

CANCER BLADDER TREATED BY UTERINE RADIUM

By

K. H. Khalid, M.D.
Radiology Dept.

Prof. Mahrous M. A., Ph.D.
Physics Dept.

Ain Shams University

INTRODUCTION

During radium treatment of cancer of the cervix uteri, the bladder receives a certain dose of radiation. The possibility of delivering an adequate dose in case of cancer of the urinary bladder in the female was thought of and investigated. Measurements were first carried out in an anatomical phantom and when the dose delivered to the region of the bladder was found sufficient, several cases were treated successfully by this method.

PHYSICAL MEASUREMENTS

An anatomical phantom previously described, Khalid (1966), was used. Radium inside an intrauterine tandem alone and in Manchester ovoids alone and then in combination was used and the dose received by the bladder was measured in each case. This was repeated for an antverted anteflexed uterus and in case it is retroverted. Sievert chambers, 9/15 mm in size, were placed at the site of the urinary bladder. Doses were as follows :

DOSE TO BLADDER

| Radium | Uterus antverted | Uterus Retroverted |
|-----------------------------|------------------|--------------------|
| 1. in vaginal ovoids only | 2300 r | 750 r |
| 2. uterine tandem only | 5400 r | 1200 r |
| 3. combined ovoids & tandem | 7500 r | 1900 r |

It is apperent that the dose received by the bladder depends upon : 1. the position of the uterus. When it is anteflexed, it contributes a bigger dose than when retroverted. 2. the intrauterine tandem gives a bigger dose to the bladder than the vaginal ovoids.

The dose distribution in the bladder itself is mostly in the posterior wall, the bladder base and trigone.

CASES TREATED

The physical measurements revealed that cases of cancer of the bladder of the posterior and lower part are the ones that are suitable for this type of treatment.

Five cases were chosen as they fulfilled the above condition, with anteverted uterus and were still localized to the bladder wall, being stage 2. Under the umbrella of an antibiotic, radium was applied in the form of a uterine tandem and vaginal ovoids. In every case the dose was measured at the posterior vesical wall, to make sure that the dose was sufficient, i.e. 6000 r in one week.

RESULT

All the five cases had normal radiation response, the neoplastic mass gradually diminishing in size to disappear completely within six weeks as evidenced by cystoscopic examination. Follow up for eighteen months demonstrated no recurrence locally at the previous tumor site.

DISCUSSION

The dose received by the urinary bladder during radium treatment of cancer of cervix uteri has been discussed by several authors to explain the radiation that sometimes occurs in the bladder. Kottmeier (1950) stated that "the average dose measured in the bladder was 4410 r in patients treated according to the Stockholm method. The variations of the maximum dose measured in the urinary bladder essentially depend on the degree of retroversion and ante-flexion of the uterus. With coincident intrauterine and vaginal radium treatment, the urinary bladder received the maximum dose either at the level of the trigone or in the lower part of the posterior wall. In a case in which the uterus was markedly ante-flexed, the maximum dose received by the urinary bladder was 7500 r, and in a case in which the uterus was markedly retroflexed it was 1800 r. In four other cases the maximum dose in the bladder varied from 5000 r to 5400 r and in all the other cases studied from 3300 r to 4300 r. The intrauterine radium is responsible for a greater percentage of the dose to the urinary bladder than is the vaginal radium." He advocated "spreading the vaginal radium over a large surface to avoid the impact of radium over the lower two cm of the cervical canal to avoid as far as possible the exposure of the rectum and the bladder to radium overdose."

As our aim here is to deliver the maximum dose to the bladder the radium should be concentrated in the uterus, cervical canal and upper part of the vagina

Cases which are considered fit for such treatment must have 1. an ante-flexed uterus 2. the vesical neoplasm must be in the posterior or lower part of the

uterus 2. the vesical neoplasm must be in the posterior or lower part of the bladder 3. and the tumor must be still confined to the bladder wall, i.e. stages 1 and 2 according to Duke and Massina (1949).

Makfouz and Maged (1962) treated some cases of cancer bladder by partial cystectomy and extravescical radium application when 1. the tumor has not reached the lower part of the bladder, 2. is less than one third of the bladder and 3. is still stage one or two. They fixed a corrugated rubber applicator to the outside of the bladder to deliver 5000 r to 6000 r in 6 to 7 days. When the trigone was involved, recurrence occurred as there is underdosage to this region.

However by intrauterine radium applicator, the trigone, bladder base and its posterior wall can be dealt with. The physical measurements and the results of the treated cases demonstrate this line of treatment to be a new approach for cancer bladder.

Baringer (1938) treated 215 cases of cancer bladder by radium and reports 32 per cent of 3 year cures and 24.1 per cent 5 year cures. Cade (1950) considers the case suitable for radium therapy "1. is a lesion of moderate size, located to the base or lower part of the bladder, of the infiltrating or ulcerative type." "2. With a dose of 6000 r or even 8500 r, a remarkable improvement in the immediate results took place." "3. The needles must be placed accurately in position and steps taken to ensure that they stay in position." which is not easy to achieve in a highly contractile viscus that changes its size markedly. 4. The closest cooperation between urologist, radiotherapist and physicist is a *sine qua non*. It is the absence of cooperation which has given needling of the bladder rather a sinister reputation, associated in the minds of many with burns, cystitis, urgency, frequency, uncontrollable pain, resulting in miseries compared with which the natural distress of cancer of the bladder pales into insignificance." This is due to end arteritis obliterans with the pain associated with ischemic death of avascular tissues and radionecrosis involving the nerve plexus of the bladder.

— It is interesting to note that the only diagram of case of cancer bladder treated with interstitial radium needle implant, Cade illustrated in his book, is that of a female with the neoplasm in the posterior wall of the bladder opposite the uterus and upper part of the vagina. This is the typical case we consider fit for treatment by intrauterine and vaginal radium.

Friedman (1948) commenting on cases of cancer of the bladder he treated by intracavitary single radium source inside the bladder remarked that with a total dose of 6000 r there is no post radiation cystitis; at 8000 r, slight cystitis and above 9000 r, severe cystitis follows. Cade comments on this method as

"attractive as it represents in practice a small source of radiation at the centre of a sphere and even irradiation of the bladder is obtained." We can conclude that the tried method of intra uterine radium treatment of cancer of the bladder can be added to the various techniques developed for this condition.

REFERENCES

1. BARRINGER B.S. (1938). *J. Urol.* 40 : 606.
2. CADE S. (1945). *Proc. R. Soc. Med.* 38 : 247.
3. CADE S. (1950). *Malignant disease and its treatment by radium* J. Wright, Bristol; 3 : 353.
4. DUKE C.E. AND MASSINA F. (1949). *Brit. J. Urol.* 21 : 273.
5. MARFOUZ M.M. AND DEEB A.A. (1962). *Proceedings of First Inter. Symposium on Bilharziasis* 767.
6. KHALID K.H. ET AL (1966). *Proceedings of the Math. and Phys. Society of U.A.R.* 27 : 13.
7. PATERSON R. (1948). *Treatment of malignant disease by radium and x-rays.* E. Arnold, London.
8. WEYDE R. (1945). *Acta Radiol* 26 : 589.
9. WILLIS R.A. (1948). *Pathology of tumors.* Butterworth, London.