

Acute Tubular Injury from Toxic Nephropathy Presenting as Bilateral Renal Masses in A 16-month-old Child in Nigeria

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Abstract

Background: Renal masses in children often result from hydronephrosis, dysplastic conditions or malignancies. We present an unusual case of bilateral renomegaly caused by toxic nephropathy.

Case Presentation: A 16-month-old child was brought by the parents on account of bilateral flank swellings of three-week duration, associated with weight loss. There was positive history of regular use of herbal concoctions. Abdominal ultrasound revealed bilateral renomegaly with preserved renal architecture. Renal biopsy showed enlarged proximal renal tubules with vacuolations in the tubular cell cytoplasm with many small-sized vacuoles with normal glomeruli. An assessment of bilateral renomegaly (enlarged kidneys) with preserved architecture, probably from

toxic nephropathy was made. The child made remarkable improvement with conservative management resulting in progressive shrinking of the enlarged kidneys.

Discussion: This is an unusual presentation of bilateral renomegaly caused by the use of herbal concoctions. While the effect of herbal concoctions causing tubular injury have been described, we found no report of an association with significant renomegaly as was seen in this patient.

Conclusion: We have presented this case to alert clinicians as to this consideration in the differential diagnoses of renal enlargement in children in Nigeria.

Keywords: Renomegaly, Toxic nephropathy, abdominal mass, children, Nigeria.

Introduction

A palpable mass in the abdomen of a child is a serious condition and requires proper evaluation.¹ The differentials of abdominal masses in children are wide and varied and include malignancies, infections, connective tissue diseases, congenital lesions, obstructive lesions, haematologic disorders, bowel disorders and many more.² In infants, most abdominal masses are retroperitoneal (65%) and of renal origin (55%).^{2, 3} Renal masses are particularly ominous in this regard as a majority of these will be obstructive lesions (hydronephrosis), congenital/dysplastic conditions (polycystic kidney, multicystic kidney) or renal malignancies, with nephroblastoma, clear cell sarcoma of the kidney and renal cell carcinoma being the leading conditions.¹⁻⁴ A detailed

history, physical examination, renal imaging studies with or without biopsy are relevant tools in the evaluation of such patients.

However, the paediatrician should be alert to the possibility of unusual causes of renal masses in children. We present such an unusual case of bilateral renal masses in a child, initially considered to be a malignancy but subsequently revealed to be an unusual manifestation of a fairly common disorder in a child.

Case diagnosis and treatment

A 16-month-old male child presented to the Emergency Paediatric Unit (EPU) of the University of Ilorin Teaching Hospital, Ilorin, Kwara State in

North-Central Nigeria. The Hospital provides tertiary level care for Kwara and neighbouring States. Kwara State ranked 15th of 36 States on the Human Development Index and the major occupation of residents is agriculture.⁵

He was brought to the hospital on account of 3 weeks history of bilateral flank masses and progressive weight loss. He had been well until three weeks before presentation when the mother incidentally noticed flank swellings on both sides, which did not progressively increase in size and were not painful. Subsequently, she noted the child had reduced appetite and progressively lost weight with clothes becoming loose fitting. The child became weaker over the period and could no longer sit or crawl (milestones that had been achieved previously and appropriately). There was no swelling in any other part of the body, no haematuria or dysuria. The urinary stream had been satisfactory since birth with no history of oliguria or polyuria. He was not vomiting and bowel habits had remained fairly normal. There was no history of chronic cough or drenching night sweats and no contact with an adult with chronic cough and weight loss. The child had never been jaundiced and there was no history to suggest sickle cell disease.

There was no history of ingestion of drugs, however, the mother admitted she had given him some herbal concoctions (contents were unknown) once every three weeks for no particular reason. Antenatal, natal and postnatal history was uneventful.

He is the fourth child of parents in a monogamous family setting. Two of the siblings have cerebral palsy secondary to birth asphyxia. No family history of deafness or renal diseases.

All other history did not provide any significant information. Examination findings were an acute on chronically ill-looking child, mildly pale, anicteric, not cyanosed and afebrile (37.1°C). He was well hydrated and had a few enlarged cervical and axillary lymph nodes measuring about 0.5cm. They were firm, not tender and mobile. He had no peripheral oedema. He weighed 8.5kg (79% of expected for his age) and his length was 76cm. His abdomen was

distended, particularly around the flanks with no area of tenderness. Both kidneys were readily palpable with smooth surfaces, firm in consistency and not tender. The right kidney was palpable up to 6cm and the left up to 8cm below the costal margins. There was no bruit. He had full volume and regular peripheral pulses. His blood pressure was 100/70mmHg which was elevated for age and height. Heart sounds were normal. Other systemic examinations were essentially normal.

