Future of LSG

Dr. Mousa Khoursheed,
BMBCH, FRCS, FACS, FASMBS

Professor of Surgery

Taiba Hospital

جامعة الكويت
KUWAIT UNIVERSITY

مستشفى طيبة
TAIBA HOSPITAL

Disclousure

- GT Metaboic: Stock hoder

RYGB vs SG ??

- Whether LRYGB or LSG is superior for weight loss and resolution of comorbidities.
- LSG: Most frequently performed
- LSG: Steady annual increase

Obesity and GERD

“Antireflux barrier”

- Is based on the proper arrangement of different anatomic structures such as
  - LES
  - Diaphragmatic crus
  - Gastric sling fibers
  - Phrenic-esophageal and cardiophrenic ligaments.

GERD

- MO patients are affected by GERD and HH more frequently than lean patients
- Obesity is a risk factor for GERD through:
    - Mechanical alterations to the EGJ
    - Associated with transient relaxation of the LES
    - Presence of HH.
- Because of conflicting results, the indication to SG in patients with GERD is still debated.

Obesity and GERD

- 50–70 % of patients undergoing bariatric surgery have symptomatic reflux.
- HH is present in 15 % of patients with BMI >35 kg/m2.

Symptom score (SS)

Severity of symptoms of heartburn and regurgitation

- Grade 0: No symptoms.
- Grade 1: Mild symptoms with spontaneous remission. No interference with normal activity and sleep.
- Grade 2: Moderate symptoms with spontaneous, but slow, remission. Mild interference with normal activity and sleep.
- Grade 3: Severe symptoms without spontaneous remission. Marked interference with normal activity and sleep.

Frequency of symptoms of heartburn and regurgitation

- Grade 0: Absent.
- Grade 1: Occasional ($<$ 2 days per week).
- Grade 2: Frequent (2 to 4 days per week).
- Grade 3: Very frequent ($>$ 4 days per week).

The final score for each symptom was obtained by multiplying the scores for severity and frequency. The total score was obtained by adding the final scores of individual symptoms and noted as Symptom Score (SS).

SG AND GERD

- Of the 110 consecutive patients, complete follow-up data was available in 65 (59.1%).
- Mean follow-up was 11.7 .4 years.
- None of the 7 patients preoperatively suffering from GERD were cured by the LSG procedure.
- Nine (21.4%) additional patients developed de novo GERD.

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Long-term (11+ years) outcomes in weight, patient satisfaction, comorbidities, and gastroesophageal reflux treatment after laparoscopic sleeve gastrectomy

Gustavo A. Arman, M.D.[a,b,*], Jacques Himpens, M.D., Ph.D.[a,b], Jeroen Dhaenens, M.D.[a], Thierry Ballet, M.D.[b], Ramon Vilallonga, M.D., Ph.D.[a], Guido Leman, M.D.[a]

[a]*Division of Bariatric Surgery, AZ St-Blasius, Dendermonde, Belgium*
[b]*Cavell Obesity Center, CHIREC, Brussels, Belgium*

Received November 25, 2015; accepted January 13, 2016

SG AND GERD

- When addressing GERD, the lack of objective measurements such as pH-metry, impedance, and high-resolution manometry does not provide robust evidence on the effects of LSG on GERD.

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Long-term (11+ years) outcomes in weight, patient satisfaction, comorbidities, and gastroesophageal reflux treatment after laparoscopic sleeve gastrectomy

Gustavo A. Arman, M.D.[a,b,*], Jacques Himpens, M.D., Ph.D.[a,b], Jeroen Dhaenens, M.D.[a], Thierry Ballet, M.D.[b], Ramon Vilallonga, M.D., Ph.D.[a], Guido Leman, M.D.[a]

[a]*Division of Bariatric Surgery, AZ St-Blasius, Dendermonde, Belgium*
[b]*Cavell Obesity Center, CHIREC, Brussels, Belgium*

Received November 25, 2015; accepted January 13, 2016

SG AND GERD. Genco et al

- A total of 110/162 SG (follow-up: 69.1%)
- Preoperatively all patients underwent
  - Visual analogue scale (VAS) evaluation of GERD symptoms
  - Proton pump inhibitors (PPIs) consumption recording
  - Esophagogastroduodenoscopy (EGD)

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Gastroesophageal reflux disease and Barrett's esophagus after laparoscopic sleeve gastrectomy: a possible, underestimated long-term complication

Alfredo Genco, M.D.[a], Emanuele Soricelli, M.D.[a,*], Giovanni Casella, M.D., Ph.D.[a], Roberta Maselli, M.D.[a], Lidia Castagneto-Gissey, M.D.[a], Nicola Di Lorenzo, M.D.[b], Nicola Basso, M.D.[a]

- At a mean 58 months of follow-up, increased compared with preoperative values
  - Incidence of GERD symptoms, P = 0.0001
  - VAS mean score, P = 0.018
  - PPI intake significantly, P = 0.0001

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Gastroesophageal reflux disease and Barrett's esophagus after laparoscopic sleeve gastrectomy: a possible, underestimated long-term complication

Alfredo Genco, M.D.[a], Emanuele Soricelli, M.D.[a,*], Giovanni Casella, M.D., Ph.D.[a], Roberta Maselli, M.D.[a], Lidia Castagneto-Gissey, M.D.[a], Nicola Di Lorenzo, M.D.[b], Nicola Basso, M.D.[a]

- Upward migration of the “Z” line and a biliary-like esophageal reflux was found in 73.6% and 74.5% of cases, respectively.
- A significant increase in the incidence and in the severity of erosive esophagitis (EE)
- Non dysplastic Barrett’s esophagus (BE) was newly diagnosed in 19 patients (17.2%).
- No significant correlations were found between GERD symptoms and endoscopic findings.

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Gastroesophageal reflux disease and Barrett’s esophagus after laparoscopic sleeve gastrectomy: a possible, underestimated long-term complication

Alfredo Genco, M.D.[a], Emanuele Soricelli, M.D.[a,*], Giovanni Casella, M.D., Ph.D.[a], Roberta Maselli, M.D.[a], Lidia Castagneto-Gissey, M.D.[a], Nicola Di Lorenzo, M.D.[b], Nicola Basso, M.D.[a]

Conclusion:

- In the present series the incidence of EE and of BE in SG patients was considerably higher than that reported in the current literature, and it was not related to GERD symptoms.
- Endoscopic surveillance after SG should be advocated irrespective of the presence of GERD symptoms.

ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2016) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Gastroesophageal reflux disease and Barrett's esophagus after laparoscopic sleeve gastrectomy: a possible, underestimated long-term complication

Alfredo Genco, M.D.[a], Emanuele Soricelli, M.D.[a,*], Giovanni Casella, M.D., Ph.D.[a], Roberta Maselli, M.D.[a], Lidia Castagneto-Gissey, M.D.[a], Nicola Di Lorenzo, M.D.[b], Nicola Basso, M.D.[a]

Can we avoid Post LSG GERD?

LSG and GERD

Table 1 Symptoms of gastroesophageal reflux disease

	GERD in obesity	*De novo* GERD after SG	Improvement of GERD after SG
Mechanism	Increasing BMI	Lack of gastric compliance	Reduced intra-abdominal pressure
	Increasing intragastric pressure	Increased intraluminal pressure	Reduced acid production
	Increasing gastroesophageal pressure gradient	Gastric fundus removal	Accelerated gastric emptying
	Hiatal hernia	LES pressure	Reduced gastric volume
		Final shape of the sleeve	
		Narrowing at the junction of the vertical and horizontal parts of the sleeve	
		Twisting of the sleeve	
		Dilation of the fundus	
		Persistence of hiatal hernia	

Studies Showing Reduction of GERD After SG

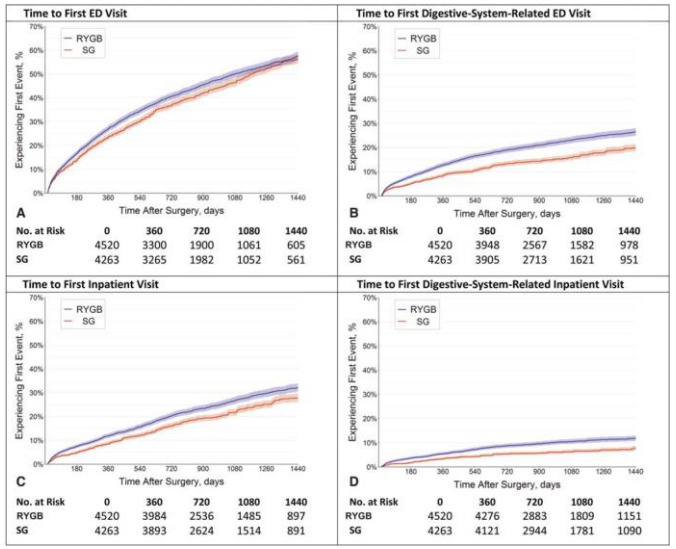
Table 2
Proposed mechanisms to minimize gastroesophageal reflux disease after sleeve gastrectomy

Study	Recommendations
Daes et al,[54] 2014	Avoid twisting of the sleeve Avoid narrowing at the junction of the vertical and horizontal parts of the sleeve Avoid dilation of the fundus Repair of a hiatal hernia
Del Genio et al,[52] 2014	Preserve integrity of the sling fibers of Helvetius Avoid small bougie size (<40 Fr) Straight lumen Avoid leaving an excessive posterior gastric fundus
Dupree et al,[53] 2014	Avoid narrowing the gastric body or pylorus Repair concomitant hiatal hernias Attention to crural repair Attention to sleeve size and volume
Keidar et al,[65] 2010	Avoid creation of a narrow sleeve Do not place an excessive tension to the stomach Do not oversuture with overly big bites

SG vs RYGB
Case Control and Cohort studies

Conclusions:

- SG may have fewer complications requiring emergency care and hospitalization, especially as related to digestive system disease.
- However, any acute care cost advantages of SG may wane over time.



ORIGINAL ARTICLE

OPEN

Acute Care Utilization and Costs Up to 4 Years After Index Sleeve Gastrectomy or Roux-en-Y Gastric Bypass

A National Claims-based Study

Katherine Callaway Kim, MPH, Stephanie Argetsinger, MPH,* James Frank Wharam, MB, BCh, BAO, MPH,* Fang Zhang, PhD,* David E. Arterburn, MD, MPH,† Adolfo Fernandez, MD,‡ Dennis Ross-Degnan, ScD,* Jamie Wallace, MPH,* and Kristina H. Lewis, MD, MPH, SM‡§✉*

Cardiovascular Disease

- Retrospective
- 380 RYGB
- 334 LSG

Published in final edited form as:
Surg Obes Relat Dis. 2022 June ; 18(6): 716–726. doi:10.1016/j.soard.2022.02.021.

Comparative effectiveness of gastric bypass and sleeve gastrectomy on predicted 10-year risk of cardiovascular disease 5 years after surgery

Anirban Basu, Ph.D.[a], **Lee J. Barton, M.S.**[b], **Heidi Fischer, Ph.D.**[b], **Kristi Reynolds, Ph.D., M.P.H.**[b], **David E. Arterburn, M.D., M.P.H.**[c], **Douglas Barthold, Ph.D.**[d], **Anita Courcoulas, M.D.**[e], **Cecelia L. Crawford, D.N.P., R.N.**[f], **Peter N. Fedorka, M.D.**[g], **Benjamin B. Kim, M.D.**[h], **Edward C. Mun, M.D.**[h], **Sameer B. Murali, M.D.**[i], **Robert E. Zane, M.D.**[h], **Karen J. Coleman, Ph.D.**[b,*]

Cardiovascular Disease

- There were no significant differences in predicted 10-year ASCVD risk between LSG and RYGB at any time.
- Both RYGB and LSG patients had a marked decrease in predicted 10-year ASCVD risk scores 1 year after surgery which remained up to 5 years after surgery.
- No difference found in predicted 10-year ASCVD risk scores between bariatric operations by age, baseline CVD risk level, or T2DM.

Published in final edited form as:
Surg Obes Relat Dis. 2022 June ; 18(6): 716–726. doi:10.1016/j.soard.2022.02.021.

