



Review Article

Surgical Treatment of Obesity: An Asian Perspective

Wei-Jei Lee^{1,2*}

¹Department of Surgery, Min-Sheng General Hospital, Taoyuan, Taiwan

²Department of Surgery, National Taiwan University, Taipei, Taiwan

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Abstract

Today, bariatric surgery, as the only effective therapy for morbid obesity, is expanding exponentially to meet the global epidemic of obesity. There is increasing evidence that effective long-term weight loss is achieved after bariatric surgery. A substantial majority of patients with diabetes, hyperlipidemia, hypertension and obstructive sleep apnea have experienced complete resolution or improvement with significant survival benefits. Patients with a body mass index (BMI) >35.0 kg/m² and comorbidities, or Asian people with a BMI of 32.0 kg/m² and diabetes mellitus can be candidates for weight-reducing surgery. Currently, laparoscopic adjustable gastric banding (LAGB) and laparoscopic gastric bypass (LGB) are two commonly used procedures in weight-reducing surgery. LAGB, a purely restrictive method, is the safest procedure. LGB, a mixed type procedure, is more effective but technically more demanding and carries a higher risk. Laparoscopic sleeve gastrectomy is a new procedure for high-risk or lower BMI patients. Biliopancreatic diversion or duodenal switch, a malabsorption procedure, is used as a second-line operation. The survival benefits of bariatric surgeries rely heavily on their safety. Unlike other gastrointestinal operations performed by general surgeons, bariatric surgery requires a team approach in a center of excellence. The surgeon requires training in advanced laparoscopic techniques and also in the care of the bariatric patient. How safe laparoscopic bariatric surgery can be provided to meet the soaring demand from morbidly obese Asian patients will be an important issue in the near future. (*Tzu Chi Med J* 2007;19(4):200–206)

*Corresponding author. Department of Surgery, Min-Sheng General Hospital, 168, Chin-Kuo Road, Taoyuan, Taiwan.

E-mail address: wjlee_obessurg_tw@yahoo.com.tw

1. Introduction

Obesity is a pan-endemic health problem in both Western and Eastern countries. Obesity is associated with many chronic health problems (Table 1), substantially increased morbidity, and decreased quality of life and life expectancy (1). Among weight loss strategies,

medical management of morbid obesity is of limited success (2,3). Today, bariatric surgery, as the only effective therapy for morbid obesity, is expanding exponentially to meet the global epidemic of morbid obesity. After evolving over the past 50 years, bariatric surgery is currently a safe and the most effective weight-loss therapy for morbidly obese patients (4,5).

Table 1 — Health risks associated with obesity (WHO 1998) (1)*

Greatly increased (RR>3)	Moderately increased (RR 2–3)	Mildly increased (RR 1–2)
Type 2 diabetes Gallbladder diseases Dyslipidemia Metabolic syndrome Breathlessness Sleep apnea	Coronary heart disease Hypertension Osteoarthritis (knees and hips) Hyperuricemia and gout	Cancer (breast cancer in postmenopausal women, endometrial cancer, colon cancer) Reproductive hormone abnormalities Polycystic ovary syndrome Impaired fertility Low back pain Increased anesthesia risk Fetal defects associated with maternal obesity

*Relative risks are approximate. RR = relative risk.

In the past decade, the application of laparoscopic techniques and new bariatric treatment modalities have reduced perioperative morbidity and have contributed to a remarkable increase in interest in the surgical treatment of morbid obesity. Bariatric surgery has undergone a prosperous growth over the past decade in both Western and Eastern countries. This paper is a general review of the surgical treatment of obesity and its current status in Asia.

1.1. Why surgical treatment?

Because effective long-term weight loss has been achieved in morbidly obese patients only after they have undergone bariatric surgery, and because surgically-induced weight loss prolongs life in morbidly obese patients.

