

CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Long-term results of laparoscopic gastric sleeve resection due to morbid obesity and metabolic syndrome

Miroslav Ilić^{1,2}, Srđan S. Putnik^{3,4}, Katarina Raspopović⁴¹Institute for Pulmonary Diseases of Vojvodina, Clinic for Thoracic Surgery, Sremska Kamenica, Serbia;²University of Novi Sad, Medical Faculty, Novi Sad, Serbia;³Vršac General Hospital, Department of General Surgery, Vršac, Serbia;⁴University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia**SUMMARY**

Introduction The aim of this paper was to present long-term results of a laparoscopic gastric sleeve resection in a “super super” obese patient and a follow-up period of eight years.

Case outline A patient with body mass index of 70 kg/m² and Stage 3 obesity according to the King's Obesity Staging Criteria, with metabolic syndrome and cardiovascular risk of over 20%, and a pronounced severe obstructive sleep apnea, underwent a laparoscopic gastric sleeve resection. After two years, the patient reached body mass index of 28.4 kg/m² and eight years after the surgery has a body mass index of 34.3 kg/m², and the percentage of excess body mass index loss of 79.3%. According to the King's Obesity Staging Criteria, he falls under Stage 0.

Conclusion Laparoscopic gastric sleeve resection may be performed as a stand-alone procedure in “super super” obese patients, with excellent long-term results.

Keywords: morbid obesity; bariatric surgery; laparoscopy; sleeve gastrectomy; weight loss

INTRODUCTION

Laparoscopic gastric sleeve resection (LGS) is a bariatric and metabolic procedure that has been performed extensively in the past decade throughout the world, either as a stand-alone procedure or as the first phase of the biliopancreatic diversion [1–4]. It gained popularity among not only surgeons but patients as well, due to its simplicity, small number of complications, good short-term results, positive effects on metabolic syndrome, and the fact that food does not change its path through the digestive tract [5, 6, 7]. However, certain papers speak of the disadvantages of LGS, the most significant being regaining weight a few years after the operation and newly developed gastroesophageal reflux disease [8, 9, 10]. In recent years, there have been papers on long-term results of LGS in the treatment of obesity and metabolic syndrome [11]. Our report presents, according to our knowledge, the first case of LGS in Serbia, which was performed in 2008 and had a follow-up period of eight years, and we observed long-term results in the treatment of a patient with “super super” obesity.

CASE REPORT

The patient is a 36-year-old male who, prior to the procedure, weighed 214 kg, was 175 cm tall and had a body mass index (BMI) of 70 kg/m²

(Figure 1). Personal anamnesis revealed that the patient had myocarditis in childhood, while family history revealed that both his father and uncle suffer from type II diabetes mellitus. The patient was showing signs of mild anxiety and social isolation, although he had a sedentary



Figure 1. Before the procedure

Received • Примљено:

April 25, 2017

Revised • Ревизија:

June 5, 2017

Accepted • Прихваћено:

June 6, 2017

Online first: June 13, 2017

Correspondence to:

Srđan S. PUTNIK
Department of General Surgery
Vršac General Hospital
Abraševićeva bb
26300 Vršac
Serbia
putniksrđjan@outlook.com

Table 1. Clinical and laboratorial characteristics of metabolic syndrome of the patient

Parameter	Preoperative		Eight years after the operation	
Weight (kg)	214		105	
Systolic blood pressure (mmHg)	180		100	
Diastolic blood pressure (mmHg)	100		70	
Fasting glucose (mmol/l)	6.7	HOMA-IR:	4.7	HOMA-IR:
Fasting insulin (μU/ml)	39.8	11.8	8.07	1.67
HbA1c (%)	/		5.1	
Total cholesterol (mmol/l)	5.4		4.93	
HDL (mmol/l)	1.51		2.13	
LDL (mmol/l)	3.72		2.6	
Triglyceride (mmol/l)	1.06		0.53	
LDL/HDL	2.5		/	
Atherosclerosis index	/		1.2	
CRP (mg/L)	/		1.8	
Fibrinogen (g/l)	4.7		/	

HbA1c – glycated hemoglobin; HDL – high-density lipoprotein; LDL – low-density lipoprotein; CRP – C-reactive protein; HOMA-IR = (fasting insulin (μU/ml) × fasting glucose (mmol/l)) / 22.5

**Figure 2.** Eight years after the procedure

job. He had been smoking more than 20 cigarettes a day for 20 years. During his youth (at the age of 15), the patient was treated in hospital conditions with a dietary treatment supervised by an internist. On that and several other occasions after that one, he would lose 30–40 kg, but would always gain ever more weight after that. During the preoperative treatment, the patient was found to have untreated hypertension (maximum blood pressure values were 180/100 mmHg), obstructive sleep apnea diagnosed during a sleep study as being “severe, predominantly obstructive sleep apnea (Apnea–Hypopnea Index: 86.7), with strong desaturations during breathing crises and high oxygen desaturation index (82.6).” Laboratory findings that reflect the existence of metabolic syndrome prior to the procedure in 2008 are presented in Table 1.

