



Case report

Breath-holding in a marijuana smoker

Avinash Aujayeb*, Calum Donald, Simon Doe

Royal Victoria Infirmary, Newcastle Upon Tyne Hospitals, Queen Victoria Road, Newcastle Upon Tyne NE1 4LP, UK

ARTICLE INFO

Article history:

Received 19 July 2011

Accepted 25 July 2011

Keywords:

Marijuana

Pneumothorax

Barotrauma

ABSTRACT

It is vital to ask about illicit drug smoking in the respiratory history as marijuana smoking augments the detrimental effects of tobacco. We describe the case of a 28 year old marijuana smoker who developed a pneumothorax during a breath-holding competition. Pneumothorax is a common clinical entity that every physician should be aware of how to manage and lifetime risk is considerably increased by smoking and in exposure to barotrauma.

© 2011 Elsevier Ltd. All rights reserved.

1. Case

A 28 year old man with no past medical history presented to the emergency department with an acute history of dyspnoea and pleuritic chest pain 20 min after breath-holding for 2 min 28 s in a competition in his local public house.

He admitted to a 10 pack year of cigarette smoking and to regular cannabis use in the resin form, which he smoked either in rolled up cigarettes mixed up with tobacco or via water-pipes, otherwise known as “bongs”.

Clinically, his trachea was central but he had reduced air entry on the left side with a hyper-resonant percussion note. His oxygen saturations were 98% on air but he was tachypnoeic with a respiratory rate of 22 per minute. He was normotensive and had a pulse rate of 100 beats per minute.

His chest X-ray ([Image 1](#)) showed a left pneumothorax with a trace of fluid at the base and given the degree of breathless and size of pneumothorax, a 12 French Seldinger chest drain was inserted with no complications. Radiology post drain insertion showed good re-expansion of the affected lung. ([Image 2](#)) but the drain continued to bubble and swing. The lung did not fully expand despite suction and a small pleural effusion developed on subsequent chest radiographs. When suction was removed, the PTx was noticeably bigger ([Images 3–6](#)). Chest computerised tomography showed apical bullae and a well sited chest drain in the left apex ([Images 7 and 8](#)). However, overnight the drain became dislodged

and was removed. His clinical and radiological appearance remained stable ([Image 9](#)). He was discharged home with scheduled early follow up which unfortunately he has failed to attend.

2. Discussion

Cannabis is an illegal drug in the United Kingdom but has widespread recreational use among the younger generation and 44% of 16–29 year-olds have tried cannabis.¹ The damage and risk to the respiratory epithelium from 3 to 4 cannabis cigarettes is equivalent to approximately 20 tobacco cigarettes.² The former tend to be smoked in two forms. Resin, the residue of the cannabis plants, tends to be ground with tar to form a sticky paste that can be combined with tobacco and smoked usually with no filter-tips at the end of the “joint”. “Skunk”, the dried up leaves or flower of the marijuana plant, can be smoked directly. Water-pipes or “bongs” are also used as smoking instruments. With whatever method, the puff volume is increased by two-thirds and the depth of inhalation by one-third.³ There is an average fourfold longer breath-holding time with cannabis than with tobacco and hence tar deposition is four times as much as an unfiltered cigarette of the same weight.⁴

PTx is air in the pleural cavity and can be classified as primary and secondary. Combined United Kingdom hospital admission rates for primary and secondary PTx have been reported as 16.7/100,000 for men and 5.8/100,000 for women, with corresponding mortality rates of 1.26/million and 0.62/million per annum between 1991 and 1995.⁵ Smoking confers a lifetime 12% risk of PTx as compared to 0.1% in non-smokers.⁶ Sub-pleural blebs and bullae have been found on thoracoscopy and CT scanning in about 90% of patients with PTx and with negative pleural pressure increasing from the

Abbreviations: CT, Computerised tomography; PTx, Pneumothorax.

* Corresponding author. Tel.: +447786512801.

E-mail address: aujayeb@doctors.net.uk (A. Aujayeb).

