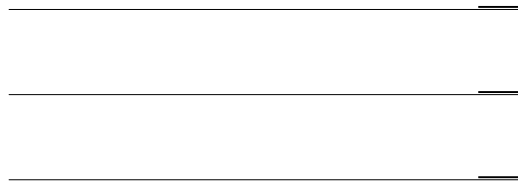


2001 12



가 가 가 가 .
가 가 , 가 .
가 가 , 가 .
가 , 가 .
가 .
가 .

	1
I.	3
II.	5
1.	5
2.	5
가.	5
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.	6
.	7
.	7
III.	8
1.	8
가.	8
.	9
.	9
.	10
.	11
.	12
2.	13
가.	14
.	14
.	15

3.	18
가.	22
(1)	22
(2)	22
(3)	23
(4)	CEA	24
(5)	25
(6)	26
(7)	26
(8)	27
(9)	28
(10)	29
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4 가 , 가

가 , 가 ,

CEA (carcinoembryonic antigen) , , , , ,

가 , 1989 1998

6 가 , 가

1 가 .

SPSS (Version 10.0 for Windows, Chicago, IL, USA) ,

Kaplan-Meier , Log rank test .

Cox regression hazard model

Chisquare test . 1973

1848(93.7%) 1643(89.1%)

60.5 ± 35.4 , 1945(98.6%)

23.5% , 86/386 (22.2%), 236/386 (61.1%),

50/386 (12.9%) ,

7.2%, 17.9% vs 3.1%, 10.5%

5 61.5% TNM 1 가 84.3%, 2 79.2%, 3

61.5%, 4 31.5%

CEA 5ng/ml , , ,

TNM ,

CEA 5ng/ml ,

:

I.

1 152,000 57,000 가
 .⁽¹⁾ 4 ,
 가 가 . (2000)
 1986 5.0% 1997
 8.8% 가 , 1986 5.0% 1997 8.7% 가
 . 1986 10 2.8 1997 6.9
 가 .
 , 가
 .⁽²⁻⁵⁾
 , , CEA
 (carcinoembryonic antigen) , , , ,
 ,
 ,⁽⁶⁻¹⁷⁾ TNM
 .⁽¹⁸⁻²²⁾
 ,

1998

1989

II.

1.

1989 1 1 1998 12 31
()

1973 1989 2001 11 15 가
1945 (98.6%) .

2.

가.

가 X-ray
가 가
가

가 , 가
 가
 가
 , 가 가 Radiofrequency
 ablation (RFA),

TNM 2
 5 Fluorouracil Leucovorin
 5 Fluorouracil, Leucovorin
 2 6 4500cGy
 , 900cGy

(1) CEA
 7 CEA CEA
 가 (< 5ng/ml)
 1 3

(2)

6 . CEA 가

(3)

1 . CEA 가,

(, 가 , , ,),
(, , , , ,),

6 가 1 6 가

SPSS (Version 10.0 for Windows, Chicago, IL, USA)

Kaplan-Meier , Log

rank test .

Cox regression hazard model , Chisquare

test . p < 0.05 .

III.

1.

가.

1989 1 1998 12 1973 가
 , 1848(93.7%) , 125(6.3%)
 1848 1643(89.1%)
 , 205(10.9%)
 60.5 ± 35.4 , 1945(98.6%)

(Table 1).

Table 1. Patient characteristics

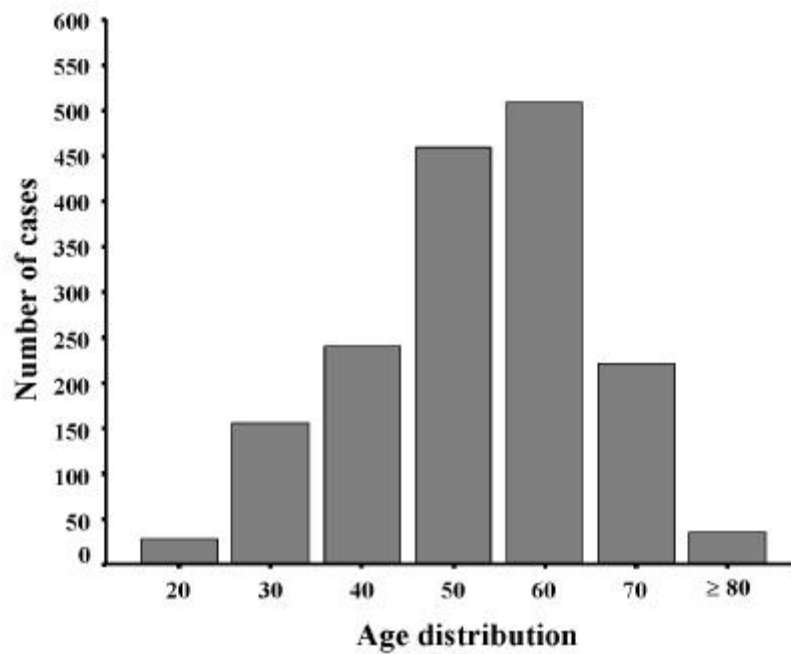
	(N=1973)
	No.(%)
Sex	
Male	1134 (57.5)
Female	839 (42.5)
Age (year)	57.3 ± 12.4
Resectability	
Yes	1848 (93.7)
Curative resection	1643 (89.1)
Palliative resection	205 (10.9)
No	125 (6.3)
Preoperative CEA (ng/ml)	27.5 ± 189.4
Op. mortality *	9 (0.5)
F/U period (months) †	60.5 ± 35.4
F/U rate (overall) ‡	1945 (98.6)

* : Operative mortality, † : Overall follow up period in months,

‡ : Overall follow up rate

1973 1134(57.5%) : 839(42.5%) ,
 57.3 ± 12.4 . 50 60 가
 1161(58.9%) 가 , 40 209(10.6%) , 70
 320(16.3%) (Figure 1).

Figure 1. Overall age distribution



862(52.5%) , S 309 (18.8%) ,
 305(18.6%) , 85(5.2%) , 82(4.9%) 가
 (Table 2).

Table 2. Tumor location

(N=1643)	
Location	No. (%)
Rectum	862 (52.5)
Sigmoid	309 (18.8)
Ascending	305 (18.6)
Transverse	85 (5.2)
Descending	82 (4.9)

1643
 422(25.7%) 가 , 374(22.8%) ,
 353(21.5%) , 266(16.2%) , 70(4.3%) ,
 68(4.1%) (Table 3).

Table 3. Type of operative procedure

(N=1643)	
Op. Name *	No. (%)
LAR †	422 (25.7)
APR ‡	374 (22.8)
Right hemicolectomy	353 (21.5)
AR §	266 (16.2)
Left hemicolectomy	70 (4.3)
Hartmann	68 (4.1)
Transanal excision	25 (1.5)
Total colectomy	20 (1.2)
CAA	16 (0.9)
Transverse colectomy	14 (0.9)
Pelvic exenteration	6 (0.4)
Others	9 (0.5)

