RESEARCH

INCIDENCE OF TUMOUR AND TUMOUR LIKE LESIONS OF BONE WITH RESPECT TO AGE, SEX AND SITE IN AND AROUND KANPUR

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Abstract

Background: The skeletal system plays a vital role in life as any other organ system. It maintains mineral homeostasis, houses haematopoietic elements and is essential to provide the mechanical support. To study the bone tumour and its like lesions with respect to age, sex and site. **Materials and Methods:** This study was carried out in the Pathology Department, G.S.V.M. MC, Kanpur. Samples were received from L.L.R. Hospital, J.K. Cancer Institute and associated hospitals and other private hospitals. **Result:** Mean age for bone tumours came out to be 10 years. Male: female ratio comes out to be 1.85:1. Maximum cases were diagnosed as Giant Cell Tumour (35.1%), second osteoid osteoma and osteochondroma. Males were diagnosed as Giant cell Tumour (33.3%), Osteoid osteoma and osteochondroma (12.5%). Females were diagnosed as Giant cell Tumour (38.5%) followed by chondrosarcoma (23.1%). 56.8% cases were benign (56.8%) followed by tumour like lesions (18.9%). 8.1% cases belonged to metastatic bone lesions. **Conclusion:** Study helps us to improve upon the evaluation of the bone lesions. Though radiology may not give the exact histological variant of bone tumours, it is prudent that it indicates correctly benign or malignant nature of the lesion.

INTRODUCTION

Skeletal system tumours are relatively constant in their pattern of presentation. The basic parameters of importance in this regard are the age, bone involved, area of bone (epiphysis, metaphysis, or diaphysis; cortex, medulla, or periosteum), radiographic and microscopic appearance. Before trying to evaluate the fifth, the pathologist should be aware of the first four. Otherwise, serious mistakes may happen.[1]

The accurate specific bone tumours incidence is not known, because many benign lesions are not biopsied. Benign tumours are more from their malignant counterparts and occur with greatest frequency within the first three decades of life, whereas in the elderly a bone tumour is likely to be malignant. about 2400 new cases of bone sarcoma are diagnosed annually in US, and approximately 1300 deaths from bone sarcoma occur each year.

As a group these neoplasms affect all ages and arise in virtually every bone, but most develop during the first several decades of life and have a make predilection and propensity to originate in the long bones of the extremities.

However, certain age groups and anatomic sites are targated by specific tumours. Thus, the location of a tumour provides important diagnostic information.

Besides cause of most bone tumours is unknown, genetic alterations similar to those that occur in other tumours clearly play a role. For example, bone sarcomas found in the Li-Fraumeni and hereditary retinoblastoma cancer syndromes, which are linked to genes encoding p53 and RB mutations.

Different etiological agents like chemotherapy, radiation, trauma, infections and pre-existing bone lesions have been implicated. But secondary neoplasms account for only a small fraction of bone tumours.

The most frequent diagnosis in patients age 40-60 yrs were plasmacytoma/myeloma, giant cell tumours and metastasis. In patients more than 60 yrs., prevalence of bone tumours and tumour like lesions sequentially is metastasis, myeloma and malignant fibrous histiocytoma.[2]

Primary tumours show tendency for long tubular bones in development. Benign tumours tend to arise in the appendicular skeleton. Malignant tumours frequently involve the pelvis and axial skeleton. Benign tumours and tumour like lesions out number their malignant counterparts by at least 10,000:1.

Radiographic imaging permits assessment of the in vivo gross characteristics of bone tumours. Plain X-ray helps to delineate the location, size, radio density and radiolucency and periosteal reaction. It is also the non-invasive preliminary investigation for the probable diagnosis. CT scan provides detailed information regarding tissue density and mineral content.

