Case report

JHSMR Journal of Health Science and Medical Research

Concurrent Emphysematous Gastritis and Small Bowel Ischemia Induced by Methamphetamine Abuse

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Received 26 June 2024 ● Revised 30 June 2024 ● Accepted 9 July 2024 ● Published online 15 January 2025

Abstract:

Methamphetamine abuse poses significant health risks, including cardiovascular and cerebrovascular events. Herein is presented a young woman with chronic amphetamine abuse having developed severe abdominal pain and vomiting. Investigations revealed emphysematous gastritis and small bowel ischemia, leading to rapid deterioration and death despite aggressive intervention. This unique case underscores the need for early recognition and intervention to prevent the life-threatening consequences of methamphetamine abuse. The concurrent occurrence of emphysematous gastritis and small bowel ischemia has not been, to our knowledge, previously documented in methamphetamine users, highlighting the importance of clinician vigilance as abuse rates rise.

Keywords: amphetamine, drug abuse, emphysematous gastritis, small bowel ischemia

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J Health Sci Med Res 2025;43(4):e20251144
doi: 10.31584/jhsmr.20251144
www.jhsmr.org

Introduction

Methamphetamine stands as the most prevalent illicit psychostimulant worldwide. According to data from the 2021 National Survey on Drug Use and Health (NSDUH), over 16.8 million individuals aged 12 or above have experimented with methamphetamine at least once, with fatalities attributed to its intoxication exceeding 30 thousand[1]. The accessibility and affordability of these substances have significantly contributed to their widespread use. Methamphetamine exerts its influence by heightening sympathetic nervous activity and inducing vasoconstriction, resulting in cardiovascular manifestations, such as tachycardia and cardiac arrhythmia. Amphetamines and methamphetamine can also precipitate ischemic events in the central nervous system, cardiovascular system, renal system, and gastrointestinal organs through the mechanism of necrotizing vasculitis[2]. Another pathophysiological mechanism for methamphetamine-induced small bowel ischemia is non-occlusive mesenteric ischemia[3], which can lead to ischemia in various visceral organs, including the stomach and small or large intestine.

From our literature review, we encountered limited reports on mesenteric ischemia induced by methamphetamine. One case series documented 10 instances of partial visceral ischemia resulting from methamphetamine use [4]. Another case report detailed a case of isolated small bowel ischemia linked to methamphetamine abuse[2]. Furthermore, the Association of University Radiologists (AUR) presented a case of emphysematous gastritis diagnosed following methamphetamine abuse[5]. However, to the best of our knowledge, there have been no prior reports documenting the concurrent occurrence of emphysematous gastritis and small bowel ischemia induced by methamphetamine abuse.

Case report

A female patient in her third decade of life presented at the emergency department with a 14-hour history of severe abdominal pain and persistent vomiting. She reported normal bowel movements and flatus and denied any pre-existing medical conditions, comorbidities, or history of trauma prior to admission. Further history-taking revealed a 15-year history of chronic methamphetamine abuse, with no complaints of chronic abdominal pain. She had ingested four tablets of methamphetamine the day before the onset of symptoms. The patient's vital signs were recorded as follows: body temperature of 36.9 degrees Celsius; pulse rate of 98 beats per minute; respiratory rate of 22 breaths per minute; and blood pressure at 165/114 mmHg. The patient displayed signs of agitation, and upon physical examination of the abdomen marked distension and diffuse tenderness with guarding were revealed.

Laboratory analyses of the blood indicated a white blood cell count of 30,140 cells per microliter, with 92.9% neutrophils and no band forms. Hematocrit was measured at 43.1%, and her platelet count was 408,000 per microliter. The patient's creatinine levels were elevated, measuring 1.6 mg/dL in addition to her arterial lactate levels being notably high at 13.3 mmol/L, while C-reactive protein (CRP) levels reached 14.31 mg/L. A urine pregnancy test yielded negative results; however, her urine test was positive for methamphetamine. .

An acute abdomen series (Figure 1) revealed gastric distention extending to the lower abdomen, with no evidence of small bowel dilatation or pneumoperitoneum. The initial diagnosis indicated gastric outlet obstruction. The patient received initial treatment involving the insertion of a nasogastric tube, intravenous fluid resuscitation, and continuous monitoring of urine output through a urinary catheter.

