AMJ Australasian Medical Journal

[AMJ 2021;14(11):269-274]

Short term weight loss and surgical outcomes of laparoscopic sleeve gastrectomy in patients with a Body Mass Index ≤35

Alexandra Miller[1*], Matthew Honore[1], Kevin Lah[1], Laila Sheikh[1], Christine Skinner[2], George Hopkins[1,2]

1 Royal Brisbane & Women's Hospital, QLD
2 Obesity Surgery Brisbane, QLD

RESEARCH

Please cite this paper as: Miller A, Honore M, Lah K, Sheikh L, Skinner C, Hopkins G. Short Term Weight Loss and Surgical Outcomes of Laparoscopic Sleeve Gastrectomy in Patients with a Body Mass Index ≤35. AMJ 2021;14(11):269-274.

Corresponding Author:
Alexandra Miller
Royal Brisbane & Women's Hospital,
Butterfield St, Herston QLD, Australia.
alexandra.miller2@health.qld.gov.au

ABSTRACT

Background

Laparoscopic sleeve gastrectomy (LSG) is the most commonly performed bariatric operation. Its efficacy for both weight loss and comorbidity resolution in the morbidly obese has been well established.

Aims

Outcomes in the obese but lower body mass index (BMI) group are not well researched. We report short term outcomes in a patient cohort with a BMI ≤ 35 kg/m^2.

Methods

Consecutive patients with a BMI ≤ 35 kg/m^2 who underwent primary LSG at a single institution between 2010 and 2020 were reviewed from a prospectively collected database. Weight loss outcomes and complications were documented.

Results

Two hundred and seventy eight patients were included with a mean preoperative BMI of 33.2 kg/m^2 and mean age of 45 years. Mean percentage excess weight loss (per cent EWL) was 97 per cent and 116 per cent at 6 and 12 months respectively. Clavien-Dindo grade III-V complications occurred in 3.6 per cent of patients and there were no patient deaths.

Conclusion

These findings demonstrate that in patients with a BMI ≤ 35 kg/m^2, LSG provides effective short term weight loss with low rates of postoperative complications.

Keywords

Laparoscopic sleeve gastrectomy, Low BMI, Weight loss, Complications

What this study adds:

1. What is known about this subject?

Overweight and obese patients with a BMI ≤35kg/m^2 are at increased risk of obesity-related comorbidities. LSG outcomes in this cohort are not well researched.

2. What new information is offered in this study?

In overweight and obese patients with a BMI ≤35kg/m^2, LSG provides effective short term weight loss with low rates of postoperative complications.

3. What are the implications for research, policy, or practice?

LSG may be beneficial for obesity management in lower BMI patients who, without intervention, remain at risk of ongoing weight gain and obesity-related comorbidities.

Background

Global obesity rates continue to rise. In Australia, it is estimated that 63.4 per cent of adults are overweight or obese[1]. As a result, the prevalence of obesity-related comorbidities (including type 2 diabetes mellitus, cardiovascular disease and malignancy[1-4]) is also increasing, and obesity-related disease accounts for 3.4 million deaths per year[5].

Laparoscopic sleeve gastrectomy (LSG) is the most commonly performed surgical intervention for the management of obesity and it continues to grow in popularity worldwide[6]. Its efficacy with regards to sustained weight loss and comorbidity resolution[7,8] as well as its operative safety and cost effectiveness,[9] is well established in the morbidly obese. However, a group of patients often excluded from bariatric surgical intervention are overweight and obese patients with a body mass index (BMI) ≤ 35 kg/m^2. Without access to surgical intervention, this cohort remains at risk of ongoing weight gain[10] and thereby the comorbid complications of obesity and its significant

psychological impact.[1-4]

Only a small number of studies have investigated LSG outcomes in this lower BMI group. We report short term weight loss and operative safety outcomes in a patient group with a BMI ≤ 35 kg/m^2.

Method

Study design and patient population

All patients with a BMI ≤ 35 kg/m^2 who underwent primary LSG performed by a single surgeon, at a single institution in Brisbane, Australia between 2010 and 2020 were included in a prospectively collected database. Ethics approval was obtained prior to commencement (SVHAC HREC 18/08).

While there were no exclusion criteria, patients were required to cease other weight loss therapies (including phentermine and very low calorie diets) to participate. Preoperatively, patients also underwent extensive review by a multidisciplinary team comprised of a surgeon, dietician, psychologist and nurse practitioner. A delay of 2 to 3 months after the initial surgical consult, followed by a second surgical consult, was mandatory for all patients prior to surgery. Patients were also required to document their understanding of the surgical, medical and medicolegal risks, current guidelines, previous weight loss attempts, and commitment to lifestyle change and ongoing follow up.

