

Community Acquired Pneumonia: Clinical Manifestations



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Introduction

Pneumonia refers to a syndrome caused by acute infection, usually bacteria, characterized by clinical and/or radiographic signs of consolidation of a part or parts of one or both lungs. True incidence of community acquired pneumonia (CAP) is exactly not known. Overall estimates of annual incidence of community-acquired pneumonia vary between 2 and 12 cases per 1000, being highest in infants and in the elderly. Mortality rates are less than 1–5% in the outpatient setting, but as high as 12% in hospitalized patients. Many factors like alcoholism, bronchial asthma/chronic obstructive pulmonary disease (COPD), age >70 years, immunosuppression, smoking, and HIV infection influence the types of pathogens that should be considered in identifying the etiologic agent. Relatively few pathogens cause most cases. They are bacterial organisms like *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus* [including community-acquired methicillin-resistant *Staphylococcus aureus*], *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. Atypical organisms like *Mycoplasma pneumoniae*, *Legionella pneumoniae*, *Chlamydia*, respiratory viruses (e.g., influenza viruses) Anaerobes play a significant role in CAP only when aspiration occurs days to weeks before presentation. Great overlap occurs among the clinical manifestations of the pathogens associated with acute community acquired pneumonia. However, constellations of symptoms, signs, and laboratory findings serve to narrow the possibilities and clinicians can better predict the clinical course of pneumonia and can narrow antibiotic coverage.

Clinical Manifestations of Specific Causes of Community-Acquired Pneumonia

Streptococcus pneumoniae

Streptococcus pneumoniae is the most commonly isolated pathogen identified in 20%–60% of cases in adults with community-acquired pneumonia. The incidence peaks in the winter and spring, when carrier rates in the general population may be as high as 70%. It is most common in infants, elderly, alcoholic and immunocompromised patients. The incidence of bacteremic pneumonia among hospitalized patients is 25% with mortality rate of 20%. Of the elderly with bacteremic pneumonia, 30% do not have fever and 50% have minimal respiratory symptoms. Classically *Streptococcus pneumoniae* has a very abrupt onset that begins with acute febrile illness. The onset of the illness is frequently preceded by mild coryza or other upper respiratory tract symptoms. Before the availability of antibiotics a patient would remain febrile with continuous fever, typically 38.5–39.5°C, for between 5 and 10 day. If recovery occurred, it was characteristically abrupt with sudden fall in temperature.

Pleuritic chest pain is common as it frequently involves peripheral lung and spreads quickly to the pleura. Sputum may be blood-streaked or rusty because capillary leakage of blood into the alveolar space in the phase of red hepatization. Now a days this is less common findings because of modifying effects of antibiotics on pathological process. The sputum is usually yellowish or greenish in colour, sometimes containing flecks of blood. On physical examination the patient may be sweating, flushed and ill looking. Cyanosis is uncommon in previously healthy patient and when present indicates extensive pneumonia. Fever with concomitant tachycardia is present. Tachypnea is usually present as breathing may be limited in depth by pleuritic pain. An impaired percussion note over the affected lobe may be elicited. The breath sounds are usually tubular bronchial breathing over the same area associated with increased vocal fremitus and vocal resonance, aegophony and whispering pectoriloquy. Localized crepts may be heard. Herpes labialis is usually present within few days of onset of infection. Although the above clinical features are well recognized in relation to lobar pneumonia, in a microbiological sense they are entirely non-specific and it is impossible to conclude with certainty that the infective organism is *Strep. pneumoniae* without supporting evidence from the laboratory. Furthermore, the classical presentation in modern-day practice is often modified by the early use of antibiotic therapy, the presence of pre-existing lower respiratory tract disease such as chronic bronchitis, emphysema and bronchiectasis, and age of the patient. Loss of mental clarity, somnolence or frank confusion are also found commonly in elderly patients with pneumonia of any type, and may be a co-existing manifestation of the pneumonia itself or of deterioration in a coexisting illness such as renal insufficiency or congestive cardiac failure. Symptoms in the young children may be non-specific and misleading. Fever and delirium are common. Respirations may be rapid and grunting. Meningism is sometimes present and abdominal pain may occur in lower lobe pneumonia. The usual auscultatory finding of consolidation may be absent or difficulty to detect, making chest radiograph essential for diagnosis. Leukocytosis is common. Early in the disease, chest x ray findings may be normal, but later, they may show classic lobar pneumonia. Pleurisy or effusion is common, and cavitation is rare.

