

Unilateral congenital pulmonary lymphangiectasia in a preterm infant

Linfangiectasia pulmonar congénita unilateral en un neonato prematuro

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Recibido: 02-02-2018; Aceptado: 17-05-2018

Abstract

Unilateral congenital pulmonary lymphangiectasia (CPL) is an extremely rare disease of the pulmonary lymphatic vessels. **Objective:** to present a case of CPL in a premature newborn. **Clinical case:** premature male newborn with severe respiratory failure at 2 hours of extrauterine life was treated with exogenous surfactant, catecholamines and high frequency oscillatory ventilation (HFOV). Chest computed tomography (CT) scan showed bullae and air trapping of the left lung; the histopathological study showed cystic dilation of the bronchoalveolar lymphatic channels. The diagnosis of secondary unilateral CPL was made. The clinical course up to 19 months of age was normal and the chest CT scan showed few emphysematous bullae. **Conclusions:** CPL must be one of the differential diagnoses in neonates with unexplained respiratory distress. The prognosis will depend on the type of CPL and lung involvement

Keywords:

Lymphangiectasis;
pulmonary;
congenital;
premature;
prognosis

Introduction

Congenital pulmonary lymphangiectasia (CPL) is a rare vascular defect of unknown etiology^{1,2}. The main characteristic for the diagnosis is the dilatation of the lymphatic vessels in multiple areas of the lung, which include the subpleural, interlobar, perivascular, and peribronchial regions^{3,4}. It was originally described by Rudolf Virchow in 1856. The incidence of CPL is difficult to estimate since there are only publications of case reports and small series of cases. Autopsy studies suggest that approximately 0.5-1% of newborns who died in the neonatal period had CPL⁶⁻⁸. Generally, in the CPL both lungs are affected and have a poor prognosis with a mortality rate of 50-98%^{8,9}. Unilateral presentation is extremely rare, only few cases have been reported, it has a better prognosis and sometimes it has a spontaneous resolution¹⁰⁻¹². In both presentations, newborns present severe respiratory failure in the first hours of life and require support with conventional mechanical ventilation and in some cases with high-frequency oscillatory ventilation (HFOV)¹³.

In this report we describe the case of a preterm newborn with unilateral CPL, histologically confirmed, treated conventionally with exogenous surfactant, mechanical ventilation and with satisfactory clinical evolution.

Clinical Case

Male newborn of 33 weeks of gestational age, delivered by cesarean section due to maternal sepsis. 19-year-old mother who died in the immediate puerperium due to severe sepsis, with no history of consanguinity. The pregnancy was monitored, and three ultrasound reports during pregnancy showed no signs of hydrops (pleural effusion, pericardial effusion or ascites). The birth weight was 2090g, Apgar score was six at the first minute and six at fifth minute. The clinical examination showed no phenotype that could suggest genetic syndrome. Two hours after birth, the newborn presented tachypnea and cyanosis with acute respiratory distress. He was treated with rescue exogenous surfactant due to the presence of signs and symptoms of respiratory distress syndrome; catecholamines, antibiotics, and mechanical ventilation for 22 days; conventional ventilation with 16 cm H₂O maximum mean airway pressure, followed by HFOV due to respiratory acidosis and refractory hypoxemia (pCO₂ 75 mmHg and pO₂ 45 mmHg).

The chest X-ray showed reticular infiltration in both lungs and lung distension without consolidations (Figure 1). The chest CT scan showed reticular changes in all areas, interstitial thickening, multiple bullae and

air entrapment in the left lung, as well as right-sided pneumonia (Figure 2). The presence of lymphangiectasia in other organs was dismissed through abdominal CT scan. Lung biopsy was performed and, for indication of pediatric surgery, left lower lobectomy. In the histopathological study, a cystic dilation of the bronchovascular lymphatic channels was observed (Figure 3). Through echocardiography, ventricular septal defect (VSD) and patent ductus arteriosus (PDA) were diagnosed and surgically corrected at 30 days of age. The evolution was satisfactory, the pediatric follow-up at 19 months of age reported appropriate weight and height for his age, normal psychomotor development without infectious symptoms of the lower respiratory

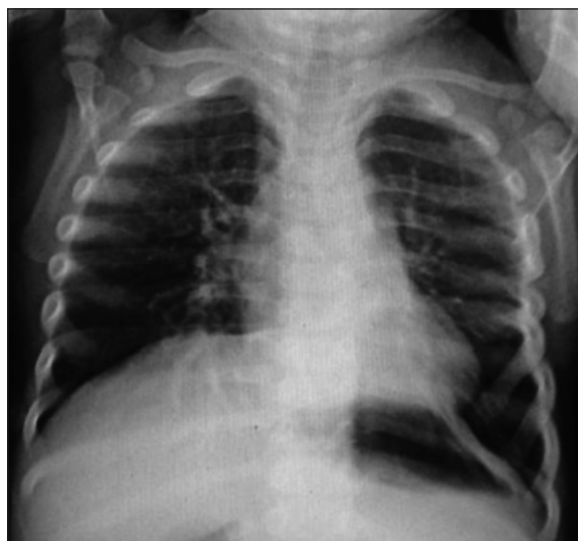


Figure 1. Chest radiograph shows lung distension with interstitial infiltrate.