Initial clinical considerations were nephroblastoma and abdominal Burkitt lymphoma. Results of some investigations performed are presented in Table I. There was normocytic normochromic anaemia and severe hypokalaemia. Urinalysis revealed blood and trace levels of protein. Abdominal ultrasound demonstrated normal hepatobiliary system, spleen, pancreas and para-aortic areas. Both kidneys were enlarged for age measuring about 121mm by 57mm and 121 mm by 58mm on the right and left respectively (expected kidney length for age using Rosenbaum formula = 70mm).⁶ They both showed good cortical echoes with prominent medulla and there was no hydronephrosis. There was no ascites and other findings were normal. Liver function tests were normal. Computerized tomography (CT) study (Figure 1) of the abdomen revealed that both kidneys were significantly enlarged, however, the kidney architecture was preserved with relatively preserved corticomedullary differentiation. They measured 10.6 x 7.6 x 6.5cm and 11.5 x 7.6 x 6cm, in the right and left respectively. They were normal in position, outline and orientation. There was a diffuse decrease in density of the kidneys, compared to the abdominal organs, however, no focal lesion or dysplastic cystic lesion was seen. Other structures were preserved. A renal biopsy was performed, which revealed renal tissue which showed eight glomeruli with normal morphology. The proximal renal tubules were enlarged and there were vacuolations in the tubular cell cytoplasm with many small-sized vacuoles. Others showed loss of nuclei. The distal tubules appeared mostly preserved with patchy areas of eosinophilia, flattened nuclei and nuclear loss. There were no features of neoplasm. The histologic findings were considered consistent with tubular injury of undetermined aetiology.

A diagnosis of acute renal tubular injury with renomegaly all secondary to toxic nephropathy from herbal concoction ingestion was made. Attempts to perform a toxicologic screen on the herbal concoction was not successful due to the lack of a toxicologic laboratory. The parents were counselled on the need to stop all herbal concoctions.

Over the next few days, the packed cell volume of the child dropped to 15% necessitating a blood transfusion and serum potassium returned to normal (4.3mmol/L) following correction. A week into admission, he developed a fever and a urethral catheter tip culture grew *Enterococcus spp* sensitive to amoxycillin-clavulanate which he received for a week, following which fever subsided.

During follow up over the next six weeks post-discharge, the kidneys dramatically reduced in size with the left kidney being no longer palpable and the right palpable about 4cm below the costal margin. The child had gained weight remarkably increasing to 8.5kg and regained previously lost developmental milestones.

Table I: Results of some investigations performed

Investigation	Result
Full blood count	
• Packed cell volume	28%
• White blood cell count	$4.73 \times 10^9/L$
• WBC differentials	
○ Neutrophils	61%
○ Lymphocytes	33%
○ Others	6%
• Platelet count	$373 \times 10^9/L$
HIV screening	Negative
Haemoglobin genotype	AA
Electrolytes/ Urea/ creatinine	
• Sodium	133mmol/L
• Potassium	1.4mmol/L
• Urea	5.7mmol/L
• Creatinine	77 μ mol/L
Urinalysis	
• pH	6
• Blood	++++
• Protein	+
• Glucose	-
• Bilirubin	-
• Urobilinogen	-
• Specific gravity	1.010
• Nitrates	-
• Leucocytes	-
Random blood sugar	6.3mmol/L
Urine microscopy/ culture	2 WBCs/ high power field
	No casts seen
	No growth

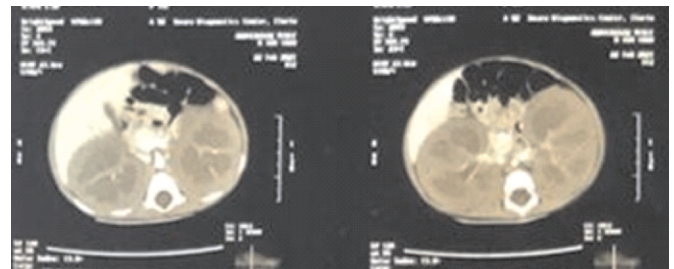


Figure 1: Sections of the abdominal CT scan of the patient showing bilateral renomegaly

Discussion

The major causes of bilateral renal masses include malignancies, inflammation, cystic lesions, obstructive uropathy and glycogen storage disease.^{2,4} Similar findings were reported by Adesiyun et al⁷ in Nigeria with malignancies as the leading cause. Bilateral renomegaly with preserved renal architecture has recently been reported in an infant with acute lymphoblastic leukaemia.⁸ Investigations of the case we are reporting revealed no evidence of renal malignancies, obstruction, glycogen storage diseases or acute leukaemia.⁹ Having excluded common causes of renomegaly, and noting the timing of the symptoms with recent ingestion of a specific herbal concoction, gradual resolution following the withdrawal of the offending agent and the biopsy findings being consistent with acute tubular injury a diagnosis of toxic nephropathy is likely.

