Pleuropulmonary blastoma is a rare malignancy in young adult and childhood

Soheila Zareifar¹, Mehran Karimi¹, Mandana Tasbihi², Babak Abdolkarimi², Bita Geramizadeh³
¹Hematology Research Center, Pediatric Hematology/Oncology Department, Shiraz University of Medical Sciences, Shiraz; ²Pediatric Hematology Oncology Department*, Amir Oncology Hospital, Shiraz University of Medical Sciences, Shiraz; ³Pathology Department, Shiraz University of Medical Sciences, Shiraz, Iran

Pleuropulmonary blastoma (PPB) is a rare childhood cancer occurs in the chest; specifically in the lungs or pleura with various histopathological appearances. Treatment for type I consist of surgery and possibly chemotherapy; for types II and III PPB surgery, chemotherapy and possibly radiation therapy. In this case report we present 2 patients with PPB which were unrecognized for several weeks and managed as pneumonia with pleural effusion. These cases are interesting because of the diagnostic difficulties and radiographic appearances.

Keywords: Pleuropulmonary blastoma, Pediatric, Cancer

INTRODUCTION

Pleuropulmonary blastoma (PPB) is a rare childhood cancer account for 0.25% to 0.5% of malignant lung neoplasms. It occurs most commonly in the chest, or in the pleura and has an unfavorable outcome. Because of its rarity, most of the publications on PPB are case reports. PPB occurs mostly in children under the age of approximately 7 to 8 years and rarely in older children, teenagers and more rarely in adults [1].

Three types of PPB were diagnosed. Type I PPB occurs in the youngest children with PPB (from birth to about 2 years of age) presents as cysts in the lungs (air-filled pockets). Type II PPB consists of cystic and solid components. Type III PPB is entirely solid tumor. Types II and III PPB tend to occur after age of 2 years. Children with type I PPB may experiences disease recurrence, usually within about 4 years after initial diagnosis as advanced type II or type III neoplasms [2]. Treatment for type I consists of surgery and possibly chemotherapy. Surgery, chemotherapy and possibly radiotherapy are recommended for patients with types II and III PPB.

Children with type I PPB have a better prognosis than those with types II or III PPB. At present, more than 80% of patients with type I PPB are cured while cure rate for type II and III PPB is about 50% to 60% [2]. We report 2 cases of types II PPB with 2 different clinical processes.

CASE REPORTS

Case 1
A 3.5-year-old girl presented with 3 week history of shortness of breath, non-productive cough, fever and right-sided non-pleuritic chest pain. She was taken two courses of oral antibiotics but with out any improvement. She was previously fit and well without history of exposure to second hand smoking. Initial investigations showed normal complete blood counts, liver and kidney function tests. Serum electrolytes and urine analysis were also normal. Chest radiography revealed complete opacification of the right hemithorax, contralateral mediastinal shifting consistent with right sided large pleural effusion (Fig. 1). Contrast enhanced chest computed tomography scan (CT scan) confirmed large right pleural effusion with associated mediastinal shift and complete right lung collapse. No abnormality was reported in the left hemithorax or upper abdomen. Right thoracotomy and decortication revealed large un-resectable masses with adherent deposits on the diaphragm and enlarged pericardial lymph nodes. The right middle lobe was obliterated. Multiple biopsies were taken from tumor and lymph nodes. Pleural fluid analysis demonstrated an exudative pattern. Bone marrow aspiration and biopsy were normal. Due to her critical condition with suspicion of primitive neuroecto-
todermal tumor (PNET) chemotherapy was started, but her parents didn’t accept this schedule and was discharged their patient personally.

Due to her critical condition a chemotherapy plan was discussed with her parents with suspicion of PNET. However, they did not convince to start chemotherapy and took their child home without treatment.

The pathology report of the biopsies showed highly malignant cellular tumors with components of small cells with blastomatous appearance, spindle shape sarcomatous cells with islands of immature looking cartilage, foci of vasculature and significant mitosis. The histologic findings was in favor of PPB (Fig. 2).

After 2 months again the patient brought to emergency ward with severe respiratory distress. Based on the final pathology report, the patient received chemotherapy with vincristine 1.5 mg/m² on day 1, cyclophosphamide 2.2 g/m² on day 1, cisplatin 90 mg/m², and adriamycin 37.5 mg/m² for one course. In the second course actinomycin was given instead of adriamycin. Her clinical condition showed improvement after the first course of chemotherapy. The chest radiography showed significant tumor shrinkage. Unfortunately, she died 3 months after completion of chemotherapy due to complications of febrile neutropenia and sepsis.

