

Early and Late Bowel Complication Following Irradiation of Cancer of the Uterine Cervix

— Whole Pelvis External Irradiation and High-Dose-Rate Intracavitary Irradiation —

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Cervix cancer is the most common female cancer in Korea. In spite of their relatively local invasive tendency, still 44% of patient will develop recurrent cancer. This result suggests that more aggressive local treatment may increase the cure rate but increased complication risk also cannot be avoidable. Various institutions proposed different treatment regimen, but recommended dose were about 4500 cGy for whole pelvis and 8000 cGy at point A, even though they agreed that those doses may not be satisfactory for control of bulky disease.

96 cases of invasive cervical cancer, treated with postoperative or primary radiation therapy were analyzed to determine the complication rate and prognostic factor in our treatment regimen which is 500~1000 cGy higher than other institution.

Mean follow up duration was 21 months. Symptomatic patients including mild but persistent abdominal discomfort was 46%, but only 1 patient (1%) had operative treatment because of incomplete obstruction of small bowel. Most symptoms appeared within 12 months and most common complaints were frequent bowel movement.

Barium enema and sigmoidoscopy were performed for persistent symptomatic patients. Only one patient had abnormal finding in barium enema which showed inefficiency of this method for detecting bowel complication.

Patient's age, total tumor dose, total TDF, rectal dose were not significant risk factors for complication, but boost dose, previous history of operation had some relationship with complication risk.

Even though dose of point A and rectum is 500~1,000 cGy higher than other institution, such a low rate of severe complications may suggest that fear of complications should not be overestimated than cure rate and the possibility of more aggressive treatment for better local control should not be underestimated.

Key Words: Bowel complication, Cancer of the uterine cervix, External irradiation, High-dose-rate intracavitary irradiation.

INTRODUCTION

Uterine cervix cancer is still the most common cancer in Korean female population. Reported incidence of cervix cancer is 27.2% of all female cancers¹⁾.

Even though about 71% of patients with invasive cervical cancer have apparently limited disease, 56% of these loco-regional disease will be cured and 44% will develop recurrent cancer²⁾. In spite of developing early diagnostic method and various treatment modalities, such a high incidence of recurrence suggested that we should review the conventional treatment method, including surgery,

radiation therapy and chemotherapy.

Many authors reported the prognostic factor which might influence survival^{3~12)}. They agreed that the type of treatment^{4,10,13)}, radiation dose at A point^{3,14~18)} and the dose of external whole pelvic irradiation^{3,19)} might be important in radiation therapy for uterine cervical cancer. Recommended dose at A point over 8,000cGy^{17,20)} and 9,000 cGy^{21,22)} for intracavitary and external irradiation regimen.

It seems to be axiomatic fact that more aggressive local treatment with increasing radiation dose would improve the survival rate of cervical cancer even in early tumor⁴⁾, but one obstacle to improvement by such philosophy is the fear of complica-

tion. There is a tendency to judge "success" or "not" by avoiding complication rather than by assessing the long-term survival, even though there is no doubt that improvement of cure rate should be a prime objective.

Various effective factors of complication were analyzed by many authors^{3,14-16,18,23-32}, but no constant relationship has been established so far.

The purpose of this study is to determine the complication rate and analyze the prognostic factor in our treatment regimen which is 500~1,000 cGy higher dose at A point and possibly on rectum than other institution. We hope that this will help to encourage the aggressive radiation therapy that will lead to improve survival without further increased rate of side effects.

MATERIAL AND METHOD

Between April 1986 and December 1987, total 165 patients of invasive carcinoma of the uterine cervix were registered and 103 patients were referred to radiation therapy department at Yeungnam University Hospital. 7 patients who were lost to follow up excluded in this study so that 96 patients (93%) were evaluated.

Minimum follow up time was 9 months and mean follow up duration was 21.2 months. All patients were staged according to FIGO classification and their age and stage were summarized in table 1.

Histologically 89 patients (93%) were squamous cell cancer, 6 patients (6%) were adenocarcinoma and 1 patient (1%) was adenosquamous cell carcinoma.

All patients were treated with curative intent. 27 patients had surgery and postoperative irradiation and 69 patients were treated with full course of radiation therapy only, including external irradiation and intracavitary irradiation. Scheme of radiation therapy in early stage (April 1, 1986~September 30, 1986) of our department is shown in Table 2 which was adopted from Japanese schedule³³.

