A History of Bariatric Surgery

The Maturation of a Medical Discipline

Adam C. Celio, MD, Walter J. Pories, MD*

KEYWORDS

• Bariatric • Obesity • Metabolic surgery • Intestinal bypass • Gastric bypass
• Gastric sleeve • Gastric band • Gastric balloon

KEY POINTS

- The history of bariatric surgery, one of the great medical advances of the last century, again documents that science progresses not as a single idea by one person, but rather in small collaborative steps that take decades to accept.
- Bariatric surgery, now renamed "metabolic surgery," has, for the first time, provided cure for some of the most deadly diseases, including type 2 diabetes, hypertension, severe obesity, NASH, and hyperlipidemias, among others, that were previously considered incurable and for which there were no effective therapies.
- With organization, a common database, and certification of centers of excellence, bariatric surgery, once one of the most dangerous operations, is now performed throughout the United States with the same safety as a routine cholecystectomy.

RECOGNITION

Obesity is now a worldwide public health problem, an epidemic, with increasing incidence and prevalence, high costs, and associated comorbidities.[1] Although the genes from our ancestors were helpful in times of potential famine, now in times of plenty, they have contributed to obesity.[1–4] The history of obesity is related to the history of food; the human diet has changed considerably over the last 700,000 years. Our ancestors at one time were hunter-gatherers, consuming large and small game along with nuts and berries. Their diets were high in protein and their way of life was strenuous; they were well suited for times of famine. Those able to store energy for long periods of time survived and passed on those genes.[2] About 8000 years ago, the development of farming allowed people to consume diets that were mainly complex

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Department of Surgery, Brody School of Medicine, East Carolina University, 600 Moye Boulevard, Greenville, NC 27834, USA
* Corresponding author.
E-mail address: poriesw@ecu.edu

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carbohydrates (wheat and barley).[3] More recently, sedentary lifestyles and the development of high-calorie fast foods with high levels of carbohydrates, saturated fat, and salt have contributed to the rise in obesity.[3]

Obesity became much more common and apparent in the 1900s as society progressed. Initially, medical means were used to attempt to help patients lose weight, dating back as far as the 1920s.[4] The results from the earliest attempts were largely unsuccessful and the patients that did achieve weight loss had great difficulty in maintaining their weight.[4,5] Medical modalities for treatment of obesity, namely a low-calorie balanced diet, anorectic drugs, behavioral therapy, and exercise, had little or nothing to offer most morbidly obese patients.[5]

The most important breakthrough in the history of bariatric surgery, that is, that surgery should be considered as a treatment of obesity, is too often forgotten. Although there are a few cultures, such as Hawaiian royalty, in which obesity was considered a sign of power, much of the world, especially in the United States, equates severe obesity with a lack of control. That bias is reflected in the difficulty millions of obese people have in finding such basic things as employment and acceptance in society.[6] Even today, there is great reluctance in admitting that medical therapy (ie, diets, behavioral modification, exercise, and drugs) fails, almost universally, in patients who are severely obese.

DEVELOPMENT OF PROCEDURES

The failure of medical therapy for severe obesity and the success of surgery has, over the last six decades, produced a remarkable series of new techniques and procedures for the treatment of obesity and its comorbidities. Bariatric operations have traditionally been divided into three groups based on their mechanism of weight loss production. Malabsorptive procedures induce weight loss totally by interference with digestion and absorption. Restrictive procedures produce weight loss solely by limiting intake. Mixed malabsorptive and restrictive procedures limit intake and produce malabsorption.[7] **Fig. 1** provides a diagrammatic overview of the operations currently in use and others for historical consideration. The following discussion of bariatric operations provides an overview. Multiple variations of each of the operations have been performed and discarded during the last 60 years with variations in, for example, the size of gastric pouches, length of limbs, type and size of anastomoses, and the use of vagotomy.

Malabsorptive Procedures: Intestinal Bypass

Surgeons have long known that shortened gut could lead to substantial weight loss.[8] The first application of these observations, the surgical treatment of obesity for the purpose of improving comorbidities, was in 1952 by a Swedish surgeon, Dr Viktor Henrickson. He noticed that small bowel resections performed for other disease processes usually produced no change in the patient's general status but, in some cases, resulted in significant weight loss.[9] Based on his observations, he resected 105 cm of small intestine from a 32-year-old obese female who could not complete a weight loss program. Interestingly, the patient lost only a small amount of weight but was noted to have an improved quality of life.[9] Although this was the first reported operation for obesity, it was not adopted for treatment in other patients because of its irreversibility. It would take the development of a reversible procedure for widespread adoption.

