

ASMBS Guidelines

A literature review on reoperative metabolic and bariatric surgery for chronic complications: American Society for Metabolic and Bariatric Surgery Clinical Issues Committee and Surgery Revision Task Force

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Abstract

Background: Reoperations account for approximately 11% of annual metabolic and bariatric surgery cases in the United States. Indications vary and include weight-related and complication-related issues. The number of American Society for Metabolic and Bariatric Surgery (ASMBS)–endorsed procedures has grown in popularity since the original 2014 ASMBS publication on reoperative metabolic and bariatric surgery (rMBS).

Objectives: This paper was created as one of a 2-part update to the 2014 ASMBS publication on rMBS.

Setting: A literature review was conducted by the American Society of Metabolic and Bariatric Surgery's Clinical Issues Committee. Available literature from 2014 to present was included.

Methods: A search was performed using Ovid MEDLINE and PubMed databases looking for studies related to surgical treatments for chronic complications after metabolic and bariatric surgery. Relevant studies were screened for inclusion by the authors.

Results: rMBS serves an important role in the care of chronic complications after all ASMBS–endorsed procedures. In many cases, data are limited in quality to retrospective case series. Prevention is essential to limiting chronic complications and their associated morbidity and mortality. Mesenteric defect closure in all anastomotic MBS procedures is of paramount importance. Once chronic complications occur, a step-wise multidisciplinary approach is recommended, beginning with medical therapy, followed by endoscopic interventions, and ultimately rMBS when indicated.

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Preamble: This review is in response to inquiries made to the society regarding interventions for long-term complications in patients who have had metabolic and bariatric surgery. These recommendations are based on current clinical knowledge, expert opinion, and published peer-reviewed scientific evidence available at this time. The paper is not intended to

establish a local, regional, or national standard of care. The paper will be revised in the future as additional evidence becomes available.

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Conclusions: Surgeons should treat each patient presenting for rMBS on an individualized basis. Patient management should follow a structured escalation of care that prioritizes nonoperative treatments before progressing to rMBS. (*Surg Obes Relat Dis* 2026;22:823–831.) © 2026 American Society for Metabolic and Bariatric Surgery. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords:

Complications; Metabolic and bariatric surgery; Reoperative surgery; Revisions

Reoperative metabolic and bariatric surgery (rMBS) accounts for approximately 11% of the total number of metabolic and bariatric surgery (MBS) cases done in the United States annually [1]. There are multiple indications for rMBS with the most common being weight recurrence or inadequate weight loss, both of which remain poorly defined. The next most common indication is the presence of complications, which may be either acute or chronic. There is an existing body of literature on the management of acute complications after MBS, and therefore this paper will focus on rMBS for chronic complications. A separate publication update will cover indications for rMBS for weight-related issues. These 2 papers will serve as an update to the 2014 American Society for Metabolic and Bariatric Surgery (ASMBS) systematic review on rMBS [2].

Long-term complications after MBS that require rMBS vary based on the index operation. In this paper, we discuss complications related to the 2 most common MBS procedures performed in the United States, Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG). We also introduce a section on MBS procedures that have grown in popularity since the previous 2014 publication. These include rMBS for chronic complications after one anastomosis gastric bypass (OAGB), single-anastomosis duodeno-ileostomy, and biliopancreatic diversion with duodenal switch (BPD-DS). Although it is not yet endorsed by the ASMBS, we will also devote a section to the single-anastomosis sleeve ileal bypass (SASI) as it is becoming widely accepted in other countries.

Methods

A literature review was conducted by the American Society of Metabolic and Bariatric Surgery's Clinical Issues Committee. A search was performed using Ovid MEDLINE and PubMed databases looking for studies related to surgical treatments for chronic complications after MBS published from 2014 to present. Relevant studies were screened for inclusion by the authors first by title and abstract and then by full text in 2 separate rounds. Articles were excluded if full text was not available, if they were in a language other than English, or if the primary indication for revision was weight regain or nonresponse after the index operation.

Roux-en-Y gastric bypass

Internal hernias and intestinal failure following RYGB

RYGB remains a cornerstone procedure for severe obesity. Its long-term complications, particularly internal hernias (IH) and intestinal failure (IF) necessitate precise preventive and therapeutic strategies. These complications arise from anatomical alterations, including mesenteric defects that may predispose patients to significant morbidity. This section describes the literature on the clinical aspects, surgical techniques, and outcomes related to IH and IF post-RYGB.