There is overwhelming evidence to support the fact that effective long-term weight loss has been achieved in morbidly obese patients only after undergoing bariatric surgery. The Swedish Obese Subjects (SOS) study recently reported their 10-year outcome of two groups of patients who had prospectively received surgery or conventional treatment for morbid obesity (2). Results were highly significant: weight loss was $23 \pm 4\%$ in the surgical group versus a $1.6 \pm 12\%$ increase in the conventional treatment group. Another recent randomized trial conducted by O'Brien et al compared surgery (laparoscopic adjustable gastric banding, LAGB) with an intensive medical treatment over 2 years in patients with a body mass index (BMI) between 30 and 35 kg/m². Results were also highly significant: 21.6% weight loss in the surgical group versus 5.5% in the medical group (3). The adjusted overall mortality rate in the SOS study was reduced in those in the surgical group by 31.6% ($p < 0.01$). The decrease in mortality was associated with a reduction in cardiovascular events (especially myocardial infarction) and cancer deaths (4). Another study by Christou et al reported a 5-year mortality rate of 0.7% in 1035 bariatric patients compared to a 6% mortality rate in 5746 matched control patients: a 79% reduction in

the 5-year mortality rate (5). Other studies reported at the 10th International Congress on Obesity showed a 40–73% reduction in mortality rate in surgically-treated groups compared to an established population-based cohort (4). The investigators concluded that bariatric surgery provided a significant survival advantage for this severely obese population. Two other meta-analyses also confirmed that surgery is more effective than nonsurgical treatment for weight loss, and the substantial majority of patients with diabetes, hyperlipidemia, hypertension, obstructive sleep apnea and metabolic syndrome experienced complete resolution or improvement (6,7).

1.2. Who can receive surgical treatment?

Patients who are morbidly obese, well informed and motivated, and who have acceptable operative risks; candidates with end-stage obesity syndrome and impaired health must be hospitalized preoperatively and undergo treatment to improve their operative risk.

Not all patients who present for weight loss surgery are acceptable candidates. The option of surgical treatment should be offered to patients who are morbidly obese, well informed and motivated, and who have acceptable operative risks. The patient should be able to participate in treatment and long-term follow-up. Current indications for obesity surgery are based on BMI. The BMI is an estimate of total body fat mass and is probably the most useful scale to define obesity. For the most part, surgeons have adopted the 1991 National Institutes of Health (NIH) consensus development guidelines, which included patients whose BMI exceeds 40 kg/m² or 35 kg/m² with associated comorbid conditions (8). However, Asian patients tend to have intra-abdominal fat accumulation and have similar incidence of obesity-related metabolic abnormalities at lower BMI levels compared to Caucasians (9). Therefore, the World Health Organization (WHO) consensus group used a BMI >30 to define obesity and the Asia-Pacific perspectives suggested a BMI >25 to

Table 2 — Consensus in Asia-Pacific regarding indication for obesity surgery (9)

1. Obese patients with BMI >37 kg/m²
2. Obese patients with BMI >32 kg/m² in the presence of diabetes or 2 other significant obesity-related comorbidities
3. Have been unable to lose or maintain weight loss by dietary or medical measures
4. Age of patient is >18 years* and <65 years

*In special circumstances and under consideration by a pediatrician, bariatric surgery may be performed in children younger than 18 years of age.

define obesity in Asian people (10). The Asia-Pacific Bariatric Surgery Consensus also modified the criteria for obese surgery down to a BMI of 32 with comorbidities (Table 2) (11). With the development of the lower operative risk procedure LAGB, many surgeons argue that LAGB should be available to patients with a BMI of 30 kg/m² (4). Age is no longer a contraindication for bariatric surgery. In the original NIH recommendation, the age limit was set at between 18 and 50 years. Due to the prevalence of obesity and overweight in children and adolescents, bariatric surgery is increasingly performed in adolescents (12–15). Also, older patients are now potential candidates because of the aging of the population and improvements in surgical results (16–18).

1.3. How to perform weight-reducing surgery?

LAGB is the safest; laparoscopic technique is effective but complicated; laparoscopic sleeve gastrectomy is a new and promising procedure.

Bariatric surgeries have been evolving over the past 50 years. There have been numerous surgical approaches to weight-loss surgery. Essentially, weight-loss operations can be considered to be either malabsorption or restrictive procedures. Malabsorption procedures include intestinal bypass, biliopancreatic diversion (BPD) and duodenal switch (DS). Restrictive procedures include vertical banded gastroplasty (VBG), LAGB and laparoscopic sleeve gastrectomy (LSG). Gastric bypass is regarded as a mixed procedure: a restrictive procedure with a small malabsorption component. Intestinal bypass and VBG have been abandoned. Gastric banding and bypass surgery are the most commonly performed procedures now. The application of laparoscopic techniques to bariatric surgery in the past decade has reduced perioperative morbidity and has contributed to a remarkable increase in interest in the surgical treatment of morbid obesity. This paper will focus on some common procedures performed for surgical weight loss.