Comparative effectiveness of gastric bypass and sleeve gastrectomy on predicted 10-year risk of cardiovascular disease 5 years after surgery

Anirban Basu, Ph.D.[a], Lee J. Barton, M.S.[b], Heidi Fischer, Ph.D.[b], Kristi Reynolds, Ph.D., M.P.H.[b], David E. Arterburn, M.D., M.P.H.[c], Douglas Barthold, Ph.D.[d], Anita Courcoulas, M.D.[e], Cecelia L. Crawford, D.N.P., R.N.[f], Peter N. Fedorka, M.D.[g], Benjamin B. Kim, M.D.[h], Edward C. Mun, M.D.[h], Sameer B. Murali, M.D.[i], Robert E. Zane, M.D.[h], Karen J. Coleman, Ph.D.[b,*]

Health Care Expenditure

- Population-based, matched cohort study of 1624 patients
- There was no statistically significant difference in mean health care expenditures between RYGB and LSG 4 years after the procedures ($33 682 vs $33 948, respectively).

JAMA Network | Open

Original Investigation | Nutrition, Obesity, and Exercise

Comparison of 4-Year Health Care Expenditures Associated With Roux-en-Y Gastric Bypass vs Sleeve Gastrectomy

Jean-Eric Tarride, MA, PhD; Aristithes G. Doumouras, MD, MPH; Dennis Hong, MD, MSc; J. Michael Paterson, MSc; Semra Tibebu, MPH; Francis Nguyen, MPH; Richard Perez, MSc; Valerie H. Taylor, MD, PhD; Feng Xie, PhD; Vanessa Boudreau, MD; Eleanor Pullenayegum, MA, PhD; David R. Urbach, MSc, MD; Mehran Anvari, MB BS, PhD

Health Care Expenditure

- There were no statistically significant differences
  - In all-cause mortality between RYGB and LSG (1.5%vs 2.2%, respectively; P = .26)
  - Total number of hospitalizations (754 vs 669, respectively; P = .11)
  - During the 4-year follow-up period.

JAMA Network | Open

Original Investigation | Nutrition, Obesity, and Exercise

Comparison of 4-Year Health Care Expenditures Associated With Roux-en-Y Gastric Bypass vs Sleeve Gastrectomy

Jean-Eric Tarride, MA, PhD; Aristithes G. Doumouras, MD, MPH; Dennis Hong, MD, MSc; J. Michael Paterson, MSc; Semra Tibebu, MPH; Francis Nguyen, MPH; Richard Perez, MSc; Valerie H. Taylor, MD, PhD; Feng Xie, PhD; Vanessa Boudreau, MD; Eleanor Pullenayegum, MA, PhD; David R. Urbach, MSc, MD; Mehran Anvari, MB BS, PhD

Health Care Expenditure

- Nonelective hospitalizations occurred more frequently with RYGB vs LSG (472 vs 339, respectively; (P = .002).
- RYGB was associated with relatively fewer subsequent bariatric procedures during the 4-year follow-up period (9 vs 40, respectively; P < .001)

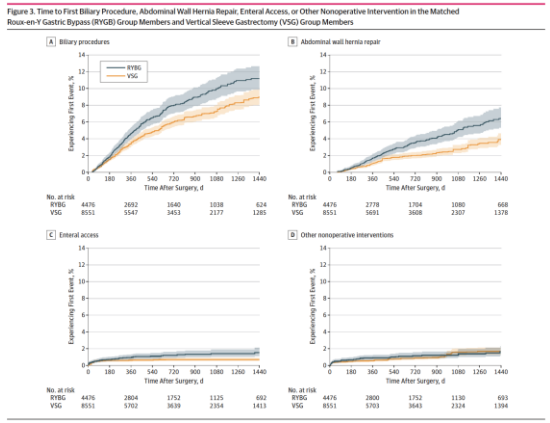
JAMA Network | Open

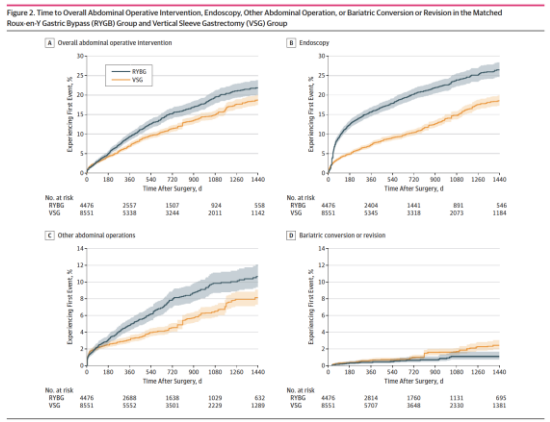
Original Investigation | Nutrition, Obesity, and Exercise

Comparison of 4-Year Health Care Expenditures Associated With Roux-en-Y Gastric Bypass vs Sleeve Gastrectomy

Jean-Eric Tarride, MA, PhD; Aristithes G. Doumouras, MD, MPH; Dennis Hong, MD, MSc; J. Michael Paterson, MSc; Semra Tibebu, MPH; Francis Nguyen, MPH; Richard Perez, MSc; Valerie H. Taylor, MD, PhD; Feng Xie, PhD; Vanessa Boudreau, MD; Eleanor Pullenayegum, MA, PhD; David R. Urbach, MSc, MD; Mehran Anvari, MB BS, PhD

Risk of Subsequent Operative and Nonoperative Interventions





- Patients undergoing LSG had lower overall risk of subsequent operative and nonoperative interventions, including biliary procedures, abdominal wall hernia repair, other abdominal operations, and endoscopy,
- Up to 4 years after surgery.
- LSG were more likely to undergo bariatric conversion or revision

JAMA Network | Open™

Original Investigation | Surgery

Risk of Operative and Nonoperative Interventions Up to 4 Year After Roux-en-Y Gastric Bypass vs Vertical Sleeve Gastrectomy in a Nationwide US Commercial Insurance Claims Database

Kristina H. Lewis, MD, MPH, SM; David E. Arterburn, MD, MPH; Katherine Callaway, MPH; Fang Zhang, PhD; Stephanie Argetsinger, MPH; Jamie Wallace, MPH; Adolfo Fernandez, MD; Dennis Ross-Degnan, ScD; James F. Wharam, MB, BCh, BAO, MPH

Safty

- Among 38,153 patients LSG rose from 52.6% (2012) to 75% (2016).
- At 2 years from surgery LSG had :
  - Fewer re-interventions (sleeve 9.9%, bypass 15.6%, p<0.001)
  - Lower complications (sleeve 6.6%, bypass 9.6%, p=0.00
  - Lower overall healthcare spending ($47,891 vs. $55,213, p=0.003)
  - Than patients undergoing RYGB.
- At the 2-year mark:
  - Revisions were slightly more common in LSG than in RYGB (sleeve 0.6%, bypass 0.4%, p= 0.009).

Published in final edited form as:
Ann Surg. 2022 March 01; 275(3): 539–545. doi:10.1097/SLA.0000000000004297.

Comparative Safety of Sleeve Gastrectomy and Gastric Bypass: An Instrumental Variables Approach

Karan R. Chhabra, MD MSc[1,2,3,*], Dana A. Telem, MD MPH[2,4], Grace F. Chao, MD MSc[1,2,5], David E. Arterburn, MD MPH[6], Jie Yang, PhD[2], Jyothi R. Thumma, MPH[2], Andrew M. Ryan, PhD[2,7,8], Blanche Blumenthal[2,7], Justin B. Dimick, MD MPH[2,4]

[1]National Clinician Scholars Program at the Institute for Healthcare Policy and Innovation, University of Michigan, Ann Arbor, MI

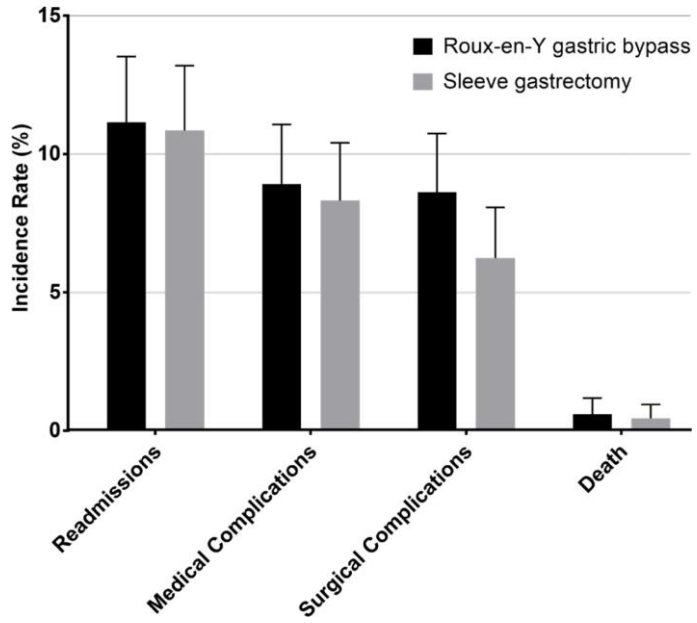
Chronic Kidney Disease

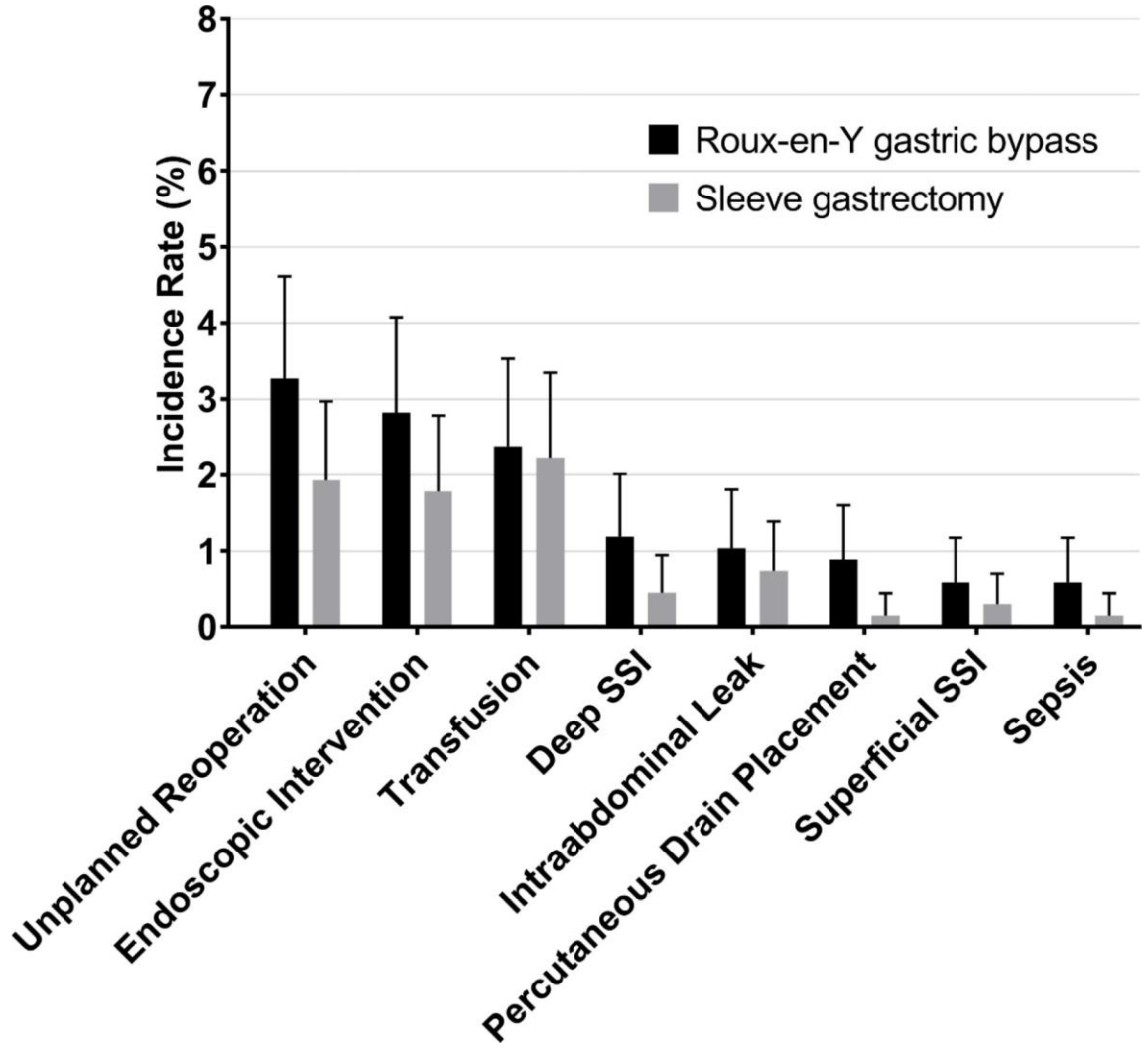
- RYGB (n=673) and LSG (n=673) cohorts.
- There were no statistically-significant differences in primary outcomes.
- Among secondary outcomes, only acute kidney injury was statistically-significantly higher among RYGB patients (4.9% vs 2.7%, P=.035).