The procedure was performed on October 31, 2008, at the Clinic for Thoracic Surgery, Institute for Pulmonary Diseases of Vojvodina, Sremska Kamenica. LGS resection was performed using five trocars, with Echelon Flex™ (Ethicon Inc., Bridgewater, NJ, USA) 60 mm stapler device through a 38 Fr bougie. Immediately after the surgery, the patient was given fluids and was recommended a month-long dietary regime of liquid and pureed foods. The postoperative period was uneventful; the patient was on proton pump inhibitors for two weeks and subcutaneous injections of low-molecular-weight heparin for 30 days after the procedure.

Maximum weight loss was achieved two years after the procedure, when the patient weighted 87 kg and had BMI of 28.4 kg/m².

Eight years after the procedure, the patient weights 105 kg and has BMI of 34.3 kg/m² (Figure 2).

Laboratory results eight years after the procedure are presented in Table 1.

The main weight-loss parameters two and eight years after the procedure are presented in Table 2.

DISCUSSION

LGS resection has been performed extensively in the past decade throughout the world as a stand-alone procedure due to its technical simplicity and good short-term and medium-term results [1, 6]. However, there are not many studies, especially large-scale ones, which assess the success of LGS in a period longer than six years [2, 11].

We present the patient who was, according to our knowledge, the first one to undergo LGS in Serbia, with an eight-year follow-up period, which falls under long-term results. The indication for the procedure was established based on morbid obesity (BMI = 70 kg/m²), and significant co-morbidities that also define the existence of metabolic syndrome: arterial hypertension, prediabetes, dyslipidemia, sleep apnea, and abdominal obesity. His initial BMI classified him among “super super” obese patients. According to the new criteria for the severity of obesity, King’s Obesity Staging Criteria (KOSC), the patient was suffering from the most severe stage (Stage 3) with cardiovascular risk of over 20% [12].

Table 2. Results two and eight years after the operation

Parameters	Two years after the operation	Eight years after the operation
BMI (kg/m ²)	28.4	34.3
%EWL	87.5	75
%TWL	59.3	51
%EBMIL	92.4	79.3

%EWL – percentage of excess weight loss, calculated as: (initial weight – current weight) / (initial weight – ideal weight) × 100; %TWL – percentage of total weight loss, calculated as: (initial weight – current weight) / initial weight × 100;

%EBMIL – percentage of excess body mass index loss, calculated as: (initial BMI – current BMI) / (initial BMI – 25) × 100

The procedure was performed by calibrating the stomach with a 38 Fr bougie. Some authors received better results with thinner bougies, but larger (wider) bougies are also used in LGS [2, 13]. We drew from our experience in surgical procedures of the esophagus and the procedures with Swedish adjustable gastric band, which is why we used a 38 Fr bougie. The size of the bougie through which LGS is to be performed has not been standardized, although the fourth consensus conference (2012) on LGS revealed that approximately one third of surgeons use a 36 Fr bougie [13]. Recent studies have found that bougie size is not crucial for the long-term success of the procedure [14, 15]. The surgical technique for complete removal of the gastric fundus after complete immobilization is more important than bougie size. The percentage of stomach stenosis after LGS is approximately 1% and is higher in patients with whom thinner bougie was used [13, 16]. Double-contrast barium enema study of our patient's esophagus and stomach eight years after LGS indicated no neo-fundus or stenosis, which are the most frequent late-stage complications of LGS; therefore, a 38 Fr bougie may be considered adequate.

