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Case Report

Primary Mediastinal Germ Cell Tumors: Literature Review of a Case in the Radiotherapy Department of Fès

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Abstract

Primary mediastinal germ cell tumors (PMGCTs), accounting for 1–6% of mediastinal tumors, have a less favorable prognosis than gonadal germ cell tumors, with a five-year survival rate of 40–60%. We report a case of a 38-year-old man with an inoperable mediastinal germ cell tumor treated with BEP chemotherapy followed by adjuvant radiotherapy due to insufficient response to chemotherapy alone. Radiotherapy was well tolerated, targeting the residual mass without acute complications. This case underscores the importance of a multimodal approach—combining chemotherapy and radiotherapy—for effective management when surgery is not feasible.

Introduction

Primary mediastinal germ cell tumors account for 1–6% of mediastinal tumors and 2–5% of germ cell tumors in adults and are of embryonic origin [1,2]. Despite similarities to gonadal germ cell tumors, PMGCTs have a poorer prognosis, with a five-year survival of 40–60% [3]. Chemotherapy alone is often insufficient, yielding a five-year survival rate of 30–60% [4]. Surgical resection of residual masses post-chemotherapy is crucial, but when vital structures are involved, radiotherapy can significantly improve outcomes [5,6]. We report a case of PMGCT treated in the Radiotherapy Department of Hassan II University Hospital, Fez, between January 2012 and January 2022.

Clinical Observation

A 38-year-old male presented with a 12-month history of progressive dyspnea and sudden-onset dysphonia, without other associated symptoms.

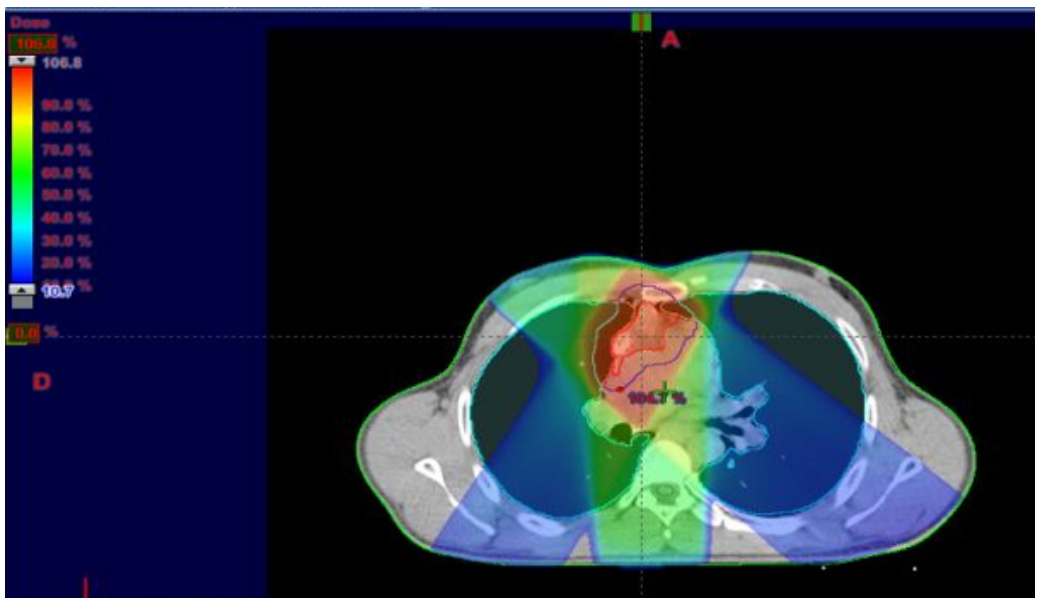
Imaging and Diagnosis:

- CT scan: Large mediastinal mass measuring 120 × 120 × 150 mm, compressing the trachea and involving major vessels.
- Biopsy: Mediastinal needle biopsy revealed an undifferentiated malignant tumor.
- Immunohistochemistry: Anti-CD20 (–), anti-CD3 (–), anti-OCT4 (+), anti-pan-cytokeratin (+), anti-CD30 (–), anti-PLAP (+), consistent with a mediastinal seminoma-type germ cell tumor.

