

Primary seminoma arising in the posterior mediastinum: a diagnostic challenge

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Abstract

Primary mediastinal germ cell tumors are a rare finding, and one third of them are seminomas. Seminomas are found in the anterior mediastinum, whereas they are extremely rare within the posterior compartment. Most clinicians would not consider a primary seminoma in the differential diagnosis of a posterior mediastinal mass, as only two cases have been reported in literature. Here we present the case of a 57-year-old male with a primary seminoma arising in the left posterior mediastinum. He was asymptomatic and the mass was an incidental finding. Positron emission tomography (PET) revealed a small area with an avid tracer uptake. Transthoracic needle aspiration led to a non-diagnostic result. Due to the strong suspect of malignancy, a surgical excision was chosen to obtain a diagnosis. He underwent complete

excision, and pathology report demonstrated a mediastinal seminoma. Subsequent further staging did not reveal any other location of the disease. Given the complete excision of the primary tumor, active surveillance was the treatment of choice. The patient is free of disease 48 months after diagnosis.

Introduction

Imaging studies play an important role in identification and characterization of mediastinal masses, which can often be diagnosed with confidence based on location and imaging features alone.

Thymic lesions, lymphomas and primary mediastinal germ cell tumors (PMGCTs) are typically located in the anterior mediastinum. Lesions of lymphoid origin and pericardial cysts are found in the middle mediastinum. Neurogenic tumors and bronchogenic cysts originate in the posterior mediastinum.

PMGCTs are uncommon, accounting for only 10-15% of all mediastinal tumors. Among these, seminomas constitute approximately one-third of malignant mediastinal germ cell tumors, and 2 to 4 percent of mediastinal masses [1]. Seminomas are extremely rare within the posterior compartment, and only two cases have been reported in literature [2,3].

Here we present the case of an asymptomatic primary seminoma arising in the posterior mediastinum.

Case Report

A 57-year-old male was taken to the emergency department after being involved in a car accident. His past medical history was unremarkable. He underwent a whole – body computed tomography (CT) scan which did not show any sign of serious injury. However, a left para-aortic mass was incidentally detected. He was asymptomatic and physical examination was normal. Contrast-enhanced CT scan showed a well-defined, oval-shaped mass, abutting the descending aorta at T8–T12 (Figure 1). The mass measured approximately 6 x 3.5 x 4 cm and it was homogeneous in its inner part, surrounded by a contrast-enhanced layer.

Chest magnetic resonance imaging (MRI) confirmed the posterior-inferior mediastinal mass filled by homogeneous fluid, hyperintense on T2-weighted/short-TI inversion recovery and hypointense on T1-weighted sequences, with an external capsule. Post-gadolinium T1-weighted images show a contrast-enhanced

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nodule of 1 cm in diameter, in the lower pole (Figure 2). A clear cleavage plane between the mass and the adventitia of the aorta could not be discerned. 18F-fluorodeoxyglucose PET-CT imaging detected a slight capsular accumulation and an avid uptake of tracer (Standard Uptake Value max 14) only in the caudal pole (Figure 1). Transthoracic needle aspiration led to a non – diagnostic result.

Subsequently, a surgical biopsy through a left lateral muscle sparing thoracotomy was planned. The lesion was easy to remove from the outermost layer of the aorta, and it showed a single lower vascular peduncle, thus a complete excisional biopsy was performed.

On gross examination, the mass was surrounded by a fibrous capsule and filled with necrotic debris. Only the small inferior pole, which stained positive for placental alkaline phosphatase (PLAP) and CD117, was diagnosed as extragonadal classic seminoma (Figure 3). Testes were carefully evaluated with ultrasound, there was no evidence of primary gonadal tumor. Postoperative restaging with PET-CT showed no residual disease. Serum human chorionic gonadotrophin (hCG), alpha-fetoprotein (AFP) and lactate dehydrogenase (LDH) levels were normal. The patient underwent active surveillance with whole-body CT and serum markers every 6 months. He is free of disease 48 months after diagnosis.

Discussion

PMGCTs usually occur in males in the third to fifth decade of life and they are commonly located in the anterior mediastinum [4]. Although the histogenesis of these tumors is still unknown, the prevailing theory is that some multipotent germ cells fail to descend and remain in the anterior mediastinum during their migration from the yolk sac to the gonadal ridge in early embryogenesis [5]. These cells maintain the ability to proliferate and dif-

ferentiate into embryonic or extraembryonic tissue, carrying a potential of malignancy.

To our knowledge, only two cases of primary seminoma within the posterior mediastinum have been reported. One case presented with a supraclavicular lymph node metastasis that enabled the diagnosis [3], the other presented with back pain, dyspnea and weight loss [2]. In our case, the disease was an incidental finding.

