COMPARISON OF ROBOTIC VERSUS LAPAROSCOPIC APPENDECTOMY: DEMOGRAPHICS, PERIOPERATIVE CHARACTERISTICS, AND OUTCOMES FROM ACS-NSQIP

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Introduction

- Acute appendicitis is a leading surgical emergency, with laparoscopic appendectomy as the standard of care.
- Robotic appendectomy has emerged as an alternative approach; however, comparative evidence remains limited.
- We conducted a multicenter national database analysis comparing robotic and laparoscopic appendectomy.

Methods

- Data obtained from ACS-NSQIP database from January 1, 2022, to December 31, 2023.
- Patients ≥18 years undergoing laparoscopic appendectomy were identified using CPT code 44970 with the ACS-NSQIP variable for robotic assistance. Cases were stratified into robotic and laparoscopic cohorts.
- Primary outcomes included conversion to open surgery, SSI, and operative time. Secondary outcomes were length of stay and mortality. 30-day postoperative events were assessed.
- 1:1 Propensity score matching was conducted to control for baseline differences.

Results

- Among 95,824 patients who met inclusion criteria, 1.3% underwent robotic and 98.7% laparoscopic appendectomy.
- After 1:1 propensity score matching, 1,212 matched pairs (N=2,424) were analyzed.
- Baseline characteristics included a median age of 47 years, 49% male, and 31% with ASA ≥ III; no significant differences were observed between groups.
- Organ/space SSI occurred in 1.9% of robotic cases compared with 3.9% of laparoscopic cases. Superficial SSI (0.5% vs. 0.5%) and deep incisional SSI (0.2% vs. 0.1%) were infrequent and comparable between groups.
- Operative time was longer in the robotic cohort (median 64.5 vs. 47 minutes).
- Conversion to open surgery, length of stay, readmissions, and mortality were similar between the two approaches.

Variable	Total (n=2,424)	Laparoscopic (n=1,212)	Robotic (n=1,212)	p-value
Superficial SSI	0.5%	0.5%	0.5%	1
Deep incisional SSI	0.1%	0.1%	0.2%	1
Organ/Space SSI	2.9%	3.9%	1.9%	0.005
Conversion to open	0.7%	0.7%	0.8%	0.814
Operative Time, median (IQR), min	55 (38–78)	47 (33–66)	64.5 (45–91)	<0.001
Length of Stay, median (IQR), days	1 (0–2)	1 (1–2)	1 (0–2)	<0.001
Readmission	3.6%	4.0%	3.2%	0.328
Return to OR	0.9%	1.0%	0.7%	0.662
Mortality	0.1%	0.2%	0%	0.5

Discussion

- Robotic appendectomy demonstrated a lower rate of organ/space SSI compared with laparoscopy (1.9% vs. 3.9%), suggesting that enhanced visualization and instrument precision may reduce infectious complications.
- Operative time was longer in the robotic cohort (median 64.5 vs. 47 minutes), consistent with known setup time and learning curve associated with robotic surgery.
- Conversion to open surgery, length of stay, readmissions, and mortality were comparable between groups, supporting the perioperative safety of the robotic approach.
- These population-level findings from over 2,400 propensity score-matched patients corroborate prior single-center studies and strengthen the evidence base for robotic appendectomy.

Conclusions

- Robotic appendectomy is a safe and feasible alternative to laparoscopic appendectomy, with lower organ/space SSI rates but longer operative times.
- The extended operative duration and potential cost implications warrant further investigation before broader adoption in emergency surgical settings.