Case Report

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Severe Intracranial Hemorrhage in a Newborn with Autosomal Recessive Polycystic Kidney Disease

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Autosomal recessive polycystic kidney disease (ARPKD) is an autosomal recessive inherited developmental kidney disorder characterized by bilateral cystic dilatation of renal collecting ducts. The liver is always affected, with various degrees of biliary dysgenesis and periportal fibrosis. Intracranial aneurysms (ICA) can be associated with autosomal dominant polycystic kidney disease (ADPKD) in 5-10% of the cases, but extremely rarely with ARPKD.
We described a full-term male infant with ARPKD born with an extremely distended abdomen and anuria. Bilateral nephrectomy and open liver biopsy were performed during the first month of hospitalization, as well as the insertion of a peritoneal dialysis catheter. On the 59th day of life, the baby`s condition abruptly deteriorated and he showed a decreased level of consciousness, coma (GCS=3), and severe anemia. Head ultrasound and head CT scan revealed large hemorrhage in the left cerebral hemisphere. Hemostasis parameters, as well as clinical and laboratory signs of infection, were in referral ranges at the time of neurological deterioration. MRI showed large hemorrhages in the left ventricle and left cerebral hemisphere but a preexisting intracranial aneurism (ICA) in the site of hemorrhage could not be diagnosed for sure. The baby died on the 66th day of life.

Keywords: Polycystic Kidney, Autosomal Recessive; Intracranial Hemorrhages; Intracranial aneurysm; Newborn.

Running Title: Severe Intracranial Hemorrhage in Autosomal Recessive Polycystic Kidney Disease.

Introduction

The infantile type of polycystic kidney disease is an autosomal recessive inherited developmental kidney disorder characterized by bilateral cystic dilatation of renal collecting ducts. The estimated incidence is 1:10000 to 1:40000 live births [1,2]. The pathogenesis of this condition is not clearly understood.

The liver is always affected, with various degrees of biliary dysgenesis and periportal fibrosis [3,4]. At birth, the newborn presents with Potter facies, enlarged kidneys, and breathing difficulties (due to pulmonary hypoplasia and atelectasis - 75%). Milder forms of the disease may sometimes occur with arterial hypertension and progressive renal failure [5].

Intracranial aneurysms (ICA) can be associated with autosomal dominant polycystic kidney disease (ADPKD) in 5-10% of cases, but extremely rarely with ARPKD. To our best knowledge, there are only three published cases of patients with ARPKD and ICA [6-8].

We present a newborn with ARPKD complicated by severe intracranial hemorrhage.

Case Report

A full-term male infant was born at 37th weeks' gestation to young, non-consanguineous, healthy parents with a negative family history for polycystic kidney disease. Kidney ultrasound of both parents was normal. Prenatal ultrasound at 36th weeks' gestation showed anhydramnios. Emergency cesarean section was performed. At birth, endotracheal intubation due to severe respiratory distress was done and mechanical ventilation was started. The baby was transferred to a referral Neonatal Intensive Care Unit (NICU). On admission, his abdomen was extremely distended, tender, and had marked venous drawing. The baby was anuric. Biochemical parameters were within referral ranges (Urea=8.1mmol/l, creatinine=174.0μmol/l, uric acid=716.0μmol/l, CCr=8.1ml/min/1.73m^2). Chest and abdominal X-ray revealed an extremely distended abdomen with an elevated diaphragm. Abdominal ultrasound showed hyperechogenic enlarged kidneys. On abdominal CT scan, both kidneys were enormously enlarged (106x73mm) with general hypodensity and poor corticomedullary differentiation.

