REVIEW ARTICLE OPEN ACCESS

# What Should be the Approach When Laparoscopic Sleeve Gastrectomy Fails to Reduce the Weight?

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*ABSTRACT*

*Laparoscopic sleeve gastrectomy (LSG) is considered to be a better option to reduce the weight due to its simplicity and effectiveness. In some cases, it fails to reduce or the patients regain weight. The revision surgery may be a challenge for a bariatric surgeon due to variety of restrictive as well as malabsorptive surgical procedures available and their complications. The review of literature was conducted on Pubmed to find out the best revision surgical procedure. The valuable suggestions observed were that the laparoscopic revision sleeve gastrectomy (LReSG) is the better option in dilated stomach, while the other procedures of revision may be selected according to the mechanism of failure of the primary surgery.*

*Key words* *Sleeve gastrectomy, Metabolic surgery, Obesity surgery, Roux-en-Y gastric bypass.*

**INTRODUCTION:**

Obesity is a disease associated with many other health disorders like diabetes mellitus, hypertension, heart diseases, infertility, cancer etc. Anti-obesity drugs have not shown significant clinical benefit in patients with body mass index (BMI) more than 40 kg/m$^2$.[1] Laparoscopic sleeve gastrectomy, due to its simplicity and effectiveness, is considered a better option as primary surgery. Its results are similar to Roux-en-Y gastric bypass (RYGBP) and duodenal switch (DS), without problem of malabsorption.[2-5] Some patients after LSG fail to loose weight or regain weight along with insufficient resolution of metabolic disorders.[6-10] In these cases revision surgery is required. Moreover, insufficient weight loss or weight regain could be non-representative in the case of super obesity (BMI >50 kg/m$^2$) or super-super obesity (BMI >60 kg/m$^2$).[11,12] Inadequate weight loss is considered to be <25% excess weight loss (EWL) defined by Reinhold criteria.[13,14] Indications for revision surgery are insufficient weight loss, persistence of co-morbidities, complications after LSG, or relevant side-effects of LSG.[15] Revision bariatric surgery following LSG failure and choice of the secondary procedure presents a clinical challenge for bariatric surgeons.[16] The revision surgical procedures vary like laparoscopic re-sleeve gastrectomy, DS, RYGBP, bilio-pancreatic diversion (BPD) and others.

**METHODOLOGY:**

Pubmed database was searched for the articles under the category of meta analysis and systemic reviews from year 2003 to 2014. The search was done between May 2015 to November 2015. MeSH words used for literature search were revisional bariatric surgery, failed sleeve gastrectomy, obesity surgery, Roux-en-Y bypass.

The sutdies in which patients who failed to reduce or re-gained the weight after sleeve gastrectomy were included. The patients who were not followed up for at least 12 months were excluded. Abstracts and full articles related to obesity surgery were reviewed to find out the most suitable revision procedure after failed LSG. The criterion settled for the failed LSG was insufficient weight loss or weight regain (Reinhold criteria), though this is not the only criterion of failure according to the Bariatric Analysis

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and Reporting Outcome System (BAROS).[17] Revision procedures were compared with respect to the percent excess weight loss (%EWL) at different postoperative periods ranging from 3 to 24 months depending upon the availability of data.

**DISCUSSION:**

The dilemma of obesity surgeon of failure of primary sleeve gastrectomy is quite obvious from a large variety of procedures available. It is hard to decide which procedure is the best to achieve the goal of weight reduction. Cheung D et al in his online systemic review of literature on revision bariatric surgery included 218 patients of different studies. He showed that the laparoscopic gastric bypass (LGBP) and LReSG, though effective in reducing the weight during initial 12 months, have the tendency to regain at follow-up of 24 months. In their studies, other surgical interventions (OSIs) are more effective than the above two.[18] It showed the urge of finding the other suitable procedure for revision in failure of primary LSG.

