CASE REPORT

Post-renal acute renal failure during pelvis irradiation for prostate cancer

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DAVID M, SOUHAMI L, APRIKIAN A. Post-renal acute renal failure during pelvis irradiation for prostate cancer. The Canadian Journal of Urology. 2002;9(5):1599-1601.

A case of post renal acute renal failure secondary to radiation therapy for prostate cancer is described. Severe bladder inflammatory reaction, leading to bilateral ureteric obstruction, occurred after a moderate dose of radiotherapy (6400 cGy in 35 fractions). At a follow-up time of 8 years, the patient has fully recovered and remains disease-free. To our knowledge, this complication has never been described previously. Given the thrust in prostate cancer treatment toward dose escalation this complication could become more frequent.

Key Words: acute renal failure, prostate cancer, radiotherapy

Introduction

Prostate cancer is a frequent disease affecting one man out of ten in a lifetime.[1] Radiotherapy is a recognized treatment in all stages of disease.[2] Rectal and bladder mucosa inflammatory changes are acute side effects frequently seen from this treatment. They are usually mild and rarely the cause of life-threatening complications. We report a case of acute renal failure (ARF) due to severe inflammatory reaction in the bladder wall leading to bilateral ureteral obstruction in a patient undergoing external beam radiotherapy (EBRT) for prostate cancer.

Accepted for publication June 2002

Acknowlegement: Dr. Marc David was supported by an Astra-Zeneca fellowship.

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Case report

A 75-year-old male was first evaluated in June 1994 for an elevated PSA (25.8 ug/L). Past medical and surgical history were unremarkable except for Paget's disease slowly evolving for 9 years. He was not on any medication. He had no genito-urinary obstructive symptoms. Digital rectal exam (DRE) showed an enlarged prostate (5 cm X 4.5 cm) and he was clinically staged as T2b (AJCC 1997).

Trans-rectal ultrasound showed a prostatic volume of 65.8cm^3 with a left medial lobe protrusion at the bladder base. Random biopsies were positive for an adenocarcinoma with a Gleason score of 4/10. CT-scan of the pelvis and bone scan were negative. CBC, liver enzymes, electrolytes were normal. Pre-treatment serum creatinine was 99 umol/L (normal 65-120 umol/L).

Laparoscopic pelvic lymph node dissection was negative (0/8 lymph nodes).

He was treated on the Radiation Therapy Oncology Group (RTOG) 9202 protocol and received neo-adjuvant total androgen blockade (goserelin and flutamide) for 2 months before and during radiation. EBRT consisted of a dose of 4500 cGy to the whole pelvis given over 5 weeks (180 cGy per fraction) using a 4 field arrangement. This was followed by a field reduction (prostate volume) with conformal margins. A dose of 1900 cGy was given over 2 weeks (190 cGy per fraction) with a 3 field arrangement. For most of the duration of his irradiation he tolerated treatments well. Grade 2 genito-urinary toxicity (frequency, dysuria) was observed after the 3rd week of EBRT.

Towards the last 10 days of treatment, he developed intermittent lower abdominal pain. Physical examination was unrevealing. On the last day of EBRT, after 6400 cGy, he complained of a left lower quadrant (LLQ) sharp pain radiating across the abdomen and to the back. This was accompanied by nausea and vomiting on three occasions. He had normal bowel movements. Urinary symptoms remained unchanged (frequency, dysuria). Physical exam revealed a mild sensitivity at the LLQ. No mass was felt and no rebound tenderness or guarding was found.

In the following 24 hours, the pain became progressively worse, his general condition deteriorated and he was admitted to the hospital for further assessment. Urine analysis contained 4-8 red blood cells per field and cetone. Urine culture was negative. Creatinine was elevated at 215 umol/L. Plain abdominal X-ray did not show any signs of GI obstruction. Intravenous pyelography showed bilateral pyelocalicial stasis. Abdominal ultrasound confirmed bilateral hydronephrosis and showed increased bladder wall thickness and a prostate extension at the bladder base. A cystoscopy demonstrated a normal anterior and posterior urethra, a right lateral lobe indenting into the bladder and a very edematous and severely inflamed trigone; ureteral orifices could not be visualized.

