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Original Research Article

Splenic flexure cancer optimum level of vessel ligation

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ABSTRACT

Background: Incidence of splenic flexure carcinoma is very low in colorectal cancer but often time presented in an advanced stage with high risk of obstruction, contributing poor prognosis. Aim of the study was to investigate the adequacy of vessel ligation in SFC in term of overall survival.
Methods: 35 patients diagnosed with splenic flexure carcinoma enrolled and analyzed, patients categorized based on the level of vessel ligation as group-A, left branch of middle colic (LMA) and left colic artery division (LCA) compared, group-B, LCA and marginal of middle colic artery (MMC).
Results: CEA marker was not significantly changed post-operatively, as it was within normal range preoperatively at an average of 9-12 µg/ml. There is no significance in staging of tumors in all stages, and recurrence of tumor is present in 5 in group A. Radical margins both proximal and distal ends are not significant. Tumor clearance achieved successfully in both arms in term of proximal margin achieved at 7.9±3.5cm in groups B and 8.3±4.1 cm in group A, p = 0.312. Distal margin reported at 8.7±4.1 cm and 8.9±3.98cm, p = 0.58, respectively. Lymph nodes are positive in group-A and group-B without any significance. Tumor size or diameter ranging from 5.1±3.1 in group-A and 4.76±3.8 in group-B. According to the cell differentiation, majority of the tumor grade turned out to be moderately differentiated cancer, rated at 14 patients (40.1%) in group A and 13 patients (37.1%) in group B. one patients found to be well or poorly differentiated cell tumors in group-A. Overall p-values were insignificant in regards tumor cell differentiation in both groups, p = 0.213. Incidence of lympho-vascular invasion reached only 3 (8.5%) vs. 4 patients (11.2%), p = 0.562, in A and B group.
Conclusions: Higher level of vessel ligation has no added significance in overall outcome, but has role to lower the risk of recurrence rate in Splenic flexure carcinoma patients.

Keywords: Left branch of middle colic artery, Marginal of middle colic artery, Splenic flexure carcinoma

INTRODUCTION

Colorectal cancer (CRC) is one of the most common forms of gastrointestinal malignancies in the world.[1] In the USA, CRC ranks as third most common overall cancer for the period 1992-2001.[2] Compared to the Western world, the incidence rates of colorectal cancer are low in India; for colon cancer they vary from 0.7 to 3.7/100,000 among men and 0.4 to 3/100,000 among women, and for rectal cancer from 1.6 to 5.5/100,000 among men and 0 to 2.8/100,000 among women.[3] Colorectal cancer is one of the most common cancers in the Western countries.

In india, colorectal cancer is frequently diagnosed cancer and its incidence is increasing.[4] A number of recent studies have analyzed the clinical and biochemical aspects of colon cancers based on their location, i.e., right-sided, left-sided or rectal.[5-7] However, more than 80% of left colon cancers occur in the sigmoid colon.

Less common are the cancers occurring between the distal transverse and descending colon, which are termed splenic flexure (SF) cancers. Therefore, the clinicopathologic characteristics of SF cancers are poorly defined, and the optimal surgical treatment for SF cancer remains to be established.

CME principles for right-sided resection equivalent to the current TME principles for left sided resection. Therefore, optimal vessel ligation has been discussed and studied well in the right-sided colon cancer with anticipated success to achieve oncological benefits. However, guideline to determine the level of vessel ligation in SPC is remained in debates. The concept of high vessel ligation is to include resection of the paracolic nodes, intermediate nodes and apical lymphnodes, which defined as D3 lymph-adenectomy. D3 lymph-adenectomy have been widely used and accepted. In case of SF cancer, whether high level of vessel ligation is required to include LMC artery or not, yet has not been proposed. To our knowledge, this is the first study aiming to investigate the adequacy of vessel ligation in SFC in term of overall survival (OS) and local recurrence.

METHODS

The study was a retrospective analysis of all patients treated at a single unit in hospital for colon cancer during 2012-2015. The study was conducted with ethical guidelines and approval. Further analysis performed and 35 patients histologically proven adenocarcinoma of SFC were enrolled in our study. Patients are divided depending on level of vessel ligation of LCA plus MMC marked as group-A and group-B with LCA plus LMA. As they are no standard guidelines Level of vessel ligation was decided per surgeon's choice. The 5th edition of the TNM classification was used for tumour staging. Patient data including demography, pathology and follow-up were retrieved. Survival was assessed by location and stage-specifically as overall survival (OS), cancer-specific survival and, for stage III, also disease-free survival.

The clinical parameters we recorded included preoperative patient characteristics as demographics, body mass index (BMI), American Society of Anesthesiologists (ASA) score, previous surgical history. Pathologic examination confirmed type, grade and stage of the disease (per AJCC/TNM), tumor diameter, number of harvested lymph nodes and length of the specimen. Abdominal and pelvic CT if needed as well as annual colonoscopy to rule out any possible recurrent or developing secondary tumor. Other imaging modalities (CT, MRI and bone scans) requested in case of recurrence or metastases were anticipated.

