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Original article

Long-term outcomes after biliopancreatic diversion with and without duodenal switch: 2-, 5-, and 10-year data

Monica Sethi, M.D.*, Edward Chau, M.D., Allison Youn, M.A., Yan Jiang, B.S., George Fielding, M.D., Christine Ren-Fielding, M.D.

Department of Surgery, New York University School of Medicine, New York, New York

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Abstract

Background: There are minimal long-term data on biliopancreatic diversion (BPD) with or without duodenal switch (BPD/DS).

Objectives: To investigate the long-term weight loss, co-morbidity remission, complications, and quality of life after BPD and BPD/DS.

Setting: An academic, university hospital in the United States.

Methods: We conducted a retrospective review of patients who underwent BPD or BPD/DS between 1999 and 2011. Outcomes included weight loss measures at 2, 5, and 10–15 years post-operatively; co-morbidity remission; long-term complications; nutritional deficiencies; and patient satisfaction.

Results: One hundred patients underwent BPD (34%) or BPD/DS (64%). Mean preoperative body mass index (BMI) was 50.2 kg/m^2. Mean follow up was 8.2 years (range: 1–15 yr) with 72% of eligible patients in active follow up at 10–15 years postoperatively. Excess weight loss (EWL) was 65.1% at 2 years, 63.8% at 5 years, and 67.9% at 10–15 years. Approximately 10% higher %EWL was achieved for those with preoperative BMI <50 kg/m^2 versus ≥ 50 kg/m^2 and patients who underwent BPD/DS versus BPD. Although co-morbidities improved, 37% of patients developed long-term complications requiring surgery. There were no 30-day mortalities; however, there was one mortality from severe malnutrition. Nutritional deficiencies in fat-soluble vitamins, anemia, and secondary hyperparathyroidism were common. Overall, 94% of patients reported satisfaction with their choice of surgery.

Conclusion: This clinical experience supports the long-term positive safety profile and efficacy of BPD and BPD/DS at a single U.S. center. Higher levels of excess weight loss are achieved by patients with a lower preoperative BMI and BPD/DS. Although nutritional deficiencies and post-operative complications are common, patient satisfaction remains high. (Surg Obes Relat Dis 2016;▮:00–00.)

Keywords: Biliopancreatic diversion; Duodenal switch; Bariatric surgery; Malabsorptive; Long-term outcomes

Bariatric surgery remains the most effective treatment for morbid obesity and obesity-related co-morbidity. One such bariatric procedure—biliopancreatic diversion (BPD) with or without duodenal switch (BPD/DS)—produces more weight loss and amelioration of co-morbidity than any other bariatric procedure. Originally introduced by Scopinaro in 1976, the BPD procedure combines distal gastric resection and intestinal malabsorption to induce significant weight loss [1]. Subsequently, Hess et al. [2] and Marceau

*Correspondence: Monica Sethi, M.D., Research Fellow, Division of Bariatric Surgery, Department of Surgery, New York University School of Medicine, 530 First Avenue, Suite 10 S, New York, NY 10016.

E-mail: monica.sethi@nyumc.org

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et al. [3] modified the procedure by replacing the distal gastrectomy with a sleeve, thereby preserving the pylorus, and termed this the BPD/DS.

Despite yielding greater weight loss outcomes and improvements in co-morbidities, the BPD and BPD/DS procedure is performed relatively infrequently [4]. There are several potential reasons for this, including its challenging technical aspects, particularly if performed laparoscopically; risks of nutritional sequelae; and need for lifelong follow-up [5]. Additionally, the existing long-term data on BPD and BPD/DS have limited application because they are based on open procedures or alternative techniques (e.g., BPD with transient gastroplasty) and derive from the few centers outside the United States that use BPD or BPD/DS as their operation of choice for all bariatric patients [3,6,7]. The risks and benefits of BPD and BPD/DS are therefore still debated.

