Clinical aspects of pneumonia

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ABSTRACT

Pneumonia is a serious medical condition and a major cause of morbidity and mortality worldwide. It has many infectious aetiologies, although bacterial and viral forms are most common. Our understanding of pneumonia has improved significantly during the course of the 20th century but the overall disease burden has changed little. Although antibiotics have helped to reduce the mortality associated with some types of pneumonia, the level of morbidity remains constant. Furthermore, the existence of antibiotic-resistant bacteria worldwide is becoming an increasing problem in treatment. This essay describes the different types of pneumonia from a clinical perspective and highlights the problems associated with the condition.

KEY WORDS: Morbidity. Mortality. Pneumonia.

Introduction

Pneumonia is a serious infection or inflammation of the lungs that continues to be a common cause of morbidity and mortality worldwide, even in developed countries with good access to antibiotics.[1] Children may have up to eight respiratory infections per year and approximately four million children die every year from pneumonia or other acute respiratory tract infections. There are numerous forms and causes of pneumonia, and this essay aims to provide a summary.

Up to the Second World War, pneumonia was the largest cause of death in developed countries (Europe and the USA). Following the introduction of antibiotics, however, pneumonia was brought under control and heart disease is now the leading killer. Pneumonia combined with influenza has been the fifth most common cause of death since 1979.[1]

Pneumonia can occur in several forms. Lobar pneumonia is limited to a section (or lobe) of a lung, whereas bronchial pneumonia (or bronchopneumonia) affects patches throughout both lungs. It is not a single disease but a description of a clinical syndrome, and the disease has over 30 causes. Here, the bacterial and viral causes of pneumonia will be discussed.

Bacterial pneumonia

Bacterial pneumonia can affect individuals of any age, from infants through to the very old. Alcoholics, the debilitated, post-operative patients, people with other respiratory diseases or viral infections, and those who have a weakened immune system are at greatest risk.[2-6]

Bacteria that cause pneumonia may already be carried in the throats of healthy individuals. When body defences are weakened, however, bacteria can multiply and cause disease by entering the lungs and causing inflammation of the alveoli (air sacs). From part of a lobe to almost five lobes can be filled with liquid, and this is known as consolidation. Infection can spread quickly and may lead to septicaemia.

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Onset can be gradual or sudden. In the most severe cases, patients may develop a range of symptoms, including chills, severe chest pain and a productive cough. Body temperature may rise to over 40°C (105°F). Usually, there is difficulty in breathing and a raised pulse rate. In some cases, the patient may be confused or delirious.

Streptococcus pneumoniae (the pneumococcus) is the most common cause of bacterial pneumonia,[7] and is one form of pneumonia against which antibiotic therapy and vaccines are available.[8] Worldwide, the pneumococcus is the major cause of mortality in children under the age of five.[2] Other causes of bacterial pneumonia are listed in Table 1.

Viral pneumonia

Half of all pneumonias are thought to have a viral aetiology.[8,9] Although most viruses cause upper respiratory tract disease, some produce pneumonia, especially in children, but most are not serious and last a short time. Influenza virus commonly causes respiratory disease, which can be severe and occasionally fatal.

Again, it is the young, the elderly and those with a weakened immune systems who suffer the most. As with the bacterial form, virus particles invade the lungs and multiply; however, in viral pneumonia there is almost no fluid accumulation in the lungs.

The symptoms of viral pneumonia include fever, a dry cough, headache, and muscle pain and weakness. Symptoms are often described as 'flu like'. Usually, within one to two days of infection, increasing breathlessness develops, the initial cough becomes worse and small amounts of mucus are produced. These symptoms usually are accompanied by a high fever. Subsequently, viral pneumonia may be complicated by bacteria infection.

Table 1. Some causes of pneumonia

Bacteria	Viral	Other
Chlamydia pneumoniae	Adenovirus	*Pneumocystis carinii*
Coxiella burnetii	Influenza	*Mycoplasma pneumoniae*
Haemophilus influenzae	Parainfluenza	
Mycobacterium tuberculosis	Respiratory syncytial virus	
Legionella pneumophila	Varicella zoster virus	
Staphylococcus aureus		
Streptococcus pneumoniae		

Mycoplasma pneumonia

Although mycoplasma is now considered to be a bacterium, the pneumonia it causes presents in a slightly differently way to other forms of the condition. Owing to its somewhat different symptoms and physical signs, and the fact that the course of the illness differs from classical pneumococcal pneumonia, mycoplasma pneumonia once was believed to be caused by one or more undiscovered viruses, and was called primary atypical pneumonia. It is now known to be caused by *Mycoplasma pneumoniae*, which generally causes a widespread but mild pneumonia.[10]

It can affect all age groups but occurs most frequently in older children and young adults. Death rate is low, even in untreated cases. A most prominent symptom is a cough that tends to come in violent attacks but produces only sparse mucus. Chills and fever are early symptoms; however, some individuals experience nausea or vomiting.

