Prognostic Factors and Treatment of Recurrence after Local Excision of Rectal Cancer

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Purpose: Indications for local excision in patients with rectal cancer remain controversial. We reviewed factors affecting survival rate and treatment effectiveness in cancer recurrence after local excision among patients with rectal cancer.

Materials and Methods: A total of 831 patients was enrolled. Of these, 391 patients were diagnosed with primary rectal cancer and underwent local excision. A retrospective observational study was performed on patients who underwent full-thickness local excision for rectal cancer.

Results: The median duration of follow-up was 61 months. The overall recurrence rate was 11.5%. The rate of local recurrence was 5.1%. Five-year overall survival rate among recurrent patients was 66.8%; the rate among patients who underwent salvage operation due to recurrence was 84.7%, compared with 44.2% among patients treated with non-operative management ($p<0.001$). Multivariate analysis of disease-free survival identified distance from the anal verge ($p=0.038$) and histologic grade ($p=0.047$) as factors predicting poor prognosis. Multivariate analysis of overall survival showed that age ($p<0.001$), serum carcinoembryonic antigen (CEA) levels ($p=0.001$), and histologic grade ($p=0.013$) also affected poor prognosis. In subgroup analysis of patients with recurrence, 25 patients underwent reoperation, while 20 patients did not. For 5-year overall survival rate, there was a significant difference between 84.7% of the reoperation group and 44.2% of the non-operation group ($p<0.001$).

Conclusion: The risk factors affecting overall survival rate after local excision were age 65 years or older, preoperative CEA level 5 or higher, and high histologic grade. In cases of recurrence after local excision of rectal cancer, salvage operation might improve overall survival.

Key Words: Rectal cancer, local excision, recurrence, preoperative chemoradiotherapy

INTRODUCTION

Colorectal cancer is the second most common cancer in the United States, and third most common cancer in Korea.[1,2] Therefore, diverse strategies for treatment of colorectal cancer continue to be developed. Rectal cancer treatment varies de-

pending on various characteristics, particularly by stage of cancer.[3] The standard treatment for early rectal cancer is removal by local excision.[4,5] However, there has been a recent trend toward chemoradiotherapy followed by excision for early rectal cancer. When a complete response is confirmed through chemoradiotherapy, a "watch and wait" approach is used without additional surgical treatment. Conversely, in advanced rectal cancer, radical surgery is performed depending on the location of the tumor or metastasis to lymph nodes (LNs).[6] In advanced rectal cancer, neoadjuvant chemoradiotherapy decreases cancer stage, facilitates a secure circumferential margin through reduction in the size of the cancer, increases the likelihood of preservation of the anal sphincter, and reduces the probability of recurrence.[7-9] However, radical surgery for low rectal cancer can lead to permanent stoma, increased mortality and morbidity, decreased quality of life, and increased disability.[10,11] Consequently, when rectal cancer is diagnosed ear-

ly, radical surgery should be avoided, and local excision should be performed.[12,13] Local excision has advantages of decreased operation time and hospitalization period, reduced likelihood of permanent stoma, and reduced mobility.[14-16] Despite these advantages, there are many risk factors associated with choosing local excision over radical operation. Failure to identify and treat hidden LN metastasis and failure to obtain an adequate safety margin during tumor resection can affect patient staging, leading to inappropriate treatment. As a result, the recurrence rate increases and overall survival decreases.[17-21] When rectal cancer recurs, disease management becomes much more difficult, and more extensive resection is required.[22,23] However, when recurrence occurs after local excision of rectal cancer, it remains unclear which treatment will most benefit patients. For this reason, the indications for local excision of rectal cancer remain controversial. The purpose of this study was to investigate factors affecting survival rate and recurrence after local excision in rectal cancer patients and differences between non-salvage treatment and salvage operation in cases of recurrence.