**Case 2**

A 4-year-old boy presented with dyspnea and respiratory symptoms since 1.5 months prior to hospital admission. His physical examina-
tion showed decreased pulmonary sounds in left hemithorax. Chest X-ray revealed left sided lung opacity which was attached to the pleura. At first, the patient started on antibiotic therapy for pneumonia but there was no change in the patient’s general condition. Blood tests including complete blood counts, liver and kidney function tests were in normal limits.

Echocardiography and abdominal sonography were normal.

Spiral chest CT scan with the administration of intravenous contrast revealed a huge mass arising from the anterior mediastinum extending to the left hemithorax almost filling the whole volume of the left hemithorax caused compressive collapse of left lung and deviation of the heart and mediastinum to the right side. Right lung was compromised by the pressure effect of the above mentioned space occupying lesion. The mass caused compression of mediastinal great vessels and also bulged through the intercostal spaces. Multiple cystic changes inside the mass were also demonstrated (Fig. 3).

He was decided to have surgery as the first option. Exploratory thoracotomy revealed a large mass that adhered to the heart and mediastinal structures, so that its complete removal was impossible. The mass was resected partially and a chest tube was inserted to drain pleural effusion.

At first, because of his poor condition, empirical chemotherapy including vincristin, cisplatin, cyclophosphamide, etoposide and
dexamethason was started. The pathology report was consistent with the diagnosis of PPB (type II). Chemotherapy protocol consisted of ifosfamide 1 gr/m^2 with Mesna on day 1 to 3, vincristine 1.5 mg/m^2 on day 1, adriamycin 50 mg/m^2 on day 1, alternated with vincristine 1.5 mg/m^2 on day 1, actinomycin-D 15 mcg/kg on day 1, and cyclophosphamide 750 mg/m^2 on day 1 for 8 courses was started for her. She also received alpha interferone because of, the pathology report which showed some component of hemangiendothelioma in some sections. The patient had significant improvement. Currently after 5 years, the patient is alive and healthy under continuous follow-up.

**DISCUSSION**

PPB in children differs from the pulmonary blastoma observed in adults because of its variable anatomic location.

It presents most commonly with symptoms that are often mistaken for a lower respiratory tract infection, such as massive pleural effusion with pneumonia like our cases. Tumors including rhabdomyosarcoma, PNET, and lymphoma are the most important differential diagnoses.

The first case was treated for pneumonia and her tumor easily misdiagnosed due to the rarity of its occurrence. After suspicion to malignancy the patient was treated empirically based on the tumor site based on PNET chemotherapy protocol because of her critical condition. Final diagnosis should be provided by histopathological examination and immunohistochemistry. In our cases, complete assessment to exclude other differential diagnosis was done.

Surgery is the preferred mode of treatment, often with postoperative adjuvant chemotherapy and/or radiotherapy.

The surgical procedure of choice for PPB is lobectomy because the limit between the lesion and normal parenchyma may be difficult to determine grossly [1]. Chemotherapy is an effective modality of PPB treatment before or after surgery [3].

Ozkaynak et al. [4] in 1990 reported two pediatric cases in which combination chemotherapy consisting of vincristine, actinomycin-D, cyclophosphamide, cisplatin, and adriaycin was successfully used. The first case was, a 5-year-old boy, underwent incomplete surgical excision of the tumor followed by a 104-week course of combination chemotherapy. The second case was a 3-year-old boy who was initially treated with combination chemotherapy that resulted in an objective response; and then underwent surgical excision [4].

Also Lobo-Sanahuja et al. [5] in 1996 used a preoperative combination chemotherapy consisting of cisplatin, etoposide alternating with ifosfamide with mesna, vincristine and epirubicine resulted in an objective response that permitted subsequent safe surgical excision of the primary tumor.

These reports demonstrate intensive combination chemotherapy is effective in inoperable tumors as initial therapy in addition to the surgical adjuvants. We used intensive adjuvant chemotherapy because of delayed on initiation of treatment [3].

In the first case, the prognosis was worse because the tumor was huge on presentation and patient had delay of starting chemotherapy. Unfortunately, she couldn’t receive complete chemotherapy regimen or radiotherapy [6].

These cases highlight the importance of excluding a malignant cause for a pleural effusion, even in young adults. In these situations, PPB should be considered as a differential diagnosis [7].

PPB is an aggressive tumor with poor outcome. However, correct diagnosis and on time treatment may be effective in longer survival. Intensive multimodal treatment regimens including aggressive surgery and risk adjusted chemotherapy is a necessity for reducing mortality.

We believe intensive combination chemotherapy should be used as the initial management of children with advanced PPB, in addition to surgery. Alternative treatment modality such as radiotherapy as adjuvantive therapy, especially in cases with high risk of recurrence may be useful.

**CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

**ACKNOWLEDGMENTS**

Our sincere thanks go to Dr. Saeedeh Haghbin, affiliated to Shiraz University of Medical Sciences, for copy editing and improving the use of English in the manuscript.

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