

## LAPAROSCOPIC SLEEVE GASTRECTOMY – OUR EXPERIENCE ON 183 PATIENTS

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**ABSTRACT.** Morbid obesity is an important public health problem worldwide, its impact on the population is extreme due to its comorbidities. So, hypertension, diabetes type I or type II, chronic venous insufficiency of the lower limbs, lumbar problems and other diseases of bones and joints, lead to decreased life span of obese patients more than 20 years. Conservative treatment has temporary effect and is often followed by regaining weight greater than the loss. Laparoscopic sleeve gastrectomy is a relatively new bariatric procedure, being performed for the first time in the year 2000 by Gagner. It is a successful bariatric method due to its high efficacy and feasibility. Our experience includes 183 patients who underwent laparoscopic sleeve gastrectomy in Surgery Clinic II of the Emergency County Hospital Timisoara between January 2008 - December 2012. Sex ratio is in favor of women in the study group, sex ratio was 2.81. Most commonly affected are the third, second and the fourth decade. The most common comorbidity was the type II diabetes, which resolved at a rate of 87.67% after surgery. Postoperative complication rate was 3.27% and mortality rate was 1.09%. Average BMI was 46. The average postoperative follow up was 36 months. ESWL was 74.45% at one year and 68.32% at two years. Three years value was of 63.34%. laparoscopic sleeve gastrectomy is safe and effective in the treatment of morbid obesity and remission of major comorbidities such as diabetes and hypertension.

**KEY WORDS:** Laparoscopic sleeve gastrectomy – LSG, morbid obesity – MO, diabetes mellitus - DM, chronic venous insufficiency – CVI

### INTRODUCTION

Morbid obesity is an important public health problem worldwide, its impact on the population is extreme due to its comorbidities. So, hypertension, diabetes type I or type II, chronic venous insufficiency of the lower limbs, lumbar problems and other diseases of bones and joints, lead to decreased life span of obese patients more than 20 years. In Romania one of three adults is obese. Conservative treatment has temporary effect and often is followed by regaining weight greater than the loss. Laparoscopic sleeve gastrectomy is a relatively new bariatric procedure, being performed for the first time in the year 2000 by Gagner. It is a successful bariatric method due to its high efficacy and feasibility.

This study presents our experience in performing LSG and its outcomes on comorbidities as DM, hypertension and CVI. We succeeded to demonstrate that due to the extremely low postoperative

complications rate and mortality rate, LSG is an efficient and safe procedure for morbid obese patients with very good results on ESWL in the follow-up period.

### MATERIAL AND METHOD

We conducted a retrospective study including 183 patients who underwent LSG between January 2008 and December 2012. The patients performed surgery in a single center – Surgical Clinic II in County Hospital Timisoara. The mean follow up period was 36 months (range 12 - 48 months) and the follow up percent was 80.87% (148 patients followed up). We studied: sex ratio, source environment, age, distribution on years, degree of disease, postoperative complications, comorbidities, the remission of comorbidities, mortality rate, ESWL.

### RESULTS

Among the 183 patients studied, 135 were females and 48 males. Sex ratio was 2.81.

Provenance was predominantly urban – 155 patients and only 28 patients were from rural environment. The mean age was 36.25 (limits 17 – 68) (**Fig.1**). The age decade most affected was the third one, followed by the second and the fourth. The mean operation time was  $63 \pm 13$  minutes. The average blood loss was  $50 \pm 10$  ml. We determined that the most cases were in the year 2011 – 52 cases, followed by 2012 – 47 cases and 2010 – 36 cases, the last positions are taken by years 2009 and 2008, with 28 and respectively 20 cases. The mean BMI was 46 (range 36- 63). We had 42 cases with BMI under 40 and the rest of 141 cases with BMI over 40.

The postoperative complications rate was 3.27%. There were 6 complications: two leakage on the stapler line, one pleural abscess, one stenosis, one hemorrhage from the gastric line and one pulmonary embolism (**Fig.2**). The leakage rate was 1.09%. One was solved conservatory by drainage and the other one was late diagnosed through an old peritonitis that required reintervention, but patient evolution was unfavorable. The pleural abscess was solved by reintervention and drainage. The stenosis of gastric tube was solved by reintervention and conversion into a gastric bypass. The hemorrhage was stopped by laparoscopic reintervention and hemostasis with clips on gastric line. Pulmonary embolism had an unfavorable evolution and the patient died.

