Risk Reduction in Gastric Operations for Obesity

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Although nearly devoid of late complications, gastric operations for obesity have resulted in 4.7% early postoperative perforations. For patients over 39 years of age who perforated, the first 11 patients died and the last 9 survived. Perforations are equally common in upper stomach, anastomosis, and lower stomach. They have become more frequent with the 50 ml upper stomach volume and 12 mm stoma that are required to assure optimum weight control. Perforation is as common with gastroplasty as with gastric bypass. If it occurs, it is normally within the first ten postoperative days. Acute dilatation and rupture of the stomach can happen if all the nasogastric tube holes are in the jejunum after gastric bypass. Erosion of the stomach by the hard end of the nasogastric tube has occurred when the tube was positioned in the upper stomach. This paper is dedicated to the prevention of death by early recognition and aggressive management of perforation and by prevention of perforations through careful attention to the details of these operations and early postoperative care.

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IN GENERAL, SURGICAL PROCEDURES are justified on the basis of risk and benefit. By limiting the use of operations for obesity to patients more than twice their estimated ideal weight, the benefit to life style, health and the probable increased life span can be high enough to warrant the limited morbidity and mortality imposed by an operative procedure. As the risk of the operation is decreased, its use can be extended to more patients whose morbid obesity predisposes them to diabetes, hypertension, degenerative arthritis, heart failure and other complications. The success or failure of treatment of each obese patient with a new procedure has implications for all future patients. It is, therefore, in the interest not only of current patients but of all future and potential patients that risk be studied in detail and reduced as rapidly as possible.

Gastric operations for obesity were introduced with gastric bypass[5–7,10] in 1966. Specifications for success of these operations consist of a 50 ml upper pouch volume together with a 12 mm stoma. Weight reduction results from a decrease in food intake similar to a weight reduction diet. The construction of a diminutive stomach introduces a significant risk of gastric perforation (40 in 863 operations, 4.6%). A surprising observation is that perforation occurs only in the early postoperative period, usually due to errors in operative technique or in early postoperative management. Gastric perforation is amenable to early recognition, effective management and prevention. This paper will explain how the mortality rate has been lowered and how the causes of perforation can be corrected.

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Recognition of Perforation and Peritonitis

Early recognition and reoperation after perforation is the key to recovery with minimal morbidity. We have discharged patients as soon as ten days after early reoperation, while other patients have been hospitalized as long as 161 days primarily because of delay in reoperation. The mean length of stay for reoperated patients has been 37 days. The combination of physician inexperience and patients older than 39 years of age produced a mortality rate of 100% prior to October 1, 1975 (Table 1). Since October 1, 1975, in spite of a two-fold increase in the incidence of perforation, survival has been 100%. This has been due to early recognition, prompt reoperation (Fig. 1) and the type of management described below. The effect of early recognition and better management is less apparent for younger patients but is no less important.

Early recognition of perforation is accomplished primarily by a surgeon's attitude towards complications. While an operation is in progress it is proper for the surgeon to feel that nothing could possibly go wrong with such a well performed procedure. As soon as the last suture is placed, however, the attitude of the surgeon should change to one of looking for a complication and wanting to be the first to recognize it. Such an attitude should be reinforced by the informed consent of patients who know that reoperation could be required.

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TABLE 1. *Survival Rates for Patients Who Have Had Perforations**

Age	Experience Prior to Oct 1, 1975			Experience After Oct 1, 1975		
	Operations	Perforations	Survivors	Operations	Perforations	Survivors
39+	211	11 (5.2%)	0 (0%)	116	9 (7.8%)	9 (100%)
38−	329	8 (2.4%)	6 (75%)	201	12 (6.0%)	10 (83%)
Total	540	19 (3.5%)	6 (32%)	317	21 (6.8%)	19 (90%)

* The patients are separated according to their age and the authors' experience in management.

