CASE REPORT

RJME
Romanian Journal of Morphology & Embryology
http://www.rjme.ro/

Vertical transmission of HIV/TB in newborns: a case report

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Abstract

We are presenting the case of a 19-day-old newborn with HIV-seropositive mother, under antiretroviral treatment since birth, who is admitted in the ICU (Intensive Care Unit) of the 1st Pediatric Clinic at the Emergency County University Hospital in Craiova, Romania, in critical general condition, with severe respiratory insufficiency. The examination of the tracheal and bronchial secretion revealed positive BK (bacillus of Koch). We considered it was an HIV/TB co-infection, the tuberculostatic treatment was instituted, but the evolution was towards exitus in the 11th day after admission.

Keywords: HIV, tuberculosis infection, opportunistic infection.

Introduction

Preventing the transmission of the HIV infection from mother to child begins with a compulsory screening of pregnant women. This screening is more efficient when the antiretroviral medication is administered to the woman during the pregnancy, continued during labor and administered to the newborn after birth [1].

The tuberculosis infection, included in 1993 among the diseases that indicate the infection with the Human Immunodeficiency Virus (HIV) is, at world level, the most frequent opportunistic infection and the main cause for death in patients with HIV. This association is present in the endemic regions of Africa and Asia, with a continuing rise of incidence in developed countries, especially due to population migration [2]. In some countries with high HIV prevalence, up to 80% of persons with positive BK (bacillus of Koch) present a positive HIV test. Overall, approximately 30% of the persons infected with HIV are estimated to have a latent TB (tuberculosis) infection. In 2008, there was an estimated 1.4 million new TB cases among persons with HIV infection [3].

HIV/TB co-infection constitutes a risk factor both for the mothers and for the newborns, the latter category usually presenting increased rates of prematurity, low birth weight and intrauterine growth restriction [4]. Furthermore, the mortality rate of newborns with HIV/TB co-infection is one to six times higher at birth in comparison to normal maternal status [5].

Materials and Methods

The authors are presenting the case of a 19-day-old female newborn, who is admitted in the ICU (Intensive Care Unit) of the 1st Pediatric Clinic at the Emergency County University Hospital in Craiova, Romania, for fever, spastic cough, cyanosis and respiratory difficulties that had the onset five days prior.

We carried out paraclinical explorations – biological and biochemical (complete blood count, glycemia, urea, creatinine, transaminases, acid-base balance, ionogram, O_2 saturation, INR – international normalized ratio, prothrombin time, aPTT – activated partial thromboplastin time); tests specific for the diagnosis of HIV and TB (anti-HIV-1/2 reactivity and analysis of the tracheal and bronchial secretion for the BK); cardiopulmonary radiography, pediatric surgery examination and adequate therapy (antibiotic, antiretroviral, tuberculostatic).

The material sampled from the lungs, after the death of the patient, was subjected to histopathological examination through the classic method of paraffin inclusion, followed by Hematoxylin–Eosin (HE) staining, after it was fixed in a 10% formaldehyde solution.

Results

The patient, M.I., aged 19 days, presented, upon admission, fever, inefficient spastic cough, perioronasal and peripheral cyanosis, as well as severe respiratory insufficiency. The symptoms had appeared five days prior, and included sub-feverish state, frequent spastic cough, feeding difficulties; she was admitted in the Slatina County Hospital, Romania, where she received treatment with Cefort, Gentamicin, Hydrocortisone hemisuccinate, and oxygen therapy.

The child was born to an HIV-seropositive mother and has been under adequate antiretroviral treatment since birth. The mother was registered in the 4th month of pregnancy, and she presented premature uterine contractions in the 7th and 8th months. The birth began spontaneously at 38 weeks of gestation, with cranial presentation and opalescent amniotic fluid. The weight of the infant at birth was 2680 g, height 46 cm, HC (head circumference): 31 cm, TC (thoracic circumference): 30 cm, AC (abdominal circumference): 29 cm, the APGAR score at one minute and five minutes was 8. The patient was administered the AHB and BCG vaccines in the maternity ward, she presented physiological jaundice and received artificial feeding.

Physical examination on admission: critical general conditions, fever, perioronasal and peripheral cyanosis, spastic cough, tachypnea with marked intercostal and subcostal recession, nasal flaring; pulmonary auscultation findings: diminished vesicular murmur, disseminated crepitant and subcrepitant rales bilaterally; meteoric abdomen, grade I hepatomegaly, abolished archaic reflexes, lack of reactivity to pain stimuli.

The pediatric surgeon's examination reveals a spontaneous right-sided pneumothorax – resolved through right-sided pleural drainage.

The infant is in severe conditions, thus orotracheal intubation and assisted ventilation are performed.

We instituted a therapy with Meronem+Targocid, intravenous perfusion, isogroup, iso-*Rhesus* red blood cells, symptomatic drugs, and antiretroviral treatment.

The first investigations carried out revealed modifications of the CBC, of the ionogram and of the acid-base balance (ASTRUP parameters) (Table 1).

