



# Adequate Lymphadenectomy for Colorectal Cancer, A Comparative Analysis between Laparoscopic surgery and Open surgery

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## Abstract

**Background:** Adequate lymphadenectomy is considered when atleast 12 lymphnodes are removed to report the N staging according to national comprehensive cancer network{NCCN} and the college of american pathologists.

**Aim:** To evaluate and compare the adequacy of lymphadenectomy in open and laparoscopic surgery for colorectal malignancy .

**Methods:** A retrospective analysis has been done on patients with colorectal cancer between February 2021 and June 2022 and following variables collected: age,gender, site of the tumour, histology of the tumour, grade of the tumour, tumour stage, number of lymph nodes affected by colorectal cancer and the number of lymph nodes removed during surgery for colorectal cancer.

**Results:** The number of the patients included as subjects for the study was 60. Among 60, half of them underwent open surgery and remaining half of them underwent laparoscopic surgery. A mean of 15 and 12 lymph nodes removed in laparoscopic and open surgery respectively. 65% of total patients underwent adequate lymphadenectomy. And the chance of adequate lymphadenectomy was more in laparoscopic surgery -70% and was found to be less in open surgery- 60%.

**Conclusion:** This study concludes that Adequate lymphadenectomy was more likely in laparoscopic surgery than in open surgery for lower rectal tumors. However further studies are needed for further evaluation and strong conclusion.

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**KeyWords:**Lymphnodes, Lymphadenopathy, Tumor, Laproscopic Surgery

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## Introduction

Globally, colorectal cancers account for 10% of all the cancers. And it constitutes to nearly 12,00,000 new cases are believed to occur globally among all other cancers. A study utilizing the SEER's data (SURVEILLANCE EPIDEMIOLOGY AND END RESULTS) shows that there is a rising incidence of CRC ( colo rectal cancers) over the past two decades. And the increasing incidence of the cases occur in patients aged 20-49 years.<sup>1,2</sup>

Current Tnm Classification For Colorectal Cancer As Follows:<sup>3,4,5</sup>

TX - Primary tumor cannot be assessed

T0- No evidence of primary tumor

Tis- Carcinoma in situ, intramucosal carcinoma (involvement of lamina propria with no extension through muscularis mucosae)

T1- Tumor invades the submucosa (through the muscularis mucosa but not into the muscularis propria)

T2- Tumor invades the muscularis propria

T3 - Tumor invades through the muscularis propria into peri colorectal tissues

T4 - Tumor invades the visceral peritoneum or invades or adheres to adjacent organ or structure

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T4a- Tumor invades through the visceral peritoneum (including gross perforation of the bowel through tumor and continuous invasion of tumor through areas of inflammation to the surface of the visceral peritoneum)

T4b -Tumor directly invades or adheres to adjacent organs or structures

NX- Regional lymph nodes cannot be assessed

N0 - No regional lymph node metastasis

N1- One to three regional lymph nodes are positive (tumor in lymph nodes measuring  $\geq 0.2$  mm), or any number of tumor deposits are present and all identifiable lymph nodes are negative

N1a- One regional lymph node is positive

N1b- Two or three regional lymph nodes are positive

N1c- No regional lymph nodes are positive, but there are tumor deposits in the

- subserosa
- mesentery
- or nonperitonealized pericolic, or perirectal/mesorectal tissues.

N2 -Four or more regional nodes are positive

N2a -Four to six regional lymph nodes are positive

N2b -Seven or more regional lymph nodes are positive

M0 - No distant metastasis by imaging, etc.; no evidence of tumor in distant sites or organs (This category is not assigned by pathologists.)

M1 -Metastasis to one or more distant sites or organs or peritoneal metastasis is identified

M1a- Metastasis to one site or organ is identified without peritoneal metastasis

M1b- Metastasis to two or more sites or organs is identified without peritoneal metastasis

M1c- Metastasis to the peritoneal surface is identified alone or with other site or organ metastases

Early diagnosis, efficient delivery of chemotherapy and radiotherapy and advanced surgical techniques like total mesorectal excision (TME) has showed significant improvements in last 20 years.

