



Multivisceral Resections for Locally Advanced Colorectal Cancer: Morbidity and Mortality

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Abstract

Introduction: Multivisceral organ resection is recommended in patients with locally advanced colorectal cancer. The aim of this study was to determine the influence of additional organ resection on morbidity and mortality on short term.

Methods: Patients who underwent curative resection for colorectal cancer were included in the study. They were divided into two groups as multivisceral resection groups (MRGs) and standard resection groups (SRGs). The patients were compared in terms of demographics, tumor localization, operation time, blood loss, length of hospital stay, and post-operative morbidity and mortality. In statistical analysis, Mann–Whitney U and chi-square tests were used.

Results: Thirty-two (10.1%) of 316 patients were in the MRG and 284 (89.9%) in the SRG. Male/female ratio, presence of comorbid diseases, and tumor localization were similar in the groups. Hospital stay (8.4 ± 4.2 vs. 8.2 ± 6.2 days) was also similar. Operation time (221 ± 62.3 vs. 181 ± 70.1 min) was longer and blood loss (180 [50–410] cc vs. 150 [40–390] cc) was significantly higher in the MRG ($p < 0.001$ and $p < 0.001$, respectively). There was no statistically significant difference with regard to morbidity (21.8% vs. 20.8%) and mortality (3.1% vs. 3.5%). In the MRG, histopathologically confirmed tumoral invasion (T4) was detected in 17 (53.1%) patients for whom multiorgan resection was performed.

Discussion and Conclusion: Multiorgan resections can be performed with acceptable morbidity and mortality in specialized centers.

Keywords: Colorectal carcinoma; morbidity; mortality; multivisceral resection.

Colorectal cancer is at the second rank among the cancers which are most frequently observed in the United States^[1,2]. In 5–10% of all cases with colorectal cancer, the adjacent organs are involved by the disease^[3,4]. Until 50 years ago, adjacent organ involvement was accepted as an irresectability criterion^[5,6]. It is not possible to determine

preoperatively or intraoperatively whether adjacent organ infiltration is a true malignant invasion or peritumoral inflammatory reaction without histopathological evaluation^[7].

In patients with colorectal carcinoma, residual tumor is an important criterion for survival. In cases where tumor is left

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behind, the average survival period reported to be 11.6 months. If the tumor is placed in the rectum and there is also poor grade or apical lymph involvement, 1 year survival ratio is 7%^[2]. Together with these results, if adjacent organ invasion is determined during surgery, wide resection should not be avoided. At this point, multivisceral resection is performed in more than 10% of patients with locally advanced colorectal cancer and it is accepted as the only chance for cure^[2,8-10]. In this study, we aim to examine the influence of additional organ resection on morbidity and mortality on short term.

Materials and Methods

Between January 2014 and November 2020, 316 patients who underwent curative resection for colorectal cancer were retrospectively retrieved from a prospectively maintained database. Then, the patients were divided into two groups as multivisceral resection group (MRG) and standard resection group (SRG). Patients who were operated on for intestinal obstruction, perforation, or serious bleeding were not included in the study. Patients with distant metastasis were also excluded from the study. While standard lymph node dissection with colon or rectum resection was performed in the patients in the SRG, at least one organ was resected additionally in patients in the MRG. The patients in both groups were compared in terms of age, gender, length of hospital stay, medical history, tumor localization, operation time, blood loss, and post-operative morbidity and mortality. Since our study was conducted retrospectively by evaluating patient results, the Ethics Committee approval was not obtained. Comparisons were made with Mann–Whitney U and Chi-square tests. P-values under 0.05 were evaluated as statistically significant.

Results

A total of 316 patients were enrolled to the study. Thirty-two (10.1%) of these patients were in the MRG and 284 (89.9%) in the SRG. In the MRG and SRG, there was no statistically significant difference in terms of age (63.9 ± 14.0 vs. 65.2 ± 11.9 years), gender (male: 53.2% vs. 54.2%), and presence of comorbid diseases [13 (40.6%) vs. 127 (44.7%)] ($p > 0.05$). Tumor localizations were also similar between the groups, but in both groups, the majority of the patients were operated on for rectal cancer (Table 1).