Other causes of pneumonia

Pneumocystis carinii pneumonia (PCP) has received much attention over recent years,[11] and is caused by what is believed to be a fungal organism. PCP is often the first sign of illness in many of those who have acquired immunodeficiency syndrome (AIDS), and around 80% of AIDS patients will develop it at some time.

In many cases PCP can be treated successfully, although it may recur a few months later. Other less-common pneumonias may be quite serious and occur more frequently, due to the inhalation of food, liquids, gases, dust or fungi. Foreign bodies, or a bronchial obstruction (e.g. tumour), may promote the development of pneumonia, although they are not direct causes.

Differential diagnosis and treatment of pneumonia

Patients with pneumonia, or diseases with similar symptoms, may prove difficult to diagnose and atypical onset of infection adds further complication. For example, lobar pneumonia may be confused with conditions such as bronchopneumonia, pulmonary infarction or pleural effusion. Less commonly, acute tuberculous pneumonia or pulmonary collapse due to a variety of causes may result in difficulties with clinical diagnosis.

In the aged, in debilitated persons or in those with chronic disease the clinical course of bronchopneumonia and lobar pneumonia can be very similar. Under such circumstances, terminal lobar pneumonia may be overlooked and central pneumonia may be in doubt for several days.

Pulmonary infarction may give rise to a symptom complex, partly or wholly indistinguishable from lobar pneumonia. Infarction should be of prime concern when there is sudden onset of pulmonary symptoms in patients who have chronic heart disease, cardiac decompensation, uterine sepsis or abdominal sepsis. Marked dyspnoea and cyanosis may appear suddenly when occlusion of a large branch of the pulmonary artery occurs. Pain on one side of the chest and a bloody productive cough are common.

Attention to the order in which symptoms present can assist in making a diagnosis. Bloody sputum may appear within a few hours of onset or be delayed for two or three days. The examination of washed sputum particles may not reveal bacteria, either microscopically or by culture. Severe secondary streptococcal infections complicating recovery from pneumococcal lobar pneumonia may give rise to a clinical picture suggestive of pulmonary infarction. In such cases, streptococcal bacteraemia usually can be demonstrated.

Acute tuberculous pneumonia, although rare, can be encountered. When it occurs, it usually simulates acute pneumococcal pneumonia. The patient is likely to have a family history of tuberculosis or a history of contact with tuberculous patients. At times, such patients will give a history of deteriorating health, accompanied by night sweats for some weeks prior to the acute illness. Although initial symptoms may be typical, chill and pain are less common than in pneumococcal cases. Frequently, repeated examination of sputum for tubercle bacilli must be performed before the diagnosis can be established. Lesions in the upper lobes are found more frequently than in pneumococcal cases.

Collapse of one or more lobes (atelectasis) during pneumonia is a very seldom occurrence. In otherwise healthy patients, collapse of one of the lower lobes may be mistaken for pneumonia. The condition may arise suddenly and cause dyspnoea, pain and viscid expectoration for about a day. Examination of the chest may reveal retraction of the affected side, slight dullness and diminished or absent breath sounds. Cardiac apex commonly is displaced toward the affected side.

Collapse of an entire lower lobe can be recognised by the presence of a homogeneous shadow in the cardiophrenic

angle, with a sharply defined outer border, slanting down and outward to the diaphragm. In unilateral atelectasis, examination shows elevation of the diaphragm, narrowing of the intercostal spaces and increased downward inclination of the ribs on the affected side, with displacement of the heart and mediastinum toward the lesion.

Distinction between pleural effusion and lobar pneumonia at times can be difficult, particularly in complicated cases. Onset is usually gradual in primary cases of serofibrinous pleuritis. If large effusions are present then diminished motion on the affected side occurs, accompanied by displacement of the heart and trachea away from the affected side.

Greatest difficulty arises in distinguishing small effusions from pneumonia. With small effusions, visceral displacement may be demonstrated on the side opposite the accumulation of fluid, and there is relatively less resonance on the affected side in the paravertebral region than in pneumonia.

Differential diagnosis of community-acquired pneumonia can be easier if a detailed case history is obtained. Pneumococcal pneumonia is the most common cause of community-acquired pneumonia and it can occur throughout the year, although it is more common during winter months.

Other common causes of community-acquired pneumonia include *Chlamydia pneumoniae* and *Haemophilus influenzae*.[9,10] Marked seasonal variation in the incidence of other infections occurs, with staphylococcal pneumonia in the winter and *Legionella pneumophila* pneumonia in late summer and autumn. Other infections vary in their epidemicity and periodicity.

A number of effective therapies are available to treat pneumonia, including antibiotics for bacterial infection. Penicillin has proved effective for many years but penicillin-resistant bacterial strains, such as *S. pneumoniae*, are now isolated more frequently and prove problematic in some areas.[12,13] Vaccines, however, may hold the key to reducing the number of pneumonia episodes.[14-16]

In summary

Pneumonia remains a common disease that has many aetiologies – bacteria, viruses, mycoplasma and other non-infectious substances – and varying symptoms. Some forms are easily treated but others are unpreventable. Pneumonia can be mistaken for a number of other illnesses that demonstrate similar presenting symptoms. □

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