



Pediatric Solid Tumors: A Pathologic Study of 152 Cases

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ABSTRACT

Background: The aim of this study is to understand the epidemiology and review the histopathology of pediatric solid tumors.

Materials and methods: This is a retrospective study of 152 cases in the Department of Pathology Rangaraya Medical College, Kakinada, Andhra Pradesh, India.

Results: A total of 152 tumors were seen in the age range of 1 week to 18 years, with 46.7%(71) occurring in boys and 53.28% (81) in girls. Benign tumors outnumbered [76.32% (n= 116)] the malignant tumors [23.68% (n= 36)]. In the benign tumors, vascular tumors were most common (n= 25) cases, while in malignant category CNS tumors were most common (n=10).

Conclusion: Although the exact incidence rate cannot be provided by this study, the information is useful in showing the pattern of pediatric solid tumors encountered in a tertiary care and teaching hospital.

KEYWORDS : pediatric, pathologic study, solid tumors.

INTRODUCTION

Tumors that occur in children are as diverse as those that occur in adults and present a number of challenges to the pathologist. [1,2] Compared with cancers that occur in adults, childhood cancers are rare comprising only 1% of all the cancers.[3] In the developing world, childhood cancers are yet to be recognized as a major pediatric illness; however, they are fast emerging as a distinct entity to be dealt upon..[4]

The spectrum of pediatric tumors varies considerably and differs from that in adults. Virtually any tumor may be encountered in children, however in general, the principal groups of cancer in children are leukemias, lymphomas, and sarcomas, whereas in adults the chief cancers are carcinomas. [5] Benign tumors are more common than the malignant tumors. Most benign tumors are of little concern but on occasion they cause serious disease by virtue of their location or rapid increase in size.[7]

The spectrum of malignancies encountered in them has a great regional variability owing to the environmental and genetic differences.[9] A literature search shows that there is paucity of studies on the histological review of the childhood tumors in general and childhood benign tumors in particular.

Both benign and malignant tumors need a comprehensive evaluation to provide an appropriate diagnosis for designing therapy and predicting prognosis.. [8]

In an effort to better understand the epidemiology of tumors in children in our region, a retrospective review of the tumors diagnosed histopathologically was carried out.

MATERIALS AND METHODS

This is a retrospective study conducted in the Department of Pathology at Rangaraya Medical College, Kakinada, Andhra Pradesh, which caters to the patients attending and referred from periphery to the hospital, to analyze the spectrum of tumors in children. The records of all the tumors diagnosed histopathologically in children <18 years of age during a period of 2-years from January 2013 to December 2014 were retrieved and analyzed. The tumors were analyzed according to age, sex and histopathological diagnosis. Both benign and malignant tumors diagnosed in children were included, while leukemias were

excluded from our study. All tumors were diagnosed on routine hematoxylin and eosin stained sections; special stains were applied wherever necessary. Fine-needle aspiration was done in some cases only. Cytogenetic and molecular studies were not done for any of the cases.

RESULTS

During the 2-year study period, a total of 152 paediatric tumors were diagnosed and these tumors (including both benign and malignant) , diagnosed on histopathology, formed the study group.

Clinical profile

The cases included in the present study were in the age range of 1 week-18 years. Maximum number of cases occurred in the age group of 10-14 years. The system wise distribution of these tumors is shown in Table 1. The Sex wise distribution of these tumors is shown in Table 2.

Table 1: System wise distribution of Pediatric solid tumors

S.no	Diagnostic group	No. of cases	% of tumors
1	Soft tissues	49	32.23
2	Bone tumors	21	13.81
3	Breast	20	13.15
4	CNS	18	11.84
5	Female genital tract	10	6.57
6	GI tract	10	6.57
7	Thyroid	07	4.60
8	Kidney	02	1.31
9	Nasopharyngeal	02	1.31
10	Laryngeal	02	1.31
11	Lymphomas	02	1.31
12	Pulmonary	01	0.65
13	Others	08	5.26
	Total	152	100

Table 2: Sex wise distribution of pediatric solid tumors

S. no.	Diagnostic group	Male	Female	Total
1	Soft tissues	27	22	49
2	Bone tumors	13	08	21
3	Breast	00	20	20
4	CNS	14	04	18
5	Female genital tract	00	10	10
6	GI tract	07	03	10
7	Thyroid	01	06	07
8	Kidney	01	01	02
9	Nasopharyngeal	02	00	02
10	Laryngeal	02	00	02
11	Lymph nodes	01	01	02
12	Pulmonary	00	01	01
13	Others	03	05	08
	Total	71	81	152

Table 3: Benign and malignant pediatric solid tumors

S. no.	Diagnostic group	Benign	Malignant	Total
1	Soft tissues	46	03	49
2	Bone tumors	17	04	21
3	Breast	18	02	20
4	CNS	07	11	18
5	Female genital tract	09	01	10
6	GI tract	07	03	10
7	Thyroid	04	03	07
8	Kidney	00	02	02
9	Nasopharyngeal	01	01	02
10	Laryngeal	02	00	02
11	Lymph nodes	00	02	02
12	Pulmonary	00	01	01
13	Others	05	03	08
	Total	116	36	152

Histopathological diagnosis

Benign tumors

As depicted in Table 1, soft tissue tumors were the most common which include vascular tumors(25), Lipomas(5) and neural tumors(Neurofibroma-4 and Schwannoma-1). Bone tumors were the next common tumors. Osteochondroma was the most common bone tumor (14 cases) followed by 2 cases of osteoid osteoma and one case of tumor like lesion- fibro-osseous dysplasia.

