

# Randomized Control Trial: Comparison Between Laparoscopic Versus Open Right Hemicolectomy

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**Abstract:** ***Background:** Advancements in colorectal surgery have introduced laparoscopic techniques as a minimally invasive alternative to traditional open surgery for right hemicolectomy. While laparoscopic surgery offers benefits such as reduced blood loss, shorter hospital stays, and improved cosmetic outcomes, it remains technically demanding, particularly for advanced malignancies. This study compares the short - term outcomes of laparoscopic versus open right hemicolectomy. **Aim:** To evaluate and compare laparoscopic and open right hemicolectomy in terms of operative time, oncological clearance, cosmetic outcomes, hospital stay, early complications, and short - term recurrence. **Methods:** A prospective randomized control trial was conducted at S. P. Medical College and P. B. M. Hospital, Bikaner, over 19 months. A total of 46 patients were randomized into two groups: Group A (laparoscopic, 23 patients) and Group B (open surgery, 23 patients). Data were collected on demographics, clinical presentations, operative metrics, and postoperative outcomes. Standardized protocols were followed, and patients were monitored for 30 - day complications and short - term recurrence. **Results:** Laparoscopic surgery demonstrated significantly shorter hospital stays (7.69 vs.13.35 days,  $p=0.0001$ ), reduced blood loss (106.25 vs.369.13 ml,  $p=0.0001$ ), shorter incision lengths (7.13 vs.15.65 cm,  $p=0.0001$ ), and fewer complications (0% vs.34.78% wound infections,  $p=0.0001$ ). However, laparoscopic procedures required longer operative times (210 vs.152.61 minutes,  $p=0.0001$ ). Oncological clearance, including lymph nodes harvested, was comparable between groups. Advanced - stage tumors (T4) were managed exclusively via open surgery due to technical challenges with laparoscopic techniques. **Conclusion:** Laparoscopic right hemicolectomy offers substantial benefits over open surgery, including faster recovery, better cosmetic outcomes, and fewer complications, making it a preferable choice for benign conditions and early - stage malignancies. Open surgery remains crucial for advanced malignancies and cases requiring conversion. Enhanced surgical expertise and advanced equipment are essential for optimizing laparoscopic outcomes.*

**Keywords:** Right hemicolectomy, laparoscopic surgery, open surgery, colorectal cancer, minimally invasive surgery, oncological outcomes.

## 1. Introduction

The field of colorectal surgery has witnessed remarkable advancements, particularly with the emergence of minimally invasive techniques. Laparoscopic surgery, a key innovation, has been widely adopted as a viable alternative to traditional open surgery. Right hemicolectomy, a surgical procedure commonly performed for conditions like carcinoma of the cecum, ascending colon, hepatic flexure, Crohn's disease, and other benign or malignant conditions of the right colon, is now approached through laparoscopic or open techniques. [1-2]

Laparoscopic right hemicolectomy involves making small incisions, using a laparoscope for visualization, and specialized instruments for dissection. This technique is associated with reduced postoperative pain, shorter hospital stays, faster recovery, and better cosmetic outcomes. However, its technical demands and limitations for advanced disease have raised debates about its universal applicability. [3]

Open right hemicolectomy, on the other hand, is the traditional method that involves larger incisions, providing direct access to the colon. While this approach allows thorough examination and management of complex cases, it is linked to higher morbidity, longer recovery periods, and less favorable cosmetic outcomes. [4] Studies comparing laparoscopic and open right hemicolectomies suggest advantages in laparoscopic procedures, but factors like

operative time, oncological clearance, and complications remain contentious. This randomized control trial evaluates and compares the short - term outcomes of laparoscopic and open right hemicolectomy, including operative duration, oncological effectiveness, cosmesis, hospital stay, early complications, and short - term recurrence. [5]

### Aim and Objectives

The study aimed to compare laparoscopic versus open right hemicolectomy for:

- 1) Operative time.
- 2) Oncological clearance (margins and lymph nodes harvested).
- 3) Cosmetic outcomes (skin incision length).
- 4) Duration of hospital stay.
- 5) Early complications (e. g., intraoperative bleeding, postoperative ileus, anastomotic leaks, wound infections, adhesions).
- 6) Short - term recurrence rates.

## 2. Material and Methods

This hospital - based prospective comparative study was conducted over 19 months in the Department of Surgery at S. P. Medical College and P. B. M. Hospital, Bikaner. All patients presenting with indications for right hemicolectomy and meeting the inclusion criteria were included. Patients were randomized into two groups: Group A (laparoscopic, 23

patients) and Group B (open surgery, 23 patients). Exclusion criteria included advanced malignancies, inoperable masses, and cases converted from laparoscopic to open surgery.

Both groups underwent preoperative evaluation, including imaging (ultrasound, CT scan, and colonoscopy) and laboratory investigations. Surgeries were performed according to standard protocols. In Group A, laparoscopic procedures included extracorporeal anastomosis, while in Group B, open surgeries involved extended midline incisions. Postoperative monitoring assessed complications, recovery time, and follow-up outcomes. Data were collected on operative time, oncological parameters, cosmetic outcomes, hospital stay, complications, and recurrence.

