



Cancer of the Transverse Colon: Comparison of Extended Right or Left Hemicolectomy versus Transverse Colectomy

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Abstract

The transverse colon is the part of colon between right and left colon from right flexure to splenic flexure. Standard surgical treatment involves either extended colectomy (EC) or transverse colectomy (TC), depending on the location of the tumor. The aim of the present study was to compare anastomotic leakage, hospital stay, operative time, overall complications rate, harvested nodes overall survival, and disease-free survival comparing EC versus TC.

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Objectives

The transverse colon is the part of colon between right and left colon from right flexure to splenic flexure. The proximal two-thirds derive from mid-gut and the latter third derives from hind-gut. The proximal part is perfused by the middle colic artery that arises from superior mesenteric artery and the latter part is perfused by the left colic artery that is a branch of inferior mesenteric artery. The two parts of artery are joint with vascular anastomosis such as Riolo connection and are considered sensitive area of ischemia during colon-rectal surgery [1], [2]. The transverse colon is attached to the stomach by greater omentum; its mesentery is attached by the anterior surface of pancreas and is in close proximity with the liver, stomach, spleen, and pancreas. All these factors transform transverse colon cancer that accounts for only 10% of all colon cancer in a challenging procedure [1], [2] (Figure 1).

Materials and Methods

We have retrospectively evaluated PubMed articles. Fourteen studies were evaluated from 1995

to 2019. Six studies compared transverse colectomy (TC) versus extended colectomy (EC), including laparoscopic and open procedure. Eight studies included only laparoscopic procedures. Two independent researches performed the review. Research inclusion criteria were “transverse colon cancer, transverse resection, extended right colectomy, and extended left colectomy.” The object of this retrospective study is to analyze anastomotic leakage, operative time, overall complications rate, harvested nodes, overall survival (OS), and disease-free survival (DFS) comparing EC versus TC.

Outcomes

Milone *et al.* revised five articles comparing extended right or left colectomy and transverse resection for transverse cancer, including 11,687 patients, 4664 transverse resection, and 7,023 EC. They found no statistical difference between the two groups for what concerns anastomotic leak, 5 years DFS, operative time, and length of stay. They noticed a statistically significant difference in favor of EC (MD = -6.98, $p = < 0.00001$, 95% CI -9.75, -4.20) in number of harvested nodes. A 5-year recurrence was reported with



Figure 1: Incidence of different procedure of transverse colon cancer, from Lieve G.J

no statistically significant difference between the groups (OR = 0.78, $p = 0.38$, 95% CI 0.45, 1.35) [1]. Leijssen *et al.* identified 103 patients who underwent a TC versus extended right or left colectomy (EC). Of 103 pt, 63% underwent EC (right 47%, left 17%) and 37% TC. They

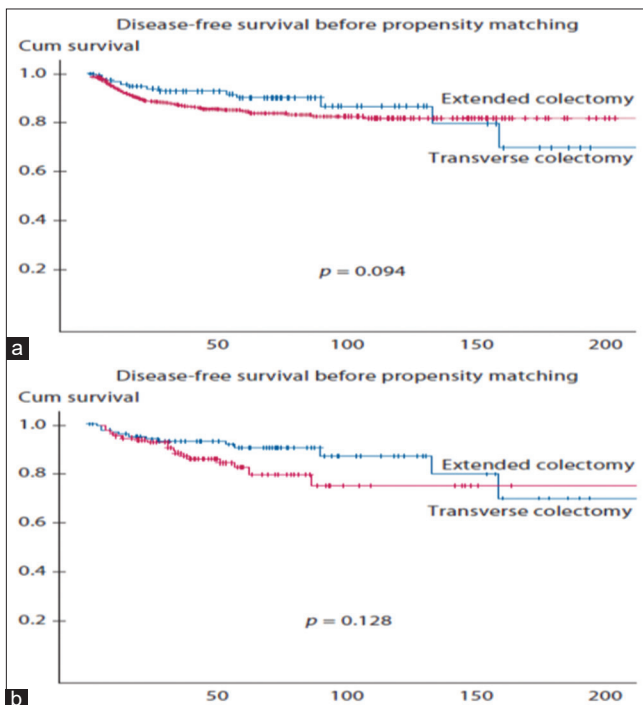


Figure 2: Disease-free survival plots before (a) and after (b) propensity score matching. Cum: Cumulative, DFS: Disease-free survival From Chong *et al.*, *diseases of the colon and rectum*, 2016;59: 7.

noticed that OS and DSF were similar between the two groups but there were fewer lymph nodes harvested and worse short-outcomes in TC group. TC group was also correlated with poor histopathological features and disease recurrence [2]. van Rongen *et al.* have identified 103 patients, 34 TC/69 EC derived from the database

