Right and Transverse Colonic Multi-Visceral Resections for Locally Advanced Cancers—a Single-Center Experience

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Abstract

Locally advanced colorectal tumors constitute to about 5–22% of all colorectal cancers at the time of presentation. Multi-visceral resection is usually required for such cases in order to achieve curative resection (R0). We aim to present our experience of right and transverse colonic en bloc resections and their outcomes. Retrospective review of a prospective database between February 2008 and December 2014. Case notes, operative findings, histopathology results, and follow-up records were analyzed. A total of 23 patients underwent en bloc multi-visceral resections for locally advanced right-sided or transverse colonic cancers. There were 11 males and 12 females. The mean age was 75 years. Fifteen patients were operated electively and eight were done as emergency. Median follow-up was 36 months. Eleven out of 23 (47%) had more than one organ resected. 78.3% had R0 resections, 17.4% were R1, and 4.3% were indeterminate. The average lymph node yield was 22 [range 5–45]. Senior trainees under supervision did 65% of procedures. Twelve-month disease-free survival was 90% and the 5-year survival was 65%. Right-sided and transverse colonic tumors have a propensity to become locally advanced making curative resections challenging. This is especially relevant when these patients present as an emergency or if the surgeon is less experienced and may opt for a palliative procedure, thus leading to suboptimal outcomes. Multi-visceral resections for locally advanced tumors can be feasible in the district general hospital setting with acceptable outcomes. Multi-disciplinary meeting (MDM) process, adequate training, and experience are vital.

Keywords Multi-visceral resections · Locally advanced colorectal tumors · En bloc resection

Introduction

Nearly 40,000 new colorectal cancers are diagnosed annually in the United Kingdom (UK). Locally advanced colorectal tumors constitute to about 5–22% of all colorectal cancers at the time of presentation [1]. The main aim of surgical resection of primary colon cancer is complete removal of the tumor with its major vascular pedicles and the lymphatic drainage. For locally advanced tumors, en bloc resection of invaded

structures is indicated if there is attachment or infiltration of the tumor into a potentially resectable organ or structure.

Guidelines from the National Comprehensive Cancer Network (NCCN), National Cancer Institute (NCI), and the American Society of Colon and Rectal Surgeons, as well as quality performance indicators for colorectal cancer surgery developed by an independent group, emphasize that appropriate surgical management for locally advanced colon cancers should include multi-visceral resection with a negative margin of the adjacent structure [2–4].

Although multi-visceral resection is associated with improved local control and overall survival, these operations represent a distinct challenging subgroup requiring higher experience and training to reduce morbidity and mortality and to achieve a curative resection for an improved prognosis [5, 6].

Right and transverse colon cancers represent 30% of the total colorectal cancer. They can present as locally advanced tumors requiring multi-visceral resection. The objective of this

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study is to present our local experience of right and transverse colonic en bloc resections and their outcomes.

Patients and Methods

We retrospectively analyzed data collected prospectively from 23 patients who underwent en bloc right or extended right hemicolectomy between February 2008 and December 2014 in a district general hospital in UK.

In elective setting, diagnosis and staging were established in all patients by endoscopic biopsies and computed tomography (CT) scans of the chest, abdomen, and pelvis. Patients admitted as emergency had completion colonoscopy within 6 months after the index procedure. All patients were discussed at the colorectal multi-disciplinary meeting (MDM), either before the surgery [elective procedures] or after [emergency procedures].

Patients included in this series had open en bloc multi-visceral resections for tumors up to and including the splenic flexure (excision of at least one additional organ in continuity with the colonic cancer resection). The decision to resect additional organ was either made preoperatively based on the radiological findings or made intraoperatively based on visual evidence of tumor adhesion or infiltration to adjacent organs. Standard oncologic principles were followed during resection ensuring wide resection of any suspected organs and a standard lymph node clearance along with the specimen.

The primary outcome of this study was to assess whether a curative resection margin (R0) was achieved or not. Secondary outcomes included 12-month and 5-year disease-free survival rate.