Pain is a prominent symptom with perforation (Table 2) in contrast to uncomplicated recovery. Obese patients with uncomplicated gastric bypass move themselves out of bed and walk without undue discomfort, even on the evening of their operation. Incisional pain is usually minimal when the patient is lying quietly. Palpation of the abdomen during the early postoperative period is important. This is true even for uncomplicated patients because it prepares the surgeon to recognize signs of peritonitis when a leak is present. Normally patients have minimal tenderness. Shoulder pain, back pain, diffuse abdominal pain and pelvic pain are unusual and require investigation. Obese patients usually prefer a semirecumbent position because it facilitates breathing. As a result, if perforation occurs, the pelvic peritoneum is bathed in irritating digestive juices. According to nursing staff recollections, pelvic symptoms such as frequency and incontinence of urine or vaginal pain have been more common than previously recognized. Failure to record these symptoms in the past was due to the fact that we were not aware of their implications.

Patients with peritonitis appear anxious, ashen and sweaty. They express fear. They are short of breath due to increased requirements for gas exchange and because deep breathing is painful. They may be up and about seeking relief by change in position. Compared to the uncomplicated patient who often looks and acts as though no operation had been performed, these patients appear ill. If a morbidly obese patient becomes difficult to manage and a complainer postoperatively, it is not a manifestation of some special characteristic of the morbidly obese but rather a possible indication of a serious complication.

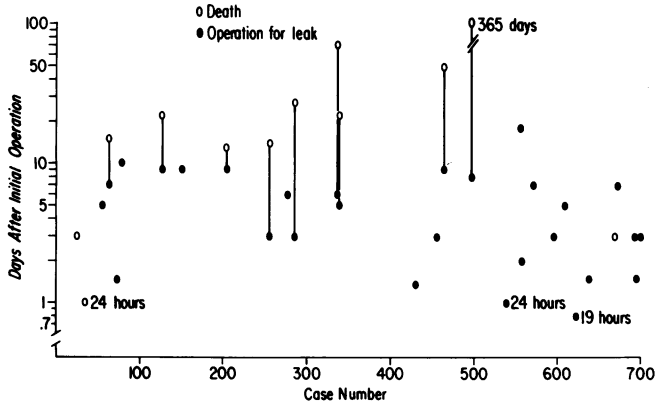

FIG. 1. Day of reoperation and death if it occurred, are plotted against case sequence number. With more timely reoperations, deaths have become less common.

The single most helpful sign in diagnosing peritonitis is abrupt tachycardia. During the first postoperative day the average pulse plus one standard deviation for patients without perforation is 120 beats per minute. Only four patients with perforation failed to have a pulse higher than 120 per minute. Twenty patients had a pulse rate above 150 per minute and 14, above 160 per minute.

Perforations are about equally common in the upper stomach, at the anastomosis and in the lower stomach (Fig. 2). The pyloric ring prevents contrast media from reaching the bypassed segment. It is not surprising, therefore, that 17 of 30 upper gastrointestinal radiographic studies were negative. A water soluble agent was used because of the problems arising when barium enters the peritoneal cavity. If a Hypaque® study is negative, the stomach contents should be aspirated and a small amount of thin barium instilled. In at least three patients the Hypaque was injected into the nasogastric tube. Consequently, a perforation in the upper stomach was bypassed and missed because the tube holes were beyond the stoma. The position of the tube both caused the perforation and prevented its detection. A negative roentgenogram should not be considered as conclusive evidence of an intact gastrointestinal tract. Eleven studies with Hypaque showed

TABLE 2. *Type and Frequency of Recorded Complaints in 36 Patients with Perforation*

Complaint	Frequency
Abdominal pain	25
Shoulder pain	15
Back pain	9
Shortness of breath	18
Sensation of fullness (urgency to void)	4
Anxiety	5

