History of the Development of Metabolic/Bariatric Surgery

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Chapter Objectives

1. Review the history and evolution of bariatric and metabolic surgery.
2. Learn from previous experiences in the development of bariatric and metabolic surgeries in order to continue to improve safety and efficacy.

History of Bariatric Surgery

The odyssey of the surgical intervention for the treatment of serious obesity began as all odysseys begin when a problem was recognized and a prepared mind coupled divergent observations and asked the question, "Why not?" In this case, the problem was severe incapacitating obesity, and the observation was that when individuals underwent resection of the greater portion of their small intestine, weight loss ensued even if the individual was of normal weight at the outset.

As the world came out of the Second World War, farming in many areas became more mechanized, manpower became available, foodstuffs became extremely affordable, and the fast-food industry emerged. The US agriculture thrived as did the urbanization of not only the United States but also the world. Preservatives were added to extend the shelf life of food. The prevalence of obesity skyrocketed.

At this time young physicians who had their medical education interrupted by the call to military duty returned to complete their specialty training. Several institutions, notably the University of Minnesota, shunted a substantial part of this work force into research laboratories, many of which were committed to unraveling the mystery of the gastrointestinal tract. Working in the environment nurtured by Owen H. Wangensteen and under the direct tutelage of Richard L. Varco, one such individual, John Linner, set about transposing segments of the small intestine to better understand the physiologic role of the jejunum as compared to the ileum. The job was arduous, the studies sophisticated, and the research laboratory was not air-conditioned. The studies were done in a canine model and were of such quality that the work was selected for presentation at the American Surgical Spring Meeting in 1954 [1]. As a part of the presentation, a comment was made about a young, seriously obese woman with heart disease that had undergone an operation to bypass the majority of her small intestine. She had lost weight, and her cardiac disease had stabilized. In the discussion of this paper, Philip Sandblom from Sweden commented that a Swedish surgeon, Viktor Henriksson, had performed a similar procedure in a small number of patients, and although they had experienced "some difficult situations of nutritional balance," they had experienced weight loss.

The patient described by Linner underwent a revision of the primary bariatric procedure in 1981 and survived to age 61 when she died of a cardiac event (Linner JG, 1985, personal communication). Although still heavy, she had not regained her original severely obese state. John Kral researched the patients operated upon by Henriksson and found they also experienced long-term control of their obesity (Kral J, 1985, personal communication).

Based in part on these results, Payne (a surgeon), DeWind (a gastroenterologist), and Commons (a pathologist) as part of a large study on "morbid" obesity ("morbid" a term coined by Payne to encourage insurance companies to pay for these procedures) performed an end-to-side jejunocolic shunt in ten patients [2] (Fig. 3.1). This was a part of an experimental study in which patients consented to a large number of baseline studies and to similar follow-up studies to characterize the effects that the procedure produced. The results of these studies were published in great detail and in a style that was

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N. T. Nguyen et al. (eds.), *The ASMBS Textbook of Bariatric Surgery*, https://doi.org/10.1007/978-3-030-27021-6_3

