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A prospective observational study of clinico pathologic spectrum of bone and joint lesions

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Abstract

Bone and joint lesions are common ailments both physiologically and pathologically. There are different lesions affecting different age groups with similar manifestation often creating a diagnostic dilemma. Its causes are diversified ranging from infective, age related, congenital, benign tumors and malignant tumors. The diagnosis involves clinical, radiological and pathological correlation. A study about bone and joint lesions and its various epidemiological aspects have not been performed in our laboratory yet. Hence, this study was planned to provide an insight about the varied diagnosis of bony lesions and importance of combined modality approach in reaching the diagnosis correctly.

Keywords: Histopathology, Osteomyelitis, Osteochondroma, Bone tumors.

Introduction

Bone lesions can present in various forms varying from inflammatory, metabolic, degenerative and neoplastic tumors.[1] The common presenting symptoms in such patients are pain, palpable mass or restriction of movement of the part involved. In some cases, acute pathological fracture may be the presenting complaint.[2] Thus it can have varying generalised presentation.

It is seen that tumors of the skeletal system are relatively constant in their presentation. The important parameters included in evaluating these tumors are the age of the patient, bone involved, part of the bone (epiphysis, metaphysis (or) diaphysis, cortex, medulla or periosteum), radiographic and microscopic appearance.[2]

Radiological diagnosis of bone lesions has its own limitations as lesions such as osteomyelitis can mimic malignant lesions and few malignant lesions such as metastasis or myeloma can mimic benign. Hence, it is difficult to determine with plain film imaging whether a bone lesion is benign or malignant. [1]

Diagnosing a bone tumor which constitute only 0.5% of total world cancer incidence[3] is a challenging task for a surgical pathologist.[4] Definitive clinical diagnosis of bone lesion is often difficult.[5] Histopathological study enables us to understand the spectrum of bone lesions and give an idea of different bone tumors in a population and different age groups and sex.[4]

The differential diagnosis of bone lesions varies according to the age of the patient and presence of solitary or multifocal disease. The histologic features are also variable. [5] So, interpretation of biopsy material and a proper histopathological study is useful and absolutely necessary in confirming the diagnosis and in staging the tumor.

However, a combined approach involving radiographic, histologic and clinical data are necessary to form a definitive diagnosis and to determine the degree of activity and nature of each lesion.[6]

Evaluation of spectrum of bone lesions was not carried out till date in our set up. Hence, the present study was carried out to assess the patterns of various bone lesions, their relative frequency in our laboratory and correlation of these lesions with their radiographic findings.

Materials and methods

A prospective study conducted in a tertiary care center for a period of 2 years i.e., October 2018 – October 2020. A total of 73 cases were analysed and evaluated which included both bone biopsies & specimens. Ethical clearance was obtained.

A detailed preoperative history of each and every case with regards to age, sex, presenting symptoms & signs and biochemical parameters was collected. X-ray images were also retrieved from the radiological department.

Tissue was processed by proper fixation, adequate sampling, decalcification and paraffin sections of the same were taken. Sections were stained with routine haematoxylin and eosin staining.

For decalcification, 5% nitric acid and 10% formalin was used.

Results and Observations

A histopathological study of various bone lesions was carried out from October 2018 – October 2020. During these 2 years, total 73 cases were studied.

Age at initial presentation ranged from 4 to 79 years. The mean age of our study participants was 41.9 years with standard deviation 18.5 years. Bone lesions were more common in age group of 11 to 20 years (19.2%) and least common in age more than 61 years of age. The majority of the patients (51.4%) were within the 3rd decade of life at the time of initial diagnosis. (Refer I)

Fifty two out of the 73 lesions were seen in males (71.2%) and 21 out of the total 73 lesions were seen in females (28.8%). Thus, males predominance was noted with a male: female ratio of 2.5:1. (Refer II)

Majority of the bone lesions among males presented at younger age i.e., 11 to 20 years (21.2%) whereas among females, the presentation is much later i.e., at 41 to 50 years of age (23.8%).

Most of the lesions were found in the tibia (23 cases, 31.5%), followed by metatarsals (14 cases, 19.2%), femur and vertebra (9 cases,12.3% each), metacarpals (5 cases, 6.8%), humerus (3cases, 4.1%), fibula and maxilla (2 cases, 2.7% each) and ulna, pelvis, nasal, scapula, rib and patella (1 case,1.4% each). (Refer III)

Amongst non-neoplastic lesions, chronic osteomyelitis (29.7%) was the most common followed by tuberculous Osteomyelitis (27.6%) while Osteochondromas (26.9%) followed by giant cell tumor (15.3%) was more common in the category of benign neoplastic lesions. Among 35.6% of neoplastic lesions, metastases (42.8%) were most common. (Refer IV)The majority of patients presented with swelling (65.3%) followed by pain (38.9%). (Refer V)

The majority of patients presented with right sided bone lesions (41.1%).