Surgeons in the United States were also investigating ways to shorten the intestines as a treatment of obesity and developed the intestinal bypass. Dr Varco, at the University of Minnesota, performed the first jejunoileal bypass (JIB) in 1953.[8] Kremen and

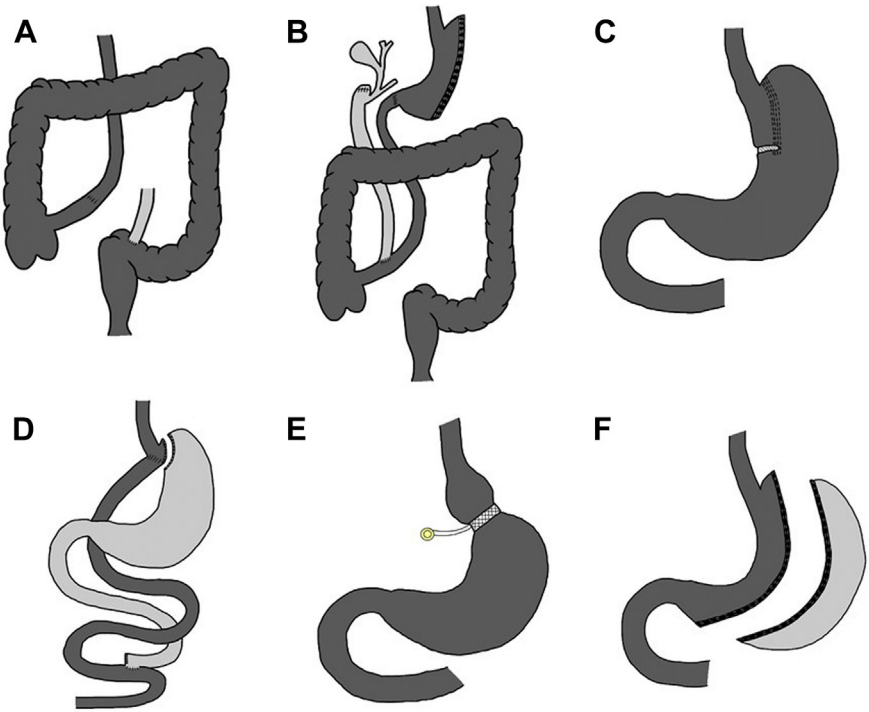

Fig. 1. Overview of bariatric surgical operations. (*A*) Jejunal-ileal bypass: end-to-end jejunoileostomy with ileosigmoidostomy. (*B*) Biliopancreatic diversion with a duodenal switch. (*C*) Vertical banded gastroplasty. (*D*) Roux-en-Y gastric bypass. (*E*) Adjustable gastric band. (*F*) Sleeve gastrectomy.

coworkers,[10] also at the University of Minnesota, published a report in 1954 describing the effects of small intestinal bypass on dogs. He bypassed various portions of the small bowel and found removing 50% of distal small bowel from the intestinal stream was associated with weight loss. This was done by diverting the proximal small intestine to the terminal ileum. They postulated that a bypass of much of the small intestine to the ileum could be used to produce weight loss in the severely obese and referenced the one human patient that had recently undergone the procedure.[10] Their procedure consisted of an end-to-end jejunoileostomy and an ileocecostomy.