IH, although rare, are among the most impactful long-term complications of RYGB, with a cumulative 5-year incidence of 3.1%, noted in a Danish nationwide study of 12,221 patients, where mesenteric defects were left open during surgery [3]. This incidence increased to 4% when including cases with intermittent symptoms and highlighted the critical role of routine defect closure to mitigate IH risk. Chronic pain associated with mesenteric window defects was also explored in a retrospective series of 11 patients, demonstrating resolution in nearly all cases following elective laparoscopic closure, reinforcing the necessity of preventive defect closure during the primary procedure [4].

Surgical technique significantly influences IH incidence. A retrospective analysis of 331 RYGB cases revealed that running sutures reduced IH rates to 1.8%, outperforming interrupted sutures and emphasizing the importance of standardized closure methods [5]. These findings align with a randomized clinical trial comparing closure of mesenteric defects using clips versus nonclosure which demonstrated a reduction in IH rates with closure from 15.5% to 6.5% at 5 years, albeit with a minor increase in operative time [6]. Another long-term randomized clinical trial involving 2507 patients corroborated the benefits of defect closure, showing a 50% reduction in reoperations for small bowel obstruction over a decade (7.8% in the mesenteric closure group versus 14.9% in the nonclosure group) [7].

The importance of meticulous defect closure was underscored in a 16-year retrospective study involving 1927 patients, which demonstrated a dramatic decrease in IH incidence from 12.9% to 1.05% with the use of running nonabsorbable sutures and additional purse-string techniques [8].

Routine mesenteric defect closure has been shown to decrease the risk of IH by 70%; however, it does not entirely eliminate the occurrence of this complication [9]. These findings collectively affirm that precise surgical techniques and consistently closing all mesenteric defects associated with RYGB should be considered standard practice.

IF represents a severe yet under-reported complication of RYGB. The causes of IF after RYGB are most commonly catastrophic loss of bowel due to volvulus or internal hernia, ischemia, technical complications, and dysfunctional syndromes such as severe malabsorption or chronic diarrhea. Parenteral nutrition (PN) is required for patients with short bowel syndrome or severe malabsorption, with the goal of weaning as tolerated [10–12]. Medical management includes aggressive correction of micronutrient deficiencies, dietary modification, and treatment of complications such as small intestinal bacterial overgrowth and exocrine pancreatic insufficiency [13]. In a multicenter study of 142 patients with prior bariatric surgery referred for IF, multidisciplinary management included reconstructive surgery in 89% and visceral transplantation (TXP) in 20%, achieving restoration of nutritional autonomy in 83% and long-term survival of 72% at 15 years [10]. A 25-year single-center review of 25 patients identified volvulus and internal hernia as leading causes of IF, with a median onset of 48 months postsurgery. Treatment strategies included intestinal rehabilitation (IR), TXP, and long-term PN. IR offered the best outcomes, with a 74% 5-year survival rate, while TXP was reserved for refractory cases or PN-related complications [12]. Management of IF often requires RYGB reversal which is described in a subsequent section (3 refs).

Post RYGB hypoglycemia

Severe postprandial hypoglycemia, also known as noninsulinoma pancreatogenous hypoglycemia syndrome (NIPHS) a rare but debilitating complication of RYGB, is increasingly recognized as a result of anatomical alterations and associated hormonal dysregulation. The true incidence is unknown and likely underdiagnosed due to variable and often mild presentations [14]. In a series of 6 patients with severe postprandial hypoglycemia, RYGB reversal resulted in a significant reduction of the postprandial hormonal and glucose excursions and symptomatic improvement in all patients [11]. These findings support the primary role of altered RYGB anatomy, rather than pancreatic dysfunction, in the pathophysiology of hypoglycemia. NIPHS management includes dietary modification and pharmacotherapy as first-line treatments, and in selected cases, endoscopic gastric outlet restriction and RYGB reversal [14]. The Branco-Zorron Switch, a novel Brazilian surgical approach involving a 20-cm jejunal interposition between the pouch and the prepyloric stomach, along with resection of the bypassed stomach and the remaining Roux limb, demonstrated effective resolution of neuroglycopenic symptoms

