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A RARE CASE OF PNEUMOMEDIASTINUM, PNEUMORETROPERITONEUM AND SUBCUTANEOUS EMPHYSEMA DUE TO CRYSTAL METHAMPHETAMINE ABUSE

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ABSTRACT

Background: Crystal methamphetamine abuse is a growing concern due to its significant adverse effects on various organ systems.

Case description: This report presents a rare case of pneumomediastinum, pneumoretroperitoneum and subcutaneous emphysema resulting from crystal methamphetamine abuse. The exact mechanism linking methamphetamine abuse to pneumomediastinum remains ambiguous. Pneumomediastinum is uncommon with drug abuse, especially if it is smoked and the subject coughs against a closed glottis; however, it is rare to cause such severe presentation.

Conclusions: This report discusses the toxic effects of crystal methamphetamine on the respiratory system. It emphasises the importance of increased awareness among clinicians regarding these complications to facilitate timely intervention and prevent life-threatening outcomes.

KEYWORDS

Crystal methamphetamine abuse, subcutaneous emphysema, pneumomediastinum, pneumoretroperitoneum

LEARNING POINTS

- Pneumomediastinum, pneumoretroperitoneum and subcutaneous emphysema is a rare complication of crystal methamphetamine (ice) abuse.
- There is a need to increase awareness among clinicians regarding the potential severe pulmonary complications associated with methamphetamine abuse.

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INTRODUCTION

Crystal methamphetamine, commonly known as crystal meth or ice, is a potent central nervous system stimulant and a highly addictive illicit drug. Its abuse has become a significant public health issue due to its devastating effects on physical and mental well-being[1].

Crystal methamphetamine abuse has been linked to severe adverse effects on various organ systems, including the cardiovascular and respiratory systems. The abuse of this drug is associated with multiple routes of administration such as inhalation, injection or ingestion, leading to varying degrees of toxicity[2].

We present an unusual and concerning case involving a rare combination of pneumomediastinum, pneumoretroperitoneum and subcutaneous emphysema attributed to crystal methamphetamine abuse.

CASE DESCRIPTION

An otherwise healthy 21-year-old male presented to the emergency department with his relatives. The patient was complaining of palpitations and difficulty in breathing. He mentioned that he had been with friends the previous night who were knowledgeable about drug substances. He also stated to the paramedics that he had smoked crystal methamphetamine (ice). Blood stains on his clothes had been noticed; however, the patient was unaware of why he had these spots of blood on his clothes and denied any pain, injury or laceration. He reported being completely well the previous day.

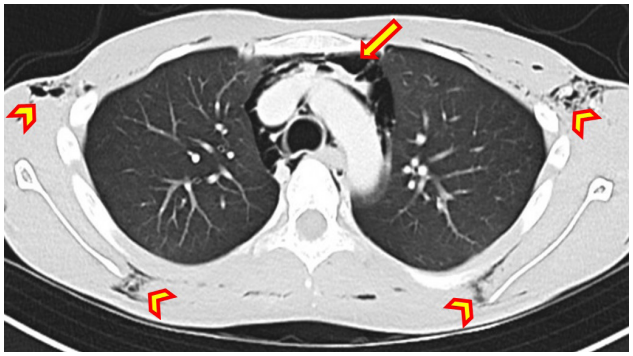


Figure 1. CT scan showing pneumomediastinum (arrow) and subcutaneous anterior and posterior chest wall surgical emphysema (arrowheads).

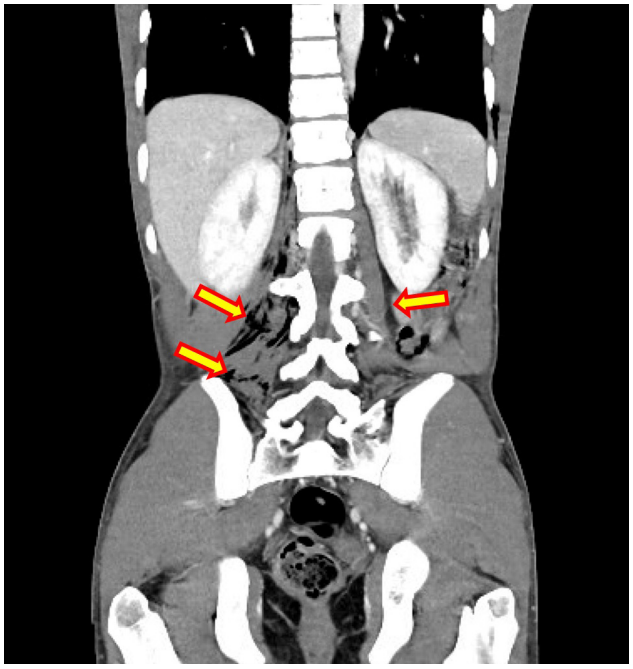


Figure 2. Pneumomediastinum down tracking into the retroperitoneal space down to the L5–S1 (arrow).