Since Oct. 1986, we changed our treatment scheme because of frequent central failure. New scheme is shown in Table 3. For postoperative treatment, external irradiation was given with 10 MV linac, 100 cm SAD, delivering a dose of 4,500 cGy ~5,000 cGy in 4~5 weeks to whole pelvis by 4 fields or AP-PA fields followed by Rals treatment (Shimadzu, Ralstron-20B) delivering 1,500~2,000 cGy at the vaginal mucosa (Fig. 1).

Other patients of primary treatment were given

Table 1. Age and Stage Distribution of 96 Patients

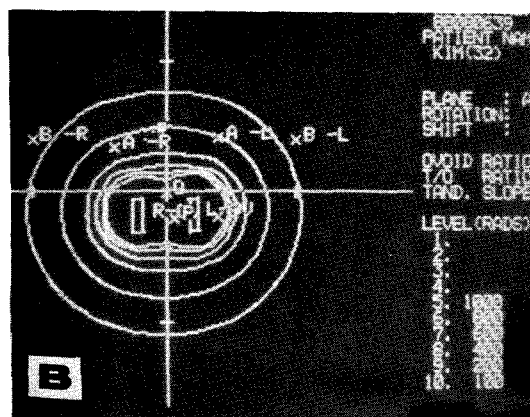
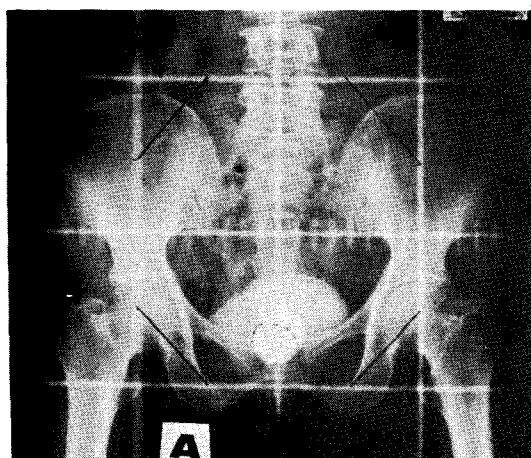
Age	Stage							Total
	Ia	Ib	IIa	IIb	IIIa	IIIb	IV	
30 - 39	1	1	4	4	-	1	1	12
40 - 49	1	5	6	13	2	2	-	29
40 - 59	1	2	6	22	-	3	2	36
60 - 69	-	2	7	5	1	2	1	19
Total	3	11	23	44	3	8	4	96

Table 2. Treatment Standard of Cervical Cancer (Japan)

Stage	External RT (Gy)		Intracavitary with Rals (A point) Gy/Fr
	Whole pelvis	With central shielding	
I	0	45	29/5
II (Small)	0	50	29/5
I (Large)	20	30	23/4
III (Small)	20 - 30	20 - 30	23/4
(Large)	30 - 40	15 - 25	15/3-20/4
IV	40 - 50	10 - 15	

Table 3. Treatment Standard of Cervical Cancer in Yeungnam University

Stage	Surgery	External RT (cGy)		Rals Treatment
		whole pelvis	Boost \bar{c} reduced field	
I	Yes	5000	0	1500–1200 cGy at vaginal wall, ovoid only.
IIa	Yes	5000	0	3000cGy at vaginal wall with ovoid only
	No	4000	If need, 1000–2000	300x3/week 3900 cGy at A point
IIb	No	5000	If need, 1000–2000	300x3/week 3900 cGy at A point
III & IV	No	5000	If need, 1000–2000 and/or cone therapy with electron 1500–3000	300x3/week 3900 cGy at A point

**Fig. 1.** Simulation film for AP & PA portal (A) and isodose curve of vaginal ovoid (B).

external irradiation first to whole pelvis using AP-PA or 4 field technique and all fields were treated everyday. Some patients had boost treatment on parametrium if needed. All patients of primary treatment had high-dose-rate intracavitary irradiation and loading of the sources of tandem or ovoid were individualized according to uterus geometry (Fig. 2 & 3).

The total dose at point A ranged around 8,900 cGy. Dose to rectum and sigmoid colon were calculated by direct insertion of dosimetric chamber which covered with rectal tube and double checked by calculation with film geometry.

All of the patients were followed up in out-patients clinic base except for some patients who were lost to follow up. All patients were checked up every month regularly for 1 year and every 2 months thereafter.

Complication were recorded by organ system and severity, graded from 1 to 4, which is shown in Table 4. If patients complained even mild symptoms but persistent, symptomatic medical treatment was given. For some patients who complained persistent symptoms without improvement in spite of medical treatment, barium enema and proctoscopy were performed to rule out metastatic cancer and/or decision of further treatment.

