Research Article

A comparative study of weight loss and co morbidity benefits between Laparoscopic Sleeve Gastrectomy and Laparoscopic Gastric Imbrication/Plication in morbid obesity

Ghanghoria A[1], Meshram R[2], Shrivastava V[3], Mathur RK[4]

[1]Dr Arvind Ghanghoria, FIAGES, FMAS, Associate Professor, Department of Surgery, [2]Dr Rohit Meshram; PG resident, Department of Surgery, [3]Dr Vaibhav Shrivastava, Assistant Professor, Department of Surgery, [4]Dr R.K Mathur, F.R.C.S, F.A.C.S, F.I.C.S, F.I.M.S.A. Professor and Head, Department Surgery. All are affiliated with MGM Medical College, Indore

Address for Correspondence: Dr Arvind Ghanghoria, Associate Professor, Department of Surgery MGM Medical College Indore, **Email:** drarvindghanghoria@gmail.com, amandiagnostic@gmail.com

Abstract

Background: Laparoscopic sleeve gastrectomy (LSG) involves resection of a portion of the greater curvature of stomach. Laparoscopic greater curvature plication /imbrication (LGCP) involves plicating/imbricating the greater curvature without gastric resection. **Materials and Methods**: 30 patients who fulfilled the NIH criteria were randomized for either LSG (n = 15) [12 women and 3 men; mean age 38. 3 years (28–50 years) and mean BMI 43 kg/m2 or LGCP (n = 15) [10 women and 5 men; mean age 36.8 years (19–48years) and mean BMI 41 kg/m2. Patients were studied in terms of postoperative weight loss, changes in hypertension (systolic and diastolic blood pressure), FBS level and total cholesterol level. Follow-up period was 6 months. The mean hospital stay was 4 days for both groups. There were no intraoperative complications. All patients experienced postoperative excess weight loss and improvement in co morbid conditions. The improvement was significantly better in the LSG group in terms of excess weight loss (52.2% in LSG and 43.7% in LGCP) and change in FBS and Hypertension was not statistically significant (t test). **Conclusion**: LGCP is feasible, safe, and effective, but has an inferior weight-loss effect as compared to LSG for morbidly obese patients with BMI above 40 kg/m2 and 35kg/m2 with co morbid conditions.

Keywords: Laparoscopic Sleeve Gastrectomy and Laparoscopic Gastric Imbrication/Plication.

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health [1]. The main cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. However, multiple factors have been linked to obesity, including genetic, biochemical and behavioral as well as environmental, social and economic factors. Obesity is a major health problem affecting over 1.7 billion individuals worldwide, and although it was considered a disease of the western world, it seems to have expanded to the developing world, especially in urban settings [2]. Since 1997, the WHO has recognized it as a global epidemic, and in 2005, over 400 million obese adults were recorded. Conservative measures, such as dieting and physical exercise, have proven inadequate, as having treatment with medications [3]. There is considerable evidence in the literature on the long-term positive impact of Bariatric surgery as a primary therapy for the treatment of obesity and its co morbidities [4]. Traditionally, the primary mechanisms through which Bariatric surgery achieves its outcomes are believed to be the mechanical restriction of food intake, reduction in the absorption of ingested foods, or a combination of both [5]. Laparoscopic sleeve (VSG) gastrectomy was first described in 1999 as part of the Biliopancreatic diversion duodenal switch procedure. Subsequently, laparoscopic sleeve gastrectomy (LSG) has been performed as a standalone procedure [6,7].

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Laparoscopic greater curvature plication (LGCP) is a new restrictive technique that was initially proposed by Wilkinson and Peloso in 1981 [8]. It was reintroduced by Dr Talebpour in Iran [9]. It reduces the gastric volume successfully by placation/imbrication of the greater curvature and has the advantage of being a reversible restrictive procedure without the use of foreign material or gastric resection and a very rare risk of leak from the sutured site.