A BMI of 25 kg/m^2 was used as ideal body weight for all calculations and weight loss outcomes were reported as percentage excess weight loss (per cent EWL).

Surgical technique

A standard LSG was performed for all patients. The same procedure was performed irrespective of patient BMI, using the same technique as is used for patients with a BMI ≥35kg/m^2. Patients were positioned supine with a standard five port placement. A Nathanson liver retractor was used to expose the hiatus. The greater curve was then mobilised from the angle of His to just proximal to the pylorus using the Harmonic Scalpel®. The greater curve was resected with an Endo GIA™ stapling device abutting a 36-French calibration tube, using the penetrators from the lesser curve to guide sleeve width. Three firings of the Covidien® 45mm black cartridges (the second and third covered with SEAMGUARD®) were used to resect the antrum, around the incisura and onto the body of the stomach. Thereafter, depending on the length of the greater curve, three or more loads of Covidien® 60mm purple cartridges (3mm, 3.5mm and 4mm staples) were used to complete the resection through the body and fundus, with completion just to the left of the angle of him. The transacted omentum was pexed to the neo-greater curve with a 3-0 PDS® suture to recreate the anatomical lie of the stomach. The resected specimen was retrieved from the 15mm port and sent for histopathology. The skin was then closed with a subcuticular 3-0 Monocryl® suture.

Postoperative care and complications

Postoperative care consisted of a slow diet upgrade - sips of water for the first 24 hours, clear fluids day 1, free fluids day 2 and a soft diet for several weeks before further upgrades with dietician support. Early mobilisation, subcutaneous heparin and graduated compression stockings were implemented for venous thromboembolism prevention. Patients were generally discharged day 1 postoperatively once requiring minimal analgesia, mobilising well and tolerating oral intake. Patients were reviewed in outpatients at 1, 3, 6 and 12 months, and again at 2 and 5 years.

Surgical complications were recorded within the 30-day postoperative time period and reported using the Clavien-Dindo classification system.[11]

Results

Two hundred and seventy eight patients were included in the study with a mean preoperative BMI of 33.2 kg/m^2 (range 27.7-34.9 kg/m^2). The mean age was 45 years (range 16-72 years) and 86 per cent of patients were female. 82.4 per cent of patients had atleast 1 obesity-related comorbidity. (Table 1)

Mean per cent EWL was 97 per cent, 116 per cent, 116 per cent and 81 per cent at 6 months, 12 months, 2 years and 5 years respectively (Figure 1). This correlated with a mean BMI of 25.4kg/m^2, 23.8kg/m^2, 23.7kg/m^2 and 26.6kg/m^2 at 6 months, 12 months, 2 years and 5 years respectively. (Figure 2)

Major 30-day complications (Clavien-Dindo grades III-V) occurred in 10 patients (3.6 per cent) (Table 2). Three patients required returns to theatre for postoperative bleeding. There were 2 leaks (1 managed by percutaneous drainage, the other converted to a Roux-en-Y bypass). One patient required surgical intervention for a pancreatic fistula. The other patients in this group required endoscopic intervention for stricture, nasojejunal feeding or investigation of poor oral intake or dysphagia. There were no patient deaths.

Patient follow up rates were 54 per cent at 12 months, 37 per cent at 2 years and 22 per cent at 5 years.

Discussion

It is well known that overweight and obese patients with a BMI ≤ 35 kg/m^2 are at increased risk of obesity-related comorbidities, including its psychological impact, compared with patients with a BMI ≤ 25 kg/m^2 [4]. Despite these risks, guidelines have traditionally excluded patients with a BMI ≤ 35 kg/m^2 from bariatric surgery. While pharmacological

therapy and very low calorie diets are effective strategies for rapid weight loss, they do not achieve lasting results and many patients regain weight on therapy cessation or experience adverse effects of treatment[12]. Without access to effective treatment options, this patient cohort remains at risk of ongoing weight gain[10] and its comorbid consequences[4].