The patient underwent bilateral nephrostomy tube placement. He improved slowly and his creatinine stabilized around 140 umol/L. The nephrostomy tube was removed and he was discharged from hospital 50 days after admission.

At eight years post treatment, he is clinically and biochemically (PSA = 0.14 ng/L) free of disease. Creatinine is stable at 140 umol/L and the latest CT-scan shows no residual hydronephrosis. Follow-up cystoscopies have shown signs of mild radiation cystitis and negative urine cytology.

Discussion

Post-renal acute renal failure account for 10% of all ARF. [3] It may be caused by benign or malignant diseases and can lead to irreversible damage to the kidneys. ARF during EBRT is uncommon and is usually related to pre-existing benign conditions such as obstructive benign prostatic hypertrophy (BPH). Urethral obstruction has been reported as a cause of post-EBRT ARF and results from prostatic swelling during EBRT in patient with BPH. To our knowledge, ureteral obstruction causing ARF secondary to bladder inflammatory reaction due to EBRT has never been reported in the literature.

EBRT fields for the treatment of prostate cancer include part of the bladder. A triad of symptoms characterizes bladder inflammation in response to EBRT: dysuria, frequency and mild lower abdominal pain. They are usually mild and controlled by hydration and anti-inflammatory medication.[4] The severity of the inflammatory reaction correlates with a large irradiated bladder volume, a high dose per fraction and a high total dose. The dose per fraction used here was 180 cGy in the first plan and 190 cGy in the second and cannot be accounted for the unusual inflammatory reaction observed. In fact, in most centers, a daily dose of 200 cGy per fraction is routinely given in the treatment of patient with prostate cancer. The two other possible contributing factors (bladder volume and total dose) were not extraordinary and followed RTOG protocol guidelines.

The unexpected deterioration of his general condition, associated with severe abdominal pain and vomiting precipitated his hospitalization for further investigation. During his admission, other possible causes of post-renal ARF were ruled out. Cystoscopic assessment revealed a severely inflamed bladder mucosa at the trigone level and confirmed the prostatic medial lobe enlargement previously seen on the CT scan images.

The reason for this unusual and unexpected bladder mucosa reaction is unclear. The patient tolerated his treatment reasonably well, otherwise, and presented no bowel or other acute complications, which could have suggested an increased tissue sensitivity to EBRT. Two possible factors that may have played a role in the development of this complication include prostate manipulation prior to EBRT (prostate biopsy 2 weeks before EBRT as per protocol requirements) and a prominent prostate medial lobe adjacent to the ureteral orifices. These elements, together, might have triggered a severe

inflammatory process of the bladder mucosa, leading to the bilateral ureteral obstruction. After 8 years of follow-up, he has no sign of chronic bladder toxicity despite the severity of the acute complication. This is not totally surprising as the severity of the acute toxicity is not predictive of late complication.

Post-renal ARF induced by EBRT is a diagnosis of exclusion. Symptoms are non-specific. However patients undergoing EBRT who present unusual and severe symptoms should be investigated for ARF and prompt treatment can be started to limit functional damage. To our knowledge this is the first reported case of ARF due to bladder mucosa inflammation induced by EBRT. With the current trend of dose escalation in EBRT protocols, this acute complication could become more frequent. □

References

1. National Cancer Institute of Canada. Canadian Statistics on Cancer 2000.
2. Perez C, Brady L. Prostate. Principles and practice of radiation oncology, Lippincott-Raven. Philadelphia. Third edition. 1998. p.1605.
3. Harrisson TR et al. Principles of internal medicine. McGraw-Hill. 14th edition. 1998. p.1505.
4. Perez C, Brady L. Prostate. Principles and practice of radiation oncology, Lippincott-Raven. Philadelphia. Third edition. 1998. p.1662.