Subsequently, a whole abdomen computed tomography (CT) scan was promptly conducted (Figure 2), revealing emphysematous gastritis with pneumatosis intestinalis and hepatic portal venous gas. According to multiple visceral ischemia, the patient was advised as to the natural history of the disease and elected to

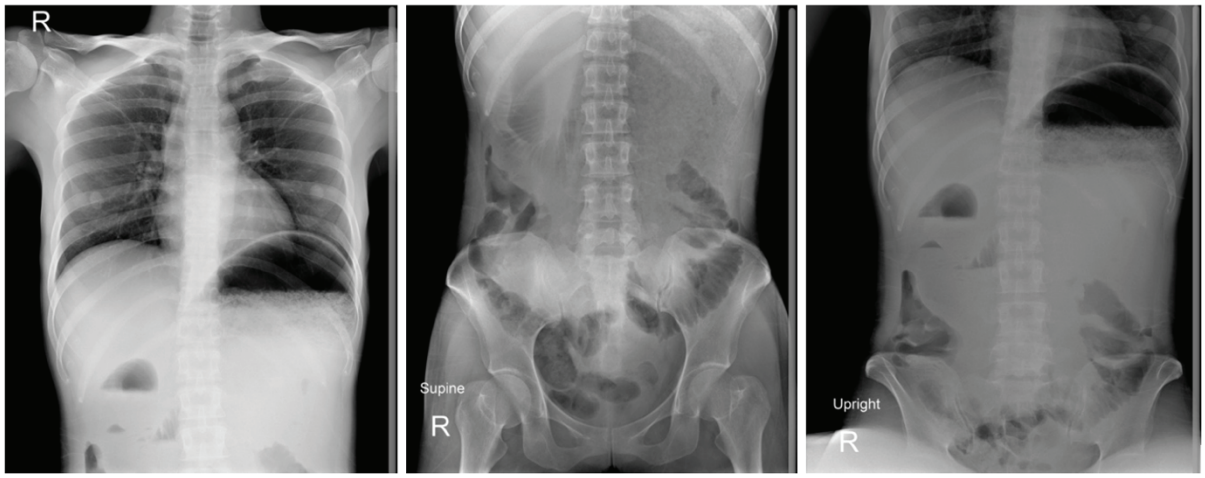

Figure 1 Acute abdomen series revealed gastric distention extending to the lower abdomen, with no evidence of small bowel dilatation or pneumoperitoneum (A) Chest x-ray (B) Supine (C) Upright

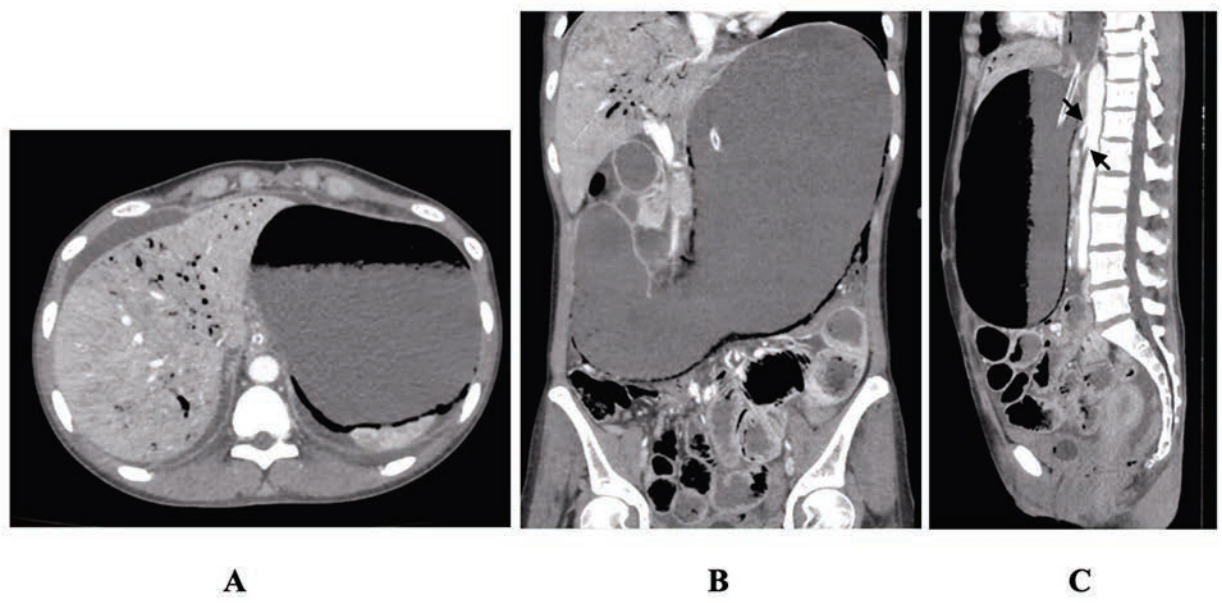

Figure 2 A whole abdomen computed tomography (CT) scan revealed a patent celiac trunk and superior mesenteric artery (black arrow), with diffused hepatic portal venous gas, gastric emphysema; and generalized pneumatosis intestinalis (A) Axial view (B) Coronal view (C) Sagittal view