On admission, mechanical ventilation was started as was conservative treatment of acute kidney injury. Bilateral nephrectomy and open liver biopsy were performed (on the 7th day of life) and a peritoneal dialysis catheter was inserted. Histopathological findings of the kidney confirmed ARPCKD. The histopathological findings of the liver showed irregular biliary ducts with sparse bile thrombi, cholangitis, and moderate periportal fibrosis. Mechanical ventilation, continuous ambulatory peritoneal dialysis, and other supportive measures were continued. The baby was extubated on the 44th day of life. On the 59th day of life, the baby's condition abruptly deteriorated (desaturation, bradicardia, arterial hypotension, apnea, coma (GCS=3), and severe anemia without hemostasis disorder). The baby underwent endotracheal intubation and mechanical ventilation was reintroduced with inotropic and vasopressor therapy and repeated blood transfusions. Brain MRI showed a large hemorrhage in the left cerebral hemisphere. TOF MRA showed pushing of the cerebral medial artery and its principal branches, as well as a preserved blood flow. OnA2 segment of the anterior choroidal artery, a single artery was detected (azygos variation or occlusion of one of the A2 branches of anterior choroidal artery) (Figure 1).

The baby died on the 66th day of life.

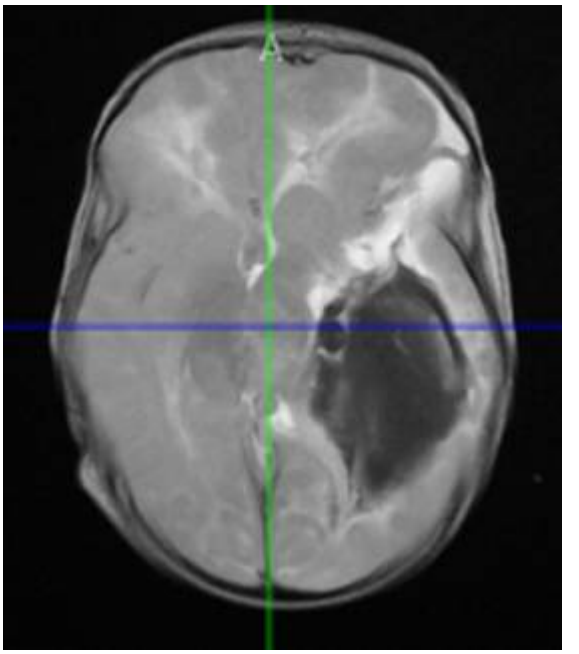

Figure 1. Brain MRI showed large hemorrhage in the left cerebral hemisphere.

Discussion

ARPKD is a rare disease that presents in early childhood and in some cases during neonatal period. The mortality of perinatal and neonatal disease is very high, as only 50% of patients with ARPKD and congenital hepatic fibrosis (CHF) survive the neonatal period [1,3]. ARPKD in our patient was diagnosed based on typical renal (ultrasound, CT, MRI, histopathology) and hepatic (histopathology) findings and normal kidney ultrasound of the parents.

Intracranial aneurysms (ICA) occur in 5-10% of the patients with autosomal dominant polycystic kidney disease (ADPKD) [9]. On the other hand, only three cases of ACI in patients with ARPKD have been published [6-8]. The risk of aneurysm rupture is the same as in the general population - 0.5-2%, but they occur earlier in life (10 years

earlier than the general population)if associated with ADPKD [10].

The exact mechanism of ICA development in ARPKD is unknown. Is an association of ICA and ARPKD in our patient a coincidence or patients with ARPKD have to be screened for ICA? Early ICA detection would ensure timely treatment. Hemostasis parameters in our patients, as well as clinical and laboratory signs of infection, were in referral ranges at the time of neurological deterioration. MRI was performed four days after this event, and large hemorrhages in the left ventricle and left cerebral hemisphere were detected; however, a preexisting aneurism in the site of hemorrhage could not be diagnosed for sure. The family history related to central nervous system and ICA was unremarkable.

Conclusion

Further examination is needed in order to determine the true incidence of ICA in ARPKD patients and its outcomes, and to decide whether neurological screening is needed in these patients, especially if unexplainable neurological symptoms develop.

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