Haemophilus influenzae

Group B and non-typable, (non encapsulated) *H. influenzae* can both cause community-acquired pneumonia. Infection with non-typable *H. influenzae* is more common in elderly individuals and in smokers with COPD. These are present in the sputum of 30% to 60% of normal adults and 58% to 80% of patients with COPD. In contrast, bacteremia is almost always associated with encapsulated strains. Both strains cause pulmonary infections, otitis, sinusitis, epiglottitis, and pneumonia. Many patients with pneumonia have underlying COPD or alcoholism, even though *H. influenzae* pneumonia develops in healthy military recruits. The onset of symptoms tends to be more insidious than that seen with *S. pneumoniae*, but the clinical pictures are otherwise indistinguishable. Pneumonia is detected in the lower lobes more

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often than in the upper lobes. Chest x ray findings are typical for bronchopneumonia or lobar pneumonia. Pleural effusions occur in 30% of patients, and cavitation is rare.

Staphylococcus aureus

Community-acquired pneumonia attributable to *S. aureus* is rare. The most common predisposing factor is a preceding influenza infection. In a few communities, community-acquired methicillin resistant *S. aureus* (cMRSA) pneumonia has been described in addition to methicillin-sensitive *S. aureus* (MSSA). *Staphylococcus aureus* may be isolated from the nasal passages of 20% to 40% of healthy adults, but pneumonia is uncommon. *Staphylococcus aureus* pneumonia is more likely to occur in patients with severe diabetes mellitus or an immunocompromised state, in patients receiving dialysis, in drug abusers, and in those with influenza or measles. The clinical manifestations of this infection are similar to other forms of bacterial pneumonia. However the illness is often severe, being associated with high fever and a slow response to conventional therapy. A chest x ray can demonstrate patchy infiltrates or dense diffuse opacifications. *S. aureus* produces multiple proteases that allow this bacterium to readily cross the lung fissures and simultaneously involve multiple lung segments. The rapid spread and aggressive destruction of tissue also explains the greater tendency of *S. aureus* to form lung abscesses and induce a pneumothorax. Spread of this infection to the pleural space can result in empyema in 10% of patients.

Pseudomonas aeruginosa

Pseudomonas aeruginosa (previously known as *pseudomonas pyocyaneus*), is a ubiquitous organism commonly isolated from patients with cystic fibrosis and bronchiectasis. Colonization may be difficult to distinguish from true infection. Pneumonia may occur in patients with COPD, congestive heart failure, diabetes mellitus, kidney disease, alcoholism, malignant otitis media, tracheostomy, or prolonged ventilation. It also may develop postoperatively and in immunocompromised hosts. *Pseudomonas pneumonia* results in microabscess, alveolar haemorrhage, and necrotic areas. Some cases of *pseudomonas pneumonia* are associated with bacteraemia. The infection may be fulminating in bacteraemic cases and may result in septic shock with hypotension and oliguria and patient may develop ARDS. Bacteraemic patients may develop vesicular rash or erythema gangrenosum. (A central area of cutaneous necrosis surrounded by a narrow ring of erythema).

Klebsiella pneumoniae

Pneumonia due to *K pneumoniae* is more likely in persons who are alcoholic, diabetic, or hospitalized and receiving mechanical ventilation. It is more common in males. The clinical syndrome produced in *Klebsiella pneumonia* may be indistinguishable from that produced by many other acute bacterial pneumonias, except that the infection tends to be severe and, in contrast to other Gram-negative bacteria may cause a confluent pneumonia of lobar distribution. As with staphylococcal pneumonia, cavitation and abscess formation may occur, although these tend to be less widespread. The sputum is viscid and may be blood-stained, like redcurrant jelly.

Moraxella catarrhalis

Moraxella (previously *Branhamella*, previously *Neisseria catarrhalis*) a gram-negative aerobic coccobacillus, is part of the normal flora. Colonization is more common in the winter. It causes sinusitis, otitis, and pneumonia. The latter is more likely in patients who have alcoholism, COPD, diabetes mellitus,

or immunocompromised status. Bacteremia is rare. Infection produces segmental patchy bronchopneumonia in the lower lobes. Cavitation and pleural effusion are rare. It accounts for 1-3% of community acquired pneumonia.