Various prognostic factors such as radiation dose at point, A rectosigmoid dose, TDF value, geometry of radium system, patients' stage and age and other factors were analyzed and their relationship were discussed.

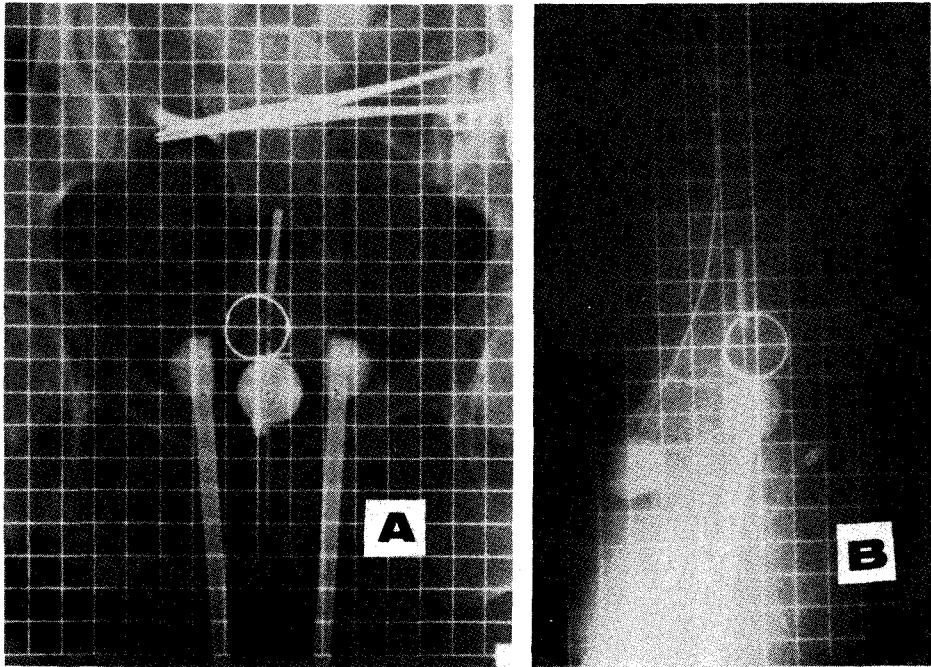


Fig. 2. AP (A) and lateral (B) view of high-dose-rate intracavitary irradiation (RALS).

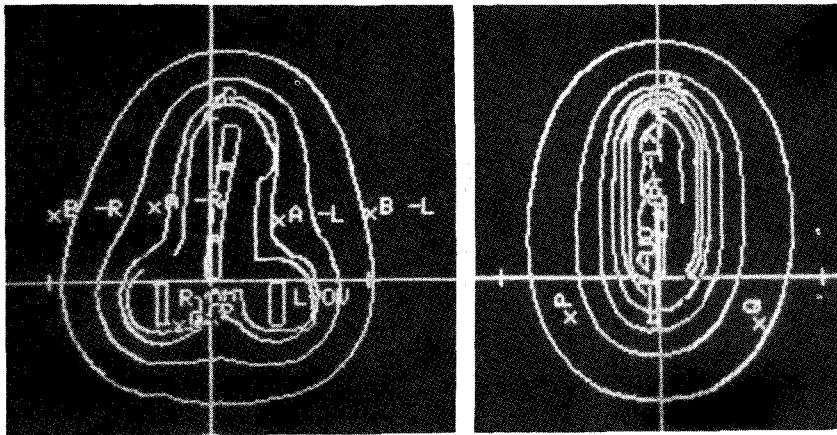


Fig. 3. Isodose curve of fig. 2 A & B.

RESULT

From April 1986 to Sept. 30, 1986, 18 patients were treated with intracavitary and external irradiation by Japanese protocol. 5 of 18 patients (28%) had persistent lesion so that we changed treatment scheme thereafter. Of these 5 patients who failed, 3 patients with stage IIa and IIb were treated with

radiation therapy again, 1 patient with stage IV had chemotherapy and another 1 patient with stage IV refused further treatment. 3 patients who were treated again were still alive without evidence of recurrence.

We did not estimate the survival rate because the maximum follow up time is less than 3 years, but we hope that we may have a chance to evaluate 5 year survival in future.

