



Positron Emission Computerized Axial Tomography in Treatment Planning Radiant of Mediastinal Relapsed Hodgkin Lymphoma

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Abstract

Introduction: Hodgkin's lymphoma is a lymphoproliferative process characterized by a polymorphous infiltrate containing Reed-Sternberg cells and various accessory populations. The treatment is high-efficiency chemotherapy. Some patients may need radiation therapy or, if the lymphoma recurs after primary treatment, high-dose chemoradiation therapy and autologous hematopoietic stem cell transplantation.

Objective: To demonstrate how the use of positron emission computed tomography (PET-CT) influenced the radiation treatment planning process in a patient diagnosed with mediastinal relapsed Hodgkin lymphoma.

Case presentation: A 24-year-old female patient diagnosed since February 2017 with Hodgkin's lymphoma, nodular sclerosis variety with extranodal extension. He was treated with polychemotherapy and achieved a total response. In January 2020, the presence of a mediastinal relapse of the disease was detected. The use of PET-CT allowed for better planning of ionizing radiation therapy. The process of delineating the volume to be treated, was carried out with greater accuracy, protecting vital organs of this region.

Conclusions: The use of PET-CT in the design of radiant treatment, allows more precise therapeutic plans achieving favorable objective responses in patients with mediastinal relapse of Hodgkin lymphoma. Its use reduces the volume to be irradiated and precisely delimits the risk organs to be protected during radiation therapy, achieving a response greater than 90% in combination with chemotherapy. These results increase the survival of our patients.

Keywords: Hodgkin's Lymphoma; Radiotherapy; Chemotherapy; Positron Emission Computed Tomography

Introduction

The English physician, Thomas Hodgkin, described in 1832 a disease consisting of a malignant proliferation of the lymph nodes, extranodal lymphoid tissue, or both, which evolves with an adenoplastic-febrile syndrome of generally fatal evolution. The disease is also known as malignant lymphogranuloma [1]. Hodgkin's disease

occurs predominantly in young adults aged 20 to 39 years and although seen in children, it is rare before the age of 15, surpassed by leukemias and tumors of the central nervous system. It occurs in all races, but seems to be more common in the white race, and males are twice as affected as females [1-3].

Hodgkin’s disease (Hodgkin’s lymphoma) is a type of lymphoma, a cancer that originates in the lymphocytes of the immune system. Because lymphatic tissue is found in many parts of the body, Hodgkin’s disease can start in almost every part of the body. Most often, it originates in the lymph nodes in the upper body. The most frequent locations are the chest, neck or under the arms.

The different types of Hodgkin’s disease are classified according to appearance under a microscope. Classification is important because types of Hodgkin’s disease can grow and spread differently and can be treated differently [3,4].

The two main types are:

- Classic Hodgkin’s disease (which has several subtypes)
- Nodular lymphocyte-predominant Hodgkin’s disease.

Its treatment has evolved progressively, cytostatics and new irradiation techniques have been incorporated. The current prognosis according to the reports published in the literature shows more than 90% survival, usually obtained with the combination of polychemotherapy and ionizing radiation [3-7].

The objective of this study is to present a case diagnosed with Hodgkin’s lymphoma with mediastinal relapse that, through the use of image fusion, detailed planning of radiant treatment was carried out and a complete clinical response was achieved.

Case Presentation

A 24-year-old female patient with a health history who in February 2017 began to present multiple nodular lesions at the level of the left supraclavicular fossa and axillary region on the same side that corresponded to adenomegaly. Supraclavicular node exceresis and biopsy (B17-875) were performed, reporting the diagnosis of Hodgkin’s lymphoma, nodular sclerosis variety with extranodal extension, classified in stage II, according to the modified Ann-Arbor Classification (Cotswolds, 1988). Treatment was decided with ABVD chemotherapy (Adriamycin/Bleomycin/Vinblastine/Dacarbazine) from which he received 6 cycles. He presented a very discreet partial response, so he received multiple cytotoxic treatment regimens until April 2019, where a complete response is achieved.

The patient remains asymptomatic until January 2020, when she begins with shortness of breath, so she is studied and the presence of multiple clusters of lymphadenopathy at the mediastinal level is detected (Figure 1).

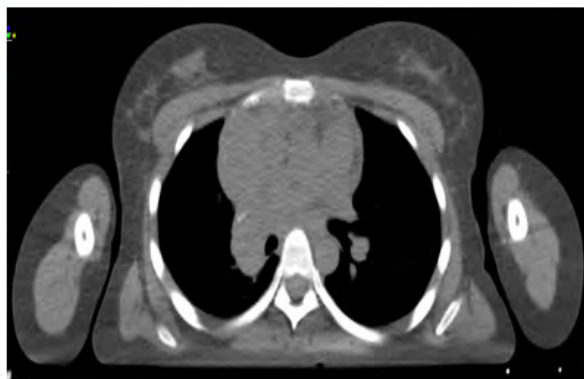


Figure 1: Ganglion conglomerate at the mediastinal level.

Treatment with chemotherapy ICE scheme (Ifosfamide/ Carboplatin/Etoposide) was started, without achieving an objective response. It is decided to treat with radiotherapy over mediastinum to reduce tumor volume.

Given the presence of vital organs in the irradiation field, positron emission computed tomography (PET-CT) is performed to define the volume to be irradiated (Thick tumor volume/GTV) and protect the target organs (Figure 2).

