Sorbitol as a cryptic cause of diarrhea

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ABSTRACT: Sorbitol is a poorly absorbed monosaccharide widely used as a sweetener for dietetic foods and as a drug vehicle. Ingestion of sorbitol can lead to gastrointestinal complaints such as cramps and diarrhea. Two patients in whom unrecognized sorbitol ingestion produced symptoms which mimicked an exacerbation of another underlying disorder are presented. The diagnosis of sorbitol induced symptoms may be missed or delayed because patients do not appreciate that they are ingesting the compound in 'sugarless foods', and drug product information may not list its inclusion as a sweetener. **Can J Gastroenterol 1988;2(4):140-2**

Key Words: *Crohn's disease, Diarrhea, Exacerbation, Sorbitol, Tyrosinemia*

SORBITOL IS WIDELY USED AS A SWEETener for dietetic foods and as a drug vehicle. It is a monosaccharide which is poorly absorbed from the intestine and ingestion can induce an osmotic diarrhea. Gryboski (1) was the first to describe the occurrence of this diarrhea in children consuming dietetic candies. Later, Hyams (2) studied the effects of varying doses of sorbitol on healthy adult volunteers and demonstrated that the ingestion of even small amounts can lead to functional complaints such as cramps and bloating without diarrhea. Two cases in which cryptic sorbitol ingestion in hospitalized patients induced symptoms that mimicked exacerbation of their underlying medical conditions are presented.

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Received for publication May 30, 1988. Accepted July 15, 1988

CASE ONE

In March 1987, an 18-year-old female with an eight-year history of Crohn's disease was admitted to hospital with a four-day history of severe colicky lower abdominal pain, nausea and decreased consistency of ileostomy output. Ileal Crohn's disease had been diagnosed at laparotomy in 1979 and the subsequent clinical course had been one of chronic smoldering disease with acute exacerbations. In 1984, recurrent bouts of intestinal obstruction required resection of a 55 cm strictured segment of jejunum. In 1986, a colectomy and ileostomy were carried out because of severe symptoms due to granulomatous colitis, unresponsive to medical therapy. Following this the patient did well with minimal symptoms, although it was not possible to reduce the dose of prednisone below 10 mg per day. On admission to hospital the patient was afebrile with a non-distended abdomen, mild lower abdominal tenderness and a healthy matured ileostomy. Physical examination was otherwise unremarkable.

An exacerbation of Crohn's disease,

or partial bowel obstruction from Crohn's disease or adhesions were considered likely diagnoses. The patient was placed on nil by mouth and started on total parenteral nutrition. However, her ileostomy output increased with volumes ranging from 750 to 1500 mL of watery fluid per day and the colicky lower abdominal pain continued. A barium contrast study revealed multiple areas of involved small bowel. There was no evidence of significant obstruction. Endoscopic examination of the distal small bowel through the stoma was normal and biopsies showed only mild nonspecific inflammatory changes. Abdominal ultrasound was normal and culture of urine and stoma fluid revealed no pathogens.

Ileostomy fluid output remained elevated. Analysis of stoma effluent revealed an osmolarity of 282 mOsm/kg, sodium 59 mmol/L, potassium 6.6 mmol/L, chloride 27 mmol/L and an osmolar gap of 151 mOsm/kg. The patient was informed that the symptoms might be due to the ingestion of some agent which induced an osmotic diarrhea, but she denied ingestion of food, medication or laxatives. A room search failed to reveal any laxatives. Ileostomy fluid and urine screens for phenolphthalein and senna were negative. The following day the patient and her mother volunteered the additional information that she had for some time been chewing 14 to 28 sticks of Trident sugarless gum per day. Each stick contains 0.93 g of sorbitol, 0.40 g of xylitol and 0.04 g of mannitol; a total of 1.37 g per stick. Total daily intake of sorbitol alone ranged between 13 and 26 g representing ingestion of 72 to 145 mOsml of poorly absorbable solute per day.

The patient ceased chewing gum and over the next 24 h there was a cessation of abdominal cramps and a decrease in ileostomy output to less than 450 mL/day. A normal diet was resumed, parenteral nutrition stopped and ileostomy effluent remained appropriate in volume and consistency. There was no osmolar gap on repeat assessment.

CASE TWO

In June 1987 a six-month-old female infant with tyrosinemia was admitted to hospital with failure to thrive, vomiting, diarrhea and hepatosplenomegaly. There was biochemical and radiological evidence of rickets. The diagnosis of tyrosinemia was based on urinary and plasma amino acid chromatography. The patient was placed on nil by mouth and on total parenteral nutrition with parenteral calcium supplements because of the rickets. Vomiting and diarrhea resolved and the patient gained weight.

