Biliopancreatic Diversion with Duodenal Switch

Ranjan Sudan, MD[a,*], Danny O. Jacobs, MD, MPH[b]

KEYWORDS

• Bariatric • Biliopancreatic diversion
• Duodenal switch • Obesity

HISTORY

The biliopancreatic diversion with duodenal switch (BPD-DS) is often referred to as the duodenal switch operation and is a modification of the original biliopancreatic diversion described by Scopinaro in 1979.[1] The essential difference between these two operations is that in the BPD-DS version, a sleeve gastrectomy is performed and the pylorus is preserved, whereas in the original Scopinaro operation, a distal gastrectomy sacrifices the pylorus. In both operations, the stomach pouch has a capacity of 250 mL and malabsorption results from a distal Roux-en-Y reconstruction of the bowel, with a common channel of 50 to 100 cm and an alimentary limb of 250 cm.[2,3] The Scopinaro BPD has excellent long-term weight loss[4] but, unlike the BPD-DS, has a greater risk of postgastrectomy symptoms that are related to the distal gastrectomy, including diarrhea, dumping, and marginal ulceration.

Postgastrectomy syndrome, which includes anastomotic ulceration, early and late dumping, bowel disturbance, and nutritional deficiencies, has been a problem with other general surgical operations, such as the Billroth hemigastrectomy or the radical pancreatoduodenectomy (Whipple procedure). To avoid these symptoms, several surgeons considered preserving the pylorus. Longmire and Traverso described the pylorus-preserving Whipple procedure in 1978.[5] Critchlow, in 1985, bypassed the duodenum beyond the pylorus to reduce mortality associated with a duodenal diverticulectomy.[6] In 1987, DeMeester, when conducting experiments for reflux disease in dogs, demonstrated that preserving the pylorus prevented marginal ulceration.[7] In bariatric surgery, Marceau and colleagues[8] were the first to describe a reduction in postgastrectomy symptoms associated with the BPD by preserving the pylorus in

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[a] Department of Surgery, Duke University Medical Center, Box 2834, Durham, NC 27710, USA
[b] Department of Surgery, Duke University Medical Center, Duke University School of Medicine, Box 3704, Suite 7690 HAFS 7th floor, Durham, NC 27710, USA
* Corresponding author.
E-mail address: ranjan.sudan@duke.edu

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1993. They modified the Scopinaro BPD by making a tube along the lesser curvature of the stomach, preserving the pylorus, and stapling the duodenum shut proximal to the ampulla of Vater. The first part of the duodenum was then anastomosed to the alimentary limb enabling gastric contents to bypass the pancreatic and biliary secretions. This operation was successful in reducing postgastrectomy symptoms; but the duodenal staple line broke down, and the continuity with the rest of the duodenum was reestablished in several patients.[8] Hess and Hess, in 1988, preserved the pylorus and completely divided the first part of the duodenum by cutting across it in a patient with a failed horizontal stapled gastroplasty and, later that year, performed the same operation as a primary bariatric procedure but they did not publish their results until 10 years later, in 1998.[9] That year, Marceau and colleagues[3] also published their results of the BPD-DS with a divided duodenum and demonstrated that weight loss was equivalent but the postgastrectomy symptoms were significantly reduced compared with the BPD. These findings contributed to the BPD-DS becoming the preferred version of the operation in North America.

The BPD-DS has traditionally been performed by midline laparotomy, and although the first laparoscopic Roux-en-Y gastric bypass was described by Wittgrove and colleagues[10] in 1994, it was not until 2000 that the results of the first human laparoscopic BPD-DS series were reported by Ren and colleagues.[11] The first robotically assisted BPD-DS was also performed in 2000 by a totally intracorporeal approach.[12] Currently, several methods of performing the laparoscopic BPD-DS have been described and differ primarily in the manner that the duodenoileostomy is created. These methods include the hand-assist technique using a linear stapler[13] and totally intracorporeal techniques using the circular stapler,[11] linear stapler,[14] robotically hand sewn,[15] and a conventional laparoscopic hand-sewn approach.[16]

Despite several good descriptions of the technique and its excellent weight-loss results, the BPD-DS is an infrequently performed procedure. A recent review of the patient registry of the American Society for Bariatric and Metabolic Surgery showed that over a 23-month period immediately before May of 2009, only 517 (.87%) of the 57,918 registered patients underwent either a BPD or a BPD-DS and most of them were performed by laparotomy.[17]

The possible reasons for the slow adoption of the BPD-DS in the United States include an apprehension about its malabsorptive side effects and its technical complexity. Apprehension about severe malabsorption is a carryover from the jejunoileal bypass (JIB) era. However, there are major differences between the JIB and the BPD-DS. In the JIB, the stomach was not resected and weight loss resulted from severe malabsorption by connecting the proximal 35 cm of jejunum to the distal 10 cm of the terminal ileum. The rest of the small bowel was a blind intestinal limb. The side effects associated with the JIB included severe diarrhea, nephropathy, and cirrhosis. Therefore, the procedure was largely abandoned by the 1980s. In contrast, the BPD-DS has no blind limb, stomach resection provides a restrictive component, and the 250-cm alimentary limb has not been associated with nephropathy or liver disease since the BPD-DS was first performed in 1988.

PHYSIOLOGIC BASIS

The clinical benefits and side effects of the BPD-DS have become known through observational studies. However, the underlying mechanisms of actions are not very well understood. It is thought that restriction from the sleeve gastrectomy provides early weight loss but fat malabsorption provides long-term weight loss. This explanation may be simplistic because significant gut hormonal changes have also been

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