

## Review Article

# The Tunnel Approach *versus* Medial Approach in Laparoscopic Right Hemicolectomy for Right Colon Cancer : A Retrospective Analysis

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**Background** : Laparoscopic right Hemicolectomy for right side colon cancer is well established and proven to be better than open approach in terms of postoperative and overall Hospital stay. Laparoscopic right hemicolectomy can be done by Medial to Lateral, Lateral to Medial or Tunnel (IRETA) approach. No studies have been conducted to compare the clinical outcomes of Medial to Lateral *versus* Tunnel Approach (IRETA) for Laparoscopic Right Hemicolectomy. This study aims to compare the two approaches and explore their advantages and disadvantages.

**Methods** : This is a retrospective cohort study carried out on 56 patients admitted to department of General Surgery AIIMS, Bhubaneswar hospital from March, 2016 to December 2021 with a diagnosis of right-side colon cancer and underwent laparoscopic right hemicolectomy. They were divided into two groups, group A (n=20) underwent medial to lateral approach and Group B (n=36) underwent Tunnel Approach. Baseline demographics and perioperative parameters were compared between the two groups.

**Results** : Operative duration, R0 resection and blood loss were significantly lower in Tunnel Approach. Postoperative complications, morbidity, mortality and conversion to open were similar in two groups.

**Conclusions** : Laparoscopic Tunnel Approach is a feasible and safe procedure and should be the preferred approach in Laparoscopic right Hemicolectomy.

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**Key words** : Tunnel Approach, Medial Approach,

**C**arcinoma colon is one of the most common cancers Worldwide, predominantly affecting the old age population. Surgical excision is the preferred treatment for colon cancers. Though the traditional approach for right Hemicolectomy is through Laparotomy, in the era of Minimally Invasive Surgeries, Laparoscopic right Hemicolectomy is being more commonly practised instead open approach. Since the introduction of Laparoscopic right Hemicolectomy by Jacobs in 1990s *et al*<sup>1</sup>, it has been established as a feasible and safe procedure to treat right-sided colon cancer with superior short-term outcomes, shorter Hospital stays and lower wound infection rate as compared to the conventional open approach<sup>2,3</sup>.

The novel approach in colon cancer Surgeries with Complete Mesocolic Excision (CME) and Central Venous Ligation (CVL) proposed by Hohenberger *et al* in 2009<sup>4</sup>, has been widely accepted by most of the

### Editor's Comment :

- Complete Mesocolic Excision (CME) and Central Venous Ligation (CVL) is most efficient approach for lymph node clearance. Laparoscopic CME with CVL has been proven to be better than Open approach.
- IRETA is recently a popular approach for Right Hemicolectomy.

Surgeons in many high-volume centers and is believed to be superior to other traditional approaches in terms of local recurrence and cancer related survival. This works on the lines of a similar concept of total Mesorectal Excision (TME) proposed by Prof. RJ Heald<sup>5</sup>. This approach is paramount for efficient lymph node dissection due to high node positive cases in our part of the World, owing to delay in presentation. Laparoscopic CME with CVL approach has been proven to be better than the open approach as far as 5-years survival rate is considered<sup>6</sup>. Its safety and efficacy already have been showed in previous literatures<sup>7</sup>.

There are many technical approaches for right Hemicolectomy named as Medial to lateral approach, lateral to Medial approach and the Initial Retrocolic

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Endoscopic Tunnel Approach (IRETA). Among them IRETA approach has been recently popularised since the last decade and is increasingly preferred by the Minimally Invasive Surgeons. Many centers have adapted both medial and IRETA approach with their pros and cons. But, the preferred among these two methods in resource limited centers yet to be decided.

Hence, the present study was conducted with the aim to compare the most commonly performed approaches (medial-to-lateral and IRETA) during laparoscopic mesocolic dissection for right sided colonic cancer in terms of overall survival, operating time, intra-operative blood loss, histopathological radicality, conversion to open along with Postoperative recovery and complications in developing countries like in India.

