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Spontaneous Pneumomediastinum Secondary to Hookah Smoking

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Male, 22
Final Diagnosis: Spontaneous pneumomediastinum
Symptoms: Shortness of breath
Medication: —
Clinical Procedure: None
Specialty: Surgery

Objective: Rare disease

Background: Spontaneous pneumomediastinum (SPM) is an uncommon, self-limiting pathology defined as the presence of free air in the mediastinum without a traumatic cause. Factors that can lead to the development of SPM include alterations in breathing patterns such as bronchial asthma, marijuana smoking, cocaine inhalation, and barotrauma occurring with Valsalva's maneuver.

Case Report: This is a case of a previously healthy 22-year-old who presented to the Emergency Department complaining of sudden shortness of breath and chest pain after smoking a hookah for the first time. Clinical and radiological findings led to the diagnosis of pneumomediastinum, which was treated conservatively. The only apparent cause of the patient's condition was hookah smoking.

Conclusions: SPM should be considered in patients who develop chest pain and shortness of breath after smoking a hookah. To the best of our knowledge, no previous cases of spontaneous pneumomediastinum associated exclusively with hookah smoking in a previously healthy patient have been reported in the English literature.

MeSH Keywords: Pneumomediastinum, Diagnostic • Smoking • Tomography, X-Ray

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Background

Hookah smoking (HS), also known as waterpipe tobacco smoking, and which is most often synonymously also called "shisha smoking", is a smoking method that involves the passage of charcoal-heated air through a perforated aluminum foil wrapping and across tobacco to become smoke, where smoke is filtered through water that is generally cooled and better filtered compared to cigarette smoking. This smoke then passes through the water before inhalation by the smoker through a hose [1]. However, not to be confused, strictly speaking, the term "hookah" refers to the pipe itself, whereas "shisha" is the name of the generally "fruit-flavored" substance smoked in a hookah.

Despite its centuries-old existence, HS remains a very popular activity among men and youth, particularly in the Middle East, Mediterranean, and some Asian countries [2]. In fact, it represents a global tobacco abuse epidemic, second only to tobacco smoking [3]. Most hookah smokers (58.3%) believe that hookah smoking is less harmful than cigarette smoking [4]. There are no WHO waterpipe-specific health warning labeling and health warning on HS and products [5]. However, there are reports that HS is associated with a multitude of short- and long-term health effects that justify stricter regulation of HS, including acute cardiovascular effects (increases in heart rates from 4.1 to 16 bpm and blood pressure increase by 6.7 to 15.7 mmHg systolic and 2.0 to 14 mmHg diastolic pressure), and long-term cardiovascular effects, including ischemic heart disease and heart failure [6]. Smoking a hookah can also lead to addiction, apart from the toxic substances that it contains, which can cause cardiovascular disease and many other diseases, including cancer [7].

Spontaneous pneumomediastinum (SPM) is a rare, self-limiting pathology, clinically defined as presence of free air in the mediastinum [8,9]. A sequence of events leading to the development of SPM has been identified as the Macklin effect. Alveolar rupture leads to air leakage to the bronchovascular sheath, which ultimately results in free air reaching the mediastinum. Various precipitating factors that can result in the development of SPM mainly involve voluntary and involuntary alterations in breathing patterns, such as bronchial asthma, marijuana smoking, cocaine inhalation, and barotrauma occurring, for example, with Valsalva's maneuver [10,11]. In 2017, there was a report of an 18-year-old hookah smoker who presented with dysphagia, cough with purulent expectoration, dyspnea on exertion, chest pain, clear rhinorrhea, and sneezing, which eventually was determined to be due to spontaneous mediastinum pneumonitis [12]. However, to the best of our knowledge, there is still no concrete evidence that links hookah smoking as a risk factor of SPM, in contrast to cigarette smoking. We report a case of a young, previously healthy young man with SPM who presented to the Emergency Department after hookah smoking.

Case Report

A 22-year-old previously healthy Saudi male presented to the Emergency Department complaining of sudden shortness of breath, chest pain, and an episode of syncopal attack. The patient reported that he was smoking a hookah (for the first time) when he felt shortness of breath that increased with exertion and inspiration. This was associated with a continuous retrosternal non-exertional, non-radiating chest pain and palpitations that started at the same time as the shortness of breath. His symptoms notably increased in severity when lying supine. After 1–2 h of shortness of breath and chest pain, he started to feel dizzy and was sweating profusely. The patient lost consciousness afterwards and was taken to a local healthcare facility by his relatives and was eventually referred to our hospital.