Experience surgeons in the field were choosen depending on the oncology surgical experience selected for study. All patients routinely received mechanical bowel preparation. Antibiotic prophylaxis with cefuroxime was given. All patients placed in a low lithotomy position, protected by straps for legs and pneumatic device to prevent deep venous thrombosis. In laparoscopic operation, five ports placed trans-abdominally, general inspection to rule out immediate complications or distant metastasis deposits. All our procedures started from medial to lateral approach with oncological concept or radical tumor resection, complete lymphadenectomy and central ligation of the feeding vessels. Likewise, in open surgery, all oncology principles and safety were as identical as in laparoscopic group except

cosmoses part where longer incision expected in open surgery, which usually located at midline of the abdomen and extended longer as per necessary

All patients were evaluated in outpatient setting 30 days after discharge. Those patients with cancer stage III were referred to the medical oncologist to be assessed for adjuvant chemotherapy. All patients were followed up with a six-month interval for five years and evaluated with physical examinaton and blood exams including serum hemoglobin, liver enzymes and tumor markers. A body CT scan was performed at least annually. Follow-up colonoscopy was recommended within one year of surgery.

Statistical analysis. Statistical analyses were performed using JMP 8.0 software (SAS, Cary, NC, USA). Statistical analyses performed included chi-square, independent-samples t-test or ANOVA. Findings with two-sided p-values <0.05 were considered statistically significant.

RESULTS

35 patients diagnosed with SF cancer were enrolled in study.

Table 1: Demographic details.

Variable	Group-A	Group-B	P-value
Age	60 (43-80)	62 (44-84)	0.561
Gender			
Males	12	11	0.762
Female	7	5	
BMI	22.3±2.8	22.3±2.8	0.683
Operative method			
Open	3	4	0.418
Laproscopic	16	12	
Carcinoemberyonic antigen			
Pre-operatively	9.1±2.1	10.1±2.4	0.518
Post operatively	1.8±0.45	1.6±0.32	0.415

Majority of patients in our institute were men, accounting for 23 patients (65.7%), 12 patients (34.3%) were women. The mean age was 61-year-old, ranging between (43- 84years). Patient's weight was almost identical in

both groups with BMI average of (22.3±2.8 vs. 22.3±2.8, p=0.68) in-group A and B, respectively. CEA marker was not significantly changed post-operatively, as it was within normal range preoperatively at an average of 9- 12 µg/ml, so all the patient characteristics are not significant

Table 2: Tumor and treatment details.

Variable	Group-A	Group-B	P-value
Stages of tumor			
Stage-1	9	7	0.89
Stage-2	3	4	
Stage-3	7	5	
Recurrence			
Present	5	1	
Absent	14	15	
Radical margins in cms			
Proximal margin	7.9±3.5	8.3±4.1	0.312
Distal margin	8.7±4.12	8.9±3.98	0.455
Positive lymphnodes	4±1	5±2	0.212
Tumor size in cms	5.1±3.1	4.76±3.8	0.567

There is no significance in staging of tumors in all stages, and recurrence of tumor is present in 5 in Group A. Radical margins both proximal and distal ends are not significant. Tumor clearance achieved successfully in both arms in term of proximal margin achieved at 7.9±3.5 cm in groups B and 8.3±4.1 cm in group A, p=0.312. Distal margin reported at 8.7±4.1 cm and 8.9±3.98 cm, p = 0.58, respectively.

Lymph nodes are positive in group-A and group-B without any significance. Tumor size or diameter ranging from 5.1±3.1 in group-A and 4.76±3.8 in group-B.

Table 3: Cell differentiations and cellular invasion.

Variable	Group-A	Group-B	P-value
Cell differentiations			
Well differentiated	5 (14%)	3 (8.5%)	0.213
Moderate differentiated	14 (40%)	13 (37.1%)	
Proximal differentiated	1 (2.8%)	0	
Lympho-vascular invasion			
Yes	3 (8.5)	4 (11.2%)	0.562
No	16 (45.7%)	11 (31.4%)	

According to the cell differentiation, majority of the tumor grade turned out to be moderately differentiated cancer, rated at 14 patients (40.1%) in group A and 13 patients (37.1%) in group B. one patients found to be well or poorly differentiated cell tumors in group-A. Overall p values were insignificant in regards tumor cell differentiation in both groups, p=0.213. Incidence of lympho-vascular invasion reached only 3 (8.5%) versus 4 patients (11.2%), p=0.562, in A and B group, respectively.

