



Laparoscopic Reproducibility of Complete Mesocolon Excision: A Retrospective Analysis

Emanuele CEA, Christopher Clark and Giuseppe Piccinni*

Department of Biomedical Sciences and Human Oncology, University of Bari, Italy

Abstract

Radical surgery for colorectal cancer is undoubtedly necessary for stages I, II and III and must consider the removal of the intestinal segment and the relative afferent lymph node stations affected by the tumor. This surgical technique called Complete Mesocolon Excision seems to satisfy an optimal oncological quality. The aim of this retrospective preliminary study is to verify the actual possibility of performing CME by laparoscopy on the left and right colon. After this fundamental requirement is met, the study aims to evaluate whether the laparoscopic technique is a valid alternative to the open approach, in terms of oncological quality. We retrospectively analysed the chart of 38 pts affected by colon cancer.

20 patients underwent left resection. Of these, 9 in open surgery and 11 using the laparoscopic approach. The remaining 18 patients underwent right hemicolectomy, open for 14 of these, laparoscopic for the remaining 4. After check of the integrity of the mesocolon we collected data regarding the length of the removed colon, the distance of the tumor from the central vascular ligation, the peritoneal area and the number of lymph node removed. The statistic analysis of the samples was carried out using the Student's T test, Fisher's exact test and Mann-Whitney's U test, where appropriate. Our data showed despite a small sample size, that CME performed laparoscopically is oncologically equivalent to open CME. With sufficient training and experience, the laparoscopic approach seems to offer a lower number of complications with comparable results.

Introduction

In spite of the substantial therapeutic improvements, colorectal carcinoma is still one of the major causes of morbidity and mortality in the world. At the moment of diagnosis, the stage of the illness remains the most important prognostic factor, with about 75% of patients diagnosed with this neoplasm being likely to require surgery [1].

Radical surgery with therapeutic purpose is undoubtedly necessary for stages I, II and III and must consider the removal of the intestinal segment and the relative afferent lymph node stations affected by the tumor [2].

In accordance with the Heald's surgical concept of *Total Mesorectal Excision (TME)* as the oncological quality standard for rectal tumors [3], *Complete Mesocolon Excision* was introduced by Hohenberger in 1998 [4] with the following principles

1. Removal of the mesentery affected by the tumor, within a complete envelope of fascia and visceral peritoneum that contain all lymph nodes draining the tumor
2. Ligation at the origin, also defined as central ligation of the directly involved artery
3. Resection of an adequate length of the bowel to guarantee r0 with particular respect of the pericolic lymph node chain.

Although Cochrane's evidence demonstrated better short-term results of laparoscopic colectomy compared to the open approach [5], we have uncertain data regarding the efficiency of CME with the laparoscopic technique. In particular, some authors have considered the relative simplicity of the open, lateral to medial approach to Toldt's retroperitoneal fascia, and questioned whether the more commonly utilized medial to lateral approach could provide the same results [6]. The aim of this study is first of all to verify the actual possibility of performing CME by laparoscopy on the left and right colon. After this fundamental requirement is met, the study aims to evaluate whether the laparoscopic technique is a valid alternative to the open approach, in terms of oncological quality.

OPEN ACCESS

*Correspondence:

Giuseppe Piccinni, Department of Biomedical Sciences and Human Oncology, University of Bari, Piazza Umberto I, 1, 70121 Bari, Italy, E-mail: giuseppe.piccinni@uniba.it

Received Date: 17 Jan 2017

Accepted Date: 17 Apr 2017

Published Date: 24 Apr 2017

Citation:

Emanuele CEA, Clark C, Piccinni G. Laparoscopic Reproducibility of Complete Mesocolon Excision: A Retrospective Analysis. *Clin Surg.* 2017; 2: 1425.

Copyright © 2017 Piccinni G. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Materials and Methods

We retrospectively analyzed data regarding 38 patients hospitalized for carcinoma of the colon at the Department of Biomedical Sciences and Oncology. In each of the patients a CME with central vascular ligation was performed, by open or laparoscopic approach. The patients were then sorted into different groups according to the location of the resection (right hemicolectomy or sigma resection) and the surgical technique (open or laparoscopic). In order to make the study more incisive we also analyzed the tissue morphometry parameters introduced by West to verify whether the two approaches can be interchangeable. For this reason high resolution photographs were taken of all the operatory pieces, while morphometric quantization was carried out by dedicated software, evaluating the tissue's morphometric data regarding the length of the removed colon, the distance of the tumor from the central vascular ligation, the minimum distance of the removed colon from the vascular ligation and the peritoneal area. Each of the different samples was evaluated on the integrity of the mesocolon, with the aim of excluding possible incomplete samples from the study. However, none of these showed incompleteness of the mesocolon; consequently, all of the samples were considered valid.

The statistic analysis of the samples was carried out using the Student's T test, Fisher's exact test and Mann-Whitney's U test, where appropriate. Statistical significance was considered for P values lower than 0.05. 20 patients underwent left resection. Of these, 9 in open surgery (3 male, 6 female, age 58 - 85, average 72.78) and 11 using the laparoscopic approach (9 male and 2 female, age 40 - 77, average 61.18). The remaining 18 patients underwent right hemicolectomy, open for 14 of these (5 male, 9 female, age 61-91, average 72.93), laparoscopic for the remaining 4 (3 male, 1 female, age 65-81, average 75.25). The anatomopathological exam showed a number of lymph nodes between 10 and 32 for the subjects who underwent open left resection (median 16), between 9 and 34 for laparoscopic left resection (median 18), between 8 and 26 for open right hemicolectomies (median 16) and between 8 and 22 for laparoscopic hemicolectomies (median 13). Of these lymph nodes, a number between 0 and 6 and between 0 and 4 were positive for neoplastic infiltration in left resections, using open and laparoscopic techniques respectively. The positivity range was 0-3 and 0-4 for right resections, using open and laparoscopic techniques respectively.