The objective of the present study was to investigate long-term weight loss, remission of co-morbidity, nutritional sequelae, surgical complications, and quality of life after BPD and BPD/DS at a single U.S. center.

Materials and methods

This is a retrospecitve cohort study of all patients who underwent BPD or BPD/DS from 1999 to 2011 with body mass index (BMI) ≥ 35 kg/m^2 and age >18 years, who were followed for at least 1 year and up to 15 years.

Perioperative details

Performance of BPD versus BPD/DS was based on surgeon and patient preference at the time of the surgery. All patients underwent a preoperative low-calorie, high-protein diet for 2 weeks before the surgery date. BPD was performed using a 350-mL gastric pouch, and limb lengths were 150 cm for the alimentary (Roux) limb and 50 cm for the common channel. BPD/DS was performed with a 60F bougie, and limb lengths were 150 cm for the alimentary (Roux) limb and 100 cm for the common channel [8]. In both the BPD and BPD/DS, the enteroenterostomy mesenteric defects were routinely closed with running 2-0 silk sutures.

All patients were instructed to take a multivitamin, as well as iron, calcium, and vitamin ADEK supplements indefinitely. Postoperative follow-up consisted of office visits at 1 week, 1 month, 3 months, 6 months, 9 months, and 1 year and annually thereafter. Visits included laboratory evaluation of nutritional parameters with associated nutritional supplementation as recommended by dieticians. Before surgery and at all postoperative visits, the importance of taking supplements was emphasized to each patient, but nutritional compliance was not routinely measured. Nutritional laboratory parameters, including a comprehensive metabolic panel, magnesium, phosphate, zinc, copper, parathyroid hormone, prealbumin, hepatic function panel, iron, folate, ferritin, and vitamins A, D, E, K, B_{12}, and B_1 were checked every 3 months for the first year and annually thereafter. If patients had nutritional deficiencies, laboratory parameters were checked more frequently and consultants were involved if there was no response to oral supplementation. Additionally, if patients encountered insufficient weight loss, we employed several strategies to aid in weight loss success. These included frequent follow-up with physicians, as well as nutritional counseling to improve dietary compliance, decrease carbohydrates, and increase protein intake.

Data sources

We reviewed a prospectively collected single-institution database, limited to all patients who underwent BPD or BPD/DS between 1999 and 2011. The study was approved by the NYU School of Medicine's Institutional Review Board. Data collected included preoperative demographic information, preoperative co-morbidity, and surgical details. We harvested all available weights, laboratory values, and surgical complications, from the preoperative timepoint to the year of most recent follow-up, from the database.

Patients who underwent BPD or BPD/DS between 1999 and 2011 were also contacted between July 2012 and October 2014 by telephone or e-mail to schedule an office visit, which included a history and physical examination, recording of weight and BMI, medication reconciliation, review of co-morbidity status, and laboratory studies. Additionally, we obtained a review of subjective data (including postoperative factors affecting quality of life, dietary changes, and overall satisfaction with choice of procedure). If an in-person office visit was not possible, a telephone interview was conducted. In this situation, medical records and laboratory values were retrieved, with patient permission, from the patient's primary physician records.

Outcomes

The primary outcome was weight loss. Weight loss measures are represented as preoperative, 2-, 5-, and 10+ year postoperative time points, with a window of 1 year for each postoperative time point. Weight loss was quantified using several measures, including percent weight loss (%WL), percent excess weight loss (%EWL), and percent excess BMI loss (%EBMIL). Ideal weight was calculated using the Robinson formula from the Metropolitan Life Insurance tables [9,10]. For the %EBMIL calculation, 25 kg/m^2 was used as the ideal BMI. Inadequate weight loss was defined as % EWL $<50\%$. Subgroup analyses were performed based on preoperative BMI (<50 kg/m^2 versus ≥ 50 kg/m^2) and type of surgery (i.e., BPD versus BPD/DS).

Secondary outcomes include rates of co-morbidity remission, surgical complications, mortality, nutritional deficiencies, and subjective data as described earlier. Co-morbidity