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ORIGINAL ARTICLE

The Pattern of Presentation of Abdominal Masses in Children

WAJEED GUL BANGASH[1], SHER ZAMAN KHOKHAR[2], ASAD ARIF[3], HABIB UR REHMAN[4], FEROZE AHMED MAHAR[5], AFTAB AHMED CHANNA[6]

[1]*Assistant Professor Urology, Islamic International Medical College and Trust, Islamabad*
[2]*Medical Officer Urology, Islam Medical College/ Teaching Hospital, Sialkot*
[3]*Medical Officer Pediatrics, Islam Medical College/ Teaching Hospital, Sialkot*
[4]*Senior Registrar Nephrology, Islamic International Medical College and Trust, Islamabad*
[5]*Consultant Urologist, Sindh Government, Lyari General Hospital, Karachi*
[6]*Associate Professor of Urology, Islam Medical College/ Teaching Hospital, Sialkot*
Corresponding author: Wajeed Gul Bangash, Email: wajidgb@gmail.com, Cell: +92 301 8090 807

ABSTRACT

Background; The abdominal masses in infants, neonate or child is a worrying sign that every clinician must be aware of as these masses can sometimes show malignant transformation. The outcome of this study would give an overview to the paediatric surgeons/ urologist about presenting spectrum of abdominal masses in children in our population which would enable them to manage these patients properly.

Study Design: A Descriptive Cross-sectional Study conducted at Children Hospital, Shaheed Zulfiqar Ali Bhutto Medical University, PIMS Islamabad and Urology department of Islam Medical College/ Teaching Hospital, Sialkot for the duration of one year from January 2022 to December 2022.

Material & Methods: This descriptive cross sectional study include ninety four (n=94) patients of less than 12 years of age irrespective of either gender who presented with abdominal mass. Patients suspected of having abdominal mass were screened from the outpatient (OPD) and emergency departments.

Results; Out of 94 children, sixty five (69.15%) children were males whereas twenty nine (30.85%) were females. The male to female ratio was 2.24:1. Thirty five (37.33%) children were less than 1 year old, Twenty six (27.66%) were between age 1 and 3 years, nineteen (20.12%) children were between age 3 to 7 years and fourteen (14.89%) of children were elder than 7 years of age. The mean age was 7.4 months ± 2.1 Standard Deviation (SD). Most of the masses are benign and cystic in nature, however, Wilms' tumour and neuroblastoma are two conditions that need a vigilant monitoring as these are the two malignant tumours (22.34% : n=21) in children where they usually present with abdominal mass.

Conclusion; In a nutshell, any child presented with abdominal symptoms in surgical department must be investigated and managed accordingly. Any delay in diagnosis may cause fatal outcome.

Keywords: Abdominal mass, UPJO-ureteropelvic junction obstruction, VUR (vesico-ureteric reflux), Hydronephrosis.

INTRODUCTION

Abdominal masses in children are due to organomegaly possible with errors of development, neoplastic transformation or inflammatory conditions. A structured approach to abdominal tumors involves distinguishing possible pathologies based on the patient's age and accompanying signs or symptoms, as well as the location of the tumor relative to the abdominal anatomy.

The overall picture varies depending on the underlying pathology of the abdominal mass. If the mass physically blocks the digestive or genitourinary tracts, patients may have difficulty urinating or defecating. Patients with systemic symptoms such as fever and weight loss with the presence of a tumor in the abdominal cavity are at increased risk of malignancy. Neuroblastoma and Wilms' tumor are two conditions that require careful monitoring as they are the two malignancies in children where an abdominal tumor is usually the first presentation[2].

A step by step approach is needed in the diagnosis of abdominal masses in neonates, children and infants. The history, clinical examination, imaging studies and laboratory findings all have their role in the evaluation of suspected abdominal mass[3].

The management of abdominal mass depends on its origin and child's age; however, a surgical procedure is opted. In the neonates, palpable abdominal masses mostly originate from the genitourinary tract as multicystic dysplastic kidney (MCDK) and hydronephrosis. In the infants and children, some of the abdominal masses present in the form of malignant lesions, in which most common are Wilms' tumour, neuroblastoma, rhabdomyosarcoma and lymphomas[1].Treatment of all these tumours can be done by surgery, radiation and chemotherapy[2].

