RESEARCH COMMUNICATION

Epidemiological Data for Common Bone Sarcomas

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Abstract

Very little epidemiological data regarding bone sarcomas from South Asia in general and Pakistan in particular are available. At the largest center for histopathology in Pakistan, we looked at three common bone sarcomas in our practice i.e. osteosarcoma, Ewing's sarcoma and chondrosarcoma. Our aim was to compile epidemiological data regarding age, gender and site distribution, and to correlate our findings with published western data in order to determine whether there were any significant differences in our population compared to the west. An overwhelming majority of osteosarcomas in our study occurred in the second and third decades of life; they were common in males; and femur, tibia and hip bone were the commonest bones involved accounting for an overwhelming majority of cases. The large majority of Ewing's Sarcomas in our study occurred in the first three decades of life; they were more common in males; vertebrae, tibia, femur and hip bone were the commonest sites. In our study, chondrosarcomas showed a wide range of age distribution and occurred quite commonly in the young. Except for the greater occurrence of chondrosarcoma in young patients; and comparatively less frequent involvement of upper limb bones, most of the bone sarcoma trends in our population appear to be similar to published western data.

Keywords : Bone - sarcoma - epidemiological data

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Introduction

Bone sarcomas comprise only 0.2% of all malignant neoplasms (Ries et al., 1999), and are one tenth as common as soft tissue sarcomas (Dorfman et al., 1995). Osteosarcomas are the commonest bony sarcomas (approximately 35%), followed by chordrosarcoma (25%) and Ewing's sarcoma (16%). Bone sarcomas show a bimodal age incidence, with two peaks in the second decade and then after age of 60 years (Dorfman et al., 2002).

Very little epidemiological data regarding bone sarcomas from South Asia is available and since this part of the world is home to around 1.5 billion people, it is useful to determine whether the epidemiology of these tumors regarding age, gender and anatomical (site) distribution is similar in this huge population to that in the West. Pakistan alone has a population of over 170 million people. The Section of Histopathology, Department of Pathology, Aga Khan University Hospital, Karachi is the largest centre for histopathology in Pakistan. We receive cases from all over the country reporting over 45,000 surgical pathology specimens a year, therefore our data can be considered a representative sample of bone sarcoma trends in our population.

The aim of this study was to present the epidemiological data regarding the age, gender and anatomical (site) distribution of three common malignant tumors of the bone that we report in our practice and to correlate our findings with published international data in order to determine whether there are any significant differences in the distribution of these lesions (by age, gender and anatomical site) in our population compared to the west.

Materials and Methods

A retrospective study was conducted in the Section of Histopathology, Department of Pathology and Microbiology, Aga Khan University to compile the epidemiological data about three common malignant tumors of the bone that we see in our practice. All of these three types of malignant tumors diagnosed over a five year period i.e. Jan 1, 2004 to Dec 31, 2008, were included in the study. All cases were diagnosed on the basis of Hematoxylin and Eosin (H&E) stains, supplemented in many cases by special stains (e.g. PAS, reticulin etc) and immunohistochemistry (e.g. CD99, S100 protein etc). The histological characterization was done according to the WHO classification of tumors of soft tissue and bone. All cases were correlated with radiological films. Variables included were age, sex and site. The tumors included were osteosarcoma, Ewing's sarcoma and chondrosarcoma.

Results

Over a 5 year period, 261 cases of osteosarcoma were

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reported, making them the single largest category of primary malignant bone tumors in our series. The large majority of osteosarcomas (96.9%) occurred in the second and third decades of life. (Table 1) 157 cases (60.1%) occurred in males, while 104 (39.9%) occurred in females. The largest proportion of cases (56.3%) occurred in the femur. (Table 2)

Over a 5 year period, 150 cases of Ewing's Sarcoma of bone were reported. The large majority occurred in children, adolescents and young adults (Table 3) 93 cases (62%) occurred in males, while 57 (38%) occurred in females.

The sites of involvement are shown in Table 4.

Over a 5 year period, 164 cases of chondrosarcoma were reported. The decade wise distribution of cases was relatively even with a significant percentage occurring in children, adolescents and young adults (Table 5). 101 cases (61.6%) occurred in males, while 63 (38.4%) occurred in females. The sites of involvement are shown in Table 6.

