Original Research Article

Histopathological Spectrum of Neoplastic and Nonneoplastic Bone Lesions at a Tertiary Care Centre of North India

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Abstract

Introduction: The spectrum of pathological bone lesions ranges from inflammatory to neoplastic conditions. Bone tumors are relatively uncommon constituting only 0.5% of all types of cancers. The final diagnosis of bone tumors should be based on an integrated use of histopathologic findings, clinical presentation and imaging characteristics. **Aim:** To study the histopathological spectrum of bone lesions and to correlate them with age and gender. **Material And Methods:** A retrospective review of histopathological reports of all bone specimens received in the department of histopathology for a period of three years from Jan 2017 to Dec 2019. **Results:** On histopathological diagnosis out of 90 cases, non-neoplastic cases were 44.4% and neoplastic cases were 55.6%. Among neoplastic cases, incidence of benign lesions was 86% and malignant lesions 14%. Among nonneoplastic lesions, chronic osteomyelitis was the most common constituting 16 cases out of 40 nonneoplastic cases followed by avascular necrosis which constituted 12 cases. Osteochondroma was most common amongst the benign and osteosarcoma was the commonest among the malignant bone tumors. 59 cases were males and 31 were females. So M:F ratio is 1.9. Age ranged from 8 years to 80 years. Peak age incidence 11-30 years. Most common site for neoplastic bone lesion was femur. **Conclusion:** Chronic osteomyelitis was the commonest non-neoplastic lesion. Among the bone tumours, osteochondroma was the commonest benign tumour and osteosarcoma was the commonest malignant tumors.

Keywords: Bone Lesions, Osteomyelitis, Osteochondroma, Osteosarcoma.

Introduction

A spectrum of pathological bone lesions can be presented in any form from inflammatory to neoplastic conditions[1]. Bone tumours are relatively uncommon constituting only 0.5% of all types of cancers. Bone consists of cartilaginous, osteoid, fibrous tissue and bone marrow elements. Each tissue can give rise to benign or malignant tumors[2]. The histopathologist plays a vital role to guide an orthopaedic surgeon for the treatment of patient with bone tumors. Some relevant demographic features like age, gender and skeletal sites are important factors while making diagnosis[3]. Morphological diagnosis of bone tumours and tumor like lesions is highly challenging which has to have simultaneous data of clinical and radiological features[4].

This study was carried out to study the histopathological patterns of various bone lesions and correlate them with age, gender and site of lesions.

Materials and methods

Place of study

The present retrospective study was undertaken in the Department of pathology (histopathology) at T.S.M Medical College Lucknow, India covering a period of three years from January 2017 to December 2019.

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Type of study

Retrospective study, were a total of 90 cases of bone biopsies from all age groups were included.

Inclusion criteria

All diagnosed cases of non-neoplastic and neoplastic bone lesions during the given period of all ages and both the genders were included in the study.

Exclusion criteria

Bone biopsy done for callus formation in fracture healing site and also any inadequate and haemorrhagic biopsy received were excluded from the present study

Method

The histopathological reports and slides of bone biopsies were collected from medical records for relevant information of age, gender, histopathological interpretation and anatomical site of occurrence. The biopsy specimens received were fixed in 10% buffered formalin and decalcified in 5% nitric acid for 2-3days. Then the decalcified tissue was processed by increasing concentrations of alcohol and paraffin wax blocks were prepared. Section was cut to 4-6ű, stained by hematoxylin and eosin and examined under the microscope for histopathological examination. The final diagnosis was made into inflammatory , benign, and malignant lesions accordingly, data tabulation and analysis was done to deduce the relative frequency of all observed parameter

Results

A total of 90 histopathological specimens were received in the Department of Pathology during the period under review. By far the majority, 50 of the bone lesions were neoplastic and 40 of the lesions were nonneoplastic. The histopathological diagnosis showed that chronic osteomyelitis was the most common diagnosis out of all

nonneoplastic lesions. Out of 50 neoplastic lesions, benign lesions constituted 43 cases (86%) and malignant lesions were 7 cases (14%). Out of 50 neoplastic lesions, most common benign lesion was found to be osteochondroma 12 cases and most common malignant was osteosarcoma 4 cases. Primary malignant bone tumors were found to be more common than metastatic tumors.