Both neoplastic and non-neoplastic bone lesions commonly presented in femur (26.9% and 31.9% respectively). However, this difference was not

statistically significant when Chi- square test was applied. (p=0.113)

Both neoplastic and non-neoplastic bone lesions were more common in males (69.2% and 73.3% respectively)

Neoplastic bone lesions were common in those aged less than 20 years (38.5%) and non-neoplastic bone lesions were more common in age group > 50 years (46.8%). This difference was statistically significant i.e., $p<0.05$ when Chi-square test was applied. (p=0.002).

The mean calcium among neoplastic bone lesions patients was 9.43 and among non-neoplastic bone lesions was 8.66, mean calcium phosphorus ratio among neoplastic and non-neoplastic lesions was respectively 2.76 and 2.4 and mean CRP was

9.7 and 33.5 among neoplastic and non-neoplastic lesions respectively and all these differences were statistically significant when t-test was applied ($p<0.05$). This implies that certain laboratory parameters like calcium, calcium phosphorus ratio ALP are raised in neoplastic lesions and CRP, ESR and uric acid were raised in non-neoplastic lesions and these differences were statistically significant ($p<0.05$).

Radiological diagnosis was available for all 73 cases. In 9 cases the radiological diagnosis differed from histopathological one which led to change in treatment. The histopathological study provided the exact diagnosis in all cases.

Age distribution of patients.

Age Group	Frequency	Percentage
≤10 years	11	15.1
11-20 Years	14	19.2
21-30 Years	11	15.1
31-40 Years	10	13.7
41-50 Years	13	17.7
51-60 Years	10	13.7
≥61 Years	4	5.5
Total	73	100

Gender distribution in patients.

Gender	Frequency	Percentage
Females	52	71.2
Males	21	28.8
Total	73	100

Distribution of lesions according to anatomic site

Site	Frequency (%)
Tibia	23 (31.5)
Metatarsal	14 (19.2)
Femur	9 (12.3)
Vertebra	9 (12.3)
Metacarpal	5 (6.8)
Humerus	3 (4.1)
Fibula	2 (2.7)
Maxilla	2 (2.7)
Ulna	1 (1.4)
Pelvis	1 (1.4)
Nasal Bone	1 (1.4)
Scapula	1 (1.4)
Rib	1 (1.4)
Patella	1 (1.4)
Total	73 (100)

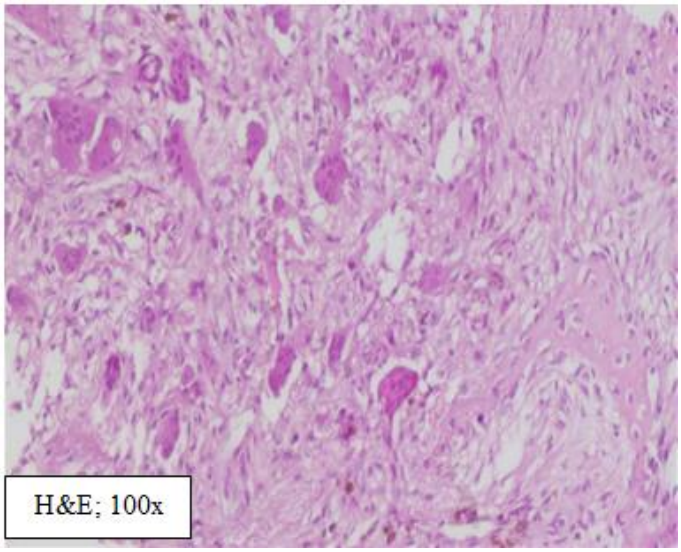
Distribution of bone lesions.

Non neoplastic	Neoplastic	
	Benign	Malignant
Chronic Osteomyelitis-14	Osteochondroma-7	Metastasis-3
Tubercular Osteomyelitis-13	Giant Cell Tumor-4	Ewing's sarcoma-2
Gouty Arthritis-3	Enchondroma-2	Osteosarcoma-1
Avascular Necrosis-2	Osteoid Osteoma-2	Fibrosarcoma-1
Synovitis-3	Aneurysmal Bone Cyst-1	
Acute	Brown tumor-1	