MATERIALS AND METHODS

Patients

A total of 831 records of patients with rectal cancer who were treated with local excision from January 2000 to December 2015 at a tertiary university hospital were reviewed retrospectively (Fig. 1). All patients participating in the study underwent preoperative abdominoperineal CT and pelvic MRI to determine clinical stage. Inclusion criteria were 18 years of age or older, diagnosis with local excision of rectal adenocarcinoma 15 cm above the anal verge, and absence of exclusion.[7] We excluded patients who had recurrence at the time of local excision, distant metastasis, genetic disorders, synchronous malignancy, or palliative surgery. A total of 391 eligible patients was classified according to these criteria. Fifty-eight patients received neoadjuvant concurrent chemoradiotherapy (CCRT). The remaining 333 patients underwent surgery without CCRT because of the absence of suspected LN metastasis. Our criteria for preoperative CCRT in rectal cancer were clinical suspicion of T3 or T4 rectal cancer or suspected LN metastasis in the perirectal area on MRI.[24] The 58 patients who underwent neoadjuvant chemoradiotherapy received fluorouracil-based chemotherapy. Surgery was performed at 6 to 8 weeks after preoperative CCRT. Patients from clinical T stages 1 to 3 were included. Patients in clinical stage 3 who underwent local excision were provided sufficient information on the course of rectal cancer and treatment guidelines.

All operations comprised full-thickness excision of the rectal wall, and the excision site was closed with sutures. Local excision was performed with two surgical techniques: transanal excision (TAE) and transanal endoscopic microsurgery (TEM).[25] Samsung Medical Center's Institutional Review Board approved this study's use of information obtained from patient records (IRB No: 2019-04-041).

Recurrence

All patients who participated in this study underwent a 5-year surveillance program. Patients were followed every 3 months for the first 2 years and then every 6 months for 3 years thereafter. During the follow-up period, cancer recurrence was
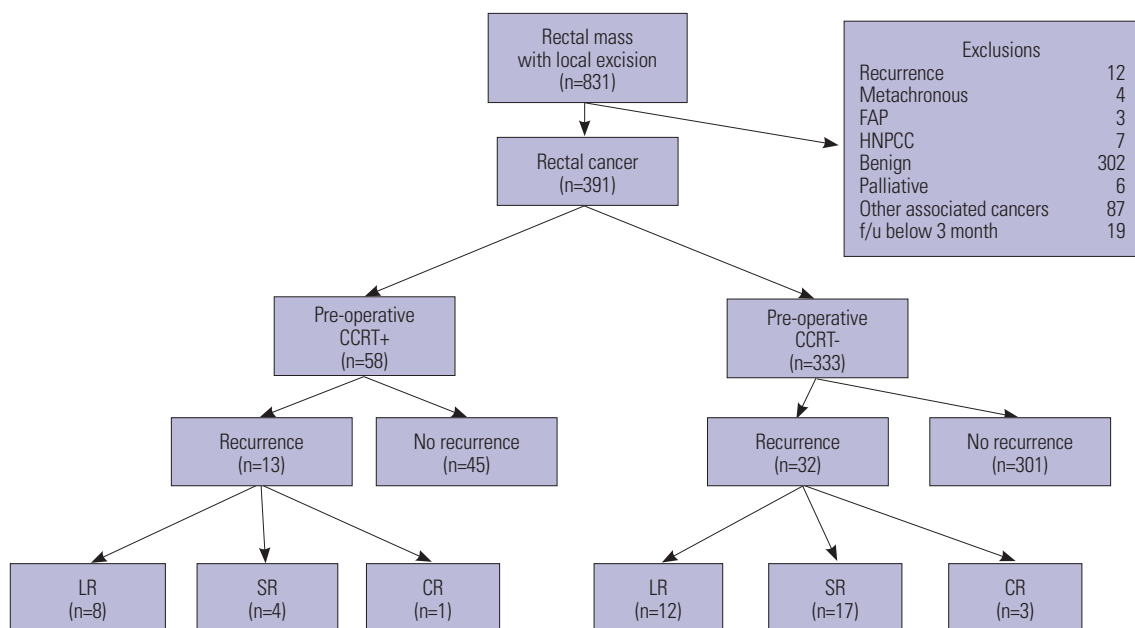

Fig. 1. Diagram of patient selection and recurrence outcomes. CCRT, concurrent chemoradiotherapy; FAP, familial adenomatous polyposis; HNPCC, hereditary nonpolyposis colorectal cancer; f/u, follow-up duration; LR, local recurrence; SR, systemic recurrence; CR, combined recurrence.

monitored through various tests, such as physical examination; serum carcinoembryonic antigen (CEA) level; chest X-ray; and abdominal, pelvic, and chest CT. Recurrence of cancer was confirmed pathologically by biopsy in patients suspected of recurrence or confirmed by CT scan, MRI, or positron emission tomography CT scan.

Recurrence was classified as local recurrence (LR), systemic recurrence (SR), or combined recurrence (CR). LR was defined as intra-pelvic recurrence following primary rectal cancer resection, without distant metastasis. SR was defined as recurrence only in other organs without LR. CR was defined as local and distant metastasis during the follow-up period.