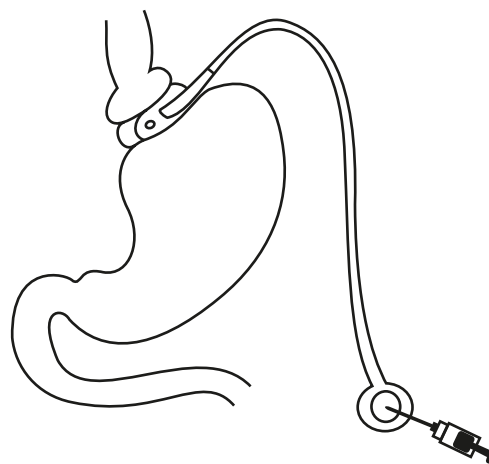


Fig. 1 — Laparoscopic adjustable gastric banding. An adjustable band is placed around the upper part of the stomach. The diameter can be adjusted by injecting or removing saline from the subcutaneous port.

2. Common procedures for surgical weight loss

2.1. LAGB

Clinical application started in 1993 and was approved by the Federal Drug Administration (FDA) in 2001. LAGB is the safest bariatric procedure and the most commonly performed procedure worldwide (5). LAGB is a purely restrictive procedure. A belt with an inflatable inner coat encircles the cardia to create a small pouch. The band can be adjusted through a catheter connected to a subcutaneous port (Fig. 1). Restriction can be achieved gradually by tightening the band such that patients eat less. By adopting the “pars flaccid approach” technique, LAGB has avoided its most common reason for failure—slippage. Currently, LAGB is the safest bariatric procedure, with an operative mortality of about 0.1%. However, the success of LAGB depends on the cooperation of the patient, both in eating behavior and regular follow-up. The reported excess weight loss varies from 30% to 70%. As the weight loss is gradual, the best weight loss is usually achieved after 3 years and long-term weight loss is compatible with gastric bypass (19). However, LAGB is less effective in super-morbidly obese patients and may result in troublesome gastrointestinal symptoms (20). Recent studies have also shown that patients who had had previous *Helicobacter* infection and less ghrelin production may have poor weight loss after a restrictive type surgery (21,22). Patients with polymorphism of the *UCP2* gene, an energy expenditure gene, may also have less favorable results after LAGB (23).

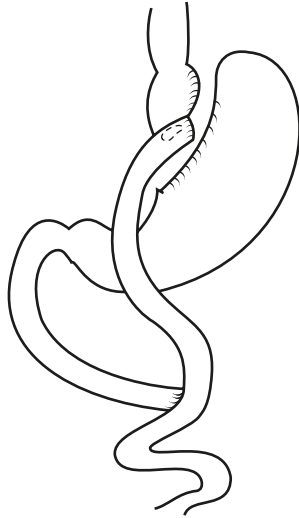


Fig. 2 — Laparoscopic Roux-en-Y gastric bypass. A small gastric pouch is created by division of the proximal stomach. The pouch is anastomosed to the jejunum. The length of the biliopancreatic limb is about 50 cm. The “Roux” or “alimentary” limb is usually 100–150 cm.

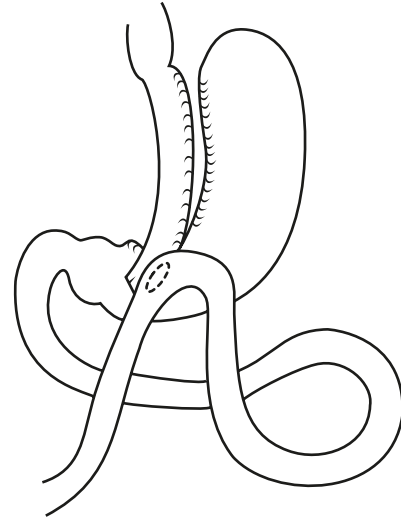


Fig. 3 — Laparoscopic mini-gastric bypass or single anastomosis gastric bypass. A long, narrow gastric tube is created by stapling and transecting the lesser curvature of the stomach. The tube is anastomosed to the jejunum, about 200 cm below the ligament of Treitz.