### 3. Results

**Table 1: Demographics and Clinical Presentation**

Parameter	Group A (Laparoscopic)	Group B (Open Surgery)	p-value
Age (Mean ± SD)	43.63 ± 19.67	50.22 ± 15.75	0.253
Gender (Male: Female)	18.75%: 81.25%	34.78%: 65.22%	0.464
Abdominal Pain/Distension	100%	87%	0.372
Nausea/Vomiting	6%	30%	0.151
Weakness	50%	26%	0.330

**Table 2: Operative and Postoperative Metrics**

Metric	Group A (Laparoscopic)	Group B (Open Surgery)	p-value
Operative Time (min)	210.00 ± 13.78	152.61 ± 33.71	0.0001
Hospital Stay (days)	7.69 ± 0.95	13.35 ± 3.71	0.0001
Blood Loss (ml)	106.25 ± 24.46	369.13 ± 44.00	0.0001
Postoperative Ileus (days)	2.19 ± 0.40	3.70 ± 0.56	0.0001

**Table 3: Oncological and Pathological Findings**

Metric	Group A (Laparoscopic)	Group B (Open Surgery)	p-value
Lymph Nodes Harvested	20.50 ± 4.83	18.70 ± 4.32	0.230
Neoplastic Cases	81.25%	56.52%	0.205
Tumor Stage (T1: T4)	6.25%: 0%	4.35%: 8.70%	0.287
Node Metastasis (Present)	31.25%	34.78%	0.134

**Table 4: Complications and Outcomes**

Metric	Group A (Laparoscopic)	Group B (Open Surgery)	p-value
Skin Incision Length (cm)	7.13 ± 0.27	15.65 ± 1.12	0.0001
Wound Infection	0%	34.78%	0.0001
Anastomosis Leak	0%	4.35%	0.0001
Mortality	0%	4.35%	0.0001

The study included a detailed analysis of patient demographics, clinical presentations, intraoperative metrics, and postoperative outcomes:

- Demographics:** No significant difference in age (Group A mean: 43.63 years, Group B mean: 50.22 years;  $p=0.253$ ) or gender distribution (Group A: 81.25% females, Group B: 65.22% females;  $p=0.464$ ).
- Symptoms at Presentation:** All patients in Group A and 87% in Group B reported abdominal pain and/or

distension. Nausea and vomiting were more frequent in Group B (30% vs.6%), but the differences were not statistically significant.

- Operative Time:** Group A had significantly longer operative times (mean: 210 minutes) compared to Group B (mean: 152.61 minutes;  $p=0.0001$ ).
- Hospital Stay:** Group A experienced shorter hospital stays (mean: 7.69 days) compared to Group B (mean: 13.35 days;  $p=0.0001$ ).
- Blood Loss:** Intraoperative blood loss was markedly lower in Group A (mean: 106.25 ml) versus Group B (mean: 369.13 ml;  $p=0.0001$ ).
- Skin Incision Length:** The mean incision length was significantly shorter in Group A (7.13 cm) compared to Group B (15.65 cm;  $p=0.0001$ ), highlighting better cosmetic outcomes for laparoscopic surgery.
- Early Complications:** Group B had higher rates of early complications, including wound infections (34.78%) and one case of anastomotic leak and mortality. In contrast, Group A had no reported early complications ( $p=0.0001$ ).
- Oncological Clearance:** Both groups showed comparable oncological outcomes, with no significant difference in the number of lymph nodes harvested (Group A mean: 20.50, Group B mean: 18.70;  $p=0.230$ ).
- Postoperative Ileus:** Group A patients had a shorter duration of postoperative ileus (mean: 2.19 days) compared to Group B (mean: 3.70 days;  $p=0.0001$ ).
- Pathology and Tumor Staging:** Group A had more neoplastic cases (81.25% vs.56.52% in Group B). Advanced tumors (T4) were exclusively managed in Group B due to technical challenges with laparoscopic surgery for such cases.

### 4. Discussion

Laparoscopic right hemicolectomy demonstrated significant advantages in terms of cosmetic outcomes, shorter hospital stays, reduced blood loss, and fewer complications compared to open surgery. However, laparoscopic procedures required longer operative times and were challenging for advanced-stage tumors. Open surgery, though associated with greater morbidity, provided effective management for bulky or locally advanced tumors.

Cosmetic outcomes were significantly better in the laparoscopic group due to smaller incision lengths. Reduced blood loss and shorter durations of postoperative ileus in laparoscopic surgery align with findings in contemporary literature, reflecting the advantages of minimally invasive approaches. The oncological outcomes, including lymph node retrieval and tumor-free margins, were comparable between the two techniques, confirming the oncological safety of laparoscopic surgery.

Advanced-stage tumors (T4) presented difficulties for laparoscopic management due to technical limitations, requiring conversion to open surgery in some cases. This highlights the need for careful patient selection and advanced laparoscopic expertise.

## 5. Summary and Conclusion

This randomized control trial confirms that laparoscopic right hemicolectomy offers significant benefits over open surgery, including shorter hospital stays, reduced intraoperative blood loss, quicker recovery, and better cosmetic outcomes. Despite longer operative times, laparoscopic surgery is a viable and often preferable option for benign conditions and early - stage malignancies. However, open surgery remains indispensable for managing advanced - stage tumors and cases where laparoscopic conversion is required.

The findings suggest that laparoscopic right hemicolectomy should be recommended for early - stage conditions and selected benign lesions, ensuring careful patient selection and adequate surgical expertise. Regular training and the availability of advanced laparoscopic equipment can further enhance outcomes.

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