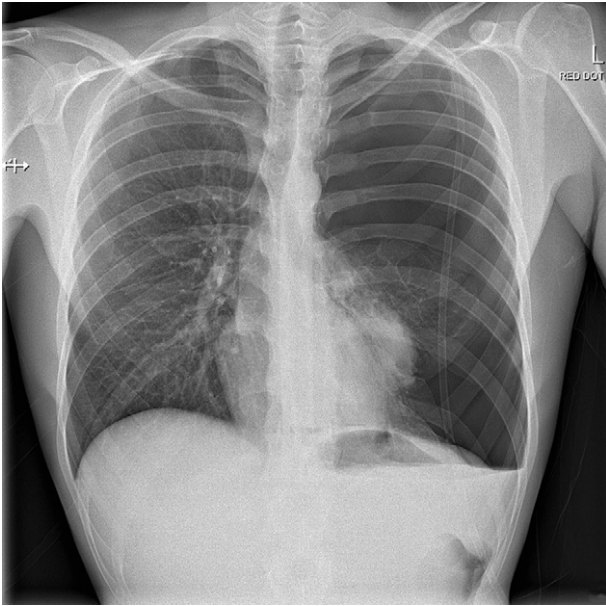


Fig. 1. Left sided pneumothorax at presentation with trace of fluid at the base.

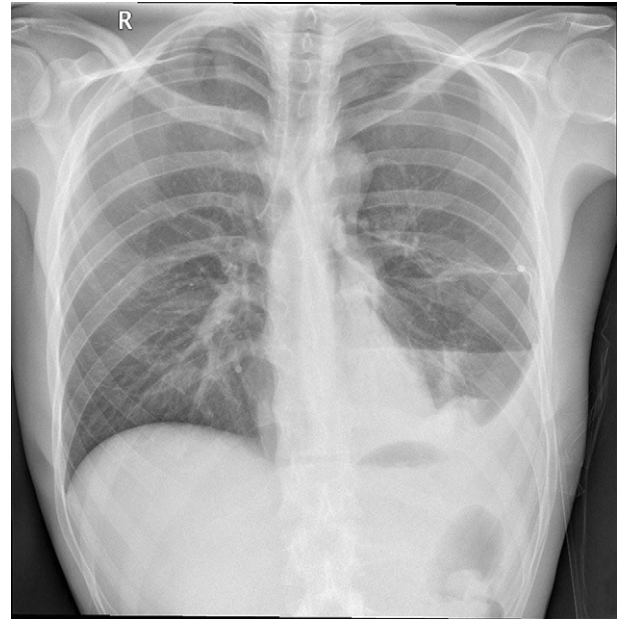


Fig. 3. Hydro-pneumothorax with intercostal drain in situ.

lung base to the apex, the alveoli in the apex are subjected to greater distending pressures.

An association between cannabis smoking and bullous lung disease has been described.^{7,8} Johnson et al⁸ coined the term “bong lung” when they described 4 patients ranging in age from 26 to 47 years who had extensive apical bullous disease and with one of them having previously suffered a spontaneous PTx. Their conclusion was that a history of marijuana smoking should be ascertained in any patient presenting with a spontaneous PTx. Pathological analysis shows supleural blebs and emphysematous changes with numerous heavily pigmented smokers’ macrophages which looks like a desquamative interstitial pneumonia.⁹ “Bong lung” however, does not have any interstitial changes on radiological imaging. It is

likely that both tobacco and cannabis are the culprits in this pathological entity rather than the latter alone.

PTx and pneumomediastinum have been reported in cannabis smokers with extreme breath-holding, Valsalva, and Muller’s manoeuvres. Miller et al¹⁰ described a case of a 23 year old smoker who performed repeated Valsalva manoeuvres for 5 h two days prior to an admission with a pneumomediastinum. It is thought that due to the increased intra-alveolar pressure, a disruptive

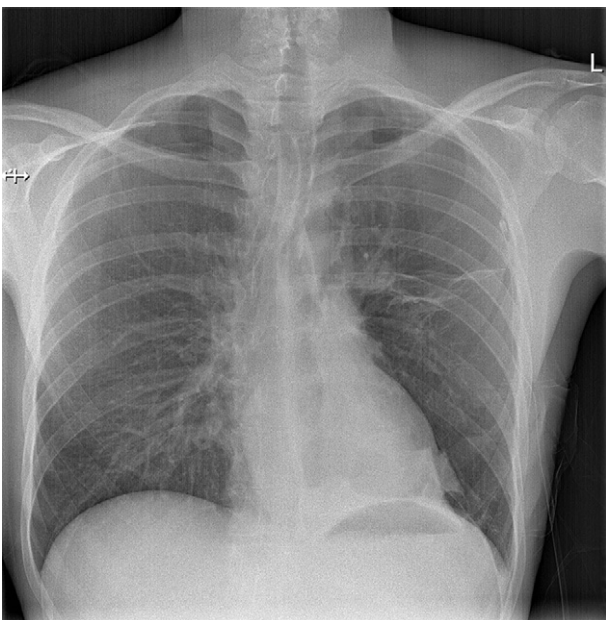


Fig. 2. Re-expansion of left lung with intercostal drain with trace of fluid at the base.