Associated diseases were in order on frequency: diabetes mellitus type II, venous chronic insufficiency, hypertension, lumbar discopathy, chronic cardiac failure, diabetes mellitus type I (**Fig.3**).

Existing comorbidities are severe affecting the subjects' quality of life. An important parameter of the longitudinal gastrectomy in bariatric surgery is represented by remission of comorbidities (such as diabetes type II or hypertension) or regression of others (CVI, CCF, lumbar discopathy, type I diabetes). Of the 73 cases of type II DM, 64 were completely resolved. Regression of CVI was over 30% in all cases by improving edema and pain in the lower limbs. Hypertension is kept under control by less medication in 17 cases, in the remaining 30 it disappeared completely. Discopathy, lumbar pain were reduced in 27 patients, for the other 10, they disappeared completely (**Fig.4**). Congestive cardiac failure is kept under control by a smaller number of drugs in the 29 affected subjects. Type I diabetes is treated with diet and no longer needed insulin. The mortality rate was 1.09%. There were two deaths. One of the patients died due to pulmonary embolism, the other patient died because of an old peritonitis caused by a leakage on the gastric line. ESWL at one year was 74.45%, ESWL at two years was 68.32%, ESWL at three years was 63.34% (**Fig.5**).

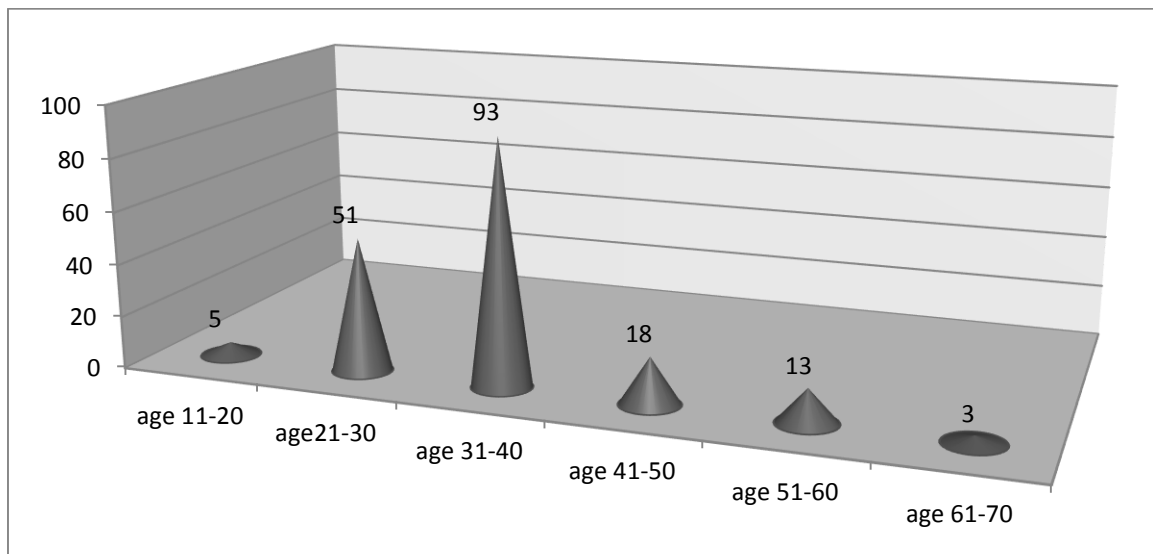


Figure 1. Distribution of cases by year decade.

