

## Spontaneous pneumomediastinum in a young male secondary to chronic marijuana abuse

Palash Samanta, Mahiry Salinas Romero, Jon Roper, Hossam Amin

From Department of Internal Medicine, New York Medical College, Metropolitan Hospital Center, New York City, New York, USA

**Correspondence to:** Palash Samanta MD, Division of Infectious Diseases, Department of Internal Medicine, Suite 3A, Falk Medical Building, 3601 Fifth Avenue, Pittsburgh, PA 15213, USA. Phone: +1-412-647-0996, Fax: +1-412-647-3162. E-mail: drpalash@gmail.com

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### ABSTRACT

Illicit drug use is emerging as a global health problem, also leading to deteriorated socioeconomic condition. *Cannabis* (Marijuana) is used throughout the world, and its use is increasing. Marijuana is associated with airway inflammation leading to pneumothorax, pneumomediastinum. It also predisposes to lung cancer. Here, we are presenting a young male presented with a cough and progressively worsening dyspnea. Imaging showed pneumomediastinum. The patient revealed chronic marijuana use for many years. Clinicians treating young adults and adolescents should be aware of the entity associated with illicit drug use, and thorough clinical and social history is warranted for early diagnosis of the perforated organ.

**Key words:** Barotrauma, *Cannabis*, Delta-9-tetrahydrocannabinol, Marijuana, Pneumomediastinum, Pneumothorax

Illicit drug use represents a worldwide health problem involving about 5% of world's adult population and contributing to crime misery, insecurity, and spread of human immunodeficiency virus [1]. *Cannabis* (Marijuana) is one of the most widely used illicit drugs with a global annual prevalence ranging from 2.6% to 5.0% [1]. New chemically engineered psychotropic substance, including synthetic cannabinoids, recently emerged as recreational drugs. Pulmonary involvement accounts for a major part of *Cannabis* related morbidities. Insults to the lung may be attributed either to a direct effect of the drug itself or to an indirect effect, generally in relation to its route of administration. Previous reports have indicated the association of marijuana use with the development of pneumomediastinum. We present a young male who presented with this complication after chronic use of marijuana.

### CASE REPORT

A 23-year-old male with no significant medical history came to the emergency department (ED) with complaints of progressively worsening in shortness of breath for the last 2 days associated with cough and mucoid expectoration. He also complained of subjective fever and chills and had one episode of vomiting. He denied any runny nose, sore throat, and other upper respiratory infection symptoms. He had a history of childhood asthma but could not recall about the last use of any inhaler. On arrival to ED vital signs were remarkable for tachycardia of 120-130 beats per min. Chest auscultation was remarkable for mild expiratory wheezing throughout lung fields. His saturation level was >94% in room air. Arterial blood gas showed mild

hypoxia. The symptoms improved after 3 rounds of nebulization. Electrocardiogram showed sinus tachycardia. Chest X-ray (CXR) revealed questionable pneumomediastinum. Chest and neck computed tomography scan confirmed pneumomediastinum with air adjacent to esophagus, trachea, and great vessels dissecting into lower neck and root of each hilum. There was also subcutaneous emphysema noted involving bilateral carotid space and retropharyngeal space without any obvious evidence of defect involving trachea, esophagus or esophageal perforation. The patient was admitted for observation. On further questioning, he admitted smoking Marijuana almost daily for the last 5 years. He denied cocaine or any other drug abuse and cigarette smoking. He never had these symptoms before. Next day, the patient had a spike of fever with a maximum temperature of 101.5°F. Intravenous moxifloxacin was started. Gastrografin swallow X-ray did not show any extravasation of contrast from esophagus. On the 3<sup>rd</sup> day, tachycardia resolved and repeat CXR showed improvement of pneumomediastinum. The patient was discharged with inhaler prescription. As the patient improved clinically and radiographically with conservative management, no additional treatment was warranted.

