



Research Article

HISTOPATHOLOGICAL STUDY OF BONE LESIONS

George Mathew¹ and Shwetha Jose²

¹Department of Orthopaedics, MOSC medical college, Kolenchery, Ernakulam, Kerala

²Department of Pathology, Sree Narayana Institute of Medical sciences, Chalakka, North Paravur

ARTICLE INFO

Article History:

Received 20th June, 2017

Received in revised form 15th

July, 2017 Accepted 18th August, 2017

Published online 28th September, 2017

Key words:

Bone lesion, Histopathology, Tubercular osteomyelitis, osteosarcoma, osteochondroma

ABSTRACT

Aim & objectives: Histopathological study of various bone lesions to determine the spectrum of bone lesions and to correlate it with demographic features like age, sex and type of lesion.

Material and Methods: A retrospective study was done at Sree Narayana Institute of Medical Sciences, Chalakka, North Paravur over a period of 3 years from January 2014 to January 2017. A total of 124 cases were included in the study. Patients were assessed by detailed clinical examination and radiological investigations followed by which bone biopsy was performed and histopathological diagnosis were made.

Result: Out of 124 cases 81 patients were male and 43 were female. Maximum 58 patients were of age group 25-50 years of age. 36 cases were of age group more than 50 years of age and rest 30 were of age less than 25 years. The incidence of non-neoplastic bone lesions was 78(62.90%) while neoplastic lesion was 46 (37.09%). Amongst neoplastic lesion, incidence of benign lesion was 34 (27.41%) and malignant lesion was 12 (9.67%). Out of 12 cases of malignant bone tumors, 7 were primary bone tumors while 5 were secondary bone metastasis. Out of 78 non-neoplastic cases, most common diagnosis was chronic osteomyelitis (28 cases). Osteoclastoma was most common benign tumor (10 cases) while osteosarcoma was found to be most common primary malignant tumor (3 cases).

Conclusion: Bone tumors occurred predominantly during 25-50 years of age with a male preponderance. Giant cell tumor was the most common benign tumor and Osteosarcoma was the most common malignant bone tumor. An integrated approach involving radiography, histopathology, and clinical data are necessary to form an accurate diagnosis and proper management of patient.

Copyright©2017 George Mathew and Shwetha Jose. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Histopathological study enables us to understand the spectrum of bone lesions and gives an idea of different bone lesions in population among different age group and sex. Bone lesions often pose diagnostic challenges to surgical pathologists. Some benign processes such as osteomyelitis can mimic malignant tumors, and some malignant lesions such as metastases or myeloma, can mimic benign. It is difficult to determine radiologically with plain film imaging whether a bone lesion is benign or malignant.^[1]

Therefore, an integrated approach involving radiographic, histologic, and clinical data are necessary to form an accurate diagnosis.^[2] A proper histopathological diagnosis is useful in confirming the diagnosis and helps in staging the tumor and aid the surgeon in planning limb salvage surgery for early malignant and benign bone lesions.^[2]

MATERIAL AND METHODS

This study was carried out at our Medical teaching hospital from January 2014 to January 2017. A total of 124 cases were included in the study. The criteria for selection of patients were radiologically apparent bone lesion. In Orthopedic OPD, patients clinically presented with pain, swelling, non-healing fractures were included in the study. Detailed history was taken which included age, sex, place of residence, occupation, fever, weight loss, cough, hemoptysis, duration of symptoms or history suggestive of any systemic involvement. All patients were subjected to thorough physical examination.

X-ray of lesioned bone had been taken in all the patients while CT scan and MRI were done according to the need. Routine blood investigations were done in all patients while sputum, body fluid examination, Serum Calcium and alkaline phosphatase were done in selected cases. Biopsy was taken from the lesion in all patients for histopathological diagnosis of the lesion.

The biopsies and specimens received for histopathological study were fixed in 10% formalin after separating the soft

*Corresponding author: **George Mathew**

Department of Orthopaedics, MOSC medical college, Kolenchery, Ernakulam, Kerala

tissue. 3 to 5mm thick sections of bone were cut and decalcification was done by placing the specimen in 5% nitric acid for 2 days. Decalcified tissue was processed by increasing concentration of alcohol, paraffin blocks were prepared. Sectioned were stained with haematoxylin and eosin. After that all slides were examined under microscope, the final diagnosis was made into inflammatory, benign and malignant lesion accordingly. In selected cases IHC was performed to confirm histopathological findings.

RESULTS

A total of 124 cases of bone lesions were included in our study who attended orthopedics OPD during the period from January 2014 to January 2017.

