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CASE REPORT

Resuscitation From Hemorrhagic Shock Using Rectally Administered Fluids in a Wilderness Environment

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We report the successful use in a wilderness environment of rectally administered oral rehydation fluid to resuscitate a patient who was in shock. The subject was a 21-year-old Nepali man who had experienced a major upper gastrointestinal hemorrhage.

Key words: proctoclysis, wilderness medicine, gastrointestinal hemorrhage, fluid resuscitation

History

A 21-year-old male Nepali cook's assistant had been vomiting blood intermittently for 3 days during a crossing of the Mera La in the Solu-Khumbu district, Nepal. His first episode of hematemesis occurred on the Mera La (5415 m), at which time a passing trekking group administered intravenous fluid (500 mL 4% succinylated gelatin in saline). We encountered him 2 days later at an altitude of 3600 m and observed marked hematemesis. His companions reported a similar episode of hematemesis that day and that he had passed ''black stool'' on several occasions during the previous 2 days. He had no medical history of gastrointestinal bleeding or peptic ulcer disease. Four days earlier he had taken 2 tablets of aspirin to treat a headache.

Examination

We found the man drowsy and in pain. His respiratory rate was 32 breaths/min, his carotid pulse was 127 beats/min, and he had profound peripheral vasoconstriction with nonpalpable radial pulses. He was not cyanosed and his chest was clear to auscultation. We had no means of measuring blood pressure.

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Clinical diagnosis

We diagnosed the patient as having hemorrhagic shock secondary to major upper gastrointestinal hemorrhage.

Management

We attempted to obtain informed consent via a translator, although this was hampered by the patient's obtunded conscious level. To permit rectal fluid administration, we constructed a makeshift device consisting of a size 14 French Foley urinary catheter and a sterile glove with 1 fingertip cut off. The open fingertip of the glove was secured to the end of the catheter with waterproof tape in order to act as a reservoir. The catheter was inserted approximately 10 cm into the rectum, the balloon was inflated, and the catheter was withdrawn until it came under gentle tension against the balloon lying in the rectum. We administered a solution of oral rehydration salts (Dioralyte, Aventis Pharma UK, West Malling, Kent, UK) via the Foley catheter. We used 1 L of double-strength solution followed by 2 L of standard-strength solution during a period of approximately 3 hours (see the Table for electrolyte concentrations of administered fluids). The solution consisted of previously boiled water that was approximately at body temperature. There was minimal external leakage of administered fluid. Fluid replacement was continued with an additional 2 L of standard-strength rehydration solution given orally during the next 12 hours. Analgesia was provided with intramuscular morphine (5 mg on 2 occasions). Oral raniti-

Concentrations (mmol·L^{-1}) of solutes dissolved in water in rectally administered oral rehydration fluid[1]

	Sodium	*Chloride*	*Potassium*	*Glucose*	*Citrate*
Rectal fluid (double strength)	120	120	40	180	20
Rectal and oral fluid (standard strength)	60	60	20	90	10

dine 150 mg and metoclopramide 10 mg twice daily were initiated.

Clinical progress

After we resuscitated the patient with rectal fluid, his clinical condition improved and he became alert and more comfortable. His carotid pulse rate decreased to 95 to 100 beats/min and his radial pulses became palpable. Four hours after we commenced resuscitation, he passed urine for the first time that day. Attempted helicopter evacuation the next morning was unsuccessful because of low cloud cover. Evacuation to Lukla via the Zatra La (4600 m) was achieved on foot during the next 2 days. During the evacuation, the patient had no further episodes of hematemesis. Oral fluids, ranitidine, metoclopramide, and intramuscular morphine were continued. He was clinically anemic. His consciousness level had returned to normal, but he became faint upon sitting upright.

The medical center at Lukla had 1 L of 0.9% saline, 500 mL of Haemaccel, and an infusion set; therefore, an intravenous infusion was started. Shortly afterwards we were called back to the patient because of ''bleeding.'' The village lama had instructed the patient's friends to pull the drip out of his arm, and as a result the patient had lost about 100 mL of blood from the cannula site.