### DISCUSSION

Pneumomediastinum, pneumothorax, subcutaneous emphysema, and occasionally pneumorachis (epidural pneumatosis or aerorachia) can be related to thoracic trauma, with symptoms including glottic closure, severe asthma, parturition, intubation complications, mechanical ventilation, and intractable vomiting [2]. In these cases, barotrauma is generated by

increased intrapulmonary pressure and a subsequent high transmural gradient between the air-filled alveoli and either the surrounding interstitial space or the pleural cavity. Marijuana smokers may perform the equivalent of Valsalva's maneuver (expiration through closed glottis) or Müller's maneuvers (deep inspiration through closed glottis) [2]. In the United States, Marijuana was used medicinally until 1941, when it was dropped from the United States Pharmacopeia [1-3]. The Controlled Substances Act, passed in 1970 classified, Marijuana as a schedule 1 drug, known to be most dangerous drug of all the drug schedules with potentially severe psychological or physical dependence [4]. Although the United States, Australia, and New Zealand reported the highest prevalence of *Cannabis* use, it is produced and consumed in virtually every country and territory of the world [4]. Recently, several papers have been published regarding the medicinal use of Marijuana, and it has also been approved by Food and Drug Administration in the United States [5,6]. Combustion of Marijuana produces hundreds of substances. The main psychoactive ingredient in marijuana is delta-9-tetrahydrocannabinol (THC). The most common route of marijuana use is by inhalation of smoke. Smoke is usually inhaled from compacted and rolled leaves, analogs to a cigarette (a "joint"), or from a water pipe ("bong"). When Marijuana is smoked, THC is absorbed into the bloodstream through the lungs. As it shares similar compounds with tobacco smoke (except nicotine which is present only in tobacco), increasing widespread use of marijuana smoking raises concerns for short- and long-term respiratory complications including bronchitis, pneumothorax/pneumomediastinum, and chronic lung diseases such as chronic obstructive pulmonary disease, interstitial lung disease, and lung cancers. It is evident that Marijuana smokers tend to have 40% deeper inhalations, about two-thirds larger inhalation or "puff" volume and up to four times longer retention of hotter and unfiltered smoke in comparison to tobacco cigarettes [1]. The smoking of marijuana is also accompanied by Valsalva maneuvers which may predispose to barotrauma [4]. It has been postulated that this smoking technique, in addition to *Cannabis* itself, is responsible for cases of spontaneous pneumothorax and bullous lung disease reported in young marijuana smokers. Common presenting complaints include retrosternal chest pain (often pleuritic) (88%), dyspnea (60%), neck pain (48%), and dysphagia (40%) [7,8]. Common physical findings include subcutaneous emphysema involving the axillae (8%), chest (24%), neck (40%), and Hamman's sign (40%) [7,8]. Hyperresonance over the sternum also may be noted. Pulsus paradoxus, an uncommon sign in this condition, has been reported in only 8% of the one of the studied population [7]. The clinical symptoms are largely attributed to the physical and immunologic effect of marijuana on respiratory epithelium including lung's compromised mucociliary clearance [9]. Delta-9-tetrahydrocannabinol exerts stimulant action on cannabinoid-1 receptors at postganglionic parasympathetic nerve endings on

airway smooth muscle leading to the inhibition of acetylcholine release. Another study from New Zealand also showed that smoking *Cannabis* was associated with a dose-related impairment of large airways function, resulting in airflow obstruction and hyperinflation [10]. Hyperinflation associated with barotrauma leads to pneumomediastinum and pneumothorax.

## CONCLUSION

The increase in drug abuse in the adolescent population is a growing concern worldwide. Among adolescents and young adults presenting with chest pain and/or shortness of breath, the need to obtain a thorough history and perform a detailed physical examination to prevent missing obvious signs and symptoms of a perforated viscus or soft-tissue infection cannot be overemphasized. Moreover, its high frequency of association with illicit inhalational drug use also requires that physicians who deal with adolescent patients, including pediatrician, general practitioners, and emergency physicians, be aware of its clinical and natural history.

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