Tumours and tumour like lesions of bone often pose diagnostic challenges to surgical pathologists. The key to accurate recognition is utilization of an integrated approach involving clinical data, radiological and pathological findings. Diagnosing bone tumours in isolation without pertinent clinical information is inappropriate and predisposes to diagnostic errors. Hence, histopathological diagnosis helps the surgeon in planning limb salvage surgery for early malignant and benign bone lesions.[3]

In resource poor environments, there is always a gap between the necessary infrastructure, human resources, and the patient load. Hence, this study was conducted.

MATERIALS AND METHODS

Present research was conducted in the department of Pathology, G.S.V.M. Medical College, Kanpur. Specimens were received from L.L.R. Hospital, J.K. Cancer Institute and associated hospitals and other private hospitals of Kanpur and nearby areas. Study Period was from December 2015 to September 2017. Ethical clearance was obtained from the institutional ethical committee for the present study.

Data was obtained from clinical records, tissue specimens (Bone lesion biopsies, curetting and excised specimen) and analysis of radiological films.

Inclusion Criteria

Study subjects of all ages and both sexes with clinical diagnosis of primary and metastatic bone tumors.

Exclusion Criteria

Patients with malignancies with bone marrow involvement.

Methodology

Specimens were systematically examined after noting down the clinical history and radiological findings. Soft tissues were processed routinely by paraffin section for light microscopy after fixation in 10% neutral buffered formalin. The large bony pieces were cut into smaller fragments (2 – 6 mm), fixed in 10% neutral buffered formalin and washed before subjecting to decalcification. Decalcification solution (10% hydrochloric acid/ 5% nitric acid/ 10% EDTA disodium salt) was used until the tissue softened and later they were taken for processing. Sections were cut at 4-5 microns using rotary microtome and stained with Haematoxylin and Eosin and special stains whenever needed.

Haematoxylinand Eosin

Reagents:

- Harris Haematoxylin
- Xylene
- Absolute alcohol
- 1% acid alcohol
- 1% eosin

Method

- Paraffin sections placed in xylene – 2 changes each for 5 minutes
- Transferred to absolute alcohol – 3 changes each for 5 minutes
- Wash in water for 5-8 minutes
- Section transferred to haematoxylin for 2-5 minutes (according to temperature).
- Section dipped in 1% acid alcohol, agitated for few second for differentiation.
- Sections were kept under running tap water for 8-10 minutes for blueing
- Sections were stained with 1% eosin.
- Section transferred to slide washing tray for 3-4 min to differentiate eosin.
- After draining, section transferred to 90% alcohol agitated for 10-15 seconds
- Slides were washed with water and blotted.
- Slides transferred to absolute alcohol 2 changes.
- Sections transferred to xylene until completely clear
- Sections mounted with DPX.

RESULTS

Nuclei –Blue. Cytoplasm – shades of pink.

Mostly study subjects belonged to 11-20 years age (37.8%) and 21-30 years age group (24.3%). Lesser number of cases were seen in age groups 0-10, 41-50 and 62-70(2.7%). Mean age for bone tumours came out to be 10 years. Out of 74 cases 48 (64.9%) were males and 26 (35.1%) were females. So, Male: female ratio comes out to be 1.85:1.

Maximum number of males represent to age group 11-20 (39.1%) years followed by 21-30 (26.1%) years.

Similarly, maximum number of females belonged to age of 11-20 (37.8%) years followed by 21-30 (21.4%) years. [Table 3]

Maximum cases were diagnosed as Giant Cell Tumour (35.1%) followed by osteoid osteoma and osteochondroma. [Table 2]

Mostly males were diagnosed as Giant cell Tumour (33.3%) followed by Osteoid osteoma and osteochondroma (12.5%).

Maximum females were diagnosed as Giant cell Tumour (38.5%) followed by Chondrosarcoma (23.1%). [Table 3]

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Maximum number of cases were benign (56.8%) followed by tumour like lesions (18.9%). Minimum number of cases belonged to metastatic bone lesions (8.1%).

