Human Pathology (2016) **56**, 109–113

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Human PATHOLOGY

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Case study

Glioblastoma arising within a mediastinal mature teratoma☆

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Received 17 November 2015; revised 25 April 2016; accepted 20 May 2016

Keywords:
Glioblastoma;
Mediastinal;
Mature teratoma;
Chromosome 12;
Germ cell tumor;
Glioma

Summary Herein we present the case of a 42-year-old man who presented with an anterior mediastinal mass, which was found to represent a mature teratoma. Within it, there was a secondary somatic malignant glial neoplasm with mitotic activity and necrosis, compatible with glioblastoma. He experienced early local recurrence and lymph node metastasis, but is alive and well 3 1/2 years after diagnosis. Neither the teratoma nor the glioblastoma components had abnormalities of chromosome 12, which may implicate that this teratoma was more closely related to those arising along the midline of infants and children (type I germ cell tumor) than to the typically malignant testicular examples, which often contain mixed germ cell elements (type II germ cell tumor).

1. Introduction

Primary extragonadal germ cell tumors (GCTs) are rare, with the mediastinum being the most common site, comprising less than 5% of all GCTs [1]. Primordial germ cells migrate along the midline of the body to the genital ridge; hence, GCTs can arise at midline sites including the mediastinum, sacrum, retroperitoneum and midline brain, presumably due to aberrant or arrested migration [2,3]. Some data suggest that the thymus can produce KIT ligands, helping to promote the survival and proliferation of these primordial germ cells, which may eventually give rise to GCTs [4,5]. Histologically, extragonadal GCTs in the mediastinum exhibit similar morphologic features and histologic subtypes compared to their gonadal counterparts. It is well known that secondary somatic malignancy can arise from GCTs, including a variety of sarcomas, carcinomas, and more rarely, gliomas [6]. Secondary somatic malignancies seem to be more common in mediastinal GCTs than those arising in the gonads [7]. Herein we report a case of high-grade astrocytoma (glioblastoma) arising from a primary mediastinal mature teratoma.

2. Case report

A 42-year-old man presented to a local urgent care clinic complaining of cough, mild wheezing, and dull pain of the anterior chest for 3 to 4 months. Physical exam revealed mild bilateral wheezing. A testicular exam was negative. Chest x-ray demonstrated a large left mid-chest mass, which was not seen on the comparison film from 17 months prior. A subsequent positron emission tomography scan showed a 12.6 × 10.3 × 9.6-cm mixed density hypermetabolic mass in the left anterior mediastinum, without evidence of metastatic disease. A testicular ultrasound was performed and revealed no significant testicular abnormalities, with several incidental benign-appearing

☆ No disclosures.

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http://dx.doi.org/10.1016/j.humpath.2016.05.019
0046-8177/

cysts in the epididymis. The patient then underwent median sternotomy and resection of the anterior mediastinal mass. At the time of surgery, the tumor appeared encapsulated, and a gross total resection was performed.

The gross specimen consisted of a 616-gram, firm mass, measuring 14.5 × 12 × 12 cm. The cut surface consisted of both solid and cystic areas, some of which contained thick hemorrhagic fluid or mucus. The solid areas were tan-yellow and had lobular contours, with focal hemorrhage and a fibrotic appearance.

Microscopically, the mediastinal mature teratoma was composed predominantly of mature-appearing glial tissue (Fig. 1A) with associated fibrotic stroma, fat, and scattered reactive lymphocytes. Multiple foci of glandular epithelium were also identified, which showed both ciliated and enteric morphology (Fig. 1B). Although no immature teratomatous or other malignant germ cell elements were identified, one area had an overtly malignant appearance, which was characterized by high sheets of spindle-shaped cells with prominent nuclear pleomorphism (Fig. 1C), some of which exhibited intracytoplasmic eosinophilic material, eccentric nuclei, and fibrillary processes, resembling gemistocytic astrocytes. There was brisk mitotic activity (Fig. 1D), bizarre mitotic figures, and large areas of necrosis (Fig. 1E and C). The malignant cells were immunoreactive with GFAP (Fig. 2A), S-100 (Fig. 2B), and synaptophysin (Fig. 2C), and exhibited high Ki-67 proliferative activity (Fig. 2D). The morphologic and immunohistochemical features were consistent with a malignant high-grade astrocytoma. Although it is difficult to grade a glioma arising from a mature teratoma, this tumor was at least anaplastic given the brisk mitotic activity, and given the presence of necrosis, it is most in keeping with a glioblastoma.