* : Name of operation, † : Low anterior resection

‡ : Abdomino-perineal resection, § : Anterior resection

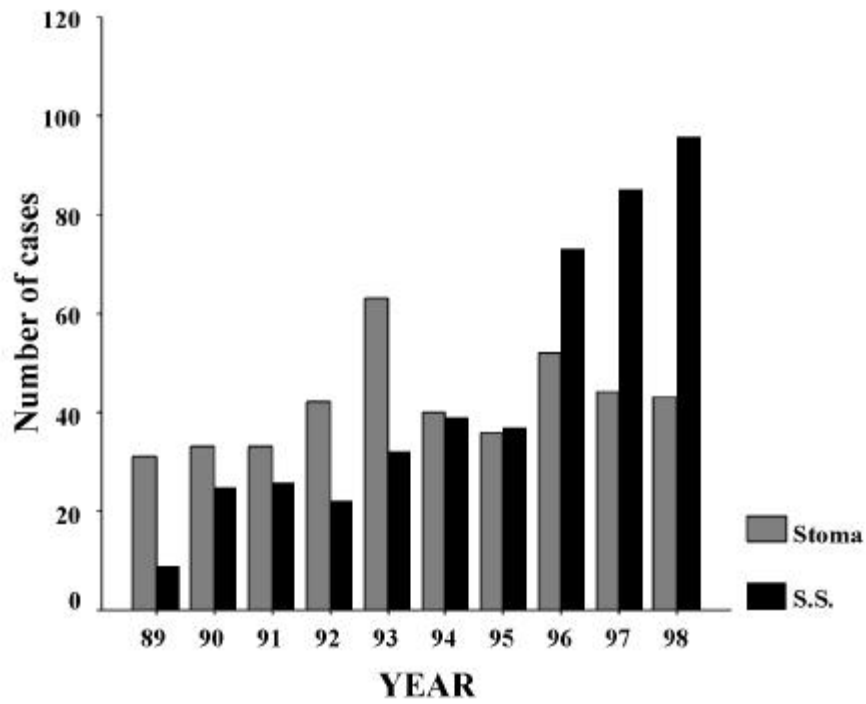
: Colo-anal anastomosis

1996

, 1996

(Figure 2).

Figure 2. Changing pattern of type of operation for rectal cancer



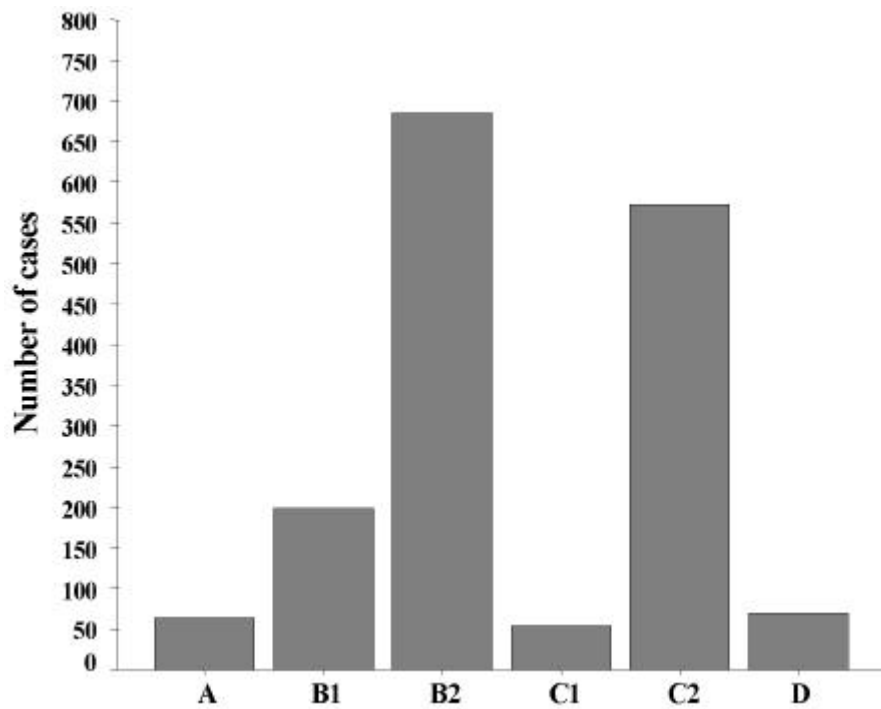
Stoma: Abdominoperineal resection or Hartmann's procedure

S.S.: Sphincter Saving procedure

Modified Astler-Coller B2 685(41.7%), C2 573(34.9%), B1 199(12.1%), D 69(4.2%) A 64(3.9%) (Figure 3).
 (moderate differentiated)가 1095(66.6%) 가

, (well differentiated) 281(17.1%) , (mucinous) 122(7.4%)
 , (poorly differentiated) 89(5.4%) .

Figure 3. Distribution according to modified Astler-Coller stage



9(0.5%) , 4(44.4%) 가 ,
 2(22.2%) (Table 4).

가,

(3.1%) (P=0.001), 62/862 (7.2%), 24/781
 27(31.5%) 가 , 17(19.7%) , 5(5.8%)
 , 10(11.7%) 가 (Table 6).

Table 6. Sites of local recurrence

Location	(N=86)	
	Colon*	Rectum*
	No. (%)	No. (%)
Anastomotic	10 (11.7)	17 (19.7)
Pelvic	1 (1.1)	27 (31.5)
Perineal	0	5 (5.8)
Vaginal	0	2 (2.3)
Bladder	1 (1.1)	1 (1.1)
Peristomal	0	1 (1.1)
Others	13 (15.2)	8 (9.4)

* : Total local recurrence rate for colon 24/781 (3.1%)
 and rectum 62/862 (7.2%). (P= 0.001)

.

(10.5%) (P=0.001), 154/862 (17.9%), 82/781
 24(10.2%) , 55(23.3%) , 44(18.6%) ,
 9(3.8%) , 38(16.1%) , 23(9.7%) ,
 (Table 7)

Table 7. Sites of systemic recurrence

Location	(N=86)	
	Colon *	Rectum *
	No. (%)	No. (%)
Liver	38 (16.1)	55 (23.3)
Lung	9 (3.8)	44 (18.6)
Bone	3 (1.3)	10 (4.2)
Brain	2 (0.8)	5 (2.1)
Carcinomatosis	23 (9.7)	24 (10.2)
LN †	2 (0.8)	4 (1.6)
Others	5 (2.1)	12 (5.1)

* : Total systemic recurrence rate for colon 82/781 (10.5%) and rectum 154/862 (17.9%). (P= 0.001)

† : Cervical lymph node, paraaortic lymph node and inguinal lymph node.

•

(P < 0.001) CEA > 5ng/ml (P < 0.001), (P < 0.001), (P < 0.001), (P < 0.001), (P < 0.001), (P < 0.001), (P=0.001) (Table 8)(Table 9).

Table 8. Analysis of prognostic factors for overall recurrence (I)

Factors	No.	Recurrence		<i>P</i>
		Yes (%)	No (%)	
Sex				0.35
Male	952	22.7	77.3	
Female	689	24.7	75.3	
Age				0.17
< 40	197	27.4	72.6	
40	1444	23.0	77.0	
Tumor site				0.001
Colon	777	16.6	83.4	
Rectum	860	29.9	70.1	
Preoperative serum CEA				0.001
5 ng/ml	998	20.2	79.8	
> 5 ng/ml	544	29.8	70.2	
Vascular invasion				0.001
(-)	1559	22.2	77.8	
(+)	82	48.8	51.2	
Lateral resection margin				0.001
(-)	1576	22.3	77.7	
(+)	65	52.3	47.7	
Tumor size				0.59
5cm	584	25.3	74.7	
> 5cm	895	24.1	75.9	

Table 9. Analysis of prognostic factors for overall recurrence (II)

Factors	No.	Recurrence		<i>P</i>
		Yes (%)	No (%)	
Gross tumor characteristics				0.001
Polypoid	50	12.0	88.0	
Ulcerative	1005	28.3	71.7	
Fungating	449	12.2	87.8	
Annular constrictive	61	39.3	60.7	
Depth of invasion]				0.001
T 1	66	1.5	98.5	
T 2	251	13.5	86.5	
T 3	1258	26.0	74.0	
T 4	48	39.6	60.4	
Lymph node invasion				0.001
N0	983	15.5	84.5	
N1	409	28.4	71.6	
N2	238	49.2	50.8	
Cell differentiation				0.001
Well	281	15.3	84.7	
Moderate	1093	24.3	75.7	
Poor	89	28.1	71.9	
Mucinous	122	32.0	68.0	
TNM stage				0.001
I	262	7.3	92.7	
II	685	17.4	82.6	
III	625	34.6	65.4	
IV	45	62.2	37.8	

3. 생존율 및 예후인자 분석

전체 환자의 5년 생존율은 61.5% 이었으며 (Figure 4), 근치적 절제와 고식적 절제에 따른 5년 생존율은 각각 71.7%, 10.0% 이었다 (Figure 5).

