Study to Correlate the Histopathological Spectrum of Bone Lesions with Demographic Profile of Patients in a Tertiary Care Institution

Abstract

Background: Bone lesions are less commonly encountered lesions, and they pose a definite diagnostic challenge. Aims and Objective: The aims and objective of this study is to determine and correlate various bone lesions histopathologically with age and gender. Materials and Methods: A combined retrospective and prospective study of all bone lesions was done for 2 years from May 2015 to April 2017 in the histopathology section of the department of pathology at a tertiary care teaching hospital. A total of 148 cases of different bone lesions were studied. Relevant history, clinical data, and radiological reports were obtained from the requisition forms submitted. Results: The present study shows that the incidence of nonneoplastic bone lesions is 59.46% and that of benign neoplastic lesions is 29.73%. The malignant bone lesions accounted for 10.81%. The younger males were commonly affected (60.81%). The peak age incidence of bony lesions was found to be 21-30 years in 21.62% of the cases. The inflammatory lesions (36%) were commonly encountered nonneoplastic lesions. Among the neoplastic lesions, giant cell tumor (40.90%) and metastatic bony deposits (43.75%) were the most common benign and malignant tumors, respectively. Conclusion: Inflammatory lesions were the most common nonneoplastic lesion. Among the neoplastic bony lesions, giant cell tumor is the most common benign tumor, and metastatic deposits were the common malignant lesions. The clinical data, radiology, and histopathology all when correlated help to establish the correct diagnosis of bone lesions.

Keywords: Benign bone lesions, bone histopathology, malignant bone lesions

Introduction

Bone is made of cartilage, osteoid, fibrous tissue, and bone marrow elements, with each tissue having a potential to develop a lesion either benign or malignant.^[1] The gamut of bone lesions ranges from inflammation, degenerative changes, and metabolic diseases to neoplasm.^[2,3] Benign and nonneoplastic bony lesions are more common than malignant lesions. Primary bone tumors are relatively uncommon and account for <0.5% of all world cancers.^[4,5] Bone is the third-most common site for metastasis of carcinomas than sarcomas. The axial skeleton due to the presence of red marrow has a predilection for metastasis than the appendicular skeleton. The secondary bone tumors with primary tumors in lungs, kidney, thyroid, breast, gastrointestinal tract, produce lytic lesion.^[2] These lesions can affect the population of any age group. These lesions clinically present as pain, swelling, restriction of movement and also have a tendency to progress quickly.

The broad spectrum of bony lesions makes the definitive diagnosis difficult. The biochemical profile is not of much significance in the bony lesions except melanoma.^[6,7] The relevant data on age, gender, and site of lesion are necessary for the establishment of diagnosis.^[8] All bone lesions can be diagnosed on imaging. The roentgenogram helps to define the exact location of lesion; however, it also has limitations as it reflects the gross manifestation of the lesion only.^[2,6] To establish an accurate diagnosis, an integrated approach toward these lesions is necessary in the form of clinical data, radiograph, and histology. Some benign lesions such as osteomyelitis can mimic malignancy and the same holds true vice versa for melanoma or metastatic bony lesions. Biopsy aids in yielding indispensable results to chalk treatment plan and to estimate prognosis.^[8]

This study was taken into account with an aim to correlate the array of bone lesions with age and gender.

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Materials and Methods

A retrospective and prospective study of all bone lesions was carried under histopathology division of the department of pathology in a tertiary care teaching hospital ranging from May 2015 to April 2017. A total of around 260 cases of bone and surrounding area were initially collected from the histopathology section. Among them, 148 cases of actual bone tissue were included in this study. The cases irrespective of their age and sex were all considered. Patients presenting with synovitis, odontogenic, and hematopoietic tumors were excluded from the study. The relevant data for all the cases, i.e., age, sex, site of tissue, and diagnosis, were all retrieved from requisition form and histopathology report maintained in the department. The hematoxylin and eosin (H and E)-stained slides were all reexamined for retrospective approach. Gross examination of the tissue was done, and new sections taken wherever necessary. The clinical data required was accessed from case sheets of the patients. For prospective approach, the bony specimens received were put through routine tissue processing. Tissue was first fixed with 10% formalin. The representative sections taken were decalcified using 5% nitric acid for 2-3 days. Paraffin block preparation was done. Section cutting was done that was stained with H and E for microscopic examination. The bony lesions were categorized into inflammatory, neoplastic, and others based on the diagnosis. Informed consent was obtained from all the patients before including them in the study. The Institutional ethical committee consent was obtained before start of the study. Data charting was done using Microsoft Office.

