Int Surg 2015;**100:**790–796
DOI: 10.9738/INTSURG-D-14-00262.1

Effect of Preoperative Colonic Drainage for Obstructing Colorectal Cancer

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Obstructing colorectal cancer (OCRC) is believed to indicate poorer long-term survival. The purpose of this study was to compare retrospectively perioperative safety and long-term results in patients undergoing surgery for OCRC following preoperative colonic decompression with that in those undergoing elective surgery alone for nonobstructing colorectal cancer (CRC). A total of 656 consecutive CRC patients undergoing colectomy between 2001 and 2011 at our institute were eligible for inclusion in the study. The patients were divided into an OCRC group, which included 104 patients undergoing colectomy with preoperative colonic decompression, and a CRC group, which included 552 patients undergoing colectomy alone. Morbidity, mortality, and prognosis were assessed. In the OCRC group, decompression was performed by nasointestinal tube in 42 patients (40.4%), transanal tube in 15 (14.4%), and colostomy in 47 (45.2%). The mortality rate was 0% in the OCRC group and 0.4% in the CRC group (2 of 552 patients). The morbidity rate was 44.8% in the OCRC group (48 of 104 patients) and 36.6% in the CRC group (202 of 552 patients). The 5-year overall survival rate was 69.5% in the OCRC group and 72.9% in the CRC group [hazard ratio 0.76; 95% confidence interval, 0.35 to 1.16; $P = 0.48$)]. No statistically significant difference in survival was observed between the 2 groups in stage II, III, or IV, or overall. No difference was observed in safety or survival between advanced OCRC patients undergoing preoperative colonic decompression and advanced non-obstructing CRC patients undergoing surgery alone.

Key words: Intestinal obstruction – Colorectal cancer – Colonic decompression – Survival – Safety

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Obstructing colorectal carcinoma (OCRC) is frequently at an advanced stage by the time of surgical intervention and is associated with a high rate of morbidity and hospital death.[1–3]

While some studies have reported that OCRC has a poorer prognosis than nonobstructing CRC,[4,5] others have found no difference.[6,7] This poses a problem in the surgical management of OCRC.

In many institutions, 1-stage primary resection is recommended for OCRC, as this allows colostomy and further nonsurgical drainage for the obstruction to be avoided.[8–10]

On the other hand, disruption of anastomosis was observed in more than 50% of cases in which resection was performed as initial surgery without surgical or nonsurgical decompression for the obstruction, threatening overall deterioration in the patient's condition.

Therefore, some have recommended decompression as a means of avoiding this problem.[11] However, the effectiveness of surgical or nonsurgical decompression for OCRC remains controversial.

Since January 2001, we have performed preoperative decompression in all OCRC patients to reduce the rate of surgical complications and hospital death.

The purpose of this study was to compare retrospectively perioperative safety and long-term results in patients undergoing elective surgery for advanced OCRC after preoperative colonic decompression with that in patients undergoing elective surgery alone for advanced nonobstructing CRC.

Materials and Methods

Patient population and methods

Between January 2001 and December 2011, a total of 879 consecutive stage I–IV colorectal cancer patients underwent colectomy for primary histologically proven colorectal carcinoma at the Department of Digestive Surgery, Nihon University School of Medicine Itabashi Hospital.

Among these 879 patients, those with T1 or T2 carcinoma were excluded from the present study as none of them presented with large bowel obstruction at the time of diagnosis, leaving a total of 656 patients eligible for inclusion. Moreover, laparoscopic surgery is performed in patients with T1 or T2 stage disease at our hospital. Therefore, no such cases were included in this study.

The patients were divided into 2 groups: an advanced OCRC group (OCRC), which included 104 patients undergoing colectomy with preoperative colonic decompression, and a nonobstructing advanced CRC group (CRC), which included 552 patients undergoing colectomy alone. The colon was divided into left and right segments at the junction of the transverse and descending colon. Each patient was assessed by medical history, physical examination, abdominal X-ray, and abdominal computed tomography. When OCRC was diagnosed, gastrografin enema and urgent decompression therapy were carried out within 24 hours of admission. The data on tumor distribution, main and concomitant surgery, TNM stage, and histopathology were recorded. This study including data analysis and statistical analysis was approved by the Research review board, Nihon University School of Medicine, Itabashi Hospital (No RK-120511).