Table 4. Grade of Complication (Quoted from Pourquier et al.²⁵)

1st degree :	Episodic diarrhea, minor rectal bleeding. Proctoscopy showed erythema, edema, no ulceration, only minor lesions of the anterior rectal wall. X-rays showed no visible lesion or simply showed spasm. Spontaneous regression occurred within less than 3 months.
2nd degree :	Same symptomatology as 1st degree but more persistent and more severe. Proctoscopy showed diffuse proctitis with more or less localized ulceration or hemorrhage. This was accompanied by partial stenosis of the rectal ampulla or of the rectosigmoid junction, sometimes visible on x-rays. There was prolonged evolution lasting more a than year followed by slow regression after local treatment, culminating in complete cure.
3rd degree :	Severe rectal syndrome with recurrent, abundant hemorrhage. Ulceration, necrosis or severe obstruction in proctoscopy. Inflamed rectum or rectosigmoid junction and possible pseudotumor aspect in x-ray film. Spontaneous regression was either very slow or necessitated surgical shunt.
4th degree :	Rectovaginal fistula subsequent to proctitis or sometimes arising spontaneously. Rectovaginal fistulas concurrent with recurrent cancer were excluded.

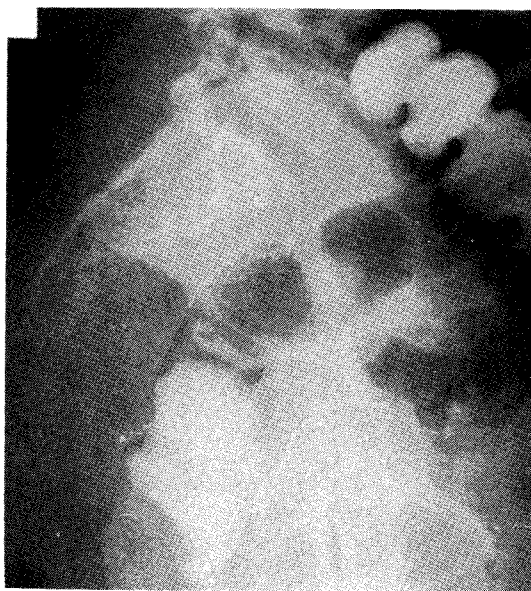
Table 5. Appearance Time of Symptoms

Onset after RT (months)	Total number of patients	Symptoms				
		Diarrhea	Tenesmus	Mucoid stool	Bloody stool	Abdominal discomfort
-3	33	29	6	0	3	8
3- 6	6	3	2	1	3	1
6-12	5	3	1	0	3	1
>13	0	0	0	0	0	0
Total	44	35	9	1	7	11

44 patients (46%) complained mild or moderate degree of diarrhea, tenesmus, mucoid stool and abdominal discomfort during treatment. Majority of patients showed good response by medical treatment except 6 patients who needed hospitalization because of rectal bleeding and/or abdominal pain. Table 5 showed the appearance time and the detailed symptoms.

Barium enema was performed for 25 patients who complained persistent symptoms for over 4 weeks without response. Only 1 patient had abnormal finding which was widening of retrorectal spaces (Fig. 4). Small bowel series was performed for 1 patient who complained persistent low abdominal discomfort. The report was incomplete small bowel obstruction. She had by-pass surgery at 4 months after completion of radiation therapy.

Sigmoidoscopy was also performed for those patients. 1 patient showed superficial ulcer, all other patients were noted as "nonspecific colitis" (Fig. 5). Table 6 showed the distribution of symptomatic patients by age which showed no correlation with complication rate ($p < 0.01$). Stage distribution

**Fig. 4.** Only one abnormal finding of barium enema. Report was abnormal widening of retrorectal space.

of symptomatic patients were analyzed in Table 7. A correlation with the rate of complication was seen except severity ($p < 0.01$).

Total dose at A point, sigmoid and rectum, and rate of complication were analyzed in Table 8 which

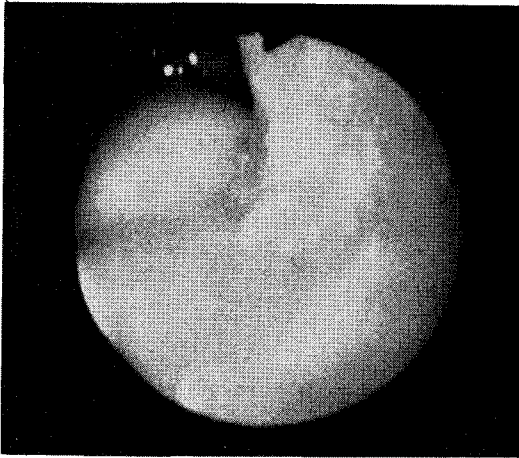


Fig. 5. Endo scopic finding of rectum. Diffuse erythema, edema and scattered superficial ulceration were seen in the anterior wall of the rectum and sigmoid.

