Finding the Optimal Pressure

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Overview

• Titration Polysomnogram-A sleep study involving the adjustment of positive airway pressure (PAP) to determine the optimal pressure to eliminate sleep breathing events and improve sleep quality.
Polysomnogram (Sleep Study)
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Polysomnogram (Sleep Study)
Pathophysiology of Obstructive Sleep Apnea

Airway Open

Upper Airway Collapse
Pathophysiology of Obstructive Sleep Apnea

Awake: Small airway + neuromuscular compensation

- Loss of neuromuscular compensation
- Decreased pharyngeal muscle activity
- Airway collapses
- Apnea, hypopnea, RERA
- Hypoxia & Hypercapnia

Sleep Onset

- Hyperventilate
- Airway opens
- Pharyngeal muscle activity restored
- Arousal from sleep

Increased ventilatory effort

Hypoxia & Hypercapnia
Types of Respiratory Events

- **Respiratory Effort Related Arousals**: Subtle fluctuations of respiratory effort or airflow

- **Hypopnea**: Partial reduction of airflow with associated desaturation

- **Apnea**: Complete cessation of airflow
  - Two Types: Obstructive and Central
Obstructive Apnea
Hypopnea
RERAs
RERAs
Central Apnea

- Arises because of unstable respiratory control
- Tends to occur in patients who hyperventilate when awake and sleep
- Hyperventilation due to stimulation of intrapulmonary receptors (from edema) or to increased responsiveness of chemoreceptors
CHF: Factors Favoring Unstable Respiratory Control

- Enhanced controller gain
  - Increased chemoreceptor sensitivity
    - Endogenous catecholamines
    - Hypoxemia
  - Increased “other input”
    - Venous congestion/interstitial pulmonary edema → increased pulmonary receptor afferent traffic
- Delayed feedback
  - Low cardiac output → increased circulatory time
Central Apnea
Goal of PAP Titration

- Optimal Titration
  - A successful titration will result in the elimination of respiratory events and restore normal sleep architecture.
Common PAP Modes

- CPAP
  - with expiratory relief settings: (C-Flex or EPR)
- BPAP S
- BPAP ST
- ASV-adaptive servo-ventilation
Guidelines for Titration

- Desensitization
- Pressure Adjustment*
  - obstructive apneas-increase CPAP/EPAP
  - obstructive hypopneas-increase CPAP/IPAP
  - RERAs-increase CPAP/IPAP
  - central apneas-use BPAP ST or ASV

*Art and Science of PAP Titration
The Patient

- 60 y/o female
- EDS, poor sleep quality, and depressed mood.
- BMI=35
- PMH
  - Obesity
  - Type II Diabetes
  - CHF
  - Hypertension
  - Depression
Desensitization

- Full Face Mask
- CPAP range 5-10
- No need for expiratory relief setting

*Titrartion will be initiated at CPAP of 5.*
Full Face Mask

Well I think we fixed that little leak that was bothering you.
Titration (OAs)
Titration (OAs)
Titration (OH)
Titration (OH)
Titration (RERAs)
Titration (Normal/REM Rebound)
Titration (CAs)
Titration (CAs)
Titration (CAs)
Titration (ASV)
Thank You