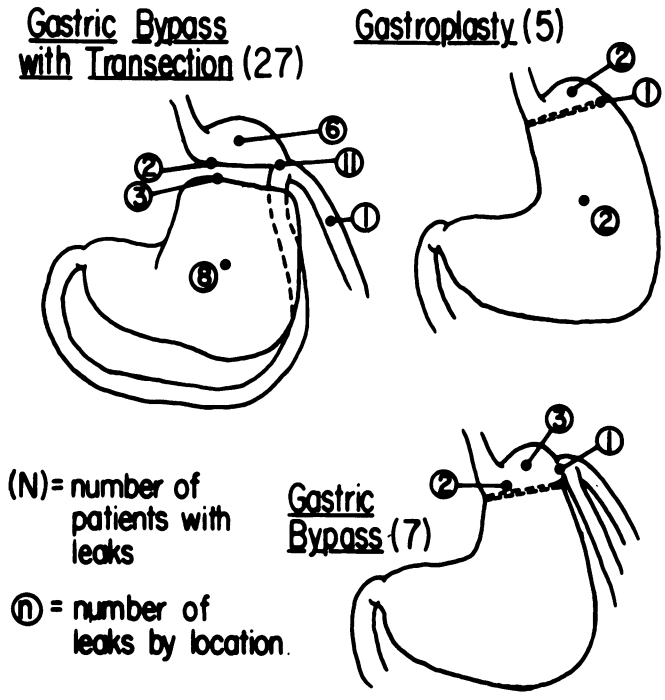

FIG. 2. Shows the location of perforations in 39 patients who were explored after the three different types of operations. Number of patients are shown in parentheses and number of perforations in each location is given in the circles. In the case of Gastric Bypass (7 patients), the precise location of perforation could not be determined in one patient.

neither the contrast material nor air in the peritoneal space even though all of these patients had operatively proven perforation. Exploration must often be undertaken on the basis of clinical signs and symptoms if morbidity and mortality are to be reduced.

Management

When the presence of a perforation has been established or is suspected, effective nasogastric suction must be assured. In some patients tachycardia and pain may be due to gastric distention. If decompression can be established soon enough by appropriate placement of the nasogastric tube or even by operative placement of a gastrostomy in the lower stomach, perforation can actually be prevented.

Extracellular fluid volume must be restored to guarantee adequate circulation and urinary output. This can be completed in the operating room. Several patients have been oliguric or even anuric when the operation commenced but were diuresing actively by the end of the operative procedure. Intravenous Clindamycin and Gentamicin are begun preoperatively. Operatively, the abdominal wound must be opened completely and the sites of perforation identified and closed. Only 12 patients had single sites of perforation. Feeding and suction enterostomies and a suction gastrostomy are popular in patients with peritonitis and the prospects of a prolonged postoperative course. In these patients, who often have hidden veins, a feeding enterostomy is of great value because there may be a prolonged period when the upper gastrointestinal tract must be at rest, even though the majority of the small bowel is functioning normally. Witzel enterostomies should be performed. This is necessary because these patients are difficult to mobilize postoperatively and, if the tube is accidently pulled out while the patient is trying to move, any hole torn in the wall of the stomach or intestine will thus be safely in the depths of the Witzel tunnel rather than open to the peritoneal cavity.

If the site of the perforation or perforations can be found and securely closed and if the peritoneal cavity can be properly debrided, drains are not necessary. Sometimes the site of the perforation cannot be found or is inaccessible. In such a case it may be elected to place drains in the area. Drains of all kinds have been used. Sometimes they are not needed and often they do not function well. Probably the best drain is a composite made from a Penrose drain with multiple holes cut in its wall and two Robinson catheters inside of the Penrose. One large catheter with multiple holes is used for suction and a smaller catheter for air or for irrigation with sterile saline.

In addition to early reoperation with drainge and closure of perforations, the most important addition to the treatment of peritonitis is radical debridement, recommended by Hudspeth.[4] The sooner the reoperation, the less fibrin will be found and the more likely that irrigation with sterile saline will suffice to clean the peritoneal cavity. If fibrin has formed, it should be removed as completely as possible from all peritoneal surfaces throughout the abdomen to reestablish normal function for the peritoneal surface in its extraction of bacteria. Finally irrigation with sterile saline is continued until the fluid is clear.

If experience with these problems is limited, there is a temptation to consider abandoning the operation. Conversion of a gastroenterostomy to a gastrogastrostomy may be a more satisfactory approach. There have been several attempts to close off the anastomotic sites and rely on gastrostomies to drain the two segments. This is the least satisfactory solution and assures the patient of at least one more and usually multiple operations with consequent increased risk of death.

Temperature probes should be placed in the patient's rectum and/or esophagus before the reoperation is begun. If the temperature is in the range of 40° the irrigating fluid can be cooled to help reduce the patient's fever. Radical debridement may increase operating time to three or more hours but the time is well spent

and justified. There are occasional patients whose perforation is recognized late but who have been able to localize an abscess to the subphrenic space without generalized soiling of the peritoneal cavity. For these patients drainage of the local abscess may be sufficient. For most patients, however, the approach described above is preferable and, if there is any question about which way to direct the treatment, the radical debridement with the entire peritoneal cavity exposed is preferable.

