

A rare occurrence of neonatal nephroblastoma in sub-Saharan Africa: a case report and management in a resource-constrained region

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Abstract

Neonatal nephroblastoma has been rarely reported in African neonate. A premature newborn (a 5-day-old male) was transferred with a history of neonatal abdominal mass. Ultrasonography revealed 75×46 mm, well-defined mass with mixed echogenicity replacing the right kidney. The patient underwent right radical nephrectomy and the tumor was confirmed to be a blastemal predominant Wilms' tumor by the histopathological examination and has an unfavorable prognosis. The child died secondary to multiple organ failure, three days after surgery. Our case report serves to remind us the need to bear in mind the possibility of the diagnosis of neonatal nephroblastoma in neonate with renal mass.

Introduction

Nephroblastoma or Wilms Tumor (WT) is the most common childhood kidney cancer worldwide. This renal tumor was first described by Max Wilms in 1899 and is a common malignant embryonic renal tumor of childhood.¹ This type of renal tumor is generally observed among children between 1 and 4 years of age, and has rarely been described in

infants less than 6 months of age.^{2,3} Nephroblastoma has been rarely reported in neonates. A case of neonatal nephroblastoma occurred in our institution (University Hospital of Kinshasa, Kinshasa, the Democratic Republic of Congo) and necessitated a literature review and a report.

Case Report

A 5-day-old boy was referred for assessment of neonatal abdominal mass and fever. His birth was through normal vaginal delivery. His elder brother and sister are alive and in good health. There was no family history of renal tumors or other cancers. His mother was a 35-year-old woman gravida 4 and para 2. There was two previous history of spontaneous abortion in the mother during the first trimester of pregnancy. Her pregnancy course was uneventful. However, no antenatal ultrasound screening was performed during pregnancy. The mother gave no history of febrile illness, drug or herbal plant utilization. No findings suggest a particular risk period or an environment exposure during mother's pregnancy. His father was a 40-year-old man and has no past medical history. At presentation in our center, the physical examination showed a premature neonate of 36 week's gestation calculated by Finnström criteria. Physical examination revealed distension of abdomen due to the large intraabdominal mass. No other visible defects was found. Full blood count demonstrated leukocytosis (8.2×10^9 WBC/L) with neutrophilia (5.74×10^9 /L), no monocytes (0%), hemoglobin was 16 g/dL (normal range: 13.5 to 24.0 g/dL) and moderate thrombocytopenia (platelets 63×10^9 /L). Bordet-Wassermann reaction, HIV and hepatitis serology were negative. Ultrasound of the abdomen revealed a predominantly cystic 75×46 mm right renal mass. The left kidney (56×22 mm) and the inferior vena cava were normal. The renal ultrasound was suggestive of nephroblastoma.

During his hospitalization, the child received blood transfusion due to severe anemia, but no chemotherapy.

Nephrectomy revealed a large primarily cystic right renal mass with no evident extracapsular extension and subcapsular hemorrhage within the tumor (Figure 1). There was apparently no residual tumor beyond the margins of excision. Kidney weighed 90 g. Histopathological examination demonstrated mesenchymal proliferation with many sites of microcysts. Layers of smooth muscle differentiation were also found in the predominant mesenchymal areas (Figure 2). Immunohistochemistry was not performed due to technical reasons. The diagnosis of blastemal predominant nephroblastoma was retained. Our child was

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not given postoperative radiotherapy and chemotherapy after surgical excision. Death three days after nephrectomy due to multiple organ failure.

Discussion

Nephroblastoma represents approximately 6% of all pediatric cancers and accounts for more than 95% of all tumors of the kidney in the pediatric age group. Approximately 75% of the cases occur in children less than 5 years of age with a peak incidence at 2 to 3 years of age.⁴ Neonatal Wilms tumor (WT) is a rare form of nephroblastoma with an incidence of 0.16%.⁵ Antenatal WT accounts for between 2-3% of nephroblastoma cases.⁵⁻⁸ The description of the disease in children less than 6 months of age is rare.^{3,6,9,10}

In sub-Saharan Africa, this pathology was not previously noted and our observation is the first description of neonatal nephroblastoma in our population.

The maximal frequency of the disease in pediatric population appears between 1 and 4 years of age with a peak incidence at 2 to 3 years of age. The age of presentation was slightly lower than usual in this patient, who presented at birth. Approximately twenty cases

in pediatric population could be found with the use of available computer-assisted medical literature search programs.^{3,5,6,10-12} Clinical and radiological features of our patient were similar of those described in the literature.^{4,8} Histopathological analysis was compatible with a nephroblastoma blastemal type as described in the literature.^{4,8} Diagnosis of nephroblastoma was made in context of low resources in Africa.¹³

With prenatal ultrasonography, the renal mass can usually be diagnosed in the first trimester of pregnancy. In the present case, no ultrasonography was performed during pregnancy. In this context, renal tumor was diagnosed in the delivery room in a resource-poor settings.

