

Abstract

This review will focus on a growing issue within the medical community: patients with acute or chronic marijuana use. There are a variety of pharmacological and physiological concerns that come with these patients including respiratory, cardiovascular, and neurological pathophysiology. There are also several things that need to change within the anesthesia plan including drug selection, changes to the preoperative interview, intraoperative considerations, and postoperative considerations. In addition, there are unique considerations to marijuana use such as its antiemetic and analgesic potentials and how those might affect the anesthesia that a patient is receiving due to tolerance or dysfunction of normal systems.

Introduction

Marijuana use leads to a variety of physiological changes, including respiratory, cardiovascular, and neurological changes, that can affect the anesthetic plan preoperatively, intraoperatively, and postoperatively⁴. Marijuana use can also lead to a variety of pharmacological interactions with anesthetic agents that anesthesia care providers use on a regular basis⁶. Anesthesia providers must have increased awareness of these pharmacological and physiological changes and how they affect the anesthetic plan in the chronic or acute marijuana user. Acute marijuana use is determined based on if the patient is actively under the influence of marijuana and is treated very differently than a patient with chronic marijuana use who is not currently under the influence of marijuana, but both will require adjustments to the anesthetic plan put in place by the anesthesia care provider⁴. From obtaining a consent to which drugs to consider for post-operative analgesia, marijuana use should be an important factor to consider when making all these choices.

Significance

Patients using marijuana, the THC containing derivative of the cannabis plant⁶, in the United States is becoming increasingly common²; and anesthesia providers need to be aware of the physiological and pharmacological changes that this may present when treating a patient using cannabis medically or recreationally^{4,6}. According to the CDC, in 2019 18% of Americans used marijuana at least once². According to King et al., this number is also increasing yearly⁷. Additionally, there has been a recent increase in emergency room visits due to use of marijuana⁷. This trend is likely due to the increased potency of marijuana related to the strain or the method for THC extraction used to prepare the marijuana for consumption⁶. Considering these developments, anesthesia providers need to be ready to adjust anesthetic plans in patients with either acute marijuana intoxication or chronic marijuana use either recreationally or medically⁶.

Learning Objectives

1. Understand pathophysiology of marijuana use
2. Learn how to approach a preoperative interview for a patient with a history of marijuana use
3. Understand the anesthetic considerations of marijuana use intraoperatively
4. Understand the anesthetic considerations of marijuana use postoperatively



Figure 1. Safety label placed on THC containing products for oral consumption (Massachusetts)³.



Figure 2. An example of a “vaporizer” used for inhalational consumption⁸.

Results - Preoperative Interview

One of the most critical elements of the anesthetic plan when it comes to acute or chronic marijuana use is identifying this use in the preoperative interview via a thorough evaluation of the patient’s social history.

When developing an anesthetic plan when marijuana use is suspected, an important first step is to identify if use is acute or chronic⁶.

Acute: If marijuana has been used within 72 hours of an elective procedure, the procedure should be postponed⁶.

Chronic: If a patient has been identified as a chronic marijuana user, there are additional questions that need to be asked to create the best plan for the patient⁶:

- Frequency of marijuana use
- Time since last use
- Typical products and dose
- History of adverse effects when using or missing doses
- Evaluation of withdrawal symptoms or signs of acute intoxication

Limitations and Future Research

The greatest limitation in the study of marijuana use and anesthetic administration is the reliance on retrospective studies due to the ethical concerns of causal studies.

One common discrepancy in the research of anesthetic interaction with marijuana is evaluating if there is a need for an increase in propofol in chronic users. Some sources indicate that there is a theoretical need for additional propofol due to cross-tolerance related to interactions between CB1 and CB2 and GABA. Others argue that retrospective studies have shown no difference in propofol needs for chronic users versus non-users. There is a need for future studies on the potential for increased anesthetic use in chronic marijuana users.

Results - Perioperative Considerations

Preoperative Considerations⁶:

- Follow preoperative interview guidelines identified in the previous section
- Assess the patient for indications of acute intoxication such as:
 - Increased anxiety
 - Paranoia
 - Psychosis
- Identify if the patient has any history of angina or CAD
- Consider running coagulation studies

Operative Considerations⁶:

- Potential sevoflurane tolerance
- Be careful with sympathomimetics and beta blockers (see “Cardiovascular Concerns”)
- Be cautious with the patient airway (see “Respiratory Concerns”)

Postoperative Considerations⁶:

- Potential need for increased analgesia due to cross-tolerance of opioids
- Monitor for any signs of withdrawal such as anxiety or abdominal pain

Conclusions

Marijuana use is common among the general population, and anesthesia care providers will be seeing patients with both acute and chronic marijuana use. To best treat these patients, perform a careful and thorough preoperative evaluation, and determine how to apply what the patient says to the anesthesia plan to provide the most safe and effective anesthetic.

Results - Physiological Changes

Changes due to CB1 and CB2 agonism as well as damage from inhalation:	
Respiratory Concerns⁴	<ul style="list-style-type: none"> • Airway ossification (chronic) • Increased carboxyhemoglobin (acute) • Bronchodilation (acute) • Increased bronchial sensitivity (chronic) • Operative obstruction (chronic - mucus plug) • Postoperative obstruction (acute - uvulitis)
Cardiovascular Concerns⁴	Changes due to amplification of sympathetic and attenuation of parasympathetic response: <ul style="list-style-type: none"> • Increased systolic blood pressure (20-100%) • Tachycardia • Increased CO • Uncommonly: peripheral vasodilation, position-based hypotension, and bradycardia (high dose, chronic users)
Neurological Concerns⁴	<ul style="list-style-type: none"> • Increased CBF • Decreased CBF (when hypoxic/hypercapnic) • Increased risk of cerebrovascular ischemia and ischemic stroke (particularly young males)

Table 1. Physiological changes of the respiratory, cardiovascular, and neurological systems due to marijuana consumption. Chronic or acute use is noted.

New Users



- Tachycardia and systolic hypertension (within 2 hours from consumption)
- Malignant arrhythmias (AFib, VFib, VTach, Brugada pattern)
- Coronary spasm if previous CAD
- Airway hyperreactivity or UAO (uvulitis)

Chronic Users



- Bradycardia → Tachycardia
- Postural / Orthostatic hypotension
- Sinus arrest
- Hyperreactive airway
- Intraoperative hypothermia → PO “shivering”
- Coronary vasospasm / myocardial infarction

Chart 1. Physical changes noted during acute and chronic marijuana use that may affect the anesthetic plan⁴.



Figure 3. An example of the cannabis plant from which marijuana is derived⁵.

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