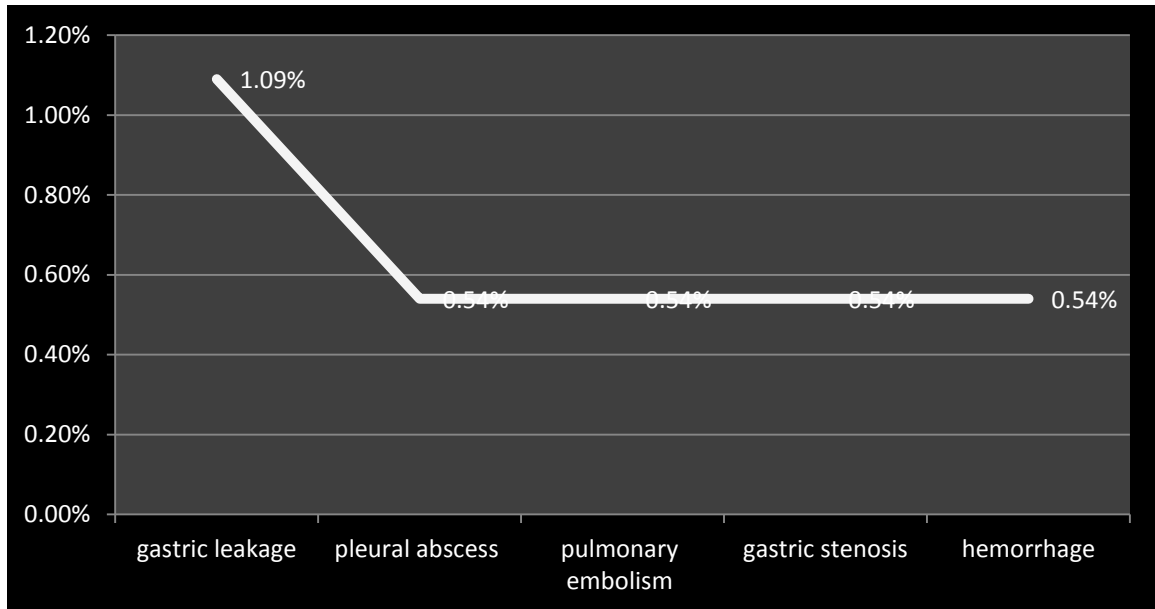


Figure 2. Distribution of cases by postoperative complications.