- All cases in 0-10 years age group belonged to tumour like lesions (100%).
- Maximum cases in 11-20 age group were benign (64.3%) followed by tumour like lesions (21.4%).
- All cases in 31- 40- and 41-50-years age group were benign.
- Most cases in 51-60 years age group were primary malignant (50%).
- All cases in 61-70 years age group were primary malignant.
- Maximum benign cases were found in 11years to 20 years.
- Largely primary malignant cases were found in 51-60 years.
- Maximum bone metastasis cases were found in 51-60 years age group.
- Maximum number of tumour like lesions cases were found in 21-30 followed by 11-20 years age group. [Table 4]

Out of 48 male patients maximum number of patients (28) were diagnosed as benign (58.3%) followed by tumour like lesions (12, 25%). Out of 14 female patients maximum number of patients were diagnosed as benign (53.8%) followed by primary malignant (30.8%). [Table 5]

Table 1: Age and gender wise distribution of cases

S. No.	Pathological Diagnosis	Frequency	Percentage
1.	GCT	26	35.1
2.	Osteoid Osteoma	8	10.8
3.	Chordoma	2	2.7
4.	Osteochondroma	8	10.8
5.	Non ossifying fibroma	2	2.7
6.	Fibrous dysplasia	4	5.4
7.	Chondrosarcoma	6	8.1
8.	Osteosarcoma	2	2.7
9.	Simple bone cyst	2	2.7
10.	Aneurysmal bone cyst	4	5.4
11.	LCH	2	2.7
12.	Metastasis	6	8.1
13.	Ewing's sarcoma	2	2.7
	Total	74	100

Table 2: Distribution of cases based on histopathological diagnosis

S. No.	Pathological Diagnosis	Frequency	Percentage
1.	GCT	26	35.1
2.	Osteoid Osteoma	8	10.8
3.	Chordoma	2	2.7
4.	Osteochondroma	8	10.8
5.	Non ossifying fibroma	2	2.7
6.	Fibrous dysplasia	4	5.4
7.	Chondrosarcoma	6	8.1
8.	Osteosarcoma	2	2.7
9.	Simple bone cyst	2	2.7
10.	Aneurysmal bone cyst	4	5.4
11.	LCH	2	2.7
12.	Metastasis	6	8.1
13.	Ewing's sarcoma	2	2.7
	Total	74	100

Table 3: Gender wise distribution of bone lesions

Bone lesion	Gender				Total	
	Males		Females			
	Freq.	%	Freq.	%	Freq.	%
GCT	16	33.3	10	38.5	26	35.1
Osteoid osteoma	6	12.5	2	7.7	8	10.8
Chordoma	0	0	2	7.7	2	2.7
Osteochondroma	6	12.5	2	7.7	8	10.8
Non ossifying fibroma	2	4.2	0	0	2	2.7
Fibrous dysplasia	4	8.3	0	0	4	5.4
Chondrosarcoma	0	0	6	23.1	6	8.1
Osteosarcoma	2	4.2	0	0	2	2.7
Simple bone cyst	0	0	2	7.7	2	2.7
Aneurysmal bone cyst	4	8.3	0	0	4	5.4
LCH	2	4.2	0	0	2	2.7
Metastasis	4	8.3	2	7.7	6	8.1
Ewing's sarcoma	2	4.2	0	0	2	2.7

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Total	48	100	26	100	74	100

Table 4: Age-wise distribution of cases based on behaviour of bone lesion

Age in years	Benign		Malignant primary		Metastasis		Tumour like lesions		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
0-10	0	0	0	0	0	0	2	100	2	100
11-20	18	64.3	2	7.1	2	7.1	6	21.4	28	100
21-30	12	66.7	0	0	2	11.1	4	22.2	18	100
31-40	6	100	0	0	0	0	0	0	6	100
41-50	2	100	0	0	0	0	0	0	2	100
51-60	4	25	8	50.0	2	12.5	2	12.5	16	100
61-70	0	0	2	100	0	0	0	0	2	100
Total	42	56.8	12	16.2	6	8.1	14	18.9	74	100

