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Original article

A matched cohort study of laparoscopic biliopancreatic diversion with duodenal switch and sleeve gastrectomy performed by one surgeon

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Abstract

Setting: Spectrum Blodgett and Mercy Health St. Mary's hospitals in Grand Rapids, Michigan**Objective:** To compare the 30-day outcomes of laparoscopic biliopancreatic diversion with duodenal switch (BPD/DS) to laparoscopic sleeve gastrectomy (SG).**Background:** Laparoscopic BPD/DS has been shown to be superior to SG in terms of excess weight loss. Despite this superiority, BPD/DS accounts for a small percentage of all metabolic surgeries due partly to the perception that BPD/DS has a higher complication rate than SG.**Methods:** Retrospective review of all patients who underwent BPD/DS or SG from January 2008 to August 2014 by 1 surgeon was completed. These patients were used to construct cohorts matched via propensity score matching and compared by surgical type. Data collected included patient demographic characteristics; hospital length of stay (LOS); and 30-day rates of leak, bleed, reoperation, readmission, and mortality.**Results:** Of the 741 patients who underwent BPD/DS or SG, 2 cohorts of 167 patients each were matched for age, sex, and BMI. LOS was longer in the BPD/DS cohort ($2.5 \pm .9$ days versus $2.1 \pm .7$ days, $P < .001$). There were no significant differences between the groups in relation to 30-day postoperative rates of leak (.3% versus .6%, $P > .99$), bleed (0% versus .3%, $P > .99$), reoperation (1.2% versus .6%, $P > .99$), or readmission (3% versus 1.2%, $P = .45$). There were no mortalities.**Conclusion:** After matching for age, sex, and BMI, BPD/DS found no significant differences from SG with regard to 30-day postoperative rates of leak, bleed, reoperation, readmission, or mortality. (Surg Obes Relat Dis 2016;■:00–00.) © 2016 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords:

Biliopancreatic diversion; Duodenal switch; Laparoscopic; Sleeve gastrectomy

Laparoscopic biliopancreatic diversion with duodenal switch (BPD/DS) has been shown to provide significantly more weight loss compared with sleeve gastrectomy (SG), in both short- and long-term follow-up [1–3]. Despite the

increase in excess weight loss that BPD/DS offers, it is not employed as routinely as SG for the surgical treatment of obesity. A recent study by the Michigan Bariatric Surgery Collaborative (MBSC) noted that BPD/DS accounted for <1% of all bariatric procedures in the state of Michigan in 2013 compared with 67.3% of procedures being SG [4]. There are various reasons why BPD/DS is less commonly performed, including longer operative times related to

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increased technical complexity, long-term nutritional risks associated with the significant malabsorption, as well as published higher complication rates [1,2]. A study by Finks et al. comparing operative risks in relation to adjustable gastric banding, found an odds ratio of 2.46 for SG, 3.58 for Roux-en-Y gastric bypass (RYGB), and 9.68 for BPD/DS [5]. Topart et al. also found that BPD/DS carried a higher rate of complications compared with both RYGB and SG, although this study was limited by pooling of patients from 2 different surgical teams [6]. In contrast, a recent matched-cohort study by Martinovski et al., which utilized data from the Michigan Bariatric Surgery Collaborative (MBSC), reported that BPD/DS carried a lower rate of complications compared with RYGB [7].

Based on recent findings that imply that BPD/DS can be performed with complication rates similar to or even lower than RYGB, the purpose of this study was to perform a matched-cohort comparison of BPD/DS and SG performed by a single surgeon. Thirty-day outcome variables examined were rates of leak, bleed, readmission, reoperation, and mortality, as well hospital length of stay (LOS).

Methods

Database

Institutional Review Board approval was obtained at Mercy Health Saint Mary's and Spectrum Health hospitals. A retrospective review of charts from consecutive patients who had undergone SG or BPD/DS performed by a single surgeon between January 2008 and August of 2014 was performed. Data gathered included patient demographic characteristics; length of hospital stay; evidence of leakage or bleeding; and 30-day rates of readmission, reoperation, and mortality. Patients with a history of prior bariatric procedure or Nissen fundoplication were excluded from this study. Matched cohorts between BPD/DS and SG were constructed based on age, sex, and BMI.

Bleeding was defined as the need for a transfusion or return to the operating room to control bleeding. Staple line leak was defined as radiographic evidence of a leak, use of antibiotics for treatment of an intraabdominal abscess, placement of a percutaneous drain, endoscopic covered wall stent placement to control a leak, or return to the operating room with subsequent repair or drainage of a leak.

Surgical technique

Decisions regarding surgical procedure selection were based on patient preference after extensive education of the short- and long-term risks and benefits of the BPD/DS and SG provided at a surgical seminar, and individually by an experienced bariatrician, dietician, behaviorist, and surgeon. All surgeries were performed by 1 surgeon. The SG technique has been previously described [8]. Briefly, the stomach was divided beginning approximately 3 cm

proximal to the pylorus with resection carried adjacent to a 34 French bougie. Staple height varied based on tissue and reinforcement material thickness.

The technique of BPD/DS included creation of a common channel of 100–150 cm (dependent on various patient factors) and a Roux limb of 150 cm. The roux limb was positioned in an antecolic fashion and a hand-sewn duodenoileostomy was created. The SG portion of the procedure was completed as described already, except that the stapler was carried slightly more lateral to the 34 French bougie.

Statistical technique

Quantitative data are expressed as the mean and standard deviation, whereas nominal data are expressed as a percentage. Quantitative data were analyzed using the *t* test. Nominal data were analyzed using the χ^2 or Fisher's exact test. Propensity score matching was utilized to obtain patients from the SG group to match to the complete dataset of the BPD/DS group. Patients were matched using age, sex, and BMI on a 1:1 basis. Significance was assessed at $P < .05$. Data were analyzed using IBM SPSS Statistics v. 22 (Armonk, NY).

Results

A total of 741 charts were reviewed with 167 patients undergoing a BPD/DS and 574 patients undergoing a SG. Propensity score matching of all BPD/DS patients based on age, sex, and BMI resulted in 2 cohorts of 167 patients each (Table 1). LOS was statistically longer in the BPD/DS cohort compared with the SG cohort ($2.5 \pm .9$ days versus $2.1 \pm .7$ days, respectively; $P < .001$). There were no significant differences between the BPD/DS and SG groups with regard to 30-day rates of bleeding (0% versus .3%, respectively; $P > .99$), staple line leak (.3% versus .6%, respectively; $P > .99$), reoperation (1.2% versus .6%, respectively; $P > .99$), or readmission (3% versus 1.2%, respectively $P = .45$) (Fig. 1). No mortalities occurred in either group.

Discussion

Partially due to the perception of BPD/DS having high early postoperative complication rates, it inarguably

Table 1
Demographic data pre- and postmatching

Characteristic	BPD/DS	Pre-SG	<i>P</i> value	Post-SG	<i>P</i> value
Female (%)	80.8	73.7	.06	83.2	.57
Age (yr)*	44.0 ± 11.4	45.7 ± 11.3	.09	44.6 ± 11.9	.64
BMI (kg/m ²)*	51.0 ± 11.2	48.9 ± 8.7	.01	50.6 ± 9.6	.74

BMI = body mass index on day of surgery; BPD/DS = biliopancreatic diversion with duodenal switch; post-SG = sleeve gastrectomy patients after matching; pre-SG = sleeve gastrectomy patients before matching.

*Mean + SD.

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