

AJCC

CT

:

1

: CT ,
 AJCC ,
 : CT
 94 . CT 600-1,200mL
 10mm, 12mm 10mm
 CT T- , N- , M-
 1997 AJCC cancer staging manual T- T1 4
 (4.3%), T2 11 (11.7%), T3 72 (76.6%), T4 7 (7.4%) . N- N0 57 (60.6%),
 N1 25 (26.6%), N2 12 (12.8%) . M- M0 90 (95.7%), M1 4 (4.3%)
 : CT 94 92 (97.9%) 가 . T- CT
 가 64 (68.1%), CT 가 9 (9.6%), 가
 21 (22.3%) . N- CT 가 51 (54.3%),
 CT 가 27 (28.7%), 가 16 (17.0%) . M- CT
 가 90 (95.7%) , CT 가 4 (4.3%)
 : CT T- 68.1%, N- 54.3%, M-
 95.7% 가 . T- , N-

가
 2 (CT)
 (1). 1998 (1-9). 1990
 8 27 “ 96 ” -S
 , (25.3%), CT T- N-
 (16.8%), (16%) 8.4% 4 (10-12).
 (22.1%), (15.4%), 가
 (12.5%) 8.2% 4 CT , S
 가 CT
 (1-3). , , CT 가
 (2, 3). (1, 8), (4-7),
 , (3, 9, 13)
 CT가

CT
CT

Duke
(3-10),

Modified Duke
AJCC

AJCC

1995 10 1998 4

142

CT

21 , 6 , 1 30

5 , 2 , 1 , 12

CT

94

31 83 , 52: 42

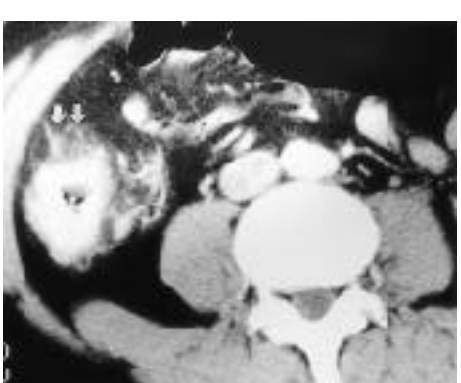
CT 1 59 29



Fig. 1. The lumen of rectosigmoid colon is markedly distended by water. Colonic wall and pericolic fat tissue is well delineated.



2



3

CT

11.2

T- 가 T1 4 (4.3%), T2 11 (11.7%), T3 72 (76.6%), T4 7 (7.4%)

N- N0 57 (60.6%), N1 25 (26.6%), N2 12 (12.8%)

M- M0 90 (95.7%), M1 4 (4.3%)

가 3 가

CT

가

CT

S

600mL

1200mL

(Fig. 1).

10mm, 12mm 10mm

Somatom plus

4A(Siemens, Erlangen, Germany) , 140mL

(Optiray 320, Mallinckrodt medical inc., St. Louis, USA)

3ml/sec 30 , 70 , 3

30 70 , 3

CT 가 94

가

가 가

3 가

가

가 , TNM stage 가

가

Fig. 2. Spiral CT scan reveals enhancing and thickened wall(arrows) at the anterior portion of rectum. The outer margin of tumor is clearly defined and perirectal fat is preserved. Surgical stage of this patient was T2.

Fig. 3. Spiral CT scan reveals highly enhancing mass at ascending colon. Fibrostreaky infiltrations and spiculations(arrows) are seen at pericolic fat tissue. Surgical stage of this patient was T3.

TNM		1997 AJCC cancer staging manual		S		CT	
CT	T-	T0	CT	S	CT	가	
		T1	(2), T2	33	가	94	71 (75.5%)
가	가	(Fig. 2). T3	(Fig. 3), T4	42mm	가	91	가 7mm
		(Fig. 4).		CT		16.7mm	Table 2-4
3mm	가	가	1cm	가	가	가	64
	가	가	1cm	가	가	가	9 (9.6%) (Fig. 8).
	가	N0	가 1	3	가	가	6 (6.4%)
	가	N1 (Fig. 5),	가 4	N2	가	가	
	가	(Fig. 6).	(regional lymph node)		가	가	
	가	(distant lymph node)	AJCC cancer staging manual		가	가	
ual	가	M1			가	가	
94	2	CT	가	92	가	가	
(97.9%)	2		가	가	가	가	
T1	-S	(rectosigmoid colon)			가	가	
		T2		1	가	가	

