

ASSESSMENT OF THE LEVEL OF MIDDLE COLIC ARTERY LIGATION INFLUENCE ON SURVIVAL IN RIGHT-SIDED COLON CANCER

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ABSTRACT

Aim: This study aims to investigate whether the addition of ligation of the Middle Colic Artery in its origin to Complete Mesocolic Excision (CME) with Central Vascular Ligation (CVL) affects overall survival and lymph node retrieval.

Method: Patients with right-sided colon cancer who underwent curative right or extended right hemicolectomy with CME and CVL were included. In cases with tumors located in the distal part of the ascending colon and the hepatic flexure, the middle colic artery was ligated in its origin. For the cecal and proximal localization of the tumor, the point of ligation was decided on the surgeons' decision.

Results: A total number of 169 patients were operated. In 78 patients the tumor was localized in the caecum, in 70 patients in the ascending colon, and 21 in the hepatic flexure. In 59 patients, the middle colic artery was ligated in its origin. Different artery ligation sites according to tumor localization subgroup presented with statistical significance ($P = 0.004$). The mean number of harvested lymph nodes between the groups was presented with a difference (33.4 vs. 28.5; $P = 0.037$). Survival rates for cecal, ascending, and hepatic flexure cancer were as follows: 61.5%, 67.1%, and 85.7%, respectively ($P = 0.22$). The survival rate for all patients was 66.9% (69.5% for patients with middle colic artery ligation and 65.5% for the right branch of middle colic artery ligation, $P = 0.42$).

Conclusion: Ligation of the middle colic artery in its origin did not improve overall survival. However, it resulted in a significantly higher number of harvested lymph nodes.

Keywords: central vascular ligation; complete mesocolic excision; middle colic artery; right-sided colon cancer; survival

INTRODUCTION

The present ongoing rising incidence of colorectal cancer puts this entity in fourth place. Colon cancer itself is the third most commonly diagnosed cancer in the world according to GLOBOCAN 2018 data. Developed countries carry the

highest risk led by Southern Europe, Australia/New Zealand, and Northern Europe regions. The mortality estimation is set on 5.8% of all cancer deaths in 2018, which puts colon cancer as the fifth most deadly cancer worldwide [1]. Colon

cancer location has been shown to present with certain differences. Colon subsite location of the malignant process differs in terms of age, gender, stage, tumor grade, and survival. Right-sided colon cancer (RCC) is associated with advanced age and female gender. On the other hand, left-sided colon cancer (LCC) is associated with a significantly reduced risk of death [2].

Having in mind the fact that the main cause of lethal outcomes in patients with cancer is metastatic disease, the focus is moved to local and distant metastasis prevention. The combination of surgery and systemic therapy (neoadjuvant and adjuvant) is the tool currently used in this, sometimes, unbalanced battle. While systemic treatment targets the tumor cells detached from the primary neoplastic focus, surgery deals with locoregional lesions accessible for excision [3].

The idea for Complete Mesocolic Excision (CME) with Central Vascular Ligation (CVL) is based on decreasing cancers' local recurrence rate and prolonging survival, especially in patients with positive lymph nodes.⁴ In patients with

right-sided colon cancer, the standard treatment consists of right/extended right hemicolectomy with CME and CVL of the ileocolic artery, right colic artery (if existing), and the right branch of the middle colic artery.⁵ However, anatomical variations in the arterial supply of the right colon must be considered when trying to ensure adequate oncological resection.⁶ A Swedish study raised questions on the mesenteric resection extent regarding the colic arteries site of ligation in right colon cancer and its effect on survival [7].

Localization of tumors within the subsite of the right colon, such as the caecum, ascending colon, and hepatic flexure, has some clinical differences that may require additional locoregional lymph node dissection such as infrapyloric and gastroepiploic lymph node harvest [8, 9].