Other surgeons began developing variations of intestinal bypasses of much of the small bowel. One of these was a diversion of the proximal small bowel to the colon. In 1963, Payne and colleagues[11] published a series of 10 patients that had jejunocolonic shunts performed. The bypassed intestine included some of the jejunum, the ileum, and the right colon with an end-to-side jejunotransverse colostomy. At the time, this was the largest series recorded of patients undergoing an operation to treat obesity. Initial results showed patients were able to lose weight and had some improvement in comorbidities. The operation was performed as a temporary measure, allowing a time for weight loss then reversal. However, after reversal, patients experienced significant weight gain so the procedure started to be performed with the intention of a long-term bypass with an option of reversal, if needed.[11]

In the following years, after the initial success of Payne, the JIB procedures increased in popularity. Subsequent follow-up over the next decade showed that

although there was significant weight loss, the patients suffered from severe diarrhea, electrolyte disturbances, and nutritional deficits. More importantly, there was a reported death rate of up to 10%.[12] These complications led to a modification by Payne to preserve the ileocecal valve.[13] This consisted of anastomosing the first 14 inches of proximal jejunum to the side of the terminal ileum 4 inches from the ileocecal valve. This procedure became very popular. But despite the modifications, complications continued. Scott and coworkers[14] found that the proximal jejunal segment had elongated in several patients to almost 20 inches and on radiograph, there was reflux of barium into the bypassed ileum. This reflux allowed reabsorption of the contents and weight gain. He concluded that the procedure was still experimental and not ready for widespread therapeutic application.[14] New variations of the JIB were developed to reduce the small intestine's absorptive capability. These included an end-to-end anastomosis of jejunum to ileum and the transected ileum was anastomosed to the transverse colon for drainage of the bypassed segment.[15]

The JIB and its variations were popular in the 1960s and early 1970s, but despite some patient happiness with the results, the procedure had significant postoperative ramifications. Bypass enteritis, an overgrowth of the enteric bacteria in the bypassed small intestine, produced gas-filled blebs. Without any food or bile passage through this limb, there was no peristaltic activity. This created an environment favorable for bacterial overgrowth. Some patients presenting with abdominal pain were found to have pneumatosis of the small intestine on radiograph. This was from a functional ileus with passage of the gas through the bowel wall. Unfortunately, this led some patients to undergo an unneeded operation because it was later found that this process could be treated with antibiotics if diagnosed correctly.[16] Among the most serious complications of the JIB were liver disease from protein deficiency, which often progressed to liver failure and death.[17] Other complications included malabsorption of vitamins and nutrients, electrolyte imbalance, renal calculi, arthritis, significant diarrhea, cholelithiasis, colonic pseudo-obstruction, and osteomalacia.[18] These patients required very close surveillance, diet modifications, and antibiotics to avoid complications. Many patients underwent reversal of the procedure or modifications.[19] For these reasons, the surgeons were not well received, many advocated for its end, and the procedure was abandoned and replaced by other less morbid operations.[20,21] It is one of the darker periods in the history of surgery because more than 30,000 intestinal bypass operations were performed before it was recognized that the complications were unacceptable.[7]

Mixed Malabsorptive and Restrictive Procedures

Gastric bypass

Because the results of the JIB were proving to be unfavorable, other surgeons searched for safer bariatric operations. There was a major breakthrough in 1967, when Mason developed the first gastric bypass, which was the first restrictive and malabsorptive procedure. His team observed that weight loss was common in patients who underwent a gastrectomy for ulcer disease. They studied this using a gastroenterostomy on dogs and concluded that a subtotal gastric bypass could be used for obesity treatment in humans.[22] They reported a series of 24 obese patients in 1969. The procedure was essentially a modification of a Billroth II resection with a different goal.

Because surgeons were already comfortable with the gastric resection for the treatment of ulcer disease, the procedure was able to grow in popularity more quickly as opposed to a novel operation. This loop gastric bypass offered the possibility of reversal with use of the excluded stomach. Despite its' familiarity, the operation proved difficult with operating times in excess of 5 hours.

A series by Alden[23] published in 1977 compared patients that underwent JIB with the gastric bypass and concluded that the gastric bypass has fewer comorbidities, was equally safe, and resulted in equal weight loss. Griffen and coworkers[24] at the University of Kentucky noted that the largest technical difficulty of the Mason loop gastric bypass was obtaining the correct positioning of the stomach and small bowel loop. Several of his early patients had postoperative bilious emesis prompting the change from a loop to a Roux-en-Y type anastomosis in 1977.