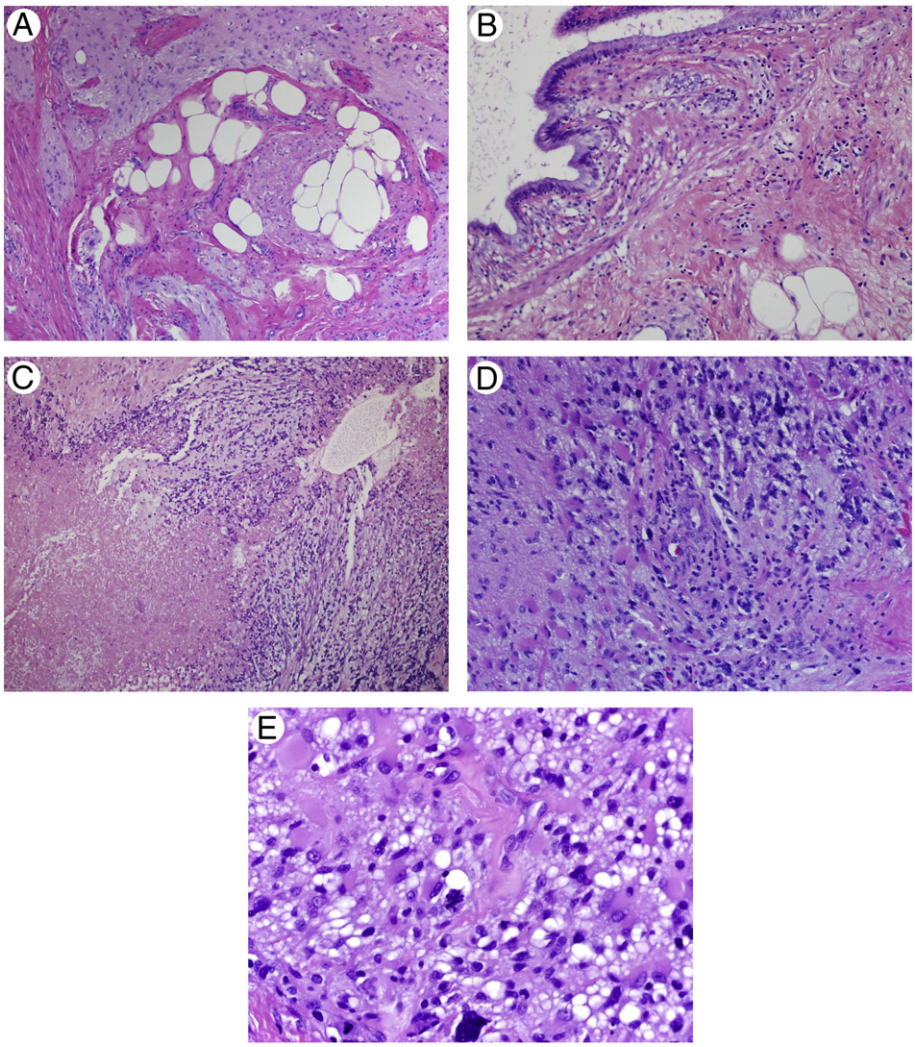

Fig. 1 Microscopically, the mediastinal mature teratoma was composed predominantly of mature-appearing glial tissue (A) with associated fibrotic stroma, fat, and scattered reactive lymphocytes. Multiple foci of glandular epithelium were also identified, which showed both ciliated and enteric morphology (B). The malignant area of the tumor was characterized by sheets of spindle cells with prominent nuclear pleomorphism and necrosis (C), some of which exhibited intracytoplasmic eosinophilic material, eccentric nuclei, and fibrillary processes, resembling gemistocytic astrocytes (D). There was brisk mitotic activity, including atypical mitoses (E).