Original article

Low dose rate brachytherapy using a tandem for cervical cancer

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Abstract

Purpose: To report the results of the Instituto Nacional de Cancerología México, of low dose rate brachytherapy for cervical cancer using only a tandem. A proportion of patients was treated with only a tandem, without ovoids, due to the distorted anatomy because of the tumour or previous external radiation, or sometimes due to physician preference.

Material and methods: We report the results of 120 patients treated only with a tandem and the impact of this treatment on local control and survival from January 2005 to December 2006. The frequency of FIGO stage was: IIB 47%, IIIB 34%, IIA 9%, IIIA 4%, IB2 3% and IB1 3%. The median overall treatment time was 12 weeks. The value of the external beam radiation dose was 50-50.4 Gy in all patients and the value of the brachytherapy dose was 30 Gy given to point A.

Results: Complete clinical response was 83% at the end of brachytherapy. Time to recurrence and frequency were: IB1 – 17 months (20%), IB2 – none, IIA – 8 months (8.3%), IIB – 11 months (40%) and IIIB – 14 months (25%). 10.8% of patients had a persistent tumour, 3.3% had progression during treatment in stage IIB. Survival in months was 26 months for stage IB1, 30 for IB2, 25 for IIA, 28 for IIB, 27 for IIIA and 24 for IIIB. 25% of patients died during follow-up.

Conclusions: These preliminary results suggest that there is no significant difference between the treatment with brachytherapy using a tandem and ovoids or a tandem alone.

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Key words: brachytherapy, cervical cancer, LDR, tandem.

Purpose

Cervical cancer is the fourth most common cancer worldwide; especially in developing countries where mortality is increasing it is a major health problem. Radiotherapy is essential for the treatment of this disease, with external beam radiation and brachytherapy as the most important modalities [1, 2]. Low dose rate brachytherapy is continuous and has the advantage of administering high doses to the tumour volume and low doses to the organs at risk (bladder and rectum), which represents lower toxicity and higher local control [3]. Sometime the standard applicator, which is a tandem and ovoids, cannot be placed due to anatomical or tumour conditions and the doses to the fornices and cervix cannot be delivered [4, 5]. Pelvic external beam radiotherapy includes pelvic lymph areas and the value of the total dose administered is 45-50 Gy [6, 7]. At the Instituto Nacional de Cancerología México, the most common used applicator is the Fletcher-Suit-Delclos. The choice of using only a tandem depends mainly on the anatomical condition and the physician's preference at the brachytherapy suite. The implant planning system is the Manchester system [8-11], and the calculation program is home made.

This paper analyses the retrospective results of brachytherapy using only a tandem without ovoids, especially local control and survival in patients treated for cervical cancer. This kind of treatment is currently not analyzed in the literature.

Material and methods

A retrospective review of 120 histopathologically confirmed cervical cancer patients of FIGO stages up to IIIB, treated with external beam radiotherapy 45 to 50 Gy and low dose rate brachytherapy with only a tandem, from 2005 to 2006, was conducted at the Radiation Oncology Department at the Instituto Nacional de Cancerología, México. Variables included were: age, FIGO stage, length of radiotherapy. Chosen data of clinical characteristics are presented in Table 1. Age was less than 39 years in 16% of patients, 40-49 years in 28%, 50-60 years in 13% and more than 70 years in 19% of patients. The median overall treatment time was 12 weeks. 50 to 50.4 Gy of external beam radiotherapy dose was given to all patients and brachytherapy total dose was 30 Gy given to point A.

Statistical analysis included absolute numbers, mean and median and survival with Kaplan Meier tables for local control and survival.

