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Does the length of resected specimen in right hemicolectomy affect the oncological outcome?

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ABSTRACT

Background:L;ymph node staging is critical for determining the stage of colorectal cancer (CRC). **Objective:** To see if there was a link between theextent of the resected specimen and count of extracted lymph nodes in hemicolectomypatients and so, the effect of resected specimen length on oncological outcome in right hemicolectomy.**Methodology:** An observational study.studydone inZagazig University Hospitals from August 2020 to October 2021. It included all patients records who underwent righthemicolectomyfor right colon cancer during this period with inclusion criteria of 26 patients. All patients underwent combined medial and caudal approach right hemicolectomy, 13 patients underwent open right hemicolectomy and 13 patients underwent laparoscopic right hemicolectomy.**Results:** Using Pearson Correlation Co-efficient. We discovered a weak correlation between the number of dissected lymph nodes and the extent of the resected specimen (r = 0.1367, P-Value is.912701). The maximum length of resected colon specimen was 115 cm and associated with 20 extracted lymph nodes. However the minimum length was 20 cm and associated with 46 lymph nodes.**Conclusion:** The number of harvested lymph nodes in right hemicolectomydepends mainly on oncological resection with radical approach and enough safety surgical margins not on resected specimen length.

Keywords: Oncological resection, Right hemicolectomy, lymph nodes.

INTRODUCTION

Incidence and mortality records ofcolorectalcancer (CRC) vary dramatically around the world. CRC is the third most frequent cancer in men and the second most common cancer in women worldwide. A steady shift towards right-sided colon malignancies has been seen, withcecalprimaries showing the biggest proportional increase in incidence **(1)**. The occurrence of lymph node metastasesis the basic prognostic factor in patientswith non-metastatic colorectal cancer **(2,3)**. Correct lymph node staging is critical for determining the stage of CRCand identifying people who require adjuvant therapy to address the microscopically prevalent disease**(4)**.

According to colorectal surgeons and pathologists, some of the parameters impacting the amount of removed lymph nodes have beenoptimized throughout the years. In order tostandardize surgical and postoperative treatment including adjuvant therapy, the American Society of Clinical Oncology, the Cancer Commission of the

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American College of Surgeons, the American College of Pathologists, the National Comprehensive Cancer Network, and the National Cancer Institute have recommended thatthe minimum count of lymph nodes needed to be dissected in colorectal carcinoma is twelve**(5-8)**.

The goal of this study was to assess the associationbetween the extent of the resected colon specimen and thecount ofextracted lymph nodes in patients with colorectal carcinoma, because there may be a direct association between the resected colon specimenextent and thecountof lymph nodes.Because the terminal ileum andileo-cecal valve are required for absorption and enterohepaticcirculation, any attempt to preserve the length of the precious ileum is made, particularly when dealing with the concept of (the greater the resected length, the better theoncologica outcome).

PATIENTS AND METHODS

This is a single centre retrospective observational study carried out in Zagazig University Hospitals from August 2020 to October 2021. Medical records of consecutive 26 patients, who underwent combined medial and caudal right hemicolectomy for right colon cancer at Zagazig University Hospitals, Zagazig, Egypt, by the same general surgeon during this period were reviewed retrospectively. 13 patients underwent openright hemicolectomyand 13 patients had laparoscopic right hemicolectomy.Informed consent was taken from all patients in the study.

Inclusion criteria

Right hemicolectomy due to malignant pathology&Radical righthemicolectomy by combined medial and caudal approach.

Exclusion criteria

Emergency cases, e.g., obstructed or perforated cases.Conventional righthemicolectomy

Demographic data of the patients (age, gender, and family history) , operative data andpost-operative data in pathological reports (extent of resected specimen, count of extracted lymph nodes) were collected.All patients underwent pathology-confirming procedures such as CT scans, colonoscopies, and biopsies.The patientput on free oral fluids the day before. Fasting for 6 hours before surgery and intravenous antibiotics were taken.

Operative Procedure:

A combined medial and caudal approach was performed on all patients, which is considered radical approach. 13 patients had open surgery and 13 patients had laparoscopic surgery.

Under general anaesthesia, patients were positioned on the operating table in a supine position.

Four ports, laparoscopic right hemicolectomy or midline exploratory incision in open cases of about 10 cm was done.

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Important surgical notes:

- In right hemicolectomy the ligated vessels were the right branch of middle colic artery, right colic and ileocolicartries.
- In extended right hemicolectomy the ligated vessels are middle colic, right colic and ileocolic arteries.
- The vessels are ligated near their origin.
- Control of hemostasis.
- Extraction of specimen.
- Ileo-colic anastomosis.
- Side to-side anastomosis with a liner cutter stapler was done. In laparoscopic cases, extra-corporeal anastomosis was done by a linear cutter stapler through a transversepara umbilical incision at the port site through which the specimen was extracted.

