Robotic vs Laparoscopic Sleeve Gastrectomy in Patients with BMI > 40 kg/m² (Class ≥ III Obesity): A Systematic Review and Meta-Analysis

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ABSTRACT

Short Abstract

Background: Whether robotic sleeve gastrectomy (RSG) improves outcomes over laparoscopic sleeve gastrectomy (LSG) in **BMI ≥ 40 kg/m²** is uncertain.

Methods: PRISMA/Cochrane systematic review of primary studies comparing RSG vs LSG in Class ≥ III obesity. Random-effects meta-analysis (MD/OR; 95% CIs), I², leave-one-out; ROBINS-I risk of bias.

Results: 7 studies; 63,286 patients (RSG = 5,314; LSG = 57,972). RSG had **longer operative time** (MD 27.47 min; I²=0%; p<0.00001). No differences in length of stay (MD 0.06 days; I²=81%; p=0.63), readmission (OR 1.14; I²=41%; p=0.64), conversion (OR 0.48; I²=0%; p=0.24), SSI (OR 0.32; I²=0%; p=0.18), or bleeding (OR 0.86; I²=0%; p=0.50). Sensitivity analyses did not alter conclusions.

Conclusions: In Class ≥ III obesity, **RSG is associated with longer operative time without peri-operative advantages**over LSG. Given limited high-quality data and sparse reporting of weight-loss and mortality, further prospective studies are needed before recommending RSG over LSG.

CONTACT

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INTRODUCTION

Sleeve gastrectomy (SG) is the most common bariatric operation. Whether **robotic SG (RSG)** offers advantages over **laparoscopic SG (LSG)** in **Class ≥ III obesity (BMI ≥ 40 kg/m²)** remains unclear, as most prior syntheses mixed BMI ranges and reported heterogeneous endpoints. We focused exclusively on Class III+ patients to compare peri-operative outcomes.

METHODS AND MATERIALS

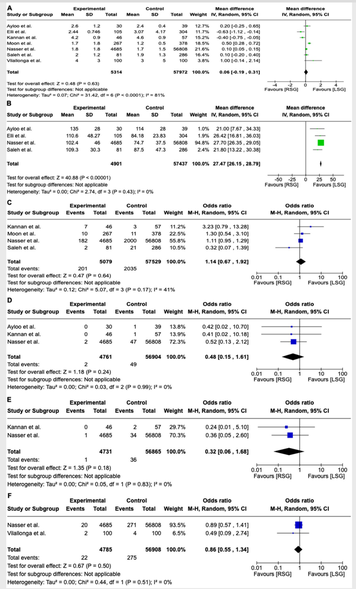
PRISMA/Cochrane systematic review of primary prospective/retrospective studies comparing **RSG vs LSG** in adults with **BMI ≥ 40**. Outcomes: operative time, length of stay (LOS), readmission, conversion, surgical-site infection (SSI), bleeding (weight-loss, mortality, morbidity planned but often unavailable). Random-effects models (MD/OR with 95% CIs); I² for heterogeneity; leave-one-out sensitivity analyses. Risk of bias: **ROBINS-I**.

RESULTS

11 studies identified (n = 63,512; RSG = 5,417; LSG = 58,095); **7 studies** contributed data to meta-analysis (**n = 63,286; RSG = 5,314; LSG = 57,972**).

- **Operative time: longer with RSG** (MD **27.47 min**, 95%CI 26.15–28.79; **I²=0%**; p < 0.00001).
- **LOS:** no difference (MD **0.06 days**, −0.19–0.31; **I²=81%**; p = 0.63).
- **Readmission:** no difference (OR **1.14**, 0.67–1.92; **I²=41%**; p = 0.64).
- **Conversion:** no difference (OR **0.48**, 0.15–1.61; **I²=0%**; p = 0.24).
- **SSI:** no difference (OR **0.32**, 0.06–1.68; **I²=0%**; p = 0.18).
- **Bleeding:** no difference (OR **0.86**, 0.55–1.34; **I²=0%**; p = 0.50).

Sensitivity: findings robust; heterogeneity for readmission fell (to ~12%) when one study was excluded; pooled effects unchanged.



DISCUSSION

In **Class ≥ III obesity**, **RSG confers no measurable peri-operative benefit over LSG** while requiring **~27 minutes longer** operative time. Other key clinical endpoints (LOS, readmission, conversion, SSI, bleeding) are comparable. may be reserved based on surgeon expertise, ergonomics, or program resources rather than expected peri-operative gains.

CONCLUSIONS

Evidence quality is limited by retrospective designs, heterogeneous reporting, and the **lack of weight-loss, mortality, and overall morbidity data**—critical outcomes for bariatric decision-making. Future **prospective/ randomized** studies should (i) report **%EWL/BMI change at 6–12 months**, (ii) include **cost** and **complication** profiles, and (iii) analyze very high BMI subgroups (Class IV–V). Until then, LSG remains the pragmatic default; RSG