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Review article

The single anastomosis duodenal switch modifications: a review of the current literature on outcomes

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Abstract

Background: The single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) was designed in 2007 to reduce the side effects of biliopancreatic diversion with duodenal switch (BPD-DS) by replacing the Roux-en-Y construction with a single duodeno-ileal anastomosis and combining the common channel with the alimentary limb. Several variants using different channel lengths were published. The objective of this study was to identify the published cases of SADI-S and variants and assess the results regarding potential benefits on side effects and revisions.

Methods: PubMed, ClinicalTrials.gov, and the databases of 3 relevant surgical journals were searched for any publication from 2007 to date.

Results: In all, 19 studies were analyzed. After identifying overlaps, 1,041 patients among 9 institutions were identified: 304 with SADI-S, 667 with stomach intestinal pylorus sparing surgery, and 70 with single anastomosis duodenojejunal bypass with sleeve gastrectomy. There were no postoperative deaths and the early complication rate was 7.3% (range 1.6–14%). The mean operative time was 100.8 minutes (range 69.9–181.7 min). The mean 1-year percentage of excess weight loss (%EWL) was 78.7% (range 61.6–87%) and percentage of total weight loss (%TWL) was 36.8% (range 32.7–41.1%). Two studies reported a 2-year %TWL of 38.7% and a single study reported a 5-year %TWL of 37%. A total of 50% of patients had biological data at 1 year. One retrospective study found no difference between BPD-DS and SIPS for vitamin deficiency at 2 years, but there was less severe diarrhea and malnutrition after SIPS. The revision rate increased from 2% to 7% after SADI-S between 2- and 5-year follow-up.

Conclusion: There are still limited long-term data available for single anastomosis duodenal switch. In the absence of published prospective randomized trials, no evidence exists in favor of this variant of the BPD-DS despite a possible trend in less malabsorption side effects. (Surg Obes Relat Dis 2017;▮:00–00.)

Keywords: Single anastomosis duodenal switch; SADI-S; SIPS; SADJB-SG; BPD-DS; Side effects; Malnutrition; Vitamin deficiency; Revision

Introduction

Since the description of the single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) by Sánchez-Pernaute et al. in 2007 [1], several papers have been published about this variant of the original biliopancreatic diversion with duodenal switch initially described by Hess et al. [2] and Marceau et al. [3] in the early 1990s. All these reports retained the sleeve gastrectomy as part of the original technique. However, with the objective of reducing side effects, in particular the risk of protein malnutrition and vitamin deficiencies, a 200-cm single loop combining the alimentary and common channels was designed with an end-to-side duodeno-ileal anastomosis. More recently,

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significant interest in this new technique has been observed with numerous papers published since 2015. The aim of this work was to analyze the results of single anastomosis duodenal switch with respect to weight outcomes and nutritional and digestive side effects. A comparison to the results of the standard biliopancreatic duodenal switch (BPD-DS) was also assessed when available in the current literature.

Methods

The current review was based on a PubMed, Google Scholar, and ClinicalTrials.gov search from 2007 to date. In addition, we searched the online databases of 3 relevant high-impact journals: *Surgery for Obesity and Related Diseases*, *Obesity Surgery*, and *Surgical Endoscopy*. The following terms were used to perform the bibliographic search: single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S), stomach intestinal pylorus sparing surgery (SIPS), single anastomosis loop duodenal switch, modified duodenal switch (MDS), and loop/single anastomosis duodenojejunal bypass with sleeve gastrectomy (SADJB-DS and LDJB-SG). Original papers, reviews, case reports, and published abstracts were considered. Weight loss outcomes, side effects, and nutritional management were analyzed. When available, comparison to "standard" biliopancreatic diversion (BPD-DS) was discussed.

Results

A total of 31 papers or published abstracts were found using the search criteria described above. Ten were not retained because they were case reports or addressed specific technical points or indications, such as gastroesophageal reflux disease and revisions, or reported very limited data [4–13]. Of the 21 selected papers, 6 were published abstracts [14–19] reporting enough data to be considered and 15 had been published in journals or books or on ClinicalTrials.gov [20–34]. Four studies included comparisons with other bariatric procedures: sleeve gastrectomy (SG) [26], Roux-en-Y gastric bypass (RYGB) [20,25], and BPD-DS [30]. One paper was an American Society for Metabolic and Bariatric Surgery statement on single-anastomosis duodenal switch [32]. Finally, a prospective randomized study was registered at ClinicalTrials.gov comparing SADI-S and standard BPD-DS [33]. After identifying any possible overlap between patients in the different published series, we found 1,041 patients. In practice, when considering a single center, only the most recent population census was considered for a specific procedure (e.g., differentiating single-stage and secondary-to-sleeve procedures). Of the 1,041 patients, 304 SADI-DS patients were at 3 different centers in Europe and Brazil, 667 had had SIPS in 4 centers in the United States, and 70 had SADJB-SG at 2 Asian centers.

Technique

The published studies were distributed among 3 procedures, which always included a sleeve gastrectomy and a single anastomosis duodenal switch (end-to-side duodeno-ileal anastomosis).

Loop or single anastomosis duodenojejunal bypass with sleeve gastrectomy

The procedure described by Huang et al. [20] used a 38 Fr bougie and a 200- to 300-cm biliopancreatic limb measured from the angle of Treitz without determining the length of the common channel. However, the procedure described by Lee et al. [21] used a 150-cm biliopancreatic limb or a 200-cm common channel according to the body mass index (BMI) of the patient.

Single anastomosis duodeno-ileal bypass with sleeve gastrectomy

Studies reported the use of 34–54 Fr bougie and a 200- to 300-cm common channel measured from the ileocecal valve.

Stomach intestinal pylorus sparing surgery also identified as modified duodenal switch and initially described as single anastomosis duodenal switch

These studies used 40 and 42 Fr bougie with a 300-cm common channel.

Except 2 papers [19,20] on LDJB-SG/SADJB-SG, which is closer to an omega loop–pylorus-preserving gastric bypass in concept, there was a significant overlap between the studies. Four centers published 5 papers on SADI-S [14,21–24]. As for SIPS/MDS, 4 centers reported their experience in 11 papers [15–19,25–30]; 3 of these reported the combined experience of 2 centers [16,17,28].

The characteristics of the series with reported data are summarized in Table 1. Two series exclusively comprised patients with type 2 diabetes [19,23].

Early results

Twelve studies reported 30-day outcomes, and 10 of them specifically indicated that revisions had been excluded (Table 2). Nine studies provided an overall complication rate ranging from 1.6% [30] to 14% [14]. Except in 1 study, which reported a 30-day reoperation rate of 11.6% [22], the other 9 series had 0 reoperations [19,25,30], or a rate $<1.6\%$. No series reported postoperative death.

Weight outcomes

Eleven series reported 1-year weight outcomes, 1 consisted of patients with an initial BMI <35 kg/m^2 [20] (Table 3). Four series had follow-up of 2 years [19,23,27,30] and 2 had