ABS Annals of Bariatric Surgery

Original Article

Laparoscopic gastric plication versus laparoscopic gastric banding in morbidly obese patients: A nonrandomized comparison study

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Received: Jan 1, 2021/ Published Online: Feb 18, 2021

Abstract

Background and aim: Nowadays, bariatric surgery benefits from various surgical techniques. These surgical methods offer different advantages. This study compared laparoscopic gastric banding (LGB) with laparoscopic gastric plication (LGP) to determine their efficacy and complications.

Methods: This comparison study was conducted in a university-affiliated hospital in Tehran, Iran. During 2018, patients who underwent LGB or LGP based on a shared decision making policy. Follow-up was performed at 3, 6, and 12 months after the surgery. The surgery's efficacy was evaluated by monitoring changes in body mass index (BMI) and Excess weight loss percent (EWL%). Also, surgical complications were recorded.

Results: Seventy patients were enrolled in this study (35 patients underwent LGP, and 35 patients had LGB). Seventeen of which (24.3%) were male, and 53 (75.7%) were female. The mean ± SD age of the participants was 34.53 ± 10.03 years. Both groups had a significant BMI loss (mean ± SD of BMI change equals 12.46± 3.8 in LGP and 11.09 ± 5.5 in LGB) and EWL% rise (59.34± 12.35 in LGP and 58.2± 17.88 in LGB). Although the difference between the two procedures was not statistically significant, complications were more frequent in LGB patients. It is also noteworthy that major complications were only seen in the LGB group.

Conclusion: The results showed that LGP and LGB were comparable in terms of the amount of weight loss. However, the absence of major surgical complications was an advantage to LGP.

Keywords: Obesity, Gastric plication, Gastric binding, Assessments, Patient outcome, Comparison

Introduction

Today, bariatric surgery is a well-known treatment for obesity. It also decreases obesity-related comorbidities (1). Since bariatric surgery has various types; there are still debates about what is the best surgical approach for each patient (2).

Among different obesity surgery techniques, laparoscopic gastric plication (LPG) is a newer reversible restrictive technique that does not require gastric resection or staple lines (3). Although, the evidence is in favor of the advantages of this technique in relation to weight-loss and safety comparison studies with other methods, particularly other restrictive methods such as laparoscopic gastric banding (LGB) and sleeve gastrectomy, are still lacking (4, 5).

LGB is also a reversible technique that is proved to be effective in the weight-loss, but there is a considerable possibility of complications such as band slippage, erosion, or obstruction of the stomach in patients (6, 7).

Given the concerns mentioned above, the present study aimed to compare the effectiveness and complications of LGP and LGB in two groups of patients with morbid obesity.

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Methods

This comparison study was conducted in a university-affiliated referral hospital in Tehran, Iran. In 2018, patients who underwent LGB or LGP were enrolled in the study. Inclusion criteria were age 25-80 years and BMI > 35kg/m2. The local ethics committee of Tehran University of Medical Sciences approved the conduct of the study. Informed consent was obtained from all participants, and they were assured that all data would be kept anonymously. In our center, patients are involved in the decision making process and selection of the bariatric surgery method after receiving information and consulting with the surgery team. Allocating the candidates to surgical treatments was based on a shared decision-making process that considered both physician and patients' preferences. Also, the same surgical team performed all LGP and LGB procedures.

Our hospital's treatment protocols do not permit performing bariatric surgery in the presence of one of the following criteria:

--Sever chronic diseases, including poor prognosis cancers and immunosuppression.

--History of psychologic diseases including psychosis, personality disorders, major depression, and mood disorders.

--History of prior gastric surgery.

--Failure to obtain informed consent from the patients.

--BMI > 60 kg/m2.

All patients had follow-up visits at 3, 6, and 12 months post-procedure, and a nurse recorded the patients' weight plus any complications of the surgery. In addition, patients

Table 1. Demographic characteristics of the patients.