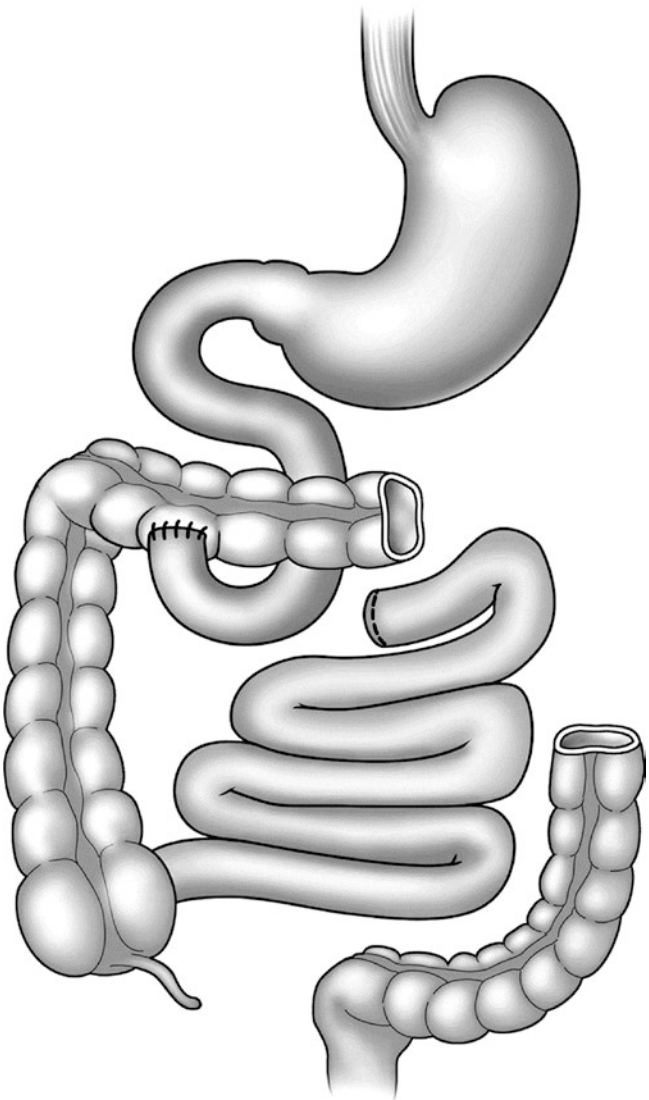

Fig. 3.1 Jejunocolic bypass

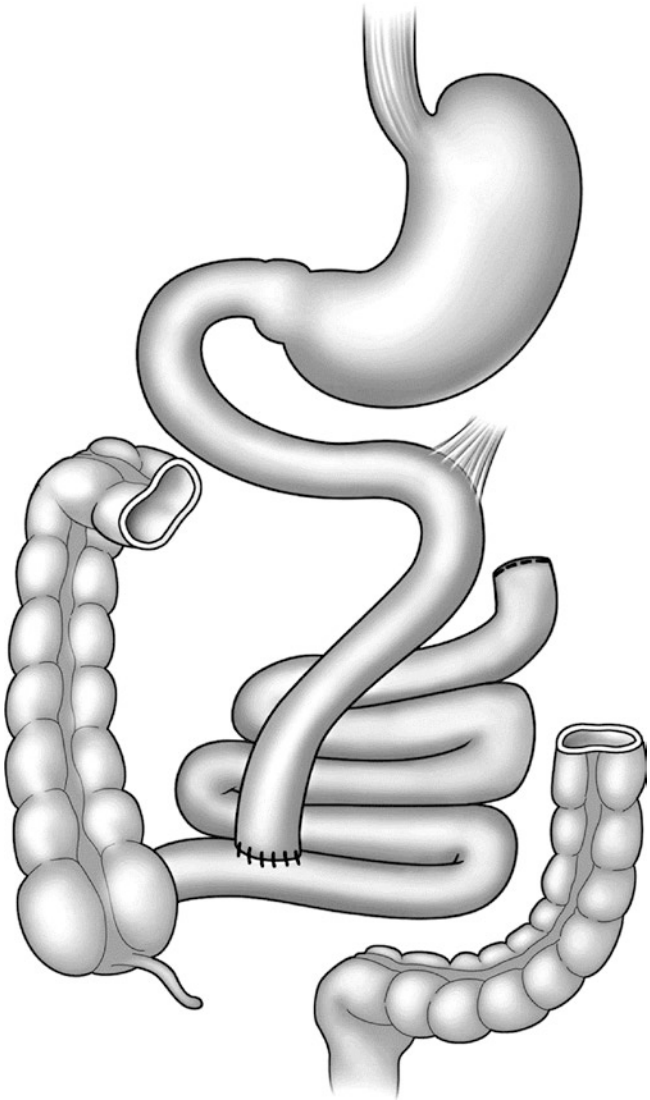

Fig. 3.2 End-to-side jejunoileal bypass

popular at that time. Weight loss occurred in each of the patients. One patient died 6 months after the procedure of a pulmonary embolism. She had an antecedent history of pulmonary emboli. The protocol included the reestablishment of continuity of the gastrointestinal tract when optimal weight had been achieved. In the six patients in whom continuity of the gastrointestinal tract was restored, all regained their previous obese state. The three remaining patients had their jejunocolic shunt revised to an end-to-side jejunoileal shunt (Fig. 3.2). One of these patients, in which a substantial amount of jejunum was placed back in continuity, experienced weight regain to her preoperative level. The authors observed that if a reasonable amount of jejunum (14 in.) and a smaller portion of ileum (4 in.) were left in continuity with the ingested food, weight loss could be maintained. In a later publication, Payne and DeWind reported acceptable weight loss results in a large number of patients [3].

By the late 1960s and early 1970s, there were a number of reports of successful weight loss being produced by jejunoileal or jejunocolic shunts. Each of these studies identified complications that were directly associated with the intestinal bypass procedure. As these reports became more numerous, it produced an extremely fertile field for a number of researchers to investigate the various mechanisms of action that produced the metabolic aberration. Perhaps, the most interesting and best studied side effect of intestinal shunting was the development of liver failure in certain patients. In Payne's original report, all of the patients had liver biopsies, and the vast majority demonstrated steatosis of the liver. Many surgeons paid little heed to this observation. After all, the patient was fat and had fat everywhere else, why not in the liver. If the excluded limb of the intestine was resected, liver failure did not occur, although these patients did experience malabsorption and weight loss. When liver failure

occurred, biopsies of the liver looked identical to alcohol-induced cirrhosis, even to the point of including Mallory's bodies. Many curmudgeons opined that these patients must be closet alcoholics. That was clearly not the case. Certain investigators demonstrated bacterial overgrowth of gram-negatives and anaerobic bacteria in the excluded limb of the intestine along with morphological changes in the intestinal wall (separation of tight junctions between enterocytes) and felt that this played a role [4]. These investigators coined the term "enterohepatic syndrome." Other complications of intestinal shunting procedures included malnutrition, vitamin deficiencies (especially of fat-soluble vitamins), electrolyte abnormalities (especially of divalent cations), ketosis, iron malabsorption, hyperoxaluria, nephrolithiasis, migratory arthralgia, profound inflammation of synovial lined spaces, and in some individuals weight regain. Although the benefits were profound, so were the complications. The second-ever National Institutes of Health (NIH) Consensus Development Conference was held in 1978 [5]. The focus was the treatment of morbid obesity, including surgical intervention. Although the recommendations were favorable for certain operative procedures in the treatment algorithm, it was felt that the risk-benefit ratio for intestinal shunting procedures was too high to recommend routine use.

Up to this time, the academic surgical community had shown little interest in the development of bariatric surgery. The individuals doing bariatric surgery were felt to be somewhat of a renegade group of surgeons who were involved in the treatment of a "condition" that was simply the end result of gluttony and sloth. This prejudiced view augmented the discrimination against the patients, their disease, and the surgeons and staff that treated them. It was a commonly held belief that seriously obese individuals simply lacked willpower. Surgeons who lowered themselves to treat individuals that were affected by obesity, which was not a serious disease (like cancer), deserved the headaches inherent in the care of such patients. It was a waste of resources that could have been used in the treatment of "real" surgical problems such as duodenal ulcer disease.

There was little or no appreciation that obesity was a disease and intimately associated with other diseases such as type II diabetes, hypertension, cardiovascular disease, and an increased incident of certain malignancies. There was a failure to understand that the underlying inflammatory process associated with severe obesity affected every system in the body to a greater or lesser degree. It was not realized that control of the obesity would be associated with increased longevity and general health.

