ATELECTASIS

(Last updated 7/22/2019 Reviewed by: Jalal Soleimani MD)

PRESENTING COMPLAINT: Difficulty breathing, coughing

FINDINGS

- A  Check airway
- B  ↑RR, rapid and shallow breathing, wheezing, decreased or absent breath sounds
- C  ↓BP, ↑HR, weak pulse (late sign – prompts immediate action),
- D  Variable altered (V,P,U,D)*
- E  Cyanosis, fever
- L_{PC}  ↓PaO_2, ↑PCO_2, ABG for hypoxemia, pulse oximetry (↓Spo2)
- U_{PC}  Pattern of consolidation (solid and hyperechoic structure)

*V (verbal), P (pain), U (unconsciousness), D (delirious)

U_{PC} (point of care ultrasound)  L_{PC} (point of care labs)

TYPES OF ATELECTASIS

- **Obstructive**: Due to blockage of airway by mass, secretions/mucus plug, etc.
- **Non Obstructive**: Due to inadequate respiratory excursion and cough, effusion, pneumothorax, bullae, immobility, poor relaxation/ inspiratory effort
- **Compressive**: Due to distended abdomen or space occupying lesion in thorax
  - Adhesive: loss of surfactant function, e.g. ARDS
  - Cicatrization: parenchymal scarring

OTHER HISTORY

- Often asymptomatic; Unexplained hypoxemia, tachypnea, fever, persistent coughing and shortness of breath not attributable to other causes, tachycardia, decreased or absent breath sounds
- **Predisposing conditions**: Post-operative state, pain, rib fracture, pneumothorax, scoliosis, neuromuscular weakness, smoking, endobronchial neoplasm, chronic bronchitis, pulmonary infections, mucous plugs, obesity, abdominal distension

DIFFERENTIAL DIAGNOSES

- Pneumonia, contusion, cardiogenic pulmonary edema, ARDS, scarring/fibrosis, neoplasm

OTHER INVESTIGATIONS

- **Monitor** pulse oximetry
• Imaging
  ○ Chest X-ray: often sufficient for lobar/whole lung atelectasis
  ○ Ultrasound: pattern of consolidation, useful point of care tool in detecting atelectasis (depends on the expertise of the operator)
  ○ CT chest: most sensitive/specific for identifying type and etiology of atelectasis

THERAPEUTIC INTERVENTIONS

General
• Sit up as tolerated (reverse Trendelenburg position)
• Encourage deep breaths: Incentive spirometry, early mobilization, optimize analgesia (especially if pain inhibits respiration)
• If hypoxemic, high flow O$_2$ via nasal cannula or noninvasive ventilation
• If mechanically ventilated, use/increase PEEP

Specific to etiology
  ○ Obstructive lung disease: bronchodilator
  ○ Mucus plug/excessive secretions
    ▪ Nebulized mucolytic, like N-acetylcysteine or hypertonic saline, can help with excess secretion
    ▪ Chest PT and vibration, nasotracheal suctioning, consider bronchoscopy (usually not necessary in the absence of foreign body/mass)
  ○ Pleural effusion/ pneumothorax: thoracostomy and thoracentesis
  ○ Abdominal distension: NGT decompression, reverse Trendelenburg position, CPAP/PEEP

ONGOING TREATMENT
• Follow-Up: Repeating chest x-ray is not necessary, but may help to confirm resolution or worsening of atelectasis
• Prophylaxis: Incentive spirometry (Useful strategy to prevent postoperative atelectasis. This works best when started preoperatively), elevated head of bed/reverse Trendelenburg position, early mobilization

CAUTIONS
• Complications: Pneumonia (prolonged atelectasis with ineffective secretion clearance increases the risk), ARDS (bilateral atelectasis)

REFERENCES & ACKNOWLEDGMENTS
Acknowledgement: Joseph C. Farmer, MD; Devang Sanghavi, MD; Emir Festic, MD
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