Postoperative Care

Severe peritonitis even in the thin patient can cause death by what Burke, Pontoppidon and Welch[2] have called high output respiratory failure. These patients often require postoperative ventilatory support. The endotracheal tube is left in place and a volume regulated ventilator is used. Septic obese patients develop respiratory failure because they cannot tolerate the increased respiratory demands of the hypermetabolic septic state. Therefore, they must be ventilated to relieve them of the work of respiration and cooled artificially to lower their metabolic needs. Cooling may be difficult because of the thick layer of fat. It may be necessary to curarize these patients and place them between two cooling blankets to achieve proper thermal control.

Whereas expansion of the extracellular fluid is usually needed before and during the operation, there may be fluid overload postoperatively. Close monitoring of pulmonary artery and wedge pressures through a Swan-Ganz® catheter, systemic pressure measurement, urinary output and blood gases help to direct proper management. Pulmonary perfusion pressure is influenced by obesity, positive pressure breathing and sepsis. The difference between pulmonary artery diastolic and pulmonary wedge pressure is of help in evaluating the progress of sepsis.[11] Serial cardiac outputs help to determine the need for blood plasma and additional fluids. Cooling is used to counteract hyperpyrexia but not to produce hypothermia. The earlier re-explorations are undertaken the simpler the postoperative care. The improvement in survivorship is evident in Table 1 and Figure 1. In fact, the only recent death from perforation involved a patient in whom the surgeons failed to recognize the classical signs and symptoms and did not re-explore the patient.

Prevention of Perforation

It would be easier to solve the problems of perforation if there were only one cause. Unfortunately, there seem to be multiple causes but most are related to the position and function of the nasogastric tube. We

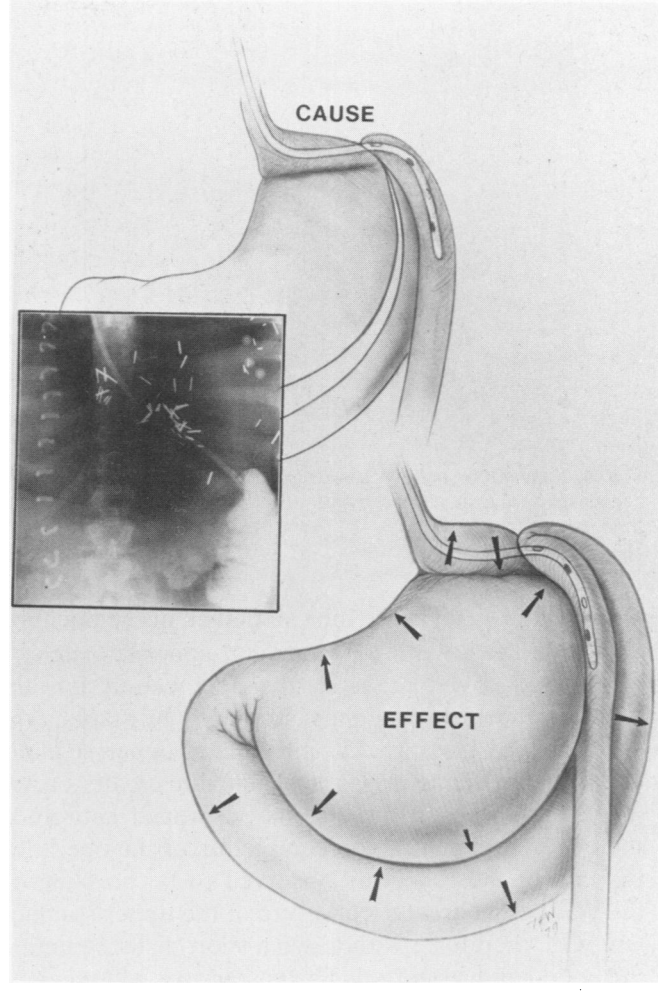

FIG. 3. Shows how placement of the nasogastric tube through the gastroenterostomy stoma may result in failure of the tube to prevent distention of the entire stomach. This is because all of the openings in the tube are in the efferent limb of the jejunal loop.