2.2. LGB

Roux-en-Y (RY) gastric bypass is the most commonly performed procedure in the USA and regarded as the gold standard of bariatric procedures (Fig. 2) (4). After Dr Wittgrove performed the first procedure, LGB has become the first-choice bariatric procedure in the USA (24). The rationale for a laparoscopic approach was to decrease pain, improve postoperative pulmonary function, shorten recovery and return to full activity, and decrease the morbidity associated with a midline incisional wound (25,26). However, RY-LGB is regarded as one of the most technically demanding advanced laparoscopic surgeries with a very steep learning curve (27–30). The reported conversion rate of RY-LGB varied from 0.8% to 11.8%, the major complication rate from 3.3% to 15%, and the late complication rate from 2.2% to 27%. A simplified LGB, a mini-gastric bypass or single anastomosis bypass, has proven to be less technically demanding, and carries less than three times the risk of major complication compared to RY-LGB (Fig. 3) (31,32). This procedure may be helpful for surgeons, such as those in Asia, who are first coming into this field.

2.3. LSG

LSG has been described as the first step of a two-stage DS surgery in super-super-obese patients (33), as well as the sole bariatric procedure for high-risk super-obese patients (34,35). LSG has been found to be more effective than intragastric balloon and

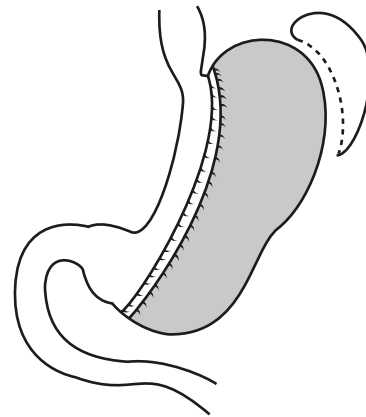


Fig. 4 — Laparoscopic sleeve gastrectomy. The greater curvature of the stomach is resected to leave the antrum and a narrow, lesser curvature gastric tube.

gastric banding (36,37). The superiority of this procedure is because of the resection of the gastric fundus (Fig. 4). As the fundus is known to be the main production site of ghrelin, a hunger-regulating hormone, LSG leads to stable decreased plasma levels of ghrelin (37). Other advantages include no foreign material and related complications (38), and avoidance of the controversy of remnant gastric cancer (39). However, little is known about the possible long-term complications and efficacy of this procedure. Further study is indicated, and patients should be informed about possible complications and the fact that a second-stage operation could be necessary.

2.4. BPD and DS

Both malabsorptive procedures can be performed by laparoscopic surgery (40,41). The weight loss is better but operative risk and long-term metabolic sequelae are higher than for other procedures (4). These procedures are usually used as second-line or second-stage surgery.

2.5. Gastric pacing

Gastric pacing using an implantable gastric stimulator (IGS) is a new empirical treatment using gastric electrical stimulation to induce weight loss. Current clinical studies of gastric pacing with IGS have shown modest weight loss of up to 10–15% (42,43). The mechanism is related to the inhibition of gastric motility and reduction of gut hormone secretion (44,45). However, the system is expensive and still in the experimental stage at present.

2.6. Intra-gastric balloon

The intra-gastric balloon was initially developed from observing the effects caused naturally by bezoars. After the failure of earlier balloon designs, a newer design of balloon (Bioenterics® Intra-gastric Balloon (BIB) system) has been developed with promising results. The BIB was designed to produce a sensation of early satiety, decreasing the capacity of the gastric reservoir and, therefore, consumption of food. An average weight loss of 15–20% can be achieved in 6 months but the BIB must be removed after 6 months (46,47). The data from Asia is also promising and, currently, BIB is the most favored procedure in Hong Kong (48). It is recommended for weight reduction in obese patients who do not meet the criteria for bariatric surgery, or in obese individuals before bariatric surgery.