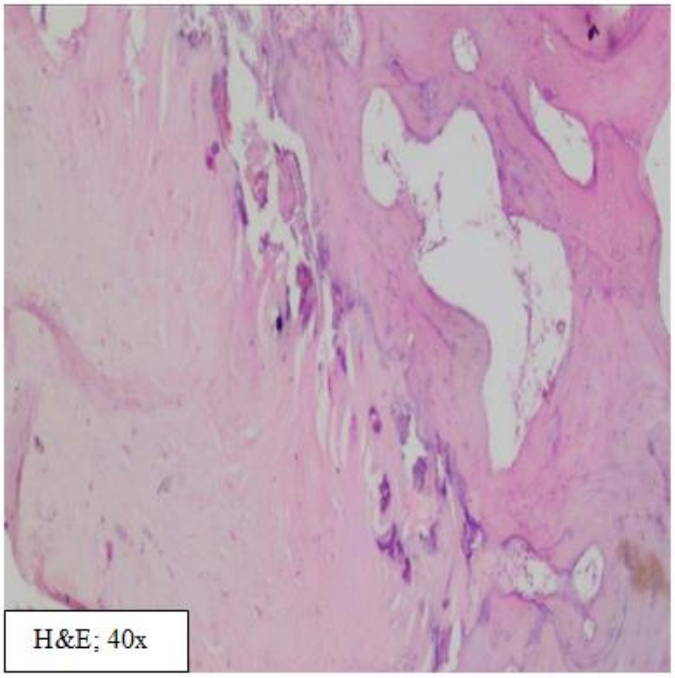
Osteomyelitis-3		
Olecranon Bursitis-2	Chondromyxoid fibroma-1	
Fibrous dysplasia-1	Benign bony lesion-1	
Chronic Arthritis-3		
Chronic inflammatory lesion-3		

Distribution of symptoms in patients (Clinical Presentation)

Symptoms	Frequency	Percentage
Swelling	48	65.8%
Pain	28	38.4%
Fever	3	4.1%

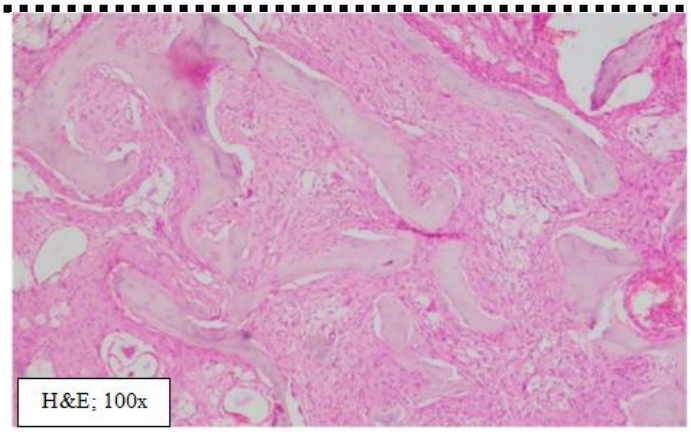


Case 1 Fig. 1: Aneurysmal Bone Cyst (Left knee)- Showing fibroblasts, giant cells & woven bone in an aneurysmal bone cyst.

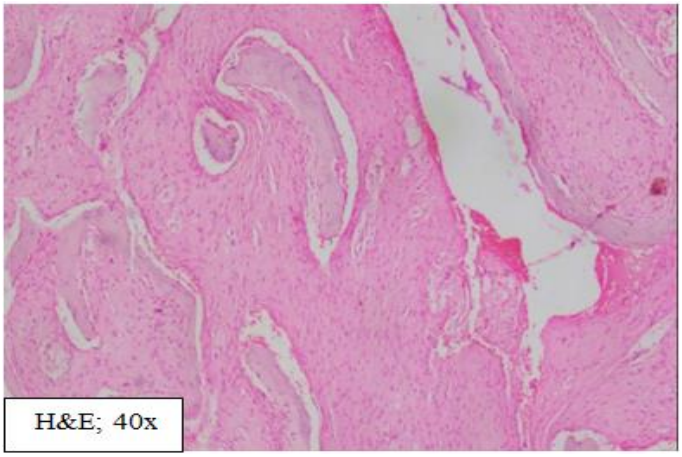


Case 2 Fig. 2: Avascular Necrosis (Head of right femur) showing necrotic dead bone.

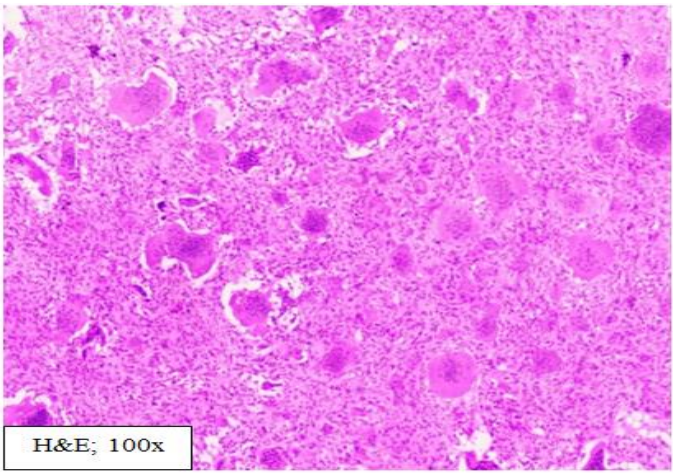
Case 3 Fig. 3A: Fibrous dysplasia(Left femur)-Well defined expansible lesion of altered signal intensity involving head, neck & proximal shaft of left femur. Courtesy: Radiology Department, Dr. D.Y. Hospital, Navi Mumbai.



