Mediastinal-like growing teratoma syndrome

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We present a case of a mediastinal-like growing teratoma syndrome (GTS) that occurred in a young man after 2 different lines of chemotherapy failed. The patient was successfully treated with a complete surgical resection of the giant mediastinal mass.

Clinical Summary

A 30-year-old man with a rapidly growing mediastinal tumor was referred to our attention after 2 lines of chemotherapy failed. The patient had been hospitalized 19 months prior for rapid onset of dyspnea. At that time, a total body computed tomography (CT) scan revealed an anterior mediastinal mass of $16 \times 8 \times 8$ cm. No evidence of extrathoracic disease was found. Alpha-fetoprotein (AFP) was 3,027 ng/mL, whereas β -human chorionic gonadotropin and serum carcinoembryonic antigen levels were normal. Fine-needle aspiration of the mediastinal mass revealed a nonseminomatous germ cell tumor.

The patient was then submitted to 2 different lines of chemotherapy (3 cycles of vinblastine, ifosfamide, and cisplatin [VeIP], followed by 4 cycles of ifosfamide, carboplatin, and etoposide, followed by rapid dimensional growth with the appearance of superior vena cava syndrome, necessitating a multidisciplinary discussion of the case. Salvage surgery was indicated.

On the patient's admission to our division, a preoperative full-body CT scan revealed an increased mediastinal mass, now $20 \times 19 \times 13$ cm in diameter, which was enveloping the superior vena cava and aortic arch, resulting in almost complete obliteration of the right hemithorax (Figure 1). The surgical approach undertaken involved a bilateral anterolateral thoracotomy with transverse sternotomy ("clamshell thoracotomy") in conjunction with a partial upper hemisternotomy. The tumor presented a fibrotic capsule apparently intact and firmly attached to the pericardium. Thus, we performed an extrapericardial resection of the lesion en bloc with those structures suspected to also be involved, such as the left brachiocephalic vein, the thymus, the right phrenic nerve, and a portion of the right inferior pulmonary lobe (Figure 2). Pathologic examination showed a capsulated germ cell neoplasm of 6 kg,

Figure 1. Computed tomography (CT) scan of the chest showing the mediastinal mass that was enveloping the superior vena cava and aortic arch, resulting in almost complete obliteration of the right hemithorax.

measuring $22 \times 19 \times 13$ cm, with the following composition: 60% teratomas, 15% rhabdomyosarcoma, 5% yolk sac-tumor, and 20% necrotic components. Neither of the resected structures were infiltrated by the tumor. The postoperative outcome was uneventful, and the patient was discharged 11 days after surgery. No adjuvant therapy was proposed. The patient is still alive 6 months after surgery, with no evidence of disease indicated at the most recent chest CT.

Discussion

Primary germ cell tumors of the mediastinum represent 3% to 10% of all tumors in this location. Most cases occur in patients between 20 and 35 years of age, and the tumor becomes very large before causing symptoms such as dull retrosternal chest pain, dyspnea, or superior vena cava syndrome.¹ The use of cisplatin-based chemotherapy has improved the curability of this tumor, from less than 10% to approximately 80%.² Serum levels of AFP and β -human chorionic gonadotropin serve as useful biomarkers in the assessment of the response to this therapy. However, after successful chemotherapy, 3% to 8% of patients present with a relapse, with growth of the mediastinal mass despite normal serum tumor markers. This condition was first recognized by Carr et al³ in 1981 and later by Logothetis⁴ in 1982, when it was given its current name of GTS. This clinical pattern must be differentiated from unresponsive teratoma, in which the germ tumor cells maintain their malignant characteristics, with increasing levels of at least 1 of the serum tumor markers.

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Figure 2. Intraoperative field before (A) and after (B) the mediastinal mass resection. *T*, Mediastinal tumor; *H*, heart; *LL*, left lung; *RL*, right lung; *SVC*, superior vena cava; *Ao*, ascending aorta; *PA*, pulmonary artery.

We report on a case presenting a clinical course in between the 2 conditions previously described.

The tumor initially responded to the first 2 cycles of VeIP, decreasing in both mass size and AFP serum levels (from 3,027.9 ng/mL to 518.8 ng/mL). Then the mass began to grow rapidly, despite the third cycle of VeIP and the 4 cycles of ifosfamide, carboplatin, and etoposide, with the serum AFP levels never returning to a normal value. This last situation must be differentiated from “classic” GTS, because it resulted in a more aggressive and rapidly evolving clinical pattern requiring salvage surgery. An unusual combined surgical approach (clamshell thoracotomy with a partial upper hemisternotomy) was used to obtain both complete exposure of the mediastinal mass and safe control of the vascular structures potentially involved. The fact that we were able to completely resect a mass of such dimensions attests to the exceptionality of the procedure performed. These initial results confirm what the literature has already indicated:⁵ In wisely selected cases, salvage surgery is useful in the treatment of mediastinal GTS.

Further data are needed to assess the role of possible adjuvant treatments, especially in those cases in which the pathology shows a significantly malignant residual component at specimen analysis.

References

1. Strollo DC, Rosado de Christenson ML, Jett JR. Primary mediastinal tumors. Part 1: tumors of the anterior mediastinum. *Chest*. 1997;112: 511-22.
2. Murphy BA, Motzer RJ, Bosl GJ. Chemotherapy for cisplatin-resistant germ cell tumors. *Probl Urol*. 1994;8:127-40.
3. Carr BI, Gilchrist KW, Carbone PP. The variable transformation in metastases from testicular germ cell tumors: the need for selective biopsy. *J Urol*. 1981;126:52-4.
4. Logothetis CJ, Samuels ML, Trindade A, Johnson DE. The growing teratoma syndrome. *Cancer*. 1982;50:1629-35.
5. Andre F, Fizazi K, Culine S, Droz J, Taupin P, Lhomme C, et al. The growing teratoma syndrome: results of therapy and long-term follow-up of 33 patients. *Eur J Cancer*. 2000;36:1389-94.