While the operation time was 221 ± 62.3 min in the MRG, it was 181 ± 70.1 min in the SRG. Blood loss was 180 cc (50–410) cc in the MRG but 150 cc (40–390) in the SRG. The differences were statistically significant between two groups for both parameters ($p < 0.001$ and $p < 0.001$, respectively). Length of hospital stay was not different between the groups (8.4 ± 4.2 days in the MRG vs. 8.2 ± 6.2 days in the SRG; $p > 0.05$). While in the MRG, the post-operative total morbidity was 7 (21.8%), it was 59 (20.8%) in the SRG. In terms of mortality, no significant difference was determined between the groups (Table 2).

The organs which were removed additionally in the MRG are shown in Table 3. The most frequently removed organ was the small intestine [$n=6$ (18.7%)] (Table 3). While single organ was removed in 26 (81.3%) patients in the MRG, more than 1 organ was removed in 6 (18.7%) patients (Table 4). While, in 15 (46.9%) of 32 patients in the MRG, the tumors were T3 pathologically, it was T4 in 17 (53.1%) patients.

Discussion

The strongest prognostic effect of complete removal of the tumor with multimodal treatment strategies in colorectal

Table 1. Demographics and clinical characteristics of patients in the MRG and SRG

Patient characteristics	MRG n=32 (10.1%)	SRG n=284 (89.9%)	p
Age (year)*	63.9±14.0	65.2±11.9	0.679
Gender (female/male)	15 (46.8)/17 (53.2)	130 (45.8)/154 (54.2)	0.391
Comorbid disease	13 (40.6)	127 (44.7)	0.125
ASA scores			
ASA 1 + ASA 2	19 (59.4)	185 (65.1)	0.347
ASA 3 + ASA 4	13 (40.6)	99 (34.9)	
Tumor localization			
Right colon	6 (18.7)	65 (22.9)	0.804
Left colon	10 (31.3)	94 (33.1)	
Rectum	16 (50.0)	141 (44.0)	

*Values presented as mean±SD and percent (%), ASA score: American Society of Anesthesiologists score, MRG: Multivisceral resection group, SRG: Standard resection group.

Table 2. Characteristics of operation and post-operative period in the MRG and SRG

	MRG n=32 (10.1%)	SRG n=284 (89.9%)	p
Operation time (min)	221±62.3	181±70.1	<0.001
Blood loss (ml)	180 (50–410)	150 (40–390)	<0.001
Length of hospital stay (day)	8.4±4.2	8.2 ±6.2	0.217
Morbidities*			
Surgical site infection	5 (15.6)	37 (13.0)	0.317
Intra-abdominal collection/abscess	2 (6.2)	16 (5.6)	0.141
Evisceration	1 (3.1)	8 (2.8)	0.214
Anastomotic leakage	2 (6.2)	13 (4.6)	0.097
Ileus	2 (6.2)	15 (5.3)	0.123
Bleeding	1 (3.1)	9 (3.2)	0.549
Non-surgical morbidity	3 (9.4)	24 (8.4)	0.137
Total	7 (21.8)	59 (20.8)	0.241
Mortality	1 (3.1)	10 (3.5)	0.217

*Some patients have developed more than 1 morbidity. Values presented as mean±SD and percent (%), MRG: Multivisceral resection group, SRG: Standard resection group.

Table 3. Single additional organ resection in the MRG

Organ	26 (81.3%)
Small intestine	6 (18.7)
Bladder wall resection	4 (12.5)
Vagina wall resection	3 (9.4)
Uterus	2 (6.2)
Gastric wedge resection	2 (6.2)
Prostate	2 (6.2)
Spleen	1 (3.1)
Abdominal wall	1 (3.1)
Ureter	1 (3.1)
Ovary	1 (3.1)
Pancreas	1 (3.1)
Duodenum wedge resection	1 (3.1)
Liver wedge resection	1 (3.1)

Values presented as percent (%); MRG: Multivisceral resection group.

