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Lymph Node Yield in Laparoscopic Total Mesorectal Excision: Our Clinical Experience

Aziz Arı **Kenan Buyukaşık** **Özgür Segmen** **Onder Akkuş** **Cihad Tatar**

Department of General Surgery, Istanbul Training and Research Hospital, Istanbul, Turkey

Abstract

Introduction: Over the years, with advances in minimally invasive surgery, laparoscopic total mesorectal excision (TME) has been more widely performed for the surgical treatment of rectal cancer. In addition to the well known advantages of laparoscopic surgery, there is also evidence that it is not oncologically inferior to open approach in the management of colorectal cancers. In the present study, we discuss our results for lymph node yield in laparoscopic total mesorectal excision for the malignant diseases of the rectum and the sigmoid colon.

Method: We retrospectively collected the data from laparoscopic operations for malignant diseases of the rectum and the sigmoid colon. All laparoscopic anterior resection, low anterior resection and abdominoperineal resection procedures performed between 2009 and 2015 in the Istanbul Training and Research Hospital General Surgery Clinic were included. The results were analyzed and compared with the literature.

Results: A total of 75 laparoscopic procedures for sigmoid colon and rectum cancers were performed in our clinic. The average lymph node yield was 17.5 (±8.4) and average metastatic lymph node was 2.4 (±3.4). There was a positive correlation between lymph node yield and tumor size.

Conclusion: Laparoscopic TME is a valid option for the treatment of colorectal cancers. In addition to the universal benefits of minimally invasive surgery, laparoscopic approach allows extensive lymph node dissection, addressing oncological concerns surrounding the technique.

Keywords: Colorectal cancer, lymph nodes, laparoscopy, total mesorectal excision

Introduction

Rectal cancer is a significant cause of morbidity and mortality worldwide. Although the disease requires a multidisciplinary approach, the standard surgical treatment remains total mesorectal excision (TME) for over 30 years. Resection of the rectum with clear margins and the intact mesorectum, together with extensive lymph node dissection has been shown to reduce recurrence (1).

Over the years, with advances in minimally invasive surgery, laparoscopic TME has been more widely performed for the surgical treatment of rectal cancer. Laparoscopic approach offers the advantage of allowing comprehensive and easy dissection of the mesocolon and mesorectum under direct vision. There is also evidence from numerous prospective randomized studies demonstrating the feasibility, safety and

Corresponding Author: Cihad Tatar, MD. Department of General Surgery, Istanbul Training and Research Hospital, Istanbul, Turkey
E-mail: tatarcihad@gmail.com

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advantages of laparoscopic colorectal surgery. In addition to the well known advantages of laparoscopic surgery, such as shorter hospital stay, lower morbidity and better cosmetic results, there is also evidence that it is not oncologically inferior to open approach in the management of colorectal cancers (2).

In the present study, we discuss our results for lymph node yield in laparoscopic total mesorectal excision for the malignant diseases of the rectum and the sigmoid colon.

Study Design

In our study, we retrospectively collected the data from laparoscopic operations for malignant diseases of the rectum and the sigmoid colon. All laparoscopic anterior resection, low anterior resection and abdominoperineal resection procedures performed between 2009 and 2015 in the Istanbul Training and Research Hospital General Surgery Clinic were included. Demographic data, surgical procedure, tumor stage and lymph node clearance were recorded. The results were analyzed and compared with the literature.

Laparoscopic colorectal surgery was performed using the standard four or five port technique. Preoperative informed consent for the operation was obtained from the patients. If at any point during the operation it was deemed necessary, conversion to open approach was made. Only cases completed using the laparoscopic technique was included in the analysis.

Results

Between January 2009 and January 2015, a total of 75 laparoscopic procedures for sigmoid colon and rectum cancers were performed in our clinic. The mean age was 62.9 (±10.8). Twenty nine patients (38.7%) were female and 46 (61.3%) were male. 63 (84%) of patients had received neoadjuvant therapy.

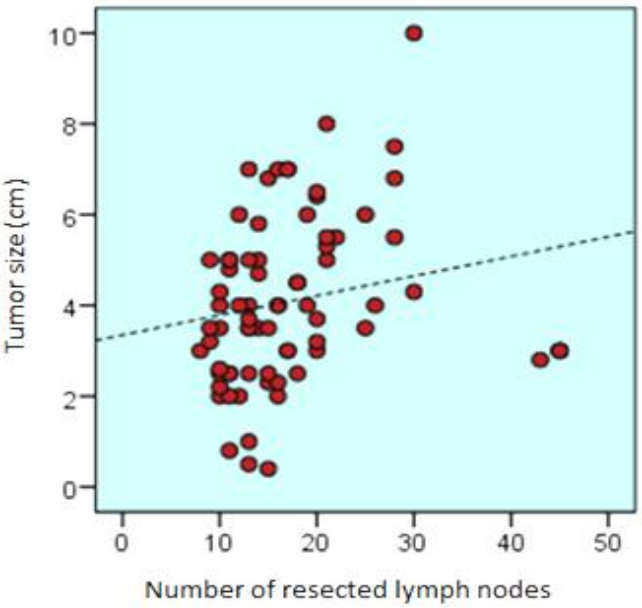

Figure-1. Tumor size/number of resected lymph node

The surgical procedure was determined according to the location of the tumor: for sigmoid and rectosigmoid tumors, anterior resection was performed (n:39, 52%), for proximal and middle rectal carcinomas, low anterior resection (n:27, %36) and for tumors