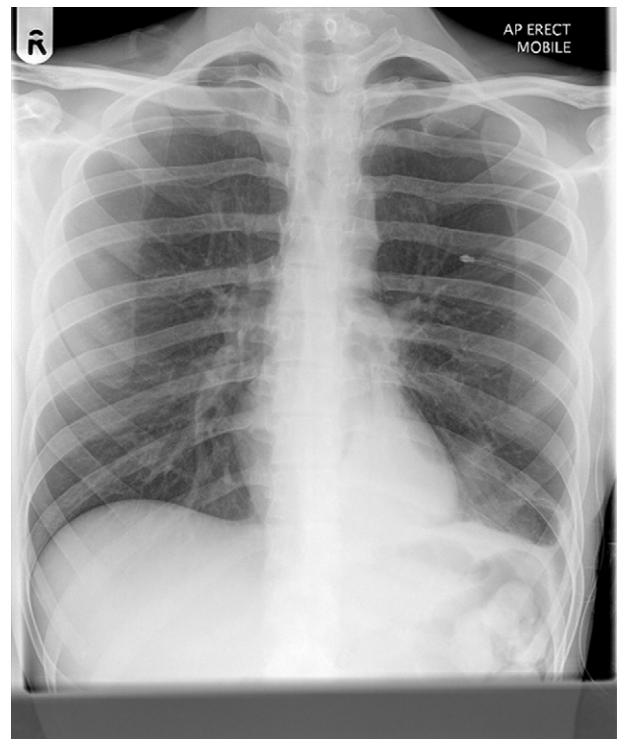


Fig. 4. Improvement of volume of pneumothorax on low pressure, high volume suction.

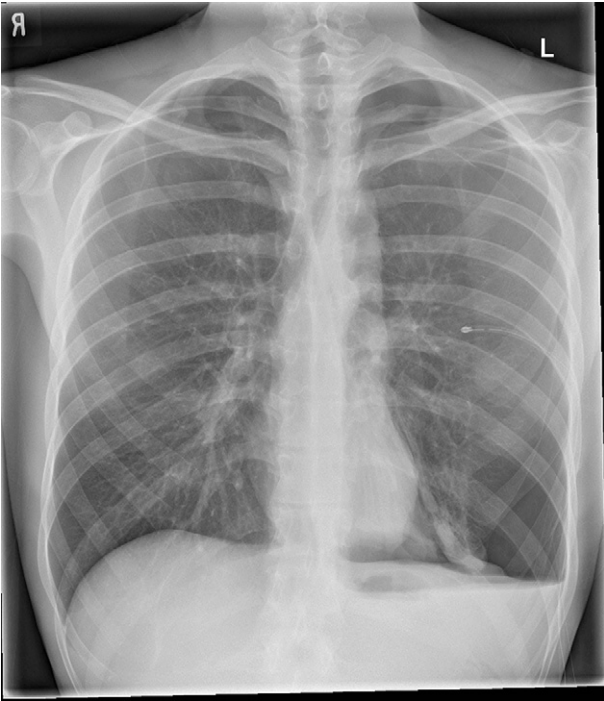


Fig. 5. Re-accumulation of pneumothorax when suction turned off.

shearing force is created in alveoli close to vascular structures.¹¹ The air can then move along the vessels and bronchi to the mediastinum. Hazouard et al¹² described a case of pneumorachis and pneumomediastinum in a patient who smoked marijuana in a narrow outlet bong with repeated deep inspiration, causing the equivalent of a Muller's manoeuvre which is an attempt at inspiration with a closed mouth and nose or closed glottis after a forced expiration. PTx is also described during Valsalva manoeuvres in very regular long term marijuana smokers.^{13,14}

Our patient had apical bullous lung disease and the fact that his drain was still bubbling after several days on suction suggested he had an ongoing air leak. He declined to have a larger bore drain inserted and unfortunately his drain dislodged prior to full

