

PRIMARY TUMORS AND TUMOR-LIKE LESIONS OF BONE IN CHILDREN

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ABSTRACT

Objective: The aim of this study was to evaluate the characteristics of bone tumors in pediatric population at the Department of Orthopedics at Sree Narayana Institute of Medical sciences, Chalakka, North Paravur during the period from March 2014 to January 2017.

Materials and Methods: This study was carried out at our Medical teaching hospital from March 2014 to January 2017. A total of 50 cases were included in the study. All the patients included were below 18 years of age. Most of the patients were referred to orthopedic department from pediatric department. All the patients underwent complete radiological and routine investigations and biopsy was taken to confirm the diagnosis.

Results: Of the 50 cases, 38 (76%) were male and 12 (24%) were female. The mean age of all cases was 13 years (range: 1-18 years).

Out of 50 patients, 34 cases (68%) were benign, 3 cases (6%) were malignant and 13 (26%) were tumor like lesions. Out of benign tumors, most common was the Osteochondroma (52%) followed by osteoid osteoma (16%). 3 cases of malignant tumors were found in present study in which 2 cases (4%) were of chondrosarcoma and 1 case (2%) of Ewing's Sarcoma. Fibrous dysplasia, Non-ossifying fibromas, Simple bone cysts and aneurismal bone cysts, were found in 5 (10%), 3 (6%), 3 (6%), and 2 (4%) of the patients with tumor-like lesions, respectively.

Conclusion: data from our series showed both similarities and differences with the literature. We suggest the formation of larger series to achieve better results and beneficial information in regard to distribution of bone and soft tissue tumors in our country, thereby benefitting both pediatric and public health.

KEY WORDS: Pediatric Bone Tumor, Benign Tumor, Malignant Tumor.

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BACKGROUND

Almost all primary bone tumors that occur in adults are also seen in children. However, some of them occur so rarely in children that they are not encountered in most medical practices and may be seen only occasionally even in large children's hospital.

With respect to the diagnosis, monitoring and

treatment, pediatric bone and soft tissue tumors form a complex and difficult patient group. Therefore, just as for adult patient groups, it is appropriate that they be evaluated by a multidisciplinary and experienced team. Cases should be taken into centers that have orthopedics, pediatric oncology, radiology, pathology, radiation oncology, and nuclear medicine

departments working together in collaboration. The diagnostic procedure starts with the presentation of uncharacteristic symptoms. The pediatrician in most of cases first sees the child and has to make the first diagnosis, considering acute or chronic disease, such as an Osteomyelitis, a skeletal dysplasia, a metabolic disturbance, a traumatic event or a tumorous growth. An orthopedician should be consulted for further management. Then the radiologist is asked to interpret the different bone changes. This is an important step in this diagnostic procedure, for many bone lesions may be recognized and diagnosed radiologically and, in some of them, no biopsy or surgical intervention is required. The pathologist plays an important role in the diagnosis of most bone lesions, especially bone tumors, for he makes the final and decisive diagnosis on which the appropriate management is based.

MATERIALS AND METHODS

This study was carried out at our Medical teaching hospital from March 2014 to January 2017. A total of 50 cases were included in the study.

Most of the patients were referred to orthopedic department from pediatric department. Patients clinically presented with pain, swelling, non-healing fractures were included in the study. Detailed history was taken which included age, sex, fever, weight loss, duration of symptoms or history suggestive of any systemic involvement. All patients were subjected to thorough physical examination.

X-ray of lesioned bone had been taken in all the patients while CT scan and MRI were done according to the need. Routine blood investigations were done in all patients while sputum, body fluid examination, Serum Calcium and alkaline phosphatase were done in selected cases. Biopsy was taken from the lesion for histopathological diagnosis of the lesion. The biopsies and specimens received for histopathological study were fixed in 10% formalin after separating the soft tissue. 3 to 5mm thick sections of bone were cut and decalcification was done by placing the specimen in 5% nitric acid for 2 days. Decalcified tissue was processed by increasing concentration of alcohol, paraffin

blocks were prepared. Sectioned were stained with haematoxylin and eosin. After that all slides were examined under microscope, the final diagnosis was made into inflammatory, benign and malignant lesion accordingly. In selected cases IHC was performed to confirm histopathological findings.