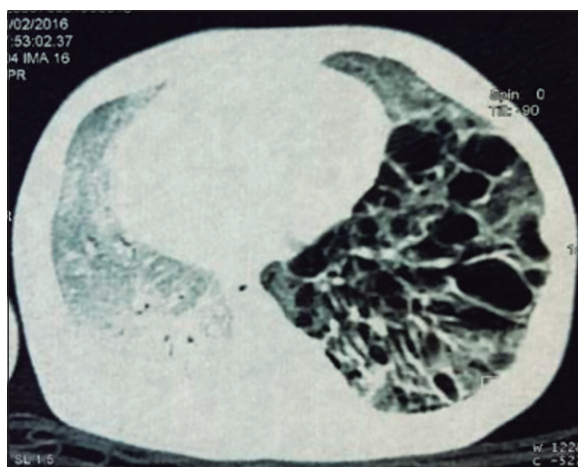


Figure 2. Computed tomography shows thickening of the interstitium, multiple emphysematous bullae, air entrapment and hyperinflation of the left lung and right pneumonia.

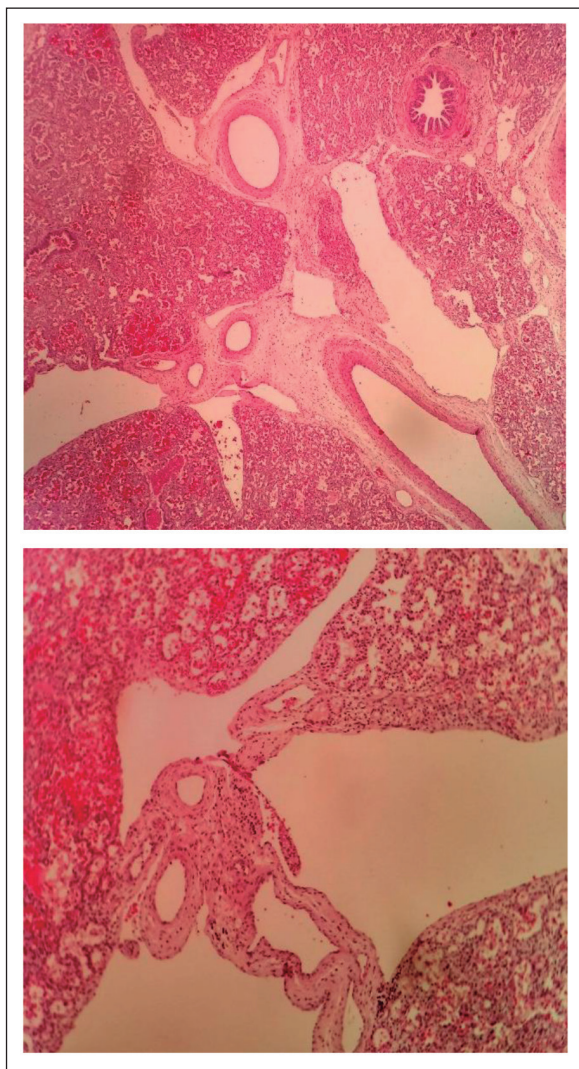


Figure 3. Hematoxylin and eosin stain, image at 40 magnifications shows pulmonary tissues with hemorrhage and cystic dilatation of the bronchial vascular lymphatic channels.

tract and did not require supplementary oxygen; the chest CT scan indicated interstitial thickening, small diffuse emphysematous bullae and improvement compared to the initial CT scan (Figure 4).

Discussion

CPL is characterized by a dilatation of the pulmonary lymphatic vessels, its etiology is unknown but is probably a pathology with maternal-fetal environmental factors¹⁴. The pulmonary lymphatics vessels are well developed at the end of 14 weeks of gestation and the lymphangiectasia is a secondary dilatation of previously normal lymphatics vessels¹⁵. The main hypothesis is the failure in the normal regression of the