Another differential diagnosis that may present in a similar fashion is Burkitt's lymphoma which is a multisystemic malignancy that could present with an abdominal mass. Sieniawska et al¹⁰ reported an 11-year-old child with bilateral renal masses confirmed to be Burkitt's lymphoma. Nephroblastoma and neuroblastoma may present with bilateral loin masses and can be seen at this age.^{1, 4} Abdominal imaging ruled out these diagnoses. Obstructive lesions of the ureters and lower urinary tract may cause bilateral hydronephrosis and consequent renomegaly. This was considered unlikely as there was no history of a poor urinary stream or reduced voiding. Imaging also ruled out this consideration. Renal biopsy is recommended in such clinical situations where a definite diagnosis is not reached and, in this patient, it showed evidence of acute

tubular injury. Acute tubular injury could either be due to ischaemia, toxin, chemicals or drugs.¹¹ This child had a history of regular ingestion of herbal concoction. Acute tubular injury subsides as soon as the offending agent is withdrawn or the insult is removed. About six weeks after follow up with no drug administered other than antibiotics given on admission, the left renal mass receded and right renal mass significantly reduced in size. The child gained weight and the lost developmental milestones lost were regained.

While not conclusive, it is likely that the bilateral renomegaly was occasioned by a toxic insult (probably from the herbal preparation) on both kidneys which may have caused some inflammatory changes of the tubules which resolved after the suspected insult (herbal preparation) was discontinued. Herbal preparations in Africa are known to contain many ingredients such as *dioscoreaquinquinloba* (wild yam) which are nephrotoxic.¹²

From the foregoing, acute tubular injury should be a differential of bilateral renomegaly in the under-five child after all common causes of bilateral renal masses are ruled out. Furthermore, where there are doubts as to the cause of the bilateral renomegaly, offer no treatment and avoid the ingestion of herbal preparation as was done in our patient.

Conclusion

Toxic nephropathy should be considered in the differential diagnosis of a child with bilateral renomegaly in Nigeria and other settings where ingestion of herbal concoctions is common.

Authors' Contributions

MBA, RE and OTA conceptualised the paper. All the authors participated in designing the study. MBA, RE and OTA reviewed the records and collected the data. MBA, RE and OTA analysed the data. MBA and RE prepared the initial draft of the manuscript. All the authors read and approved the final manuscript.

References

1. Golden CB, Feusner JH. Malignant abdominal masses in children: quick guide to evaluation and diagnosis. *Pediatr Clin North Am* 2002; **49**:1369-92.
2. Merten DF, Kirks DR. Diagnostic imaging of pediatric abdominal masses. *Pediatr Clin North Am* 1985; **32**:1397-425.
3. Annuar Z, Sakijan AS, Annuar N, Kooi GH. Ultrasound in the diagnosis of palpable abdominal masses in children. *Med J Malaysia* 1990; **45**:281-7.
4. Malkan AD, Loh A, Bahrami A, Navid F, Coleman J, Green DM, et al. An Approach to Renal Masses in Pediatrics. *Pediatrics* 2015; **135**:142.
5. UNDP. National Human Development Report 2018. Abuja: UNDP, 2018.
6. Rosenbaum DM, Korngold E, Teele RL. Sonographic assessment of renal length in normal children. *Am J Roentgenol* 1984; **142**:467-9.
7. Adesiyun O, Adeniyi W, Ololu-Zubair H, Nasir A. Radiological evaluation of childhood abdominal masses in Ilorin, Nigeria. *East Afr Med J*. 2017; **94**:427-32.
8. Saswade K, Moorthy HK, Pillai BS. Massive bilateral renomegaly with maintained renal morphology in an infant. *Indian J Urol* 2019; **35**:170-1.
9. Ali SHG, Yacoub FM, Al-Matar E. Acute lymphoblastic leukemia presenting as bilateral renal enlargement in a child. *Med Princ Pract* 2008; **17**:504-6.
10. Sieniawska M, Bialasik D, Jedrzejowski A, Sopylo B, Maldyk J. Bilateral primary renal Burkitt lymphoma in a child presenting with acute renal failure. *Nephrol Dial Transplant* 1997; **12**:1490-2.
11. Andreoli SP. Acute kidney injury in children. *Pediatric Nephrol* 2009; **24**:253-63.
12. Touiti N, Houssaini TS, Achour S. Overview on pharmacovigilance of nephrotoxic herbal medicines used worldwide. *Clin Phytosci* 2021; **7**:9.