are at the stage in the use of this operation at which some of the complications are probably the result of trying too hard to prevent all of the problems of the past. The situation is analagous to the early days of Billroth II gastrectomy when duodenal stump leaks led to the use of more sutures and this in turn led to more leaks. In some respects it may be the same problem except that we have reason to believe that now the perforations are the result of excessive gastric distention rather than poor closure of the bypassed segment. There is evidence in some patients that the nasogastric tube failed to decompress the stomach because the openings in the tube were beyond the gastroenterostomy stoma and located in the efferent limb of the jejunal loop. As a result, the upper stomach, the afferent jejunal limb, the duodenum and the distal stomach became markedly distended (Fig. 3). The obvious response to observing such a complication is to

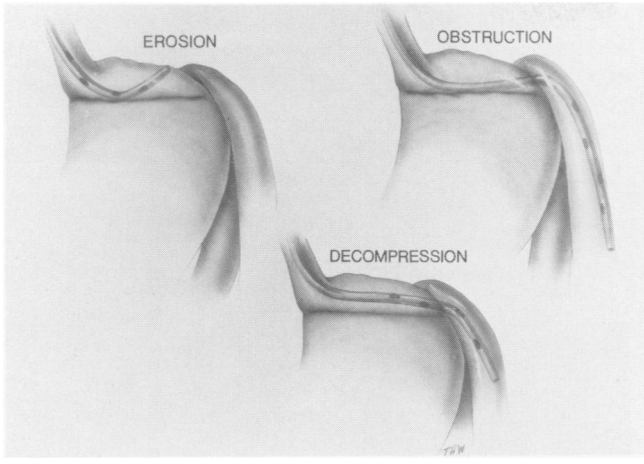

FIG. 4. Shows too shallow, too deep and correct placement of the nasogastric tube in gastric bypass. Both erosion and obstruction have caused perforation.

position the nasogastric tube so that all of the openings will be in the lower esophagus and upper stomach.

Having arrived at such a simple conclusion the senior author performed a gastroplasty by stapling the stomach and leaving a 50 ml volume upper segment and a 12 mm diameter passage along the greater curvature. The nasogastric tube was positioned entirely in the upper stomach. Upon completion of the operation the end of the tube was observed to be pressing on the wall of the greater curvature of the upper stomach and was, therefore, withdrawn a short distance before the abdomen was closed. The nasogastric tube seemed to be working well because 50 ml of swallowed water would promptly return. On the second day slightly bloody drainage appeared and the volume of nasogastric drainage increased. These observations brought to memory patients in whom removal of the tube, in the presence of increasing nasogastric drainage before passage of flatus, had been followed by perforation of an obstructed upper stomach. For this reason the nasogastric tube was left in place. The pH of the gastric secretions dropped to two by color indicator paper and, according to the suggestion of Gomez,[3] cimetidine was administered. Finally on the fourth day there was passage of flatus and the tube was removed. However, by this time the patient's temperature elevated to 39° and the pulse rate increased to 120 per minute. Hypaque swallow was obtained and demonstrated extravasation. In the interim the patient had developed left shoulder and abdominal pain and frequent urination in small amounts, all signs of peritoneal irritation.

Reoperation showed a hole in the anterior wall of the stomach just above the stoma where the end of the nasogastric tube had been seen at the conclusion of the initial operation. The hole had the appearance of pressure necrosis. It was the exact size of the plastic nasogastric tube that, incidently, has a very firm tip. The mucosa was healed to the serosa and was not protruding. There was almost no reaction in the surrounding stomach wall and the opening did not have the radiating tears that are characteristic of rupture from distention. The patient commented on the second day following gastroplasty that there was strong tugging on the nasogastric tube. Apparently peristalsis pulled the tube down and this had re-established pressure of the tip against the stomach wall and had eroded through. We have seen similar perforations, although not yet in an obese patient, in which a gastrostomy tube has been inserted too far. Malecot catheters have now replaced stiff catheters for use in gastrostomies. The plastic nasogastric tubes are not rigid enough to be passed down the esophagus during an operative procedure without at times doubling up. However, the end of the tube is too rigid to rest in one position against the wall of the stomach without perforating that wall.