There was a real schism between believers that obesity was a disease state and those that did not adhere to this premise. Department chairs grudgingly allowed young surgical faculty to do bariatric surgery as it produced volume in the operating room and technical experience for residents. Bariatric surgery was often looked upon as a nuisance that had a tendency to congest intensive care units with long-term stay patients. Academic advancement for young surgeons occurred in spite of their involvement in bariatric surgery not because of their achievements in this area. National meetings rarely accepted papers about bariatric surgery, and when papers were accepted, they almost always dealt with the management of complications that might be pertinent to similar complications that occurred in normal weight individuals. The papers were always positioned at the worst spot on the program.

By the early 1970s, certain surgeons became sensitized to the complications associated with malabsorptive procedures and looked for alternatives. From a simplistic standpoint, if allowing patients to eat large volumes of food and then interrupting absorption by short-circuiting the intestine did not work, perhaps limiting intake would.

At the University of Iowa, there were strong connections to the University of Minnesota. Not only were they in relative proximity, but many of the faculty at Iowa had been educated in part at the University of Minnesota. Edward E. Mason was interested in the gastrointestinal tract and specifically in peptic ulcer disease. Working with Chikashi "Chick" Ito, Mason performed a side-to-side anastomosis between the very upper third of the divided stomach and a loop of the jejunum to treat duodenal ulcers disease (Fig. 3.3). A number of patients were obese, and Mason observed that although the procedure did not control the ulcers, it was associated with weight loss. He reported this in a 1967 publication during the peak of

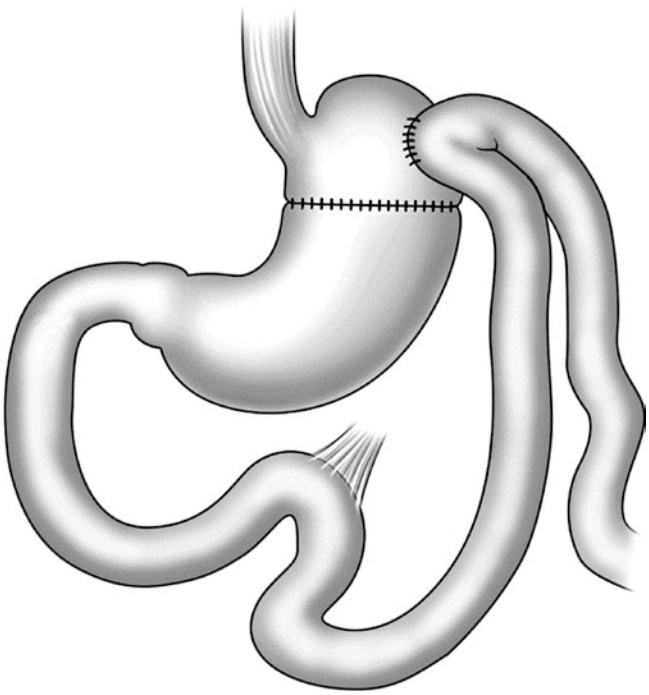

Fig. 3.3 Side-to-side anastomosis

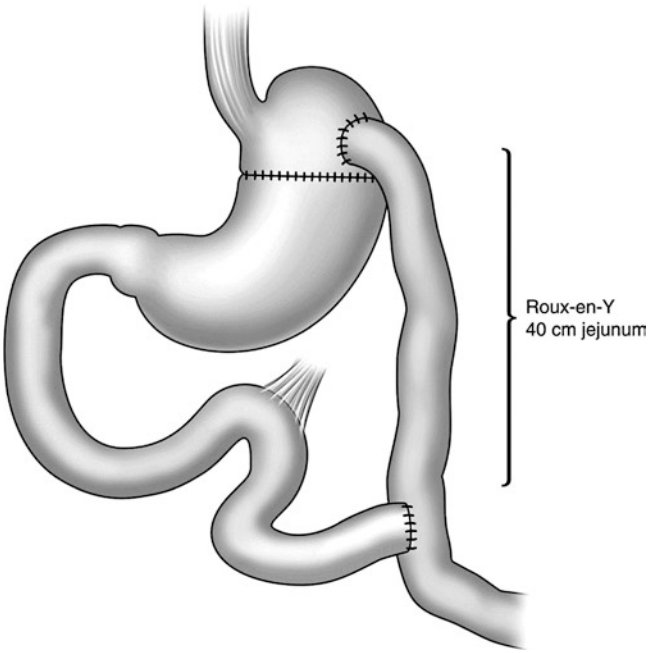

Fig. 3.4 Roux-en-Y limb for gastrojejunostomy

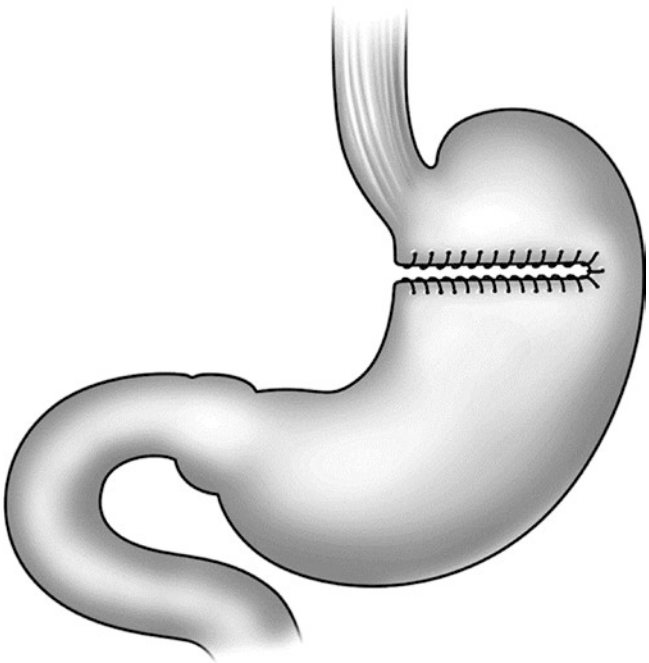

Fig. 3.5 Gastric partition with the opening on the greater curvature of the stomach