Results

A total of 148 cases of various bone lesions were studied histopathologically [Table 1]. Among all bone lesions studied, nonneoplastic lesions were noted in 88 cases (59.46%). Neoplastic bone lesions accounted for 60 cases (40.54%), of which 44 cases (29.73%) were benign and the remaining 16 cases (10.81%) were malignant [Tables 2 and 3]. The bony lesions have more predilections for younger population belonging to the age group of 21-30 years. They are predominantly seen in males (60.81%) as compared to females (39.19%), with male-to-female ratio being 1.5:1 [Table 1]. Inflammatory lesions are the most common and constitute 36% of all nonneoplastic lesions. Premalignant conditions such as fibrous dysplasia form 4% of all nonneoplastic cases [Figure 1]. Benign osteoclastic tumors are the most common bone lesions of neoplastic etiology (40,90%), and metastatic bony deposits account for maximum malignant neoplastic lesions (43.75%) [Figure 2].

Discussion

The bony lesions amount to a small proportion of all the lesions that exist in a population.^[5] The complete

sex					
Age (years)	Male (%)	Female (%)	Total		
0-10	9	4	13		
11-20	17	9	26		
21-30	14	18	32		
31-40	20	7	27		
41-50	14	8	22		
51-60	9	4	13		
61-70	7	6	13		
>70	0	2	2		
Total	90 (60.81)	58 (39.19)	148		

Table 1: Incidence of bone lesions according to age and

Table 2: Gender distribution of the lesions of bone						
	Nonneoplastic lesions (%)	Neoplastic lesions		Total		
		Benign (%)	Malignant (%)			
Male	60 (66.67)	22 (24.44)	8 (8.89)	90 (60.81)		
Female	28 (48.28)	22 (37.93)	8 (13.79)	58 (39.19)		
Total	88 (59.46)	44 (29.73)	16 (10.81)	148		

Table 3: Age-wise distribution of the bone lesions					
	Nonneoplastic	Neoplastic lesions		Total (%)	
	lesions (%)	Benign (%)	Malignant (%)		
0-10	8 (61.54)	4 (30.77)	1 (07.69)	13 (8.78)	
11-20	10 (38.46)	12 (46.15)	4 (15.39)	26 (17.56)	
21-30	17 (53.12)	15 (46.88)	0	32 (21.63)	
31-40	18 (66.67)	6 (22.22)	3 (11.11)	27 (18.24)	
41-50	16 (72.73)	2 (9.09)	4 (18.18)	22 (14.87)	
51-60	10 (76.92)	1 (7.69)	2 (15.38)	13 (8.78)	
61-70	8 (61.54)	3 (23.08)	2 (15.38)	13 (8.78)	
>70	1 (50.00)	1 (50.00)	0	2 (1.36)	
Total	88 (59.46)	44 (29.73)	16 (10.81)	148	

clinical data, including age, gender, site, and radiological findings, are the prerequisites for establishing the diagnosis of any bone lesion.^[4] The histological diagnosis is mandatory in all bone lesions as many bony entities are confusing clinically such as osteomyelitis and Ewing's sarcoma, pathological fracture and traumatic fracture, osteoblastoma and osteosarcoma, tuberculosis, and malignancy.^[7] The histopathological diagnosis based on the different cytomorphological characteristics aids to predict the prognosis of bone lesion.^[6,9] This study was taken into consideration to diagnose a variety of lesions of bone and its relationship with age and gender.^[6]

In the present study, the incidence of bone lesions was more common in younger age group (<30 years). The predilection of the lesions was more in males than in females, similar to the study by Hathila *et al.* and Sharma and Mehta [Figure 3].^[7,9] In our study, the secondary bone tumors were encountered more than the primary bone tumors. In the study by Hathila *et al.* and Patel *et al.*, primary tumors were more common.^[4,7] The metastatic bone lesions in our

study were noted more in female population, while in the study by Jain *et al.* and Rafiq and Tanwani, metastatic tumor deposits had male predilection [Table 4].^[3,5]. In present study, It was noted that non-neoplastic and benign bone lesions were more than malignant lesions. This finding was similar to the findings of the other studies.^[7,9] In our study, the inflammatory lesions were noticed in maximum of the cases (36.36%) followed by osteomyelitis, while in a study by Patel *et. al,* tuberculosis was most common nonneoplastic lesion, and osteomyelitis was the common lesion encountered by Rafiq and Tanwani [Figures 1 and 4].^[3,4]

Giant cell tumor (30%) is the most common benign neoplastic lesion in our study followed by osteochondroma similar to the study by Kethireddy



