Results of Gastric Bypass Plus Resection of the Distal Excluded Gastric Segment in Patients With Morbid Obesity

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Surgical treatment is the procedure of choice for morbidly obese patients. Gastric bypass with a long limb Roux-en-Y anastomosis is the "gold standard" technique for these patients. We sought to determine the early and late results of open gastric bypass with resection of the distal excluded stomach in patients with morbid obesity. We included in this prospective study 400 patients who were seen from September 1999 through August 2003 (311 women and 89 men; mean age, 38.5 years). The mean body mass index of the patients was 46 kg/m^2. All underwent 95% distal gastrectomy, with resection of the bypassed stomach, leaving a small gastric pouch of 15 to 20 ml. An end-to-side gastrojejunostomy was performed with circular stapler No. 25. The length of the Roux-en-Y loop was 125 to 150 cm. In all patients, a biopsy was taken from the liver and routine cholecystectomy was performed. Follow-up was as long as 36 months. A barium study was performed in all patients at 5 days after surgery. Mortality and postoperative morbidity rates were 0.5% and 4.75%, respectively, mainly due to anastomotic leak in 10 patients (2.5%). Hospital length of stay was 7 days for 95% of the patients. Follow-up data for longer than 12 months were available in 184 patients. There was excess body weight loss of 70% at 24 and 36 months, and there was an inverse correlation among preoperative body mass index and the loss of weight. Anemia was present in 10%, and incisional hernia was present in 10.2%. At 1 year after surgery, the BAROS index demonstrated very good or excellent index in 96.6% of the patients. Gastric bypass with resection of the distal excluded segment has results very similar to those of gastric bypass alone but eliminates the potential risks of gastric bypass such as anastomotic ulcer, gastrogastric fistula, postoperative bleeding due to peptic ulcer and gastritis, and the eventual future development of gastric cancer. It is also possible to perform via laparoscopy, as we started to do recently. (J GASTROINTEST SURG 2005;9:121–131)

KEY WORDS: Morbid obesity, gastric bypass, gastrectomy

Surgical treatment is increasingly recognized as the procedure of choice for morbidly obese patients due to the severe metabolic, cardiovascular, and psychological comorbid conditions.[1–7] As the number of candidates for this type of therapy has increased in all developed countries, several surgical techniques have been designed, with different results.[4–7] Vertical banded gastroplasty (VBG) and gastric bypass via a Roux-en-Y loop have produced an impressive loss of weight, are well tolerated by the patients, and have become the most recommended procedures.[1–3, 7–9] Several prospective randomized trials and nonrandomized studies have shown that gastric bypass techniques are superior to VBG.[7–14] In recent years, laparoscopic procedures have also been used, mainly gastric banding techniques,[15–23] with results that are not as good as those for the gastric bypass operation.[24–27] We used the Griffen modification of the Mason-Aldin gastric bypass.[28–31] After some complications were seen postoperatively,[32,33] we changed to a new type of surgical procedure that eliminates some of the potential complications of the different gastric bypass procedures.

The purpose of the present prospective study was to report the surgical technique and the preliminary results of this operation.

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MATERIAL AND METHODS

Patients Studied

This prospective trial was begun on September 1999 and continued through August 2003. We included 400 patients, (89 men and 311 women; mean age, 38.5 years; range, 15–70 years). Of the 400 patients, 91 (22.7%) had a body mass index (BMI) between 35 and 39.9 kg/m^2; 228 patients (57%), 40 to 49.9 kg/m^2; and 81 patients (20.2%), greater than 50 kg/m^2. The mean BMI was 46 kg/m^2 (range, 36–64 kg/m^2). All patients had a complete preoperative medical evaluation, and 61% were found to have a comorbid state. All gave their consent to be included in this new protocol, and only three patients were excluded due to severe psychiatric disorders.

Surgical Technique

After general anesthesia and an upper middle laparotomy, a careful abdominal exploration was performed. The surgical technique (Fig. 1) consisted of the following sequential steps:

1. Skeletonization of the greater curvature is performed exactly as when performing gastrectomy for benign disease, with use of Ligasure equipment (Tyco Healthcare, USA, Mansfield, MA).
2. Dissection and section of all short vessels were performed to avoid splenic injury, using surgical clips or ligasure.
3. Section of the duodenum 1 to 2 cm distal to the pylorus was achieved by means of GIA-60 stapler (Tyco Healthcare, USA) (A).
4. The stomach is lifted from distal to proximal, leaving irrigation to the small remnant pouch via the left gastric artery.
5. A right clamp is placed on lesser curvature to determine the diameter of the anastomosis (B).
6. The stomach is sectioned by use of a GIA-80 stapler almost parallel to the lesser curvature, resecting all fundi and the greater curvature, leaving a small pouch of 15- to 20-ml capacity (C).
7. Reinforcement of the stapler line is achieved with a running suture of Biosyn 3-0.
8. Routine cholecystectomy is performed in all, as well as liver biopsy.
9. A Roux-en-Y limb of 125 to 150 cm in length is prepared and passed through a nonvascular area of the transverse mesocolon (retrocolic).
10. End-to-side gastrojejunostomy is achieved with the RS 25 circular stapler (Tyco Healthcare), which is set at an internal diameter of 15 mm (D).