Statistical analysis

Statistical analysis was performed using SPSS for Windows (version 25.0; IBM Corp., Armonk, NY, USA). Patient characteristics were described by Student's t test, chi-square test, and Fisher's exact test. Variables with a $p<0.1$ according to univariate analysis were further analyzed using the Cox regression method for multivariate analysis. Disease-free survival and overall survival rates were determined using Kaplan-Meier analysis and log-rank test. Statistical significance was defined as a $p<0.05$.

RESULTS

Patient characteristics

Of 391 patients, 211 male (54.0%) and 180 female (46.0%) were enrolled in this study. Mean age was 58.99±11.33 years (range, 28–87 years). Mean body mass intex was 24.32±3.05 kg/m². Mean tumor distance from the anal verge was 5.40±2.92 cm, and mean tumor size was 1.68±1.21 cm. Mean preoperative CEA level was 1.90±2.81 ng/mL. With regard to postoperative pathologic T stage, there were 345 patients with T1, 39 patients with T2, and 7 patients with T3 stage disease. Mean duration of follow-up was 75.74±47.69 months (range, 3–223 months). Fifty-one patients (13.5%) underwent local excision by TAE, 338 patients (86.4%) by TEM, and 2 patients (0.1%) by transanal minimally invasive surgery. Baseline characteristics of the patients were classified according to preoperative CCRT. For clinical T stage, the stages at preoperative CCRT and re-diagnosis by MRI were included. Between control and CCRT groups, there were statistical differences in American Society of Anesthesiology score, distance from the anal verge, clinical T stage, tumor size, cell type, pathologic T stage, and TNM stage. The clinicopathologic features of patients are summarized in Table 1.

After local excision, recurrence was observed in 45 patients (11.5%; 45/391). When classified by pathologic T stage, recurrence affected 32 patients in stage T0–T1, 11 in T2, and 2 in T3. A total of 20 patients experienced LR in the pelvis and anastomosis sites regardless of SR (5.1%; 20/391). Those with only

distant metastasis (systemic metastasis) represented 5.3% (21 patients) of the sample. There were four cases of CR with both local and distant metastases. Recurrence was most common in the second year after surgery (Fig. 2), but occurred up to 92 months after local excision. When the overall survival rate of patients was analyzed in relation to recurrence, the 5-year survival rates were 94.4% for the non-recurrence group and 66.8% for the recurrence group (Fig. 3).

Univariate analysis and multivariate analyses were performed to identify factors that impacted disease-free survival after local excision of rectal cancer (Table 2). Ninety percent profile likelihood confidence intervals were calculated for hazard ratios. Age ($p=0.021$), preoperative CCRT ($p=0.01$), distance from the anal verge ($p=0.003$), and histologic grade ($p=0.045$) influenced prognosis on univariate analysis. Multivariate analysis identified distance from the anal verge ($p=0.038$) and histologic grade ($p=0.047$) as factors influencing prognosis. We also used univariate analysis to identify factors that affected overall survival after local excision of rectal cancer (Table 3). At a hazard ratio of 90%, age ($p<0.001$), preoperative CEA ($p=0.001$), distance from the anal verge ($p=0.036$), and histologic grade ($p=0.028$) affected prognosis. Multivariate analysis revealed an association of prognosis with age ($p<0.001$), preoperative CEA ($p=0.001$), and histologic grade ($p=0.013$).

We classified and analyzed relapsed patients according to CCRT status. Of the 58 patients who underwent preoperative CCRT, 13 experienced recurrence. Eight exhibited LR, four SR, and one CR. All 8 patients with LR underwent additional operations, comprising six abdominopelvic resections and two low anterior resections. Of the 4 patients with SR, two refused additional treatment and died. One refused further treatment because another cancer was found and died. The last patient with SR underwent additional chemotherapy and is alive. The CR patient refused both surgery and chemotherapy and died without additional treatment. Of the 351 patients who did not receive preoperative CCRT, 32 exhibited recurrence: 12 LR, 17 SR, and three CR. Of the patients with LR, 10 underwent additional surgery of one abdominoperineal resection, one intersphincteric resection, one Hartmann operation, four low anterior resections, and two local excisions. Of the 17 SR patients, eight had liver metastasis, seven had lung metastasis, and two had multiple metastases. Among these patients, five received postoperative CCRT, five received chemotherapy, and one received radiotherapy only. Six patients underwent surgical treatment for metastasis without additional chemotherapy. Three of these patients showed CR, two refused additional treatment, and only one patient underwent low anterior resection and chemotherapy.