Table 6. Distribution of Symptomatic Patients by Age

Age	Total number of patients	Number of Symptomatic patients	%
<29	1	1	100
30-49	10	3	30
50-49	29	12	41
50-59	35	18	05
60-69	16	8	50
70-79	4	2	50
Total	96	44	46

Table 8. Complication Rate by Total Dose at Point A, Sigmoid and Rectum

Dose (Gy)	Point* A	%	Sigmoid*	%	Rectum*	%
41 - 50	9/14	64	4/ 9	44	21/13	68
51 - 60	6/14	43	20/38	53	19/36	13
61 - 70	7/13	58	10/26	38	4/26	15
71 - 80	4/ 8	50	6/16	38	0/ 0	0
81 - 90	11/48	38	4/ 7	57	0	0

* Symptomatic patients/total patients

showed no correlation ($p < 0.01$). Table 9 showed TDF value of symptom positive patients which showed no correlation between complication and TDF value ($p < 0.01$).

Distribution of symptomatic patients by treatment method and total dose at point A showed in Table 10 which had some correlation between complication rate and surgery because of relative low radiation dose but high rate of symptom compared to radiation therapy group ($p < 0.05$).

This table also showed that adding chemotherapy is also risk factor for complication ($p < 0.01$). Table 11 showed detailed statement of 6 patients who suffered 2nd and 3rd degree of symptoms. 5 patients complained rectal bleeding but all patients showed good response with medical treatment. 1 patient who complained persistent low abdominal pain and intermittent abdominal distension had surgical treatment (side to side enterostomy) because of incomplete obstruction of the small intestine due to adhesion.

Total dose at point A of this patient was 7,720 cGy and expected irradiation dose at small bowel in the parametrial boost area was 6,520 cGy. The

Table 7. Distribution of Symptomatic Patients by Clinical Stage

Stage	Total number of patients	Number of Symptomatic patients	%
Ia	3	2	67
Ib	11	3	27
IIa	23	10	43
IIb	44	20	45
IIIa	4	3	75
IIIb	6	4	67
IV	5	2	40
Total	96	44	46

other 4 patients were irradiated 4,500~5,080 cGy to whole pelvis and 600~2,000 rad boost dose with reduced field on parametrium. Their expected rectal dose were 5,305 cGy~6,685 cGy. These data suggested that boost treatment of parametrium may have a role for severe complication ($p < 0.05$).

DISCUSSION

Extensive application of cytological screening and development of techniques for biopsy and surgery allowed a decreasing incidence of invasive cervical cancer, increasing numbers of early stage, consequently improved local control. But reported overall 5 year survival is 55~66.8%^{16-18,20,26,29,30} and about 44% will develop recurrent cancer²⁾. Even in stage Ib group, reported overall recurrence is 11.3%~19.8%^{7,8,12,34} and 42.2%³⁴⁾, 45%³⁵⁾ in positive pelvic node and/or close surgical margin group. Reported overall survival for those recurrent patients, treated with any modalities, was only 2~9% for even stage Ib group⁷⁾. These data suggested that more aggressive local treatment should be given for improvement of the survival rate.

Various prognostic factors which influenced

survival rate and multidisciplinary treatment modalities were proposed but postoperative and primary radiation therapy has been the major treatment modality for several decades. It is generally accepted that increased radiation dose may achieve improved local control but this may increase the risk of complication. The fear of complication is the main preclusion for improvement of local control in clinical field. Actually, there is a tendency to judge the successful treatment by avoiding complications rather than by long-term survival even though cure is the major purpose of cancer treatment.

Barium enema, endoscopic examination, IVP and CT were recommended for diagnosis of rectal complication and/or differentiation of recurrence. We performed barium enema and endoscopy for 25 patients who complained persistent symptoms, but we observed only 1 abnormal finding in this study which showed the widening of retrorectal space. This result suggest us careful selection of barium enema for this purpose.