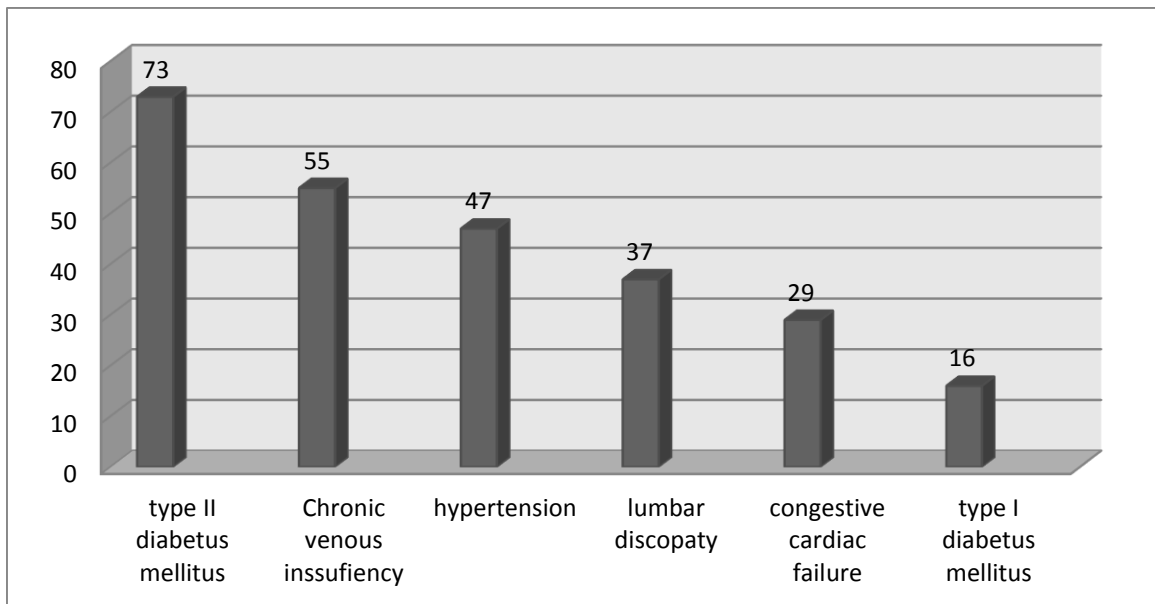


Figure 3. Distribution of cases by comorbidities

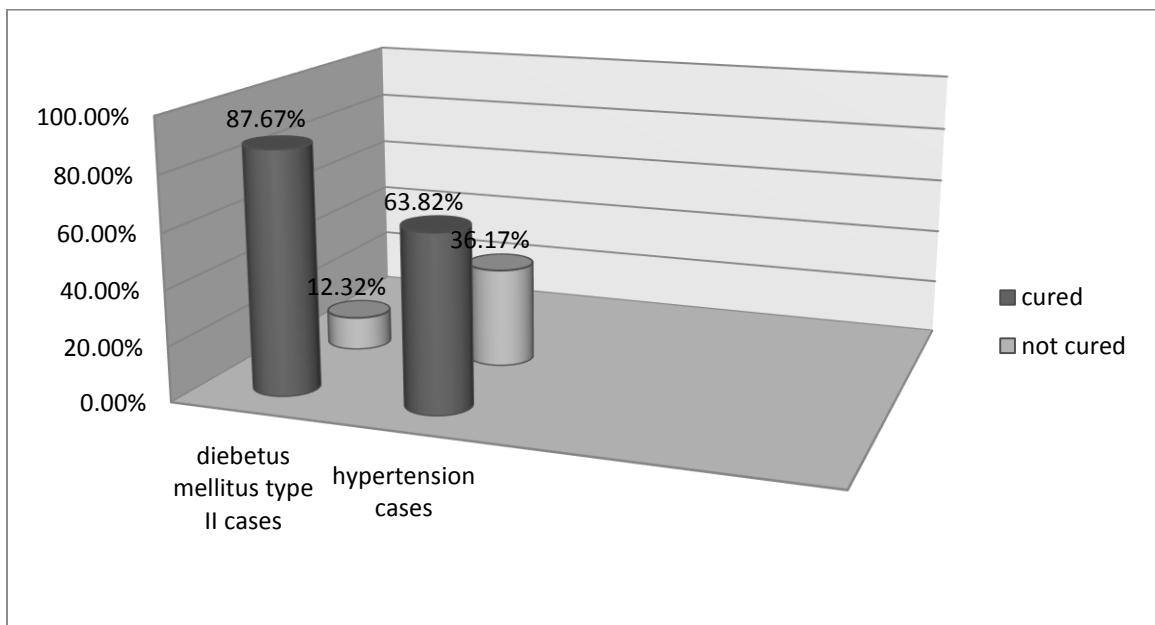


Figure 4. Distribution of cases by comorbidities regression.

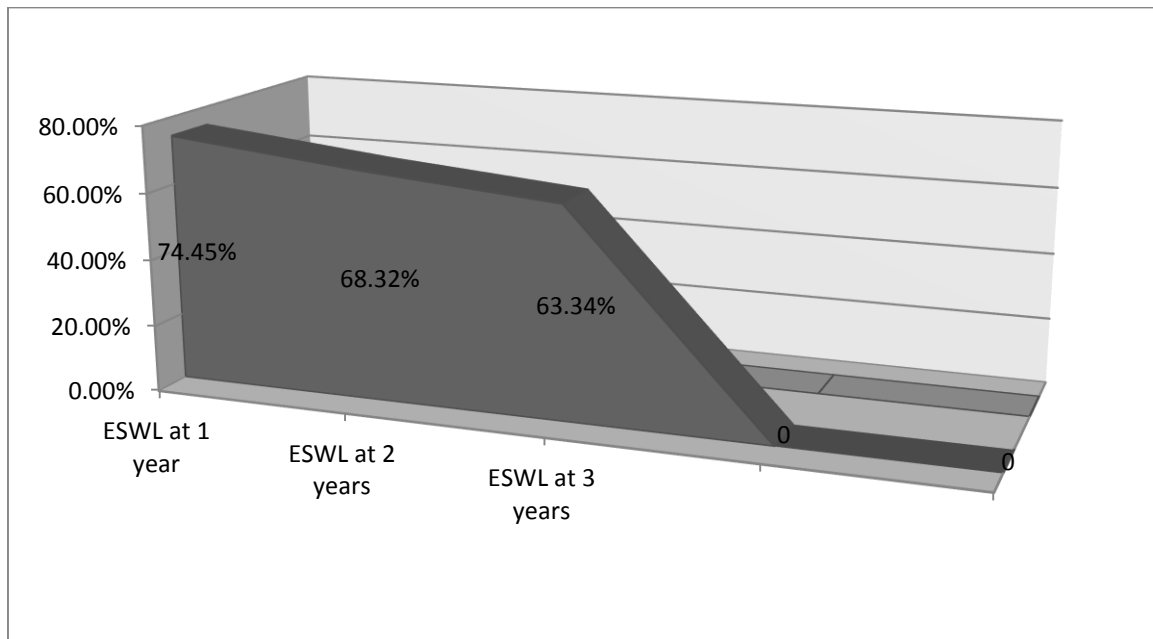


Figure 5. Distribution of cases by ESWL.

