

# ANESTHESIOLOGY™ 2014

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Session: L097  
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## **Help - My Patient Is on a Multi-Chemotherapeutic Regimen and Is Coming for a Laparotomy! What Do I Need to Know?**

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**Disclosures:** This presenter has no financial relationships with commercial interests

### **Stem Case and Key Questions Content**

A 62 year old 72 kg female presents to the operating room for an urgent laparotomy for intractable abdominal pain. She presented to the ER 2 hours after eating a heavy dinner at the local restaurant. She has nausea and vomiting, describing her pain as 6/10. The surgeon wants to proceed immediately.

PMH: Hodgkin lymphoma, hypertension, PONV, + nausea/vomiting from chemotherapy

PSH: Appendectomy

Medications: lisinopril, multi-vitamins, chemotherapeutic agents

Vital Signs: P-103, BP-98/63, RR-34, T-37.5 BMI

### **Questions:**

#### **Preoperative Evaluation**

1. Do you agree with the surgeon that this is an emergent case? Would you delay this procedure to obtain more information?
  - o What is urgent versus emergent? How would you communicate rationale for delaying case
2. What are the priorities in the initial evaluation and management of this patient?
3. What further information do you desire in this case?

*The pulse oximeter reading was 92% on 3L nasal cannula, EKG showed non-specific EKG changes with Qtc-469. Portable CXR showed no acute disease with clinical correlation recommended.*

What is normal Qt? What is Qtc? Implications of prolonged QTc?

Labs- Which labs would you obtain? Why?

*Hemoglobin 8.4, Plts 75, Chemistry and Liver panel normal.*

o T&S versus T&C?

o ABG? Echo?

o PFTs? Do you need to evaluate spirometry? Do you expect an obstructive or restrictive pattern for her chemotherapeutic regimen?

*Echo-49%, ABG on room air- 7.45/32/75*

4. Is there any information about her chemotherapy that you wish to obtain?

*She notes that she has been on the ABVD regimen. Her oncologist is out of the country and cannot be reached.*

- o Adriamycin
- o Bleomycin
- o Vinblastine
- o Dacarbazine

5. Any specific concerns with any of this therapy regimen?
6. Would you delay surgery to obtain more information specifically regarding this regimen? How will you determine if the patient is optimized to go to the operating room?
7. Would you offer this patient regional anesthesia? What are some contraindications for regional anesthesia? What complications would you discuss with the patient in the preoperative holding area? Is regional anesthesia contraindicated in patients with peripheral neuropathies from vinblastine?

*Patient is hesitant about a needle inserted in her back. However she still wants an adjunct for analgesia intraoperative and for postoperative management.*

*Patient's INR-1.4, plts-75*

8. Would you still offer an epidural to this patient? Why or why not?
9. What are some other options for this patient in terms of regional techniques?
10. Would a transversus abdominis plane (TAP) block be an option for this patient? How would you describe this block to this patient and the surgeon? What risks and benefits would you mention to the patient?

## **Intraoperative Course**

11. What are your induction agents?

*Induction of Anesthesia is uneventful. Airway is secured in rapid sequence with cricoid pressure, however the blood pressure after induction is now 72/51.*

12. What are some causes of patient's hypotension? How will you treat this hypotension?
13. Does previous treatment with anthracyclines (doxorubicin) be implicated for reasons of hypotension?
14. How do ACE-Inhibitors affect hypotension upon induction? Any preferred method of treatment if you suspect that this is the reason for hypotension?

*Patient is now hemodynamically stable after initial resuscitation with fluids and vasopressin. Now, you attempt the TAP block under ultrasound guidance.*

15. What are the landmarks for a TAP Block? What local anesthetic will you inject into the space?
16. Is an ultrasound a requirement for TAP blocks?

*Patient now begins to desaturate 30 minutes into the surgery.*

17. What do you immediately do? What do you want to know?
18. Would an ABG be helpful? What would you expect?
19. Would you change your ventilator settings if you suspected interstitial fibrosis? How is this different from ventilator management strategy for an obstructive pattern?
20. Would you maintain this patient on an inhaled agent? Nitrous oxide an option? Total intravenous agents? Why would you want to avoid a high inspired oxygen concentration in this patient? Any issues with her receiving bleomycin treatment?

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21. What are your criteria for extubation in this patient? Is this criteria different from an ASA-1 patient?

