Dose Distribution Within the Pelvis With the Use of Telecobalt Moving Therapy

大竹, 久; 柳沢, 融; 樋口, 喜代治; 飯田, 肇

日本医学放射線学会雑誌. 29(1) P.89-P.92

1969-04-25

publisher

http://hdl.handle.net/11094/19155

Osaka University Knowledge Archive : OUKA

https://ir.library.osaka-u.ac.jp/repo/ouka/all/
Dose Distribution Within the Pelvis With the Use of Telecobalt Moving Therapy

By

Himashi Ohtake, Tohru Yanagisawa* and Kiyoji Higuchi
Dept. of Radiology, School of Medicine, Iwate Medical University, Morioka
(Director: Prof. S. Tarusawa)

Hajime Iida
Dept. of Obstetrics and Gynecology, School of Medicine, Iwate Medical University, Morioka
(Director: Prof. Y. Hata)

*Present address: Dept. of Dental Radiology, School of Dentistry, Iwate Medical University, Morioka.

Introduction

To perform a moving irradiation therapy, it is necessary to know the accurate spatial dose distribution in the body. Many reports are available concerning this point.1-3,5356

In the present report, the dose distribution from a telecobalt moving therapy against carcinoma of the uterine cervix is reported.

Method of Measurement, Results and Discussion

As the apparatus for irradiation, a Shimadzu double rotation type RT-2000 was used. The source
Fig. 1. Penumbra at SSD 75 cm (measured in air). Field size of 4 cm × 4 cm, 5 cm × 5 cm and 10 cm × 10 cm.

was cobalt-60 600 Ci (as of September 1960) in wafer type measuring 20 mm × 1 mm × 6. The degree of haziness at the border of the radiation cone in air was measured with the Colonial's rate meter (Nihon Hoshien Bogyo Co. Ltd.). The source-surface distance was 75 cm. In a field of radiation of 10 cm × 10 cm, the dose was 97% of that of the center at the edge of the field (5 cm from the center), 72% at 0.5 cm from this point, 42% at 1 cm, and 10% at 2 cm (Fig. 1). In a field of radiation of 5 cm × 5 cm, and a field 4 cm × 4 cm, approximately similar results were obtained. The obscuring of the border was practically unrelated to the field size.

As the phantom, an approximately oval 5 mm thick plastic vessel, filled with water was used, with an outside diameter of 30 cm in the transverse direction, 18 cm in the longitudinal direction, 40 cm in the length. Radiation was aimed at both parametria. Placing both points B at the center, pendulum irradiation of 220 was carried out from both right and left. Source-center distance was 75 cm, and the field size was 4 cm × 10 cm and 5 cm × 10 cm at the center of rotation. The Colonial's rate meter was used for measurement of dose, according to the method reported by us previously. The dose distribution is

Fig. 2. Iodose chart in water phantom. Field size of 4 cm × 10 cm.
Left side: Unilateral irradiation
Right side: Bilateral irradiation
shown in Fig. 2 and 3. Upon irradiation on the field $4 \text{ cm} \times 10 \text{ cm}$, the ratio between the dose at point B and that at point A was 100 : 73, while the corresponding value was 100 : 75 in the field $5 \text{ cm} \times 10 \text{ cm}$.

Since point B, on both sides, received a dose of radiation about 10% of the dose at the center of rotation of the contralateral side, the addition of this amount to the dose calculated from the tumor-air ratio by H. E. Johns should not be forgotten.

As shown in Fig. 4, the dose was measured in the pelvic bone and femur of man placed in a water containing phantom. As compared to the occasion without bone, the maximum decrease of the dose was only 4-5%, and the presence of the bone may be almost completely ignored. Consequently, the dose distribution within the water phantom appears to be sufficient for clinical purposes.

**Summary**

The dose distribution with the use of telecobalt moving therapy revealed a good distribution from the
pendulum irradiation using both points B as centers. Besides such external irradiation, internal irradiation or radical operation was used in combination in the therapy of carcinoma of the uterine cervix, and excellent results were obtained. Since it was established that the absorption by bone may be almost completely ignored in γ-ray from cobalt-60, the results obtained in a water phantom may be used without any correction.

(The guidance and review of this manuscript by Prof. S. Tarusava and Prof. Y. Hata are appreciated. The outline of the present study was presented at the 23rd Regional Meeting of the Japanese Radiological Society in Northern Japan.)

References