Published in final edited form as:
Ann Surg. 2021 October 01; 274(4): e328–e335. doi:10.1097/SLA.0000000000003627.

Perioperative Risks of Sleeve Gastrectomy versus Roux-en-Y Gastric Bypass among Patients with Chronic Kidney Disease: A Review of the MBSAQIP Database

John R. Montgomery, MD[1,2], Seth A. Waits, MD[1], Justin B. Dimick, MD, MPH[1,2], Dana A. Telem, MD, MPH[1,2]





Published in final edited form as:

Ann Surg. 2021 October 01; 274(4): e328–e335. doi:10.1097/SLA.0000000000003627.

Perioperative Risks of Sleeve Gastrectomy versus Roux-en-Y Gastric Bypass among Patients with Chronic Kidney Disease: A Review of the MBSAQIP Database

John R. Montgomery, MD[1,2], Seth A. Waits, MD[1], Justin B. Dimick, MD, MPH[1,2], Dana A. Telem, MD, MPH[1,2]

GI Symptoms

- Methods In this cross-sectional study, RYGBP and LSG patients answered a questionnaire including the
  - Gastrointestinal Symptom Rating Scale (GSRS)
  - Questions from the Brief Pain Inventory (BPI)
  - Self-rated health (SRH).

Obesity Surgery (2021) 31:4338–4346
https://doi.org/10.1007/s11695-021-05605-5

IFSO

ORIGINAL CONTRIBUTIONS

Check for updates

Self-Reported Gastrointestinal Symptoms Two To Four Years After Bariatric Surgery. A Cross-Sectional Study Comparing Roux-en-Y Gastric Bypass and Laparoscopic Sleeve Gastrectomy

Brit Thorsen[1,2] · Kari Hanne Gjeilo[2,3,4] · Jorunn Sandvik[5,6,7] · Turid Follestad[6] · Hallvard Græslie[1] · Siren Nymo[1,6,7]

GI Symptoms

- RYGBP (n=73) and LSG (n=99).
- There was no evidence of a difference in total Gastrointestinal Symptom Rating Scale (GSRS) scores between the surgical methods (p=0.638).
- There were higher scores of reflux symptoms in LSG vs. RYGBP (p <0.001) and higher consumption of ARM after LSG (32% vs. 12%, p <0.001).
- Pain scores were low in both groups;
  - Abdominal pain was higher for RYGBP (p = 0.025).
- There was no significant difference in Self-rated health .

Obesity Surgery (2021) 31:4338–4346
https://doi.org/10.1007/s11695-021-05605-5

IFSO

ORIGINAL CONTRIBUTIONS

Check for updates

Self-Reported Gastrointestinal Symptoms Two To Four Years After Bariatric Surgery. A Cross-Sectional Study Comparing Roux-en-Y Gastric Bypass and Laparoscopic Sleeve Gastrectomy

Brit Thorsen[1,2] · Kari Hanne Gjeilo[2,3,4] · Jorunn Sandvik[5,6,7] · Turid Follestad[6] · Hallvard Græslie[1] · Siren Nymo[1,6,7]

Adverse Cardiac Events

- In this population-based cohort study (Switzerland) of 39 067 adults with up to 11 years of follow-up
- RYGB was associated with a lower risk of major adverse cardiac events (MACE) compared with LSG, primarily due to reduced rates of MI
- Suggesting a cardiovascular advantage of RYGB over LSG

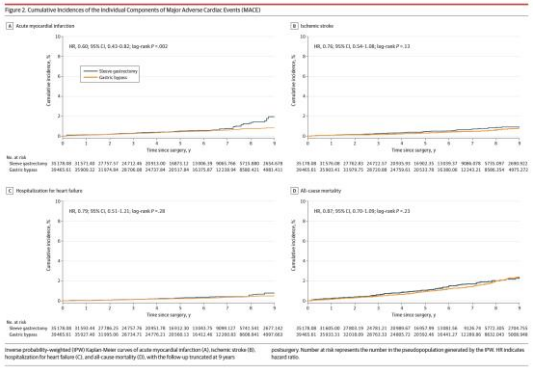
JAMA Surgery | Original Investigation

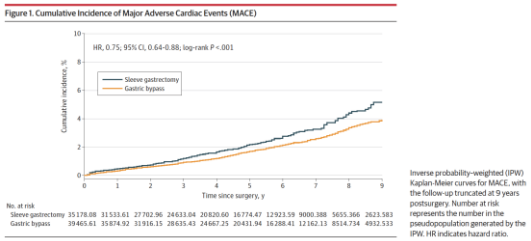
Major Adverse Cardiac Events After Gastric Bypass vs Sleeve Gastrectomy

Simone Wildisen, MMed; Rahel Laager, MD; Tristan Struja, MD, MPH, MSc; Alessia Wildisen, MD; Beat Mueller, MD; Philipp Schuetz, MD, MPH; Ralph Peterli, MD; Alexander Kutz, MD, MPH, MSc

Adverse Cardiac Events

- Both short- and long-term secondary outcomes favored RYGB over LSG, except for higher rates of revision surgery and immediate postoperative complications.





Inverse probability–weighted (IPW) Kaplan-Meier curves for MACE, with the follow-up truncated at 9 years postsurgery. Number at risk represents the number in the pseudopopulation generated by the IPW. HR indicates hazard ratio.

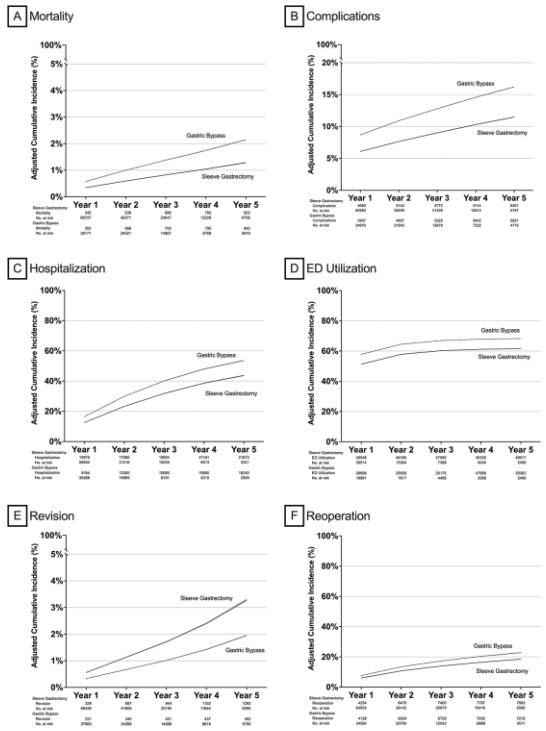
JAMA Surgery | Original Investigation

Major Adverse Cardiac Events After Gastric Bypass vs Sleeve Gastrectomy

Simone Wildisen, MMed; Rahel Laager, MD; Tristan Struja, MD, MPH, MSc; Alessia Wildisen, MD; Beat Mueller, MD; Philipp Schuetz, MD, MPH; Ralph Peterli, MD; Alexander Kutz, MD, MPH, MSc

Comparative Safety

- Among 132,788 patients with Medicaid,
  - 84,717 (63.8%) underwent LSG
  - 48,071 (36.2%) underwent RYGB
- Compared to RYGB, LSG was associated with
  - A lower 5-year cumulative incidence of mortality (1.29% vs. 2.15%),
  - Lower complications (11.5% vs. 16.2%),
  - Lower hospitalization (43.7% vs. 53.7%),
  - Lower ED use (61.6% vs. 68.2%), and
  - Lower reoperation (18.5% vs. 22.8%),
  - But a higher cumulative incidence of revision (3.3% vs. 2.0%).



Published in final edited form as:
Ann Surg. 2023 June 01; 277(6): 979–987. doi:10.1097/SLA.0000000000005692.

Comparative Safety of Sleeve Gastrectomy and Gastric Bypass Up to 5 Years After Surgery in Patients with Medicaid

Ryan Howard, MD, MS[1,2], Jie Yang, PhD[2], Jyothi Thumma, MPH[2], Anne Ehlers, MD, MPH[1,2], Sean O'Neill, MD, PhD[1,2], David Arterburn, MD, MPH[3], Andrew Ryan, PhD[2,4,5], Dana Telem, MD, MPH[1,2,6], Justin B. Dimick, MD, MPH[1,2,6]

Comparative Effectiveness

- 50,987 SO patients who underwent
  - RYGB (N = 42,119)
  - SG (N = 8868).
- There was no difference in adjusted overall 30-day complication rate comparing RYGB and SG patients (11.5 vs. 11.1 %, p = 0.250).
- RYGB patients had higher adjusted rates of
  - 30-day mortality (0.3 vs. 0.2 %, p = 0.042)
  - Reoperation (4.0 vs. 2.4 %, p=0.001)
  - Readmission (6.9 vs. 5.5 %, p=0.001)

Surg Endosc
DOI 10.1007/s00464-016-4974-y

Comparative effectiveness of Roux-en-Y gastric bypass and sleeve gastrectomy in super obese patients

Adam C. Celio[1] · Qiang Wu[2] · Kevin R. Kasten[1] · Mark L. Manwaring[1] · Walter J. Pories[1] · Konstantinos Spaniolas[1]

Comparative Effectiveness

- The percent of total weight loss (%TWL) was significantly higher for
  - RYGB than SG at
  - 3 months (14.1 vs. 13.1 %, p=0.001)
  - 6 months (25.2 vs. 22.4 %, p=0.001)
  - 12 months (34.5 vs. 29.7 %, p=0.001).

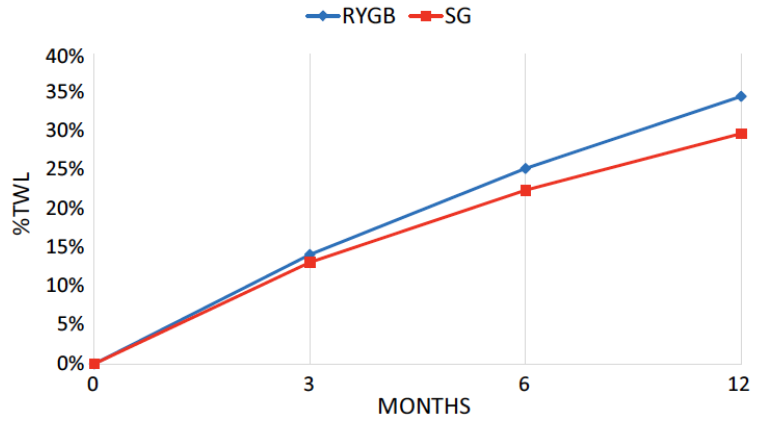


Fig. 1 Percent total weight loss of RYGB (laparoscopic Roux-en-Y gastric bypass) and SG (laparoscopic sleeve gastrectomy) at 3, 6, and 12-month follow-up

Surg Endosc
DOI 10.1007/s00464-016-4974-y

Comparative effectiveness of Roux-en-Y gastric bypass and sleeve gastrectomy in super obese patients

Adam C. Celio[1] · Qiang Wu[2] · Kevin R. Kasten[1] · Mark L. Manwaring[1] · Walter J. Pories[1] · Konstantinos Spaniolas[1]

