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Assessment of Changes in Tumor Volume Following Chemotherapy For Nodular Sclerosing Hodgkin Lymphoma (NSHL)

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Abstract

Objective: Hodgkin lymphoma is a critical malignancy which may be seen during childhood and adolescence. Since it may be observed in younger patients, treatment strategies should be considered thoroughly to achieve optimal results in terms of local control and treatment related adverse effects. Systemic therapy plays a critical role in treatment of Hodgkin lymphoma. In this study, we evaluated changes in tumor volume following chemotherapy for nodular sclerosing Hodgkin lymphoma (NSHL).

Materials and Methods: Main goal of this study has been to evaluate changes in tumor volume following chemotherapy for NSHL. For the aim of this study, patients with NSHL having available imaging data as part of initial workup have been selected. All included patients received chemotherapy and afterwards were referred for RT at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences. We have carried out a comparative analysis for tumor volumes at diagnostic CT scan of the patients and at CT-simulation for radiation treatment planning after chemotherapy. CTsimulations of the patients were done at CT-simulator (GE Lightspeed RT, GE Healthcare, Chalfont St. Giles, UK) available at our tertiary cancer center. Changes in tumor volume after chemotherapy have been documented for comparative assessment of data.

Results: All patients have been irradiated by using state of the art RT techniques at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences. As the primary outcome of our study, we have found a mean decrease of 41% in tumor size after chemotherapy for patients with NSHL.

Conclusion: Our results may have implications for utilization of adaptive RT strategies, however, further studies are needed to shed light on this critical issue.

Keywords: Hodgkin lymphoma; Radiation therapy (RT); Chemotherapy

Introduction

Hodgkin lymphoma is a critical malignancy which may be seen during childhood and adolescence [1-7]. Since it may be observed in younger patients, treatment strategies should be considered thoroughly to achieve optimal results in terms of local control and treatment related adverse effects. Radiation therapy (RT) and systemic agents may be utilized for optimal management of Hodgkin lymphoma. Several forms of irradiation may be used, and sophisticated strategies such as intensity modulation and adaptive RT techniques may offer optimal radiotherapeutic management. Adverse effects of irradiation must be considered to maintain patients' quality of life. Many major advances have occurred in technology in the millenium era which obviously contributed to improved outcomes with RT. Molecular imaging methods, automatic segmentation techniques, Image Guided RT (IGRT), Intensity Modulated RT (IMRT), stereotactic RT, and adaptive RT (ART) were introduced for optimal RT [8-49]. As a matter of fact, best therapeutic results could be obtained by close collaboration among related disciplines for cancer management. Tumor boards may contribute to bringing together radiation oncologists, medical oncologists, imaging and other relevant specialists to discuss about patient, tumor, and treatment characteristics to design the treatment strategy for optimal and individualized patient management. Systemic therapy plays a

critical role in treatment of Hodgkin lymphoma. In this study, we evaluated changes in tumor volume following chemotherapy for nodular sclerosing Hodgkin lymphoma (NSHL).

Materials and Methods

At Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences, we are treating a huge patient population from several places from Turkey and abroad. In this context, many benign and malignant tumors have been irradiated at our tertiary cancer center for decades. Main goal of this study has been to evaluate changes in tumor volume following chemotherapy for NSHL. For the aim of this study, patients with NSHL having available imaging data as part of initial workup have been selected. All included patients received chemotherapy and afterwards were referred for RT at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences. We have carried out a comparative analysis for tumor volumes at diagnostic CT scan of the patients and at CT-simulation for radiation treatment planning after chemotherapy. CTsimulations of the patients were done at CT-simulator (GE Lightspeed RT, GE Healthcare, Chalfont St. Giles, UK) available at our tertiary cancer center. Changes in tumor volume after chemotherapy has been documented for comparative assessment of data.

Linear Accelerator (LINAC) furnished with contemporary IGRT techniques has been utilized for RT. Following robust patient immobilization, planning CT images were obtained at CT simulator for radiation treatment planning. Later on, acquired RT planning images have been sent to the contouring workstation via the network. Treatment volumes and normal tissues were defined on these images and structure sets have been generated. All patients have been treated by using state of the art RT techniques at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences.

Results

This original research article was designed in an attempt to evaluate changes in tumor volume following chemotherapy for NSHL. Irradiation has been performed out at our Radiation Oncology Department of Gulhane Medical Faculty at University of Health Sciences, Ankara. Prior to treatment, all included patients have been individually evaluated by a multidisciplinary team of experts from medical oncology and radiation oncology disciplines. Patients with NSHL having available imaging data as part of initial workup have been included. Selected patients received chemotherapy and later were referred for RT at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences. We executed a comparative analysis for tumor volumes at diagnostic CT scan of the patients and at CT-simulation for radiation treatment planning after chemotherapy. CTsimulations of the patients were done at CT-simulator (GE Lightspeed RT, GE Healthcare, Chalfont St. Giles, UK) available at our institution. Changes in tumor volume after chemotherapy were documented for comparative analysis. As the primary outcome of our study, we have found a mean decrease of 41% in tumor size after chemotherapy for patients with NSHL.

Optimized RT planning procedure included consideration of lesion sizes, localization and association with surrounding critical structures. Radiation physicists were involved in RT planning procedure with consideration of reports by American Association of Physicists in Medicine (AAPM) and International Commission on Radiation Units and Measurements (ICRU). Precise RT planning process included consideration of electron density, tissue heterogeneity, CT number and HU values in CT images. Primary goal of RT planning has been to achieve optimal encompassing of treatment volumes along with minimized exposure of surrounding normal tissues. All patients have been irradiated by using state of the art RT techniques at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences.

Discussion

Hodgkin lymphoma is an important malignancy which may be observed during childhood and adolescence [1-7]. Since it may be observed in younger patients, treatment strategies must be considered thoroughly to achieve optimal results in terms of local control and treatment related adverse effects. RT and systemic agents might be used for optimal management of Hodgkin lymphoma. Several forms of irradiation could be utilized, and contemporary strategies such as intensity modulation and adaptive RT techniques may offer optimal radiotherapeutic management. Adverse effects of irradiation should be considered to maintain patients' quality of life. Major advances have occurred in technology in the millenium era which obviously contributed to improved outcomes with RT. Molecular imaging methods, automatic segmentation techniques, IGRT, IMRT, stereotactic RT, and ART were introduced for optimal RT [8-49]. As a matter of fact, best therapeutic results could be obtained by close collaboration among related disciplines for cancer management. Tumor boards may contribute to bringing together radiation oncologists, medical oncologists, imaging and other relevant specialists to discuss about patient, tumor, and treatment characteristics to design the treatment strategy for optimal and individualized patient management.

Systemic therapy plays a critical role in treatment of Hodgkin lymphoma. In this study, we evaluated changes in tumor volume following chemotherapy for nodular sclerosing Hodgkin lymphoma (NSHL). For the aim of this study, patients with NSHL having available imaging data as part of initial workup have been selected. All included patients received chemotherapy and afterwards were referred for RT at Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences. We have carried

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Conflict of Interest & Acknowledgement

There are no conflicts of interest and no acknowledgements.

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