

## Efficiency of Staging Work-Ups in the Evaluation of Carcinoma of the Uterine Cervix

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A series of 510 patients with carcinoma of the uterine cervix given the curative radiation therapy from March 1979 through December 1986 was evaluated to determine the value of intravenous pyelography (IVP), cystoscopy, sigmoidoscopy, and abdomino-pelvic CT as staging work-up prior to treatment.

On IVP and cystoscopy, 10.7% (49/456) and 5.3% (24/452) showed abnormality, respectively, but only 0.7% (3/413) did on sigmoidoscopy. As a result of these work-ups prerequisite to FIGO staging, twenty six (5.1%) out of 510 patients were upstaged from the stage determined by the findings of physical examination alone. The proportions of upstaging in each stage were as follows; none in stage IB (35), IIA (89) and IIIA (8), 7.9% (20/252) in stage IIB (14 patients to FIGO stage IIIB, 6 patients to FIGO stage IVA), and 4.8% (6/126) in stage IIIB (all to FIGO stage IVA). Positive findings of staging work-ups were found only in patients with advanced stages of stage IIB or over determined by physical examination alone but not in those with earlier stages.

CT was performed in 337 patients. CT detected pelvic lymph node (LN) enlargement in 25.2% (85/337) and paraaortic LN enlargement in 7.4% (25/337). Pelvic LN positivity was well correlated with increasing stage but paraaortic LN positivity was not. In the evaluation of parametrial involvement, CT findings were in accordance with those of physical examination only in 65.6% (442/674). When compared with endoscopic studies, CT had much lower positive predictive value than negative predictive value in the evaluation of adjacent organ invasion.

The staging work-ups should be individualized by the disease extent of each patient, and then the efficiency of work-ups may be increased without compromising the appropriate FIGO staging and treatment.

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**Key Words:** Cervix cancer, Staging work-ups, Efficiency

### INTRODUCTION

Accurate pretreatment evaluation and staging of patients with carcinoma of the uterine cervix is indispensable to proper patient management. In addition to a history taking and physical examination including an adequate pelvic examination, it has been recommended to obtain routine laboratory tests and various staging work-ups. Staging work-ups, which generally include intravenous pyelography, barium enema, cystoscopy, and sigmoidoscopy can be expensive, time-consuming, and morbid. Although we accept the concept of clinical staging as a necessity for determining the type of therapy to be employed, and as a basis for comparison of therapeutic results, many authors<sup>1-5)</sup> have reported that the roles of staging work-ups frequently performed in evaluating

patients may be questionable and not well defined. So, we have reviewed retrospectively the records of patients with carcinoma of the uterine cervix to determine the frequency of positive findings and the effectiveness of performing these work-ups. This report is an attempt to assess the efficiency of these staging work-ups.

### MATERIALS AND METHODS

Retrospective review was performed on medical records of 510 patients with invasive carcinoma of the uterine cervix who were given the curative radiation therapy at the Department of Therapeutic Radiology in Seoul National University Hospital between March 1979 and December 1986. Patient evaluation usually included history taking, physical examination including pelvic examination, complete blood count, liver function test including blood urea nitrogen and creatinine, urinalysis, chest PA, intravenous pyelography, cystoscopy, and sigmoidoscopy. As an ancillary study,

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abdomino-pelvic CT was commonly performed in patients treated after May 1981. Initially, the patients were retrospectively staged on the findings of physical examination alone. Each additional work-up was then evaluated with respect to this initial stage. Final stage was determined after staging work-ups excluding the findings of abdomino-pelvic CT according to the International Federation of Gynecology and Obstetrics (FIGO) classification system<sup>6</sup>.

## RESULTS

### 1. Intravenous Pyelography (IVP)

Four hundred and fifty six (89.4%) out of 510 patients studied had intravenous pyelography. Forty nine procedures (10.7%) out of them were abnormal, revealing unilateral or bilateral hydronephrosis with obstruction of ureters or nonvisualization of the urinary tract. Positive findings were

found only in advanced stages of stage IIB or over (15 (6.6%) out of 227 stage IIB patients and 34 (30.1%) out of 113 stage IIIB patients) (Table 1). Intravenous pyelography had the highest percentage yield of positive findings of the staging work-ups reviewed.