Treatment:

The patient received four cycles of BEP chemotherapy (bleomycin, etoposide, cisplatin). Post-chemotherapy CT scan revealed a reduction of the residual mass to 90 × 32 × 90 mm. PET scan showed an anterior mediastinal mass with calcifications and SUVmax higher than the mediastinal background but lower than the liver, with no metastatic lesions.

Given the tumor's proximity to major vessels, complete surgical resection was unfeasible. The patient underwent adjuvant radiotherapy (40 Gy in 20 fractions of 2 Gy, five fractions per week). Treatment was well tolerated without acute complications.



Here is a dosimetric image of the patient's treatment.

Follow-up:Radiological assessment showed gradual reduction of tumor volume (residual 60 mm mass with microcalcifications, without pathological enhancement). At 36 months, the patient remains clinically and radiologically stable.

Discussion

Primary mediastinal seminoma, a rare extragonadal germ cell tumor, represents 30–40% of mediastinal GCTs and 1–3% of extragonadal GCTs [1–4]. It predominantly affects young men aged 20–40 years, often located in the anterior mediastinum [1,5]. Associations with Klinefelter syndrome suggest a genetic predisposition [5].

Clinical Presentation:

Symptoms are mainly mass-related: dyspnea, cough, chest pain, or superior vena cava syndrome [2,4]. Tumor progression is usually slow, delaying diagnosis. Testicular ultrasound excludes a gonadal primary [1,2].

Biomarkers:

- AFP: Normal in pure seminomas; elevation suggests non-seminomatous components.
- β-hCG: Mildly elevated in 10–20% of cases.
- LDH: Often elevated, correlates with tumor mass [3,5].

Imaging:

- CT scan: Gold standard, showing homogeneous, well-defined masses.
- MRI: Assesses vascular relationships.
- FDG-PET: Useful for staging and follow-up [1,5].

Differential Diagnosis:

Includes mediastinal lymphoma, thymoma, teratoma, plunging goiter, or metastases [2,4].

Histopathology and Immunohistochemistry:

Mediastinal seminomas consist of large cells with clear cytoplasm in lobules separated by fibrous septa infiltrated with lymphocytes. Positive markers include PLAP, OCT3/4, and CD117 (c-KIT) [2,5]. Absence of AFP excludes non-seminomatous components.

Treatment:

Platinum-based chemotherapy (BEP) is standard [3,5,6]. Surgery is indicated for residual masses post-chemotherapy. Radiotherapy remains important for unresectable or persistent masses, exploiting the radiosensitivity of seminoma [2,4,7,8]. Modern conformal or IMRT techniques target tumors while sparing organs at risk [8].

Prognosis:

Pure mediastinal seminoma has an excellent prognosis, with 5-year survival >85–90% under multimodal treatment [3,5,6]. Residual masses are usually fibrotic or necrotic rather than tumorous [1,3,5].

Follow-up:

Clinical, biochemical (AFP, β-hCG, LDH), and radiological monitoring every 3–6 months for the first two years, then every six months [6,9]. Our patient achieved significant reduction in residual mass and long-term disease control with combined BEP chemotherapy and radiotherapy, confirming the high sensitivity of mediastinal seminoma to these treatments.

Conclusion

Primary mediastinal germ cell tumors, though rare, pose significant diagnostic and therapeutic challenges.

Primary mediastinal seminomas respond well to platinum-based chemotherapy and radiotherapy, allowing prolonged survival even when surgery is not possible.

Optimal management requires a multidisciplinary approach involving oncologists, radiation therapists, and thoracic surgeons, with careful evaluation of residual masses and long-term follow-up.

This case highlights the effectiveness of integrated, individualized care in improving outcomes for this rare entity.

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