

## Successful Resection of a Mediastinal Nonseminomatous Germ Cell Tumor Who's Response to Induction Chemotherapy was Evaluated by Fluorodeoxyglucose-Positron Emission Tomography

Yuta Ogura<sup>1</sup>, Hisashi Saji<sup>1,3\*</sup>, Hideki Marushima<sup>1</sup>, Ichiro Maeda<sup>2</sup>, Hirota Ka Koizumi<sup>2</sup> and Haruhiko Nakamura<sup>1</sup>

<sup>1</sup>Department of Chest Surgery, St. Marianna University School of Medicine, Japan

<sup>2</sup>Department of Pathology, St. Marianna University School of Medicine, Japan

<sup>3</sup>Department of Thoracic Surgery, Tokyo Medical University, Japan

### Abstract

Mediastinal germ cell tumors are rare malignant tumors whose current management strategy involves making a prompt diagnosis and providing an appropriate chemotherapy. However, there is as yet no consensus regarding the optimal management postchemotherapy. We encountered the case of a 23-year-old man who was diagnosed as having a mediastinal nonseminomatous germ cell tumor. We evaluated its response to induction chemotherapy by fluorodeoxyglucose-positron emission tomography/computed tomography. We performed complete surgical excision of the residual tumor postchemotherapy. Histopathologic examination of the surgical specimen showed no viable tumor cells.

**Keywords:** Mediastinal germ cell tumor; FDG-PET

### Introduction

A malignant mediastinal germ cell tumor (GCTs) is rare and represents only 1% to 4% of all mediastinal tumors. Gonadal GCT is the most common tumor cell type and constitutes 90% of the GCTs, followed by mediastinal GCT which affects the area ahead of the other extragonadal areas [1]. The most striking difference between mediastinal and gonadal nonseminomatous GCTs concerns their prognosis. The overall 5-year survival rate of mediastinal nonseminomatous GCT is about 40%, which is much lower than that of gonadal nonseminomatous GCT, because of its relative chemoresistance and frequent metastases [2,3]. However, induction cisplatin-based chemotherapy followed by surgery has been shown to improve the survival outcome of mediastinal nonseminomatous GCT [4].

Recently, fluorodeoxyglucose-positron emission tomography (FDG-PET) has been widely used for evaluating the response of gonadal GCT to chemotherapy in the management of the tumor including gonadal GCT [5]. Here, we report a case of mediastinal nonseminomatous yolk sac tumor showing a decreasing FDG uptake postchemotherapy, with no viable tumor cells histopathologically upon resection of the surgical specimen.

### Case Report

A 23-year-old man without any remarkable medical history was referred to our hospital for left chest discomfort and a low-grade fever. Chest X-ray showed a bulky mediastinal mass around the area of the left main branch of the pulmonary artery. An inhomogeneous irregularly shaped mass with a maximum diameter of 72 mm was identified on chest computed tomography (CT) (Figure 1A) and magnetic resonance imaging. The patient's serum alpha fetoprotein (AFP) level was high at 296.1 ng/ml, and the levels of other tumor markers such as CEA, CYFRA, Pro-GRP, and HCG- $\beta$  were normal.

FDG-PET/CT specifically revealed an anterior mediastinal tumor with high FDG accumulation with a standardized uptake value max (SUVmax) of 9.9 (Figure 1B), with no other abnormal FDG uptake, including the testes. Yolk sac tumor was highly suspected based on the histopathological findings of a Hematoxylin and Eosin (HE)- and immunohistologically stained panel of a CT-guided core needle biopsy specimen (Figure 2A) and the clinical features. Bleomycin, etoposide, and cisplatin combination chemotherapy was administered every 3

weeks for 4 cycles. Although the tumor remained in the left thorax, the tumor diameter decreased to 26 mm on chest CT (Figure 1C), the FDG uptake decreased with an SUV max of 2.5 on FDG-PET/CT (Figure 1D), and the serum AFP level normalized after the combination chemotherapy. We suspected the presence of residual tumor cells and thus performed a complete surgical excision of the residual tumor. Anterior mediastinal tumor resection with partial left upper lobe resection was performed through median sternotomy and anterolateral thoracotomy. The residual tumor was resected completely and showed no viable tumor cells pathologically (Figure 2a-2C). Tumor recurrence has not been detected for more than 12 months postoperatively without adjuvant chemotherapy.

### Discussion

The current standard strategy for managing primary mediastinal GCTs is to make a prompt diagnosis and administer an appropriate chemotherapy. However, the optimal management postchemotherapy has not yet been clarified to date. Patients with a residual GCT postchemotherapy are indicated for resection to achieve long-term survival [6]. On the other hand, a close follow-up of a patient with a persistent radiographic mass after the completion of induction chemotherapy has been reported, with a recommendation for salvage treatment in case of a relapse [7].