Table 5: Gender distribution of cases based on bone lesions

Gender	Benign		Malignantprimary		Metastasis		Tumour like lesions		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Male	28	58.3	4	8.3	4	8.3	12	25	48	100
Female	14	53.8	8	30.8	2	7.7	2	7.7	26	100
Total	42	56.8	12	16.2	6	8.1	14	18.9	74	100

DISCUSSION

Bone tumour prevalence in global community is very low. So, the studies in a localised area does not constitute case numbers to be of statistical importance and randomization becomes even more difficult. Hence, beacause of insufficient data and limited experience in non-specialised centres, the initial diagnosis made on clinico-radiological basis differs from final histopathological diagnosis.

Incidence of differential bone tumour assessment is even more difficult, as many of the benign lesions are not biopsied.

In our study, we have 74 cases of bone tumours& its lesions. The assessment of the correlation b/t clinic-radiological with histopathological diagnosis was carried out in 60 cases.

Most participants belonged to 11-20 years (37.8%) and 21-30 years age group (24.3%). This is similar to observations of Nayar M.[4]

In the present study, osteoid osteoma (26.7%) was the most commonest tumour in the childhood as against osteochondroma (44.4%) in a study by Hendrik van den Berg.[5]

Present study showed that benign tumours were more commonly same as by Bamanikar,[6] (2015) and Jain et al,[7] (2011) according to which primary bone tumors are mainly benign, occurred predominantly in the second decade of life with a male preponderance. Malignant tumours were more common in other studies.[4,8]

Male preponderance was seen in benign and tumour like lesionswith male: female ratio of 2:1, 6:1 respectively while female preponderance is seen in malignant lesions with male: female ratio of 1:2. Thus indicating males had slightly predominant involvement than females.

In our study, among benign tumours, Giant cell tumour was most common (61.9%) followed by osteochondroma and osteoid osteoma (19%). Among primary malignant tumours, chondrosarcoma was most common (50%) followed by osteosarcoma, Ewing's sarcoma and Chordoma (16.7%). Among tumour like lesions, aneurysmal bone cyst and fibrous dysplasia (28.6%) were most common followed by simple bone cyst, non-ossifying fibroma and Langerhans cell histiocytosis (14.3%). According to Jain et al (2011),[7] osteochondroma and osteosarcoma are the most common benign and primary malignant bone tumors, respectively. The most common primary foci for metastatic bone tumor are from the respiratory tract. According to Bamanikar et al (2015),[6] Osteochondroma was the most common benign tumour followed by Giant cell tumour and Osteosarcoma was the most common malignant bone tumour.

In our study most common site was around knee, i.e., lower end of femur and upper end of tibia. proximal tibia (21.6%) and distal femur (21.6%) followed by proximal femur, shaft of femur and distal radius (10.8%) similar to study by Jain et al (2011) which showed lower end of femur was the most common site for primary bone tumors and accounted for 30 cases (25.64%) followed by upper end of tibia and fibula (24 cases, 20.51%).

Out of 5 discordant cases, one was fibrous dysplasia, one simple bone cyst, one aneurysmal bone cyst, one osteosarcoma and one Langerhans cell histiocytosis. Gregory S. Stacy et al9, reported different types of lesions that mimic GCT radiographically. One such case was of 18 year old female with osteosarcoma. The patient had radiolucent lesion in distal ulna that extended to articular surface, was indistinguishable from GCT.

The present work helps us to improve upon evaluation of the bone lesions. Though radiology may not give the exact histological variant of bone tumours, it is prudent that it indicates correctly benign or malignant nature of the lesion.[9]

CONCLUSION

Having a representative biopsy needs to be emphasized, as the tumours of bone have varied histological features in the same lesion, hence

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biopsy diagnosis may be misleading in few instances. Special stains and immunohistochemistry are helpful only in small round cell tumours and ancillary techniques like karyotyping are helpful in further categorising them.

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