popularity for the jejunoileal bypass [6]. The paper was somewhat confusing to the surgical community as it reported results for patients with two different diseases. As these patients were followed longer term, weight regain was observed. Over the subsequent 8 years, Mason published three more papers modifying the procedure by first making the anastomosis between the stomach and the jejunum smaller and then substantially decreasing the gastric pouch size. The problems were multiple. The procedure was performed high in the abdomen and therefore was technically demanding, and the enlarged left lobe of the liver was often problematic. Staplers were not available in the early years. Although early weight loss was obtained, weight regain occurred in many patients by 6 months. Because the procedure involved a loop of jejunum, regurgitation of small bowel content into the gastric pouch frequently occurred. Alden solved some of the problems by doing away with the loop and creating in Roux-en-Y limb for the gastrojejunostomy [7] (Fig. 3.4).

Mason continued to modify his procedure and by the mid-1970s had first performed a gastric partition with the opening on the greater curvature of the stomach. This was done only in a small number of patients and did not seem to produce long-term weight loss (Fig. 3.5). By 1975, Tretbar, Echout, Fabito, Laws, O'Leary, and others had performed a vertical gastric partition along the lesser curvature of the stomach and controlled the outlet using a variety of devices from chromic suture to a silicone ring [8] (Fig. 3.6). Staplers were critical in the development of such a partition. Mason modified his approach by placing an end-to-end anastomosis

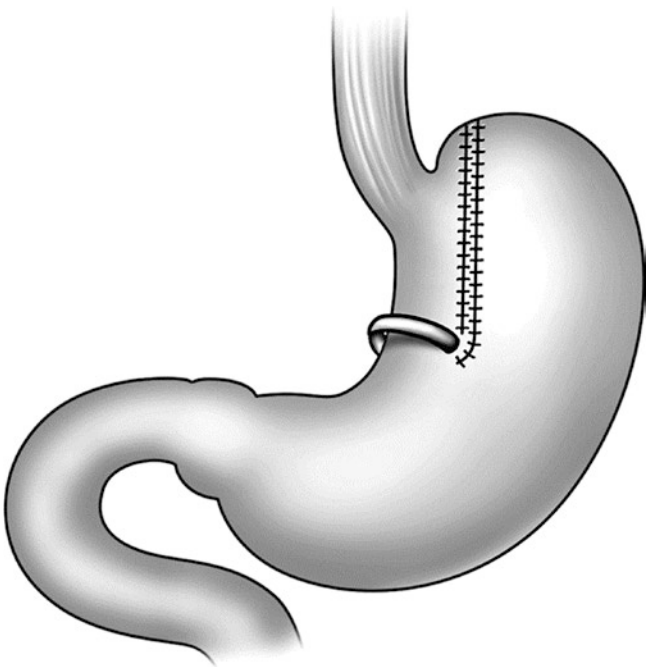

Fig. 3.6 Vertical gastric partition along the lesser curvature of the stomach with the outlet controlled with a silicone ring

(EEA) stapler through the stomach at the distal end of the lesser curvature cylindrical gastric tube and placing a piece of Marlex® mesh through the hole and back up through an aperture at the lesser curvature of the stomach sparing the nerve of Latarjet [9] (Fig. 3.7). This vertical banded gastro-

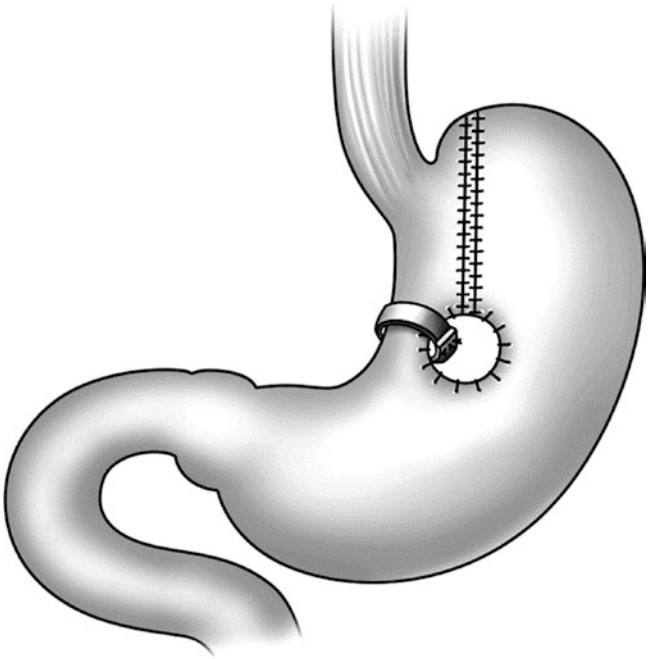

Fig. 3.7 End-to-end anastomosis through the stomach at the distal end of the lesser curvature cylindrical gastric tube with a piece of Marlex mesh through the hole and back up through an aperture at the lesser curvature of the stomach

