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CASE REPORT PEER REVIEWED | OPEN ACCESS

# *Mycoplasma pneumoniae*-induced pneumonia with pleural effusion in a young child

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## ABSTRACT

**Introduction:** *Mycoplasma pneumoniae* is a leading pathogen of community-acquired pneumonia (CAP) in children above 5 years old. *Mycoplasma pneumoniae* illness is often mild and a complication of significant parapneumonic effusion and empyema (PEE/PE) is not common. However, cases with severe *M. pneumoniae*-induced pneumonia (MPP) complicated by a large pleural effusion in young children have been reported.

**Case Report:** We report a 2-year-old female who presented with right sided pneumonia complicated by a large pleural effusion and respiratory failure, requiring oxygen supplementation and chest tube placement, and responding well to levofloxacin. *Mycoplasma pneumoniae* was confirmed by the polymerase chain reaction (PCR) method on pleural fluid sample and elevated IgM titer in serum.

**Conclusion:** Severe MPP complicated by PPE/PE can occur in children, even below the age of 5 year. An increase in *M. pneumoniae* resistant to macrolide should be taken into consideration of antibiotic choice.

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## INTRODUCTION

*Mycoplasma pneumoniae* is a common cause of community-acquired pneumonia (CAP) among school aged children and adolescents and accounts for up to 40% cases of CAP in children older than 5 years of age [1–3]. *Mycoplasma pneumoniae*-induced pneumonia (MPP) in children less than 5 years old was reported in 3% of all CAP acquired hospitalization during childhood [4]. It usually presents with a mild disease, and most cases can be managed in an outpatient clinic [1–3, 5]. Significant parapneumonic effusion and empyema (PPE/PE) are not commonly seen in MPP, although small simple pleural effusions without the need for chest tube insertion have been described [1–5]. We report the case of a 2-year-old female who presented with right sided MPP complicated by a large pleural effusion and respiratory failure, requiring oxygen supplementation, intravenous antibiotics, and chest tube placement.

## CASE REPORT

A 2-year-old previously healthy girl presented with a six-day history of high fever, productive cough, and poor

appetite. Her immunization was up to date. There was no history of sick contact or travel. On presentation, the child was alert, febrile (temperature 39.2°C), tachypneic (respiratory rate: 42/min), mildly hypoxemic (pulse ox: 92–93%), tachycardic (heart rate: 124 beats/min), and normotensive (blood pressure: 90/60 mmHg). Her weight and height were 11.9 kg and 93.5 cm, respectively. Pulmonary auscultation revealed diminished breath sounds in the 1/3 right lower lung without adventitious noises. Her physical examination was otherwise unremarkable. The initial investigations revealed normal white blood count (WBC 7.9 × $10^9$/L, neutrophil 78.7%), normal Hb 12.1 g/dL, low platelet count 137 × $10^9$/L and significantly elevated C-reactive protein (CRP) to 215.6 mg/L (normal range <10 mg/L). Serum electrolytes, liver function tests, blood urea nitrogen (BUN), and creatinine were within normal ranges. Chest X-ray revealed opacification of the right lower lobe (Figure 1A). Thoracic ultrasound showed no pleural effusion. The patient required oxygen via a nasal cannula for hypoxemic respiratory failure. Broad-spectrum antibiotics with cefotaxime was started for CAP.

Over the following three days, she remained febrile with a peak temperature of 40.1°C with CRP rising to 280 mg/L. Her work of breathing worsened with subcostal and intercostal retractions, respiratory rate 40–50/min, and saturation ranges of 92–96% on a nasal cannula. The blood culture showed no growth. The repeated chest X-ray showed increased opacification to half of the right lower lung (Figure 1B). A repeated thoracic ultrasound revealed small right pleural effusion. Given a concern of empyema complication, vancomycin and amikacin were empirically added. A diagnostic thoracocentesis was performed under ultrasound guidance and drained 40 mL of serosanguineous fluid. The pleural fluid analysis revealed an exudate fluid with the pleural to serum protein ratio of 0.7 (34.5/48 g/L) and pleural to serum lactate dehydrogenase ratio of 1.6 (1991/1202 U/L). The pleural pH was 7.7 and glucose was 82 mg/dL (serum glucose of 86 mg/dL). Cell count demonstrated 60 WBC/$mm^3$ (90% lymphocyte) and 9000 red blood cells/$mm^3$. The gram staining and culture of pleural fluid did not reveal any organism, but PCR resulted in 295,000 copies/mL of *M. pneumoniae*. Blood culture was negative, and *M. pneumoniae* IgM (Elisa) titer measured 19.9 U/mL on day 3 after admission (day 9 of illness), which rose to a titer of >150 U/mL five days later. Given complicated MMP and concern of a high rate of macrolide-resistant *M. pneumoniae*, intravenous levofloxacin was started after discussions with the pulmonary and infectious disease consultants. Amikacin and cefotaxime were discontinued, and vancomycin was continued for a total 7-day course. Fever curve improved shortly after levofloxacin was stated. However, she again became highly febrile three days later with a maximal temperature of 41°C, tachypneic and required increase in oxygen therapy. A chest ultrasound showed moderate-to-large simple right pleural effusion but with no evidence of lung abscesses (Figure 1C). Due to clinical deterioration, a diagnostic and therapeutic pleural aspiration was performed and drained a total of 170 mL of serosanguineous fluid. A chest tube was placed with an additional 360 mL of serosanguineous fluid drained over the next 24 hours. A chest computed tomography (CT) was discussed and considered. However, given simple effusion was present on ultrasound, and the patient improved significantly shortly after, chest CT was ultimately not performed. A repeated pleural fluid PCR was also positive for *M. pneumoniae* (1,086,800 copies/mL). Her work of breathing improved significantly following chest tube placement and she was weaned off oxygen shortly after. Fever curve improved and completely subsided over the following five days. The chest tube was removed after three days with no recurrent pleural effusion on chest ultrasound. The patient was discharged after a 16-day length of stay and completed a 14-day course of levofloxacin. Two months later, she was doing well with near resolution of right lower lobe consolidation on chest X-ray (Figure 1D).

