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RADIOLOGICAL EVALUATION OF CHILDHOOD ABDOMINAL MASSES IN ILORIN, NIGERIA
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RADIOLOGICAL EVALUATION OF CHILDHOOD ABDOMINAL MASSES IN ILORIN, NIGERIA

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ABSTRACT

Background: **The presentation of a child with an abdominal mass is a source of concern to the Paediatricians, Paediatric Surgeons and the parents, and it poses a diagnostic challenge. Due to the low socio-economic status of the patients in this setting, cost-effective approach in evaluating these patients is necessary.**
Objective: **This was to determine the common causes and the most cost-effective radiological examination to diagnose abdominal mass in children.**
Design: **This was a retrospective cross sectional descriptive study.**
Setting: **University of Ilorin Teaching Hospital, Ilorin. Nigeria.**
Subjects: **Paediatric patients with abdominal masses seen in the Radiology Department of UITH, Ilorin over a period of 5 years (2011-2015)**
Analysis: **Statistical analysis was carried out using the Statistical Package for the Social Sciences version 20.0 (SPSS Inc; Chic; Il.).**
Result: **A total of 172 patients were seen, including 98(57%) males. All patients seen (100%) had abdominal ultrasound followed by plain radiography 161 (93.6%) and 44(25.5%) patients had histological confirmation. The Kidneys 53 (30.8%) was the most affected organ followed by liver 48(27.9%) and spleen 30(17.4%). Burkitt's lymphoma 15 (34.1%) was the commonest histological diagnosis followed by nephroblastoma 14 (31.8%).**
Conclusion: **Ultrasonography was the most common imaging modality used for evaluation of children with abdominal masses in this setting. The kidney was the most affected organ and Burkitt's lymphoma was the most prevalent histological diagnosis followed by nephroblastoma in this study.**

INTRODUCTION

The presentation of a child with an abdominal mass is a source of concern to the Paediatricians and the Parents, and poses a diagnostic challenge (1). Due to the low socio-economic status of the populace in our environment, some of the patients especially those with benign lesions are not managed to logical conclusions before their discharge. Thus, the need to evaluate the abdominal mass as cost effectively as possible. Multidisciplinary evaluation and care involving the Paediatricians, Radiologists, and Paediatric surgeons and in the case of

prenatal diagnosis, the Obstetrician can facilitate this process (2).

The role of radiology in the management of paediatric abdominal masses has increased with the advent of modern imaging techniques such as Ultrasound, Computed Tomography (CT), Fluoroscopic-guided contrast studies, Magnetic Resonance Imaging (MRI) and Proton Emission Technique (PET) scan. These roles include diagnosis of abdominal masses and monitoring of patient's response to treatment by assessing reduction in the size of the masses post treatment (3). Radiological diagnosis is also important in ascertaining the organ of origin, the nature of the mass and presence or absence of complications.

An abdominal mass is a common presentation in paediatric patients. In the evaluation of Paediatric patients with abdominal masses, the age of patient must be taken into consideration as the differential diagnosis of abdominal masses depend majorly on the age of the patient4. Abdominal masses are more common in children under the age of 5 years. Most abdominal masses in neonates are retroperitoneal, of kidney origin and are not malignant. The older the child the more likely the mass represents a malignant process (4).

The aims of this study include determination of the most cost-effective imaging modality in the management of childhood abdominal masses and to determine the pattern of paediatric abdominal masses in UITH, Ilorin.

MATERIALS AND METHODS

This is a retrospective cross sectional descriptive study carried out in the Department of Radiology, UITH, Ilorin on paediatric patients (16 years and below) with abdominal masses over a period of five (5) years between 2011 and 2015. The age, sex, organ of origin, imaging modalities, radiological diagnosis and where available histological diagnosis was recorded. Comparison of the histological findings with the radiological diagnosis was made. Radiological examinations available were also assessed.

Data collected was sorted and checked for errors. Statistical analysis was carried out using the Statistical Package for the Social Sciences version 20.0 (SPSS Inc; Chic; Il.). Continuous variables were expressed as mean ±SD and categorical variables as percentages. Results were presented in descriptive statistics such as frequency tables, percentages, mean, median and mode. Association between categorical variables was exploited using Chi square. Significance level was set at 5% ($p < 0.05$).

RESULTS

A total of 172 cases of paediatric abdominal masses presented to the Department of Radiology over the period of 5 years, with male representing 57% while female represented 43% (Table 1).

Table 1
Number of Paediatric patients coming into Radiology Department

	2011	2012	2013	2014	2015	Total
Sex	n = 25 (%)	n = 30 (%)	n = 32 (%)	n = 37 (%)	n = 48 (%)	N = 172 (%)
Male	14 (56.0)	17 (56.7)	20 (62.5)	22 (59.5)	25 (52.1)	98 (57.0)
Female	11 (44.0)	13 (43.3)	12 (37.5)	15 (40.5)	23 (47.9)	74 (43.0)

All Patients 172 (100%) had ultrasound scan done, followed by plain radiograph of the abdomen 161 (93.6%), contrast studies 76 (44.1%) and Computed tomography 11 (6.4%) respectively. None of the patient however, had MRI (Table 2).

Table 2
Radiological Examination done for Paediatric Patients with abdominal masses

Radiological Examination	No of Patients (N=172)	Percentage (%)
Ultrasound	172	100.0
Plain X-Ray	161	93.6
Contrast Studies	76	44.1
CT	11	6.4
MRI	0	0.0

Renal masses accounted for 30.8% (n=53), followed by hepatic masses 27.9% (n=48) and spleen 17.4% (n=30) Table 3. All these patients were suspected from the ultra-sound examination. Renal masses were common in all the age groups except those between 5 and 8 years of age where hepatic masses constituted the highest percent-age. This observation was statistically significant in the 1-4years (p=0.006) and13-16years (p=0.001) age groups.

