

THE "LIMITING PROXIMAL GASTRIC POUCH": THE EVOLVING SOLUTION OF MORBID OBESITY

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Seventy-five patients received the "limiting proximal gastric pouch." The technique used is the complete transverse gastric stapling with Roux-en-Y reconstruction of gastrointestinal continuity. There was one death, 13 patients required rehospitalization, and five patients required reoperation because of complications. Both the weight loss and percentage of excess weight loss were satisfactory. The patients' acceptance was very high. The limiting proximal gastric pouch is evolving as the procedure of choice for morbid obesity.

Morbid obesity is an underestimated medical problem with many medical, social, and economic ramifications. Nonoperative treatment of morbid obesity has thus far met with very poor results. Surgical approaches have evolved as more successful modalities for the control of obesity. Intestinal bypass was the first of these surgical procedures popularized by Payne^{1,2} and Scott.^{3,4} Unfortunately, complications from the procedure are fast rendering it obsolete.⁵⁻⁷

In 1966 Mason⁸⁻¹⁰ introduced a gastric procedure, gastric bypass, which has become very popular. As opposed to the intestinal procedure which induced weight loss by promoting caloric malabsorption, the gastric procedure limits the intake of calories.

There have been many technical modifications to the gastric procedure (Table 1).^{8,11-18} In all, the gastric procedures have two common underlying factors: creation of a proximal small gastric pouch and creation of a narrow outlet from this pouch. Based on this we have proposed the term "limiting proximal gastric pouch" (LPGP) as the common name for the gastric procedures. This term should, therefore, adequately define gastric bypass, gastropasty, and various forms of gastric partitions.

Large series of each one of these modifications have been reported in the literature with efficacies greater than or equal to that of intestinal bypass but with fewer complications of varying degrees.

In the last two years we have used the LPGP for treating morbid obesity at the King/Drew Medical Center. This report presents our experience with the first 75 patients together with an analysis of the first 42 who have been followed for more than one year.

MATERIAL AND METHODS

The charts of the patients from March 1978 through September 1980 were reviewed. Information was gathered concerning each patient's age, sex, height, initial weight, excess weight, and present weight. Of the 75 patients who received the LPGP, there were 69 women and 6 men. The average preoperative weight was 269 lb with a range of 185 to 454 lb, an average height of 65 in with a range of 57 to 72 in, the average excess weight was 137 lb (using Metropolitan Life Insurance Co. tables), with a range of 85 to 235 lb. Ages ranged from 19 to 62 years, and the average hospital stay was 7.2 days.

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TABLE 1. VARIATIONS OF THE LIMITING PROXIMAL GASTRIC POUCH (LPGP)**Gastric Bypass**

1. Gastric transection with a loop gastrojejunostomy. The loop may be antecolic or retrocolic.⁸
2. Gastric transection with Roux-en-Y gastrojejunostomy. The Roux-en-Y loop may be antecolic or retrocolic.^{11,12}
3. Gastric complete stapling (two rows) with a loop proximal pouch gastrojejunostomy as in 1.¹³
4. Gastric complete stapling (two rows) with Roux-en-Y proximal gastrojejunostomy as in 2.¹²

Gastroplasty

1. Gastric partial resection with a gastrogastrostomy.¹⁴
2. Gastric stapling with a greater curvature 1-cm aperture.¹⁵
3. Gastric stapling with a central 1-cm aperture.¹⁶
4. Gastric stapling with a lesser curvature 1-cm aperture.¹⁷
5. Gastric stapling with a central gastrogastrostomy.^{18,19}

The workup of patients was done under outpatient conditions and consisted of psychiatric evaluation, endocrine evaluation, and radiological evaluation of the stomach, gall bladder, and kidneys. Routine preoperative evaluation with glucose tolerance test, pulmonary function test, ECG, chest x-ray studies, serum chemistries, and cell counts was carried out on admission.

Office counseling, explanation of the surgical procedure with possible outcome, dietary education, and discussion of any points which the patient raised resulted in a total of four to five visits to the physician prior to the surgery. A next of kin was involved in at least one of these visits. The patients were admitted to the hospital the evening before the surgery. A regular diet was eaten for supper, and from midnight on the patients were given nothing orally in preparation for surgery at 7:30 AM. All patients had a pHisoHex shower the night before the surgery. On the morning of the surgery, an Ace wrap was applied from the foot to the mid thigh. Dextran-40 administration (25 mL/h) was begun, and each patient received 1 g of cefazolin sodium (Ancef) antibiotic intravenously for anti-thrombosis and prophylaxis, respectively. A Foley catheter also was inserted prior to surgery.

