

## Case Report

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# Acute inhalation injury after marijuana use: A hidden cause

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### Abstract:

Marijuana is one of the most extensively smoking substance all around the world, although not common in our society. Its effects on lung are similar to tobacco, causing increased cough, sputum, hyperinflation, and rapid bronchodilatation following with possible airway obstruction. Chronic usage of marijuana may cause a variety of conditions such as bronchitis, large bullae formation, and pneumonia. Here, we report an uncommon case of hidden marijuana smoking causing acute inhalation injury. A 39-year-old male had consulted clinics with sudden onset of dyspnea, cough, and nausea. His chest X-ray and thorax computed tomography have revealed peripheral opacities with ground-glass infiltrations. After a detailed review of history, he was diagnosed with acute inhalation injury due to hidden marijuana smoking. As a conclusion, clinicians who encounter with individuals who have concurrent inhalation damage need to take a careful exposure history and should be alert for the possibilities of further complications and a worsening clinical picture.

### Keywords:

Acute inhalation injury, hypoxemic respiratory distress, marijuana

## Introduction

Marijuana is one of the most extensively smoking substance all around the world. Its long-term use is known to have adverse effects in the body, especially in the lungs. Smoking marijuana affects the lungs in a similar way to tobacco smoke, by causing an increased cough, sputum, hyperinflation, bronchodilatation, and progressive airflow obstruction due to mucus hypersecretion.<sup>[1,2]</sup> Those symptoms are the result of permanent inflammation and edema of the tracheobronchial mucosa. It is also known that marijuana smoking causes apical emphysema with large bullae formation, which presents as spontaneous

pneumothorax, especially in the young adult population.<sup>[3]</sup> Since chronic usage of marijuana weakens the immune system, enhances the inflammatory cells, and impairs the activity of alveolar macrophages in the bronchial mucosa, it most commonly leads to the development of pneumonia or acute or chronic bronchitis.<sup>[1,2]</sup> Here, we report a case of acute inhalation injury as a hidden usage of marijuana in a middle-aged adult.

## Case Report

A 39-year-old male has admitted to the emergency room with sudden-onset dyspnea, cough, and nausea. There was no significant illness reported in his past medical history. The patient denied any

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smoking history. Physical examination revealed expiratory wheezing with abnormal breath sounds. His vital signs were in the normal limits, he was afebrile, and no pathological finding was found in the biochemical laboratory results. His oxygen saturation was measured as 88% by pulse oximetry in the emergency room. His nasopharyngeal swab was also negative for influenza viral antigen. There was no eosinophilia, and his erythrocyte sedimentation rate was not elevated. Autoantibodies were negative, and sputum microscopy and culture for bacteria and fungi were negative. Since the general status of the patient was stable, echocardiography and exercise testing were performed to exclude the possibility of cardiogenic pulmonary edema. His echocardiography result showed highly reduced aerobic capacity, with an excessive ventilatory response. In his lung X-ray, bilateral peripheral opacities were observed, especially in mid zones [Figure 1]. At the time of his admission, the hypoxemic respiratory distress was drawn attention. High-resolution computed tomography (HRCT) revealed the bilateral widespread ground-glass infiltrations in peripheral zones throughout the lungs [Figure 2].

After a detailed medical history taking, it was revealed that the patient was a habitual marijuana smoker. With taken all together his clinical presentation, radiological findings, and exposure history, he was diagnosed with the acute inhalation injury based on the marijuana smoking. At the meantime, supporting therapy was started with noninvasive ventilation for 24 h and oxygen therapy with nasal cannula afterward, with an addition of steroid treatment. His respiratory distress was disappeared following to treatment protocol. His lung X-ray showed a significant improvement with the loss of consolidations after therapy [Figure 3], and the patient was discharged with further recommendations.



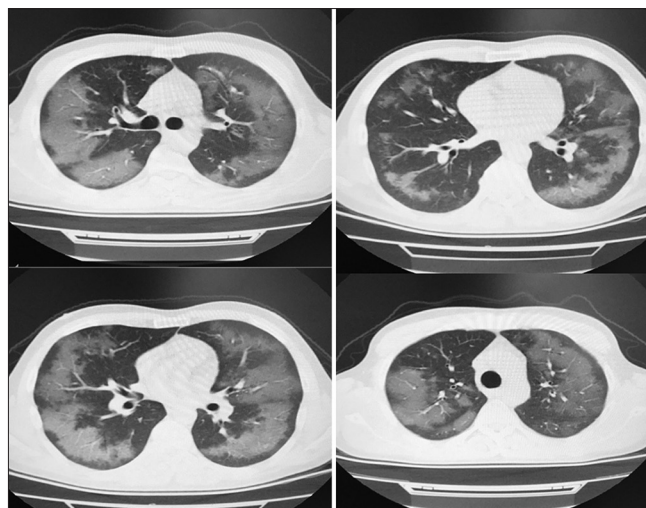
**Figure 1:** Chest X-ray showing bilateral peripheral opacities were observed, especially in mid zones

