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CLINICAL AND LABORATORY CHARACTERISTICS OF ATYPICAL PNEUMONIA IN CHILDREN

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Abstract Atypical pneumonia in children is a significant cause of respiratory morbidity worldwide and is commonly associated with pathogens such as *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and various respiratory viruses. Unlike typical bacterial pneumonia, atypical pneumonia often presents with nonspecific clinical manifestations and subtle radiological findings, making early diagnosis challenging. Laboratory investigations, including hematological parameters, inflammatory biomarkers, serological tests, and molecular diagnostics, play a crucial role in accurate identification and management. This review summarizes current knowledge on the clinical presentation and laboratory characteristics of pediatric atypical pneumonia and highlights diagnostic challenges and implications for treatment.

Keywords: atypical pneumonia, children, Mycoplasma pneumoniae, laboratory diagnostics, inflammatory markers, PCR

Introduction

Pneumonia remains one of the leading causes of morbidity in children globally. Atypical pneumonia accounts for a substantial proportion of community-acquired pneumonia in school-aged children and adolescents. The disease is characterized by gradual onset, persistent cough, mild fever, and extrapulmonary manifestations, which distinguish it from typical bacterial pneumonia. Because symptoms may be nonspecific, laboratory confirmation is essential for appropriate antimicrobial therapy and prevention of complications.[1,2,3,4,5]

Etiological Agents of Pediatric Atypical Pneumonia

The most common causative pathogens include:

Mycoplasma pneumoniae – the leading cause in school-aged children

Chlamydia pneumoniae – associated with prolonged respiratory symptoms

Respiratory viruses such as adenovirus, influenza virus, and respiratory syncytial virus

These pathogens often lack classic bacterial cell wall structures or present intracellular lifestyles, explaining reduced response to beta-lactam antibiotics and the need for macrolide or alternative therapy.[6,7,8,9,10,11]

Clinical Characteristics

1. General Symptoms

Children with atypical pneumonia typically present with:

Gradual onset of illness

Low-grade or moderate fever

Persistent dry cough progressing over several days

Headache, malaise, and fatigue

Compared with typical pneumonia, severe toxicity and abrupt onset are less common.[12,13,14,15]

2. Respiratory Findings

Physical examination may reveal:

Mild tachypnea

Scattered wheezing or fine crackles

Minimal auscultatory changes despite radiographic abnormalities

Chest radiographs often show **interstitial or patchy infiltrates**, disproportionate to clinical severity.[16,17,18,19]

3. Extrapulmonary Manifestations

Some children develop:

Skin rashes

Gastrointestinal symptoms

Neurological or hematological complications (rare but clinically significant)

Laboratory Characteristics

1. Hematological Findings

Normal or mildly elevated leukocyte count

Relative lymphocytosis in viral or *Mycoplasma* infections

Absence of marked neutrophilia typical of bacterial pneumonia

These findings help differentiate atypical from typical bacterial disease.[20,21,22,23]

2. Inflammatory Biomarkers

C-reactive protein (CRP): usually normal or moderately elevated

Erythrocyte sedimentation rate (ESR): mildly increased

Procalcitonin: typically low, supporting non-typical bacterial etiology

Low procalcitonin levels are particularly useful in avoiding unnecessary broad-spectrum antibiotics.[24,25,26,27]

3. Serological Testing

Detection of pathogen-specific **IgM and rising IgG titers** is widely used for diagnosing *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*. However, serology may lack sensitivity in early disease and requires paired samples.

4. Molecular Diagnostics

Polymerase chain reaction (PCR) from nasopharyngeal or throat swabs provides rapid and sensitive pathogen detection and is considered the diagnostic gold standard in many settings.[28,29,30,31]

5. Radiological Correlation

Imaging typically reveals **diffuse interstitial infiltrates, peribronchial thickening, or segmental consolidation**, which, when combined with laboratory data, supports diagnosis.[32,33,34,35,36]

Differential Diagnosis

Atypical pneumonia must be distinguished from:

Typical bacterial pneumonia

Viral lower respiratory tract infection

Asthma exacerbation

Tuberculosis in endemic regions

Integration of clinical, laboratory, and radiological findings is essential for accurate diagnosis.

Treatment Implications

Because atypical pathogens lack a cell wall, **macrolide antibiotics** (e.g., azithromycin) are first-line therapy. In macrolide-resistant cases, alternatives such as tetracyclines (in older children) or fluoroquinolones (selected severe cases) may be considered. Supportive care, including hydration, antipyretics, and monitoring for complications, remains important.[37,38]

Discussion

Early recognition of atypical pneumonia in children is challenging due to nonspecific symptoms and mild laboratory abnormalities. However, combining **low procalcitonin, modest CRP elevation, normal leukocyte count, and positive PCR or serology** significantly improves diagnostic accuracy. Advances in molecular diagnostics are transforming pediatric respiratory infection management and enabling targeted therapy, reduced antibiotic misuse, and improved outcomes.

Conclusion

Atypical pneumonia is a common and clinically important cause of respiratory illness in children. Its subtle clinical presentation necessitates reliance on laboratory diagnostics, particularly inflammatory markers, serology, and PCR testing. Accurate early diagnosis allows appropriate antimicrobial therapy, prevents complications, and supports rational antibiotic use. Continued research into rapid diagnostics and pathogen-specific management strategies is essential for improving pediatric respiratory health worldwide.

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