## DISCUSSIONS

Morbid obesity is one of the major health problems of the 21st century. Once considered a problem only of high-income countries, obesity rates are rising worldwide and affecting both the developed and developing world (Michael Kourkoulos et al., 2012).

The bariatric surgery developed several techniques to improve the long term results for obese patients. Among bariatric procedures we consider laparoscopic sleeve gastrectomy as an effective and good procedure due to good outcomes and less complications.

We agree the principles debated in The Third Summit for Bariatric Surgery in 2010 and our study demonstrates it by values of ESWL (in the Summit 62.7% at 1 year, 64.7% at 2 years and 64% at 3 years) and mortality rate – 1-3% in the Summit. (Deitel M et al., 2011)

Our complications rate of 3.27% integrates to literature data. Chopra et al (Chopra A et al., 2012) in 2012 mentioned a complication rate of 14.09%, while Yaghoubian et al (Yaghoubian A et al., 2012) has 9% as complications percent and in the same year Boza et al (Boza C et al., 2012) mentioned a 3.4% as the rate of complications. The lowest rate is mentioned by Choi et al (Choi YY et al., 2012) which present a value of 0.52% of complications.

The incidence of leakage in our lot is of 1.09%. Similar percents are reported by various authors. So, Sakran et al in 2013 (Sakran N et al., 2013) present a percent of leakage of 1.5% on 2834 patients and concludes that the fistula algorithm of therapy still needs to be debated. Using of local drainage, reintervention, the endoscopic stent placement, clipping or using fibrin glue to seal the leakage depends on the surgeons' choice. In our 2 cases of leakage, for one we performed a reintervention and for the other local drainage. In 2012 Gentileschi (Gentileschi P et al., 2012) published a rate of leakage of 1% and Aurora et al (Aurora AR et al., 2012) a value of 2.4% on 4888 cases. The last author correlates the size of calibrating bougie with the risk of leakage.

The higher the diameter of bougie (40 Fr or more), the lowest is the leakage risk. In our lot we use a 36 Fr bougie to calibrate the gastric tube. We consider the risk for fistula to be highly correlated with the learning curve and reinforcement of the staple line. We had the 2 cases of leakage in the beginning period (2008) and after reinforcement of staple line we had no more leakage cases. Gentileschi et al (Gentileschi P et al., 2012) Gentileschi P et al., 2012) in 2012 reminds the procedure to reinforce the staple line and had no difference between fibrin, thrombin gel or poliglycolic acid for reinforcement. The sewing procedure is considered by the same author as a little bit longer than the other described procedures. In our lot we used first the sewing procedure and after introducing fibrin reinforcement we use this one to seal the margins.

The most frequent comorbidity in our study was type II diabetes mellitus. We had a remission of it of 87.67% - similar with other authors. Abbatini et al (Abbatini et al., 2012) in 2012 mentioned a percent of remission for DM type II of 84.6% at 36 months, Cavarreta et al (Cavarreta et al., 2012) had a 83% remission, Ruiz Tovar J et al (Ruiz Tovar J et al., 2012) – 83.3% remission for DM type II, Pequignot et al (Pequignot et al., 2012) published a 64% remission and Rawlins et al (Rawlins et al., 2012) a 100% remission. Leonetti et al (Leonetti et al., 2012) mentioned a remission of 80% due to LSG and compares with medical remission which is 0%.

Hypertension – another important comorbidity for obese patients – in our study had a cured percent of 63.82%. Shen DJ et al (Shen DJ et al., 2012) in 2012 has a lower cure rate, of only 45.5% , Sarkhash et al (Sarkhash K. et al., 2012) reminds a 58% of healing cases while Prasad et al (Prasad et al., 2012) had 85.7% hypertension remission.

We had one rare complication – left pleural abscess solved by thoracoscopic drainage. In literature there are mentioned as rare cases – gastro-bronchial fistula by Abraham et al (Abraham et al., 2012) in 2012 or splenic abscess by Sakran et al (Sakran N. et al., 2012).