We planned to study the presentation spectrum of abdominal masses in a paediatric population. The children suspected of having abdominal mass and presenting to the Children Hospital, PIMS, Islamabad, Pakistan, were enrolled in the study to determine the clinical presentation of these cases. The study outcome would give an overview to the paediatric surgeons/ Urologist about presentation spectrum of abdominal masses in children in our population which would enable them to better manage these patients in our settings.

MATERIAL & METHODES

A Descriptive Cross-sectional Study conducted at Children Hospital, Shaheed Zulfiqar Ali Bhutto Medical University, PIMS Islamabad and Urology department of Islam Medical College/ Teaching Hospital, Sialkot for the duration of one year from January 2022 to December 2022.

The study included ninety-four (n=94) patients of less than 12 years of age irrespective of either gender who presented with abdominal mass. Patients suspected of having abdominal mass were screened from the outpatient (OPD) and emergency departments. The sample was collected by consecutive sampling (non-probability). The Institutional Review Committee approved th study and parents or guardians have signed the written informed consent. Detailed history was noted. Physical examination was carried out and findings noted. Ultrasound abdomen was performed in all patients to assess the origin and site of the mass. The study outcome was monitored in terms of trend of presentation of abdominal masses. The study information was recorded on study proforma. Children with secondaries of tumours in abdomen; and those who did not give consent were not included in the study. Information regarding the demographic characteristics of the enrolled patients was collected.

Collected data was converted into variables, which were analyzed by SPSS version 20. Descriptive statistics counting S.D and mean were calculated for contiguous variables like age. The percentage and frequency were calculated for qualitative variables like abdominal pain, gender, pallor, fever, anorexia, weight loss, incidental abdominal mass, constipation, ascites and physical signs as type, size, site of mass, extent, mobility and consistency of mass. The data is presented in tables and graphs in the result section.

RESULTS

The mean age of all the enrolled children in the current study was 7.4 months with standard deviation of ± 2.1 months. The median age of our study population was 9.0 months. The youngest child enrolled in the current study was of one day of life while the eldest child was 12 years old. The age distribution is presented in Table 1 and 2.

Table 1: Age distribution of all the enrolled children

Age (in months)	Number
Mean	7.4 months
Standard deviation	2.1 months
Median	9.0 months
Range (min - max)	(1st Day of Life - 12 years)

Table 2: Age distribution range of all the enrolled children (n = 94)

Age Range(in years)	Number	Percentage
1st Day of Life to 1 year	n = 35	37.33%
1 to 3 years	n = 26	27.66%
3 to 7 years	n = 19	20.12%
7 to 12 years	n = 14	14.89%

Out of 94, thirty-five (37.33%) children were less than 1 year old, twenty-six (27.66%) were between age 1 and 3 years, nineteen (20.12%) children were between age 3 to 7 years and fourteen (14.89%) of children were elder than 7 years of age. Out of 94 children, sixty-five (69.15%) children were males whereas twenty-nine (30.85%) were females. The male to female ratio was 2.24: 1(Figure 1).