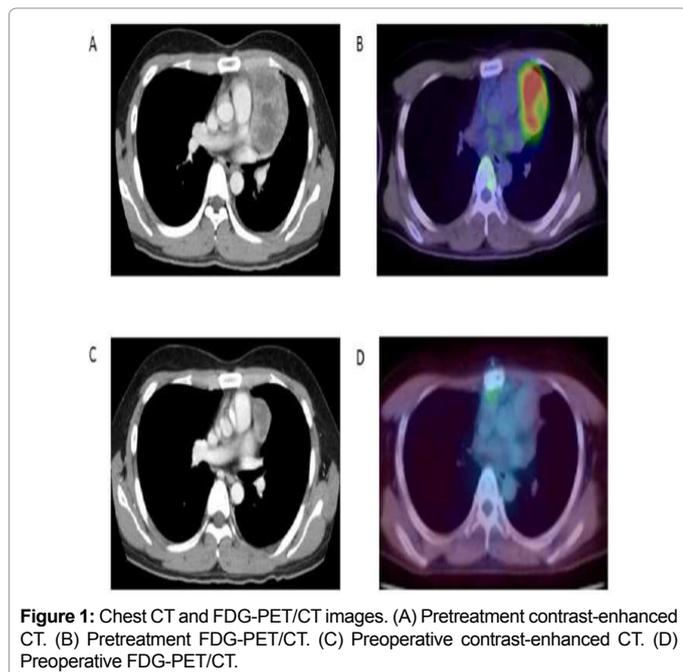
Recently, FDG-PET has been used for estimating viable residual tumors in gonadal seminoma patients postchemotherapy, as well as for predicting long-term event-free survival in patients with extragonadal GCTs [8,9]. In the present patient, FDG-PET was performed pre- and postchemotherapy and showed a decreasing and normal FDG uptake.

**\*Corresponding author:** Hisashi Saji, Department of Chest Surgery, St. Marianna University School of Medicine, Japan, Tel: +81-44-977-8111; Fax: +81-44-976-5792; E-mail: [saji-q@ya2.so-net.ne.jp](mailto:saji-q@ya2.so-net.ne.jp)

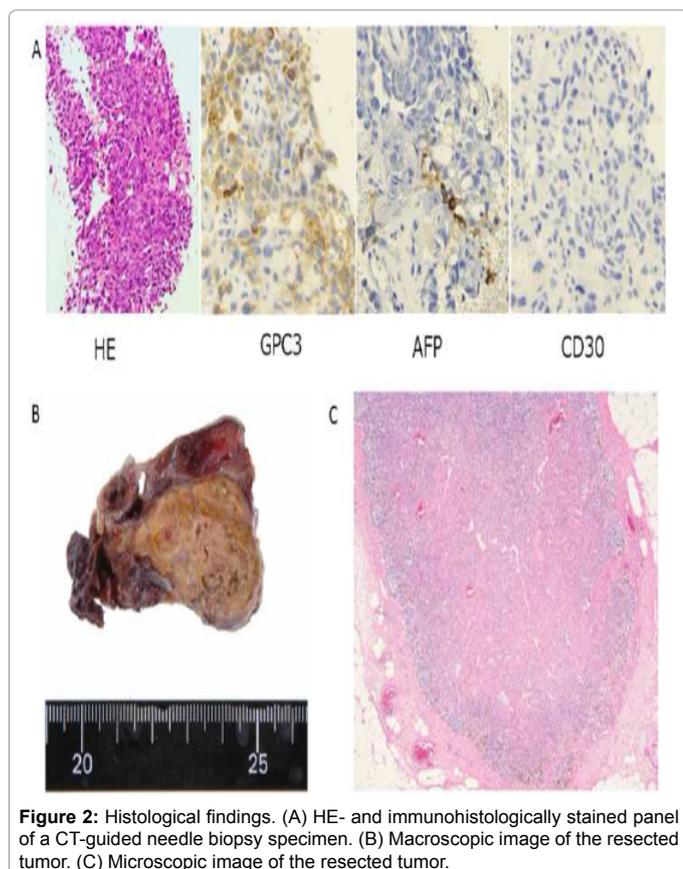
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**Figure 1:** Chest CT and FDG-PET/CT images. (A) Pretreatment contrast-enhanced CT. (B) Pretreatment FDG-PET/CT. (C) Preoperative contrast-enhanced CT. (D) Preoperative FDG-PET/CT.



**Figure 2:** Histological findings. (A) HE- and immunohistochemically stained panel of a CT-guided needle biopsy specimen. (B) Macroscopic image of the resected tumor. (C) Microscopic image of the resected tumor.

Accordingly, the completely resected residual tumor showed necrosis and no viable tumor cells. On the other hand, some cases have been reported in which no viable tumor cells were found in the resected tissues even with an abnormal FDG uptake postchemotherapy owing to the persistent calcification and fibrillation changes in the necrotic tumor [10]. Thus, a remaining abnormal SUV max level postchemotherapy is still likely to reflect an inflamed lesion during the repair process after oncology.

Accumulating knowledge is eagerly anticipated regarding the usefulness of FDG-PET in the management of patients with mediastinal GCTs postchemotherapy, as this will undoubtedly contribute to the optimal management of residual tumors following chemotherapy. Appropriate patient selection, careful surgical planning, and ample consideration of referral to multidisciplinary experts are crucial in optimizing the successful therapeutic management of GCTs.

### Conclusion

Recently, FDG-PET has been widely used for evaluating the response of gonadal GCT to chemotherapy in the management of the tumor including gonadal GCT. Here, we report a case of mediastinal nonseminomatous yolk sac tumor showing a decreasing FDG uptake postchemotherapy, then, performed complete surgical excision of the residual tumor with no viable tumor cells histopathologically upon resection of the surgical specimen.

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