## **Postoperative Course**

*You are called to the PACU by the nurse. You arrive and this patient has severe nausea and vomiting. What are you going to do?*

22. What is the pathophysiology of PONV? What receptors are involved in PONV?

23. What are this patient's risk factors for PONV? What are risk factors for postoperative nausea and vomiting?

24. Name some premedications that reduce the risk of PONV.

25. What is the best anesthetic technique to prevent PONV in this patient?

26. Agents that you want to avoid in this patient with a prolonged QT?

*The patient is now POD #2. You go evaluate her for a postoperative visit. She complains of increasing pain. How are you going to evaluate her?*

27. What is your first action in evaluating her abdominal pain?

28. If you assume this is due to surgical pain, what are some options for her?

29. What are the advantages of a multimodal analgesic approach?

## **Model Discussion Content**

### **Introduction**

An increasing number of cancer patients are presenting to undergo procedures under general anesthesia, both elective and emergent. As anesthesiologists, we will encounter these patients either during or after their chemotherapeutic regimens. It is important to consider organ toxicities and systemic effects of these agents to develop an optimal anesthetic plan. A discussion of some of the common chemotherapeutic agents and their implications on anesthetic management will be discussed. In addition to developing a multimodal analgesic plan, we will review transversus abdominis plane (TAP) blocks. Nausea and vomiting also will be addressed in this high-risk patient population.

### **I. Preoperative Assessment of a Patient on Chemotherapy**

Toxicity of chemotherapy relates to the preoperative assessment of this patient. Initial preoperative goals are to assess the effects of cancer and therapy on the patient's physical status. The anesthesiologist must do a complete history and physical initially. Preoperative labs (serum electrolytes, BUN, creatinine, liver panel), electrocardiogram, chest x-ray, arterial blood gas, pulmonary function tests and echocardiogram are indicated unless the surgical procedure is emergent. Knowing the side effect profile of commonly used chemotherapy agents will help guide the perioperative physician to safely manage these patients (1).

The ABVD regimen is a commonly used for first line treatment for Hodgkin's Lymphoma.

In regards to this patient, we are highly concerned about the following:

- Immunosuppression: Paying attention to sterile technique will help avoid infection in this immunocompromised patient.

- Pulmonary fibrosis: History & Physical will guide severity. Preoperative questions should elucidate symptoms of dyspnea, orthopnea and exercise tolerance. Pulmonary function tests will reveal a restrictive pattern, increased alveolar-arterial gradient and decreased carbon

monoxide diffusing capacity.

•**Cardiotoxicity:** Similar to pulmonary fibrosis. CHF symptoms should be optimized before entering the operating room. Expect hemodynamic instability upon induction and depressant effects of the anesthetic on the myocardium (2,3). Cardiac toxicity may manifest as decreased QRS voltage or decreased ejection function. Placement of invasive monitors such as transesophageal echo or pulmonary artery catheter should be individualized for each patient. Other common chemotherapeutic agents and side effect profile:

Neuropathy during and after chemotherapy is common. Vincristine is the biggest offender in peripheral neuropathy. Patients present with paresthesias and numbness. Anesthesiologists should assess both the risks and benefits regarding providing regional anesthesia in this patient population. However, others indicate that regional anesthesia is contraindicated in these patients.

## **II. Regional Anesthesia - Transversus Abdominis Plane (TAP) Block**

The TAP block is a peripheral nerve block that allows for anesthesia of the abdominal wall. It can be used as an adjuvant technique that allows for both intraoperative and postoperative pain management. We often see hematologic disturbances in patients treated with chemotherapy, which preclude the use of an epidural. TAP blocks can be particularly useful in patients when an epidural is refused or contraindicated.

Blockade of the anterior rami of the spinal nerves can be accomplished by the TAP block. This is a sensory blockade and does not impact visceral pain. Depending on location of the TAP block and technique used, you can have blockade of T6-L1. Volume of the local anesthetic injected is imperative to the block success. Maximal safe dosages of local anesthetics should be followed.

Few techniques have been described with TAP block (landmark technique and ultrasound guided technique). Advantages include its long duration (depending on local anesthetic chosen), minimal side effect profile, opioid-sparing, ease of administering the block as well as increased patient satisfaction scores in first 24 hours. Minimal risks can occur with TAP blocks but can include bruising, bleeding, intraperitoneal injection, infection, and nerve palsy.

## **Intraoperative Management:**

Induction of anesthesia should promptly begin with pre-oxygenation. This patient has a reduced ejection fraction and induction agents must be carefully chosen to minimize any hemodynamic instability. If concerned about cardiac function or hemodynamic instability, an arterial catheter may be placed pre-induction for careful titration and assessment.

•**Hypotension upon induction:** Recognition and immediate action is necessary to treat this hypotension to ensure vital organ blood flow.

Differential Diagnosis:

- Preoperative hypovolemia
- Anesthetic Agents
- ACE-I (vasopressin responsive)
- Doxorubicin - may enhance myocardial depressant effects of anesthetics even with a normal cardiac function.
- Dysrhythmias
- Anaphylaxis

. Treatment must aim at correcting hypotension with fluid bolus and vasopressor/ionotrope administration while assuring the patient is ventilated with 100% O<sub>2</sub>. Call for help if needed to stabilize the patient

## •Intraoperative Hypoxia:

- First evaluate the degree of hypoxia. Is it 91% or 76% oxygen saturation?
- Switch patient off the ventilator and hand-ventilate assessing for compliance
- Look at monitor: ETCO<sub>2</sub>, peak airway pressures, blood pressure
- Listen to the patient's lungs
- Check connections of circuit to the anesthetic machine
- Suction any mucus plugs or secretions
- Fiberoptic bronchoscope could be helpful
- Check ABG (can show arterial hypoxemia with severe fibrosis)

You suspect the patient's underlying lung disease as contributing to hypoxia after ruling out other causes. What can you do?