Table 4. More than 1 additional organ resection

Organ	6 (18.7%)
Small intestine/bladder	1 (3.1)
Pancreas/spleen	1 (3.1)
Vagen/uterus	1 (3.1)
Prostate/seminal vesicle	1 (3.1)
Stomach/pancreas/spleen	1 (3.1)
Small intestine/bladder/uterus	1 (3.1)

carcinoma has been shown in studies^[7,11,12]. Moynihan, first in 1926 by defining locally advanced CRC, argued unblock extended resection for involved organs and structures^[13]. The event that reinforces this idea was the publication of first series of 42 patients with multivisceral resection in 1946. Sugarbaker stated in his publication that colon with tumor should be removed with involved tissue or organ^[14]. It is very difficult to distinguish the infiltration of locally advanced cancers to the surrounding tissues from inflammatory reaction without histopathology and frozen is not helpful in determining the actual infiltration.

It has been shown that when the involved organ has not

been resected, local recurrence increases, and the mean survival decreases, if it is suspicious with infiltration. Infiltration of the tumor to adjacent organs is sometimes observed during surgery. Histopathological examination shows whether it is tumor infiltration or not. Therefore, intestine with tumor should be removed together with adjacent organs and it should not be resected solely. As the primary aim of the surgeons is to avoid recurrence and provide long-term survival, R0 resection should be the target^[7,9,10,15,16]. In our study, R0 resection was achieved in 90% of the patients in the MRG. This rate is similar with the other studies^[4,7,17]. It is reported that the mean survival of patients with multivisceral resection to maintain R0 resection is between 40 and 70%^[4,7,18]. However, it is reported in many studies that the survival rates decrease when residual tumor is left behind^[3,7,15,19].

Derici et al.^[20] compared morbidity after standard resection to multivisceral resection and reported that morbidity was as high as 60% in multivisceral resection, but 21% for standard resection. Yet in other studies conducted in pa-

tients who underwent multivisceral resection, morbidity was reported to be high. However, in this study, mortality was low^[4,10,15].

In the literature, reported morbidity rates for multivisceral resections are between 11.4% and 49.1% and the mortality rates are between 0% and 7.5%^[4,8,19,21]. In our study, while the morbidity was 21.8% and 20.8% in the MRG and SRG, respectively, the mortality was 3.1% versus 3.5%. Although these ratios are consistent with the literature, the low ratios in our study could be attributed to the fact that all operations were performed by or under supervision of a senior surgeon. Moreover, there was not a significant statistically difference between the two groups in terms of morbidity and mortality. This also shows that multivisceral resections can be performed safely. While in some studies performed, higher morbidity and mortality are observed in the MRG when compared to the SRG, no difference was observed among the two groups in numerous other studies^[3-5,9,10,15].

In some studies, multivisceral resection rates were reported between 7 and 16%^[8,9]. We have found that rate as 10.1%. In our study, these results are consistent with the literature. In studies conducted in patients who underwent unblock resection, histopathologically proven actual rate of invasion (T4) was between 33 and 84%^[8-10]. In our study, this ratio was 53.1%. In our series, additional organs were removed after evaluation of the tumor and the surrounding organs, and the resection was performed with the suspicion of tumoral invasion. This shows that it is not possible to determine the existence of invasion in adjacent organ involvement without histopathology. Nevertheless, we believe that unblock resection during surgery would be beneficial.

In the literature, the most frequently resected organs are reported as small bowel, bladder, and vagina wall^[7,15,16]. In our study, small intestine (18.7%), bladder (12.5%), and vagina wall resection (9.4%) were the most frequently removed adjacent organs. In 81.3% of the patients, only one additional organ resection was performed, and in 18.7% of them, more than 1 organ resection was performed.

Conclusion

In patients with locally advanced colorectal carcinoma, R0 resection including the involved adjacent organs should be performed. These multiorgan resections can be performed with acceptable morbidity and mortality in specialized centers.

Ethics Committee Approval: Retrospective study.

Peer-review: Externally peer-reviewed.

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