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Second malignancy after radiotherapy for seminoma

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A patient who developed a malignant peripheral nerve sheath tumor in the field of radiation 19 years after radiotherapy for stage I seminoma is presented. Data from recent population-based studies evaluating the risk of second malignancies in this group of patients is discussed. This case report illustrates the need for judicious evaluation of adjuvant radiotherapy in early stage seminoma patients.

Key words: seminoma-radiotherapy; radiotherapy-adverse effect; neoplasms, second primary; nerve sheath tumor; soft tissue sarcoma

Introduction

The role of adjuvant radiotherapy for stage I seminoma is controversial. Although the relapse free survival is greater than 95% with adjuvant therapy, there is no benefit in overall survival since patients who relapse are salvaged with treatment. Additional issues include the frequency of follow-up studies, maintenance of fertility, and the risk of radiation induced second malignancies. We report a patient who developed a malignant sarcoma in the radiation field 19 years following adjuvant radiotherapy for seminoma.

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Case report

A 45-year old man presented 19 years after left orchiectomy and radiotherapy for a stage I seminoma with severe pelvic pain and a dense left sciatic nerve palsy. Computer tomography (CT) showed a 8.5 cm enhancing heterogeneous mass extending to the superior aspect of the sacrum (Figure 1). An ultrasound-guided biopsy revealed a high grade malignant peripheral nerve sheath tumor. Staging chest and abdominal CT showed no additional lesions. The patient received 3000 cGy of external beam radiation. The original simulation films show the radiation fields (Figure 2), which includes the paraaortic, left iliac and pelvic region. Given this previous radiation treatment, it was now felt that neoadjuvant radiotherapy was not indicated. A curative surgical resection was attempted which included a modified left internal

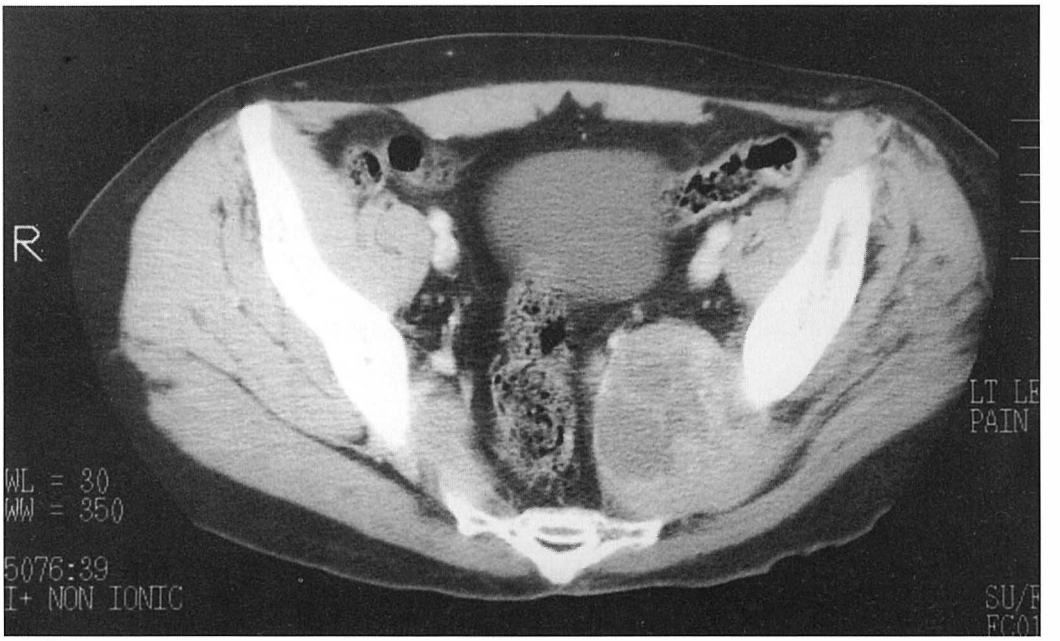

Figure 1. CT of the pelvis demonstrating a left pelvic mass. Tissue biopsy revealed a malignant peripheral nerve sheath tumor.