DISCUSSION

Surgical approach selection for splenic flexure carcinoma is still under debate. Similarly, to other colon cancer sites, the resected area must encompass the mesocolon and include major vessels ligation at the origin; the rationale is to reduce local recurrence by complete removal of potentially involved lymph node stations. A more accurate definition of splenic flexure cancer may regard any lesion occurring between the distal third of the transverse colon and the first part of the descending colon.[8]

In present study majority of patients are men, accounting for 23 patients (65.7%), 12 patients (34.3%) were women. The mean age was 61-year-old, ranging between (43 – 84 years). Patient's weight was almost identical in both groups with BMI average of (22.3±2.8 vs. 22.3±2.8, p=0.68) in-group A and B, respectively. CEA marker was not significantly changed post-operatively, as it was within normal range preoperatively at an average of 9-12 µg/ml. There is no significance in staging of tumors in all stages, and recurrence of tumor is present in 5 in Group A. Radical margins both proximal and distal ends are not significant. Tumor clearance achieved successfully in both arms in term of proximal margin achieved at 7.9±3.5 cm in groups B and 8.3±4.1 cm in group A, p = 0.312. Distal margin reported at 8.7±4.1 cm and 8.9 ± 3.98 cm, p = 0.58, respectively. Lymph nodes are positive in group-A and group-B without any significance. Tumor size or diameter ranging from 5.1±3.1 in group-A and 4.76±3.8 in group-B. According to the cell differentiation, majority of the tumor grade turned out to be moderately differentiated cancer, rated at 14 patients (40.1%) in group A and 13 patients (37.1%) in group B. one patients found to be well or poorly differentiated cell tumors in Group-A. Overall p-values were insignificant in regards tumor cell differentiation in both groups, p = 0.213. Incidence of lympho-vascular invasion reached only 3 (8.5%) vs. 4 patients (11.2%), p= 0.562, in A and B group.

Saadler et al, advocated extended right colectomy an option for SFC.[9] He believed that lymph nodes metastasis could follow ileocolic artery in SFC but it had been rarely reported, hence then, left colectomy stated as the standard procedure of choice in SFC. Left colectomy is therefore increasing in popularity as the uptake of knowledge about feeding vessel increased however variation in practice with regards to the ligation of vascular pedicle root is still remained in controversy.[10,11] Essential point to consider during division of feeding vessel to splenic flexure area is the anatomy network of the blood supply to the splenic flexure as it is variable from person to another. It has

studied earlier by Griffith et al, demonstrated anatomical description of colon blood supply in 100 cadavers, revealed that splenic flexure colon supplied by LCA in 89% of cases and 11% by MCA.[12] As lympahtic spread will follow arterial system in their drainage.[13] Therefore, SFC carcinoma has dual lymphatic drainage: to the superior mesenteric vessel and to the inferior mesenteric vessels. Particular point of interest, late presentation of SFC could have metastatic lymph nodes in all feeding vessel to splenic flexure area including MCA and LCA at which better prognosis theoretically will be anticipated if division has considered for both vessels at the root, however clinically has not addressed well yet. As opposed to feeding vessels and lymphatic drainage to SFC, there is a direct lymphatic drainage to the splenic hilum As well as to pancreas tail, but there was no significant different in 5-year survival if splenectomy and distal pancreatectomy were performed in SFC patients.[10,14] Lymph node metastasis in splenic hilum has been studied before without existence of malignant cells in splenic hilum, herein, splenectomy has no more considered an important part of SFC management unless if the tumor invading splenic hilum or a consequence bleeding following the tumor excision.

Karanjia et al reported 219 patients undergoing low anterior resection for cancer with splenic flexure mobilisation in all cases.[15] A significant increase in leakage occurred if the anastomosis was made to the rectum using sigmoid colon, but no increase in leakage if the ascending left colic artery was preserved. Another method of looking at this is the measurement of vascularity during surgery using tissue oxygen tension or laser Doppler techniques. There is a suggestion of decreased vascularity in the descending colon but there is no clear guidance regarding the optimal proximal site for anastomosis. Hallbook et al demonstrated in 30 patients that the side of the bowel cm above the cut proximal end has a better blood supply than the cut end.[8,13,17] The authors felt this supported the use of aside-to-end technique and hence colonic pouches, but did not comment on a difference in flow depending on whether the ascending left colic artery was preserved. Hall et al. demonstrated that sigmoid colon tissue oxygen tension decreased following inferior mesenteric artery origin ligation in an elegant study involving 62 patients. With ascending left colic artery preservation, there was no significant decrease in tissue oxygen. The authors urged caution when interpreting the study owing to the small numbers in each group.

Brennan and colleagues recently reported the selective use of splenic flexure mobilization and, in reporting excellent results from a single centre, claimed that there was a saving of 40 min in the group who did not undergo the additional procedure. On reading their methodology, the inferior mesenteric was divided distal to the ascending branch of the left colic and the colon was divided in the mid-sigmoid.

However, in our study group A, recurrence rate was potentially lesser than study group B, which might affect patients quality of life, hospitality and cost of hospital stay compared to study group B ($p = 0.56$).

CONCLUSION

Although we found no strong direct clinical Impact between two levels of vessel ligation but still randomized clinical trials has to address this regards to emphasize the proper level of vessel ligation in term of oncology safety and patient's overall survival. Randomized controlled trials are required to address this point in near future.

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