During this study, seven patients were diagnosed with T3 stage disease after local excision. Five patients underwent additional salvage operation, but two refused further surgery. Of the seven T3 patients, three died. Of these, two refused surgery and one underwent additional salvage operation, but systemic

**Table 1.** Clinicopathologic Features of the Study Patients (n=391)

	Preop CCRT (-) (n=333)	Preop CCRT (+) (n=58)	Total (n=391)	*p* value
Age (yr)			58.99±11.33	0.084
<64	228 (68.5)	33 (56.9)	261 (66.8)	
≥65	105 (31.5)	25 (43.1)	130 (33.2)	
Sex				0.627
Male	178 (53.5)	33 (56.9)	211 (54.0)	
Female	155 (46.5)	25 (43.1)	18 (46.0)	
Preoperative CEA level (ng/mL)	1.84±2.51	2.17±4.18	1.90±2.81	0.058
0–5	303 (98.1)	51 (96.2)	354 (97.8)	0.402
≥5	6 (1.9)	2 (3.8)	8 (2.2)	
BMI (kg/m^2)	24.29±2.95	24.41±3.56	24.32±3.05	0.054
ASA score				
I	170 (51.1)	19 (32.8)	189 (48.3)	0.035
II	148 (44.4)	36 (62.1)	184 (47.4)	
III	15 (4.5)	3 (5.2)	18 (4.6)	
Anal verge (DRE) (cm)	5.71±2.93	3.61±2.14	5.4±2.92	0.004
<4	82 (24.6)	33 (56.9)	115 (29.4)	<0.001
≥4	251 (75.6)	25 (43.1)	276 (70.6)	
Clinical T stage				<0.001
T1	310 (93.1)	21 (36.2)	332 (84.9)	
T2	21 (6.3)	13 (22.4)	33 (8.4)	
T3	2 (0.6)	24 (41.4)	26 (6.6)	
Tumor size (cm)	1.77±1.25	1.11±0.80	1.68±1.21	0.045
<2	215 (64.6)	49 (84.5)	264 (67.5)	0.003
≥2	118 (35.4)	9 (15.5)	127 (32.5)	
Histologic grade				<0.001
WD	220 (66.1)	23 (39.7)	243 (62.1)	
MD	102 (30.6)	34 (58.6)	136 (34.8)	
PD	9 (2.7)	0	9 (2.3)	
MUC	2 (0.6)	1 (1.7)	3 (0.8)	
Pathologic T stage				<0.001
T0, Tx, T1/yT0, yT1	303 (91.0)	42 (72.4)	345 (88.2)	
T2/yT2	27 (8.1)	12 (20.7)	39 (10.0)	
T3/yT3	3 (0.9)	4 (6.9)	7 (1.8)	
TNM stage				0.001
Stage I	330 (99.1)	53 (91.4)	383 (98)	
Stage II	2 (0.6)	3 (5.2)	5 (1.3)	
Stage III	1 (0.3)	2 (3.4)	3 (0.8)	
CRM				0.162
Negative	312 (93.7)	57 (98.3)	369 (94.4)	
Positive	21 (6.3)	1 (1.7)	22 (5.6)	
Lymphovascular invasion				0.006
Negative	191 (57.4)	29 (50.0)	220 (56.3)	
Positive	40 (12.0)	1 (1.7)	41 (10.5)	
Undescribed	102 (30.6)	28 (48.3)	130 (33.2)	
Perineural invasion				0.413
Negative	133 (39.9)	19 (32.8)	152 (38.9)	
Positive	2 (0.6)	1 (1.7)	3 (0.8)	
Undescribed	198 (59.5)	38 (65.5)	236 (60.4)	

Table 1. Clinicopathologic Features of the Study Patients (n=391) (Continued)

	Preop CCRT (-) (n=333)	Preop CCRT (+) (n=58)	Total (n=391)	*p* value
Vascular invasion				0.239
Negative	128 (38.4)	17 (29.3)	145 (37.1)	
Positive	20 (6.0)	2 (3.4)	22 (5.6)	
Undescribed	185 (55.6)	39 (67.2)	224 (57.3)	
Tumor budding				0.226
Negative	61 (18.3)	12 (20.7)	73 (18.7)	
Positive	16 (4.8)	0	16 (4.1)	
Undescribed	256 (76.9)	46 (79.3)	302 (77.2)	
Follow up duration (month)	74.29±48.38	84.07±42.88	75.74±47.69	
Length of hospital stay (day)	4.95±2.72	5.69±2.34	5.06±2.68	0.051