There was no familial history in our case. We have evoked the possibility of a sporadic mutation unknown because of the short time history of his disease and the antenatal development of the tumor. The genetic cause in our case is unknown and a screening of whole family should be necessary for a research of genetic study for a possible particular mutation. WT, whose pathogenesis was once thought to follow the same single-gene, has instead become a paradigm for genetic complexity.¹⁴ As for other types of pediatric nephroblastoma, the cause of congenital nephroblastoma remains unclear. However, previous studies showed that ten genes have been implicated in its development, most of which are associated with familial disease were reported.^{4,8} In patients with isolated WT, however, evidence for WT1 mutation exists in

only about 5% to 10% of the cases.⁴

This discovery was an important step in knowledge about the pathogenesis of the disease. Facilities for genetic and molecular studies are not readily available in most developing countries like Democratic Republic of Congo, this limits understanding of the genetic disorder underlining Wilms tumor in our context and environment.

Classic Wilms' tumor is composed of three types of cells undifferentiated blastemal, mesenchymal, and epithelial; although the occurrence of all three types in the same case is uncommon. Our case is a blastemal predominant Wilms' tumor, an unfavorable histology.¹⁵ A recent study showed that children with nephroblastoma blastemal type showed a high expression of minichromosome maintenance 2 (MCM2) by immunohistochemistry in nephrectomy specimens. MCM2 is a promising prognostic factor in WT treated according to the Society International d'Oncologie Pédiatrique (SIOP) scheme.¹⁶ Recent work has combined molecular, microscopic and epidemiologic observations in an attempt to identify biological subgroups of WT that may present distinct targets for therapeutic intervention.^{4,8}

In neonatal WT, no effective treatment guidelines have been established and chemotherapy is rarely indicated in neonates.⁴ In addition, chemotherapy, despite appropriate dose reduction, had significant morbidity and mortality in African experience.¹⁷ In our institution, the initial management was surgical when possible following by chemotherapy reg-

imen with Adriamycin, vincristine and actinomycine D. Radiotherapy could not be planned. This treatment is not available in the DRC. In addition, cytogenetic markers are not available. Facilities for genetic and molecular studies are not readily available in the Democratic Republic of Congo.

However, early surgery for this subset of tumors is recommended. In our case severe anemia had contraindicated an early nephrectomy. In addition, rapid progress of the renal tumor mass did not allow for nutritional build up in the first days of life. Death occurred three days after nephrectomy to an array of multiple organ failure. This situation is due to the lack of materials resources for post-operative care and the lack of standard guidelines for neonatal care in highly resource-scarce settings such as the DRC. The management of the electrolytes, hematological parameters and biochemical markers is difficult in the absence of the micromethods techniques for their dosage in this category of the population. The access to dialysis is limited because of its expensive cost. In addition, dialysis materials for neonates are not readily available in the specialized hospitals of the DRC.^{18,19}

Future perspective

An implementation of molecular and genetic laboratories is advocacy in tertiary institutions of the Democratic Republic of Congo to elucidate particular cases for a contribution to knowledge and progress of science in Tropical environment.



Figure 1. Renal mass after nephrectomy; the tumor was found to be encapsulate with no evident extracapsular extension.

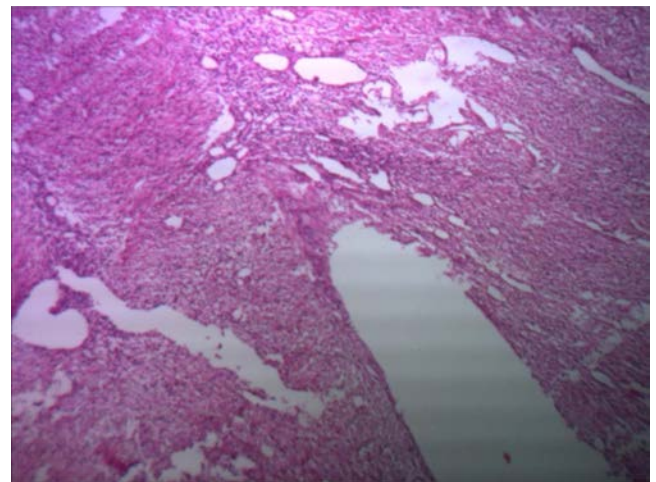


Figure 2. Microscopy examination of the kidney; histopathological examination demonstrated mesenchymal proliferation with many sites of microkysts.

Conclusions

Diagnosis of abdominal mass in children needs a fast and accurate exploration. Our case-report serves to remind us the need to bear in mind that Wilms' tumor should be considered in differential diagnosis of neonatal renal mass.

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