The Greenville Gastric Bypass developed at East Carolina University was reported in 1983. Our study included 837 consecutive patients, all treated with an identical operation (30-mL gastric pouch, 10-mm handsewn gastroenterostomy, 60-cm alimentary jejunal segment) with a 95% follow-up from 1980 to 1986 with a mean duration of 9.2 years. This study documented that the procedure could be done safely, achieved a long-term mean weight loss of 102 lb, and most importantly produced long-term remission of type 2 diabetes in 83% of the patients with diabetes.[7,25] From the same series, MacDonald[26] was also the first to document the reduction in the mortality of diabetics by 78%. The study highlighted that patients lost to follow-up were treatment failures and that any new operative procedure requires thorough evaluation before widespread use.[27] The development of the Roux-en-Y was important because it eliminated bile reflux and provided less tension on the gastroenteric anastomosis.

In the 1980s and 1990s, there was additional experimentation and modifications made to improve the operation.[28] Although the gastric bypass had good results compared with the other available options, it also had its own set of new complications. Patients suffered from dumping syndrome if too high of a carbohydrate load was eaten; but some argued that this was beneficial for weight loss as a deterrence to overindulgence. More importantly, marginal ulcers were now a potential serious complication. As seen in other procedures, iron, vitamin B_{12}, and calcium supplements were necessary. In 1994, Wittgrove and coworkers[29] described the technique of the laparoscopic Roux-en-Y gastric bypass. This was a major advancement in bariatric surgery; one of the most difficult abdominal operations could be performed with laparoscopy safely. This approach offered the patients a shorter hospital stay and earlier return to activity among other benefits, and over time replaced the open technique.[7]

Biliopancreatic diversion and biliopancreatic diversion with duodenal switch

In 1979, after success on animal models, Scopinaro and coworkers[30] published a report of 18 patients that underwent a biliopancreatic diversion (BPD) with 1-year follow-up. The operation consisted of a partial gastrectomy with closure of the duodenal stump, transection of the jejunum 20 cm distal to the ligament of Treitz, and a gastrojejunostomy performed with the distal part of the transected jejunum for a limb about 250 cm long. The proximal part of the transected jejunum was anastomosed to the distal ileum forming a common channel of 50 cm with a preserved terminal ileum. This arrangement was created to keep the bypassed bowel from developing stasis and blind loop syndrome seen after older operations. The results from the initial case series showed that the procedure was a safe alternate to the JIB.[30]

The BPD proved to be safe and very successful. Scopinaro and coworkers[31] reported their experiences with the BPD over a 21-year period in 1998. The results of more than 2000 patients showed that the BPD was the most effective procedure in terms of initial weight loss and maintenance of weight. The procedure also had excellent reduction in comorbidities. However, potentially dangerous side effects were identified. The complications included diarrhea, foul-smelling stools, increased

flatulence, anemia from poor iron absorption, stoma ulceration, protein malabsorption, dumping syndrome, peripheral neuropathy, Wernicke encephalopathy, and bone demineralization from poor calcium and vitamin D uptake. Among these, protein malnutrition was the most serious complication of BPD and the most common reason for late mortality after the operation. Surgeons recognized that careful lifetime follow-up was needed for surveillance and prevention of these complications.[32]

Although the BPD produced excellent weight loss, the long-term morbidity inspired others to attempt to improve on it. In 1998, Hess and Hess[33] described the BPD combined with a duodenal switch (DS). The procedure was essentially a hybrid of the BPD and an experimental operation initially used for duodenogastric reflux. The BPD with DS preserved the pylorus with a gastrectomy performed along the greater curvature. After 9 years follow-up, reported weight loss and comorbidity resolution was similar to the BPD data. The advantages of the BPD with DS over the BPD alone were that with the longer common channel there was incidence of less liver failure, renal failure, and electrolyte abnormalities. Additionally, with the preserved pylorus, marginal ulcers and dumping syndrome were not present. The BPD and the BPD with DS are difficult and long operations open and laparoscopically. The most serious complication, however, is the internal hernia, a problem that may need immediate attention to avoid bowel incarceration and necrosis. The complication was rare in the days of open surgery, but has become more common since the advent of laparoscopic surgery, an approach that produces fewer adhesions.[34] This, combined with the potential morbidity if not followed properly, has hindered the popularity of the operations despite the excellent weight loss results.