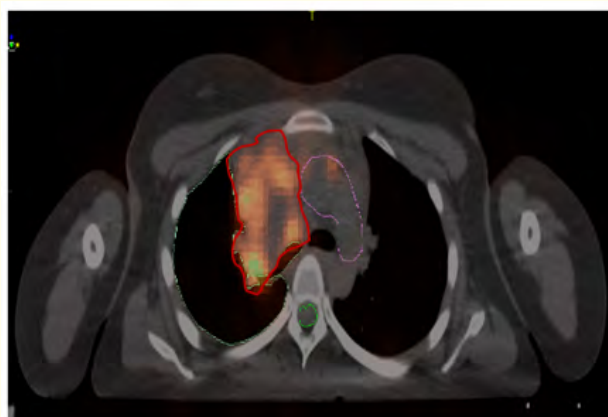


Figure 2: Volume delineation in PET-CT/ TA images.

Defined thick tumor volume

Treatment with linear accelerator radiation is planned: Dosis tumor total (DTT): 30 Gy. Daily Tumor Dose (DTD) 2 Gy Fractionation: 15 days

The patient presented a satisfactory evolution with a partial response of 90%, so it was discussed in the tumor committee and it was decided to complete treatment with chemotherapy, Ch/PPV scheme (Chlorambucil/Vinblastine/Procarbazine/Prednisona) to seek a complete response.

Discussion

Currently, Hodgkin’s lymphoma is one of the cancers with the highest probability of control or long-term cure, ranging from 70 to 95% [8,9]. The treatment of this disease has evolved from the use of chemotherapy, or radiotherapy, to combinations of both modalities, with the use of the latter as consolidation after chemotherapy [4,7,10,11]. Radiotherapy has evolved from large fields, including adjacent lymphatic areas, to irradiation fields in areas initially taken [12].

The addition of radiation therapy in patients who obtain partial responses (RP) to chemotherapy regimens increases the rate of patients who obtain a complete response and improves overall survival [13].

The patient received treatment with ionizing radiation as established in the diagnostic and treatment standards approved in the national oncology group of our country. The objective response was about 90% without presenting secondary reactions to the treatment received (Figure 3).



Figure 3: Objective response of 90% after radiation treatment.

The fusion of the anatomical and functional images obtained in the PET-CT, allowed a precise delineation, achieving a maximum reduction in the amount of radiation to which the surrounding organs are subjected with the use of simple tomography.

The use of this technique in the process of delineating radiation treatment has provided great benefits for patients with mediastinal relapsed Hodgkin lymphoma. Its implementation reduces complications associated with treatment and allows high response rates to be achieved.

Conclusions

The use of PET-CT in the design of radiant treatment, allows more precise therapeutic plans achieving favorable objective responses in patients with mediastinal relapse of Hodgkin lymphoma. Its use guarantees to reduce the volume to be irradiated and accurately delimit the organs of risk to be protected during ionizing radiation therapy, achieving a response greater than 90% in combination with chemotherapy. These favorable results increase the survival of our patients.

Summary

Introduction: The Hodgkin’s lymphoma is a lymphoproliferative process characterized by an infiltrated of Reed-Sternberg’ cells and diverse accessory cells. The base of the treatment is the chemotherapy of high effectiveness. Some patients can need radiotherapy or, if the lymphoma relapse after the primary treatment, chemoradiotherapy in high dose and autologue transplant of mother hematopoietic ‘ cells

Objective: To demonstrate how it influences the use of the positron emission tomography/Computer tomography (PET-CT) in the process of planning of the treatment with radiations in one patient with diagnostic of Hodgkin’s lymphoma with mediastinal relapse.

Case presentation: Patient feminine of 24 years of age with diagnostic from February of 2017 of Hodgkin’s lymphoma, variety nodular sclerosis with extranodular extension. She received treatment with chemotherapy being achieved total answer. In January of the 2020 it begins with breathing symptoms and the presence of a relapse mediastinal of the illness is detected. The use of the PET-CT, it allowed a better planning of the therapy with

ionizing radiations. The process of having delineated from the volume to try was carried out with more accuracy, protecting vital organs of this region.

Conclusions: The use of the PET-CT in the delineated of the radiant treatment, it allows to carry out more precise therapeutic plans achieving favorable objective answers in patient with relapse mediastinal of Hodgkin's lymphoma. The use of this technique guarantees to diminish the volume to irradiate and to define with accuracy the organs of risk to protect during the therapy with ionizing radiations, being achieved a superior answer to 90% in combination with chemotherapy. These favorable results increase the survival of our patients.

Authors' Statement

The signatories declare to be authors of the manuscript Use of PET-CT in the planning of radiation treatment in mediastinal relapse of Hodgkin lymphoma. This has not been published in any other journal.

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Ethical Aspects

The authors state that patients were informed and gave their consent to use the images. This work was authorized by the ethics committee of the Miguel Enríquez General Teaching Hospital. Havana. Cuba.

Conflicts of Interest

The authors declare that there is no conflict of interest.

Authors' Contribution

- MsC. Dr. Rubén Alexander Elzaurdín Mora: Radioterapeuta, revisión bibliográfica, confección del artículo y revisión final.
- Dr. Noralys Lara Fernández: Chemotherapist, bibliographic vision, preparation of the article and final review.

Use of Images

The authors declare that they have the authorization to use the images included in this publication.

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