in patients with refractory (NIPHS), achieving normalization of glucose and insulin levels while maintaining weight loss during a 24-month follow-up [15]. A variation of this approach involves disconnecting the Roux limb just proximal to the jejuno-jejunostomy and performing an anastomosis of a trimmed 70-cm Roux limb segment to the duodenum without resecting the remnant stomach. In a series of 8 patients with a mean follow-up of 35 months, there was complete resolution in 2, marked improvement in 4, and no improvement in 2 patients following this revisional surgery [16]. Collectively, these studies highlight the importance of tailored surgical interventions in addressing RYGB-associated hypoglycemia, emphasizing innovative revisional techniques and alimentary transit reconstruction as viable alternatives to complete RYGB reversal. Pancreatectomy, which may be recommended as a treatment for adult-onset nesidioblastosis, is rarely a recommended treatment for post-RYGB neuroglycopenia [14].

RYGB reversal

Although reversal of RYGB is rare, it is sometimes indicated to address chronic complications and side effects associated with the altered gastrointestinal anatomy. These include recalcitrant symptoms such as nausea, vomiting, and abdominal pain; recurrent nonhealing marginal ulcers (MU); excessive weight loss/malnutrition; dumping syndrome; neuroglycopenia; and hypocalcemia associated with hypoparathyroidism. Before proceeding with reversal, a multidisciplinary evaluation is essential, involving specialists such as dietitians, psychologists, endocrinologists, and others tailored to the specific indication for reversal. Given the risks associated with RYGB reversal, a stepwise approach is recommended. This should begin with less invasive interventions, such as dietary modifications, pharmacotherapy, and nutrition optimization via total PN or enteral nutrition using a gastric tube in the bypassed stomach.

In a review of RYGB reversal encompassing 100 patients, malnutrition was the most common indication for reversal (12.3%), followed by severe dumping syndrome (9.4%), postprandial hypoglycemia (8.5%), and excessive weight loss (8.5%) [17]. The time interval from primary surgery to reversal ranged from 3.5 months to 25 years. The reversal technique included resection of the gastro-jejunostomy and creation of a gastro-gastrostomy. The Roux limb was either resected or anastomosed in continuity with the biliopancreatic limb, with some surgeons making this decision based on the total length of the small bowel and the patient's nutritional status [18]. Information about the gastro-gastrostomy technique was available for 42 patients, with the following distribution: laparoscopic hand-sewn technique was used in 67.4% of cases, linear stapler in 23.2%, and circular stapler in 6.9%. The Roux limb was reconnected in 32 patients (57.2%) and resected in 24 (42.8%). Three patients underwent endoscopic reversal by creating

a gastro-gastrostomy using a covered stent. Weight recurrence was reported in 17 patients (28.8%), severe gastroesophageal reflux disease (GERD) in 6 patients (10.2%), persistent abdominal pain in 4 patients (6.8%), and anastomotic leak in 4 patients (6.8%). The reported mortality was zero.

In a multicenter series of 50 RYGB reversal procedures, 27 (54%) were performed to address recalcitrant MU, 12 (24%) functional disorders (e.g., chronic pain, dumping syndrome, nausea and vomiting), 9 (18%) anatomical complications (e.g., intussusception, stricture, adhesions), and 2 (4%) malnutrition [19]. Most cases (72%) were completed laparoscopically. Three of the MU patients underwent an emergency reversal due to bleeding or postdilation perforation. There were no 30-day deaths and only one leak/abscess. Resolution of symptoms among patients who had follow-up 1 year after surgery was achieved in all patients who had reversal for MU and malnutrition and in > 85% of patients who had surgery for anatomical or functional issues.

In a single institution series of 48 RYGB reversal procedures, 25 (52%) were performed to address recalcitrant MU (12 of whom had malnutrition and 17 coexisting substance abuse), 11 (23%) malnutrition, 7 (14.6%) chronic pain and nausea, and 5 (10.4%) postprandial hyperinsulinemic hypoglycemia [18]. The mean time between the index RYGB procedure and reversal surgery was 9.6 years (3 months–25 years). All cases were performed laparoscopically. The overall 30-day complication rate was 29% ($n = 14$), which included a mortality rate of 2% ($n = 1$) and an anastomotic leak rate of 10.4% ($n = 5$). All patients with severe malnutrition experienced weight recurrence.

