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Original article

## Duodenal–jejunal bypass with sleeve gastrectomy versus the sleeve gastrectomy procedure alone: the role of duodenal exclusion

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### Abstract

**Background:** Laparoscopic sleeve gastrectomy (SG) has become accepted as a stand-alone procedure as a less complex operation than laparoscopic duodenojejunal bypass with sleeve gastrectomy (DJB-SG).

**Objectives:** The aim of this study was to compare one-year results between DJB-SG and SG.

**Setting:** University hospital.

**Methods:** A total of 89 patients who received a DJB-SG surgery were matched with a group of SG that were equal in age, sex, and body mass index (BMI). Complication rates, weight loss, and remission of co-morbidities were evaluated after 12 months.

**Results:** The mean preoperative patient BMI in the DJB-SG and SG groups was similar. There were more patients with type 2 diabetes mellitus (T2DM) in the DJB-SG group than in the SG group. The mean operative time and length of hospital stay (LOS) were significantly longer in the DJB-SG group than in the SG group. At 12 months after surgery, the BMI was lower and excess weight loss higher in DJB-SG than SG. Remission of T2DM was greater in the DJB-SG group. Low-density lipoprotein, total cholesterol, and metabolic syndrome (MS) improved after operation in both groups.

**Conclusions:** In this study DJB-SG was superior to SG in T2DM remission, triglyceride improvement, excess weight loss, and lower BMI at 1 year after surgery. Adding duodenal switch to sleeve gastrectomy increases the effect of diabetic control and MS resolution. (Surg Obes Relat Dis 2015;■:00–00.) © 2015 American Society for Metabolic and Bariatric Surgery. All rights reserved.

### Keywords:

Duodenal switch; Foregut hypothesis; Laparoscopic duodeno-jejunal bypass with sleeve gastrectomy; Metabolic syndrome; Roux-en-Y gastric bypass; Sleeve gastrectomy

Obesity and its associated metabolic disorders are serious emerging issues worldwide [1,2]. Bariatric surgery is known to be a highly effective and long-lasting treatment for morbid obesity and its many related conditions; however, the types of operations are still evolving [3,4]. Laparoscopic sleeve gastrectomy (SG) was recently

accepted as a primary procedure for morbidly obese patients because of its simplicity and effectiveness [5–7]. The acceptance of SG is particularly high in Asia because of the concern of remnant gastric cancer [4,8,9]. However, some studies have shown that type 2 diabetes mellitus (T2DM) remissions after SG are inferior to those obtained after another commonly performed bariatric procedure, namely Roux-en-Y gastric bypass (RYGB) [10–12]. The T2DM remission rate after RYGB has been reported to be up to 80%, which is higher than the 50% rate found in SG patients [12]. The main difference between these 2

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procedures is that RYGB presents a duodenal exclusion effect (the foregut hypothesis), whereas SG does not have this effect [13].

The duodenojejunal bypass with sleeve gastrectomy (DJB-SG) procedure was introduced as a novel metabolic surgery that adds a duodenal switch procedure to SG. Additionally, this approach combines the principles and advantages of SG and a duodenal switch [14,15]. However, some questions have been raised regarding the efficacy of adding duodenal switch procedures to SG procedures [16]. The aim of this study was to investigate the effect of adding duodenal exclusion to SG through a comparison of one-year results between DJB-SG and SG patients.

## Methods

The study was conducted in the Department of Surgery of the National Taiwan University Min-Sheng General Hospital. Prior approval for the performance of the study was obtained from the Hospital's Ethics Committee. This was a matched case-control study. A total of 89 patients who received a DJB-SG surgery from 2012 to 2013 were retrospectively collected. The inclusion criteria were morbidly obese patients (body mass index [BMI]  $\geq 32$  kg/m<sup>2</sup>) [17] or patients with not-well-controlled T2DM (glycated hemoglobin [HbA1c]  $>7.5\%$ ) and BMI  $\geq 27.5$  kg/m<sup>2</sup> [18]. These patients were well informed of this procedure and agreed to receive it. Patients with previous bariatric operations were excluded. A matched group of SG patients with an equal number of patients, age, sex and BMI from our historical database was collected as a control group. The patients were followed for 12 months.

