IJBPAS, March, 2014, 3(3): 289-295

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

DISTRIBUTION OF BONE AND CARTILAGINOUS TUMORS IN PEDIATRIC AGE GROUP IN WESTERN UTTAR-PRADESH: AN EVALUATIVE STUDY

QADRI S, HASAN M, AKHTAR K* AND SHERWANI RK

The Departments of Pathology, J.N. Medical College, Aligarh Muslim University, Aligarh (UP)-India

***Corresponding Author: E Mail: drkafilakhtar@gmail.com**

ABSTRACT

48 cases of bone and cartilaginous origin who presented clinically with the tumor or with tumor associated symptoms were included in the study. Relevant clinical details, radiologic and histopathologic examinations were done along with other ancillary investigations in making the final diagnosis. Out of 56 cases, 25 (44.6%) were benign while 31(55.4%) were malignant. Maximum numbers of cases, 33(60.4%) were seen in 7-12 years of age while 23 (39.6%) cases occurred in 0-6 years of age. Various common bone and cartilagenous tumors encountered during study were chondroma and osteoma, 3 cases each, osteochondroma, 24 cases, giant cell tumor, 5 cases, osteosarcoma, 10 cases, Ewing's sarcoma,8 cases and 1 case each of chondromyxoid Fibroma, plasmacytoma and chondrosarcoma. 33 (58.9%) cases were benign and 23 (41.1%) cases were malignant. Osteosarcoma and osteochondroma were the commonest malignant and benign bone tumors in children respectively. It is still important to remember that although rare and apparently presenting in an inocuous manner, some rare bone tumors as osteoclastoma, solitary plasmacytoma and chondrosarcoma can also occur in the pediatric age group.

Key Words: Pediatric Tumors, Bone, Cartilaginous Tumors

INTRODUCTION

Cancer is the leading cause of death in economically developed countries and the second leading cause of death in developing countries.Incidence data (the number of

newly diagnosed cases each year) are derived from population-based cancer registries, which may cover entire national populations but more often cover smaller, subnational areas, and, particularly in developing countries.

The total incidence of childhood cancer varies rather little between different regions of the world, with cumulative risk to age nearly always in the range 1.0-2.5 per thousand **[1]**. Environmental, cultural, racial and genetic factors have been attributed to the variation in the prevalence of the malignant tumors. The major childhood malignancies being leukemias, neuroblastoma, wilm's tumor, brain cancer, rhabdomyosarcoma, lymphomas, retinoblastoma, and bone cancers.

Bone tumors are fortunately a slightly rare category of pediatric tumors. Bone tumors comprises approximately 7.3% of all malignancies in children. Almost 90% belonged to osteogenic sarcoma of long bones, which accounts for approximately 5% of childhood tumors.

MATERIAL AND METHODS

All children with bone tumor, aged 0 to 12 years attending the out patients and in patients departments of pediatrics, surgery and orthopedic surgery at Jawaharlal Nehru Medical College Hospital, Aligarh, who presented with tumor or with tumor associated sign and symptoms, diagnosed by means of histological or cytological examination, were included in the study. The profile of childhood bone cancer was studied focusing on the nature of lesion (benign vs malignant), most common site of involvement, age, sex, and common or uncommon for that age. The material for this study was obtained from fresh sections of paraffin blocks of different cases and were stained with H and E Stain. Special staining was done in cases wherever required.

RESULTS

The study included 48 cases of pediatric bone tumors aged 0 to 12 years attending the outpatients and inpatients departments of pediatrics, surgery and orthopedic surgery at Jawaharlal Nehru Medical College Hospital.

Out of 56 cases, 25 (44.6%) were benign while 31 (55.4%) were malignant. Maximum numbers of cases, 33 (60.4%) were seen in 7-12 years of age while 23 (39.6%) cases occurred in 0-6 years of age. Mean age was 10.7 years. 33 (58.9%) cases were benign and 23 (41.1%) cases were malignant.

Osteochondroma (24 cases) being the most common benign tumor, followed by osteosarcoma (10 cases) being most common malignant bone tumor. 1 case each of chondromyxoid fibroma and solitary

plasmacytoma bone and 3 cases each of osteoma and chondroma were seen. Osteoclastoma (5 cases) and chondrosarcoma (1 case) were also found. Ewing's sarcoma (8 cases) were kept in a separate category of small round cell tumor.

