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Review article

# Revision and reversal after biliopancreatic diversion for excessive side effects or ineffective weight loss: a review of the current literature on indications and procedures

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**Abstract**

**Background:** Biliopancreatic diversion is a powerful bariatric procedure that relies on gastric restriction combined with a large malabsorptive component. This can lead to excessive side effects and/or weight loss. Despite this, long-term weight regain can also occur. Objectives: To determine the rate of and options for revision in patients who experience excessive side effects and weight loss. To explore the revisional procedures available to overcome weight regain.

**Methods:** A PubMed search was conducted of all reports published between 1979 and August 31, 2014. Series and case reports on revision or reversal after biliopancreatic diversion with duodenal switch (BPD/DS) or without (BPD) were included.

**Results:** Revision rates for excessive malabsorption ranges from .5%–4.9% and 3%–18.5% after BPD/DS and BPD respectively. Revisions increase common channel by up to 150 cm. Reversal is necessary in .2%–7% of cases, with an increased risk when the common channel is ≤50 cm. In most instances, reversal (of the malabsorptive component only) is indicated after the revision failure. A proximal, side-to-side anastomosis between the biliopancreatic and alimentary limbs is the preferred option. Most reoperations are performed within 2 years of the initial procedure and for protein malnutrition in about half of the cases. Revision for insufficient weight loss is reported in .5%–2.78% of cases. Except inadequate channel lengths, little is to be gained by common channel shortening. Additional gastric restriction, which results in an average 9–14 kg weight loss, is another option.

**Conclusions:** Biliopancreatic diversion can be relatively easily revised to control excessive side effects and protein malnutrition. Early diagnosis is essential and warrants a close nutritional monitoring. In case of weight regain, limited results can be obtained by reducing the gastric volume provided the lengths of the small bowel channels are adequate. (Surg Obes Relat Dis 2015;▮:00–00.)
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*Keywords:* Biliopancreatic diversion; revision; Reversal; Side effects; Malnutrition; Weight regain

Biliopancreatic diversion is considered to be the most effective of all of the bariatric procedures currently available with a mean percentage of excess weight loss of 75% for most reports and meta-analyses [1–2]. The 2 versions of the procedure, the biliopancreatic diversion or Scopinaro's procedure (BPD) and the biliopancreatic diversion with duodenal switch (BPD/DS) rely on gastric restriction combined with a small bowel short-circuit. They leave a 250 cm alimentary limb of terminal ileum with a 50–100 cm common channel where biliopancreatic juices mix with food. While BPD includes a distal gastrectomy, BPD/DS is

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based on a smaller volume sleeve gastrectomy, which preserves the pylorus and was designed to alleviate the risk of stomal ulcer, as well as to improve micronutrients absorption. Despite its efficacy, this procedure only accounts for 2% of bariatric surgeries worldwide [1]. One explanation for such a low incidence is the risk of excessive weight loss with malnutrition and/or side effects with relation to the surgically induced malabsorption. After the creation of a short common channel and a significant reduction in the length of the functional small bowel, poor resorption of bile salts, low protein absorption and reduced intake of fat (and fat-soluble vitamins) can explain these symptoms and the nutritional disturbances. These problems were known as early as 8 years after the development of biliopancreatic diversion in its original Scopinaro version [3] with some alarming reports concerning the severe consequences of protein malnutrition [4]. Revision is dictated by such excessive malabsorption, typically between 18 months and 2 years after the initial procedure [3]. In this case, a revision of the initial procedure usually proceeds with an elongation of both the common channel and the alimentary limb at the expense of the bypassed small bowel to increase the contact between food and the small bowel mucosa and improve bile salt resorption. Another option is reversal, by dismantling with a return to normal anatomy or more simply by suppressing the malabsorptive component of the biliopancreatic diversion. This latter procedure, by connecting, very proximally, side to side the alimentary and the biliopancreatic limbs, creates a "dual channel" and restores a fully functional small bowel. After BPD/DS, however, reversal inevitably retains the gastric restriction because of the sleeve gastrectomy. On the other hand, long-term reports have emphasized weight regain, especially in super-obese patients [5]. Although revision options to resume or increase weight loss could be considered limited for such an effective operation, this remains debatable. Because biliopancreatic diversion usually leads to a rapid and intense weight loss within 18 months of the surgery, in particular in relation with malabsorption, it is essential to identify its pitfalls. Alterations of the small bowel short-circuit can be necessary and the indications as well as the technical aspects are reviewed. The aim of this article is to summarize and compare the indications and efficacy of technical options for surgical revision after biliopancreatic diversion for excessive weight loss, side effects, or weight regain in the available literature.

## Methods

The current review was based on a PubMed search for articles discussing revision of biliopancreatic diversion either for excessive malabsorption or insufficient weight loss published between 1979 (first publication on biliopancreatic diversion) and August 31, 2014. The search was conducted on English language citations of human studies containing the following keywords: "biliopancreatic diversion," "revision," "reoperation," "weight loss," and "malnutrition." The same search was performed using the "duodenal switch" keyword instead of "biliopancreatic diversion." Because the number of reports was limited, all publications, including case reports, were reviewed. The studies were reviewed according to the following indications for reoperation beyond 30 days of surgery: excessive malabsorption, or insufficient weight loss. Publications from the same institution were included if they reported additional cases of revision, revision for a different indication or major updates. Within the excessive malabsorption indication, malnutrition and excessive side effects were separately identified. Incidence, timing, and surgical revision options are discussed. No statistical analysis was performed.

## Results

Eighteen papers, of which 5 case are reports were found using the search criteria described.

### *Excessive side effects*

*Incidence.* Ten biliopancreatic diversion series (3 originating from the same institution) reported revision and reversal cases motivated by excessive malabsorption (Table 1). The reported rate of revisions ranges from .5–4.9% for the BPD/DS [2,6–11] and from 3%–18.5% for the BPD [7,12–14]. Two series compared BPD and BPD/DS revision rates [7,11]. The series with a significantly lower rate of revision after BPD/DS used a 100 cm and a 50 cm common channel length for the BPD/DS and the BPD respectively [7] after the procedures as they were initially described. In the other study [11], both procedures had the same 50 cm common channel lengths. In addition, Hamoui [10] found that after using variable common channel lengths (50, 75, and 100 cm) for BPD/DS, patients with the shortest common channels were significantly more likely to undergo revision, with a rate of 19.5% compared with 4.9 and 4.5% for a 75 and 100 cm common channels, respectively.

Reversal is much less frequently reported, and the rate varies between .2 [2] and 7% [14] (Table 1). In a series comparing BPD and BPD/DS, Marceau [7] found significantly less frequent indications for reversal (0.5%) after BPD/DS than after BPD (2.7%).

*Indications.* Protein malnutrition is the chief reason found for reoperation accounting for 43% and 60% of the indications for reversal and revision respectively for Clare [14] and Hamoui [10]. Revision is less frequently undertaken to control diarrhea or flatus only [6,8–10,12,13]. However, this indication makes nearly 30% of the revisions with a decrease in the number of daily bowel movements from 5 to 1 [10]. Other rare indications for revision include bone demineralization after BPD [12], the inability of the

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