Initial BMI is an important success factor of LGS, since it was determined that patients with lower initial BMI (under 40 kg/m²) have a higher success rate in short-term and medium-term results, whereas “super super” obese patients (BMI > 60 kg/m²) experience less success due to subsequent weight gain [2, 16]. For such patients, LGS is the operation of choice, since other procedures are coupled with increased intraoperative and postoperative risk of

complications [17]. According to a 20-year analysis of biliopancreatic diversion made by Biron et al. [18], the criteria for a successful bariatric procedure based on the initial BMI have been adopted. Since our patient belonged to the “super super” obese group, the success of the procedure is considered long-term if the BMI is under 40 kg/m². The result after eight years indicates that BMI is now 34.3 kg/m² and, according to this criterion, LGS has proven successful. In regard to the percentage of excess weight loss (%EWL), an ideal procedure should achieve a 100% loss of excess weight [2, 19]. In practice, however, this occurs only in a negligible number of patients, and is certainly not the case with “super super” obese patients. However, the two-year and eight-year %EWL that amounted to 89.7% and 77%, respectively, indicates that LGS was successful in our patient, both medium-term and long-term. Along with %EWL, BMI is the second parameter and is considered borderline if it equals 35 kg/m², which our patient maintains as long as eight years after LGS [20]. Some authors recommend the so-called percentage of excess BMI loss (%EBMIL) as a success parameter for the performed bariatric procedure, and the starting point for its calculation is the achieved BMI of 25 kg/m² [11, 21, 22]. This occurs much easier in patients whose initial BMI was under 50 kg/m², and much harder in patients whose BMI was over 50 kg/m², as was the case with our patient. Also recognized is the significance that a three-month %EBMIL (over 20%) has on the long-term result, which should be over 50%. Eight years after the procedure, our patient's %EBMIL is 79.3%, which classifies LGS as a very successful procedure for this “super super” obese patient. Other studies have also confirmed LGS as a successful bariatric procedure.

In relation to the KOSC, eight years after LGS, our patient no longer takes any medication for any of the co-morbidities he had been suffering from before the procedure. He has normal blood pressure, his cardiovascular risk is under 10%, and glycosylated hemoglobin is 5.1% (Stage 0 of the KOSC).

LGS resection may be successfully performed as a stand-alone procedure in selected “super super” obese patients, with excellent long-term results in terms of both anthropological measures and KOSC.

REFERENCES

- Angrisani L, Santonicola A, Iovino P, Formisano G, Buchwald H, Scopinaro N. Bariatric surgery worldwide 2013. *Obes Surg.* 2015; 25(10):1822–32.
- Seki Y, Kasama K, Hashimoto K. Long-term outcome of laparoscopic sleeve gastrectomy in morbidly obese Japanese patients. *Obes Surg.* 2016; 26(1):138–45.
- Cottam D, Qureshi FG, Mattar SG, Sharma S, Holover S, Bonanomi G, et al. Laparoscopic sleeve gastrectomy as an initial weight-loss procedure for high-risk patients with morbid obesity. *Surg Endosc.* 2006; 20(6):859–63.
- 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(6):861–4.
- Iannelli A, Dainese R, Piche T, Facchiano E, Gugenheim J. Laparoscopic sleeve gastrectomy for morbid obesity. *World J Gastroenterol.* 2008; 14(6):821–7.
- Alexandrou A, Athanasiou A, Michalinos A, Felekouras E, Tsigris C, Diamantis T. Laparoscopic sleeve gastrectomy for morbid obesity: 5-year results. *Am J Surg.* 2015; 209(2):230–4.
- Lee WJ, Almulaifi A. Recent advances in bariatric/metabolic surgery: appraisal of clinical evidence. *J Biomed Res.* 2015; 29(2):98–104.
- Biertho L, Lebel S, Marceau S, Houled FS, Lescelleur O, Marceau P, et al. Laparoscopic sleeve gastrectomy: with or without duodenal switch? A consecutive series of 800 cases. *Dig Surg.* 2014; 31(1):48–54.
- Stenard F, Iannelli A. Laparoscopic sleeve gastrectomy and gastroesophageal reflux. *World J Gastroenterol.* 2015; 21(36):10348–57.
- Crawford C, Gibbens K, Lomelin D, Krause C, Simorov A, Oleynikov D. Sleeve gastrectomy and anti-reflux procedures. *Surg Endosc.* 2017; 31(3):1012–21.

