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Review Article

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Revisional Surgery After Adjustable Gastric Banding: Sleeve Gastrectomy or Gastric Bypass?

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ABSTRACT

Adjustable gastric banding was the most common type of bariatric surgery performed in Korea prior to 2019. Many patients that have undergone this procedure require revisional bariatric surgery while removing the gastric band, and it is important to select an appropriate revisional procedure. If reoperation is performed owing to insufficient weight loss or weight regain, a 1-step procedure can be considered. However, a 2-step procedure is preferred when complications such as band erosion or stomach perforation have occurred. Previous studies from Western countries have shown that revisional Roux-en-Y gastric bypass (RYGB) can achieve more effective postoperative weight loss than revisional sleeve gastrectomy, although this procedure may also carry a higher risk of morbidity, reoperation, and readmission to hospital. In Korea, the short-term outcomes of the 2 procedures may be similar. However, the potential risk of gastric cancer in the remnant stomach after RYGB must also be considered. The type of revisional surgery should be selected following discussions with the patient regarding the advantages and disadvantages associated with each procedure.

Keywords: Bariatric surgery; Reoperation; Gastric bypass

INTRODUCTION

Obesity is a growing global health issue, and obesity-related diseases are gaining attention in Asian countries including Korea [1]. In 2019, the Korean Ministry of Health and Welfare declared that National Health Insurance would reimburse the costs of bariatric surgery, a decision that reflects the importance of surgical intervention in the treatment of morbidly obese patients. Bariatric surgery for morbid obesity is associated with significant weight loss and decreased mortality; currently, laparoscopic sleeve gastrectomy (SG) is the most frequently performed primary procedure in Korea and worldwide [2].

Prior to 2019, the most common bariatric surgery performed in Korea was adjustable gastric banding (AGB) [3]. Although the use of AGB had been decreasing worldwide due to frequent long-term complications [4], it remained widely performed in Korea for several reasons. At the time, bariatric surgery was rarely performed in tertiary hospitals, with most surgeries carried out in local clinics. This was accepted by patients who considered bariatric surgery to be a form of cosmetic surgery rather than a major medical procedure. Surgeons in local

clinics preferred AGB owing to its simplicity and short anesthesia time. Consequently, AGB was performed in a high proportion of cases in Korea until a relatively late period. Many of these patients undergo revisional bariatric surgery alongside band removal; the selection of an appropriate revisional procedure is essential.

INDICATIONS OF 1- AND 2-STEP PROCEDURES

Patients who undergo revisional bariatric surgery largely do so for one of 2 reasons: complications of AGB, or insufficient weight loss or weight regain. In general, when complications such as band erosion or stomach perforation occur after AGB, it is advisable to plan revisional bariatric surgery as a 2-step procedure [5,6]. In cases where the degree of complications is less severe, SG or Roux-en-Y gastric bypass (RYGB) may be performed simultaneously; however, this is at the operator's discretion. Safety is a major concern in bariatric surgery, especially revisional surgery, because these are not, in most cases, life-saving procedures and therefore the first consideration of the surgeon must be patient safety.

However, if reoperation is performed owing to insufficient weight loss or weight regain, a 1-step procedure can be considered. Although it has been reported that following a 2-step procedure the postoperative complication rate was not increased compared with primary surgery [7], a large-scale retrospective study of 1-step revisional SG revealed no significant differences in reoperation, readmission, hospital stay of 2 weeks or longer, mortality, or complications compared with primary SG [8]. While neither study classified revisional SG according to the reason for surgery, weight regain is likely to account for the majority of the cases.

The complication rate after revisional RYGB has also been assessed. Theunissen et al. [9] reported that the major complication rate was not significantly different between revisional and primary RYGB (2.8% vs. 2.3%, P=0.73), although the overall complication rate was higher following revisional compared with primary surgery (16.8% vs. 9.3%, P<0.05). When revisional RYGB cases were classified as one- and 2-step procedures prior to analysis, the overall (16.9% vs. 17.7%) and major (1.4% vs. 5.6%) complication rates were not significantly different between the 2 methods.

