**MASSIVE HEMOPTYSIS** by Nick Mark MD & Mark Ramzy DO

**DEFINITIONS:**
- **Hemoptysis** = bleeding from below vocal cords
- **Pseudo-hemoptysis** = upper respiratory tract (e.g. epistaxis) or GI bleeding (mimics hemoptysis)
- Massaive hemoptysis = life threatening bleeding, not necessarily defined by the amount (100-1000ml) or rate of bleeding (>100 ml/hr) but has potential to cause death by asphyxia or blood loss.

**APPROACH:**
- Management is patient and disease specific
- TB is the most common cause worldwide. Bronchiectasis, necrotizing pneumonia & lung cancer are most common in the US.

**GENERAL MANAGEMENT**

**LABS**
- CBC, BMP, LFT, PT/PTT/INR, Type & screen
- Consider Thromboelastography (TEG) (faster, identifies multiple abnormalities)
- Also consider infectious workup & autoimmune labs (ANA, anti-GBM, etc)

**CXR**
- Poor sensitivity to detecting bleeder site but a useful first step

**CHEST CT**
- Best if PE suspected. Complementary to bronchoscopy. Helps identify bronchial artery anatomy. Limited utility in unstable patient (consider airway prior to scanning)

**Dx: BATTLECAMP**

B – Bronchitis / Bronchiectasis
A – Aspergilloma / AV Malformation
T – Tuberculosis
T – Tracheal-innominate Fistula
L – Lung Cancer/metastasis or Abscess
E – Pulmonary Embolism
C – Cocaine / Coagulopathy / Catamenal / Cystic Fibrosis
A – Autoimmune (SLE, vasculitis)
A – Alveolar Hemorrhage (DAH)
M – Mitral Stenosis
P – Pneumonia / Paragonimiasis + Iatrogenic (PAC, TBb, T1 fistula, etc) + Cytogenic (up to 18% of cases)

90% of bleeds arise from the high-pressure Bronchial Artery circulation (not the pulmonary arteries)

**WORKUP**

**CORRECT COAGUOPATHY**
- Reverse anticoagulants (FFP, Cryo, Vit K)
- Treat platelet dysfunction (ddAVP)

**TRANSFUSE IF NECESSARY**
- No exact cutoff defined in literature
- Highly Recommended if Hgb < 10 mg/dL and actively bleeding
- Increased mortality if transfusion needed

**NEBULIZED TXA (500 mg/5ml TID)**
- Reduces need for invasive procedures

**AIRWAY MANAGEMENT & POSITIONING**

**STANDARD ETT → MAINSTREAM ETT → BRONCHIAL BLOCKER → RIGID BRONCHOSCOPY**

**MAINSTREAM ETT**
- Readily available
- Does not isolate bleeding
- Does ventilate both lungs
- If possible, use larger size ETT (8.0) to facilitate suctioning & bronchoscopy

**BRONCHIAL BLOCKER**
- Bronchoscopically deployed balloon isolates bleeding to a single lobe or segment
- Can be placed through an ETT ≥ 7.5 (not a dual lumen)

**RIGID BRONCHOSCOPY**
- If bleeding from central airway lesion, rigid bronchoscopy may be beneficial if available
- Avoid Dual Lumen ETT (difficult to place and lumen size may limit use of bronchoscopy)

**AIRWAY PROTECTION**
- Rigid preferred but requires expertise & not always readily available

**ROTATE BLEEDING SIDE DOWN**
Rotation partially isolates blood to the dependent side; however it may be difficult to identify the side with bleeding using clinical exam or even imaging.

**PROTECT AIRWAY**
An effective cough and preserved airway reflexes may be the best way to protect the airway. If the patient is unable to clear bleeding due to delayed effect of epinephrine or if hypoxemia or altered mental status are present intubation may be necessary. When intubating consider:
- Call for help (high risk for difficult airway) & verbalize airway plan
- Entire team should wear full PPE
- Try to minimize risk of losing visibility: head-up positioning; use of DL instead of VL; have two large suctions
- Consider the choice of ETT; weight pros/cons of each:
  - Airway protected but blood can spread from the site of bleeding & impair gas exchange bilaterally
  - May isolate bleeding to one lung
  - Only ventilates one lung; must decrease TV if using VC ventilation.

- Bronchoscope should be used to guide ETT into unaffected lung (avoid accidental misplacement)
- If bleeding from central airway lesion, rigid bronchoscopy may be beneficial if available
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**INTERVENTIONAL RADIOLOGY**

**BRONCHIAL ARTERY EMBOLIZATION**
- High success rates (60-90%) with BAE
- Risk of off target embolization (spinal artery, esophagus)
- Very effective for Pulmonary AVMs
- Recurrent bleeding likely for TB, aspergilloma, bronchiectasis and bronchogenic carcinoma
- Complications such as chest pain and dysphagia are usually self-limiting

**ARGON PLASMA**
- Effective electrocautery if the bleeding site can be adequately visualized

**SURGICAL MANAGEMENT**
- May be particularly useful for PA ruptures, leaking aortic aneurysm, AV malformations, traumatic injuries & tracheo-innominate bleeds, etc