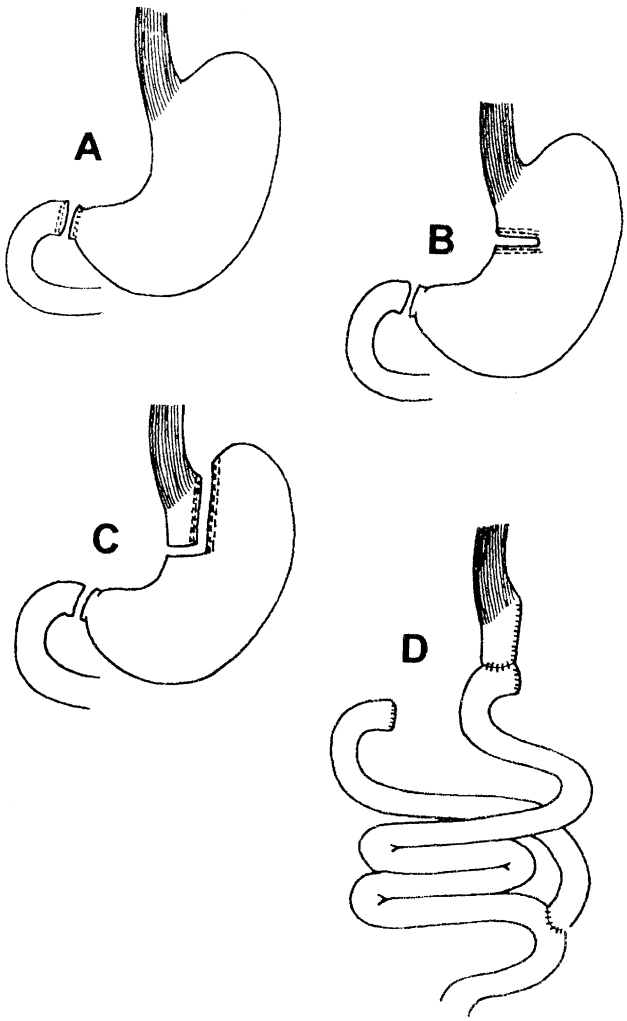

Fig. 1. Schematic representation of near-total gastrectomy, with section of the duodenum (A), section of the lesser curvature 3 cm below the cardia (B), resection of 95% of the stomach (C), and gastrojejunostomy with a Roux-en-Y limb of 125 to 150 cm (D).

11. End-to-side jejunojejunoanastomosis is made on a single layer with continuous suture using Biosyn 3-0.
12. Two soft drains are left next to the anastomosis and duodenal stump for 5 days.

Protocol of Postoperative Care

All patients were kept in the intensive care unit for 1 to 2 days, with use of special respiratory therapy. Oral feeding started on the fourth day after surgery, and intravenous solutions were ended on the fifth day after surgery. On the fifth day, radiologic control was performed with barium sulfate in all patients to check emptying through the anastomosis, size of the remnant stomach, and eventual leakage. Patients

were discharged 7 days after surgery. All patients received heparin for 6 days after surgery. In all, an ultrasound with color Doppler of the veins of both legs was performed 1 day before and 6 days after surgery.

Follow-up

After discharge, all patients were seen at the outpatient clinic on postoperative days 15 and 21 and at 3, 6, 12, 24, and 36 months after surgery. Postoperative weight and eventual complications were recorded. The impact on body weight loss was expressed as BMI before and late after the operation and as the mean percentage of excess body weight loss.

The final results of follow-up were expressed as four items, as follows:

1. Presence or loss of comorbidity at 12 months after surgery, evaluating the presence of diabetes (blood sugar >110 mg dl), dyslipidemia (total cholesterol >200 mg dl and tryglicerides >200 mg dl), arterial hypertension (blood pressure >140/90 mm Hg), and osteoarticular problems (osteoarthrytis, arthralgias, back pain, and so on). These conditions were defined at postoperative assessment as resolved (presence of normal values, without the need of any medication), improved (better values than before surgery or still the need of some medication to relieve disease), or unresolved.
2. The quality of life questionnaire 12 months after surgery:[34] this is a well-validated questionnaire that measures the following five health concepts:
   - Self-esteem (how patient feels or individual's perception of his or her overall health)
   - Work capacity (limitations in the performance during daily work)
   - Sociability (measures limitations in social functioning)
   - Physical capacity (limitations in performing various physical activities)
   - Sexual activity (interest in performing sexual activity and behavior)

   The total scores are expressed as follows, compared with before the operation, by each patient: worst, equal, better, or much better. All of these evaluations were performed by one of the authors who did not participate in any surgical procedures (K.P.).
3. The Bariatric Analysis and Reporting Outcome System (BAROS) was evaluated 12 months after surgery. The BAROS is a simple questionnaire that evaluates three main categories: percent of excess body weight loss, change in comorbidites, and the Moorehead-Ardelt Quality of Life Questionnaire.[34] A maximum of 3 points is given in each category. The Moorehead-Ardelt Quality of Life Questionnaire assesses the five parameters that were detailed previously. Points were added for positive changes and subtracted for negative changes. Points were also deducted for complications and eventual reoperation from the subtotal scores of the three categories. The BAROS outcome was classified based on total points as failure (<1 point), fair (1–3 points), good (4–5 points), very good (6–7 points), and excellent (8–9 points).
4. Late complications seen after surgery such as anemia (hemoglobin <12 g dl), incisional hernia, loss of hair, hypoglycemia, and so on.

RESULTS

The early postoperative results of all 400 patients who underwent near-total gastrectomy are shown in Table 1. The duration of the operation ranged between 2 and 3 hours. The mean estimated blood loss during surgery was 225 ml, and the blood hematocrit 12 hours after surgery changed from a mean of 41% to 38%. All patients were kept in the intensive care unit for 1 or 2 days, and postoperative ventilatory support was necessary in only 11 patients (2.75%) who required reoperation because of a complication.

Table 1. Early postoperative results in 400 morbidly obese patients who underwent 95% (near-total) gastrectomy with Roux-en-Y bypass

Complication	No.	%	Reoperation
Mortality	2	0.5	2
Morbidity			
Common to gastric bypass			
Anastomotic leakage	10	2.5	1
Postoperative bleeding of suture line	3	0.75	1
Necrosis of proximal segment jejunal loop	1	0.25	1
Partial dehiscence and necrosis of surgical wound	1	0.25	1
Intestinal obstruction	1	0.25	1
Due to gastrectomy			
Hemoperitoneum	1	0.25	1
Partial necrosis of greater omentum with abscess formation	1	0.25	1
Duodenal stump leakage	1	0.25	
Total	19	4.75	9 (2.25%)

