

CASE REPORT

Vaping - A Precipitating Factor of Pneumothorax in A Smoker?

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ABSTRACT

A 24 years old man who was a dual user of tobacco smoke and e-cigarette presented with one month history of right sided pleuritic chest pain, associated with cough and shortness of breath a week prior to the admission. He was diagnosed with a right primary spontaneous pneumothorax. A right pleural catheter was inserted after a failed simple needle aspiration. He recovered uneventfully. Advice on quitting smoking and vaping was given prior to discharge. This case highlights the importance of obtaining a thorough history including vaping from every patient who experiences pneumothorax.

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INTRODUCTION

E-cigarette or vaping related product use has become popular among Malaysians in recent years, particularly in the younger generation. Smoking is a well established risk factor in causing pneumothorax. There is an increasing trend of using e-cigarette as compared to tobacco smoking. However, risk of vaping in primary spontaneous pneumothorax is yet to be studied, especially among the dual users of tobacco and e-cigarette.

CASE REPORT

A 24 years old man with no known medical illness presented with one month history of right sided pleuritic chest pain which was his first time to experience. This was accompanied by cough and shortness of breath for one week prior to admission. The shortness of breath was worse when lying flat. He denied any fever, runny nose, sore throat or constitutional symptoms. There was no injury to his chest, contact with tuberculosis patients or family history of connective tissue disease. He was a dual user of tobacco cigarettes and vaping products. He smoked for 5 packs per day for the last 6 years and started to vape 1 year prior to admission with the reason to stop smoking. Eventually, he did not manage to stop smoking. In fact, he smoked 5 sticks of tobacco cigarettes

and around 100 puffs of e-cigarette daily before the admission. He used a pod e-cigarette device that can be charged with a cartridge which needed to fill the juice. He typically used e-juice which was fruity flavour like raspberry and contained 3% nicotine. He did not add any illicit substance. For his vaping behaviour, he practised direct to lung vaping which meant inhaling vapour of e-cigarette directly into lungs. The history of vaping was missed at first until authors explored when he was warded.

On initial presentation, his vital signs were stable with the blood pressure of 129/81 mmHg, pulse rate of 95 beats per minute, respiratory rate of 22 breaths per minute and oxygen saturation of 100% under room air. He was supplemented with oxygen through a high flow mask at the rate of 15 L/min. His body mass index (BMI) was 16.3 kg/m² with the weight of 50 kg and height of 175 cm. There was no marfanoid feature. The chest examination revealed a reduced breath sound over his right middle zone with no other abnormal findings.

His full blood count, renal and liver function tests results were within normal range. Connective tissue disease screening including antinuclear factor (1:80 titre with nucleolar pattern), complements (C3 of 109 mg/dL, C4 of 28 mg/dL) and rheumatoid factor (<9iu/mL) were normal. An anteroposterior view of chest X ray showed right-sided pneumothorax with the right apex to cupola distance of 38.7 mm and depressed right hemidiaphragm without mediastinal shift (Fig. 1). He was initially treated with needle aspiration at the emergency department. This was followed by Computerised Tomography (CT)

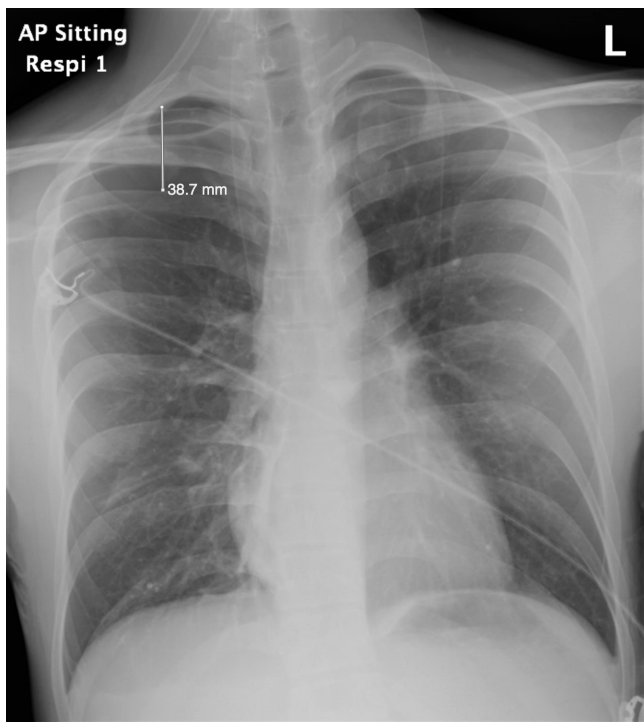


Figure 1: Chest X ray at initial presentation shows right sided apical pneumothorax with apex to cupola distance of 38.7 mm