Characteristic	LGP N=35	LGB N=35	P-value
Age (Mean ± SD, years)	35.34 ± 10.8	33.71 ± 10.05	0.5
Gender N(%)			
Female	25 (71.4)	28(80)	0.52
Male	10 (28.6)	7(20)	
Height (Mean ± SD, CM)	161.54 ± 6.81	165.69±7.32	0.17
weight (Mean ± SD, Kg)	116±9.49	120.18±23.49	0.12
Comorbidities N(%)			
Fatty liver	10 (28.5)	13 (37.1)	0.4
Hypertension	6 (17.1)	9 (25.7)	0.38
Hyperlipidemia	8 (22.85)	10 (28.5)	0.59
Diabetes	6 (17.1)	5 (14.2)	0.7
Hypothyroidism	4 (11.4)	5(14.2)	0.8

were assessed by nutritionists and treating surgeons.

Data comprised of patients' age, gender, weight, height, BMI, excess weight loss (EWL), post-surgical complications (nausea, vomiting, gastrointestinal bleeding, leakage into the abdominal cavity, and peritonitis) were recorded in a prepared checklist.

Our Primary endpoints were BMI and EWL% changes over 12 months, and the secondary outcome was the morbidity and mortality rates among the two groups.

Considering the prior studies and α=0.05, we estimated that at least 30 participants would provide 80% power.

Data were analyzed using the SPSS (version 17.0; SPSS, Chicago, IL). Quantitative data were expressed by mean ± SD. An independent-sample t-test or the chi-square test was applied to find any difference between the two groups. K–S test was used to check the normality of the sample data. Also, ANOVA with repeated measurements was used to compare the weight changes during the follow-up period. $P< 0.05$ was considered statistically significant.

Surgical Technique: Firstly, pneumoperitoneum (15–16 mmHg) was achieved by inserting a Verres needle under the left subcostal margin. A four-trocar approach was used in all patients.

In the subsequent step, the dissection and the division of the vascular supply of the greater curve of the stomach were done with the ligature starting at the antrum, 4 cm proximal to the pylorus up to the angle of HIS, with complete exposure of the left crus as for LSG.

LGP was modeled on a 36-Fr gastric bougie with a double row of sutures (running with polypropylene 2.0), starting 2 cm below the esophageal-gastric junction to the antrum. Finally, plication was achieved with full-thickness stitches, each bite 1 cm apart, in order to reduce unintentional tears or early prolapses. Dexamethasone 4 mg was administered during the surgical procedure and on the first postoperative day (POD-1) to reduce vomiting because of gastric wall edema. No drain or nasogastric tube was left in place at the end of the procedure in any of the patients.

LGB was performed by opening the avascular portion of the gastrohepatic ligaments in the upper stomach. Afterward, an incision was made along the right crus base to develop from the crura to the HIS angle. Next, the lap band tube was passed through this tunnel by a grasper. The buckle end of the band was left anteriorly, and the remainder was pulled around the proximal stomach. Then the tubing was inserted through the buckle, and the buckle closed. Subsequently, three sutures were made to imbricate up the fundus over the band. Finally, the tubing was brought out through the abdominal muscles, and the port was sutured to the facia of the abdominal wall. The port also had metal hooks that bolstered the connection to the facia. The preferred port location was the epigastric area.

Results

A total of 70 patients were included in the study; of whom 35 underwent LGP and 35 LGB. Seventeen (24.3%) patients were male, and 53 (57.7%) female. The mean ± SD age of the patients was 34.5 ± 10 years. The most frequent comorbidity among the patients was fatty liver (32%). As shown in Table 1, there was no significant difference between the two groups regarding the demographic features.

Tables 2 and 3 illustrate the BMI and EWL changes over 12 months post-surgery. After 12 months, both groups experienced a significant decrease in their BMI ($p<0.001$)

Table 2. BMI change in the two groups, one-year post-surgery.

