Mycoplasma Pneumonia in Young Children, 2-5 Years of Age

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Background: *Mycoplasma pneumoniae is one of the most common causes of childhood community-acquired pneumonia (CAP), particularly in school-age children. Information regarding this infection in pre-school age children is lacking.*
Objective: *To determine the prevalence of M. pneumoniae in young children aged under 5 years with CAP.*
Material and Method: *This prospective study was conducted at Queen Sirikit National Institute of Child Health (QSNICH), Bangkok, Thailand between December 2001 and November 2002. We enrolled children aged 2 to 5 years with a clinical and radiological diagnosis of CAP. Acute and convalescent sera were collected and measured by using a particle agglutination test. Polymerase chain reaction (PCR) assay for M. pneumoniae was detected from nasopharyngeal secretions. Criteria for diagnosis were defined as ≥ 4-found rising of mycoplasma antibody or titer ≥ 1:160 with positive PCR.*
Results: *Thirteen out of 113 CAP patients were diagnosed as mycoplasma pneumonia. Three of them were diagnosed by ≥ 4-fold rising of mycoplasma antibody while another 10 patients were diagnosed by mycoplasma titer ≥ 1:160 with positive PCR for M. pneumoniae. Clinical symptoms and signs of these 13 mycoplasma pneumonia in young patients were fever (85%), cough (92%), dyspnea (85%), diarrhea (15%), rales (85%), wheezing or rhonchi (46%), and skin rash (15%).Leucocytosis (wbc > 15,000/cumm) was found in 46%. Chest x-rays revealed interstitial infiltration (71%), patchy infiltration (29%) and no pleural effusion was detected. Choices of antibiotic were erythromycin (31%), beta lactam antibiotics (61%), and antibiotic was not prescribed in one patient (8%). Sixty-nine percent of the patients improved, while 31% did not, possibly due to the use of beta lactam antibiotics, or non use of antibiotics.*
Conclusion: *Mycopalsma pneumonia is not uncommon in children aged 2-5 years with CAP. Clinical signs, symptoms and radiological findings are non-specific and cannot be differentiated from other causes of CAP.*

Keywords: *Mycoplasma pneumoniae, Children, Community-acquired pneumonia*

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Community-acquired pneumonia (CAP) is common in Thailand, particularly in young children. The most common pathogen of pneumonia in the young age group is from a virus. A bacterial cause is less common. Common bacteria pathogens are *Streptococcus pneumoniae* and *Hemophilus influenzae*. Therefore, the clinical practice guideline for non-severe CAP in young children (under 5 years) started with amoxicillin to cover those two common bacteria. However, there is a problem in our daily practice. Some patients do not clinically improve by amoxicillin treatment as suggested in the guideline. Are there other common pathogens? Atypical pathogens may be the answer to that question. There are three common atypical pathogens in CAP: *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae* and *Legionella pneumophila*. Mycoplasma pneumonia is noted in the previous reports and textbooks[1,2] as being common in older children (older than 5 years). Some physicians tried by changing antibiotics from amoxicillin to macrolide group (such as erythromycin) in the case of clinically unresponsive, and the patients responded to the

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macrolide antibiotics. Therefore, our hypothesis is *Mycoplasma pneumoniae* may be one of common pathogens for CAP in young children.

Objectives

1. To determine the prevalence of mycoplasma pneumonia in young children.

2. To determine the clinical features and outcome of the treatment of mycoplasma pneumonia in young children.

Material and Method

This study was a prospective study. The study was conducted at Queen Sirikit National Institute of Child Health (QSNICH), Bangkok, Thailand, between October 2001 and December 2002. The study was approved by the independent review board. Written informed consent was obtained from all parents or caretakers.

Patients

The subjects were male and female, aged 2-5 years. Both outpatients and hospitalized patients were included. Inclusion criteria were a clinical diagnosis of CAP plus radiological change in the chest x-ray. Serological test on paired acute and convalescent phase sera plus antigen test, polymerase chain reaction (PCR) on respiratory samples were done in all patients. Exclusion criteria were nosocomial infection, tuberculosis, HIV infection, lung cancer, and patients who had been hospitalized within two weeks prior to enrollment.