This study aims to investigate whether adding a Middle Colic Artery (MCA) origin ligation to the CME/CVL compared to the ligation of its right branch will affect the overall survival and the extent of the lymph node retrieval (Figure 1). As a secondary endpoint, the study investi-

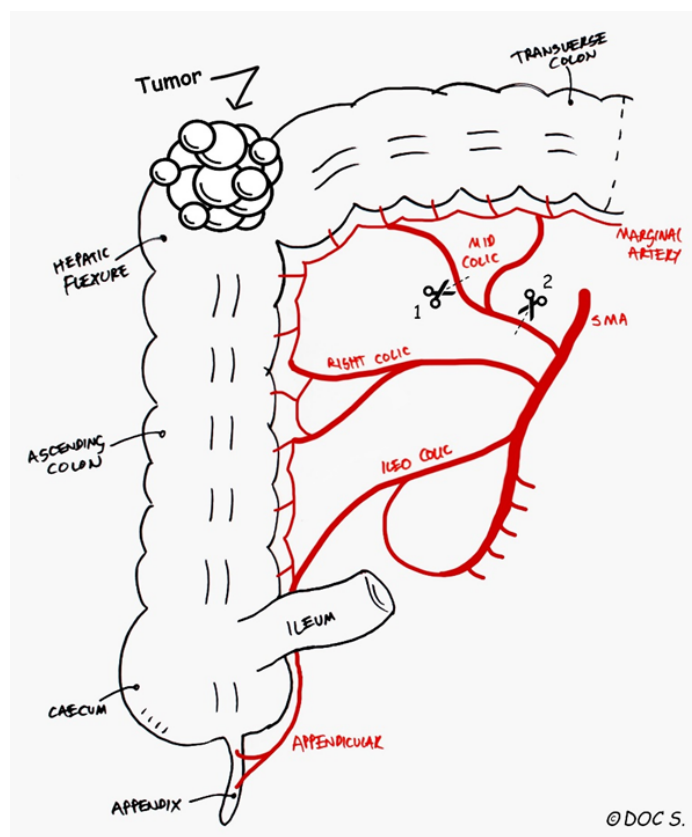


Figure 1. Different locations of artery ligation in right-sided colon cancer surgery. Scissor 1 – right branch of middle colic artery ligation; scissor 2 – middle colic artery ligation in its origin.

gates the influence of right-colon subsite cancer localization on survival.

METHODS

Patient selection, diagnosis, and treatment protocol

This is a retrospective single-center study. Patients with right-sided colon cancer who underwent curative right or extended right colectomy with CME and CVL between January 2015 and December 2021 were included in this study. All the patients' data were evaluated on a multi-disciplinary oncological board. Double contrast-enhanced abdominal computerized tomography was used for preoperative tumor and local nodal status determination following the endoscopic cancer diagnosis. Patients were operated with either right hemicolectomy (right branch of middle colic artery ligation, Group A) or extended right hemicolectomy (middle colic artery ligated in its origin, Group B). Adjuvant chemotherapy was conducted in Stage II and III cancers.

Surgical technique

Lateral to medial (open surgery) approach was used in standard fashion. Following the right plane dissection by taking all of the embryological adhesions sharply, the Kocher maneuver was employed. These steps allowed colon exposure with its mesentery root and the adjacent central vessel. Next, the duodenum along with the head of the pancreas was taken down from the mesocolic fascia. The Superior Mesenteric Vein was exposed and dissected. The origin of the Middle Colic Vessels was visualized and examined to see if there are suspected metastatic lymph nodes. In distally located ascending colon and hepatic flexure cancers, the middle colic artery was ligated in its origin. For the cecal and proximal localization of the tumor, surgeons' decision whether to ligate or not the middle colic artery was dictated by tumor size, the length of the right colon, and the distal resection margin. Patient demographic and tumor data (tumor location, T stage, tumor grade, lymph node number and status, and Lymphovascular invasion - LVI and Perineural Invasion - PNI) were collected. Patients were

divided into two groups according to whether the middle colic artery was ligated or not and were compared for overall survival (OS) function estimation.

Statistical analysis

Statistical analysis was performed by using the SPSS v. 18.0.0 (IBM Corp., Armonk, NY, USA) software. Numeric variables are presented as mean and compared with the Student t-test or the Mann-Whitney U-test. Categorical variables are presented as numbers and compared with the chi-square test. OS was estimated by the Kaplan-Meier method and the log-rank test was used to compare differences in survival between the groups. Log Rank test was used for the univariate analysis and Cox regression analysis was performed to identify the independent factors that affect survival. Statistical significance was set for a p-value of ≤ 0.05 .