RESULTS

Of the 50 cases, 38 (76%) were male and 12 (24%) were female. The mean age of all cases was 13 years (range: 1-18 years).

Out of 50 patients, 34 cases (68%) were benign, 3 cases (6%) were malignant and 13 (26%) were tumor like lesions.

Out of benign tumors, most common was the Osteochondroma (52%) followed by osteoid osteoma (16%).

3 cases of malignant tumors were found in present study in which 2 cases (4%) were of chondrosarcoma and 1 case (2%) of Ewing's Sarcoma.

Fibrous dysplasia, Non-ossifying fibromas, Simple bone cysts and aneurismal bone cysts, were found in 5 (10%), 3 (6%), 3 (6%), and 2 (4%) of the patients with tumor-like lesions, respectively.

The localization of the lesions was determined as 18 (36%) in the femur and thigh, 16 (32%) in the knee joint, 7 (14%) in the tibia and calf, 4 (8%) in the humerus and arm, 3 (6%) in the wrist and hand bones, and 2 (4%) in the pelvis and gluteal region.

Clinical features of bone tumors in children in present study are shown in table.1

Table 1: Clinical features of Bone tumors.

Type of lesion	Most Frequent site	Mean Age (Years)	Most common Sex affected	%
Benign (68%)				
Osteochondroma	Femur	12.6	Male	52%
Osteoid osteoma	Femur	11.7	Male	16%
Malignant (6%)				
Chondrosarcoma	Femur/Tibia	13.2	Male/ Female	4%
Ewing's Sarcoma		13.5	Male	2%
Tumor-like lesion (26%)				
Fibrous Dysplasia	Femur	14.7	Male/Female	10%
Non-ossified Fibroma	Tibia/Femur/ Metacarpal bones	12.9	Female	6%
Simple Bone Cyst	Femur/Humerus	12.3	Female	6%
Aneurysmal Bone cyst	Humerus/Fibula/ Vertebrae	13.1	Female	4%

Knowledge of tumor incidence, age, gender, and localization provides important clues to reach a diagnosis. So many studies on tumor patient series have been published in the past by Gülman et al. [1] (1982-1986), Kösem and Bayram [2] (1994-2000), Solakođlu and Benzer [3] (1990-2000), Güngör et al. [4] (2000-2007), and more recently by Yüçetürk et al. [5](1989-2009). In the current study, we aimed to determine the frequencies of primary bone tumors and tumor-like lesions of bone and the anatomical sites of their occurrence in the pediatric population.

Bone tumors are classified as benign or malignant according to the tissue of origin, as well as their patterns of growth and behavior [6-8]. The majority of pediatric bone tumors are of benign character with distinctive and specific radiographic and clinical features, obviating the need for biopsy [9]. Common benign bone tumors include osteochondroma, endochondroma, osteoid osteoma, osteoblastoma, chondroblastoma and hemangioma. Also, tumor-like lesions that may occur frequently in children include non-ossified fibroma, simple bone cyst, and fibrous dysplasia [10].

In current study, the total bone tumors comprised 34 benign tumors, 3 malignant tumors and 13 tumor like lesions. Benign tumors are seen more often than malignant tumors in the general population.

In a study by Yüçetürk et al. [5], the number of malignant tumors was determined to be greater, which was reported to be due to benign tumors being treated at external healthcare centers.

In pediatric cases, the most feared and most commonly seen malignant bone and soft tissue tumors are osteosarcoma, Ewing sarcoma and rhabdomyosarcoma [11].