Occasionally, the reversal procedure includes a conversion to SG or duodenal switch to prevent the weight recurrence that occurs with RYGB reversal. In a series of 12 patients who underwent conversion of RYGB to SG, indications included gastro-jejunostomy-related complications: chronic ulcer, stricture, fistula ($n = 8$), hypoglycemia/dumping ($n = 3$), and weight increase ($n = 1$) [20]. Five patients with class 2/3 obesity achieved 13.0% weight loss after an average follow-up of 19 months. Seven patients without preoperative obesity maintained a body mass index (BMI) < 30 kg/m² after an average follow-up of 11.5 months. Although there were no mortalities, 4 patients experienced 7 major complications, including portal vein thrombosis, bleeding, pancreatic leak, pulmonary embolus, anastomotic leak, and stricture, and 2 required reoperation. Not surprisingly, these technically challenging operations are associated with a high rate of major complications, readmissions, and the need for supplemental nutrition.

In a case series of 25 RYGB reversals with medium-term follow-up, 13 patients were reversed to normal anatomy and 12 to SG anatomy [21]. This technique of RYGB conversion to SG involves creation of a gastro-gastrostomy followed by gastric reduction using the standard SG approach. The

potential benefit is to limit weight gain associated with traditional RYGB reversal. At a mean follow-up of 5.3 ± 2.3 years, RYGB reversal corrected early dumping ($n = 3$), malnutrition ($n = 5$), diarrhea ($n = 3$), and nausea/vomiting ($n = 2$) in all patients. Resolution of reactive hypoglycemia occurred in 6/8 (75%). RYGB reversal led to significant weight recurrence of 14.2 ± 13.7 kg, whereas conversion to SG led to a weight loss of 4.8 ± 15.7 kg. The anastomotic leak rate was higher in patients with reversal to SG anatomy (25%) than in those with reversal to normal anatomy (7.7%).

RYGB reversal is effective in addressing reactive hypoglycemia recalcitrant to dietary modification and pharmacotherapy. In a series of 6 patients with severe symptomatic hypoglycemia, mixed meal tolerance testing was performed at baseline, following placement of a feeding tube in the bypassed stomach and after RYGB reversal [22]. Gastric feeding and RYGB reversal dramatically reduced postprandial glucose, insulin, and glucagon-like peptide 1 changes. All patients experienced symptomatic improvement of hypoglycemia following RYGB reversal, and in 4/6 patients, the average number of hypoglycemic episodes per week decreased from 18.5 ± 12.4 to 1.5 ± 1.9 .

Reversal of RYGB is often part of surgical IR to manage catastrophic small bowel loss, which may result from IH, mesenteric venous thrombosis, or multiple complicated abdominal surgeries [12]. In a series of 131 MBS patients referred to 2 transplant centers in the United States with gut failure over a period of 20 years, 97 (74%) had RYGB anatomy [10]. Of those, 45 (46.4%) had catastrophic gut loss, 27 (27.8%) technical complications, and 25 (25.8%) dysfunctional syndromes. RYGB reversal was performed in 23 (23.7%) of patients, a decision guided by the type of gut failure, presence of short gut syndrome, and the patient's wish to maintain lost weight. Depending on the anatomy of these complicated patients, creative anatomical restorations may be necessary, including using the Roux limb or colon as an interposition conduit between the gastric pouch or the esophagus and the distal stomach [10,15].

Sleeve gastrectomy

Gastroesophageal reflux disease

The long-term incidence of GERD after SG is reported to be 20%–30% [23,24]. Multiple factors have been associated with the development of GERD including hiatal herniation of the sleeved stomach, stricture/stenosis, and *de novo* GERD, due to an incompetent lower esophageal sphincter in the setting of a high-pressure system [25]. GERD management includes proton pump inhibitors (PPIs), hiatal hernia repair with or without conversion to RYGB, and magnetic sphincter augmentation (MSA) [24,26–31]. The initial treatment includes nonoperative management with PPIs. When patients demonstrate poor response to medical management, one may consider a surgical approach. The most effective treatment to date is conversion to RYGB,

shown to provide a 60%–100% resolution of GERD symptoms [24,28–30,32,33]. Postconversion, the use of antireflux medications is significantly reduced, with only 20%–40% of patients requiring continued PPI therapy [24,28–30,33]. Another option includes conversion to OAGB, which shows promise as a feasible alternative but requires further validation [34]. In cases of intrathoracic sleeve migration where patients are not suitable candidates for RYGB, hiatal hernia repair with posterior cruroplasty alone has demonstrated up to 72% resolution of GERD symptoms and discontinuation of PPIs [25,35].