RESULTS

A total of 169 patients with a mean age of 63.4 were operated on, 101 of them male, and 68 females. According to gender, there were no statistical differences between the two groups. Patients in whom the middle colic artery was ligated in its origin presented younger in comparison to the rest (59.7 and 65.4 years, respectively) and this difference presented statistically significant ($P = 0.006$). According to tumor localization, in 78 patients the tumor was in the caecum, in 70 patients in the ascending colon, and 21 in the hepatic flexure. In 59 patients, the middle colic artery was ligated in origin, and in the rest 110, the right branch of the middle colic artery was ligated. Different artery ligation sites (the root of middle colic artery ligation or not) according to tumor localization subgroup (cecum, ascending colon, and hepatic flexure tumors), presented with statistical significance ($P = 0.004$). Most of the patients presented with stage T3 tumors and a predominance of moderate tumor differentiation. The mean number of harvested lymph nodes in patients with middle colic artery ligation was higher than the ligation of the right branch of the middle colic artery (33.4 vs. 28.5; $P = 0.037$). In 90 patients, lymph node metastases were present (Table 1).

The log-rank test was used for the univariate survival analysis according to T stage, LVI, and PNI. The T4 stage presented with the worst survival ($P = 0.001$). LVI presence in the tumor was found to have worse survival ($P = 0.01$). PNI presence in the tumor also presented with worse survival ($P < 0.001$).

Survival rates according to tumor localization for cecal, ascending, and hepatic flexure cancer were 61.5%, 67.1%, and 85.7%, respectively. Still, the Log Rank test for survival distributions showed no statistical difference (Figure 2).

The mean overall survival of the patients during follow-up was 40.4 months, with a survival rate of 66.9%. There was no statistical difference in OS between the groups according to gender ($P = 0.26$) and tumor localization ($P = 0.22$). Statistically significant differences in survival were presented according to T stage ($P = 0.001$) and positive lymph node presence ($P < 0.001$).

Patients with middle colic artery ligation had a survival rate of 69.5%, on the contrary, the ones with the right branch of middle colic artery ligation had a survival rate of 65.5% during follow-up. The log-rank (Mantel-Cox test) for comparison of survival time estimation presented without statistical significance ($P = 0.42$), (Figure 3).

Multivariate analysis of certain tumor variables was performed by using Cox regression analysis. It revealed that T stage ($P = 0.008$) and the presence of PNI ($P = 0.003$) are the independent prognostic factors that affect survival in right-sided colon cancer (Table 2).

DISCUSSION

The question of the level of lymphadenectomy extension is still present and unanswered. Having in mind the concept of “two colons”

Table 1. Patient demographics and tumor data.

	Total (%)	Group A (%)	Group B (%)	P value
Age (mean)	63.4	65.4	59.7	0.006
Gender				
Male	101 (59.7)	66 (65.3)	35 (34.7)	0.93
Female	68 (40.3)	44 (64.7)	24 (35.3)	
Tumor localization				
Cecum	78 (46.1)	53 (67.9)	25 (32.1)	0.004
Ascending colon	70 (41.4)	50 (71.4)	20 (28.6)	
Hepatic flexure	21 (12.5)	7 (33.3)	14 (66.7)	
T stage				
I	2	1	1	0.12
II	14	10	4	
III	95	54	41	
IV a	49	38	11	
IV b	9	7	2	
Tumor differentiation				
Well	21 (12.4)	15 (71.4)	6 (28.6)	0.037
Moderate	101 (59.8)	67 (66.3)	34 (33.7)	
Poor	10 (5.9)	5 (50)	5 (50)	
Mucinous	26 (15.4)	14 (53.8)	12 (46.2)	
Mixed	9 (5.3)	7 (77.8)	2 (22.2)	
Signet ring cell	2 (1.2)	1 (50)	1 (50)	
Mean lymph node number harvested	30.27	28.5	33.4	
Lymph node metastases				
Negative	79	48	31	0.27
Positive	90	62	28	