Comparative Effectiveness

- RYGB patients had increased resolution of all measured comorbidities:
  - TIIDM (61.6 vs. 50.8 %, p=0.001)
  - Hypertension (43.1 vs. 34.5 %, p=0.001)
  - GERD (53.9 vs. 32.5 %, p=0.001),
  - Hyperlipidemia (39.7 vs. 32.5 %, p=0.001)
  - OSA (42.8 vs. 40.6 %, p = 0.058)
  - At 12 months compared to SG patients

Fig. 2 Comparison of comorbidity resolution between RYGB (laparoscopic Roux-en-Y gastric bypass) and SG (laparoscopic sleeve gastrectomy) at 3, 6, and 12-month follow-up. *Error bars* represent 95 % Confidence Interval. DM (type 2 diabetes), HTN (hypertension), GERD (gastroesophageal reflux disease), HLD (hyperlipidemia), and OSA (obstructive sleep apnea)

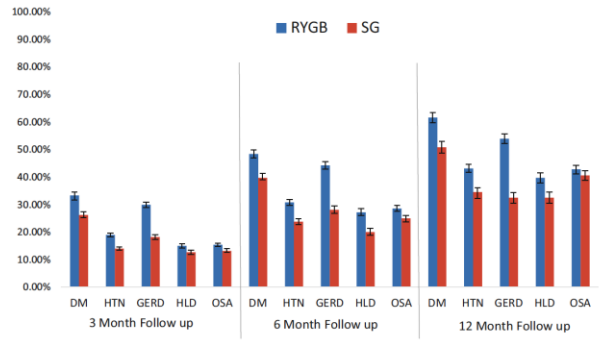
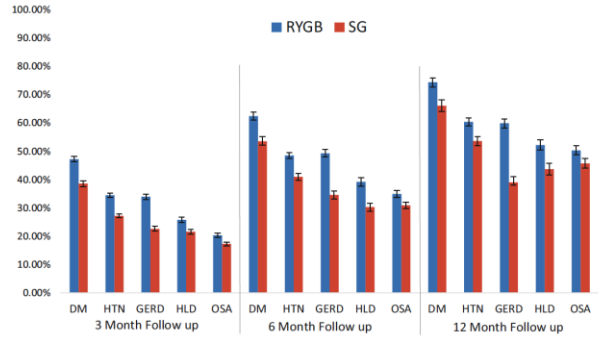


Fig. 3 Comparison of comorbidity improvement between RYGB (laparoscopic Roux-en-Y gastric bypass) and SG (laparoscopic sleeve gastrectomy) at 3, 6, and 12-month follow-up. *Error bars* represent 95 % Confidence Interval. DM (Type 2 diabetes), HTN (hypertension), GERD (gastroesophageal reflux disease), HLD (hyperlipidemia), and OSA (obstructive sleep apnea)



Surg Endosc
DOI 10.1007/s00464-016-4974-y

Comparative effectiveness of Roux-en-Y gastric bypass and sleeve gastrectomy in super obese patients

Adam C. Celio[1] · Qiang Wu[2] · Kevin R. Kasten[1] · Mark L. Manwaring[1] · Walter J. Pories[1] · Konstantinos Spaniolas[1]

Weight Recurrence

- 19.762 patients
  - 14.982 RYGB
  - 4.780 SG patients.
- After matching 4.693 patients from each group, patients undergoing
  - SG had A higher WR up to 5-year ($p < 0.01$)]
  - Less often remission of
    - TIIDM, ($p < 0.01$)
    - Hypertension, ($p < 0.01$)
    - Dyslipidemia, ($p < 0.01$
    - GERD, ($p < 0.01$)
    - OSA , ($p < 0.01$).

Surgical Endoscopy (2023) 37:4351–4359
https://doi.org/10.1007/s00464-022-09785-8

ORIGINAL ARTICLE

Check for updates

Weight recurrence after Sleeve Gastrectomy versus Roux-en-Y gastric bypass: a propensity score matched nationwide analysis

Erman O. Akpinar[1,2] · Ronald S. L. Liem[3,4] · Simon W. Nienhuijs[5] · Jan Willem M. Greve[1,6,7] · Perla J. Marang-van de Mheen[8] on behalf of the Dutch Audit for Treatment of Obesity Research Group

Weight Recurrence

- In subgroup analyses, patients who experienced WR after SG but maintained ≥ 20% TWL from starting weight, more often achieved
  - HTN (44.7% vs 29.4%)
  - Dyslipidemia (38.3% vs 19.3%)
  - OSA (54% vs 20.3%) remission
  - Compared with patients not maintaining ≥ 20%TWL.
- No such differences in comorbidity remission were found within RYGB patients.

Surgical Endoscopy (2023) 37:4351–4359
https://doi.org/10.1007/s00464-022-09785-8

ORIGINAL ARTICLE

Check for updates

Weight recurrence after Sleeve Gastrectomy versus Roux-en-Y gastric bypass: a propensity score matched nationwide analysis

Erman O. Akpinar[1,2] · Ronald S. L. Liem[3,4] · Simon W. Nienhuijs[5] · Jan Willem M. Greve[1,6,7] · Perla J. Marang-van de Mheen[8] on behalf of the Dutch Audit for Treatment of Obesity Research Group

SG vs RYGB

CRT

SLEEVEPASS CRT. 5 YEARS

- The Sleeve vs Bypass
- (SLEEVEPASS)
  - Multicenter,
  - Multisurgeon,
  - Open-label,
  - Randomized clinical equivalence trial (Finland).
- The trial enrolled 240 MO patients
- LSG (n = 121)
- RYGB (n = 119).

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity
The SLEEVEPASS Randomized Clinical Trial

Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Soinio, MD, PhD; Pirjo Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

SLEEVEPASS CRT. 5 YEARS

- Prespecified equivalence margins for the clinical significance of weight loss differences between RYGB and LSG were –9%to +9% excess weight loss.
- Secondary end points included
  - Resolution of comorbidities
  - Improvement of quality of life (QOL)
  - Adverse events (overall morbidity),
  - Mortality.

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity
The SLEEVEPASS Randomized Clinical Trial

Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Soinio, MD, PhD; Pirjo Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

SLEEVEPASS CRT. 5 YEARS

- 80.4% completed the 5-year follow-up
- At baseline,
  - 42.1% had TIIDM
  - 34.6% dyslipidemia
  - 70.8% hypertension.

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity
The SLEEVEPASS Randomized Clinical Trial

Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Soinio, MD, PhD; Pirjo Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity

The SLEEVEPASS Randomized Clinical Trial

Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Soinio, MD, PhD; Pirjo Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

SLEEVEPASS CRT. 5 YEARS

- The estimated mean %EWL at 5 years was
  - 49% after LSG
  - 57% after RYGB
  - Difference, 8.2 percentage units, higher in the gastric bypass group and did not meet criteria for equivalence.

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity
The SLEEVEPASS Randomized Clinical Trial

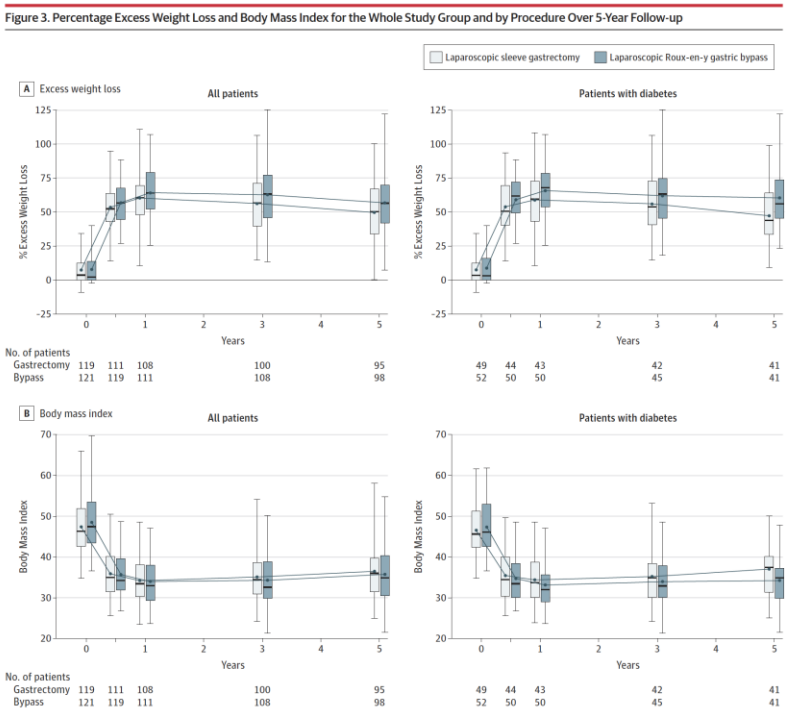
Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Sainio, MD, PhD; Pirkka Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

SLEEVEPASS CRT. 5 YEARS

- Complete or partial remission of TIIDM
  - 37% after LSG
  - 45% after RYGB (P > .99).
- Medication for dyslipidemia was discontinued in
  - 47% after LSG 60%(n = 24/40) after RYGB (P = .15)
- Hypertension in
  - 29% and 51% (P = .02).

SLEEVEPASS CRT. 5 YEARS

- No statistically significant difference in QOL between groups (P = .85) and no treatment-related mortality.
- Overall morbidity rate was
  - 19% for LSG
  - 26% for RYGB
  - P = .19



JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity

The SLEEVEPASS Randomized Clinical Trial

Paulina Salminen, MD, PhD; Mika Helmiö, MD; Jari Ovaska, MD, PhD; Anne Juuti, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Saija Hurme, MSc; Minna Soinio, MD, PhD; Pirjo Nuutila, MD, PhD; Mikael Victorzon, MD, PhD

Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass)

L Ulas Biter,[a,b,j] Judith WH. 't Hart,[b,d,*,j] Bo J. Noordman,[b,d] J Frans Smulders,[e] Simon Nienhuijs,[e] Martin Dunkelgrün,[b] Johannes F. Zengerink,[b] Erwin Birnie,[c,f] Irene AM. Friskes,[g] Guido HH. Mannaerts,[h,i] and Jan A. Apers[b]

SleeveBypass
CRT
Phase III

- Randomised open-label controlled trial (two Dutch hospitals)
- 5-year follow-up
- LSG (n = 312) and RYGB (n = 316)

Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass)

L Ulas Biter,[a,b,j] Judith WH. 't Hart,[b,d,*,j] Bo J. Noordman,[b,d] J Frans Smulders,[e] Simon Nienhuijs,[e] Martin Dunkelgrün,[b] Johannes F. Zengerink,[b] Erwin Birnie,[c,f] Irene AM. Friskes,[g] Guido HH. Mannaerts,[h,i] and Jan A. Apers[b]

SleeveBypass
CRT
Phase III

- Primary endpoint was weight loss, expressed by %BMI loss.
- The predefined clinically relevant equivalence margin was −13% to 13%.
- Secondary endpoints included percentage total kilograms weight loss, obesity-related comorbidities, quality of life, morbidity, and mortality.

Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass)

- L Ulas Biter,[a,b,j] Judith WH. 't Hart,[b,d,*,j] Bo J. Noordman,[b,d] J Frans Smulders,[e] Simon Nienhuijs,[e] Martin Dunkelgrün,[b] Johannes F. Zengerink,[b] Erwin Birnie,[c,f] Irene AM. Friskes,[g] Guido HH. Mannaerts,[h,i] and Jan A. Apers[b]

  - 67.1% after RYGB
  - (difference 8.3%)
  - This was within the predefined margin ($P < 0.001$).

- Total weight loss at 5 years was
  - 22.5% after LSG
  - 26.0% after RYGB
  - difference 3.5%.

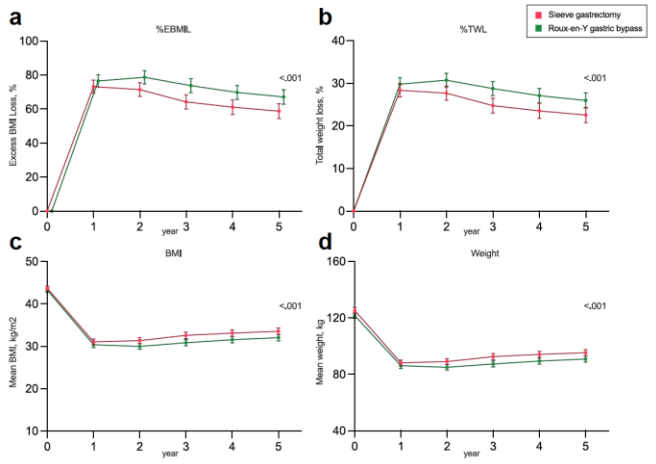


Fig. 2: **a–d** Weight loss at follow-up between groups[a]. All values are mean, whiskers show with a 95% CI. a, Repeated measurement using Linear mixed model. Abbreviations: %EBMIL = percentage excess body mass index loss; %TWL = percentage total weight loss; BMI = body mass index; kg/m2 = kilogram per square meters.

