

## Pneumothorax Associated with Absolute Use of Marijuana

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### Abstract

**Introduction:** The association of pneumothorax in marijuana smokers is previously reported, however, those patients had concurrent tobacco smoking, radiographical bullous lung disease, or frequent performance of the valsalva maneuver during marijuana smoking.

**Case Presentation:** A 41-year-old male with no significant past medical history presented with complaints of acute shortness of breath and pleuritic chest pain for five days. He denied fever, chills, cough, and did not recall any relevant exposures and recent trauma. He denied smoking tobacco, however, he smoked marijuana for twenty years with a method of quick inhalation and exhalation. Chest radiography showed a large left tension pneumothorax with compressive right sided atelectasis. Tube thoracostomy was performed with an air leak noticed in the drainage system. The patient required suction of -20 cm H<sub>2</sub>O for failure of lung re-expansion. After 24 hours of a chest tube in place, the patient's symptoms improved and repeat chest radiography revealed resolution of the pneumothorax. Chest computed tomography demonstrated compressive atelectasis and patchy ground glass with no bullae or pneumothorax. The chest tube was subsequently removed after continuous negative air leak in the drainage system. Upon clinical and radiographical improvement, the patient was counseled about the association of marijuana and pneumothorax and was discharged to home.

**Discussion:** Marijuana is one of the most commonly smoked substances in the United States after tobacco but most often concurrently smoked. Δ9-tetrahydrocannabinol (THC) is the main component of marijuana which is not found in other smoke inhalation substances. Marijuana smokers usually smoke with deep inhalation and longer breath holds leading to more deposition of tar in lung tissues which causes loss of ciliary apparatus and goblet cell hyperplasia. Pulmonary function testing reveals no decrease in forced expiratory volume 1 (FEV1) or forced residual capacity (FRC), however, a decrease in FEV1/FVC ratio is observed. Pneumothorax associated with bullous lung disease in marijuana smokers is also well known.

**Keywords:** Pneumothorax; Atelectasis; Marijuana

### Introduction

The association of pneumothorax in marijuana smokers is previously reported, however, those patients had concurrent tobacco smoking, radiographical bullous lung disease, or frequent performance of the valsalva maneuver during marijuana smoking.

### Case Presentation

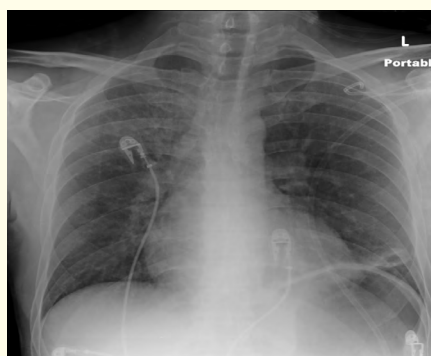
A 41-year-old marijuana smoking male with no significant past medical history presented to the hospital with complaints of acute shortness of breath and pleuritic chest pain for five days. The patient's symptoms started abruptly at rest and were initially attributed to his mental stress. He denied fever, chills, cough, and did not recall any previous similar episodes, relevant exposures, recent travel, or changes in medications. His family history was unremarkable. The patient reported no tobacco smoking history, however; he smoked marijuana for twenty years with a method of quick inhalation and exhalation. On physical examination the patient was noted to be alert

and oriented, in moderate respiratory distress, speaking with short single word sentences, and had audible wheezing. No jugular venous distention noted. On chest auscultation the patient had decreased air movement throughout the left lung field with right inspiratory and expiratory wheezing. Cardiac auscultation did not reveal any murmurs or irregularities. Oxygen saturation on pulse oximetry was 88% while breathing ambient air. Laboratory diagnostics revealed a white cell count of 13,000/ $\mu$ L with a shift to the left in the differential (78% neutrophils, 14% lymphocytes, 6% monocytes, 1% basophils, and 1% eosinophils). The HIV test was negative. Other blood cell counts, electrolytes, renal, and liver function tests were unremarkable. An arterial blood gas (ABG) analysis showed a pH of 7.30,  $pCO_2$  of 50 mmHg, and  $pO_2$  of 68 mmHg on room air. The patient was initially started on oxygen, albuterol/ipratropium nebulizer treatment and one dose of solumedrol 125 mg intravenously with minimal improvement in symptoms.

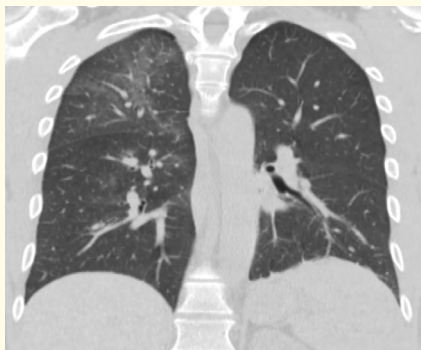
Chest radiography showed large left tension pneumothorax with compressive right atelectasis (Figure 1). Tube thoracostomy was performed with an air leak noticed in the drainage system. The patient required suction of -20 cm  $H_2O$  for the failure of re-expansion of the lung. After 24 hours of a chest tube in place, the patient's symptoms improved and repeat chest radiography after clamping of the tube revealed resolution of the pneumothorax (Figure 2). Chest computed tomography without contrast demonstrated patent central airways, a small left pleural effusion with compressive atelectasis, and patchy ground glass opacities throughout the right lung. No bullae or pneumothorax were noted (Figure 3). The chest tube was subsequently removed after continuous negative air leak in the drainage system. Leukocytosis resolved post-tube thoracostomy without administration of any antibiotics. Upon clinical and radiographical improvement, the patient was counseled about the association of marijuana and pneumothorax and was discharged home.