There was no history of trauma, similar attacks, or previous medical/surgical problems. No significant family history of medical diseases was mentioned. The patient weighed 56 kg and was180 cm tall (BMI=17.3 kg/cm^2). On examination, the patient was hemodynamically stable. He was conscious, alert, and oriented to time, place, and person. Heart rate was 76 bpm with normal rhythms, temperature was 36.7°C, respiratory rate was 22, and his blood pressure was 112/67 mmHg. His oxygen saturation was 97% on room air. He was in respiratory distress and was using his accessory muscles with symmetric chest movement. No pallor, cyanosis, or dysmorphic features were noted. His trachea was central on palpation. There was normal tactile vocal fremitus, equal bilateral chest expansion, and equal chest resonance on percussion. On auscultation, there was good air entry bilaterally, with mild wheezing but no crackles. Precordial examination revealed a non-displaced apex beat, muffled first and second heart sounds, without murmurs or added sounds.

His laboratory workup was within the normal range (complete blood count, coagulation profile, cardiac enzymes and markers, arterial blood gas, serum electrolytes, and serum antibodies). The anterior-posterior (AP) view of the chest x-ray showed linear lucency projecting over the superior mediastinum tracking superiorly to the neck area and inferiorly along the left border of the heart. The continuous diaphragm sign was obvious (Figure 1). On CT scan, the coronal view (Figure 2) showed pneumomediastinum around the heart that extended to the neck area and interstitial emphysema, and the sagittal view (Figure 3) showed posterior extension of air noted around the aorta and the esophagus.

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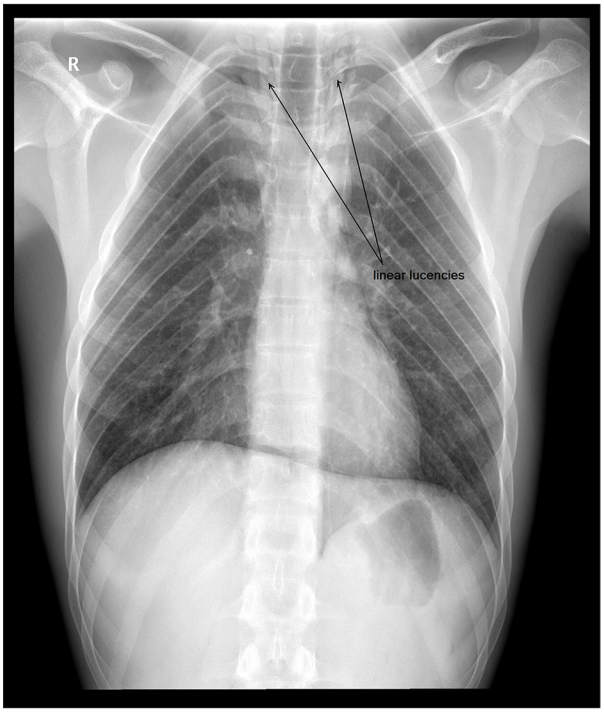

Figure 1. Anterior-posterior view of the chest x-ray showing linear lucency projecting over the superior mediastinum (see arrow).

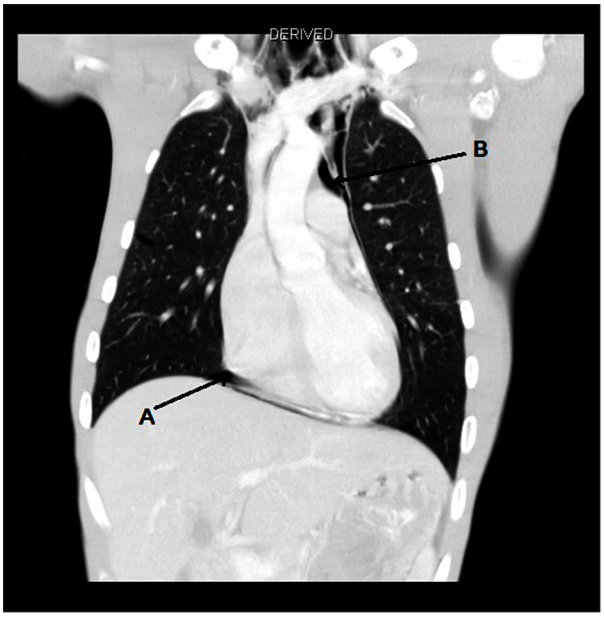

Figure 2. Coronal view on CT scan showing pneumomediastinum around the heart A) that extends to the neck area B).