## Discussion

Marijuana smoking is a well-known cause of lung injury, most commonly in the formation of large lung bullae with emphysema, known as “marijuana lung.”<sup>[3]</sup> Chronic marijuana usage is associated with chronic bronchitis symptoms and large airway inflammation and possible development of chronic obstructive pulmonary disease along with lung cancer.<sup>[4]</sup> In addition, most people are observed to smoke tobacco and marijuana currently, thus contributing the pathophysiology of lung injury.<sup>[4]</sup> Phan *et al.* reported that marijuana smoking causes a two-thirds larger puff volume, one-third larger depth of inhalation, and four times longer breath holding than tobacco smoking.<sup>[5]</sup> This pattern of inhalation also thought to be responsible for the enhanced risk of spontaneous pneumothorax in especially marijuana smokers.<sup>[5]</sup>

Although complications such as bronchitis, spontaneous pneumothorax, and emphysema are seen as the common clinical presentations of marijuana smoking, acute inhalation injury was not reported as a complication before. There were only a few reports declaring that the inhalation of marijuana smoke caused a damage to the pulmonary epithelial barrier and causing severe lung injury.<sup>[6-8]</sup> Since the diagnosis of acute inhalation injury is subjective and made on the basis of clinical findings, it is crucial to evaluate the patient and review the history, as well as to confirm the damage with an advanced imaging modality, such as HRCT.<sup>[9,10]</sup>

In acute pulmonary responses, the lungs are primarily affected by the toxicity, as in the case of acute inhalation injury. Stimulation of cannabinoid receptor type-1 in chronic marijuana usage causes an acute bronchodilatory response, as well as an upper airway obstruction due to



**Figure 2:** Thorax computed tomography showing the bilateral widespread ground-glass infiltrations in peripheral zones throughout the lungs, in all zones



**Figure 3:** Subsequent to treatment, chest X-ray revealed a significant recovery with quick improvement from respiratory distress with steroid treatment and supportive respiratory care

mucus hypersecretion and delayed pulmonary edema.<sup>[11]</sup> Although we thought that marijuana smoke caused the sudden symptoms, other possible contributors cannot be excluded such as method and duration of smoking or other inhaled substances.<sup>[8]</sup>

Recent larger studies have also indicated the increased risk of chronic bronchitis, pneumonia, and evidence of inflammation and injury involving the larger airways, but not a significant risk for chronic obstructive pulmonary disease or lung cancer, at least on itself at the population level.<sup>[11]</sup> However, further epidemiological studies for the evidence to increased risk of alveolar destruction and parenchymal injury are still lacking. Recently, Stefani *et al.* demonstrated that cannabis smoking has detrimental effects on lung parenchyma, in a dose-dependent manner.<sup>[12]</sup> It is also claimed that different pattern of inhalation, higher temperatures of smoke compared to tobacco, and the unique breath-holding mechanism may alter the lung physiology and take a role in the cause of further epithelial injury and inflammation.<sup>[7]</sup> Recent case studies also have drawn attention to different spectrum of exposure injuries in the lungs.<sup>[6]</sup> However, none of the aforementioned studies investigated the aspects of acute inhalation injury as a result of marijuana smoking. Since the concentration and solubility of smoked substance, the degree of chemical irritation and thermal injury, as well as the response to that injury by the individual, create the pattern of acute inhalation injury, the degree of acute lung injury and acute respiratory distress syndrome varies on the case basis.<sup>[9]</sup> Therefore, for a good medical practice, it is important to be aware of respiratory effects of cannabis from the most popular to the rarest one and to ask about cannabis use in any patient with such symptoms.

While the consumption of this substance can be common and legal in different cultures, it is unseen and not well

known in our society. This case demonstrates an unseen case of acute inhalation injury related to hidden marijuana smoking. Due to extremely common viral pneumonia cases in the current winter season, the patient was first evaluated for the atypical viral pneumonia. The combination of an atypical clinical picture with the inconsistency of symptoms might be a suitable indicator to investigate the further etiologies. Although supportive care and withdrawal of substance remain the cornerstone for the treatment, better understanding of the injury and repair mechanisms may lead to a better prognosis for those patients.<sup>[9]</sup>

## Conclusion

Although uncommon in our society, marijuana smoking should be included in the differential diagnosis of a patient with extensive interstitial opacities and respiratory distress. Other causes must be excluded, and detailed medical history from the patient must be performed to have a definitive diagnosis. Clinicians who encounter with individuals who have concurrent inhalation damage need to take a careful exposure history and be alert to possibilities of further effects and a worsening clinical picture.

## Consent for publication

Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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None.

## Conflicts of interest

There are no conflicts of interest.

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