THE NORTHERN HOSPITAL

HAEMOPTYSIS

Left: John Keats, oil on canvas, by William Hilton, National Portrait Gallery London. Right: John Keats on his death bed, pencil sketch by Joseph Severn with inscription "28 Janry 3 o'clock mng. Drawn to keep me awake - a deadly sweat was on him all this night." 1821.

"On entering the cold sheets before his head hit the pillow he coughed and I heard him say - "This is blood." I approached him and saw he was examining a stain on the sheet. "Bring me a candle Brown, and let me see this blood." After I handed him the candle and he examined the blood he looked up into my face with a calmness of countenance that I can never forget and said: "This is arterial blood: I cannot be deceived by its colour. It is my death warrant."

Recollections of John Arbuthnot Brown of the night his good friend John Keats diagnosed his own tuberculosis, February 1820.

Rome. 27 February 1821.

My dear Brown,

He is gone - he died with the most perfect ease - he seemed to go to sleep. On the 23rd, about 4, the approaches of death came on. "Severn - I - lift me up - I am dying - I shall die easy - don't be frightened - be firm, and thank God it has come!" I lifted him up in my arms. The phlegm seemed boiling in his throat, and increased until 11, when he gradually sunk into death - so quiet that I still thought he slept. I cannot say now - I am broken down from four nights' watching, and no sleep since, and my poor Keats gone. Three days since, the body was opened; the lungs were completely gone. The Doctors could not conceive by what means he had lived these two months. I followed his poor body to the grave on Monday, with many English. They take such care of me here that I must, else, have gone into a fever. I am better now - but still quite disabled.

The Police have been. The furniture, the walls, the floor, every thing must be destroyed by order of the law. But this is well looked to by Dr C.

The letters I put into the coffin with my own hand.

I must leave off.

J. S.

This goes by the first post. Some of my kind friends would have written else. I will try to write you every thing next post; or the Doctor will.

They had a mask - and hand and foot done -

I cannot get on-

John Keats was one of the very rare breed of those gifted in the fields of both the humanities and the sciences. He was one of the world's greatest poets but he was also a medical doctor and so when he suddenly coughed up a large amount of bright blood on a wintry night in 1820 he was under no illusions as to what this meant. In his day and at his age it was tuberculosis, the same disease which his brother Tom had died of in his arms in 1818. He confided the diagnosis to his closest friend John Arbuthnot Brown the night he noticed the first symptoms. One year later he was dead. He died in the arms of another friend the artist Joseph Severn, who sketched him during his last moments on Earth. Literary masterpieces that he would no doubt have produced had he lived were lost to the world forever. He was 23 years old.

Haemoptysis is an important diagnosis as it may indicate serious underlying pathology. In the early Seventeenth century nothing could have been done for Keats and he knew this from the start, "It is my death warrant." In the 21st century Keats would have been astounded to know that his very own profession would eventually be able to defeat one of the deadliest causes of the symptoms he noticed on that wintry night.

HAEMOPTYSIS

Introduction

Haemoptysis is an important symptom. It may indicate serious underlying pathology.

Decisions on disposition or the need for admission will depend on:

- The clinical stability of the patient
- The degree of haemoptysis
- The risk profile, for any potential serious underlying condition
- Co-morbidities

The most important causes that will need to be considered include:

- Malignancy
- Tuberculosis
- Pulmonary embolism

Pathophysiology

Causes

The non-traumatic causes of haemoptysis include:

1. Infective:

   In particular:

   - Bronchitis, (probably the commonest cause)
   - More serious infection: pneumonia/ bronchiectasis / lung abscess.
   - **Tuberculosis**

2. **Malignancy:**

   This may be

   - Upper airway oropharyngeal or laryngeal
   - Lower respiratory tract, pulmonary malignancy (primary or secondary)

3. **Pulmonary embolism:**

- This symptom generally indicate pulmonary infarction in the setting of pulmonary embolism.

4. Rheumatological:

- Wegener's granulomatosis
- Goodpasture's syndrome

5. Coagulopathy:

- Over warfarinization
- Underlying pathological coagulopathies

Less commonly:

6. Vascular:

- Aortic aneurysm rupture into bronchial tree
- Arteriovenous malformations.

7. Severe pulmonary congestion:

- Acute severe pulmonary oedema
- Mitral stenosis

8. Severe chemical pneumonitis.

Clinical Assessment

Important points of history:

1. Establish symptomology:

- Some patients find difficulty in distinguishing haemoptysis from haematemesis and careful initial questioning is needed to establish the exact nature of the bleeding.
- Bronchial bleeding is usually bright, whilst gastrointestinal is more commonly darker, though this is not absolute.

2. The degree of haemoptysis is important to establish.

- The majority of patients will describe small amounts mixed with saliva or sputum. Occasionally bleeding may be massive however.