Diagnostic tests

Specific antibodies (IgG and IgM) to *M. pneumoniae* were measured using a particle agglutination test (PAT). PCR assays were performed with primers targeting the P1 adhesin gene of *M. pneumoniae*. The presence of a PCR product of 209 bp size on gel electrophoresis was the indicator of *M. pneumoniae* infection.

Diagnostic criteria

Current mycoplasma infection was defined as:

1. Four-fold or greater rise in antibody titer between paired acute and convalescent sera or

2. High antibody titer ($\geq$ 1: 160) plus positive PCR.

Results

One hundred and thirteen young children with CAP were enrolled. There were 13 patients (11.5%) who met the criteria for diagnosis of mycoplasma pneumonia. Based on only $\geq$ 4-fold rising of titer, 3 cases (2.7%) were diagnosed and based on high titer plus positive PCR criteria, 10 cases (8.8%) were diagnosed.

Demographic data of mycoplasma pneumonia in young children are: mean age = 2.85 $\pm$ 0.69 years, youngest patient = 2 years old, male: female = 9: 4, OPD cases: IPD cases = 2:11.

Clinical symptoms and signs are shown in Table 1. Common co-morbidity or underlying disease was asthma (30%). About half of the patients (46%) had leucocytosis (wbc > 15,000/cumm). Radiological findings are shown in Table 2.

Beta-lactam antibiotics were commonly prescribed for mycoplasma pneumonia in this study (61%). The other antibiotic prescribed was erythromycin (31%) and antibiotic was not prescribed in one patient (8%).

As for the outcome of the treatment, most of the patients improved (69%).

Discussion

Mycoplasma pneumonia is found commonly not only in adults and older children as mentioned in the textbook, but also in young children. In this study, the prevalence of mycoplasma pneumonia in young children presenting with CAP is 11.5%. The prevalence of mycoplasma pneumoniae in children is increasing in some countries[3,4].

Table 1. Clinical manifestation of mycoplasma pneumonia in young children (n = 13)

Fever	85%
Cough	92%
Dyspnea	85%
Diarrhea	15%
Wheezing or rhonchi	46%
Crepitation	85%
Skin rash	15%

Table 2. Chest x-ray findings of mycoplasma pneumonia in young children (n = 13)

Interstitial infiltration	71%
Patchy infiltration	29%
Location of infiltration:	
Upper lobe	21%
Middle lobe	34%
Lower lobe	45%

There are many problems in the laboratory diagnosis of *M. pneumoniae* in general practice[5] *M. pneumoniae* cannot be isolated by a routine culture method. There were different diagnostic criteria in different centers. A high-cost antigen (PCR) test alone may not indicate current mycoplasma infection but rather a carrier state. A single serology test may indicate a past infection. These two diagnostic criteria: 4-fold rise in serological titer or high titer plus positive antigen (PCR) test, yield more accuracy in the diagnosis of current mycoplasma infection[5,6].

Wheezing or rhonchi (46%) are the predominant clinical presentation of *M. pneumonia* in young children, which is different from adults or older patients[7,8]. Also, a common co-existing disease of mycoplasma pneumonia is asthma. An infection with *M. pneumonia* may precede the onset or exacerbate of asthma symptoms[9].

The clinical presentation of mycoplasma pneumonia in a young child cannot be differentiated from other bacterial or viral pneumonia. Esposito[10] and Michelow's[11] study also showed the limited role of clinical features in predicting the etiology. There were two patients (15%) who developed maculopapular skin rash in this study. A skin rash is one common sign of mycoplasma infection. Therefore, young children with pneumonia and rash may alert us for the diagnosis of mycoplasma infection, apart from usual drug allergy.

Chest x-ray findings of mycoplasma pneumonia in young children can be both interstitial (71%) and patchy infiltration (29%). A similar pattern of radiological features was reported in children 3-13 years of age in Taiwan[12]. Therefore, it cannot help us to exclude other bacterial or viral pneumonia. The common location of pulmonary infiltration in the lower lobe is the same as mycoplasma pneumonia in adults.

