

ROBOTIC VERSUS LAPAROSCOPIC STAPLERS IN ROBOTIC BARIATRIC PROCEDURES: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CLINICAL AND ECONOMIC OUTCOMES

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Introduction

Robotic surgery has expanded rapidly in the U.S., with adoption in bariatric procedures growing from 5.8% in 2015 to nearly 30% in 2022. However, costs remain up to 1.5 times more expensive than laparoscopy. To optimize resources, many centers now use non-robotic (laparoscopic) staplers (LS) during robotic cases. The surgical community lacked a high-level evidence synthesis comparing the clinical and economic impact of this strategy.

Objectives

- Primary Goal:** Evaluate the comparative effectiveness of Robotic vs. Laparoscopic staplers in bariatric procedures.
- Specific Outcomes:** Assess operative time, economic impact (total and stapling-specific costs), and early postoperative complications (leaks and bleeding).

Methods

- Study Design & Protocol:** Systematic review and meta-analysis following PRISMA 2020 guidelines.
- PROSPERO ID:** CRD420251065221.
- Search Strategy:** Databases: PubMed, Scopus, Web of Science, and ScienceDirect.
- Timeline:** Inception through May 2025.
- Selection Criteria:**
 - Inclusion:** Adult patients (age 18 years) undergoing robotic bariatric procedures with direct comparison between Robotic (RS) and Laparoscopic (LS) staplers.
 - Exclusion:** Non-bariatric surgery, case reports, editorials, and studies without a direct comparator.

Results

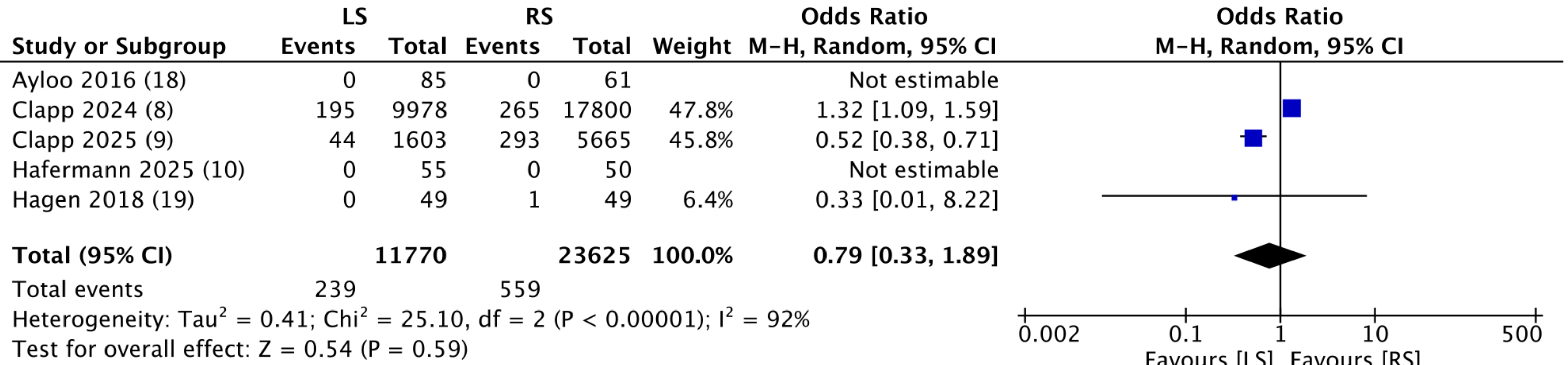


Figure 1: Risk of complications and adverse events with LS versus RS.