### METHODOLOGY

A retrospective study was designed with a total of 56 patients with colon cancer who underwent Laparoscopic Radical Right Hemicolectomy Surgery at a single high-volume teaching hospital AIIMS, Bhubaneswar, Odisha, India between January, 2018, to January, 2021. The patients had undergone either IRETA approach (n=36) or Medial to lateral approach (MA) (n=20) as per the surgeon performed during the surgery. Experienced laparoscopic colorectal surgeons performed all the operations. All patient data were collected on demographics, method of Laparoscopic mobilization, intra-operatively duration of surgery and blood loss, histopathological clearance, postoperative recovery and complication and overall survival of the patient.

### Inclusion criteria :

- (1) All patients with right colon cancer [growth involving caecum, ascending colon and hepatic flexure, or right transverse colon] with age 18 years or more;
- (2) Underwent elective Laparoscopic right hemicolectomy with complete mesocolic excision for Tumor;
- (3) Tumor not invading adjacent organs.

### Exclusion criteria :

- (1) Patients age less than 18 years;
- (2) Patients who underwent open surgery;
- (3) Those who were operated in emergency or for non-malignant etiology;
- (4) Patient with distant metastasis confirmed by pre-operative CT scan.

### Surgical technique :

All the patients underwent laparoscopic right hemicolectomy and the colon was initially mobilised either medially or initial tunnel approach depending upon the surgeon's choice and expertise. Excised specimen was retrieved via a transverse skin incision in right lumbar region. All patients had stapled extra-corporeal ileo-transverse side-to-side Anastomosis and received standard postoperative care.

### Data analysis :

Data was analysed using SPSS 27.0 (IBM SPSS Inc. Armonk, NY, USA). Comparison between the groups were made using chi-square test or Fischer's exact test as appropriate. Results were extrapolated in Box-and-whisker plot with considering p-value < 0.05 as significant.

### RESULTS

A retrospective analysis of the data was performed using SPSS version 27. There is no significant difference in clinicopathological characters of the patients in both the arms, which is depicted in Table 1.

There was a significant difference in the perioperative resection. A total of 14 patients (70%) patient had R0 resection in MA arm and 34 out of 36 in IRETA arm with a p-value of 0.01. Also, there was a significant difference in amount of blood loss as shown in Table 2.

Characteristics	MA group (N=20)	IRETA group (N=36)
AGE (Years)(mean, SD)	58.39, 6.057	57.70, 6.961
SEX		
Male (%)	9 (45%)	16 (44.4%)
Female	11 (55%)	20 (55.5)
BMI (Kg/m <sup>2</sup> ) (median, IQR)	20.05, 1.8	20.05, 1.27
ASA grade		
I	11 (55%)	18 (50%)
II	9 (45%)	18 (50%)
Site of tumour		
IC Junction	6 (30%)	8 (22.2%)
Cecum	6 (30%)	8 (22.2%)
Ascending colon	5 (25%)	10 (27%)
Hepatic flexure	3 (15%)	10 (27%)
Pre-operative chemotherapy		
Yes	11 (55%)	21 (58%)
No	9 (45%)	15 (42%)
Past history of abdominal surgery		
Yes	11 (55%)	15 (42%)
No	9 (45%)	21 (58%)
Pre-operative CEA (ng/ml)		
<5	12 (60%)	26 (72.2%)
>5	8 (40%)	12 (27.8%)

There were no intra-operative complications like ureteric, duodenal or gonadal vessel injury (Figs 1-4).

Table 3 shows postoperative outcomes and complications. No statistically significant difference was noted.

And after 6 months of follow-up, the Sr.CEA level is significantly lower in IRETA group which signifies adequate tumour resection in IRETA group (Table 4).