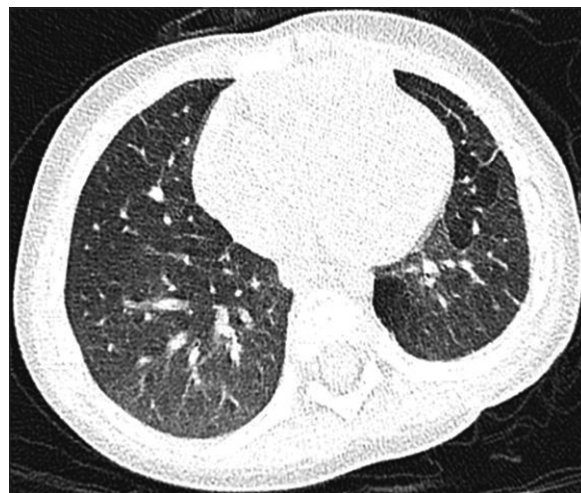


Figure 4. Computed tomography taken at 19 months of age shows generalized interstitial thickening and small emphysematous bullae in the left lung.

pulmonary lymphatics vessels in the fetus after the week 18-20 of gestation, and this can lead to CPL¹⁶. It has also been associated with congenital heart diseases with increased lymphatic circulation that contributes to the lymphatic dilatation, such as total anomalous pulmonary venous drainage, pulmonary stenosis and mitral stenosis, hypoplastic left heart syndrome, cor triatriatum, pulmonary vein atresia, and atrioventricular canal defects^{17,18}. Although it is mostly a sporadic presentation, an autosomal recessive genetic etiology with intrafamilial variability has also been described in the LPC. Some cases have been described in association with genetic disorders, such as the Noonan, Down, Turner, Fryns, and Ullrich-Turner syndromes¹⁹.

The CPL has gone through several classifications by different authors in recent decades, the first classification of vascular malformations was proposed by Virchow in 1863 and was described as simple hemangioma, cavernous hemangioma, racemosum hemangioma, and lymphangioma⁵. In 1970, Noonan et al. divided CPL into three types: generalized (lymphedema with intestinal lymphangiectasia), secondary (pulmonary hypertension or venous obstruction), and primary (primary pulmonary development deficiencies)²⁰. In 1978, Wagenaar et al. classified two types of CPL: primary and secondary with three subtypes of the primary type: limited to the lung with lung and mediastinum involvement, and the generalized type²¹. In 2004, Esther and Barker proposed a classification system for the CPL and divided it into two categories: with primary manifestations (including generalized manifestations to organs or lungs and added to a syndrome or a genetic disease), and secondary manifestations that define those caused by the pulmonary or lymphatic

tic venous obstruction (cardiovascular obstruction), and acquired through other means (infection, surgery, radiation or tumors)¹⁷. The last classification was proposed in 1996 and updated in 2014 by the International Society for the Study of Vascular Anomalies (ISSVA), stratifying vascular anomalies as vascular tumors or vascular malformations, the last one includes venous and lymphatic malformations such as CPL²².

According to the classification proposed by Esther and Barker, our patient presented secondary pulmonary lymphangiectasia due to lymphatic obstruction. We considered that the congenital heart disease (VSD and PDA) was not a causative factor of CPL, especially since it could be part of the natural history in a preterm newborn. The CPL of the left lung was probably secondary to an obstructive process of the lymphatic system. The normal lungs have two interconnected lymphatic systems: the superficial one that drains into the subpleural space and the external surface of the lung and a deep system of lymphatic channels that extend into the interlobular septa and along the bronchovascular bundles. Both systems of lymphatic vessels drain into the hilum and then form the bronchomediastinal trunk that extends along the trachea and drains into the large lymphatics systems (thoracic duct) or directly into the brachiocephalic veins^{17,23}.

The clinical presentation of our case is similar to other published reports: no significant history, preterm newborn with severe respiratory insufficiency and difficulty after a few hours of life and who received supportive treatment. The supportive treatment for CPL consists of drainage of pleural and peritoneal effusions, intubation within the first hours of life, conventional mechanical ventilation and HFOV in cases of severe hypoxemia; for neonates with persistent pulmonary hypertension, nitric oxide and oxygenation with extracorporeal membrane are indicated^{24,25}. Surgical resection may be indicated in some cases of CPL^{26,27}. Treatment with pneumonectomy has only been described in a newborn of 39 weeks of gestation with right-sided pulmonary lymphangiectasia and refractory respiratory insufficiency to the conventional treatment. The authors concluded that pneumonectomy can be considered for cases with unilateral CPL, with respira-

tory insufficiency that is difficult to control and with a high probability of survival²⁸.

After one year of age, the clinical evolution of the presented case was satisfactory, which is very important, especially since most of the cases described with CPL died during the neonatal period.

Conclusions

The CPL must be one of the differential diagnoses in neonates with unexplained respiratory distress, the prognosis will depend on the timely treatment of the newborn respiratory distress syndrome, the type of CPL and the severity of lung involvement.

Ethical responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Financial Disclosure

Authors state that no economic support has been associated with the present study.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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