

Single-incision versus conventional laparoscopic appendectomy in adults: a systematic review and meta-analysis of randomized controlled trials

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ABSTRACT

Background: Evidence comparing SILA vs CLA in adults is confounded by surgeon experience and pediatric inclusion.

Methods: PRISMA/Cochrane systematic review and random-effects meta-analysis of adult RCTs (to Nov 7, 2024) with experienced surgeons; outcomes: LOS, operative time, postoperative complications, wound infection; RoB 2; sensitivity analyses. PROSPERO CRD42024612596.

Results: 4 RCTs, 408 patients (SILA 202; CLA 206). No significant differences for LOS (WMD 0.07 days; I²=0%), operative time (WMD 4.49 min; I²=89%), complications (OR 1.32; I²=0%), or wound infection (OR 1.14; I²=0%). Leave-one-out showed operative time favored CLA when Kim et al. was excluded; other findings were stable.

Conclusions: In adults with experienced surgeons, SILA and CLA are equivalent for short-term clinical outcomes. Further RCTs should assess cosmesis, pain, and long-term port-site hernia to refine patient-centered choice.

INTRODUCTION

Conventional three-port laparoscopic appendectomy (CLA) is standard for acute appendicitis. Single-incision laparoscopic appendectomy (SILA) may improve cosmesis but is technically demanding. Prior meta-analyses often mixed adults with pediatrics and did not control for surgeon experience—both key confounders. We synthesize **adult-only RCTs** and explicitly account for experienced surgeons.

METHODS AND MATERIALS

PRISMA/Cochrane-guided systematic review and random-effects meta-analysis (PROSPERO CRD42024612596).

Databases: PubMed, Scopus, Cochrane through **Nov 7, 2024**. Inclusion: RCTs, adults (≥18y), **SILA vs CLA**, procedures by experienced surgeons. Outcomes: length of stay (LOS), operative duration, postoperative complications, and wound infections. Effect sizes: WMD/OR with 95% CIs; I² for heterogeneity. Risk of bias: **RoB 2**.

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RESULTS

Short Results

4 RCTs; n=408 (SILA 202; CLA 206).

- LOS:** no difference (WMD **0.07** days, 95%CI -0.32–0.47; I²=0%, p=0.72).
- Operative duration:** no difference (WMD **4.49** min, -7.02–16.00; I²=89%, p=0.44).
- Postop complications:** no difference (OR **1.32**, 0.69–2.51; I²=0%, p=0.40).
- Wound infection:** no difference (OR **1.14**, 0.46–2.83; I²=0%, p=0.78).
- Sensitivity:** results robust overall; **operative time became significant (favoring CLA)** when **Kim et al.** was excluded; fixed-effect analyses did not materially change other conclusions.

DISCUSSION

Among adults operated on by experienced surgeons, **SILA and CLA provide comparable short-term outcomes** for acute appendicitis (LOS, time, complications, SSI). Any potential time penalty for SILA appears study-dependent.

CONCLUSIONS

Given single-incision access may raise trocar-site hernia risk in other SILS settings, longer-term surveillance is prudent. Future trials should prioritize **patient-reported outcomes** (pain, cosmesis, satisfaction), standardized technique reporting, and hernia follow-up to guide shared decision-making.

