Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2015; 3(1F):436-439 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2015.v03i01.085

Research Article

Paediatric Malignant Soft Tissue Sarcoms: A Clinicopathological Study

Chandrashekhar Thotadamane Nagaraja*[1], Geethalakshmi Ugrappa[2], Girish Chandrashekara Jarabandi[3], Rameshbabu K[4]

[1,3]Associate Professor, Department of Pathology, Shivamogga Institute of Medical Sciences, Sagar Road, Shivamogga - 577201, Karnataka, India

[2]Assistant Professor, Department of Pathology, Shivamogga Institute of Medical Sciences, Sagar Road, Shivamogga - 577201, Karnataka, India

[4]Professor, Department of Pathology, Shivamogga Institute of Medical Sciences, Sagar Road, Shivamogga - 577201, Karnataka, India

***Corresponding author**
Dr. Chandrashekhar Thotadamane Nagaraja
Email: drchandru2420@gmail.com

Abstract: Pediatric soft tissue sarcomas (STSs) are a heterogenous group of malignant tumors originating from primitive mesenchymal tissue. They account for 7% of all childhood tumors. Risk-based management allows the pediatric oncologist to determine the risks and benefits of treatment for each patient in order to maximize survival, minimize morbidity, and improve the quality of life. Thus, accurate histopathological reporting in conjugation with ancillary methods is needed. We attempted to study the occurrence of soft tissue sarcomas in paediatric population. This study was under taken to evaluate the incidence and morphological features of malignant soft tissue sarcomas in children of fifteen years and below. The histopathology slides and paraffin blocks were reviewed. Gross examination was done carefully noting the size, shape, extent and configuration, nodularity, consistency (solid, cystic or mixed). The sections 3-5 µ thick, were cut and stained by haematoxylin and eosin in all cases and special stains like PAS, MTS, RT and IHC done where ever feasible. Thirteen cases were encountered, out of which 9(13.63%) were Rms, 3 (4.54%) were fibrosarcoma and 1 (1.51%) was synovial sarcoma. Case distribution included one in infancy, 2 in 1-5yr, 4 in 5-10yrs and 6 cases in 10-15 yrs age group. In the present study most common site was abdominal wall and the age group was between 10-15 yrs (46.15%). The mean age being 8 yrs 4mts. Sex ratio of M: F was 1.16:1.
Keywords: Soft tissue sarcomas, Histopathology, Childhood.

INTRODUCTION

Pediatric soft tissue sarcomas (STSs) are a heterogenous group of malignant tumors originating from primitive mesenchymal tissue. They account for 7% of all childhood tumors [1]. About half of all childhood soft tissue sarcomas are rhabdomyosarcoma arising from skeletal muscle. The other soft tissue sarcomas of childhood include a wide range of different histologies that include fibrosarcoma, leiomyosarcoma, liposarcoma, schwannoma, soft tissue Ewing's / peripheral neuroectodermal tumours, synovial sarcoma and other types. These non-rhabdo sarcomas are found to be more common in adults, but usually behave quite differently when compared to children [2-4]. Risk-based management allows the pediatric oncologist to determine the risks and benefits of treatment for each patient in order to maximize survival, minimize morbidity, and improve the quality of life [5]. Thus, accurate histopathological reporting in conjugation with ancillary methods is important. We attempted to study the occurrence of soft tissue sarcomas in paediatric population

METHODOLOGY

This study was under taken to evaluate the incidence and morphological features of malignant soft tissue sarcomas in children of fifteen years and below. The material for present study was obtained from SIMS and referred cases.

The clinical history regarding duration of the disease, mode of presentation, symptoms and signs were recorded from the case papers, request forms, patient's history, clinical data along with relevant details obtained from available hospital and departmental records. The histopathology slides and paraffin blocks were reviewed. Gross examination was done carefully noting the size, shape, extent and configuration, nodularity, consistency (solid, cystic or mixed). A minimum of 4-5 bits were selected from the representative areas of tumor. The tissue for routine microscopy was preserved and fixed in 10% neutral buffered formalin for 24 hours and processed in automatic tissue processor (Histokinette) and embedded

in paraffin [5]. The sections 3-5 µ thick, were cut and stained by haematoxylin and eosin in all cases and special stains like PAS, MTS, RT and IHC done where ever feasible.

