

Urinary calcium excretion in short bowel syndrome patients receiving cyclic parenteral nutrition: Case report

Excreção urinária de cálcio em pacientes com síndrome do intestino curto recebendo nutrição parenteral total cíclica: Relato de caso

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ABSTRACT

Total parenteral nutrition is essential for the survival of short bowel syndrome patients. However, in the long term it is associated with complications such as metabolic bone disease. This complication has been attributed, among other causes, to an increased urinary calcium loss, which might be related to the amount of aminoacids, glucose and calcium present in the parenteral nutrition solution. Two case reports are here presented showing normal calciuria in short bowel syndrome adults, receiving parenteral nutrition for up to 5 years after extensive bowel resection.

CASE 1

PS, a 47 year-old male had been submitted to small bowel resection in 2008 due to mesenteric ischemia. The remaining bowel was shorter than 100 cm and the ileocecal valve was also removed. The patient developed short bowel syndrome with intestinal malabsorption and protein-energy malnutrition. The patient had a previous history of high blood pressure and panic syndrome. He has been receiving total parenteral nutrition every 2 weeks since then. The total parenteral nutrition was composed of 50% glucose solution, 10% aminoacid solution, 20% lipid solution, 20% sodium chloride, 19,1% potassium chloride, potassium phosphate 2mEq/ml, 10% calcium gluconate, 10% magnesium sulfate, vitamins: A, D3, E, K1, B1, B2, B3, B5, B6, Vitamin C, zinc, copper, chrome, manganese. The total caloric content of the parenteral nutrition was equivalent to

30 kcal/kg/day, distributed as 70% glucose and 30% lipid. The protein content was equivalent to 1,5 g/kg/day. The urinary calcium excretion while receiving total parenteral nutrition was 118 mg/24 hours.

CASE 2

JCA, a 49 year-old male had been diagnosed with Chron disease. In July 2009 presented to the emergency room and acute obstructive abdomen was diagnosed. He was submitted to intestinal resection and the remaining bowel was 60 cm of the jejunum. After the surgery the patient lost 24% of his habitual weight in 2 months. He has been receiving total parenteral nutrition every 2 weeks since then. The total parenteral nutrition was composed of 50% glucose solution, 10% aminoacid solution, 20% lipid solution, 20% sodium chloride, 19,1% potassium chloride,

potassium phosphate 2mEq/ml, 10% calcium gluconate, 10% magnesium sulfate, vitamins: A, D3, E, K1, B1, B2, B3, B5, B6, Vitamin C, zinc, copper, chrome, manganese. The total caloric content of the parenteral nutrition was equivalent to 30 kcal/kg/day, distributed as 70% glucose and 30% lipid. The protein content was equivalent to 1,5 g/kg/day. The urinary calcium excretion while receiving total parenteral nutrition was 103 mg/24 hours.

Table 1 shows the oral diet composition of both patients at the time of urine collection.

DISCUSSION

Short bowel syndrome is a very serious disease related to intestinal malabsorption (macronutrients, water electrolytes and vitamins) as a result of extensive small bowel resection. The total parenteral nutrition is essential for the survival of patients with less than 200 cm of remaining bowel^{1,2}. However, it is not free of complications. The metabolic bone disease described after prolonged parenteral nutrition might be possibly related to the increased urinary calcium excretion³.

Hypercalciuria is defined as urinary excretion of more than 250 mg of calcium per day in women or more than 275-300 mg of calcium per day in men while on a regular unrestricted diet. It can also be defined as the excretion of urinary calcium in excess of 4 mg/kg of body weight per day or as a urinary concentration of more than 200 mg of calcium per liter⁴. Although the causes of total parenteral nutrition related hypercalciuria have not been defined, the aminoacids, glucose and calcium content of the nutrition emulsion might be contributing factors⁵.

The calciuria of the patients here reported were within the reference range. A few hypothesis might explain the normal calciuria here described. In the presence of fat malabsorption the unabsorbed fatty acids compete with the oxalate for calcium, and bind to calcium. Consequently the intestinal oxalate is in the form of sodium oxalate which is more easily absorbed than calcium oxalate^{6,7}. As a consequence there is an increase in the amount of oxalate that is filtered by the glomerulus, which combines to calcium leading to renal stone formation and decreased urinary calcium excretion. The frequent use of antibiotics might also lead to intestinal microbiota alterations which in turn leads to decreased oxalate degradation and increased absorption⁵.

Another hypothesis is the increased fecal calcium excretion related to malabsorption which could explain the normal calciuria in these patients.

The normal calciuria in the patients here described is indicative that other causes of bone disease should be investigated in short bowel syndrome.

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Table 1- Oral diet and parenteral nutrition composition of both patients at the time of urine collection

	Nutrients	Home oral diet	Hospital oral diet	Hospital parenteral nutrition	Oral calcium Supplement (mg)	Calciuria (mg/24 hs)	Normal calciuria (mg/24 hs)
Case 1	Energy kcal/day	3200	3670	1740	1000	118	Até 300
	Carbohydrate (g)	380	466	250			
	Protein (g)	109	117	60			
	Lipid (g)	148	158	50			
	Calcium (mg)	960	857	233			
Case 2	Energy kcal/day	2420	1800	1428	1000	103	Até 300
	Carbohydrate (g)	336	181	228			
	Protein (g)	120	125	140			
	Lipid (g)	66	65	50			
	Calcium (mg)	1066	1453	233			