High dose rate intracavitary radiation therapy of carcinoma of the cervix using a linear source

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Summary

One hundred patients with carcinoma of the cervix stages 1B to 4A were treated with intracavitary high dose rate radiation using a linear cobalt source. All cases have received external beam pelvic irradiation to 4500cGy mid plane in twenty fractions over four weeks. The results in terms of patient compliance and convenience were good while acute and late morbidities were comparable to standard Manchester technique of low dose rate intracavitary therapy as practised in the Institute of Radiotherapy and Oncology General Hospital Kuala Lumpur.[1] The four year actuarial survival rate is 76% for stage II and 48% for stage III. All three stage IV patients died within 1 year. Four out of seven stage I patients are alive (minimum follow-up 18 months, longest 43 months). One died of systemic spread at 33 months while one is lost to follow up.

Key words: Intracavitary radiation for carcinoma of cervix.

Introduction

The two components of radiation treatment of carcinoma of the cervix consists of intracavitary irradiation from radioactive isotopes placed in the uterus and vagina, and external beam irradiation from teletherapy machines like the linear accelerators or the cobalt teletherapy unit. Occasionally in very early cervical cancers only intracavitary radiation is employed. There are minor variations from

centre to centre with regard to the dose contribution from the intracavitary and the external radiation. The range of doses of the external radiation is between 4250 to 5000cGy while the intracavitary radiation will be such that a point A dose of between 7500 to 8000cGy is achieved. The intracavitary treatment has for a long time followed the time honoured Manchester technique of a uterine source and one source each in the lateral fornices. The isotopes are either radium^{226} or caesium^{137}. To a limited extent californium^{252} have been used.[2]

This study has two main features which departs from the Manchester technique. Firstly it does not employ the Manchester arrangement of radiation sources but instead employs a linear central source in the uterus extending down the vagina.

Secondly the dose rate is high (in the order of approximately a hundred cGy per minute to point A as compared to the low dose rate of 50 to 70cGy per hour from the Manchester low dose rate system). The first high dose rate system clinically used was reported by Henschke in 1963, followed later by O'Connell in 1965 and Wakabayashi in 1966.[3,4,5,6]

Any new technique employed such as this should not compromise the established cure rate or incur increased acute or late morbidities. Most studies did not show that high dose rate systems are inferior to the established low dose rate system.[7] This is the first experience of high dose rate intracavitary treatment in Malaysia.

Materials and Method

The first remote after loading high dose rate intracavitary device was made available in this country in early 1986. The intracavitary treatment of cervical cancers started from March 1986 with patients of all stages except stage 4B. The criteria for inclusion were any patient who has completed the external pelvic radiation and were able to come for regular follow up. The majority of patients were therefore from the Federal Territory or those who would be available in the peripheral follow up clinics. One hundred cases were treated this way between March 1986 to February 1989.

All cases were staged according to FIGO staging classification. They received 4500cGy from an external beam in an anteroposterior portal from a 6 Mev linear accelerator or a cobalt^{60} teletherapy unit. A ten days gap is given between completion of external beam treatment and the commencement of intracavitary treatment, to allow acute radiation reaction to settle. The intracavitary radiation is given from the Ralstron system (Shimadzu Japan), two fractions a week (Monday and Thursday) for six fractions. The dose per fraction is 500 cGy to point A. The source is cobalt^{60} and moves in a linear fashion from the top of the uterine cavity down the vagina. The source stops at five stations. The interval between these stations and the duration of the stop at each station is computed to give 500cGy to point A based on the length of the uterine cavity. The actual position of the linear applicator inserted is checked by an AP and lateral X-ray film with barium in the rectum to allow estimation of the rectal dose. Patients were assessed for acute complications (acute cystitis, proctitis, perforation, etc). Tolerance to the procedure were also noted. Late complications were assessed after one year of completing treatment. Four year actuarial survival analysis was made.

Results

Similar to a previous local study,[1] the Chinese constitutes more than half of the patients involved. Late presentation is also very much in evidence, i.e. 80% presenting with a 2B to 4A disease. The predominant histology of 96% squamous cell type, 3% adenocarcinoma and 1% oat cell is not unexpected since this is the pattern seen in all reported studies. The peak incidence is between 40 – 60 years of age.