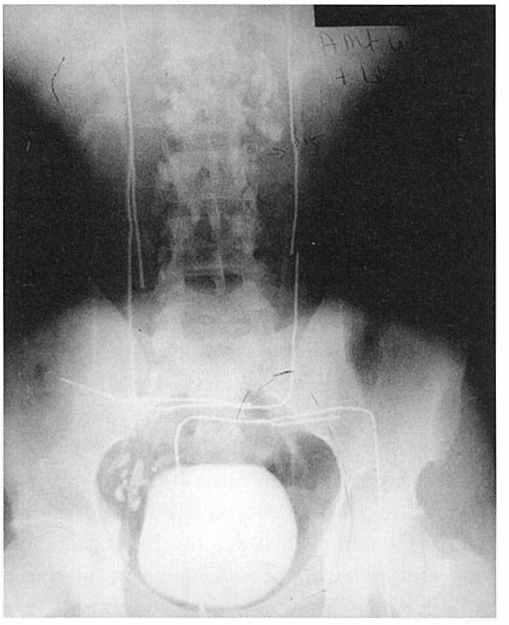

Figure 2. Original radiation ports for adjuvant radiotherapy. The soft tissue sarcoma occurred in the left pelvis within the radiation field.

hemipelvectomy with sacrifice of the sciatic nerve. Intraoperative margin assessment was negative for tumor, however, final pathology revealed a positive microscopic margin. The patient refused adjuvant radiation secondary to the risks of bladder and bowel toxicity. Ten weeks postoperatively the patient developed lung metastases. Treatment with Adriamycin was initiated.

Discussion

Iatrogenic carcinogenesis due to ionizing radiation is a well established observation. The probability of secondary malignancies increases with the dose. A threshold is not known, however, and doses as low as 1000 cGy have been associated with secondary malignancies.[1]

While radiation therapy is an integral part of the primary treatment for many cancers,

its role in stage I testicular seminoma remains controversial. Surveillance after orchiectomy may be a safe alternative to adjuvant radiotherapy, if one is prepared to accept a 15 to 20% recurrence rate. If all patients receive adjuvant radiotherapy, recurrences can be reduced to 2 to 4% which can be treated with systemic chemotherapy.[2] If one elects surveillance, 85% of patients are cured. The remaining 15% of patient will relapse and undergo retroperitoneal irradiation only (10%), chemotherapy only (3%), or combined chemoradiation (2%).[2] Therefore, with surveillance alone 1 to 2% more patients will require chemotherapy but the majority of patients will be spared radiotherapy. Young patients wishing to remain fertile may elect surveillance, whereas patients anxious about the higher relapse rate may opt for adjuvant radiotherapy.

The issue of radiation-induced malignancies in seminoma patients remains controversial.[3] While cases such as the one presented here support the entity of postirradiation malignancies in seminoma patients, population based studies have resulted in conflicting reports on the risk for cancer following adjuvant radiotherapy.[4,5] Whereas studies have found no evidence of an increased risk for second malignancies after adjuvant radiotherapy for seminoma, others have estimated the risk for postirradiation sarcoma in this group of patients at 0.003% to 0.8%.[1] The largest population based study on this subject has recently been published by the National Cancer Institute. It has documented a significantly elevated risk of second malignancies in seminoma patients treated with radiotherapy.[6] The cumulative risk of second malignancies at 25 years was 18.2 % for men with seminoma compared with 9.3 % in the general population.[6] The expected occurrence of connective tissue tumors in this group of patients was approximately 4 times higher in seminoma patients 20 years after initial treatment. The risk remained elevated throughout the follow-up period.[6] The median latency to tumor development was approximately 10 to 15 years.

Differences in treatment modalities, stage distribution, and surveillance for early stage seminoma patients weaken the conclusions of most studies examining radiation carcinogenesis. Unfortunately, the prognosis for patients who develop postirradiation sarcomas is poor, particularly for those located in the pelvis, with a 5 year survival rate of less than 10%.[1]

In conclusion, this case illustrates the need for the careful evaluation of risks and benefits of adjuvant radiotherapy in early stage seminoma patients.

References

1. Mark RJ, Poen J, Tran LM, Yao SF, Selch MT, Parker RG. Postirradiation sarcoma. A single-institution study and review of the literature. *Cancer* 1994; **73:** 2653-62.

2. Thomas GM and Williams SD. *Principles and practice of radiation oncology.* 3rd Edition. Philadelphia: Lippincott-Raven Publishers; 1997. p. 1695-715.

3. Warde PR, Gospodarowicz MK, Panzarella T. Stage I testicular seminoma: Results of adjuvant irradiation and surveillance. *J Clin Oncol* 1995; **13:** 2255-62.

4. Chao C, Lai P, Michalski J, Perez C. Second malignancy among seminoma patients treated with adjuvant radiation therapy. *Int J Radiat Oncol Biol Phys* 199; **33:** 831-5.

5. Van Leeuven FE, Stiggelbout AM, Van den Belt-Dusebout AW, Noyon R, Eliel MR, van Kerkhoff EA, et al. Second cancer risk following testicular cancer: A follow-up study of 1.909 patients. *J Clin Oncol* 1993; **11:** 415-24.

6. Travis LB, Rochelle E, Storm H, Hall P, Holowaty E, Van Leeuwen FE, et al. Risk of second malignant neoplasms among long-term survivors of testicular cancer. *JNCI* 1997: **89:** 1429-39.