The operative times, estimated blood loss, length of hospital stay, and postoperative complications were assessed in both groups, and the changes in total weight loss and BMI as well as T2DM improvements or remissions were compared between the groups.

### Surgical Technique

*The laparoscopic single anastomosis duodenojejunal bypass with sleeve gastrectomy procedure.* The conducted surgical procedure was a simplified DJB-SG procedure with one anastomosis that was published previously [19]. To describe it briefly based on the standard 5-port laparoscopic technique, sleeve gastrectomy with a 36Fr bougie was performed with a linear stapler. The dissection was then prolonged through the lower part and posterior wall of the duodenum above the gastroduodenal artery. The duodenum was divided by preserving the right gastric artery and supra-duodenal vessels. The length of the alimentary limb was 150 to 250 cm according to the BMI value [20]. The selected loop was ascended antecolically without division of the omentum, and a stapler isoperistaltic side-to-side duodenojejunal anastomosis was performed. The stapler

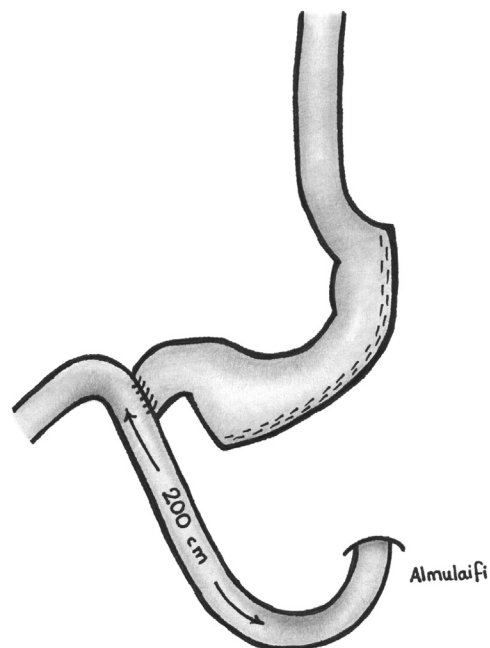


Fig. 1. Operation schema of laparoscopic single anastomosis duodenojejunal bypass with sleeve gastrectomy.

defect was closed with a 2-layer running absorbable suture. An air leak test was then conducted, and a drain was routinely left in place (Fig. 1).

### The Laparoscopic Sleeve Gastrectomy Procedure

The laparoscopic SG technique was described previously [21]. Briefly, the omentum was divided 4 cm proximal to the pylorus ring till the angle of the His. The gastric tube was created over a 36-F bougie using multiple stapler firings. The stapler line was routinely reinforced with a running invaginating nonabsorbable suture.

## Results

The procedure was laparoscopically performed in all patients successfully. The mean preoperative patient BMIs in the DJB-SG and SG groups were similar ( $35.1 \pm 5.9$  and  $36.2 \pm 5.6$  kg/m<sup>2</sup>, respectively,  $P = .185$ ). There were more patients with T2DM in the DJB-SG group than in the SG group ( $n = 77$  versus  $40$ ,  $P < .001$ ). The differences in the demographic characteristics between the DJB-SG and SG groups are listed in Table 1. The mean operation time and hospital stay duration were significantly longer in the DJB-SG group than in the SG group ( $189.1 \pm 32.7$  versus  $122.6 \pm 32.3$  minutes, respectively,  $P < .001$ ;  $4.4 \pm 2.6$  versus  $3.2 \pm 1.6$  days, respectively,  $P < .001$ ). The operative parameters are listed in Table 2.

The mean blood losses in the SG and DJB-SG groups were  $53.6 \pm 66.6$  and  $42.1 \pm 16.9$  mL, respectively ( $P = .145$ ). According to the Clavien-Dindo classifications [22], a total of 21 patients with minor complications (I–II) were

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