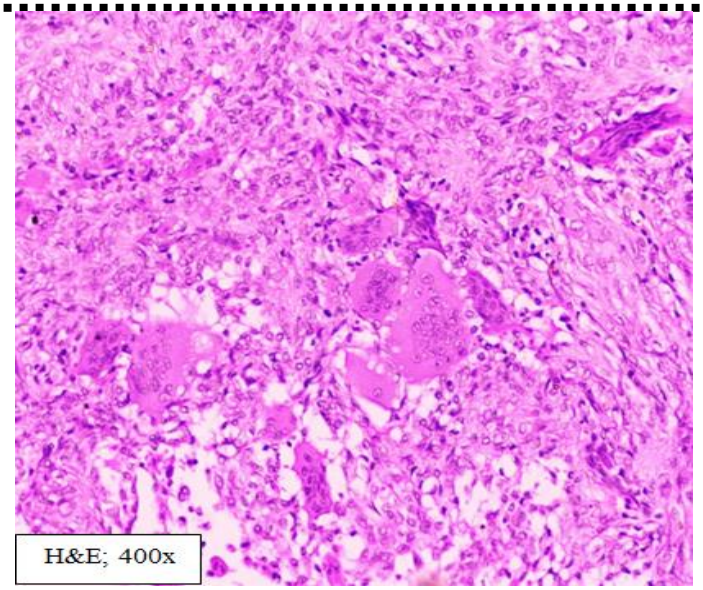
Case 3 Fig. 3B: Fibrous dysplasia (Left femur)-Irregular trabaculae of woven bone (C &S shapes) with no osteoblastic rimming.



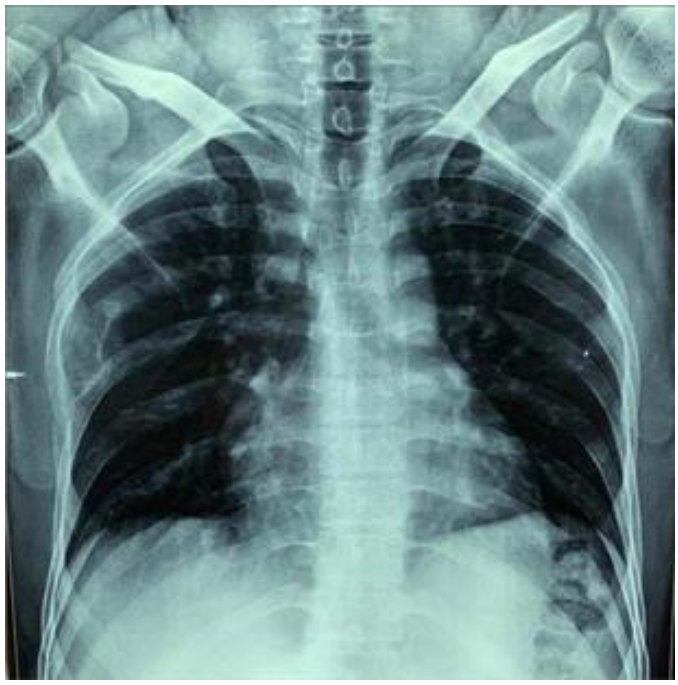
Case 3 Fig. 3C: Fibrous dysplasia(Left femur)- Showing Chinese letter pattern



Case 4 Fig. 4A: Giant cell tumor(Left wrist)- Numerous Osteoclast-Like Giant Cells Uniformly Distributed Throughout.



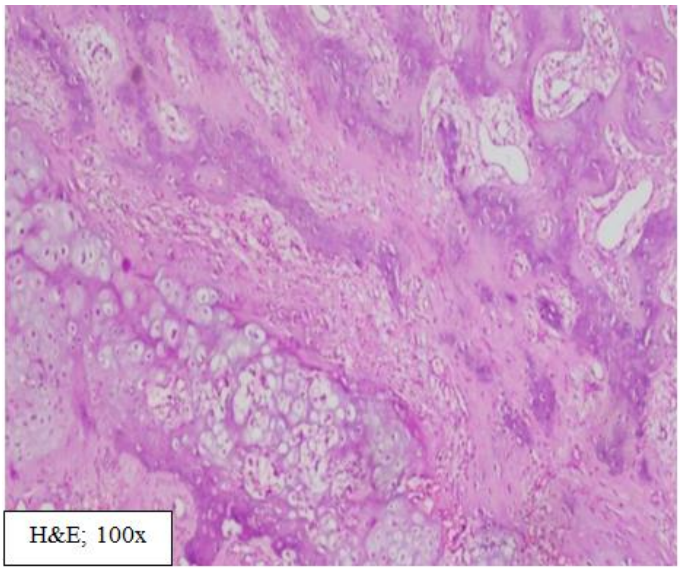
Case 4 Fig. 4B: Giant cell tumor (Left wrist)- Osteoclasts with numerous >50 nuclei.



