

Hand-Assisted Laparoscopic Vertical Banded Gastroplasty

Report of a Series

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Hypothesis: Hand-assisted laparoscopic vertical banded gastroplasty is technically feasible and has weight loss and morbidity outcomes similar to those of the standard open technique.

Design: Patients in this study met the indications for bariatric surgery and were followed up prospectively for postoperative morbidity, mortality, and weight loss.

Patients: A total of 26 patients with an average body mass index (calculated as weight in kilograms divided by the square of height in meters) of 50.8 underwent hand-assisted laparoscopic vertical banded gastroplasty. Follow-up ranged from 3 to 18 months.

Results: The hand-assisted technique was carried out efficiently, with low operative morbidity and no mortality. Weight loss during follow-up was similar to that described for the open technique.

Conclusions: Hand-assisted laparoscopic vertical banded gastroplasty is technically feasible and has weight loss and morbidity outcomes similar to those of the open technique in this first report of a series. The hand-assisted technique greatly facilitates performance of the procedure over the completely laparoscopic procedure and yet retains the advantages realized by laparoscopic surgery.

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THE NATIONAL Institutes of Health consensus statement¹ on gastrointestinal tract surgery for severe obesity defined clinically severe obesity as a body mass index (calculated as weight in kilograms divided by the square of height in meters) greater than 40, which is roughly equivalent to being 45 kg overweight for the average adult. The National Institutes of Health recommended that these patients consider weight reduction (bariatric) surgery because of the high risk of morbidity and mortality associated with severe obesity. Vertical banded gastroplasty is one of the two most commonly performed bariatric procedures because it produces good results in weight reduction, has low morbidity, and causes few physiological disturbances of digestion.²⁻⁴

Because of the morbidity of open bariatric surgery, minimally invasive techniques are being investigated. Vertical banded gastroplasty⁵ and Roux-en-Y gastric bypass^{6,7} have been performed laparoscopically, and both seem to have recovery advantages over their open counterparts.

To assist the surgeon while performing complicated laparoscopic procedures, hand-assisted laparoscopic tech-

niques are being developed. Hand-assisted laparoscopic vertical banded gastroplasty has been described and seems to simplify the technique over completely laparoscopic vertical banded gastroplasty.⁸ In this article, a hand-assisted laparoscopic vertical banded gastroplasty technique is described, along with the results of the first series of patients reported (26 patients with maximum follow-up of 18 months).

RESULTS

All patients in the study underwent the procedure described in the "Patients, Materials, and Methods" section. Average operating room time was 98.7 minutes. Average estimated blood loss was 53.8 mL. Average length of stay in the hospital was 4 days (discharge on postoperative day 3) (Table).

Patients were seen in follow-up 2 and 4 weeks after the procedure, and then every 3 months. Weight loss during this period was good (**Figure 2**) and similar to that reported in previous articles,² which described weight loss of 45% to 53% of excess body weight 6 months to 1 year after the procedure. Minor complications included 2 mild wound infections (8%). One patient (4%) developed a suture granu-

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PATIENTS, MATERIALS, AND METHODS

Vertical banded gastroplasty was carried out in a fashion similar to that described by Mason⁹ while using the laparoscopic technique for abdominal entry. A hand entry device (Dexterity Pneumo Sleeve; Dexterity Incorporated, Atlanta, Ga) was used for placement of the surgeon's hand inside the peritoneal cavity during the procedure. A total of 26 patients underwent hand-assisted laparoscopic vertical banded gastroplasty between April 1996 and May 1998. Twenty-five patients were women and 1 was a man, with an average age of 42.5 years. Patients had an average weight of 138.9 kg and an average body mass index of 50.8 (**Table**).

TECHNIQUE

After the induction of general anesthesia, the patient is secured to the operating table in the supine position with both arms out on arm boards. A urinary catheter is used to drain the bladder, and an oral gastric tube is used to decompress the stomach. The abdomen is sterilely prepared and draped so that the upper abdomen is widely exposed.

