Case Report

Huge thymoma combined with pure red cell aplasia: a case report and literature review

Ruihua Wang[1#], Xiuchun Yang[2#], Wenyu Zhu[1], Wei Liang[1], Zhenglong Li[1], Cheng Chen[2]

[1]Department of Thoracic Surgery, Liupanshui People's Hospital, Liupanshui, China; [2]Department of Thoracic Surgery, The Affiliated Hospital of Zunyi Medical University, Zunyi, China

[#]These authors contributed equally to this work and should be considered as co-first authors.

Correspondence to: Wenyu Zhu. Department of Thoracic Surgery, Liupanshui People's Hospital, 56 Zhongshanxi Road, Liupanshui 563000, China. Email: 912601630@qq.com; Cheng Chen. Department of Thoracic Surgery, The Affiliated Hospital of Zunyi Medical University, 149 Dalian Road, Zunyi 563000, China. Email: 29217036@qq.com.

Background: Thymoma is the most common tumor of the anterior mediastinum, especially in adults, and accounts for 20–25% of all mediastinal tumors and 50% of anterior mediastinal tumors. Thymomas originating from thymus epithelial cells or lymphocytes are the most common, and account for 95% of thymomas. Thymoma is a relatively rare and inert disease of the chest, and many thymoma patients have a long survival period despite disease progression. Surgery is the first choice of treatment for thymoma, but controversy remains as to the best approach for treating giant thymoma. The incidence of large tumors in the thorax is low, surgical treatment is difficult, and surgical risk is high. A thymoma with myasthenia gravis is common, but a huge thymoma with pure red cell aplasia is rare.

Case Description: Our hospital (Liupanshui People's Hospital) admitted a patient with a large thymoma. The 37-year-old female patient had chest pain without obvious cause, accompanied by chest tightness and shortness of breath for 3 days. The patient appeared to have severe anemia. The patient's initial hemoglobin level was 51 g/L. A computed tomography (CT) scan after hospitalization revealed a large soft tissue mass in the left thoracic cavity, about 22.0 cm × 18.0 cm × 15.0 cm in size, of mixed density, with an intact boundary envelope, partial pulmonary atelectasis of the left lung, and pleural fluid on the left. The tumor was successfully removed by left anterolateral incision, and postoperatively, the patient s compression and anemia improved significantly, and a pathologic diagnosis of type A thymoma.

Conclusions: Through a literature review and case analysis, we extend understandings of thymoma. Clinical differential diagnosis should be made before surgery, which is very important for making treatment plan. Our results can provide a reference for the clinical treatment of thymoma, and strive to provide the best treatment for patients.

Keywords: Huge thymoma; thymectomy; pure red cell aplasia; case report

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Introduction

A thymoma is a slow-growing tumor that often occurs in the anterior mediastinum, and complete surgical resection is key to its treatment. Median sternotomy is the standard surgical procedure for thymoma resection; however, the optimal incision for huge thymomas remains controversial (1,2). Less than 10% of patients with thymoma develop rare pure red cell aplasia, and less than 5% of patients with pure red cell aplasia have rare thymoma (3). The incidence of large tumors in the thorax is low, surgical treatment is difficult, and surgical risk is high.

In 2015, the World Health Organization (WHO) divided thymus epithelial tumors into types A, AB, B1, B2, B3, and

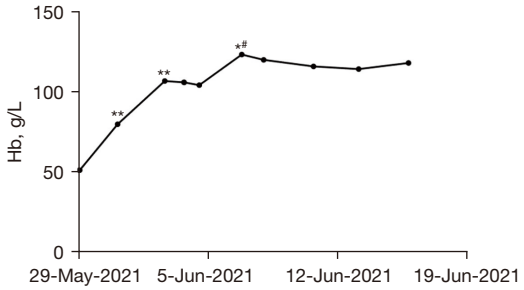

Figure 1 Patient hemoglobin diagram. *, one unit of leukocyte-reduced red blood cells; **, one unit of leukocyte-reduced red blood cells; #, on the day of surgery. Hb, hemoglobin.

C (i.e., thymic carcinoma, including thymic neuroendocrine carcinoma), which to some extent reflect the biological behavior and prognosis of the tumor. Thymic epithelial tumors are phased according to the Masaoka-Koga staging system and stage is related to patient survival (4-6). Some huge thymomas can infiltrate into the mediastinal connective tissue, which can invade important structures, such as the precava, brachiocephalic vein, pericardium, and pulmonary artery, resulting in a higher risk of complete surgical removal and greater difficulty. In this study, we report a case of Huge thymoma combined with pure red cell aplasia, but had no symptoms of myasthenia gravis, and the course of the disease appeared to be severe anemia, requiring repeated (but ineffective) blood transfusion treatments. The tumor was successfully removed by left anterolateral incision, and postoperatively, the patient s compression and anemia improved significantly. We present the following case in accordance with the CARE reporting checklist (available at https://gs.amegroups.com/article/view/10.21037/gs-22-218/rc).