MSA has gained attention for the treatment of GERD in patients after MBS. This may be particularly appealing to patients who have a contraindication to RYGB conversion (e.g., smoking, chronic use of nonsteroidal anti-inflammatory drugs). In a systematic review of 14 studies including 109 patients who underwent MSA after laparoscopic sleeve gastrectomy (LSG), both GERD-heartburn related quality of life (GERD-HRQL) scores (38 ± 13 versus 10 ± 11 ; $P = .0078$) and daily PPI use (97.4% versus 25.3%; $P < .0001$) significantly improved compared with preoperative values at a median follow-up of 18.9 months. MSA explantation due to esophageal erosion occurred in .9% of patients [36].

Late, chronic, and recurrent leak after SG

It is estimated that staple line leaks occur in .2%–2.4% of SG cases [37–40]. Late leaks, defined as those occurring more than 6 weeks postoperatively, and chronic leaks, defined as those persisting beyond 12 weeks despite adequate management, require special consideration [41]. Occasionally, leaks that initially appear to heal can recur weeks or months later. Late leaks can present as abscesses or fistulae to surrounding organs or the skin. Initial management includes broad-spectrum antibiotics, percutaneous or endoscopic drainage, and nutritional optimization [42]. Endoscopic strategies include stenting, internal drainage, endoscopic vacuum therapy, and septotomy/septoplasty depending on the chronicity and anatomy of the leak [38]. Success rates for purely endoscopic treatments of leaks have been reported as high as 81% [38,40]. In a study comparing internal drainage and closure (covered metal stent and/or endoclips), the primary success of internal drainage and closure was 86% and 63%, respectively. Internal drainage appears particularly effective in cases involving large collections or purulent material [43]. Chronic fistulae, however, are less likely to resolve with a purely endoscopic approach and will often require surgery [40]. Surgical approaches include proximal gastrectomy with Roux-en-Y esophagojejunostomy, resection of the leak area with RYGB reconstruction, and Roux-en-Y fistula-jejunostomy [38,42]. These surgical salvage procedures are technically difficult but have high success rates for resolving the chronic leak, albeit with significant risk for postoperative complication. Early diagnosis and intervention are critical as they are

associated with higher treatment success rates [38]. Despite the morbidity of chronic leaks, long-term outcomes are generally favorable in terms of weight loss and resolution of associated conditions, with the need for further surgery in only 14.6% of patients [37].

Anatomical and functional stenosis after SG

Sleeve stenosis is a rare complication of SG with a rate ranging from .5% to 3.5% [44]. It can be classified as either a “true” stricture or a “twisted” (helix) sleeve. A true stricture most commonly occurs at the angular incisura and may result from stapling too close to the bougie in this location, postoperative hematoma, or excessive scar formation. In contrast, a twisted sleeve typically develops intraoperatively due to misalignment of the staple line or postoperatively from abnormal healing of the staple line. A twisted sleeve usually presents later and may cause more functional symptoms than a fixed obstruction [45]. The diagnosis may be challenging to establish in some cases and is most reliably confirmed with an upper gastrointestinal contrast study in combination with upper endoscopy. The primary treatment modality is endoscopic dilation with bougie, controlled radial expansion or pneumatic balloons, and placement of self-expandable metallic stents with an overall success rate of endoscopic therapy of 77.8% [44]. Refractory cases may require surgical intervention, including adhesiolysis and sleeve fixation to prevent angulation, stricturoplasty, gastro-gastrostomy, or conversion to RYGB with a pooled success rate of 97.9% [46].

One anastomosis gastric bypass

Patients with OAGB may need revisional surgery due to (1) gastric pouch and gastrojejunal pathology, including bile reflux with pouch gastritis, MU, gastrojejunal stricture, and enlarged gastric pouch, or (2) short alimentary limb presenting with chronic diarrhea and protein-calorie malnutrition (PCM) [47,48]. A pooled analysis of 44 studies reported a 2% need for OAGB revisional surgery due to severe reflux [49]. PCM can be a result of a long biliopancreatic limb (> 200 cm); however, severe PCM requiring revisional surgery has been reported in patients with a biliopancreatic limb ≤ 200 cm [50]. In a series of OAGB revision for PCM, there was a wide variation of the total small intestinal length, suggesting that exclusion of a 200-cm biliopancreatic limb may result in a relatively short alimentary limb [51].