Osteochondroma (24 cases): It included 17 males and 7 females. Mean age was 9.5 years. Histopathology revealed mature bony trabeculae with cartilaginous cap, fibrocollagenous tissue and congested vessels.

Osteosarcoma (10 cases): Males were involved more than females and M:F ratio was 3:1. Mean age was 10.5 years. 6 cases were located on lower end of femur, 2 cases on upper end tibia, 1case each on upper end of fibula and upper end of humerus. Histopathology revealed pleomorphic bizarre tumor cells, dense eosinophilic osteoid material and tumor giant cells, and necrosis **(Figure 1)**.

Chondroma (3 cases): 2 cases were seen in males aged 11 and 9 years and 1 case in 13 year old female. The tumor was located in the proximal phalynx of index finger, lower end of radius and first metacarpal respectively. On histopathology, lobules of mature cartilage was seen in all the cases.

Chondromyxoid fibroma (1 case): Occurred in a male patient of 11 years. On histopathology revealed areas of chondromyxoid tissue with stellate cells separated by bundles of fibroblastic cells showing hyalinization with osteoclastic giant cells in the margin of the chondromyxoid tissue.

Osteoma (3 cases): 2 cases were seen in males and 1 in a female. Mean age was 10 years. On histopathology, dense mature lamellar bone was seen.

Osteoclastoma / Giant cell tumors (5 cases): 3 cases were seen in males and 2 in females. Mean age was found to be 9.7 years. Upper end of fibula was involved in 2 cases with lytic lesion on X rays, 2 cases were located at the upper end of femur (1 case presented with subtrochantric fracture, the other case showed lytic lesion on X- ray) and 1 case involved the talus. On histopathology, osteoclast like giant cells dispersed uniformly in a stroma of mononuclear oval to spindle cells and fibrous tissue were seen.

Chondrosarcoma was seen in a 12 year female patient, who presented with swelling of the lower end of femur. Histopathologic examination showed it to be a clear cell variant of chondrosarcoma: tumor cells with abundant clear or ground glass cytoplasm interspersed with small trabeculae of woven bones **(Figure 2)**.

Plasmacytoma (1 case): It was seen in a 12 years male patient, located on iliac bone of pelvis. Serum and urine electrophoresis showed no M spike. Systemic examination and bone marrow aspirate failed to show generalized involvement. On histopathology, sheets of plasma cells intercepted by bony trabeculae and vascular channels were seen. Major population was of mature plasma cells, with coarse clumped nuclear chromatin and a minimal population of lymphocytes and histiocytes.

Ewing's sarcoma (8 cases): It was seen in 7-12 years age group with mean age of 9.5 years, and M: F ratio of 1: 2. Clinically all the cases presented with painful swelling and a single case presented with pathological fracture of shaft femur. Histopathology revealed malignant small round cells, monotonous in appearance, with hyperchromatic nuclei and scant eosinophilic cytoplasm. Tumor cell membrane showing strong immunoreactivity for CD99 **(Figure 3)**.

DISCUSSION

Incidence of paediatric tumours is on rise **[2]**. Pediatric tumors differ markedly from adult tumors in their nature, distribution and prognosis. Overall pediatric tumors were 4.4 % of total cancers as reported by National Institute of Cancer Research and Hospital, Dhaka **[3]**.

The most common benign tumors observed were osteochondroma, 24 cases, with mean age of 9.5 years, a finding consistent with the reports of Spjut *et al.*, 1983 **[4]**. Male preponderance was seen with M: F ratio of 2:1.

Osteosarcoma accounted for 28.6% of all bone tumor cases, which was the only malignant bone tumors observed in our study (Ewing's sarcoma included in small round cell tumors). Mean age was found to be 10.5 years, while Ennecking, 1975 observed a mean age of 11.5 years in their study **[5]**. Histopathologic finding of the tumor was similar to that of Ayala *et al.*, 1989, **[6]**.

We encountered 3 cases of osteoma, all were located in the nasal bone, a finding very similar to that reported by Huvos, 1991 **[7]**.

We observed 5 cases of giant cell tumors with mean age 9.7 years. 2 cases each involved upper end of femur and upper end of fibula that showed lytic lesion on X-ray, while 1 case was seen in talus. Campanacci *et al*., 1975, **[8]**, reported it to be a rare tumor of childhood, most commonly involving the lower end of radius **[8]**. While Elder *et al*., 2007, **[9]**, reported two cases of GCT of the skull, in a 2 year male and 7 week female **[9]**.