11. Arman GA, Himpens J, Dhaenens J, Ballet T, Vilallonga R, Leman G. Long-term (11+years) outcomes in weight, patient satisfaction, comorbidities, and gastroesophageal reflux treatment after laparoscopic sleeve gastrectomy. *Surg Obes Relat Dis*. 2016; 12(10):1778–86.
12. Valderhaug TG, Aasheim ET, Sandbu R, Jakobsen GS, Småstuen MC, Hertel JK, et al. The association between severity of King's Obesity Staging Criteria scores and treatment choice in patients with morbid obesity: a retrospective cohort study. *BMC obesity*. 2016; 3:51.
13. Gagner M, Deitel M, Erickson AL, Crosby RD. Survey on laparoscopic sleeve gastrectomy (LSG) at the Fourth International Consensus Summit on Sleeve Gastrectomy. *Obes Surg*. 2013; 23(12):2013–17.
14. Spivak H, Rubin M, Sadot E, Pollak E, Feygin A, Goitein D. Laparoscopic sleeve gastrectomy using 42-French versus 32-French bougie: the first-year outcome. *Obes Surg*. 2014; 24(7):1090–3.
15. Parikh M, Issa R, McCrillis A, Saunders JK, Ude-Welcome A, Gagner M. Surgical strategies that may decrease leak after laparoscopic sleeve gastrectomy: a systematic review and meta-analysis of 9991 cases. *Ann Surg*. 2013; 257(2):231–7.
16. Gluck B, Movitz B, Jansma S, Gluck J, Laskowski K. Laparoscopic sleeve gastrectomy is a safe and effective bariatric procedure for the lower BMI (35.0–43.0 kg/m²) population. *Obes Surg*. 2011; 21(8):1168–71.
17. Gagner M, Gumbs AA, Milone L, Yung E, Goldenberg L, Pomp A. Laparoscopic sleeve gastrectomy for the super-super-obese (body mass index >60 kg/m²). *Surg Today*. 2008; 38(5):399–403.
18. Biron S, Hould FS, Lebel S, Marceau S, Lescolleur O, Simard S, et al. Twenty years of biliopancreatic diversion: what is the goal of the surgery? *Obes Surg*. 2004; 14(2):160–4.
19. Brolin RE, Kenler HA, Gorman RC, Cody RP. The dilemma of outcome assessment after operations for morbid obesity. *Surgery*. 1989; 105(3):337–46.
20. Christou NV, Look D, Maclean LD. Weight gain after short- and long-limb gastric bypass in patients followed for longer than 10 years. *Ann Surg*. 2006; 244(5):734–40.
21. Biter LU, Gadiot RPM, Grotenhuis BA, Dunkelgrün M, van Mil SR, Zengerink HJ, et al. The Sleeve Bypass Trial: a multicentre randomized controlled trial comparing the long term outcome of laparoscopic sleeve gastrectomy and gastric bypass for morbid obesity in terms of excess BMI loss percentage and quality of life. *BMC Obes*. 2015; 2:30.
22. Baltasar A, Perez N, Serra C, Bou R, Bengochea M, Borrás F. Weight loss reporting: predicted body mass index after bariatric surgery. *Obes Surg*. 2011; 21(3):367–72.

Дугорочни резултат лапароскопске ресекције желуца због екстремне гојазности и метаболичког синдрома

Мирослав Илић^{1,2}, Срђан С. Путник^{3,4}, Катарина Распоповић⁴

¹Институт за плућне болести Војводине, Клиника за грудну хирургију, Сремска Каменица, Србија;

²Универзитет у Новом Саду, Медицински факултет, Нови Сад, Србија;

³Општа болница Вршац, Служба опште хирургије, Вршац, Србија;

⁴Универзитет у Крагујевцу, Факултет медицинских наука, Крагујевац, Србија

САЖЕТАК

Увод Циљ овог рада је био да прикаже дугорочан резултат лапароскопске „рукавне“ ресекције желуца код „супер супер“ гојазног болесника са периодом праћења од осам година.

Приказ болесника Код болесника са индексом телесне масе (ИТМ) 70 kg/m², са трећим стадијумом гојазности према *Kings Obesity Staging Criteria (KOSC)*, метаболичким синдромом и кардиоваскуларним ризиком преко 20% и израженим синдромом апнеја у сну, изведена је лапароскопска „рукав-

на“ ресекција желуца 2008. године, прва оваква процедура у Србији. Две године после операције болесник је достигао ИТМ 28,4 kg/m², а осам година после операције ИТМ 34,3 kg/m² и утврђени губитак индекса телесне масе од 79,3%. Према *KOSC*, стадијум овог болесника је најнижи.

Закључак Лапароскопска „рукавна“ ресекција желуца може се успешно извести код „супер супер“ гојазног болесника као самостална процедура са одличним дугорочним резултатом.

Кључне речи: екстремна гојазност; хирургија гојазности; лапароскопска „рукавна“ ресекција желуца; губитак тежине