Long-term effect of sleeve gastrectomy vs Roux-en-Y gastric bypass in people living with severe obesity: a phase III multicentre randomised controlled trial (SleeveBypass)

L Ulas Biter,[a,b,j] Judith WH. 't Hart,[b,d,*,j] Bo J. Noordman,[b,d] J Frans Smulders,[e] Simon Nienhuijs,[e] Martin Dunkelgrün,[b] Johannes F. Zengerink,[b] Erwin Birnie,[c,f] Irene AM. Friskes,[g] Guido HH. Mannaerts,[h,i] and Jan A. Apers[b]

- In both groups, obesity-related comorbidities significantly improved after 5 years.
- Dyslipidaemia improved
  - More frequently after RYGB (83%, 54/65) compared to
  - LSG (62%, 44/71)
  - (P = 0.006).
- De novo GERD occurred more frequently after
  - LSG (16%, 46/288)
  - RYGB (4%, 10/280)
  - (P < 0.001).
- Minor complications were more frequent after RYGB
  - (5%, 15/316) compared to
  - LSG (2%, 5/312).
- No statistically significant differences in major complications and health-related quality of life

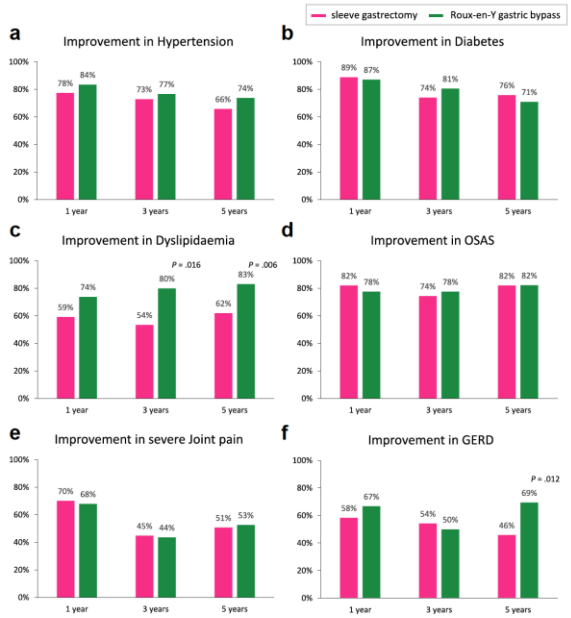


Fig. 3: **a–f** Changes in comorbidities and GERD at 1, 3 and 5 years[a]. All values are mean percentage. a, Multivariable logistic regression analysis for improvement (resolution + party resolution) of comorbidity between sleeve gastrectomy and Roux-en-Y gastric bypass. Corrected for multiple testing with step-down Bonferroni-Holm. Abbreviations: OSAS = obstructive sleep apnoea syndrome; GERD = gastro-oesophageal reflux disease.

SM-BOSS

- The Swiss Multicenter Bypass or Sleeve Study (SM-BOSS)
- 4 Swiss bariatric centers
- 205 (94.5%) completed the trial.
- 217 patients were enrolled and randomly assigned to LSG or RYGB with a 5-year follow-up period.
  - LSG (n = 107)
  - laparoscopic RYGB (n = 110).

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity

The SM-BOSS Randomized Clinical Trial

Ralph Peterli, MD; Bettina Karin Wölnerhanssen, MD; Thomas Peters, MD; Diana Vetter, MD; Dino Kröll, MD; Yves Borbély, MD; Bernd Schultes, MD; Christoph Beglinger, MD; Jürgen Drewe, MD, MSc; Marc Schiesser, MD; Philipp Nett, MD; Marco Bueter, MD, PhD

SM-BOSS

- In this randomized clinical trial that included 217 adults with morbid obesity
- percentage excess body mass index loss in patients undergoing LSG compared with RYGB was 61.1% vs 68.3%after 5 years,
- This study did not find a significant difference in weight loss between LSG and RYGB.

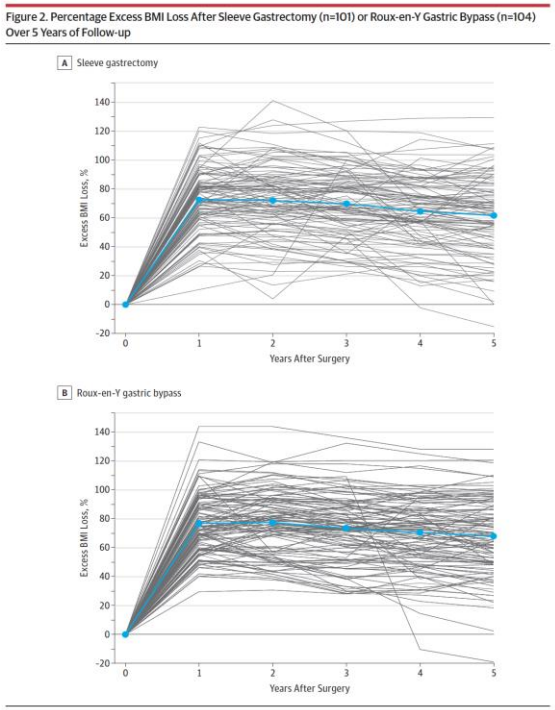
JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity
The SM-BOSS Randomized Clinical Trial

Ralph Peterli, MD; Bettina Karin Wölnerhanssen, MD; Thomas Peters, MD; Diana Vetter, MD; Dino Kröll, MD; Yves Borbély, MD; Bernd Schultes, MD; Christoph Beglinger, MD; Jürgen Drewe, MD, MSc; Marc Schiesser, MD; Philipp Nett, MD; Marco Bueter, MD, PhD

SM-BOSS

- Excess BMI loss was not significantly different at 5 years:
  - LSG, 61.1%
  - RYGB, 68.3%
  - (P = .22)



JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity

The SM-BOSS Randomized Clinical Trial

Ralph Peterli, MD; Bettina Karin Wölnerhanssen, MD; Thomas Peters, MD; Diana Vetter, MD; Dino Kröll, MD; Yves Borbély, MD; Bernd Schultes, MD; Christoph Beglinger, MD; Jürgen Drewe, MD, MSc; Marc Schiesser, MD; Philipp Nett, MD; Marco Bueter, MD, PhD

SM-BOSS

- GERD remission was observed more frequently after
  - RYGB (60.4%) than after
  - LSG (25.0%).
- Gastric reflux worsened more often after
  - LSG (31.8%)
  - RYGB (6.3%).

JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity

The SM-BOSS Randomized Clinical Trial

Ralph Peterli, MD; Bettina Karin Wölnerhanssen, MD; Thomas Peters, MD; Diana Vetter, MD; Dino Kröll, MD; Yves Borbély, MD; Bernd Schultes, MD; Christoph Beglinger, MD; Jürgen Drewe, MD, MSc; Marc Schiesser, MD; Philipp Nett, MD; Marco Bueter, MD, PhD

SM-BOSS

- The number of patients with reoperations
  - 16/101 (15.8%) after LSG
  - 23/104 (22.1%) after RYGB.

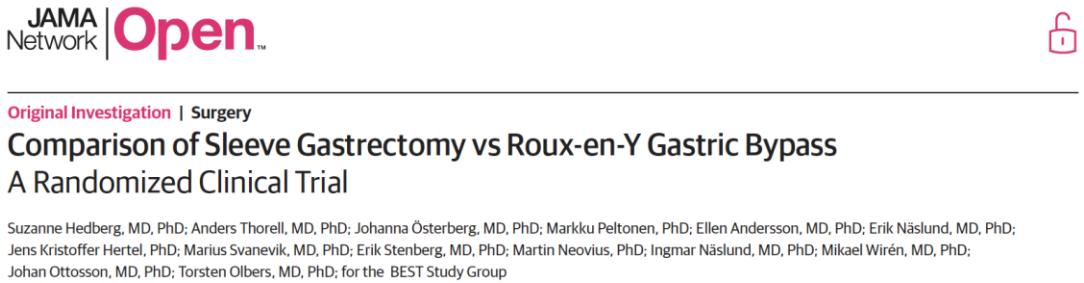
JAMA | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity
The SM-BOSS Randomized Clinical Trial

Ralph Peterli, MD; Bettina Karin Wölnerhanssen, MD; Thomas Peters, MD; Diana Vetter, MD; Dino Kröll, MD; Yves Borbély, MD; Bernd Schultes, MD; Christoph Beglinger, MD; Jürgen Drewe, MD, MSc; Marc Schiesser, MD; Philipp Nett, MD; Marco Bueter, MD, PhD

BEST

- BEST is a Swedish-Norwegian,
  - Registry-based
  - Open-label
  - Pragmatic multicenter randomized clinical trial
  - Comparing midterm (5-year) outcomes of SG and RYGB
- Perioperative complication rates were low and not statistically different between groups.
- Operating time was shorter for those who underwent LSG.



JAMA Network | Open

Original Investigation | Surgery

Comparison of Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass
A Randomized Clinical Trial

Suzanne Hedberg, MD, PhD; Anders Thorell, MD, PhD; Johanna Österberg, MD, PhD; Markku Peltonen, PhD; Ellen Andersson, MD, PhD; Erik Näslund, MD, PhD; Jens Kristoffer Hertel, PhD; Marius Svanevik, MD, PhD; Erik Stenberg, MD, PhD; Martin Neovius, PhD; Ingmar Näslund, MD, PhD; Mikael Wirén, MD, PhD; Johan Ottosson, MD, PhD; Torsten Olbers, MD, PhD; for the BEST Study Group

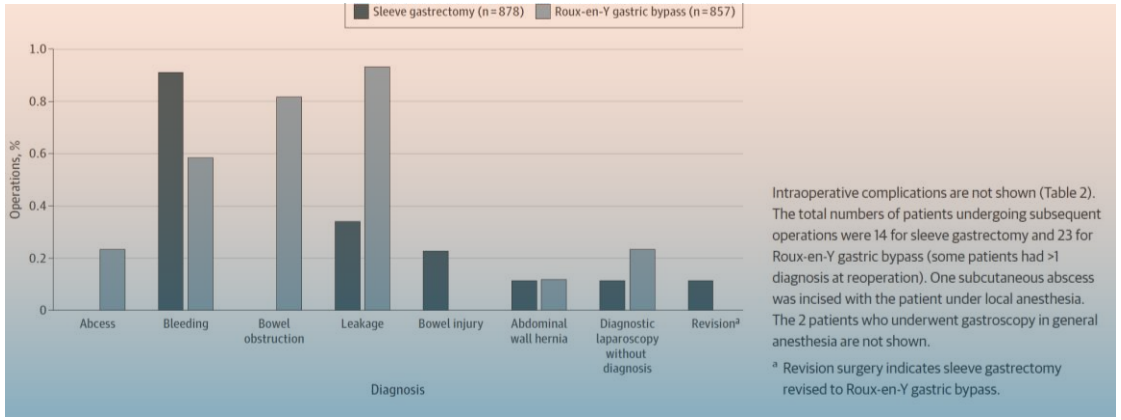
BEST

JAMA Network | Open

Original Investigation | Surgery

Comparison of Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass
A Randomized Clinical Trial

Suzanne Hedberg, MD, PhD; Anders Thorell, MD, PhD; Johanna Österberg, MD, PhD; Markku Peltonen, PhD; Ellen Andersson, MD, PhD; Jens Kristoffer Hertel, PhD; Marius Svanevik, MD, PhD; Erik Stenberg, MD, PhD; Martin Neovius, PhD; Ingmar Näslund, MD, PhD; Mikael Johan Ottosson, MD, PhD; Torsten Olbers, MD, PhD; for the BEST Study Group



Intraoperative complications are not shown (Table 2). The total numbers of patients undergoing subsequent operations were 14 for sleeve gastrectomy and 23 for Roux-en-Y gastric bypass (some patients had >1 diagnosis at reoperation). One subcutaneous abscess was incised with the patient under local anesthesia. The 2 patients who underwent gastroscopy in general anesthesia are not shown.