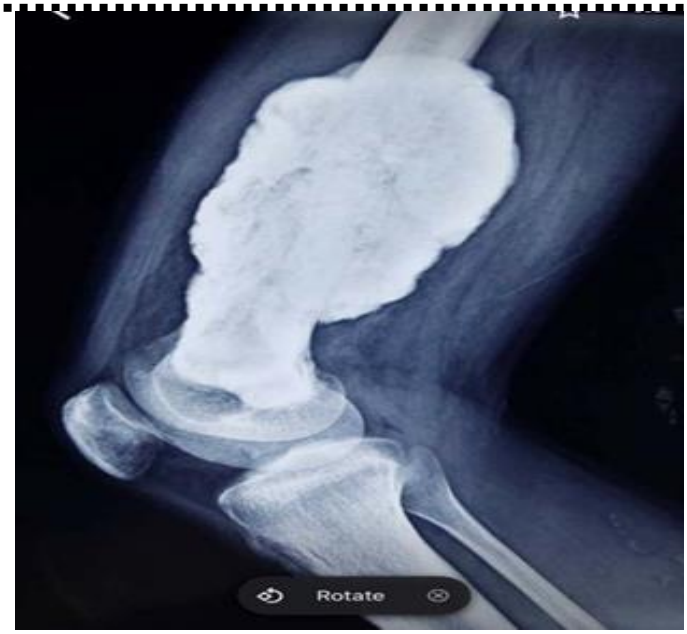
Case 5 Fig. 5A: Enchondrom (Fifth right rib)-Expansible lytic lesion, in mid portion of rt 5^{th} rib with severe thinning & breech of cortex.

Courtesy: Radiology Department, Dr. D.Y. Hospital, Navi Mumbai.

Case 5 Fig. 5B: Enchondroma(Fifth right rib)-Gross image of excised rib

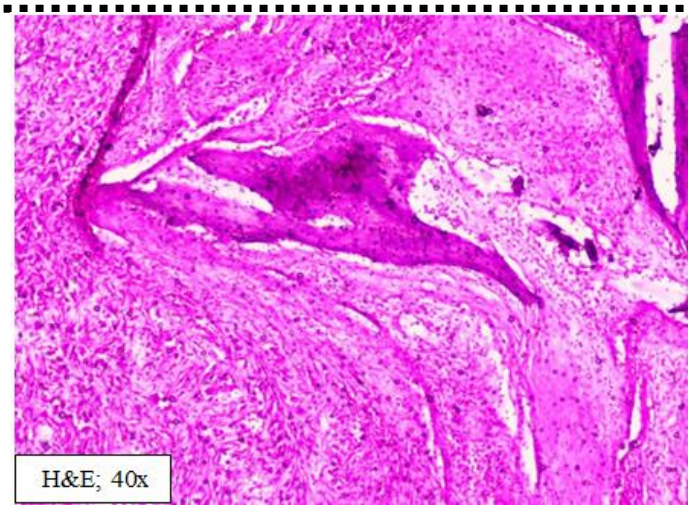


Case 5 Fig. 5C: Enchondroma(Fifth right rib)-Hypercellular lesion composed of lobules of benign cartilage with chondrocytes suggestive of Enchondroma.

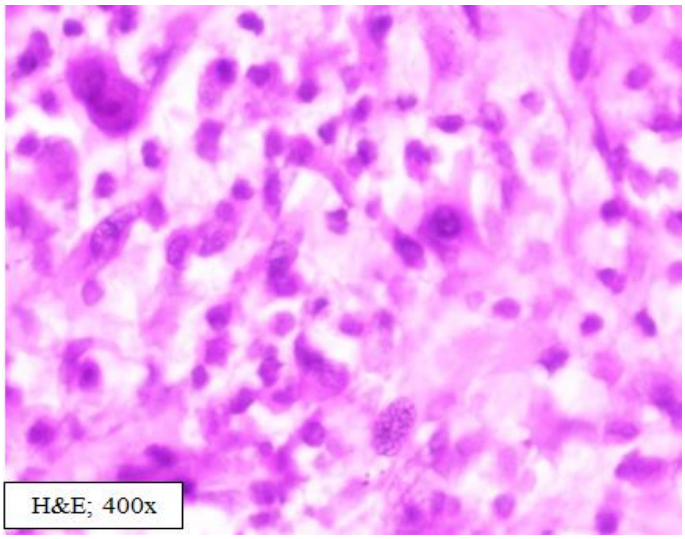


Case 6 Fig. 6A: X-ray picture of osteosarcoma (Right Femur). Courtesy: Radiology Department, Dr. D. Y. Hospital, Navi Mumbai.