Developed in the era of very high-risk surgery (the open vertical banded gastroplasty and biliopancreatic diversion with duodenal switch procedures), traditional guidelines sought to target only the most at-risk patient groups (BMI ≥ 35 kg/m^2). However, there has been increasing recognition that BMI is a poor surrogate for body fatness[13] and its use as an arbitrary sole indicator of whether to undertake bariatric surgery overlooks a large group of patients who may benefit from surgical intervention (for example, patients of high-risk ethnicity who carry the risks of obesity-related complications even at a lower BMI). More recent guidelines suggest consideration of bariatric surgery in patients with a BMI 30-35kg/m^2 where obesity-related comorbidities such as poor glycaemic control are also present, but continue to recommend against surgical intervention for overweight patients with a BMI ≤ 30 kg/m^2 [4,14,15]. Our results indicate that, using current surgical techniques, good weight loss outcomes and operative safety profiles are achievable in a lower BMI patient group, suggesting that the traditional thinking around which patients should benefit from bariatric surgery should be broadened.

Early surgical intervention in this lower BMI cohort reduces the weight loss required to return to the healthy weight range. Our results of 116 per cent excess weight loss and 23.8 kg/m^2 mean BMI at 12 months are superior to those reported in several large studies confined to patients with a BMI ≥ 35 kg/m^2 [7,8,16]. These findings are comparable to those reported in the small number of studies that have also investigated LSG in mildly obese patients[17-19]. Park and Kim,[17] for example, similarly demonstrated that patients with a BMI 30-35 kg/m^2 have greater per cent EWL and reach a lower BMI baseline post bariatric surgery compared to patients with a BMI ≥ 35 kg/m^2. Our study is unique; however, in that all LSGs were performed by a single surgeon at a single institution, thereby ensuring a uniform surgical technique, environment and patient follow up.

The most common deviation from the normal postoperative course was readmission for postoperative nausea and discomfort, requiring short hospital stays for rehydration and analgesia. With regards to our major complications, the 0.7 per cent leak rate is comparable to large volume studies with reported leak rates varying from 0-7 per cent[20]. Portal vein thrombosis occurred in 4 patients (1.4 per cent), a higher rate compared with the literature. All were diagnosed by computed tomography imaging performed to investigate postoperative abdominal pain. None of these patients had additional risk factors for thrombosis (other than obesity and recent surgery). All were managed with therapeutic anticoagulation and experienced an uneventful further recovery. Portal vein thrombosis is an uncommon complication post LSG and we postulate that the higher rate may be due to the higher degree of clinical suspicion and subsequent targeted investigation to exclude this diagnosis brought about by its recent attention in the literature[21].

Limitations of this study are related to design and incomplete patient follow-up. This was a retrospective cohort study investigating patients treated by a single surgeon at a single institution, and results may therefore not be generalizable to other surgeons or centres. The incomplete postoperative follow-up rates of 54 per cent at 12 months, declining to 22 per cent at 5 years, are largely explained by the large geographical catchment area, with more peripherally located patients often preferring to follow up with local services.

Conclusion

Our study demonstrates that LSG provides effective short term weight loss with low complication rates in overweight and obese patients with a BMI ≤ 35kg/m^2. These results suggest greater access to LSG may be beneficial for the management of obesity in this lower BMI cohort, who without intervention remains at risk of ongoing weight gain and obesity-related comorbidities. Further studies evaluating longer term weight loss outcomes are required to establish longevity of these findings. In addition, longer term data on patient comorbidity profiles, especially glycaemic control, would be beneficial to assess whether surgery in the lower BMI cohort could also avoid the development of more severe obesity related comorbidities.

References

1. Australian health survey: First results, 2011-2012. Australian Bureau of Statistics. 2012. Available from: https://www.abs.gov.au/ausstats/abs@.nsf/lookup/4364.0.55.001main+features12011-12.
2. Flegal KM, Kit BK, Orpana H, et al. Association of all-cause mortality with overweight and obesity using standard body mass index categories: A systematic review and meta-analysis. JAMA. 2013;309(1):71-82. doi: 10.1001/jama.2012.113905.
3. Bays HE, Chapman RH, Grandy S, et al. The relationship of body mass index to diabetes mellitus, hypertension and dyslipidaemia: Comparison of data from two national surveys. Int J Clin Pract. 2007;61(5):737-747. doi: 10.1111/j.1742-1241.2007.01336.x.