[a] Revision surgery indicates sleeve gastrectomy revised to Roux-en-Y gastric bypass.

- Patients were randomized and underwent
  - SG (n = 878)
  - RYGB (n = 857).
- The mean (SD) operating time was shorter in those undergoing
  - SG 47 minutes
  - RYGB 68 minutes
  - P < .001
- The median (IQR) postoperative hospital stay was 1 (1-1) day in both groups.
- The 30-day readmission rate was
  - 3.1% after SG and
  - 4.0% after RYGB
  - (P = .33).
- There was no 90-day mortality.
- The 30-day incidence of any adverse event was
  - 40 (4.6%) SG
  - 54 (6.3%) RYGB
  - P = .11
- Corresponding figures for serious adverse events were
  - 15 (1.7%) for the SG
  - 23 (2.7%) RYGB
  - P = .19

Banded RYGB
7 years

Obesity Surgery
https://doi.org/10.1007/s11695-023-06635-x

IFSO

ORIGINAL CONTRIBUTIONS

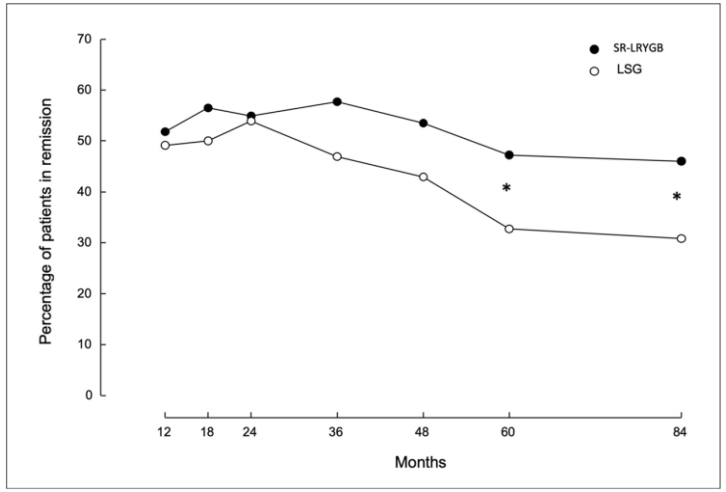
Check for updates

Seven-Year Results of a Randomized Trial Comparing Banded Roux-en-Y Gastric Bypass to Sleeve Gastrectomy for Type 2 Diabetes and Weight Loss

Jack S. Pullman[1] · Lindsay D. Plank[2] · Sherry Nisbet[1] · Rinki Murphy[3] · Michael W. C. Booth[1]

- 114 patients were randomized
  - 6 died before the 7-year follow-up (2 SR-LRYGB, 4 LSG).
- Diabetes remission, assessed in 89
  - 23/50 (46.0%) SR-LRYGB
  - 12/39 (30.8%) LSG
  - $p = 0.013$
- %EWL was greater after
  - SR-LRYGB (26.2%)
  - LSG (13.4%)
  - $p < 0.001$.
- Complication rates were similar between groups.

Banded RYGB
7 years



- Percentage of patients in remission from TIIDM over time (*p < 0.01)

Obesity Surgery
https://doi.org/10.1007/s11695-023-06635-x

IFSO

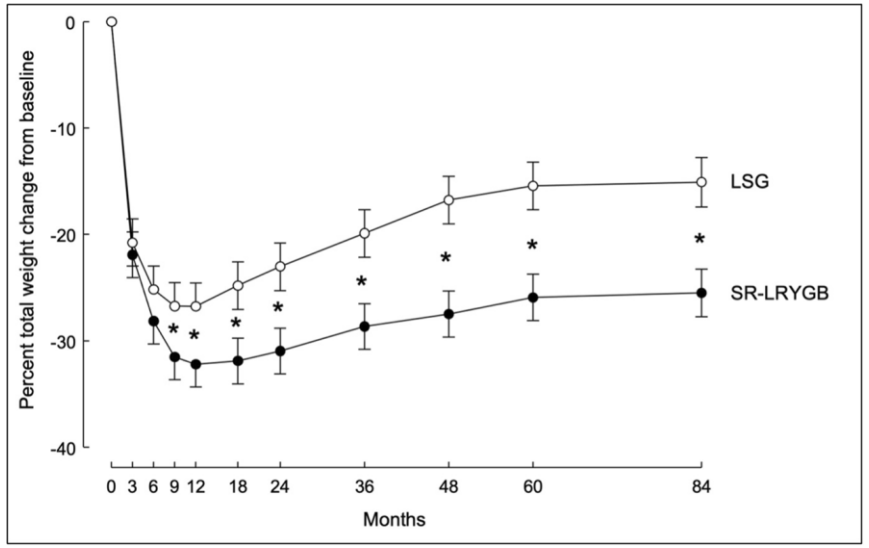
ORIGINAL CONTRIBUTIONS

Check for updates

Seven-Year Results of a Randomized Trial Comparing Banded Roux-en-Y Gastric Bypass to Sleeve Gastrectomy for Type 2 Diabetes and Weight Loss

Jack S. Pullman[1] · Lindsay D. Plank[2] · Sherry Nisbet[1] · Rinki Murphy[3] · Michael W. C. Booth[1]

Banded RYGB
7 years



- %EWL change (from baseline) over time

Obesity Surgery
https://doi.org/10.1007/s11695-023-06635-x

IFSO

ORIGINAL CONTRIBUTIONS

Check for updates

Seven-Year Results of a Randomized Trial Comparing Banded Roux-en-Y Gastric Bypass to Sleeve Gastrectomy for Type 2 Diabetes and Weight Loss

Jack S. Pullman[1] · Lindsay D. Plank[2] · Sherry Nisbet[1] · Rinki Murphy[3] · Michael W. C. Booth[1]

SLEEVEPASS CRT. 7 YEARS

- 182 (75.8%) completed the 7-year follow-up.
- The mean %EWL was
  - 47% after LSG and
  - 55% after LRYGB
  - Difference, 8.7 percentage units [95%CI, 3.5-13.9 percentage units]).
- The mean (SD) DSQoL total score at 7 years was
  - 0.50 (1.14) LSG
  - 0.49 (1.06) LRYGB
  - (P = .63)
- The median HRQoL total score was
  - 0.88 LSG
  - 0.87 LRYGB
  - (P = .37).

JAMA Surgery | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass on Weight Loss and Quality of Life at 7 Years in Patients With Morbid Obesity
The SLEEVEPASS Randomized Clinical Trial

Sofia Grönroos, MD; Mika Helmiö, MD, PhD; Anne Juuti, MD, PhD; Roosa Tiusanen, BM; Saija Hurme, MSc; Eliisa Löyttyniemi, MSc; Jari Ovaska, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Suvi Mäklin, MSc; Harri Sintonen, DSocSc; Henna Sammalkorpi, MD, PhD; Pirjo Nuutila, MD, PhD; Paulina Salminen, MD, PhD

SLEEVEPASS
CRT. 7 YEARS

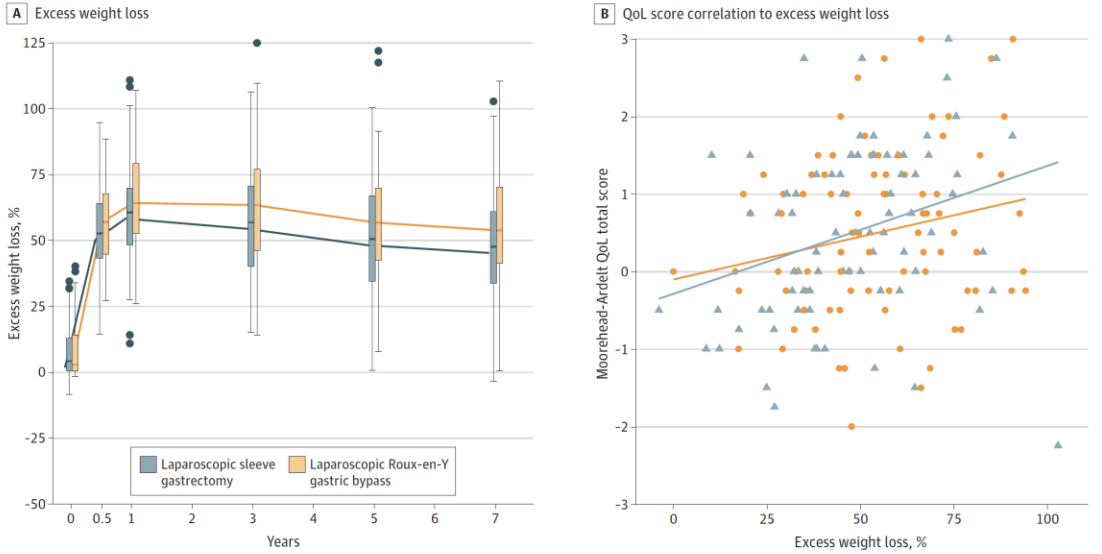
JAMA Surgery | Original Investigation

Effect of Laparoscopic Sleeve Gastrectomy vs Roux-en-Y Gastric Bypass on Weight Loss and Quality of Life at 7 Years in Patients With Morbid Obesity

The SLEEVEPASS Randomized Clinical Trial

Sofia Grönroos, MD; Mika Helmiö, MD, PhD; Anne Juuti, MD, PhD; Roosa Tiusanen, BM; Saija Hurme, MSc; Eliisa Löyttyniemi, MSc; Jari Ovaska, MD, PhD; Marja Leivonen, MD, PhD; Pipsa Peromaa-Haavisto, MD, PhD; Suvi Mäklin, MSc; Harri Sintonen, DSocSc; Henna Sammalkorpi, MD, PhD; Pirjo Nuutila, MD, PhD; Paulina Salminen, MD, PhD

Figure 2. Excess Weight Loss and Moorehead-Ardelt Quality of Life (QoL) Total Score Correlation to Excess Weight Loss



A, Excess weight loss at each follow-up point. B, Moorehead-Ardelt QoL total score correlation to excess weight loss.

SG vs RYGB
Systematic Reviews and Meta-Analysis

- 16 studies were included

TABLE 3 Basic characters of the randomized controlled trials comparing LSG and LRYGB (LSG vs. LRYGB).