The thoracic surgery team was consulted for further management, and a conservative approach involving weekly follow-up appointments in their clinic with serial chest x-rays was planned. Several days later, the patient presented to the clinic with less pain and shortness of breath. There was no increase in pneumomediastinum. Seventeen days later, his symptoms had completely resolved and chest films did not show any evidence of persistent pneumomediastinum. The patient was advised to abstain from hookah smoking and no further appointments were made.

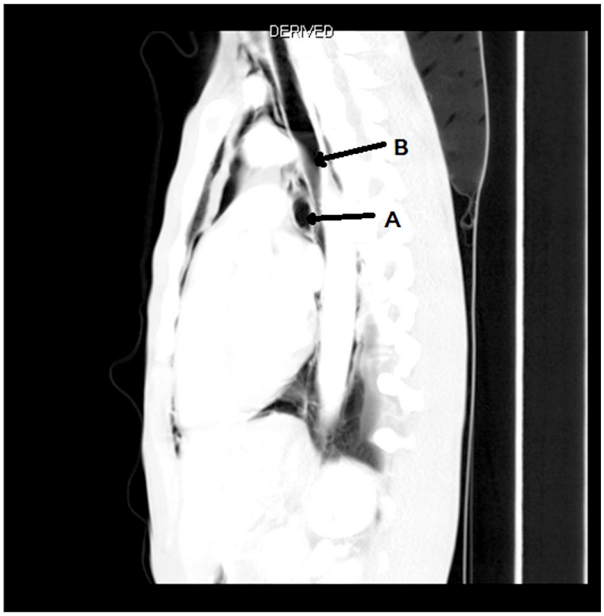

Figure 3. Sagittal view on CT scan showing posterior extension of air noted around the aorta A) and the esophagus B).

Discussion

SPM is defined as the presence of free air in the mediastinum without any traumatic cause. It is an infrequent condition occurring in 1 in 30 000 cases in the Emergency Department (ED) [1,2]. This entity is usually seen in young adults and is generally self-limiting [6,9]. The most common clinical features of SPM are chest pain, neck pain, shortness of breath, difficulty swallowing, weakness, and swelling of the face and neck [3]. Various precipitating factors can result in SPM, the most common of which is bronchial asthma, with alveolar rupture being the main etiology [3,4]. Other causes include barotrauma, Valsalva's maneuver, or inhalation of illicit drugs such as cocaine and marijuana [3–6].

Although hookah smoking is not mentioned in the literature as a direct cause of SPM, our patient only reported hookah smoking before his presentation to the Emergency Department. Cigarette smoking has been well reported in the literature as a risk factor for SPM. However, there is no evidence that hookah smoking is the cause of SPM, in contrast to cigarette smoking. A potential causative mechanism related to hookah smoking as a cause of SPM may be similar to cigarette smoking. However, in hookah smoking, the smoke is filtered through water, and

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it is generally cooled and better filtered compared to cigarette smoking, making it less likely to cause SPM. Hookah is especially dangerous because 40–100 times more tobacco is consumed in a typical session compared to cigarette smoking [2,13]. The danger inherent in hookah smoking is not due to the apparatus, but rather due to large amounts of tobacco and toxic substances consumed [7].

The present case appears to be the second documented case of SPM from hookah (shisha) smoking. In contrast to the other case [12], our patient's signs and symptoms appeared unexpectedly while he was smoking a hookah. The other case started dramatically with concomitant dysphagia, fever, expectoration, rhinorrhea, sneezing, asthma, and subcutaneous emphysema. Both cases presented with shortness of breath and chest pain. One factor that may have contributed to the development of SPM in our patient was his asthenic nature, although some authors did not find any relationship between SPM and the asthenic somatic type [14]. In our case, the clinical presentation and radiological investigations led to the diagnosis of SPM, which was treated conservatively with rest and analgesia. The patient was subsequently discharged without complications.

Conclusions

SPM is a rare pathology with several precipitating factors. Correlation of chest radiography findings with the clinical findings is imperative to reach the diagnosis. Patients should be followed up to identify the development of any further complications. When chest pain and shortness of breath develop after hookah smoking, the presence of pneumomediastinum should be considered.

Department and Institution where work was done

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Conflict of interest

None to declare.

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