The next morning the patient's clinical condition had deteriorated after another episode of hematemesis during the night. He again experienced shock with a reduced level of consciousness. He was laid out on the floor of an airplane, was flown to Katmandu Airport, and was then taken immediately to the hospital. Upon arrival, his hemoglobin was 2.2 g·dL^{-1}. He received 8 units of blood and intravenous fluids. Gastroscopy demonstrated diffuse hemorrhagic gastritis. Ranitidine was continued, and he left the hospital a few days later but was lost to follow-up.

Discussion

The rectal administration of 3000 mL of crystalloid solution produced a clinically significant improvement in this patient's condition. We believe it is unlikely that he would have survived without this intervention.

The emergency treatment of hemorrhagic shock in the hospital environment includes immediate intravenous access, rapid intravenous infusion of crystalloid or colloid resuscitation fluids and blood, and control of the source of bleeding. The aim of this management is to restore an effective circulating volume in order to maintain adequate tissue perfusion and correct hypotension. In remote settings, few or none of these therapies may be available.

Rectal administration of fluid (proctoclysis) has not been reported in the medical literature as a method of resuscitation in a wilderness environment. In a hospital setting, proctoclysis has received little attention since the advent of safe intravenous fluid resuscitation. Recently, the technique has been ''rediscovered'' in palliative medicine and shown to be safe, effective, and generally well tolerated.[2] In a study by Bruera et al,[2] proctoclysis with tap water or normal (0.9%) saline at rates of between 100 and 400 mL per hour was shown to be a safe, effective, and low-cost technique for the delivery of hydration for 2 weeks or more in terminally ill cancer patients. In the study, 78 patients received either tap water ($n = 76$) or 0.9% saline ($n = 2$) via a size 22 French nasogastric tube inserted 40 cm into the rectum. Four patients declined to continue treatment because of discomfort, and 9 had an ''enema effect,'' which is the occurrence of a bowel movement as a result of the infusion of fluids. In most patients, hydration was well maintained and there were no additional clinical complications. Significant volumes of fluid can be absorbed across the rectal and colonic mucosa. When used as a method of cleaning the colon for diagnostic studies, total gut perfusion with a balanced electrolyte solution resulted in absorption of up to 2400 mL water and 375 mEq of sodium during a 3-hour period.[3]

We did not carry intravenous fluids on this expedition. During pre-expedition planning, the decision had been made that the weight and volume of intravenous fluids was impractical considering the climbing objectives and size of the expedition. Our plan for situations requiring fluid therapy for hypovolaemia was to attempt resuscitation by rectal administration of oral rehydation salt solution. We carried a size 14 French Foley urinary catheter, sterile gloves, and oral rehydration salts in our medical kit. We also carried intravenous cannulae for drug administration.

Common sense and our own clinical experience sug-

gest that administration of intravenous fluids would have been more rapid and effective in this situation and that such fluids, along with the appropriate intravenous cannulae and administration sets, should be carried where possible. However, in situations where treatment with intravenous fluid therapy is not available, rectal administration of nonsterile crystalloid fluids can be effective for resuscitation from hypovolemic shock. When possible, the procedure should be explained to the ill individual and informed consent should be obtained. Every effort should be made to minimize the risk of infection and anaphylaxis (eg, filtration and boiling to ''sterilize'' the fluid). Administration of fluids at as close to body temperature as possible is prudent for the comfort of the patient and to avoid the risks of hypothermia. Therapy should be titrated in the usual manner to clinical signs (eg, heart rate, respiratory rate, conscious level, urine output). It is recommended that the doctor inserting the catheter into the rectal canal wear protective gloves. After initial resuscitation, the priority should be rapid, controlled evacuation to a dedicated medical facility with the highest possible level of medical supervision maintained at all times.

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