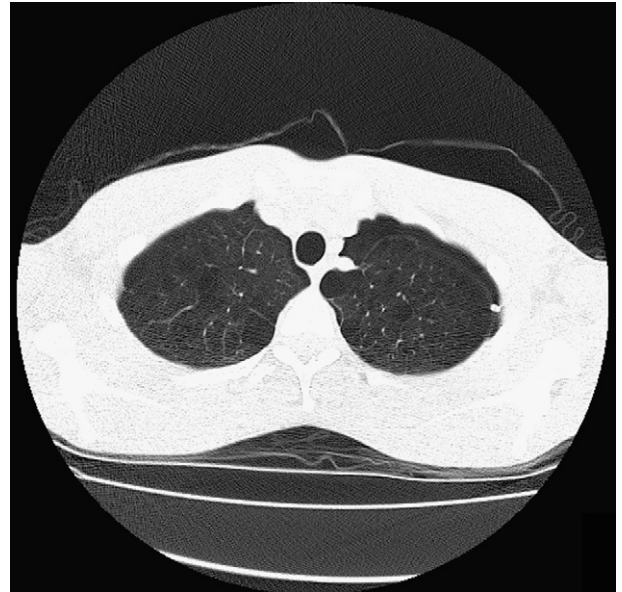


Fig. 7. High resolution CT scan of chest showing apical bullae.

radiological resolution. A referral to cardiothoracic services was considered but as the patient was clinically and radiologically stable following the removal of his drain he was discharged after strong counselling not to fly, dive and to give up smoking completely. However, he has failed to keep his appointments for follow up.

3. Learning points

- Marijuana is the most common illegal drug used in the UK.
- A history of marijuana smoking should be elicited in the respiratory history.
- Marijuana smoking can be associated with significant lung pathology and all physicians should be aware of the health implications.

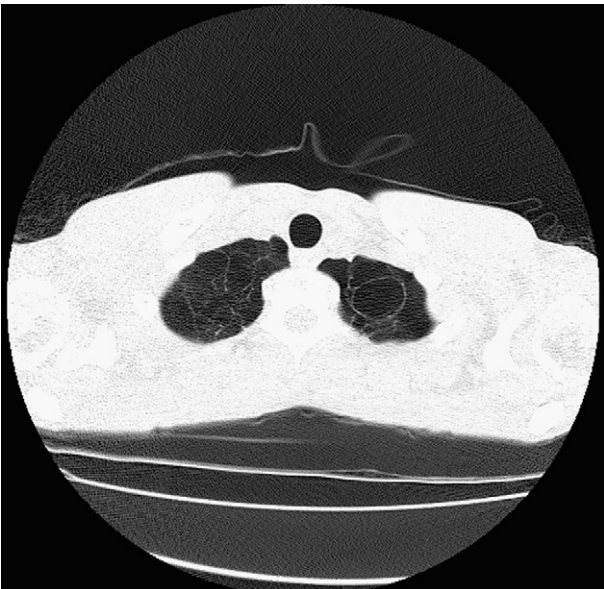


Fig. 6. High resolution CT scan of chest showing apical bullae and a non-resolving pneumothorax with a well sited drain.

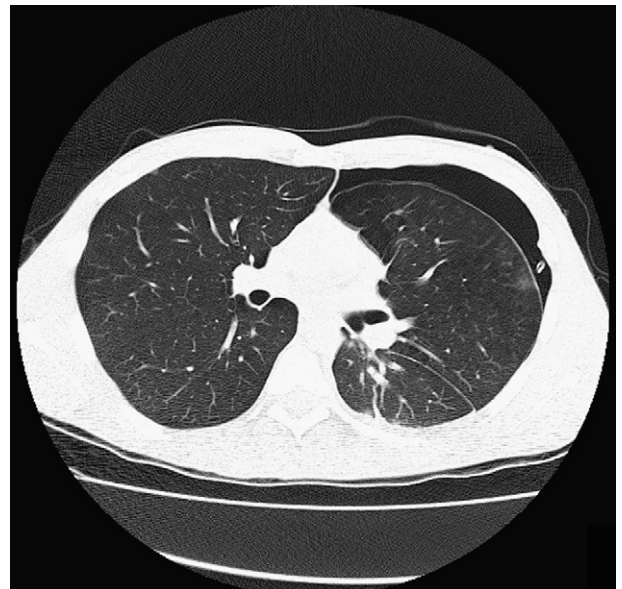


Fig. 8. High resolution CT scan of chest showing apical bullae and a non-resolving pneumothorax with a well sited drain.