Postoperative fluid requirements were used for 4 days after surgery, as established in our protocol. Prophylactic antibiotics (cephalosporine) were administered for 2 hours before and 24 hours after surgery. Fever was a frequent finding on days 1 and 2 after surgery and resolved spontaneously. Postoperative analgesia was easily managed with a high epidural analgesia placed 12 hours before surgery and was maintained for 3 days after surgery. Two patients died 23 and 32 days after surgery. One had a localized anastomotic leakage and massive pulmonary failure. The other patient presented with prolonged (16 days) severe hyperthermia (fever >41° C) and died from cardiovascular failure. Both deaths occurred in patients with hyperobesity and a BMI of greater than 50 kg/m^2. This corresponds to an operative mortality rate of 2.4% in these 81 patients and a mortality rate of 0% among 319 patients with a BMI of less than 50 kg/m^2. Surgical complications occurred in 19 patients (4.75%). These complications were divided into those common to any gastric bypass and those specifically related to gastrectomy. Among those complications common to any gastric bypass were 10 cases of anastomotic leakage. Nine of these patients received conservative treatment with parenteral nutrition and permanent suction through the drain left at surgery; and only one patient was reoperated. There were three patients with early postoperative intraluminal bleeding (1–5 days after surgery), and one underwent reoperation. There were other isolated rare complications in three patients, and all were reoperated. Three patients (0.75%) presented with a complication directly attributed to gastric resection, and two of them were reoperated. The postoperative hospital length of stay for 379 patients (94.75%) was 7 days. In all patients, radiologic studies with barium on the fifth postoperative day revealed a small gastric pouch of 15 to 20 ml and a good emptying through the gastrojejunal anastomosis. Only 21 patients (5.25%) remained in the hospital for longer than 7 days, and this was due to complications (Table 1).

There were 184 patients with a follow-up of longer than 12 months. The BMI values at different periods are shown in Table 2. The mean BMI was 33.5 at 6 months, 27.7 at 12 months, 27.6 at 24 months, and 27.7 kg/m^2 at 36 months. For surgical success, we established BMI of 30 kg/m^2 or less. At 12 months, 31% of the patients had a BMI above 30, value that decreased to 22% at 24 months after surgery and to 21% at 36 months. The body weight loss after surgery was closely related to the preoperative BMI. Forty-eight patients with BMI between 35 and 39.9 kg/m^2 are represented in Fig. 2. At 12 months, the mean BMI in this group was 25.4 kg/m^2, with only 1 patient (6%) who was over 30 kg/m^2. At 24 months, the mean BMI was 24.2 kg/m^2, which was maintained at 36 months. Figure 3 shows the same values in 93 patients with a BMI between 40 and 49.9 kg/m^2. At 12 months, the mean BMI was 29.7 kg/m^2, with 23% of patients above 30. At 24 months, the mean BMI decreased to 28.7 kg/m^2, which was similar at 36 months. Figure 4 shows the same findings in patients with a BMI equal to or above 50 kg/m^2. In these patients, at 12 months the mean BMI was 36.1, having 68% of them with a BMI over 30 kg/m^2. At 24 months, the mean BMI decreased to 33.1 kg/m^2, with 41% of the patients having a BMI above 30 kg/m^2; at 36 months, the values were similar.

Table 2. Body mass index (BMI) in patients with morbid obesity who underwent 95% (near-total) gastrectomy with Roux-en-Y bypass

Follow-up (mo)	No.	BMI at follow-up (kg/m^2)	% Patients with BMI kg/m^2 >30 (n)
6–9	198	33.5	52.0
12–15	115	27.7	31.0
24	55	27.6	22.2
36	14	27.7	21.0

Figure 5 shows a comparison of the percentage of excess body weight loss at 1 and 2 years after surgery. This loss was inversely proportional to preoperative BMI.

Table 3 shows the behavior of the main comorbidites evaluated in 142 patients. Among 27 patients with diabetes, all of them had normal blood sugar values at 1 year after surgery. In patients with hyperlipemia, 92.5% had complete resolution, with normal blood serum values. In patients with hypertension, only 63.6% had resolution of their disease. In patients with an osteoarticular problem, 73% had resolution of their disease. Evaluation of quality of life at 1 year after surgery (Table 4) demonstrated that some parameters, such as self-esteem and physical capacity, improved considerably. The worst response was seen concerning the return to sexual activity.

Table 5 shows the final BAROS index in these 184 patients; a very good or excellent index was obtained in almost 97% of the patients.

Table 6 illustrates the late complications seen at the late control period. Anemia, which was due to decreased absorption of iron, occurred in 20%. Incisional hernia occurred in 10%, whereas a partial loss of hair was a frequent finding. In 3%, severe depression was diagnosed and treated by a specialist.

DISCUSSION

There are many surgical procedures for the treatment of patients with morbid obesity. Three techniques