Table 1 proportion of various bone lesions

Non-neoplastic	Neoplastic			Total
	Benign	Malignant		
		Primary	Metastasis	
78	34	7	5	124

Table 2 Distribution of Non-neoplastic lesions

Various Non-neoplastic lesions	Number of cases
Chronic Osteomyelitis	28
Tuberculosis	21
Rheumatoid arthritis	08
Osteoarthritis	06
Synovitis	11
Others	04
Total	78

Table 3 Distribution of Benign lesions

Various benign lesions	Number of cases
Osteoclastoma (Giant cell tumor)	10
Osteochondroma (Exostosis)	08
Fibrous dysplasia	04
Ossifying fibroma	03
Osteoma	03
Chondroma	02
Aneurysmal bone cyst	03
Pyogenic granuloma	01
Total	34

Table 4 Distribution of Malignant bone lesions

Malignant bone lesions	Number of cases
Osteosarcoma	03
Chondrosarcoma	02
Synovial sarcoma	01
Ewing's sarcoma	01
Metastasis	05
Total	12

Out of 124 cases 81 patients (65.32%) were male and rest 43 (34.67%) were female (Table 5).

Table 5 Gender distribution of bone lesions

Gender	Non-neoplastic	Neoplastic		Total
		Benign	Malignant	
Male	52	21	8	81
Female	26	13	4	43
Total	78	34	12	124

Out of 124 cases, maximum 58 patients were of age group 25-50 years of age (46.77%). 36 cases were of age group more than 50 years of age and rest 30 were of age less than 25 years (Table 6).

Table 6 Age wise distribution of bone lesions

Age group	Non neoplastic	Neoplastic		Total
		Benign	Malignant	
<25 years	23	6	1	30
25-50 years	37	16	5	58
>50 years	18	12	6	36
Total	78	34	12	124

The incidence of non-neoplastic bone lesions was 78(62.90%) while neoplastic lesion was 46 (37.09%). Amongst neoplastic lesion, incidence of benign lesion was 34 (27.41%) and malignant lesion was 12 (9.67%). Out of 12 cases of malignant bone tumors, 7 were primary bone tumors while 5 were secondary bone metastasis (Table 1).

Out of 78 non-neoplastic cases, most common diagnosis was chronic osteomyelitis (28 cases) (22.58%) followed by tubercular osteomyelitis (21 cases) (16.93%) and others (Table 2).

Osteoclastoma was most common benign tumor (10 cases) (8.06%) while osteosarcoma was found to be most common primary malignant tumor (3 cases) (2.41%). 5 cases (4.03%) of secondary metastasis were found (Table 3 & 4).

DISCUSSION

Jaffe and Hydson, in 1958, pointed out the importance of cooperation between the surgeon, the radiologist and the pathologist in diagnosing a lesion of bone.^[3] Precise radiological differential diagnose of bone sarcomas is uncertain beyond indicating the presence of a tumor and biopsy remains the ultimate diagnostic method of choice.^[4] Unlike in lesions of other organ systems, the bone pathologist must have a basic idea regarding the appearances of all bone lesions in imaging. Hence, a proper correlation between imaging and histopathological findings is often the key to appropriate diagnosis.

This study was carried out precisely to diagnose different lesions of bone. In our study, out of 124 cases of bone lesions, most common were non neoplastic lesions making 78 cases. 34 cases were of benign bone tumors followed by 12 cases of malignant bone lesions.

Most tumors of the bone showed male preponderance with male to female ratio of 1.8:1. Similar findings were reported in other studies.^[5-10]

The peak age of incidence of various bone lesions in our study was 25-50 years age group. Similar findings in age incidence were also reported in other studies.^[6,11-13] Most common type of bone lesions were non-neoplastic (62.90%). This finding was similar to other study done by Modi D *et al.*^[14]

Benign tumors were more common than malignant which are in conformity with other studies.^[6,12,15] whereas, the reverse is true in other studies where malignant bone tumors was found to be more common than benign.^[5,9,13,16]

Metastatic bone tumors were seen in older age group (above 50 years). In a study conducted by Sirikulchayanonta *et al.*^[17] there were similar findings with average age of 50 years in metastatic bone tumors. Primary malignant bone tumors were more common than metastatic tumors which are in conformity with other studies^[10,11,18-20] whereas, the reverse is

true for studies done by Gomez *et al.*^[15] The likely reason may be due to the fact that our study was based on a small number of cases. It may be also due to lack of care in old age, no access to hospital because of poverty and inadequate medical facilities.

Chronic Osteomyelitis was most common non-neoplastic lesion in our study (22.58%) followed by tubercular Osteomyelitis (16.9%). Osteomyelitis implies inflammation of bone and marrow; it may be complication of any systemic infection but frequently manifest as a primary solitary focus of disease.

Giant cell tumor was most common benign bone neoplasm in our study (8.06%). This corresponds to a study conducted by Settacom *et al.*^[18]. Giant cell tumor is the most common benign tumor of bone. It is usually seen in patients over 20 years of age with female preponderance. The classic location is the epiphysis of long bone, from which it may spread into the metaphyseal area, break through cortex, invade the inter muscular septa or even cross a joint space. Most patients present with slowly progressive pain, with or without a mass. Some tumor may present with a pathological fracture.

Osteosarcoma was the commonest malignant tumour with 2.04 % of all tumors. Similar results were reported in other studies with frequency of osteosarcoma ranging from 9.1% to 35.14%.^[2,21,22] Osteosarcoma occurs with dual peak incidence. One peak is at the age of 10-25 years while other is after 40 years of age. Most rise *denovo*, but others arise within context of pre-existing conditions like Paget disease, radiation exposure, chemotherapy, pre-existing benign bone lesions, foreign bodies, trauma and genetic predisposition^[23]. Mostly originate from the metaphysis of long bones.