**DISCUSSION**

Although there are many technical approaches for right hemicolectomy, the 'lateral to medial approach' which is the most ancient of them, is mostly preferred

Table 2 — Peri-operative and short-term outcomes			
	MA Group (N=20)	IRETA Group (N=36)	P-value
Tumor size (cm) (mean, SD)	7.40, 1.569	7.44, 1.576	0.92*
R0 (no.)	14 (70%)	34 (94.4%)	0.01@
R1 (no.)	3 (15%)	1 (2.8%)	0.125@
R2 (no.)	3 (15%)	1 (2.8%)	0.125@
Blood loss (ml) (median, IQR)	200, 28	120, 23	0.01#
Duration of surgery (min) (median, IQR)	175, 10	160, 10	0.01#
Conversion to open (%) (no.)	3 (15)	2 (5.5)	0.33@
Lymph node yield (no.), (median, IQR)	20, 4	21, 5	0.32#

\*: Student t-test, @: Fischer's exact test, #: Mann Whitney U test

Table 3 — Postoperative outcomes & complications			
Characteristics	MA group	IRETA group	P-value
First flatus on POD (median, IQR)	2, 1	2, 1	0.4#
Time to oral liquids (median, IQR)	2, 1	2, 1	0.4#
Postoperative hospital stays, Days (median, IQR)	5, 2	5, 1	0.35#
<b>COMPLICATIONS</b>			
Wound infection	1	2	0.3@
Anastomotic leak	0	0	0.55@
Anastomotic stricture	0	0	-
Bowel obstruction requiring re-exploration	0	1	0.35@
Intra-peritoneal infection	1	2	0.3@
Wound/Sheath dehiscence	1	1	0.5@
Paralytic Ileus (IV fluids >7days)	0	0	-

@: Fischer's exact test, #: Mann Whitney U test

Table 4 — Follow-up after 6 months			
	MA group	IRETA group	P-value
Sr CEA (median, IQR)	6.7, 8.2	4, 5.2	0.04#
Received Adjuvant Chemotherapy	16 (80%)	30 (83.3 %)	0.62@