The two previously described cases were heterogeneous masses with irregular margins at chest CT and MRI, whereas in our case

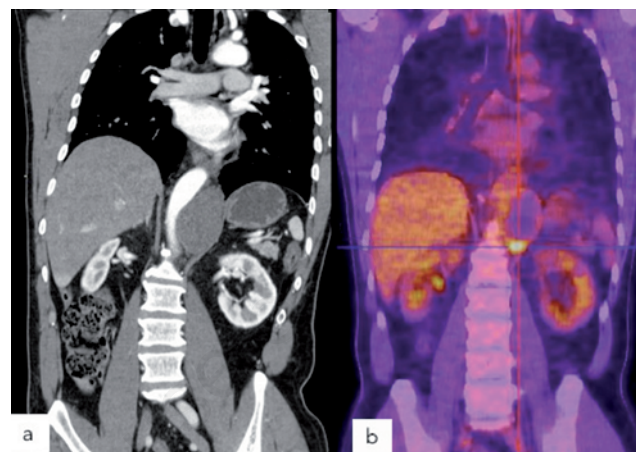


Figure 1. Coronal CT scan (a) and PET-CT (b). Coronal reconstruction of CT scan showing a unilocular mass within the posterior-inferior mediastinum, displacing the aorta to the right (a). Portal venous-phase CT scan (not showed) reveals a slightly hyperdense area in the lower pole of the lesion, corresponding to tracer uptake in PET-CT (b).

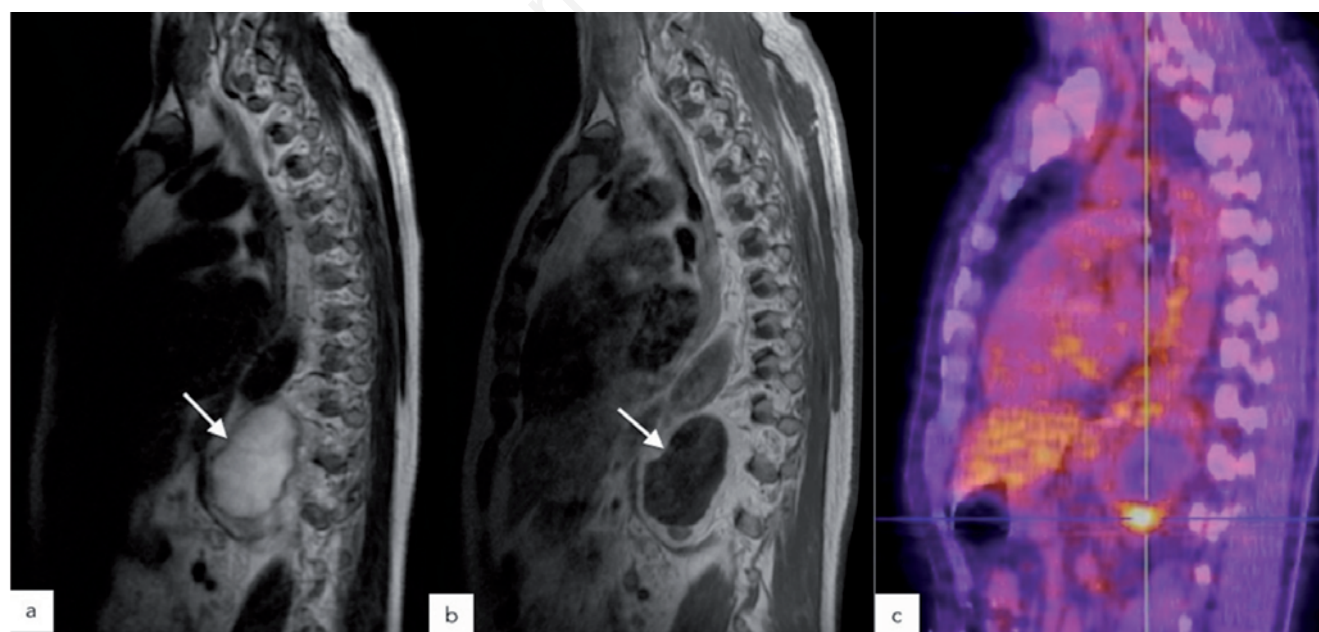


Figure 2. MRI: sagittal T2-weighted image (a) and post-gadolinium sagittal T1-weighted image (b). PET-CT scan (c). Sagittal T2-weighted image (a) shows a unilocular fluid-like mass with a solid component, hyperintense in T2-weighted and hypointense in T1-weighted images (not showed). Post-gadolinium sagittal T1-weighted image (b) shows peripheral contrast enhancement and an area with less enhancement at the lower pole. PET-CT scan (c) shows tracer accumulation at its inferior pole.