Pneumoperitoneum is then established through a 12-mm incision in the supraumbilical midline using a Veress needle (see **Figure 1**), and a 12-mm trocar is inserted. The abdomen is then explored for any abnormalities or adhesions. A 10-mm trocar is then inserted in the lateral left upper quadrant near the rib margin.

The Dexterity Pneumo Sleeve base is then adhered to the skin over the upper abdomen, and an incision is opened in the midline, the length of which is equal to the surgeon's glove size in centimeters. The Pneumo Sleeve is placed on the surgeon's hand, attached to the adhesive base, and the surgeon inserts the hand into the abdomen.

The surgeon stands on the patient's right side. The laparoscope is moved to the left upper quadrant position, where it is held by an assistant. Dissection is carried out through the supraumbilical location. The hepaticogastric ligament is divided. Blunt dissection with the surgeon's left hand is used to free the posterior wall of the cardia and fundus of the stomach. The peritoneal attachments of the fundus to the diaphragm are then transected to mobilize the superior portion of the fundus.

A 34F Ewald tube is placed through the mouth and into the stomach, where it is positioned along the inside of the lesser curvature. The left upper quadrant 10-mm port is then exchanged over an exchange rod to a 33-mm trocar (Ethicon Inc, Somerville, NJ). A 25-mm ILS Stealth circular stapler (Ethicon Inc) is then passed through the 33-mm port and positioned along the lesser curvature 4 cm below the angle of His and adjacent to the Ewald tube. The spike on the stapler is then advanced so that it passes through the anterior and then the posterior walls of the stomach. The anvil to the circular stapler is placed onto the spike using the surgeon's left hand. The surgeon's hand is used to hold the stomach in correct alignment while the stapler is turned down into place and fired. This creates a circular window through the fundus of the stomach. A 60-mm Endopath linear stapler with no knife (Ethicon Inc) is then placed through the 33-mm port, and one jaw of the stapling device is passed through the newly created window in the fundus of the stomach and placed longitudinally across the fundus to the angle of His. This stapling device is then fired, producing 4 rows of staples and creating the new gastric pouch. A second application of the linear stapler is used to reinforce the staple line.

A 2 × 7-cm piece of polypropylene mesh is then cut. A mark is made on the mesh 2 cm from one end to indicate the area that will be overlapped. The mesh is passed through the window made in the fundus by the circular stapler and wrapped around the outlet to the gastric pouch. The mesh is overlapped 2 cm, for an outside diameter of 5 cm, and is secured to itself with polypropylene sutures. The mesh can be held in place before suturing using a hernia stapler, which will also help identify the band on future radiographs. An 18F sump-type nasogastric tube is then placed through the gastric pouch and into the body of the stomach. The incisions are closed.

On the first postoperative day, patients take nothing by mouth, and gastric decompression is accomplished using the nasogastric tube. On the second postoperative day, a barium study is performed to evaluate the staple lines. If the staple lines are intact, the nasogastric tube is removed and patients are given a clear liquid diet that is advanced over successive weeks. After the procedure, patients receive education from dietitians, attend a surgical weight loss support group, and have an exercise program developed for them by physical therapists.

loma, which was later excised. Mild atelectasis occurred in 2 patients (8%), which prolonged their hospital stay 1 day for pulmonary toilet treatment, and this improved. One patient (4%) had gastroesophageal reflux after the procedure, which was treated with an oral histamine blocking medication and subsequently resolved.

Complications requiring reoperation included incisional hernia at the subxyphoid incision in 3 patients (12%). One patient (4%) experienced staple line leakage requiring laparotomy and repair of the circular staple line, with good recovery. One patient (4%) had pouch outlet obstruction from kinking of the surgical suture (Prolene) mesh band, which was treated laparoscopically by cutting the sutures on the band, allowing it to unkink, and opening the outlet of the pouch, and the patient resumed a normal postoperative course. One pa-

tient (4%) experienced a dehiscence of the linear staple line, resulting in the ability to consume greater amounts of food, which was repaired by dividing the gastric pouch from the stomach and draining it with a Roux-en-Y intestinal bypass. There were no deaths.