CCRT, concurrent chemoradiotherapy; CEA, carcinoembryonic antigen; BMI, body mass index; ASA, American Society of Anesthesiology; WD, well differentiated; MD, moderately differentiated; PD, poorly differentiated; MUC, mucinous carcinoma; CRM, circumferential resection margin.
Data are presented as mean±standard deviation or n (%).
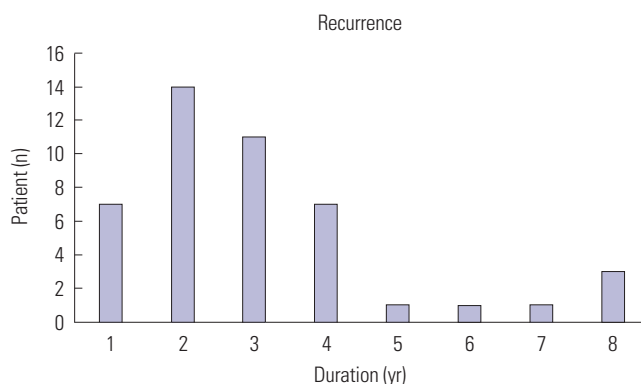
Fig. 2. Yearly comparison of patients with recurrence after local resection for rectal cancer (n=45).

Fig. 3. Five-year overall survival in patients who were diagnosed with primary rectal cancer who underwent local excision. The overall survival rate after 5 years of follow up was 94.4% (n=346) in the non-recurrence group and 66.8% (n=45) in the recurrence group (*p*<0.001; log-rank test).
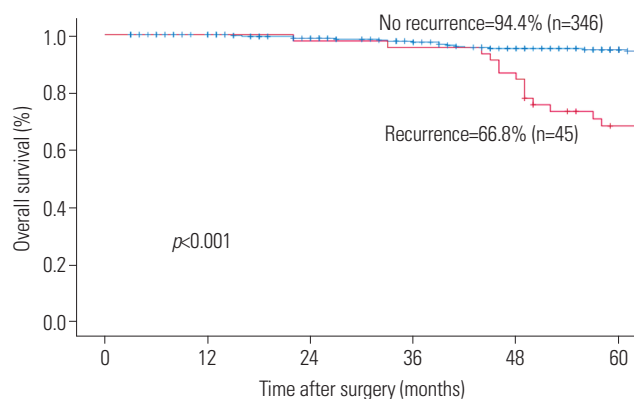
metastasis progressed and they died (Table 4).

In subgroup analysis of patients with recurrence, 25 underwent reoperation and 20 did not. There was a significant difference in 5-year overall survival rate between these individuals (84.7%, reoperation group; 44.2%, non-operation group; *p*<0.001) (Fig. 4). The characteristics of recurrence with salvage operation patients are described in Table 5.

Complications occurred in 15 patients (3.6%), and major complications occurred in 5 (1.2%). In 2 patients, perforation occurred at the operation site, 2 patients had intraluminal bleeding, and 1 patient developed a rectovaginal fistula. There was no postoperative mortality. The circumferential resection margin was positive in 5.6% of patients (22), four of whom exhibited recurrence.

DISCUSSION

Therapeutic strategies for rectal cancer are evolving in various ways. Until recently, radical surgery was the best option for rectal cancer. However, with the development of chemotherapy, local excision using new techniques, and the latest diag-

nostic techniques, strategies for treating cancer without salvage operations are increasing.[15] According to this trend, many researchers are conducting "watch and wait" studies to observe patients without surgery.[12,13,26,27] However, the treatment of choice for advanced rectal cancer is still a radical operation, encompassing low anterior resection or abdomino-pelvic resection,[25] and recurrence rates have decreased with radical surgery.[28,29] However, complications caused by radical surgery and increased morbidity and mortality are larger disadvantages, compared to the patient advantages.[30-32] While surgery improves oncologic outcomes, uncertainty exists around patient toleration of complications or dysfunction. In order to minimize damage to patients, continuing research seeks to avoid radical operations and to perform local excision. Although more studies on local excision have been performed, there have not been many studies on recurrent disease after local excision or the prognostic factors that affect recurrence.[33,34]