Table 1. Location of Colorectal Carcinoma

Location	No.(n= 94)
Cecum	2
Ascending	10
Hepatic flexure	2
Transverse	4
Splenic flexure	2
Descending	3
Sigmoid	20
Rectosigmoid	18
Rectum	33



4



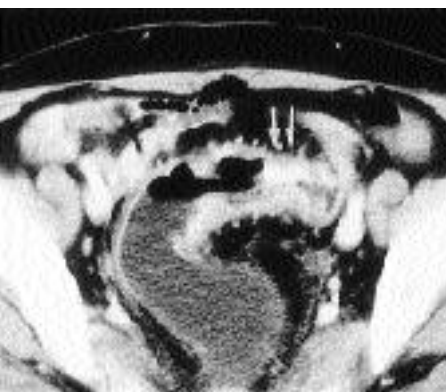
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Fig 4. Spiral CT scan reveals poorly enhancing mass at anterior portion of rectum. Posterior wall of vagina is attached and infiltrated by rectal tumor(arrows). Surgical stage of this patient was T4.

Fig. 5. Spiral CT scan reveals annular wall thickening of rectum. A perirectal lymph node is enlarged at the right side of rectum(arrow). Surgical stage of this patient was N1.



A



B

Fig. 6. A. Spiral CT scan reveals multiple enlarged lymph nodes(arrows) at sigmoid mesentery. Surgical stage of this patient was N2.

B. Spiral CT scan 2cm caudal to A. reveals well enhancing and thickened wall(arrows) of sigmoid colon with luminal narrowing. But distal sigmoid colon that has no tumor infiltration is well expanded.

(Table 5). N-CT가 , CT가 4 (4.3%) 2
51 (54.3%)(Fig. 5, 6), CT가 27
(28.7%)(Fig 9),가 16 (17.0%) . M-
CT가 90 (95.7%)

Table 2. Comparison of CT and Pathologic Staging of Colorectal Carcinoma in T-Stage.

Pathologic staging	CT stage					Total
	T0	T1	T2	T3	T4	
T1	1	0*	2	1	0	4
T2	1	0	5*	5	0	11
T3	0	0	17	54*	1	72
T4	0	0	0	2	5*	7
Total	2	0	24	62	6	94

*CT stage was concordant with pathologic staging.

Table 3. Comparison of CT and Pathologic Staging of Colorectal Carcinoma in N-Stage.

Pathologic staging	CT stage			Total
	N0	N1	N2	
N0	31*	23	3	57
N1	9	15*	1	25
N2	3	4	5*	12
Total	43	42	9	94

*CT stage was concordant with pathologic staging.

가 (1, 2),
가 (1, 8,
9). 1980
CT CT

Table 4. Comparison of CT and Pathologic Staging of Colorectal Carcinoma in M-Stage.

Pathologic stage	CT stage		Total
	M0	M1	
M0	86*	4	90
M1	0	4*	4
Total	86	8	94

*CT stage was concordant with pathologic staging.

Table 5. Results of Published Articles about CT Staging of Pericolic Fat Infiltration

Reference	Contrast	No.	Accuracy(%)		
			Overstage	Correct Dx	Understage
(4)	I	34	1/34 (2.9%)	19/34 (55.9%)	14/34 (41.2%)
(5)	I	33	3/33 (9.1%)	27/33 (81.8%)	3/33 (9.1%)
Grabbe et al(6)	I	155	28/155 (18.1%)	123/155 (79.4%)	4/155 (2.6%)
(7)	I	56	5/56 (8.9%)	45/56 (80.4%)	6/56 (10.7%)
Balthazar et al(8)	A	76	2/76 (2.6%)	44/76 (57.9%)	30/76 (39.5%)
Freeny et al(14)	X	80	6/80 (7.5%)	55/80 (68.8%)	19/80 (23.8%)
Angelelli et al(9)	W	42	1/42 (2.4%)	41/42 (97.6%)	0/42 (0%)
Gazelle et al(3)	W	30	0/30 (0%)	30/30 (100%)	0/30 (0%)
	W	94	6/94 (6.4%)	71/94 (75.5%)	17/94 (18.1%)

I : iodinated contrast agent, A : air, X : no use of luminal contrast agent, W : water, Dx : diagnosis



7



8

Fig. 7. Spiral CT scan reveals enhancing and thickened rectal wall. Fibrotic infiltrations and spiculations(arrows) are seen at the right, posterior side of rectum. CT stage of this patient was T3, but surgical stage of this patient was T1.

Fig. 8. Spiral CT scan reveals thickened rectal wall(arrows) and preserved perirectal fat tissue. CT stage of this patient was T2, but surgical stage was T3 due to microscopic invasion of perirectal fat tissue.

