

## **LOW DOSE RATE BRACHYTHERAPY CAESIUM-137 AFTERLOADING IN THE TREATMENT OF CARCINOMA OF UTERINE CERVIX IN SRINAGARIND HOSPITAL : ANALYSIS OF ACTUAL SURVIVAL RATE**

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### **ABSTRACT**

From October 1982 to December 1985, 412 patients with invasive uterine cervical carcinoma were treated with radiotherapy alone at the Division of Radiotherapy, Department of Radiology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand. The patients were in stages IB, IIA, IIB, IIIA, IIIB, IVA and IVB with 13, 5, 176, 5, 164, 14 and 15 cases respectively. Treatment methods were external irradiation 5000 cGy in 5 weeks in addition to intracavitary low dose rate brachytherapy 5400 mGy once or 3600 mGy twice after external radiotherapy. 66.4% of patients received brachytherapy after teletherapy more than 2 week interval. The average point A dose was 89.63 Gy and point B dose was 61.59 Gy. The actual 3 year survival rates for stage IB, IIA, IIB, IIIA, IIIB, IVA and IVB were 89%, 100%, 70%, 60%, 56%, 28%, and 29% respectively. The 5 year actual survival rates for stage IIB and IIIB which represent the highest number of the populations in this study were 63% and 39% respectively. The 5 year actual survival rates for small size tumor less than 2 cm in diameter and tumor size larger than 2 cm in diameter were 74% and 56% respectively. Our study had been reported previously about residual tumors and complications.<sup>1,2</sup>

### **INTRODUCTION**

Carcinoma of the uterine cervix is still the major problem of malignant disease in Thai women. Even now it is still the highest incidence of malignancy in the Northeastern Thai women. In Srinagarind Hospital, Faculty of Medicine, Khon Kaen University there were more than four hundred new cases of patients with uterine cervical carcinoma every year as table 1.<sup>3-8</sup>

Most of the patients were in advanced stages burdened with large tumor volume and radiotherapy remains the most generally applicable method for

controlling inoperable tumors of uterine cervical carcinoma. Our results have been reported previously about residual tumors and complications.<sup>1,2</sup> This study will be the analysis of actual survival rate.

### **MATERIAL AND METHODS**

During October 1982 to December 1985, there were 412 patients with histologically proven invasive carcinoma of the uterine cervix treated with radiotherapy alone in Radiotherapy Division, Department of Radiology, Srinagarind Hospital. All patients were

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Table 1 Statistical incidence

Year	% of total cancer	
	cases in female	No of CA.Cervix cases
1988	26.26%	483
1989	29.11%	605
1990	26.10%	541
1991	25.50%	552
1992	22.50%	522
1993	26.20%	596

jointly evaluated by gynecologists and radiotherapists for clinical staging according to the International Federation of Gynecology and Obstetrics (1973)<sup>3</sup>. Patients were followed periodically by the radiotherapist for an average time about 2 years or until lost to follow up or death occurred. Informations were available either from the Division of Radiotherapy records, Cancer Unit records or letter of follow up through direct communication with the patients or relatives. Actuarial survival rate analysis was performed according to life-table method<sup>10</sup>.

## TREATMENT

### EXTERNAL RADIATION THERAPY

All patients were treated with Cobalt-60 teletherapy units. Most of the patients received 5000 cGy in 5 weeks to the whole pelvis through AP and PA 15x15 cm<sup>2</sup> or 16x16 cm<sup>2</sup> port. The ports were extended to 18x15 cm<sup>2</sup> for the patients with stage IIIA. In small size tumors, the patients received 2000-3000 cGy to the whole pelvis. Tumor dose of 180-200 cGy were treated daily in five fractions per week. The lead block size 9x4x5 cm<sup>3</sup> for midline shielding was used in some patients whose tumor shrunk or disappeared during external radiotherapy or after intracavitary insertion.

### BRACHYTHERAPY

Low dose rate intracavitary caesium-137 was performed by using Fletcher afterloading technique. All doses were prescribed in mg-hr Radium equivalent. Standard source loaded by 15-10-10 mg in tandem

and 20 mg sources in each of standard vaginal ovoids were practiced.

More than two weeks after completion of teletherapy, the brachytherapy doses of 5400 mghr once or 3600 mghr for two intracavitary insertions were practiced in most patients due to limitation of our facilities and only 4 patients can be treated per week. (two brachytherapy service beds)

### PARAMETRIAL BOOST

In addition to the external irradiation, parametrial boosts of 200 cGy for 3 days after the completion of brachytherapy were treated to the patients in stage IIIB with massive tumors at the parametrium.

## RESULTS

Four hundred and twelve patients with uterine cervical carcinoma were treated with radiotherapy alone during October 1982 to December 1985. The patient characteristics are given in Table 1. The residual tumors and radiation complications had been reported previously.<sup>1,2</sup>

## DISCUSSION

The aim of radiotherapy in malignancy is to obtain the highest possible tumor control, the best survival, the lowest possible incidence of major radiation complications and good quality of life of the patients.

Many prognostic factors influencing on radiotherapy in uterine cervical carcinoma are size of tumor, gross appearance of lesions, histologic type or degree of differentiation, staging as well as host prognostic factors including hemoglobin level.<sup>11,12</sup>

Table II Dose rate at point A and point B from caesium-137  
(Standard Manchester Technique)

Year	Point A Gy/hr	Point B Gy/hr
1982	0.55	0.173
1983	0.54	0.169
1984	0.52	0.166
1985	0.51	0.162

Our results revealed that patients with small tumor size less than 2 cm in diameter had 5 year actuarial survival rate 73% but the patients with large tumor size more than 2 cm in diameter had 5 year actuarial survival rate 56%. (Table 4)

In patients with stage IIB and IIIB which were the highest number of populations in this study had 5 year actuarial survival rate 63% and 39% respectively. (Table 5)

This data may support the hypothesis that large tumor volume or advanced carcinoma of the cervix contain cores of hypoxic cells which resist to conventional radiation therapy. Attia AB, et al. (1985)<sup>13</sup> reported that tumor size of uterine cervical carcinoma less than 2 cm, 2-4 cm, more than 4 cm in diameter revealed pelvic node involvement 7.5%, 27.5% and 45%, respectively. Conclusion can be drawn that pelvic node involvement rate increases when tumor size increases and this may be another reason for the decreased survival rate in large size tumor.