The age range of neoplastic bone lesions ranged from 8 years to 80 years in which 59 were males and 31 were females with a M:F ratio of 1.9. Youngest was an 8-year-old child with osteochondroma and oldest was 80-year-old man with metastatic adenocarcinoma. Peak incidence for most lesions was between 2nd and 3rd decade of life. Table 2 shows age and gender distribution of different bone lesions.

Most common benign nonneoplastic bony lesion is chronic osteomyelitis occurring in elderly population ie 5th and 6th decades of life commonly. Males are commonly affected by benign bony lesions.as shown in table 3.

Most common age group for occurrence of benign bony tumours is 2nd and 3rd decade of life and most common benign tumour of bone is osteochondroma maximally occurring in the ages 11-20years followed by giant cell tumour occurring in the ages 21-30years. Males are more commonly affected by benign bone tumours. Table 4 shows the age and gender distribution of benign bony tumours.

Most common malignant tumour of bone was osteosarcoma occurring mostly in females in ages 11-20 yrs and 31-40 yrs followed by bone secondaries occurring mostly in elderly above 60 yrs of age as shown in table 5. Figures 1 -9 shows histopathology of different neoplastic bone lesions in our study.

Table 1: Number and distribution of different bone lesions

Non-Neoplastic Lesions	Neoplastic Lesions	Neoplastic Lesions
	Benign	Malignant
1.Chronic Osteomyelitis- 16 cases	1.Osteochondroma- 12 cases	1.Osteosarcoma- 04 cases
2.Avascular necrosis- 12 cases	2.Chondroblastoma 02cases	2. Bone secondaries- 01 case
3.TB Osteomyelitis- 02 cases	3.Aneurymal bone cyst 04 cases	3.Plasmacytoma- 01 case
4.Pigmented villonodular synovitis- 10 cases	4.Fibrous dysplasia 02cases	4.Chondrosarcoma- 01 case
	5.Giant cell tumor 10 cases	
	6.Giant cell tumor of tendon sheath- 10 cases	
	7.Enchondroma- 02 cases	
	8.Ameloblastoma jaw- 01 cases	
Total- 40 cases	43 cases	07 cases

Table 2: Age and gender distribution of different bone lesions:

Histological Types	0-10	11-20	21-30	31-40	41-50	51-60	>60 y	Male	Female	Total
Non-neoplastic	-	03	06	05	09	11	06	26	14	40
Benign	2	21	16	-	02	02	-	30	13	43
Malignant	-	02	-	02	-	-	03	03	04	07
Total	2	26	22	07	11	13	09	59	31	90

Table 3: Age and gender distribution of non-neoplastic bone lesions

Histological subtypes	0-10	11-20	21-30	31-40	41-50	51-60	>60	Male	Female	Total
Chronic osteomyelitis	-	03	-	-	05	08	-	10	06	16
TB Osteomyelitis	-	-	-	-	-	-	02	-	02	02
Avascular necrosis	-	-	-	03	04	03	02	10	02	12
PVNS	-	-	06	02	-	-	02	06	04	10
Total	-	03	06	05	09	11	06	26	14	40

Table 4: Age and gender distribution of benign bone tumours

Histological subtypes	0-10	11-20	21-30	31-40	41-50	51-60	>60	Male	Female	Total
Osteochondroma	02	08	02	-	-	-	-	10	02	12
Chondroblastoma	-	02	-	-	-	-	-	-	02	02
Aneurysmal bone cyst	-	02	02	-	-	-	-	02	02	04
Giant cell tumour	-	04	06	-	-	-	-	06	04	10
Giant cell tumour of tendon sheath		04	02	-	02	02	-	08	02	10
Enchondroma	-	-	02	-	-	-	-	02	-	02
Fibrous dysplasia	-	-	02	-	-	-	-	02	-	02
Ameloblastoma Jaw	-	01	-	-	-	-	-	-	01	01
Total	02	21	16	-	02	02	-	30	13	43

