

Single-port robotic versus single-incision laparoscopic cholecystectomy in patients with BMI ≥ 25 kg/m²: a systematic review and meta-analysis

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ABSTRACT

This PRISMA-based meta-analysis compared **single-port robotic, virtual single-incision, and conventional laparoscopic cholecystectomy** in overweight and obese patients (BMI ≥ 25 kg/m²). Pooled data from eligible studies showed **no significant differences** in overall complications or conversion rates among approaches. **Robotic techniques** demonstrated **shorter hospital stay** and **less blood loss**, while operative time was **slightly longer**. Sensitivity analyses confirmed the stability of results. **Conclusion:** Robotic and single-incision approaches are **safe and feasible** alternatives to conventional laparoscopy in overweight and obese patients, offering **enhanced recovery without compromising safety**.

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INTRODUCTION

Overweight/obese patients (BMI ≥ 25 kg/m²) frequently require cholecystectomy. Evidence comparing **single-port robotic cholecystectomy (SPRC)** versus **single-incision laparoscopy (SILC)** in this group is limited.

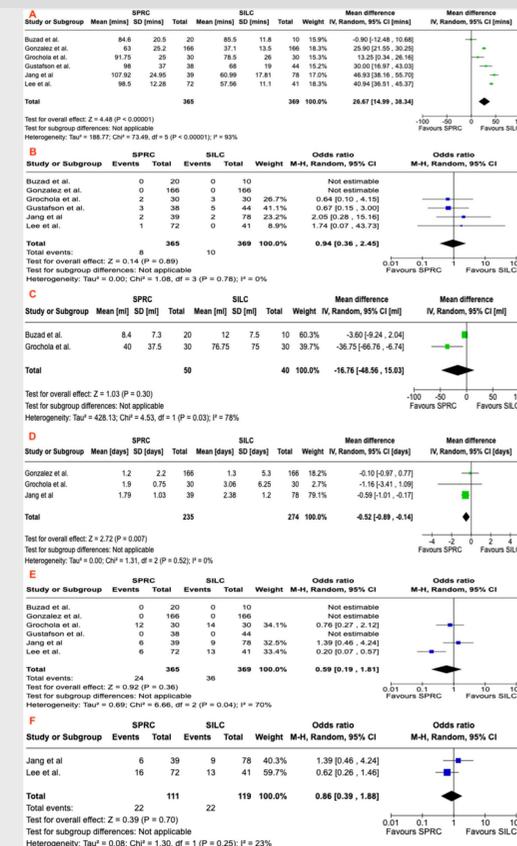
METHODS AND MATERIALS

PRISMA meta-analysis (PROSPERO CRD42024602514). PubMed/Scopus/Cochrane to 20 Oct 2024. Comparative primary studies of **SPRC vs SILC** in adults with BMI ≥ 25 kg/m². Random-effects models: WMD/OR with 95% CIs; I² for heterogeneity; sensitivity analyses.

RESULTS

6 studies; n=734 (SPRC 365; SILC 369).

- **Operative time:** longer with SPRC (+26.67 min, 95% CI 14.99–38.34; I²=93%; p<0.00001).
 - **Length of stay:** shorter with SPRC (–0.52 days, 95% CI –0.89 to –0.14; I²=0%; p=0.007).
 - **Conversion to multi-port:** OR 0.94 (0.36–2.45; I²=0%; p=0.89).
 - **Blood loss:** WMD –16.76 mL (–48.56 to 15.03; I²=78%; p=0.30).
 - **Intra-op complications:** OR 0.59 (0.19–1.81; I²=70%; p=0.36).
 - **Bile leak (2 studies):** OR 0.86 (0.39–1.88; I²=23%; p=0.70).
- Sensitivity: operative time result robust; one study drove heterogeneity for intra-op complications (effect remained non-significant).



DISCUSSION

In patients with **BMI ≥ 25 kg/m²**, **SPRC** yields **shorter hospitalization** but **longer operative time** versus **SILC**, with **no differences** in conversion, blood loss, intra-operative complications, or bile leak.

CONCLUSIONS

SPRC appears **safe and feasible**; decisions may hinge on OR scheduling, expertise, and resources. Future multicenter RCTs should assess long-term outcomes (e.g., trocar-site hernia) and cost-effectiveness.