After local excision, 22 patients (5.6%) were circumferential resection margin positive, and the total number of recurrence patients was 45 (11.5%). This recurrence rate is relatively low,

Table 2. Univariate and Multivariate Analyses of Prognostic Factors Affecting Disease-Free Survival after Local Excision of Rectal Cancer

Variable	Univariate analysis		Multivariate analysis	
	HR (90% CI)	*p* value	HR (95% CI)	*p* value
Age				
<65 yr vs. ≥65 yr	1.997 (1.111–3.589)	0.021	1.724 (0.949–3.131)	0.074
Sex				
Male vs. Female	1.350 (0.751–2.424)	0.316		
Preop CEA				
<5 ng/mL vs. ≥5 ng/mL	2.018 (0.488–8.355)	0.333		
Preop CCRT				
No vs. Yes	2.327 (1.221–4.435)	0.010	1.864 (0.947–3.671)	0.072
Tumor size				
<2 cm vs. ≥2 cm	0.558 (0.276–1.127)	0.104		
Anal verge				
<4 cm vs. ≥4 cm	0.410 (0.228–0.736)	0.003	0.520 (0.280–0.963)	0.038
Pathologic T stage				
Tx, T0, T1, T2 vs. T3	2.523(0.611–10.425)	0.201		
Histologic grade				
WD, MD vs. PD, MUC	2.862 (1.025–7.993)	0.045	2.873 (1.016–8.128)	0.047
CRM				
No vs. Yes	1.541 (0.552–4.302)	0.410		
Lymphatic invasion				
No vs. Yes	2.051 (0.917–4.587)	0.081		
Perineural invasion				
No vs. Yes	3.434 (0.456–25.840)	0.231		
Vascular invasion				
No vs. Yes	1.677 (0.560–5.020)	0.355		
Tumor budding				
No vs. Yes	0.464 (0.120–1.797)	0.266		

WD, well differentiated; MD, moderately differentiated; PD, poorly differentiated; MUC, mucinous carcinoma; CCRT, concurrent chemoradiotherapy; CEA, carcinoembryonic antigen; CRM, circumferential resection margin; HR, hazard ratio; CI, confidence interval.

compared to that in previous studies. However, according to the results of recent studies, the recurrence rate after local excision is decreasing. In a study of Suzuki, et al.,[35] the recurrence rate after local excision of CCRT for early rectal cancer was 8% (4/50). In addition, Sun, et al.[16] reported that the recurrence rate for rectal cancer when TAE was performed was 13.8% (16/116). According to the results of van Oostendorp, et al.,[36] a recent meta-analysis study on local excision of rectal cancer, the recurrence rate of patients who underwent local resection alone was 13.6%. In our study, stage T1 patients accounted for the majority (93%), and patients who underwent CCRT before surgery were included and showed a low recurrence rate. In addition, in patients with T1 tumor grade, selection bias caused by radical resection is presumed. In other studies, local excision only in patients with early rectal cancer diagnosed at stage T1 to T2 reduced the probability of recurrence to 12% to 29% in T1 tumors and 26% to 37% in T2 tumors.[37,38] The recurrence rate is decreasing compared to that identified in our previous study.[39] In our study, there was one follow-up loss after recurrence. We also investigated the prognostic fac-

tors that affect recurrence after local excision. In a study by Xu, et al.,[40] prognostic factors associated with a high risk of recurrence after radical operation in colorectal cancer were poor differentiation, old age, lymphovascular permeation, and perineural invasion. Saso, et al.[41] found that CEA level, preoperative obstruction, tumor invasion, lymphatic invasion, and venous invasion were correlated with disease-free survival. A study by Ryuk, et al.[42] found that CA19-9 level, venous invasion, and advanced N stage affected recurrence within 2 years after curative resection for colorectal cancer. In our study, distance from the anal verge and histologic grade were found to affect recurrence.

