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A review of 25 years experience in 461 cases of pediatric abdominal mass

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Abstract

Background: Regarding the significance of abdominal masses in children, we aimed to identify the pathology of masses according to the age and sex groups.

Materials and Methods: We retrospectively reviewed pathological reports of 461 patients with abdominal mass that underwent resection or biopsy during the study period (25 years).

Results: One hundred and eighty six cases (40%) were non-neoplastic, many of which had renal originand 35 cases (7%) were hydatid cysts. Concerning the 271 neoplastic masses (58%), 96 cases (20%) were diagnosed as renal tumors (frequently Wilm's tumor), 63 (13%) as neuroblastoma and 56 (12%) as abdominal lymphomas.

Conclusion: Abdominal masses in children coming to a referral pediatric surgery center are more likely to be neoplastic. We also found that malignancies are rare in neonatal period in comparison to other age groups.

Keywords: Abdominal mass, neoplastic, hydatid cyst, wilm's tumor, neuroblastoma

Introduction

Abdominal masses in children are challenging diagnostic problems and they represent a spectrum of lesions of diverse origin and significance. [1 - 6] They may occur at any age from newborn period through adolescence. Some abdominal masses are incidental findings in otherwise well children, while many masses may be associated with symptoms or signs, for example vomiting, constipation, jaundice, fever and symptoms of urinary tract obstruction.[6, 7] Although it is imperative that children with abdominal mass be quickly referred to the appropriate specialist, evaluation by the pediatrician is of great value in deciding about initial management and in making the most appropriate referral.[7-10] Age, history and physical examination provide initial guides to diagnosis. Imaging studies, particularly ultrasonography, may point to a specific diagnosis.

Abdominal masses in the newborn period (from birth to one month of age) are predominantly benign lesions, usually representing defects in embryonic development.[6, 7] Beyond the newborn period, there is a significant increase in malignant tumors and the frequency of specific abdominal masses changes considerably.[1-5,11] Even benign conditions can be serious and warrant prompt evaluation and treatment.[9,12-15]

After completion of the necessary preoperative studies, prompt surgery is indicated. Outcome varies widely depending on the malignant or benign nature of the existing mass, but is generally more favorable in neonates. The Aim of this study

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was to give a complete report of children with abdominal masses admitted to a referral pediatric surgery center, and also showing our experience in the identification and analysis of the nature of the masses in children under 14 years old.

Materials and Methods

All patients with abdominal mass, treated at Bahrami Children's Hospital, a referral pediatric surgery center in Tehran, Iran, in the years between 1984 and 2009, were included in the study.

After obtaining approval from the ethical committee of Tehran University of Medical Sciences, data pertaining to all patients presenting with abdominal mass during a 25-year period (1984-2009) was obtained from hospital medical records department.

All patients' surgeries were performed by 3 board-certified pediatric surgeons, via transperitoneal left or right transverse incision, depending on the mass location. Initial imaging studies including ultrasonography, CT scan, intravenous pyelography (IVP) and rarely intestinal follow-through and barium enema were all performed at Bahrami Children's hospital. The following data were retrospectively studied based on the patients' medical records: sex, age at surgery, surgical complications including postoperative bleeding, vascular lesions, infection, intestinal obstruction and recurrence. The data was analyzed to determine the relative and absolute frequency of abdominal masses in 5 different age groups.

Results

During the 25-year study period, there were 461 cases of abdominal mass. There were 246 boys and 215 girls with the mean age of 37.7 months. Common masses in each age group are listed in table1.

Of the 461 cases, 96 (21%) proved to be of renal origin; Wilm's tumor being the diagnosis in 86cases (19%). Four cases were diagnosed as mesoblastic nephroma. Rare renal tumors consisted of two cases of clear cell sarcoma, two cases of renal teratoma, one rhabdoid tumor and one cystic nephroma. The second most frequent abdominal mass was neuroblastoma accounting for 63 cases (14%), two third of which were located in left adrenal. The third most common mass was abdominal lymphoma afflicting 56 cases (12%). Hydronephrosis and polycystic kidney disease, detected in 47 cases (10%), made up the forth most common group. Thirty nine cases (8%) were ovarian masses and 35 cases (7%) were hydatid cysts which were often located in right hepatic lobe. The characteristics of the frequent abdominal masses are listed in table 2.

Primary hepatic tumors involved 29 cases (6%), 80% of which were malignant and 20% were benign. Twenty-three cases were diagnosed as choledochal cyst (4%). Other masses in order of frequency included: abdominal and retroperitoneal teratoma, yolk sac tumor, mesenteric and omental cyst, enteric duplication cyst, hydrometrocolpos, abdominal rhabdomyosarcoma, Primitive NeuroEctodermal Tumor (PNET), abdominal pseudotumor, pheochromocytoma, abdominal lymphangioma, adrenal adenoma, pancreatic pseudocyst, fibromatosis and three cases of fetus in fetu.