Figure 4. Overall 5 year survival rate

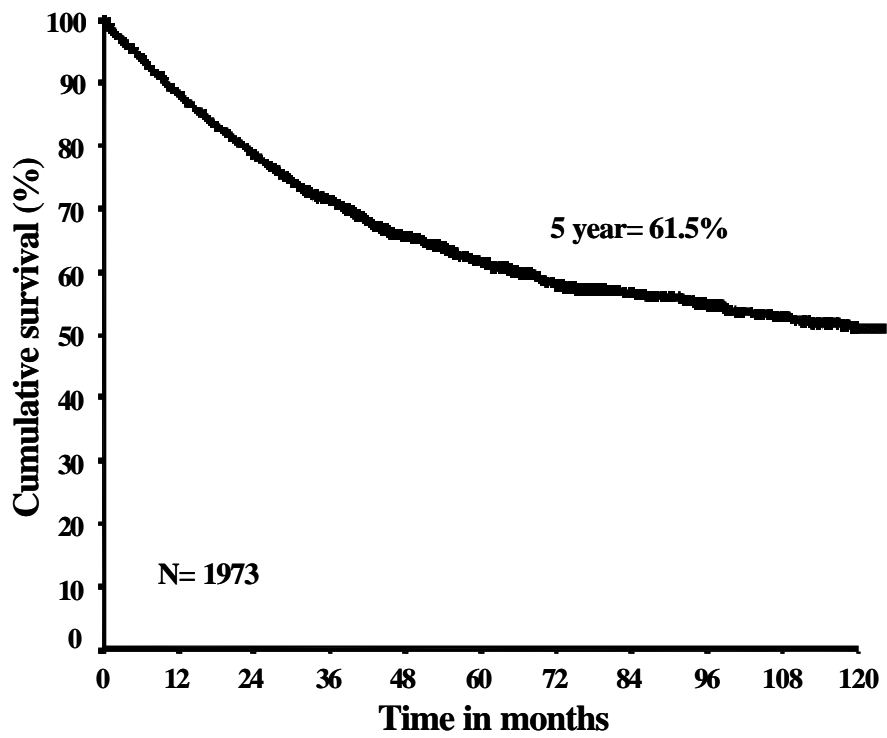
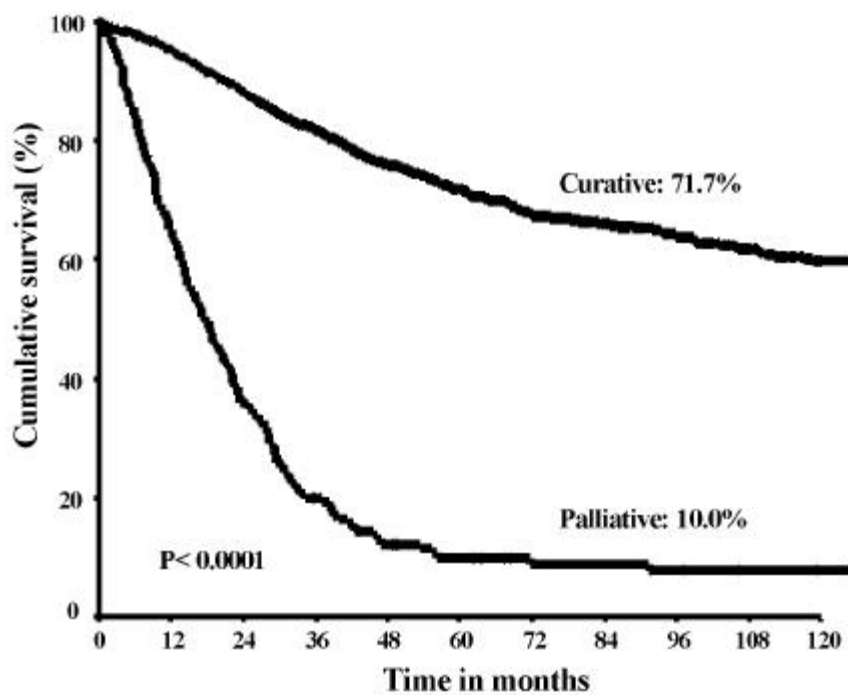


Figure 5. Cumulative survival curve for 5 year according to resectability



5

(Table 10)(Table 11)

가

(Table 12)

Table 10. Univariate analysis of prognostic factors for 5 year survival (I)

Factors	No.	5 year (%)	<i>P</i>
Sex			0.6
Male	946	72.0	
Female	683	71.4	
Age			0.055
< 40	181	77.4	
40	1448	70.9	
Tumor site			0.0001
Colon	768	78.8	
Rectum	857	65.2	
Preoperative serum CEA			0.0001
5 ng/ml	991	76.5	
> 5 ng/ml	539	63.8	
Vascular invasion			0.0001
(-)	1546	72.9	
(+)	83	47.6	
Lateral resection margin			0.0001
(-)	1564	72.8	
(+)	65	44.8	
Tumor size			0.62
5cm	580	69.8	
> 5cm	891	70.9	

Table 11. Univariate analysis of prognostic factors for 5 year survival (II)

Factors	No.	5 year (%)	<i>P</i>
Gross tumor characteristics			0.0001
Polypoid	49	81.2	
Ulcerative	999	68.3	
Fungating	445	81.0	
Annular constrictive	60	55.8	
Depth of invasion			0.0001
T 1	65	90.8	
T 2	250	79.6	
T 3	1249	70.1	
T 4	48	58.6	
Lymph node invasion			0.0001
N0	974	79.4	
N1	406	65.6	
N2	238	50.7	
Cell differentiation			0.001
Well	278	78.6	
Moderate	1088	71.7	
Poor	88	61.1	
Mucinous	122	66.1	
TNM stage			0.0001
I	259	84.3	
II	683	79.2	
III	624	61.5	
IV	44	31.5	

Table 12. Multivariate analysis of prognostic factors for 5 year survival

	RR	CI (95%)	P
Tumor location	1.625	(1.322- 1.997)	< 0.001
CEA *	1.504	(1.238- 1.826)	< 0.001
VI	1.636	(1.149- 2.329)	0.006
LM †	1.554	(1.040- 2.323)	0.031
N stage	1.058	(0.540- 2.072)	0.002
Gross tumor ‡	2.813	(1.062- 7.447)	0.006
TNM	4.417	(2.220- 8.789)	< 0.001

* : Preoperative serum CEA level, † : Lateral margin positive,

‡ : Gross tumor characteristics, VI: Vascular invasion

가.

(1)

5 72.0%, 71.4% 가 (P=0.6).