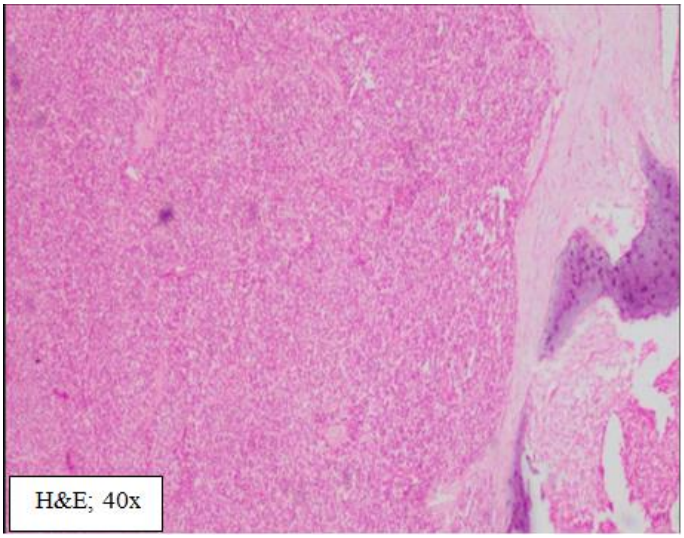
Case 6 Fig. 6B: Osteosarcoma-Gross of excised Femur.



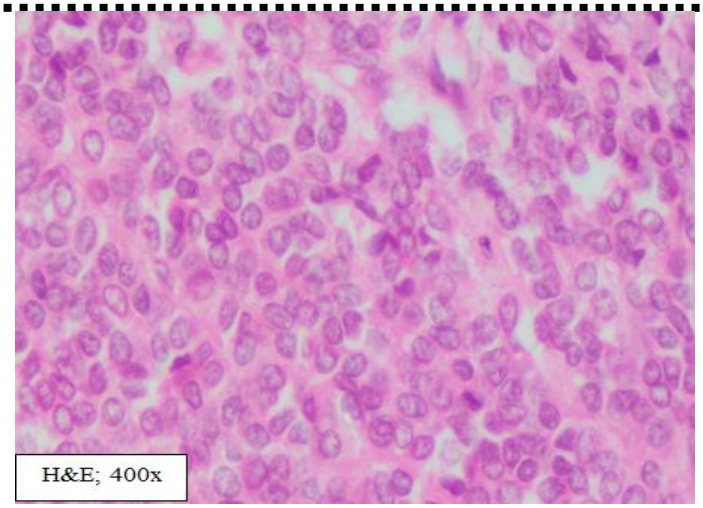
Case 6 Fig 6C: Osteosarcoma (Right Femur).



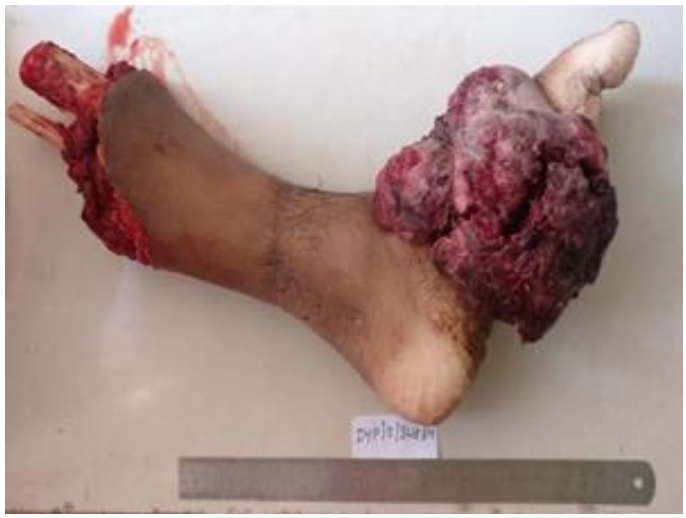
Case 6 Fig 6D: Osteosarcoma (Right Femur).



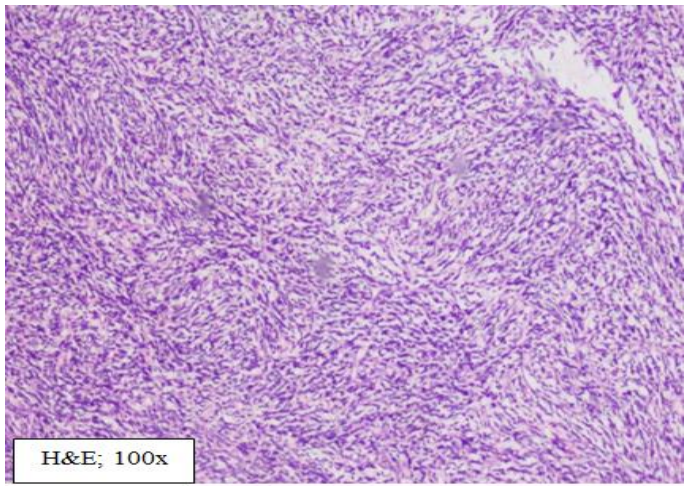
Case 7 Fig. 7B: Malignant round cell tumor (Rt proximal humerus)- Tumor seen infiltrating the bone.



