

CASE REPORT

From Crisis to Cure: Managing Pneumatocele in Extreme Prematurity Through CT-Guided Pigtail Drainage – A Case Report

Jia Cheng Ong^{1,3,4}, Mohd Hafizuddin Husin^{2,3}, Noraida Ramli^{1,3}, Nor Rosidah Ibrahim^{1,3}, Farohah Che Mat Zain^{1,3}

¹ Department of Pediatrics, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kota Bahru, Kelantan, Malaysia

² Radiology Department, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kota Bahru, Kelantan, Malaysia

³ Hospital Pakar Universiti Sains Malaysia (HPUSM), Health Campus, Kubang Kerian, 16150 Kota Bahru, Kelantan, Malaysia

⁴ Faculty of Medicine, Universiti Sultan Zainal Abidin, Medical Campus, 20400 Kuala Terengganu, Malaysia

ABSTRACT

Pneumatocele management in extremely low birth weight (ELBW) infants presents significant clinical challenges due to underlying prematurity and limited therapeutic options. We report a male infant born at 26 weeks gestation weighing 810 grams who developed severe pneumatocele secondary to necrotizing pneumonia. He initially presented with respiratory distress syndrome (RDS), requiring high-frequency oscillatory ventilation (HFOV) and surfactant therapy. On day 12, he contracted *Pseudomonas aeruginosa* bacteremia, followed by infections with *Stenotrophomonas maltophilia* and Extended Spectrum Beta-Lactamase (ESBL) *Klebsiella pneumoniae*. Despite appropriate antibiotic therapy and conservative management, serial imaging revealed progressive pneumatocele development, with a large right-sided lesion on a computed tomography (CT) scan at day 48. Due to persistent respiratory compromise, percutaneous drainage was performed at day 74 using a 6F pigtail catheter under CT guidance. The procedure was complicated by pneumothorax and subcutaneous emphysema but achieved complete pneumatocele resolution after 33 days of drainage. Following successful drainage, respiratory status improved significantly, allowing extubation to non-invasive ventilation at day 79 of life and discharge on room air at 5 months. CT-guided percutaneous drainage represents a safe and effective treatment for large pneumatoceles in ELBW infants when conservative management fails, requiring a multidisciplinary approach for optimal outcomes.

Malaysian Journal of Medicine and Health Sciences (2026) 22(SUPP2):155-157. doi:10.47836/mjmh.22.s2.21

Keywords: Pneumatocele, Extremely low birth weight, Necrotizing pneumonia, Percutaneous drainage, Preterm in-fant

Corresponding Author:

Farohah Che Mat Zain, MMed (Pediatrics)

Email: drfarohah@usm.my

Tel: +60197751410

INTRODUCTION

A pneumatocele is defined as an air-filled cyst that is located in the lung parenchyma. The incidence of pneumatocele in premature newborns had decreased due to the development of surfactant, as high positive pressure ventilation increased the risk of air leaks in the past. Apart from that, postinfectious or traumatic intervention can cause pneumatocele among neonates. The most common organism isolated from infectious pneumatocele is *Staphylococcus aureus*. The morbidity and mortality are high in neonates who suffered from infectious pneumatocele with the background of impaired immunity and underlying RDS.

CASE REPORT

A male infant was born premature at 26 weeks with the birth weight of 810 grams. Her mother had subclinical chorioamnionitis, whereby she presented with leaking liquor associated with anhydramnios. Prior to the emergency lower segment cesarean section, she had completed two doses of intramuscular dexamethasone. Post delivery, he had a poor Apgar score and required intubation. From his clinical examination and chest radiograph, he received a total of two doses of surfactant, as he had moderate RDS. He also required High Frequency Oscillation Ventilation (HFOV) to maintain his oxygenation.

His clinical condition worsened at Day 12 of life when he developed frequent desaturation on HFOV, complicated by hyperglycemia, hypotension, thrombocytopenia, leukopenia, and raised inflammatory markers.

Blood culture and endotracheal tube culture grew *Pseudomonas Aeruginosa*. His antibiotics were escalated to intravenous meropenem, given his critical condition.

Despite escalation of antibiotics and optimizing ventilation using HFOV, he showed minimal improvement and difficulty in weaning oxygen support. Chest radiograph repeated at Day 22 of life showed multiple pneumatoceles in both lung fields (Figure 1A), which had contributed to poor recovery. He was managed conservatively with antibiotics. His repeated ETT culture grew different organisms, such as *Stenotrophomonas maltophilia* and Extended Spectrum Beta-Lactamase (ESBL) *Klebsiella pneumoniae*.

He remained ventilated on HFOV and repeated chest radiograph at Day 48 of life showed a huge right pneumatocele (Figure 1B). To fully evaluate the cause of persistent pneumatocele, we did perform CT Thorax (Figure 2) and it showed a large air-filled cystic lesion at the superior segment of the right lower lobe, while the periphery of the lesion showed thickened walls with surrounding ill-defined consolidation. He was diagnosed with necrotizing pneumonia with right pneumatocele. He was managed conservatively with antibiotics and optimizing his ventilation.

As his condition did not improve, at 74 days of life a decision was made for a pigtail drainage of the pneumatocele under interventional radiology. The procedure was performed under CT guidance. The baby was put in the left lateral position, and the pneumatocele was

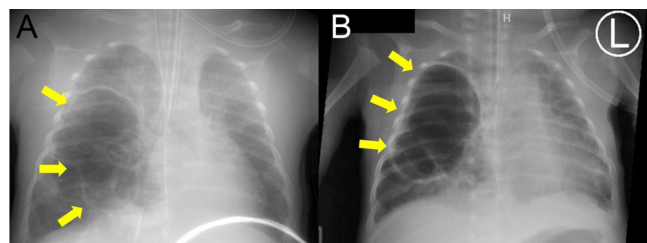


Figure 1: A - Chest radiograph showing multiple pneumatocele (yellow arrows), B - Huge right pneumatocele (yellow arrows).