(2)

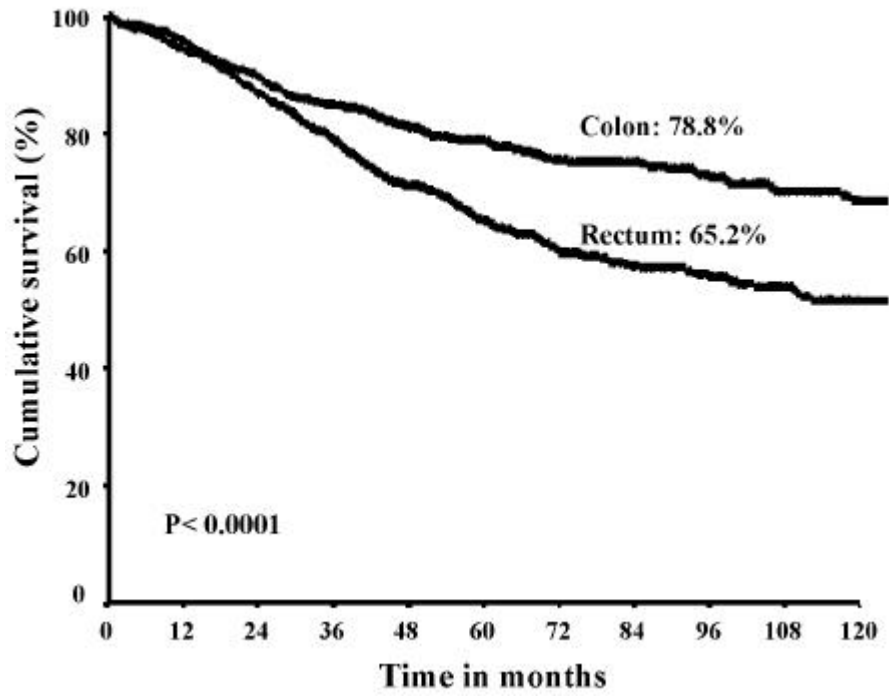
5 40 77.2%, 40 70.9% 40
(P=0.055).

(3)

65.2%, 78.8%

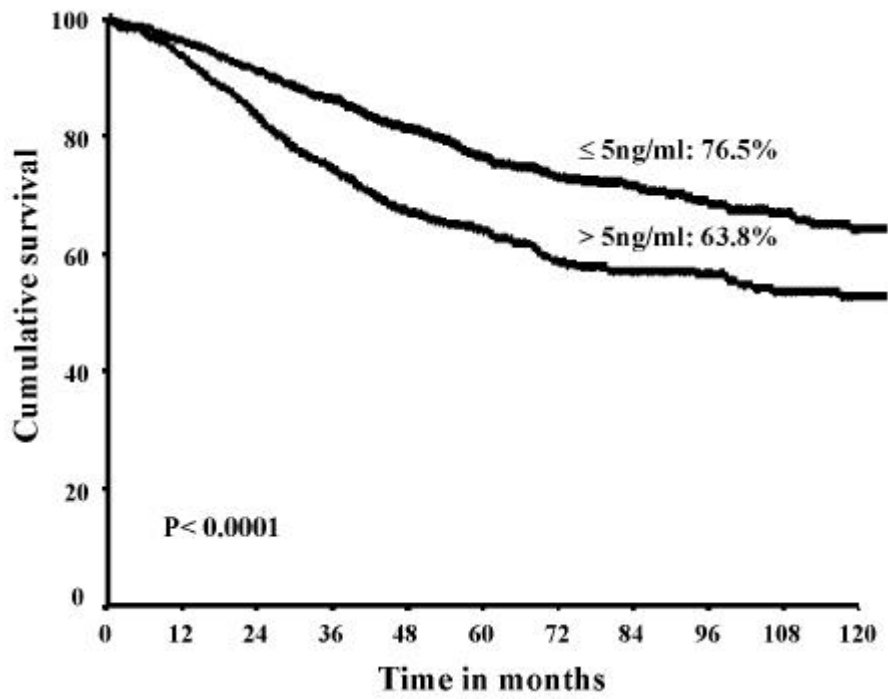
가 (P < 0.0001)(Figure 6).

Figure 6. Cumulative survival curve for 5 year according to the tumor location



(4) CEA
 CEA 가 5ng/ml 5 76.5%, 5ng/ml
 63.8% 가 (P < 0.0001)(Figure 7).

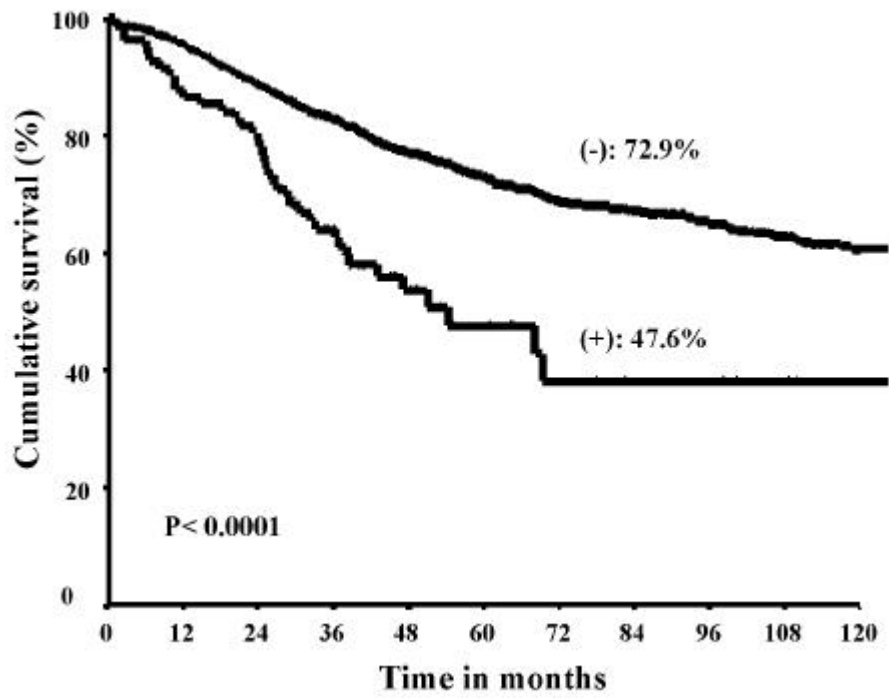
Figure 7. Cumulative survival curve for 5 year according to preoperative CEA level



(5)

5 72.9% , 47.6%
가 (Figure 8).

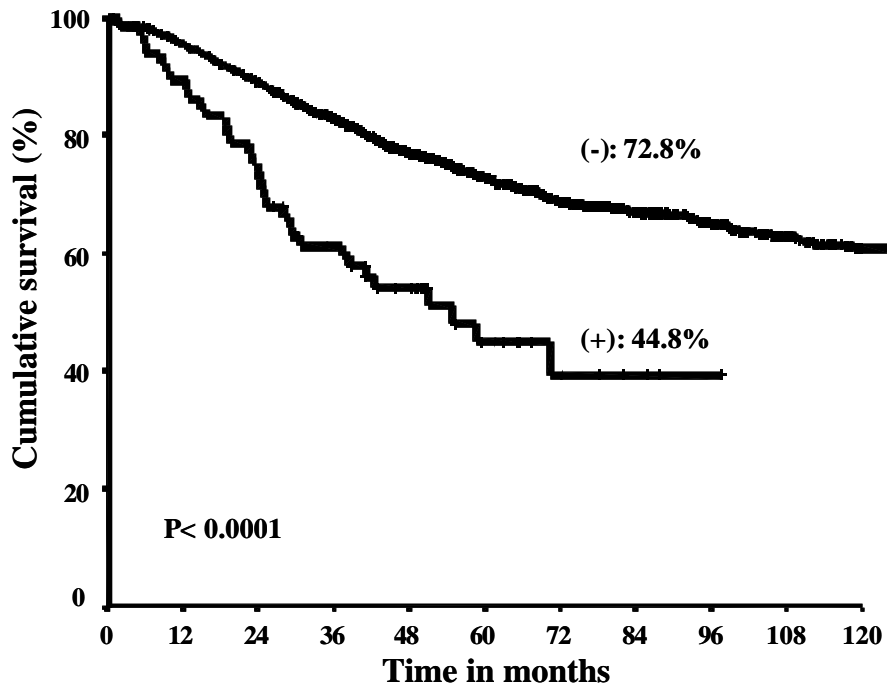
Figure 8. Cumulative survival curve for 5 year according to vascular invasion



(6) 측방 절제면

측방 절제면 침범유무에 따른 5년 생존율은 절제면에 종양의 침윤이 있을 때 44.8%, 침윤이 없을 때 72.8%로 절제면에 종양의 침윤이 있을 때 생존율이 통계적으로 의의가 있게 낮았다 ($P < 0.0001$)(Figure 9).