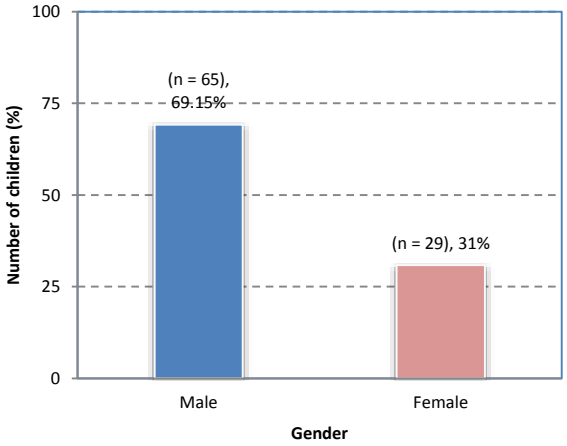

Figure 1: Distribution of all the enrolled children by age groups

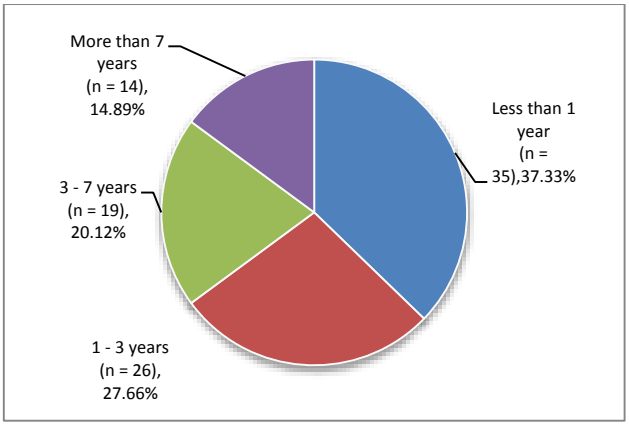

Figure 2:

Out of 94 children with abdominal mass, sixty-eight (72.34%) children had abdominal pain, forty-one (43.61%) had pallor, thirty (31.91%) had fever and twenty (21.27%) had anorexia. Twelve (12.76%) children presented with weight loss, nineteen (20.21%) children had incidental mass while thirty six (38.29%) had constipation. Forty nine (52.12%) complained that the size of mass had increased while eleven (11.70%) children presented with ascites.

Most of the patients (68.42%), who were diagnosed with hydronephrosis presented with palpable abdominal mass along with flank pain, urinary tract infection, fever, and increase in size of mass. Clinical feature of hydronephrosis is depicted in Table 3.

Table 3: Age distribution of hydronephrosis of enrolled children **(n = 57)**

Age of patients	Clinical features of hydronephrosis
1st Day of Life to 1 year (n = 24)	Fever (n = 3; 12.5%), retention of urine on/off (n = 10; 100%, only in PUV cases)
1 to 3 years (n = 13)	Pain abdomen (n = 12; 92.31%), Fever (n = 3; 23.08%), Increase size of mass (n = 4; 30.76%), UTI (n = 5; 38.46%), Failure to thrive (n = 1; 7.69%), incidental mass (n = 5; 38.46%)
3 to 7 years (n = 8)	Abdominal pain (n = 7; 87.5%), Fever (n = 5; 62.5%), UTI (n = 5; 62.50%), Hematuria (n = 3; 37.50%), Increase size of mass (n = 5; 62.50%), Anorexia (n = 3; 37.5%), constipation (n = 3; 37.5%), pallor (n = 4;50%)
7 to 12 years (n = 12)	Abdominal pain (n = 12; 100%), Fever (n = 5; 41.66%), Vomiting (n = 8; 66.66%), Anorexia (n = 4; 33.33%), UTI (n =10, 83.33%), Weight loss (n = 5; 41.66%), Hematuria (n = 6; 50%), pallor (n = 5; 41.66%), Increase size of mass (n = 10 ; 83.33%), constipation (n = 7; 53.85%)

Patient with UPJ obstruction, abdominal mass was the main clinical presentation in neonates and infants (n = 10), otherwise asymptomatic. In patient between age of 1– 3 years, the common presentation were abdominal mass with sporadic abdominal pain (92.31%), fever (23.08%), increase in size of mass (30.76%), urinary tract infection (38.46%), failure to thrive (7.69%) and incidental finding (38.46%). Children with UPJ obstruction, between ages of 3 – 7 years presented with a variety of symptoms such as flank/abdominal pain (87.50%), UTIs (62.50%), fever (62.50%), hematuria (37.50%) and constipation (37.50%). Among them, two patients had hematuria as initial symptom. In patient of more than 7 years age had abdominal/flank pain (100%), association with vomiting (66.66%), recurrent UTIs (83.33), increase size of mass (83.33%), anorexia (33.33%), pallor (41.66%) and five had weight loss (41.66%). There were also two case of UPJ obstruction, presented with unilateral non-functioning kidney. Forty one patient of UPJ obstruction had hydronephrosis grade III and IV on ultrasound.

Neonate having PUV (n = 10) had presented with retention of urine (on/off), palpable bladder and grade II hydronephrosis on ultrasound. Six infant having VUR presented with pain abdomen, low volume urine, UTI and fever. Patients with hydronephrosis were categorized according to their age group on the basis of renal status, is depicted in Table 4.

