Journal of Diabetes and Clinical Practice

Wei et al., J Diabetes Clin Prac 2019, 2:1

Mini Review Open Access

Bariatric Surgery and its Clinical Applications in China: Single Center Experience

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Received date: November 27, 2018; **Accepted date:** December 17, 2018; **Published date:** December 24, 2018

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Abstract

Type 2 Diabetes Mellitus (T2DM) as a common chronic metabolism disease, its prevalence is creasing currently, especially in China. For its treatment, hypoglycemic drugs and insulin are commonly used besides of physical exercise and diet adjustment. Meanwhile, bariatric surgery is emerging as a promising option for severely T2DM specifically combined with obesity. To present our experience from a single center on diabetes surgery for selected patients mainly based on the guidance from Chinese experts. A short communication and literature review mainly based on the Chinese population was performed. In our center, all of the uncontrolled and intolerable T2DM patients after comprehensive no-surgical treatment are potential for bariatric surgery, especially Roux-en-Y Gastric Bypass surgery (RYGB). For T2DM patients with a medical history less than 15 years, pre-operative evaluation mainly included pancreatic beta-cell reserve function and C-peptide section. Also, operative metabolism monitor is necessary for efficacy determination. The choice of bariatric surgery in our center is mainly RYGB, and proper patient selection based on pre-operative evaluation is essential for confirmed treatment efficacy by a long-term post-operative monitoring.

Keywords: Bariatric surgery; Type 2 diabetes mellitus; RY bypass

Type 2 Diabetes Mellitus (T2DM) and Bariatric Surgery in China

Diabetes is a common chronic disease worldwide, and its prevalence in East Asia is creasing. It was reported by an epidemic meta-analysis that the prevalence of Type 2 Diabetes Mellitus (T2DM) in China was estimated to be 1.3% in 1980 to 1989, 4.5% in 1990 to 1999, 6.8% 2000 to 2009, 8.7% in 2010 to 2014, and increased as high as 12.5% in 2025 [1]. According to the latest epidemiological research results, T2DM accounts for more than 90% of the entire adult diabetes [2]. In terms of regional distribution, the prevalence rate in western China is about 4.6%, and in the eastern is about 8%. At the same time, its incidence rate is also a trend of aging and rapid growth [3], and also some researchers proposed a possibility of famine related high risk and modern-day epidemic [4], which is bound to seriously affect China in the future. The health level of the population also creates a huge social and economic burden.

At present, in addition to traditional medical and insulin treatment methods for surgical treatment of T2DM, surgery has gradually shown an increasingly positive effect in recent years. Studies have shown that certain specific surgical methods improve the related indicators of T2DM patients better than the internal medicine and insulin treatment, and sometimes even achieve the "cure" effect [5]. Among more and more developed surgical methods, Roux-en-Y Gastric Bypass surgery (RYGB) and Sleeve Gastrectomy (SG) are two of the most commonly used and relatively easy procedures. As one kind of methods to restrict gastric intake and intestinal absorption, they also presented more additional effects on metabolism which were reported to be helpful to reduce weight, the level of cholesterol and lipids, and the risk of cardiovascular accidents in patients earlier [6]. Currently, it is clear underlying mechanism is absent, and one of the most popular explanations was gut hormones and incretins [7].

Guidance and Guideline in China

In 2007, experts from Chinese Medical Association Surgery Branch published the first "*Guideline of surgery for obesity in China*" [8]. In 2011, experts published the first "*Guidance of surgery for type 2 diabetes mellitus in China*" [9]. Finally, in 2014, the Guideline of surgical treatment for obesity and type 2 diabetes mellitus in China were updated in Chinese Journal of Practical Surgery [10]. The inclusion and exclusion of potential patients in China have been recommended mainly based on the different characteristic of Asian patients from Western countries [11]. It was stated that all of the uncontrolled and intolerable T2DM patients after comprehensive no-surgical treatment is potential for bariatric surgery. For patients with BMI ≥ 32.5 kg/m^2, bariatric surgery was strongly recommended; for patients with BMI located between 27.5 and 32.5 kg/m^2, bariatric surgery should be recommended only when uncontrolled patients adopted lifestyle adjustment and medication therapy. After that, bariatric surgery needs to be rarely recommended for patients with a BMI lower than 27.5 kg/m^2. In detail, patients who is promising for satisfied clinical outcomes required the following baseline characteristics: (1) Aged from 16 to 65 years; (2) Duration of T2DM less than 15 years; (3) Pancreatic beta-cell reserve function is estimated to be above the normal lower limit of 1/2, and the level of secreted C peptide more than 1/2 of the normal low limit. Besides, the guidance explained that obese Chinese patients mainly presented as the type of abdominal obesity, which was associated with high risks of cardiovascular incidence and other co-morbidities. Both of a man with waistline >90 cm and a woman with waistline >80 cm should be recommended to consider bariatric surgery. After surgery, a lifetime

follow-up is also essential to ensure a satisfied treatment efficacy by establishing a new type of dietary style and energy intake balance.

Single Center Practice

Based on the characteristics in our patients, our first analysis through meta-analysis demonstrated that surgical procedures were more likely to achieve benefits compared with medical therapy, as it can significantly lower the levels of HbA1c, FBG, weight, triglycerides, high-density lipoprotein, and increased diabetes remission rate. The required dose of hypoglycemic, antihypertensive and lipid-lowering medicine was both lower in the bariatric surgery patients [12]. And then for 2 mostly adopted surgeries, we found that RYGB offers equal efficacy for T2DM controlling in obese patients, it is associated with lower risk of cardiovascular incidence than SG [13]. Considering that, abdominal obesity and its associated cardiovascular risk, our center mostly adopted Laparoscopic RYGB for our T2DM and obese patients. Besides, we investigated the distinctive influence of surgery (distal gastrectomy) on T2DM and non-T2DM patients. As known, the surgical procedure and the mechanism seems to be similar the RYGB and distal gastrectomy, however research of the influence of surgery on non-diabetes patients in impossible due to ethnic limits. We thus followed the metabolism data of gastric patients with or without T2DM, and found that immediate postoperative glucose changed significantly in both groups, and it would be all in stable conditions in about 28 days [14,15]. T2DM patients can achieve benefit also from gastric surgery, and we proposed that the impact of surgery on metabolism may involve not only decreased food intake and weight loss but also gastrointestinal reconstruction. Specifically, in our center, related researches and follow-up are underway in the process of surgery that the volume of residual stomach, and also the distance of the afferent loop were to be adjusted for individualized patients. For postoperative and all T2DM patients, nutrition therapy including diet strategy and energy intake on individualized management is important for the confirmed efficacy [16].

Conclusion

Overall, bariatric surgery can achieve confirmed efficacy and safety for selected T2DM patients alone or combined with medical therapy. The selection of potential patients is essential for promising treatment outcomes. However, clear underlying mechanism is still far away, and more basic studies are warranted.

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