CHAPTER 5

RESPIRATORY DISEASES

PNEUMONIA

Pneumonia is an inflammation in alveolar tissue, most often caused by a microbial agent. Inhalation is the commonest route of infection. The most frequent inhalational pneumonia is the community acquired pneumonia. The community acquired pneumonia is most commonly caused by *Streptococcus pneumoniae* (typical) and less frequently by *Mycoplasma pneumoniae*, *H. influenzae*, *Chlamydia pneumoniae*, *Staphylococcus aureus* or *Legionella pneumophila* (atypical). *Haemophilus influenzae* infection is seen mostly in patients with chronic bronchitis. Nosocomial pneumonia is likely to be caused by Gram-negative bacilli or *Staphylococcus aureus*. Aspiration pneumonia is usually seen in patients with neuromuscular disorders or in ICU care is polymicrobial including anaerobes. Age is an important predictor of infecting agent.

SALIENT FEATURES

- Sudden onset of fever, productive cough, chest pain, shortness of breath and (in some cases) pleuritic chest pain; systemic symptoms like headache, bodyache and delirium are more severe with atypical pneumonia.
- The atypical pneumonia syndrome is characterized by a more gradual onset, a dry cough, shortness of breath and a prominence of extrapulmonary symptoms (headache, myalgias, fatigue, sore throat, nausea, vomiting and diarrhoea) and abnormalities on chest X-ray despite minimal signs of pulmonary involvement (other than rales).
- The "primary atypical pneumonia" caused by Mycoplasma results in a violent, episodic cough with small mucoid sputum preceded by fever with or without chills and may be accompanied by profound weakness.
- Diagnosis is confirmed by X-ray chest, sputum examination (Gram stain and culture).

Treatment

Nonpharmacological

Adequate fluids, promoting expectoration (gravity drainage).

Pharmacological

Antibiotics are the mainstay of treatment—initial choice depends on setting in which infection was acquired, age, the clinical presentation, pattern of abnormality on chest X-ray, result of staining of sputum or other infected body fluids and current pattern of susceptibility of pathogens to antimicrobial agents. The choice of antibiotic may be modified based on response and sputum culture.

A. Community acquired pneumonia (CAP) in a young/middle aged, otherwise healthy subject: Outpatient

Cap. Clarithromycin 500 mg twice daily for 10 days

Or

Cap. Azithromycin 500 mg once and then 250 mg/day for 4 days

Or

Cap. Doxycycline 100 mg twice daily for 10 days**.**

B. Community acquired pneumonia (CAP) in patients with cardiopulmonary disease and/or risk factors for DRSP infection

i) Antibiotics for exacerbating bacterial infection/pneumonia

Cap. Levofloxacin 500 mg/day for 10-14 days

Or

Cap Amoxycillin 500 mg 3 times a day.

Or

Cap. Amoxycillin 500 mg + Clavulanic acid 125 mg 3 times a day plus Tab. Erythromycin 500 mg 6 hourly for 10 to 14 days or Cap. Doxycyclin as above .

Or

Inj. Erythromycin 500 mg IV 6 hourly (Preferred if sensitivity to penicillin or when *Mycoplasma* or *Legionella* infection suspected).

Or

If *Staph* infection is suspected, Inj. Cefotaxime 1-2 g IV 8 hourly.

ii) Elderly individual (immunocompetent) with CAP or nosocomial pneumonia

Inj. Cefotaxime 1-2 g IV 8 hourly.

Or

Inj. Ceftazidime 1-2 g IV 8-12 hourly

iii) Elderly individual (immunosuppressed) with CAP or nosocomial pneumonia

1. Same as (ii).
2. Inj. Gentamicin 1-1.5 mg/kg IV 8 hourly.

   Or

   Inj. Amikacin 5 mg/kg IV 8-12 hourly.

iv) Aspiration pneumonia

1. Tab. Levofloxacin 500 mg/day

Or
Cap Amoxicillin 500-750 mg 8 hourly.
Or
Same as (ii), if aspiration occurs in the hospital.

2. Inj.or Tab. Metronidazole 400 mg 8 hourly for 7-14 days.

C. Concommittant use of bronchodilators (salbutamol, terbutaline) is beneficial for associated bronchospasm.

D. Non-specific treatment, if high fever and body aches (see section on Fever in Chapter 1)

E. Non-invasive/invasive ventilator support depending upon the ABG analysis.

Follow-up

Continue same antibiotic, if good clinical response for 7-10 days. Change of antibiotic required only if culture results show resistance to given antibiotic and there is no clinical improvement, repeat chest X-ray at 4-5 days interval. Follow-up X-ray to be done after 3-4 weeks of completing treatment.

Patient education

- Explain the importance of chest percussion and gravity drainage of sputum.

References

1. Pneumonia. In: Harrison's Principles of Internal Medicine. Fauci, Braunwald, Kasper et al (eds), 18th Edition, McGraw Hill Company Inc., New York, 2012; pp 2130-2140.
2. Guidelines for the Management of Adult with Community-acquired Pneumonia - American Thoracic Guidelines. Am J Resp and Critical Care Medicine, Vol 16, 2001; pp 1730-1754.
3. IDSA Guidelines. Update of Practice Guidelinees for the Management of Community Acquired Pneumonia in Immunocompetent Adults. Clinical Infections Diseases 2003; 37: 1405-1433.
4. IDSA Guidelines. Practice Guidelines for Outpatient Parenteral Antimicrobial Therapy. Clinical Infections Diseases 2004; 38: 1651-1672.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

COPD is a common preventable and treatable disease and is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbiditeis contribute to the overall severity in individual patients. It includes a spectrum of disease with two ends being 'chronic bronchitis' (cough/ expectoration for at least 3 months in a year for 2 or more years) or 'emphysema' (distension of air spaces distal to terminal bronchiole with destruction of alveolar septa). The most important cause is inhalation of smoke, mostly from cigarette (80% of smokers get it), the other factors being air pollution, infections and genetic. Diagnosis is clinical, supported by chest X-ray and pulmonary function tests. A clinical diagnosis of

COPD should be considered in any patient who has dyspnoea, chronic cough or sputum production, and/or history of exposure to risk factors for the disease. Spirometry FEV_1/FVC <0.70 confirms the presence of persistent airflow limitation.

Treatment

A COPD management programme includes four components: Assess and monitor disease, reduce risk factors, manage stable COPD, and manage exacerbations.

Nonpharmacological

Cessation of smoking, avoiding inhalation of smoke from other sources (home or occupational), chest physiotherapy to help expectoration of sputum, postural drainage of sputum and adequate hydration.

Pharmacological

A. Severe acute bronchospasm

1. Oxygen inhalation (24-28%) with the venturi mask or through nasal prongs at flow rate of 1-2 liters/min.
2. Salbutamol solution 2.5 mg inhaled using nebulization 4-6 times a day and as and when required.
3. Inj. Aminophylline 250-500 mg (5 mg/kg) dissolved in 20 ml of 5% dextrose given slowly over 20 minutes (not given if patient already receiving theophylline) or has liver disease followed by infusion at the rate of 0.5 mg/kg/h.
4. Oral/parenteral Amoxycillin 500 mg+ Clavulanic acid 125 mg 3 times a day for 7-10 days.
5. Tab Prednisolone 1-2 mg/kg/day for 5 days.

Refer the patient to hospital for further treatment/assisted ventilation if no response to above treatment, severe cyanosis and/or altered sensorium.

B. Maintenance treatment

1. Salbutamol-metered dose inhaler (MDI) inhalation 200 mcg 4 times a day and as and when required (use spacer, if coordination is a problem for the patient).
   Or
   Terbutaline metered dose inhaler 250 mcg 4 times a day and as and when required.
2. If no complete response to the above, give Ipratropium bromide inhalation 200 mcg 2 times a day.
3. Tab. Theophylline 100-200 mg 3 times a day given after meals.
4. If patient is expectorating yellowish sputum, oral Amoxycillin 500 mg+ Clavulanic acid 125 mg 3 times a day for 7-10 days.
5. Steroids have a very limited role in selected patients only, if at all required should be administered by the specialist only.

Indication about home therapy of oxygen to be decided by the specialist and if indicated, should be taken for 15 hours a day.

Use of mucolytics has no proven benefit. Regular use of antitussives is contraindicated in stable COPD. Respiratory stimulants are not recommended.

Patient education

- Explain about importance of total cessation of smoking and its benefit not only during the acute stage but even about the long-term recovery of lung functions.
- Patient should also be given 1 week dose of antibiotic and instructed to use, if the symptoms start worsening with change in colour of sputum to yellow.

References

1. Chronic Obstructive Pulmonary Disease (COPD). In: Harrison's Principles of Internal Medicine. Fauci, Braunwald, Kasper et al (eds), 18th Edition, McGraw Hill Company Inc., New York, 2012; pp 2151-2160.
2. Global Strategy for Diagnosis, Management and Prevention of COPD. The Global Initiative for Chronic Obstructive Lung Diseases (GOLD). Updated Oct. 2011.

BRONCHIECTASIS

Bronchiectasis is caused by permanent abnormal dilatation of one or more bronchi/bronchiole due to destruction of ciliated epithelium, elastic and muscular tissue. The destructive process may be initiated by primary microbial infection (necrotizing pneumonia, tuberculosis, aspergillosis, etc.) or obstruction (foreign body, tumour, lymph node, etc.) resulting in stasis and secondary infection.

SALIENT FEATURES

- Insidious onset with chronic productive cough, increasing volume of sputum due to recurrent infections, haemoptysis, clubbing of fingers, terminating in cor pulmonale and respiratory failure.

Treatment

Nonpharmacological

Stop smoking; physiotherapy in the form of chest percussion and gravity drainage to remove secretion; graded exercise. Routine deep breathing exercises and maintenance of good nutrition.

Pharmacological

Aim is to take care of complicating infections (as indicated by purulent sputum, may be associated with blood) and management of associated bronchospasm, if present.

1. Cap Amoxycillin 50 mg/kg in 3 divided doses.

Or
Cap Amoxycillin 500 mg+ Clavulanic acid 125 mg 3 times a day.
Or
Cap Tetracycline 25-50 mg/kg/day in 3 divided doses.
Or
Tab. Cotrimoxazole (SMZ 800 mg + TMP 160 mg) 2 times a day.
The antibiotic choice is modified by Gram stain and sputum culture and is given for 7-10 days.
If *Staph aureus* suspected or isolated, then consider
Cap Ampicillin + Cloxacillin 1 g 6 hourly.
Or
Inj. Nafcillin or Oxacillin 2 g 4 hourly.
If *Pseudomonas* isolated, use at least 2 effective antipseudomonal drugs
Inj. Ceftazidime 1-2 g IV 8 hourly + Inj Gentamicin 3-5 mg/kg/day.

2. Salbutamol inhaler 200 mcg four times a day and SOS.
3. Tab. Etophylline + Theophylline 100-200 mg 3 times a day.

Surgery is indicated in case of uncontrolled haemoptysis and if the disease is localized to one lobe/lobule.

Observe for the improvement in amount and colour of sputum and constitutional symptoms. If no clinical response and sputum culture report is available, change the antibiotic accordingly. If bronchospasm is not relieved by metered dose inhaler, nebulization should be done.

Hospitalization is required for severe bronchospasm, a very sick patient or significant haemoptysis.

Patient education

- Emphasize on stopping smoking, annual vaccination against *Pneumococcus*, prompt treatment of upper respiratory tract infections, physiotherapy, early antibiotic treatment, if change in colour of sputum.

Reference

1. Bronchiectasis and Lung Disease. In: Harrison's Principles of Internal Medicine. Fauci, Braunwald, Kasper et al (eds), 18th Edition, McGraw Hill Company Inc., New York, 2012; pp 2142-2146.

COR PULMONALE

Right ventricular dilatation and/or hypertrophy associated with pulmonary hypertension (PHT) secondary to disease of thoracic wall, pleura or pulmonary parenchyma.

SALIENT FEATURES

- Same as congestive heart failure.
- Diagnosis is made by clinical findings, chest X-ray, pulmonary function tests (PFTs), ECG, echocardiography.

Treatment

1. Treat the underlying cause.
2. Same as congestive heart failure (for details see respective section).

Reference

1. Heart Failure and Cor Pulmonale. In: Harrison's Principles of Internal Medicine. Fauci, Braunwald, Kasper et al (eds), 18th Edition, McGraw Hill Company Inc., New York, 2012; pp. 1901-1915.