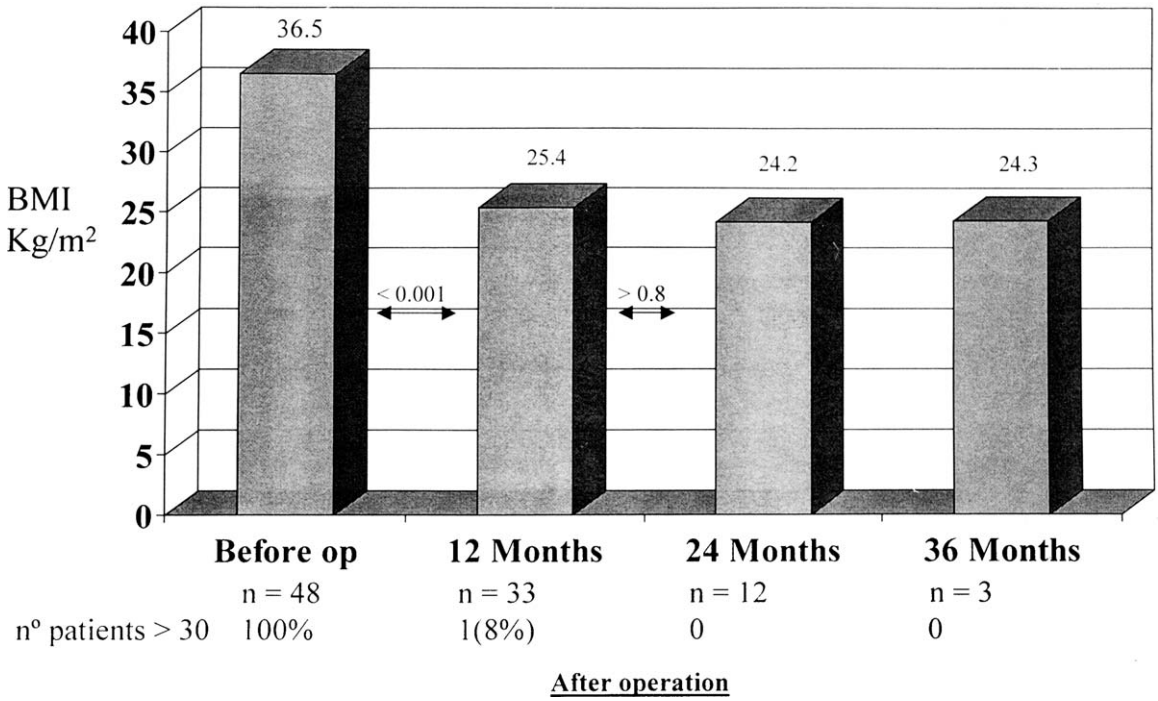

Fig. 2. Body mass index (BMI) (kg/m^2) in patients between 35 to 39.9 kg/m^2 before and 12, 24, and 36 months after surgery.

have had the best early and late results in terms of loss of weight and acceptance by the patients: 1) vertical banded gastroplasty, 2) gastric banding with a Silastic ring performed laparoscopically, and 3) gastric bypass procedures with a Roux-en-Y long limb.[1–4]

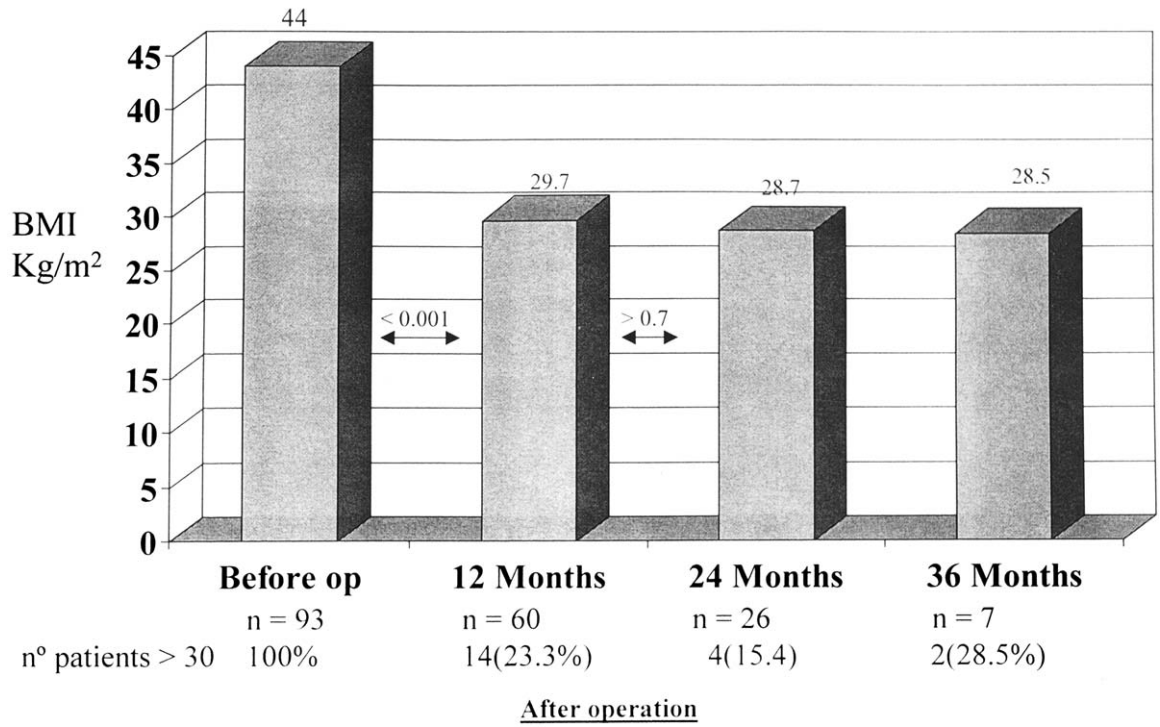

Fig. 3. Body mass index (BMI) (kg/m^2) in patients between 40 and 49.9 kg/m^2 before and 12, 24, and 36 months after surgery.

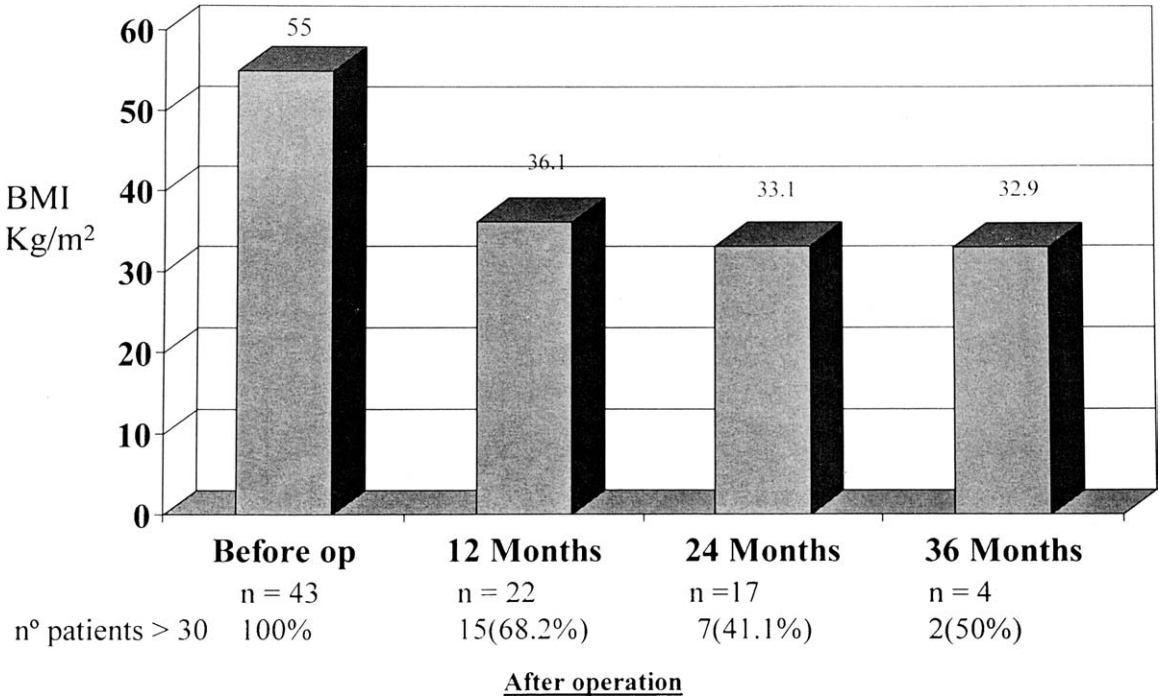

Fig. 4. Body mass index (BMI) (kg/m^2) in patients equal to or greater than 50 kg/m^2 before and 12, 24, and 36 months after surgery.