Figure 9. Cumulative survival curve for 5 year according to lateral margin



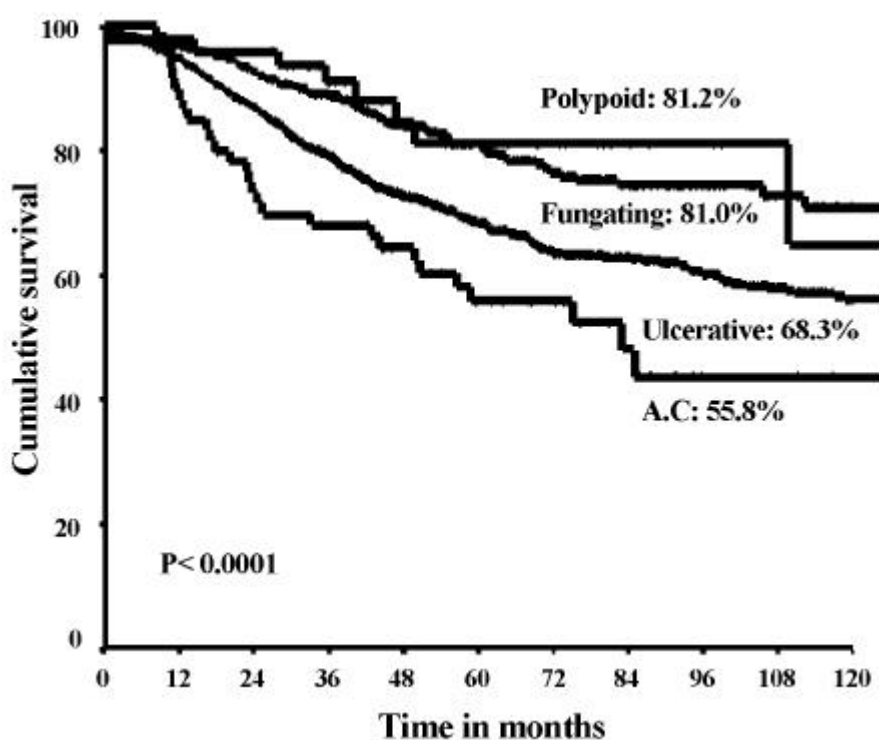
(7) 종양의 크기

암종의 장경이 5cm 이하의 환자의 5년 생존율은 69.8%, 5cm 이상인 경우 70.9%로 종양의 크기에 따른 생존율의 차이는 없었다 ($P=0.62$).

(8)

5 Polypoid 81.2%, Fungating 81.0%,
Ulcerative 68.3%, Annular constrictive 55.8% Ulcerative Annular constrictive
($P < 0.0001$)(Figure 10).

Figure 10. Cumulative survival curve for 5 year according to gross tumor characteristics



A.C: Annular constrictive

(9)

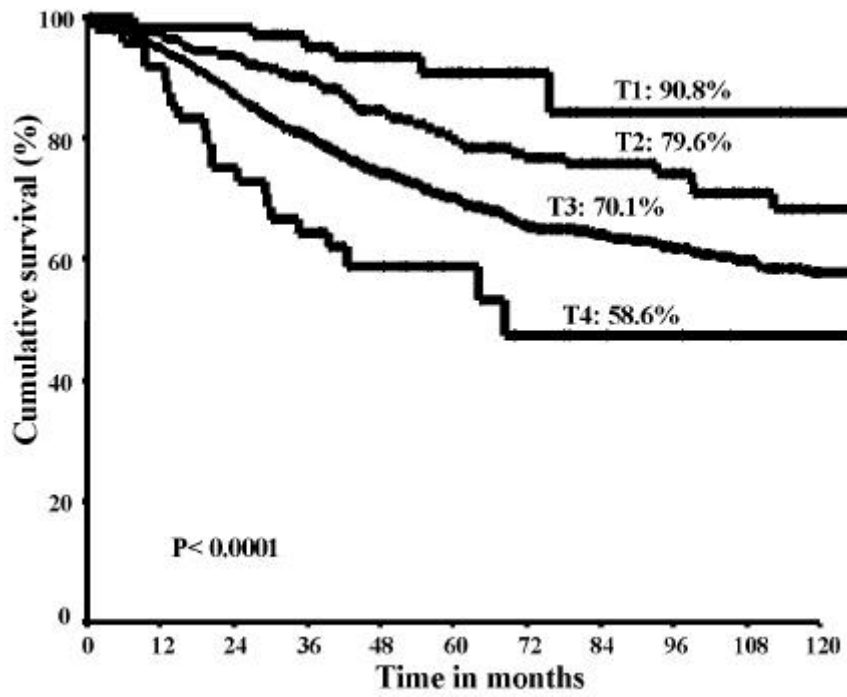
5

T1 90.8%, T2 79.6%, T3 70.1%, T4 58.6%

가

($P < 0.0001$)(Figure 11).

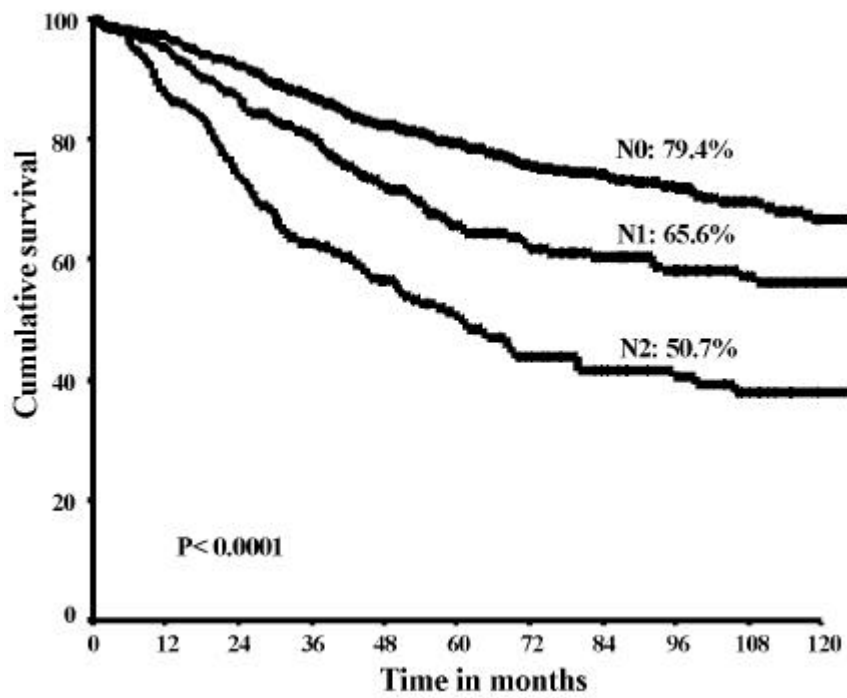
Figure 11. Cumulative survival curve for 5 year according to depth of invasion



(10)

5 가 79.4%, 3 가
65.6%, 4 가 50.7% 가
($P < 0.0001$)(Figure 12).