Number of lymph nodes removed significantly correlates with the survival of the patient, thus surgery remains as the effective treatment of choice for colorectal cancers.<sup>6</sup>

Pathological staging in colo rectal cancers (CRC) requires adequate resection of main tumour with regional lymph nodes by total mesorectalexcision(TME). Accurate examination of the surgical specimen should be done to avoid understaging of the tumour. <sup>7</sup>

Total mesorectal excision (TME) is the gold

standard treatment for rectal cancer in west.Totalmesorectal excision is a standard technique for colorectal cancer , first described by professor bill heald in 1982, at UK' Basingstoke district hospital.. A significant length of the bowel around the tumour is removed, as is the surrounding tissue upto the plane between mesorectum and pre-sacral fascia(Healds holy plane).<sup>8,9</sup>

The yield of lymph nodes after surgical excision is reduced after pre operative radiotherapy this is due to inflammation and fibrosis making them smaller size difficult to identify during surgery.<sup>10</sup>

In 1991 first laparoscopic assisted colectomy was performed, since then, several studies have been done regarding short and long term outcome, followed by studies comparing laparoscopic assisted and conventional surgery. In 1996 some studies reported following laparoscopic surgery port site metastasis as a problem. Hence many studies conducted and analysed the data in the next 10 years and then results showed that laparoscopic surgery as an accepted alternative surgery for colorectal cancer<sup>11,12</sup>.

The adoption of laparoscopy was slow because the technique requires advanced skills and equipment. Abdominal incision would still be needed for anastomosis and specimen retrieval, the technique was seen to offer few advantages over open surgery.

There is no consensus in literature about to mention as 'N' stage by a minimum number of lymph nodes. However , the national comprehensive cancer network(NCCN), the college of american pathologists, and the american joint committee on cancer(AJCC) suggests that to mention as 'N' stage , a minimum number of lymph nodes to be removed should be 12.<sup>13,14</sup>

For stage II patients, in whom the number of lymph nodes removed is less than 12 are considered to be at high risk and they need adjuvant chemotherapy.

## Objectives

To evaluate and compare the adequacy of lymphadenectomy in open and laparoscopic surgery for colorectal malignancy

## Aim And Methods

The aim of this study is to check whether the laparoscopic or open surgery yields increases the lymph node yield. This is a retrospective study, 60 patients were analyzed between the time gap of



February 2021 and June 2022 done at Mysore Medical College and Hospital, Mysore . 30 subjects the underwent open surgery and the remaining 30 subjects underwent laparoscopic surgery.

**Inclusion Criteria:** All patients of diagnosis colorectal adenocarcinoma with histological Confirmation Were Included.

**Exclusion Criteria:** Any patient of colorectal cancer with

Locally advanced disease

Metastatic disease

Acute bowel obstruction or perforation from cancer

Severe medical illness

Pregnancy

Recurrent cancer

**Results**

30 patients underwent laparoscopic surgery and 30 patients underwent open surgery for rectal cancer between 2021 February and June 2022.

Descriptive variables such as age, sex, and outcome variables such as type of resection, number of lymph nodes resected, number of lymph nodes affected by the disease, proximal, distal and circumferential margin, histology are noted and analyzed.

**Table 1: Showing Laparoscopic Surgery Results**

	Male	Female	Total	P-Value
Numbers	16	14	30	
Youngest	29	38		
Oldest	75	76		
Range	29-75	36-76		
Tumour 5 Cm Above The Anal Verge	4	4	8	0.656
Tumour Within 5cm From Anal Verge	13	9	22	

There was no significant difference in tumour 5 cm above the anal verge in laparoscopic surgery between males and females.

**Table 2: Showing Open Surgery Information**

	Male	Female	Total	P-Value
Numbers	17	13	30	
Youngest	27	22		
Oldest	85	80		
Range	27-85	22-80		
Tumour 5 Cm Above The Anal Verge	7	6	13	0.785
Tumour Within 5cm From Anal Verge	10	7	17	

There was no significant difference in tumour 5 cm above the anal verge in open surgery between males and females.