The increase in the overall complication rate in revisional RYGB compared with primary RYGB is not surprising given the greater challenge faced by the surgeon during the revisional procedure owing to adhesions around the gastric band. However, these previous studies have demonstrated the safety of 1-step revisional procedures, with no increase in the major complication or reoperation rates observed compared with primary surgery.

WHICH IS SAFER, 1-STEP SG OR 1-STEP RYGB?

According to a large retrospective cohort matched case-control study (n=2,708) in the United States [10], patients undergoing a 1-step conversion to RYGB had significantly higher rates of bleeding (2.66% vs. 0.44%, P<0.001), 30-day readmission (7.46% vs. 3.69%, P<0.001), and 30-day reoperation (3.25% vs. 1.26%, P<0.001) than patients undergoing 1-step conversion to SG. A similar study identified 1-step conversion from AGB to RYGB as an independent risk factor for 30-day complication (odds ratio [OR] 2.17, 95% confidence interval [CI] 1.62–2.90), 30-day reoperation (OR 1.81, 95% CI 1.19–2.75), and 30-day readmission (OR 1.42, 95% CI 1.07–1.88)

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[11]. In a single-center retrospective study, Creange et al. [12] also reported a significantly higher reoperation rate in revisional RYGB patients than in revisional SG patients (7.3% vs. 1.4%, P=0.002), although the groups in this study included both 1- and 2-stage procedures.

WHICH IS MORE EFFECTIVE FOR WEIGHT LOSS, REVISIONAL SG OR RYGB?

Revisional bariatric surgery is almost the last resort for weight reduction; therefore, weight loss is the most important outcome for both surgeons and patients. A meta-analysis showed that the percentage excess weight loss (%EWL) at 12 and 24 months after revisional surgery was significantly greater in the RYGB group than in the SG group; however, no significant difference was detected in the %EWL after 36 months [13].

A single-center retrospective study reported similar results. The initial body mass index (BMI) before revisional surgery did not differ between the RYGB and SG groups (39.22 vs. 39.11 kg/m^2, P=0.866); however, the BMI at 24 months postoperatively was significantly different (32.93 vs. 38.34 kg/m^2, P=0.0004). The percentage excess BMI loss 24 and 36 months after revisional surgery was also significanly higher in the RYGB group than in the SG group (24 months: 57.8±26.0 vs. 29.3±40.6, P<0.001; 36 months: 55.3±32.6 vs. 40.1±25.4, P=0.038) [12]. The relevant literature is summarized in **Table 1**.