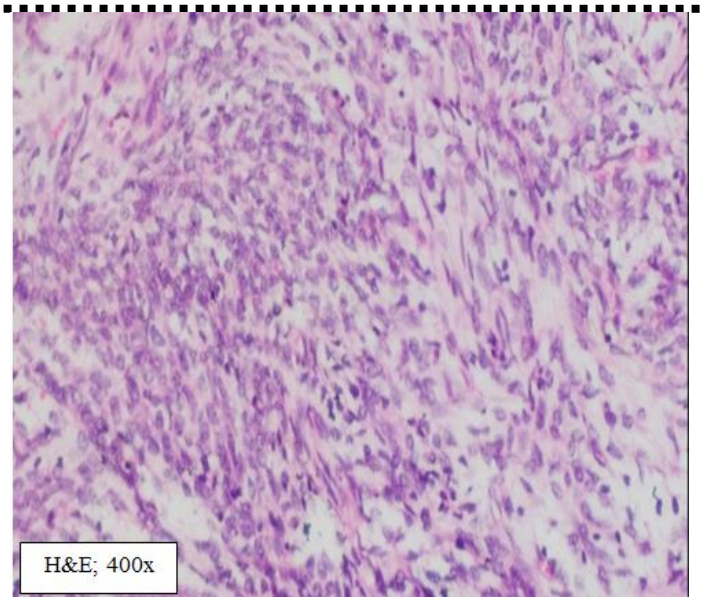
Case 7 Fig.7 B: Malignant round cell tumor (Rt proximal humerus)- High power view of individual tumor cells.



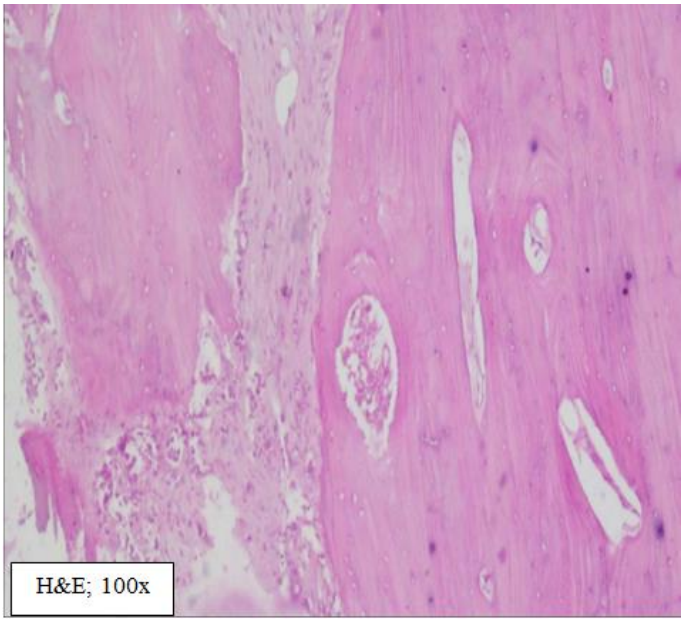
Case8 Fig. 8A: Gross image of Fibrosarcoma (amputated lower leg).



Case 8 Fig. 8B: Fibrosarcoma (Left foot)showing herringbone pattern



Case 8 Fig. 8 C: Fibrosarcoma(Left foot)Tumor cells are oval to spindle with tapering end & hyperchromatic nuclei.



Case 9 Fig. 9: Metastatic deposits in vertebra of epithelial malignancy secondary to prostate carcinoma.

Discussion

Jaffe and Hydson, in 1958, pointed out that cooperation between the surgeon, the radiologist and the pathologist in diagnosing a lesion of bone is of utmost importance.[4]

Precise radiological differential diagnosis of bone lesions is uncertain beyond indicating the presence of a tumor and histopathological evaluation remains the ultimate diagnostic method of choice.[4]

Therefore, histopathological diagnosis is the gold standard for exact diagnosis and for helping the clinician to predict the prognosis of the variety of bone lesions.

The present study helped us understand the variety of bone lesions in patients presenting to our hospital. This study was undertaken to study bone lesions for a period of two years. Seventy-three cases were included in the study. These cases were evaluated with different variables like age, gender, site, clinical presentation, and histological type.

A literature review of 3 original studies was done to evaluate the distribution of neoplastic and non-neoplastic bone lesions according to their age and gender.

In our study, out of 73 cases studied, 47(64.4%) were non-neoplastic bone lesions. These non- neoplastic lesions were more common in males (73.3%) than females (26.7%). Male predominance and younger age presentation was in agreement with studies done by Sameer et al.[7], Manoja et al[8] and Anita et al[9] (Refer VI) 51 to 60 years was the common age group presented with non-neoplastic bone lesions (25.5%). Sameer et al.[7], and Anita et al.[9] also reported that non-neoplastic lesions were more common than neoplastic ones. In our study, out of all the cases studied, 26 (35.6%) were neoplastic bone lesions, among them benign were 19 (73.1%) and malignant were 7 (26.9%). These neoplastic lesions were more common in males (69.2%) than females (30.8%). Less than 20 years was the common age group presented with neoplastic bone lesions (38.5%). This was in agreement with various studies by Sameer et al.[7], Anita et al.[8] and Manoja et al[9]. (Refer VII)