The small size and boot shape of the upper stomach in both gastric bypass and gastroplasty contributes to the problem of perforation (Fig. 4). The nasogastric tube must make two nearly right angle turns, one at the cardia and the other at the gastroenterostomy, if the tube is positioned through the stoma. Placement of the tube a few centimeters through the stoma positions the end of the tube in a relatively safe area. If the tube is placed entirely in the upper stomach the combination of the bend at the cardia and the pressure of the stapled stomach on the side of the tube immobilizes the tube and holds its end against the anterior wall of the stomach near the greater curvature and just above the stoma. This is the site of most of the perforations that have occurred in gastroplasty in our experience. This is also the area where perforations have occurred in the experience of Gomez.

With the nasogastric tube posing a risk from being positioned too deeply, causing distention because all holes are beyond the stoma or too shallow and making erosion more likely, perhaps the best solution would be to not use a nasogastric tube at all and to rely on a gastrostomy placed in the lower stomach. Provided that the tube functioned properly and the stoma were patent, this would decompress both the upper and lower stomach. If both a nasogastric tube and gastrostomy were used the nasogastric tube could be removed early on the morning following operation. The gastrostomy tube should be a soft nosed Malecot catheter, positioned so that the opening is just within the gastric wall and will not cause pressure on the opposite wall. It should be positioned far enough below the area where the stomach is stapled to assure that there will not be pressure on the staple line. Reliance on the gastrostomy

without a nasogastric tube or with early removal of the nasogastric tube requires assured patency of the small stoma draining the upper stomach. Lewis, in our group, recommends intraoperative injection of air into the upper stomach as a means of determining patency. Sometimes the construction of the stoma can leave an obstructive flap valve.

With regard to the prevention of perforation, what can be recommended for gastric bypass should also be applied to gastroplasty (Table 3) because the factors contributing to the problem (small volume, boot shape and small outlet of the upper stomach) are the same. In both procedures there is a need for removal of swallowed air and secretions before excessive distention is created. Because there is limited room for the tube, which must be positioned properly to function well, there is a reluctance on the part of the surgeon to change the position of the tube after the abdomen is closed. The narrow tortuous passage through the cardia, upper stomach and stoma contributes to the fixation of the lower end of the tube and the development of what appear to be "pistol shot" erosions through the wall of the stomach.

Another risk with the small upper stomach is occasioned by early ventilation with a mask after the patient is extubated. Every surgeon is familiar with the occasional patient who had a large amount of air in the entire gastrointestinal tract after a difficult induction of anesthesia. It is possible to force a great deal of air into the gastrointestinal tract and if a small upper stomach has been created it would be easy to burst this segment. The endotracheal tube should be kept in place and used for suctioning and ventilation until the patient is sufficiently alert to manage secretions and to get along without ventilatory assistance. Ventilation of the patient with a mask is definitely contraindicated in these patients.

Gomez has interpreted the "pistol shot" perforations in the upper stomach as perforated stress ulcers. To prevent this he has established a routine of administering cimetidine to all his patients for the first four or five days after their operation. Other surgeons have been analyzing the nasogastric juice and administering cimetidine only if the pH drops below two. Stress ulcers certainly could cause perforation. Why they should be located most often in the toe of the boot shaped upper stomach, however, is uncertain. At the present time we can not deny that at least some of the perforations are due to stress ulcerations. Therefore, we are treating patients with cimetidine if there seems to be an excessive secretion of very acid gastric juice. Nevertheless, it seems that the most likely cause of perforations in this area is due to erosion from the tube.

There have been other causes of stomach perforations after these operations. In those patients who have had a Roux-en-Y enterostomy, care must be taken to prevent narrowing at the site of the enteroenterostomy from use of a stapled closure of the opening in which the GIA® stapler has been inserted. The afferent limb coming from the duodenum to the enteroenterostomy is placed behind the long limb so that it will make a gentle curve. We have not seen obstruction from kinking in any of our obese patients, but other patients who have had a Roux type of gastroenterostomy have developed a kink of the afferent limb just proximal to the anastomosis when it was placed on the patient's right side. This is caused by peristalsis that carries the afferent limb to the left thus creating the kink. An afferent limb of a loop gastroenterostomy which is too long can create the same problem since peristalsis will force the afferent loop to the patient's left and kink the jejunum at the anastomosis. When using a retrocolic gastroenterostomy, the mesocolon opening can be too small and may slide down. If this occurs, the two limbs of the jejunum pull together causing obstruction. If there are adhesions or potential sites for internal herniation, the early postoperative ileus may evolve into a mechanical bowel obstruction. At this time the excluded stomach may distend to the point of perforation if bowel obstruction develops. Later, after the patient has recovered and the stomach has regained its tone, obstruction will not cause distention of the stomach to the extent of perforation. The stomach under these circumstances seems to pump the contents back into the small bowel causing additional intermittent pain thereby encouraging the patient to seek medical attention in time for re-exploration before perforation.