Postoperatively:

Postoperative medicationswere given. Monitoring ofvital signs and drains.Early ambulation was encouraged, and clear oral fluids were started if intestinal sounds were audible. Theintraperitoneal drain is removed when there is less than 50cc of fluid per 24 hours or after performing ultrasonography.

Parameters of evaluation:

1- **Number of harvested lymph nodes** was evaluated in the pathology report of the resected specimen in allpatients in patients records.
2- **Length of resected specimen** which includes colonic segment and ileal segment was measured in centimeters by a ruler, documented in patients records and confirmed in the pathology reports.

ETHICAL APPROVAL:

This paper was approved by Institutional Review Board (IRB) for medical research ethics in Egypt and given an approval number #6199-29-6-2020. Written informed consent has been obtained from all the participants included in this study.

Statistical analysis:

Data collected from patients records and outcome measures coded, entered and analyzed using Microsoft Excel software. After that, the data was analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0 software.According to the nature of data, qualitative data is represented as a number and a percentage, whereas quantitative data is represented as a mean and standard deviation. Difference, association of a qualitative variable using the Chi-square test (X2), and association of two variables using the Pearson correlation coefficient were employed to examine differences for significance.To compare quantitative independent groups, the t test or Mann Whitney U test might be employed. For significant results, the P value was set at 0.05, and for very significant results, it was set at 0.001.

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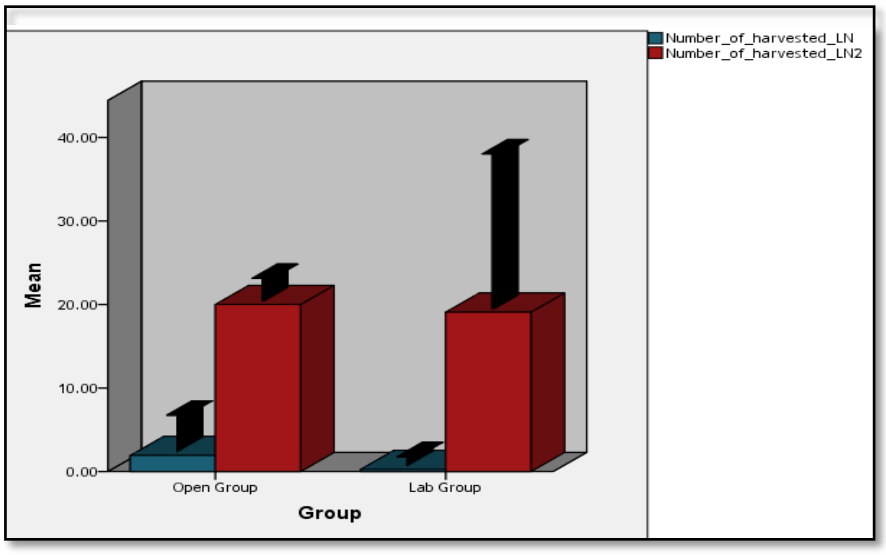
RESULTS

Age was distributed as 54.66±16.7 and 51.66±14.25 with no significant difference between laparoscopic or open surgery patients.In addition, there was no discernible variation in sex or family history distribution**(Table 1)**. As combined medial and caudal approach is a radical approach, all harvested lymph nodes were above 12 **(Graph 1)**.Although there is a positive relationship between the extent of the resected specimen and the count of extracted lymph nodes, it is weak (the closer the value is to zero, the weaker the relationship).Also, the P-Value is .912701. The result is not significant (p <0.05) **(Table 2)**.

Table (1): Demographic data distribution between studied groups

			Open	Lab	t/ X^2	P
Age			54.66±16.7	51.66±14.25	0.457	0.652
Sex	Female	N	6	4		
		%	50.0%	33.3%		
	Male	N	6	8	0.68	0.40
		%	50.0%	66.7%		
Family history	No	N	11	9		
		%	91.7%	75.0%		
	Yes	N	1	3	1.2	0.27
		%	8.3%	25.0%		
Total		N	12	12		
		%	100.0%	100.0%		



Graph (1):Extracted lymph nodes in open and laparoscopic groups.