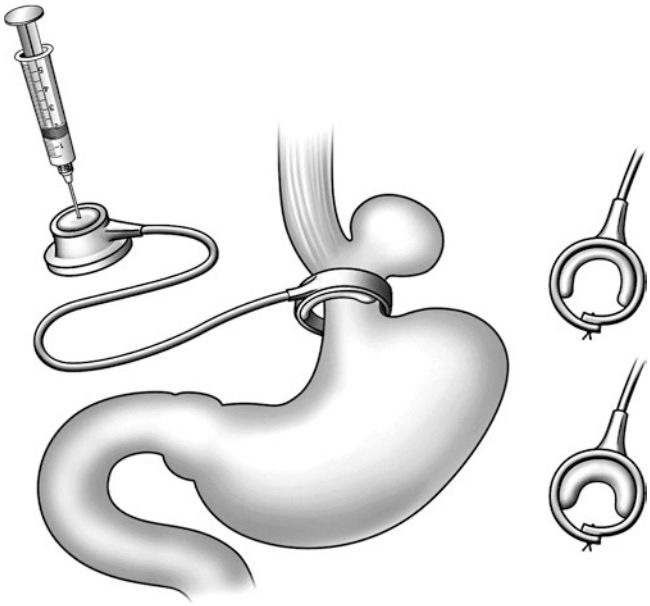

Fig. 3.8 Adjustable gastric banding. A silastic ring with a small balloon embedded on the inner aspect of the ring that could be accessed from a subcutaneously placed reservoir

plasty gained considerable popularity and for a period of time in the early 1980s was probably the most commonly performed bariatric operation in the United States.

The same NIH consensus conference that spelled the demise of the jejunoileal bypass surgery opened an alternate avenue for gastric restrictive procedures. A variety of different mechanisms had been explored to partition the stomach. Various surgeon pioneers began to perfect the operative techniques surrounding gastric bypass procedures. Investigators from the University of Kentucky and the University of North Carolina published comparison studies between the intestinal bypass procedure and gastric bypass [10, 11]. Complications were clearly less in the gastric procedures, and weight loss was equivalent. During the 1980s, Mason continued to champion gastric restriction using the banded gastroplasty. Various modifications of these procedures were proposed.

In an ingenious modification of the silastic ring championed by Laws, L. Kuzmak invented a silastic ring with a small balloon embedded on the inner aspect of the ring that could be accessed from a subcutaneously placed reservoir [12]. This allowed calibration of the outflow lumen (Fig. 3.8). With this innovation, adjustable gastric banding was born.

At this phase in the development of bariatric surgery, which occurred in the 1980s, a number of individuals adopted the philosophy that gastric restrictive procedures—including gastric bypass, which was thought at that time to be primarily a restrictive procedure—were associated with less in the way of postoperative complications, produced satisfactory weight loss, were associated with amelioration of the complications of obesity, and were technically reasonable to perform. Gastric restrictive procedures benefited enormously from advances in technology, especially in the area of stapling devices. Surgeons also learned many invaluable lessons as to the management of obese individuals after other intra-abdominal procedures. These lessons were accepted by the general surgeons, who were not necessarily doing bariatric surgery but operating on seriously obese people for other causes.

Not all of the advances in bariatric surgery were confined to the North American continent. Bariatric surgery was beginning to become recognized in Europe, South and Central America, and to a lesser degree Asia. One of the most prolific writers from the European continent was Nicola Scopinaro, who in 1979 had devised an operation he termed the biliopancreatic diversion (BPD) [13]. Scopinaro performed a generous gastrectomy, usually leaving a gastric remnant about one-third the size of the original stomach. He then divided the small intestine at about its midpoint and brought the ileal end up to be anastomosed to the stomach remnant. The other end of the intestine that carried the biliary and pancreatic excretions was anastomosed to the side of the ileum, approximately 120 cm from the ileocecal valve (Fig. 3.9). This produced an abbreviated channel where the digestive juices mixed with ingested food. Scopinaro reported excellent weight loss results. His patients underwent a large number of metabolic studies that demonstrated amelioration of many of the comorbidities associated with morbid obesity.

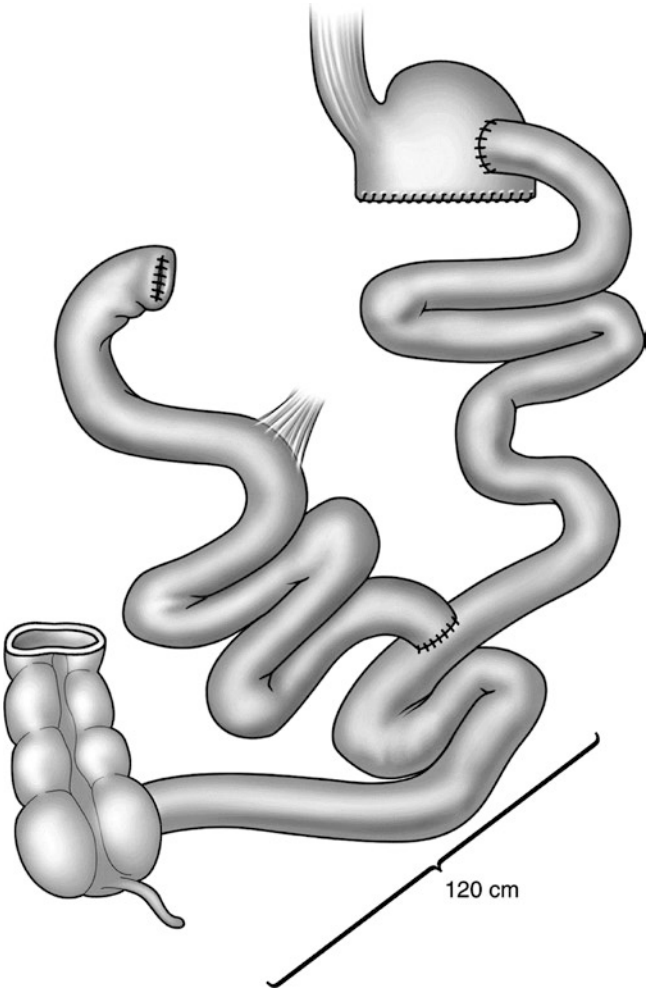

Fig. 3.9 A generous gastrectomy leaving a gastric remnant about one-third the size of the original stomach. The small intestine is divided at about its midpoint, and the ileal end is brought up to be anastomosed to the stomach remnant. The other end of the intestine that carried the biliary and pancreatic excretions is anastomosed to the side of the ileum, approximately 120 cm from the ileocecal valve

He did acknowledge many of the side effects seen in the previously discussed malabsorptive procedures, especially those having to do with iron and divalent cation absorption as well as absorption of fat-soluble vitamins. From the literature, it would appear that his patients required diligent and prolonged follow-up, but with this type of management, Scopinaro reported excellent long-term results [14].