Table 4: Renal status according to age of presentation (n = 57)

Age	Grade of hydronephrosis; Differential renal function
Upto 1 year, n = 24 (PUV = 10, VUR = 4, UPJ obstruction = 10)	grade II (n = 10; 41.66%), grade III (n = 11; 45.83%), grade IV (n = 3; 12.5%), DRF < 45%
1 – 3 years, n = 13 (VUR = 2, UPJ obstruction = 11)	grade III (n = 6; 46.15%), grade IV (n = 7; 53.85%), DRF < 45% and DRF < 40%
3 – 7 years, n = 8, (UPJ obstruction = 8)	grade IV (n =8; 100%), DRF < 45% and DRF < 40%
7 – 12 years, n = 12, (UPJ obstruction = 12)	grade IV (n = 12; 100%), DRF < 40% and DRF < 10%

Patients of Wilms' tumour presented with abdominal pain (100%), fever (58.33%), weight loss (33.33%), pallor (100%), anorexia (41.66%), ascites (41.66%) and incidental finding (50%). All patient of neuroblastoma were presented in less than two year. They complained of abdominal pain (100%), pallor (100%), fever (44.44%), anorexia (100%), weight loss (33.33%), constipation (88.88%) and ascites (44.44%). All parents of children with Wilms' tumour and neuroblastoma complained that the size of mass had rapidly increased.

Figure 3 and 4 show the distribution of type of abdominal mass in all the enrolled children. Out of 94, seventy (74.47%) had cystic mass whereas twenty four (25.53%) had solid mass. Seventy three (77.66%) of children had benign mass while twenty one (22.34%) had malignant mass.

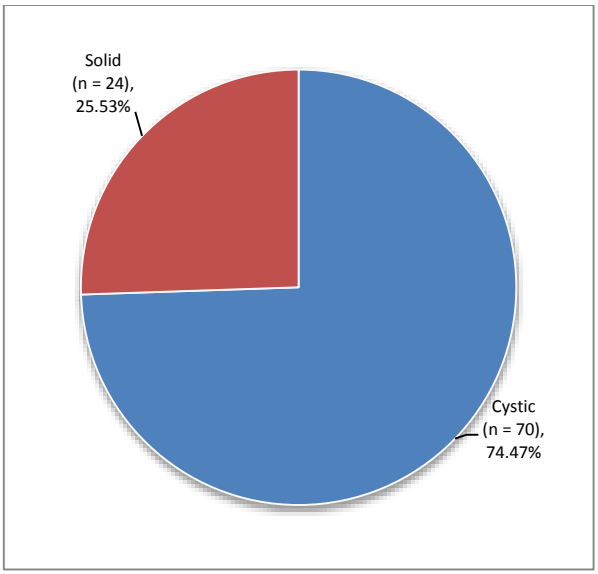

Figure 3: Distribution of type of mass among all the enrolled children. Cystic Vs Solid

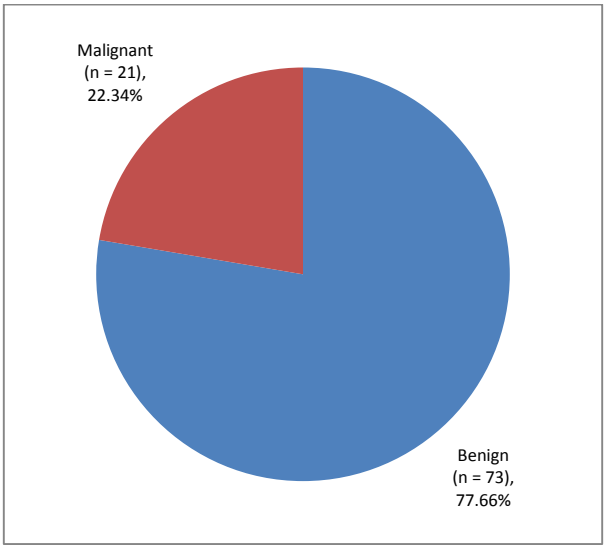

Figure 4: Distribution of type of mass among all the enrolled children

DISCUSSION

Both radiological investigation and a good clinical examination have equal sensitivity. Radiological investigations are thus only adjuvant to a good clinical examination[4].