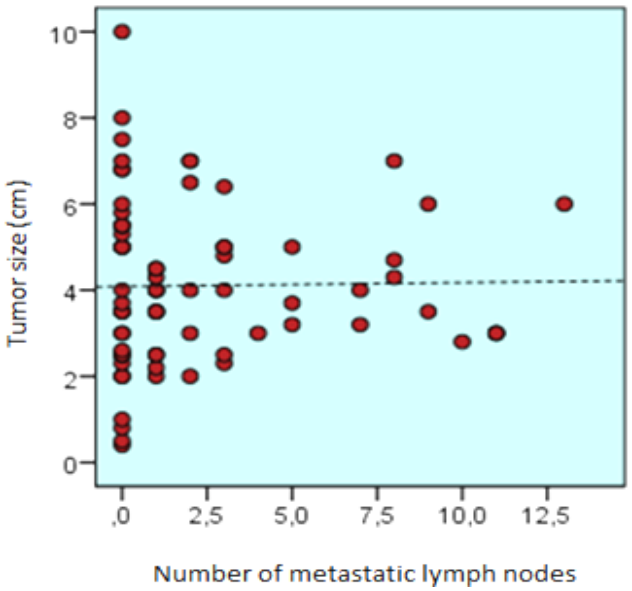

Figure-2. Tumor size and the number of metastatic lymph nodes

invading the distal rectum and the anal verge, abdominoperineal resection and Miles procedure (n:9, %12) was performed. The average lymph node yield was 17.5 (±8.4) and mean metastatic lymph node was 2.4 (±3.4). The results are summarized in Table-1.

Table-2. Lymph node yield and metastatic lymph nodes according to tumor size

Tumor Size							
	< 4 cm			≥4 cm			p value
	Mean±SD / n-%		Med (Min-Max)	Mean±SD / n-%		Med (Min-Max)	
No of lymph nodes	17,1±10,4	13	8-45	17,9±6,0	17	9-30	0,045
No of metastatic lymph nodes	2,4±3,6	1	0-11	2,3±3,2	1	0-13	0,841

Number of harvested lymph nodes was significantly higher in cases with tumor size ≥4 cm , and there was a positive correlation between lymph node yield and tumor size. On the other hand, no such relationship that reached statistical significance was demonstrated for number of metastatic lymph nodes and tumor size. The lymph node yield and number of metastatic lymph nodes according to tumor size are shown in Table-2 and Spearan Correlation in Table-3. Figure-1 and 2 contain the graphical analyses.

		No of lymph nodes	No of metastatic lymph nodes
Tumor size	r	0,336	0,03
	p	0,003	0,798

Table-3. Spearan Correlation between tumor size and number of lymph nodes

Discussion

TME has been standard surgical treatment for rectal cancer for over 30 years. Over the years, with advances in minimally invasive surgery, laparoscopic TME has been more widely performed. As extensive lymph node dissection is a key aspect in the success of colorectal surgery, one of the major concerns surrounding laparoscopic colorectal surgery is about whether sufficient lymphatic dissection is possible with this approach. Thus, numerous studies were conducted which compare laparoscopic and open techniques regarding lymph node yield, completeness of mesorectal excision morbidity and survival.

Among randomized trials comparing laparoscopic and open approaches to rectal surgery, Leung et al. reported a mean lymph node yield of 11.1 from 203 laparoscopic operations (3). Braga et al. in a smaller series of 83 patients reported 12.7 nodes (4). Ng et al, in their study with low rectal cancers undergoing abdominoperineal resection published in 2008, compared laparoscopic and open approaches with an average of 12.4 lymph nodes per laparoscopic operation (5). In a more recent study from the same institution, this time including mid level as well as low level rectal cancers, the average number of lymph nodes removed was 17.7 (6).

There are also many non-randomized studies comparing laparoscopic and open rectal surgery. Anthuber et al. have reported 15.3 lymph nodes in 2003 (7). Bretagnol et al

have harvested in average 10 nodes per laparoscopic operation (8) and Morino et al 12.4 (9). Average yield in the study of Law et al was found to be 10 lymph nodes (10). Two series of similar size by Lelong et al and Staudacher et al comparing laparoscopic and total mesorectal excision, both published in 2007 report the number of laparoscopically resected lymph nodes as 11 and 14.3, respectively (11, 12). The study of Dural et al from Turkey reports the highest number of resected lymph nodes at 20.7 (13). The results of our analysis from our own clinic are similar with others in the literature. Taking the number of resected lymph nodes as a sign of successful surgery, with 17.5 lymph nodes per operation, we have performed favorably. Our results thus support the point that laparoscopic approach does indeed allow meticulous lymphatic dissection with the added benefit of low surgical morbidity.

Our study has several drawbacks. One of these was that there is no distinction between patients receiving neoadjuvant oncological therapy and those who do not. Neoadjuvant therapy can significantly reduce the number of lymph nodes in the specimen, thus affecting the results. Another drawback was the retrospective descriptive nature of the study only analyzing cases who underwent laparoscopic colorectal surgery instead of comparing laparoscopy and open technique. As discussed previously, the lymph node yield differs very much between different institutions, so comparing the results from different studies would inevitably overlook the effects of surgical experience and the pathological examination process. The finding that the number of total resected lymph nodes was higher in larger tumors despite the number of metastatic nodes not displaying statistical difference was interesting. The sample size might be inadequate for demonstrating any such statistical significance.

In conclusion, laparoscopic TME is a valid option for the treatment of colorectal cancers. In addition to the universal benefits of minimally invasive surgery, laparoscopic approach allows extensive lymph node dissection, addressing oncological concerns surrounding the technique.

Conflict of interest

The authors declare no conflicts of interest.

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