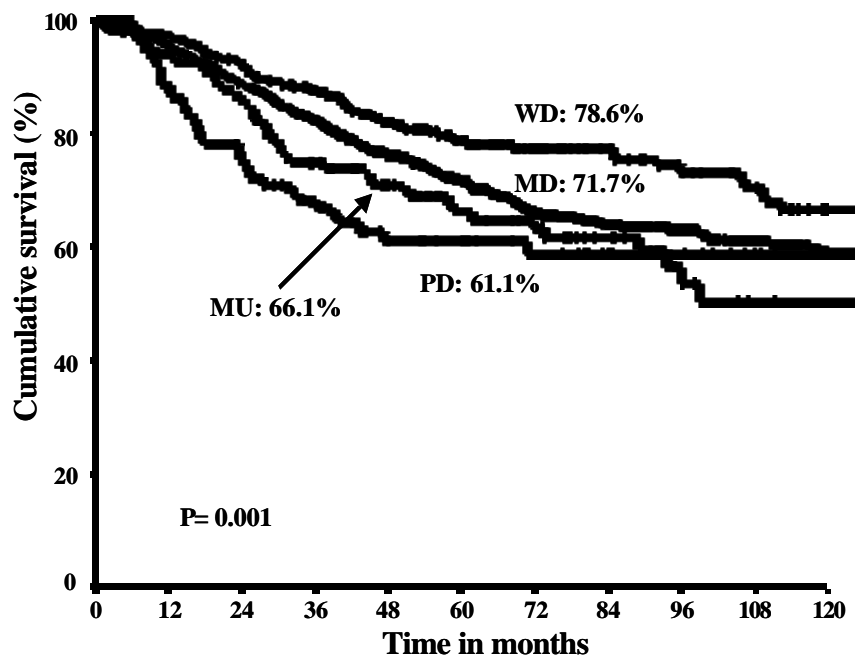
Figure 12. Cumulative survival curve for 5 year according to lymph node metastasis



(11) 암세포 분화도

고분화 암에서 5년 생존율은 78.6%, 중등도인 암에서 71.7%, 분화도가 나쁜 암에서 61.1%, 점액분비 암에서 66.1%로 분화도에 따라 생존율에 유의적인 차이가 있었다 (p=0.001)(Figure 13).

Figure 13. Cumulative survival curve for 5 year according to cell differentiation

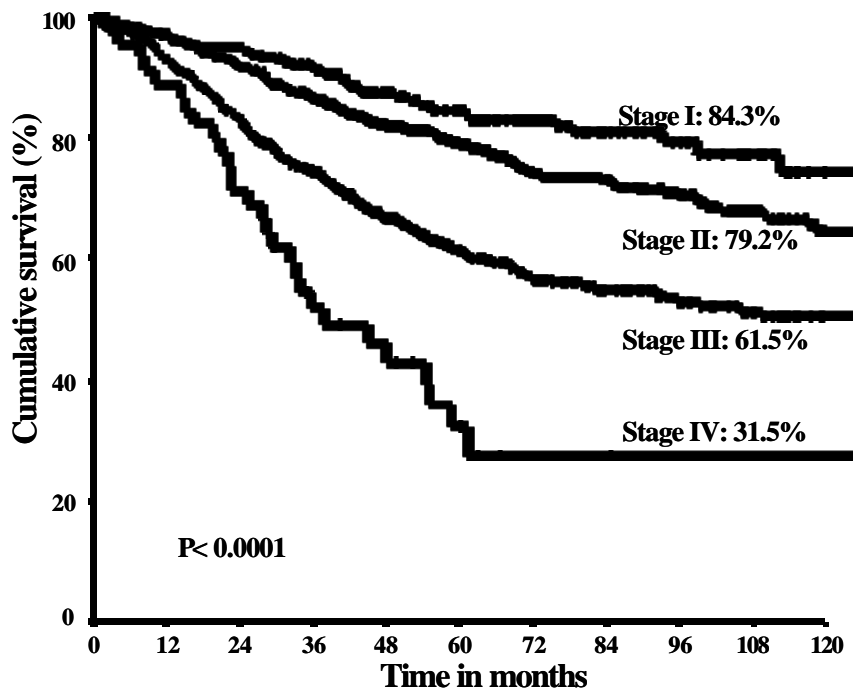


WD: Well differentiated, MD: Moderate differentiated,
PD: Poorly differentiated, MU: Mucinous

(12) TNM 병기

TNM 병기에 따른 5년 생존율은 1기 84.3%, 2기 79.2%, 3기 61.5%, 4기 31.5%로 각 병기에 따른 생존율의 유의있는 차이가 있었다 ($P < 0.0001$)(Figure 14).

Figure 14. Cumulative survival curve for 5 year according to TNM stage



나. 다변량분석

단변량분석 에서 통계학적으로 의의가 있는 인자들을 Cox proportional hazard model에 의한 다변량 회귀분석을 시행하였다. 위의 분석에서 종양의 위치 ($p < 0.001$), 수술전 혈청 CEA 수치 $> 5\text{ng/ml}$ ($p < 0.001$), 혈관침윤 (+) ($p=0.01$), 측방 절제연 (+) ($p=0.02$), 림프절전이 ($p=0.005$), 종양의 육안적 형태 ($p=0.005$), TNM 병기 ($p < 0.001$)가 생존율에 영향을 미치는 독립적인 변수로 분석되었다.

IV.

50

가 (23-25)

46 65 가 (7)

50 60 가 58.9% 가 , 70

40 16.3% 10.6%

57 57.5% 42.5%

가

(93.7%) (89.1%) 가 (7)

52.5% 가

(7,23,26,27) (25.7%)

가 , (22.8%) (21.5%)

1995

가 , 1996

가 가 (28-35)

(5,24,28-30,36,37)

5 61.5% 가 (7,23)

(7,25,26,38)

23.5% 23.8 6

10 (25,26,38)

가 , Merchant⁽³⁹⁾ T3N0

22% , Staib⁽⁴⁰⁾ 1054
33.2% ,
CEA 5ng/ml , ,
가 , 가
가 , 가 TNM 가
NIH Consensus Conference⁽²⁷⁾
TNM 2
7.2%
Heald Enker 가 ^(3,41,42)
가 ,
, Wolmark⁽¹⁰⁾
1021 Dukes' stage B C
, S 가
가 가 , Jatzko⁽⁴⁾
, TNM ,
5ng/ml CEA
가 ,
TNM 가 가
, , , , (Dukes' stage),
CEA, , , ,
⁽⁶⁻¹⁷⁾
가 , ⁽⁷⁾ 2230

가 .

Takahashi⁽²⁶⁾ 1254 CEA

, Deans⁽⁶⁾ 312

, 가 .

TNM 가

,

. 5ng/ml (CEA)

5 ,

. Wolmark⁽⁸⁾ 가 CEA 가

, Oh⁽⁴³⁾ 58

CEA 가 2.5(ng/ml) , 2.5 2.5 ,

2.5 CEA 가 2.5

. Slentz⁽⁴⁴⁾

428 CEA 가 5(ng/ml)

CEA 가 5 5

CEA

가 , CEA

CEA

가 .