@: Fischer's exact test, #: Mann Whitney U test

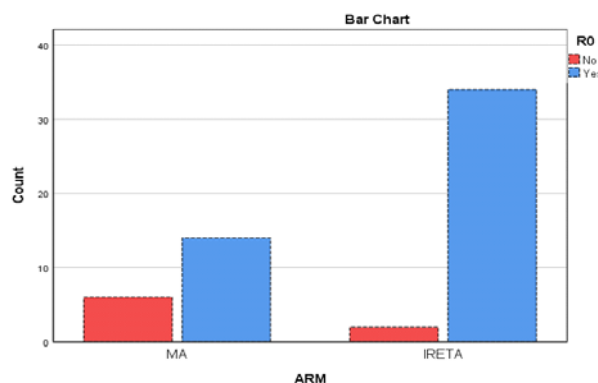


Fig 1 — Histogram showing R0 Resection in both arms

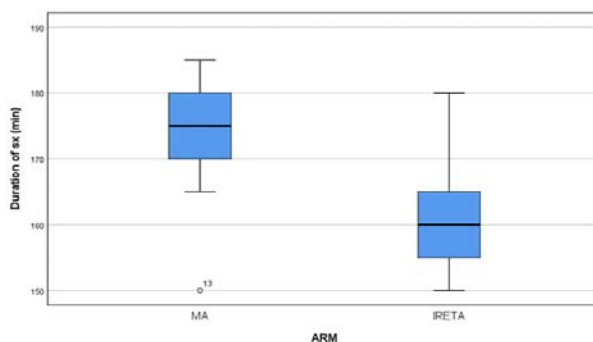


Fig 2 — Box-whisker plot showing duration of surgery across both the arms

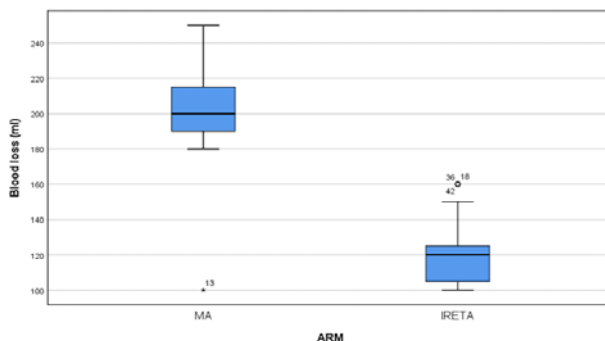


Fig 3 — Box-whisker plot showing blood loss across both arms

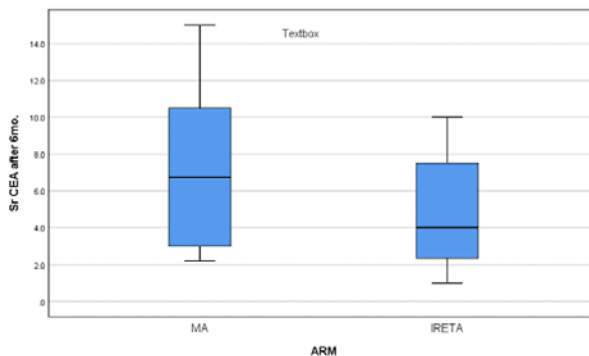


Fig 4 — Box-whisker plot showing Sr CEA after 6 months across both the arms

in open approaches<sup>15,8</sup>. It starts with division of the lateral peritoneal attachments followed by an exploration of medial mesenteric attachments and division of the blood vessels<sup>9,10</sup>.

This was followed by development of 'the medial to lateral approach' by Milson and colleagues, which explains a vessel first approach from medial side followed by division of the lateral peritoneal attachments<sup>11,12</sup>. This was widely accepted because of its pedicle/vessel first approach with "no-touch" principle followed by mesocolon mobilization. Many previous studies have collated its safety and efficacy compared with the former approach<sup>13,14</sup> which shows superiority of MA approach in terms of less duration of Surgery and less blood loss.

In our study, we have compared the Medial to Lateral Approach (MA) to Initial Retrocolic Endoscopic Tunnel Approach (IRETA). There was a significant difference in intra-operative blood loss (200, 28ml in MA approach *versus* 120, 23ml in IRETA approach, p-value=0.01). Also, there was a significant decrease in duration of surgery in IRETA approach (175, 10min in MA approach *versus* 160, 10min in IRETA approach, p-value=0.01). But, at times MA approach might be troublesome if there is local infiltration of the tumour and it may cause difficulty in getting into the fascial plane via mesenteric window, especially in obese patients<sup>7</sup>. It also has a steep learning curve and higher conversion rate to open as its drawbacks as shown in two previous studies<sup>15,16</sup>.

Recent studies have shown extended lymph node dissection with CME to have better oncological outcomes, without any significant difference in complications<sup>17,18</sup>. Over the last decade, development of retrocolic tunnel approach which involves initial retroperitoneal mobilisation between parietal and visceral fascia of mesocolon, followed by dissection vertically along superior mesenteric vessels, ileocolic, right colic and right branch of middle colic vessels, has become the preferred approach worldwide in many high-volume centres.

The Initial Retrocolic Endoscopic Tunnel Approach (IRETA) is a stepwise approach that provides excellent view and easy identification of retroperitoneal structures and clearance of fibro fatty and lymphatic tissue along the vessels and also an easy approach to high ligation of the vessels. Even though a minimum retrieval of twelve lymph nodes is considered to be adequate for lymphatic dissection, previous studies have

demonstrated numbers ranging from 19 to 32<sup>8,19</sup> in IRETA approach. In our study, we retrieved a median of 20,4 lymph nodes in MA approach *versus* 21, 5 lymph nodes in IRETA approach with no significant difference.

With IRETA approach, the retroperitoneally placed ureter can be safely dissected off from the tumour irrespective of the size and it also minimizes tumour handling eventually minimising risk of bowel injury and tumour seeding<sup>8,20</sup>. In our study, there were no ureteric injury, bowel injury or gonadal vessel injury. IRETA approach also eases the surgery with significantly minimising the amount of blood loss and operative duration, both of which were also evident in our study also. Its primary utility is in large tumors where CME is essential to maximise the Oncological outcomes. In our study, it also showed a significant difference in number of R0 resections (34/36 in IRETA approach *versus* 14/20 in MA approach, p-value=0.04).

### CONCLUSION

Laparoscopic initial retrocolic endoscopic tunnel approach for right colon cancer is simple to implement, safe and feasible with improved intra and postoperative outcomes when compared to the conventional medial to lateral approach. It is more applicable in tumours presenting late and bulky tumors where adequate lymph node dissection and R0 resection is challenging.

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