COMMENT

Although nonsurgical treatment remains the primary method of care for most obese patients, a select group of severely obese patients has been shown to benefit from bariatric surgery. The increased risk of complications in obese patients undergoing surgery, however, has limited the use of bariatric surgery in this patient group.

Laparoscopic surgery has been shown in large series¹⁰⁻¹² of patients to promote earlier mobilization and

Characteristics of 26 Patients Who Underwent Hand-Assisted Laparoscopic Vertical Banded Gastroplasty

| Patient No. | Age, y | Weight, kg | Ideal Body Weight, kg | BMI,* kg/m ² | Excess Body Weight, kg | Operating Room Time, min | Estimated Blood Loss, mL | Length of Hospital Stay, d |
|-------------|--------|------------|-----------------------|-------------------------|------------------------|--------------------------|--------------------------|----------------------------|
| 1 | 41 | 191.2 | 79.6 | 57.7 | 111.6 | 100 | 150 | 3 |
| 2 | 37 | 121.0 | 54.0 | 46.2 | 67.0 | 70 | 25 | 5 |
| 3 | 44 | 107.4 | 56.2 | 39.7 | 51.5 | 80 | 25 | 7 |
| 4 | 49 | 113.8 | 49.5 | 46.2 | 64.4 | 80 | 25 | 2 |
| 5 | 43 | 171.4 | 56.2 | 62.0 | 115.2 | 160 | 100 | 3 |
| 6 | 37 | 130.5 | 47.2 | 53.1 | 83.2 | 95 | 25 | 3 |
| 7 | 55 | 116.6 | 49.5 | 47.5 | 67.0 | 85 | 25 | 2 |
| 8 | 38 | 132.6 | 47.2 | 55.7 | 85.2 | 85 | 25 | 3 |
| 9 | 55 | 142.6 | 56.2 | 52.7 | 86.4 | 95 | 150 | 2 |
| 10 | 48 | 126.0 | 53.1 | 48.1 | 72.9 | 90 | 150 | 5 |
| 11 | 54 | 137.1 | 56.2 | 50.7 | 80.7 | 150 | 100 | 3 |
| 12 | 28 | 130.5 | 56.2 | 48.2 | 78.8 | 110 | 150 | 4 |
| 13 | 46 | 120.4 | 65.2 | 40.6 | 57.4 | 105 | 50 | 3 |
| 14 | 40 | 166.0 | 60.8 | 57.7 | 105.2 | 90 | 25 | 9 |
| 15 | 38 | 151.6 | 51.8 | 58.2 | 99.9 | 90 | 25 | 5 |
| 16 | 49 | 108.9 | 47.2 | 44.6 | 61.6 | 80 | 25 | 4 |
| 17 | 39 | 138.6 | 63.0 | 46.8 | 75.6 | 120 | 25 | 3 |
| 18 | 45 | 143.6 | 51.8 | 56.5 | 91.8 | 105 | 25 | 4 |
| 19 | 32 | 114.8 | 51.8 | 45.2 | 63.0 | 65 | 25 | 10 |
| 20 | 40 | 153.0 | 58.5 | 54.8 | 94.5 | 90 | 25 | 3 |
| 21 | 42 | 158.8 | 60.8 | 55.3 | 98.1 | 120 | 100 | 3 |
| 22 | 24 | 160.7 | 58.5 | 57.0 | 102.2 | 80 | 25 | 4 |
| 23 | 51 | 131.4 | 54.0 | 50.1 | 77.4 | 105 | 25 | 3 |
| 24 | 47 | 185.4 | 72.0 | 55.9 | 113.4 | 115 | 25 | 3 |
| 25 | 44 | 143.1 | 65.2 | 46.9 | 77.8 | 120 | 25 | 3 |
| 26 | 40 | 115.0 | 56.2 | 42.4 | 58.7 | 80 | 25 | 3 |
| Average | 42.5 | 138.9 | 56.8 | 50.8 | 82.3 | 98.7 | 53.8 | 3.9 |

*BMI indicates body mass index.

