Familial lipoprotein lipase deficiency (LPLD) is an autosomal recessive disorder characterized by severely elevated serum triglyceride (TG) levels with an associated risk of recurrent pancreatitis. The prevalence is approximately 1–2 in 1,000,000 [1]. LPLD usually presents in childhood with severe hypertriglyceridemia (HTG) and associated episodes of abdominal pain, recurrent pancreatitis, eruptive cutaneous xanthomata, and hepatosplenomegaly [1].

Metabolic surgery, defined as surgery resulting in anatomic and functional changes with the goal of treating metabolic disorders [2], has been proposed as an effective treatment for severe HTG. Gastric bypass, as a bariatric surgery, has been shown to be highly effective for reducing plasma lipid levels in patients with hyperlipidemia [3,4]. Therefore, gastric bypass should be a viable treatment option for recurrent pancreatitis secondary to LPLD-induced HTG.

To the best of the authors’ knowledge, this is the first report of a patient with LPLD undergoing laparoscopic mini-gastric bypass (LMGB) as a metabolic surgery for the treatment of intractable HTG-related pancreatitis.

Case report

A 28-year-old man with a history of HTG diagnosed at the age of 10 years and recurrent episodes of pancreatitis beginning at the age of 18 years presented to the authors’ clinic. His TG level was typically in excess of 500 mg/dL and at times exceeded 4,000 mg/dL. He did not smoke, rarely consumed alcohol, and had not taken drugs known to cause HTG or pancreatitis. A diagnosis of HTG-related pancreatitis was made. Further genetic testing revealed LPLD to be the cause of his HTG.

Despite strict diet control and medical treatment, the patient has had over 20 hospitalizations for acute pancreatitis since the age of 18 years. Apheresis from July 1, 2011 to July 5, 2011 reduced his TG level to approximately 600 mg/dL; however, within 3 weeks, his TG level rebounded to 3,884 mg/dL (Fig. 1). Eventually, he was referred to Min-Sheng Hospital for metabolic surgery.

Although the patient experienced no acute attacks during his diagnostic evaluation, a non-enhanced abdominal CT scan revealed pancreatitis (Fig. 2). A contrast-enhanced CT scan was not performed because of his history of anaphylactic shock requiring cardiopulmonary resuscitation after contrast injection. Physical examination revealed a protuberant abdomen without tenderness to palpation. His body mass index (calculated as weight in kilograms divided by height in meters squared) was 37.1 kg/m². Laboratory data were as follows: TG 3,884 mg/dL, total cholesterol 400 mg/dL, amylase 38 U/L, and lipase 167 U/L. Gastric bypass as a metabolic surgery for both obesity and HTG was suggested. Preoperative preparation, including psychological assessment, was performed.

The patient underwent LMGB as a metabolic surgery on August 1, 2011. LMGB, first reported by Rutledge, in 1997, is a modification of Mason’s loop gastric bypass with a long lesser curvature tube from the antrum to the angle of His (outer diameter 1–2 cm). A loop gastro-enterostomy was created with the small bowel about 200 cm distal to the ligament of Treitz in an antecolic fashion (Fig. 3) [5]. The patient was able to sip water on postoperative day 2 and recovered without incident. He was discharged from the hospital on postoperative day 7 in stable condition. Approximately 1 month after the surgery, follow-up laboratory data revealed that the TG level had decreased to 327 mg/dL (Fig. 1). The patient had
lost 17.8 kg in weight, and his BMI decreased from 37.1 to 31.7 kg/m².

At 2 years, the patient’s BMI had decreased to 27.4 kg/m² and his TG level was 214 mg/dL. The patient experienced no further episodes of pancreatitis following surgery, and he had lower BMI and TG levels through the time of writing.

Discussion

LPL is the central enzyme in the hydrolysis of TG-rich lipoproteins [6]. The LPL gene is mapped to chromosome 8p22 and comprises 10 exons. LPLD results in severe hyperchylomicronemia and HTG, which often leads to recurrent pancreatitis [7].

HTG is the third most common cause of acute pancreatitis after gallstones and alcohol [8]. It is either primary or secondary (e.g., medications, insulin resistance, and hypothyroidism). The exact mechanism of HTG-induced pancreatitis is not fully understood [8]. HTG-induced pancreatitis rarely occurs when TG levels are <500 mg/dL. Frequently, TG levels exceed 1,000 mg/dL in patients with HTG-induced pancreatitis.

While pharmacologic therapy is relatively ineffective in treating LPLD, restriction of dietary fat to ≤20 g/d is more effective for reducing TG levels and episodes of pancreatitis [7].
In 1978, apheresis was first used to treat severe diabetic HTG [9]. It can be used in acute pancreatitis or as prophylaxis for recurrent pancreatitis due to severe primary HTG unresponsive to drug and diet therapy [9]. However, the effect of apheresis is transient, and repeat procedures may be necessary.

The most recently developed treatment is gene therapy. Alipogene tiparvovec (Glybera®), UniQure, Amsterdam, The Netherlands) was the first adeno-associated virus-mediated gene therapy to be approved for the treatment of HTG due to LPLD. It has been shown to successfully lower serum TG levels for up to 12 weeks and to reduce the incidence of pancreatitis for up to 2 years [10]. However, high cost may limit its widespread use.

Metabolic surgery has been proposed for the treatment of recurrent pancreatitis secondary to HTG. Partial ileal bypass performed specifically for the reduction of plasma lipids first occurred in 1963 [11]. The surgery sacrifices only the distal 200 cm of the small intestine or one third of its length. It results in lower cholesterol and TG levels without significant weight loss compared with other bypass surgeries [11]. Bilipancreatic diversion surgery, first introduced in 1979, was also performed in some cases of LPLD [12,13]. This is a more malabsorptive surgery, and more nutritional supplements may be needed, such as trace element, than typically needed after gastric bypass [14].

By modifying the anatomy of the gastrointestinal tract and affecting hormone secretion (e.g., ghrelin), bariatric surgery, as a metabolic surgery, allows obese patients to lose weight and improve obesity-related co-morbidities, such as type 2 diabetes, hypertension, and hyperlipidemia/HTG [15]. In a previous study, the authors demonstrated that a simplified gastric bypass, LMGB, was a simpler and safer procedure compared with laparoscopic Roux-en-Y gastric bypass [5].

The authors’ patient’s HTG was related to a genetic defect rather than obesity. His TG level did not decrease to <500 mg/dL with conventional therapy, including apheresis. They performed LMGB to treat their patient’s HTG related to LPLD. The patient’s TG level decreased to <500 mg/dL within 3 weeks and to 200 mg/dL 2 years after surgery. Compared with diet control, medications, and apheresis, surgery may be a viable treatment option.

In conclusion, to the authors’ knowledge, this is the first report of simplified gastric bypass surgery used to treat a patient with intractable HTG with recurrent pancreatitis caused by LPLD. LMGB was chosen instead of gastric restriction alone (such as adjustable gastric banding) because of its effectiveness in malabsorption of TG from the intestines. Future studies may use bypass surgeries, such as LMGB or partial ileal bypass, in both obese and nonobese patients to treat HTG and consequent pancreatitis including elevated TG due to LPLD. Determining the type of bypass surgery that produces the best outcome requires further investigations. Further comparison of the lipid-lowering potency of gene therapy with that of surgery, is another area for future study. For nonobese patients with HTG without pancreatitis, we do not recommend bariatric surgery owing to the potential surgical risks.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article

References