4. Busetto L, Dixon J, De Luca M, et al. Bariatric surgery in class I obesity: A Position Statement from the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO). Obes Surg. 2014;24(4): 487–519. doi: 10.1007/s11695-014-1214-1.
5. Global status report on noncommunicable diseases 2014. Geneva: World Health Organization; 2015. Available from: https://apps.who.int/iris/handle/10665/148114.
6. Ohta M, Seki Y, Wong SK, et al. Bariatric/Metabolic Surgery in the Asia-Pacific Region: APMBSS 2018 Survey. Obes Surg. 2019;29(2):534-541. doi: 10.1007/s11695-018-3539-7.
7. Boza C, Salinas J, Salgado N, et al. Laparoscopic sleeve gastrectomy as a stand-alone procedure for morbid obesity: report of 1000 cases and 3-year follow-up. Obes Surg. 2012;22(6):866-871. doi: 10.1007/s11695-012-0591-6.
8. Van Rutte PW, Smulders JF, de Zoete JP, et al. Outcome of sleeve gastrectomy as a primary bariatric procedure. Br J Surg. 2014;101(6):661-668. doi:10.1002/bjs.9447.
9. James R, Salton RI, Byrnes JM, et al. Cost-utility analysis for bariatric surgery compared with usual care for the treatment of obesity in Australia. Surg Obes Relat Dis. 2017;13(12):2012-2020. doi: 10.1016/j.soard.2016.12.016.
10. Dahl AK, Reynolds CA, Fall T, et al. Multifactorial analysis of changes in body mass index across the adult life course: A study with 65 years of follow-up. Int J Obes. 2014;38(8):1133-1141. doi:10.1038/ijo.2013.204.
11. Dindo D, Clavien PA. What is a surgical complication? World J Surg. 2008;32(6):939-41. doi: 10.1007/s00268-008-9584-y.
12. Padwal R, Li SK, Lau DC, et al. Long-term pharmacotherapy for overweight and obesity: A systematic review and meta-analysis of randomized controlled trials. Int J Obes Relat Metab Disord. 2003;27(12):1437–1446. doi: 10.1038/sj.ijo.0802475.
13. Piers LS, Soares MJ, Frandsen SL, et al. Indirect estimates of body composition are useful for groups but unreliable in individuals. Int J Obes Relat Metab Disord. 2000;24(9):1145-1152. doi: 10.1038/sj.ijo.0801387.
14. Rubino F, Nathan DM, Eckel RH, et al. Metabolic surgery in the treatment algorithm for type 2 diabetes: A joint statement by International Diabetes Organizations. Diabetes Care. 2016;39(6):861-877. doi: 10.2337/dc16-0236.
15. ASMBS Clinical Issues Committee. Bariatric surgery in class I obesity (body mass index 30-35 kg/m^2). Surg Obes Relat Dis. 2013;9(1):e1-10. doi: 10.1016/j.soard.2012.09.002.
16. Sakran N, Raziel A, Goitein O, et al. Laparoscopic sleeve gastrectomy for morbid obesity in 3003 patients: results at a high-volume bariatric center. Obes Surg. 2016;26(9):2045-50. doi: 10.1007/s11695-016-2063-x
17. Park JY, Kim YJ. Efficacy of laparoscopic sleeve gastrectomy in mildly obese patients with body mass index of 30-35kg/m^2. Obes Surg. 2015;25(8):1351-1357. doi: 10.1007/s11695-015-1575-0.
18. Berry M, Urrutia L, Lamoza P, et al. Sleeve gastrectomy outcomes in patients with BMI between 30 and 35 - 3 Years of follow-up. Obes Surg. 2018;28(3):649-655. doi: 10.1007/s11695-017-2897-x.
19. Noun R, Slim R, Nasr M, et al. Results of laparoscopic sleeve gastrectomy in 541 consecutive patients with low baseline body mass index (30-35 kg/m^2). Obes Surg. 2016;26(12):2824-2828. doi: 10.1007/s11695-016-2224-y.
20. Aurora A, Khaitan L, Saber A. Sleeve gastrectomy and the risk of leak: a systematic analysis of 4888 patients. Surg Endosc. 2012;26(6):1509-1515. doi: 10.1007/s00464-011-2085-3.
21. Tan S, Greenslade J, Martin D, et al. Portomesenteric vein thrombosis in sleeve gastrectomy: A 10 year review. Surg Obes Relat Dis. 2018;14(3):271-275. doi: 10.1016/j.soard.2017.12.010.

ACKNOWLEDGEMENTS

Not applicable.

PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

FUNDING

Not applicable.

ETHICS COMMITTEE APPROVAL

St Vincent's Health and Aged Care Human Research and Ethics Committee 18/08.

