

**Original Article****Urinary tract infections in patients with early prostate cancer during 3D conformal radiotherapy**

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**ABSTRACT****Objective**

To determine the prevalence of urinary tract infections (UTI), and their association with dose to bladder, bladder volume and treatment time in patients with early prostate cancer during three dimensional (3D) conformal radiotherapy.

**Patients and Methods**

Fifty-four patients with localized prostate cancer who were to undergo curative radiation of 7000 cGy over eight to nine weeks were enrolled in the study. Patients catheterized during or within four weeks of pelvic radiation were excluded. Statistical analysis of frequencies, percentages and correlation coefficients was done by using SPSS version 17.0

**Results**

Urine culture was positive in 9 out of 54 patients (16.6%) with E. coli in all specimens (100%) and mixed growth of pseudomonas and E. coli in 4 out 9 (44.4%) cases. Six out of 9 (66.6%) cases were resistant to ciprofloxacin. Mean bladder volume irradiated was 127.17 cm.<sup>3</sup> No dose-volume or treatment time relationship for infectious cystitis was seen.

**Conclusions**

Infectious cystitis occurred in 16.6% of patients with early prostate cancer during conformal radiotherapy. No relationship was seen with dose, volume of bladder irradiated and treatment time. Weekly urine culture during radiotherapy can prevent serious sequelae. Resistance to ciprofloxacin raises a concern for inappropriate wide usage by general practitioners in Asian countries. (Rawal med J 2009;34: ).

**Keywords**

Prostate cancer, conformal radiotherapy, UTI, dose-volume relationship.

## **INTRODUCTION**

The pelvic radiotherapy is known to induce the epithelial damage of the bladder mucosa and increases the risk of both opportunistic and pathogenic infections. The true extent of urinary tract infections (UTI) is unclear, and the degree to which infections are reflected in symptoms is even less clear. Symptoms prior to radiotherapy, may add to risk of developing urinary problems during radiation. Previous studies suggest that up to 50% of men undergoing whole pelvis radiotherapy have urinary frequency and dysuria prior to radiotherapy.<sup>1</sup> If the symptoms are already severe then these can be further exacerbated by radiation damage.

As compared to men, women develop more UTI during pelvic radiotherapy, due to catheterization during brachytherapy and rectal or bladder involvement of tumor.<sup>2</sup> Different studies have shown radiotherapy tolerance of bladder is 45-50 Gy,<sup>3</sup> but many patients present with irritative symptoms much earlier than reaching at doses to bladder tolerance. Possible reasons could be individual patient radiobiology and infection. For the prevalence of UTI during prostate radiotherapy limited literature is available.<sup>4</sup> It is estimated that urinary tract infection rate is 14% during radiotherapy for men with localized prostate cancer.<sup>5</sup> Furthermore, 1-2% of men per week develop an infection during therapy. We conducted a prospective study in our department in patients with localized prostate cancer undergoing radical radiotherapy to evaluate the frequency of urinary tract infection in our population.

## **PATIENTS AND METHODS**

A total 54 patients with early stage prostate cancer were included in this study during November 2008 to March 2009 after taking a written consent. Patients who were catheterized at time of simulation or within 4 weeks of radiotherapy and those who had any instrumentation within 4 weeks of commencement of radiotherapy were excluded from the study

All patients were first simulated with full bladder and total dose planned was 70Gy over 8 or weeks. Weekly urine culture was performed on midstream urine samples (MSU) irrespective of symptoms for any bacterial growth and its sensitivity and resistance. Positive culture reports were matched with 3D treatment plan for any dose-bladder volume relationship and any specific treatment time. Patients with

positive urine culture were given treatment according to culture sensitivity. All descriptive data was analysed using SPSS version 17.0. The frequencies, percentages and correlation coefficients were calculated.

## **RESULTS**

A total 350 MSU samples from 54 patients were analysed during study period. UTI was detected in 16.6% patients (9/54) (Fig 1).

*E. coli* was seen in all specimens (100%), and mixed growth of *pseudomonas* and *E. coli* was seen in 4 out of 9 (44.4%) cases. Surprisingly 6 out of 9 (66.6%) cases were resistant to ciprofloxacin. Mean bladder volume irradiated was 127.17 cm.<sup>3</sup> No dose-volume relationship for infection was seen ( $r = 0$ ) (Fig 2).

No association with treatment time was seen.

## **DISCUSSION**

Radiation therapy is known to induce the breakdown of certain body defence factors. In patients with localized prostate cancer, high dose conformal pelvic radiotherapy increases risk of urinary tract infection. In women, UTI has been reported in 33.3% patients who underwent pelvic radiotherapy for cervical cancer.<sup>6</sup> Our study revealed comparatively lower (16.6%) UTI in men with prostate cancer. Possible reason may be the invasive brachytherapy and advanced stage with rectal and bladder invasion in cervical cancer.

E.coli was seen in all culture positive specimens (100%) followed by pseudomonas; both are well know pathogenic bacteria for urinary tract infection. But higher resistance to ciprofloxacin (66.6%) in our study was surprising. Possible causes may be widespread use of flouroquinolones by general practitioners in Pakistan. One study reported ciprofloxacin resistance (49%) to typhoid salmonellae.<sup>7</sup> We do believe that E. coli resistance in our country is much higher than reported from western world. Multidrug-resistant isolates, including third generation cephalosporin and quinolones, are very common.<sup>8</sup>

Mean bladder volume irradiated was 127.17 cm,<sup>3</sup> however, we could not see any dose volume relationship between bladder volume exposed to radiation and chance of urinary tract infection as different studies have reported a dose volume relationship of radiation induced cystitis.<sup>9</sup> Whether prophylactic use of antibiotics shall be considered? It remains controversial, but a study by Bessel et al proved no role of prophylactic use of antibiotics as these measures remained failed to prevent occurrence of urinary tract infections during pelvic radiotherapy.<sup>10</sup>

## **CONCLUSION**

Our study suggests that infectious cystitis occurs in significant number of patients independent of dose and volume of bladder irradiated. Weekly urine culture might help in early diagnosis and treatment. Ciprofloxacin resistance of E.coli in Pakistan warrants improving methods of checking drug resistance.

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