Author	Age	Women %	BMI	Diabetes duration	HbA1c	Waist circumference	Follow-up
Hofso et al. 2019 (14)	47·1 ± 10·2 vs. 48·2 ± 8·9	58% vs. 74%	42·1 ± 5·3 vs. 42·4 ± 5·4	6·3 ± 5·5 vs. 6·6 ± 6·5	7·9 vs. 7.6	128 ± 12 vs. 127 ± 12	1 year
Kehagias et al. 2011 (15)	36.0 ± 8.4 vs. 33.7 ± 9.9	66.7%	45.8 ± 3. 7 vs. 44.9 ± 3.4	NA	NA	NA	3 years
Keidar et al. 2013 (16)	47.7 vs. 51.45	43%	42.5 ± 5.2 vs. 42. ± 4.8	NA	NA	NA	1 year
Lee et al. 2011 (17)	45.8 ± 9.5 vs. 44.1 ± 8.4	71.8% women	31.5 ± 3.2 vs. 29.6 ± 3.2	NA	NA	NA	2 years
Murphy et al. 2018 (18)	45.5 ± 6.4 vs. 46.6 ± 6.7	45% vs. 59%	25–45 in 77% vs. 71%	<5 years in 41.4% vs. 46.4	61.9 ± 12.8 vs. 64.5 ± 18.1	NA	1 year
Peterli et al. 2018 (19)	43.0 ± 11.1 vs. 42.1 ± 11.2	72% vs. 71.8%	43.6 ± 5.2 vs. 44.2 ± 5.3	NA	NA	NA	5 years
Ruiz-Tovar et al. 2019 (20). HYT	43.9 ± 10.9 vs. 45 ± 11.3	75% both arms	45.3 ± 3.2 vs. 46.5 ± 3.4	NA	NA	NA	5 years
Salminen et al. 2018 (21). HYT	48.5 ± 9.6 vs. 48.4 ± 9.3	71.9% vs. 67.2%	45.5 ± 6.2 vs. 46.4 ± 5.9	NA	NA	NA	5 years
Schauer et al. 2017 (22)	49 ± 8	66% females	37 ± 3.5	NA	9.5 ± 1.7 vs. 9.3 ± 1.4	NA	5 years
Tang et al. 2016 (23)	36.6 ± 8.0 vs. 40.4 ± 12.3	64.7% vs. 47.4%	38.4 ± 8.6 vs. 37.8 ± 5.6	5.1 ± 4.1 vs. 6.5 ± 4.1	7.4 ± 1.8 vs. 7.4 ± 1.8	116.7 ± 19.2 vs. 113.3 ± 14.5	2 years
Wallenius et al. 2020 (24)	51.9 ± 1.9 vs. 51.2 ± 1.6	55.5% vs. 46.7%	36.9 ± 0.7 vs. 38.6 ± 0.8	6.5 ± 1.1 vs. 5.7 ± 0.6	55.7 ± 2.1 vs. 61.8 ± 3.9	NA	2 years
Wölnerhanssen et al. 2021 (25)	45.9 ± 10.7 vs. 45.3 ± 10.7	71.9% vs. 69.6%	45.6 ± 6.5 vs. 46.4 ± 6.6	NA	7.1 vs. 7	NA	5 years
Yang et al. 2015 (26)	40.4 ± 9.4 vs. 41.4 ± 9.3	71.9% vs. 59.4%	31.8 ± 3.0 vs. 32.3 ± 2.4	4.0 ± 1.7 vs. 4.2 ± 1.9	8.5 ± 1.2 vs. 8.9 ± 1.3	103.0 ± 7.7 vs. 104.5 ± 6.8	3 years
Zhang et al. 2014 (27)	29.3 ± 9.8 vs. 32.2 ± 9.2	62.5% vs. 56.2%	38.5 ± 4.2 vs. 39.3 ± 3.8	NA	NA	NA	5 years
Shivakumar et al. 2018 (28)	39.89 ± 11.75 vs. 42.89 ± 14.02	65% vs. 62%	44.57 ± 7.16 vs. 44.32 ± 7.88	NA	NA	NA	3 years
Navarini et al. 2020 (29)	39.3 ± 12.1	83% women	41.5 ± 5.1	NA	NA	NA	1 year

BMI, body mass index; LRYGB, Roux-en-Y gastric bypass; LSG, laparoscopic sleeve gastrectomy; NA, not applicable.

frontiers | Frontiers in Surgery

TYPE Systematic Review
PUBLISHED 02 December 2022
DOI 10.3389/fsurg.2022.953804

OPEN ACCESS

EDITED BY
Pradeep Chowbey,
Max Healthcare, India

REVIEWED BY
Salman Yousuf Guraya,
College of Medicine University of Sharjah, United Arab Emirates
Mahdieh Golzarand,
Shahid Beheshti University of Medical Sciences, Iran

*CORRESPONDENCE
Hyder Mirghani

Roux-en-Y gastric bypass and laparoscopic sleeve gastrectomy effects on obesity comorbidities: A systematic review and meta-analysis

Salah Alghamdi[1], Hyder Mirghani[2]*, Khalid Alhazmi[3], Amirah M. Alatawi[4], Haneen Brnawi[1], Tariq Alrasheed[2] and Waleed Badoghaish[2]

- 16 studies were included
- LRYGB was equal weight to LSG for
  - Diabetes (P-value = 0.10)
  - OSA (P-value = 0.38)

frontiers | Frontiers in Surgery

TYPE Systematic Review
PUBLISHED 02 December 2022
DOI 10.3389/fsurg.2022.953804

OPEN ACCESS

EDITED BY
Pradeep Chowbey,
Max Healthcare, India

REVIEWED BY
Salman Yousuf Guraya,
College of Medicine University of Sharjah,
United Arab Emirates
Mahdieh Golzarand,
Shahid Beheshti University of Medical Sciences,
Iran

*CORRESPONDENCE
Hyder Mirghani

Roux-en-Y gastric bypass and laparoscopic sleeve gastrectomy effects on obesity comorbidities: A systematic review and meta-analysis

Salah Alghamdi[1], Hyder Mirghani[2]*, Khalid Alhazmi[3], Amirah M. Alatawi[4], Haneen Brnawi[1], Tariq Alrasheed[2] and Waleed Badoghaish[2]

- LRYGB was superior to LSG regarding
  - Hypertension (P-value = 0.009)
  - Dyslipidemia (P= 0.02)
  - GERD (P-value = 0.003).

frontiers | Frontiers in Surgery

TYPE Systematic Review
PUBLISHED 02 December 2022
DOI 10.3389/fsurg.2022.953804

OPEN ACCESS

EDITED BY
Pradeep Chowbey,
Max Healthcare, India

REVIEWED BY
Salman Yousuf Guraya,
College of Medicine University of Sharjah,
United Arab Emirates
Mahdieh Golzarand,
Shahid Beheshti University of Medical Sciences,
Iran

*CORRESPONDENCE
Hyder Mirghani

Roux-en-Y gastric bypass and laparoscopic sleeve gastrectomy effects on obesity comorbidities: A systematic review and meta-analysis

Salah Alghamdi[1], Hyder Mirghani[2]*, Khalid Alhazmi[3], Amirah M. Alatawi[4], Haneen Brnawi[1], Tariq Alrasheed[2] and Waleed Badoghaish[2]

11 studies (N=1,328 participants)

International Journal of Surgery 72 (2019) 216–223

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Review

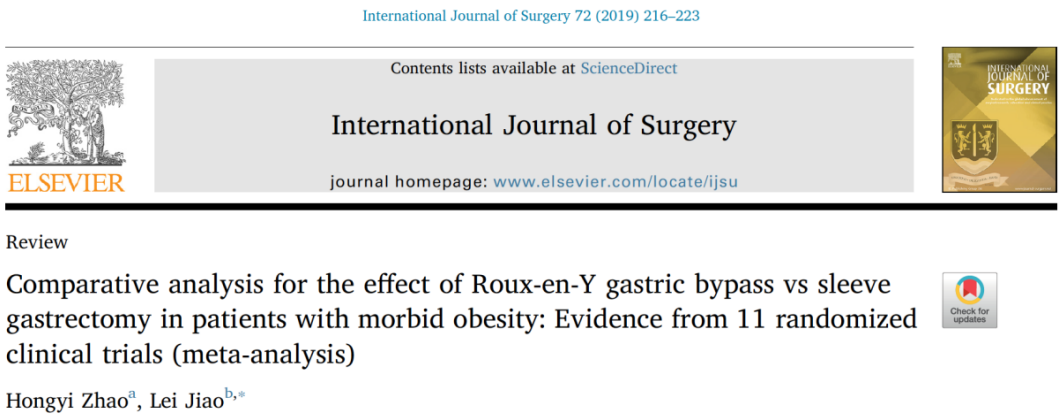
Comparative analysis for the effect of Roux-en-Y gastric bypass vs sleeve gastrectomy in patients with morbid obesity: Evidence from 11 randomized clinical trials (meta-analysis)

Hongyi Zhao[a], Lei Jiao[b,*]

The characteristics of included studies for the analysis of LRYGB versus LSG for weight loss and resolution of co-morbidity.

Study (author/year)	Country	Study design	Sample size	Gender (M/F)	Mean age (range/SD)		BMI(kg/m^2)		Follow-up time (month)	Outcomes
					LRYGB	LSG	LRYGB	LSG		
Kehagias I et al., 2011	Greece	RCT	60	16/44	36.0 (8.4)	33.7 (9.9)	45.8 (3.7)	44.9 (3.4)	36.0	BMI, T2DM, co-morbidities
Keidar A et al., 2013	Israel	parallel un-blinded RCT	37	21/16	51.45 (8.3)	47.7 (11.7)	42.0 (4.8)	42.5 (5.2)	12.0	BMI, T2DM, FBG
Nogues X et al., 2010	Spain	RCT	15	0/15	45.86 (8.6)	49.63 (9.6)	43.1 (3.9)	43.5 (3.2)	12.0	BMI, reoperation
Peterli R et al., 2013	Switzerland	RCT	217	61/156	42.1 (11.2)	43.0 (11.1)	44.2 (5.3)	43.6 (5.3)	12.0	T2DM, co-morbidities, reoperation
Salminen P et al., 2018	Finland	multicenter, multisurgeon, open-label RCT	240	73/167	48.4 (9.3)	48.5 (9.6)	46.4 (5.9)	45.5 (6.2)	60.0	Excessweight loss, resolution of comorbidities, improvement of QoL, all AEs and mortality.
Schauer PR et al., 2014	US	RCT	97	31/66	48.0 (8.45)	47.8 (8.08)	37.1 (3.39)	36.1 (3.91)	36.0	BMI, T2DM, reoperation, LDL
Peterli R et al., 2017	Switzerland	Multicenter RCT	217	61/156	42.1 (11.2)	43.0 (11.1)	44.2 (5.3)	43.6 (5.3)	48.0	weight loss, comorbidities, quality of life, and complications.
Vix M et al., 2013	France	RCT	100	18/82	35.23 (9.37)	35.13 (9.7)	47.09 (5.64)	45.57 (4.79)	12.0	FBG, LDL
Yang J et al., 2015	China	RCT	64	22/42	41.4 (9.3)	40.4 (9.4)	32.3 (2.4)	31.8 (3)	36.0	BMI, T2DM, HTN, HLP
Zhang Y et al., 2014	China	RCT	64	26/38	32.2 (9.2)	29.3 (9.8)	39.3 (3.8)	38.5 (4.2)	60.0	BMI, T2DM, co-morbidities
Peterli R et al., 2018		Multicenter RCT	217	61/156	42.1 (11.2)	43.0 (11.1)	44.2 (5.3)	43.6 (5.3)	60.0	weight loss, changes in comorbidities, increase in QoL and AEs.

- No significant difference in excess weight loss between LRYGB and LSG, (P = 0.36).
- No significant difference in midterm and long-term weight loss between the comparative groups.
- No significant difference was found in T2DM resolution
- The pooled results indicate that patients receiving LSG experienced fewer postoperative complications and reoperation rate, (P = 0.01)



International Journal of Surgery 72 (2019) 216–223

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Review

Comparative analysis for the effect of Roux-en-Y gastric bypass vs sleeve gastrectomy in patients with morbid obesity: Evidence from 11 randomized clinical trials (meta-analysis)

Hongyi Zhao[a], Lei Jiao[b,*]

- LRYGB may be superior to LSG in:
  - Dyslipidemia
  - Hypertension
  - GERD remission.

International Journal of Surgery 72 (2019) 216–223

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Review

Comparative analysis for the effect of Roux-en-Y gastric bypass vs sleeve gastrectomy in patients with morbid obesity: Evidence from 11 randomized clinical trials (meta-analysis)

Hongyi Zhao[a], Lei Jiao[b,*]

HIGHLIGHTS

- Included six meta-analyses
- RYGB was more efficient in term of weight loss outcomes in older adults.
- RYGB reduced the risk of remission of TIIDM
- Complications were more in the older adults undergoing LSG than RYGB

Systematic Review and/or Meta-analysis

INTERNATIONAL JOURNAL OF SURGERY

OPEN

Comparing the safety and efficacy of sleeve gastrectomy versus Roux-en-Y gastric bypass in elderly (> 60 years) with severe obesity: an umbrella systematic review and meta-analysis

Mohammad Kermansaravi, MD, FIFSO[a,b], Antonio Vitiello[d], Rohollah Valizadeh[c,*], Shahab Shahabi Shahmiri[a,b], Mario Musella[d,*]

- 12 records from 10 different RCTs were finally included.
- 705 patients with follow-up from 1 to 5 years
- The remission rate of T2DM at 1 year was higher
  - RYGB (57%)
  - SG (47%)
  - P = .047
- Among studies with 2-5 year follow-up, there was no difference in remission rates
    - RYGB (50%)
    - SG (46%)
    - P = .34

Received: 20 December 2019 | Revised: 22 January 2020 | Accepted: 28 January 2020
DOI: 10.1111/obr.13011

BARIATRIC SURGERY/OBESITY COMORBIDITY

OBESITY Reviews WILEY

Comparison of the effect of Roux-en-Y gastric bypass and sleeve gastrectomy on remission of type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials

Heidi Borgeraas[1] | Dag Hofsø[1] | Jens Kristoffer Hertel[1] | Jøran Hjelmesæth[1,2]

28 articles.