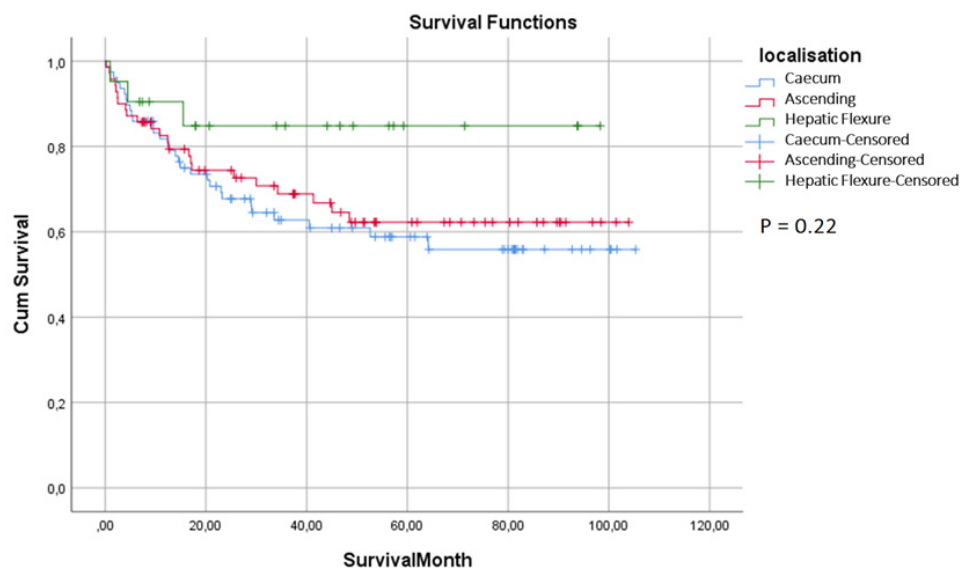


Figure 2. Kaplan-Meier curve on the cumulative survival functions according to different tumor localization.

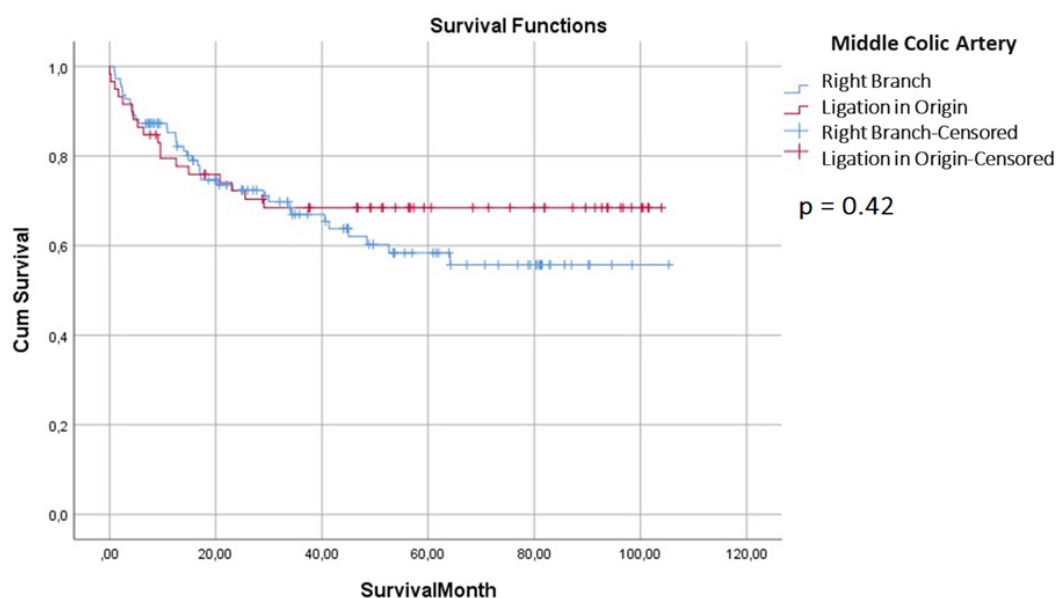


Figure 3. Kaplan-Meier curve on the overall survival functions according to different sites of artery ligation

Table 2. Multivariate analysis of factors that affect survival.