Chondrosarcoma was seen in a 12 year female patient, who presented with swelling of the lower end of femur. Nick Vertzyas et al, 2000 reported a case of chondrosarcoma involving the head of the left 8th rib, in an 8 year female **[10]**.

Plasmacytoma was seen in a 12 years male patient, located on iliac bone of the pelvis who presented with pain in the right hip. Cumhurdinçer et al, 1994, also reported a case of solitary plasmacytoma in a young female child of 7 years **[11]**.

Ewing's sarcoma accounted for 8.9% of all malignant tumors, a finding comparable to the observation of Strom by and Akerman, 1993 **[12]** but higher than that reported by Larsson *et al*., 1973 **[13]** Mean age was 9.5 years in present study, a finding discordant to the observation by Huvos, 1991, who reported the disease in the mid second decade of life **[7]**.

CONCLUSION

Osteosarcoma and osteochondroma were the commonest malignant and benign bone tumors in children respectively. It is still important to remember that although rare and apparently presenting in an inocuous manner, some rare bone tumors as osteoclastoma, solitary plasmacytoma and chondrosarcoma can also occur in the pediatric age group.

REFERENCES

[1] Parkin DM, Stiller CA, Draper GJ and Bieber CA, The international incidence of childhood cancer, Int. J. Cancer, 42, 1988, 511-20.

[2] Arora RS, Eden T and Kapoor G, Epidemiology of childhood cancer in India, Indian J. Cancer, 46, 2009, 264-73.

[3] Jabeen B, Us-Kransovec M and Jereb M, Thin needle biopsy of solid tumors in children, Med. Pediatr. Oncol., 4, 1978, 213-20.

[4] Spjut HG, Robert K and Ayala AG, Skeletal tumors in children and adolescents, Hum. Pathol., 14, 1983, 628-42.

[5] Enneking WF, Osteosarcoma Symposium, Gun. Orthop., 111, 1975, 100-104.

[6] Ayala AG, Ro JY and Raymond AK, Small cell osteosarcoma - clinicopathologic study of 27 cases, Cancer, 64, 1989, 2162-65.

[7] Huvos AG, Bone tumors: diagnosis, treatment and prognosis, 2nd Ed., Philadelphia, 1991, Saunders, 34-39.

[8] Campanacci M, Giunti A and Olmi R, Giant cell tumor of bone, A study of 209 cases with long term follow up in

130, J. Ortho. Traumatol., 1, 1975, 249-77.

[9] James BE, Cherisse B, Ignacio G, Mark DK and Gordon M, Incidence of GCT in pediatric population, Case Report, 107 (1), 2007, 69-74.

[10] Nick Vertzyas K, John C, Sandra B and Michael B, Chondrosarcoma of the thoracic spine in an 8-year-old child with 12 years follow-up: A case report, J. Orthopaedic. Surg., 8 (1), 2000, 89-92.

[11] Camhurinecer R, Stiller C and Draper G, The epidemiology of cancer in children. In: Voute PA, Barrett A, Stevens MCG, Caron HN (Eds): Cancer in Children: Clinical Management, New York: Oxford University Press, 5th Ed., 2005 (ISBN: 0-19-852932-5), 1-16.

[12] Stromby N and Akerman M, Cytodiagnosis of bone lesions by means of FNAB, Acta Cytol., 17, 1993, 166-72.

[13] Larsson SE, Boquist L and Bergdahl L, Ewing's sarcoma: A consecutive series of 64 cases diagnosed in Sweden, 1958-1967, Clin. Orthop., 95, 1973, 263-67.

