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METHYLENE BLUE FOR REFRACTORY SHOCK IN POLYTRAUMATIZED PATIENT: A CASE REPORT

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□ **Abstract—Background: Methylene blue (MB) has been advocated for the treatment of shock refractory to standard measures. MB is proposed to increase blood pressure in shock by interfering with guanylate cyclase and nitric oxide synthase (NOS) activity. Several studies have evaluated the vasoconstrictive and positive inotropic effects of MB in septic shock patients. However, there is a paucity of studies involving trauma patients. Case Report: A 4-year-old boy was hit by a truck while riding his bicycle and was treated with fluid resuscitation at the emergency department and then taken to the operating room for damage-control surgery. He had liver, diaphragm, rectal, and thoracic injuries. At the pediatric intensive care unit (PICU), he remained hypotensive despite volume, dopamine, epinephrine, and norepinephrine infusion. A dose of 0.5 mg/kg of i.v. MB was administered. During the next 2 h after MB administration, we were able to wean him off norepinephrine, and doses of epinephrine and dopamine were reduced. Ultimately, he was discharged from the PICU 13 days later in good condition. Why Should an Emergency Physician Be Aware of This?: Trauma patients who have experienced bleeding and survived the initial insult are still at risk of dying from continuing systemic hypoperfusion and the resultant multiple organ dysfunctions. Use of a low dose of MB as an adjuvant to treat shock might improve survival of these patients.** © 2018 Elsevier Inc. All rights reserved.

□ **Keywords—methylene blue; shock; trauma**

INTRODUCTION

Among children, trauma is one of the leading causes of morbidity and mortality. Even worse outcomes might be expected, in cases of severe traumatic injury, due to acute traumatic coagulopathy, which results from a combination of circulatory and direct tissue injury (1). The systemic inflammatory response that results from trauma and the release of cytokines and proinflammatory mediators can induce cardiac dysfunction and shock, and enriches tissue damage. Therefore, strategies to limit these processes might improve survival (2). It has been demonstrated that controlled bleeding in experimental animals leads to a progressive decrease in the blood pressure response to the action of vasoactive substances. It should be noted that this vascular hyporeactivity is not restored by retransfusion, but it can be reversed by the pharmacological inhibition of nitric oxide (NO) synthesis (3). Overproduction of NO has a significant role in potentiating hypoperfusion associated with hemorrhagic events (4). Methylene blue (MB) has been proposed for the treatment of shock refractory to standard measures. MB is recommended to increase blood pressure, cardiac contractility, and sensitivity to catecholamines in both the vasculature and myocardium in shock by interfering with guanylate cyclase and NO

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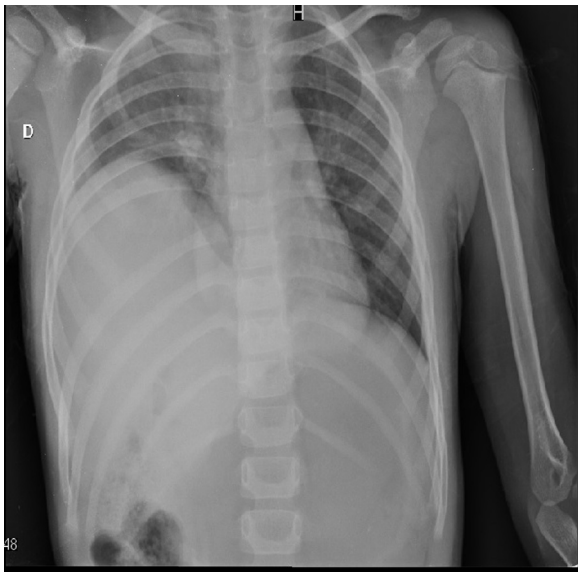

Figure 1. A simple chest radiograph showing a marked elevation of the right hemidiaphragm, suggesting a diaphragmatic hernia.

synthase (NOS) activity. Several studies have evaluated the vasoconstrictive and positive inotropic effects of MB in septic shock, anaphylactic shock, toxin-induced shock, shock from calcium channel blocker intoxication, and patients with vasoplegic syndrome (VS) after coronary artery bypass surgery (5–14). Also, MB may provide anti-inflammatory effects (15).