Aims and Objectives

1. To study the effect on weight following LSG and LGCP.
2. To study the effect on various co-morbid conditions following LSG & LGCP
   (Diabetes Mellitus/ hypertension/ dyslipidaemia).

Materials and Methods:

The Prospective Study was carried out from January 2014 to October 2015 at MYH Hospital, Indore, in the Department of surgery after clearance from the college scientific committee. Based on clinical and laboratory parameters, Laparoscopic Sleeve gastrectomy and Laparoscopic Gastric Imbrication are compared and its effect on obesity and comorbid conditions were studied.

This study was carried on 30 patients affected by obesity with BMI of >40 kg/m^2 or greater or obese patient with BMI > 35 kg/m^2 with obesity-related co morbid conditions like diabetes mellitus, hypertension, dyslipidemia undergoing Laparoscopic Sleeve gastrectomy and Laparoscopic Gastric Imbrications.

All these patients were thoroughly evaluated irrespective of their caste, religion, and socioeconomic status. Written informed consent was obtained from all patients. The subjects included in the study were not revealed. 30 patients fulfilled the National Institutes of Health criteria [10] and were assigned randomly to receive either LGCP (n = 15) or LSG (n = 15).

The patients who underwent LSG [12 women and 3 men, mean age 38.3 years (28–50 years) and mean BMI 43 kg/m2], and 15 patients who underwent LGCP [10 women and 5 men, mean age 36.8 years (19–48 years) and mean BMI 41 kg/m2] Table 1. The two groups were studied in terms of postoperative weight loss, changes in hypertension and RBS, serum cholesterol level and postoperative complications. Follow-up was 6 months.

Postoperative, patients were followed up at 1month and 6 months and monitored for weight, BMI, excess weight loss, diabetes status (RBS), hypertension (Systolic and Diastolic BP), and dyslipidemia (Total cholesterol level) table 2. Patients were also evaluated for any complication following surgery.

Both surgical procedures were performed under general anaesthesia with the patient in a supine position. Prophylactic intravenous antibiotics and subcutaneous heparin were administered before induction of anaesthesia. Closed pneumoperitoneum was achieved using a five/six-trocar port technique.

Table 1: Sex wise distribution.

	LSG	LGCP	Total	Weight (kg)	BMI(kg/m2)
Male	3	5	8	93.2	40.7
Female	12	10	22	108.8	42.4
Total	**15**	**15**	**30**		

Table 2: Distribution of study group as per surgery and patient characteristics at 0 months.

Type of	n	%	Mean Wt.(kg)	Mean BMI	DM	HTN	DYSLIPEDEMIA
LSG	15	50	104	43	6	5	3
LGP	15	50	105.3	41	5	4	1
Total	**30**	**100.0**	--	--	**11**	**9**	**4**

Operative technique of Laparoscopic Sleeve Gastrectomy:

Trocar placement was as follows: one 12-mm optical trocar above and slightly to the left of the umbilicus for the 30° laparoscope; one 10 mm on the upper right quadrant for the surgeon's left hand and one 10 mm trocar for the surgeon's right hand were placed 5 cm subcostally; one 5mm trocar on the upper left quadrant (ULQ) anterior axillary line3–4 cm subcostally for the surgeon's assistant; and one 5-mm trocar below the xiphoid appendices for liver retraction. The procedure began with the dissection of the angle of His, followed by careful dissection of the gastric greater curvature using the Harmonic scalpel (Ethicon) or the LigaSure Vessel Ligation System (Covidien, USA) starting from the antrum 6 cm from the pylorus towards the angle of His. The omentum and the gastroepiploic vessels were dissected away from the greater curvature, followed by the short gastric vessels and the posterior gastric attachments.