Bleomycin pulmonary toxicity can manifest as pulmonary fibrosis. These patients have a restrictive lung disease with lower total lung capacity (TLC) and normal FEV<sub>1</sub>/FVC ratios. They are breathing at lower lung volumes. On the other hand, obstructive patients have decreased FEV<sub>1</sub>/FVC ratio and are managed differently.

Ventilator management strategy:

- Restrictive: lower tidal volumes, higher respiratory rate
- Obstructive: higher lung volumes, prolonged expiratory time
- Intraoperative PEEP can be used to improve oxygenation

Careful assessment of fluid balance with care not to overload these patients must be taken, as it impairs ventilation/perfusion balance. Initially, high FiO<sub>2</sub> must not be used in patients on bleomycin however this has been contended with later studies.

## Extubation criteria:

Depending on the preoperative assessment of the patient and intraoperative course, decision may be made to extubate or keep the patient intubated and transferred to the ICU for further management.

## **I. Management of Postoperative Nausea & Vomiting**

This patient has many risk factors for PONV, which include female gender, her previous history of PONV and side effects of chemotherapy. Risk factors for PONV can be categorized by patient, surgery or type of anesthetic.

Risk Factors:

Central nervous system receptors involved in PONV involve dopamine (D<sub>2</sub>), serotonin (5 HT<sub>3</sub>), cholinergic and NK<sub>1</sub> receptors. Medications aimed at antagonizing these receptors have been used in the multimodal therapy to reduce PONV. It is advocated that the use of more than a single agent will better control PONV (4-6).

Antiemetic Drugs:

- 5-HT<sub>3</sub> Receptor Antagonists: ondansetron, dolasetron
- Anticholinergics: scopolamine
- Butyrophenones: droperidol, halperidol
- Corticosteroids: dexamethasone
- NK<sub>1</sub> receptor antagonists: aprepitant

## **I. Multimodal Analgesic Plan**

The concept of a multimodal analgesic plan allows us to improve postoperative analgesia through different mechanisms as well as reducing the incidence of any opioid-related effects due to lower dosages (7-9).

- a. Opioids- play an important role in acute postoperative periods, however the adverse effects can hinder recovery.
  - b. Tramadol- advantage is the decreased lack of respiratory depression with minimal abuse potential.
  - c. Non-opioids (anesthetic and opioid sparing effects)
    - i. NSAIDs- achieve pain relief through effects on COX-1 and COX-2 inhibition, and inhibiting prostaglandin synthesis. Not used in patients with compromised renal and hepatic function.
    - ii. Acetaminophen- peaks within 1-2 hours of use; antipyretic and analgesic. Rarely used as a single agent.
    - iii. Paracetamol- central COX-2 and COX-3 inhibition, no anti-inflammatory effects. opioid sparing and effective in abdominal surgical pain.
    - iv. Alpha-2 agonists (clonidine, dexmedetomidine)- work on the substantia gelatinosa of the dorsal horn. Hypotension, bradycardia and sedation can be significant side effects.
    - v. Ketamine- commonly used antihyperalgesic drug however use is limited secondary to its neurologic effects
    - vi. Gabapentin type drugs (pregabalin, gabapentin)- bind to voltage gated calcium channel in the brain/spinal cord.
    - vii. Dexamethasone- reduce inflammation and postoperative pain.
    - viii. Neuraxial/Regional Techniques- Local anesthetics work by sodium channel blockade. Commonly used in both acute and chronic pain management. Epidural, spinal or directing surrounding nerve bundles can be used for superior pain control.
    - ix. Hypnosis, acupuncture- Accupuncture is based on the concept of yin and yang. Basis of acupuncture tried to restore any imbalance in the body. Hypnosis can reduce the stress postoperatively.
- Multiple agents that act at different receptors within central and peripheral nervous system systems to improve pain control with fewer opioid-related side effects such as sedation, nausea/vomiting, pruritis and constipation.
- The pathophysiology of pain is multifaceted and requires much investigation. Consequences of untreated postoperative pain affect multiple organ systems, as well as the patient's mental state. Faster recovery, reduced hospital stay and decreased length of convalescence are just a few of the benefits of treated pain. We need to do more to address postoperative pain in a multimodal approach to reduce the many negative consequences for our patients.

## **Conclusion**

In summary, care for the cancer patient is complex. Many of these patients are high risk stemming from systemic effects of the primary cancer, metastasis, or toxic effects of the chemotherapy. We will continue to encounter more of these patients, as they are surviving longer from new treatments available. However, these patients pose a considerable risk intraoperatively and in postoperative management. A multimodal approach to both pain and PONV will benefit these patients a great deal. Understanding some of the common chemotherapeutic agents will also help guide preoperative assessments and further management for optimum care of these cancer patients.

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