Anaerobic Bacteria

Bacteroides melaninogenicus, *Fusobacterium nucleatum*, anaerobic cocci, and anaerobic streptococci are responsible for most cases of anaerobic pneumonia. *Bacteroides fragilis* is recovered from 15% to 20% of patients with anaerobic pneumonia. Most of these anaerobes reside in the oropharynx as saprophytes. Common factors responsible for aspiration of anaerobes include altered consciousness, tooth extraction, poor dental hygiene, oropharyngeal infections, and drug overdose. More than 50% of patients have foul-smelling sputum. Patchy pneumonitis in dependent segments may progress to lung abscess and empyema.

Community-Acquired "Atypical" Pneumonia

The classification of pneumonia into "atypical" and "typical" arose from the clinical observation that in some patient's pneumonia had a different course from that of pneumococcal pneumonia. The appreciation that numerous organisms, each with varied manifestations, can cause atypical pneumonia limits the clinical usefulness of such a classification. Organisms causing atypical community-acquired pneumonia include *Legionella pneumophila*, *Mycoplasma pneumoniae*, *Chlamydia psittaci*, *Chlamydia pneumoniae*, *Coxiella burnetii*, and *Francisella tularensis*. In atypical pneumonia, the chest x ray abnormalities are often disproportionate to the pulmonary symptoms, and sputum analysis may reveal numerous leukocytes and no organisms. It is important to keep in mind that significant overlap occurs in the clinical manifestations of this group of infections and the more typical forms of pneumonia associated with purulent sputum production.

Legionella pneumophila

Immunocompromised patients, smokers and elderly people are more susceptible to this infection. Clinically, *Legionella* infection causes symptoms typical of other acute community-acquired pneumonias, including high fever, cough, myalgias, and shortness of breath. As compared with other bacterial pneumonias, cough usually produces only small amounts of sputum. Gastrointestinal symptoms, confusion, and headache are more frequently encountered in patients with *Legionella*. Symptoms, in decreasing order of frequency, are abrupt onset of cough (hemoptysis in 30% of patients), chills, dyspnea, headache, myalgia, arthralgia, diarrhoea, and relative bradycardia and change in mental status. Laboratory findings are similar to other acute pneumonias. The only distinctive finding may be hyponatremia, which is noted in approximately one third of patients. A chest x ray frequently demonstrates lobar pneumonia. In the immunocompromised host, cavitory lesions may be seen. Small pleural effusions are also commonly found.

Mycoplasma pneumoniae

Mycoplasma pneumoniae infection is seen primarily in patients under age 40 years. The disease is seasonal, with the highest incidence of *Mycoplasma* being seen in the late summer and early fall. Illness is more common in school-aged children and young adults. The incubation period is 2 to 3 weeks. Clinical features include cough (>95% of patients), fever (85%), pharyngitis (50%), coryza, and tracheobronchitis. Bullous myringitis (20%) is a rare but unique feature of this disease. Sore throat is usually a prominent symptom. Tracheobronchitis results in a hacking

cough that is often worse at night and that persists for several weeks. Physical exam may reveal some crepts, but classically, radiologic abnormalities are more extensive than predicted by the physical examination. The clinical course is usually benign and cough, malaise and tiredness may persist for over a month and there may or may not be local signs of consolidation. Other rare complications include Bullous myringitis (painful haemorrhagic blisters on the ear-drum and external auditory canal) in 5% of cases, generalized lymphadenopathy, splenomegaly, pleural effusion, haemolytic anaemia, erythema multiforme, hepatitis, thrombocytopenia, and Guillain-Barré syndrome. It causes interstitial pneumonia and acute bronchiolitis.

Chlamydia pneumoniae

Chlamydia pneumoniae (Taiwan acute respiratory agent) is another important cause of atypical pneumonia, it is confined to the human respiratory tract; no-reservoirs are known. Person-to-person spread occurs among schoolchildren, family members, and military recruits. The incubation period is 10 to 65 days (mean, 31 days). Re-infection is common, with cycles of disease every few years. The disease occurs sporadically and presents in a manner similar to Mycoplasma, with sore throat, hoarseness, and headache in addition to a non-productive cough, Pharyngeal erythema and wheezing are common. Radiologic findings are also similar to those with Mycoplasma and may include unilateral segmental patchy opacity.

Conclusions

The diagnosis of CAP encompasses a broad spectrum of clinical, radiological, microbiological and biochemical techniques. Currently, most of CAP is diagnosed in primary care setting where clinical history and physical examination are very important and there is limited use of the majority of additional diagnostic tests. When the clinician is challenged by treatment failure, in CAP more intensive and accurate investigation is required.

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