Case Report

Local hyperthermia case study

Leila Khalafi[1], Hosein Foudazi[2], Seied Rabi-Mahdavi[1]*

[1] Department of Medical Physics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
[2] Omid Tehran Radiation Oncology Clinics, Tehran, Iran

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Abstract

Background: Prostate cancer is the second most common reason of death in men. Multidisciplinary therapy is the best treatment option, although, there is no common consent on optimal therapy for advanced prostate cancer. **Case Presentation:** The present study reports a case of 75 year-old man who had a huge heterogeneous soft tissue mass lesion with non-homogeneous enhancement consisted low attenuated foci occupying pelvis cavity and lower abdomen with loss of mesenteric fat and invasion to posterior bladder wall due to T4N1Mx prostate cancer. The patient was treated with adjuvant radiotherapy (RT) plus local hyperthermia (HT). **Conclusion:** This report shows the potential capability of HT application during RT. Radiotherapy with hyperthermia combination revealed a dramatic response in this case and after treatment it left the patient asymptomatic.

Keywords: radiotherapy, hyperthermia, prostate cancer

***Corresponding Author:** Seied Rabi Mahdavi, Department of Medical Physics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran. E-mail: srmahdavi@hotmail.com, Tell: (+98)-912 1373327

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Introduction

Prostate cancer is the most commonly identified malignant disease in men and microscopic prostate cancer will develop during their lifetime about 30% (1). In patients with advanced and unresected prostate cancer, combination therapy is the best option for increasing life expectancy (2). A number of studies have shown that the simultaneous use of hyperthermia (HT) and radiotherapy (RT) is more effective in patients with huge mass prostate (3). However, there are few studies on radiotherapy combination with hyperthermia in patients with locally advanced and unresected prostate gland. To our best knowledge, the present study is the first report of the use of these two modalities combination for the treatment of locally advanced prostate cancer in Iran.

Case Presentation

Patient presentation

A 75-year old man presented with a huge heterogeneous soft tissue mass of prostate cancer (T4N1Mx) in lower abdomino-pelvic area with loss of mesenteric fat and invasion to posterior bladder wall. Upon examination, the patient had a palpable abdominal mass that was the same size as the small ball. The CT scan imaging revealed a large heterogenous hyperintense mass originated from the prostate cancer (Fig. 1). In regard to the persistent symptoms, conservative treatment was chosen for this case. Symptoms in examination were: edema, large prostate, pelvic visceral invasion, urinary retention and pressure on the distal ends of the ureters. Patient treatment was continued for 33 days.

Radiotherapy

Prior to radiotherapy, CT images were obtained for treatment planning and it revealed stable disease according to the response evaluation criteria in solid tumors. RT was routinely prescribed as a first treatment choice for this case. The patient received a three dimensional planned four-field box technique (15 MV photon beam Siemens linear accelerator) with external radiation fields to the pelvic at a dose of 4500 cGy for 25 fractions of 180 cGy. The clinical target volume (CTV) was defined as the persistent mass with an enough safe margin around it. RT was performed at the Omid Tehran Radiotherapy Oncology Clinics and continued over the treatment course. No chemotherapy was considered for this case and patient was under routine examinations during treatment.

Hyperthermia treatment

After evaluation of the CT images and careful clinical examination by the radiation oncologist, the criteria were checked for HT. Informed consent was obtained from the patient for hyperthermia procedure. Hyperthermia electrodes were positioned over the target volume according to the radiation treatment field marked on the patient skin. Hyperthermia regime is normally selected for two sessions per week over the whole radiotherapy course. There is an expert investigated HT protocol and evidences nearly for each part of the body and each session that we also used them for the present study. HT regime for this case was 2 sessions per week for 60 minutes in each session and overall 10 sessions were administered to his lower abdomen and pelvic area as it is demonstrated in the Fig 2. The time gap between HT and RT was at least one hour either pre-RT or Post-RT. We used loco regional electric HT system (Celsius 42+ Co., Germany) that is operating at frequency of 13.56 MHZ. Machine has two sets of, namely, arm and bed electrodes. Heating is performed sequentially in each session and then for different sequence, energy parameters should be determined including electrode size, position, power (watt), time (minutes) and energy (Kilojoules). After patient set up and selecting the energy parameters, HT procedure is started under direct control of the operator. For this palliative case HT was added to the conventional RT regime.

