Frequency of Primary Malignant Tumors of the Bone A Five Year Retrospective Study (1980-1984)

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ABSTRACT: During a period of five years, 367 cases of primary tumors of bones were collected. Diagnosis was established from surgical specimens and marrow aspiration was not included. There were 240 cases of benign tumors and 127 cases were malignant lesions. The most common benign bone tumor was osteochondroma followed by osteoma. Of malignant tumors, osteosarcoma was the most common finding, followed by chondrosarcoma, giant cell tumor and plasma cell myeloma. In the malignant lesions, male patients were commonly affected. The age, sex distribution, as well as the site of the malignant tumors appeared to be quite similiar to those reported in the world literatures.

The frequency and incidence of malignant tumors in general vary in different countries. This also applies for primary malignant tumors of the bone. These geographic differences are difficult to explain; it may not only be related to psychologic factor but is also dependent on the institution or laboratory compiling the cases.

The purpose of this survey is to compare the distribution of primary malignant tumors of the bone according to frequency, sex and common age of the patients, as well as the common site of tumors, with that found in the literature.

In our department we received bone specimens from the Cipto Mangunkusumo Hospital in Jakarta (formerly called the Jakarta General Hospital) and occasionally also from other hospitals in and outside the city. A few cases are from hospitals outside the island of Java, namely Lampung (South Sumatra0, Ujung Pandang (South Sulawesi) and Jayapura (West Irian). Unfortunately, the orthopedic centre in the city which formerly was located in the Cipto Mangunkusumo hospital has been moved to the Fatmawati hospital, which has its own laboratory of anatomical pathology, so that since that time quite a number of cases were not recorded anymore in our laboratory.

The figures obtained in this survey are not representative of Jakarta even more for Java or Indonesia, but it may give some impression about the real figures for some region in Indonesia.

MATERIALS AND METHODS

All cases of benign and malignant bone tumors received in our department during the years 1980-1984 were collected and categorized according the W.H.O. classification. The samples were all obtained by surgical procedures; marrow aspirations were not included. Some of the specimens were decalcified before they were stained with hematoxylin and eosin. Of each tumor, the sex and age of the patient, as well as the localization of the tumor were recorded in order to get an impression of the male-femlae preponderance, the common age of the patients, and the commonest site of the tumors. The results were tabulated and compared to those found in the literature.

RESULTS

During the period of five years, 367 cases of primary tumors of the bone were received in our laboratory. Of these tumors 240 cases were benign and 127 malignant. The distribution of the umors according to frequency was outlined in Table 1 and Figure 1. The most frequent benign tumor encountered was osteochondroma (100 cases), followed by osteoma (90 cases). Of the malignant tumors, osteosarcoma was the most common lesion (65 cases), followed by chondrosarcoma (23 cases), giant cell tumor of the bone (17 cases) and plasma cell myeloma (8 cases). (Tables 2, 3, 4).

In chondrosarcoma, there was also a slight male predominace of 65.2 per cent, with 15 males and 8 females, while the common age of the patients was in the third decade (more than one third of the patients) and the most common site of the tumor was at the femur.

In giant all tumor of the bone, females seemed to have a predilection over males in the proportion

TABLE 1
Classification of Primary Neoplasms of the Bone

Tissue of origin	Benign	Nbr	Malignant	Nbr
Cartilage/cartilage forming connective tissue	Osteochondroma	100	Chondrosarcoma	23
	Chondroma	16		
	Chondroblastoma	5		
	Chondromyxoid fibroma	3		
Osteoblastic derivation	Osteoma	90	Osteosarcoma	65
	Osteoid osteoma	2	Ossifying parosteal sarcoma	
	Ossifying fibroma	11	(parosteal osteosarcoma)	2
Nonosteoblastic connective tissue	Nonosteogenic broma	4	Fibrosarcoma	4
			Giant cell tumor	17
Unknown origin			Ewing's sarcoma	3
Nerve origin	Neurofibroma	–	Malignant schwannoma	–
	Neurilemmoma	–		
Vascular origin	Hemangioma	2	Malignant hemangioendothe-	–
	Hemangioendothelioma	–	lioma (angiosarcoma)	–
	Hemangiopericytoma		–	
Fat cells	Lipoma	–	Liposarcoma	1
Notochordal derivation			Chordoma	4
Hemopoietic derivation			Plasma cell myeloma	8
			Reticulum cell sarc.	–
Total		240		127

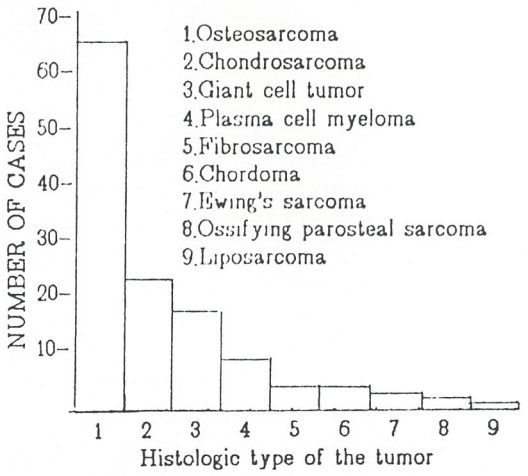

Fig. 1 Distribution of Primary Malignant Tumors of the Bone According to the Number of Cases.

of approximately two to one (11 cases of females to 6 males). More than one half of the patients were between 20-30 years of age and the most common localization of the tumor was also at the femur.