Metabolic

As the decade of the 1980s drew to a close, the field of bariatric surgery had stabilized. Much had been learned and applied over the preceding 25 years. The surgeon's knowledge about the disease had improved substantially. The understanding of complex hormonal mechanisms and detailed physiology was at a much higher level than ever before, although still quite incomplete. The vast majority of procedures were gastric restrictive procedures, with the most common operation performed being the gastric bypass. The bariatric surgical community could now perform this type of surgical intervention with an operative mortality of less than 1% and morbid complications occurring in less than 6% of patients. The beneficial effects had now been clearly documented in certain areas. Although insurance coverage was not widely available, certain payers were beginning to cover the procedures. The field of surgery for morbid obesity was poised at the precipice, awaiting the next great breakthrough. These change agents came in two forms.

The first was a report by MacDonald and Pories published in 1995 detailing the beneficial effect seen in obese individuals with adult-onset (type II) diabetes who had undergone a Roux-en-Y gastric bypass [15]. It was known that diabetes was ameliorated by weight loss. Previous studies, in the early 1980s, dealt with changes in insulin resistance and glucose metabolism after intestinal shunting procedures [16]. Insulin resistance improved, and hyperglycemia disappeared even before weight loss had occurred. This report went virtually unnoticed, in part because intestinal shunting procedures were out of favor.

The Pories report about glucose metabolism and the amelioration of diabetes was well received in the bariatric surgical community but less well received in the general medical community. The report showed that insulin levels plummeted, while glucose metabolism improved, suggesting a change in insulin resistance.

Eight years later, in 2003, Schauer reported similar results in a large cohort of patients who had either impaired testing glucose levels or type 2 diabetes mellitus (T2DM) [17]. Shortly thereafter, prompted by these observations, a summit was convened in Rome by a diverse group of individuals with an interest in T2DM. This summit was well attended by a large number of scientific organizations. A consensus was reached and published in 2010 [18].

Perhaps the most important results of this meeting were the creation of a research agenda and the more widespread understanding of some of the mechanisms by which diabetes was controlled with surgical intervention. It was understood that something was happening to these patients that went far beyond simply rerouting the food flow in the intestines—something metabolic. Although Wolfe had introduced the term "metabolic intestinal surgery" in the mid-1970s, it was only now as surgeons begin to truly appreciate the magnitude of what was being accomplished that the name "metabolic" resurfaced [19].

The third NIH consensus conference on obesity, in 1991, found that surgical intervention of morbid obesity ameliorated many of the comorbidities associated with obesity. In 2008, the membership of the American Society of Bariatric

Surgery elected at the annual business meeting to change the name of the society by adding "Metabolic" to the organization's title. This seminal change refocused efforts on understanding how these procedures worked. In some ways, this validated earlier bariatric surgeons who had demanded that patients be followed long term and that their results be published using defined parameters of success. The conference went on to conclude that the risk-benefit ratio in certain patients favored surgical intervention [20].

Minimally Invasive Techniques

On the second front, in the early 1990s, there was a pivotal technical revolution in general surgery. Surgeons had begun to explore the laparoscopic approach to certain general surgical procedures. Obstetrics and gynecology physicians had known for years that the abdominal cavity could be approached by minimally invasive techniques. These techniques were usually limited to observation and, perhaps through biopsy, diagnosis. Therapeutic interventions had not been a part of their armamentarium. Advances in digital imaging, light sources, miniaturization of cameras, and advanced instrumentation would allow therapeutic intervention to become possible. With these advances, minimally invasive surgery was spawned. As laparoscopic cholecystectomy became commonplace, the tsunami of minimally invasive operations followed. The first minimally invasive gastric restrictive procedure was not far behind.

The first laparoscopic gastric bypass operation in the United States was performed by Wittgrove and Clark in October 1993, using a retrocolic limb with a circular stapler anastomosis for the gastrojejunostomy [21]. Just as in the open procedure, the three key components to the creation of an effective gastric bypass were the creation of a small gastric pouch, a restrictive gastrojejunal anastomosis, and the creation of a roux limb to promote malabsorption. Initially technical constraints made this operation very difficult, but as experience with laparoscopic surgery grew and as suturing, stapling, and electrocoagulation devices became readily available, the popularity of laparoscopic gastric bypass increased rapidly. By the late 1990s almost every academic department of surgery had created a division that performed minimally invasive bariatric procedures.

The era of minimally invasive surgery revolutionized the surgical management of obesity. The number of bariatric procedures multiplied exponentially allowing surgeons to care for patients in a much safer and effective fashion. Laparoscopy allowed surgeons to perform these complex gastrointestinal operations with a level of safety that has never before been seen. This improved morbidity and mortality profile made bariatric surgery increasingly more attractive to patients, surgeons, and referring physicians alike.

The landscape had truly changed – where operative mortality had been less than 1%, now the operative mortality plummeted to less than 0.2%. The rate of complications fell to a third of complication rate for open procedures [22]. Hospital stays went from 3 to 5 days down to 2 days. The use of laparoscopy in bariatric surgery resulted in reduced impairment of pulmonary function [23], less intraoperative blood loss, shortened length of hospital stay, decreased rates of wound infection, and incisional hernias becoming rare [24]. Reduction in complication rates resulted in decreased costs. Patients routinely returned to work in less than 2 weeks.