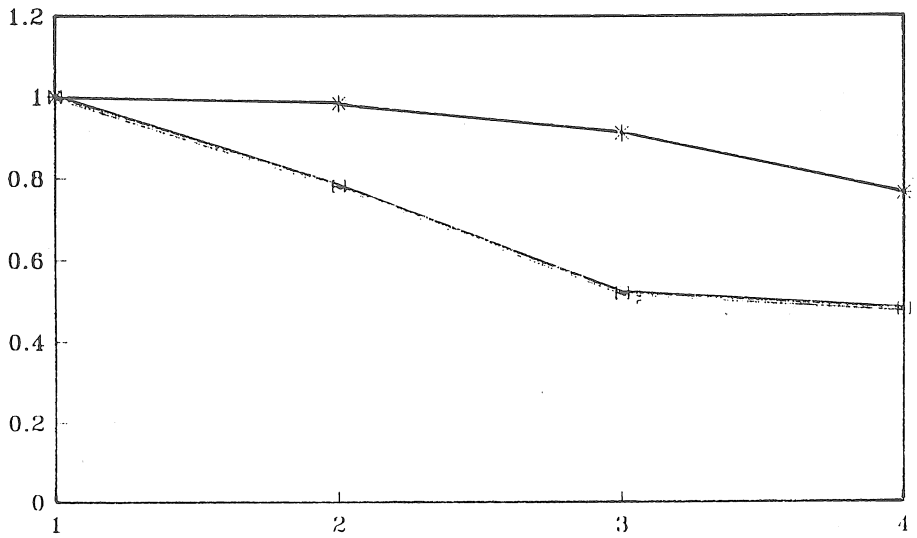
The technique used is related to minimal acute morbidity of no serious consequence. One patient had a tight os and dilatation had to be done under general anaesthesia on the first occasion only. There was one case of perforated uterus.

The incidence of late morbidity from moderate to severe proctitis was 3% and 1% for cystitis. There were no cases of fistulae or stricture formation.

The 4 year survival rate (actuarial) was 76% for stage II and 48% for stage III (Fig. 1). This is very acceptable since the established 5 year survival rate is between 44 – 72% for stage II and 36 – 52% for stage III.[1]

FIGURE 1

Survival Curve for Patients Stage 2 and 3 (A + B)



YEAR

* STAGE 2 -⊟-STAGE 3 (A + B)

Discussion and Conclusion

Intracavitary treatment is an important component of radical radiation treatment of cancer of the cervix. The aim is to boost the central pelvis to eradicate tumour. The standard time tested method of intracavitary treatment is the Manchester system of low dose rate using radium ^{226}or caesium ^{137}. There are several disadvantages of this technique. Firstly it has to be done under general anaesthesia. Due to the low dose rate between three to four days are required to deliver the dose and patients are required to be confined to bed with all the ensuing inconvenience of urinary catheter, vulval stitches, vaginal pack and isolation. Shielding of patients were necessary to minimise radiation exposure to other patients and nursing staff. The position of the sources are presumed to be static through out the three or four day period which may not be the case and hence the dosimetry may be not be optimal.

This study reflects again the predominance of late presentation (Table 2) i.e. 82% in stage 2B and above. The most affected group are between the ages 40–60 years (Table 4). Acute complications were insignificant while late complications were mainly mild to moderate cystitis and proctitis 3% and 1% respectively (Table 5 & 6). The survival patterns are comparable to established figures elsewhere. The system of high dose rate has the advantage of an out patient procedure, well tolerated and there is no staff exposure. The use of a line source further makes the insertion easy and the dosimetry is identical at each insertion even when done by different operators at each insertion. The initial anticipation about increase acute and late morbidity due to the high dose rate is not borne out in this study. In a centre with a high patient load and relative shortage of senior radiation oncologists this is a safe and excellent alternative to administer intracavitary radiation. Apprehension about moving away from the standard Manchester arrangement is not, fortunately, related to inferior results in terms of morbidity and mortality.

Table 1
Racial distribution of 100 cases of carcinoma of the cervix

Race	No. of cases
Chinese	53
Malay	21
Indian	24
Others	2
Total	**100**

Table 2
100 cases of carcinoma of the cervix by stage

Stage	No.
IB	7
IIA	11
IIB	50
IIIA	4
IIIB	25
IVA	3
Total	**100**

Table 3
Histology of 100 cases of carcinoma of the cervix

Histology	%
Squamous cell carinoma	96
Adenocarcinoma	3
Oat cell carcinoma	1

Table 4
Age distribution of 100 cases of carcinoma of the cervix

Age (Yrs)	No.
20 – 29	2
30 – 39	9
40 – 49	29
50 – 59	30
60 – 69	23
70 – 79	7
Total	**100**

Table 5
100 cases of carcinoma of the cervix, acute morbidity

Acute morbidity	No.	%
Failed insertion (tight os)	1	1
Perforated uterus	1	1

Table 6
100 cases of carcinoma of the cervi, late morbidity

Proctitis	
Mild	6%
Moderate	2%
Severe	1%
Cystitis	1%
Fistulae / Strictures	0%

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