These tumors represent 10% of all newly diagnosed pediatric cancer cases [12]. In the current study, these three tumors were seen to account for approximately 94% of the malignant tumors. In this respect, the importance of the subject is obvious.

Bone tumors are seen more often in males, benign tumors are more common than malignant tumors, and the most common location is around the knee [4]. The findings of the current study conformed with this, in that they were seen

slightly more in males than females, benign tumors were seen more often, and they were most often around the knee.

The most commonly seen benign bone tumor is osteochondroma [3]. Osteochondromas represent 10-15% of all bone tumors and 20- 25% of all benign bone tumors [13]. In children, osteochondroma is the most commonly seen lesion in the distal femur and proximal tibia [14]. Güngör et al. [4] reported that there was most often humerus proximal involvement of solitary bone cyst, while femoral proximal involvement was seen most often for osteoid osteoma.

While benign bone tumors exert a pressure effect on normal tissues and cause bone resorption by the osteoclastic cells, malignant bone tumors also result in the destruction of normal tissues as well. The site and appearance of the lesions as well as the patient age give important clues regarding the type of bone tumors. Malignant bone tumors comprise 2 to 4% of all tumors in children under 15 years of age, while this figure rises to 6.5% in those between 15 and 19 years of age [15,16]. Most benign tumors are confined within the limits of the anatomic structure in which they arise from, leading to the bone growth in that direction. While malignant tumors exhibit a bi-compartmental behavior, outgrowing the cortex into the adjacent soft tissues. Benign tumors may exhibit a slow growth pattern parallel to the normal growth of the individuals and stop growing at later stages, while others may show a progressive enlargement requiring wide excision. Malignant tumors, on the other hand, have two types of behavior, namely the "low" or "high" grade behavior with corresponding growth patterns [17].

In the current study. out of the 50 cases with pediatric bone tumors, 38 patients were male and 12 were female, with a mean age of 13 years old. The localization of the lesions was determined as 18 (36%) in the femur and thigh, 16 (32%) in the knee joint, 7 (14%) in the tibia and calf, 4 (8%) in the humerus and arm, 3 (6%) in the wrist and hand bones, and 2 (4%) in the pelvis and gluteal region. Van den Berg et al. studied 1474 children with bone tumors and reported the incidence of bone tumors was 79.3 per 1,000,000. Osteochondromas were the most

prevalent tumors, followed by aneurysmal bone cysts with male preponderance [18]. Obalum et al. reviewed 242 patients aged 7.5 to 62 years old and they found that osteochondroma and osteosarcoma were the most common benign and primary malignant bone tumors [19]. Senac et al. conducted a retrospective review of 268 biopsies of the bone of the children who were less than 10 years of age. Benign tumors were found much more frequently than malignant lesions. Again Osteochondroma and histiocytosis X were the most common lesions [20]. Lasebikan et al. studied 68 cases and reported that primary bone tumors were commonest in young males, usually benign and affecting the tibia. A total of 28 (41.1%) were benign, 21 (30.9%) were malignant while 19 (27.9%) were tumor-like conditions. The commonest benign tumor was osteochondroma, accounting for 44.7% of non-malignant lesions, while fibrous dysplasia was the commonest tumor-like condition (23.4%) [21]. Mohammed et al. revealed that again osteochondroma and osteosarcoma were the most common benign and malignant tumors respectively in young adults [22]. A multicenter study showed that primary bone tumors were common amongst males and teenagers among 698 cases and most common was benign again [23]. Abdulkareem et al. reported that osteochondroma and giant cell tumors are the commonest benign tumors while osteosarcoma is the most common primary bone tumor among 77 cases all occurring in the first two decades of life [24].

CONCLUSION

In conclusion, data from our series showed both similarities and differences with the literature. We suggest that formation of larger series through collection of such studies, which include demographical data, will provide beneficial information in regard to distribution of bone and soft tissue tumors in our country, thereby benefitting both pediatric and public health.

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