Figure 1: Nonneoplastic lesions



Figure 3: Incidence of bone lesions according to age and sex



Figure 5: (a) Nonossifying fibroma showing storiform pattern of fibroblasts with scattered giant cells, histiocytes, cholesterol crystals. (b) Giant cell tumor showing osteoclast-like multinucleate giant cells

et al. and Sharma and Mehta [Figures 2 and 5].^[6,9] In a study carried by Patel *et al.*, osteochondroma was the most common benign neoplasm followed by giant cell tumor. Others benign neoplastic lesions noted were enchondroma, osteoma, nonossifying fibroma, and hemangioma [Figure 6].^[4]

The majority of the cases in our study showed metastatic deposits to bone, whereas in other studies carried by Rafiq and Tanwani, osteosarcoma was the common malignant tumor.^[3] Other malignant bone lesions noted were chondrosarcoma, small round-cell tumor, and chordoma [Figure 7].^[4]



Figure 2: Neoplastic lesions



Figure 4: (a) Aneurysmal bone cyst showing plump uniform fibroblasts with multinucleate giant cells. (b) Pott's spine showing epitheloid cell granuloma with caseous necrosis



Figure 6: (a) Enchondroma showing lobules of hyaline cartilage encased by bone. (b) Osteochondroma showing perichondrium covering the cartilage cap



Figure 7: (a) Osteosarcoma showing pleomorphic tumor cells with delicate osteoid. (b) Round-cell tumor showing sheets of small, round cells with scant clear cytoplasm forming pseudorosettes

Table 4: Spectrum of different bone lesions according to

	sex		
	Male	Female	Total
Nonneoplastic lesions			
Inflammatory	25	7	32
Cystic lesions	3	2	5
Tubercular lesion	5	12	17
Osteomyelitis	16	6	22
Brodie's abscess	1	0	1
Fibrous dysplasia	3	0	3
Others	7	1	8
Neoplastic lesions			
Chondrogenic			
Benign	6	9	15
Malignant	1	0	1
Osteogenic			
Benign	2	2	4
Malignant	3	2	5
Vascular			
Benign	3	1	4
Malignant	0	1	1
Fibrous			
Benign	2	1	3
Malignant	0	0	0
Osteoclastic			
Benign	9	9	18
Malignant	0	0	0
Notochordal	0	1	1
Small round-cell tumor	1	0	1
Metastatic deposits	3	4	7
Total	90	58	148

Conclusion

In our study, the bone lesions are predominantly seen in younger age group, and they have predilection for male population. The incidence of nonneoplastic lesions is more than the neoplastic lesions. The benign neoplastic lesions are more common than the malignant lesions. The histopathological examination remains the gold standard to diagnose bone lesion when combined with relevant history and clinical data.

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Conflicts of interest

There are no conflicts of interest.

References

- Rhutso Y, Laishram RS, Sharma LD, Debnath K. Histopathological evaluation of bone tumors in a tertiary care hospital in Manipur, India. J Med Soc 2013;27:135-9.
- Modi D, Rathod GB, Delwadia KN, Goswami HM. Histopathological study of bone lesions – A review of 102 cases. IAIM 2016;3:27-36.
- Rafiq M, Tanwani AK. Spectrum of bone lesions at Pakistan institute of medical sciences. J Islamabad Med Dent Coll 2012;2:69-71.
- Patel D, Patel P, Gandhi T, Patel N, Patwa J. Clinicopathological study of bone lesions in tertiary care center – A review of 80 cases. IJAR 2015;3:1267-72.
- Jain K, Sunila, Ravishankar R, Mruthyunjaya, Rupakumar CS, Gadiyar HB, *et al.* Bone tumors in a tertiary care hospital of South India: A review 117 cases. Indian J Med Paediatr Oncol 2011;32:82-5.
- Kethireddy S, Raghu K, Chandra Sekhar KPA, Babu YS, Dash M. Histopathological evaluation of neoplastic and nonneoplastic bone tumours in a teaching hospital. J Evol Med Dent Sci 2016;5:6371-4.
- Hathila RN, Mehta JR, Jha BM, Saini PK, Dudhat RB, Shah MB. Analysis of bone lesions in tertiary care center – A review of 79 cases. Int J Med Sci Public Health 2013;2:1037-40.
- Deoghare SB, Prabhu MH, Ali SS, Inamdar SS. Histomorphological spectrum of bone lesions at tertiary care centre. Int J Life Sci Sci Res 2017;3:980-5.
- Sharma S, Mehta NP. Histopathological study of bone tumors. IJSR 2015;4:1970-2.