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Unusual Superior Vena Cava Metastatic Thrombus and Muscular Metastases of Anaplastic Thyroid Carcinoma Detected by ¹⁸F-FDG PET/CT

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Abstract

A 50-year-old man was submitted to total thyroidectomy due to a rapid growing thyroid nodule (Bethesda III).

Histopathology revealed an anaplastic thyroid carcinoma, extending into the adjacent skeletal muscular tissue and with vascular invasion. The patient developed left internal jugular vein thrombosis at the postoperative period.

His staging ¹⁸F-FDG PET/CT showed a neoplastic thrombus in the left superior thyroid vein extending into the left internal jugular vein. Another thrombus was noted in the left brachycephalic vein, extending into the superior vena cava.

The ¹⁸F-FDG PET/CT were crucial for staging and altering patient management from surgery to chemo/radiation therapy.

Keywords: Anaplastic thyroid carcinoma; Thyroid nodule; Jugular vein thrombosis; Vena cava thrombosis; Positron emission tomography

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Copyright © 2019 Elba Etchebehere. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Anaplastic Thyroid Carcinoma (ATC) occurs in older patients or as the result of undifferentiating of a differentiated thyroid carcinoma. It is the most aggressive histologic subtype of thyroid cancer, presenting median overall survival of 6 months to 8 months. The most common sites of metastases are the lungs, intrathoracic lymph nodes, neck lymph nodes, pleura, adrenal glands, liver, brain, heart, and retroperitoneal lymph nodes. ¹⁸F-FDG-PET/CT is recommended as part of initial staging and follow-up evaluation at 3 to 6 months after therapy.

Case Presentation

Introduction

A 50-year-old man was submitted to a total thyroidectomy due to a rapidly enlarging left thyroid nodule (Bethesda III). Histopathology revealed ATC, extending into the adjacent skeletal muscular tissue with vascular invasion.

While the majority of the thyroid malignancies are well-differentiated and have an excellent outcome, ATCs are aggressive, undifferentiated tumors with high mortality rates [1-4]. Initial treatment strategy consists of surgery of the primary tumor and loco-regional metastases to obtain grossly negative margins and to avoid airway and esophageal obstruction [1-5].

The patient developed left internal jugular vein thrombosis in the postoperative period. An ¹⁸F-FDG PET/CT performed for primary staging of ATC showed mild uptake in the thyroid bed due to post-surgical inflammation.

Additionally, two extensive hypermetabolic metastatic thrombi were noted, one beginning in the left superior thyroid vein (extending into the left internal jugular vein) and another involving the left brachiocephalic vein and extending through the superior vena cava. The ¹⁸F-FDG PET/CT findings were completely unexpected and altered patient management from surgery to chemo/ radiation therapy. ¹⁸F-FDG PET/CT alters management in up to 50% of patients with ATC [6,7].

A follow-up ¹⁸F-FDG PET/CT scan was performed after chemo/radiation therapy and showed progression. A follow-up ¹⁸F-FDG PET/CT performed 3 months to 6 months after initial helps guide treatment planning [2-4,8]. Although the outcome of ATC patients continues dismal regardless of



Figure 1: ¹⁸F-FDG PET/CT scan was performed for primary staging of the Anaplastic Thyroid Carcinoma (ATC). The ¹⁸F-FDG PET/CT scan maximum intensity projection images shows mild uptake in the thyroid bed (arrow) due to inflammation post thyroidectomy. Furthermore, the hypermetabolism noted in the left cervical region (thick arrow) is due to a metastatic thrombus in the left superior thyroid vein that extends into the left internal jugular vein and reaches the mediastinum (dotted arrow).



Figure 2: Transaxial and coronal images of the ¹⁸F-FDG PET/CT scan. A hypermetabolic linear uptake (corresponding to the neoplastic thrombus) is noted beginning at the (A) thyroid cartilage, extending through the (B) left superior thyroid vein and reaching the (C) left internal jugular vein. Another neoplastic thrombus is noted involving the (D) left brachiocephalic vein and extending through the (E) superior vena cava. These ¹⁸F-FDG PET/CT findings were unexpected and altered patient management from surgery to chemo/radiation therapy.

multimodal treatment, ¹⁸F-FDG PET/CT could potentially serve as a marker of treatment response in ATC [9].

There were new metastases in a mass in the thyroid bed (displacing the trachea and esophagus to the right), in cervical and intrathoracic lymph nodes, in lung nodules and in foci in the muscles and bone.

Less common sites of distant metastases have been described in the pericardium (13%), bones (13%), kidneys (13%), mesentery or peritoneum (13%), skin (9%), pancreas (4%), stomach (4%), diaphragm (4%), pituitary gland (2%), ovary (2%), jejunum (2%), axillary lymph nodes (2%), and gingival mucosa (2%) 6,7. However, muscular metastases form ATC is very unusual.

Autopsy studies have shown that local infiltration of the primary tumor is found in 76% of ATC and the most common sites of metastases are lungs (78%), intrathoracic lymph nodes (58%), neck



Figure 3: After chemo/radiation therapy, a follow-up ¹⁸F-FDG PET/CT scan (performed 5 months after initial staging) showed marked progression. The top row represents the current ¹⁸F-FDG PET/CT study and the bottom row, the prior study. New lesions (or increase in previous lesions) were as follows: (A) a mass in the thyroid bed (displacing the trachea and esophagus) with central necrosis (arrow); (B) cervical and intrathoracic (thick arrow) lymph node metastases, (C) lung nodules (stars) and (D) muscles and bone (dotted arrows).

lymph nodes (51%), pleura (29%), adrenal glands (24%), liver (20%), brain (18%), heart (18%), and retroperitoneal lymph nodes (18%) [10,11].

To that effect, staging with ¹⁸F-FDG PET/CT prior to treatment is imperative because of its superiority to conventional imaging in terms of lesion detectability (99.6% vs. 62%, respectively) [6]. Moreover, the intensity of uptake with SUV max \geq 18 has been shown to be a significant prognostic factor for survival8. Our patient's left internal jugular vein metastasis' SUV max was 49. Unfortunately, the patient died a few months after the last ¹⁸F-FDG PET/CT.

Discussion and Conclusion

The outcome of ATC patients continues dismal regardless of multimodal treatment. ¹⁸F-FDG PET/CT can potentially be used as a marker of treatment responses.

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