In our study on follow up at one, 2 and 3 years, we had an ESWL of 74.45%, 68.32% and 63.34% respectively. Ohta et al (Ohta M. et al. 2011.) mentioned an ESWL at 2 years of 68% and Fischer (Fischer L. et al., 2012) in 2012 details an ESWL at one, 2 and 3 years of 56.1%, 64.3% and 66%, the 2 years ESWL according to him is similar with ESWL at 2 years for gastric by-pass as a bariatric procedure. The same opinion is sustained by Ortega et al (Ortega E et al., 2012). Sarela et al (Sarela AI et al., 2012) with a very good follow up presence reports one year ESWL of 73%, two years ESWL of 78% and three years one of 73%.

## CONCLUSIONS

LSG is a very good bariatric procedure with excellent results on short term follow up and with a very good balance between advantages and complications. After overcoming the learning curve the surgical technique is feasible and the complication rate is low. We need a longer follow up period for more detailed results.

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## AUTHOR CONTRIBUTION

All authors have contributed equally to the present work.

## REFERENCES:

Michael Kourkoulos, Emmanouil Giorgakis, Charalampos Kokkinos, Theodoros Mavromatis, John Griniatsos, Nikolaos Nikiteas, and Christos Tsigris Laparoscopic Gastric Plication for the Treatment of Morbid Obesity: A Review Minimally Invasive Surgery Volume 2012, Article ID 696348, 7 pages. Journal article with more than six authors.

Deitel M, Gagner M, Erickson AL, Crosby RD Third International Summit: Current status of sleeve gastrectomy. *Surg Obes Relat Dis.* 2011 Nov-Dec;7(6):749-59.

Chopra A, Chao E, Etkin Y, Merklinger L, Lieb J, Delany H. Laparoscopic sleeve gastrectomy for obesity: can it be considered a definitive procedure? *Surg Endosc.* 2012 Mar;26(3):831-7.

Yaghoobian A, Tolan A, Stabile BE, Kaji AH, Belzberg G, Mun E, Zane R Laparoscopic Roux-en-Y Gastric Bypass and Sleeve Gastrectomy Achieve Comparable Weight Loss at 1 Year. *Am Surg.* 2012 Dec;78(12):1325-8. Journal article with more than six authors.

Boza C, Salinas J, Salgado N, Pérez G, Raddatz A, Funke R, Pimentel F, Ibáñez L. Laparoscopic sleeve gastrectomy as a stand-alone procedure for morbid obesity: report of 1,000 cases and 3-year follow-up. *Obes Surg.* 2012 Jun;22(6):866-71. Journal article with more than six authors.

Choi YY, Bae J, Hur KY, Choi D, Kim YJ. Reinforcing the staple line during laparoscopic sleeve

gastrectomy: does it have advantages? A meta-analysis. *Obes Surg.* 2012 Aug;22(8):1206-13

Sakran N, Goitein D, Raziell A, Keidar A, Beglaibter N, Grinbaum R, Matter I, Alfici R, Mahajna A, Waksman I, Shimonov M, Assalia A. Gastric leaks after sleeve gastrectomy: a multicenter experience with 2,834 patients. *Surg Endosc.* 2013 Jan;27(1):240-5. Journal article with more than six authors.

Gentileschi P. Laparoscopic sleeve gastrectomy as a primary operation for morbid obesity: experience with 200 patients. *Gastroenterol Res Pract.* 2012;2012:801325.

Aurora AR, Khaitan L, Saber AA Sleeve gastrectomy and the risk of leak: a systematic analysis of 4,888 patients. *Surg Endosc.* 2012 Jun;26(6):1509-15.

Gentileschi P, Camperchioli I, D'Ugo S, Benavoli D, Gaspari AL. Staple-line reinforcement during laparoscopic sleeve gastrectomy using three different techniques: a randomized trial. *Surg Endosc.* 2012 Sep;26(9):2623-9.

Gentileschi P, D'Ugo S, Benavoli D, Gaspari A Staple-line reinforcement with a thrombin matrix during laparoscopic sleeve gastrectomy for morbid obesity: a case series *LJ Laparoendosc Adv Surg Tech A.* 2012 Apr;22(3):249-53.

Abbatini F, Capoccia D, Casella G, Soricelli E, Leonetti F, Basso N. Long-term remission of type 2 diabetes in morbidly obese patients after sleeve gastrectomy *Surg Obes Relat Dis.* 2012 Sep 18. pii: S1550-7289(12)00340-1.

