Learning from errors

The importance of an illicit drug history in the evaluation of suspected spontaneous pneumothorax

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Summary

The authors present the case of a 27-year-old man who presented with acute left-sided pleuritic chest pain and dyspnoea managed as for a spontaneous pneumothorax with aspiration and subsequent chest drain insertion following a chest radiograph. Despite intervention, however, his chest radiograph showed what appeared to be a non-resolving pneumothorax. Further history revealed a large cannabis smoking exposure and subsequent CT imaging revealed large apical bullous disease with little residual pneumothorax. The patient was referred for cardiothoracic bullectomy and pleurodesis. The authors review the association between cannabis smoke inhalation and apical bullous lung disease and stress the importance of direct questioning on initial history. If a significant history is found, the authors argue that CT imaging and primary cardiothoracic intervention may then be the investigation and management of choice in a stable patient.

BACKGROUND

This case highlights the importance of an illicit drug history in patients with suspected pneumothorax. There is an underappreciation of the association of apical bullous disease with cannabis inhalation, and given the increasing consumption of cannabis throughout the western world, this is likely to be an increasingly common complication.

Our case highlights the consequences of not appreciating this association, and we argue that in cases where there is a strong suspicion of possible bullous disease, as in emphysematous patients, CT imaging should be performed in stable patients.

CASE PRESENTATION

In June 2009, a 27-year-old Caucasian man presented to the emergency department of our hospital with acute left-sided pleuritic pain associated with shortness of breath and a non-productive cough. Evaluation by the casualty officer revealed a medical history significant for a 15-year history of stable asthma controlled with infrequent use of a β -2-agonist inhaler. The patient was employed as a club doorman, and admitted to a 20-pack year tobacco smoking history. Initial examination revealed decreased left-sided air entry. Chest radiograph showed what was thought to be a left-sided apical pneumothorax of 2 cm diameter with no other abnormality noted. Aspiration of the pneumothorax was attempted with a 22-gauge cannula. Follow-up imaging showed a persistent pneumothorax. The patient, however, self discharged prior to any further management.

He represented with the same complaint 1 day later on a weekend with repeat chest radiograph showing similar findings as previously. He was referred to the general medical team on-call, and a 14-French Seldinger chest drain was inserted into the fifth intercostal space in the mid-axillary line. Postprocedure chest radiograph showed the apical pneumothorax had increased to 12 cm. Following this,

the 14-French chest drain was replaced with a 24-French Argyle chest drain. Repeat chest radiograph imaging again showed what appeared to be a persistent apical pneumothorax. The chest drain was swinging adequately implying correct positioning but was not bubbling. It was subsequently placed on suction at -2 kPa.

The following day, the patient was referred to the respiratory specialist team where the history was revisited. On further questioning, the patient reported that he was a heavy marijuana smoker with a 10-year history, with occasional 'bong' use. Of note, his mother had also been diagnosed with chronic obstructive lung disease at an early age of 45. Urgent CT chest imaging was obtained, which revealed a large left bulla with little residual pneumothorax and additional right apical blebs (figure 1). An α -1-antitrypsin level was within normal range. The patient was subsequently transferred to a local tertiary cardiothoracic centre for video-assisted thoracoscopic (VATS) bullectomy and pleurodesis.

OUTCOME AND FOLLOW-UP

The patient recovered well, and on outpatient follow-up he is well without complaint and has given up his marijuana habit.

DISCUSSION

Marijuana is the most commonly abused narcotic in the UK. The prevalence among people aged 16–59 years has increased from 1996 to 2003 by more than 30%, and it was responsible for 16 493 persons accessing drug and alcohol treatment centre assistance in 2007–2008.¹ In the UK, it is reported that up to 50% of young adults have tried to smoke marijuana at some time with around 5% being frequent users between the ages of 16 and 30.¹

Asymmetrical, variable-sized emphysematous bullae on high-resolution CT imaging has been reported in

Figure 1 CT showing large left-sided apical bullae with right apical blebs.

the literature, previously, in young marijuana smokers.² Although a causative link has yet to be definitively established, several factors have been implicating in its aetiology including the pattern of cannabis smoking, and the subsequent increased tar and chemical deposition within the alveoli compared to adjacent bronchioles.²⁻³ A draw on a marijuana 'joint' involves, on average, a volume two-thirds larger, a depth of inspiration a third greater, and a breath-holding time four times longer than a draw on a cigarette, occasionally accompanied by a Valsalva manoeuvre all leading to a higher systemic absorption of Δ_9 -tetrahydrocannabinol, the active component of marijuana.⁴ This increased barotrauma is postulated to overdistend and rupture alveoli leading to bullae formation and cause presentation with 'traumatic' pneumomediastinum and/or pneumothorax. This is due to the fact that the tension on the cyst wall is related to the fourth power of the pressure in the cystic cavity (Laplace's law).²

The additive effect of tobacco and marijuana smoking on the development of giant upper zone bullae has also been postulated.² A recent review in the *European Journal of Cardiothoracic Surgery* retrospectively compared 17 patients with a heavy marijuana consumption presenting with secondary pneumothoraces and bullous emphysema requiring VATS pleurodesis to those with minimal or no marijuana exposure.⁵ Interestingly, the study revealed that all heavy marijuana smokers had severe peripheral emphysematous disease on CT imaging and lung histology with the majority having an upper lobe distribution. A proportion of patients, however, had a more homogenous distribution of emphysema unlikely to be secondary to tobacco inhalation, suggesting a heterogeneous lung effect.

Non-marijuana smokers had little peripheral emphysema and only minor apical bullous disease. There was a strong link between the length of marijuana exposure and the severity of emphysema, highlighting the need to quantify exposure with the authors suggesting 'joint-years' as a measure, with one-joint of marijuana a day being equivalent to at least a pack of standard cigarettes with regard to effect.

Given the above studies, we suggest that a combination of tobacco and heavy marijuana consumption in our patient contributed to the development of severe upper lobe bullous emphysema despite his possible contributing factors of a coexisting history of asthma and significant tobacco smoking history. Subsequent 'joint' inhalation with breath holding would have predisposed the patient to a secondary pneumothorax via the mechanisms illustrated earlier.

Bullae rupture may present to the emergency department as chest pain with shortness of breath.³ Chest radiograph imaging may appear suggestive of a pneumothorax prompting further management with intervention as for a spontaneous pneumothorax. Aspiration and drain insertion, as in this case, may result in further bullae rupture and worsening of the pneumothorax. An initial history of marijuana use should always be taken prior to any intervention, and, when present, should heighten suspicion of underlying bullous lung disease. In our opinion, providing the patient is stable, further imaging with CT should be obtained prior to intervention, and if proven to have bullous lung disease, referral to a tertiary specialist cardiothoracic unit should be considered for a primary VATS bullectomy and pleurodesis as definitive treatment.

Learning points

- ▶ A comprehensive illicit drug history is extremely important in patients presenting with suspected pneumothoraces.
- ▶ There is an association between cannabis inhalation and apical bullous lung disease.
- ▶ In stable patients presenting with a suspected pneumothorax with a history of frequent cannabis inhalation and possible apical bullous disease, a CT thorax should be considered prior to chest drain insertion.

Competing interests None.

Patient consent Obtained.

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