On examination the patient was agitated, hallucinating, anxious and angry. His pulse rate was 87 bpm, blood pressure was 109/75 mmHg, respiratory rate was 18/minute and oxygen saturation was 99% on room air. His Glasgow Coma Score was 15/15 and both pupils were equally dilated and reactive to light. His body mass index was 15.9 kg/m^2.

The chest examination revealed multiple superficial abrasions to the back of his trunk. Subcutaneous crepitation was felt around the root of the neck and the chest wall; chest air entry was bilaterally equal. The rest of the physical examination was unremarkable. Baseline blood tests, including blood gases and urine toxicology tests, were all normal. A trauma computerised tomography (CT) scan showed subcutaneous anterior and posterior chest wall surgical emphysema extending to the base of the retroperitoneal space at the L5-S1 level on the right side, along with pneumomediastinum (*Fig. 1 and 2*). No other findings such as fractures, bullae or pneumothorax were reported. The rest of the trauma CT scan was unremarkable. Oesophageal injury was ruled out with a diatrizoate swallow study, which was normal. The patient was admitted to the hospital and was kept under observation for conservative management. He showed gradual improvement and was discharged after 48 hours in good health. He was referred to a psychiatric clinic for further assessment of possible addiction problems and drug abuse.

DISCUSSION

Pneumomediastinum is uncommon with drug abuse, especially if it is smoked and the subject coughs against a closed glottis; however, it is rarely to cause such severe presentation. Crystal methamphetamine abuse poses serious health risks, encompassing a spectrum of pulmonary complications. The use of inhaled methamphetamine can directly damage the lung parenchyma, making the tissue more liable to complications[3,4]. The exact mechanism linking methamphetamine abuse to pneumomediastinum remains ambiguous. It is thought to result from a combination of increased intrathoracic pressure due to violent coughing or shotgunning (forcibly exhaling smoke into the mouth of other person) and pre-existing emphysematous blebs[2,3]. Another mechanism is the closure of the glottis right after a deep breath during drug inhalation, resulting in elevated positive pressure within the tracheobronchial system. This increased pressure potentially causes the rupture of alveoli or bullae. This releases air tracks under pressure into the mediastinum, then to the retroperitoneal and subcutaneous

spaces. This is a phenomenon commonly referred to as the Macklin effect[5].

Crystal methamphetamine users often experience a severe loss of appetite causing rapid weight loss and overlooking nutritional needs, which may have contributed to a lower-than-average BMI in the presented case[6]. On presentation to the emergency department, the patient had agitation, hallucinations, anxiety and palpitations, which can be related to drug abuse. Notably, he was found with blood stains on his clothes with abrasions on the trunk, which indicates minor trauma. We did not notice any signs of blunt trauma resulting in contusions or bone fractures that may explain the patient's condition; however, the patient denied any exposure to trauma. The patient's disclosure of crystal methamphetamine smoking points to the association between drug abuse and his clinical presentation, including surgical emphysema. Physical examination findings such as subcutaneous crepitus can be a crucial diagnostic clue, mandating further imaging studies. CT imaging plays a pivotal role in the diagnosis of this unusual clinical presentation. The identification of air in the mediastinum, retroperitoneum and subcutaneous tissues confirms the diagnosis and helps to rule out other potential causes such as pulmonary trauma or infection processes[7]. Management of pneumomediastinum and subcutaneous emphysema primarily involves supportive care. Oxygen therapy can help accelerate the reabsorption of extraluminal air. Pain management and careful monitoring for complications such as tension pneumothorax are essential[8]. In this case, the patient responded well to conservative treatment, with gradual improvement in subcutaneous emphysema. There was no evidence of further complications. It is crucial to consider the psychosocial aspects of care in patients with substance abuse. Referral to psychiatric and addiction services is necessary to address the underlying drug abuse and prevent recurrence. The patient's discharge plan included a follow-up with a psychiatric clinic, emphasising a holistic approach to care[9].

This case underscores the need for increased awareness among clinicians regarding the potential for severe pulmonary complications associated with methamphetamine abuse. Early recognition and intervention can prevent life-threatening outcomes. Additionally, public health initiatives should focus on prevention and education to reduce the incidence of methamphetamine use and its associated health risks.

CONCLUSION

This case underscores the urgent need for increased awareness and understanding of the rare complications associated with crystal methamphetamine abuse, particularly in the respiratory system. Clinicians and emergency care providers should be vigilant in recognising and managing these complications promptly to mitigate potential life-threatening consequences.

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