Figure 2: Coronal reformatted CT shows a cystic structure (yellow arrow) within the right hemithorax that represents a pneumatocele.

punctured using a 16G branula. A guide wire was inserted, and a 6F pigtail catheter was introduced over the wire into the pneumatocele. The procedure was complicated by pneumothorax and subcutaneous emphysema. Attempts were made to aspirate; however, there was reaccumulation of the air (Figure 3A-D). The pigtail was then connected to an underwater-sealed drainage. Follow-up CT shows complete resolution of the pneumatocele, pneumothorax, and subcutaneous emphysema (Figure 4). The pigtail catheter was able to come off

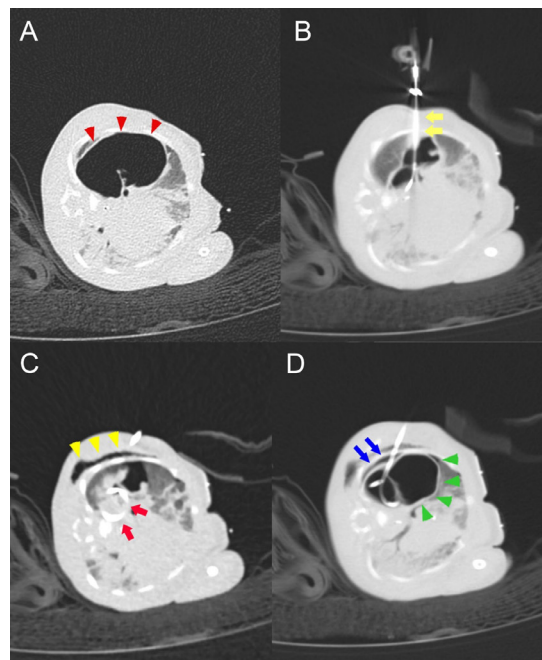


Figure 3: A- Right pneumatocele pre-drainage (red arrowheads). B- A guidewire was inserted through a 16G branula (yellow arrow) into the pneumatocele. C- Pigtail catheter (red arrows) within the pneumatocele, which is reduced after aspiration. Persistent subcutaneous emphysema is noted (yellow arrowheads). D- Reaccumulation of air within the pneumatocele (green arrowheads) and pneumothorax (blue arrow).



Figure 4: Follow-up CT shows a pigtail catheter in situ with resolution of the cystic air structure, pneumothorax, and subcutaneous emphysema.

after 33 days of drainage. His lung condition improved and he was able to extubate to non-invasive ventilation (NIV) at Day 79 of life. He was able to discharge under room air at 5 months old.

DISCUSSION

Pneumatocele in an extremely low birth weight infant with severe prematurity is a huge challenge for clinicians to manage. The cause of pneumatocele in our patient was due to complications from bacteremia and pulmonary infection, as both blood culture and endotracheal tube culture grew *Pseudomonas Aeruginosa*. Repeated endotracheal tube culture also grew another organism, such as *Stenotrophomonas Maltophilia* and Extended Spectrum Beta-Lactamase (ESBL) *Klebsiella Pneumoniae*.

Despite antibiotic therapy, conservative management is the mainstay treatment of pneumatocele, including reducing mean airway pressure, decubitus positioning with the affected side down, selective intubation of the uninvolved side and HFOV (1,2). We had employed a non-invasive approach in reducing the pneumatocele since detection. However, the pneumatocele had increased in size based on serial chest radiographs. Drainage, either by a surgical method such as thoracotomy or insertion of a chest tube or pigtail catheter had to be done.

Considering this was a premature infant with extremely low birth weight, surgical options such as thoracotomy have a very high risk of mortality and morbidity. Complete removal of pneumatocele via surgical approach can result in massive hemorrhage or permanent respiratory insufficiency (1). Percutaneous drainage is one of the safe options for the treatment of pneumatocele in a preterm infant. This procedure can be performed under CT or US guidance (2,3). In our patient, the procedure is performed under CT guidance, as the air-filled struc-

ture and expected complication is better seen using this modality.

Complications of pneumatocele must be carefully monitored, such as pneumothorax, bronchopleural fistula, persistent lung infection, and bronchopleural fistula. It can be enlarged due to high-pressure ventilation and ruptured, causing tension pneumothorax. Timing for needle decompression is crucial to prevent such complications from occurring.

CONCLUSION

Managing pneumatocele in ELBW infants is challenging and requires a multidisciplinary approach. This case demonstrates that CT-guided percutaneous drainage is a safe and effective alternative to surgery when conservative management fails. Early intervention with appropriate imaging guidance and coordinated team care can achieve favourable outcomes, prevent prolonged respiratory compromise, and reduce morbidity in this vulnerable population.

REFERENCES

1. Price TR, Miller MA, Prescott AC, Meadows JM, Tabak BD. Expanding pneumatocele in an ELBW infant. *J Pediatr Surg Case Rep.* 2021; 73:102000. doi:10.1016/j.epsc.2021.102000
2. Munoz A, Moores DC, Khan FA, Baerg J, Radulescu A. Successful treatment of post-infectious pneumatocele via percutaneous drainage in a premature infant. *J Pediatr Surg Case Rep.* 2019; 47:101235. doi:10.1016/j.epsc.2019.101235
3. Muniraman H, Chintala S, Richardson R, Duarte A. Successful ultrasound guided percutaneous drainage of pneumatocele in an extremely preterm infant. *Radiol Case Rep.* 2020;16(3):607-611. doi:10.1016/j.radcr.2020.12.053