2.7. Inappropriate bariatric procedure

Although obesity is an excess accumulation of fat, resection of fatty tissue or liposuction itself is not a bariatric procedure. It does not improve the resolution of obesity-related metabolic complications (49).

3. Where to receive obesity surgery

Coincident with the high rate of bariatric surgery, the accumulation of complications from bariatric surgery is also escalating, especially during the long and steep learning curve for bariatric surgery (27–30). Although

the mortality rates are low in expert hands (0.1% for VBG or LAGB, 0.5% for LGB and 1.1% for BPD in meta-analysis), the true mortality rate in the community may be very high (50). The study reported by Flum et al pointed out the discrepancy between surgical literature and actual comprehensive data (50). The bariatric surgery mortality rate for Medicare beneficiaries in the USA was 2% at 2 months and 4.6% at 1 year. Another study in New York also supported this finding (51). The operative mortality is four times higher in a low-volume hospital or for inexperienced surgeons compared to a high-volume hospital or for experienced surgeons (52,53). This is why the American Society of Bariatric Surgeons (ASBS) has started to identify "ASBS Bariatric Surgery Centers of Excellence" to promote safe bariatric surgery and also recommends that all bariatric surgery should be performed in these centers (54). In their preliminary report, the 90-day operative mortality rate was 0.35% for 55,567 patients from 176 centers. Therefore, unlike many other types of surgery performed by the general surgeon, bariatric surgery requires a specialized team approach. The surgeon needs training in advanced laparoscopic techniques and also in the care of surgically obese patients (55). It will be critical in the coming years for us Asian bariatric surgeons to promote safe practice for morbidly obese Asian patients (11).

4. Bariatric surgery in Asia

Obesity was not a problem in Asia until recent decades when countries in Asia began to experience an increasing proportion of the population becoming obese. The mean prevalence of obesity is estimated to be 3% in Asia, one tenth of that of the United States (11). It has been estimated that over 10 million obese Asian patients will require bariatric surgery. However, bariatric surgery is still in its infancy in Asia. Professor Kai-Mo Chen performed the first gastric partitioning in Taiwan in 1981 and reported the first series of bariatric surgery in 63 patients over a period of 15 years in 1987 (56). VBG was then introduced to Japan by Professor Iso Kawamura in 1982 and to Singapore by Dr Thiow Kong Ti in 1987 (11,57). During this period, VBG was the principal bariatric surgery in Eastern countries, although some gastric bypass surgeries were performed.

With the development of laparoscopic surgery, bariatric surgery has entered the realm of minimally invasive surgery. Laparoscopic VBG (LVBG) was successfully performed in Taiwan in 1998 and has emerged as an alternative to conventional VBG (58). The initial results have shown that LVBG is as safe and effective as open VBG, although it is technically challenging and more time-consuming (59). LVBG was

effective in reducing weight and resolving comorbidities in morbidly obese patients, but the specific gastrointestinal quality of life did not improve, and some patients regained body weight 5 years later (60). Therefore, revision surgery after LVBG was frequently required (61). This is why LVBG was replaced by modern bariatric surgery.

LAGB was introduced to Asia in 1999 (11). LGB was first performed in Taiwan in 2000 (62) and has subsequently proven to be more effective than LVBG, although complicated (63). Currently, LGB and LAGB are the two most commonly performed procedures in Asia. LSG is a new procedure but is gaining much support in Asian countries because of its simplicity and the avoidance of the risk of remnant gastric cancer (39). Intra-gastric balloon is a less invasive bariatric procedure and is also attracting much interest in Asian countries (48).

Although Eastern countries have limited experience compared to Western countries, preliminary data from Eastern countries have confirmed that surgically-induced weight loss improves the health status and quality of life of severely obese patients (7,12,13,16). The metabolic syndrome found in many severely obese Asians can almost be nullified by bariatric surgery, giving more support to bariatric surgery in Asia (64).

5. Conclusion

Bariatric surgery has made substantial progress in recent decades. Laparoscopic bariatric surgery, as a minimally invasive surgery, has been rapidly gaining acceptance and facing a soaring demand worldwide. How to provide safe bariatric surgery, train qualified bariatric surgeons and continue to develop better techniques will be important issues in the surgical treatment of obesity in the future.

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