Table 1. Summary of key articles

Author (year)	County	Control vs. Comparison groups	Safety outcomes	Weight loss outcomes
Noel et al. (2014) [7]	France	Primary SG (n=1,060) vs. 2-step conversion of SG from AGB (n=300)	Postoperative complications: 4.5% vs. 2.0% (P=0.055) Leak: 1.6% vs. 1.0% (P=0.47) Bleeding: 1.79% vs. 0.33% (P=0.069)	%EWL: 75.9±21.4% at a mean interval of 29±19.8 months vs. 62.6±22.2% at a mean interval of 35±24 months (P=0.008)
Aminian et al. (2015) [8]	United State	Primary SG (n=10,997) vs. 1-step conversion of SG from AGB (n=323)	30-day morbidity: 5.4% vs. 6.8% (P=0.29) 30-day reoperation: 1.5% vs. 2.2% (P=0.32) 30-day readmission: 3.7% vs. 4.3% (P=0.61) Hospital stay >2 weeks: 0.3% vs. 0 (P=0.32) 30-day mortality: 0.1% vs. 0.3% (P=0.17) Operative time: 98.5±42.8 minutes vs. 130.0±53.7 minutes (P<0.001)	(–)
Theunissen et al. (2016) [9]	Netherlands	Primary RYGB (n=1,020) vs. Redo RYGB (n=107)	Overall complications: 9.3% vs. 16.8% (P<0.05) Major complications: 2.3% vs. 2.8% (P=n.s.)	BMI change at 1 year: 14.3±3.7 kg/m^2 vs. 9.0±4.9 kg/m^2 (P<0.001) %TWL: 32.5±6.9% vs. 21.5±9.9% (P<0.001)
		1-step RYGB (n=71) vs. 2-step RYGB (n=36)	Overall complications: 16.9% vs. 16.7% (P=n.s.) Major complications: 1.4% vs. 5.6% (P=n.s.)	No significant differences in weight loss results (data not suggested)
Janik et al. (2019) [10]	United State	1-step RYGB (n=1,354) vs. 1-step SG (n=1,354) (after matching)	Operative time: 151±58 minutes vs. 113±45 minutes (P<0.001) Leak: 2.07% vs 1.18% (P=0.070) Bleeding: 2.66% vs 0.44% (P<0.001) 30-day readmission: 7.46% vs 3.69% (P<0.001) 30-day reoperation: 3.25% vs 1.26% (P<0.001) Hospital stay: 2.3±2.8 days vs. 1.8±2.1 days (P<0.001)	(–)
Creange et al. (2018) [12]	United State	AGB to RYGB (n=192) vs. AGB to SG (n=283)	Reoperation: 7.3% vs. 1.4% (P=0.002) Readmission: 7.3% vs. 3.5% (P=0.087) Hospital stay: 3.33 days vs. 2.11 days (P<0.001)	%EBMIL: 57.8±26.0 (n=49) vs. 29.3±40.6 (n=51) (P<0.001) (2 years) 55.3±32.6 (n=37) vs. 40.1±25.4 (n=31) (P=0.038) (3 years) 55.9±22.4 (n=20) vs. 7.0±10.4 (n=5) (P<0.001) (5 years) %TWL: 23.4±11.2 vs. 12.6±14.2 (P<0.001) (2 years) 22.7±12.0 vs. 15.4±9.4 (P=0.007) (3 years) 24.8±9.9 vs. 7.0±10.4 (P=0.002) (5 years)

SG = sleeve gastrectomy, AGB = adjustable gastric banding, %EWL = percentage excess weight loss, n.s. = not significant, RYGB = Roux-en-Y gastric bypass, %TWL = percentage total weight loss, BMI = body mass index.

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DISCUSSION

It is predicted that if a restrictive operation fails in a patient, another restrictive procedure will have equally poor outcomes in terms of weight loss. Therefore, some surgeons prefer to perform RYGB after a failed AGB, and the weight loss outcomes reported by previous studies support this approach [12,13].

Nevertheless, we must consider 2 points: postoperative morbidity and the potential risk of gastric cancer. As previously mentioned, revisional RYGB is associated with higher rates of morbidity, readmission to hospital, and reoperation than revisional SG. However, all previous studies on short-term outcomes were based on databases from Western countries [10-12]. In Korea, most gastrointestinal surgeons have greater experience in gastric cancer surgery than in SG. Therefore, they are more familiar with the laparoscopic bowel anastomosis involved in RYGB than with the vertical transection of the stomach performed during SG. This may result in similar short-term outcomes between revisional RYGB and SG in Korea, although as yet there is no scientific evidence to support this theory.

Although revisional RYGB after AGB is more effective for weight loss and Korean surgeons are proficient in the techniques involved, the potential risk of gastric cancer after RYGB must always be considered in East Asian countries. Therefore, some Korean bariatric surgeons prefer to perform a resectional gastric bypass to eliminate the risk of gastric cancer in the remnant stomach. The selection of conventional RYGB or resectional gastric bypass depends on which of the unknown risks is weighed more heavily: severe dumping syndrome (or severe weight loss) requiring reversal to the original anatomy or gastric cancer in the remnant stomach. A long-term study is required to identify which risk is greater in East Asian populations.

In conclusion, 1-step revisional bariatric surgery after AGB can be considered if reoperation is performed because of insufficient weight loss or weight regain. Revisional RYGB can achieve more effective postoperative weight loss, although it may be associated with a higher risk of morbidity, reoperation, and readmission to hospital. In Korea, bariatric surgeons have 3 options for revisional procedures after AGB: SG, RYGB, and resectional gastric bypass. The type of revisional surgery should be selected following discussions with the patient regarding the advantages and disadvantages associated with each procedure.

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