Case presentation

The 37-year-old female patient had chest pain without obvious cause, accompanied by chest tightness and shortness of breath for 3 days. The patient appeared to have severe anemia. The patient's initial hemoglobin level was 51 g/L. After 5 preoperative infusions of leukocyte-reduced red blood cells, amounting to a total of 9 units red blood cells, the patient's preoperative hemoglobin level increased to 119 g/L (*Figure 1*). The repeated blood transfusion treatment was not effective. The patient had a repeated fever, no myasthenia gravis symptoms, no radiating pain or referred pain, no cough, no expectoration, no palpitations, no chill, and reported a recent weight loss of about 10 kg. The patient had no family history of disease. A computed tomography (CT) scan after hospitalization revealed a large soft tissue mass in the left thoracic cavity, about 22.0 cm × 18.0 cm × 15.0 cm in size, of mixed density, with an intact boundary envelope, partial pulmonary atelectasis of the left lung, and pleural fluid on the left. The heart and large blood vessels had shifted to the right and the pulmonary arteries were slightly wider (*Figure 2A*). Chest CT showed no obvious abnormality after surgical resection (*Figure 2B*).

Thoracoscopic assisted mass resection of the left thoracic cavity was performed. During the operation, a huge cystic mass, about 22.0 cm × 18.0 cm × 15.0 cm in size, was observed in the left thoracic cavity, which adhered to the left lingular segment and pericardium, with an upper edge to the aortic arch and a lower edge to the diaphragmatic surface (*Figure 2C*). Atelectasis was present in the lingular segment and the inferior lobe of the left lung due to tumor compression. The tumor pedicle was located in the connective tissue of the left subclavian artery.

After surgery, the patient's anemia and fever improved significantly. No chest pain or chest distress was reported, and 8 days after surgery, the patient had recovered well and was satisfied with the therapeutic effect. Approximately 1 month after discharge, the patient's hemoglobin level was 131 g/L. Postoperative pathology: microscopically, braided proliferation of spindle cells was observed, some of them were epithelioid, necrosis and cystic changes were observed, and the capsule was intact (*Figure 2D*). The immunohistochemical results were as follows: type A thymoma, no envelope invasion, cytokeratin (+), epithelial membrane antigen (+), lymphocytotoxic antibodies (+), melan-A (–), chromogranin A (–), synapsin (–), vimentin (–), desmin (–), h-caldesmon (–). The patient's diagnosis was as follows: left anterior mediastinum—type A thymoma; Masaoka-Koga stage I (*Figure 3*).

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

The onset of thymoma is insidious; when the tumor size

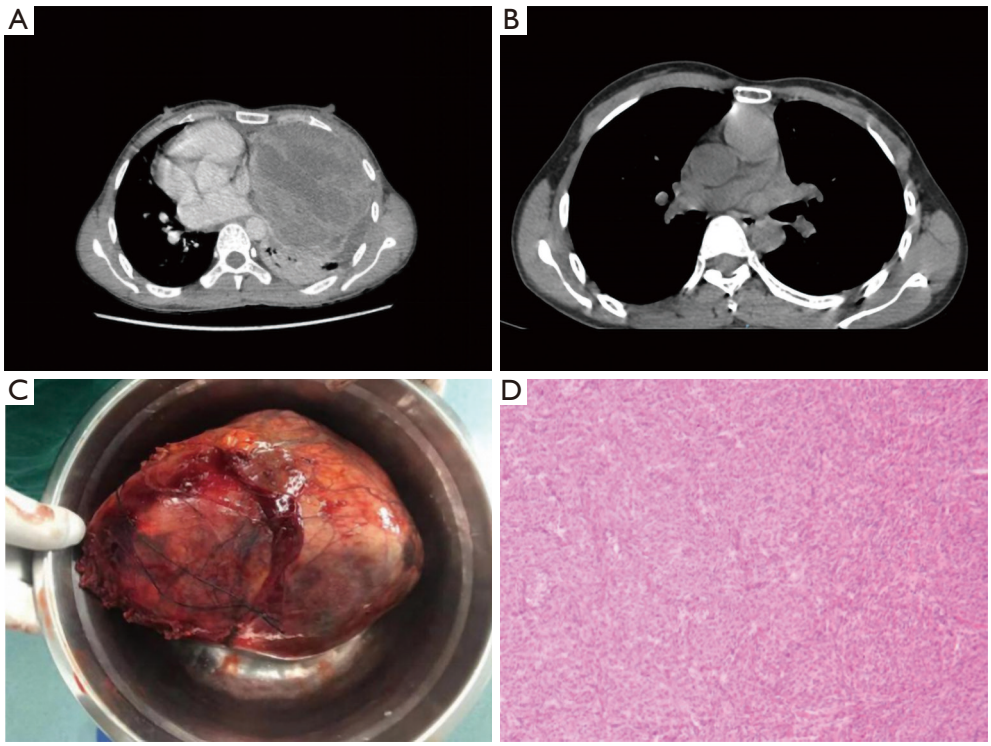

Figure 2 Imaging and pathological data of patients. (A) The patient's chest CT was transected on admission; (B) patient's postoperative chest CT scan (transverse position); (C) tumor specimens; (D) pathological results (HE, ×100). CT, computed tomography. HE, hematoxylin-eosin.