Perioperative management

Preoperative decompression was performed in all OCRC patients in line with the treatment policy of our department. Decompression was performed by insertion of a nasogastric decompression tube via the right segment or a transanal decompression tube via the colon proximal to the tumor using a colonoscope and guide wire in the left segment. Decompression by colostomy was performed when no improvement was observed with either of these conservative treatments. Metallic stent insertion was not covered by the national insurance system in Japan until 2011. Therefore, this procedure was not used in any of the present cases. The timing of surgery and procedures used in all patients were in line with the policy of this institute. The rate of hospital deaths, defined as death during the period of hospitalization due to the surgical procedures used or any other cause within 30 days postoperatively, and surgery-related complications were calculated by dividing the number of patients in whom an event occurred by the total number of enrolled patients. Chemoradiotherapy has yet to be recognized as the standard treatment for rectal cancer in Japan. Therefore, this type of therapy was not included in the present study.

Statistical analyses

Correlations between overall survival (OS) curves in the 2 groups were determined by the Kaplan-Meier method. Prognostic factors were analyzed by univariate analysis and logistic regression. The statistical significance of differences in survival curves was assessed with a 2-sided log rank test. A P value of

less than 0.05 was considered to indicate statistical significance. The SAS software package for Windows, version 8.02 (SAS Institute Inc, Cary, NC, USA) and Microsoft Excel 2003 (Microsoft Co, Ltd, Tokyo, Japan) were used for the statistical analysis and data calculation. Data were entered into a prospectively managed database at the time of treatment. We retrospectively reviewed records from this database. The data used for this study were from the last follow-up visit or contact with the patients.

Results

Patient characteristics and clinical and pathological stage are shown in Table 1. Nasointestinal decompression was performed in 42 patients (40.4%); transanal decompression in 15 patients (14.4%); and decompression by colostomy in 47 patients (45.2%). Median hospital stay was 11 days longer in the OCRC group than that in the CRC group (39 days versus 28 days, respectively; $P = 0.0001$). Median preoperative days, however, was 7 days shorter in the OCRC group than that in the CRC group (21 days versus 28 days, respectively; $P = 0.058$). The surgical findings are shown in Table 2. More patients required 2-stage resection in the OCRC group than in the CRC group ($P = 0.0001$). Median operation time in the OCRC group was 240 min, which was 12 minutes longer than that in the CRC group ($P = 0.001$). Histopathologic findings are shown in Table 3. A greater percentage of patients showed T4 or N2 in the OCRC group than in the CRC group ($P = 0.0001$). Operative complications are shown in Table 4. Overall incidence of surgery-related complications was 46.2% in the OCRC group (48 of 104 patients) and 36.6% in the CRC group (202 of 552 patients). None of these differences was statistically significant ($P = 0.066$). Rate of hospital death was 0.0% in the OCRC group and 0.6% in the CRC group. Obstructing colorectal carcinoma was not identified as an independent prognostic factor (Table 5). Figure 1 shows the OS rates for patients in each group. The 5-year OS rate was 71.9% in the OCRC group and 72.0% in the CRC group [hazard ratio 0.926; 95% confidence interval (CI), 0.575 to 1.581; $P = 0.77$]. Figures 2, 3, and 4 show the OS rates in 244, 196, and 158 patients with stages II, III, and IV tumor, respectively, in both groups. The 5-year OS rate of stage II was 87.1% in the OCRC group and 85.4% in the CRC group (hazard ratio 1.072; 95% CI, 0.314 to 6.701; $P = 0.93$); that of stage III was 81.2% in the OCRC group and 76.0% in the CRC group (hazard ratio 1.156; 95% CI, 0.482 to 3.423; $P = 0.77$); and that of stage IV was 41.6% in the OCRC group and 42.2% in the CRC group (hazard ratio 1.009; 95% CI, 0.548 to 2.038; $P = 0.98$). No statistically

Table 1 Patient characteristics

Clinical features	OCRC n = 104 (%)	CRC n = 552 (%)	*P* value
Sex			0.44
Male	70 (67.3)	350 (63.4)	
Female	34 (32.7)	202 (36.6)	
Age (y)			0.94
Median [range]	68 [33–87]	68 [29–89]	
Tumor distribution			0.23
Right side	30 (28.8)	193 (35.0)	
Cecum	10 (9.6)	61 (11.1)	0.67
Ascending colon	12 (11.5)	79 (14.3)	0.45
Transverse colon	8 (7.7)	53 (9.6)	0.54
Left side	74 (71.2)	359 (65.0)	
Descending colon	21 (20.2)	32 (5.8)	<0.001
Sigmoid colon	31 (29.8)	134 (24.2)	0.23
Rectum	22 (21.2)	193 (35.0)	0.06
Intestinal decompression of obstruction			
Nasointestinal	42 (40.4)	-	
Transanal	15 (14.4)	-	
Colostomy	47 (45.2)	-	
Preoperative days			0.058
Median [range]	21 [5–160]	28 [4–224]	
Total hospital stay (d)			<0.0001
Median [range]	39 [13–206]	28 [10–203]	