Some surgeons feel that leaks, particularly from an anastomosis, are prima fascie evidence of poor blood supply.[8] We have always taken great care to preserve lesser curvature blood vessels. We do not dissect the area rather, we simply pass a Robinson catheter close to the lesser curvature and feed the toe of the stapler into the back end of the catheter so that it may be guided into place. We use a lesser curvature point, 5 cm below the cardia, for stapling across the stomach as described by Alder and Terry.[1] This gives added

TABLE 3. *Risk of Perforation and Risk of Death from Perforation According to the Type of Operation Performed*

	Gastric Bypass (GB)	Gastroplasty (GP)	Revision of GB	Conversion GP → GB	Total
Procedures	620	82	130*	25	857
Perforations	25 (4.0%)	5 (6.1%)	9 (6.9%)	1 (4.2%)	40 (4.7%)
Deaths	11 (1.8%)	1 (1.2%)	2 (1.5%)	0 (0.0%)	14 (1.6%)

* One hundred fifteen patients had 130 revisions.

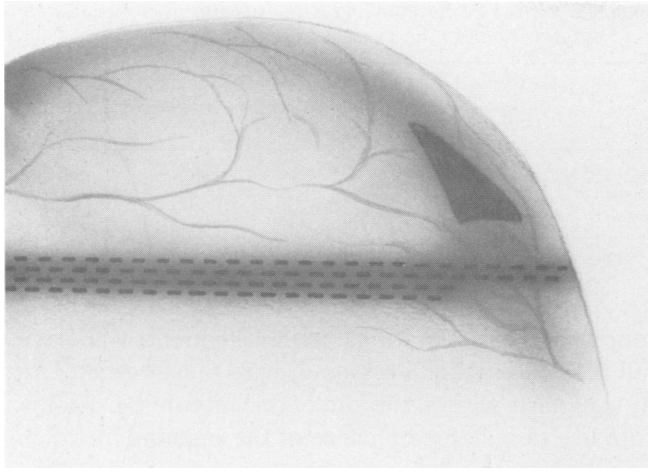

FIG. 5. Shows staple line at greater curvature. Second set of staples is left incomplete to enhance blood supply.

assurance that an adequate blood supply will come into the stomach above the area of stapling.

Blood supply can be compromised by the congestion of staples and/or sutures. Many surgeons have had occasional staple failure in patients following stapling without stomach transection. In fact, two of our patients have not only had formation of a passage between the upper and lower stomach, because of staple disruption, but a simultaneous leak outside of the stomach. In response to this problem some surgeons are using a second set of staples close to the first set. If an anastomosis is made on the greater curvature, the staples or sutures of this anastomosis will decrease small vessel blood flow to the tissue between the anastomosis and the transverse staple line. For this reason the second set of staples across the stomach should be incomplete at the greater curvature so that some blood will flow through the stomach wall and through the staples subjacent to the gastroenterostomy (Fig. 5). Blood flow through two rows of staples has been demonstrated by bleeding if the tissue is cut and by Wood's light inspection after fluorescein injection as shown by Myers.[9] If too much space is left between two parallel applications of staples (four rows of staples) then necrosis may occur between the inner two rows. Should this develop, it may progress into the staple line with resultant perforation. If two applications of staples are used they should be close enough together so that the two inner rows are approximately as far apart as the outer rows.

If the stomach is transected, as was the routine when this operation was first introduced, the corner of the upper stomach segment at the greater curvature should be cut off and this opening used for an end-to-side anastomosis rather than making a separate anastomosis above the closed end of the stomach. This will provide a better blood supply to the anastomotic area. It is possible to create an anastomosis above a two row application of staples across the intact stomach and maintain adequate blood supply between the two stapled or sutured areas. However, this is not always the case if the stomach has been transected rather than stapled (Fig. 6).