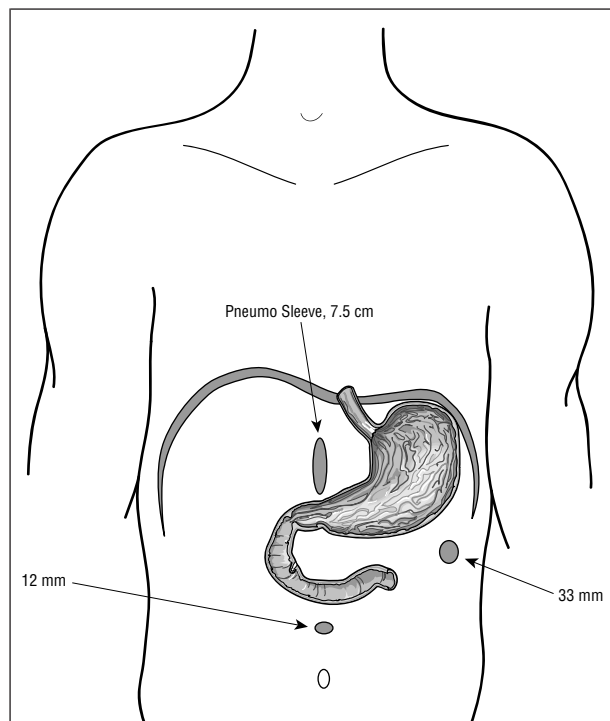


Figure 1. Pneumo Sleeve and secondary port placement.

operative morbidity. This could make laparoscopic bariatric surgery a more favorable treatment option and could expand its use to a greater number of patients with severe obesity. The relatively complex nature of the procedure

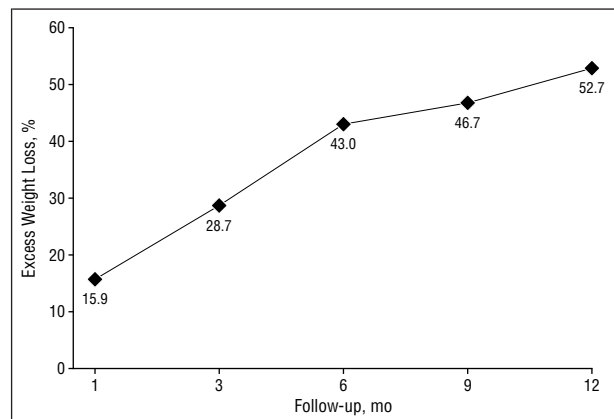


Figure 2. Percentage of excess body weight lost during follow-up.

makes a completely laparoscopic technique difficult and time consuming, as seen in porcine¹³ and human trials in unreported experience by me and in studies⁷ by others.

Hand-assisted techniques decreased operation times and retained the recovery advantages of completely laparoscopic techniques when they were compared in a large multicenter trial.¹⁴ In colorectal surgery, hand-assisted techniques helped with identification of dissection planes, manual retraction, finger dissection, hemostasis, and application of clip applicators and endoscopic staplers.¹⁵ Hand-assisted laparoscopy also reduced operative time in a study¹⁶ using a porcine model that evaluated laparoscopic vs hand-assisted nephrectomies, which showed the operating time to be reduced from 90 to 120 minutes to

30 to 45 minutes. Hand-assisted laparoscopic surgery was also documented in humans as resulting in shorter operative times and requiring fewer ports than with a completely laparoscopic technique for a variety of major procedures.^{17,18}

Use of the surgeon's hand in vertical banded gastroplasty allowed blunt dissection around the stomach, which must be performed carefully to avoid injury to the esophagus or stomach. Furthermore, it greatly facilitated the placement of the endoscopic stapling devices, which in this procedure must be done at precise locations.

Use of the hand-assisted technique does not seem to adversely affect patient recovery compared with the completely laparoscopic technique. Operative morbidity is similar, and the hospital stay in this series is the same as that reported with the totally laparoscopic procedure of 3 to 5 days.⁵

Hand-assisted laparoscopic vertical banded gastroplasty is technically feasible and is shown in this study to be well tolerated by patients. Weight loss during follow-up in this series is consistent with that reported for open surgery. The hand-assisted technique greatly facilitates the laparoscopic approach to vertical banded gastroplasty.

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