Anesthesia Considerations for Autonomic Hyperreflexia

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Patient Population

- **Spinal Cord Injury**
  - 200,000 in United States
  - Increased risk for complications with anesthesia
    - Impaired ventilation
    - Muscle spasms
    - Autonomic Hyperreflexia (AH)
Autonomic Hyperreflexia

- Occurs in 30-90% of patients with spinal lesions at or above T6 vertebrae
- Exaggerated, uninhibited sympathetic response
- Medical Emergency
Pathophysiology

- Disordered autonomic response
- Afferent stimulus triggers peripheral sympathetic response
- Descending sympathto-inhibitory signals are disrupted by the spinal lesion
- Results in bradycardia and profound hypertension
LEVEL OF SPINAL INJURY T6 OR ABOVE

1. STIMULUS BELOW LEVEL OF INJURY (EX. DISTENDED BOWEL OR BLADDER)

2. AFFERENT STIMULUS

3. MASSIVE SYMPATHETIC RESPONSE

4. WIDESPREAD VASOCONSTRICTION

5. HYPERTENSION

6. BARORECEPTORS IN BLOOD VESSELS DETECT HYPERTENSIVE CRISIS - SIGNAL BRAIN

7A. HEART RATE SLOWED

7B. DESCENDING INHIBITORY SIGNALS BLOCKED AT SPINAL CORD INJURY

CRANIAL NERVES IX, X

http://rjh.goingeast.ca/wp-content/SCI4/AutonomicDysreflexia.html
Triggers

- Bladder/bowel distention
  - Cystoscopy
- Abdominal pathologies
- Deep pressure ulcers
- Tight clothing or restrictive devices
  - Tourniquet
- Uterine contractions
Treatment

- Removal of precipitating stimulus

- **Blood Pressure Control**
  - Nitrates most common: Topical Nitroglycerin & IV Sodium Nitroprusside (titrated to effect)
  - Nifedipine & Labetalol

- Alpha adrenergic blockers
  - Phentolamine (2-10mg)

- Ganglionic blockers (commonly used preventatively)
  - Trimethaphan & Mecamylamine

- Non-pharmacological
  - Relief of bladder distention
  - Bowel dis-impaction
  - Tourniquet release
Complications

- Intracranial hemorrhage
- Pulmonary edema
- Seizures
- Myocardial infarction
- Coma
- Death
Sevoflurane Concentrations

- Study conducted in 2008 by Yoo et al. focused on Sevoflurane concentration required to block AH

- Results: EC\textsubscript{50} 3.12% and EC\textsubscript{95} 3.83%
  - MAC-BAR (1.7-2.0 MAC)
Considerations for laboring patient

- Physiologic changes secondary to spinal cord injury are exaggerated during pregnancy
- Uterine contractions are strong stimulus for AH
- Epidural opioids recommended
  - Place prior to labor
  - Remain in place for 48 hrs after delivery to prevent delayed crisis
Conclusion

- Stimuli accompanying surgery and labor in spinal cord injury patients, with lesions at or above T6, result in high risk of AH
- Awareness of potential triggers
- Knowledge of preventative measures... Prevention is key!
- Deepened anesthesia can prevent AH
- Prompt intervention
Questions?