Restrictive Procedures

Vertical banded gastroplasty

Many surgeons sought other means to provide an operation for obesity that did not involve an enteric or gastric bypass. Gastroplasty was first reported in 1973, working off of the observation that extensive gastric resection with a Billroth II anastomosis produces weight loss, Printen[35] wanted to find a simpler procedure than the loop bypass that would not have the risk associated with bowel anastomoses, and proposed a partial horizontal transection of the stomach leaving a small upper gastric remnant with a narrow channel between the upper and lower gastric pouches. This entailed stapling across the stomach to provide a functional gastric transection with a greater curvature conduit of 1.0 to 1.5 cm between the upper and lower pouches. The gastroplasty resulted in less weight gain compared with gastric bypass, but the common channel could be stretched with excessive eating and become widened. Overtime, partition was modified and breakdown of the staple line remained a problem. To keep the gastric pouch the same size, Laws[36] added a silastic ring around the newly created gastric outlet after a vertical gastric partition in 1981.

One year later, Mason[37] published a series of 42 patients who underwent what he called a vertical banded gastroplasty (VBG). The procedure consisted of creating a vertical partition to create a small, less than 50-mL pouch, and banding of the lesser curvature pouch outlet with polypropylene mesh to keep the outlet diameter consistent over time. He noted that with horizontal stapling, the retaining sutures and staples often failed over time resulting in a larger stoma. The small gastric pouch put the patient at risk for reflux esophagitis. But with a vertical partition, the incidence was less as the angle between the stomach and the esophagus was maintained.[38] The long-term data showed that the silastic ring created stenosis of the gastric outlet in some patients and contributed to food intolerance and reflux esophagitis and had high rates

of reoperation. Other surgeons began using marlex mesh to reinforce the gastric outlet created and this proved to be the superior material for the VBG procedure.[37]

The VBG had advantages compared with the other available weight loss operations available in the 1980s and early 1990s. First, it was not as technically challenging as the bypass procedures. Additionally, it avoided the potential complications of dumping and marginal ulcers. The VBG also was easier to reverse, if needed. However, over several years, patients began to regain their weight. Studies comparing VBG with the gastric bypass with long-term results began to surface in the mid-1990s. The Roux-en-Y bypass proved to be a better weight loss operation. The reports pointed out that the stapled partition began to breakdown over time and weight is regained.[38] Many patients underwent revisions to other bariatric operations. The VBG slowly fell out of favor and was rarely performed once the laparoscopic adjustable gastric band was widely available.

Adjustable gastric bands

In the mid-1970s, Wilkinson at the University of New Mexico began to search for other possible ways to surgically achieve early satiety and reduced caloric intake. He wanted to develop a more physiologic operation without disturbing the continuity of the gastrointestinal tract. He conducted canine experiments in which he tied prolene suture around the greater curvature of the stomach with a 1-cm bougie in the stomach. The dogs lost weight but after 3 to 4 months the stomach dilated back to normal size, so he changed to polypropylene mesh to prevent dilation. His first human patient underwent a similar operation with a polypropylene mesh wrap around the stomach in 1976.[39] The patient was pleased with their weight loss in the first 6 months but became discouraged at 1 year and underwent a gastric bypass.[39] Later, he published a series of 100 patients that underwent a Nissen fundoplication and gastric wrapping with polypropylene mesh. The fundoplication was performed to prevent postoperative reflux. His findings were that the procedure had satisfactory weight loss and gave the patients early satiety without any metabolic or physiologic changes.[40]

As the operation gained popularity and success, different sizes and materials of mesh were used to decrease inflammation and the potential for erosion. Fewer surgeons began wrapping the entire stomach as Wilkinson did initially and began using 1- to 2.5-cm bands placed across the stomach to create a small upper pouch and narrow channel to the remaining stomach. Among the most used materials was the Marlex mesh. In a series with 7 to 12 years follow-up from Sweden, the Marlex gastric band was not successful at long-term weight loss. Half of the patients underwent revision because of severe vomiting, esophagitis, and weight gain.[41] Other surgeons used silicone bands with better results. Despite this, the nonadjustable banding procedures were difficult in creating the correct stoma size and reoperations were at a high rate because of obstruction. Additionally, the gastric pouch could dilate over time contributing to reflux esophagitis.[42]

With further development of the procedure, the band was made adjustable. The adjustable bands were originally developed in Austria by work on rabbits. The goal was to develop a reversible gastric band that could be adjusted to the individual needs of the patient. A liquid-filled silastic cuff that is placed around the stomach adjacent to the cardia was used. The cuff diameter was adjusted by filling or draining fluid from a subcutaneous valve accessed by percutaneous needle puncture.[43]