In plasma cell myeloma, 75 per cent of the patients were males (6 out of 8 cases). More than one third of the patients were between 70-80 years of age and 75 per cent of the tumors were located in the flat bones.

In chordoma, there was a marked male predominance (75%). Half of the patients were between 40-50 years of age and in three fourth of the cases the tumors were located in the sacrum.

In fibrosarcoma, most of the patients were females (75%) and half of the patients were between 10-20 years of age, while in 50 per cent of the cases the tibia was involved. The number of the other malignant tumors were too small to merit any conclusion.

DISCUSSION

In our series, osteosarcoma is the most common primary malignant tumor of the bone. This is also true in the series of Schajowicz et al.[1] Jaffe,[2] and Dahlin,[3] when diagnosis of tumors by bone marrow aspiration is excluded. When the latter is included then plasma cell myeloma appears to be

TABLE 2
Distribution of Primary Malignant Tumors of the Bone by Histologic Type and by Age of the Patients.

Histologic type	Age Distribution by Decades									Total
	1	2	3	4	5	6	7	8	?	
Chondrosarooma	1	4	9	3	6	–	–	–	–	23
Osteosarcoma	5	33	20	4	2	1	–	–	–	65
Ossifying parosteal sarcoma	–	–	–	1	1	–	–	–	–	2
Fibrosarcoma	–	2	–	1	1	–	–	–	–	4
Giant cell Tumor	–	1	9	4	3	–	–	–	1	17
Ewing's sarcoma	–	1	–	–	2	–	–	–	–	3
Liposarcoma	–	–	1	–	–	–	–	–	–	1
Chordoma	–	–	–	1	2	–	–	1	–	4
Plasma cell myeloma	–	–	–	2	1	1	1	3	–	8
Total	6	41	38	16	18	2	1	4	1	127

TABLE 3
Localization of Primary Bone Tumors.

Histologic type of the tumor	Femur	Tibia	Knee	Patella	Fibula	Cruris	Foot	Humerus	Radius	Hand	Pelvis	Ribs	Sternum	Scapula	Vertebra	Sacrum	Skull	Jaws	?	Total
Chondrosarcoma	7	–	1	–	–	1	1	1	–	1	3	2	–	2	–	–	1	3	–	23
Osteosarcoma	22	15	6	1	3	8	–	1	–	–	–	–	–	–	–	–	2	5	2	65
Ossifying parosteal sarcoma (parosteal osteosarcoma)	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Fibrosarcoma	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	4
Giant cell tumor	6	5	–	–	–	–	–	–	3	1	1	–	–	–	1	–	–	–	–	17
Ewing's sarcoma	1	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Liposarcoma	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Chordoma	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	3	–	–	–	4
Plasma cell myeloma	1	–	–	–	–	–	–	1	–	–	2	1	1	–	2	–	–	–	–	8
Total	38	23	7	1	4	11	1	3	3	2	7	3	1	2	3	3	3	9	3	127

TABLE 4
Distribution of Primary Malignant Bone Tumors According to Sex, Age and Site.

Histologic type	Male	Female	Common age	Most Common site	Total
Chondrosarcoma	15	8	20–29 yrs (9)	Femur (7)	23
Osteosarcoma	42	23	10–19 yrs (33)	Femur (22)	65
Ossifying parosteal sarcoma	2	–	–	–	2
Fibrosarcoma	1	3	10–19 yrs (2)	Tibia (2)	4
Giant cell tumor	6	11	20–29 yrs (9)	Femur (6)	17
Ewing's sarcoma	2	1	40–49 yrs (2)	–	3
Liposarcoma	1	–	–	–	1
Chordoma	3	1	40–49 yrs (2)	Sacrum (3)	4
Plasma cell myeloma	6	2	70–79 yrs (3)	Flat bones (6)	8
Total	78	49			127

the most frequent malignant primary tumor of the bone. Otherwise this tumor ranks third after chondrosarcoma. In our survey, plasma cell myeloma ranks fourth next to chondrosarcoma and giant cell tumor of the bone. Mirra however, found in his series that multiple myeloma was the most common primary malignant bone tumor, accounting for 27 per cent of all biopsied bone tumors.[4]

In our series, chondrosarcoma is the second most frequent tumor next to osteosarcoma. This is consistent with the findings of Spjut et al.[5] and Dahlin[3] in their series.