There was another innovation that affected the safety of surgery for obesity and related disease. The first successful laparoscopic banding procedure was published in 1993 by Broadbent [25]. The authors reported the laparoscopic placement of a nonadjustable gastric band in a 16-year-old female the year prior. Catona also published a series of patients who underwent nonadjustable gastric banding using a laparoscopic approach in the same time frame [26]. These procedures were similar to the Laws procedure without the lesser curvature partition. During the same time, Belachew designed an adjustable gastric band that could be placed using laparoscopic techniques. He described this procedure in a porcine model [27]. This was similar to the band patented by Kuzmak a decade earlier. A large number of bands were placed in Australia, Latin America, and Europe prior to approval of the device in the United States. Subsequently, O'Brien from Australia published a review of laparoscopic adjustable gastric banding that showed durable weight loss of 47% excess body weight (EBW) in patients followed up to 15 years [28].

In 1986, Hess and Hess performed an open procedure adding a sleeve gastrectomy to the original biliopancreatic bypass procedure and modified the anastomosis to a duodenojejunal (BPD-DS) configuration (Fig. 3.10) [29]. Some of the advantages of BPD-DS included the avoidance of dumping syndrome and marginal ulceration by preserving the innovated pylorus and creating the anastomosis between the duodenum and the jejunum. A common channel of 100 cm was created; therefore, malabsorption of protein and calories were increased as compared to Roux-en-Y gastric bypass.

The first laparoscopic duodenal switch was performed by Ren and Gagner in 1999, as a modification of the original Scopinaro procedure [30]. Laparoscopic BPD-DS has been associated with larger weight loss when compared to all other bariatric procedures. It was reserved for patients with a body mass index (BMI) of 60 or greater, but due to technical difficulty as well as concerns for nutritional deficiency, the procedure has not been widely adopted in the United States.

Throughout the history of bariatric surgery, there has been avid interest in developing safer procedures with less complications and equivalent effectiveness in the short and long

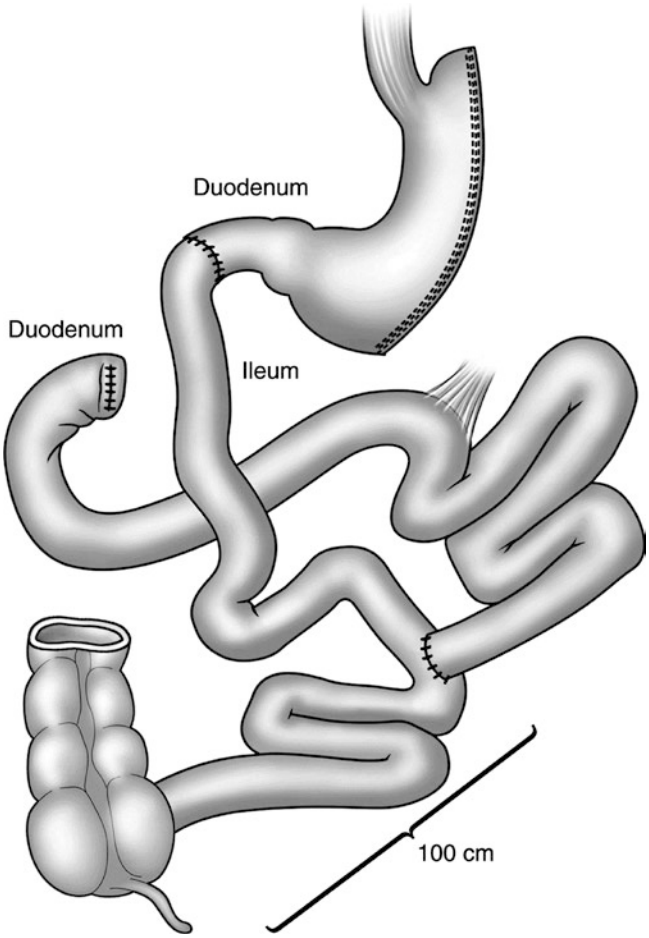

Fig. 3.10 An open procedure adding a sleeve gastrectomy to the original biliopancreatic bypass procedure and modifying the anastomosis to a duodenojejunal (BPD-DS) configuration