Rectal complication is the most common complication. Reported incidence of overall complication which included mild and severe complications is 21%¹⁸⁾, 27.6%³⁶⁾, 36%³⁷⁾, in radiation therapy only group, 25%¹²⁾ in surgery group and 22%¹²⁾, 57.6%³⁴⁾ in postoperative irradiation group. Our study showed 46% which is a little higher than others because we included even mild abdominal discomfort and/or tenesmus. Severe complication which require transfusion or surgical procedure has been reported 2.3%²³⁾, 7%^{3,12)}, 14%³⁰⁾ in radiation therapy alone group, 13%¹²⁾ in surgery alone group, 5%³⁸⁾, 7.9%³⁴⁾ and 15%³⁵⁾ in postoperative irradiation group.

In our study 6 of 96 patients (6%) had hospitalization but only 1 patient (1%) had a surgery because of incomplete obstruction of small bowel.

Table 9. Distribution of Symptomatic Patients by TDF at Point A

TDF	Total number of patients	Number of Symptomatic patients	%
-125	33	10	62
125-135	4	4	75
136-145	7	5	71
146-155	27	9	33
156-166	17	3	18
Total	96	44	46

Table 10. Distribution of Symptomatic Patients by Treatment Method and Total dose at A Point.

Treatment method	Total dose at A point	Total number of patients	Number of symptomatic patients	%
Ext. RT + ICR	8500	58	28	48
Chemo TX+ Ext RT + ICR	8500	3	2	67
Surg. + Etx RT + ICR	6300	15	7	47
Surg. + Etx RT	= 5000	12	55	42
Ext RT	≠ 5000	8	2	25
Total		96	44	46

Table 11. Statements of 6 Patients with 2nd & 3rd Degree of Complication

Patients name	Huh o o	Yoo o o	Shin o o	Whang o o	Lee o o	Lee o o
Age	52	52	47	37	46	64
Stage	IIIb	IIIb	IIb	Ib	IIa	IIb
Histology	Adeno ca.	Sq. ca.	Sq. ca.	Sq. ca.	Sq. ca.	Sq. ca.
Op. history	Yes	No	ywaq	Yes	No	No
Time of Sx onset	8Months	7	4	5	7	11
Whole pelvis dose (cGy)	4500	4800	4520	5008	4500	4500
Parametrial boost (cGy)	1080	720	2000	600	1000	0
Number of portal	4	4	2 & arc	2 & Lat. boost	3	2
ICR (cGu)	1500 (ovoid)	3900	1200 (ovoid)	1500 (oviod)	2900	3900
Rectal dose (cGy)	5305	5585	6520	5320	6225	6011
Chief Complaint	Rcetal bleeding	Rectal bleeding pain.	Abdo. pain.	Rectal bleeding.	Rectal bleeding	Rectal bleeding
Ba. enema	*	Normal	Normal	Normal	Normal	Normal
Endoscopy	Radiation colitis	Radiation colitis	Normal	Radiation colitis	Simple ulcer	Radiation colitis
Hospitalization	+	+	+	+	—	—
Tretament	Steroid enema	Steroid enema	Surgery	Observation	Obesrvtaion	Observation
Response of Tx.	†	+	+	+	+	+

*Widening of retrorectal space

In spite of higher irradiation dose compared to other institution, such a low incidence of moderate or severe complications suggested us the possibility of aggressive radiotherapy without further increase of complications.

Appearance time of rectal complication after completion of radiation therapy is 5~15 months³⁶⁾, within 18 months^{23,39)}, so that complications of our study may be almost appeared, because our mean follow up duration was 21.2 months.

Several risk factors which may have the correlation with complication were suggested, such as patient's age²³⁾, stage^{8,23,29)}, dose at point A^{16,23,36)}, rectal dose^{9,18,24,25,30,31)}, rectal TDF^{3,14,16,18,24,31)}, geometry of intracavitary system^{3,14,15,28,29,36,40)}, external dose of whole pelvic irradiation^{23,24)}, parametrial boost dose^{15,32)}, extended field^{26,32)} and previous pelvic surgery^{12,15,23,28,29,34,41)}. Suh et al²³⁾ reported slight higher incidence of complication in older age group (>50 years old) but we cannot demonstrate the association with age and complication.

Inoue and Okumura⁸⁾ advocated that stage of disease has been one of the most important prognostic factor for patients with invasive cervical cancer. Bourne et al²⁹⁾ agreed that incidence of early complication correlated significantly with advancing stage of disease. Suh et al²³⁾ reported that the reason of increased complication with increasing stage might be high irradiation dose for cure especially for stage IIb and III. They also insisted that somewhat decreased complication in stage IIIb and IV was because of low survival and early death before appearance of complication. Our results support Bourne et al²⁹⁾ and Suh et al²³⁾ in a part which showed increased symptomatic patients in stage II and IIIa and slight decreased in stage IV patients group. However, we cannot observe significant stage effect in severe complication group ($p < 0.01$).