Table 1 – ***Preliminary paraclinical data***

Parameter	Value
Hemoglobin	10.6 g/dL
Platelets	20 000/mm^3
Leucocytes	13 000/mm^3
Red blood cells modifications	2 oxyphilic erythroblasts/100 elements and anisocytosis ++
Na	160 mmol/L
K	2.9 mmol/L
pH	6.9
pO_2	54.4 mmHg
SO_2	88.3%
Lactic acid	3.3 mmol/L
Glycemia	177 mg/dL

The INR was 1.21, the prothrombin time was 65%, and the aPTT was 41 seconds. As we can observe, the data indicated anemia, thrombocytopenia, leukocytosis and metabolic acidosis.

The pulmonary radiograph revealed the presence of micronodular, non-uniform opacities, disposed in both lung fields (Figure 1).

The test for anti-HIV-1/2 reactivity revealed seropositivity, and the examination of the tracheal and bronchial secretion, carried out the 2nd day after admission, revealed positivity for acid-alcohol resistant bacilli (positive AARB). The patient then underwent antibiotic treatment (Sulcef, Meronem, Targocid), antiretroviral treatment (Retrovir and Epivir), as well as tuberculostatic treatment (Isoniazid, Rifampicin, Tyrosinamide, Streptomycin 7/7). We also instituted fluid and electrolyte and acid-base rebalancing treatment, as well as repeated transfusions of isogroup, iso-*Rhesus* red blood cells and platelets. The severe conditions of the patient were maintained throughout the entire period, with limited response to the therapy administered, and on the 11th day from admission, she died.

The lab tests carried out on the mother revealed a viral load of 5 478 000 copies/mL, with a number of CD4 cells of 184 cells/mm^3, while the newborn had a viral load of 4 250 000 copies/mL and a number of CD4 cells of 673 cells/mm^3.

The histopathological analysis revealed the presence, in the lungs, of an acute purulent inflammation, with numerous intact and degraded polymorphonuclear cells in the alveolar spaces and the bronchial lumen (Figure 2).

We could also observe the presence of giant cells that presented a diameter of 78 μm, abundant cytoplasm and numerous nuclei (Langhans cells), and were surrounded by scattered epithelioid cells (Figure 3).

The sections investigated revealed areas of eosinophilic necrosis of granular nature, infiltrated by acute inflammatory elements (Figure 4).

The stasis of the capillaries in the alveolar septa and the edema and the scaling of the bronchial cells completed the histopathological panel. The panel described was compatible with tuberculous bronchopneumonia.

From a macroscopic point of view, the lungs did not present crepitations; they were dense when palpated, and on the section surface one could observe areas of slightly non-homogenous aspect, with reddish and brown patches alternated to yellowish granular areas, as well as the expression of a whitish-yellowish material in the parenchyma.