Table 2 Surgical findings

Surgical features	OCRC n = 104 (%)	CRC n = 552 (%)	*P* value
Main surgical operation			
Rt. hemicolectomy	16 (15.4)	64 (11.6)	0.28
Rt. partial	13 (12.5)	121 (21.9)	0.029
Lt. hemicolectomy	13 (12.5)	23 (4.2)	0.0006
Lt. partial	28 (26.9)	134 (24.3)	0.57
Low anterior resection	19 (18.2)	99 (17.9)	0.94
Miles	6 (5.8)	68 (12.3)	0.01
Hartmann	9 (8.7)	43 (7.8)	0.076
Stage of resection			<0.0001
1-stage resection	57 (54.8)	540 (97.8)	
2-stage resection	45 (43.3)	10 (1.8)	
3-stage resection	2 (1.9)	2 (0.4)	
Residual tumor			0.92
R0 + 1	80 (76.9)	422 (76.4)	
R2	24 (23.1)	130 (23.6)	
Node dissection			0.31
Median [range]	12 [0–49]	11 [0–58]	
Bleeding (ml)			0.022
Median [range]	216 [10–8460]	150 [3–6008]	
Operation time (min)			<0.001
Median [range]	240 [107–680]	228 [43–591]	

Table 3 Histopathologic findings

Clinical features	OCRC n = 104 (%)	CRC n = 552 (%)	*P* value
T			0.22
T3	58 (55.8)	372 (67.4)	
T4	46 (44.2)	180 (32.6)	
N			0.018
N0	36 (34.6)	283 (51.3)	
N1	41 (39.4)	189 (34.2)	
N2	27 (26.0)	80 (14.5)	
M			0.93
M0	77 (70.0)	411 (74.5)	
M1	27 (20.0)	141 (26.2)	
Histological Staging (TNM)			0.92
Stage II	29 (27.9)	235 (42.6)	
Stage III	48 (46.2)	171 (31.0)	
Stage IV	27 (26.0)	146 (26.4)	
Histological type			
Well-differentiated	15 (14.4)	40 (7.2)	0.76
Moderately-differentiated	78 (75.0)	459 (83.2)	
Poorly-differentiated	5 (4.8)	22 (4.0)	
Mucinous	6 (5.8)	31 (5.6)	
Maximal diameter (mm)			0.83
Median [range]	50 [20–140]	45 [12–170]	

significant differences were observed in survival between the two groups in stage II, III, IV, or overall.

Discussion

Obstructing CRC is believed to indicate poorer long-term survival than non-obstructing CRC. In this study, however, preoperative colonic decompression in OCRC yielded no difference in safety or prognosis between the 2 groups. Currently, postoperative adjuvant chemotherapy is indicated in the NCCI guidelines (Version 3.2013 Colon Cancer) for the

Table 4 Complications

Clinical features	OCRC n = 104 (%)	CRC n = 552 (%)	*P* value
Complication			0.066
(+)	48 (46.2)	202 (36.6)	
(−)	56 (53.8)	350 (63.4)	
Anastomotic leakage	7 (6.7)	18 (3.3)	0.091
Abdominal abscess	9 (8.7)	23 (4.2)	0.051
Pneumonia	8 (7.7)	23 (4.2)	0.12
Cardiac	2 (1.9)	9 (1.6)	0.83
Ileus	7 (6.7)	39 (7.1)	0.68
Wound infection	20 (21.8)	87 (15.8)	0.38
Other	5 (19.2)	41 (7.4)	0.34
Re-operation	3 (2.9)	13 (2.4)	0.72
Hospital death	0 (0.0)	2 (0.4)	0.54

Table 5 Univariate analysis of prognostic factors for overall survival

Clinical features	P	HR	95% CI
Obstructing	0.705		
(+)		1	
(−)		1.143	0.753–2.097
Sex	0.315		
Female		1	
Male		1.223	0.825–1.813
Location	0.623		
Rt. Colon		1	
Lt. Colorectal		1.108	0.737–1.665
Age	0.146		
≦67		1	
>68		1.312	0.907–1.899
Pathologic stage	0.0213		
Stage II–III		1	
Stage IV		2.273	1.130–4.571
Residual tumor	0.0062		
R0+1		1	
R2		2.691	1.325–5.468
Histologic type	0.552		
Intestinal		1	
Diffuse		1.197	0.662–2.161
Maximal diameter (mm)	0.481		
≦50		1	
>51		1.143	0.788–1.887
Intraoperative bleeding	0.135		
≦150		1	
>151		1.399	0.901–2.171
Operative time	0.333		
<300		1	
≧300		1.234	0.807–1.887

CI, confidence interval.