The adjustable band provided patients with a variable size stoma that could be altered based on their symptoms. The procedure proved to be better at weight loss than the nonadjustable band and had fewer complications.[42] The adjustable bands easily displaced the nonadjustable in popularity. Around this time in the early 1990s,

laparoscopy was starting to offer alternative ways of traditionally open procedures and in 1993, Belachew and coworkers[44] described laparoscopic adjustable silicone band placement. The laparoscopic gastric band became the most common bariatric operation in Europe and later the United States. Laparoscopic adjustable gastric banding was able to provide a significant loss of excess weight with few complications and a reduction in comorbidities. The procedure provided a less invasive and reversible operation than a gastric bypass with similar short-term weight loss, but with long-term potential risks of band slippage, erosion, and foreign body infection.[45] Although the operation has fallen out of favor in recent years, the adjustable gastric band remains a current option for obese patients.

Sleeve gastrectomy

The sleeve gastrectomy (SG) was originally described as a staging procedure for super obese patients to bridge them to a more definitive operation. After observing a high morbidity and mortality rate after BPD with DS in the super obese, Regan and Gagner developed the two-stage operative approach. The patients underwent an initial SG over a 60F catheter bougie, then in 6 to 12 months after plateau of weight loss, the patients would undergo a second stage BPD with DS or gastric bypass.[46] The SG separates the greater curvature from the lesser curvature and the antrum. The first laparoscopic SG (LSG) was reported in 1999 and the first report of SG as a standalone operation was in 2003.[47]

Many patients that underwent SG as a bridge operation lost enough weight with the SG that the secondary procedure was no longer necessary or wanted by the patient. Gagner and coworkers[47] published a comparison of LSG patients with laparoscopic adjustable gastric band patients. They found that the LSG was comparable in short-term 1-year weight loss and had the benefits of a decreased need for reoperation, no foreign material in the body, and decrease in ghrelin production.

The standalone LSG has increased in popularity in the last several years and now is the most common bariatric operation performed in the United States.[48] The SG has many advantages over other current operations. The SG is less technically demanding than the gastric bypass or BPD; has minimal morbidity; has no foreign material; and is without marginal ulcers, dumping syndrome, internal hernias, or nutritional deficiencies. Complications seen with the LSG are staple line leaks and strictures. Over time, the leak rate has decreased with improved surgical techniques. The LSG's favorable weight loss results, significant remission of comorbidities, and very low rates of postoperative mortality and morbidity have contributed to its rise in popularity.[49] The LSG is still a relatively new procedure without much long-term data; it has to be seen what the future holds for this operation.

Gastric balloon

Despite their knowledge of comorbidities associated with morbid obesity, some patients are reluctant to undergo bariatric surgery. Intragastric balloon placement offers an alternative to these patients. The intragastric balloon provides a temporary, reversible, and repeatable treatment. The balloon is placed endoscopically and typically the balloon is filled with 500 mL of saline and removed after 6 months.[50] Newer balloons with two intragastric chambers are available to help prevent migration. The therapy has been found to have only a temporary effect up to 3 years, despite repeat balloons.[51] The weight loss experienced does improve obesity-related comorbidities, but typically the weight is regained and the positive effect lost.[50] The balloon, along with diet and exercise, has shown better weight loss results against diet and exercise alone in a prospective randomized trial.[52] The balloon does not solve obesity and only

with multiple placements can it control obesity in the long term, but in patients who decline surgery, it should be strongly considered.[50] However, up to 32% of patients who undergo gastric balloon placement eventually go on to have bariatric surgery.[50,51]

