

## Original Research Article

# Study on clinical profile and management of abdominal tumours in children

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**Received:** 25 December 2018

**Accepted:** 02 January 2019

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### ABSTRACT

**Background:** The discovery of an abdominal mass in a child usually presents a challenging problem in the diagnosis and treatment to the paediatrician, surgeon and urologist. Because of the heterogeneity of the lesion knowledge of differential of a mass in abdomen is essential for the logical evaluation of a child.

**Methods:** The present study comprises of 25 children who presented with an intra-abdominal mass were included. The medical causes of the abdominal masses i.e. hepatosplenomegaly and leukemias were excluded. All patients admitted were routine investigated and whichever necessary. After the diagnosis, surgery was done wherever indicated and post-operatively the diagnosis was confirmed after the histopathological report.

**Results:** All the cases presented with mass in abdomen while the other presentations were pain in abdomen (36%), fever (20%) and haematuria and vomiting (16% each). It was found that 64% of the masses were urological in origin while 36% of the masses were non-urological in origin. 21 (84%) patients underwent surgery, 10 (40%) patients took chemotherapy, 9 (36%) patients took radiotherapy.

**Conclusions:** Routine investigations were only helpful in diagnosing the infection in infecting cases. Most reliable specific investigation was intravenous pyelography. It was found that majority of the abdominal masses in children were arising from urinary system. Correlation between pre-operative and post-operative diagnosis was found almost consistent.

**Keywords:** Abdominal mass, Children, Ultrasonography, Wilm's tumour

### INTRODUCTION

The problem in paediatric age group is quite different in presentation than from adult age group. The child is often unable to convey his symptoms in any meaningful way and is incapable of comprehending the seriousness of his illness. Symptomatology is frequently vague and inadequate vocabulary of child may impede its perfect expression. In majority of cases, the description of symptoms may have to be secured from the parents whose impression may be distorted by their own intellectual capacity and emotional responses. The discovery of an abdominal mass in a child usually

presents a challenging problem in the diagnosis and treatment to the paediatrician, surgeon and urologist. It was observed that, a child during first fifteen years of life has 0.2% chances of developing cancer.<sup>1</sup>

Abdominal lump in paediatric age group may present in variety of ways. It may as an acute abdominal emergency and surgeon may notice a mass. It may present as a chronic abdominal illness and mass may be discovered on palpation. It may present as an asymptomatic mass or the child may be presented to paediatrician with some symptoms unrelated to the mass. Hence, it becomes challenge to decide for requirement of further

investigation.<sup>2</sup> Because of the heterogeneity of the lesion knowledge of differential of a mass in abdomen is essential for the logical evaluation of a child. When presented with such a condition, it is important that prompt and thorough investigations should be done. Nowadays, with the newly developing sophisticated and reliable investigations like contrast radiography, radioisotope scanning, ultrasonography, CT scan, nuclear magnetic resonance studies, endoscopies and fine needle aspiration cytology techniques, a preoperative diagnosis is rarely inconsistent with the final diagnosis after exploration and histopathology.

Finally, because of the availability of different modalities of treatment in the form of surgery, radiotherapy and chemotherapy, author could do their best for the cure of patient and analyses the management. So, it has been a challenging as well as interesting exercise to study and analysis abdominal masses in paediatric age group due to which this present study has been undertaken. The objectives were to study the clinical profile and management of abdominal tumours in children.

## METHODS

The present study comprises of 25 children who presented with an intra-abdominal mass admitted in ARMCH and RC, Kumbhari were included. The medical causes of the abdominal masses i.e. hepatosplenomegaly and leukemias were excluded. Patients studied were from 1day old child to 12years of age and of both sexes. Majority of the patients presented with mass in abdomen, few with generalized or localized abdominal distension and some with vomiting, pain in abdomen, haematuria and few with symptoms unrelated to the mass, like cough, fever and breathlessness.

All patients admitted were investigated in the form of urinalysis, complete blood count, blood urea, blood sugar, serum creatinine, liver function tests, X-ray chest, plain X-ray abdomen, barium studies, ultrasonography, intravenous pyelography and retrograde pyelography.

After the diagnosis, surgery was done wherever indicated and post-operatively the diagnosis was confirmed after the histopathological report. Postoperatively patients were given antibiotics. In patients with malignant diseases, anti-malignant drugs and radiotherapy were given.

Descriptive statistics such as mean, SD and percentage was used to present the data.

## RESULTS

It was observed that, majority of patients belongs to age group 1-4years (32%) followed by <1year (28%), 4-7years (24%) and >7years (16%). Youngest case was one day old and eldest was 12years old child. Majority of patients were male (72%) (Table 1).

