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"SUCCESSFUL MANAGEMENT OF ACUTE METHEMOGLOBINEMIA DUE TO NITROBENZENE POISONING IN A TERTIARY CARE HOSPITAL: A CASE SERIES"

Emergency Medicine

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ABSTRACT

Introduction: Nitrobenzene poisoning, although an uncommon method of suicidal poisoning, can lead to life-threatening complications. The incidence is on the rise due to easy access to products containing nitrobenzene. Clinical presentation of acute methemoglobinemia can range from mild to severe symptoms and signs with rapid progression to grave outcomes. **Case Series:** 17-year-old male: Severe abdominal pain, vomiting, dizziness. The patient is managed with methylene blue, ascorbic acid, mechanical ventilation, Hemodialysis, antibiotics, and PRBC transfusion. **Outcome:** Extubated and discharged. 1. 22-year-old male: Vomiting, blurred vision after ingesting "Bloom flower" compound. We managed with methylene blue, ascorbic acid, and FAD. **Outcome:** Discharged against medical advice. 2. 33-year-old male: Unconsciousness, vomiting after ingesting "Flower Bloom Plus" (30% nitrobenzene). We managed with methylene blue, antibiotics, riboflavin, mechanical ventilation, and exchange transfusion. Outcome: Extubated and discharged. 3. 65-year-old patient: Loose stools, decreased sensorium after ingesting unknown insecticide. We managed with methylene blue, exchange transfusions, antibiotics, and mechanical ventilation. Outcome: Extubated and discharged. **Conclusion :** Timely identification, diagnosis, and treatment with the antidote methylene blue, exchange transfusion, along other supportive care have been proven to save lives.

KEYWORDS

INTRODUCTION

Nitrobenzene is a pale yellow oily liquid oxidizing nitrite compound with an odour of bitter almonds. It is used as an intermediate in the synthesis of solvents for paint remover, lubricant oils, and in petroleum refining. It is a potent oxidizer of the iron moiety in haemoglobin, causing acute methemoglobinemia leading to an inability to transport oxygen, resulting in various degrees of morbidity and mortality. Intoxication can be accidental or suicidal, or the side effect of some drugs, including metoclopramide. Accidental toxicity can occur in patients consuming well water with dangerously high levels of nitrites and nitrates.

Case Series

Case 1

- **Patient Profile**: 17-year-old male
- **Exposure**: Unknown compound, ingested on January 8, 2022
- **Clinical Presentation**: Severe abdominal pain, 3 episodes of vomiting, dizziness

- **Physical Examination**:
- Conscious but drowsy
- Vital Signs: PR 130/min, BP 80/60 mmHg, SpO2 88% (on 15L O2)
- GCS: E3V2M3

- **Investigations**:
- ABG: SO2 96%, pH 7.3, pCO2 30, HCO3 21
- Chocolate brown color of blood
- WBC: 10,500
- Saturation gap: Positive

- **Management**: Methylene blue, ascorbic acid, mechanical ventilation, Hemodialysis, antibiotics, 3 units PRBC transfusion
- **Outcome**: Extubated and discharged

Case 2

- **Patient Profile**: 22-year-old male
- **Exposure**: "Boom flower" compound, approximately 150ml, on January 11, 2021
- **Clinical Presentation**: One episode of vomiting, blurred vision

- **Physical Examination**:
- Conscious and coherent
- Vital Signs: PR 98/min, BP 140/80 mmHg, SpO2 96% (on room air)
- GCS: E4V5M6

- **Investigations**:
- ABG: SO2 96%
- WBC: 15,800

- **Management**: Methylene blue (50mg), ascorbic acid, FAD
- **Outcome**: Discharged against medical advice (DAMA)

Case 3

- **Patient Profile**: 33-year-old male
- **Exposure**: "Flower boom plus" (30% nitrobenzene), on July 1, 2018
- **Clinical Presentation**: 4 episodes of vomiting, unconsciousness

- **Physical Examination**:
- Unconscious
- Vital Signs: PR 128/min, BP 90/70 mmHg, SpO2 75% (on room air)
- GCS: E1V1M1

Investigations:
- ABG: SO2 80%, pH 7.2, pCO2 41, HCO3 25
- Chocolate brown colour of blood
- WBC: 17,300
- Saturation gap: Positive