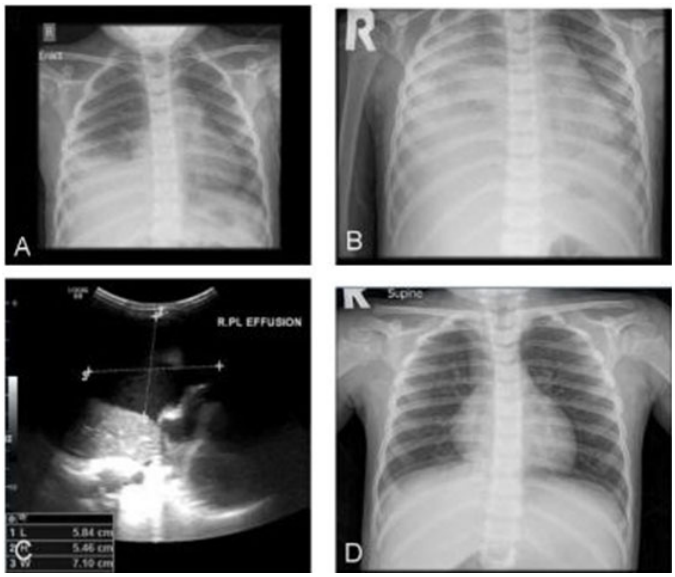


Figure 1: (A) Initial chest X-ray showing opacification of the right basal lobe. (B) Repeated chest X-ray showing extension of consolidation up to half of right mid zone and right pleural effusion. (C) A chest ultrasound showed moderate-to-large simple right pleural effusion. (D) Chest X-ray at 2-month follow-up reveals clear lungs.

## DISCUSSION

*Streptococcus pneumoniae* is the most common cause of PPE/PE in children, followed by *Streptococcus pyogenes* and *Staphylococcus aureus* as the second and third pathogen [6]. *Mycoplasma pneumoniae* accounts for approximately 5% cases of PPE/PE [6]. PPE/PE due to *M. pneumoniae* is commonly seen in children older than 5 years of age and usually not severe [6, 7].

Our patient is a 2-year-old girl with MPP complicated by empyema with large pleural effusion requiring chest tube drainage for three days, which is an uncommon

clinical presentation. The use of PCR-based assays allowed for pathogen identification in pleural fluid in our patient with complicated MPP. A four-fold or greater rise in antibody titer in paired sera is a clinical test for a diagnosis of *M. pneumoniae* [6, 8]. *Mycoplasma pneumoniae* was confirmed by PCR method on two pleural fluid samples and a rise in serum IgM exceeding four folds for *M. pneumoniae*. The test results provided insight for etiology and was helpful in the successful management of this child. Macrolide-resistant *M. pneumoniae* has been increased in Asia, 43.5% and 69% in Japan and China, respectively [8, 9]. In this patient, given concern for potential macrolide-resistant *M. pneumoniae* in the setting of severe pneumonia, a quinolone was chosen instead of macrolide antibiotics, which resulted in complete resolution of MPP. Our case is among rare scenarios where young children present with severe and complicated MPP [7].

## CONCLUSION

*Mycoplasma pneumoniae* infection can cause severe pneumonia and should be taken into consideration as a cause when treating children younger than 5 years with CAP, particularly in cases with poor response to antibiotics commonly used in CAP.

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## Author Contributions

Minh Dien Duong – Conception of the work, Design of the work, Acquisition of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Dong P Tran – Conception of the work, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Nguyet Diem H Phan – Conception of the work, Design of the work, Acquisition of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Tam T Doan – Conception of the work, Design of the work, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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The corresponding author is the guarantor of submission.

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## Consent Statement

Written informed consent was obtained from the patient for publication of this article.

## Conflict of Interest

Authors declare no conflict of interest.

## Data Availability

All relevant data are within the paper and its Supporting Information files.