**Table 1: Basic characteristics.**

Characteristics	Number	Percentage
<b>Age group</b>		
< 1year	7	28
1-4years	8	32
4-7years	6	24
7-9years	2	8
9-12years	2	8
<b>Sex</b>		
Male	18	72
Female	7	28

In the study of 25 cases, it was observed that all cases had a mass abdomen which was recognized by parents during bathing and clothing. Next to the mass, pain in abdomen was the chief complain in 9 cases i.e. 36% of cases. Fever was present in 5 cases i.e. 20% of cases. 16% of the patients presented with vomiting and haematuria (Table 2).

**Table 2: Incidence of clinical presentation.**

Clinical presentation	Number	Percentage
Mass in abdomen	25	100
Pain in abdomen	9	36
Fever	5	20
Haematuria	4	16
Vomiting	4	16

Urine analysis was showing abnormal findings in the form of pus cells and epithelial cells in 12 (48%), all these cases were having infection and they were the cases of hydronephrosis with infection and congenital polycystic kidneys.

Blood urea and serum creatinine were raised in 6 (24%). In these, 4 were found to be cases of hydronephrosis with infection and 2 cases were of polycystic kidneys.

In the present study, 14 (56%) cases had anaemia, these were cases of hydronephrosis (6), Wilm's tumour (4), and 1 case each of neuroblastoma, malignant ovarian tumour, appendicular lump and tuberculous mesenteric lymphadenitis.

Eighteen (72%) cases were having raised ESR. Either they were cases of malignancy or chronic infection (8-Wilm's tumour, 2 cases of neuroblastoma, 1 case-malignant ovarian tumour, 6 cases of hydronephrosis and 1 case of tuberculous mesenteric lymphadenitis).

In 3 cases of hydronephrosis, intravenous urography was followed by retrograde pyelography which showed pelvi-ureteric junction obstruction.

In 2 cases of hydronephrosis intravenous urography was followed by micturating cystourethrography and posterior urethral valve was evident.

Ultrasonography was done in 10 (40%) cases, 6 patients were of Wilm's tumour, 2 patients were of hydronephrosis and 2 patients were of neuroblastoma (Table 3).

**Table 3: Findings of investigations.**

Investigations	Normal (%)	Abnormal (%)
Urine analysis	13 (52)	12 (48)
Hemoglobin %	11 (44)	14 (56)
Total leucocyte count	17 (68)	8 (32)
ESR	7 (28)	18 (72)
Blood urea	19 (76)	6 (24)
Serum creatinine	19 (76)	6 (24)
Liver function test	25 (100)	0
Blood sugar	25 (100)	0
Plain X-ray abdomen	8 (32)	16 (64)
Ultrasonography	0	10 (40)
Barium study	1 (4)	0

In this study, it was found that majority of the abdominal masses in children were arising from urinary system, so they were analysed as urological and non-urological. It was found that 64% of the masses were urological in origin while 36% of the masses were non-urological in origin. Out of 16 urological cases, 8 were Wilm's tumour, 6 were hydronephrosis and 2 were polycystic kidneys. Out of 9 cases of non-urological, 2 were neuroblastoma, 2 were congenital hypertrophic pyloric stenosis with lump, 2 were appendicular lumps and 1 case each of tuberculous mesenteric lymphadenitis, malignant ovarian tumour and undescended testis (Table 4).

**Table 4: Causes for urological masses and non-urological masses.**

Causes	No. of cases	%
<b>Urological masses</b>		
Wilm's tumour	8	50
Hydronephrosis	6	37.5
Bilateral polycystic kidneys	2	12.5
Total	16	
<b>Non-urological masses</b>		
Neuroblastoma	2	22.22
Congenital hypertrophic	2	22.22
Pyloric stenosis with lump	2	22.22
appendicular lump		
Tuberculous mesenteric lymphadenitis	1	11.11
Malignant ovarian tumour	1	11.11
Undescended tests with lump	1	11.11
Total	9	

In the present study, 11 cases were of malignant disease, 8 urological in origin and 3 non-urological. 14 cases were of benign nature, 8 were urological and 6 were non-urological in origin (Table 5).

**Table 5: Incidence of benign and malignant lesions.**

Disease	Malignant	Benign	Total
Urological	8	8	16
Non-urological	3	6	9
Total	11	14	25

It was observed that, 21 patients underwent surgery. Post operatively anti-malignant drugs were given to 9 patients, these were (Wilm's tumour 6, neuroblastoma 2, malignant ovarian tumour 1) (Table 6).