Cavarretta E, Casella G, Cali B, Dammaro C, Biondi-Zoccai G, Iossa A, Leonetti F, Frati G, Basso N. Cardiac Remodeling in Obese Patients After Laparoscopic Sleeve Gastrectomy. *World J Surg.* 2012 Dec 20. Epub ahead of print

Ruiz-Tovar J, Oller I, Tomas A, Llaveró C, Arroyo A, Calero A, Martínez-Blasco A, Calpena R. Midterm impact of sleeve gastrectomy, calibrated with a 50-Fr bougie, on weight loss, glucose homeostasis, lipid profiles, and comorbidities in morbidly obese patients. *Am Surg.* 2012 Sep;78(9):969-74. Journal article with more than six authors.

Péquignot A, Dhahri A, Verhaeghe P, Desailly R, Lalau JD, Regimbeau JM. Efficiency of laparoscopic sleeve gastrectomy on metabolic syndrome disorders: two years results. *J Visc Surg.* 2012 Oct;149(5):e350-5.

Rawlins L, Rawlins MP, Brown CC, Schumacher DL Sleeve Gastrectomy: 5-year outcomes of a single institution. *Surg Obes Relat Dis.* 2012 Sep 6. pii: S1550-7289(12)00325-5.

Leonetti F, Capoccia D, Coccia F, Casella G, Baglio G, Paradiso F, Abbatini F, Iossa A, Soricelli E, Basso N. Obesity, type 2 diabetes mellitus, and other comorbidities: a prospective cohort study of laparoscopic sleeve gastrectomy vs medical treatment *Arch Surg.* 2012 Aug;147(8):694-700. Journal article with more than six authors.

Shen DJ, Ye H, Wang YD, Ji Y, Xie ZJ, Wu J, Zhan XL, Zhu JH. Efficacy analysis of laparoscopic sleeve gastrectomy in the treatment of obesity-related comorbidities. *Zhonghua Wei Chang Wai Ke Za Zhi.*

2012 Nov;15(11):1139-41. Journal article with more than six authors, article is not in English.

Sarkhosh K, Birch DW, Shi X, Gill RS, Karmali S. The impact of sleeve gastrectomy on hypertension: a systematic review. *Obes Surg.* 2012 May;22(5):832-7.

Prasad P, Tantia O, Patle N, Khanna S, Sen B. An analysis of 1-3-year follow-up results of laparoscopic sleeve gastrectomy: an Indian perspective. *Obes Surg.* 2012 Mar;22(3):507-14.

Abraham A, Virdi RP, Rajan D, Singh J, Mustacchia P, Iqbal J, Rizvon K. Gastrobronchial fistula following laparoscopic sleeve gastrectomy. *BMJ Case Rep.* 2012 Sep 12;2012. pii: bcr2012006789. Journal article with more than six authors

Sakran N, Ilivitzki A, Zeina AR, Assalia A. Splenic abscess after sleeve gastrectomy: a report of two cases. *Obes Facts.* 2012;5(4):635-9.

Ohta M, Kitano S, Kasama K, Kawamura I, Inamine S, Wakabayashi G, Tani T, Kuwano H, Doki Y, Atomi Y, Kitajima M; Japan Research Society for Endoscopic and Laparoscopic Treatments of Obesity. Asian Results of a national survey on laparoscopic bariatric surgery in Japan, 2000-2009. *J*

*Endosc Surg.* 2011 Aug;4(3):138-42. Journal article with more than six authors.

Fischer L, Hildebrandt C, Bruckner T, Kenngott H, Linke GR, Gehrig T, Büchler MW, Müller-Stich BP. Excessive weight loss after sleeve gastrectomy: a systematic review. *Obes Surg.* 2012 May;22(5):721-31. Journal article with more than six authors.

Ortega E, Morínigo R, Flores L, Moize V, Rios M, Lacy AM, Vidal J. Predictive factors of excess body weight loss 1 year after laparoscopic bariatric surgery. *Surg Endosc.* 2012 Jun;26(6):1744-50. Journal article with more than six authors.

Sarela AI, Dexter SP, O'Kane M, Menon A, McMahon MJ. Long-term follow-up after laparoscopic sleeve gastrectomy: 8-9-year results. *Surg Obes Relat Dis.* 2012 Nov-Dec;8(6):679-84.

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