The operative findings, histopathology results, and follow-up records were collected retrospectively and analyzed using Microsoft Excel® stats module.

Results

There were a total of 23 patients in this study (11 males and 12 females), with a mean age of 75 (47–88). Fifteen patients were operated electively and eight were done as emergency. Patient characteristics, site of tumor, and number of patients who underwent adjuvant treatment are summarized in Table 1. Table 2 shows the American Society of Anesthesiologists (ASA) classification for all patients.

Eleven patients out of 23 (47%) had more than one structure resected. The organs commonly involved included abdominal wall (ten patients), duodenum (five patients), Gerota's fascia (four patients), small bowel (three patients), stomach (two patients), pancreas (two patients), sigmoid colon (one patient), diaphragm (one patient), urinary bladder (one patient), and ovary (one patient) (Table 3).

Table 1 Patient characteristics, site of tumor, and number of patients who underwent adjuvant treatment

	Number	%
Gender		
Male	11	47
Female	12	53
Site of tumor		
Cecum	8	34
Ascending colon	4	17
Hepatic flexure	1	4
Transverse colon	6	26
Splenic flexure	3	13
Adjuvant chemotherapy	12	52

Postoperative complications were wound infection in two patients (8%), paralytic ileus in two patients (8%), and postoperative bleeding in one patient (4%). None of the patients needed a postoperative emergency re-laparotomy, and there were no evidence of anastomotic leaks or ureteric injuries.

Outcome of Resection Margins

Eighteen patients (78.3%) had curative resections (R0), four patients (17.4%) were judged as R1 resections, and one patient (4.3%) had an indeterminate result. The average lymph node yield was 22 (range 5–45).

Follow-up

Median follow-up was 36 months (range 12–84 months). Twenty-two out of 23 patients had no evidence of metastatic disease at presentation. On follow-up, one patient developed low-volume liver metastasis localized to the right lobe of liver that was amenable to curative liver surgery. None of the patients had neo-adjuvant treatment but 12 patients (52%) had adjuvant chemotherapy. The 12-month free survival rate was 90%, and the 5-year survival was 65% (Fig. 1).

Table 2 ASA classification of anesthetic risks

ASA classification	Number (%)
ASA 1	0
ASA 2	3 patients (13%)
ASA 3	15 patients (65%)
ASA 4	5 patients (22%)

Table 3 Organ excised along with primary tumor and rate of invasion

Organs excised	Number	Rate of invasion (%)
Abdominal wall	10	7/10 (70)
Small intestine	8	5/8 (62.5)
Gerota's fascia	4	0/4 (0)
Stomach	2	2/2 (100)
Tail of pancreas	2	2/2 (100)
Spleen	1	0/1 (0)
Diaphragm	1	1/1 (100)
Sigmoid colon	1	0/1(100)
Ovary	1	1/1(100)
Bladder	1	0/1 (0)

Trainee Involvement in En bloc Resections

Senior trainees performed 65% of these operations under the supervision of a consultant surgeon.

Discussion

Locally advanced tumors, especially in the right colon, may reach large sizes before they become clinically symptomatic. In some cases, these tumors have already started to invade adjacent viscera at time of presentation. Cecal cancers can involve the abdominal wall musculature, right ureter, right ovary, fallopian tubes, and uterus. Tumors of the hepatic flexure and transverse colon may involve Gerota's fascia,

gallbladder, liver, duodenum, stomach, and spleen or even the diaphragm as well as the abdominal wall.

It may be difficult for the surgeon to distinguish intraoperatively whether a tumor is adherent to an adjacent structure due to inflammatory adhesions or due to tumor infiltration. Hence, en bloc resection of these locally advanced tumors has to be attempted as this has a strong influence on patient survival and prognosis [4, 7–9]. The plane of adherence between the colonic tumor and the adjacent organ(s) should not be disrupted because over 40% of these adhesions are malignant [10] and transection of tumor could further impair prognosis.

Preoperative imaging such as CT scans of these lesions may not be able to differentiate between direct tumor infiltration and subtle peritumoral inflammatory changes, thus making it more challenging to treat. MDM teamwork, preoperative plan for en bloc resection, and involvement of other specialties if needed are crucial in managing these patients in elective settings.