Table 5: Age and gender distribution of malignant bone tumours

Histological types	0-10	11-20	21-30	31-40	41-50	51-60	>60	Male	Female	Total
Osteosarcoma	-	02	-	02	-	-	-	01	03	04
Secondaries	-	-	-	-	-	-	01	01	-	02
Plasmacytoma	-	-	-	-	-	-	01	-	01	01
Chondrosarcoma							01	01	-	01
Total	-	02	-	02	-	-	03	03	04	07

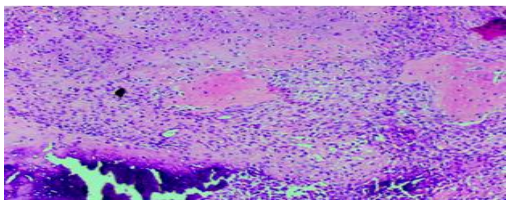

Fig 1: Photomicrograph of Chondroblastoma bone (40x) shows round to polyhedral chondroblasts with abundant eosinophilic cytoplasm and well-defined borders along with chondroid matrix.

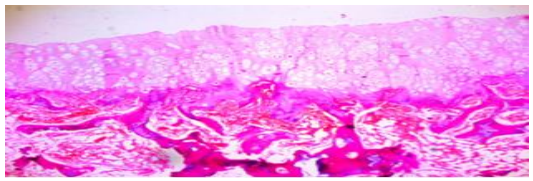

Fig 2: Photomicrograph of Osteochondroma of bone (10x) shows cartilaginous cap and underlying endochondral ossification.

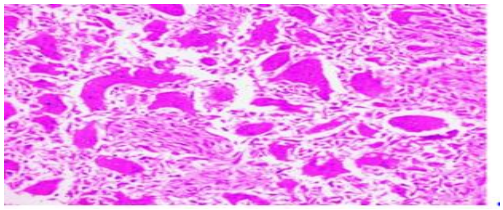

Fig 3: Photomicrograph of Giant cell tumor of bone (10x) showing numerous multinucleated giant cells and mononuclear cells.

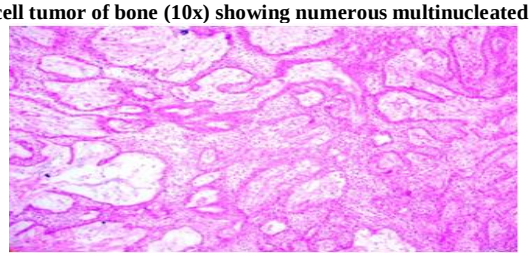

Fig 4: Photomicrograph of Ameloblastoma of Jaw(10x) shows sheets and cords of anastomosing columnar basal cells with hyperchromatic nuclei at the basal layer in palisading arrangement.

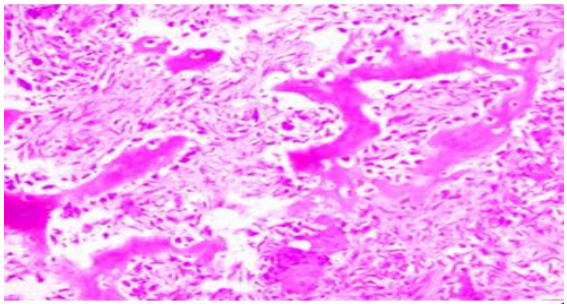

Fig 5: Photomicrograph of Osteosarcoma of bone(40x) showing lace like osteiod and densely eosinophilic tumour cells.