Figures and Tables

Figure 1: Mean percentage excess weight loss post primary laparoscopic sleeve gastrectomy (patients with initial BMI ≥35 kg/m^2)

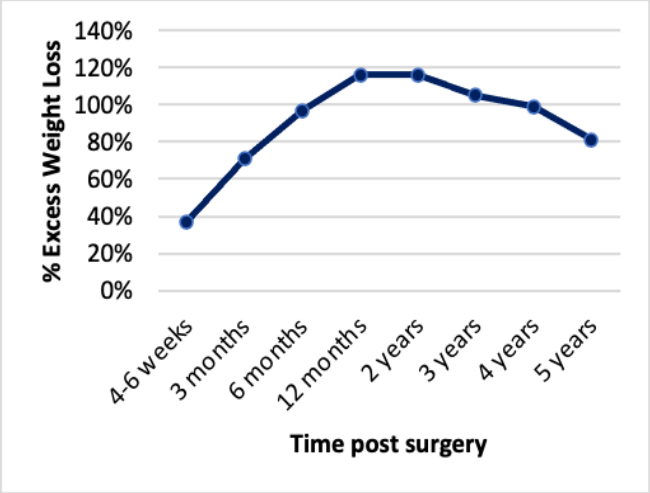

Figure 2: BMI outcomes post primary laparoscopic sleeve gastrectomy (patients with initial BMI ≥35 kg/m^2).

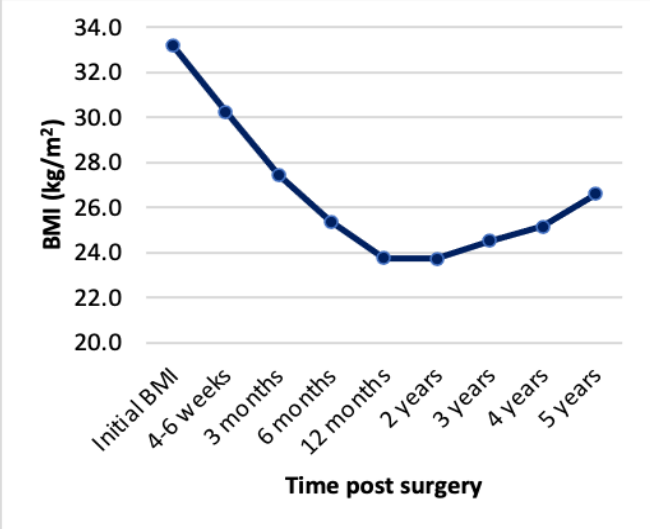

Table 1: Patient comorbidities.

Comorbidities	No. of patients	% total patients
Type 2 diabetes mellitus (including insulin and non-insulin dependent diabetes mellitus)	24	8.6%
Pre-diabetes/history gestational diabetes mellitus	15	5.4%
Hypertension	52	18.7%
Dyslipidaemia	27	9.7%
Arthritis/musculoskeletal disorders (including osteoarthritis, rheumatoid arthritis, osteoporosis)	38	13.7%
Obstructive sleep apnoea	40	14.4%
Cardiovascular disease (including cardiomyopathy, atrial fibrillation, coronary artery stent/ coronary artery bypass)	8	2.9%
Psychiatric diagnoses (including depression, anxiety)	99	35.6%
Hypothyroidism	24	8.6%
Gastrooesophageal reflux	38	13.7%
Chronic pain	19	6.8%
Polycystic ovarian syndrome	11	4.0%
Nonalcoholic steatohepatitis	11	4.0%
Other medical comorbidities	19	6.8%
No medical comorbidities	49	17.6%

Table 2: 30-day complications as per Clavien-Dindo classification.

Complications	No. of patients	% total patients
Clavien-Dindo I		
Readmission (rehydration/analgesia)	9	3.2%
Wound infection/ haematoma/pain	6	2.2%
Rapid atrial fibrillation	1	0.4%
Clavien-Dindo II		
Portal vein thrombosis	4	1.4%
Readmission + radiological investigations	3	1.1%
Blood transfusion	1	0.4%
TOTAL C-D I-II	24	8.6%
Clavien-Dindo IIIa		
Endoscopic intervention - diagnostic	2	0.7%
Endoscopic intervention - therapeutic	2	0.7%
Clavien-Dindo IIIb		
Laparoscopy – postoperative bleed	3	1.1%

Leak - Percutaneous drainage of collection - Laparoscopic patch repair -> conversion to RYGB	2 - 1 - 1	0.7% - 0.4% - 0.4%
Laparoscopy – pancreatic fistula washout + drain	1	0.4%
TOTAL C-D III-V	10	3.6%