Giant cell tumor of the bone ranks as number three in our series while according to Dahlin it is the fourth most frequent malignant primary bone tumor. It is next to plasma cell myeloma when tumor diagnosis by bone marrow aspiration is excluded.

From the above findings we can conclude that the distribution of primary malignant bone tumors according to frequency in our series is almost the same as that found in the literatures. In osteosarcoma, the common age of the patients is in the second decade and there is a marked male preponderance. The most common site of the tumor is in the femur. These are consistent with the findings of many authors in the literatures. In chondrosarcomas, we found that most of the patients are between 20-30 years of age and males predominate to females. The commonest site of the tumor is the femur as in osteosarcoma. In the literature, the commonest age of the patients are between 30-60 years[1,5-7] or over 40 years.[2,4] Many authors found a higher incidence in males[1,5-7] except Jaffe[2] who in his series found that males and femalaes were equally affected. As to the commonest site of the tumor, only Jaffe, Schajowicz and Dahlin found that the femur was most frequently involved.[2,3,7]

The incidence of giant cell tumor is rather high in our series. There is marked female predominace, which is consistent with the opinion of most authors in the literature[2,4-7] except Schajozicz et al.[1] who found that males and females were equally affected. In our series, the common age of the patients is between 20-30 years, which is the same with what Mirra found in his series. According to most authors, the greatest incidence is between 20-30 years. The site most frequently involved in our series is the femur. This is in accordance with Mirra, Dahlin and The Netherlands Committee of Bone Tumors.[3,5]

Plasma cell myeloma, which was presented as the commonest primary malignant tumor of the bone in the series of Mirra,[4] in our series ranks only as number four next to the giant cell tumor. There is a marked male predominance. This finding is shared by most authors[2,4-7] except Schajowicz and Dahlin. The common age of our patients is somewhat higher than that in the literature. Most patients are between the age of 70-80 years and the flat bones are the most commonly affected. In the literature the common age of the patients in between 40-70 years.[1,2,4-7] In our series the pelvic and vertebral bones are the most common flat bones involved, which is consistent with Mirra who found that the vertebral bones were involved in 62 per cent of the cases.[3] Spjut et al. also noted that this tumor overwhelmingly affected the vertebral bones, followed by the pelvic bones, skull, sternum and ribs.[5]

In our series, we only found 4 chordomas, three of which were located in the sacrum. There is a male predominance and 50 per cent of the patients are between 40-50 years of age. According to the literature males are more frequently affected than females[1,2,5,7] except for Mirra, who in his series found that the male to female incidence was equal.[4] Mirra, Jaffe and Dahlin agree that occipital chordoma, the common age of the patients is between 30-60 years while in sacrococcygeal chordoma it is between 40-70 years. Most of the patients in the series of Mirra and Dahlin were between 50-60 years. The incidence of fibrosarcoma of the bone in our series is equal to that of chordoma. Most of the patients are females, their ages range between 10-20 years, and most of the tumors involve the tibia. Concerning the age of the patients, Schajowicz found that the tumor was seen mostly in persons between 20-60 years of age. Jaffe in his series, found that in most cases the patients were young or middle aged adults, while Spjut noted that this tumor was most common in the second, third and fourth decade. The common age of the patients in the series of Spjut is in accordance with ours. The commonest site of the tumor in our series is the tibia. Most of the authors have the opinion that the femur is the most common localization of the tumor, followed by the tibia.[3,4,7] As to the sex of the patients, the opinions of different authors are controversial. According to Jaffe male patients predominated over females, while Spjut in his series noted a slight predominance in female. Mirra in his series found an equal male to female incidence.

The other malignant tumors namely ossifying parosteal sarcoma, Ewing's sarcoma and liposarcoma are not discussed because their number in our material is too small.

Of this survey we can make the conclusion that in our series the distrubution of primary malignant tumors of the bone according to their frequency, sex distribution and common age of the patients, as well as the most common site of the tumores, are consistent with that found in the literature; only the incidence of of giant cell tumors of the bone in our series in perhaps a little bit higher and that of plasma cell myeloma is somewhat low.

CONCLUSION

All primary bone tumors received in the Department of Anatomical Pathology, Medical Faculty, University of Indonesia, Jakarta, during 5 years from 1980-1984 were collected and categorized according to the concept of the W.H.O. The sex and age of the patients, and the most common site of the tumors were recorded. The distribution of primary malignant tumors of the bone according to frequency, sex and age of the patients, as well as the common site of the tumors, is compared with that in the leterature and appears to be consistent.

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