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Original Article

The spectrum of childhood neoplasms – Evaluation of 161 cases in surgical pathology department

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ABSTRACT

Although major cause of childhood morbidity and mortality in the developing world is still malnutrition and infections, pediatric neoplasms are also rising in number. Although pediatric neoplasms occur infrequently, they present a challenging diagnostic and therapeutic problem. Unfamiliarity with these conditions may lead to the erroneous diagnosis and unnecessary aggressive therapy. This was a retrospective analysis of 161 cases of pediatric tumors, both benign and malignant, in surgical pathology department excluding neurosurgery, cardiothoracic, and hemato-lymphoid malignancies (age group 0–12 years) encountered over a period of 5 years: January 2004–December 2008. The clinical, radiological, and therapeutic data were obtained from patients' case paper records. Pattern of childhood tumors was studied with a focus on tumor incidence, age and sex distribution, demographic pattern, and histological type.

1. Introduction

Incidence of pediatric neoplasms is on the rise all over the globe, though it is a small fraction of the overall global tumor burden. Yet for children and their families, it can be deeply distressing. Although pediatric neoplasms occur infrequently, they present a challenging diagnostic and therapeutic problem. Unfamiliarity with these conditions may lead to the erroneous diagnosis and unnecessary aggressive therapy.

Malignancy is the second most common cause of childhood mortality in the developed world, accounting for 12.3% of all childhood deaths in U.S.A.[1] Although the major cause of childhood mortality in the developing world is still malnutrition and infections, pediatric neoplasms are also rising in number. About 1/650 children develops malignancy before their 15th birthday.[2] Malignancies account for the major cause of death in Indian children, next only to infection and malnutrition. Approximately 35,000–40,000 children develop malignancies each year in India.[2]

Thus, the appropriate management of pediatric tumors requires detailed clinical history, tumor site, precise histopathological diagnosis, and accurate grading and staging wherever possible along with other clinical investigations. Histological type is important for understanding etiology and progression of disease. No histological diagnosis can be accurate without a clinico-radio-pathological correlation.

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2. Materials and methods

This was a retrospective analysis of 161 cases of pediatric tumors in surgical pathology department, excluding neurosurgery, cardiothoracic, and hemato-lymphoid malignancies (age group 0–12 years), encountered over a period of 5 years: January 2004–December 2008. Institutional ethics committee permission has been taken before starting the study. Surgical specimens and biopsy tissues received were fixed overnight in 10% buffered formalin and submitted for processing. Paraffin sections were cut at 4–6 μm thickness and routine H&E staining was performed. All cases were reevaluated histologically on sections from routinely processed formalin-fixed, paraffin-embedded blocks. Special stains and immunohistochemistry were studied wherever necessary. The clinical, radiological, and therapeutic data were obtained from patients' case paper records. Pattern of childhood malignancies was studied with a focus on tumor incidence, age and sex distribution, environmental and other etiological factors, demographic pattern, and histological type (Tables 1–6).

Table 1 – Incidence of pediatric tumors in total surgical specimens (both biopsy and surgical specimens of adults and pediatric) received.

Year	No. of pediatric tumors	Total no. of surgical pathology cases	Percentage (%)
2004	15	9423	0.16
2005	28	9154	0.31
2006	33	8613	0.38
2007	46	8745	0.53
2008	39	8460	0.46
Total	161	44,395	0.36

Table 2 – Incidence of pediatric tumors in total pediatric cases (both biopsy and surgical specimens) received.

Year	No. of pediatric tumors	Total no. of pediatric surgical pathology cases	Percentage (%)
2004	15	602	2.49
2005	28	577	4.85
2006	33	685	4.82
2007	46	619	7.43
2008	39	666	5.86
Total	161	3149	5.11

Table 3 – Age incidence.

Age group (years)	Total cases (n = 161)	Percentage (%)
0–1	10	6.22
1–5	52	32.29
5–10	56	34.78
10–12	43	26.71

Maximum cases were seen in children aged 5–10 years – 34.78%.

3. Results

Average incidence of pediatric tumors in surgical pathology in tertiary care unit was 0.36%. Males were affected more with male to female ratio as 1.3:1. The commonest tumors in our study were soft tissue tumors (49 cases out of 161), most commonly seen in age group 5–10 years, with male:female ratio as 1.4:1. Amongst soft tissue tumors, vascular tumors (55.10%), including lymphangioma and angiofibroma, were followed by lipoma and neurofibroma. In the vascular tumors, hemangiomas were excluded, as these are clinically, radiologically distinct entities. Lymphangioma contributed 16 cases out of 49 vascular soft tissue tumors followed by angiofibroma. In the skeletal system, the most common tumor in children was osteochondroma and the predominant age group affected was the 10–12 years age group, with 13 out of 19 cases (68.42%) belonging to this group. Osteochondroma had shown male predominance. In the renal tumors, only Wilms tumors (9 cases) were seen, with classical triphasic tumors being more common. The mean age of presentation was 3 years with the age group 1–5 years being the commonest age group of presentation (8 cases out of 9). Three of them had showed unfavorable histology. Among the gonadal germ cell tumors, there were noted three mature teratomas, one immature teratoma, two yolk sac tumors of ovary, and one yolk sac tumor in testis. Two mature sacrococcygeal teratomas were also seen. Among the nonteratomatous dermoid cyst, periorbital region (16 out of 27 cases) was the commonest location. In the adrenal gland, adrenal medullary tumors were more common than adrenal cortex, with neuroblastoma (4 of 10 cases) as the common individual tumor. 37 (22.98%) cases out of 161 were diagnosed as malignant. The commonest tumor was Wilms tumor (9 out of 37 cases) followed by neuroblastoma (4 out of 37 cases). The common age of presentation was 1–5 years with male predominance. Immunohistochemistry performed on 10 of 11 round cell tumors revealed five cases of lymphoma, three cases of rhabdomyosarcoma, and two cases of Ewing's sarcoma/PNET.

4. Discussion

In literature, differences have been demonstrated in the incidence rates of pediatric neoplasms, as they are studied by anatomic site, age, race, or gender. They are also studied in reference to various parameters, such as total pediatric tumors against total pediatric hospital admissions or total autopsy studies or total surgical pathology samples received. The present study comprises of 161 cases (0.36%) of childhood tumors from a total of 44,395 surgical specimens (both adults and pediatrics) received over a period of 5 years. The incidence of pediatric neoplasms from total pediatric surgical cases received is 5.11% (161 cases of 3149). Data on the incidence of childhood cancer in Queensland during the 10-year period, 1979–1988, show that the average annual crude incidence rate and age-standardized incidence rate (to the world population) for both sexes were 12.63 and 13.30 per 100,000, respectively.[3] Kusumakumary et al. observed total number of pediatric malignancies during a 10-year period and accounted for 4.5%