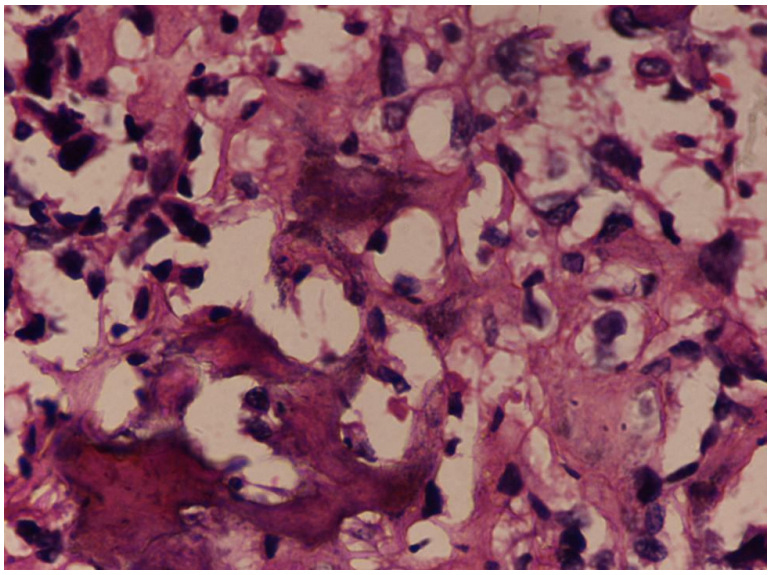

Figure 1: Osteosarcoma: Histopathology Revealed Pleomorphic Bizarre Tumor Cells With Dense Eosinophilic Osteoid Material, Tumor Giant Cells and Necrosis. H and E x 40

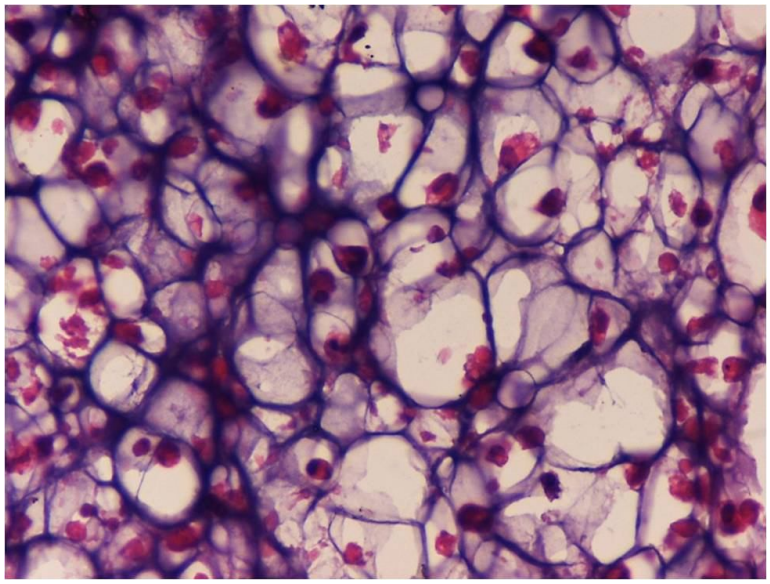

Figure 2: Chondrosarcoma: Histopathologic Examination Showed a Clear Cell Variant of Chondrosarcoma: Tumor Cells With Abundant Clear Or Ground Glass Cytoplasm Interspersed With Small Trabeculae Of Woven Bone H and E x 40

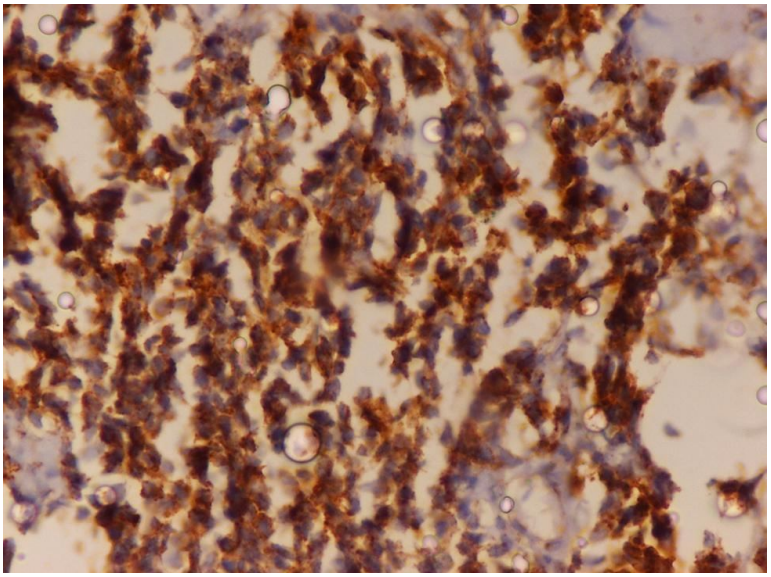

Figure 3: Ewing's Sarcoma: Tumor Cell Membrane Showing Strong Cytoplasmic Immunoreactivity for CD 99. Immunostain CD 99x 40