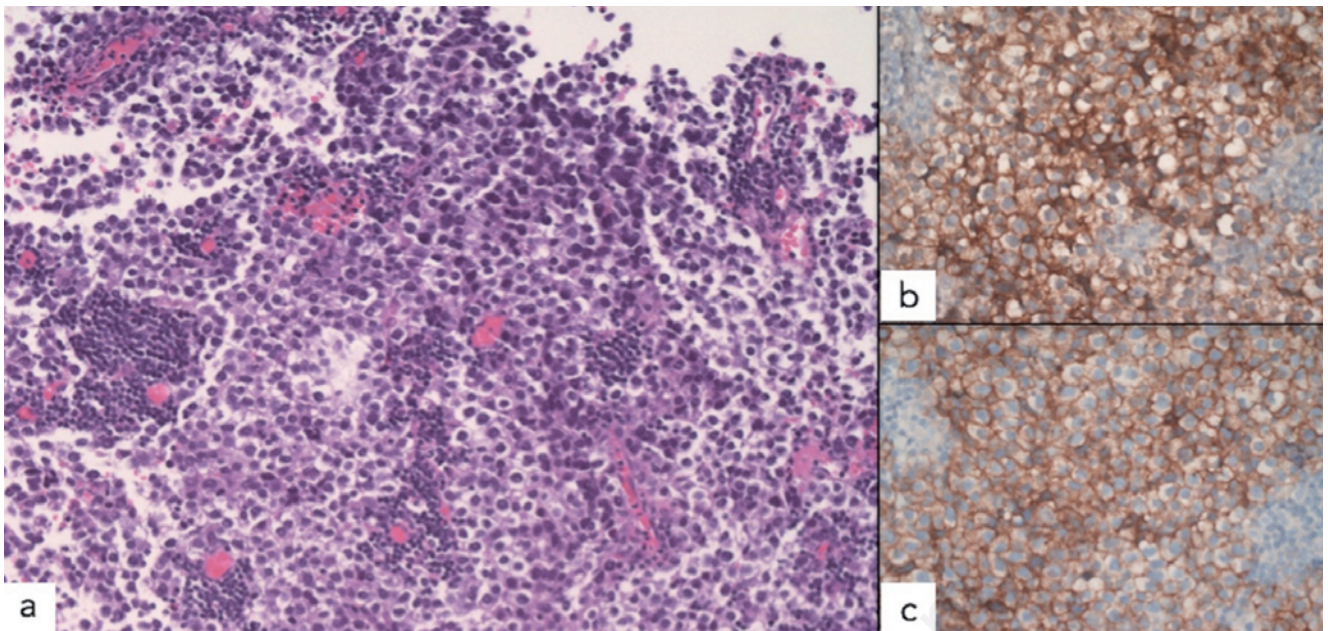


Figure 3. Hematoxylin & Eosin, 200x magnification (a). Expression of CD117, 400x magnification (b). Placental alkaline phosphatase (PLAP), 400x magnification (c). On gross examination a well-defined oval-shaped lesion, 6 cm maximum diameter, with a white-gray area (lower pole) measuring about 2 cm that was fixed in 10% formalin, embedded in paraffin; sections were evaluated by hematoxylin and eosin stain. Microscopic examination (a, 200x magnification) showed a diffuse sheet of uniform cells with mature lymphocyte infiltration, separated into clusters and columns by septa. Neither necrosis nor mitosis were seen. All tumor cells showed strong and diffuse expression of CD117 (b, 400x magnification) and placental alkaline phosphatase (PLAP) (c, 400x magnification).

the lesion was well-defined with a capsule filled by homogeneous tissue, which was found to be necrosis on pathological examination. The suspect of a malignant component arose from the finding of a small area with a high ^{18}F -FDG uptake, which was the nodule showing seminoma features on pathological examination. Given the location, a PMGCT was not considered in our differential diagnosis, therefore serum hCG and alpha fetoprotein markers were not included in the preoperative evaluation. The uncertainty about the nature of the tumor raised the need for a surgical diagnosis, that may have carried risks for the patient.

Conclusions

When a presumptive diagnosis is unclear or confusing, primary seminomas should be considered in the differential diagnosis of posterior mediastinal masses. In these cases, appropriate laboratory analysis should be performed in the attempt to avoid unnecessary surgical resection. It is also important to remember that mediastinal lymph nodes are metastatic sites for primary gonadal germ

cell tumors. Thus, careful clinical evaluation of both testes is necessary to exclude the possibility of a mediastinal lymph node metastasis of a primary testicular seminoma.

References

1. Moran CA, Suster S, Przygodzki RM, Koss MN. Primary germ cell tumors of the mediastinum: II. Mediastinal seminomas—a clinicopathologic and immunohistochemical study of 120 cases. *Cancer* 1997;80:691–8.
2. Makiyama K, Senga Y. Primary seminoma in the posterior mediastinum. *J Urol* 2001;165:908.
3. Ravenel JG, Gordon LL, Block MI, Chaudhary U. Primary posterior mediastinal seminoma. *AJR Am J Roentgenol* 2004;183:1835–7.
4. Nichols CR. Mediastinal germ cell tumors. Clinical features and biologic correlates. *Chest* 1991;99:472–9.
5. Rosti G, Secondino S, Necchi A, et al. Primary mediastinal germ cell tumors. *Semin Oncol* 2019;46:107–11.