	B	SE	Wald	Sig.	Exp(B)	95,0% CI for Exp(B)	
						Lower	Upper
T stage	0.490	0.185	7.029	0.008	1.632	1.136	2.343
Localization	-0.262	0.213	1.509	0.219	0.770	0.507	1.169
LVI	0.444	0.321	1.906	0.167	1.558	0.830	2.925
PNI	0.905	0.310	8.544	0.003	2.472	1.347	4.534
MCA ligated	0.235	0.301	0.610	0.435	1.265	0.701	2.283

(proximal and distal), a distinction between these two parts can be made. Partially it is due to the differences in the embryologic origin and biologic characteristics of different colon parts [10]. A large number of patients with colon cancer develop distant liver and pulmonary metastases regardless of the locoregional lymph nodal status. Namely, in their population-based study, Riihimäki et al. showed that 40 – 60% of metachronous metastases in patients with colorectal cancer developed regardless of their N0 status [11]. In addition to this, the Dutch national postmortem retrospective review of Klijn et al. revealed equal distribution of liver and lung metastases with and without lymph node metastases presence [12]. Still, in one-third of the rest of these patients, the lymph node metastases are considered to be the main gateway to distant metastases. The importance of lymph node metastases as a strong prognostic factor is fading by other newly discovered factors such as extramural vascular invasion and tumor deposits [13]. The surgeon is an important chain in the oncologic multidisciplinary team that implements the therapeutic strategy in colon cancer. Its role is to perform oncologically appropriate colon resection to establish the route to a potentially successful cancer treatment.

Very few studies assess the problem of the colon vessel ligation level in right-sided colon cancer [7, 14-16]. Hida et al. examined the level of primary feeding artery ligation in colon cancer and its influence on the proper oncologic resection. They concluded that for T1 tumors, central lymph node dissection is not required. On the contrary, for T3 and T4 tumors, it should be performed [14].

In the study of Olofsson et al., three variations of right-colon cancer surgery based on the position of the vascular tie were compared. One of them was a central ligation of the ileocolic vessels with central ligation of the middle colic vessels in 334 patients. No difference in the three-year overall survival and three-year disease-free survival was shown between the groups [7].

Tiselius et al. examined the influence of the length of the removed specimen and the arterial vessel on survival in left- and right-sided colon cancer surgery. They concluded that more lymph nodes were extracted in patients with longer colon specimens, but no survival benefit was associated with the tumor-feeding arterial vessel length [16].

This study shows that ligation of the middle colic artery from its origin is not superior to ligation of its right branch according to overall survival. In the definition of complete mesocolic excision, central vascular ligation is suggested to achieve proper lymphatic dissection [5]. A higher number of lymph node extractions is proven in cases where CVL was performed, thus resulting in an oncologically superior specimen [17]. The main route of the right colon lymphatic drainage is to the ileocolic vessel area and high vascular ligation of ileocolic vessels is enough for adequate lymph node harvest [18]. On the contrary, extended procedure with CVL of the middle colic artery can lead to increased surgical complication rates [14]. Olofsson et al. report increased 30-day mortality in their extended mesenteric resection group due to the higher ratio of long operation time and perioperative bleeding [7].

Right colon cancer itself carries some surgical dilemma and the surgeon needs intraoperative decision making. Tumor subsite (caecum, proximal ascending colon, distal ascending colon, hepatic flexure) might produce a dilemma in the resection procedure selection. While distally located tumors might need the use of extended right colectomy, proximally located cancers require only right hemicolectomy with CME. Other than the tumor subsiding, the tumor size, the anatomical length of the right colon, and the distal resection margin may also affect whether right hemicolectomy or extended right hemicolectomy should be selected.

For tumors originating in the hepatic flexure, the non-use of extended right colectomy carries the risk and possibility of tumor recurrence and leaving the potentially positive lymph nodes behind [9]. Therefore, in some European countries, their national guidelines recommend the use of conventional right hemicolectomy for cancers located in the cecum and oral part of the ascending colon while cases with ascending colon, hepatic flexure, and oral part of the transverse colon cancers should be treated with extended right hemicolectomy with subsequent middle colic artery ligation [19].

The number of lymph node harvests in cases with middle colic artery ligation is significantly higher compared to the standard right hemicolectomy [20]. The proposed Japanese technique of D3 lymphadenectomy by Kanemitsu resulted in a mean number of examined lymph nodes of 31 (range 3 – 115), but this ap-

proach was applied without ligation of the middle colic artery in its origin [21]. However, this technique is demanding in comparison to conventional right-sided hemicolectomy [8]. In the systematic review and meta-analysis of Ferri et al., fifteen studies reported differences in mean lymph node number extraction after CME and non-CME surgery (28.1 and 19.9, respectively) [22]. This study also presented a statistically significant difference in the number of lymph node extractions.