Different revisional procedures for OAGB have been described in case series. These include complete or partial reversal of OAGB, revision of the length of bypassed jejunum, and conversion to RYGB or SG. Upper gastrointestinal series and upper endoscopy are recommended to evaluate the anatomy. Intensive nutritional support and addressing other causes of poor oral intake (e.g., bile gastritis or MU) should be undertaken before reversal or revision of OAGB for PCM [52]. The decision for reversal

versus conversion to other procedures should be individualized based on the underlying pathology [53]. Reversal or revision of OAGB is effective in resolution of symptoms and PCM; however, it can be associated with a high morbidity rate, up to 31%–41% [47,48,53]. Therefore, thorough preoperative evaluation, including assessment of patient needs, risk stratification, optimization, and counseling, is essential before undertaking these procedures. During revision, attention to limb length is crucial [47,51].

A series of 16 conversions of OAGB to RYGB were performed by complete resection of the gastrojejunostomy, creation of a 50-mL gastric pouch, stapled anastomosis of the jejunal ends to restore intestinal continuity, and RYGB reconstruction. Although 37.5% of patients experienced complications within 30 days postoperatively, all achieved symptom resolution by the 6-month follow-up [47]. Another report described 12 (1.4%) OAGB reversals performed for symptomatic hypoalbuminemia unresponsive to nonoperative management in patients with an original biliopancreatic limb of 200 cm [54]. The reversal technique consisted with stapling the gastric pouch close to the gastro-jejunostomy (horizontal antimesenteric resection of jejunum) to maintain the jejunal loop continuity, followed by a linear-stapled gastro-gastrostomy between the gastric pouch and the bypassed stomach. There were no postoperative complications in 8–22 months of follow-up. In another series, 11 patients underwent partial reversal of OAGB for refractory hypoalbuminemia by creating a gastro-gastrostomy between the posterior pouch and the anterior bypassed stomach using a linear stapler [52]. There was a significant improvement of serum albumin from $3 \pm .4$ to $4 \pm .5$ g/dL, a BMI increase from 27.3 ± 7.5 to 33.3 ± 3.8 kg/m², and improvement in liver enzymes. Most patients (82%) maintained excess weight loss $\geq 50\%$ in 1–7 years of follow-up.

Single Anastomosis Duodenoileostomy with Sleeve Gastrectomy

Malabsorption is a possible complication of Single Anastomosis Duodenoileostomy with Sleeve Gastrectomy, especially when the common channel is less than 250 cm [55]. This can cause severe PCM with nutritional deficiencies and malabsorptive diarrhea. Revision of the duodenoileal bypass to a more proximal duodenojejunal bypass has been described to lengthen the common channel. One reported technique involved 5 patients with a common channel length of 175 – 250 cm, in whom the duodenum was transected above the previous anastomosis while maintaining ileal continuity [56]. A loop duodenojejunal anastomosis was then performed 60 cm from the ligament of Treitz and a Roux-en-Y duodenojejunal anastomosis in one patient due to a short duodenal segment and potential bile reflux [49]. All patients recovered from the initial symptoms and experienced a mean BMI increase of 7.1 kg/m² (5 – 10.8 kg/m²). In another series, 7/17 patients with a common alimentary loop < 2.5 m developed severe

malabsorptive complications necessitating surgical conversion to a longer common channel [57]. In a larger cohort of 780 Single Anastomosis Duodenoileostomy with Sleeve Gastrectomy patients, 1.2% required common channel lengthening to address hypoproteinemia or diarrhea [58]. All 7 patients with chronic diarrhea who underwent laparoscopic common channel lengthening experienced resolution of their symptoms. In 2 additional patients, protein levels improved, with one patient's peripheral edema resolving.

