

# Marijuana use in Pregnancy: Anaesthetic Implications

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## Introduction

Marijuana has been used for thousands of years for both medical and recreational purposes. Today it remains the most widely used illicit substance, worldwide.<sup>1</sup> In the United States marijuana dependence remains the most common form of illicit drug addiction.<sup>2</sup> About one in ten of those exposed to the drug become dependent on it at some time in later life.<sup>2</sup>

Because the pharmacological actions of marijuana are complex and include a unique blend of effects of alcohol, opioids, tranquilizers and hallucinogens, the clinical picture could be very unpredictable and diagnosis often difficult.<sup>3,4</sup> As a result marijuana addiction in pregnancy may continue undetected, affecting pregnancy outcome and peripartum obstetric and anaesthetic management of these patients.

## MARIJUANA:

### General considerations

Even though its use is prohibited by law, marijuana is widely used for recreational purposes in many developed societies.<sup>1</sup> Its health- and psychological effects are poorly understood and remain the subject of significant controversy. Most often, marijuana use or dependence is first suspected or diagnosed during medical management of another condition such as infection or pregnancy.<sup>4,5</sup> As with other illicit substance use, psychological personality characteristics seem to predispose to, rather than result from marijuana addiction.<sup>2,4</sup> Because the actions of marijuana are complex it is always difficult to predict anaesthetic implications in marijuana-dependent parturients.<sup>3,6,7,8</sup> The prevalence of recreational marijuana use among young adults, including women, has markedly increased over the past twenty years.<sup>3,9-12</sup> The majority of these women are of childbearing age.<sup>3,7</sup> As a result it is no longer uncommon to find women who continue to use marijuana in pregnancy.<sup>9,12-14</sup>

Marijuana remains the most common recreational drug used in pregnancy. Other drugs commonly used by parturients include

ethanol, tobacco, caffeine, cocaine, amphetamines and opioids. Poly-substance abuse is common.<sup>3,14</sup> The majority of parturients with a history of drug addiction deny it when interviewed preoperatively by anaesthesiologists.<sup>6,15</sup> Therefore a high index of suspicion for drug use in pregnancy is necessary. Risk factors suggesting drug use in pregnancy (including marijuana) include absence of prenatal care, cigarette smoking and history of preterm labour.<sup>16-18</sup>

## MARIJUANA:

### Epidemiology and pathophysiology

The use of marijuana for both medical and recreational indications dates back for thousands of years.<sup>19</sup> Marijuana is a naturally occurring substance, obtained from the dried flowering tops and leaves of the female plant of *Cannabis sativa*. Marijuana is smoked for its hallucinogenic properties. It is usually smoked in a "joint", which is the size of a cigarette. Tobacco may be added to assist burning. Smokers typically inhale deeply and hold their breath to maximize marijuana absorption by the lungs.

More than 61 chemicals known as cannabinoids obtained from the *Cannabis sativa* plant have been identified.<sup>20</sup> It has been estimated that marijuana is used by 9.5-27% of pregnant women.<sup>21</sup> Among all 61 known cannabinoids, delta 9-tetrahydrocannabinol (THC) appears to be the most potent psychoactive agent and of the greatest importance in the recreational use of cannabinoids. Cannabinoids act on a specific receptor that is widely distributed in the brain.

A typical joint contains between 0.5g and 1.0 g of marijuana. It is believed that approximately 50% of the THC and other cannabinoids present in a cannabis cigarette are inhaled and enter the bloodstream.<sup>20,21</sup> High fat solubility of cannabinoids leads to rapid accumulation in adipose tissue from which they are slowly released into the brain. The plasma elimination half-life of cannabinoids in occasional users is approximately 56 hours, whereas in chronic users it is only 28 hours.<sup>22</sup> However, adipose tissue sequestration may extend the tissue half-life to approximately 7 days. It has been reported that complete elimination of a single dose may require up to 30 days.<sup>20</sup> As little as 2-3 mg of available THC will produce a "high" in the occasional user; however, chronic users may need five or more joints a day to achieve de-

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sired effect. Cannabinoids undergo metabolism in the liver forming more than 20 metabolites, most of which have psychoactive properties.

## MARIJUANA:

### Clinical presentation

Marijuana affects every body system, although acute toxicity is very rare.<sup>23</sup> Pharmacological actions of marijuana are complex and include a unique blend of effects of alcohol, opioids, tranquilizers and hallucinogens. The clinical picture could be very unpredictable and diagnosis often difficult.