The reported difference in local-regional recurrence rate in terms of whether the middle colic artery is ligated or not is without statistical significance. The Danish Nationwide Population-Based Study conducted on 12,855 patients, where 1,151 underwent extended right hemicolectomy showed no significant difference in the distant metastasis occurrence and the overall mortality. According to the reported limitation of the study, the extent of the lymphatic dissection was not reflected by the extended right hemicolectomy as it was pre-defined. However, the study showed higher rates of postoperative complications associated with the extended resection, but none of its endpoints addressed the overall survival. The study opens a gate for further research in the management of patients with right colon cancer [20].

The concept of Complete Mesocolic Excision with Central Vascular Ligation resulted in an increase in disease-free survival for patients with right colectomy [17, 22]. Regarding the overall survival, the advantage of the CME with CVL over the conventional surgery was yet not proven and heterogeneity in the outcome is present. While some authors present improved OS with the use of CME/CVL, others show no advantages [23].

Regarding the factors associated with worse overall survival in patients with right-sided colon cancer (T stage, N stage, hepatic flexure localization, histological grade, lymphovascular invasion presence, number of examined lymph nodes) [2, 24-26], almost none of the cited reports focus on the question of whether the root of the middle colic artery should be ligated, especially in younger patients with cancer located at the level of the hepatic flexure. In the study of Zenger et al., the authors give an accent on the level of ligation of the main vascular structures and not the anatomical plane dissection differences between the standard right hemicolectomy

and the CME. Their results showed better three-year overall and disease-free survival in the CME group without statistical significance [15]. When compared, in the work of Zenger et al., the main observation was performed between two groups operated with conventional right hemicolectomy and complete mesocolic excision, while in this study CME was done in all patients and the only technical difference was the point of vascular ligation of the middle colic artery.

This study might open a dilemma that is objectively present in the surgeons' mind when dealing with right-sided colon cancer, thus having in mind the anatomical varieties in the arterial anatomy of the right colon and the local extent of the malignant process.

Study limitations: this is a retrospective, single-center study, with a small number of patients, and a relatively short follow-up period. Selection bias is also possible due to the retrospectivity. The choice of the used procedure (right hemicolectomy and extended right hemicolectomy) depended on the surgeons' preference and was not dictated by guidelines or recommendations.

CONCLUSION

The ligation of the middle colic artery in its origin in cases of right-sided colon cancer resulted in a significantly higher number of harvested lymph nodes. This fact must be considered when intending to extract as many as possible lymph nodes to influence overall survival despite the controversies in the published reports. Younger patients and patients with tumors located in the hepatic flexure were more likely to be treated with ligation of the middle colic artery. Cancers located in the hepatic flexure had a higher survival rate when compared to other subsite localization tumors of the right colon, but this difference was not significant. The tumor stage and lymphovascular invasion were the only independent factors affecting survival.

The ligation of the middle colic artery from its origin did not improve overall survival in right-sided colon cancer. The decision whether to ligate it in its origin in patients with right-sided colon cancer remains to the leading surgeon and certainly may be considered if the tumor is

located in the distal ascending colon and the hepatic flexure.

REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018; 68(6): 394–424.
2. Mangone L, Pinto C, Mancuso P, Ottone M, Bisceglia I, Chiaranda G, et al. Colon cancer survival differs from right side to left side and lymph node harvest number matter. *BMC Public Health*. 2021; 21(1): 1–10.
3. Klein CA. Parallel progression of primary tumours and metastases. *Nat Rev Cancer*. 2009; 9(4): 302–12.
4. Paquette IM, Madoff RD, Sigurdson ER, Chang GJ. Impact of Proximal Vascular Ligation on Survival of Patients with Colon Cancer. *Ann Surg Oncol*. 2018; 25(1): 38–45.
5. Hohenberger W, Weber K, Matzel K, Papadopoulos T, Merkel S. Standardized surgery for colonic cancer: Complete mesocolic excision and central ligation – Technical notes and outcome. *Color Dis*. 2009; 11(4): 354–64.
6. Cirocchi R, Randolph J, Davies RJ, Cheruiyot I, Gioia S, Henry BM, et al. A systematic review and meta-analysis of variants of the branches of the superior mesenteric artery: the Achilles heel of right hemicolectomy with complete mesocolic excision? Vol. 23, *Colorectal Disease*. 2021. 2834–2845 p.
7. Olofsson F, Buchwald P, Elmståhl S, Syk I. No benefit of extended mesenteric resection with central vascular ligation in right-sided colon cancer. *Color Dis*. 2016; 18(8): 773–8.
8. Franceschilli M, Vinci D, Di Carlo S, Sensi B, Siragusa L, Guida A, et al. Central vascular ligation and mesentery based abdominal surgery. *Discov Oncol* [Internet]. 2021; 12(1). Available from: <https://doi.org/10.1007/s12672-021-00419-4>.
9. Zheng H Da, Xu JH, Liu YR, Sun YF. Analysis of 20 patients with laparoscopic extended right colectomy. *World J Clin Cases*. 2022; 10(2): 528–37.
10. Gervaz P, Bucher P, Morel P. Two colons-two cancers: Paradigm shift and clinical implications. *J Surg Oncol*. 2004; 88(4): 261–6.
11. Riihimäki M, Hemminki A, Sundquist J, Hemminki K. Patterns of metastasis in colon and rectal cancer. *Sci Rep* [Internet]. 2016; 6: 1–9. Available from: <http://dx.doi.org/10.1038/srep29765>.
12. Knijn N, van Erning FN, Overbeek LIH, Punt CJA, Lemmens VEPP, Hugen N, et al. Limited effect of lymph node status on the metastatic pattern in colorectal cancer. *Oncotarget*. 2016;7(22):31699–707.
13. Brouwer NPM, Hugen N, Nagtegaal ID. More extensive lymphadenectomy in colon cancer; how far are we willing to go for a biomarker? *Tech Coloproctol* [Internet]. 2020;24(7):761–4. Available from: <https://doi.org/10.1007/s10151-020-02239-0>.
14. Hida JI, Okuno K, Yasutomi M, Yoshifuji T, Uchida T, Tokoro T, et al. Optimal ligation level of the primary feeding artery and bowel resection margin in colon cancer surgery: The influence of the site of the primary feeding artery. *Dis Colon Rectum*. 2005;48(12):2232–7.
15. Zenger S, Aytac E, Gurbuz B, Ozben V, Ozoran E, Baca B, et al. Metastasis to lymph nodes around the vascular tie worsens long-term oncological outcomes following complete mesocolic excision and conventional colectomy for right-sided colon cancer. *Tech Coloproctol* [Internet]. 2021;25(3):309–17. Available from: <https://doi.org/10.1007/s10151-020-02378-4>.
16. Tiselius C, Kindler C, Smedh K. Importance of Arterial Vessel Length for Metastatic Lymph Node Retrieval and Survival in Standardized Left- and Right-Sided Colon Cancer Surgery. *J Gastrointest Cancer*. 2023;54(3):809–19.
17. Gouvas N, Agalinos C, Papaparaskeva K, Perakis A, Hohenberger W, Xynos E. Surgery along the embryological planes for colon cancer: a systematic review of complete mesocolic excision. *Int J Colorectal Dis* [Internet]. 2016; 31(9): 1577–94. Available from: <http://dx.doi.org/10.1007/s00384-016-2626-2>.
18. Bertelsen CA, Kirkegaard-Klitbo A, Nielsen M, Leotta SM, Daisuke F, Gögenur I. Pattern of Colon Cancer Lymph Node Metastases in Patients Undergoing Central Mesocolic Lymph Node Excision: A Systematic Review. *Dis Colon Rectum*. 2016 Dec; 59(12): 1209–1221.
19. Ingeholm P, Gögenur I, Iversen LH. Danish colorectal cancer group database. *Clin Epidemiol*. 2016; 8: 465–8.
20. El-Hussuna A, Lytras T, Bruun NH, Klein MF, Emile SH, Qvist N. Extended Right-Sided Colon Resection Does Not Reduce the Risk of Colon Cancer Local-Regional Recurrence: Nationwide Population-Based Study from Danish Colorectal Cancer Group Database. Vol. Publish Ah, *Diseases of the Colon & Rectum*. 2022.
21. Kanemitsu Y, Komori K, Kimura K, Kato T. D3 lymph node dissection in right hemicolectomy with a no-touch isolation technique in patients with colon cancer. *Dis Colon Rectum*. 2013; 56(7): 815–24.