Following clinical and biochemical improvement, a low tyrosine diet and oral medications were commenced. Oral medications consisted of a calcium supplement (Calcium-Sandoz syrup; Anca Pharma, 23 mL qid) providing 506 mg elemental calcium per day, 1-25 dihydroxycholecalciferol (Rocaltrol; Roche, 125 μg bid), potassium phosphate 500 mg qid, pyridoxine 25 mg daily, vitamin K 2.5 mg daily, vitamin E 50 iu per day and N-acetylcysteine 20% 2 mL every 4 h.

The patient developed a recurrence of frequent watery stools, but was afebrile, not dehydrated and appeared to be improving clinically. Stool volume ranged from 285 to 420 mL/day. Stools were negative for reducing substances; stool virology and culture for bacteria failed to reveal the presence of pathogens. Metabolic control of the underlying tyrosinemia deteriorated with wide fluctuations in serum tyrosine levels. The milk-free formula fed to the infant contained a mixture of Isomil (Ross Laboratories), 3200-AB (Mead-Johnson) and 80056 (Mead-Johnson), balanced to provide essential amino acids at appropriate levels. Carbohydrate content was sucrose 7%. Feeds were discontinued and total parenteral nutrition recommenced, however, the loose, watery stools persisted.

Examination of prescribing information available for the oral medications made no mention of an osmotically active vehicle. When specific enquiries were made to the manufacturer it was learned that the sorbitol content of Calcium-Sandoz syrup was 0.354 g/5 mL. The daily dose of 92 mL contained 6.5 g of sorbitol representing an osmotic load of 36 mOsm per day. The medication was discontinued and replaced with calcium carbonate. Watery diarrhea ceased within 12 h and feeds were recommenced 24 h later without recurrence of diarrhea.

DISCUSSION

Sorbitol is a hexahydric alcohol with about half the sweetness of sucrose. Its systemic toxicity is very low (3,4) even by the parenteral route (5,6). Small intestinal absorption of sorbitol is minimal (7), the majority of the drug reaching the large bowel. Fermention by enteric bacteria further increases the osmolar load. Ingestion of as little as 5 g can be detected by excess breath hydrogen production (2). After an oral dose of 10 g, 71% of adult subjects note mild gastrointestinal distress with gas and bloating (8). After 20 g, 57% develop abdominal cramps and diarrhea (8).

The Canadian Society of Hospital Pharmacists estimates that 31.5% of oral liquid pharmaceuticals marketed in Canada contain sorbitol (9). In the two cases described the presence of sorbitol in the diet was not initially recognized and a number of investigative procedures were performed before the cause of the symptoms was established. In the first case the symptoms induced by sorbitol ingestion mimicked an exacerbation of Crohn's disease. The unintentional administration of sorbitol to the second patient in the form of a drug vehicle resulted in diar-

Le sorbitol, une cause cryptique de diarrhée

RESUME: Le sorbitol est une monosaccharine difficile à absorber qui est largement utilisée comme succédané du sucre et comme véhicule de médicament. L'ingestion du sorbitol peut entraîner des troubles gastrointestinaux telles les crampes et les diarrhées. Nous présentons deux patients chez qui l'ingestion non identifiée de sorbitol a produit des symptômes imitant l'exacerbation d'un autre désordre sous-jacent. Le diagnostic correct peut être manqué ou retardé parce que les patients ne réalisent pas qu'ils absorbent le composé dans les aliments 'sans sucre'. D'autre part, les renseignements fournis avec les médicaments n'incluent pas toujours le sorbitol comme succédané du sucre.

rhea and a deterioration in the dietary control of plasma tyrosine levels.

In summary, unrecognized sorbitol ingestion should be kept in mind as a potential cause of diarrhea when the etiology is not apparent (10,11). Sorbitol ingestion can produce symptoms which mimic the clinical features of other underlying disorders. The diagnosis of sorbitol induced symptoms may be missed or delayed because patients do not appreciate that they are ingesting the compound in sugarless foods and drug product information may not list its inclusion as a sweetener.

ACKNOWLEDGEMENTS: Dr A.G. Catto-Smith is the recipient of an Alberta Children's Hospital Fellowship. The authors thank Dr K. Hegde for allowing us to participate in the care of patient 2, and Lauren Tokarek for typing the manuscript.

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