Then, a 34/ 36 Fr bougie was passed into the stomach with its tip positioned in the pylorus. The bougie was used to calibrate the size of the sleeve. The stomach was first transected tangentially from the greater curve towards the lesser curve using an Endo GIA™ stapler 6 cm proximal to the pylorus parallel to the bougie till the angle of His. The specimen was then extracted through the 10-mm port site. Stapled end was checked for any leak. Haemostasis was achieved. Intra-abdominal drain was inserted and removed 24 h postoperatively;

Operative technique for Laparoscopic Gastric Plication:

Port placement was similar to the sleeve gastrectomy. Same steps for dissection of the greater curve as in sleeve gastrectomy. The next step was to initiate gastric plication by invaginating the greater curvature over a 34/36 Fr bougie and applying a first row of extra mucosal continuous stitches of non absorbable sutures 2-0. This row guided a subsequent row created with extra mucosal interrupted sutures. The reduction resulted in a stomach shaped like a large sleeve gastrectomy without resection. No drains were placed.

Intraoperative: There were no intraoperative complications. Postoperative: On the first postoperative day, nausea & vomiting were reported by most patients; these symptoms resolved gradually on treatment with antiemetics and anti spasmodics. DVT prophylaxis was given to all. Patients were discharged when they were vitally stable and as soon as they could accept a liquid diet and could tolerate pain. All were prescribed of a daily proton-pump inhibitor for the 1st 3months and multivitamins for the next 4 months. The postoperative diet was prescribed as liquid diet for 10 days, followed by a progressive return to solid foods for a month, with the dietary restrictions removed after 4–6 weeks, depending on patients" acceptance. Follow-up visits in the post-operative period for the assessment of safety and weight loss and other clinical and laboratory parameters were scheduled for 1 week and at 1 and 6 months.

Results

Both procedures were completed laparoscopically. There were no intraoperative complications. Cholecystectomy was done in 6 patients. Most of the patients were discharged on day 4. Follow up was 6 months. Some patients had postoperative vomiting, which was controlled by anti-emetics. There were no leaks or stenosis or mortality.

Following surgery, at 6 months weight loss was more for LSG group (21.7kgs) than LGCP group (17.9 kgs) and was statistically significant. (SD 6.5 and 6.7 respectively, $p<.05$).

The initial %EWL at 6 months was more for LSG 52.2% and 43.7% for LGCP group which is statistically significant. (SD 6.1 and 4.2 respectively $p<.05$). (Fig 1/Table 3).

The mean reduction in BMI in LSG was by 9.2kg/m^2 and with LGCP by 6.9kg/m^2

Table 3: Comparison of both surgeries with respect to weight loss.

Surgery/weight (kg)	Before surgery	1 Month	6 Months
LSG	104	94.1	82.3
LGCP	105.3	96.6	87.4

