

Neonatal intrathoracic neuroblastoma: unusual presentation with haemothorax

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Abstract

Thoracic neuroblastomas are rare in the neonatal period. They may be asymptomatic or cause respiratory distress. Congenital haemothorax present at birth, as the result of intravascular disseminated coagulopathy, is an uncommon initial presentation of intrathoracic neuroblastomas.

Keywords

Intrathoracic neuroblastoma, haemothorax, newborn, disseminated intravascular coagulation.

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Introduction

Neuroblastoma is the most common solid tumor in newborns and the most common extracranial tumor in infancy [1-3]. It is most frequently located in the adrenal gland, intrathoracic lesions being very rare in this age group [3]. Clinical manifestations depend on the primary location of the tumor

and the extent of metastatic disease. Thoracic neuroblastomas may be asymptomatic and detected incidentally on radiographs, or cause respiratory distress. Haemothorax and coagulopathy are unusual presentations.

Case report

The authors report the clinical case of a full-term female, born by vaginal delivery. She was the second child of non-consanguineous parents. Pregnancy was complicated by diabetes controlled with diet, and no other antenatal problems were reported. Third trimester ultrasound was normal and routine serological workup was negative. Labour was unremarkable. Apgar scores were 10 at 1 and 5 minutes and birth weight was 3.245 kg.

Within an hour after birth, she developed progressive respiratory distress, hypoxemia and metabolic acidosis requiring mechanical ventilation and bicarbonate.

On physical examination she presented a heart murmur and hepatomegaly, and was transferred to a level III intensive care unit with suspected cardiopathy. No skin lesions were noted.

At admission she had a sudden cardiac arrest requiring resuscitation manoeuvres. Chest radiograph revealed opacity of the right hemithorax, firstly interpreted as a unilateral chylothorax (Fig. 1). A chest tube was placed with continuous blood drainage, after confirmation of a large volume pleural effusion by thoracic echography.



Figure 1. First chest x-ray: opacity of the right hemithorax.

Initial blood analysis revealed 8.6 g/dl haemoglobin, 25% haematocrit, white cell count of $27.54 \times 10^9/L$, a platelets count of 153,000, creatinine of 1.6 mg/dl and a negative C reactive protein (CPR). Olyguria installed at birth.

The 2D-echocardiogram was normal and cranial ultrasound showed a grade IV intraventricular haemorrhage. A chest ultrasound identified a solid right paravertebral, supradiaphragmatic hypoechoic lesion and thoracic computed tomography (CT) confirmed a right paravertebral mass (about 37 x 49 mm) that may correspond to a hematoma or some cystic lesion. The abdominal CT revealed hepatomegaly, signs of global hypoperfusion, bilateral renal infarction, but no masses (Fig. 2).

The newborn developed severe hyperkalemia unsuccessfully treated with insulin perfusion and bicarbonate, and maintained persistent systemic hypotension despite inotropes.

Newborn's clinical condition further deteriorated over the next few hours. Despite multiple packed red blood cells, platelets and fresh frozen plasma transfusions, she presented severe anemia (Hb 6.8 g/dl), thrombocytopenia (platelets 45,000/ m^3), and coagulopathy (prothrombin time 153,4 s, activated partial thromboplastin time > 180 s, fibrinogen < 10 mg/dl). She died within 48 hours after birth. Blood cultures were negative.

Autopsy findings revealed a right paravertebral thoracic tumour (5.5 x 4.5 cm), without relation to the lung. Histologically, a diffuse pattern with blue round small cells was observed, with mild atypia and extensive necrosis. The immunohistochemical study revealed strong and diffuse reactivity of the



Figure 2. Thorax and abdominal computed tomography (CT): paravertebral tumor.

neoplastic cells for CD56. No metastases were found. There was evidence of multiple visceral haemorrhagic necrosis, haemopericardio (4 ml), haemoperitoneum (3.5 ml), and brain haemorrhage.

The tumour was histologically classified as a neuroblastoma.

Discussion

Neuroblastoma is an embryonic tumour of primitive neuroblasts and can arise anywhere throughout the sympathetic nervous system, including brain, cervical region, posterior mediastinum, para-aortic sympathetic ganglia, pelvis and adrenal medulla [4]. About 40% of patients are younger than 1 year when diagnosed, 35% are aged 1-2 years, and 25% are older than 2 years [5]. More than 90% of congenital neuroblastomas are located in the adrenal gland [6, 7]. Male-to-female ratio is 1.2:1 [4, 5].

Its molecular basis remains largely unknown. The majority arise sporadically; 1-2% of the cases have a family history [5]. The common use of obstetrical ultrasonography has increased prenatally detected neuroblastomas [7].

Signs and symptoms of neuroblastoma vary with site of presentation. Abdominal neuroblastomas may present with abdominal pain, abdominal mass and hepatomegaly. Some authors reported intrathoracic neuroblastoma presenting with respiratory symptoms and needing respiratory support [2, 8]. Nakwan and Smathakanee described a case of associated persistent pulmonary hypertension [3]. Mediastinal tumours may also cause tracheal deviation, Horner syndrome and superior vena cava syndrome.

Many cases are diagnosed on incidental chest X-ray [2]. When a thoracic mass lesion is identified on a newborn's chest X-ray, neuroblastoma must be considered in the differential diagnosis.

In neuroblastoma, bleeding can be due to pancytopenia from bone marrow infiltration. In our case, necropsy findings failed to show any metastasis disease.

Nevertheless it is rare to find neuroblastoma as a cause of neonatal haemothorax. Minola and Gambacorta have reported a case of massive haemothorax caused by the rupture of a thoracic neuroblastoma; in our case the tumor had no relation to the lung [9]. The newborn was submitted to resuscitation manoeuvres. We can hypothesize that these resuscitation manoeuvres may lead to an intratumoral haemorrhage and haemothorax.

Despite being rare, coagulation disorders, such as disseminated intravascular coagulation (DIC), may be associated to metastatic neuroblastoma [6, 10]. Of the 16 patients with advanced neuroblastoma reviewed by Scott and Morgan, 4 had major haemorrhagic or thromboembolic complications and all with active metastatic disease, had abnormal coagulation screening tests [11].

Vora et al. reported 2 cases of congenital neuroblastoma, one of which developed haemoperitoneum and the other visceral haemorrhages secondary to DIC [6].

DIC is a systemic process producing both thrombosis and haemorrhage and results from a massive activation of the clotting cascade. The causes of DIC in patients with cancer may include infections or be related to the tumor itself. The mechanisms leading to cancer-related DIC are unclear. Some of these mechanisms may include: procoagulant factors (tissue factor and cancer procoagulant) released by the tumour and the injured endothelial cells, high levels of fibrinolytic inhibitor PAI-1 and proinflammatory cytokines such as tumour necrosis factor and interleukin-1b, 6 and 8, as it has been described in other tumors in children [12]

In our case, although fibrin split products weren't measured, thrombocytopenia, hypofibrinogenemia, the others abnormal coagulation results and clinic manifestations, all favoured DIC. Autopsy findings confirmed generalized haemorrhage. As there was no evidence of infection, we assume that the DIC was secondary to the tumor.

The authors report this clinical case to highlight an uncommon cause of congenital haemothorax as the presentation of an overwhelming DIC associated to a thoracic neuroblastoma.

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Declaration of interest

The Authors declare there is no conflict of interests regarding the publication of this article.

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