RESULTS

Thirteen cases were encountered, out of which 9(13.63%) were Rms, 3 (4.54%) were fibrosarcoma and 1 (1.51%) was synovial sarcoma. Case distribution included one in infancy, 2 in 1-5yr, 4 in 5-10yrs and 6 cases in 10-15 yrs age group. In the present study most common site was abdominal wall and the age group was between 10-15 yrs (46.15%). The mean age being 8 yrs 4mts. Sex ratio of M:F was 1.16:1. The sites of involvement were as follows- abdominal wall (3), nasal cavity (2), proximal lower limb (2) and one each in vulva, orbit, aural cavity, maxilla, proximal upper limb and distal lower limb. The symptomatology included swelling, pain, fever, loss of movements and discharge with duration ranging from 2mts- 2yrs.

Table 1: Soft tissue tumor subtypes with respect to age, site and sex distribution

Histological subtypes	Mean age	Common age group	Male (%)	Female (%)	Total No. (%)
Rhabdomyosarcoma	8yrs 9mts	10-15yrs	3 (23.07%)	6 (46.15%)	9 (69.23%)
Fibrosarcoma	8yrs 9mts	10-15yrs	3 (23.07%)	-	3 (23.07%)
Synovial sarcoma	12 year	10-15yrs	1(7.69%)	-	1(7.69%)
Total soft tissue tumors	10yr 4mts	10-15yrs	7 (7.69%)	6(46.15%)	13(100%)

Rhabdomyosarcoma

Nine cases (13.63% of total malignant tumors) were encountered, out of which 6(9.09%) were embryonal Rms and 3 (4.54%) alveolar Rms. Case distribution included one case in infancy, 2 in 1-5yr, 4 in 5-10yrs and 3 cases in 10-15 yrs age group. In the present study most common site was abdominal wall and the age group was between 5-10yrs (44.44%). The mean age being 8 yrs 9mts. Sex ratio of M:F was 1:2. The sites of involvement were as follows- abdominal wall (3), nasal cavity (2) and one each in vulva, orbit, aural cavity and maxilla. The symptomatology included swelling, pain, fever, loss of movements and discharge with duration ranging from 2mt- 2yrs.

Embryonal Rms

Six cases (9.09% of total malignant tumors) were encountered. Case distribution included one case in infancy, 2 in 1-5yr, 3 in 5-10yrs and 1 case in 10-15 yrs age group. In the present study most common site was abdominal wall and the age group was between 5-10yrs (50%). The mean age being 7 yrs 8mts. Sex ratio of M: F was 1:2. The sites of involvement were as follows- abdominal wall (3), nasal cavity (1), aural cavity (1) and maxilla (1). The symptomatology included swelling, pain, fever, loss of movements and discharge with duration ranging from 4mts- 2yrs.

Alveolar Rms

Three cases (4.54% of total malignant tumors) were encountered. The mean age being 11 yrs. Case distribution included one in 5-10yrs and 2 cases in 10-15 yrs age group. Sex ratio of M: F was 1:2. The sites of involvement were as follows- nasal cavity (1), vulva (1) and orbit (1).

The symptomatology included swelling, pain and loss of vision with duration ranging from 4mts-2yrs.

Table 2: Rhabdomyosarcoma subtypes with respect to age, site and sex distribution

Histological subtypes	Mean age	Sites	Male (%)	Female (%)	Total No. (%)
Embryonal Rms	7yr 8mts	Maxilla-1 abdominal wall-3 Nasal cavity-1 Aural polyp-1	2 (22.22%)	4 (44.44%)	6 (66.66%)
Alveolar Rms	11yrs	Vulva-1 Orbit-1 Nasal cavity-1	1 (11.11%)	2 (22.22%)	3 (33.33%)
Total	8yrs 9mts		3 (33.33%)	6 (66.66%)	9 (100%)

Fibrosarcoma

Three cases (4.54% of total malignant tumors) were encountered. The mean age being 8yrs 9mts, all three were seen in male children. Case distribution included one in infancy and 2 cases in 10-15 yrs age group. The sites of involvement were as follows- proximal lower limb (2) and proximal upper limb (1). The Symptomatology included swelling, pain, fever and loss of movements with duration ranging from 2mts-1yr.

