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Dumping syndrome with severe hypoglycemia after Nissen fundoplication in adults. Case report and literature review[☆]



Síndrome de Dumping con hipoglucemia grave tras funduplicatura de Nissen en el adulto. Caso clínico y revisión de la literatura

Gastroesophageal reflux disease (GERD) is the most common esophageal disease. GERD management using antisecretory, prokinetic, and cytoprotective drugs, in addition to hygienic and dietary measures, attempts to relieve the symptoms and to prevent complications (peptic stenosis, Barrett's esophagus, and adenocarcinoma). Surgery is sometimes required, and Nissen—or laparoscopic 360°—fundoplication has been the most widely used antireflux procedure since its introduction in 1991. This surgical procedure achieves satisfactory results in 86–96% of patients, providing functional results similar to the original laparotomy procedure described by Rudolph Nissen (1956). This procedure often has side effects due to anatomic and functional changes, including dysphagia, flatulence, distention, and impossibility to belch and vomit (gas bloat syndrome).

Villet et al. reported accelerated gastric emptying or dumping syndrome (DS) (1978) as a frequent complication of Nissen fundoplication, which occurred in up to 30% of children undergoing this procedure.¹ By contrast, few cases have been reported and well documented in adults.^{2–6}

We report the case of a 21-year-old female patient with a BMI of 27 kg/m² who complained of ascending heartburn for the previous eight years, severe daily acid regurgitation occurring mainly at night with episodes of cough and suffocation, epigastric pain, and mild functional dysphagia which did not improve despite treatment with esomeprazole (80 mg/day).

Work-up was completed with a barium meal test (showing no changes) and upper gastrointestinal endoscopy (which revealed mild peptic esophagitis and incompetence of the cardia). Intraluminal esophageal manometry showed a hypotensive lower esophageal sphincter (8.2 mmHg) with normal esophageal motility, and ambulatory 24-h esophageal pH manometry found a proportion of total time with pH less than 4 of 17.3%, with a DeMeester score of 75.1.

Based on a diagnosis of GERD refractory to medical treatment, the patient underwent laparoscopic surgery consisting of diaphragmatic crura closure and Nissen fundoplication over a 48 Fr. tube. The postoperative course was uneventful, and the patient was discharged on the second day after surgery on a soft diet.

Once at home, the patient started to experience episodes of sweating, dizziness, tremor, and diarrhea two to three hours after meals. Capillary blood glucose levels less than 50 mg/dL were found in several measurements. This delayed her return to work and affected her quality of life.

Abdominal ultrasonography and computed tomography performed due to the occurrence of severe postprandial hypoglycemia showed no pancreatic lesions. An oral glucose tolerance test showed a blood glucose level of 58 mg/dL at 90 min, preceded by a high insulin level (87 nIU/mL). ACTH, cortisol, free T4, and TSH levels were normal. A fasting test was negative, ruling out endogenous hyperinsulinism secondary to insulinoma, nesidioblastosis, or non-tumor induced pancreatogenous hyperinsulinism. A study of gastric emptying by administering a dose of 37 MBq of albumin macroaggregates labeled with Tc99m both as juice and omelette revealed accelerated fluid evacuation. The patient had a good course after the adoption of dietary measures (the avoidance of quickly absorbed sugars and the addition to the diet of complex carbohydrates distributed into five meals). She is currently asymptomatic after three years of follow-up.

DS was described by Hertz in 1913 as an untoward effect of gastroenteroanastomosis, but during the 20th century it was related to gastrectomy, gastrojejunostomy, and vagotomy; it may occur after any stomach surgery (fundoplication, gastrectomy,⁷ or bariatric surgery⁸).

DS is characterized by signs and symptoms divided into two chronological stages. The early/osmotic stage

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(30–60 min after intake), due to accelerated gastric emptying of hyperosmolar contents into the duodenum and jejunum, causes the release of intravascular fluid into the intestinal lumen. This results in vasomotor (sweating, asthenia, pallor, and weakness) and gastrointestinal (abdominal distention and diarrhea) symptoms. The release of serotonin, bradykinin, enteroglucagon, pancreatic polypeptide, peptide YY, neurotensin, and vasoactive intestinal peptide has been related to the production of these symptoms in this early stage.⁹ The late/hypoglycemic stage (90–240 min after intake), characterized by a hyperinsulinemic response to initial hyperglycemia, causes significant rebound hypoglycemia with signs and symptoms (tachycardia, sweating, and even syncope) which have an impact on the quality of life. The glucose-dependent insulinotropic peptide (GIP) and glucagon-like peptide 1 (GLP-1) contribute to the development of this phase.⁹ GLP-1 levels are directly related to the gastric emptying rate and inversely related to plasma glucose concentration. Thus, accelerated gastric emptying causes increased GLP-1 levels in the presence of nutrients, particularly fluids and simple carbohydrates, contributing to an exaggerated insulin response with corresponding hypoglycemia.¹⁰

The pathophysiology of DS is complex, involving hormonal factors related to the autonomic nervous system and gastric motility. After Nissen fundoplication, a decrease occurs in the storage capacity of the fundus and gastric distensibility,¹ which causes increased gastric motility with rapid emptying⁹ even in patients with delayed gastric emptying before surgery and in the presence of vagus nerve lesion.

In addition to an adequate clinical history, useful tests for the diagnosis of DS include: the oral glucose tolerance test, a fasting test, HbA1c levels, scintigraphy with labeled food, quantification of exhaled air and a respiratory test with ¹³C-octanoic acid.² Differential diagnosis of DS includes exogenous insulin administration, insulinoma, and noninsulinoma pancreatogenous hypoglycemia syndrome (NIPHS, characterized by neuroglycopenic symptoms and nesidioblastosis³). Tests helpful for differential diagnosis include the measurement of sulfonylurea, proinsulin, and C-peptide levels, pancreatic imaging tests, and selective arterial stimulation with calcium for insulin measurement.

DS management is based on dietary measures (a diet free from quickly absorbed sugars divided into several small meals). In more severe cases, beta-blockers, serotonergic antagonists, corticosteroids, calcium channel blockers, acarbose, somatostatin, and octreotide may be effective,⁹ and partial gastrectomy with Roux-en-Y gastrojejunostomy may also be performed.²

In view of the reported case, it would be advisable for adult patients who undergo a Nissen fundoplication to

temporarily take some simple dietary measures to prevent the occurrence of this complication.

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