Vertical banded gastroplasty has been extensively used in the United States and Europe.[1,3,4,8,10,22] The late results, even in prospective randomized studies, have shown a worse outcome than the gastric bypass procedure.[3,8,10,14] There is a high incidence (17%) of vomiting, gastroesophageal reflux, and stenosis of the stoma with food impaction.[3,21,35] Several patients present with gastric dilatation due to this stricture, and revisional surgery is often performed.[3,21,35,36]

Gastric banding has also been used extensively, especially as a laparoscopic procedure due to its simplicity, noninvasiveness, ease of revision, and

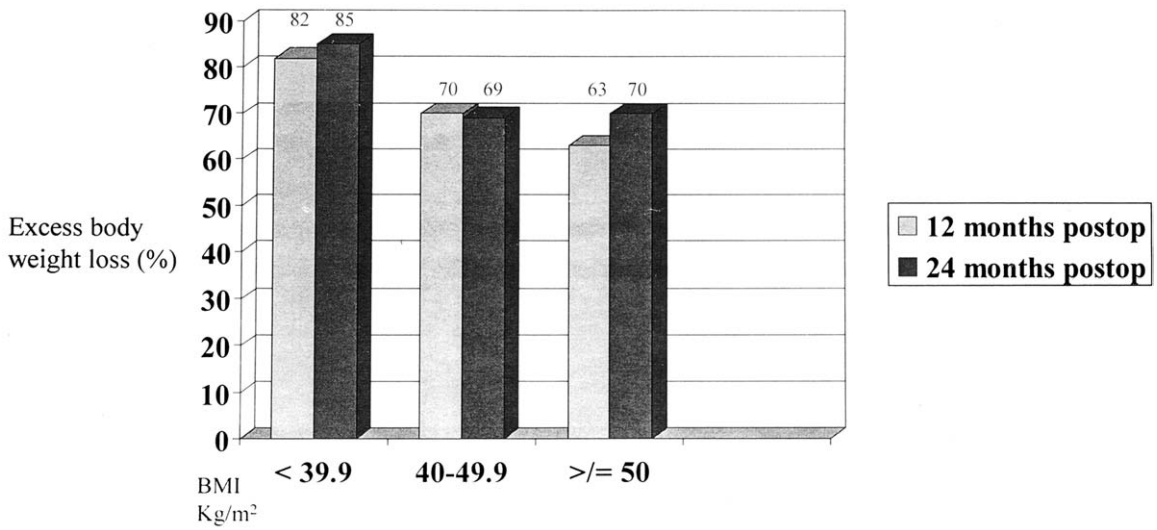

Fig. 5. Comparison of the percentage of excess body weight loss 1 and 2 years after gastrectomy with Roux-en-Y bypass according to preoperative body mass index.

Table 3. Evolution of comorbidities (N = 142)

Comorbidity	n	Improved (n)	Resolved (n)
Diabetes	27	0	27 (100%)
Dyslipidemia	67	5 (7.4%)	62 (92.5%)
Hypertension	33	12 (36.3%)	21 (63.6%)
Osteoarticular problems	15	4 (26.6%)	11 (73.3%)

Table 5. Final BAROS index in 184 patients with morbid obesity who underwent gastric bypass with 95% (near-total) gastrectomy

	Points	%
Failure	<1	0
Fair	1–3	0
Good	3–5	3.4
Very good	7–7	18.6
Excellent	7–9	78.0

complete reversibility.[15–23] It creates a small pouch that empties into the lower stomach through a narrow nonstretchable stoma, similar to the earlier gastrogastrostomy procedure. However, based on long-term follow-up, we believe that it is not an adequate procedure; several complications can occur: distention of the pouch, slippage of the band, entrapment of foreign material (bezoar) in the proximal stomach, prolapse of the stomach through the band (9% of the cases), high incidence of conversion due to difficult exposure of the hiatus, and frequent hypertrophy of the left liver lobe. In addition, a high incidence of severe gastroesophageal reflux is reported, as well as frequent deterioration of esophageal motility.[24–27] Also, several cases of band reposition or band removal have been reported. We disagree that a "less-invasive" procedure that the surgeons perform laparoscopically is therefore an "easier technique." These "easier procedures" (as were seen with some other laparoscopic techniques) performed via the laparoscopic route are as effective as other, "more complex operations." We are convinced that in very ill patients laparotomy and 3 or 4 additional days of hospital stay are of no importance when dealing with such a severe disease and an operation that should have life-long consequences. Our length of stay data indicate that our patients spend a considerably greater period of time in the hospital, with an average length of stay of 7 days, compared with most U.S. series that report a length of stay of 3 or 4 days for patients with open Roux-en-Y gastric bypass (GBP). This is due to the fact that we are not in a "hurry" to discharge our patients and we like to be sure that no complications will occur. We disagree with reported practices of discharging the patients 24 or 36 hours after surgery. Laparoscopic or even Roux-en-Y GBP corresponds to an operation with similar risks, and the only difference is a laparotomy.

