Case report

Abdominal complications from crack cocaine

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Not only is cocaine a powerfully addictive and dangerous drug of abuse, the use of the purified cocaine derivative crack has also reached epidemic proportions. Apart from causing fatal cardiorespiratory complications, crack cocaine is capable of producing surgical emergencies, which may or may not be associated with the pharmacology of cocaine itself. This is a report of crack-induced pneumoperitoneum, the mechanism of which seemed to be related to the prolonged Valsalva manoeuvre during crack smoking. Other differential diagnoses of crack related pneumoperitoneum are also discussed.

Key words: Crack cocaine – Valsalva manoeuvre – Pneumoperitoneum

A 42-year-old male presented to the accident and emergency department in an intoxicated state, after heavy binge of alcohol and recreational use of smoking crack cocaine. On admission, he was pyrexial (38°C), tachycardic (117 bpm), tachypnoeic (35 RR/min), hypoxic (PaO₂ 7.3) and with metabolic acidosis (pH 7.28) on arterial blood sampling. Physical examination revealed decreased levels of consciousness (GCS 8/15), obvious acute respiratory distress and tenderness in the left iliac fossa. There was extensive subcutaneous emphysema in the face, neck, chest, and abdomen down to both ankles.

Erect chest radiograph did not demonstrate significant pulmonary disease or pneumomediastinum, but showed free gas under the right hemi-diaphragm (Fig. 1). The patient's clinical status deteriorated with worsening metabolic acidosis and a laparotomy was undertaken to exclude a diagnosis of perforated viscus. Even after a rectal examination under anaesthesia and sigmoidoscopy, no cause of the pneumoperitoneum was found.

The patient was cared for in the intensive care unit postoperatively, requiring pulmonary support in the form

of intubation and ventilation. Emergency CT of the chest and abdomen showed extensive subcutaneous emphysema within the left thorax (Fig. 2A), with a small amount of free air in the anterior mediastinum (Fig. 2B). No pneumothorax was demonstrated, and the oesophagus was normal. There was right-sided basal consolidation consistent with aspiration pneumonia. This was successfully treated with antibiotic and chest physiotherapy.

The cause of pneumoperitoneum is assumed to be secondary to a prolonged Valsalva manoeuvre whilst smoking crack cocaine. He made a gradual and uncomplicated recovery.

Discussion

The development of spontaneous pneumomediastinum and pneumoperitoneum is a well-recognised complication of smoking crack cocaine.¹ Although it can be associated with surgical disease, pneumoperitoneum in these patients may be a manifestation of non-surgical intrathoracic disease. It is now believed that the

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Figure 1 Erect chest radiograph showing pneumoperitoneum with free gas under the right hemi-diaphragm.

pathogenesis is related to the deep vigorous inhalation, prolonged and repeated Valsalva manoeuvre while smoking crack cocaine in order to augment drug absorption. This causes an abrupt imbalance of pressures in the pulmonary alveolar-capillary complex, with a dramatic rise in the alveolar pressure as a result of the direct application of positive pleural pressure and a concomitant decrease in the pulmonary capillary pressure as the venous return to the right atrium is reduced.² This overdistends the alveoli causing them to rupture. The free air then dissects along the continuum of fascial planes that connect cervical soft tissues with the mediastinum and retroperitoneum permitting aberrant air arising in any one of these areas to spread elsewhere.³ If this air re-enters the peritoneum, pneumoperitoneum will result (Fig. 3). In these cases, perforation of intra-abdominal hollow viscus are absent and, therefore, there is no contamination.

There have been isolated case reports involving spontaneous pneumothorax, pneumomediastinum, and pneumoperitoneum as a result of crack abuse,^{4,5} and the subject has been reviewed previously.⁶ Our case is the first documentation of a significant pneumoperitoneum without the development of pneumothorax; the aetiology of this combination is somewhat mysterious. Clinicians should be aware of the symptoms and signs of the

complications of smoking crack cocaine, and other causes of pneumoperitoneum must be excluded before considering spontaneous pneumoperitoneum secondary to Valsalva manoeuvre. Subcutaneous emphysema might point to the latter, where it can conservatively managed, but with low threshold to proceed to laparoscopy or laparotomy.⁷

Other differential diagnoses of pneumoperitoneum related to cocaine or its derivatives are more serious. Ischaemic enterocolitis is a well-recognised entity occurring in cocaine users.^{8,9} Diagnosis is based on gastrointestinal haemorrhage and abdominal pain, with a history of cocaine use. Whilst evaluating endoscopic and histopathological findings in seven patients with cocaine colitis, Niazi *et al.*¹⁰ found that the lesions were mainly restricted to the left colon, with haemorrhagic oedematous mucosa, pseudopolyps, and ulcerations. The right colon can also be involved.¹¹ The mechanism by which cocaine causes severe gut ischaemia is related to the basic pharmacological properties. Cocaine induces catecholamine stimulation of α -receptors in the mesenteric vasculature causing intense vasoconstriction.^{12,13} Additionally, ischaemic enterocolitis may result from accidental rupture of bags of cocaine that are swallowed by drug traffickers, so-called body-packers or mules. Such individuals may also present