Recurrence after preoperative CCRT occurred in 13 of 58 patients (22.4%). This is more than double the probability of recurrence in patients without CCRT [32/333 (9.6%)]. However, patients treated with preoperative CCRT were diagnosed at a higher stage than other patients and were downstaged through CCRT. In addition, when comparing the pathologic T stage, more than twice the proportion of patients were diagnosed with T2–T3 stage out of the CCRT group (Table 1). It is thought

Table 3. Univariate and Multivariate Analyses of Prognostic Factors Affecting Overall Survival after Local Excision of Rectal Cancer

Variable	Univariate analysis		Multivariate analysis	
	HR (90% CI)	p value	HR (95% CI)	p value
Age				
<65 yr vs. ≥65 yr	4.724 (2.674–8.344)	<0.001	3.729 (1.997–6.962)	<0.001
Sex				
Male vs. Female	1.135 (0.664–1.939)	0.644		
Preop CEA				
<5 ng/mL vs. ≥5 ng/mL	4.579 (1.795–11.679)	0.001	5.020 (1.895–13.297)	0.001
Preop CCRT				
No vs. Yes	0.630 (0.269–1.475)	0.287		
Tumor size				
<2 cm vs. ≥2 cm	0.983 (0.557–1.736)	0.953		
Anal verge				
<4 cm vs. ≥4 cm	0.561 (0.327–0.964)	0.036	0.598 (0.320–1.114)	0.105
Pathologic T stage				
Tx, T0, T1, T2 vs. T3	1.801 (0.438–7.409)	0.415		
Histologic grade				
WD, MD vs. PD, MUC	2.812 (1.117–7.078)	0.028	3.750 (1.324–10.625)	0.013
CRM				
No vs. Yes	1.311 (0.473–3.638)	0.603		
Lymphatic invasion				
No vs. Yes	1.153 (0.437–3.040)	0.774		
Perineural invasion				
No vs. Yes	0.305 (0.040–2.329)	0.252		
Vascular invasion				
No vs. Yes	1.698 (0.595–4.845)	0.322		
Tumor budding				
No vs. Yes	0.268 (0.060–1.197)	0.084		

WD, well differentiated; MD, moderately differentiated; PD, poorly differentiated; MUC, mucinous carcinoma; CCRT, concurrent chemoradiotherapy; CEA, carcinoembryonic antigen; CRM, circumferential resection margin; HR, hazard ratio; CI, confidence interval.

Table 4. Initial Pathology of Patients with Recurrence

Pathology	LR	SR	CR	Reoperation
pT0, pTx	8	2	-	7
pT1	9	10	3	12
pT2	3	8	0	5
pT3	-	1	1	1
Total	20	21	4	25

LR, local recurrence; SR, systemic recurrence; CR, combined recurrence.

Fig. 4. Five-year overall survival in patients who were treated for recurrence after local excision. The overall survival rate was 84.7% (n=25) in the salvage operation group and 44.2% (n=20) in the non-salvage group (p<0.001; log-rank test).

that this rate also affected the recurrence rate.

Factors affecting overall survival after local excision were investigated. Age, preoperative CEA level, and histologic grade were significantly different between groups. Several studies have shown that prognostic factors, such as pathologic T stage, affect survival. However, our study did not show any significant results for pathologic T stage. This might be due to the small number of patients.

In this study, patients diagnosed with clinical stage T3 who underwent local excision were included (Table 6). In cases of stage T3, salvage operation met treatment guidelines but was not performed. Prior to surgery, sufficient data were provided
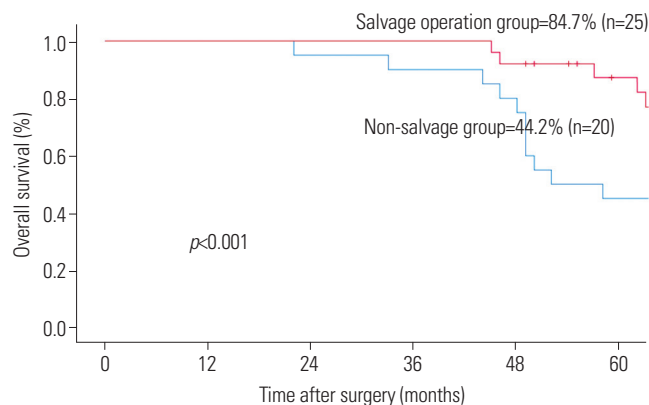
to all patients, and the need for treatment was explained. However, only local excision was performed due to the burden of stoma formation, fear of postoperative complication, economic burden, and difficulty in anesthesia due to underlying dis-

Table 5. Characteristics of Recurrence among Salvage Operation Patients (n=25)