For exophytic lesions and ulcerative lesions we found that 5 year actuarial survival rates were 50.3% and 58.2%, respectively. (Table 6)

From a report on 1013 uterine cervical cancer patients treated with radiotherapy alone, the 5 year survival rates for stage I, II, III and IV were 73.2%, 48.6%, 25.2% and 6.8%, respectively. The pathological report was squamous cell carcinoma 89.5% and adenocarcinoma 8.7% (Tepmongkol P, 1985).<sup>14</sup>

In addition, the 5 year survival rates of another report studied in 845 cases treated by radiotherapy in stage I and II of uterine cervical carcinoma were 69.1% and 48%, respectively. (Benerjee SK, et al 1985)<sup>15</sup>

Jampolis S, et al (1975)<sup>16</sup> also reported that 5 year survival rates on 916 squamous cell carcinoma patients who received radiotherapy alone in stage IIA, IIB, IIIA and IIIB were 91%, 82%, 65%, 54% and 40%, respectively.

Perez CA, et al.(1986)<sup>17</sup> reported that 5 year survival rates on 970 patients treated with radiotherapy alone, stage I, IIA, IIB and III were 89%, 70%, 68% and 45%, respectively. This study revealed that over 90% of the patients had squamous cell carcinoma.

Our results on 5 year actuarial survival rates for stage IIB and IIIB were 63% and 39% respectively. (Table 5)

According to the pathology, we found 51% 5 year actuarial survival rate for squamous cell carcinoma and 58% for adeno-carcinoma (Table 7). However in our study there were about 87.1% of cases had squamous cell carcinoma and only 10.4% had adenocarcinoma.

All the above mentioned reports showed the result of survival by using the low dose rate brachytherapy. From other reports<sup>18,19</sup>, 5 year survival rate by using low dose rate brachytherapy for stage I, II, III and IV were 85-90%, 68-85%, 39-62% and 17-30%, respectively.

## CONCLUSION

It can be concluded from our data that radiotherapy remains the useful modality in the treatment of uterine cervical cancers, but it will be effective in early stages and small tumor sizes. However, low dose rate brachytherapy, caesium-137 has the advantage of long half-life activity, about 30 years and cheaper



Table 3. Patient characteristics.1,2

Patient characteristics		
1.	Geographic distribution	
	Northeastern part	99.1%
	Other parts	0.9%
2.	Age	
	The average age	48 yrs
	(youngest =16, oldest = 76)	
3.	Histopathology	
	Squamous cell carcinoma (no=359)	87.1%
	Adenocarcinoma (no=43)	10.4%
	Adenosquamous cell CA. (no=6)	1.5%
	Others (no=4)	1.0%
4.	Staging	
	Stage IB (no=13)	3.2%
	Stage IIA (no=5)	1.2%
	Stage IIB (no=176)	42.7%
	Stage IIIA (no=5)	1.2%
	Stage IIIB (no=164)	44.7%
	Stage IVA (no=14)	3.4%
	Stage IVB (no=15)	3.6%
5.	Tumor Size (Mean tumor size = 4.6 cm)	
	< 2 cm	8.8%
	> 2 cm	91.2%
6.	Gross appearance	
	Exophytic	83.8%
	Infiltrative	3.6%
	Ulcerative	12.6%
7.	Brachytherapy Insertion	
	No brachytherapy (no=23)	5.6%
	During teletherapy (no=30)	7.3%
	After teletherapy 1-2 wk (no=77)	18.7%
	After teletherapy >2 wk (no=282)	66.4%

The actuarial survival rate was analysed as followed. (Table 4, 5, 6, 7).

in the cost than high dose rate brachytherapy. So it may be suitable for developing countries in the beginning of setting up the radiotherapy unit. But one disadvantage of low dose rate brachytherapy is that patients must be treated in hospital beds for 48-72 hours, so it needs many beds for servicing many patients. When hospital beds are available, low dose rate brachytherapy with mechanical remote after-loading offers the best effective value in quality of therapeutic results and economical reasons.<sup>20</sup>

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Table 4 : Acturial survival rate due to tumor size in all stages.

Tumor size	Acturial survival rate	
	3 yrs (%)	5 yrs (%)
< 2 cm	74	74
> 2 cm	64	56

Table 5 : Acturial survival rate due to staging.

Stage	Acturial survival rate	
	3 yrs (%)	5 yrs (%)
IB	89	-
IIA	100	-
IIB	70	63
IIIA	60	-
IIIB	56	39
IVA	28	-
IVB	29	-

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Table 6 : Acturial survival rate due to gross appearance in all stages.

Gross appearance	Acturial survival rate		
	3 yrs (%)	4 yrs (%)	5 yrs (%)
Exophytic	63.7	56.6	50.3
Infiltrative	67.1	-	-
Ulcerative	58.2	58.2	58.2



Table 7 : Acturial survival rate due to pathology in all stages.

Pathology	Acturial survival rate		
	2 yrs (%)	3 yrs (%)	5 yrs (%)
Squamous cell CA.	70	63	51
Adenocarcinoma	70	64	58
Adenosquamous cell CA.	60	-	-

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