Fibroadenoma was seen to occur exclusively in females >10 years of age. The spectrum of benign tumors of skin and adnexae included Pilomatricoma(1), Eccrine hidrocystoma(1), Clear cell hidradenoma(1), Trichoepithelioma(1), Eccrine acrospiroma(1), Melanocytic nevi(2), and Angiokeratoma of Meibelli(1). All female genital tract tumors were ovarian tumors and include mature cystic teratomas (6), mucinous cystadenomas (2) and one case of serous cystadenoma. Our study also included 7 cases of benign gastro intestinal polyps, follicular adenoma (3), laryngeal papillomas (2) and inverted papilloma(1).

Malignant tumors

In our study CNS tumors were the most common malignant tumors and included 10 cases of Astrocytomas and 2 cases of Medulloblastoma. The category of bone tumors include 2 cases of osteosarcoma and 2 cases of Ewing sarcoma/ PNET. There were 2 cases of adenocarcinoma of intestine and 1 case of immature teratoma of stomach. The category of malignant thyroid tumors included 2 cases of papillary carcinoma and 1 case of follicular carcinoma. 2 cases of malignant phyllodes, 2 cases of Wilms tumor, 1 case of Non Hodgkin lymphoma, 1 case of Hodgkins lymphoma, 1 case of naso pharyngeal carcinoma, 1 case of malignant mixed germ cell tumor were seen in our study. Along with this, our study also include 1 case of pleurapulmonary blastoma. In addition, 1 case of neuroblastoma, 2 cases of sacrococcygeal teratoma were also included in this study.

DISCUSSION

Childhood tumors form a highly specific group, are mainly embryonal in type and arise in the lymphoreticular tissue, CNS, connective tissue

and viscera. Unlike adults, epithelial tumors are rare.[4]

The incidence and frequency of childhood tumors has a great geographical variability. In India, although infections and malnutrition are the major factors contributing to morbidity and mortality, malignancies are coming into greater focus because of preventive measures being taken for the former.[10]

Our study attempts to provide a spectrum of tumors in children <18 years of age in our region. Maximum

number of childhood tumors were seen in the age group of 10-14 years which correlated with a study conducted by Punia , et al[1]. Female predominance is the salient feature in our study. Benign tumors were more common than malignant tumors (Table 3). In our study, malignant tumors accounted for 23.68% cases. Benign tumors usually have a favorable outcome, but they can cause a lot of concern to the patient and the clinician and rarely may lead to serious complications. This mandates a comprehensive evaluation for appropriate management and a need to study their spectrum in children.

Benign tumors

The majority of soft tissue tumors in young adults are benign vascular or fibroblastic proliferations.[13] Majority of breast masses in the pediatric age group are benign, but malignancies do occur.[14] Fibroadenoma is the most frequent breast tumor in adolescent girls. [15] Similar findings were noticed in our study.

Malignant tumors

Childhood cancers frequently arise in the hematopoietic system, nervous tissue, soft tissue, bone

and kidney. This is in contrast to those occurring in adults, in whom the skin, lung, breast, prostate and colon are the most common sites of tumors.[7] Childhood cancers comprise a variety of malignancies with an incidence varying worldwide by age, sex, ethnicity and geography. Our study has a higher incidence of CNS tumors with Astrocytomas being the most common CNS tumors. The analysis based on data collected by the Manchester Children's Tumor Registry during a 45-year time period (1954-1998) revealed 2511 nonlymphoreticular solid tumors, of which 1055 were CNS tumors, with astrocytoma being most common.[20]

Diagnosis of bone tumors requires correlation of clinical, radiographic and pathologic findings. The major bone tumors diagnosed were Ewing sarcoma/PNET and Osteosarcoma, in the 10-14 years age group which correlates with the observations in other series..[1,10,19]

Malignant epithelial tumors are uncommon in the pediatric age group. In the current study 1 case of mucin secreting adenocarcinoma, and 1 case of immature teratoma stomach were diagnosed.

The current study is a single institution based study, restricted by a small sample size. Hence this retrospective review cannot serve as a benchmark for reference. Although the cooperative groups' studies on pediatric neoplasms overcome such a limitation, they are scarce. [18,20] In India, we could not find any large cooperative study on pediatric tumors. This study is an attempt to provide a complete spectrum of childhood tumors diagnosed on histopathology. The study includes both benign and malignant tumors, while most of the previous studies have mainly focused on malignant tumors in children.

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