Time (month)	BMI (Mean ± SD, kg/m^2)		P-value
	LGP N=35	LGB N=35	
Baseline	44.6 ± 3.5	43.46±6.2	0.3
3	40.11±3.43	38.65±5.4	0.2
6	35.9±3.24	34.3±5.27	0.8
12	32.14±2.74	32.37±4.99	0.8

Table 3. EWL% changes in the two groups, one-year post-surgery

Time (month)	EWL (%) (Mean ± SD)		P-value
	LGP N=35	LGB N=35	
3	31.76 ± 8.47	36.11±13.13	0.09
6	51.39±12.03	53.7±17.14	0.2
12	59.34±12.35	58.2 ±17.88	0.1

Table 4. Post-surgical complications in the two groups.

Complication (%)	LGP N=35	LGB N=35	P-value
Two weeks post-surgery	10 (28.5)	12 (34.2)	0.6
Nausea and vomiting	8 (22.8)	9(25.7)	0.7
Abdominal pain	0(0)	1(2.8)	0.3
Two weeks – 12 months post-surgery			
Wound infection			
Slippage	0(0)	2(5.7)	0.15
Gastric erosion and bleeding	0(0)	2(5.7)	0.15
Reversing surgery	0(0)	1(2.8)	0.3

and EWL% ($p<0.001$) from the baseline, but there was no statistically significant difference between the two groups at each time point.

According to Table 4, the frequency of complications was higher in the LGB group, and major complications were only seen in these patients.

Discussion

Based on the results of the present study, both LGP and LGB techniques were comparable with regard to the amount of weight loss in morbidly obese patients, and there was no difference between the two procedures in terms of EWL% and BMI changes at 3,6 and 12 months post-surgery (Table 2 and 3).

Prior studies have reported up to 58.8% decrease in excess weight one-year post-LGP. Our LGP patients had 59.34±12.35 EWL% in the 12th month, which is in line with the prior reports (7, 8).

Also, the complications of the two techniques were statistically similar between the two groups. There were minor complications in the short-term, including nausea, vomiting, and abdominal pain in both groups; all were managed medically.

Of note, in the midterm, is that LGB patients experienced major complications including gastric erosion and bleeding, wound infection, band slippage, and need to reversing surgery. On the contrary, these major complications did not occur in the LGP group. Surve et al. reported that 10.5% of their patients with LGB needed revisional surgery (7). They stated that the complication rates were high with LGB. This higher frequency is in accordance with our findings, although due to the limited number of participants, we could not find the statistically meaningful difference in the complication rates between the two groups.

Even though we observed no major complications in LGP patients, according to the literature, LGP patients are likely to suffer from complications like gastric perforation and bleeding (8-10).

In a study conducted by Strekas et al., the rate of complication 33 months post-LPG was 8.8%. Since our follow-up period was 12 months, our results must be considered as midterm complications (11).

To the best of our knowledge, this was the first study that compared the LGP with LGB. So far, other studies have compared LGP with sleeve gastrectomy and yielded controversial findings (5,12).

Limitations

The present study had no long follow up period, and in turn, our data on the weight loss and long-term complications of the surgery were limited. Also, the limited number of participants was another drawback that affected our results, particularly in finding a statistically significant difference in the complication rates between the LGP and LGB.

Conclusion

Our study showed that both LGP and LGB led to a significant weight loss in patients with morbid obesity.

Acknowledgments

The authors appreciate the hard work and excellent teamwork of all the medical staff at the surgery department and obesity clinic of Sina hospital, Tehran, Iran.

Conflicts of Interest: *The authors declared no conflict of interest*
Funding: *None*

Cite this article as: Najjari K, Zabihi Mahmoudabadi H, Elyasinia F, Karimialavijeh E, Talebpour M. Laparoscopic gastric plication versus laparoscopic gastric banding in morbidly obese patients: A nonrandomized comparison study. *Ann Bariatr Surg 2019(Dec);8(2).8.*

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