MEASUREMENT OF OUTCOMES

An innovation that advanced bariatric and metabolic surgery was quality control and documentation that operations could be done with minimal mortality and morbidity. Our studies, the Swedish Obese Subjects (SOS) study, and the National Institutes of Health/National Institute of Diabetes and Digestive and Kidney Diseases Longitudinal Assessment of Bariatric Surgery (LABS) all demonstrated the importance of long-term studies. The SOS study was a prospective controlled trial of 4047 obese patients, with 2010 undergoing bariatric surgery including gastric bypass, banding, and VBG; and 2037 in a matched control group undergoing conventional treatment. The patients were followed over a period of up to 15 years, with average 10.9 years of follow-up for 99.9% of patients. The results from SOS showed that compared with conventional treatment, the surgery group was associated with a long-term reduction in overall mortality and decreased incidence of diabetes, myocardial infarction, stroke, and cancer.[53] The LABS study was established to analyze the risks and benefits of bariatric surgery and its impact on the well-being of patients with obesity.[54] The consortium collected data starting in 2005. LABS first evaluated the 30-day outcomes after bariatric surgery, with data from 4776 bariatric surgery patients, with an overall 30-day mortality rate of 0.3% and low rate of adverse outcomes, comparable with a laparoscopic cholecystectomy.[55] LABS also evaluates long-term safety and efficacy of bariatric surgery and its data have led to multiple publications and newfound knowledge in bariatric surgery.

A FOCUS ON SAFETY

Another aspect of the quality control innovation was the development of Centers of Excellence (CoE). Confronted with reports of disastrous clinical outcomes in hospitals with limited experience, an increase of malpractice suits, and unaffordable insurance premiums, the leadership of the American Society of Bariatric and Metabolic Surgery created a program for the certification of CoE in 2003.[7] The certification required standardization of care paths, training of hospital personnel, well-equipped hospitals capable of managing very obese patients, and registering all patients and their outcomes. In addition, all sites were inspected at least once every 3 years, often with unannounced visits.[56]

Outcomes were recorded with the Bariatric Outcomes Longitudinal Database (BOLD) in the program that eventually included 425 hospitals in the United States and other centers in 22 countries. BOLD collected patient demographics and surgical outcomes for up to 2 years after their operation. BOLD provides information for providers to learn and provide better patient care. In 2006, the Centers for Medicare and Medicaid Services (CMS) restricted procedures coverage for bariatric procedures for Medicare patients to CoE.[57] In 2012, the program was absorbed by the American College of Surgeons, which had developed its own CoE program to ensure there would only be one set of standards for bariatric surgery. In an interesting development, centers that were not certified were forced to produce the same excellent outcomes to continue reimbursement by carriers. This “the tide lifts all boats” phenomenon then led the CMS to stop requiring center certification for reimbursement in 2013, the price of success.[57,58] Despite the CMS decision, private insurers continue to support accreditation and restrict coverage to high-volume centers.

SUMMARY

Currently in the United States there is a failure for the medical community as a whole to take full advantage of this breakthrough. More than one-third of Americans are obese and approximately 20% have a body mass index greater than 35.[59] Furthermore, there are 29.1 million Americans with type 2 diabetes, with close to 2 million newly diagnosed cases annually.[60] Despite this, there were only 179,000 bariatric operations performed in 2013.[61] Less than 1% of possible patients underwent a treatment that could cure them of diabetes, not to mention improvement in their other comorbidities. There are several prospective randomized studies that show superiority of the bariatric operations to intensive medical therapy.[62–65] There are also retrospective studies that show patients that underwent bariatric surgery compared with a matched control group without surgery have lower all-cause mortality and decreased deaths from diabetes, heart disease, and cancer.[66,67] Despite the benefits and the supporting data, patients remain afraid of surgery and many physicians are not convinced that traditional treatments are not effective.

This delay in acceptance of a revolutionary treatment has been seen many times throughout medicine. For example, Alexis Carrel developed the basic principles of vascular surgery in 1894 but the first vascular procedure did not occur until 1962.[68] Additionally, laparoscopy was used in 1901 by Georg Keiling on dogs[69] but it was not until 1981 that Kurt Semm performed a laparoscopic appendectomy.[70] Along those same lines, in the 1940s, Gerhard Kuntscher developed and used the first intramedullary nail in Europe during World War II. The procedure was described in Time magazine in a 1945 article "Amazing Thighbone," but American surgeons remained skeptical of his methods. It was not until the 1970s that the closed nailing technique was revisited and is now the standard of care for femoral shaft and tibial fractures requiring operative stabilization.[71]

With the obesity epidemic and the increasing prevalence of associated comorbidities, more work needs to be done to educate patients and physicians of the lifesaving ability of bariatric surgery.

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