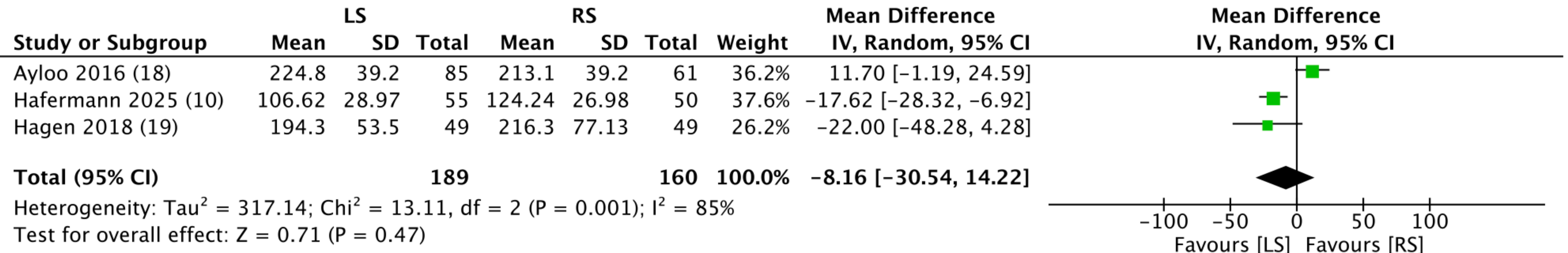


Figure 2: Operative time in patients undergoing gastric bypass with LS or RS.

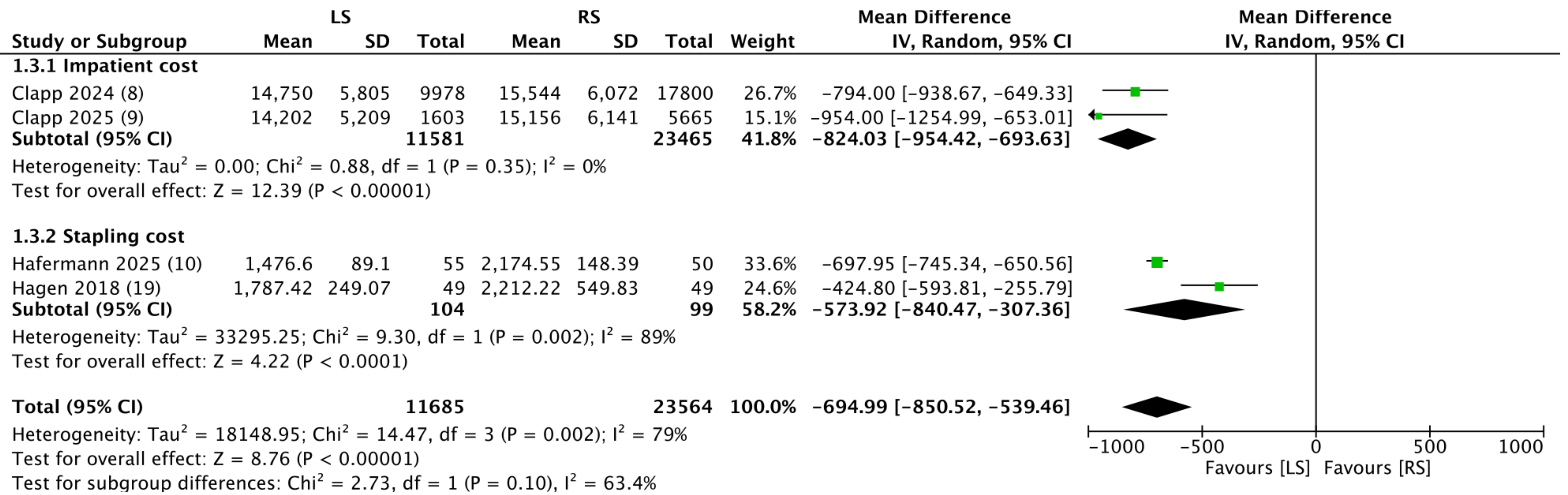


Figure 3: Cost associated with LS and RS.

Complications

No significant difference in leaks (OR 0.79, p=0.59) or bleeding complications. Events: 239 in LS group vs. 559 in RS group. The study population was RS= 23,625 vs. LS= 11,770.

Operative time

No significant difference in total operative time (MD -8.16 min; 95% CI -30.54 to 14.22; p=0.47). Two studies favored LS with shorter times (up to -22 min), while one favored RS.

Economic impact

LS savings: ~\$700
per patient on average

Index Hospitalization: Reduced by ~\$824 USD per case. Stapling Devices: Reduced by ~\$574 USD per case.

Conclusions

LS is a high-value alternative that achieves cost-optimization without compromising outcomes.

- LS matches RS in short-term safety and efficiency.
- Meaningful cost reductions achieved per case.
- Further randomized trials are warranted to confirm long-term benefits.

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