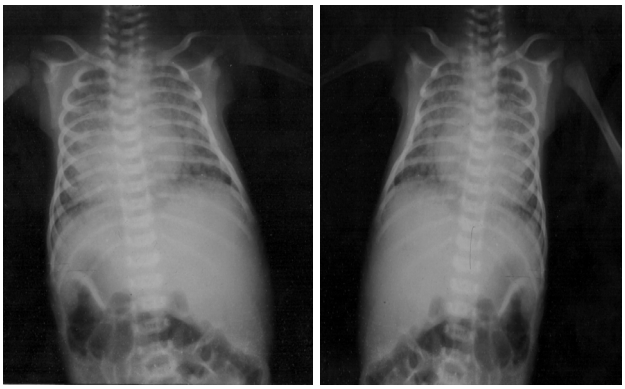

Figure 1 – ***Micronodular opacities in both lung areas.***

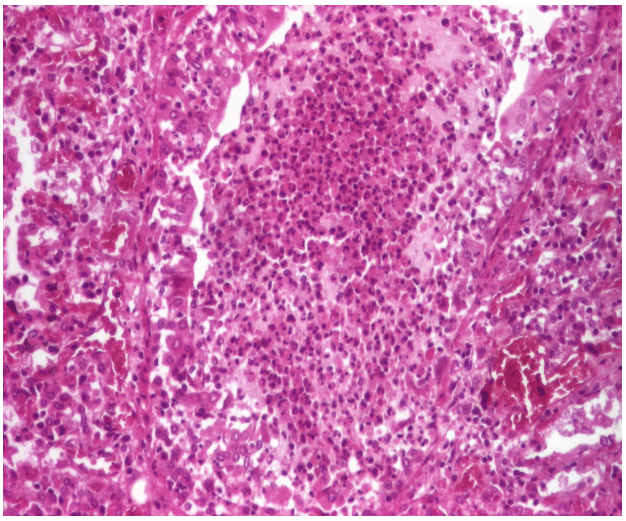

Figure 2 – ***Acute bronchoalveolar purulent inflammation, HE staining, ×100.***

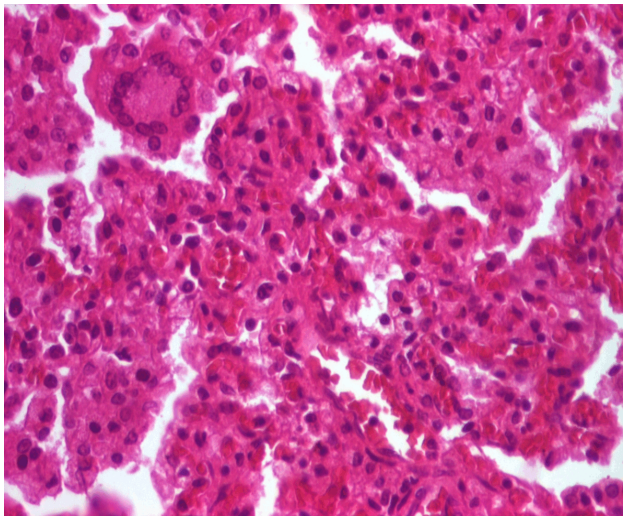

Figure 3 – ***Langhans multinucleated giant cells, HE staining, ×200.***

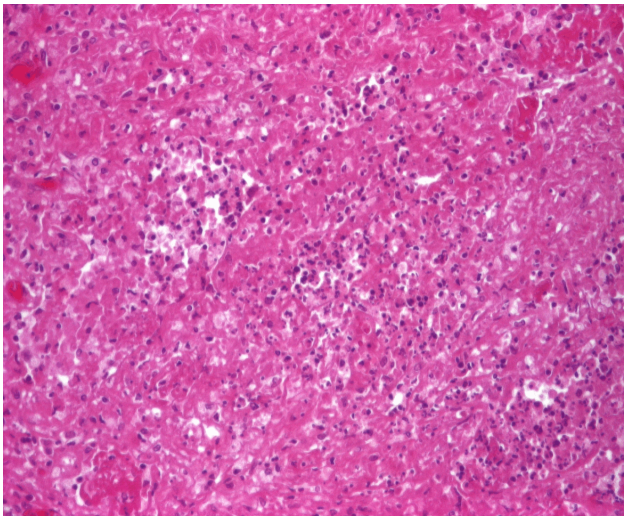

Figure 4 – ***Area of necrosis with acute inflammatory infiltrate, HE staining, ×100.***

Discussion

Our case presents two diagnosis issues: vertically transmitted HIV infection and the association of the TB infection.

Although tuberculosis associated to HIV represents a relatively frequent aspect in endemic areas, in our country this association in newborns is rare. The rate of vertical transmission of tuberculosis and HIV in the newborns, in endemic areas, is respectively 16% and 25–40% [6, 7].

The diagnosis of perinatal tuberculosis is relatively difficult, because the tuberculin skin test is often negative (up to 80% of the cases), while symptoms are non-specific and include fever, dyspnea, asthenia [2, 3, 8]. The diagnosis in such cases is based on the lack of efficiency of the antibiotherapy, pleural and pulmonary radiographs and microbiological examination [9].

In the case under study, the initial symptoms were non-specific, and the diagnosis was based on the lab tests specific for HIV and TB, taking into consideration the HIV+ history of the patient's mother.

In most cases, there are pulmonary radiological modifications, in 50% of the cases miliary granulations are identified [10]. The pleural and pulmonary radiography of our patient was suggestive of the aspect of tuberculous bronchopneumonia.

The mortality rate in TV (*Trichomonas vaginalis*)-positive, HIV-seronegative newborns proved to be high in most studies [6, 11, 12]. Nonetheless, there are authors who show that a carefully applied therapeutic management can reduce this rate to values close to zero [10].

In a study carried out by Pillay *et al.*, in 2004, on a group of 107 pregnant women diagnosed with tuberculosis, it was observed that the vertical transmission was independent from the HIV status or other obstetric comorbidities [4]. In another study, which investigated the prevalence of the TB infection in newborns, Lyon *et al.* observed a considerably higher rate of mycobacterial infection in HIV-positive patients, as compared to seronegative patients [13]. Although there is insufficient proof in the literature to directly associate neonatal tuberculosis to the HIV-positive status of the mother, in the case we investigated both infections proved to be vertically transmitted.

In another prospective study, carried out on a large cohort of HIV-positive newborns, Pillay *et al.* have showed that such patients manifest, during the neonatal period, elevated risks for co-infections, rapidly progressive immunodeficiency and death [14]. The risk factors for vertical transmission of the HIV infection proved to be the high level of viremia, chorioamnionitis, and exposure to mother's blood during delivery, while, according to many studies, the colostrum and mother's milk are vectors of the infection [5, 7, 15, 16].

Conclusions

Sustained efforts are necessary, in order to educate mothers with regard to the importance of biological screening during the pregnancy. HIV-positive mothers should become aware of the risk of fetal transmission and should undergo specific antiretroviral treatment during the pregnancy. Children born to HIV+ mothers should be tested for tuberculosis.

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Received: January 23, 2014

Accepted: December 19, 2014