Invasion of adjacent organs makes curative resections of such locally advanced cancers quite challenging. Lehnert et al. [11] looked at 201 cases of colorectal cancer with multi-visceral resections for suspected tumor infiltration. Their study demonstrated that achieving R0 resection was possible in 65% (130/201) with 44% of patients in this group had histological evidence of tumor infiltration. A multivariate analysis of their data demonstrated that intraoperative blood loss, age > 64years, and tumor, node, metastasis (TNM) stage were independent prognostic factors. However, tumor infiltration, number of resected organs, or surgical experience did not appear to have prognostic significance.

Kapoor et al. [12] have looked at a small series of 11 patients who underwent right hemicolectomy with en bloc resection of adjacent organs and showed that extended survival with low morbidity and mortality is possible. Multiple studies reported a good survival rate for en bloc right hemicolectomy with pancreaticoduodenectomy for locally advanced right-sided colon cancer with pancreatic or duodenal invasion [13, 14].

The median survival of patients undergoing R1 resection is only 11.6 months [17, 15]. The 5-year overall survival rate following multi-visceral resections from several studies ranges from 30–50% [16, 17, 18, 19, 20]. Hence, en bloc resection must be performed if the expertise is available for better outcomes.

In this study, malignant infiltration of adjacent organs was demonstrated histologically in 15 patients (65%), fully justifying performing more extensive resections in these cases. Curative resection was achieved in 18 out of our 23 patients (78.3%) in keeping with other studies [15, 16, 19, 20].

The average lymph node yield was 22 and lymph node metastatic disease was noted in 15 patients. Twelve patients underwent adjuvant chemotherapy after discussion at the colorectal MDM, and two other patients with lymph node involvement were not offered chemotherapy due to their age and comorbidities while one patient declined any further treatment.

Fig. 1 Percentage of survival rates

Although right hemicolectomy is a common operation which is performed on elective and emergency lists and is taught early during surgical training, when these operations involve en bloc resection for locally advanced tumors, they represent a different and challenging entity that definitely requires more experience and further training. The tendency to perform palliative bypass operations for locally advanced tumors is clearly associated with by far worse outcomes. One of the important findings of this study was the fact that senior trainees performed 65% of these operations under consultant supervision with no compromise on the curative resections and the 12-month free survival rate. This emphasizes the importance of incorporating multi-visceral resections into surgical training.

The high percentage of R0 resections, high rate of 5-year survival, and low rate of complications reported in this study justify multi-visceral resections for operable locally advanced right and transverse colonic cancers. Non en bloc resections of such tumors increase the likelihood of loco-regional recurrence associated with intraoperative tumor cell dissemination. This indicates the importance of having experienced, well-trained surgeons to keep postoperative morbidity low and to decrease the incidence of recurrence. This small series also demonstrates that multi-visceral resections for these tumors are feasible and safe in district general hospitals with acceptable morbidity and mortality and can achieve clear margins in the majority of the patients.

Multi-visceral resection is associated with improved overall survival and comparable long-term outcomes to those patients undergoing standard resection who do not have adjacent organ adhesions in some studies [11, 21], although perioperative morbidity rates may be higher [11]. Although the benefits of multi-visceral en bloc resection for locally advanced disease is well known, this approach is underutilized [6]. In a study derived from the Surveillance, Epidemiology, and End Results (SEER) database, only one third of patients with locally advanced colorectal cancer treated between 1988 and 2002 were managed by multi-visceral en bloc resection [22]. These data highlight the need for further education and training of surgeons as well as better preoperative staging and surgical planning through a multidisciplinary approach.

Conclusion

Curative resection for operable locally advanced right-sided and transverse colonic tumors requires en bloc resection of the adjacent organ. This paper demonstrates that acceptable outcome from these operations are feasible in district general hospital setting with the adequate expertise and multidisciplinary team involvement. Larger studies are required to investigate this further on larger scales.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

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