Figure 2 Emergency CT showing extensive subcutaneous emphysema principally within the left side of the thorax (A), with a trace of free air in the anterior mediastinum (B).

with life-threatening symptoms of intoxication, including seizures and cardiorespiratory collapse, as well as mechanical obstruction from the ingested drug packets.¹⁴ Although abdominal plain radiography, CT and ultrasonography represent valuable diagnostic modalities in the

assessment of body-packers, small packages can be missed, even by CT.¹⁵

Crack cocaine can also cause massive gastrointestinal haemorrhage or perforation of stomach or duodenum.¹⁶ Although the mechanism is not known, it could be related

Sequence of Events Leading to Pneumoperitoneum

Figure 3 Presumed mechanism for the development of pneumoperitoneum after prolonged and repeated Valsalva manoeuvre while smoking crack cocaine.

to the swallowing of significant amount of air during cocaine smoking, as well as the rapid increase in intra-abdominal pressure caused by breath-holding and coughing.¹⁷ On review of 50 patients, Feliciano *et al.*¹⁸ concluded that juxtapyloric perforations after the smoking of crack cocaine occur in a largely male population of drug addicts who are 8–10 years younger than the patient group that historically has perforations in the pyloroduodenal area, and that it is important to test for the presence of *Helicobacter pylori*.

Conclusions

As the recreational use and trafficking of cocaine becomes increasingly common, all health practitioners involved in emergency work should include this as a differential diagnosis in patients with abdominal symptoms. Cocaine use may induce pneumoperitoneum without visceral perforation, which has to be distinguished from other more serious gastrointestinal complications, including gastric ulcerations, retroperitoneal fibrosis, intestinal ischaemia, visceral infarction and perforation.

References

- Andreone P, L'Heureux P, Strate RG. An unusual cause of massive non-surgical pneumoperitoneum: case report. *J Trauma* 1989; **29**: 1286–8.
- Panacek EA, Singer AJ, Sherman BW, Prescott A, Rutherford WF. Spontaneous pneumomediastinum: clinical and natural history. *Ann Emerg Med* 1992; **21**: 1222–7.
- Maunder RJ, Pierson DJ, Hudson LD. Subcutaneous and mediastinal emphysema. Pathophysiology, diagnosis, and management. *Arch Intern Med* 1984; **144**: 1447–53.
- Brody SL, Anderson Jr GV, Gutman JB. Pneumomediastinum as a complication of 'crack' smoking. *Am J Emerg Med* 1988; **6**: 241–3.
- Chan L, Pham H, Reece EA. Pneumothorax in pregnancy associated with cocaine use. *Am J Perinatol* 1997; **14**: 385–8.
- Uva JL. Spontaneous pneumothoraces, pneumomediastinum, and pneumoperitoneum: consequences of smoking crack cocaine. *Pediatr Emerg Care* 1997; **13**: 24–6.
- Arrillaga A, Sosa JL, Najjar R. Laparoscopic patching of crack cocaine-induced perforated ulcers. *Am Surg* 1996; **62**: 1007–9.
- Hon DC, Salloum LJ, Hardy 3rd HW, Barone JE. Crack-induced enteric ischemia. *N Engl J Med* 1990; **87**: 1001–2.
- Boutros HH, Pautler S, Chakrabarti S. Cocaine-induced ischemic colitis with small-vessel thrombosis of colon and gallbladder. *J Clin Gastroenterol* 1997; **24**: 49–53.
- Niazi M, Kondru A, Levy J, Bloom AA. Spectrum of ischemic colitis in cocaine users. *Dig Dis Sci* 1997; **42**: 1537–41.
- Margovsky A, Grieve DA. Cocaine-induced isolated caecum necrosis. *Aust NZ J Surg* 2001; **71**: 321–2.
- Muniz AE, Evans T. Acute gastrointestinal manifestations associated with use of crack. *Am J Emerg Med* 2001; **19**: 61–3.
- Wattoo MA, Osundeko O. Cocaine-induced intestinal ischemia. *West J Med* 1999; **170**: 47–9.
- Olmedo R, Nelson L, Chu J, Hoffman RS. Is surgical decontamination definitive treatment of 'body-packers'? *Am J Emerg Med* 2001; **19**: 593–6.
- Eng JG, Aks SE, Waldron R, Marcus C, Issleib S. False-negative abdominal CT scan in a cocaine body stuffer. *Am J Emerg Med* 1999; **17**: 702–4.
- Kodali VP, Gordon SC. Gastrointestinal hemorrhage secondary to crack cocaine. *Gastrointest Endosc* 1995; **41**: 604–5.
- Kram HB, Hardin E, Clark SR, Shoemaker WC. Perforated ulcers related to smoking 'crack' cocaine. *Am Surg* 1992; **58**: 293–4.
- Feliciano DV, Ojukwu JC, Rozycki GS, Ballard RB, Ingram WL, Salomone J *et al.* The epidemic of cocaine-related juxtapyloric perforations: with a comment on the importance of testing for *Helicobacter pylori*. *Ann Surg* 1999; **229**: 801–6.