Respiratory Pathophysiology and Rapid Assessment

Ma, Cline, *Emergency Medicine Manual*
chapter : 30
Respiratory Distress
Brady (or standard paramedic text) chapter :
Bates p245; PC II p77

Outcomes

The learner will be able to discuss :

- The signs and symptoms of the various grades of severity of respiratory distress
- The type and importance of initial interventions for various grades of respiratory distress
- That the hypoxic drive is not a contraindication for treatment of respiratory failure
- How to grade hypoxia severity
- Causes and significance of shunting

Stages of Respiratory Distress

- 1/6: ↑ Rate
- 2/6: ↑ Airway
- 3/6: ↑ Use of chest muscles
- 4/6: ↑ Use of accessory muscles
- 5/6: End organ failure (asphyxia)
- 6/6: Respiratory arrest (apnea)

Two Categories of Respiratory Distress

Compensating

- 1/6: Tachypnea
- 2/6: Pursed Lips
- 3/6: Intercostal Retractions
- 4/6: Accessory Muscles

Failing

- 5/6: End Organ Failure
  - Cyanosis
- 6/6: No respirations

Signs of Increasing of Respiratory Distress

- 1/6: Rate
  - Tachypnea
- 2/6: Airway
  - Sniff Position
  - Grunting
  - Flaring
  - Pursed Lips
- 3/6: Chest
  - Intercostal Muscle Retractions
- 4/6: Accessory Muscle Retractions
  - Neck Muscles
  - Abdomen Muscles
  - Rocking
- 5/6: End Organ Failure
  - Skin: Cyanosis
  - Brain: Confusion
  - Muscle: Floppiness
- 6/6: Respiratory Arrest

Degrees of Respiratory Distress

Mild (increased WOB)

- 1/6: Rate
  - Tachypnea
- 2/6: Airway
  - Sniff position
  - Grunting
  - Flaring
  - Pursed lips

Moderate Respiratory Distress

Further increase in WOB

- 3/6: Chest muscle retractions
- 4/6: Accessory muscle retractions
  - Neck muscles
  - Abdomen muscles
  - Rocking

Respiratory Failure

- Severe (***decreasing*** WOB)
  - 5/6: End organ failure
    - Skin: cyanosis
    - Brain: confusion
    - Muscle: floppiness
- 6/6: Respiratory arrest (apnea)

Treatment : Prevention of Respiratory Failure / End Organ Failure

- Aggressive intervention
  - Issue of hypoxic drive
    - ***cannot*** treat respiratory ***failure*** with ***2 L*** O2 NC
- Goal:
  - Prevention of respiratory arrest
  - Prevention of consequences of respiratory failure
    - ↓ oxygenation → end organ failure
    - ↓ ventilation → ↑ CO2 → acidosis → shock [PEA]

Hypoxia

- O2 sat. < 94 : *mild* hypoxia
- O2 sat. < 91 : *moderate* hypoxia
- O2 sat. < 86 : *severe* hypoxia

Shunting

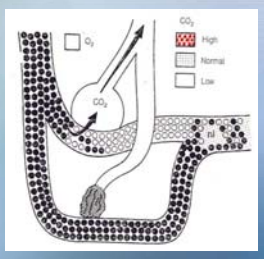
"Shunting" may be thought of as bypassing the lungs [as if blood were shunted, without oxygenation, from the RV to the LV]

- "Heart" causes
  - CHF / Pulmo. Edema
  - Pulmonary embolism
  - Shock
- Lung causes
  - Pneumothorax
  - Pneumonia
  - Atelectasis [small area of unexpanded lung tissue]

Shunting

Hypoxemia causes:

- V / Q mismatch
  - Areas of lung are perfused (Q), [black] but not ventilated (V) [pnthx]
- R to L Shunt [not pictured]
  - Areas of lung are ventilated (V) , but not perfused (Q) [shock]
- Hypoventilation
  - CO2 retention
  - CO2 displaces O2



Summary

- Physical signs respiratory distress, how these are weighted, and are not of equal severity
- Importance of initial interventions for various grades or degrees of distress severity
- Hypoxic drive is not a contraindication for aggressive treatment in the case of respiratory failure
- Grading hypoxia severity
- Causes of shunting
  - Either or both shock-shunting and hypoventilation-shunting lead to hypoxemia