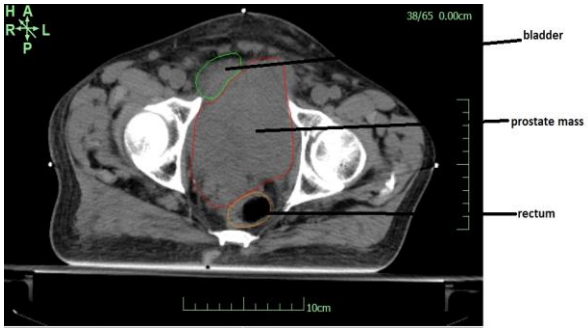

Fig. 1. CT scan of prostate cancer before treatment shows multi focal mass in the pelvic. The large tumor mass in the pelvic pushed the urinary bladder and rectum to the antero-lateral and Postero-lateral directions, respectively. Scale at the left side of the image reveals the size of the mass.

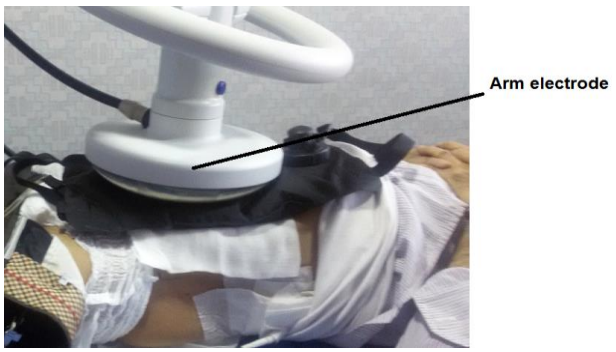

Fig. 2. Patient position during treatment with hyperthermia system. Arm electrode with 25 cm diameter (arrow) and bed electrode (not shown) are placed on the anterior and posterior surfaces, respectively.

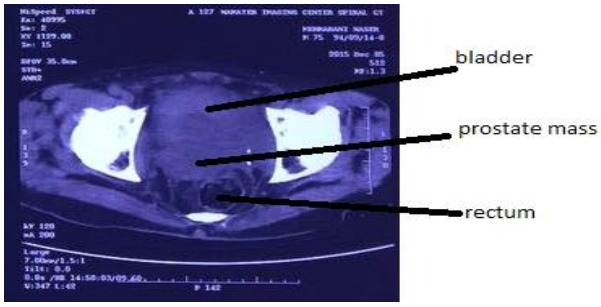

Fig. 3. In the repeated CT image revealed the changes in tumor size and anatomic information. Antero-posterior diameter was dramatically decreased and pressure was removed from lympho-vascular drainage system as well as on the ureters.

Discussion

In first examination, patient manifested with

multiple symptoms and complication secondary to the large pelvic mass originated from prostate carcinoma. After termination of treatment period (including both RT and HT) patient was examined by the physician and control imaging was obtained with same protocol to the pre-treatment CT scan for evaluating response to treatment and measuring the changes in the tumor size.

Dramatic response was observed following 25 fractions RT combined with 10 sessions local HT. Two weeks after treatment termination, lower extremity lymphedema almost completely disappeared, pelvic pain was significantly reduced and urinary retention was also significantly better. The antero-posterior diameter of the mass was reduced to less than 1/3 of its initial size (tumor volumes were 633 and 138 cc before and after RT+HT, respectively). Bladder and rectum were displaced to their normal anatomic sites and all symptoms secondary to the pelvic mass were significantly reduced (Fig. 3).

External HT is a noninvasive modality for delivering heat to the interested part of the body. Based on the patient's tumor histopathology, local HT can be prescribed to the RT area as a complementary medicine. According to improved previous studies, hyperthermia can positively change the quality of life, biochemical recurrence and overall survival (4).

Researchers who have used HT with RT agree that it does not increase complication which may be induced by RT alone (5). In patients with advanced prostate cancer, hyperthermia with radiotherapy may be safe and useful (6). Combination of radiotherapy and hyperthermia was practicable and effective for this case of advanced prostate adenocarcinoma in comparison to the previous RT alone cases. However, for prostate cancer, it has been revealed that the patients eligible for hyperthermia in combination with radiotherapy are those who are androgen resistant and hormone refractory, or have received a high dose of radiotherapy, or there is a possibility to develop radiotoxicity to vital organs such as the rectum. In fact, all authors who have HT experience in association with radiotherapy confirm that HT does not impose any complication more than single radiotherapy method (5).

To our best knowledge this is the first local regional prostate cancer hyperthermia case study in Iran which finds out a promising future in the treatment of not only the hormone refractory prostate cancers but also other types of malignancies.

Conflicts of Interest

The authors declare that there is no conflict of interest.

Acknowledgment

None

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