Synovial sarcoma

A single case presented in 12 year male involving distal lower limb. The presentation was with swelling and loss of weight for 2 years.

DISCUSSION

The soft tissues refer to a wide range of different cell types and include connective tissues, lymphatics, vessels, smooth and striated muscles, fat, facsia, synovium, endothelium and reticuloendothelium. Tumors arising from these soft tissues are uncommon in children, accounting for about 7% of all childhood malignancies. More than half (53%) of these soft tissue sarcomas (STS) originate from the striated muscles and are called rhabdomyosarcomas (RMS). The remaining group (47%) consists of a heterogenous collection of subtypes referred to as nonrhabdomyosarcoma soft tissue sarcomas (NRSTS). Pediatric STS shows a striking difference in the incidence as compared to their adult counterparts. RMS, by far the commonest STS in children, is rare in adults. In children RMS is commonly of the embryonal histology as compared to pleomorphic variety in adults. Similarly among the NRSTS, malignant fibrous histiocytoma (MFH) comprises the most common histology in adults, but is exceedingly rare in children. Of the MFH also, only the angiomatoid variety, a low grade lesion of borderline behavior, occurs in children [1-4].

Soft tissue tumors

Various Soft tissue tumor parameters like incidence, male dominance, sub typing, age group and general incidence in various studies are in conformity with other studies in India and abroad as depicted in the Table 3.

John N.N and Miller [6] in their study noted that malignant soft tissue sarcoma formed 8.8% of total malignancies, 2/3 of those were embryonal rhabdomyosarcoma. But in studies conducted by Banerjee and Walia [7], malignant soft tissue tumors formed 14.3% of total malignancies, Out of which 5% were embryonal rhabdomyosarcoma. Exleby P.R. *et al*. [] 8also noted rhabdomyosarcoma as a commonest soft tissue tumor. MPNST was rarely encountered in the study conducted by Young and Miller [9].

Table 3: Comparison of Soft tissue tumor parameters in various studies

Soft tissue tumors	SEER [8]	Venugopal *et al*. [10]	Present study
Incidence	9.6%	10.47%	19.69%
M:F	10.3:8.8	1.57:1	1.16:1
Mc age group	<5yrs	1-5yrs	10-15
Mc subtype	Rms	Rms	Rms

Rhabdomyosarcoma

Various rhabdomyosarcoma parameters like male dominance, sub typing and general incidence in various studies are in conformity with other studies in India and abroad as depicted in the Table 4**.**

Rhabdomyosarcoma is not only the most common soft tissue sarcoma in children under 15 years of age but also one of the most common soft tissue sarcomas of adolescents and young adults. Males are affected more commonly than females, but the male preponderance is less pronounced during adolescence and young adulthood' and for rhabdomyosarcomas of the alveolar type [6].

Alveolar type tends to arise at a slightly older age than embryonal, botryoid, and spindle cell rhabdomyosarcomas, with a peak incidence at 10-25 years of age. It has a predilection for the deep soft tissues of the extremities and accounts for approximately 50% of all extremity rhabdomyosarcomas [11].

Rhabdomyosarcoma subtypes occur in a characteristic age group. For example, embryonal rhabdomyosarcomas and the botryoid and spindle cell subtypes affect mainly, but not exclusively, children between birth and 15 years of age. On the other hand, alveolar rhabdomyosarcoma tends to affect older patients, with a peak age of 10-25 years. The mean age of patients with this subtype of rhabdomyosarcoma enrolled in the IRS-I and IRS-II studies was 7.2 yrs [12]. The most common site of embryonal rhabdomyosarcoma is the head and neck, similar mean age (7yrs 8mts) and site predominance (head and neck) was observed in present study.

Table 4: Comparison of rhabdomyosarcoma parameters in various studies

Rms	SEER [9]	Venugopal *et al*. [10]	Present study
Incidence	---	10.47%	13.63%
M:F	1.17:1	1.57:1	1:2
Mc age group	<5yrs	1-5yrs	5-10 yrs
Mc subtype	Embryonal	------	Embryonal

Fibrosarcoma

Conventional fibrosarcoma falls into two main groups, the adult and infantile types; infantile lesions are more frequent than those in adults. Adult fibrosarcoma presents usually in the fourth to sixth decades as a painful, deep-seated mass. There is a male predominance and the thigh or trunk is the most favored sites. Overall 5-year survival probability is no more than 40%, depending on histologic grade and adequacy of surgery. Infantile fibrosarcoma generally develops

within the first two years of life and often is congenital. The majority of cases arise in the extremities, especially in the distal portions, and there is a male predominance. In striking contrast to adults, the 5-year survival probability exceeds 80% and, with modern chemotherapy, may be even higher. Metastasis is especially rare [13]. Similar male dominance, limb involvement and age group distribution is noted in present study.