### 2. Cystoscopy

Urinary bladder was evaluated by cystoscopy in 452 (88.6%) out of 510 patients. The procedure was considered positive if biopsy revealed invasion or definite mucosal invasion by tumor was observed. Bullous edema or submucosal bulging was not counted as evidence of bladder invasion by tumor. Using these criteria, twelve procedures yielded positive results (6 in stage IIB patients and 6 in stage IIIB patients). The overall yields of abnormal findings suggesting tumor invasion and positive findings were 5.3% (24/452) and 2.7% (12/452), respectively. The details of positive findings

**Table 1. Incidence of Abnormality Detected on Intravenous Pyelography**

Stage*	No. of Patients	Normal	Abnormal		
			Unilat. Obstr.	Bilat. Obstr.	Total (%)
IB	29	29	—	—	—
IIA	80	80	—	—	—
IIB	227	212	14	1	15 ( 6.6)
IIIA	7	7	—	—	—
IIIB	113	79	26	8	34 (30.1)
Total	456	407	40	9	49 (10.7)

\* Stage determined by physical examination alone

**Table 2. Incidence of Abnormality Detected on Cystoscopy**

Stage	No. of Patients	Normal	Abnormal			Total (%)
			Invasion suspected		Invasion definite*	
			Bx (—)	Bx (+)		
IB	30	30	—	—	—	—
IIA	79	78	1	—	—	1 ( 1.3)
IIB	226	215	5	4	2	11 ( 4.9)
IIIA	6	6	—	—	—	—
IIIB	111	99	6	4	2	12 (10.8)
Total	452	428	12	8	4	24 ( 5.3)

\* Definite mucosal invasion of tumor, but biopsy not done

**Table 3.** Incidence of Abnormality Detected on Sigmoidoscopy

Stage	No. of Patients	Normal	Abnormal			Total (%)
			Invasion suspected		Invasion definite*	
			Bx (-)	Bx (+)		
IB	26	26	—	—	—	—
IIA	72	72	—	—	—	—
IIB	207	207	—	—	—	—
IIIA	6	6	—	—	—	—
IIIB	102	99	2	—	1	3 (2.9)
Total	413	410	2	—	1	3 (0.7)

\* Definite mucosal invasion of tumor, but biopsy not done

**Table 4.** Incidence of Upstaging by Staging Work-Ups

Stage	No. of Patients	Same	No. upstaged		
			IIIB	IVA	Total (%)
IB	35	35	—	—	—
IIA	89	89	—	—	—
IIB	252	232	14	6	20 (7.9)
IIIA	8	8	—	—	—
IIIB	126	120	—	6	6 (4.8)
Total	510	484	14	12	26 (5.1)

**Table 5.** Incidence of Lymph Node Involvement on CT

FIGO Stage	Pelvic LN (%)	PAN* (%)
IB	2/ 20 (10.0)	0/ 20 ( 0.0)
IIA	7/ 57 (12.3)	5/ 57 ( 8.8)
IIB	40/159 (25.2)	8/159 ( 5.0)
IIIA	0/ 4 ( 0.0)	0/ 4 ( 0.0)
IIIB	33/ 91 (36.3)	12/ 91 (13.2)
IVA	3/ 6 (50.0)	0/ 6 ( 0.0)
Total	85/337 (25.2)	25/337 ( 7.4)

\* Paraaortic lymph node

according to stages are presented in Table 2.

### 3. Sigmoidoscopy

The sigmoidoscopy was performed in 413 (81%) out of 510 patients. Biopsy proven tumor involvement was documented in none of patients studied but definite mucosal invasion was found in one patient who also had biopsy proven bladder invasion on cystoscopy. The overall yields of abnormal findings suggesting tumor invasion and positive findings were 0.7% (3/413) and 0.2% (1/413), respectively (Table 3). Sigmoidoscopy had the lowest percentage yield of the staging work-ups reviewed.

### 4. Upstaging

As a result of these work-ups, twenty six (5.1%) out of 510 patients were upstaged from the initial stage determined by physical examination alone. None of the patients with the initial stage IB, IIA, and IIIA (0/132) was upstaged after staging work-ups. Twenty (7.9%) out of 252 stage IIB patients were

upstaged (14 patients to FIGO stage IIIB, 6 patients to FIGO stage IVA) and six (4.8%) out of 126 stage IIIB patients were upstaged to FIGO stage IVA (Table 4).