Table 3
Relationship between the age group and the Organs affected

	Age (years)				
Organs affected	1 – 4	5 – 8	9 – 12	13 – 16	Total
	n = 33 (%)	n = 35 (%)	n = 46 (%)	n = 58 (%)	N =172 (%)
Kidney	12 (36.4)	7 (20.0)	13 (28.3)	21 (36.2)	53 (30.8)
Liver	9 (27.3)	10 (28.6)	12 (26.1)	17 (29.3)	48 (27.9)
Spleen	5 (15.2)	7 (20.0)	8 (17.4)	10 (17.2)	30 (17.4)
Lymph nodes	4 (12.1)	7 (20.0)	7 (15.2)	6 (10.4)	24 (14.0)
Appendix	0 (0.0)	4 (11.4)	6 (13.0)	4 (6.9)	14 (8.1)
Adrenal gland	2 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.2)
Mesentery	1 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
χ^2	16.273	2.571	4.217	18.034	
(p value)	(0.006*)	(0.632)	(0.377)	(0.001*)	

Histological diagnosis of the abdominal masses is presented in (Table 4) with Burkitt's lymphoma constituting the majority representing 34.1% (n=15), closely followed by Nephroblastoma 31.8% (n=14). Rhabdomyosarcoma accounted for the least representing 1 (2.3%).

Table 4
Histological Distribution of Childhood Abdominal Masses

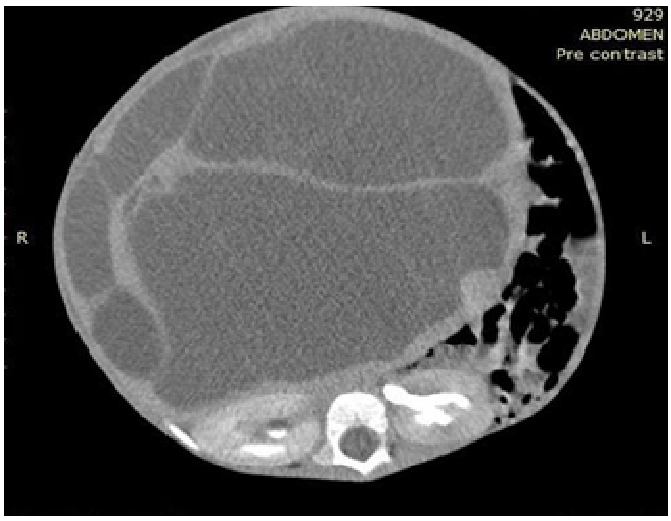
Histological diagnosis	Frequency (N=44)	Percent (%)
Burkitt's lymphoma	15	34.1
Nephroblastoma	14	31.8
Abdominal TB	10	22.7
Neuroblastoma	2	4.5
Ovarian cyst	2	4.5
Rhabdomyosarcoma	1	2.3

Figure 1
A child with abdominal mass

Figure 2
Abdominal USS in a child showing a hyperechoic right upper pole renal mass

Figure 3
Plain abdominal radiograph in a child showing soft tissue opacity in the left flank displacing the bowel loops to the right

Figure 4
Computed tomography (contrast enhanced) showing a multiseptated cystic hepatic mass



DISCUSSION

The identification of an abdominal mass is a cause for concern to the Paediatrician and parents because of the possibility of malignant process 1 (Figure 1). The evaluation of a child with abdominal mass involves a number of diagnostic considerations such as the age and sex of the patient, the location of abdominal mass and the presence or absence of other potentially related signs and symptoms (4).

The patient's age is one of the most important factors that helps narrow the potential etiologies of an abdominal mass in a child as likely etiologies differ between neonates and infants/children (2). Radiology plays an important role in the diagnosis of childhood abdominal masses as it can differentiate cystic masses from solid masses. All patients with histological confirmation had radiological suspicion by their appearances on Ultra-sound (Figure 2), Plain abdominal radiograph (Figure 3), Computed Tomography (Figure 4)

Ultrasound is usually the first imaging modality used in the evaluation of an abdominal mass since it is widely available, does not expose children to radiation5 and can be used to establish the presence of a mass, its primary origin, size, depth, internal structure and effect on surrounding structures besides its capacity to differentiate a cystic from solid masses(6). We found that all our patients had USS for evaluation.

Most cases of paediatric abdominal masses are of renal origin with variation in incidence based on the age (4, 7) such that hydronephrosis and multicystic dysplastic kidney are the most common etiologies in neonates, whereas malignant lesions are more commonly encountered as the cause of abdominal masses in infants and children (4,6) with Wilm's tumour accounting for 87% of paediatrics renal masses and occurring in approximately 1:10, 0008 and 4-13% being bilateral (9).

The observation in this study agrees with previous studies (4, 10, 11) as renal origin was found to be responsible for most cases of abdominal mass. However, in contrast to most studies where hydronephrosis was the most common cause (4,7,10,11) the vast majority of cases were Wilm's tumour and renal involvement in Burkitt's lymphoma in our study. This might be due to the low economic status where most patients with benign lesions do not have histological confirmation. As observed in our study, abdominal masses are more common in males than females which agree with previous studies (3, 12). This might be due to the cultural background where survival of male child is preferred to female.

CONCLUSION

The clinical presentation and the age are two important factors guiding the investigation of an abdominal mass in children. However, imaging plays a significant role in reaching the final diagnosis. Ultrasound was the most common imaging modality used in the evaluation of a child with abdominal masses. It thus, remains important in the diagnosis and follow up, especially in developing countries like ours, due to its cost-effectiveness, non-invasiveness and easy availability, with CT reserved for unusual or complicated cases and staging of tumour.

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