**Table 3 : Showing Laparoscopic Surgery Results**

Characteristic	Male	Female	Total	P-Value
Lap APR	13	9	22	0.656
Lap AR	4	4	8	
Proximal Margin Of >5cm Achieved In	16	12	28(94%)	0.117
Not Achieved	0	2	2(6%)	
Distal Margin Of >2cm Achieved In	15	12	27(90%)	0.464
Not Achieved	1	2	3(10%)	
Well Differentiated Grade	1	2	3	0.685
Moderately Differentiated Grade	10	9	19	
Poorly Differentiated Grade	5	3	8	

In the study there was no significant difference in LAP APR and AR between males and females in laparoscopic group. In the study there was no significant difference in Proximal Margin Of The Specimen between males and females in laparoscopic group. In the study there was no



significant difference in Distal Margin >2CM Grade between males and females in laparoscopic group. In the study there was no significant difference in

**Table 4: Showing Open Surgery Information**

Characteristic	Male	Female	Total	P-Value
Open APR	10	7	17	0.785
Open AR	7	6	13	
Proximal Margin Of >5cm Achieved In	16	13	29(96%)	0.373
Not Achieved	1	0	1(4%)	
Distal Margin Of >2cm Achieved In	16	12	28(94%)	0.843
Not Achieved	1	1	2(6%)	
Well Differentiated Grade	2	3	5	0.274
Moderately Differentiated Grade	12	6	19	
Poorly Differentiated Grade	2	4	6	

In this study there was no significant difference in OPEN APR and AR between males and females in open group. In this study there was no significant difference in Proximal Margin Of The Specimen between males and females in open group. In this

study there was no significant difference in DISTAL MARGIN >2CM between males and females in open group. In this study there was no significant difference in GRADE between males and females in open group .

**Table 5: Showing Adequate Lymphadenectomy Status**

	Laparoscopic Surgery Group (N=30)	Open Surgery Group (N=30)	P-VALUE
Adequate Lymphadenectomy Achieved (Removal Of >12 Nodes)	21(70%) [Achieved in 21 of 30 patients in laparoscopic group]	18(60%) [achieved in 18 of 30 patients in open surgery group]	0.224
Maximum Lymphnode Harvested In A Single Patient	33(2.4)	28(2.6)	<0.0001*
Minimum lymphnode harvested in a single patient{Excludes Post CT/RT}	4(3.6)	3(2.9)	0.240
Average Lymphnode Removed In Each Group	15+/-2	12+/-2	<0.0001*
Pathological Positive	14(46%) N1=4 N2=10	13(43%) N1=5 N2=8	0.795

In the study there was significant difference in average number of lymph nodes removed which was 15+/- 2 among laparoscopic group and 12+/- 2 in open group.

stage III patients of colorectal cancer significantly related to the number of lymph nodes removed in surgery.

The technical treatment and histo-pathological examiner are important factors in evaluating the specimen and counting the number of lymph nodes. According to the literature age , gender, tumour grade and location of the tumour are the factors affecting the number of lymph nodes removed. Limitations of the study being the retrospective collection of the data and analysis and limited number of patients involved calls for larger prospective study.

**Discussion**

The number of lymph nodes removed was greater 15 for laparoscopic surgery than open surgery, and the average number of lymph nodes removed in both types surgery was 12. The adequate lymphadenectomy influences the patient survival and the choice of adjuvant therapy. A systematic review of 17 studies analysed 61371 cases from 2007, showed that survival rates in stage II and

**Conclusion**



There was a significant difference in mean maximum lymph node harvested in a single patient between two groups. Maximum lymph node harvested in a single patient was highest in laparoscopy group.

There was no significant difference in mean minimum lymph nodes harvested in a single patient {excludes post CT/RT} between two groups. Adequate lymphadenectomy is achieved more likely in laparoscopic surgery than that of in open surgery for lower rectal tumours. Prospective studies are needed for further evaluation.

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