**Table 6: Final diagnosis based on.**

Masses	Histo-pathology	Operative	Clinically
Wilm's tumour	8	0	0
Hydronephrosis	1	5	0
Polycystic kidneys	1	0	1
Neuroblastoma	2	0	0
CHPS with lump	0	2	0
Appendicular lump	0	0	2
Tb mesenteric lymphadenitis	1	0	0
Malignant ovarian tumour	1	0	0
Undescended testis	1	0	0
Total	15	7	3

Out of patients of Wilm's tumour, 7 patients underwent nephrectomy of the tumour bearing kidney, 1 patient who had very huge lump undergone laparotomy and biopsy. Out of 6 patients of hydronephrosis, one case underwent nephrectomy who had infected hydronephrosis. 3 patients underwent pyeloplasty and 2 patients having posterior urethral valves underwent excision of posterior urethral valves.

Out of 2 patients of neuroblastoma, 1 underwent total excision of tumour and 1 underwent exploratory laparotomy and biopsy. Both patients of congenital hypertrophic pyloric stenosis, underwent Ramstedt's operation (Pyloromyotomy). The case of tuberculous mesenteric lymphadenitis was explored and only biopsy was taken. On exploration of undescended testis right side orchidectomy was done. The malignant ovarian tumour was excised completely. 2 cases of polycystic kidneys were not operated. 2 patients of appendicular lump were treated by Oschner, sherrren line of treatment and lump completely resolved. 10 patients took chemotherapy, 9 anti-malignant (Wilm's tumour 6, neuroblastoma 2, malignant ovarian tumour 1) and 1 antituberculous in case of tuberculous mesenteric lymphadenitis. 9 patients took radiotherapy i.e. 7 cases of neuroblastoma and 2 cases of neuroblastoma. Every case received radiotherapy in the dose of 2500Rads.

Almost all the patients studied in the series were followed regularly (Table 7).

**Table 7: Mode of treatment.**

Masses	Surgery	Chemo-therapy	Radio-therapy
Wilm's tumour	8	6	7
Hydronephrosis	6	0	0
Polycystic kidneys	0	0	0
Neuroblastoma	2	2	2
CHPS with lump	2	0	0
Appendicular lump	0	0	0
TB mesenteric lymphadenitis	1	1	0
Malignant ovarian tumour	1	1	0
Undescended testis	1	0	0
Total	21	10	9

## DISCUSSION

A significant proportion of abdominal masses in infants and children are tumours whose prognosis improves with prompt discovery and treatment. Therefore, it is mandatory that such children should be urgently investigated and treated.<sup>3</sup>

In the present study, out of 25 patients, majority of patients belongs to age group 1-4yrs (32%). Youngest case was one day old and eldest was 12years old child.

In the study of Vyas JJ et al, the maximum peak incidence was observed in the age group of 7-9years and findings are almost corresponding with the present study.<sup>4</sup> In this study, it was observed that out of 25 patients, 72% were male patients (18) and 28% patients were female (7) giving the approximate ratio of 2.5:1.

In the series of Vyas et al, out of 170 cases, 99 were boys and 71 were girls, giving the ratio of 1.4:1 which indicates that number of female patients was slightly more in their study as compared to the present study.<sup>4</sup> In the study of Kasper TE et al, male to female ratio was 1.3:1.<sup>3</sup> Findings of Vyas JJ et al, are almost in the line with the findings of Kasper TE et al.<sup>3,4</sup>

Besides the mass in abdomen, pain in abdomen (36%), fever (20%), haematuria (16%) and vomiting (16%) were the chief complaints.

In the study of Vyas JJ et al, mass in abdomen was present in 73% of cases (124), pain in abdomen was present in 3% of cases (5), fever was present in 2% of cases only (3), haematuria was present in 7% of cases (13) and vomiting was present in 4% of cases (7).<sup>4</sup>

Urine analysis was showing abnormal findings in the form of pus cells and epithelial cells in 12 out of 25

cases, all these cases were having infection and these were the cases of hydronephrosis with infection and congenital polycystic kidneys with infection. In the present study, 14 cases had anaemia. These were the cases of hydronephrosis with infection (6), Wilm's tumour (4) and one case each of neuroblastoma, malignant ovarian tumour, appendicular lump and tuberculous mesenteric lymphadenitis. Out of 8 cases of Wilm's tumour, only 3 cases had haematuria. In the present study, only 8 out of 25 cases were having raised leucocyte count.

ESR was raised in 18, either malignancy or chronic infection. Blood urea and serum creatinine were raised in 6 cases. In these, 4 were cases of hydronephrosis with infection and 2 cases were of polycystic kidneys.