Gastric bypass operation was first introduced by Mason and Ito and colleagues in 1969 with a horizontal transection of the stomach and a Billroth II type anastomosis.[5,7] Later, Alden proposed the use of mechanical stapler with an in-continuity division between the upper pouch and the distal stomach.[29] This change simplified the operation and made it technically less complex and safer. At the same time, Griffen and Young[28] used a Roux-en-Y gastrojejunostomy, which eliminated the problem of bile reflux. We have used this technique previously in 66 patients[32,33] and have seen only three main problems:

1. Dilatation of the pouch in 12 anxious patients, mainly at the fundus, that can easily dilate
2. Break down of the stapler line in five cases

Table 4. Quality of life after gastric bypass and gastrectomy (percent of patients) (N = 184)

Parameter	Worst	Equal	Better	Much better
Self-esteem	0	0	18.4	81.6
Work capacity	3.5	8	25.3	63.2
Sociability	2.4	16	28.7	52.9
Physical capacity	0	1.1	14.9	83.9
Sexual activity	1.2	42.5	32.2	24.1

Table 6. Late complications in 184 patients with morbid obesity who underwent gastric bypass with 95% (near total) gastrectomy

Complications	%
Anemia	20
Incisional hernia	10.2
Severe depression	3.1
Intestinal obstruction	2.0
Dumping	1.0
Hypoglycemia	1.0
Loss of hair	25.5

3. Anastomotic ulcer in two patients. These complications have been clearly seen and reported by other authors. Sugerman,[37] reporting on 672 patients who underwent gastric bypass, noted rates of 1.2% for anastomotic leakage, 1% for gastric staple line disruption (despite three superimposed applications of staples), 15% for stomal stenosis, 13% for marginal ulcer, and 10% for symptomatic gallbladder disease. MacLean and colleagues[9,12,38] reported staple line failure in 29% of patients after gastric bypass. Jordan et al.[39] and Sapala et al.[40] reported a high rate of marginal ulcer. When the bypassed stomach was separated from the distal stomach, a 6% rate of gastrogastric fistula was reported.[41]

We have noticed and agree completely with Fobi et al.[29] and Sugerman[37] that the maximal stomach capacity should be of 20 ml or less. If it is greater than 20 ml, the patient can eat more and the success rate is lower. In addition, the diameter of the anastomosis should be less than 15 mm to avoid a fast emptying and a dumping syndrome. However, we are concerned about what will happen to the distal stomach that is excluded from the gastrointestinal tract and becomes a real "blind loop." If any disease occurs that involves gastric mucosa (cancer, gastric ulcer, gastritis or bleeding, and duodenal ulcer), there is no way to reach it via endoscopic procedures and no therapeutic endoscopic techniques can be performed. Also, this excluded stomach will remain so for the rest of the patient's life, and because these patients are usually young and have a life expectancy of a normal subject after surgery, we are dealing with the fact of leaving as a "blind loop" this excluded stomach for 30 to 50 years. There are some important points to discuss in this aspect.

1. If a bleeding occurs within the postoperative period, it is very difficult to manage it, due to the fact that endoscopy cannot be used after a long Roux-en-Y loop. This bleeding can be severe in some cases and reoperation could be necessary, due to the presence of an unknown gastric or duodenal ulcer.
2. Gastrogastric fistula have been described after transection in up to 10% of cases,[41] even if a jejunal loop is interposed.
3. We believe that the high incidence of marginal ulcer described as between 3% and 16% after surgery[42] is due to an excessive production of gastric juice, which can be due to a greater amount of parietal cell mass (greater gastric pouch) or to a retained antrum effect. This is due to the presence of a denervated stomach that could release more gastrin. After gastrectomy, we have not seen any cases of anastomotic ulcer.
4. Up until now, no one has evaluated the eventual bacterial proliferation in the excluded stomach, except the study of Flickinger et al.,[43] who took bacteriologic samples in two patients with this excluded distal stomach and found enterobacteria in both.
5. What is the most important concern for us are the histologic changes that can occur in the excluded stomach many years after surgery. In a country such as the United States, gastric cancer is probably rare in this situation. There have been two cases of gastric cancer reported after gastric bypass, 5 and 13 years after surgery.[44,45] However, in countries with a higher prevalence of gastric cancer, such as Chile, this could represent an important late complication. The report of Flickinger et al.,[43] who performed endoscopy 4 to 48 months after gastric bypass through the Roux-en-Y loop, which was short, is very interesting. They found in the excluded stomach bile staining (53% of cases), chronic gastritis (21%), and intestinal metaplasia (9%). Gastric pH remained between 1.75 and 7.5 (mean, 3), documenting an acid environment, together with bile reflux. This gastritis did not disappear when endoscopy was repeated in some cases. The authors suggested the need for endoscopic surveillance every 5 years. We have studied the resected gastric segment in 423 patients and found chronic inactive superficial gastritis in 38% of the cases and atrophic gastritis with intestinal metaplasia in 6.5% of them at the time of operation, with one patient who had a carcinoid tumor. A more recent report by Sundbom et al.[46] demonstrated that in 22 patients who underwent gastric bypass with scintiscan evaluation 18 months after surgery, 36% showed an important duodenogastric reflux, which remained for a long time at the stomach. When this test was repeated, the results were similar.

We started to perform a resection of the distal stomach, thus avoiding all eventual problems at this level. We were not aware at the time we started using this operation of an excellent article by the surgical group of Tacoma,[47,48] who proposed the same operation in 1998. They performed 47 primary resectional operations, with excellent results. They had similar complications as seen in our patients, with no deaths. At the later follow-up, they noticed a high incidence rate of dumping. We have not seen dumping or

diarrhea in our patients, probably due to the fact that our end-to-side gastrojejunostomy is performed with circular stapler No. 25, with an internal diameter of 15 mm, while they constructed a hand-sewn widely patent anastomosis. In addition, the residual pouch that they construct has a capacity of 30 to 50 ml, which is in contrast to the 15- to 20-ml capacity of our patients. With our technique, emptying of the small pouch is slow.

We have also asked, "What are the reasons to leave the stomach in situ and not resect it, as is usual in other gastric procedures?" There could be several arguments against resecting the stomach and leaving it in situ.