Table 1. Age (decade) Wise Distribution of Osteosarcoma (n=261)

Age Range (in years)	Number	Percentage
0 – 10	2	0.8%
11 – 20	158	60.5%
21 – 30	95	36.4%
31 – 40	4	1.5%
41 – 50	1	0.4%
51 – 60	1	0.4%

Table 2. Site Wise Distribution of Osteosarcoma (n=261)

Location	Number	Percentage
Femur	147	56.3%
Tibia	65	24.9%
Hip Bone	34	13.0%
Humerus	8	3.1%
Foot	3	1.1%
Skull	3	1.1%
Vertebrae	1	0.4%

Table 3. Age (decade) Wise Distribution of Ewing's Sarcoma (n=150)

Age Range in years	Number	Percentage
0 – 10	20	13.3%
11 – 20	75	50%
21 – 30	41	27.3%
31 – 40	9	6%
41 – 50	5	3.3%

Table 4. Site Wise Distribution of Ewing's Sarcomas (n=150)

Location	Number	Percentage
Vertebrae	28	18.6%
Tibia	22	14.6%
Femur	20	13.3%
Hip Bone	16	10.6%
Humerus	12	8%
Scapula	11	7.3%
Skull (including facial bones)	10	6.6%
Ankle and foot	8	5.3%
Fibula	8	5.3%
Hand	8	5.3%
Clavicle	4	2.6%
Ulna	3	2%

Table 5. Age (decade) Wise Distribution of Chndrosarcoma (n=164)

Age Range in years	Number	Percentage
11 – 20	17	10.3%
21 – 30	30	18.3%
31 – 40	26	15.8%
41 – 50	33	20.1%
51 – 60	36	21.9%
61 – 70	14	8.5%
>70	8	4.8%

Table 6. Site Wise Distribution of Chondrosarcoma (n=164)

Location	Number	Percentage
Hip Bone	42	25.6%
Femur	30	18.3%
Ribs	25	15.2%
Skull	18	11%
Tibia	12	7.3%
Scapula	8	4.9%
Vertebrae	8	4.9%
Humerus	7	4.2%
Hand	4	2.4%
Foot	3	1.8%
Radius	3	1.8%
Ulna	2	1.2%
Fibula	2	1.2%

Discussion

As shown in Table 1, almost 97% of the osteosarcomas in our study occurred in the second and third decades of life, with the greatest percentage in the second decade. Male patients accounted for 60%, while 40% cases occurred in females. Western studies also show that osteosarcoma is a disease of the young and occurs most frequently in the second decade of life. (Dorfman et al., 1995; 2002) However, unlike Western data which show that 30% osteosarcomas occur in patients over 40 years of age (Huvos, 1999), the incidence of osteosarcoma above the age of 30 years was almost negligible in our study. Western data also indicates that osteosarcoma is more common in males than females in a ratio of 3:2 especially is young patients. Similar picture was seen in our study results. In our study, femur was the commonest site for osteosarcoma (56.3%), followed by the tibia and the hip bone (24.9% and 13%). Together, these three sites accounted for almost 94% cases. Western data also show the propensity of osteosarcoma to involve the femur and tibia. However, involvement of humerus was much less common in our cases, while the hip bone was involved

much more frequently. These findings are slightly in conflict with the Western data. (Raymond et al., 2002)

As shown in Table 3, the large majority of Ewing's Sarcomas, occurred in the first three decades of life, especially in the second and third decades. Incidence above age 30 was extremely rare. Western studies show that this tumor is the second commonest bone sarcoma in children, with nearly 80% in patients younger than 20 years of age. Peak incidence is in the second decade of life, and the tumor is extremely uncommon above the age of 30 years. (Ushigome et al., 2002) These findings are similar t the findings in our study. Also, Western data shows a slight male predilection in a ratio of 1.4 to 1. (Ushigome et al., 2002) Our findings are similar (see results). In our study, vertebrae, tibia, fever and hip bone were the commonest sites. (Table 3) Western studies also show that long bones and pelvis are common locations. (Ushigome et al., 2002) However, in our study, vertebrae were the commonest site, while western data indicate that vertebrae are uncommonly involved. Western data also show that rib is a common site. (Ushigome et al., 2002) However, this was not the case in our study.

As shown in Table 5, chondrosarcoma showed a wide range of age distribution and was also quite common in the young. The frequency dropped after the age of 60 years. However, our findings are in conflict with Western data which indicates that the majority of patients are older than 50 years and the peak incidence is in the fifth to seventh decades of life. Western data show a slight male preference. (Bertoni et al., 2002) However, in our study, these tumors showed a significant male predilection with over 61% occurring in males (see results). As shown in Table 6, the commonest sites for chondrosarcoma were hip bone, femur, ribs and skull in that order. 70% cases in our study occurred in these four sites. Western data also show that the pelvic bones (ileum most frequently), femur, ribs and humerus are the commonest sites. (Bertoni et al., 2002) In our study, humerus was a much less common site. (Table 6) Overall, in our study, upper limb bones were less common sites than bones of lower limbs, hip bones, ribs and vertebrae.

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