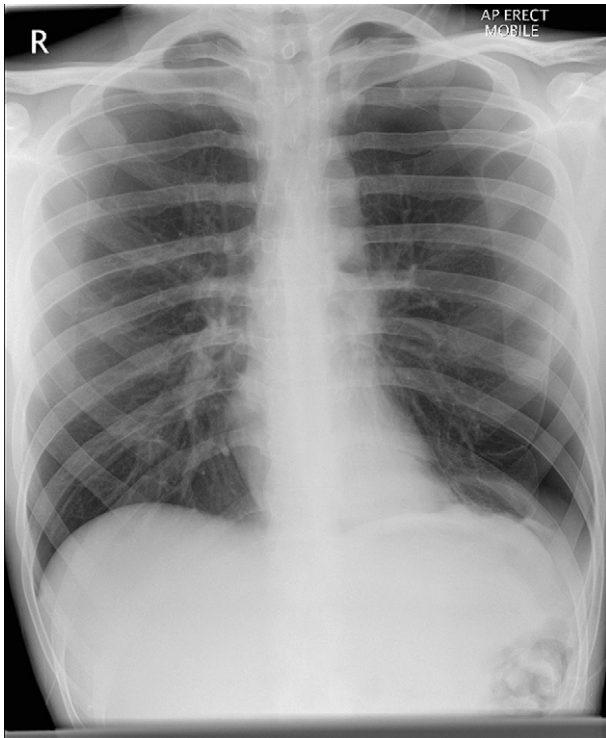


Fig. 9. Persisting pneumothorax after chest drain “fell out”.

Conflict of interest

There are no conflicts of interest in this paper.

References

1. Annual report on the UK drug situation in 2001. European Monitoring Centre for Drugs and Drug Addiction; Drug Scope, London.
2. British Lung Foundation. *A smoking gun? The impact of cannabis smoking on respiratory health*. London: BLF; 2002.
3. Ashton H. Pharmacology and effects of cannabis: a brief review. *Br J Psychiatry* 2001;**178**:101–6.
4. Wu TC, Tashkin DP, Djahed B, Rose JE. Pulmonary hazards of smoking marijuana as compared with tobacco. *N Engl J Med* 1988;**318**(6):347–51.
5. Gupta D, Hansell A, Nichols T, et al. Epidemiology of pneumothorax in England. *Thorax* 2000;**55**:666e71.
6. <http://www.brit-thoracic.org.uk/guidelines/pleural-disease-guidelines-2010.aspx>.
7. Allen R. Bullectomy for “bong lung” in an 18 year-old male presenting with spontaneous pneumothorax. *Pneumon* 2010;**23**(3):301–3.
8. Johnson MK, Smith RP, Morrison D, Laszlo G, White RJ. Large bullae in marijuana smokers. *Thorax* 2000;**55**:340–2.
9. Taylor DR, Hall W. Respiratory health effects of cannabis: position statement of the Thoracic Society of Australia and New Zealand. *Int Med J* 2003;**33**:310–3.
10. Miller WE, Spiekerman RE, Hepper NG. Pneumomediastinum resulting from performing nalsalva maneuvers during marijuana smoking. *Chest* 1972;**62**:233–4.
11. Macklin MT, Macklin CC. Malignant interstitial emphysema of the lungs and mediastinum as an important occult in many respiratory diseases and other conditions: an interpretation of the clinical literature in the light of laboratory experiment. *Medicine (Balt)* 1944;**23**:281–358.
12. Hazouard E, Koninck JC, Attucci S, et al. Pneumorachis and pneumomediastinum caused by repeated Muller’s maneuvers: complications of marijuana smoking. *Ann Emerg Med* 2001;**38**:694–7.
13. Goodyear K, Laws D, Turner J. Bilateral spontaneous pneumothorax in a cannabis smoker. *J R Soc Med* 2004;**97**:435–6.
14. Birrer RB, Calderon J. Pneumothorax, pneumomediastinum, and pneumopericardium following Valsalva’s maneuver during marijuana smoking. *N Y State J Med* 1984;**84**:619–20.