1. There are fewer metabolic consequences. This is not true, because all late metabolic complications are related to the small remnant gastric pouch and to the long Roux-en-Y loop, and not to the presence or absence of distal gastric remnant.
2. In some patients, a revisional surgery could be necessary. This situation is highly improbable.
3. It is very difficult to resect the stomach, and morbidity and mortality rates could rise. This is not true, because the real morbidity attributed to gastric resection was only 0.75%, which is a very low figure. Our results have clearly shown that our patients are not sicker than patients who have Roux-en-Y GBP without gastric resection. The only difference is that we try to be more "prudent" and discharge our patients in 7 days instead of 3 or 4 days after surgery.
4. Gastric cancer will not develop in the residual stomach. As discussed earlier, we do not know about this peculiar point because there is no late follow-up.
5. Surgical team has no experience in gastric surgery and gastrectomy. We firmly believe that this is the main argument. The majority of surgeons performing laparoscopic procedures have no previous experience in open gastrectomies and they believe that it is very difficult. This clearly is not true, and if a surgeon has experience in gastric surgery, open gastric bypass with gastrectomy can be easily done in 2 hours. However, we accept this true argument in this discussion.

We recommend some surgical steps that seem to be essential to achieve optimal results: 1) initial division of all short vessels, ensuring there is no damage to the spleen; 2) it is not necessary to mobilize or dissect the abdominal portion of the esophagus or to perform bilateral vagotomy; and 3) gastric resection is greatly facilitated when it is performed from distal to proximal, elevating the stomach, which also facilitates its high section using Ligasure equipment. We section the stomach with the GIA stapler almost parallel to the lesser curvature, resecting all fundi to avoid later dilatation. The pouch is extensively irrigated by the left gastric artery, and we have not seen any case with gastric isquemic necrosis. The anastomosis is performed in an end-to-side manner in the most dependent part of the small stomach, measuring 15 mm. By performing the gastrectomy, we avoid Fobi's gastrostomy.[29] A radiologic control is performed in all patients 5 days after surgery, demonstrating a normal functioning anastomosis without leakage. After having 10 anastomotic leakages, we created an additional step, which consists of suturing the proximal end of the jejunal limb that is anastomosed to the stomach to the suture line like a jejunal patch, in this way covering the "death or sorrow angle," where the anterior and posterior layers of the stomach and the jejunum converge.

The results of this operation have been very encouraging. We will evaluate the late results, but we believe that it has the benefits of the gastric bypass procedure, avoiding the potential complications and problems that can appear late after surgery. We believe, as do Curry et al.,[47] that resection of this "blind loop," or excluded stomach, is a reasonable alternative. It is obviously a permanent effect, but it eliminates all complications seen with classic gastric bypass, such as staple line disruption, enlargement of residual stomach, anastomotic ulcer (gastrin-producing area is resected and the small residual capacity of 20 ml of the stomach practically eliminates acid production), the risk of future gastric disease, gastrogastric fistulas, etc. We have started to perform this operation with gastric resection via the laparoscopic route. We have operated on 71 patients with laparoscopy, but we still are in the learning curve. In the near future, we will probably change from the open to the laparoscopic approach. All of these patients are in a close follow-up by a multidisciplinary medical team. The optimal bariatric operation is still under debate and permanent evaluation. Also, the performance of a prospective randomized study is difficult to perform, because eventual differences and results will be seen very late after surgery, and therefore it could represent a great effort with very few short-term results. We postulate that this surgical procedure can be safely performed if an experienced surgical team in gastric surgery is dedicated to this problem. We are aware that Roux-en-Y GBP with resection of the distal gastric remnant is not performed by the great majority of U.S. surgeons dedicated to bariatric surgery. The purpose of our report is only to call

attention to the fact that we do not know the eventual pathophysiologic behavior of this excluded stomach 30 to 50 years after surgery, and therefore it deserves special attention and close late follow-up.