Vyas JJ et al, has stated that hemogram, urine analysis, X-ray chest, X-ray abdomen and I. V. P. will differentiate between retroperitoneal and kidney conditions. Synchronous metastasis if present can also be delineated, but they have not given any data.<sup>4</sup>

From the above investigations, except I. V. P. it can be said that the routine investigations can only tell about the infection and it will not help in the specific diagnosis of the cases.

Plain X-ray abdomen was abnormal in 16 cases. In 15 cases, kidney shadow was enlarged and in 1 case of neuroblastoma kidney shadow was depressed due to mass lesion.

In the study of Kasper TE et al, plain X-ray abdomen revealed speckled calcification in 12% cases of neuroblastoma and 30% patients had bony metastasis. Further, secondaries were seen in skull (60%), humerus (30%) and femur (30%). These were all the cases of neuroblastoma. In the present study, calcification or secondaries were not seen in any case.<sup>3</sup>

In this present study, intravenous pyelography was done in 17. These were the 8 cases of Wilm's tumour in which kidney function on affected side was either delayed or absent, 6 cases of hydronephrosis in which the pelvi-calyceal system was dilated on affected side. Out of the 6 cases of hydronephrosis, 3 cases were having pelvi-ureteric junction obstruction and 2 cases were having posterior urethral valves and 1 case of polycystic kidney showed spider leg deformity.

In the study of Kasper TE et al, intravenous pyelography demonstrated calyceal distortion in 80% with Wilm's tumour and 12% failed to visualize collecting system and they have further stated that 70% patients with neuroblastoma displace the renal axis and/or ureters without distortion of calyceal system. Only 8% failed to visualize the collecting system.<sup>3</sup>

In the series of Kasper TE et al, 54% of the hydronephrosis were due to posterior urethral valves and 30% due to vesico-ureteral obstruction or reflux. They have further stated that these cases of hydronephrosis dominated the younger age group and were generally associated with urinary tract infection, fever and irritability. In the present study, 5 cases of hydronephrosis were of younger age group and 1 case was 12 years old.<sup>3</sup>

Emanuel B et al, 44 were renal in origin and 10 were the cases of hydronephrosis. They found the delayed functioning of affected kidneys on intravenous pyelography in 8 out of 10 patients of hydronephrosis.<sup>5</sup>

In the present study, 8 cases were diagnostic on ultrasonography. 1 case of Wilm's tumour was misdiagnosed as polycystic kidney and in 1 case of neuroblastoma, sinologist was unable to come to any conclusion.

Kasper TE et al, have mentioned that the sophisticated development of selective renal angiography and ultrasonography has helped to distinguish between nephroblastoma and neuroblastoma and also to differentiate them from hydronephrotic or cystic mass lesion conditions.<sup>3</sup>

In one series of 36 neonates with abdominal masses, Wilson DA observed that ultrasound was completely accurate in ruling out a mass in 7 patients and was 96% accurate in predicting the final diagnosis in 29 patients.<sup>6</sup>

Vyas JJ et al, and Labrosse EH, have stated that urinary excretion of VMA and HVA are increased in neuroblastoma but in the present study, VMA and HVA were not done.<sup>4,7</sup>

Out of 25 cases, urological cases accounted for 16. Raffensperger JG reported 31 infants operated upon for abdominal masses, the genitourinary tract was the source of mass lesion in his 77% of cases.<sup>8</sup>

Emanuel B et al, reviewed 52 neonates with abdominal masses, out of these 52, 44 were renal in origin.<sup>5</sup>

In the study of Slim MS et al, reported abdominal malignant neoplasm seen over 11 years period, only lymphoma was more common than Wilm's tumour.<sup>9</sup>

Wedge JJ et al, reported 63 infants with abdominal masses seen over 10 years of period and noted that 47 infants were renal in origin.<sup>10</sup>

Kasper TE et al, classified 80% of the surgical masses as urologic in origin and further noted that 45% were neoplasm, 32% were hydronephrosis and 13% were cystic disease and 10% were renal parenchymal lesions.<sup>3</sup>

Parrot TS et al, noted that 8.4% of 603 major operations in neonates were for urological diseases.<sup>11</sup>

In the series of Vyas JJ et al, urological cases accounted for 40% and non-urological for 60% of cases. 69 patients were of nephroblastoma and 20 patients were of neuroblastoma.<sup>4</sup>

The incidence of urological cases varied from 40.10% to 84.00% in different series.<sup>4,5</sup> In the present series it was 64.00%.