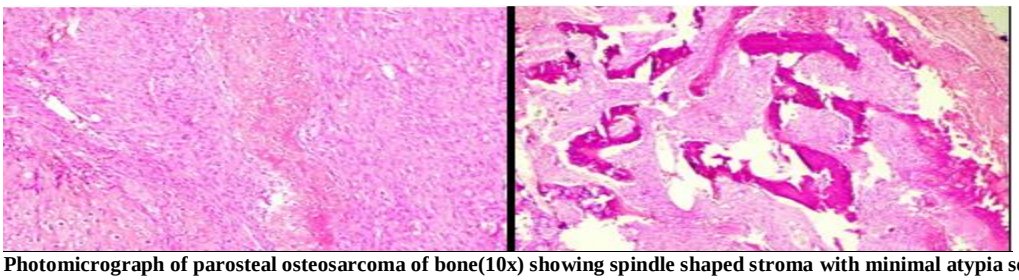

Fig 6 &7: Photomicrograph of parosteal osteosarcoma of bone(10x) showing spindle shaped stroma with minimal atypia seperating irregular trabeculae of woven bone.

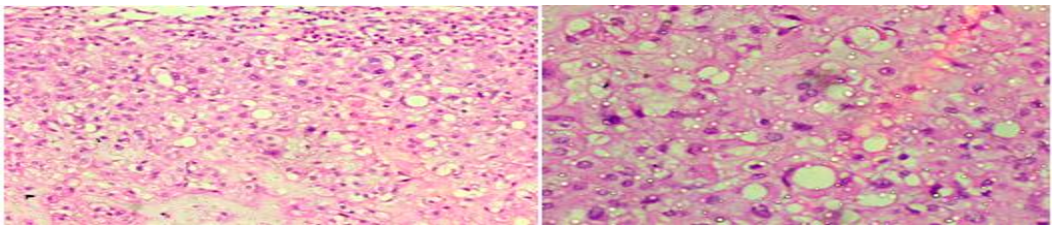

Fig 8 & 9: Photomicrograph of low grade chondrosarcoma of bone(20x) and (40x) showing hypercellularity and enlarged chondrocytes with few mitotic figures

Discussion

This retrospective study was done to study the spectrum and relative frequency of various bone lesions. In this study, out of 90 bone specimens received during the study period from January 2017 to December 2019; neoplastic lesions were found to be more common than the non-neoplastic lesions as done in their study by Dr Anita B sajjanar et al in 2019[5].The peak incidence of primary bone tumours in our study was seen in second and third decade. Similar to study done by Yopovinn Rhutso et al in 2013[6].

In our study male were commonly affected with male to female ratio of 1.7:1. Similar study done by Jayaram M et al found the similar results[7].Neoplastic lesions are more common than non-neoplastic lesions confirming to study done by Settakom et al[8].Chronic osteomyelitis was the most common non-neoplastic lesion affecting 12 cases (21.4%) similar to a study done by Saroj B Deoghare et al in 2017 who also found chronic osteomyelitis as the most common non-neoplastic condition affecting 16 cases[9].Benign cases were more common as compared to malignant cases similar studies done by Rao et al[10].Osteosarcoma was the most common primary malignant tumours and affected femur in 75% and Osteochondroma was the most common neoplastic benign condition similar to a study done by Dr Deval Patel et al in 2015[11] and also in a study by Nidhi Verma[12].The most common malignant bone tumour was osteosarcoma. Male preponderance was seen, and long bones were commonly involved. Similar findings were observed in study by Gulia A et al in 2016[13].Similarly, most common benign tumor was osteochondroma and most common malignant bone tumour was osteosarcoma as found in their study by Manoj V et al in 2019.They also found that peak incidence of primary bone tumour was between 10-40 years similar to our study[14].Most common site of involvement of bone tumors is femur similar to Kethireddy S, Raghu K, Chandra sekhar KPA et al in their study in 2016[15].Metastatic bone tumours were seen in older age groups (above 60 yrs). In a study conducted by Siri kulchayanonta et al there were similar findings in metastatic bone tumours[16] and in a study done by Rehman A et al in 2004[17].The proper and prompt diagnosis of bone tumor is imperative and warrants a multi diagnostic approach ranging from hematological diagnosis, radiological diagnosis and tissue diagnosis. Out of these modalities, tissue diagnosis is a critical step in the diagnosis of skeletal tumors[18].

Conclusion

Chronic osteomyelitis was the commonest non-neoplastic bone lesion. Among the bone tumours, osteochondroma was the commonest benign and osteosarcoma was the most common malignant bone tumours.

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