Operations were performed under general anesthesia through vertical upper midline incisions. A Gomez retractor¹⁵ was used. A Roux-en-Y loop 40 cm long, about 20 to 40 cm from the ligament of Treitz, was created by using a suture stapler. The greater curvature of the stomach was then mobilized to the gastroesophageal junction. A TA-90 Auto Suture stapler was used to create a gastric pouch of 45 to 60 mL in volume.

Two applications of the TA-90 stapler were used. The antecolic gastrojejunostomy anastomo-

TABLE 2. COMPLICATIONS OF THE LIMITING PROXIMAL GASTRIC POUCH

Complications	Number
Early	
Splenic injuries	9
Splenectomy	3
Wound infection	1
Anastomosis leak	1
Hypertensive crises	26
Pleural effusion	3
Death	1
Late	
Intractable vomiting requiring hospitalization	7
Nonspecific abdominal pain needing hospitalization	1
Incisional hernia	1
Small-bowel obstruction	1
Alopecia	1
Staple-line disruption	3
Gastric-outlet obstruction	1
Neuropathy (transient)	3
Inadequate weight loss after 1 year (ie, less than 50% excess weight loss)	6
Partial small-bowel obstruction	1
GI bleeding from marginal ulcer	1

sis from the proximal gastric pouch to the Roux-en-Y loop was performed side-to-side using two layers of sutures, 3-0 dextron and 3-0 silk, with a stoma 0.5 to 0.8 cm wide.

A size 18 nasogastric Salem sump tube was passed down through the proximal pouch to the Roux-Y loop about 5 in distal to the stoma and left in place for 48 hours. The abdominal wall was closed with buried nylon retention sutures with

TABLE 3. PATIENTS REQUIRING REHOSPITALIZATION FOR PROBLEMS RELATED TO THE LPGP PROCEDURE

Patient	Problem	Number of Hospitalizations	Number of Days Hospitalized
1	Vomiting	1	3
2	Vomiting	1	3
3	Vomiting	1	3
	Electrolyte imbalance	2	4
	Vomiting	3	2
4	Vomiting	1	3
	Vomiting	2	4
5	Abdominal pain	1	2
6	Partial small-bowel obstruction	1	3
7	Wound infection	1	8
	Staple-line disruption	2	6
8	Staple-line disruption	1	7
9	Small-bowel obstruction	1	6
10	Encephalopathy	1	8
	Vomiting	2	3
11	Gastric-outlet obstruction	1	22
12	GI bleeding from marginal ulcer	1	9
Total		17	81 days

two Jackson Pratt drains in the subcutaneous layer. The skin was closed with Auto Suture skin clips. All laparotomy pads used during the procedure were soaked in cefazolin sodium (1 g/L). Procedures performed concomitant to this procedure were cholecystectomy, splenectomy, oophorectomy, ureteroplasty, ventral hernioplasty, jejunoleal takedown, and umbilical hernioplasty.

Patients were left intubated overnight in the intensive care unit, and the nasogastric tube, Foley catheter, and drains were removed two days postoperatively. Patients were then started on a clear liquid diet and advanced to a regular diet by the fourth postoperative day. Most patients were discharged on day five.

RESULTS

Seventy-five patients received the LPGP procedure. Six underwent jejunoleal takedown prior to the LPGP. There was one operative mortality (1.3 percent). Complications included nine splenic injuries with three splenectomies (4 percent), three staple-line disruptions (4 percent), one anasto-

motric leak (1.3 percent), one incisional hernia (1.3 percent), one stomal obstruction (1.3 percent), and nine other complications (Table 2). Twelve patients required 17 rehospitalizations for problems related to the LPGP procedure (Tables 3 and 4). The only death was secondary to an anastomotic leak that was recognized late. His course was complicated by intra-abdominal abscess, wound infection, and finally, total organ failure. One patient had a marginal jejunal ulcer with melena; this was confirmed by endoscopy, and required operative repair.