3. Establish a risk profile for the important causes of haemoptysis:

Malignancy:

- Smoking history.
- Recent development chronic cough.
- Recurrent recent episodes of haemoptysis.

Pulmonary tuberculosis:

- Fevers including night sweats
- Weight loss
- Non-specific constitutional symptoms
- Recurrent recent episodes of haemoptysis.
- HIV/ Immunosuppression
- Epidemiological factors: History of contact/ country of origin.

Pulmonary embolism:

- Consider the Well's criteria in association with d-dimer testing.

Important points of examination:

1. Immediate ABC issues

- The airway must be assessed.

2. Vital signs:

- Pulse, blood pressure, temperature, respiratory rate and the SaO_2 must be quickly assessed to ensure the patient's airway and hemodynamic status is stable.

3. Any evidence of local pathology:

- Local oropharyngeal pathology should be ruled out.

4. Respiratory examination:

- Respiratory effort.
- Chest auscultation.

Massive haemoptysis:

This does not have a precise definition.

Blood loss of 100 to 600 mL over a 24-hour period is a commonly accepted definition.

Massive haemoptysis is uncommon.

The immediate problem with massive haemoptysis is one of asphyxiation rather than haemodynamic compromise. Asphyxiation may occur with relatively small amounts of blood if it involves the major airways.

Likely causes of massive haemoptysis include:

- Tuberculosis
- Bronchiectasis
- Lung abscess
- Vascular lesion

Investigations

Blood tests:

1. FBE
    - Haematological malignancies or infection
2. CRP
    - Suggestive of infection
3. U&Es/ glucose
4. Coagulation profile
    - INR/ APPT
5. ABGs, as clinically indicated.

Others are done according to the index of clinical suspicion for any given condition.

Sputum:

This is for:

- Micro and culture.
- Acid fast bacilli.
- Cytology

CXR:

This should be done in all cases

Evidence of tumour, tuberculosis, infection, pulmonary infraction, granulomas and bronchiectasis should be looked for.

CT scan chest:

This can better define pathology seen on CXR.

It is particularly helpful for malignancy and bronchiectasis

CTPA is useful when PE *or other* pulmonary pathology is suspected.

Bronchoscopy:

In cases of massive haemoptysis this is the preferred investigation and should be performed early.

It is the best investigation for suspected lesions of the **bronchial tree.**

It also has the advantage of:

- Being able to collect material for microscopy and culture and cytology.
- Being able to perform some **therapeutic measures** such as balloon tamponading a specific bleeding point.

Pulmonary embolism:

It PE needs to be ruled out:

- V/Q scan
- CTPA

Bronchial angiography:

This may be considered if a vascular anomaly is suspected on CT scan.

Management

Massive haemoptysis:

The most serious presentation is massive haemoptysis resulting in asphyxiation.

There should be immediate attention to any ABC issues:

- Immediate suctioning and provision of oxygen
- IV access/ take bloods.

Intubation may be necessary:

- Following intubation, suction can then clear blood from the bronchial tree and improve oxygenation.
- Intubation whilst allowing of suction may not necessarily lead to adequate oxygenation if there is ongoing bleeding. In extreme cases the ETT may be advanced into the right main bronchus to protect the right lung if bleeding is thought to be left sided, (on CXR evidence for example).
- If the expertise and equipment is available a double lumen ETT, such as a **Carlen tube** is helpful, in order to provide protection for the normal lung. A disadvantage is that they are too narrow to allow for the passage of a fiber optic bronchoscope (for diagnostic, suction and therapeutic purposes)
- Following intubation a balloon tipped catheter may be introduced via the fiber optic bronchoscope to tamponade a specific bleeding point.
- The patient may also be laid on the side with the bleeding lung in the dependent position. This may assist in limiting blood flow into the normal lung.

Definitive management options then include:

- Conservative measures involving ongoing suction, endobronchial tamponading, antibiotics and locally applied vasoconstrictor agents.
- Radiographic bronchial artery embolization.
- Surgical resection of the involved segment of lung.

Lesser haemoptysis:

In most cases immediate urgent airway control will not be necessary and management will consist of investigations and disposition considerations

In most cases haemoptysis is mild and transient.

If there is low index of suspicion for serious underlying pathology requiring immediate management (such as tuberculosis or pulmonary embolism), the patient may be suitable for ongoing management as an outpatient. They may be discharged on antibiotics if an infective cause is thought likely with follow-up by the GP or outpatients (medical or thoracic if malignancy is suspected) as appropriate.

Disposition:

Admission criteria for those with haemoptysis include:

- Those with massive haemoptysis/ clinically unstable.
- Those with *significant ongoing* haemoptysis
- Those with significant co-morbidities (relative)
- Those with coagulopathies
- Those with possible serious underlying pathology such as tuberculosis, or pulmonary embolism that needs management or ruling out.

References

1. Dilley S. Haemoptysis in Textbook of Adult Emergency Medicine, Cameron et al, 2nd ed, 2004 p. 300-302.

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