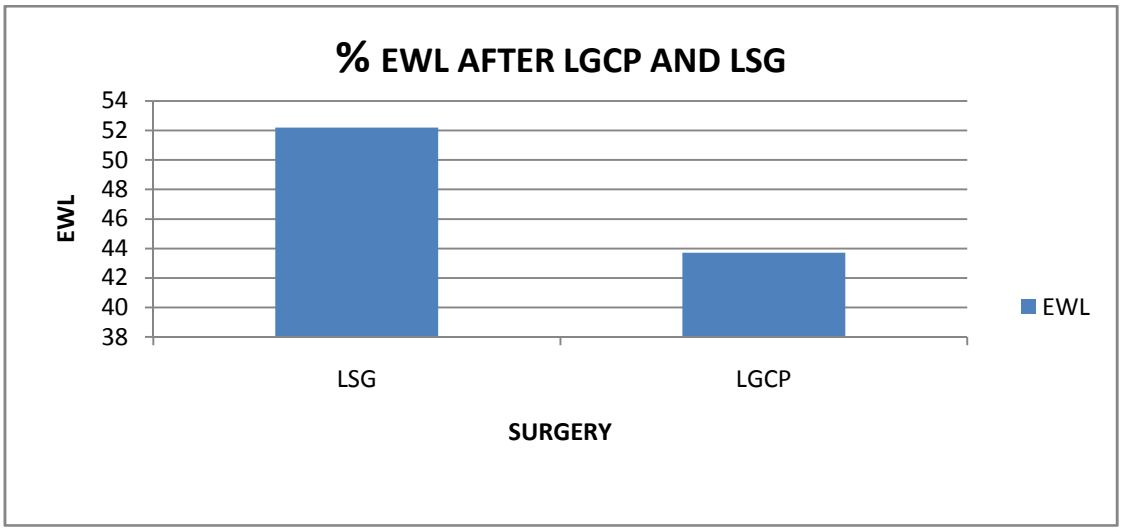

Fig 1: Bar diagram showing %EWL after the two surgeries at 6 months

Table 4: Table showing effect of two surgeries at 6 months.

Surgery	No of patients	Mean wt. loss(kg)	Mean BMI reduction	%EWL	Resolution(R)/Improvement (I) in comorbid conditions			
					DM R/I	HTN R/I	Dyslipidemia R/I	TSH
LSG	15	21.7	9.2	52.2%	3/3	3/2	2/3	3
LGCP	15	17.9	6.9	43.7%	2/3	2/2	0/1	3

In terms of hypertension, there was no statistical difference in the change of SBP/DBP in both groups, attributable to the small number of hypertensive patients in each group, but in the hypertensive group, 3 out of 5 patients resolved and 2 out of 5 improved after LSG whereas 2 out of 4 resolved and 2 out of 4 improved after LGCP. (SD 9.7 and 5.7 respectively for Systolic BP and 4.1 and 1.6 for diastolic BP respectively). In terms of diabetes there was no statistical difference in the change of FBS in both groups, this was also attributable to small number of diabetics in both groups. Diabetes resolved in 3 out of 6 and improved in 3 out of 6 patients in the LSG group. Similarly Diabetes resolved in 2 out of 5 and improved in 3 out of 5 patients in the LGCP group. (SD 5.6 and 3.7 Respectively) $p > .05$. Similar improvements were seen in dyslipidemia (total cholesterol level) but only 4 patients were dyslipidemic. 3 patients had hypothyroidism with significantly improvement in the TSH values after both procedures. Joint pains was complaint of 3 patients which improved in all 3.(Table 4). No weight regain in any patient was recorded until the end of the study.

Discussion

LSG is a procedure used initially as the first stage of a definitive bariatric treatment known as the duodenal switch. Vertical gastrectomy of the greater curvature is performed, resulting in a tubular stomach (80 to 120 ml) with the purpose of restricting food intake. As a primary bariatric procedure, results have been shown to be adequate reduction in excess weight loss (EWL), with improvements in co morbidities such as type 2 diabetes mellitus and hypertension [11]. LGCP is similar to LSG in that it generates a gastric tube by means of infolding the greater curvature, without gastric resection.

In the present study, we compared the efficacy of both laparoscopic bariatric surgeries; the weight loss after 6 months with LSG was 21.7 kgs and after LGCP 17.9 kgs. Change in BMI after LSG was 9.2 kg/m2 (52.2% EWL) compared with LGCP, which was 6.9 kg/ m2 (43.7% EWL) after 6months; thus, the result was significantly better with sleeve gastrectomy. [12]. There has been no record of weight regain or mortality in any patient till the end of the study. Both groups showed similar improvements in BP (hypertension) and FBS (DM) and dyslipidemia.

Conclusion

The present study shows that LGCP is a feasible, safe and a cost effective procedure in morbidly obese patients; having a positive effect in improving hypertension and diabetes mellitus and dyslipidemia. It has the advantage of being cost effective, less invasive with absence of prosthetic material, negligible risk of leak and reversibility make it more attractive but is inferior to LSG in relation to weight loss. Longer follow-up period and prospective comparative trials are needed to show whether it can be used as a stand-alone procedure for weight loss and resolution of comorbidities, especially in developing countries.

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