No perforation of the proximal or distal pouch was seen. One patient with partial staple-line disruption is losing weight adequately and thus has not needed reoperation. Forty-one patients have been followed for more than 1 year. The weight loss at 6 and 12 months averaged 33 and 42 kg, respectively. Of these patients, 30 lost at least 60 percent of their excess weight with an average loss of 70 percent. Only six patients lost less than 50 percent of their excess weight after more than a year of follow-up. No clear-cut case of inadequate

TABLE 4. REOPERATIONS RELATED TO INITIAL LPGP PROCEDURE

Type of Operation	Number
Revision of bypass	
Stomal obstruction	1
Staple-line disruption	2
Total	3
Incisional hernia	1
Drainage of intra-abdominal abscesses	1
Small bowel obstruction	1
Closure of iatrogenic jejunal perforation	1

weight loss has been identified because all patients are still losing weight. All patients who were working prior to surgery have returned to work, and 16 of the 29 patients who were unemployed have started working or going to school. No patient has required takedown of the LPGP because of complications, either medical or psychological in nature.

COMMENTS

Nonoperative management of morbid obesity has had such poor long-term results that surgery has become the treatment of choice for the problem. An ideal operative procedure for morbid obesity should be safe and simple, result in optimal weight reduction, have a minimum number of side effects or complications, and be dismantled easily in the event of dissatisfaction. Several surgical procedures are evolving to meet this need. Payne^{1,2} and Scott^{3,4} popularized the small-bowel bypass which induced weight loss by caloric malabsorption. This procedure is technically safe and simple but unfortunately has the limitation of less than optimal weight loss in a large fraction of patients and carries complications with significant morbidity and mortality.⁵⁻⁷

The limiting proximal gastric pouch, first developed by Mason and co-workers⁸ at Iowa and termed gastric bypass, has undergone various modifications and variations. This procedure limits caloric intake and, because of the limiting proximal pouch, a state of satiety quickly sets in upon ingestion of rather small aliquots of food; thus a formerly ravenous appetite is subdued thereby rather promptly. Technically, this is a more difficult procedure than the intestinal bypass, but even as such it is safe and simple.

Certain complications are possible, but the vast experience being accumulated at various centers using this procedure attributes the complications to technical deficiencies.^{10,15,18} It has been our experience that the complications have decreased with an increase in the number of procedures done. All our complications were in the first 45 patients, and now that we are treating two cases a week we are encountering fewer or no problems. This trend is also well documented by Mason,¹⁰ MacArthur,¹⁹ and Murphy¹⁸ who have reported more than 500 procedures each.

The exact modification of the LPGP that will emerge as the procedure of choice awaits the test of time. We prefer and have therefore used total gastric stapling with an antecolic Roux-en-Y loop gastrojejunostomy. This technique is emerging as the technique of choice. Griffen,¹¹ Murphy¹⁸ and Mason,¹⁰ after their vast experience, have adopted this modification as the technique of choice. Our complications were mostly technical. Splenectomy can be avoided if splenic salvage techniques are practiced. Staple-line disruptions were attributable to the use of the wrong staple size, 3.5-mm instead of 4.8-mm staples. The anastomotic leaks can be prevented by good surgical techniques of maintaining good blood supply and no tension or hematomas at the anastomosis. We documented 26 cases of hypertensive crises postoperatively, but these were treated with no sequelae. The exact cause is still to be determined. The only complication peculiar to the procedure is vomiting. Seven patients (10 percent) required rehospitalization because of vomiting. One patient had severe hypokalemic, hypochloremic alkalosis after vomiting, and one had encephalopathy due to deficiencies in vitamin B₁₂, folic acid, and thiamine. With volume-intake restriction and persistent counseling, most of the patients have overcome this problem.

The primary issue with the LPGP is its long-term results. In its first 15 years, it has stood the standards of less mortality and morbidity and adequate weight loss. Whether there are any long-term effects that may emerge will be seen in due time. Complete gastric stapling with a Roux-en-Y loop creates the problem of inaccessibility of the distal pouch to an examiner. This is probably why modifications of gastroplasty will continue until it is made as effective as the gastric bypass.

Mortality is low but present. Mason,¹⁰ with more than 500 cases, reported a mortality of 2.8

percent. Ours is 1.3 percent, and Murphy,¹⁸ with 700 cases, had a mortality of 0.4 percent. The overall mortality is approximately 1.6 percent.¹¹ It is possible, therefore, to attain acceptable mortality rates. Whether the long-term effects of weight loss warrant the efforts is a question to be answered by another generation that may review our work. Short-term results of safety, effectiveness, and patient acceptance thus far justify continued efforts with this method of treatment.

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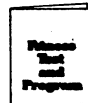
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