The most common benign neoplastic bone lesion we studied was osteochondroma (26.9%) followed by giant cell tumor (15.3%). This is consistent with studies conducted by Sameer et al.[7] and Manoja et al.[8] Among malignant neoplastic lesions, primary malignancies was observed in 4 cases where as metastatic lesions were observed in 3 cases. These findings were in agreement with studies conducted by Sameer et al.[7] and Manoja et al.[8]

In our study, the lower extremity (Tibia) was the most common site (67.1%) of bone lesions. These findings were in agreement with a study conducted by Sameer et al.[7], Anita et al.[9], and Manoja et al.[8]

According to age distribution, maximum number of cases belonged to the 11 to 20 years of age group (19.2%). Mostly the presentation was in young patients aged <20 years (34.3%). Majority of the bone lesions among males presented at younger age i.e., 11 to 20 years (21.2%) whereas among females, the presentation is much later i.e., at 41 to 50 years of age (23.8%).

This was consistent with studies conducted by Sameer et al.[7] and Manoja et al[8] where authors observed distribution of lesions most commonly in patients <20 years of age.

Anita et al[9] also observed that most common presentation was present in individuals <25years of age.

Non-Neoplastic bone lesions

	Sameer et al. (2020)	Anita et al. (2019)	Manoja et al. (2019)	Our Study (2021)
Non-Neoplastic lesions	53.3%	49.4%	26%	64.4%
Males v/s females	59.4% v/s 40.6%	63.4% v/s 36.6%	69.2% v/s 30.8%	73.3% v/s 26.7%
Age group	<20 years (31.3%)	25-50 Years (46.3%)	<20 years (38.5%)	51-60 years (25.5%)

Neoplastic bone lesions

	Sameer et al. (2020)	Anita et al. (2019)	Manoja et al. (2019)	Our Study (2021)
Neoplastic lesions	46.7% Benign= 75% Malignant= 25%	50.6% Benign= 78.6% Malignant= 21.4%	74% Benign= 91.9% Malignant= 8.1%	35.6% Benign= 73.1% Malignant = 26.9%
Males v/s females	60.7% v/s 39.3%	52.4% v/s 47.6%	59.5% v/s 40.5%	69.2% v/s 30.8%
Age group	<20 years (32.1%)	<25 years (45.2%)	<20 years (45.9%)	<20 years (38.5%)

Conclusion

In our study, we observed a wide spectrum of bony lesions whether infective, inflammatory, benign or malignant. Different lesions showed predilections for certain age groups, particular sex and sites of body which was in concordance with previous literature.

We observed a good correlation between radiological and histopathological diagnosis. But a few places the histopathological diagnosis overcame the limitations of radiology and provided accurate diagnosis. Further during histopathological evaluation, prior radiological evaluation aided in approaching to a correct diagnosis.

Since every modality has its limitations, a combined approach is always superior to any single approach. The histopathological evaluation remains as the gold standard to diagnose any bony lesion when integrated with clinical history and other investigations.

Acknowledgment: Histopathology staff, D.Y. Patil school of medicine, Navi Mumbai.

References

1. Modi D, Rathod GB, Delwadia KN, Goswami HM. Histopathological study of bone lesions - A review of 102 cases. IAIM, 2016; 3(4): 27-36.

2. Weyessa TG, Kindie EA, Yefter ET. Histopathological pattern of primary bone tumours at the Black Lion Specialized Hospital, Addis Ababa, Ethiopia: a retrospective cross-sectional, 2015-2019. Pan Afr Med J. 2022 Jan 21;41:62. doi: 10.11604/pamj.2022.41.62.27905. PMID: 35371378; PMCID: PMC8933449.
3. Jain K, S, Ravishankar R, M, 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.
4. George Mathew and Shwetha Jose (2017) 'Histopathological Study of Bone Lesions', International Journal of Current Advanced Research, 06(09), pp. 6330-6333.
5. Wenger, D., Wold, L. Malignant vascular lesions of bone: radiologic and pathologic features. Skeletal Radiol 29, 619–631 (2000).
6. Rani R, Gupta I, Suri J. Histopathological Study of Bone Tumours- 4 Years Study in A Tertiary Care Centre. JK Science 2022;24(4):243-248
7. Sameer MA, Sonwane GR. Histopathological evaluation of bone lesions in tertiary care centre. Journal of Medical Science And clinical Research. 2020; 8(1):164- 171.
8. V Manoja, Divya Chevakula, K Suresh. Histopathological evaluation of bone lesions: A retrospective institutionalstudy. MedPulse International Journal of Pathology. October 2019; 12(1): 01-04.
9. Sajjanar D, Rajagopal D, More D. A histopathological study of bone lesions in a tertiary care hospital in Kolhapur. International Journal of Clinical and Diagnostic Pathology. 2019;2(2):419-422.