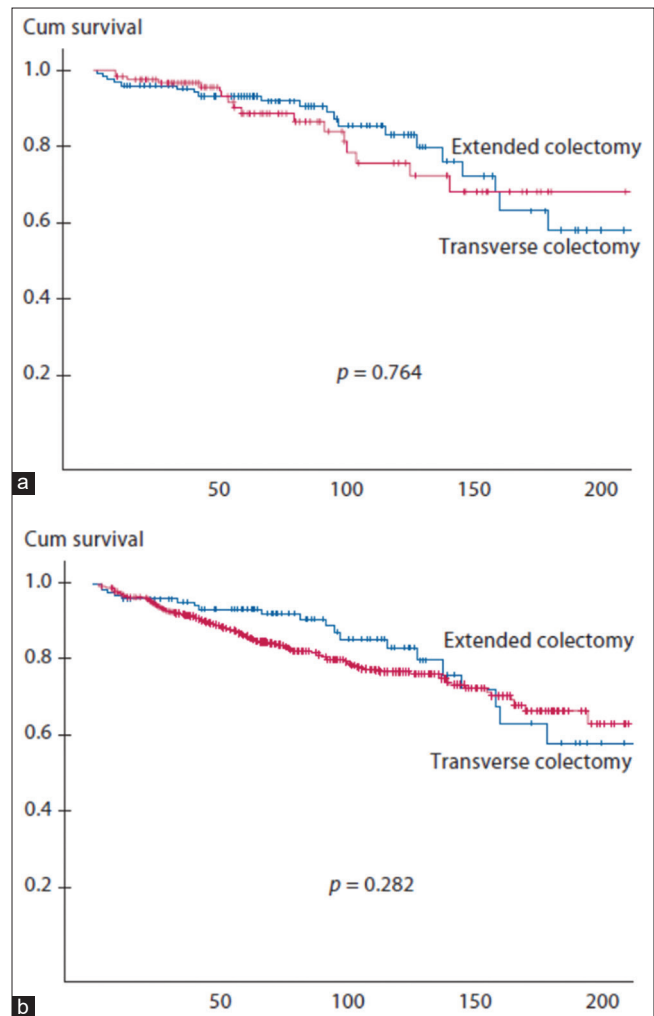


Figure 3: Overall survival plots before (a) and (b) propensi From Chong *et al.*, *diseases of the colon and rectum*, 2016;59: 7.

of the regional cancer registry. They evidenced that the mean number of lymph nodes was slightly higher for patients treated by extended hemicolectomy ($p = 0.20$) and post-operative mortality was 6% after TC against 7% after extended hemicolectomy ($p = 1.00$). For TNM

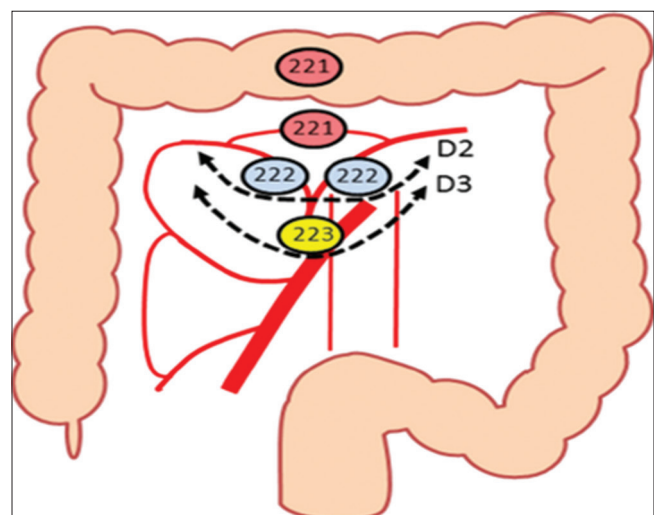


Figure 4: Lymph node mapping for transverse colon cancer according to the Japanese Society of colorectal surgeons

Table 1: Cumulative results of the published literature about the comparison of extended right or left hemicolectomy versus transverse colectomy in the cancer of the transverse colon

