

Original article

Excellent long-term disease control with modern radiotherapy techniques for stage I testicular seminoma—The Mayo Clinic experience

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Abstract

Objectives: The objectives of this study are to examine the long-term efficacy and adverse effects of adjuvant radiotherapy (RT) for stage I testicular seminoma.

Methods and materials: A retrospective review was conducted in 199 patients with stage I testicular seminoma treated with curative intent orchiectomy and adjuvant megavoltage RT at the institution from January 1, 1972 through December 31, 2009. Computed tomography staging was performed for 90% of the patients. No patient received mediastinal RT or adjuvant chemotherapy. Overall survival (OS), cause-specific survival, relapse rate, major cardiac event (MCE), and second malignancy (SM) were estimated using the Kaplan-Meier method.

Results: The median age of the patients was 36 years (range: 18–80). The nodal regions irradiated were the para-aortic and ipsilateral pelvic nodes in 147 patients (74%), the para-aortic nodes alone in 34 (17%), and the para-aortic and bilateral pelvic nodes in 18 (9%). The median RT dose was 25.5 Gy (interquartile range: 25–30). The median follow-up after RT was 13 years (range: 0.1–37). OS at 10 and 20 years was 92% and 77%, respectively. Cause-specific survival at 10 and 20 years was both 99%. Risk of relapse at 10 and 20 years was 1% and 2%, respectively. Risks of MCE and SM at 20 years were 12% and 19%, respectively.

Conclusions: This series confirms an excellent outcome in patients with stage I testicular seminoma treated with RT. Relapse after adjuvant RT is very uncommon, but late morbidity associated with RT may occur. © 2014 Elsevier Inc. All rights reserved.

Keywords: Seminoma; Testicular neoplasms; Radiotherapy

1. Introduction

For stage I testicular seminoma, management options following a radical inguinal orchiectomy include adjuvant radiotherapy (RT) to the para-aortic +/- ipsilateral pelvic nodes, adjuvant chemotherapy, and surveillance. Historically, adjuvant RT has been the standard approach with excellent long-term results [1–10]. Adjuvant chemotherapy has recently emerged as an alternative, although a longer follow-up is required to ensure that long-term relapse rates and toxicities are acceptable in comparison with RT [10].

In spite of excellent outcomes with either RT or chemotherapy, major concerns have been raised with regard to the potential late treatment-related morbidity, such as a secondary malignancy and increased risk of cardiovascular disease [11,12]. As a result, there has been an increasing shift toward surveillance alone with the reservation of RT or chemotherapy for relapse [13].

RT has remained an efficacious therapeutic option when a surveillance strategy is difficult to apply for various reasons or there is reluctance in adopting chemotherapy as an alternative due to the lack of its long-term outcomes data. In the RT setting, most series reported a cause-specific survival (CSS) of 99% at 10 years and relapse rates of 1% to 5% [1–10]. Relapses following RT are almost always found outside the treatment field and usually occur in the

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supradiaphragmatic sites, such as the mediastinal nodes, lungs, or supraclavicular nodes [7,14].

The aim of this report is to provide additional data regarding the long-term efficacy of adjuvant RT for stage I testicular seminoma, including survival results and relapse patterns. In addition, some of the long-term late RT toxicities, including the risk of a major cardiac event (MCE), gastrointestinal toxicity, and second malignancy (SM), are examined.

2. Patients and methods

2.1. Patient selection

The Department of Radiation Oncology database was searched for all patients receiving RT for clinical stage I testicular seminoma at the institution between January 1, 1972, and December 31, 2009. A total of 213 patients were identified. Of these, 14 patients were excluded from the analysis as they had no clinical follow-up after the completion of RT. The conduction of this retrospective review was approved by the Institutional Review Board.

2.2. Staging and treatment

Routine preoperative staging consisted of testicular ultrasound and serum measurement of beta-human chorionic gonadotropin and alpha fetoprotein. Radical inguinal orchiectomy was performed either at the institution or elsewhere. In all patients, the diagnosis of pure seminoma was confirmed at the institution by histologic review. Postoperative staging consisted of bipedal lymphangiography and/or computed tomography (CT) of the abdomen and pelvis and radiographs of the chest. CT staging was performed in all patients diagnosed after 1979. Megavoltage external beam RT was delivered to the para-aortic lymph nodes +/- pelvic lymph nodes with anterior-posterior and posterior-anterior fields. Patients who underwent transscrotal biopsy prior to orchiectomy also typically received RT to the ipsilateral hemiscrotum. RT fields and doses evolved over the study period with larger fields (para-aortic plus ipsilateral or bilateral pelvis) and higher doses (30 Gy) used earlier in the study period and smaller fields (para-aortic alone or para-aortic plus ipsilateral pelvis) and lower doses (≤ 25.5 Gy) used later in the study period.

Follow-up typically consisted of clinical, laboratory, and radiographic evaluation every 3 to 6 months for 1 to 2 years, every 6 months for 3 to 5 years, and then yearly thereafter. In patients with suspected recurrent disease, histologic confirmation was obtained prior to salvage treatment.

2.3. End points

Overall survival (OS) was determined from the date of RT completion to the last available clinical follow-up. CSS was defined as freedom from death secondary to testicular

seminoma, due to either progressive metastatic disease, seminoma-related paraneoplastic syndrome, or acute complications associated with the treatment. MCE was defined as an acute myocardial infarction; coronary artery bypass graft, angioplasty, or stent placement; chronic systolic heart failure; or valve replacement. SM was defined as any biopsy-confirmed malignancy, regardless of relation to the RT field. Peptic ulcer disease (PUD) was defined as the endoscopically confirmed ulceration of the stomach or duodenum with negative biopsy for underlying malignancy. Small-bowel obstruction (SBO) was determined by clinical or surgical diagnosis.

2.4. Data analysis

The Kaplan-Meier (KM) estimates were determined from the date of RT completion. Predictors of relapse were not analyzed due to a very small number of observed relapses. Statistical analyses were performed using JMP version 9.0 (SAS Institute Inc, Cary, NC).

3. Results

3.1. Patient and treatment characteristics

Major patient and treatment characteristics are detailed in Table 1. Patient race was Caucasian in 98%. Cryptorchidism history was reported in 8 patients (4%). A history of prior surgery in the ipsilateral inguinal region was reported in 23 patients (12%). A transscrotal biopsy prior to

Table 1
Patient and treatment characteristics

Characteristics	Value	%
Age		
Median	36	
Range	18–80	
CT staging		
Yes	179	90
No	20	10
Bipedal lymphangiography		
Yes	89	45
No	110	55
RT field		
PA + bilateral pelvic	18	9
PA + ipsilateral pelvic	147	74
PA only	34	17
RT dose, Gy		
Median	25.5	
Interquartile range	25–30	
Number of RT fractions		
Median	17	
Interquartile range	17–20	

Gy = Gray; PA = para-aortic.

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