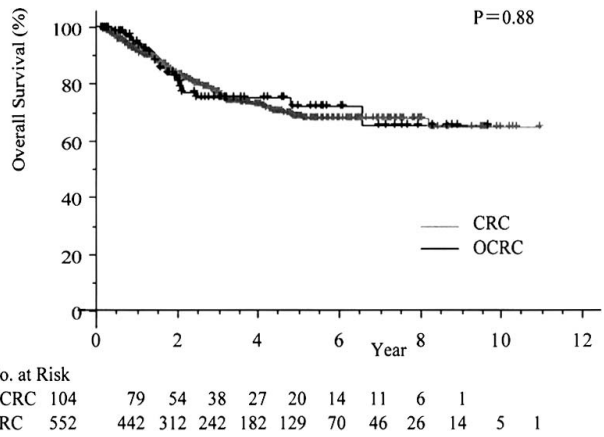

Fig. 1 Kaplan-Meier estimates of overall survival in all 598 patients. Rate of 5-year overall survival in all patients was 71.9% in OCRC group and 72.0% in CRC group. Hazard ratio for death in OCRC group, as compared with in CRC group, was 0.926 (95% confidence interval, 0.575 to 1.581; $P = 0.77$).

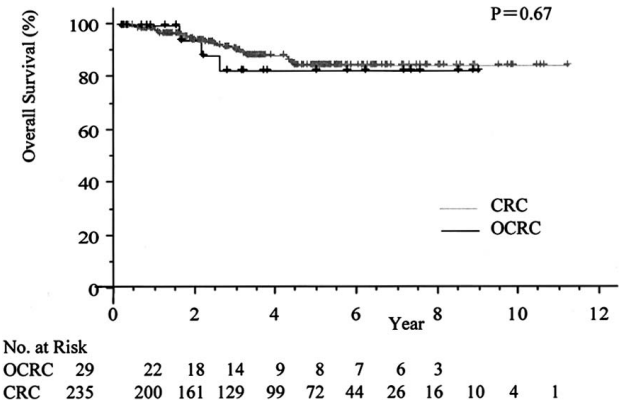

Fig. 2 Rate of 5-year overall survival in 244 stage II patients was 87.1% in OCRC group and 85.4% in CRC group. Hazard ratio for death in OCRC group, as compared with in CRC group, was 1.072 (95% confidence interval, 0.314 to 6.701; $P = 0.93$).

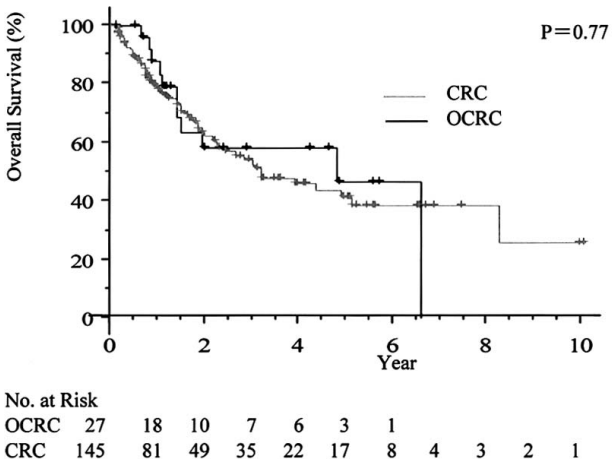

Fig. 4 Rate of 5-year overall survival in 244 stage II patients was 41.6% in OCRC group and 42.2% in CRC group. Hazard ratio for death in OCRC group, as compared with in CRC group, was 1.009 (95% confidence interval, 0.548 to 2.038; $P = 0.98$).

treatment of stage II colon cancer when the prognosis is poor, and OCRC is included in this category. Preoperative colonic decompression, however, may allow OCRC to be excluded from this group.