Out of 57 patients with hydronephrosis, 41 (71.93%) were diagnosed with UPJ obstruction, commonly presented with palpable abdominal mass along with flank pain, UTI (51%) with fever. In a study conducted by Rafique Ahmed Sahito, the most common presenting symptoms were also found to be flank pain and palpable abdominal mass[5]. Other studies also showed that UPJ obstruction is the most common anatomical cause of antenatal hydronephrosis[6,7].

There were 11 (11.70%) patients who presented with ascites in our study (Wilms' tumour = 5, neuroblastoma = 4 and pseudo pancreatic cyst = 2). Cause of ascites of our patients might be due to malignant diseases, pressure symptoms over inferior vena cava and pancreatitis.

A study conducted by Rastogi et al[8] on two hundred and sixty cases (n=260) of abdominal masses in children below 12 years at Kalawati Saran Children Hospital, New Delhi, more than two-third masses (71.5%) were benign. In our study percentage of benign masses was found to be 77.66%.

They found in their study most common cause was renal: one hundred thirty nine (53.5%) followed by gastrointestinal: fifty eight (22.3%), hepatobiliary: twenty (7.7%) and genital tract: seven (2.7%). Most common cause was also found to be renal in our study (60.64% hydronephrosis plus 12.77% Wilms' tumour). Percentage of hydronephrosis was more in our study and is likely due to better antenatal care in our setup. GIT causes were 8.51% in our study including pseudo pancreatic cyst, mesenteric cyst, duplication cyst, and abdominal lymphangioma. Hepatobiliary cause was established in 5.32% of cases including choledochal cyst.

In another study conducted by Kirks et al found that 55% of patients had masses of renal origin, including Wilms' tumour which was found to be 25% of the masses of renal origin[9] , whereas in our study the percentage of renal masses was 74% (hydronephrosis 60.64% : n=57 and Wilms' tumour 12.77% : n = 12). Wilms' tumour was found in 17.39% of the masses of renal origin in our study. The difference may be attributed to better antenatal screening programs resulting in higher percentages of hydronephrosis in our study. In another study 31% patients had Wilms' tumours[10]. The difference may be attributed to different sample size and geographical distribution.

In Pakistan, the accurate incidence of cancers and malignant tumours in children is unknown. A report from the Pakistan Medical Research Council (PMRC) Cancer Study group revealed that malignant tumours in children under 15 years of age constitute 4.38% of all malignant tumours[11] while in our study 22.34% were malignant. Difference may be attributed to different sample size and selection criteria.

In the INMOL series of cancer patients and a report of childhood tumours in Karachi, the most common solid malignant tumours in children are Wilms' tumours, lymphomas, retinoblastomas, bone and joint tumours occurring mostly in patients under 5 years of age[12]. In our study most common malignant tumour was also found to be Wilms' tumour. In another recent study conducted at Agha Khan University and hospital, Karachi, Wilms' tumour was found to be the most common type of all malignant neoplasms of the kidney[13].

Fine-needle aspiration cytology (FNA) is believed to be an invaluable tool in the treatment of abdominal tumors in children, providing quick and accurate diagnosis. In a recent study, Viswanathan S.et al correctly identified Wilms tumor (n = 19), lymphoma (n = 10), neuroblastoma (n = 6), hepatocytoma (n = 5) and miscellaneous cancers (n = 7) diagnosed by FNAC. They found an overall agreement between the final histopathological and biochemical parameters and the FNAC results in 79/83 (95.5%) cases. They concluded that clinically relevant FNAC classification of abdominal tumors in children is possible when interpreting clinical-radiological parameters. This eliminates the need for a more laborious biopsy in critical situations and in stage II nephroblastoma where it is contraindicated. FNAC is

contraindicated in stage II neuroblastoma because it can cause a compartment in its capsule that can invade and recur.

CONCLUSION

Most of the masses are benign and cystic in nature, however, Neuroblastoma and Wilms' tumour are two conditions that need a vigilant monitoring as these are the two malignant tumours (22.34%: n = 21) in children where they usually present with abdominal mass. In a nutshell, any child presented with abdominal symptoms in surgical department must be investigated and managed accordingly. Any delay in diagnosis may cause fatal outcome**.** Paediatric surgeon / Urologist, do the counselling of the parents regarding nature of disease, natural course, mode of delivery, compatibility with life and treatment choices.

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