In this study, as in daily practice, the physicians did not know the causative agent of pneumonia on the first day. Therefore, they prescribed beta-lactam antibiotics to cover common bacterial pathogens. Clinical failure occurred among children who were treated with beta-lactam. *Mycoplasma pneumoniae* lacks a cell wall, so beta-lactam antibiotics are not effective. The mechanism of a good antibiotic for mycoplasma is interfering protein or DNA synthesis. Macrolide antibiotics are the antibiotics of choice.

In conclusion, mycoplasma pneumonia is also found in young children (11.5%). Clinical presentation and radiological findings cannot differentiate mycoplasma pneumonia from other bacteria or virus in young children. Pneumonia in young children who do not respond to beta-lactam antibiotics may be mycoplasma pneumonia. Pneumonia in young children with a skin rash may alert the diagnosis of mycoplasma pneumonia, apart from drug allergy. A new kind of diagnostic test (timely report and inexpensive) should be developed.

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โรคปอดอักเสบจากเชื้อมัยโคพลาสมาในเด็กเล็กอายุ 2-5 ปี

ธัญญณัฐ บุนนาค, สรศักดิ์ โล่ห์จินดารัตน์, พนิดา ศรีสันต์, ประวิทย์ เจตนชัย

วัตถุประสงค์: *เพื่อศึกษาหาความชุกและลักษณะทางคลินิกของโรคปอดอักเสบ จากเชื้อมัยโคพลาสมาในผู้ป่วยเด็กเล็กอายุ ตั้งแต่ 2 ปี ถึง 5 ปี ที่สถาบันสุขภาพเด็กแห่งชาติมหาราชินีกรุงเทพมหานคร*

วัสดุและวิธีการ: *เป็นการศึกษาแบบก้าวหน้า ใน พ.ศ. 2544-2545 เป็นระยะเวลา 1 ปี ผู้ป่วยจะได้รับการตรวจระดับแอนติบอดีต่อเชื้อมัยโคพลาสมาในซีรัม 2 ครั้งห่างกัน 2 สัปดาห์ และตรวจ PCR เพื่อหาแอนติเจนของเชื้อมัยโคพลาสมาจากเสมหะ ผู้ป่วยที่มีระดับแอนติบอดีเพิ่มอย่างน้อย 4 เท่า หรือ ระดับสูงกว่าหรือเท่ากับ 160 ร่วมกับมีผลบวกของ PCR จะได้รับการวินิจฉัยว่ากำลังมีการติดเชื้อมัยโคพลาสมา*

ผลการศึกษา: *จากผู้ป่วย 113 ราย ร้อยละ 11.5 มีการติดเชื้อมัยโคพลาสมา โดยวินิจฉัยจากระดับแอนติบอดีเพิ่มเป็น 4 เท่า ร้อยละ 2.7 และ ระดับแอนติบอดีสูง ร่วมกับผล PCR เป็นบวกร้อยละ 8.8 ผู้ป่วยมีอาการทางคลินิก คือ ไข้ร้อยละ 85, ไอร้อยละ 92, หายใจลำบากร้อยละ 15, wheezing หรือ rhonchi ร้อยละ 46, มีผื่นร้อยละ 15 ตรวจเลือดพบ leucocytosis ร้อยละ 46, ภาพรังสีปอด พบลักษณะ interstitial ร้อยละ 71, patchy ร้อยละ 29 ให้การรักษาโดยใช้ยาปฏิชีวนะ erythromycin จำนวนร้อยละ 31 ได้ผลการรักษาดีทุกราย การใช้ยาปฏิชีวนะกลุ่ม beta-lactam ได้ผลการรักษาไม่ดีนัก*

สรุป: *โรคปอดอักเสบจากการติดเชื้อมัยโคพลาสมา ไม่เพียงแต่พบได้ในผู้ใหญ่ และเด็กโต แต่ยังสามารถพบได้ในเด็กเล็กต่ำกว่า 5 ปี ได้ถึง 11.5% ในเด็กที่มาด้วยอาการปอดอักเสบจากชุมชน ลักษณะทางคลินิกและภาพรังสีปอดไม่สามารถแยกเชื้อมัยโคพลาสมาจากเชื้อแบคทีเรียหรือไวรัสอื่นได้*