Post-Bariatric Surgery Nesidioblastosis:

A Case Study

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Introduction

Obesity is an important lifestyle-associated disorder which has affected increasing number of people especially in the recent times. Multiple treatment modalities have been used to treat/manage obesity, such as preventive strategies, lifestyle modifications with dietary and behavior therapies, and pharmacotherapy. Of late, surgical intervention with bariatric surgery has been used routinely, to manage obesity and obtain drastic results, maintained over a long period of time. Despite its usefulness, multiple post-surgical side-effects have been found to develop after bariatric surgery, including hyperinsulinemic hypoglycemia.

An increase in the post-bariatric hyperinsulinemic hypoglycemia was first described by two different groups in 2005 (Service et al, 2005; Patti et al, 2005). The initial incidence of post-gastric by-pass hypoglycemia has been estimated at approximately 12% of cases (Evenson, 1942). This hyperinsulinemic hypoglycemia has been attributed to pathologic conditions such as Nesidioblastosis, insulinoma, and/or noninsulinoma pancreatogenous hypoglycemia syndrome (NIPHS) (Cui, Dariush & Andersen, 2011). This report describes the management of hyperinsulinemic hypoglycemia after bariatric surgery in a 42-year old woman who underwent gastric bypass surgery.

Case Report

A 42-year-old female reported with a previous body mass index (BMI) of 42, underwent gastric bypass surgery in 2016. Post-surgically, the patient experienced a rapid loss of weight and achieved a BMI score of 14.2 within a period of two months. However, the weight loss was accompanied by symptoms such as frequent loss of consciousness and episodes of seizures. These symptoms resulted in her being hospitalized multiple times. She exhibited high levels of carbohydrates, especially post alimentary consumption of food. Further evaluation revealed a fasting insulin level which was three times greater than the basal insulin levels, and a blood glucose level which was estimated at < 30 mg/dl. Other general examinations such as the hemogram appeared normal. Base don these findings, a preliminary diagnosis of insulinoma was made. To identify the tumor, a computed tomography (CT) scan, a nuclear magnetic resonance (NMR) scan with diffusion, and an octroescan were performed, all of which yielded negative results.

Arteriography with calcium stimulation is routinely used to detect insulinotropic response to intra-arterial injection of calcium, and localize the region of insulin hypersecretion. This test was performed on the patient and an increased secretion of insulin from the head and tail of the pancreas was observed.

The treatment of the patient began by the administration of octreotide, and Diazoxide. This pharmacotherapy was administered in conjunction with a low-carbohydrate diet. Upon further evaluation, this therapy did not yield the desired results, necessitating the use of surgical intervention. Subtotal pancreatectomy was performed to ensure the resolution of hypoglycemia (Figures 1 & 2).

References


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References


Despite the intervention, persistently high insulin level and hypoglycemia resulted in the consideration of total pancreatectomy. The blood insulin and glucose levels were normalized after total pancreatectomy (Figures 3 & 4) and the patient was discharged 6 days after the surgery.

Histopathological analysis of the tissue sample confirmed the diagnosis of Nesidioblastosis as the primary etiology of hyperinsulinemic hypoglycemia in the current case.

Discussion

The Roux-en-Y gastric bypass procedure diverts food directly from the gastric pouch to the small intestine. Therefore, the food is processed in a non-physiological way because the majority of the stomach, duodenum, and upper intestine are no longer involved. The hyperinsulinemic hypoglycemia after the RYGB may especially lead to hypoglycemia of the central nervous system, i.e., neuroglycopenia. An important etiology of this clinical feature is nedioblastoma (Chen et al., 2015). Nesidioblastosis is best described as the hyperfunctioning of pancreatic cells which produce insulin (Malik et al., 2016).
Multiple theories have been put forth to explain the mechanism of development of hyperinsulinemic hypoglycemia after RYG, such as increased glucagon-like peptide-1 (GLP-1), insulin-like growth factors, and Ghrelin (Goldfine et al, 2007; Rumilla et al, 2009; Nikolopoulos et al, 2010). These hormones, post gastric bypass, stimulate insulin secretion, increase the proliferation of islet cells, and increase the expression of GLUT2 and glucokinase on islet beta cells. GLP-1 is also said to induce the expression of pancreatic-duodenal homeobox-1 (PDX-1), that further promotes the growth of pancreatic islets (Cui et al, 2011).

The selective arterial calcium stimulation (SACST) is an effective method to localize occult lesions which produce excess insulin, such as Nesidioblastosis and/or insulinomas. The SACST differentially stimulates the release of insulin from pathologic pancreatic β-cells but not normal β-cells, with a measured sensitivity > 90%. This test can also differentiate between the lesions with great precision, thereby establishing its clinical relevance (Thompson et al, 2017).

The treatment of Nesidioblastosis begins with the establishment of a low-carbohydrate diet, followed by pharmacotherapy if needed. The drugs used in Nisedioblastosis are octreotide, beta-cell inhibitor diazoxide, alpha-glucosidase inhibitors (such as acarbose), or calcium-channel blockers. Octreotide is a somatostatin analog that inhibits the action of insulin. Diazoxide is said to inhibit the beta cells, thereby preventing the secretion of insulin. Failure of these modalities is the prime reason for the advocacy of surgical interventions. Despite partial/sub-total pancreatectomies, it is not uncommon for the patient to require complete removal of the pancreas to ensure complete resolution. However, total pancreatectomy is associated with the development of type 3 Diabetes Mellitus, along with risks of retinal and/or renal diseases (Cui et al, 2011).

It is thus imperative to thoroughly analyse the implications of surgical interventions during the treatment planning process. Newer methods such as laparoscopic conversion of RYGB to a sleeve gastrectomy and placement of adjustable gastric bands have said to reverse the hypoglycemic states, but are yet to be analysed using large-scale interventional studies.

Hyperinsulinemic hypoglycemia after gastric bypass, particularly with neuroglycopenia, though rare, requires immediate intervention which may vary from dietary restrictions, pharmacotherapies, respective procedures and/or reversal of the bariatric procedures.

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**Works Cited**