The incidence of non-urological cases varied from 16.00% to 59.90%.<sup>4</sup> In present study, it was 36%.

In the present study, Wilm's tumour was the commonest lesion observed in urological cases, which accounted for 45% in the series of Kasper TE et al, 100% in the series of Vyas JJ et al and 50% in the present series.<sup>3,4</sup>

Hydronephrosis was the next common lesion accounting for 32% in the series of Kasper TE et al, it accounted for 37.50% in the present series. Vyas JJ et al, have not reported a single case of hydronephrosis.<sup>3,4</sup>

Congenital polycystic kidneys accounted for 13% in the series of Kasper TE et al, and 12.50% in the present series. Vyas JJ et al have not reported any case of polycystic kidneys.<sup>3,4</sup>

Renal parenchymal anomalies accounted for 10% of patients in the series of Kasper TE et al.<sup>3</sup> Not a single case was found in the series of Vyas JJ et al, as well as the present study.<sup>4</sup>

In the present study, non-urological cases were 9. Out of these 9, neuroblastoma was present in 2 (22%) patients while in the series of Vyas JJ et al, neuroblastoma accounted for 20%. The incidence of neuroblastoma was same in both the series.<sup>4</sup>

Gynecological lesions accounted for 11% of cases in this series which was slightly more than the series of Vyas JJ et al. Dysgerminoma of ovary was seen in 8 out of 100 cases of non-urological masses. In the present study of 25 cases, 1 case of embryonal carcinoma of ovary was seen.<sup>4</sup>

Out of the 25 cases, final diagnosis was done after histopathological examination in 15 cases i.e. 60%.

In 7 (28%) cases, final diagnosis was done on operation table. In 3 cases, 2 cases were of appendicular lump diagnosed clinically and 1 case of congenital polycystic kidneys was diagnosed by intravenous pyelography.

In 23 out of 25 cases, pre and post-operative diagnosis was consistent. One case of neuroblastoma was misdiagnosed as a case of intestinal lymphoma and another case of tuberculous mesenteric lymphadenitis

was misdiagnosed as a case of lymphoma of mesenteric group of lymph nodes.

In one case of neuroblastoma complete excision of the tumour was possible while in the other case only biopsy was taken; as the growth was extensive and adherent to surrounding structures. In 2 cases of congenital hypertrophic pyloric stenosis Ramstedt's pyloromyotomy was done.

In one case of tuberculous mesenteric lymphadenitis exploratory laparotomy and biopsy was done.

One case of malignant ovarian tumour underwent complete excision of tumour. Only 4 cases were treated conservatively, these were 2 cases of appendicular lump and 2 cases of bilateral polycystic kidneys. 2 patients of appendicular lump were treated with Ochsner-Sherren line of treatment and lump completely resolved. In 2 cases of bilateral polycystic kidneys with bilateral bronchopneumonia antibiotics were given.

During the course of chemotherapy and radiotherapy patients were investigated in the form of haemoglobin percentage, total leucocyte count and platelet count, microscopic haematuria and cardiovascular system examination regularly to know the toxic effects of chemotherapy and radiotherapy.

Almost all the patients studied in the series were followed up regularly. They improved and were asymptomatic, only 1 case of Wilm's tumour developed metastasis in left supraclavicular lymph node after complete dose of radiotherapy but was dissolved completely after one dose chemotherapy and kept on chemotherapy subsequently.

In the study of Vyas JJ et al, 87% patients underwent surgery. In the present study, it was 84%. In the study of Vyas JJ et al, 23% patients took anti-malignant chemotherapy, which accounted for 36% of the patients in the present study. In the same above-mentioned series, radiotherapy was given post-operatively in 40% of cases while in the present series 36% of the patients took radiotherapy.<sup>4</sup>

In the study of Vyas JJ et al, 56 (32%) patients developed metastasis, while in the present series only 4% patients developed metastasis subsequently.<sup>4</sup>

This disparity may be because of time interval as present study was completed in one and half years while Vyas JJ et al, covered a period of 15 years in their series.<sup>4</sup> To evaluate the cases of paediatric malignancy properly, long time follow up was required and then only efficacy of the treatment can be judged. It was not possible to do long term follow up of malignant and other cases because of stipulated time period for presenting this work.

## CONCLUSION

Routine investigations were only helpful in diagnosing the infection in infecting cases. Most reliable specific investigation was intravenous pyelography. It was found that majority of the abdominal masses in children were arising from urinary system. Correlation between pre-operative and post-operative diagnosis was found almost consistent.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Kane VS, Ubale BP. Study on clinical profile and management of abdominal tumours in children. Int Surg J 2019;6:447-52.