Table 1 Characteristics of studies included in the meta-analysis

Author, year	Country	No. of participants		Follow-up (year)	No. of remaining		Comorbidities remission (without medication)	Study type
		LSG	LRYGB		LSG	LRYGB		
Abbatini, 2010	Italy	20	16	3	20	16	FPG < 126 mg/dl, HbA1c < 6.5%	Retrospective
Ahmed, 2018	USA	59	57	7	27	26	NA	Prospective
Alexandrou, 2014	Greece	40	55	4	40	55	NA	Prospective
Dakour Aridi, 2018	Lebanon	400	175	5	87	118	NA	Retrospective
Boza, 2012	Chile	811	786	3	811	786	FPG < 126 mg/dl, HbA1c < 6.5%	Retrospective
Carandina, 2014	France	34	74	4	34	74	NA	Retrospective
Dogan, 2015	Netherlands	255	430	5	245	245	NA	Retrospective
Du, 2016	China	63	63	3	60	59	FPG < 5.6 mmol/l, HbA1c < 6%/BP < 120/80 mmHg	Retrospective
Climent, 2018	Spain	48	103	5	48	103	NA	Retrospective
Gonzalez-Heredia, 2016	USA	77	12	3	30	8	NA	Retrospective
Ignat, 2017	France	55	45	5	41	32	NA	RCT
Jammu, 2016	India	339	295	5	97	143	NA	Prospective
Jimenez, 2012	Spain	55	98	3	55	98	FPG < 126 mg/dl, HbA1c < 6.5% for at least 1 year	Prospective
Kim, 2019	Singapore	256	39	3	71	10	NA	Retrospective
Kaseja, 2014	Poland	33	41	3	33	41	NA	Prospective
Lager, 2018	USA	334	380	4	226	272	HbA1c < 6.5%/BP < 120/80 mmHg	Retrospective
Lee, 2015	China	519	519	5	116	218	NA	Retrospective
Leyba, 2014	Venezuela	42	75	5	27	47	HbA1c < 6%	Prospective
Perrone, 2017	Italy	162	142	5	162	142	NA	Retrospective
Peterli, 2018	Switzerland	112	113	5	101	104	FPG < 100 mg/dl, HbA1c < 6.0% at least 1 year	RCT
Rondelli, 2017	Italy	280	301	3	259	282	NA	Retrospective
Ruiz-Tovar, 2019	Spain	200	200	5	182	184	FPG < 110 mg/dl, HbA1c < 6.5%/BP < 135/85 mmHg/FPT < 200 mg/dl, TC < 200 mg/dl, HDL > 40 mg/dl	RCT
Salminen, 2018	Finland	121	119	5	98	95	FPG < 100 mg/dl, HbA1c < 6.0%/LDL < 115.8 mg/dl	RCT
Sepulveda, 2018	Chile	57	55	3	41	35	FPG < 100 mg/dl, HbA1c < 6.0%	Retrospective
Vidal, 2013	Spain	114	135	4	91	108	NA	Retrospective
Yang, 2015	China	32	32	3	28	27	HbA1c < 6.0%	RCT
Zhang, 2014	China	32	32	5	26	28	NA	RCT
Schauer, 2017	USA	47	49	5	47	49	HbA1c < 6.5%	RCT

LSG laparoscopic sleeve gastrectomy; *LRYGB* laparoscopic Roux-en-Y gastric bypass; *NA* no available; *FPG* fasting plasma glucose; *HbA1c* glycosylated hemoglobin; *BP* blood pressure; *FPT* fasting plasma triglycerides; *TC* total cholesterol; *LDL* low-density lipoprotein; *HDL* high-density lipoprotein; *RCT* Randomized clinical trial

Gu *et al. BMC Surgery* (2020) 20:30
https://doi.org/10.1186/s12893-020-00695-x

BMC Surgery

RESEARCH ARTICLE Open Access

A meta-analysis of the medium- and long-term effects of laparoscopic sleeve gastrectomy and laparoscopic Roux-en-Y gastric bypass

Lihu Gu[1†], Xiaojing Huang[2†], Shengnan Li[2], Danyi Mao[3], Zefeng Shen[4], Parikshit Asutosh Khadaroo[5], Derry Minyao Ng[6] and Ping Chen[1*]

Gu *et al. BMC Surgery* (2020) 20:30
https://doi.org/10.1186/s12893-020-00695-x

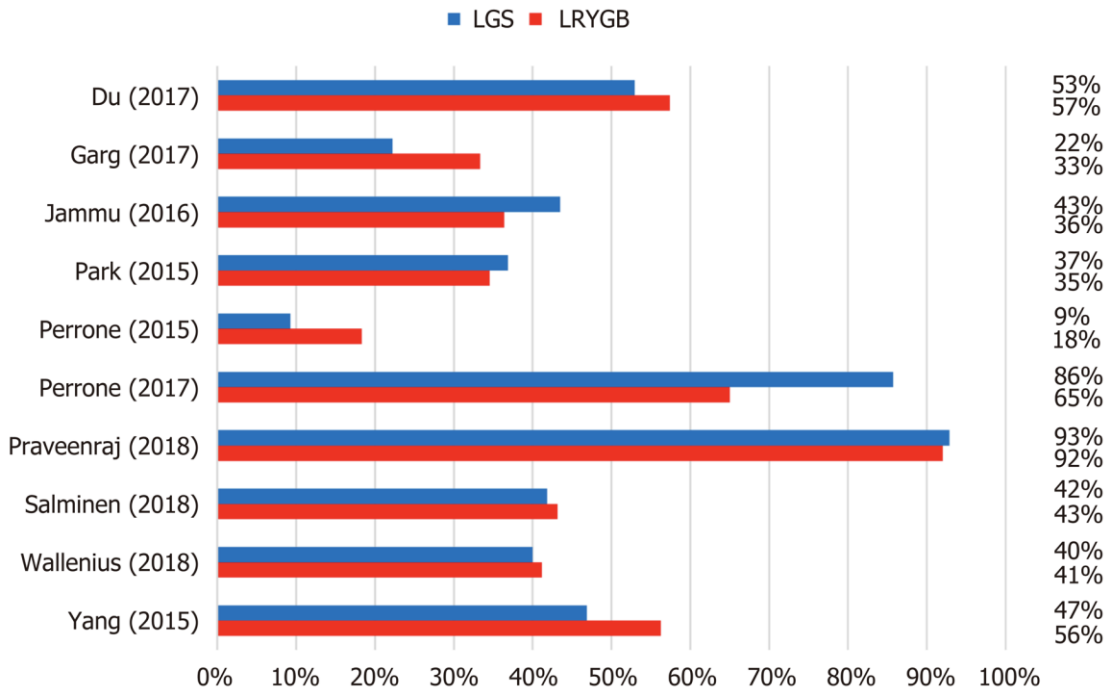
BMC Surgery

RESEARCH ARTICLE Open Access

A meta-analysis of the medium- and long-term effects of laparoscopic sleeve gastrectomy and laparoscopic Roux-en-Y gastric bypass

Lihu Gu[1†], Xiaojing Huang[2†], Shengnan Li[2], Danyi Mao[3], Zefeng Shen[4], Parikshit Asutosh Khadaroo[5], Derry Minyao Ng[6] and Ping Chen[1*]

- This study included retrospective studies that reduced the overall quality of evidence.
- 9038 patients
  - 4597, LSG
  - 4441, LRYGB
- The remission rate of TIIDM in the LRYGB group was superior to that in the LSG group at the 3-years follow-up.
- Five-year follow-up results showed that LRYGB had an advantage over LSG for the
  - %EWL
  - Remission of T2DM
  - Hypertension
  - Dyslipidemia
  - Abnormally low-density lipoprotein.



World Journal of Gastroenterology

Submit a Manuscript: https://www.f6publishing.com

World J Gastroenterol 2020 February 28; 26(8): 865-876

DOI: 10.3748/wjg.v26.i8.865

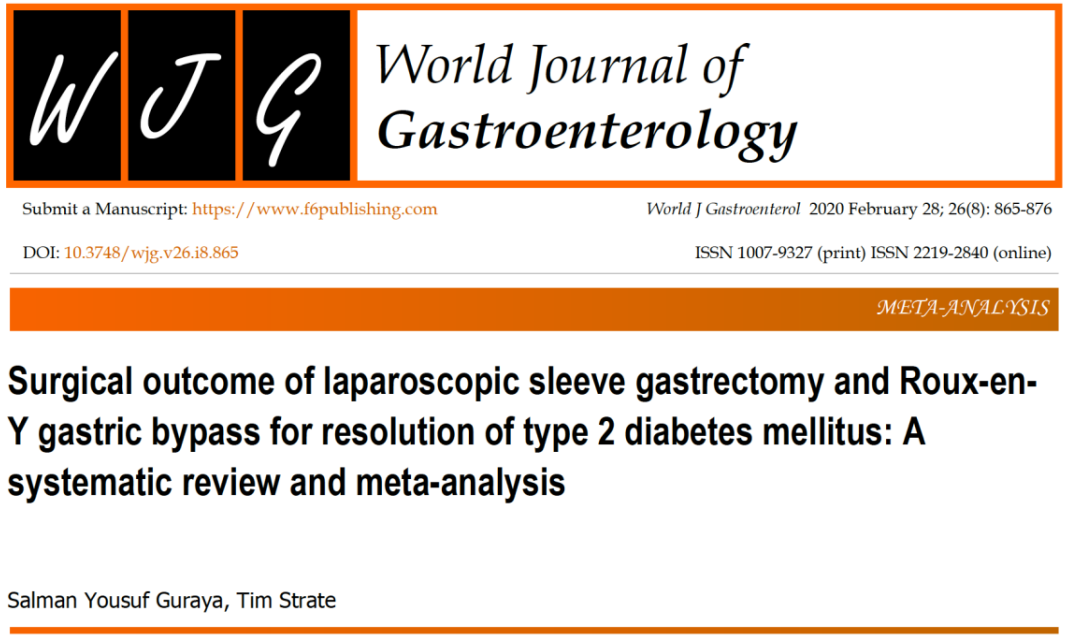
ISSN 1007-9327 (print) ISSN 2219-2840 (online)

META-ANALYSIS

Surgical outcome of laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass for resolution of type 2 diabetes mellitus: A systematic review and meta-analysis

Salman Yousuf Guraya, Tim Strate

- Nine studies
- Found insignificant differences for T2DM resolution by LRYGB and LSG, (P = 0.71).
- Additionally, subset analyses for T2DM resolution showed insignificant differences after
  - 24 mo (P = 0.87),
  - 36 mo (P = 0.81)
  - 60 mo (P = 0.19)
- This study reports a T2DM remission rate of 82.3% by LRYGB and 80.7% by LSG.



World Journal of Gastroenterology

Submit a Manuscript: https://www.f6publishing.com

World J Gastroenterol 2020 February 28; 26(8): 865-876

DOI: 10.3748/wjg.v26.i8.865

ISSN 1007-9327 (print) ISSN 2219-2840 (online)

META-ANALYSIS

Surgical outcome of laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass for resolution of type 2 diabetes mellitus: A systematic review and meta-analysis

Salman Yousuf Guraya, Tim Strate

Why the LSG?

LSG

- Besides weight loss results and treatment of TIIDM, LSG has other advantages compared to RYGB
  - Preserving bowel anatomy
  - Technically easier
  - Less minor complications
  - No risk of internal herniation
  - Good HRQoL
  - Less dumping syndrome
  - Less vitamin deficiencies

Conclusions

- Proper preoperative assessment of GERD.
- Hiatus hernia need to be repaired?
- Follow proper technical steps in SG.
- RYGB is better option for patients with GERD than SG.