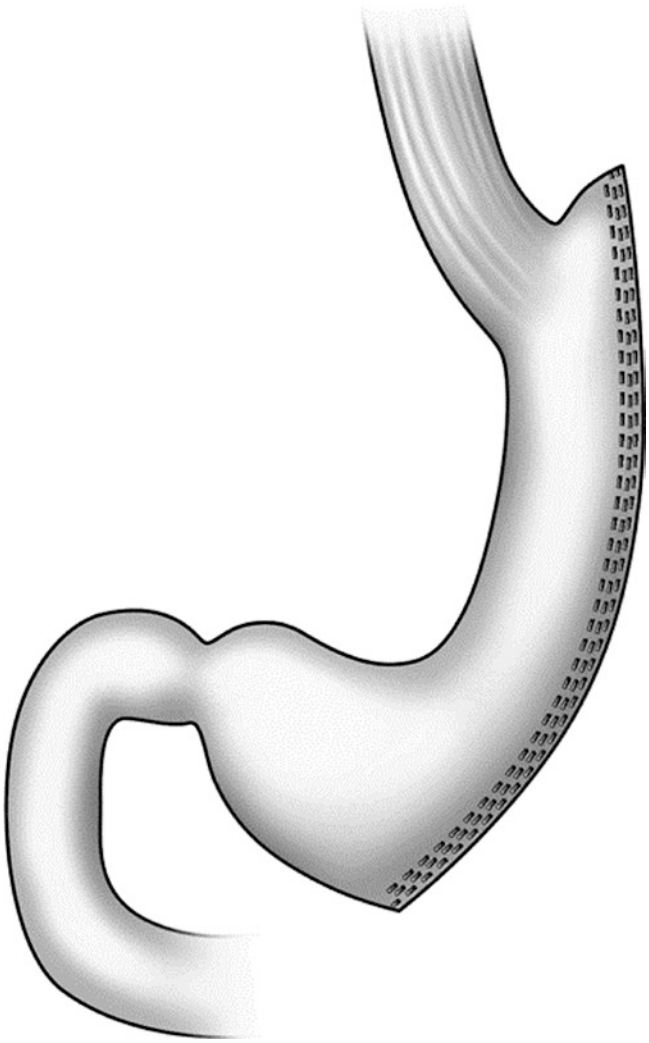

Fig. 3.11 Sleeve gastrectomy

term. Johnston, in 1987, performed the first Magenstrasse and Mill procedure [31]. The idea was to create a safe simple alternative to the gastric bypass and the vertical banded gastroplasty. The Magenstrasse referred to a thin tube created from the lesser curvature of the stomach and the Mill referred to the antrum. The Magenstrasse and Mill procedure was created by using a circular stapler to create a defect in the antrum and then creating a narrow tube along the lesser curvature initially over a 40 Fr bougie. The diameter of the bougie was then reduced to a 32 Fr to optimize weight loss. The technique was subsequently improved by simply resecting the greater curvature of the stomach. The result was the sleeve gastrectomy, which had previously been performed as part of the restrictive component of the duodenal switch by Hess and then Marceau [32].

Sleeve gastrectomy was initially used as part of a two-step procedure in high risk (BMI > 60) patients (Fig. 3.11). Close follow-up of these patients revealed substantial weight loss and resolution of comorbidities with the sleeve gastrectomy alone [33]. The indications for laparoscopic sleeve gastrectomy (LSG) as a stand-alone procedure were published in 2008 [34]. The popularity of the LSG has grown dramatically due to a perceived simplicity of the surgical technique and adequate resolution of comorbidities. However, long-term studies on effectiveness and difficult to treat complications, such as leak, require further evaluation.

Hormonal Weight Loss

As a better understanding of gut peptides emerged, innovative procedures were developed to produce hormonally induced weight loss. One such procedure targeted the gut neurohormonal activity by producing an ileal interposition in upper intestines. Harkening back to the early work of Linner, Mason in 1999 interposed the ileum to a position in the proximal jejunum and produced weight loss [35]. A 170–200-cm-long portion of ileum was isolated leaving 30 cm of distal ileum. This segment was relocated 50 cm distal to the ligament of

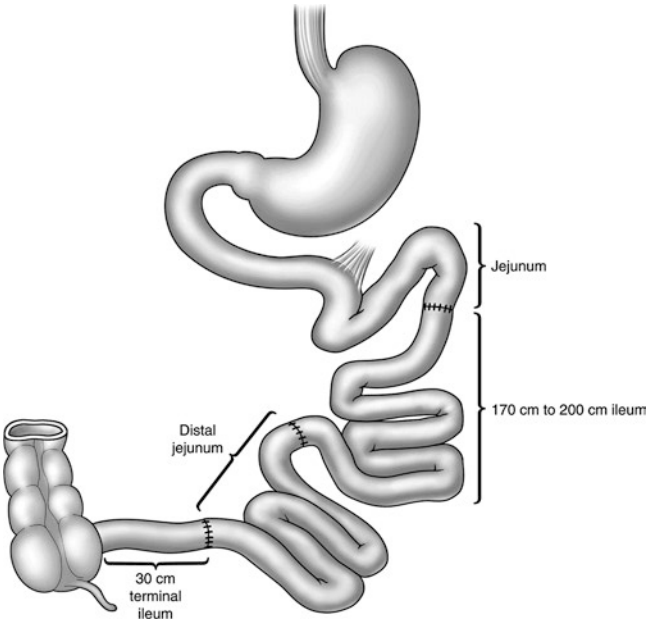

Fig. 3.12 The ileum is interposed to a position in the proximal jejunum. A 170–200-cm-long portion of the ileum is isolated leaving 30 cm of the distal ileum. This segment is relocated 50 cm distal to the ligament of Treitz utilizing two jejunoileal anastomoses. Bowel continuity is restored with a third jejunoileal anastomosis

Treitz utilizing two jejunoileal anastomoses. Bowel continuity was restored with a third jejunoileal anastomosis (Fig. 3.12). Multiple peptides have been studied, some of which surely play a role in food intake and satiety. The most fertile area of current research is in establishing the actual mechanism of action by which metabolic procedures work and relating that to the pathophysiology of obesity and related disorders. It is through this path of investigation that future innovation will improve the safety and effectiveness of these procedures.

Accreditation

In 2004, an impending crisis loomed that centered in some ways around ethics. Two separate factors contributed to the conundrum; laparoscopic procedures were now performed commonly by a markedly increased number of surgeons who felt comfortable approaching the abdomen using a minimally invasive approach. At the same time, more insurance coverage was available for patients needing surgical interventions for their obesity. Although the operative procedure itself was becoming better understood from a technical standpoint, many surgeons, with only minimal skills, were operating on patients who were at high risk. A few high-profile complications attracted attention both on television and in print media, with challenging questions being asked about the level of training of bariatric surgeons and about the necessity of these procedures. It seemed the complication rate was unacceptably high. The underlying bias and discrimination against patients affected by obesity continued to create a public environment of blame for both the patient and the surgeons who operated on them. The ASMBS moved not only to create educational programs but also to establish accreditation for surgeons and institutions that were performing bariatric surgical intervention.

Conclusion

At the close of the first decade of the twenty-first century, several things would appear to be unequivocally true. Firstly, surgical intervention in the treatment of morbid obesity has an acceptable risk-benefit ratio and produces amelioration or control of many of the diseases associated with serious obesity. Secondly, the minimally invasive approach has contributed remarkably to the improvement in the risk-benefit ratio. Thirdly, although much remains to be understood, metabolic/bariatric surgery has emerged from the shadows of charlatanism into the mainstream of general surgery. The baby was not thrown out with the bathwater and has emerged on the surgical stage as a vibrant, healthy adolescent.

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