- **Management**: Methylene blue for 7 days, antibiotics, ascorbic acid, riboflavin, mechanical ventilation, FAD, 2 cycles of exchange transfusion
- **Outcome**: Extubated and discharged

Case 4
- **Patient Profile**: 65-year-old, gender not specified
- **Exposure**: Unknown insecticide, on September 10, 2014
- **Clinical Presentation**: Multiple episodes of loose stools, decreased sensorium

- **Physical Examination**:
- Drowsy
- Vital Signs: PR 102/min, BP 110/60 mmHg, SpO2 76% (on room air)
- GCS: E2V2M5

- **Investigations**:
- ABG: SO2 99%
- WBC: 14,400
- Saturation gap: Positive

- **Management**: Methylene blue (150mg), 2 exchange transfusions, antibiotics, mechanical ventilation
- **Outcome**: Extubated and discharged

DISCUSSION

The case series presented here offers valuable insights into the clinical spectrum, diagnostic challenges, and management strategies for methemoglobinemia. This rare condition can have significant clinical implications and requires prompt recognition and treatment.

Demographic Considerations

The wide age range of patients in our series (17 to 65 years) underscores that methemoglobinemia can affect individuals across various life stages. This aligns with previous literature, which has reported cases in neonates, children, and adults [1]. The diverse age distribution emphasizes the need for healthcare providers across all specialties to be aware of this condition.

Etiological Factors

The toxic agents identified in our cases included both known methaemoglobin inducers (nitrobenzene, insecticide) and unknown compounds. This finding is consistent with the literature, which recognizes a broad array of potential causative agents, including pharmaceuticals, industrial chemicals, and environmental toxins [2]. The presence of cases with unknown etiology highlights the importance of considering methemoglobinemia in any patient presenting with unexplained cyanosis or low oxygen saturation, even in the absence of a clear exposure history [3].

Clinical Presentation

The symptomatology observed in this series of cases ranged from mild to severe, with common features including vomiting, altered sensorium, and respiratory distress. This variability in presentation is well-documented in the literature and correlates with the methaemoglobin levels in the blood [4]. The severity of symptoms can be influenced by factors such as the patient's age, comorbidities, and the concentration of the toxic agent [5].

Diagnostic Approach

Our cases reinforce the critical diagnostic features of methemoglobinemia, particularly the characteristic chocolate brown coloured blood and the presence of a saturation gap. These findings are consistent with established diagnostic criteria [6]. The arterial blood gas (ABG) analysis proved crucial in all cases, serving as a key diagnostic tool. This aligns with recommendations in the literature, which emphasize the importance of co-oximetry in confirming the diagnosis [7].

Treatment Strategies

Methylene blue emerged as the primary antidote in all our cases, which is in line with current treatment guidelines [8]. The efficacy of methylene blue in rapidly reducing methaemoglobin levels has been well-documented, with response typically observed within 30-60 minutes of administration [9]. In more severe cases, we employed additional strategies such as ascorbic acid administration, mechanical ventilation, and exchange transfusion. These adjunctive therapies are supported by various case reports and small studies, particularly in cases refractory to methylene blue or in patients with G6PD deficiency [10].

Patient Outcomes

The successful treatment and discharge of three out of four patients in our series is encouraging and consistent with the generally good prognosis of methemoglobinemia when promptly recognized and treated [11]. However, the case of the patient who left against medical advice underscores the importance of patient education regarding the potential severity of the condition and the need for complete treatment.

Limitations and Future Directions

While our case series provides valuable insights, it is limited by its small sample size and retrospective nature. Future research should focus on larger, prospective studies to better elucidate the epidemiology, risk factors, and long-term outcomes of methemoglobinemia. Additionally, investigations into novel treatment modalities and the optimization of existing protocols could further improve patient care [12].

CONCLUSION

This case series highlights the diverse presentations of methemoglobinemia and reinforces the importance of maintaining a high index of suspicion, especially in cases of unexplained cyanosis. Prompt recognition, accurate diagnosis, and appropriate treatment are crucial for favourable outcomes. As our understanding of this condition continues to evolve, ongoing education of healthcare providers and refinement of management strategies will be essential in optimizing patient care [13].

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