**Figure 1:** Chest radiography showing large left tension pneumothorax with compressive right atelectasis.



**Figure 2:** Post-chest tube chest radiography noted re-expansion of the left lung.



**Figure 3:** Post-chest tube chest computed tomography without contrast demonstrated patent central airways with no bullae and pneumothorax.

## Discussion

Marijuana is one of the most commonly smoked substance in United States after tobacco smoke [1]. Marijuana is taken primarily to feel “high” through inhalation of the smoke from a cigarette (“joint”) or a water pipe (“bong”) [2]. Lung Injury from aspiration pneumonia is the usual entity seen in people with illicit drug abuse due to impaired consciousness [3].

Marijuana associated lung injury has been well described in the literature which is primarily dependent on the duration of the drug abuse.  $\Delta 9$ -tetrahydrocannabinol (THC) is the main component of marijuana which is not found in other smoke inhalation substances. Some components which are commonly present in both tobacco and marijuana are procarcinogenic benzopyrene, benzanthracene, ammonia, hydrocyanic acid, nitrosamines, phenols, and naphthalene. Nicotine is only present in tobacco smoking [4].

Chronic marijuana users, when compared to tobacco users, smoke in a mechanically different way. Marijuana smokers usually inhale less smoke but are ultimately found to have more deposition of tar in lung tissues from taking larger puffs, with deep inhalation and longer breath holds [5]. Tar deposition in lung tissue leads to loss of ciliary apparatus and goblet cell hyperplasia causing symptoms of chronic bronchitis. Pulmonary function testing reveals no decrease in forced expiratory volume 1 (FEV1) or forced residual capacity (FRC), however, a decrease in FEV1/FVC ratio was observed [6,7]. Squamous cell metaplasia and atypical cells are produced with the possibility of developing malignancy, but to date, there is no positive association [6]. Association of marijuana smokers and infections including *Aspergillus* and Tuberculosis has also been reported [8,9].

Pneumothorax in marijuana smokers has been previously reported, however, those patients had concurrent tobacco smoking, radiographical bullous lung disease, or frequent performance of the valsalva maneuver during marijuana smoking [10,11].

We hereby, up to the best of our knowledge, report the first case of pneumothorax in a patient with chronic use of marijuana smoking not associated with neither tobacco use, performance of the valsalva maneuver during smoking or bullous lung disease in chest imaging.

## Conclusion

We hereby, to the best of our knowledge, report the first case of pneumothorax in a marijuana smoking patient not associated with tobacco use, performance of the valsalva maneuver during smoking, or bullous lung disease in chest imaging.

## Bibliography

1. Terry-McElrath YM, *et al.* “Middle and high school drug testing and student illicit drug use: a national study 1998-2011”. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine* 52.6 (2013): 707-715.

2. Patrick ME, *et al.* "Age-related changes in reasons for using alcohol and marijuana from ages 18 to 30 in a national sample". *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors* 25.2 (2011): 330-339.
3. Megarbane B and Chevillard L. "The large spectrum of pulmonary complications following illicit drug use: features and mechanisms". *Chemico-Biological Interactions* 206.3 (2013): 444-451.
4. Hoffmann DE and Weber E. "Medical marijuana and the law". *The New England Journal of Medicine* 362 (2010): 1453-1457.
5. Wu TC, *et al.* "Pulmonary hazards of smoking marijuana as compared with tobacco". *The New England Journal of Medicine* 318.6 (1988): 347-351.
6. Sidney S, *et al.* "Marijuana use and cancer incidence (California, United States)". *Cancer Causes and Control: CCC* 8.5 (1997): 722-728.
7. Bloom JW, *et al.* "Respiratory effects of non-tobacco cigarettes". *British Medical Journal* 295.6612 (1987): 1516-1518.
8. Denning DW, *et al.* "Pulmonary aspergillosis in the acquired immunodeficiency syndrome". *The New England Journal of Medicine* 324 (1991): 654-662.
9. Munckhof WJ, *et al.* "A cluster of tuberculosis associated with use of a marijuana water pipe". *The International Journal of Tuberculosis and Lung Disease: The Official Journal of the International Union against Tuberculosis and Lung Disease* 7.9 (2003): 860-865.
10. Feldman AL, *et al.* "Pneumothorax in polysubstance-abusing marijuana and tobacco smokers: three cases". *Journal of Substance Abuse* 5.2 (1993): 183-186.
11. Johnson MK, *et al.* "Large lung bullae in marijuana smokers". *Thorax* 55.4 (2000): 340-342.

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