The effects of acute marijuana use include euphoria, relaxation, perceptual alteration, time distortion, tachycardia and conjunctival congestion. When used in a social setting it may produce infectious laughter and talkativeness. Short-term memory and attention, motor skills and reaction time are usually impaired. The most common unpleasant side effects include anxiety and panic reactions. Marijuana increases heart rate by 20-50% within a few minutes; this effect lasts for up to 3 hours. Changes in blood pressure following marijuana use have been reported, however, these effects seem of negligible clinical significance in healthy parturients.<sup>2</sup>

Chronic heavy marijuana smoking may be associated with increased symptoms of chronic bronchitis. The smoke of cannabinoids may have mutagenic and carcinogenic effects on the lung tissue. There is evidence of an additive effect of marijuana and tobacco smoking on pulmonary histopathological abnormalities.

## MARIJUANA:

### Interaction with pregnancy

The active ingredient in marijuana, THC, freely crosses the placental barrier and directly affects the fetus. Since most marijuana-addicted parturients also abuse other substances such as tobacco, cocaine and alcohol, it is difficult to identify the specific effects of cannabis on the fetus.<sup>24</sup> It appears that chronic use of marijuana results in decreased uteroplacental perfusion and intrauterine growth retardation.<sup>24</sup> Chronic use of marijuana may alter pituitary-adrenal axis and hormone production with adverse effects on fertility and pregnancy.<sup>25</sup> Suppression of ovulation has been reported in association with chronic cannabis smoking.<sup>20</sup> The production of both estrogen and progesterone by human placenta may also be altered. There is some evidence that chronic cannabis use may be associated with functional brain changes and subtle impairment in cognitive function.<sup>26</sup>

The effects of cannabis exposure result in significant changes in the respiratory system, which include coughing, increased sputum production and wheezing.<sup>27</sup> Smoke from cannabis cigarettes is known to suppress both the hormonal and the cell-mediated immune responses.<sup>20</sup> There appears to be no evidence of teratogenicity resulting from cannabis exposure. However, low neonatal birth weight, increased risk of complications during labour and delay in cognitive development in infants, have been reported in cannabis-addicted-parturients.<sup>28</sup>

## MARIJUANA:

### Anaesthetic implications

The cardiovascular effects of marijuana (myocardial depression and tachycardia) may potentiate the effects of anaesthetic drugs affecting heart rate and arterial pressure. Adverse interactions of marijuana with propranolol and physostigmine have been re-

ported.<sup>29</sup> Cannabis may enhance the sedative-hypnotic effects of other drugs that depress the central nervous system. Studies have shown cross-tolerance of cannabis with alcohol, barbiturates, opioids, benzodiazepines and phenothiazines.<sup>30</sup>

During general anaesthesia additive effects of marijuana and potent inhaled anaesthetic agents can result in pronounced myocardial depression.<sup>31</sup> In patients with a history of acute marijuana abuse, agents that increase heart rate such as ketamine, pancuronium, atropine and epinephrine should be avoided. Cannabis inhalation leads to impairment of lung function similar to tobacco smoking. Oropharyngitis and uvular oedema causing airway obstruction under general anaesthesia have been reported.<sup>32</sup> Additionally, adverse psychiatric and autonomic reactions to cannabis may interfere with safe induction of anaesthesia and postoperative recovery.

Heavy smokers of marijuana may develop tolerance to its subjective and cardiovascular effects, and some may experience withdrawal symptoms on the abrupt cessation of marijuana use at admission to labour and delivery unit. Large doses of THC may produce confusion, delusions, hallucinations and agitation, which may interfere with obstetric and anaesthetic management peripartum, including administration of analgesia or anaesthesia.<sup>3,33</sup>

## Conclusion

Maternal marijuana use in pregnancy continues to increase, worldwide. The diverse clinical manifestations of marijuana combined with physiological changes of pregnancy, and pathophysiology of coexisting pregnancy-related disease, might lead to complications and impact the management of labour analgesia. Because most marijuana-abusing parturients also use other illicit drugs the clinical picture could be very unpredictable and diagnosis often difficult. Knowledge of possible anesthetic implications of marijuana as well as other drugs used in pregnancy seems essential to deliver safe analgesia or anaesthesia to these patients.

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