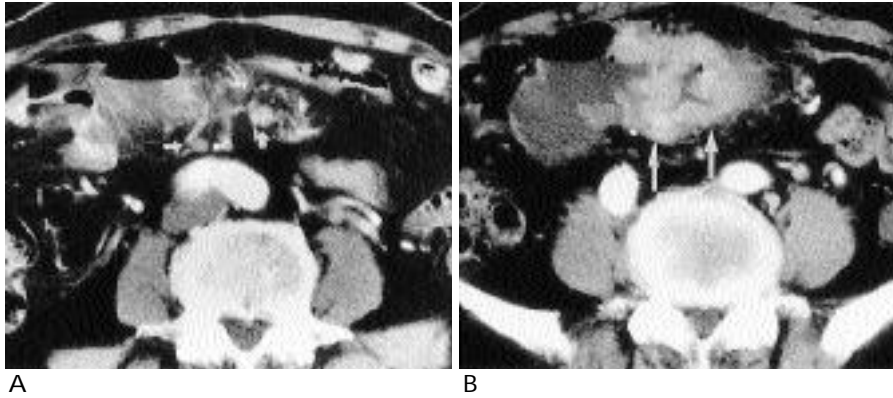


Fig. 9. Disappointing N-stage of colorectal cancer.

A. Spiral CT scan reveals several enlarged lymph nodes at transverse mesocolon(arrows). CT stage of this patient was N1, but surgical stage was N0.

B. Spiral CT scan 2cm caudal to A. reveals enhancing and thickened transverse colon(arrows). Proximal transverse colon that has no tumor infiltration is well expanded.

14). 가 , (4-7, (1), Gazelle Angelelli (3, 9). 5mm . Gazelle . (9). CT (3), Angelelli 가 CT 가 가 (motion artifact) , 가 1 (misregistration artifact) 가 가 6.4% Angelelli Gazelle (Fig. 7). T- T- CT (1-9). CT (10-12), (1). CT가 CT가 S , CT가 CT (2, 9). 70% (Table 5). 가 (2). CT 100% (4), 64% 68% (5). CT , 72% 100% (Table 5). 75.5% 가 가 18.1% Zerhouni (16), Balthazar 58% (8). 90 60% 79% 88% 64.7% (9). Thompson 22% 75% 73% Gazelle (3), Angelelli (9).

67.6% CT 가 54.4% .

1cm (1-9). (2, 3, 9),

staging manual (2, 9). AJCC cancer N- NO, N1, N2 3 가 28.7%

가 17.0% 3mm

CT 97.9% CT CT

T- N- 68%

54%

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Staging of Colorectal Carcinoma by Spiral CT with Water Enema : Correlation with Pathologic Staging Using New AJCC Classification¹

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Purpose : In cases of colorectal cancer, to correlate the spiral CT staging with water enema with the pathologic staging according to the new AJCC classification.

Materials and Methods : Ninety four patients with pathologically proven carcinoma of the colon who had undergone spiral CT with water enema were evaluated. CT scans were obtained after enema involving about 600-1,200mL of water. Scanning was performed from the diaphragmatic dome to the symphysis pubis using 10mm collimation thickness, 12mm table feed, and 10mm reconstruction interval. The TNM stage, as seen on spiral CT, was determined without reference to the pathologic results. Staging was performed according to the new AJCC cancer staging manual(1997). The pathologic T-stage was T1 in four cases(4.3%), T2 in 11(11.7%), T3 in 72(76.6%), and T4 in seven(7.4%). The pathologic N-stage was N0 in 57 cases(60.6%), N1 in 25 cases(26.6%), and N2 in 12(12.8%). The pathologic M-stage was M0 in 90 cases(95.7%) and M1 in four(4.3%).

Results : The detection rate of colon cancer using spiral CT with water enema was 97.9%. At the T-stage, pathologic correlation was good in 68.1% of cases(64/94). Nine patients(9.6%) were overstaged and 21(22.3%) were understaged. At the N-stage, pathologic correlation was good in 54.3% of cases(51/94), with 27 patients(28.7%) overstaged and sixteen(17.0%) understaged. At the M-stage, pathologic correlation was good in 95.7% of cases(90/94). Four patients(4.3%) were overstaged.

Conclusion : The accuracy of staging of colorectal carcinoma by spiral hydro-CT was 68.1% at the T-stage, 54.3% at the N-stage, and 95.7% at the M-stage. As seen on spiral CT with water enema, the T-stage tended towards understaging and the N-stage towards overstaging.

Index words : Colon, CT
Colon, neoplasms
Computed tomography (CT), helical

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