Table (2):Pearson Correlation Co-efficient for relationship between number of harvested lymph nodes and resected colon specimen:

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$X - M_x$	$Y - M_y$	$(X - M_x)^2$	(Y - My)2	(X - Mx)(Y - My)
-5.400	-12.040	29.160	144.962	65.016
-17.400	-3.040	302.760	9.242	52.896
2.600	10.960	6.760	120.122	28.496
-2.400	-16.040	5.760	257.282	38.496
22.600	16.960	510.760	287.642	383.296
3.600	5.960	12.960	35.522	21.456
0.600	-11.040	0.360	121.882	-6.624
0.600	-1.040	0.360	1.082	-0.624
-1.400	-5.040	1.960	25.402	7.056
1.600	78.960	2.560	6234.682	126.336
-4.400	2.960	19.360	8.762	-13.024
27.600	-16.040	761.760	257.282	-442.704
-2.400	-6.040	5.760	36.482	14.496
-1.400	-10.040	1.960	100.802	14.056
-2.400	-1.040	5.760	1.082	2.496
-4.400	-11.040	19.360	121.882	48.576
-5.400	-10.040	29.160	100.802	54.216
-1.400	-4.040	1.960	16.322	5.656
-3.400	-6.040	11.560	36.482	20.536
1.600	3.960	2.560	15.682	6.336
-5.400	-11.040	29.160	121.882	59.616
0.600	8.960	0.360	80.282	5.376
-1.400	-5.040	1.960	25.402	7.056
0.600	5.960	0.360	35.522	3.576
-3.400	-6.040	11.560	36.482	20.536
Mx: 18.400	My: 36.040	Sum: 1776.000	Sum: 8232.960	Sum: 522.600

$r = 522.6 / \sqrt{((1776)(8232.96))} = 0.1367$; X: X Values (the count of extracted lymph nodes);Y: Y Values (extent of resected specimen);The value of R is 0.1367.

DISCUSSION

In order to stagethe disease, postoperative care, and prognosis, radical excision of colonic cancers and correct detection of positive lymph nodes are critical. The number of dissected metastatic lymph nodes has an adverse relationship with survival rates**(9)**.Some of the criteria affecting the quantity of lymph nodes removed have been optimisedthroughout time, thanks to the oncological principles established by colorectal surgeons and methods used by pathologists in dealing with mesocolon.In order to standardize surgical and postoperative treatment, Many international organizations and societies have recommended thatthe minimum count of extracted lymph nodes needed for proper oncological decisions is twelve**(6,8)**.

In this study, we adopted a radical approach which is a combined medial and caudal approach. We found that all harvested lymph nodes were above 12 which achieves the principle of radical resection.

Many surgeons seemed to agree that 'the longer the colon resection, the greater the retrieved LN, and other investigations have concluded that there is a direct association between the length of the resected specimen and the number of dissected lymph nodes. Despite the fact that the average length of theresected specimen varies depending on the tumor's position and the type of surgery done, the number of lymph nodes dissected is also affected by the tumor's location**(10,11)**.

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In our study we tried to standardize the approach to be a radical one to see if it is really enough to harvest a proper number of lymph nodes or an additional extra length of resected specimen is better.**Valsecchi et al. (12)**found that when the resected section was less than 19.6 cm, <12 lymph nodes were dissected, however when the resected segment was more than 29.9 cm,> 12 lymph nodes were removed. It washypothesized in another study that the pedicle ormesocolon, rather than the resected colonic section, was more essential.

According to **Üreyen et al. (13)** revealed if theextent of the excised column is beyond 21 cm or the number of lymph nodes removed is 12 or more, there is no survival advantage. They determined that if performed with oncological surgical uniformity, the excised colonic length can be large. When the colon resection was more than 21 cm, they recommended that at least 12 lymph nodes can be removed.

Our study agrees with the literature data, we foundthat oncological resection with 5 cm surgical margins and complete mesocolic excision is enough and adding extra length to the specimen is of no value. The smallest specimen length was 20 cm, was associated with 46 extracted lymph node. While the the largest specimen length 115 cm, was associated with 20 lymph nodes only**(11)**. So, the length of resected segment in right hemicolectomy should not be a major factor determining the oncological outcome and more length of bowel should be preserved whenever possible.

CONCLUSION

Although there is a direct relation between the length of resected specimen and the number of harvested lymph nodes, it is a weak relation and it does not affect the oncological outcome of right hemicolectomy.

AUTHORS' CONTRIBUTION:

RZ: Conception or design of the work, or the acquisition, analysis, or interpretation of data for the work, drafting the work or revising it critically for important intellectual content, final approval of the version to be published.
AHAE: Conception or design of the work; or the acquisition, analysis or interpretation of data for the work.
AMAS: Conception or design of the work, or the acquisition, analysis, or interpretation of data for the work, final approval of the version to be published.
GMO: Analyses, or interpretation of data for the work.

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