Many studies have noted that OCRC is either locally advanced or associated with distant metastases.[8,9,12,13] In this study, however, distribution of TNM stage and rate of residual tumor after decompression surgery were similar between the 2 groups, indicating no association between OCRC and distant metastasis in patients undergoing colectomy for primary colorectal cancer. There is a possible association between OCRC and aging. Such patients are often older than CRC patients and have increased risk factors due to hypovolemia and electrolytic alterations.[14] In this study, however, age was similar between the 2 groups, indicating no association between OCRC and age.

One study noted that long-term outcome in OCRC was worse than that in CRC due to the lower rate of emergency curative resection in the former group.[15] Moreover, colonic distension and fecal loading can make the surgical procedure more technically demanding in patients with OCRC. It is possible that the choice of surgery is the reason for the poor prognosis in OCRC patients. One-stage surgery with primary resection and anastomosis is performed in the majority of patients with OCRC.[16] While primary resection and ileocolic anastomosis at initial surgery is the generally accepted approach in right-sided OCRC, primary resection and colon anastomosis has been suggested as the best oncologic approach in left-sided OCRC.[8–10] Operative mortality after primary colonic resection in emergency cases, however, has been reported to range from 23% to 50%.[8,13] The high rates of morbidity and hospital mortality seen with 1-stage surgery may be associated with a low rate of curative resection and worse prognosis in OCRC. In this study, preoperative colonic decompression in OCRC patients yielded no mortalities and a low rate of morbidity, results comparable with those for CRC. This suggests that the problems usually associated with

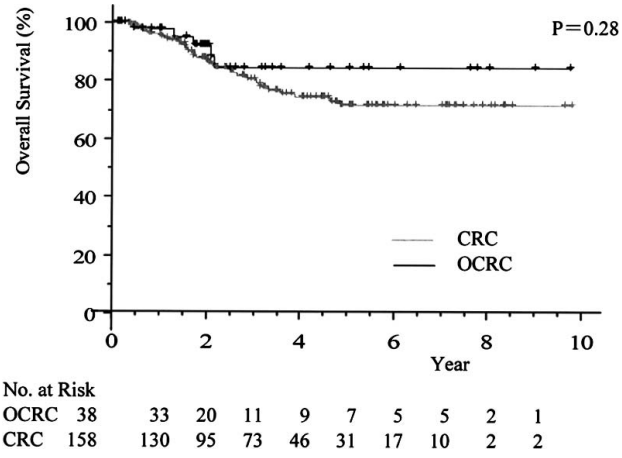

Fig. 3 Rate of 5-year overall survival in 244 stage II patients was 81.2% in OCRC group and 76.0% in CRC group. Hazard ratio for death in OCRC group, as compared with in CRC group, was 1.156 (95% confidence interval, 0.482 to 3.423; $P = 0.77$).

the treatment of OCRC might be avoided by use of preoperative decompression.

One study found that preoperative colonic decompression using a transanal ileus tube was safe and that there was no increase in complications or anastomotic leakage in one-stage surgery for left segment OCRC.[16] In this study, if peritonitis developed or there was no improvement in obstruction by conservative treatment with nasointestinal or transanal decompression within 3 days, a colostomy was performed. However, the success rate in conservative decompression using nasointestinal or transanal decompression was 86.7% (26 of 30 patients) in the right segment and 41.9% (31 of 74 patients) in the left segment. Among the present cases, 45.2% required a colostomy as second- or third-stage surgery. Although an increase of 10 days in length of hospital stay was observed in the OCRC group in comparison with in the CRC group, we believe that the improvements obtained in safety and prognosis vindicate the use of preoperative decompression in such patients. Recent studies have indicated that colonic self-expanding metallic stents may provide prompt relief in OCRC, and such stents are now increasingly being used in either a palliative setting or as a bridge to surgery in patients in whom a definitive surgical approach is unsuitable.[18–20] Therefore, this procedure was not used in any of the present cases. While colonic self-expanding metallic stents may offer an effective treatment option in patients with OCRC, however, it has also been reported that stent placement for OCRC was associated with the risk of recurrence.[21] Therefore, the efficacy of colonic self-expanding metallic stents remains controversial.

In conclusion, in this study, preoperative colonic decompression in advanced OCRC patients was associated with low mortality and reasonable survival time, indicating the validity of this approach, providing the institution concerned has sufficient experience with the procedures and postoperative management required. The results also suggest that use of preoperative decompression can yield a marked reduction in risk in advanced OCRC, thus improving its prognosis.

Acknowledgments

This work was mainly supported by a Grant-in-Aid for Scientific Research (A) 24249068 from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.

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