Results

Patients who underwent left resection by laparoscopic approach were younger than patients who underwent open resection (average 61.18 vs. 72.78), a statistically significant difference ($p=0.048$). By contrast, patients who underwent right resections in laparoscopy were older than patients who underwent them in open surgery (average 75.25 vs. 72.93), but this result was not statistically significant ($p=0.679$). The number of lymph nodes collected in right resections is comparable with both laparoscopic and open techniques, with a median of 16 and 18 respectively ($p=0.364$).

Left resections performed in laparoscopy show a slightly lower median compared to the open ones (13 vs. 16, respectively), but in this case too, they are not statistically relevant differences ($P=0,322$). In the group undergoing left resection, the segment of large intestine removed was between 10 cm and 28 cm long in the open surgeries (median 18 cm), while laparoscopic resections provided samples of a length between 12.5 cm and 30 cm (median 18 cm). In the group of

patients who underwent open right hemicolectomy, the dimensions of the removed colon varied from 7 cm to 40 cm (median 22 cm), while the group undergoing the same surgery laparoscopically showed a colic segment of length between 9 cm and 30 cm (median 19 cm). There were no statistically relevant differences either for right hemicolectomies or sigma resections, ($P=0.580$ and $P=0.719$, respectively). The group of patients who underwent left resection showed a high minimum distance of the colon from the vascular ligation, in an 8-13 cm range both for open and laparoscopic resections (median 11 cm and 10 cm, respectively). These differences are not statistically significant ($P=0.596$). On the contrary, those who underwent right resection showed a minimum distance of the colon from the vascular ligation of between 4-10 cm and 8-10 cm, in open surgery and laparoscopy respectively (median 8 cm and 9 cm); these differences were statistically relevant ($P=0,026$).

The distance of the tumor from the vascular ligation showed no statistically relevant variations ($P=0.849$ left, $P=0.07$ right), either for left or right resections. As for left resections, the range was 10-16 cm (open) and 10-15 cm (laparoscopy), with a median of 12 cm for both groups; regarding right resections, the range was 7-13 cm (open, median 10 cm) and 10-12 cm (laparoscopy, median 10.5 cm).

The area of mesentery included in the operatory piece derived from left resections ($P=0.834$) was between 80 cm and 140 cm for open surgeries, and between 62.5 cm and 142.5 cm for laparoscopic resections (median 112 cm and 112.5 cm respectively). The area of mesentery included in the operatory piece derived from right resections ($P=0.984$) was between 17.5 and 200 cm for open surgery (median 99.25 cm) and between 45 and 180 cm for laparoscopic resections (median 110.5 cm) [7,8].

Conclusion

Indeed, by comparing the results obtained by German surgeons who applied the CME with central vascular ligature, with those of British surgeons who operated using traditional surgery, they demonstrated the net superiority of the former technique, by assessing four main morphological parameters: the length of the respected intestine, the distance of the tumor from the vascular ligature, the minimum distance of the section of intestine respected by the vascular ligature and the area of mesentery removed. Apart from these parameters, a higher number of lymph nodes were collected that, when negative are strictly related with improvement of the survival rate.

After this, European and Japanese surgeons have increasingly adopted the more radical principle of complete mesocolon excision as the gold standard for colon cancer.

Analysis of our data, in spite of the small size, allow us to state that CME would seem to be possible using either laparoscopy or open surgery, with both techniques guaranteeing similar surgical quality and aggression. It can, therefore, be concluded that CME performed laparoscopically is oncologically equivalent to open CME. With sufficient training and experience, the laparoscopic approach seems to offer a lower number of complications with comparable results.

References

1. Desch CE, Benson AB, Somerfield MR, Flynn PJ, Krause C, Loprinzi CL, et al. Colorectal cancer surveillance: 2005 update of an American society of clinical oncology practice guideline. *J Clin Oncol.* 2005;23:8512-9.
2. Rentsch M, Schiergens T, Khandoga A, Werner J. Surgery for Colorectal

- Cancer - Trends, Developments, and Future Perspectives. *Visc Med.* 2016;32(3):184-91.
3. Heald RJ. The 'Holy Plane' of rectal surgery. *J R Soc Med.* 1988;81(9):503-8.
 4. Hohenberger W, Merkel S, Weber K. [Lymphadenectomy with tumors of the lower gastrointestinal tract]. *Chirurg.* 2007;78(3):217-25.
 5. Schwenk W, Haase O, Neudecker JJ, Müller JM. Short term benefits for laparoscopic colorectal resection. *Cochrane Database of Systematic Reviews.* 2005;CD003145.
 6. Dimitriou N, Griniatsos J. Complete mesocolic excision: Techniques and outcomes. *World J Gastrointest Oncol.* 2015;7(12):383-8.
 7. West NP, Hohenberger W, Weber K, Perrakis A, Finan PJ, Quirke P. Complete mesocolic excision with central vascular ligation produces an oncologically superior specimen compared with standard surgery for carcinoma of the colon. *J Clin Oncol.* 2010;28(2):272-8.
 8. West NP, Kobayashi H, Takahashi K, Perrakis A, Weber K, Hohenberger W, et al . Understanding optimal colonic cancer surgery: comparison of Japanese D3 resection and European complete mesocolic excision with central vascular ligation. *J Clin Oncol.* 2012;30(15):1763-9.