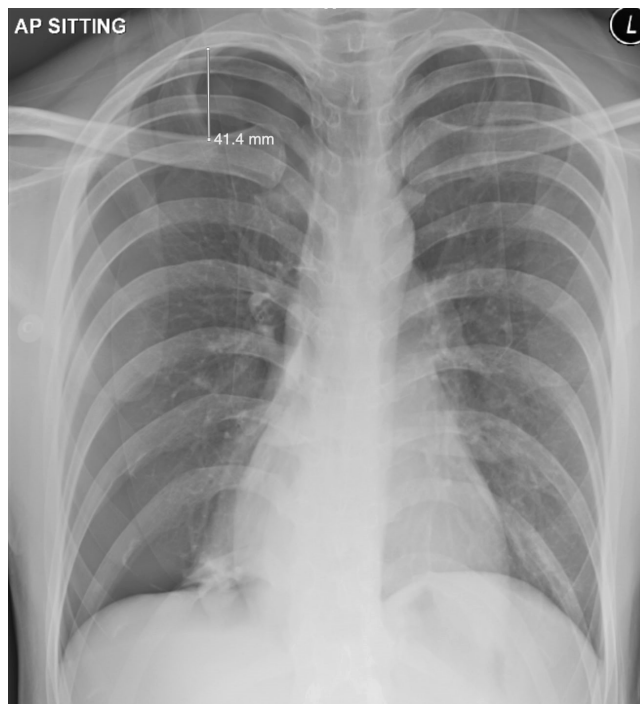


Figure 2: Chest X ray shows increased size of right pneumothorax even after needle aspiration

guided right pleural catheter insertion because there was an increase in size of pneumothorax one day after needle aspiration (Fig. 2). The CT of the thorax showed massive right pneumothorax with collapsed right middle and lower lobes. There was absence of tree-in-bud sign, subpleural blebs, cysts or bullae (Fig. 3). He was discharged after 5 days of admission in view of resolving symptoms and stable vital signs with minimal residual right pneumothorax with right apex to cupola distance of 3 mm. Subsequent chest X-ray on follow up visit after 8 weeks showed complete resolution of the pneumothorax. He also stopped smoking and vaping since discharge.

DISCUSSION

E-cigarette is a battery-powered device that heats up e-juice which is a mixture of propylene glycol, glycerine, nicotine and flavouring ingredients to aerolize for inhalation (2). This product has been widely used among Malaysians for many years and there is an increasing number of users among adults aged 18 years and above from 3.2% in 2016 (4) to 4.9% in 2019 (5). The highest prevalence was among those aged 20-24 years old (14.7%) (5). Seventy four percent of the current e-cigarette users used tobacco cigarettes and 27% of them used it daily (4). There are case reports showing the incidence of pneumothorax in vapers (1, 3). However, incidence of pneumothorax in patients with history of vaping and concomitant tobacco use have yet to be explored.

Primary spontaneous pneumothorax is a condition of

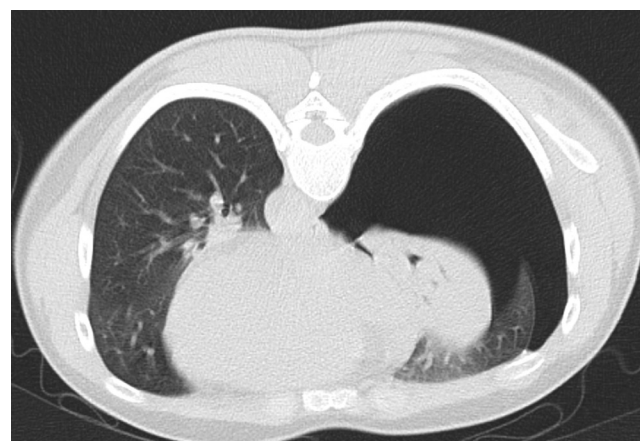


Figure 3: CT Thorax shows massive right pneumothorax with collapsed right lung lobes

gas collection within the pleural cavity without any apparent cause (1). It occurs in 18–28/100 000 per year for men and 1.2–6/100 000 per year for women (1). It could lead to a life-threatening condition if it becomes tension pneumothorax. The exact mechanism of pneumothorax by vaping remains unknown and could be a precipitating factor of pneumothorax for a dual user. Inflammatory response in the lung and impaired lung ciliogenesis could be caused by inhaled flavoured chemicals and its byproducts during the process of aerosolization (2, 3). It favours bleb formation because of increase in metalloproteinase-9 which induces tissue injury and inflammation after alteration of the innate immune system of the airways (3). Another possible mechanism on how vaping precipitates the risk of

pneumothorax is creation of large transmural pressure across the alveoli due to performing Muller manoeuvre during vaping (1, 3).

The importance of inquiring the history of vaping from patients must be highlighted among medical practitioners in Malaysia to avoid missing history of vaping during clerking as in this case. Thus, earlier intervention by advice on cessation of vaping apart from quit smoking could be delivered to prevent recurrence of spontaneous pneumothorax (3). Apart from this, awareness on potential harm of e-cigarette has to be inculcated among the citizens. Implementing a proper regulation on the sale of e-cigarette is also imperative to prevent adverse effects of e-cigarette as there are also reports of associated life-threatening conditions such as e-cigarette or vaping use-associated lung injury (EVALI).

CONCLUSION

Thorough history taking on smoking and vaping product use should be obtained in any patients presenting with unexplained pneumothorax, as it is an important measure to provide smoking

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