Int J Diabetes Dev Ctries (July–September 2015) 35(3):314–317
DOI 10.1007/s13410-015-0290-7

ORIGINAL ARTICLE

Short term effect of laparoscopic sleeve gastrectomy on diabetes in morbid obesity ; an North Indian experience

Prabhdeep Singh Nain · Parminder Singh · Ashish Ahuja · Vikas Garg

Received: 2 April 2013 / Accepted: 13 January 2015 / Published online: 22 January 2015

Abstract Bariatric surgery results in better weight loss and remarkable resolution of type 2 diabetes mellitus (DM). Laparoscopic sleeve gastrectomy (LSG) has over years proved to be an excellent procedure with low morbidity and results in effective, sustainable and long term weight loss. The motive of this study was to review overall effect of LSG in resolution of type 2 Diabetes mellitus. Sixteen patients were studied retrospectively and prospectively. The effect of LSG was studied at 3 and 6 months after surgery on changes in BMI & blood sugar. Sixteen patients were diabetic which was resolved after 6 months in 13 patients and improvement was seen in other three patients. Excess weight loss was 31.21 and 64.05 % 3 and 6 months respectively.

Keywords Laparoscopic sleeve gastrectomy (LSG) · Diabetes mellitus · BMI

Introduction

Obesity is one of the leading preventable causes of death worldwide with increasing prevalence in adults and children. Authorities view it as one of the most serious public health problems of the 21st century [3]. The problem of obesity has been observed to be on the rise in the entire Indian subcontinent [1]. India is following a trend of other developing countries that are steadily becoming more obese unhealthy, processed food has become much more accessible following India s continued integration in global food market. Indians are also genetically susceptible to central obesity. Current evidence suggests onset of obesity related co-morbidities in Asians is at lower body mass index (BMI) levels.

Sleeve Gastrectomy involves a major gastric resection. changes in gastric emptying which occours in patients after surgical treatment may alter the regulatory neurohormonal mechanisms and lead to change in production of distal gut hormones such as GLP-1 contributing to weight loss and better glucose metabolism. Therefore gastric emptying could have a major role in glycemic control after this procedure. In our institute we are using LSG as a sole procedure as primary bariatric surgery for obese patients, with or without co-morbidities.

Chowbey et al.[2] reported the Indian experience with the Laparoscopic Sleeve Gastrectomy (LSG) for treating morbid obesity. The data of 75 patients, who underwent LSG for the treatment of morbid obesity from November 2006 to February 2009, was retrospectively reviewed. There was a steady rise in %EWL from 31.2 % at 3 months to 52.3 % at 6 months, 59.13 % at 1 year, and 65 % at 2 years. Type2 diabetes was resolved in 81.2 %, hypertension in 93.75 %, and dyslipidemia in 85 % at 1 year. One patient died at 2 weeks postoperatively due to pulmonary embolism. They concluded that early results indicate that LSG is a safe and feasible option for treating the morbidly obese patients

Observations & results

This study was undertaken in the Department of Surgical Disciplines at DMCH Ludhiana between Jan 2009 and Jan 2012. A total of 16 patients, who underwent surgery for morbid obesity and had type II diabetes and gave consent were included in the study.

P. S. Nain (✉) · P. Singh · A. Ahuja · V. Garg
Dayanand Medical College & Hospital, 211/A, Tagore Nagar, Ludhiana, Punjab, India
e-mail: prabhdeepnain@rediffmail.com

P. Singh
e-mail: pam_endo66@yahoo.in

A. Ahuja
e-mail: ashishahuja17@yahoo.co.in

V. Garg
e-mail: drviccy@yahoo.com

Impact on type 2 diabetes mellitus

In our study 16 patients had Type 2 diabetes mellitus (T2 DM), 7 of them had duration of diabetes for more than 5 years, 4 patients had history of diabetes for <5 years and remaining patients were diagnosed pre-operatively during the work-up for bariatric surgery. Out of the 16, 8 patients were on oral hypoglycemic agents (OHA) and 3 of them were on insulin. Out of 16 patients, 8 became euglycemic within 3 months of surgery and were without any medication. The remaining 8 patients required reduced drug dosage for control of diabetes and by 6 months 13 patients (81.2 %) were off anti-diabetic medication.

At 6 months, all patients on preoperative diet therapy had normal fasting glucose values. 7 of 8 (87.5 %) patients on oral hypoglycemic medication presented normal fasting glucose values without any medication, and one patient presented with improvement of the disease and needed only metformin medications. The patients on insulin therapy presented normal fasting glucose values at 6 months postoperatively. One patient still required insulin though the dose was half of the earlier and other patient earlier on insulin was on metformin only at 6 month.

Fasting plasma glucose

The fasting plasma glucose levels of all patients were checked pre operatively as well at 3rd and 6th month after the bariatric procedure. There is a significant decrease in levels as compared to pre operative values (Fig. 1).

Impact on HbA1c levels

The fall in HbA1c varied from 0.6 to 1.8 % at 3 months, with further fall in HbA1c of 0.5–0.8 % at 6 months. The total decline in HbA1c varied from 1 to 3.8 %. The maximum rate of decline was noted in first 3 months of follow up. Maximum fall occurred in patients with high value of HbA1c. (Fig. 2).

