CASE REPORT

Mephedrone inhalation causes pneumomediastinum

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Accepted 10 February 2014

SUMMARY

A 17-year-old male patient presented to A&E with swelling on the right side of his neck, extending to below the clavicle, associated with neck pain and dysphonia. On examination, subcutaneous supraclavicular and chest wall emphysema was noted. Clinical observations and bloods were normal. A chest X-ray and subsequent CT of the thorax showed evidence of pneumomediastinum and subcutaneous emphysema. The patient denied any history of trauma but admitted to inhalation of mephedrone 3 days previously. The patient was discussed with the regional cardiothoracic unit who advised conservative management. He was treated prophylactically with antibiotics and was initially kept nil by mouth, but diet was introduced 24 h later. He remained well, his dysphonia resolved and his subcutaneous emphysema improved. He was discharged after 3 days. He has not attended any formal follow-up but was well when contacted by phone.

BACKGROUND

Pneumomediastinum is a rare complication of recreational drug use. A pneumomediastinum is characterised by free air within the mediastinum. In the majority of cases, it is caused by an injury to the thorax. A spontaneous pneumomediastinum (SPM) often has no recognisable cause.¹ Mephedrone (4-methylmethcathinone, 4-MMC) is one of several synthetic cathinones structurally related to the naturally occurring phenylpropylamine alkaloid cathinone found in the khat plant. Mephedrone is a banned substance since April 2010, when it became classified as a class B drug, although it remains legal in many other countries worldwide.² In the UK, usage of this drug is increasing rapidly. Det Supt Rhianon Kirk, of Operation Tarian's regional intelligence unit, suggests that mephedrone use is more than twice as prevalent in Wales and other parts of the UK compared to 12 months ago;³ therefore, this complication is something we need to be able to recognise.

CASE PRESENTATION

A 17-year-old man presented to A&E with swelling on the right side of his neck, extending below the clavicle, associated with neck pain and dysphonia. He denied any other symptoms. He denied any history of chest trauma or vomiting. He had no significant medical history and was not on regular medication but did admit to one episode of mephedrone inhalation 3 days earlier. On examination, supraclavicular and chest wall surgical emphysema was noted. Examination was otherwise normal. Initial observations were unremarkable: respiratory rate 18 breaths per minute, SpO₂ 99% on air,

heart rate 99 bpm, blood pressure 132/67 mmHg. Bloods including a blood gas were normal. An ECG showed no abnormality. A chest X-ray (CXR) showed soft tissue emphysema and pneumomediastinum but no pneumothorax. These findings were confirmed on CT. He was treated conservatively.

INVESTIGATIONS

On admission, he had routine observations. An ECG showed no abnormality. He had blood test results and arterial blood gases. A chest X-ray on admission showed subcutaneous emphysema and pneumomediastinum but no pneumothorax (figure 1). A subsequent thoracic CT scan confirmed the findings of significant pneumomediastinum (figure 2) and surgical emphysema (figure 3) extending to the right chest wall and the neck. There was no evidence of lung pathology or of a pneumothorax. A repeat CXR taken 24 h later demonstrated partial resolution of the pneumomediastinum.

TREATMENT

The case was discussed with the regional cardiothoracic unit, and the patient was managed conservatively. He was initially kept nil by mouth, but diet was introduced 24 h later. He had prophylactic co-amoxiclav and metronidazole for 2 days. His symptoms improved significantly, and he was discharged on day 3.

OUTCOME AND FOLLOW-UP

Observations remained stable throughout his admission. He had significant resolution of the subcutaneous emphysema and was discharged home. He has not attended a formal follow-up but was well when contacted by phone.

Figure 1 Chest X-ray (CXR) 26 September 2012: there is a pneumomediastinum (arrowed). Lungs are clear. Normal heart size.

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To cite: Graham R, Bowen N, Singh J. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-203704

Figure 2 CT coronal 26 September 2012: the CT scan confirms the findings of pneumomediastinum (arrowed) involving more or less all compartments and surgical emphysema extending to the right chest wall and the neck, while the left chest wall is included only insignificantly. No evidence of lung pathology or of a pneumothorax.

DISCUSSION

Mephedrone (4-methylmethcathinone, 4-MMC) is one of several synthetic cathinones structurally related to the naturally occurring phenylpropylamine alkaloid cathinone found in the khat plant. Synthetic cathinones, including mephedrone, have been freely available and inexpensive for purchase as research chemicals or plant foods, especially via the internet.^{2 4} Mephedrone is a banned substance since April 2010, when it became classified as a class B drug. It remains legal in many other countries worldwide.² Mephedrone is referred to by many street names, including meow meow, drone, bubbles, plant food, M-cat and MMC hammer. It is usually available as a white powder or fine crystals and is snorted or orally ingested, but there are reports of intramuscular, intravenous and rectal administration.⁵ In the UK, this use of mephedrone is increasing rapidly. Its use in certain regions has doubled in the past 12 months.³

The most common clinical features reported to the UK National Poisons Information Service following mephedrone exposure were those typical for a sympathomimetic agent, including tachycardia, palpitations, agitation, anxiety, mydriasis, tremor, fever or sweating and hypertension. Some patients reported painful white or blue extremities suggesting peripheral vasoconstriction. Chest pain is a common symptom; in one case, this was associated with ECG changes suggesting acute myocardial infarction. Confusion and psychosis were also frequently reported. There were also occasional reports of acidosis

Figure 3 CT axial 26 September 2012: showing surgical emphysema extending to the right chest wall (arrowed).

and abnormal liver function tests. There is a single report of SPM associated with inhalation.^{2 5 6}

A pneumomediastinum is characterised by free air within the mediastinum. In most cases, it is caused by an injury of the thorax. SPM occurs without any recognisable cause. Acute onset of typical symptoms and the exclusion of other possible causes of pneumomediastinum with the help of CT are sufficient to make a diagnosis of SPM. SPM is a rare complication of asthma, especially in young men.^{1 7} Pneumomediastinum may result from coughing or retching^{8 9} and is also a rare complication of recreational drug use.¹ The commonest presenting symptoms of SPM are chest pain, dyspnoea and neck pain.⁷

Gunluoglu *et al* reviewed 23 cases of SPM in 2009. The most frequent symptoms were neck swelling and rhinolalia. A preceding factor was found in 19 (83%) patients; these included vigorous cough, forced physical activity, vigorous sneezing and enormous efforts during spontaneous vaginal delivery.⁷ Review of previously reported cases of pneumomediastinum following drug inhalation reveals that the likely mechanism is due to Valsalva manoeuvre during periods of extreme physical exertion, and not a direct pharmacological effect of the drug.⁸

Subcutaneous emphysema is a rare condition presenting with a smooth bulging of the skin. This can occur anywhere but is more common in the head and neck due to the proximity of the airway. This air will be reabsorbed over time, but careful observation of the airway is required initially.¹⁰ Owing to its rarity, there is no clear policy on the management of SPM; however, symptoms generally resolve with conservative management, meaning surgical intervention is rarely required.⁷

Learning points

- ▶ Pneumomediastinum is a rare complication of mephedrone inhalation.
- ▶ Mephedrone use is increasing rapidly; therefore, we are likely to see more such complications.
- ▶ Pneumomediastinum and subcutaneous emphysema are usually self-limiting but require careful airway observation.

Contributors RG was involved in writing up the case report using the required template and in the literature review. NB was involved in collecting the relevant information from the patient notes and radiology. JS was the consultant in charge of the case and was involved in editing the case report.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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