22. Ferri V, Vicente E, Quijano Y, Duran H, Diaz E, Fabra I, et al. Right-side colectomy with complete mesocolic excision vs conventional right-side colectomy in the treatment of colon cancer: a systematic review and meta-analysis. *Int J Colorectal Dis.* 2021;36(9):1885–904.
23. Alhassan N, Yang M, Wong-Chong N, Liberman AS, Charlebois P, Stein B, et al. Comparison between conventional colectomy and complete mesocolic excision for colon cancer: a systematic review and pooled analysis. *Surg Endosc* [Internet]. 2019;33(1):8–18. Available from: <https://doi.org/10.1007/s00464-018-6419-2>
24. Lim DR, Kuk JK, Kim T, Shin EJ. Comparison of oncological outcomes of right-sided colon cancer versus left-sided colon cancer after curative resection. *Med (United States).* 2017;96(42):1–7.
25. Nasser Y, Wai C, Zhu R, Sutanto C, Kasher E, Oka K, et al. The impact of tumor location on long-term survival outcomes in patients with right-sided colon cancer. *Tech Coloproctol* [Internet]. 2022;26(2):127–33. Available from: <https://doi.org/10.1007/s10151-021-02554-0>.
26. Reima H, Soplemann J, Innos K. Stage-specific survival differences between colon cancer subsites: a population-based study. *Acta Oncol (Madr)* [Internet]. 2021;60(12):1702–5. Available from: <https://doi.org/10.1080/0284186X.2021.1987515>.

Резиме

ПРОЦЕНА НА ВЛИЈАНИЕТО НА НИВОТО НА ЛИГИРАЊЕ НА СРЕДНАТА КОЛИЧНА АРТЕРИЈА ВРЗ ПРЕЖИВУВАЊЕТО КАЈ КАНЦЕР НА ДЕСЕН КОЛОН

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Цел: Студијата има цел да истражи дали лигирањето на средната колична артерија (СКА) веднаш по нејзиното настанување (централно лигирање) како додаток на централната мезоколична ексцизија (ЦМЕ) со централното васкуларно лигирање (ЦВЛ) влијае врз севкупното преживување и врз бројот на екстрахирани лимфни јазли.

Метод: Вклучени беа пациенти со карцином на десен колон, кои беа подложени на куртивна десна или проширена десна хемиколектомија со ЦМЕ и ЦВЛ. Кај случаи со тумор лоциран во дисталниот дел од асцендентниот колон и хепаталната флексура, СКА беше лигирана по нејзиното настанување (централно лигирање). Кај случаите на тумори лоцирани во цекумот и во проксималниот асцендентен колон, местото на лигирање беше одлучено од страна на хирургот.

Резултати: Вкупно беа оперирани 169 пациенти. Кај 78 од нив туморот беше локализиран во цекумот, кај 70 во асцендентниот колон и кај 21 нивно на хепаталната флексура. Кај 59 пациенти, СКА беше лигирана централно. Различно ниво на лигирање на СКА во однос на туморската локализација се презентираше статистички значајно ($P = 0,004$). Средниот број на екстрахирани лимфни јазли меѓу групите се прикажа со статистички значајна разлика (33,4 наспроти 28,5; $P = 0,037$). Стапките на преживување за туморите лоцирани во цекумот, асцендентниот колон и хепаталната флексура беа: 61,5 %, 67,1 % и 85,7 %, соодветно ($P = 0,22$). Стапката на преживување за сите пациенти беше 6,9 % (69,5 % за пациентите со централно лигирање на СКА и 65 % кај они каде беше лигирана нејзината десна гранка, $P = 0,42$).

Заклучок: Лигирањето на СКА на ниво на нејзино настанување не го подобри севкупното преживување. Сепак, тоа резултираше со значајно повисок број екстрахирани лимфни јазли.

Клучни зборови: централна васкуларна лигација, комплетна мезоколична ексцизија, средна колична артерија, деснострани карцином на колон, преживување