In the study conducted by Moszkowicz D et al,[19] patients were converted from sleeve gastrectomy (SG) to mini gastric bypass (MGBP). It showed that malabsorptive procedure was very effective if restrictive procedure like SG failed to reduce the weight.[11] Some authors consider the main advantage of LSG to act as a bridge procedure before laparoscopic DS or a laparoscopic RYGBP.[18-21] Many patients who failed to loose weight or regain weight developed large stomach or neofundus after LSG. In such patients, LReSG is considered as best option.[22-25] In a study by Giovanni C et al, 11 out of 201 (5.4%) patients required revision after LSG. These patients had post-LSG gastric dilatation in a variable period ranging from 3 to 18 months. The causes of gastric dilatation could be related to a technical problem or to a natural process of stomach tissue dilatation. The antrum may be dilated because it was dissected farther than 6 cm from the pylorus, while fundus may be dilated because it was dissected farther than 1 cm to the left of the esophagus. They underwent LReSG. The %EWL in these patients was 56.3 ± 12.4%, which was quite significant. The advantages of this procedure were to avoid malabsorption and preserve the easy approachable way of diagnostic or operative endoscopy, if required in future. Their strategy is to do LReSG again if the investigations show re-dilatation of the stomach and malabsorptive procedure without its dilatation.[26]

**Table I: Percent Excess Weight Loss (%EWL) at Different Postoperative Periods**

| Name of Study | Procedure | %EWL at 3 months | %EWL at 6 months | %EWL at 12 months | %EWL at 18 months | %EWL at 24 months |
|---|---|---|---|---|---|---|
| Cheung D et al (n=218) | LGBP*<br>LReSG*<br>OSI* | 27<br>50<br>NA | 37<br>48<br>NA | 60<br>68<br>65 | 58<br>48<br>NA | 48<br>44<br>75 |
| Moszkowicz D et al (n=19) | LMGBP-OL* (%EBL*) | 26.8±12 | 37.2±12.4 | 49.3±19.8 | 48.6±21 | 51.6±14.8 |
| Giovanni C et al (n=11) | LReSG* | NA | NA | 56.8±12.4 | NA | NA |
| Rebibo et al (n=15) | LReSG* | NA | NA | 29.1 | NA | NA |
| Gautier T et al (n=9) | RYGBP* | NA | NA | NA | NA | 61.7 |
| Langer FB et al (n=5) | RYGBP* | NA | 63 | NA | NA | 28 |
| Carmeli I et al (n=19) | BPD-DS*<br>RYGBP* | NA | NA | NA | NA | 80±40<br>65.5±34 |

**Key:** LGBP = Laparoscopic gastric bypass, LReSG = Laparoscopic re-sleeve gastrectomy RYGBP = Roux-en-Y gastric bypass, LMGBP-OL = Laparoscopic mini-gasric bypass-Omega loop, BPD-DS = Bilio-pancreatic diversion-Duodenal switch, OSI = other surgical interventions which include BPD-DS or Butterfly gastroplasty, %EBL = Percent Excess BMI loss.

Deguines JB et al have considered failure of LSG by measuring residual gastric volume (RGV) using gastric computed tomography volumetry (GCTV) after a period of 34 months. They have suggested LReSG when the RGV is >250 ml.[27] Gautier T et al converted 18 patients from SG to RYGBP, out of which, 9 were due to insufficient weight loss. Their %EWL changed from 47.1% to 64.6%.[28] Experience of Rebibo L et al of ReSG is different from others. Their study of 15 patients who underwent ReSG did not show difference in respect to the %EWL, rather little opposite, while ReSG patients resulted in more postoperative morbidity and mortality rate. His study showed EWL in ReSG equal to 66%, while first-line LSG showed that equal to 77% at 12 months follow-up.[28] Weiner RA et al concluded in his study after revision surgery in 88 failed cases of LSG that the malabsorptive procedures like DS and Omega-loop gastric bypass were more efficient second stage procedures than ReSG or RYGBP.[29] Zundel N and his colleague Hernandez JD suggest in their study that the restrictive procedures like laparoscopic adjustable gastric banding (LAGB), LSG and vertical banded gastroplasty (VBG) are effective procedures but less than malabsorptive or combined procedures.[30]

