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Comparative Analysis Of Clinical Outcomes Between Total Intracorporeal Versus Extracorporeal Anastomosis In Robotic Left-sided And Rectal Colectomies

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Introduction

- **Minimally invasive colorectal surgery reduces complications, pain, and recovery time compared to open procedures.**
- **Anastomosis can be performed:**
  - **Extracorporeally (ECA): outside the abdominal cavity**
  - **Intracorporeally (ICA): within the abdominal cavity**
- **Studies of right-sided colectomies show ICA results in smaller incisions, faster bowel recovery, and shorter hospital stays without increased complications.incisions, faster bowel recovery, and shorter hospital stays without increas**
- **Left-sided colectomies are more technically demanding, and data comparing robotic ICA vs. ECA are limited.**
- **Our institution historically performed ECA, requiring larger incisions and greater bowel manipulation.incisions and greater bowe**
- **We transitioned to robotic ICA to reduce bowel handling and postoperative morbidity.**
- **Hypothesis: Robotic intracorporeal anastomosis in left-sided colectomies decreases postoperative length of stay while maintaining comparable anastomotic leak and complication rates.**
- **Outcomes from 16 months pre- and post-transition were analyzed.**

Methods

- **Design:** Retrospective cohort study at *Spectrum Health/Corewell Health West*.
- **Population:** Adults undergoing **robotic left colectomy, sigmoidectomy, or low anterior resection** from *Oct 2022–Mar 2024*.
- **dentification:** Cases selected via CPT codes; final cohort confirmed by chart review.
- **Data Source:** Electronic medical records.
- **Variables Collected:**
  - **Demographics:** Age, sex, BMI, zip code, ADI, **Charlson Comorbidity Index (CCI)**.
  - **Surgical:** Surgeon, indication, operative time, blood loss, ostomy creation, anastomosis type (ICA vs ECA), specimen site, infection, contamination.
  - **Postoperative:** Length of stay, ICU admission, leak, infection, ileus, hemorrhage, 30-day readmission, major complications (MI, stroke, DVT, PE, pneumonia).
  - **Pain control:** Measured using **morphine milligram equivalents (MME) per day**.

Results

- **Patient cohort:** 390 met inclusion criteria (297 ECA, 93 TICA) across 6 surgeons. After **propensity score matching**, 88 patients per group were analyzed.
- **Demographics:** No significant differences in age, sex, race, BMI, Charlson Comorbidity Index, or Area Deprivation Index.

- **Intraoperative outcomes:**
  - **Estimated blood loss:** Lower in TICA (30 mL vs 50 mL; $p < 0.0001$).
  - **Ostomy creation:** More frequent in ECA (19.5% vs 9.1%; $p = 0.05$).
  - **Extraction site:** TICA predominantly Pfannenstiel (81.6%) vs ECA midline (85.2%; $p < 0.0001$).
  - No difference in operative time, surgical indication, intra-abdominal infection, or feculent contamination.

- **Postoperative outcomes:**
  - **Length of stay:** Shorter for TICA (75.5 h vs 93.5 h; $p = 0.02$), 19.2% reduction after adjusting for demographics.
  - **Pain control:** TICA used less MME/day (98.8 mg vs 167.5 mg; $p = 0.02$), 31.5% reduction after adjustment.
  - **Safety outcomes:** No differences in ICU admission, anastomotic leak, surgical site infection, ileus, reintubation, or 30-day readmission.

Overall, TICA demonstrated improved recovery metrics without increased complications.

Conclusions

- **Robotic left-sided intracorporeal anastomosis (TICA)** compared to extracorporeal anastomosis (ECA) is associated with **shorter hospital length of stay**, **reduced postoperative opioid use**, and **lower rates of ostomy creation**.
- These results suggest that TICA offers meaningful **perioperative benefits** for patients undergoing left-sided colectomies and proctectomies, while **maintaining similar rates of 30-day postoperative complications** including anastomotic leak, ICU admission, and readmission.anastomotic leak, ICU admissi
- The findings reinforce the role of TICA in improving recovery and minimizing morbidity without compromising safety.
- While this retrospective study demonstrates promising outcomes, **prospective, randomized controlled trials** are needed to more definitively compare TICA and ECA, establish best practice guidelines, and evaluate long-term functional and quality-of-life outcomes.

References

1. 1. Cleary RK, Silviera M, Reidy TJ, et al. Intracorporeal and extracorporeal anastomosis for robotic-assisted and laparoscopic right colectomy: short-term outcomes of a multi-center prospective trial. Surg Endosc. 2022;36(6):4349-4358. doi:10.1007/s00464-021-08780-9
2. 2. Al Natour RH, Obias V, Albright J, et al. A propensity score matched comparison of intracorporeal and extracorporeal techniques for robotic-assisted sigmoidectomy in an enhanced recovery pathway. J Robot Surg. 2019;13(5):649-656. doi:10.1007/s11701-018-00910-1

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