REFERENCES

1. Ramsey-Steward G. Vertical banded gastroplasty for morbid obesity: Weight loss at short and long term follow up. Aust N Z J Surg 1995;65:4–7.
2. Reinhold RB. Late results of gastric bypass surgery for morbid obesity. J Am Coll Nutr 1994;13:326–331.
3. Wolfel R, Gunther K, Rumenapf G, Koerfgen P, Husemann B. Weight reduction after gastric bypass and horizontal gastroplasty for morbid obesity. Results after 10 years. Eur J Surg 1994;160:219–225.
4. Deitel M. Overview of operation for morbid obesity. World J Surg 1998;22:913–918.
5. Mason EE, Tang S, Renquist KE, Barnes DJ, Cullen JJ, Doberty C, Mola JW. A decade of change in morbid obesity. National Bariatric Surgery Registry (NB SR). Obes Surg 1997; 7:189–197.
6. Balsiger BM, LuguediLeon E, Sam MG. Surgical treatment of obesity: Who is an appropriate candidate? Mayo Clin Proc 1997;72:551–558.
7. Mason EE. Development and future of gastroplasties for morbid obesity. Arch Surg 2003;138:361–366.
8. Brolin RE, Robertson LB, Kenler HA, Cody RP. Weight loss and dietary intake after vertical banded gastroplasty and Roux-en-Y gastric bypass. Ann Surg 1994;220:782–790.
9. MacLean LD, Rhode BM, Nahr CW. Late outcome of isolated gastric bypass. Ann Surg 2000;231:524–528.
10. Hall JC, Watts JM, O'Brien PE, Dunstan RE, Walsh JF, Slavotrie KAH, Elnrslie RG. Gastric surgery for morbid obesity. The Adelaide study. Ann Surg 1990;211:419–427.
11. Brolin RE, Kenler HA, Gormar JH, Cody RA. Long limb gastric bypass in the super obese. A prospective randomized study. Ann Surg 1992;215:387–395.
12. MacLean LD, Rhode BM, Sampaliers JS, Forse RA. Results of the surgical treatment of obesity. Am J Surg 1993;165:155–160.
13. Avinoali E, Ben-Yehuda A, Ounat A, Pelpel D, Charuzi I. Long term weight changes after Roux-en-Y gastric bypass for morbid obesity. Harefudh 1993;324:185–187.
14. Azagra JS, Georgen M, Ansay J, DeSimone P, Vanhaverbeek KM, Devust L, Squelaert J. Laparoscopic gastric reduction surgery. Preliminary results of a randomized prospective trial of laparoscopic versus open vertical banded gastroplasty. Surg Endosc 1999;13:558–559.
15. Lovig T, Haffner JF, Kaaresen R, Nygaard K, Stadaas JO. Gastric banding for morbid obesity. Five years follow up. Int J Obes Relat Metab Disord 1993;17:453–457.
16. Jensen ME, Jensen FU. Gastric banding. A follow up study. Ugeskr Laeger 1993;155:1789–1791.
17. Wiesner W, Schöb O, Hauser RS, Hauser M. Adjustable gastric banding for obesity. Tightening the beltline. Radiology 2000;216:389–394.
18. Orie HE. Gastric banding for morbid obesity. Eur J Gastrointest Hepatol 1999;11:105–111.
19. Lonroth H, Dalenback J. Other laparoscopic bariatric procedures. World J Surg 1998;22:964–968.
20. Chelala E, Cadiere GB, Fauretti F, Himpens J, Vertruyen M, Bruyns J, Maraguin L, Lise M. Conversions and complications in 185 laparoscopic adjustable silicone gastric banding cases. Surg Endosc 1997;11:268–271.
21. Naslund E, Backman L, Grasntrom L, Stockeld D. Seven years results of vertical banded gastroplasty for morbid obesity. Eur J Surg 1997;163:281–286.
22. Naslund E, Freedman J, Lagergren J, Stockeld D, Granstom L. Three years results of laparoscopic banded gastroplasty. Obes Surg 1999;9:369–373.
23. O'Brien PE, Dixon JB. Laparoscopic adjustable gastric banding in the treatment of morbid obesity. Arch Surg 2003;138: 376–382.
24. Abu-Abeid S, Szold A. Results and complications of laparoscopic adjustable gastric banding: An early and intermediate experience. Obes Surg 1999;91:88–90.
25. Victorzon M, Tolonen P. Intermediate results following laparosocopic adjustable gastric banding for morbid obesity. Dig Surg 2002;19:354–358.
26. Doberty C, Maher JW, Heithusen DS. Long term data indicate a progressive loss in efficacy of adjustable silicone gastric banding for the surgical treatment of morbid obesity. Surgery 2002;132:724–728.
27. DeMaria EJ, Sugerman HJ, Meador JS, Doty JM, Kellum JM, Wolfe L, Szucs RA, Tierner MA. High failure rate after laparoscopic adjustable silicone gastric banding for treatment of morbid obesity. Ann Surg 2001;233:809–810.
28. Griffen WO Jr, Young VL. A prospective comparison of gastric and jejuno-ileal bypass procedures for morbid obesity. Ann Surg 1977;186:520–529.
29. Fobi MAL, Lee H, Holness R, Cabinda D. Gastric bypass operation for obesity. World J Surg 1998;22:925–935.
30. Balsiger BM, Murr MM, Poggio JL, Sarr MG. Surgery for weight control in patients with morbid obesity. Med Clin North Am 2000;84:437–489.
31. Koraliski J. Surgical treatment for morbid obesity. Print Med Bull 1997;53:433–441.
32. Csendes A, Burdiles P, Jensen C, Díaz JC, Cortes C, Rojas J, Csendes P, Domic S. Horizontal gastroplasty with Roux-en-Y anastomosis in morbidly obese patients. Preliminary results. Rev Méd Chile 1999;127:953–960.
33. Csendes A, Burdiles P, Díaz JC, Maluenda F, Burgos A, Recio M, Hernández J. Resultados del tratamiento quirúrgico de la obesidad mórbida. Análisis de 180 pacientes. Rev Chil Cir 2002;54:3–9.
34. Oria HE, Moorehead MK. Bariatric Analysis and Reporting Outcome System (BAROS). Obes Surg 1998;8:487–499.
35. Verset D, Houben JJ, Gay F, Elcheroth J, Bourgeois V, Van Gosserner A. The place of upper gastrointestinal tract endoscopy before and after vertical banded gastroplasty for morbid obesity. Dig Dis Sci 1997;42:2333–2337.
36. Denothi DN, Forse RA. The role of gastric surgery in the multidisciplinary management of severe obesity. Am J Surg 1995;169:361–367.
37. Sugerman H. The surgical treatment of morbid obesity. Curr Probl Surg 1998;35:791–858.
38. MacLean LD, Rhode BM, Nahr C. Stomal ulcer after gastric bypass. J Am Coll Surg 1997;185:1–7.
39. Jordan JH, Hocking MA, Rout WR, Woodwood ER. Marginal ulcer following gastric bypass for morbid obesity. Am Surg 1991;57:286–288.
40. Sapalar JA, Wood HH, Sapala MA. Marginal ulcer after gastric bypass: A prospective 3-years study in 173 patients. Obes Surg 1998;8:505–516.
41. Cucchi SG, Pories WJ, MacDonald KG, Morgan EJ. Gastrogastric fistulas: A complication of divided gastric bypass surgery. Ann Surg 1995;221:387–391.

42. Brolin BE. Complications of surgery for severe obesity. Probl Gen Surg 2000;17:55–61.
43. Flickinger EG, Sivar OR, Pories WJ, Gloss RR, Park HK, Gibson JH. The bypassed stomach. Am J Surg 1985;149:151–156.
44. Raizman J, Strother SV, Donegar WL. Gastric cancer after bypass for obesity. Case report. J Clin Gastroent 1991;13:191–197.
45. Lord RV, Edwards PD, Coleman MJ. Gastric cancer in the bypassed segment after operation for morbid obesity. Aust N Z J Surg 1997;67:580–582.
46. Sundborn M, Hedernstion H, Gustasson S. Duodenogastric bile reflux after gastric bypass. A cholecistingraphic study. Dig Dis Sci 2004;47:1891–1896.
47. Curry TK, Carter PL, Porter CA, Watts DM. Resectional gastric bypass is a new alternative in morbid obesity. Am J Surg 1998;175:367–370.
48. Lee C, Carter PL, Elliott D, Mulleui XP, Egghatern W, Porter CH, Watts DM. An institutional experience with laparoscopic gastric bypass complications seen in the first year compared to open gastric bypass complications during the same period. Am J Surg 2002;183:533–538.