Langer FB et al found RYGBP as an effective procedure of conversion to address the problem of weight regain after LSG.[31] Carmeli I et al suggested in their study that the selection of the revision procedure should be based on understanding the mechanism of failure. In their study, nine patients were converted from LSG to DS and ten to RYGBP. They had 28±16.5% EWL at the time of re-operation. After DS, it reached to 80±40%, while after RYGBP it reached to 65.5±34% (table I).[32]

**CONCLUSIONS:**

From the review of the above literature, a great diversity of the opinion found for revision procedure after failed sleeve gastrectomy. The valuable suggestions observed were that LReSG should be opted if there is dilatation of the stomach. Secondly, the mechanism of failure should be understood before selecting the procedure of revision.

**REFERENCES:**


1. Owers CE, Ackroyd R. Bariatric surgery. Surgery – oxford international edition. 2014;32:614-8.

2. Moy J, Pomp A, Dakin G, Parikh M, Gagner M. Laparoscopic sleeve gastrectomy for morbid obesity.Am J Surg. 2008; 196:e56–e9.

3. Nocca D, Krawczykowsky D, Bomans B, Noël P, Picot MC, Blanc PM, et al. A prospective multicenter study of 163 sleevegastrectomies: results at 1 and 2 years.Obes Surg. 2008;18:560-5.

4. Gagner M, Gumbs AA, Milone L, Yung E, Goldenberg L, Pomp A. Laparoscopic sleeve gastrectomy for the super-super-obese (body mass index and weight 60 kg/m$^2$). Surg Today. 2008;38:399-403.

5. Fischer L, Hildebrandt C, Bruckner T, Kenngott H, Linke GR, Gehrig T, et al. Excessive weight loss after sleeve gastrectomy: a systematic review. Obes Surg. 2012;22:721-31.

6. Himpens J, Dobbeleir J, Peeters G. Long-term results of laparoscopic sleeve gastrectomy for obesity. Ann Surg. 2010; 252:319-24.

7. Bohdjalian A, Langer FB, Shakeri-Leidenmühler S, Gfrerer L, Ludvik B, Zacherl J, et al. Sleeve gastrectomy as sole and definitive bariatric procedure: 5-year results for weight loss and ghrelin. Obes Surg. 2010;20:535-40.

8. Santoro S. Technical aspects in sleeve gastrectomy. Obes Surg. 2007;17:1534-5.

9. Langer FB, Bohdjalian A, Shakeri-Leidenmühler S, Schoppmann SF, Zacherl J, Prager G. Conversion from sleeve gastrectomy to Roux-en-Y gastric bypass--indications and outcome. Obes Surg. 2010;20:835-40.

10. Roslin M, Damani T, Oren J, Andrews R, Yatco E, Shah P. Abnormal glucose tolerance testing following gastric bypass demonstrates reactive hypoglycemia. Surg Endosc. 2011;25:1926-32.

11. Gautier T, Sarcher T, Contival N, Le Roux Y, Alves A. Indications and mid-term results of conversion from sleeve gastrectomy to Roux-en-Y gastric bypass. Obes Surg. 2013;23:212-5.

12. Moszkowicz D, Rau C, Guenzi M, Zinzindohoue F, Berger A, Chevallier JM.

Laparoscopic omega-loop gastric bypass for the conversion of failed sleeve gastrectomy: early experience. Visc Surg 2013; 150: 373-8.

13. Mongol P, Chosidow D, Marmuse JP. Laparoscopic conversion of laparoscopic gastric banding to Roux-en-Y gastric bypass: a review of 70 patients. Obes Surg 2004;14:1349-53.

14. Reinhold RB. Critical analysis of long term weight loss following gastric bypass. Surg Gynecol Obstet. 1982;155:385-94.

15. van Rutte PWJ, Smulders JF, de Zoete JP, Nienhuijs SW. Indications and short-term outcomes of revisional surgery after failed or complicated sleeve gastrectomy. Obes Surg. 2012;22:1903-8.