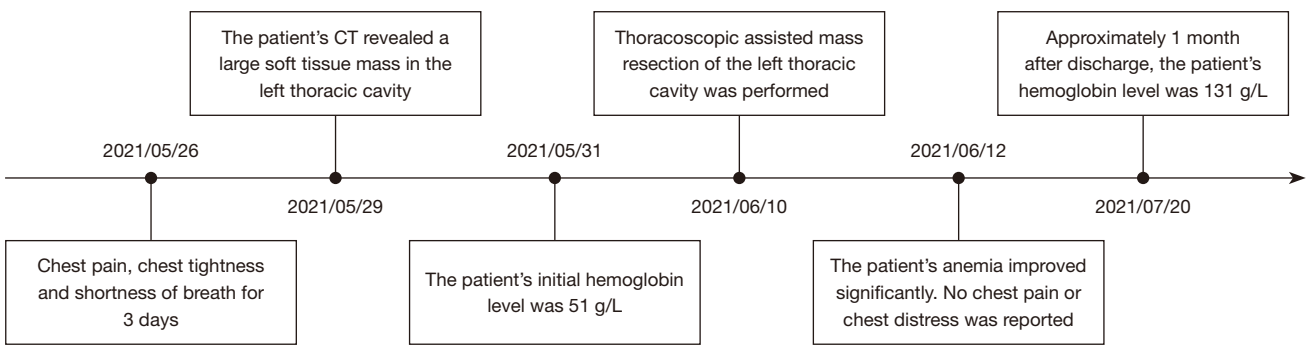

Figure 3 Timeline of diagnosis, treatment, and prognosis in this case. CT, computed tomography.

is small, patients are often asymptomatic; however, as the tumor size increases, patients will first present with symptoms of local mediastinal compression, such as thoracalgia, anhelation. Myasthenia gravis is more common in AB, B1, and B2 thymoma, and is mostly associated with acetylcholine receptors (4,7). Other common accompanying diseases include aplastic anemia and hemoglobinemia γ (7).

The pathophysiology mechanism of pure red cell aplasia and thymoma is not fully understood, but it appears to be determined by an autoimmune mechanism. The most important functions of the thymus are the maintenance of self-tolerance and aiding in the production of regulatory T cells (8). Thymoma-derived immature thymocytes can avoid critical medullary selection and maturation and alter the T-cell subset composition in the blood (9,10). In some cases, anti-erythrocyte antibodies have been shown to block

the differentiation of erythrocyte progenitors (3).

In this case, similar to other cases, the patient presented with left chest pain accompanied by chest tightness, and repeated fevers, but had no symptoms of myasthenia gravis, and the course of the disease appeared to be severe anemia, requiring repeated (but ineffective) blood transfusion treatments. The cause may be ischemic nercrosis caused by massive tumor space. Clinically, we found a huge mediastinal tumor, which generally reflected the clinical symptoms. We used imaging characteristics to make the initial diagnosis. Teratoma, lymphoma, an aneurysm of the ascending aorta, and other differential diagnoses were considered. Finally, it was necessary to clarify the type and nature of the tumor and guide treatment through the pathological diagnosis and immunohistochemical results.

Surgical treatment is preferred for thymoma, and complete or incomplete excision is an important factor affecting patients' postoperative recurrence and survival (11,12). However, controversy remains as to the best surgical approach for huge thymomas. Only 2 cases of giant thymomas resected via anterolateral thoracotomy have been reported previously. In 1 case, the patient had an ectopic thymoma, which adhered to the right lower lobe of the lung pleura and the middle of the diaphragm (13). In the other case, the patient had a mass weighing 1,705 g attached to the mediastinum (2). Due to the large convex thymus position, a thymoma was preoperatively assessed as unlikely, and thus the patient underwent a left anterolateral thoracotomy. Due to the lack of high-quality clinical evidence, whether the surgical incision should be combined with the left anterolateral incision, and whether the thymus and adipose tissue in the mediastinum should be enlarged when the tumor is removed.

In conclusion, we report a case of huge thymoma combined with pure red cell aplasia, which is rare and difficult to diagnose before surgery, according to our case and reviewed literature. Although the diagnosis was thymoma, there was no common presentation of myasthenia gravis, presenting as intractable anemia. Therefore, the possibility of the disease should be considered when these symptoms occur. The relationship between thymoma combined with pure red cell aplasia and autoimmune mechanism remains to be further explored.

Conclusions

Thymomas are common in clinical settings. However, type A thymomas combined with pure red cell aplasia are rare, and their mechanism appears to be related to the autoimmune mechanism. The preferred treatment is surgical treatment. At present, controversy remains as to the best surgical approach for huge thymomas, and appropriate choices should be made according to each specific situation. A clinical differential diagnosis should be made for patients. Preoperative diagnosis is also very important for the formulation of treatment plan, which requires comprehensive consideration by clinicians to bring maximum benefits to patients.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at https://gs.amegroups.com/article/view/10.21037/gs-22-218/rc

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://gs.amegroups.com/article/view/10.21037/gs-22-218/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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