Author	Year	Origin	Study	N Patients	Technique	Anastomotic leakage	5-year disease-free survival	operative time	Harvested nodes	Notes
Milone et al.	2016	Italy	retrospective	133	ERC cases (patients undergoing transverse colectomy, laparoscopic extended right and left colectomy, patients undergoing extended right hemicolectomy)	no statistical difference	No significant difference between the groups (OR = 1.05, p = 1.21, 95% CI 0.38, 3.13)	No significant difference between the groups (95% CI: 0.82, p = 0.18, 95% CI: 0.72, 0.98)	few lymph nodes were harvested after TC	
Lejman et al.	2018-2014	USA	retrospective	113	TC (n=60), EC (n=53)	no statistical difference	5-year overall (OS) and disease-free survival (DFS) was comparable between transverse resection and right TC	not	few lymph nodes were harvested after TC	
van Dampe et al.	2010-2013	Belgium	retrospective	113	TC (n=58), EC (n=55)	no statistical difference	Five-year survival was slightly higher for the hemicolectomy group (57% versus 52%), no statistical significance	not	few lymph nodes were harvested after TC	
Chong et al.	2016-2013	Singapore/China	retrospective	383	TC (n=70), EC (n=108), ELC (n=17), ERC (n=188)	no statistical difference, p value 0.02	No significant difference between the groups	no significant difference between the groups	few lymph nodes were harvested after TC, similar size of mesocolon	Independent prognostic factors for DFS were node-positive disease, vascular invasion, ulcerative morphology
Matsuda et al.	2007-2017	Japan	retrospective	72	ERC (n=38), ELC (n=14), TC (n=20)	no statistical difference	5-year OS (28.9% for ERC, 29.1% for ELC, 26.7% for TC)	no significant difference between the groups	few lymph nodes were harvested after TC and other size were similar	Laparoscopic extended right colectomy had fewer complications than laparoscopic TC
Guan et al.	2014-2010	China	retrospective	1034	TC (n=413), EC (n=621)	no statistical difference	5-year cancer-specific survival: TC were (57.5%) similar to patients who received EC (58.5%)		node positivity was equal between TC and EC	Subgroup analysis showed that patients with tumor size > 3 cm could not obtain survival benefit from TC

stages I-II, 5-year survival was slightly higher for the hemicolectomy group (65% vs. 55%) but this difference did not reach statistical significance (p = 0.38, hazard ratio 1.4, 95% CI 0.6–3.1). For TNM stage III, 5-year survival was also higher for the hemicolectomy group (52% vs. 42%), but again not significantly (p = 0.82, hazard ratio 1.1, 95% CI 0.4–2.9). They preferred to propose TC technique and they suggested that segmental resections of the transverse colon can be performed at an acceptable risk with satisfactory survival outcome [3]. Matsuda *et al.* performed a retrospective study of their center from 2007 to 2017 comparing laparoscopic endoscopic retrograde cholangiography (LERC) versus laparoscopic total colectomy (LTC). They found similar DFS and OS, similar anastomotic leakage but fewer general complications in LERC, fewer harvested nodes, and colon size in LTC [4]. Chong *et al.* have proposed a retrospective study, included 1.066 patients with transverse colon cancer, of whom 70% received ERC, 17% ELC, and 11% TC. They noted that there is no difference about OS and DFS between the two groups, underlying that TC must be reserved for old patients or patients with extended pathology or for small transverse tumors. TC had lower harvested lymph nodes (LNs) and small size of colon resection. Independent prognostic factors for DFS were node-positive disease, vascular invasion, and ulcerative morphology (Figures 2 and 3) [5]. Guan *et al.* found inferior number of harvested nodes in transverse resection but similar rate of nodes positivity between transverse resection and EC. They said that the 5-year cancer-specific survival for patients with transverse resection was similar to patients who received extended colectomy [6] To conclude, many studies also compare laparoscopic versus open TC and EC, underlying similar short- and long-term outcomes for both procedure [7], [8], [9], [10], [11], [12], [13], [14] (Table 1).

Conclusions

Transverse colon cancer has a 5-year survival rates of 25–50% which is significantly poorer outcome compared with cancers in the other part of the colon [5]

TC cancer has various number of technical description but lacks about indications of real gold standard technique. Due to the risk of vascular insufficiency and for the anatomical location in proximity of superior mesenteric artery and technical difficulties to splenic and hepatic flexure takedown, TC and EC are two challenging procedures. Conservative treatment using TC is safe and has similar oncological results and post-operative complications compare to EC. The studies underline a superior number of harvested nodes with EC with similar 5 years oncological outcomes but lack in results about anastomotic leakage. The length of the specimen, the number of harvested nodes, perineural, and vascular invasion can influence OS and DFS in favor of EC. Park *et al.* reported only 10% of occurred lymph node metastasis in the right colic artery and no metastasis in ileocolic vessels [15]. ERC was performed to have a minor risk of anastomotic leakage, fewer difficulties in the technique to avoid splenic flexure takedown that is necessary in TC and to have a large margin to cancer and more harvested LFN. Section of right colic artery and ileocolic artery should be unnecessary. This means that D2 LFN versus D3 LFN in Japanese classification does not have any difference in DFS and OS (Figure 4). For more results, it is necessary defining transverse colon tumor as a tumor of mid-transverse colon or on the right or left splenic flexure too and prospective trials with inclusion and exclusion criteria are needed to have clear oncological results and post-operative complications [2].

Human Rights Statement

All procedures and experiments met the ethical standards.

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