Discussion

Weight loss is the most important gain of bariatric surgery operations, and it is the parameter by which success or failure of weight reducing techniques is measured. Success of treatment has been defined as weight loss >50 % of excess weight. In our study 100 % of patients lost >50 % of their excess weight 6 months after surgery. The mean weight loss at 3 and 6 months was 19.92 kg and 41.20 kg. The mean %EWL at 3 and 6 months was 31.21 % and 64.05 % respectively.

Bariatric operations prolong survival and resolve comorbid medical conditions associated with severe obesity. Bariatric surgery leads to resolution/improvement of Type 2 Diabetes mellitus, hypertension, obstructive sleep apnea and dyslipidemia. LSG may induce weight loss by reducing food intake, but in accelerated gastric emptying, delivery of nutrients to the small intestine early in the eating cycle could activate small intestine satiety inducing chemoreceptors that could modify food ingestion periodicity. Increases in the response of gastrointestinal hormones, such as glucagon-like peptide-1 (GLP-1), a meal-related satiation factor, have been reported after LSG. This type of response may be caused by the food quickly reaching the level of the small intestine due to accelerated gastric emptying.

Bariatric surgery has been shown to reduce comorbidities and mortality in patients with morbid obesity and most significantly to ameliorate or resolve T2DM. Much of the improvement has been related to the excess weight loss after surgery. However, some effects appear to be independent from weight loss.

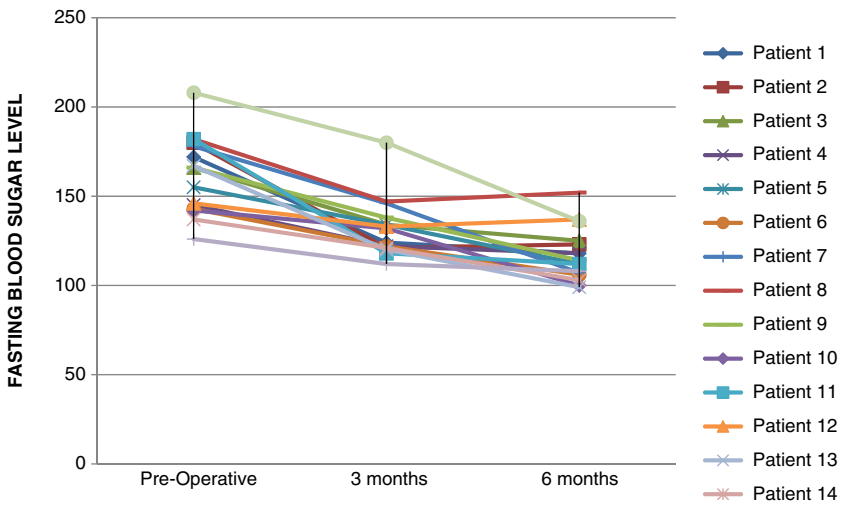

Fig. 1 Changes in blood sugar level

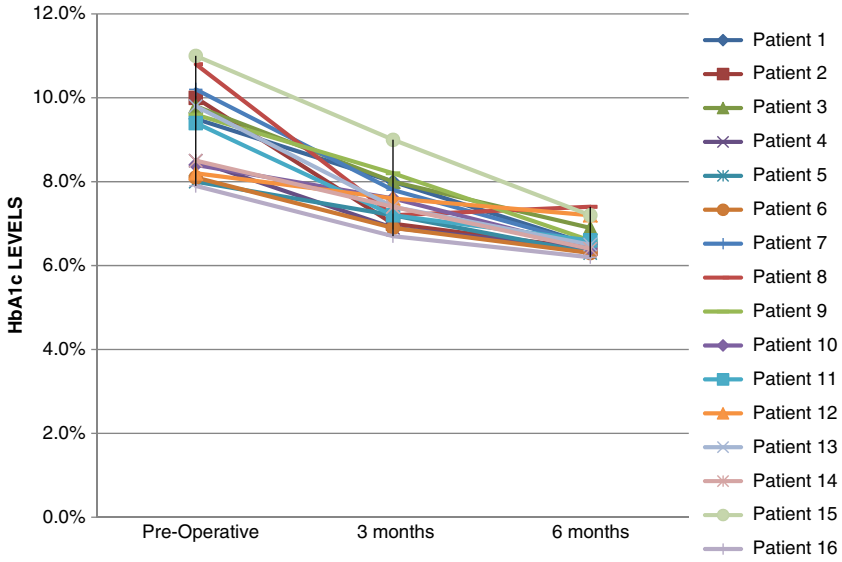

Fig. 2 Changes in HbA1c levels

Eight of the 16 diabetic patients had resolution of diabetes at 3 months and 13 patients had resolution after 6 months and improvement was seen in all the 16 patients. There was reduction in requirement of drugs in the remaining three patients one on half the dose of insulin other two on metformin only.