가

(15-17)

B

,⁽¹⁷⁾ ,

가

TNM

가 가

. (11-14)

N0 15.5%, N1 28.4%, N2 49.2% 가

, N0 79.4%, N1 65.6%, N2 50.7%
 (13,45)
 , 가 ,
 가
 가 가 가
 MAC (Modified Astler-Coller) A 90.5%,
 T 1 90.8% , TNM 1 84.3%
 MAC B1 가 TNM TNM 1
 1
 가 , 가
 가 ,
 가 (22,27,46) Gryfe⁽⁴⁷⁾ 607
 microsatellite instability가
 , Watanabe⁽⁴⁸⁾
 460 TNM 2 3 microsatellite stable 18q
 , microsatellite instability가 TGF- 1
 가
 (19-22,49,50)
 ,

V.

1989 1 1998 12 10 1973

.

1. 1973 1134(57.5%) / 839(42.5%) ,
 50 60 가 58.9% 가 70 40
 16.3% 10.6% . 57 .

2. 52.5% 가 , S 18.8% ,
 18.6% , 5.2% , 4.9% .

3. 89.1% , 10.9% .
 가 가 .

4. 386/ 1643 (23.5%) , 86/386 (22.2%) ,
 236/386 (61.1%) , 50/386 (12.9%) .
 , 62/862 (7.2%) , 154/862 (17.9%) vs 24/781
 (3.1%) , 82/781 (10.5%) ,

5. 5 61.5% , TNM 1 가 84.3% , 2 79.2% , 3
 61.5% , 4 31.5% .

6. , CEA
 5ng/ml , , , ,

7. TNM , ,
 , , CEA 5ng/ml , .
 , , 가 ,

가 ,

1. Corman ML. Carcinoma of the colon. In: Corman ML, editors. Colon and rectal surgery. 4th ed. New York: Lippincott-Raven Publishers; 1998. p. 625-732.
2. Garcia J, Mellgren A, Sirivongs P, Buie D, Dadoff RD, Rothenberger DA. Local excision of rectal cancer without adjuvant therapy: A word of caution. *Ann Surg* 2000;231:345-51.
3. Bonadeo FA, Vaccaro CA, Benati ML, Ojea GM, Garione XE, Telenta MT. Local recurrence after surgery without radiotherapy. *Dis Colon Rectum* 2001;44:374-9.
4. Jatzko GR, Jagoditsch M, Lisborg PH, Denk H, Klimpfinger M, Stettner HM. Long-term results of radical surgery for rectal cancer: multivariate analysis of prognostic factors influencing survival and local recurrence. *Eur J Surg Oncol* 1999;25:284-91.
5. Habr-Gama A, Santinho PM, Ribeiro U, Nadalin W, Gansl R, e Sousa Jr AH, et al. Low rectal cancer: Impact of radiation and chemotherapy on surgical treatment. *Dis Colon Rectum* 1998;41:1087-96.
6. Deans GT, Heatley M, Patterson CC, Moorehead RJ, Parks TG, Rowlands BJ, et al. Colorectal carcinoma: importance of clinical and pathological factors in survival. *Ann R Coll Surg Engl* 1994;76:59-64.
7. Park YJ, Park KJ, Park JG, Lee KU, Choe KJ, Kim JP. Prognostic factors in 2230 Korean colorectal cancer patients: analysis of consecutively operated cases. *World J Surg* 1999;23:721-6.
8. Wolmark N, Fisher B, Wieand S, Henry RS, Lerner H, Legault-Poisson S, et al. The prognostic significance of preoperative carcinoembryonic antigen levels in colorectal cancer. *Ann Surg* 1984;199:375-82.

9. Moertel CG, O'Fallon JR, Go VL, O'Connell MJ, Thynne GS. The preoperative carcinoembryonic antigen test in the diagnosis, staging, and prognosis of colorectal cancer. *Cancer* 1986;58:603-10.
10. Wolmark N, Wieand HS, Rockette HE, Fisher B, Glass A, Lawrence W, et al. The prognostic significance of tumor location and bowel obstruction in Dukes B and C colorectal cancer: findings from the NSABP clinical trials. *Ann Surg* 1983;198:743-52.
11. Cohen AM, Tremitterra S, Candela F, Thaler HT, Sigurdson ER. Prognosis of node-positive colon cancer. *Cancer* 1991;67:1859-61.
12. Wolmark N, Cruz I, Redmond CK, Fisher B, Fisher ER. Tumor size and regional lymph node metastasis in colorectal cancer. *Cancer* 1983;51:1315-22.
13. Tang R, Wang JY, Chen JS, Chang-Chien Ch R, Tang S, Lin SE, et al. Survival impact of lymph node metastasis in TNM stage III carcinoma of the colon and rectum. *J Am Coll Surg* 1995;180:705-12.
14. Tepper JE, O'Connell MJ, Niedzwiecki D, Hollis D, Compton C, Benson III AB, et al. Impact of number of nodes retrieved on outcome in patients with rectal cancer. *J Clin Oncol* 2001;19:157-63.
15. Horn A, Dahl O, Morild I. Venous and neural invasion as predictors of recurrence in rectal adenocarcinoma. *Dis Colon Rectum* 1991;34:798-804.
16. Gallego MG, Fernandez MJ, Sanz J, Aljama A. Vascular enumeration as a prognosticator for colorectal carcinoma. *Eur J Cancer* 2000;36:55-60.
17. Khankhanian N, Mavligit GM, Russell WO, Schimek M. Prognostic significance of vascular invasion in colorectal cancer of Dukes' B class. *Cancer* 1977;39:1195-1200.
18. Scott NA, Wieand HS, Moertel CG, Cha SS, Beart RW, Lieber MM. Colorectal cancer: Dukes' stage, tumor site, preoperative plasma CEA level, and patient prognosis related to tumor DNA ploidy pattern. *Arch Surg*

- 1987;122:1375-9.
19. Yokota J. Tumor progression and metastasis. *Carcinogenesis* 2000;21:497-503.
 20. Jernvall P, Makinen MJ, Karttunen TJ, Makela J, Vihko P. Microsatellite instability: Impact on cancer progression in proximal and distal colorectal cancers. *Eur J Cancer* 1999;35:197-201.
 21. Srivastava S, Verma M, Henson D. Biomarkers for early detection of colon cancer. *Clin Cancer Res* 2001;7:1118-26.
 22. Compton C, Fenoglio CM, Pettigrew N, Fielding LP. American Joint Committee on cancer prognostic factors consensus conference: colorectal working group. *Cancer* 2000;88:1739-57.
 23. Roncucci I, Fante R, Losi L, DiGregorio C, Micheli A, Benatti P, et al. Survival for colon and rectal cancer in a population-based cancer registry. *Eur J Cancer* 1996;32A:295-302.
 24. Janjan N, Abbruzzese J, Pazdur R, Khoo VS, Cleary K, Dubrow R, et al. Prognostic implications of response to preoperative infusional chemoradiation in locally advanced rectal cancer. *Radiother Oncol* 1999;51:153-60.
 25. Ratto C, Sofo L, Ippoliti M, Merico M, Doglietto GB, Crucitti F. Prognostic factors in colorectal cancer: literature review for clinical application. *Dis Colon Rectum* 1998;41:1033-49.
 26. Takahashi T, Kato T, Kodaira S, Koyama Y, Sakabe T, Tominaga T, et al. Prognostic factors of colorectal cancer: results of multivariate analysis of curative resection cases with or without adjuvant chemotherapy. *Am J Clin Oncol* 1996;19:408-15.
 27. NIH Consensus Conference. Adjuvant therapy for patients with colon and rectal cancer. *JAMA* 1990;264:1444-50.
 28. Jones OM, Smeulders N, Wiseman O, Miller R. Lateral ligaments of the rectum: an anatomical study. *Br J Surg* 1999;86:487-9.