Suh et al²³⁾ and Kim³⁶⁾ reported that rectal injury was increasing as point A dose increase. Montana et al¹⁶⁾ suggested that the mean dose to point A for patients with and without complication were 7,877

cGy in their study but this might contribute to the development of high treatment failure. Other authors reported 7,500 cGy²⁵⁾ and 7,900 cGy³⁰⁾ at point A for occurrence of severe rectal damage, even though those irradiation dose were less than commonly used dose for cure, over 8,000 cGy^{17,20,23,29,31,36,39,41-43)}.

Orton and Rosenbaum³¹⁾ reported the good relationship between complication and TDF. But Yudelev et al¹⁸⁾ insisted no correlation between dose and TDF except some association with maximum TDF in the rectum. Our study showed no definite relationship between point A dose, or rectal TDF and rectal complication even in severe cases.

Many authors agreed that geometry of intracavitary irradiation might contribute to complications. Geometry of radium sources^{3,15,36,40)} such as protruding vaginal source or non-standard radium source^{15,28,29)} and too close position of ovoid and tandem source (less than 1 cm)³⁶⁾ were the reported causes of intracavitary irradiation related complications. Our result showed no evidence of relationship between deviation of intracavitary sources and complication ($p < 0.05$). We will discuss about this in other publication in the future.

Suh et al²³⁾ advocated higher incidence of bowel complication with increasing dose of external whole pelvic irradiation. In their study, severe complication rate was 0.4% in 4,000 cGy irradiated group and 3.3% in 5,000 cGy group. Lederman et al²⁴⁾ observed that 48% of fibrosis occurred in the group who irradiated over 5,500 cGy and TDF value of 110 but 88.2% in patients with TDF value greater than 110 in the subcutaneous tissue.

They also emphasized treating all fields every day to diminish the TDF value and complication. Hamberger et al¹⁹⁾ reported that complications were associated with unilateral parametrial boost and 28.5% of fistula were observed in 6,000 cGy whole pelvic irradiation group. Our result showed that 5 of 6 patients who had serious complications were associated with external parametrial boost dose (ranged 720~2,000 cGy), because their average rectal dose was only 5,252 cGy which is much lower than average dose, 7,300 cGy, of our study group.

History of previous pelvic surgery has been thought to be a greater important risk factor in complication analysis. Suh et al²³⁾ reported that high dose irradiation because of adhesion and fixation of the bowel due to previous surgery might

be a main cause of higher complication. Pantanaphan et al²²⁾ reported that the overall complication rate was not much different between radiation alone group (21%), postoperative radiation therapy group (22%) and surgery group (25%) but severe complication that required surgery occurred more commonly in the surgery group (13%) than radiation therapy alone group (7%). In our study, 3 of 6 patients who showed severe symptoms had previous history of operation even though their rectal dose were much lower than average dose of our treatment.

Jolles et al³²⁾ suggested that unacceptable complication might result when external irradiation dose exceeds 4,500 cGy in 5 weeks even though 4,500 cGy is insufficient to control bulky disease. Himmelman et al⁴⁴⁾ also reported that irradiation of 4,000~5,000 cGy without boost did not improve survival but recurrence and metastasis tended to occur later compared with non-postoperative irradiation group. They insisted that these delayed relapse could be due to persistent positive pelvic node having received an insufficient dose. Now, we confront with cumbersome problem, namely, we should give over 8,000 cGy at point A and over 4,500 cGy at whole pelvis for increasing cure rate but consequently, it might increase complications.

These mean that if we want aggressive treatment for increased cure rate, some complication cannot be avoidable, but this does not mean that any level of complication may be accepted. We should search for good treatment methods with acceptable complication level but much higher cure rate. Unfortunately, we have no exact answer so far.

The level of tolerable radiation dose of rectum was well investigated by clinical and experimental research. But because of dose distribution within pelvis or lower abdomen of each patient is highly inhomogeneous, simple dose computation are not suitable for combined modality such as intracavitary plus fractionated external irradiation. Also, because the pattern of response to even same dose may vary considerably from patient to patient bases, exact unified "biologically effective dose" or simple Gy dose is difficult to justify for complication level.