At present, the preoperative factors predicting the successful treatment of T2DM after LSG have not yet been established. Possible factors associated with diabetes non-remission of diabetes are older age, male gender, diabetes duration >10 years, use of insulin, inadequate weight loss, type of surgery (LAGB vs. LSG vs. LRYGB), severity of preoperative B cell dysfunction .

LSG has shown to resolve or improve T2DM in a majority of patients in many series. It has been suggested that changes in ghrelin and PYY after LSG may help to explain these results. Moon Han et al.[5] showed that LSG without the second-stage operation was associated with an excess weight loss of 71 % and with a 100 % resolution rate of T2DM at 6 months after surgery. Lacy et al.[6] reported that LSG is associated with a high resolution of T2DM at short-term (4 months after surgery). At 12 months T2DM had resolved, in 33 out of 39 (84.6 %) of the LSG subjects. Neither the weight loss nor the degree of diminished waist circumference was associated with T2DM resolution following LSG .

Rizzello et al[8] emphasized the resolution of T2DM after LSG. They also presented the effect of LSG on T2DM in patients with a BMI <35 kg/m^2. They studied 9 patients with T2DM and a BMI of 30–35 kg/m^2, who also had hypertension, dyslipidemia, and obstructive sleep apnea. A normal BMI and normal glycemia were achieved within 6 months, with a mean HbA1c of 6.0 %. T2DM resolved in all but 1 of these patients (88 % cured). The patient in whom T2DM did not resolve had been diabetic for >20 years, but postoperatively had a decrease in the insulin requirement. Rizzello et al.[6] stated that 10-years' duration of T2DM is a cutoff for resolution.. However, patients with T2DM for >5 years did not do as well as those with shorter term T2DM.

Visceral fat has been shown to be decreased after bariatric surgery which in turn reduces hepatic as well as peripheral insulin resistance. Some studies have also found a greater decrease in visceral fat when compared to subcutaneous fat after bariatric surgery.

Bariatric surgery and impact on glucose homeostasis

Bayham et al.[3] conducted a retrospective review of 262 patients diagnosed with diabetes who underwent either the LRYGB or the LSG between 2002 and 2010. Medication use before and after surgery was recorded. Approximately 79 % of LRYGB patients and 83 % of LSG patients remained off their diabetes medication. LSG patients experienced a significantly lower incidence of major and minor complications both peri- and postoperatively compared with LRYGB patients. They concluded that both operations appear to equally resolve T2DM in an obese, adult population, however, the incidence of both major and minor complications is much lower in the LSG patient group.

Nocca et al.[3] studied the impact of Laparoscopic Sleeve Gastrectomy on HbA1c blood level and pharmacological treatment of type 2 diabetes mellitus in morbidly obese patients. At 1 year after surgery, T2DM had resolved in 75.8 % of the LSG group. Reduced use of pharmacological therapy was noted in 15.15 % of the LSG patients. Percentage excess weight loss and BMI lost were 60.11 and 29.80 % in the LSG group, respectively.

Vidal et al.[4] conducted a 4-month prospective study on the changes in glucose homeostasis in 35 severely obese

T2DM subjects undergoing Laparoscopic Sleeve Gastrectomy and 50 subjects undergoing Laparoscopic Roux-en-Y gastric bypass. At 4-months after surgery, LSG and LRYGB operated subjects lost a similar amount of weight (20.6 and 21.0). T2DM had resolved respectively in 51.4 and 62.0 % of the LSG and LRYGB operated subjects. A shorter preoperative DM duration, a preoperative DM treatment not including pharmacological agents, and a better presurgical fasting plasma glucose or HbAlc, were significantly associated with a better type 2 DM outcome in both surgical groups. The data suggested that mechanisms beyond weight loss may be implicated in DM resolution following LSG & LRYGB.

Summary & conclusion

We conclude that the laparoscopic sleeve gastrectomy is safe and effective bariatric techniques in the short term with , excess weight loss, and improvement of type 2 diabetes mellitus.

References

1. Misra A, Chowbey P, Makkar BM, Vikram NK, Wasir JS, Chadha D, et al. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J Assoc Physicians India. 2009;57:163–70.
2. Chowbey PK, Dhawan K, Khullar R. Laparoscopic sleeve gastrectomy: an Indian experience—surgical technique and early result. Obes Surg. 2010;20:1340–7.
3. Rizzello M, Abbatini F, Casella G. Early postoperative insulin-resistance changes after sleeve gastrectomy. Obes Surg. 2010;20:50–5.
4. Vidal J, Ibarzabal A, Romero F, Delgado S, Momblán D, Flores L, et al. Type 2 diabetes mellitus and the metabolic syndrome following sleeve gastrectomy in severely obese subjects. Obes Surg. 2008;18(9):1077–82.
5. Moon Han S, Kim WW, Oh JH. Results of laparoscopic sleeve gastrectomy at 1 year in morbidly obese Korean patients. Obes Surg. 2005;15(10):1469–75.
6. Abbatini F, Rizzello M, Casella G. Long-term effects of laparoscopic sleeve gastrectomy, gastric bypass, and adjustable gastric banding on type 2 diabetes mellitus. Surg Endosc. 2010;24(5):1005–10.