Acute Water Intoxication during Whole Gut Irrigation

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Time after irrigation, h

6 12 16

24

Dear Sir,

It is generally believed that water intoxication does not normally occur in a healthy adult after voluntary ingestion of water. If the mechanisms for excreting water are compromised by some event, the continued ingestion of abnormally large amounts of water could exceed the reduced excretory capacity, and water retention and intoxication would result [1].

Since its introduction by Hewitt in 1973, whole gut irrigation has been recognized as a rapid, safe and acceptable alternative that is highly effective in clearing the bowel for colon surgery, endoscopy and barium enema [2–4]. To our knowledge no case has yet been reported of a water intoxication after whole gut irrigation in a healthy young man. We encountered just such a case recently, and herewith is our report.

Table I. Serum electrolytes and condition of the patient

Serum K mEq/l

Patient's condition

Serum Na mEq/l

Hypertonic saline, 3% sodium chloride 1,000 ml and furosemide 40 mg were intravenously administered immediately. Thereafter, the patient's mental status started to improve. The change of serum electrolytes and mental condition of the patient are shown in table I. In 24 h the serum Na was 140 mEq/l and K 3.73 mEq/l, and his mental status had returned to normal without any neurologic deficit. In 48 h, liver function tests revealed the total bilirubin to be 1.5 mg%, SGOT 312 U and SGPT 188 U. In 2 weeks they returned to normal. During the remainder of his hospital stay, the serum Na concentration remained at 140 mEq/l and his general condition was good.

Case Report

A 33-year-old male patient with a 3-year history of multiple cecal diverticula was admitted for colon operation. Results of routine preoperative physical examination were normal except mild right lower quadrant tenderness.

Laboratory examination showed a hemoglobin of 15.4 g%, SGOT 23 U, SGPT 63 U, total protein 7.3 g% (albumin 4.6 g, globulin 2.7 g), BUN 20 mg%, creatinine 1.0 mg%. Serum electrolytes showed Na 141 mEq/l, K 4.1 mEq/l and Cl 102 mEq/l. The urinalysis was normal.

Whole gut irrigation was started, and warm normal saline was infused via a nasogastric tube. When 4,500 ml was completed, massive abdominal distention, vomiting, stuporous mental state and convulsion developed. At that time, laboratory examination showed a hemoglobin of 14.9%, Na 120 mEq/l, K 2.83 mEq/l and serum osmolality 254 mosm/l. Arterial blood gas analysis disclosed the pH at 7.52, pCO₂ 33 mm Hg, pO₂ 73 mm Hg, and HCO₃ 28 mEq/l respectively. Urine examination showed specific gravity 1.003, osmolality 194 mosm/l, Na 96 mEq/l, K 34 mEq/l and Cl 111 mEq/l.

Comments

Acute water intoxication typically occurs in a situation in which a large quantity of water is administered to a person whose ability to excrete the water load is impaired. But even with normal kidneys and a normal ADH level, water may be given faster than it can be excreted, thereby producing water intoxication [1, 5].

The principle of whole gut irrigation is that most of the saline is unabsorbed, and the increased volume load results in a faster transit through the gut rather than an increased absorption of the water load by the intestine [2]. The resultant increased intraluminal volume stimulates peristalsis throughout the bowel, thus clearing the colon and rectum of solid feces [1, 6]. The side effects observed

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are nausea, vomiting, abdominal distention, abdominal cramps, increased body weight and mild electrolyte imbalance [2–4]. Hitherto few reports were concerned about fluid absorption from the intestinal lumen into the circulation which might be an important complication [3].

In healthy adults, secretion of ADH is regulated predominantly by an osmoreceptor that is extremely sensitive to small changes in the plasma concentration of Na. This ‘Osmostat’ appears to be set so that below a certain minimum or threshold plasma osmolality of about 275–285 mosm/kg, plasma ADH decreases to levels that permit maximum urinary dilution [7]. Anything that alters this control mechanism predisposes the patients to water intoxication. On the other hand, excessive ADH secretion may occur as a result of fever, pain, nausea, anxiety, stressful situation or even being hospitalized [1, 8].

In this patient, factors promoting and inhibiting the secretion of ADH were both present. What net effect these opposing factors had on him was unknown, since the circulating level of ADH was not measured. Nonetheless, it seems likely that whatever the ADH level might have been, it did not determine the clinical picture of this patient. More likely, our case was simply one of massive water loading which overwhelmed the excretory capacity of his kidneys [9]. One of the possible defects in our case might be attributed to the partial obstruction of the intestinal lumen. The abnormal liver function test may reflect hepatic damage in acute water intoxication. As shown in the outcome of our case, all patients undergoing whole gut irrigation should be monitored closely on serum and urine electrolytes and osmolality and body weight change. The clinical indication for whole gut irrigation still needs to be carefully defined.

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