There is need for a small stoma in order to prevent future overeating. There is, no doubt, even a need for some measure to keep the stoma from stretching. We have had patients lose weight only to report after a year or two that they could suddenly eat more and had begun to regain weight. It is likely that sutures have pulled through and scar tissue has stretched allowing the gastroenterostomy or gastroplasty stoma to become considerably larger. There have been efforts to prevent stretching of the stoma by placing a running nonabsorbable 3-0 Prolene® seromuscular suture around the stoma in gastroplasty. In one patient a chromic catgut suture was placed through the stomach wall near the end of the line of staples and near the passage that had been left along the greater curvature. This catgut suture was then tied down on the outside surface of the stomach in order to calibrate the stoma around an inlying 28 F Hurst dilator. The 3-0 Prolene seromuscular suture was then placed circumferentially, overlying the groove which had been created. After removal of the Hurst dilator the stapled end of the stomach was held in such a position that it was invaginating the wall of the stomach into the stoma and blocking the passageway. This contributed to a perforation of the stomach above the stoma. This type of complication can be prevented by placing the sutures in such a way that the end of the line of staples is not pulled into the lumen. In addition, however, it is

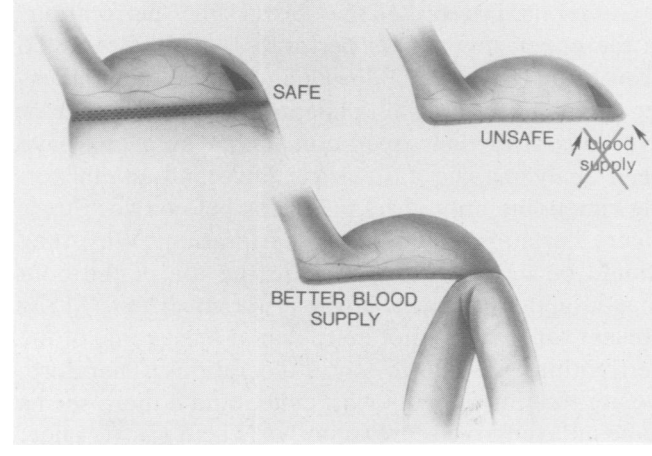

FIG. 6. Illustrates why the gastroenterostomy should be placed at the end of the upper segment when the stomach has been transected instead of stapled in continuity.

advisable to have the anesthesiologist place saline in the upper stomach to determine patency by observing the saline passing through the stoma before the abdominal wound is closed. Gastroplasty is still under investigation but it is being used in varying modifications by increasing numbers of surgeons. The basic principles are quite similar to those of gastric bypass. A small nonstretching stoma combined with the small volume of the upper segment are essential; and therein lies the hazard of obstruction and perforation.

Patient Education

Surgeons are perpetual optimists. They believe that they can create a situation within the abdomen which is markedly different from anything the patient has had to contend with before and that the patient will learn to cope with a minimal amount of instruction. Actually, these patients are like tigers in regard to eating and drinking. It is illogical to think that a wild animal can be contained in an orange crate. These patients need a great deal of instruction and early supervision. We have had patients rupture their stomachs on the day of operation by sneaking a drink from the sink or from their roommate's water pitcher. Patients should be given a set of plastic medicine glasses on their first visit and told to start practicing the style of eating and drinking that will be required after their operation. If this advise is not acceptable to a prospective patient then he or she is simply not a candidate for this type of operation. Gastric bypass and gastroplasty are behavior modification procedures with a vengance and patients should be so informed. Perforation is a vanishing risk after the first ten days because patients become aware of distension and desist. Awareness of these hazards on the part of surgeons is required to prevent early perforation.

Addendum

When autopsy is not permitted, early postoperative deaths are often attributed to pulmonary embolism. The cause of death is more likely to have been peritonitis according to our experience, vide supra. With this in mind, review of the records of all unproved deaths following gastric bypass and gastroplasty is strongly recommended and will perhaps be the best educational exercise that can be provided for those who have had such patients. Hopefully there are few such undiagnosed deaths. Nevertheless, this is something that must not be overlooked. Perforation with resultant peritonitis is much more amenable to treatment than pulmonary embolism, if diagnosed.

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