	Value
Age (range), yr	61.72 (31–81)
Sex	
Male	14 (56)
Female	11 (44)
Mean preop CEA (ng/mL)	3.29±6.58
BMI (kg/m²)	24.02±2.62
ASA score	
I	8 (32)
II	17 (68)
III	0
Mean tumor diameter (cm)	1.908±1.58
Mean distance from anal verge (DRE)	5.26±4.63
Pathologic T stage	
pTx, pT0	7 (28)
pT1	3 (12)
pT2	3 (12)
pT3	12 (48)
Histology	
WD	2 (8)
MD	12 (48)
PD	2 (8)
MUC	1 (4)
No residual tumor	6 (24)
Lymphovascular invasion positive	4 (16)
Perineural invasion positive	3 (12)
Vascular invasion positive	5 (20)
Tumor budding positive	3 (12)
Salvage operation	
Anterior resection	1 (4)
Low anterior resection	9 (36)
Intersphincteric resection	1 (4)
Hartmann operation	1 (4)
Abdominoperineal resection	11 (45)
Local excision	2 (8)

CEA, carcinoembryonic antigen; BMI, body mass index; ASA, American Society of Anesthesiology; WD, well differentiated; MD, moderately differentiated; PD, poorly differentiated; MUC, mucinous carcinoma.
Data are presented as mean±standard deviation or n (%).

ease. It is necessary to investigate the prognosis of local resection in T3 patients.

We mainly recommended salvage operation in cases of LR. However, local excision was repeated based on patient desire or refusal of salvage operation. In cases of combined metastasis, chemotherapy was performed as the first treatment, but local excision was not performed with disease progression. Finally, there have been cases of refusal of further treatment in old age or economically poor patients.

LR after 5 years is uncommon but has been reportsed.[43] In our study, 5 patients relapsed, four of whom were identified with pathologic T1 and one with pathologic T2. All 5 patients underwent adjuvant CCRT after local excision. In view of these results, tumor regression due to chemotherapy is not confirmed or is considered to be delayed in diagnosis due to slow tumor regrowth.

There were several limitations to this study. Our study was performed retrospectively at a single institution. Local excision of rectal cancer was performed using two techniques, and the difference between the two techniques might have influenced outcomes. Tumor stage could not be identified in greater detail, preventing comparison of stage 1 and stage 2 disease in relation to LN metastasis. However, it is difficult to obtain sufficient information on node metastasis in patients who underwent local excision only. Additional pathologic reports were not obtained for all patients. Tumor budding, lymphovascular invasion, perineural invasion, and lymphatic invasion were screened selectively before 2005, after which data often were missing.

Patients who underwent local excision for rectal cancer were reviewed, and the recurrence rate was 11.5%. The prognostic factors affecting recurrence after local excision were distance from the anal verge and histologic grade. Prognostic factors affecting overall survival were age, preoperative CEA, and histologic grade. The survival rate was higher among patients who underwent additional surgery at recurrence than among those who underwent chemotherapy or radiotherapy.

Table 6. T3 Patients with Recurrence after Local Excision (n=7)

Patients	Age	Sex	Pre op TNM stage	Detail	Pre op CCRT	Post op TNM stage	Detail	Histologic grade	Postop chemotherapy	Recurrence	Recurrence times	Salvage operation	Follow-up (mo)	Outcome	Cause of death
1	55	M	Stage I	T1N0	Yes	Stage II	T3Nx	ADC MD	Tegafur/uracil	No	-	-	136	-	-
2	45	F	Stage I	T1N0	No	Stage II	T3Nx	ADC MD	5FU +RT	No	-	LAR	156	-	-
3	57	F	Stage I	T1N0	No	Stage II	T3Nx	ADC MD	5FU +RT	No	-	LAR	85	-	-
4	83	F	Stage II	T2N0	No	Stage IIa	T3N0	ADC MD	-	Yes	17 month	-	47	Expire	Lung meta after 1 yr f/u
5	57	M	Stage IIIb	T3N2	Yes	Stage IIa	yT3Nx	ADC MD	-	No	-	ISR	92	-	-
6	56	M	Stage IIIa	T2N1	Yes	Stage II	T3Nx	ADC WD	-	Yes	13 month	L-APR	57	Expire	Lung meta after 1 yr f/u
7	76	M	Stage II	T2N0	Yes	Stage II	yT3Nx	ADC MD	-	No	-	LAR	72	-	-

LAR, low anterior resection; ISR, intersphincteric resection; ADC, adenocarcinoma; MD, moderately differentiated; APR, abdominoperineal resection; CCRT, concurrent chemoradiation therapy; f/u, follow-up.

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