Single anastomosis sleeve ileal bypass

In a cohort of 30 SASI patients with a 300-cm common channel, malabsorptive complications were frequent, including diarrhea (43%), anemia (70%), and hypoalbuminemia (23%) [59]. Six patients (20%) required conversion surgery after failed attempts of nutritional support; one to RYGB and 4 to SG. Another series described conversion in 2 of 24 patients (8.3%) to SG due to hypoalbuminemia and excessive weight loss approximately 1 year post-SASI [60]. Both patients regained significant weight and reached their normal BMI 6 months after the conversion surgery. In a randomized controlled trial comparing single anastomosis sleeve jejunal bypass with SASI, the reoperation rate in the SASI group was 11.4%, primarily for excessive weight loss and protein malnutrition [61]. Seven patients were converted to SG due to either nutritional complications or excessive weight loss, and 2 patients converted to RYGB due to combined biliary gastritis and GERD. A systematic review and meta-analysis reported an overall revision rate of 2.1%, most commonly to SG, primarily for excessive weight loss and hypoalbuminemia [62].

Biliopancreatic diversion with duodenal switch

The primary indications for revision or reversal of BPD-DS surgery include severe PCM, refractory diarrhea, and metabolic complications such as hepatic dysfunction that fail to improve with intensive nutritional support and supplementation [63–66]. In a literature review of BPD and BPD-DS patients, protein malnutrition is the leading indication for reoperation accounting for 43% and 60% of the indications for reversal and revision, respectively [66]. MU and dumping may occur after BPD-DS but generally respond to dietary management and pharmacotherapy rather than surgical intervention [67]. Reported rates of revision or reversal for malnutrition after duodenal switch range from .5% to 10.6% in long-term studies, with most series citing rates between 1% and 5% [63,65,66,68]. The risk is greater in patients with shorter common channels, poor adherence to vitamin and protein supplementation, alcohol use, and pre-existing liver disease [66,68]. Most revisions occur within 9–48 months after the primary operation, with approximately 75% performed within the first 18 months [66]. Early recognition is crucial, as delayed intervention can lead to irreversible organ failure or death [64,66]. The primary goal of revisional surgery is to lessen malabsorption

by moving the entero-enteric anastomosis proximally along the biliopancreatic limb to lengthen the common channel.

In a series of 701 patients who underwent BPD-DS, 33 patients (4.7%) required revisional surgery at a median of 17 months postoperatively, most commonly due to protein malnutrition ($n = 20$), diarrhea ($n = 9$), and metabolic abnormalities ($n = 5$) [63]. Following side-to-side entero-terostomy 100 cm proximal to the original anastomosis, there was a modest weight regain (median: 18 lbs), serum albumin improvement (from 3.6 to 4.0 g/dL) with no mortality, and 15% perioperative complications.

In a series of 153 patients with more than 10-year follow-up, 10.6% of patients requiring surgery for excessive weight loss or malnutrition, including conversion to normal anatomy ($n = 1$), lengthening of the common channel ($n = 10$), and placement of a feeding jejunostomy ($n = 1$) [68]. Among these patients, mean BMI decreased from 42.3 ± 3.8 preoperatively to 20.5 ± 3.4 at revision and 24.6 ± 3.0 kg/m² at follow-up. No patients with BMI > 50 kg/m² required revision for malnutrition. The incidence of revisional surgery for malnutrition was higher in patients with a 75-cm common channel (13.3%) compared with those with a 100-cm channel (8.2%).

Complete “reversal” of BPD-DS aims to eliminate malabsorption and can be achieved through several techniques, including creating a side-to-side or an end-to-side anastomosis between the alimentary and biliopancreatic limbs at 25 cm from the ligament of Treitz [66]. Full anatomic restoration is more complex and includes a duodeno-duodenostomy to reconnect the sleeved stomach with the duodenum, division of the biliopancreatic limb near the jejuno-ileostomy, and creation of a new jejuno-jejunostomy [69].

Conclusions

Reoperative surgery for chronic complications of MBS fortunately remains uncommon. When surgical intervention is considered, a stepwise and individualized approach is essential. Medical and endoscopic therapies are often first-line treatments with surgery reserved for patients who do not respond to less invasive treatments. Current evidence supporting rMBS for complications consists of retrospective case series, underscoring the need to balance available data with sound clinical judgment. Management by an experienced bariatric surgeon is critical and should include a thorough review of the medical record to clearly define the index operation, along with comprehensive patient education and counseling. Treatment options should be tailored to the type of original MBS, the underlying problem, and the patient’s goals and preferences.

Author contributions

Dr. Vosburg developed the project methods, outline, and plan. Drs. Vosburg, Carter, Khorgami, Fam, ElDjouzi,

Groller, Northup, and Papasavas participated in project development, literature review, and writing the manuscript.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

Supplementary data

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