### 5. Abdomino-Pelvic CT

As an ancillary study to above mentioned work-ups, abdomino-pelvic CT was performed in 337 patients who were treated after May 1981. Although the correlation between paraaortic lymph node enlargement and increasing FIGO stage was not evident, pelvic lymph node enlargement was well correlated with increasing FIGO stage as follows: 10% in stage IB (2/20), 12.3% in stage IIA (7/57), 25.2% in stage IIB (40/159), 0% in stage IIIA (0/4), 36.3% in stage IIIB (33/91) and 50% in stage IVA (3/6) (Table 5). In the evaluation of parametrial involvement, CT findings and physical examination findings were identical in 65.6% (442/674) but inconsistent in 34.4% (232/674) (Table 6). In the evaluation of adjacent organ involvement, it was revealed that CT had a specificity of 88.3% (256/290), a

**Table 6.** Summary of CT Findings Compared with the Findings of Pelvic Examination and Endoscopic Studies

	Examination	CT findings	
		Normal (%)	Invasion (%)
Negative	Pelvic examination to parametrium	224 (33.2)	95 (14.1)
	Cystoscopy	256 (86.5)	34 (11.5)
	Sigmoidoscopy	238 (87.8)	33 (12.2)
Positive	Pelvic examination to parametrium	137 (20.3)	218 (32.4)
	Cystoscopy	1 ( 0.3)	5 ( 1.7)
	Sigmoidoscopy	0 ( 0.0)	0 ( 0.0)

**Table 7.** Efficiency of CT in the Evaluation of Adjacent Organ Invasion

CT	Bladder invasion	Rectal invasion
Sensitivity	83.3%	100.0%
Specificity	88.3%	87.8%
Positive predictive value	12.8%	0.0%
Negative predictive value	99.6%	100.0%

sensitivity of 83.3% (5/6) in comparison with cystoscopic findings and a specificity of 87.8% (238/271) in comparison with sigmoidoscopic findings, respectively, but CT had much lower positive predictive value than negative predictive value in its predictivity (Table 6, 7).

## DISCUSSION

Carcinoma of the uterine cervix is currently a clinically staged disease. Staging of cervical cancer according to the International Federation of Gynecology and Obstetrics (FIGO) staging system<sup>6)</sup> includes physical examination, routine roentgenologic studies including chest PA, intravenous pyelography (IVP), and barium enema as well as routine endoscopic evaluations such as cystoscopy and sigmoidoscopy. We might have a question to the usefulness of staging work-ups frequently performed without consideration of effectiveness.

Review of literature indicates that patients presenting with early disease on physical examina-

tion are rarely found to have advanced disease by the staging work-ups considered here. In view of the expense, patient discomfort and morbidity, and delay in the initiation of treatment, it is important to establish the value of these work-ups. Shingleton et al<sup>1)</sup> reported that the positive yield of the staging work-up under consideration was: IVP-14.1% (118/834), cystoscopy-5.7% (42/736), sigmoidoscopy-1.5% (8/505). They insisted that routine use of the work-ups did not seem justified and that patients with stage I or II pelvic findings did not require these work-ups unless palpable tumor was found in such a position as to warrant use of one or more of the examinations. The figures of positive yields in our study were comparable to those of Shingleton and we also could obtain the similar conclusion from this analysis. Griffin et al<sup>2)</sup> reported that some studies such as barium enema and cystoscopy giving little information were not indicated in early stages of the disease. They recommended chest PA, IVP and sigmoidoscopy as well as routine laboratory tests as pretreatment evaluation of all patients with carcinoma of the uterine cervix. Romero et al<sup>3)</sup> confirmed the findings of Griffin and they found that none of patients with stage I or II pelvic findings (0/78) was upstaged by cystoscopy but 12% of patients with stage III (3/25) were upstaged. In 1974, the Patterns of Care Study<sup>4)</sup> began a prospective nationwide survey of radiotherapeutic cancer care in the United States and revealed that the frequency of ordering staging work-ups was: IVP-79%, barium enema-48%, cystoscopy-38% and sigmoidoscopy-28%. They regarded that the more common use of barium enema examination compared with cystoscopy was contrary to the natural course of the disease, wherein bladder invasion was far more common than rectal invasion. Also, they found that a distinct trend toward more frequent use of these tests for more advanced cases of the disease was evident, analyzing by subsequent stages of disease. Abayomi et al<sup>5)</sup> reported that the barium enema and sigmoidoscopy were generally noncontributory in pretreatment evaluation of all stages of this disease but IVP and cystoscopy yielded positive results considerably in advanced stages.