Synovial sarcoma

Synovial sarcoma occurs mainly in young adults, more commonly in males [13]. Similar parameters are noted in present study. The best outcome are in childhood patients, tumors with <5cms diameter, <10mitoses/hpf and no necrosis [14]. The prognosis does not differ between monophasic and biphasic tumors, or in relation to immunophenotype [15]. However, cases with SS18/SSX2 variant gene, which is mostly found in monophasic variant has better prognoisis [14].

CONCLUSION

The frequency of soft tissue sarcomas and their distribution is comparable to that reported from other studies. The early onset and the embryonal nature of the major paediatric tumors, suggest a prenatal origin and role of genetic factors. Accurate incidence of data is important in the planning and evaluation of clinical trials. Documentation of cases, advanced diagnostic methods like IHC, cytogenetic studies and treatment modalities with close follow up is needed to achieve better statistical evaluation of the problem.

REFERENCES

1. Smith MA, Altekruse SF, Adamson PC, Reaman GH, Seibel NL; Declining childhood and adolescent cancer mortality. Cancer, 2014; 120(16): 2497-506.
2. Guidelines for the pediatric cancer center and role of such centers in diagnosis and treatment. American Academy of Pediatrics Section Statement Section on Hematology/Oncology. Pediatrics, 1997; 99(1): 139-41.
3. Pappo AS, Pratt CB; Soft tissue sarcomas in children. Cancer Treat Res., 1997; 91: 205-22.
4. Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL *et al*.; Cancer incidence and survival among children and adolescents: United States SEER Program 1975-1995. National Cancer Institute, SEER Program, NIH Pub. No. 99-4649, Bethesda, MD, 1999.
5. Chandrashekar Thotadamane Nagaraj, Girish Chandrashekar Jerabandi; Paediatric hodgkin's lymphoma: A clinico-pathological study. Journal of Evidence based Medicine and Healthcare, 2015; 2(4): 365-371.
6. Young G, Miller RW; Incidence of malignant tumors in US children. J Paediatrics, 1975; 86(2): 254-258.
7. Baneerjee CK, Walia BNS; Pattern of neoplasms in childhood. Indian J Paediatr., 1986; 53(1): 93-97.
8. Exelby PR, Ghavimi F, Jerb B; Genitourinary rhabdomyosarcoma in children. J Paediatr Surg., 1978; 13(6D): 746-752.
9. Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL *et al*.; Cancer Incidence and Survival among Children and Adolescents: United States SEER Program 1975-1995. National Cancer Institute, SEER Program. NIH Pub. No. 99-4649. Bethesda, MD, 1999.
10. Venugopal KV, Joseph TP, Verma KK; Solid malignant tumor of infancy and childhood – A clinicopathological study. Indian Pediatr., 1981; 18: 365-368.
11. Guillou L, Coquet M, Chaubert P, Coindre JM; Skeletal muscle regeneration mimicking rhabdomyosarcoma: a potential diagnostic pitfall. Histopathology: 1998; 33(2): 136-144.
12. Berry MP, Jenkin RD; Parameningial rhabdomyosarcoma in the young. Cancer: 1981; 48(2): 281-288.
13. WHO; 9040/3 Synovial Sacroma, NOS. International classification of diseases for oncology. Available from http://codes.iarc.fr/code/3562.
14. Antonescu CR1, Kawai A, Leung DH, Lonardo F, Woodruff JM, Healey JH *et al*.; Strong association of SYT-SSX fusion type and morphologic epithelial differentiation in synovial sarcoma. Diagn Mol Pathol., 2000; 9(1): 1–8.
15. Fletcher CDM, Unni KK, Mertens F; Pathology and genetics of tumours of soft tissue and bone. IARC Press, Lyon, 2002.