. She developed pneumothorax on the right side the following day. A size 10 French chest tubes were inserted on both sides. At 15 days of age she was inactive, her colour was dusky and her blood gases showed respiratory acidosis. The white cell count was 15 x 10⁹/1 with 59%-segmented neutrophils and 2% band forms. Chest radiograph showed bilateral extensive consolidation, in addition to a thin walled 2 cm unilocular cavity at medial part of the right lower zone. There were no fluid levels or any suggestion of pleural involvement (Figure 1). A septic work up was performed and she was started on intravenous cloxacillin and gentamicin due to suspicion of staphylococcus aureus pneumonia. The blood culture was negative but the endotracheal tube aspirate grew Staphylococcus aureus. Chest tubes were removed at 19 days of age, and the antibiotics were discontinued after a course of 10 days. The pneumatocele increased gradually in size over the following 4 weeks (Figure 2). Concurrently her ventilatory support requirements increased. On day 47, the peak inspiratory pressure was 25 cm of water, the rate was 70 per minute FiO₂ 100%. Needle aspiration of the pneumatocele was attempted, 20 cc of air was aspirated, and chest radiograph showed no change in the pneumatocele size. A 10 French chest tube was inserted into the pneumatocele cavity. Chest radiograph showed complete resolution of the pneumatocele (Figure 3-4). No pus or fluid was drained from the pneumatocele. The ventilatory support was decreased gradually, and she was extubated 1 week after insertion of the chest tube, which was removed 4 days later. Repeated chest radiographs showed changes of bronchopulmonary dysplasia and no pneumatocele. She was discharged to home at the age of five and half months.

Discussion:

Pulmonary pneumatocele, a cyst-like gas filled space within the lung parenchyma is an unusual complication of pneumonia in the neonate. Detection of pneumatocele strongly suggests to explain the development of pneumatocele in the course of a pneumonic process. In an extensive histopathological study, pneumatoceles were proposed to be caused by collection of air in the sub pleural space. The initial lesion was hypothesized to

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Figure 1: Chest radiograph showed bilateral extensive consolidation, in addition to thin walled 2cm unilocular cavity lesion at medial part of the right medial zone.

Figure 2: Chest radiograph showed large pneumatocele at the right lower zone.

Figure 3: Chest radiograph showed chest tube in situ within the pneumatocele.

Figure 4: Chest radiograph showed complete resolution of the pneumatocele.

being inflammation and necrosis causing rupture of a portion of the respiratory tree, air entering the interstitium pushes through the interlobular space to form (air corridors) between the point of rupture in the respiratory tree and the sub pleural space. Air accumulating beneath the pleura can coalesce to form pneumatocele. In our patient, the pneumatocele developed during the course of pneumonia. It progressively increased in size leading to compression of the right lung and increase in the ventilatory requirements. The gradual increase in the size of the pneumatocele and the failure to drain it by needle aspiration suggest a connection with the tracheobronchial tree and check-valve mechanism between the pneumatocele and the airways, this mechanism was most probably potentiated by ventilation.

To our knowledge, transthoracic drainage of pneumatocele has not been reported in neonates. Drainage of infected traumatic pneumatocele with small chest tube inserted into the pneumatocele with insertion of prophylactic pleural chest tube was reported in a 21-year-old male who was involved in a motor vehicle accident. Pneumatoceles usually resolve spontaneously, with loss of valve mechanism perhaps as inflammation subsides, the pneumatocele can disappear in weeks and the collapsed lung parenchyma will rapidly expand. In conclusion, for large pneumatoceles which does not resolve spontaneously, which is unlikely to occur in ventilated infants, we recommend a small chest tube to be inserted into the pneumatocele for drainage.

Acknowledgment:
We are grateful for Dr. N. Sharief for reviewing the manuscript.

References: