CASE TWO

Short case number: 3_10_2
Category: Respiratory System
Discipline: Medicine
Setting: General Practice
Topic: Pneumonia – hospital acquired, suppurative, aspirational and SARS [SDL]

Case

Martin Clark, aged 62 years presents to your general practice three days following discharge from hospital following day surgery for an impacted wisdom tooth extraction. Surgery was uncomplicated but since discharge he has developed a productive cough and today he feels hot and sweaty. Martin is otherwise well apart from type 2 diabetes managed with metformin.

Questions

1. Describe you management of Martin in terms of history, examination and investigations.
2. How would you further manage this case?
3. What factors predispose to nosocomial or hospital acquired infection and which are present in Martin's history?
4. In a table, summarise why respiratory infections are more common in old age.
5. Define suppurative and aspirational pneumonia and briefly state how their appearances differ on chest x-ray
6. Briefly describe SARS and how it presents clinically.

Suggested reading:

- Colledge NR, Walker BR, Ralston SH, Penman ID, editors. Davidson's Principles and Practice of Medicine. 22nd edition. Edinburgh: Churchill Livingstone; 2014. Chapter 19.

ANSWERS

HOSPITAL-ACQUIRED PNEUMONIA

1. **Describe your management of Martin in terms of history, examination and investigations.**
   The clinical features and investigation of patients with hospital-acquired pneumonia are very similar to CAP. Symptoms include increased cough and sputum purulence associated with a rise in temperature. Breathlessness and central cyanosis may then appear, but pleural pain is uncommon. In the early stages the physical signs are those of acute bronchitis followed by the development of crackles. There is a neutrophil leucocytosis and the chest X-ray shows mottled opacities in both lung fields, chiefly in the lower zones.

2. **How would you further manage this case?**
   Management include chest X-ray, obtaining microbiological diagnosis (e.g. sputum culture & sensitivity), blood tests (e.g. FBC, blood gas & culture) and

   Antibiotics treatment:

   Adequate Gram-negative coverage is usually obtained with:
   - a third-generation cephalosporin (e.g. cefotaxime) plus an aminoglycoside (e.g. gentamicin) or
   - meropenem or
   - a monocyclic β-lactam (e.g. aztreonam) plus flucloxacillin.

   Aspiration pneumonia can be treated with co-amoxiclav 1.2 g 8-hourly plus metronidazole 500 mg 8-hourly. The nature and severity of most hospital-acquired pneumonias dictate that these antibiotics are all given intravenously, at least initially.

   Physiotherapy is of particular importance in the immobile and elderly, and adequate oxygen therapy, fluid support and monitoring are essential. The mortality from hospital-acquired pneumonia is high (approximately 30%)

   What factors predispose to nosocomial or hospital acquired infection and which are present in Martin's history?

   - **Reduced host defences against bacteria**
     i. *Reduced immune defences* (e.g. corticosteroid treatment, *diabetes,* malignancy)
     ii. *Reduced cough reflex (e.g. post-operative)*
     iii. *Disordered mucociliary clearance (e.g. anaesthetic agents)*
     iv. Bulbar or vocal cord palsy
   - **Aspiration of nasopharyngeal or gastric secretions**
     i. Immobility or reduced conscious level
     ii. Vomiting, dysphagia, achalasia or severe reflux
     iii. Nasogastric intubation
   - **Bacteria introduced into lower respiratory tract**
     i. Endotracheal intubation/tracheostomy
     ii. Infected ventilators/nebulisers/bronchoscopes
     iii. *Dental or sinus infection*
   - **Bacteraemia**
     i. Abdominal sepsis
     ii. Intravenous cannula infection

iii. Infected emboli

** *Underlined and italic* are factors that are present in Martin's history

3. In a table, summarise why respiratory infections are more common in old age.

- **Increased risk of and from respiratory infection:** because of reduced immune responses, increased closing volumes, reduced respiratory muscle strength & endurance, altered mucus layer, poor nutritional status and the increased prevalence of chronic lung disease.
- **Predisposing factors**: other medical conditions may predispose to infection, e.g. swallowing difficulties due to stroke increase the risk of aspiration pneumonia.
- **Atypical presentation**: classical symptoms and signs are less likely, and older patients often present with atypical symptoms, especially confusion.
- **Mortality**: the vast majority of deaths from pneumonia in developed countries occur in older people.
- **Influenza**: has a much higher complication rate, morbidity and mortality. Vaccination significantly reduces morbidity & mortality in old age but uptake is poor.
- **Tuberculosis**: most cases in old age represent reactivation of previous, often unrecognized disease and may be precipitated by steroid therapy, diabetes mellitus and the factors above. Cryptic miliary TB is an occasional alternative presentation. Older people more commonly suffer adverse effects from antituberculous chemotherapy and require close monitoring.

4. Define suppurative and aspirational pneumonia and briefly state how their appearances differ on chest X-ray.

Suppurative pneumonia is the term used to describe a form of pneumonic consolidation in which there is destruction of the lung parenchyma by the inflammatory process. Although microabscess formation is a characteristic histological feature of suppurative pneumonia, it is usual to restrict the term 'pulmonary abscess' to lesions in which there is a large localised collection of pus, or a cavity lined by chronic inflammatory tissue, from which pus has escaped by rupture into a bronchus.

Chest X-ray features: There is a homogeneous lobar or segmental opacity consistent with consolidation or collapse. A large, dense opacity, which may later cavitate and show a fluid level, is the characteristic finding when a frank lung abscess is present. Occasionally, a pre-existing emphysematous bulla becomes infected and appears as a cavity containing an air-fluid level.

5. Briefly describe SARS and how it presents clinically.

SARS rose to prominence in late 2002 when a series of cases in the Guangdong Province, China, was followed by an international outbreak (including Hong Kong, Canada & USA). The illness is characterised by the presence of a high fever (> 38°C), malaise and muscle aches and later a dry cough with shortness of breath and followed by respiratory failure which may be fatal. A history of travel within 10 days of onset of symptoms to an area with documented or suspected community transmission of SARS or close contact within 10 days of onset of symptoms with a person known to be a suspect SARS case is typical. The chest X-ray is usually indicative of pneumonia. SARS is a highly infectious atypical pneumonia caused by the coronavirus SARS-CoV (a family of enveloped, single-strand RNA virus). The optimum method of treating SARS remains uncertain and is largely supportive, including mechanical ventilation. The role of antibacterial, antiviral and immuno-modulatory therapy is still under research.