29. Enker WE, Kafka NJ, Martz J. Planes of sharp pelvic dissection for primary, locally advanced, or recurrent rectal cancer. *Semin Surg Oncol* 2000;18:199-206.
30. Heald RJ, Ryall RD. Recurrence and survival after total mesorectal excision for rectal cancer. *Lancet* 1986;28:1479-82.
31. Nagamatsu Y, Shirouzu K, Isomoto H, Ogata Y, Tsuchida I, Akagi Y. Surgical treatment of lower rectal cancer with sphincter preservation using handsewn coloanal anastomosis. *Surg Today* 1998;28:696-700.
32. Kim NK, Choi JS, Sohn SK, Min JS. Transrectal ultrasonography in preoperative staging of rectal cancer. *YMJ* 1994;35:396-403
33. Kim NK, Kim MJ, Yun SH, Sohn SK, Min JS. Comparative study of transrectal ultrasonography, pelvic computerized tomography, and magnetic resonance imaging in preoperative staging of rectal cancer. *Dis Colon Rectum* 1999;42:770-5.
34. Kim NK, Kim MJ, Park JK, Park SI, Min JS. Preoperative staging of rectal cancer with MRI: accuracy and clinical usefulness. *Ann Surg Oncol* 2000;7:732-7.
35. , , , , . : . 1999;15:273-9.
36. Min JS, Kim NK, Park JK, Yun SH, Noh JK. A prospective randomized trial comparing intravenous 5-Fluorouracil and oral doxifluridine as postoperative adjuvant treatment for advanced rectal cancer. *Ann Surg Oncol* 2000;7:674-9.
37. Kim NK, Min JS, Park JK, Yun SH, Sung JS, Jung HC, et al. Intravenous 5-Fluorouracil versus oral doxifluridine as preoperative concurrent chemoradiation for locally advanced rectal cancer: prospective randomized trials. *Jpn J Clin Oncol* 2001;31:25-9.

38. Chapuis PH, Dent OF, Fisher R, Newland RC, Pheils MT, Smyth E, et al. A multivariate analysis of clinical and pathological variables in prognosis after resection of large bowel cancer. *Br J Surg* 1985;72:698-702.
39. Merchant NB, Guillem JG, Paty PB, Enker WE, Minsky BD, Quan SH, et al. T3N0 rectal cancer: results following sharp mesorectal excision and no adjuvant therapy. *J Gastrointest Surg* 1999;3:642-7.
40. Staib L, Link KH, Beger HG. Follow up in colorectal cancer: cost-effectiveness analysis of established and novel concepts. *Langenbecks Arch Surg* 2000;385:412-20.
41. Heald RJ, Moran BJ, Ryall RD, Sexton R, MacFarlane JK. Rectal cancer: The Basingstoke experience of total mesorectal excision, 1978-1997. *Arch Surg* 1998;133:894-9.
42. Enker WE, Thaler HT, Cranor ML, Polyak T. Total mesorectal excision in the operative treatment of carcinoma of the rectum. *J Am Coll Surg* 1995;181:335-46.
43. Oh JH, MacLean LD. Prognostic use of preoperative and immediate postoperative carcinoembryonic antigen determinations in colonic cancer. *Canadian J Surg* 1977;20:64-7.
44. Slentz K, Senagore A, Hibbert J, Mazier WP, Talbott TM. Can preoperative and postoperative CEA predict survival after colon cancer resection? *Am Surg* 1994;60:528-32.
45. Wolmark N, Fisher B, Wieand HS. The prognostic value of the modifications of the Dukes' C class of colorectal cancer: an analysis of the NSABP trial. *Ann Surg* 1986;203:115-121.
46. Fielding LP, Pettigrew N. College of American Pathologists Conference XXVI on clinical relevance of prognostic markers in solid tumors: report of the colorectal cancer working group. *Arch Pathol Lab Med* 1995;119:1115-21.

47. Gryfe R, Kim HJ, Hsieh ET, Aronson MD, Holowaty EJ, Bull SB, et al. Tumor microsatellite instability and clinical outcome in young patients with colorectal cancer. *N Engl J Med* 2000;342:69-77.
48. Watanabe T, Wu TT, Catalano PJ, Ueki T, Haller RS, Benson III AB, et al. Molecular predictors of survival after adjuvant chemotherapy for colon cancer. *N Engl J Med* 2001;344:1196-206.
49. Jen J, Kim HG, Piantadosi S, Liu ZF, Levitt RC, Sistonen P, et al. Allelic loss of chromosome 18q and prognosis in colorectal cancer. *N Engl J Med* 1994;331:213-21.
50. Jass JR. Towards a molecular classification of colorectal cancer. *Int J Colorectal Dis* 1999;14:194-200.

Abstract

Prognostic factors influencing the recurrence and survival
rates in curatively resected colorectal cancer.

Jea Kun Park

Brain Korea 21 project for medical sciences
The Graduate School, Yonsei University

(Directed by Professor Nam Kyu Kim)

Colorectal cancer is one of the most common cancers in the western countries including the United States. The incidence is also high in South Korea, ranking as the fourth most common cancer, and there is a tendency of increasing occurrence in relationship with improved quality of life. The treatment of colorectal cancer depends primarily upon the stage, varying from transanal local excision to combined resection of the metastatic cancer, and whether preoperative neoadjuvant chemoradiotherapy and postoperative adjuvant therapy would be necessary would also be decided through this staging. The prognostic factors affecting the postoperative recurrence and survival rate are Duke's stage, preoperative CEA level, tumor location, tumor size, LN metastasis, and etc. In addition to these clinicopathologic prognostic factors, the importance of molecular biological prognostic factors has also come to light. This study was devised in order to analyze the recurrence rate and the survival rate in correlation with the prognostic factors in a

group of surgically treated colorectal cancer patients recruited from 1989 to 1998 at the Severance Hospital, Yonsei University College of Medicine. Statistical data were calculated using SPSS (Version 10.0 for Windows, Chicago, IL, USA), and the survival curves were analyzed by using Kaplan-Meier method, and were confirmed by the Log-rank Test. The analysis of prognostic factors influencing the survival rates were done by Cox regression hazard model. Other statistical analyses were done by the Chi square test. A total of 1973 patients were recruited, and among them 1848 (93.7%) had undergone resection, which in turn 1643 (89.1%) had curative resection. The overall follow-up rate after surgery was 60.6 ± 35.4 months and 1945 (98.6%) patients were confirmed either of their survival or death. The overall recurrence rate was 386/1643 (23.5%). Of these, local recurrence rate was 86/386 (22.2%), systemic recurrence rate was 236/386 (61.1%), and both local and systemic recurrence rate was 50/386 (12.9%). The local and systemic recurrence rate for rectal cancer and colon cancer were 7.2%, 17.9% vs. 3.1%, 10.5% respectively. The overall 5 year survival rate was 61.5%, and according to the TNM stage, 84.3% for stage 1, 79.2% for stage 2, 61.5% for stage 3, and 31.5% for stage 4. Prognostic factors influencing the recurrence were rectal cancer, preoperative CEA level, vascular invasion, positive lateral margin, gross appearance of the tumor, depth of invasion, number of regional lymph nodes involved, cell differentiation. Multivariate analysis indicates TNM stage, number of lymph nodes involved, gross appearance of tumor, positive lateral margin, vascular invasion, preoperative CEA level (higher than 5ng/ml), and rectal cancer as significant prognostic factors for 5 year survival rate.

key words: colorectal cancer, recurrence and survival rates, prognostic factors