Discussion

Abdominal masses in children include a wide spectrum of lesions from organomegaly, fecal material, phytotricho-bezoar and retention bladder to cystic or solid and benign or malignant masses[6,

Table 1: The most common abdominal masses in different age groups

Age group	Most common abdominal masses (in order of frequency)
0 to 1 month	Hydronephrosis, Polycystic Kidney Diseases, Ovarian cysts, Mesoblastic nephroma
1 to 12 months	Wilm's tumor, Hydronephrosis, Neuroblastoma
1 to 5 years	Wilm's tumor, Neuroblastoma, Lymphoma
5 to 10 years	Lymphoma, Hydatid cyst, Wilm's tumor
10 to 14 years	Ovarian masses, Choledochal cyst, Hydatid cyst

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Table 2: General characteristics of common abdominal masses

Abdominal mass	Frequency	Number of male cases	Number of female cases	Average male age	Average female age	The eldest	The youngest
Right unilateral Wilm's tumor	38 (8%)	19	19	29 months	36 months	9 years	10 years
Left unilateral Wilm's tumor	45 (9%)	27	18	45 months	45 months	12 years	2 months
Bilateral Wilm's tumor	3 (0.6%)	1	2	1.5 years	34 months	5 years	8 months
Mesoblastic nephroma	4 (0.8%)	4	0	4.5 months	-------	1 year	7 days
Right hydronephrosis	6 (1%)	3	3	14 months	26 months	6 years	2 months
Left hydronephrosis	10 (2%)	7	3	57 months	32 months	9 years	15 days
Bilateral hydronephrosis	19 (4%)	14	5	47 months	25 months	13 years	10 days
Polycystic Kidney Disease	12 (2%)	5	7	7.6 months	7.6 months	4 years	4 days
Lymphoma	56 (12%)	42	14	6.6 years	6.5 years	14 years	2 years
Neuroblastoma	63 (13%)	41	22	29 months	48 months	10 years	54 days
Hydatid cyst	35 (7%)	22	13	7 years	7 years	13 years	8 months
Hepatic masses except Hydatid cyst	42(9%)	16	26	39 month	46 month	13 years	5 months
Choledocal cyst	39(8%)	13	26	5.5 months	6 years	13 years	56 months
Mesenteric cyst	89(19%)	35	54	61 months	81.6 months	13 years	6 month
Total	461 (100%)	------	------	--------	-------	-------	-----

[7, 10] Astonishingly, most of them (57%) are non-surgical problems [6, 7,10, 11] such as hepatomegaly or splenomegaly secondary to medical diseases like leukemia, lymphoma and portal hypertension, which may be diagnosed and treated with physical examination and paraclinical evaluations. Regarding the surgical masses (43%), almost half are of urinary tract origin (14-16). Ninety percent of the masses are extraperitoneal, two-third of which being of renal origin. The remainders (extra-renal masses) are mostly malignant.[1-5, 12, 13]

Abdominal masses can be categorized on the basis of age and anatomic location.[7] Through such classification, one can predict the origin and the nature of the mass. Regarding the anatomic site, they can be classified as upper abdomen, lower abdomen, intrapelvic, retroperitoneal and intraperitoneal.[7] Categorizing the abdominal masses on the basis of age will clarify the prevalence of each mass in each age group.

Most of the neonatal masses are detected in first days of life.[6-8, 10, 11] Eighty seven percent of them are benign and 50-75% has got urologic origin.[7] The most common neonatal masses include hydronephrosis and polycystic/dysplastic kidney disease.[14, 15] Intraperitoneal gastrointestinal lesions consist 10-15% of neonatal masses in which alimentary tract duplication cysts are of most importance.[6, 10] Other masses in neonatal period include hydrometrocolpos, pseudocyst derived from intestinal perforation secondary to meconium ileus, teratoma, follicular ovarian cysts, choledochal cyst, gall bladder hydrops and hepatic cysts.[6] Only 13% of neonatal abdominal

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masses are malignant and include neuroblastoma, Wilm's tumor, malignant teratoma and primary hepatic malignant tumors.[12-15] Interestingly, they have favorable prognosis; surgical and medical cure is achieved in 60% and 20% of cases, respectively.[12, 13]

In our study, the most frequent sign was a palpable mass and the most common symptom was abdominal distention. Considering sex, most of the masses appeared in boys. By nature, more than half of masses were malignant. Similar to some other studies[7-10] benign lesions such as hydronephrosis and polycystic kidney disease were common in neonatal period.[6, 7, 10] After the neonatal period, Wilm's tumor, neuroblastoma and lymphoma were common. In the late childhood, benign lesions such as ovarian cysts, choledochal cyst and hydatid cyst were more frequent. In this study, 57% of the masses had retroperitoneal location and 43% were intraperitoneal. These figures differ from those appearing in the literature which states that 90% and 10% of the childhood abdominal masses are retroperitoneal and intraperitoneal respectively.[5]

When all age groups except the neonatal group are studied, the frequency of malignant masses raises gradually with respect to the increasing age.[5, 7] It is important to mention that, excluding trauma, the first cause of mortality among the children between 0-14 years is malignancy.[12, 13] Leukemia and lymphoma, Central Nervous System (CNS) malignancies, neuroblastoma and Wilm's tumor comprise 25-35%, 25-30%, and 10-20% of malignancies, respectively.[1-4] After the neonatal period, especially under 1 year of age, neuroblastoma is a common malignancy.[14, 15] Beyond this age, Wilm's tumor takes the first place.[14, 15] Actually, more than 50% of the intraabdominal masses in children older than 1 year are retroperitoneal malignant tumors.[1-5] In our study in most cases, detailed patient information and diagnostic pre-operation diagnostic tests were missing in patients medical files. Moreover, close follow-up issues including the recurrence and its timing, surveillance methods, detailed complications and exact post-operation treatment plans were not explained.

Conclusion

Our data implicated that the four most common intraabdominal masses in children coming to a referral pediatric surgery center are renal tumors, neuroblastoma, abdominal lymphoma and hydronephrosis. We also found that malignancies are rare in neonatal period in comparison to other age groups.

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