In addition to that, treatment with high-dose-rate remote afterloading system is still various among institutions and its exact biological response is not justified by dose, fractionation and overall treatment time satisfactory.

Careful attention to technical aspects such as

use of vaginal retractor for protection of anterior rectal wall²³, placement of tungsten shield on the posterior vaginal wall during treatment, develop of posteriorly shielded vaginal ovoids, increased fractionation of the total brachytherapy³⁰ and treatment of all fields every day to diminish the TDF value²⁴ were suggested for high tumor dose without compromising the late of complications. But nobody reported the treatment method for "absolutely no complication".

We treated 5000 cGy of external irradiation to whole pelvis without central shielding and 1500 ~3000 cGy in vaginal mucosa for postoperative irradiation, 5000 cGy of external irradiation to whole pelvis plus 3900 cGy at point A by Rals with 300×3/week regimen for primary radiation therapy which is higher dose on rectum than other institution. But overall symptomatic patient was 46% which was lower than Park et al³⁴ (57.6%) and severe complication rate was 6% including 1 patient who require operation due to incomplete obstruction which is still lower than other reports (2 ~13%)^{3,6,12,15,18,19,23,29,30,32,34,39}.

Although our study have not followed up for long time, such low rate of severe complication may suggest that fear of complication should not be overestimated than cure and a possibility of more aggressive treatment for improvement of local control should not be underestimated.

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= 국문초록 =

자궁경부암의 고선량 치료후의 장관 합병증

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자궁경부암은 치료후의 생존율이 좋은 암으로 인정되고 있으나 전 자궁경부암의 44%는 재발되며 재발암의 대부분은 국소재발이다. 더욱이 재발된 암은 어떤 방법으로 치료한다 하더라도 5년 생존율은 2~9%에 불과하다고 보고되고 있다. 이러한 사실은 적극적인 국소치료법이 필요함을 시사하고 있으나 국소방사선 조사선량을 증가시켜 치료율을 높이려 할 경우 필연적으로 따라오는 합병증의 증가가 우려되어 불충분함을 인정하면서도 전골반에 4500 cGy 이하, A점에 8500 cGy 정도가 사용되어 왔다.

1986년 4월부터 1987년 12월까지 영남대학 치료방사선과에서 중앙차폐없이 전골반에 5000 cGy, 고선량을 강내치료로 A점에 3900 cGy, 외부선량을 포함한 A점 총 선량 8900 cGy를 조사함으로써 종래의 치료보다 500~1000 cGy를 더 조사받은 자궁경부암 환자 103명중 추적 치료가 불가능 하였던 환자를 제외한 96명을 대상으로 장관합병증을 분석하였다. 종래보다 500~1000 cGy를 더 조사받았으나 합병증이 증가되지 않았음을 보고함으로써 합병증의 증가없이 생존율의 증가를 얻을 수 있는 최고선량을 결정하는 기초자료로 삼고자 본 연구를 시도하였다. 평균 추적기간은 21개월이었고 대부분의 증상은 12개월 이내에 나타났다. 이급후증(tenesmus), 하복부 동통을 포함한 장관합병증은 46%였고 입원치료를 받은 환자는 6명(6%)이었으나 수술이 필요한 환자는 1명 뿐이었다.

X선 대장촬영과 직장경 검사를 실시하였으나 바리움 대장촬영에서 1명만이 비정상적인 소견을 보여 직장손상의 진단에 효율이 적음을 시사하였다. 환자의 연령, 총조사선량, 총 TDF, 직장조사선량과 장관합병증은 무관함을 보여주었다.

입원치료가 필요한 6명의 환자중 5명이 축소조사야를 사용한 추가치료를 했던 환자로서 추가치료가 합병증의 위험인자임을 시사하였다($p < 0.01$). 심한 합병증을 보인 6명중 3명이 방사선 치료전 수술경험이 있었으며 직장선량이 다른 환자들의 평균직장선량(7300 cGy) 보다 작음에도 불구하고(5252 cGy) 심한증상을 보여 치료전의 수술기왕력이 위험인자가 될 수 있음을 시사 하였다.

종래의 치료양보다 500~1000 cGy 더 높은 선량에도 불구하고 입원치료가 필요하였던 환자는 6%, 수술이 필요하였던 환자는 1%로 합병증의 증가없이 A점에 8900 cGy, 직장에 7300 cGy 정도의 국소치료가 가능함을 보여 주었으나 생존율에 대한 추후 분석이 따라야 할 것으로 사료된다.