CASE REPORT

A 4-year-old boy, 20 kg, was hit by a truck and admitted to the emergency department with arterial blood pressure of 57/28 mm Hg, heart rate of 170 beats/min, diminished breath sounds over the right side, weak pulses, cold extremities, O_2 saturation 95% on 100% FiO_2, and Glasgow Coma Scale score of 13.

A chest radiograph showed a marked elevation of the right hemidiaphragm, suggesting a diaphragmatic hernia (Figure 1).

Initial laboratory studies demonstrated lactic acidosis (Figure 2) and abnormal coagulation tests (Figure 3). He was treated with fluid resuscitation (1150 mL of

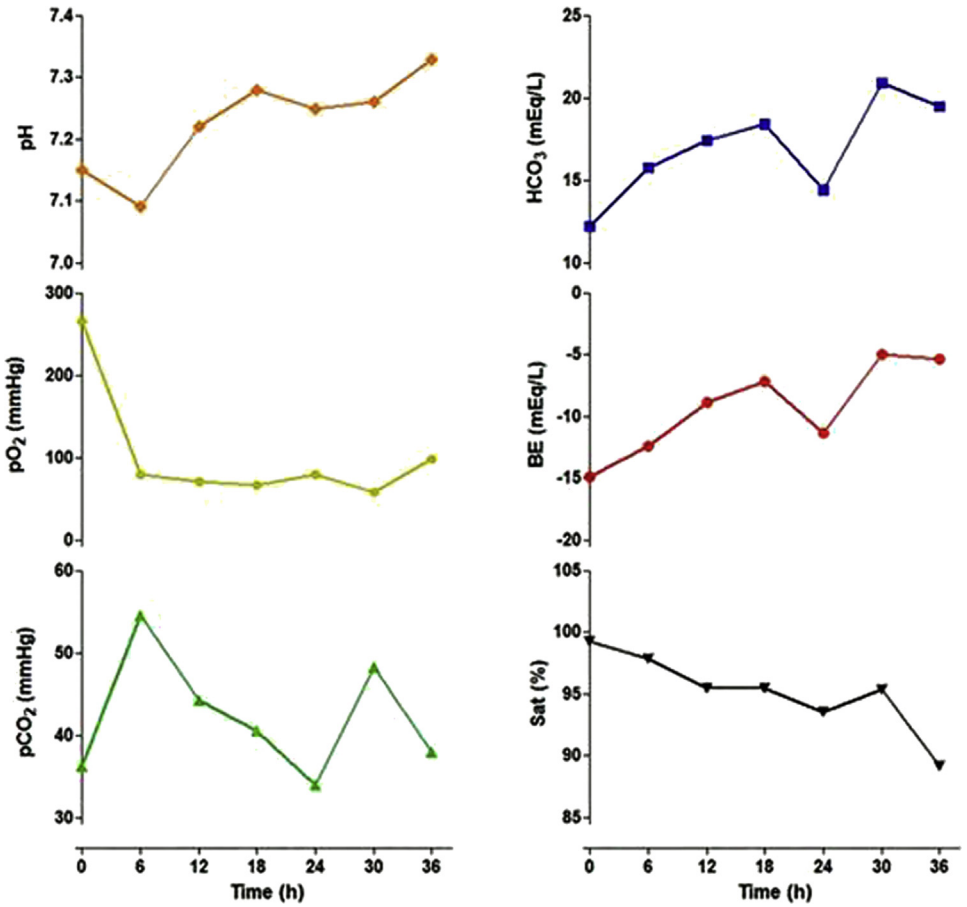

Figure 2. Acid–base balance evolution parameters.

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