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Table 1. Clinical characteristics

FIGO stage	IB1	IB2	IIA	IIB	IIIA	IIIB
Rate (%)	3	3	9	47	4	34
Mean age (years)	39	46	60	56	49	55
Total treatment time (weeks)	12.7	13.4	11.8	13.4	13.2	12.9

Results

Complete clinical response was observed in 83% of patients at the end of brachytherapy. Time and recurrence rate according to FIGO stage was: IB1 – 17 months (20%), IB2 – none, IIA – 8 months (8,3%), IIB – 11 months (40%) and IIIB – 14 months (25%). 10.8% had persistent tumour, 3.3% had progression during treatment in stage IIB. Median survival time was 26 months for IB1, 30 for IB2, 25 for IIA, 28 for IIB, 27 for IIIA and 24 for IIIB. 25% of patients died during follow-up. Overall survival rate was 100% in clinical stage IB1-IB2, 95% in IIA, 65% in IIB, 96% in IIIA and 45% in IIIB (Fig. 1).

Proctitis grade 2-3 was present in 12% and cystitis grade 2-3 in 7% of patients. Summarized complication rate was 18%.

Discussion

The treatment of cervical cancer with radiotherapy includes external beam radiotherapy and brachytherapy. The applicators consist most often of a tandem and 2 ovoids to deliver high doses to the cervix and fornices. The organs at risk must be taken into account giving the lowest possible doses to avoid toxicity. In some cases, the application can only be done with the tandem due to infundibular vagina, very high doses to organs at risk or the ability of the physician.

The results of our study were based on 120 patients treated with low dose rate brachytherapy using only a tandem. Most of them were in clinical stage IIIB, with tumours larger than 4 cm in diameter, attaining the pelvic wall, some with renal dysfunction. Another, earlier study at the Institute showed some differences in frequency: EC I: 28%, EC II: 34%, EC III: 33%, EC IV: 5% compared to the present study with 47% IIB, 34% IIIB, 9% IIA, 4% IIIA, 3% IB2 y 3% [12].

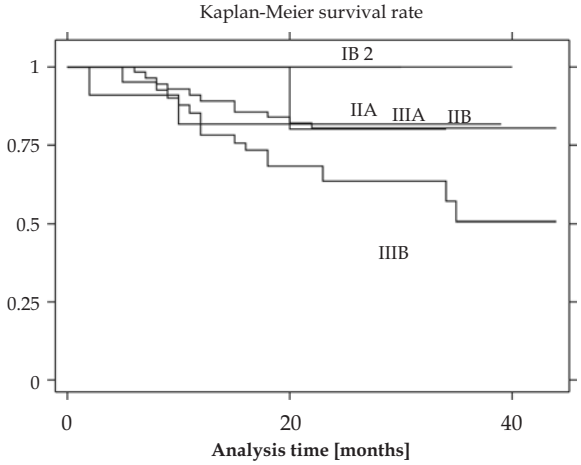

Fig. 1. Survival rate according to FIGO stage in the researched group

Median age was 39 years with 68% of patients younger than 40 years, showing that Mexican patients are much younger compared to developed countries, where only 16% are in this age range [13]. Local control at 24 months of follow-up found in the literature is for stage IB1 – 90-95%, IB2 – 60-80%, IIA – 80-95%, IIB – 60-80%, IIIA – 70%, IIIB – 50-60%; in our study it was in clinical stage IB2 – 80%, IIA – 91.7%, IIB – 60%, IIIA – 96% and IIIB – 75%, with a recurrence rate of 17.5% [14].

Survival reported in the literature is 90-95% for stage IB1, 60-70% for IB2, 75% for IIA, 60-70% for IIB, 25-50% for IIIA and 25-50 for IIIB. Our results were (after 24 months): IB1-2 – 100%, IIA – 95%, IIB – 65%, IIIA – 96% and IIIB – 45%, showing no significant difference [14, 15].

In all patients treated with radiotherapy, the total treatment time must be individually planned, and any disruption or delay must be avoided. Local control is influenced by the total time including external beam radiotherapy and brachytherapy. In our study, the total median treatment time was 12 months, compared to 8 months in the literature [16, 17].

Our results show that local control and survival are the same as in the literature, even without the application of ovoids in the brachytherapy device. Complete clinical responses are expected to be the same. Other important risk factors are clinical stage, age, and histological type, which must be taken into account for the results.

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