16. Cheung D, Switzer NJ, Gill RS, Shi X, Karmali S. Revisional bariatric surgery following failed primary laparoscopic sleeve gastrectomy: a systemic review. Obes Surg. 2014;24:1757-63.

17. Oria HE, Moorehead MK. Bariatric analysis and reporting outcome system (BAROS). Obes Surg. 1998;8:487-99.

18. Iannelli A, Dainese R, Piche T, Facchiano E, Gugenheim J. Laparoscopic sleeve gastrectomy for morbid obesity. World J Gastroenterol. 2008;14:821–7.

19. Iannelli A, Schneck AS, Dahman M, Negri C, Gugenheim J. Two-step laparoscopic duodenal switch for superobesity: a feasibility study. Surg Endosc. 2009; 23:2385-9.

20. Gagner M, Deitel M, Kalberer TL, Erickson AL, Crosby RD. The Second International Consensus Summit for Sleeve Gastrectomy, March 19-21, 2009. Surg Obes Relat Dis. 2009;5:476-85.

21. Regan JP, Inabnet WB, Gagner M, Pomp A. Early experience with two-stage laparoscopic Roux-en-Y gastric bypass as an alternative in the super-super obese patient. Obes Surg. 2003;13:861-4.

22. Dapri G, Cadière GB, Himpens J. Laparoscopic repeat sleeve gastrectomy versus duodenal switch after isolated sleeve gastrectomy for obesity. Surg Obes Relat Dis. 2011;7:38-43.

23. Iannelli A, Schneck AS, Noel P, Ben Amor I, Krawczykowski D, Gugenheim J. Re-sleeve gastrectomy for failed laparoscopic sleeve gastrectomy: a feasibility study. Obes Surg. 2011;21:832-5.

24. Baltasar A, Serra C, Pérez N, Bou R, Bengochea M. Re-sleeve gastrectomy. Obes Surg. 2006;16:1535-8.

25. Noel P, Nedelcu M, Nocca D, Schneck AS, Gugenheim J, Iannelli A, et al. Revised sleeve gastrectomy: another option for weight loss failure after sleeve gastrectomy. Surg Endosc. 2014;28:1096-1102.

26. Cesana G, Uccelli M, Ciccarese F, Carrieri D, Castello G, Olmi S. Laparoscopic re-sleeve gastrectomy as a treatment of weight regain after sleeve gastrectomy. World J Gastrointest Surg. 2014;6:101-6.

27. Deguines JB, Verhaeghe P, Yzet T, Robert B, Cosse C, Regimbeau JM. Is the residual gastric volume after laparoscopic sleeve gastrectomy an objective criterion for adapting the treatment strategy after failure? Surg Obes Relat Dis. 2013;9:660-6.

28. Rebibo L, Fuks D, Verhaeghe P, Deguines JB, Dhahri A, Regimbeau JM. Repeat sleeve gastrectomy compared with primary sleeve gastrectomy: a single-center, matched case study. Obes Surg. 2012;22:1909-15.

29. Weiner RA, Theodoridou S, Weiner S. Failure of laparoscopic sleeve gastrectomy – further procedure? Obes Facts. 2011;4S::42-6.

30. Zundel N, Hernandez JD. Revisional surgery after restrictive procedures for morbid obesity. Surg Laparosc Endosc Percutan Tech. 2010;20:338-43.

31. Langer FB, Bohdjalian A, Shakeri-Leidernmuhler S, Schopmann SF, Zacherl J, Prager G. Conversion from sleeve gastrectomy to Roux-en-Y gastric bypass—indications and outcome. Obes Surg. 2010;20:835-40.

32. Carmeli I, Golomb I, Sadot E, Kashtan H, Keidar A. Laparoscopic conversion of sleeve gastrectomy to a biliopancreatic diversion with duodenal switch or a Roux-en-Y gastric bypass due to weight loss failure: our algorithm. Surg Obes Relat Dis. 2015; 11:79-85.

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