receive comfort-focused therapy. She was immediately administered broad-spectrum antibiotics and aggressive intravenous fluid resuscitation. Regrettably, despite these interventions, the patient succumbed to the natural course of muti-visceral organ ischemia, resulting in her demise within four hours of admission to the hospital. Despite the medical team's recommendation, the patient's relatives declined to grant permission for an autopsy. This case underscores the grave implications of chronic methamphetamine abuse and the urgency of early diagnosis and intervention in patients with similar clinical profiles.

Discussion

Although there has been a growing trend in methamphetamine usage, previous data reveals that the mortality rate attributed to methamphetamine has remained relatively stable[6]. This observation is consistent with the limited number of reported cases documenting peripheral and central nervous system side effects, which have predominantly not resulted in fatalities.

With insight into how methamphetamine affects cerebrovascular and cardiovascular functions, it is suggested that gastrointestinal complications share a common pathway with mesenteric vasoconstriction induced by sympathetic activity, ultimately leading to intestinal ischemia[4,6,7]. We identified a review article dating back to 1989, which examined the toxicological mechanisms underlying acute abdominal disorders and elucidated the impact of methamphetamine, a vasoconstrictor drug, on ischemic processes leading to small bowel ischemia[8]. An additional mechanism by which methamphetamine may induce visceral ischemia without vascular occlusion was documented in a case report in 1970[9]. In this case, the authors detailed the visceral ischemia attributed to necrotizing angiitis, substantiating their findings through angiography and postmortem autopsy.

A case series encompassing ten patients unveiled instances of partial visceral ischemia attributed to non-occlusive mesenteric ischemia. Alarmingly, six out of the ten patients succumbed to their condition even when their viscera were only partially affected [4]. These findings underscore the considerable risk associated with these mechanisms, potentially leading to fatal outcomes in affected patients.

Our case report stands out from others due to the involvement of affected viscera, which is typically reported as partial visceral involvement in previous cases[3,4]. Our case describes a unique scenario involving the simultaneous occurrence of emphysematous gastritis and small intestinal ischemia, believed to be induced by methamphetamine through a non-occlusive mesenteric ischemia process. While a few reports have mentioned either complete small intestine and colonic ischemia[6], or isolated emphysematous gastritis resulting from methamphetamine use[5], to the best of our knowledge, concurrent manifestation of emphysematous gastritis and small intestinal ischemia induced by methamphetamine has not been previously documented.

While selected angiography is traditionally regarded as the gold standard for diagnosing mesenteric ischemia, our patient's diagnosis relied solely on a CT scan, which revealed evidence of visceral ischemia without apparent organic occlusion (Figure 2C). The exact causation of our patient's visceral ischemia, specifically related to methamphetamine abuse, could not be definitively confirmed. Unfortunately, the option of a post-mortem examination to establish the precise cause of death was not granted by the patient's relatives. This limitation potentially impacts our ability to pinpoint a definitive cause of death in this case. Nonetheless, it is important to note that our patient was a healthy young woman with no underlying comorbidities. Following a comprehensive review of the existing literature, primarily composed of case reports and case series, on the subject of methamphetamine intoxication, it is strongly

indicated that non-occlusive mesenteric ischemia may indeed be attributed to methamphetamine abuse, even at relatively low levels of consumption[10].

In the context of treatment decision-making for isolated emphysematous gastritis, the initial approach involves medical management, consisting of the administration of broad-spectrum antibiotics and aggressive intravenous fluid resuscitation[11-13]. However, in cases where compelling evidence of intestinal ischemia, especially ones associated with necrosis, is present, the primary course of action shifts towards surgical intervention, necessitating prompt consideration of this surgical treatment option. In our patient's specific case, a decision was made to pursue surgical treatment. Regrettably, the patient faced a heightened mortality risk due to the presence of multi-visceral infarction and the development of multiple organ failure. Consequently, our medical team provided compassionate counseling to the patient and their family, guiding them toward a palliative care approach that prioritized her comfort. Subsequently, the patient passed away without experiencing unnecessary pain or distress.

Conclusion

Even as we recognize our case as an extraordinary event of methamphetamine intoxication, it is important for clinicians to be mindful of this potential concern. This awareness becomes especially critical in the face of the increasing prevalence of methamphetamine abuse. Early recognition and prompt diagnosis could potentially be a lifesaving measure for patients.

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