A major cause of treatment failure with the routine clinical staging algorithm is undetected tumor involvement of lymph node in the pelvic and paraaortic chains. In the evaluation of lymph node involvement in carcinoma of the uterine cervix, there are conflicting reports as to the value of CT by several authors<sup>7-13)</sup>. Within the pelvis, lymph node

enlargement was only diagnosed in the presence of marked asymmetry, since the arteries, veins, and lymph nodes appear as a group rather than as easily definable structures. Some authors<sup>7,10,11</sup> reported that CT had a low sensitivity, but a high specificity in this respect. This means that enlarged pelvic lymph nodes on CT have a very high probability of containing metastasis but absence of enlarged lymph nodes correlates poorly with absence of metastasis. Nevertheless, we could find some meaningful data from this study that increasing FIGO stage was well correlated with the incidence of pelvic lymph node enlargement on CT, although the absolute figures were slightly lower than those generally known<sup>14-16</sup>. In the evaluation of parametrial involvement, it was reported by some authors<sup>11,12,17</sup> that physical examination by an experienced examiner was superior to CT, particularly in early cervical cancer. Grumbine et al<sup>18</sup> reported that even fourth-generation CT had an accuracy of only 58% compared with surgical/pathological findings in parametrial tumor extension, whereas physical examination had an accuracy of 92%. In this study, the findings between CT and physical examination coincided only in 65.6% regarding to parametrial involvement. Also, CT had some problems in the detection of adjacent organ invasion since the tumor involvement of the serosa and muscularis without mucosal penetration could escape cystoscopic or sigmoidoscopic detection. In this study, we can recognize that CT had much more false positive findings than false negative findings, when compared with endoscopic studies. Walsh et al<sup>13</sup> reported that CT in prone position or postvoid bladder sections might be helpful in differentiating extrinsic mass compression from tumor involvement in this respect.

### CONCLUSION

From the results of this study, it can be concluded that the staging evaluation for patients with carcinoma of the uterine cervix should be individualized by disease extent of each patient and that chest PA and IVP may be enough for patients with early presentation of disease without palpable parametrial extension (stage IB and IIA), especially when the tumor size is small. By individualizing the staging evaluation, the efficiency of staging work-ups may be increased without compromising the appropriate FIGO staging and treatment.

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== 국문초록 ==

## 자궁경부암에 있어서 병기결정을 위한 검사의 효용성

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요로조영술, 방광경검사, 직장내시경검사 등 자궁경부암에 있어서 병기결정을 위해 필요한 검사의 효용성을 평가하기 위하여 1979년 3월부터 1986년 12월까지 방사선 치료를 받은 510명의 자궁경부암환자를 대상으로 후향적 분석을 시행하였다.

요로조영술 및 방광경검사상 각각 10.7% (49/456), 5.3% (24/452)가 이상소견을 보였으나 직장내시경검사에서는 0.7% (3/413)만이 이상소견을 보였다. FIGO 병기결정에 필수적인 이러한 검사 결과로 26명의 환자 (5.1%)가 골반내진 소견만으로 얻어진 병기보다 FIGO 병기가 상승하게 되었다. 각 병기의 환자에서 병기상승의 비율은 IB 및 IIA 병기에서는 0% (0/124), IIB 병기에서는 14명의 환자가 FIGO IIIB 병기로 또한 6명의 환자가 FIGO IVA 병기로 상승하여 7.9% (20/252)로 나타났으며, IIIA 병기에서는 0% (0/8), IIIB 병기에서는 6명이 FIGO IVA 병기로 상승하여 4.8% (6/126)로 나타났다. 병기결정을 위한 검사상 양성소견은 IIB 병기이상의 진행된 병기에서만 나타났으며 초기에서는 나타나지 않았다.

보조적 검사로 337명이 전산화단층촬영을 시행받았으며 전산화단층촬영상 골반 임파절비대 소견이 25.2% (85/337), 대동맥 임파절비대 소견이 7.4% (25/337)에서 관찰되었다. 골반 임파절비대 소견의 빈도는 병기의 증가에 따라 증가하는 경향을 나타내었으나 대동맥 임파절비대 소견은 이러한 경향을 보이지 않았다. 자궁방결합 조직의 침윤소견에 있어서 전산화단층촬영 소견과 골반내진 소견은 65.6% (442/674)에서 일치하였다. 또한 주위장기 침범소견에 있어서 전산화단층촬영은 내시경검사를 기준으로 비교할 경우 음성예측치에 비하여 상당히 낮은 양성예측치를 나타내었다.

결론적으로, 병기결정을 위한 검사의 선택은 각 환자의 이학적 소견상의 진행정도를 고려하여 시행되어야 하며 그렇게 할 경우 적절한 FIGO 병기가 결정되면서 그 효용성을 증대시킬 수 있을 것이다.