CONCLUSIONS

The results of our study were compared with many other studies similarly conducted by different authors. There is a wide spectrum of bone lesions and specific tumor has predilection for certain age, sex, and site which are in conformity with our study from the data reviewed. Lastly, an exact diagnosis of bone tumors is at times difficult. Therefore, an integrated use of clinical, radiological, and histopathological finding is recommended to increase accuracy of diagnosis and for better management of the patient.

Conflict of interest

No conflicts of interest exist for these authors. No relevant financial relationship exists between the authors and procedures or products used in this manuscript.

References

1. Bonetumor.org, (internet), Massachusetts, Henry Degroot, Bone metastasis, Available from, <http://www.bonetumor.org/tumors/pages/page67.htm>.
2. Negash BE, Admasie D, Wamisho BL, Tinsay MW. Bone tumors at Addis Ababa University, Ethiopia: Agreement between radiological and histopathological diagnosis- a 5-year analysis at Black-Lion Teaching Hospital. *Malawi Med J* 2009; 1:62-5.
3. Jaffee HL, Hydson TM. Tumors and tumorous conditions of the bones and joints. *J Clin Orthop* 1958; 17:27-39.
4. Dollahite HA, Tatum L, Moinuddin SM, Carnesale PG. Aspiration biopsy of primary neoplasms of bone. *J Bone Joint Surg Am* 1989; 71:1166-9.
5. Rehman A, Qureshi H, Shafiullah. Bone tumors and tumor-like lesions: 10 years retrospective analysis of biopsy results. *J Postgrad Med* 2004; 18:40-5.
6. Baena-Ocampo Ldel C, Ramirez-Perez E, Linares-Gonzalez LM, Delgado Cheavez R. Epidemiology of bone tumors in Mexico City: Retrospective clinicopathologic study of 566 patients at a referral institution. *Ann Diagn Pathol* 2009; 13:16-21.
7. Van den Berg H, Kroon HM, Slaar A, Hogendoorn P. Incidence of biopsy proven bone tumors in children: A report based on Dutch pathology registration "PALGA". *J Pathol Orthop* 2008; 28:29-35.
8. Stiller CA, Biellack SS, Jundt G, Steliarova-Foucher E. Bone tumor in European children and adolescent 1978-1997. Report from Automated Childhood Cancer Information System Project. *Eur J Cancer* 2006; 42:2124-35.
9. Mohammed A, Sani MA, Hezekiah IA, Enoch AA. Primary bone tumor and tumor like lesions in children in Zaria, Nigeria. *Afr J Paediatr Surg* 2010; 7:16-8.
10. Shah SH, Muzaffar S, Soomro IN, Pervez S, Hasan SH. Clinicomorphological pattern and frequency of bone cancer. *J Pak Med Assoc* 1999; 49:110-2.
11. Rao VS, Pai MR, Rao RC, Adhikary MM. Incidence of primary bone tumor and tumor like lesions in and around Dakshina Kannada district of Karnataka. *J Indian Med Assoc* 1996; 94:103-4.
12. Sarma NH, al-Fituri O, Visweswara RN, Saeed SO. Primary bone tumor in eastern Libya- a 10 year study. *Cent Afr J Med* 1994; 40:148-51.
13. Mohammed A, Isa HA. Pattern of primary tumor and tumor like lesions of bone in Zaria, Northern Nigeria: A review of 127 cases. *West Afr J Med* 2007; 26:37-41.
14. Modi D, Rathod GB, Delwadia KN, Goswami HM. Histopathological study of bone lesions - A review of 102 cases. *IAIM*, 2016; 3(4): 27-36.
15. Valdespino-Gomez VM, Cintra-McGlone EA, Figueroa-Beltran MA. Bone tumors: Their prevalence. *Gac Med Mex* 1990; 126:325-34.
16. Balubeck J, Atangana R, Eyenga V, Pison A, Sando Z, Hoffmeyer P. Bone tumor in Cameroon: Incidence, demography and histopathology. *Int Orthop* 2003; 27:315-7.
17. Sirikulchayanonta V, Klongwansayawan S. Metastatic bone tumors in Ramathibodi Hospital, Thailand. *J Med Assoc Thai* 1992; 75 Suppl 1:131-5.
18. Settacom J, Lekawanvijit S, Arpornchayanon O, Rangdaeng S, Vanitanakom P, Kongkarnka S, *et al.* Spectrum of bone tumors in Chiang Mai University Hospital, Thailand according to WHO Classification 2002: A study of 1,001 cases. *J Med Assoc Thai* 2006; 89:780-7.
19. Katchy KC, Ziad F, Alexander S, Gad H, Abdel Motal M. Malignant bone tumors in Kuwait: A 10 year clinicopathological study. *Int Orthop* 2005; 29:406-11.
20. Pongkripetch M, Sirikulchayanonta V. Analysis of bone tumors in Ramathibodi Hospital, Thailand during

- 1977-86: A study of 652 cases. *J Med Asso Thai* 1989; 72:621-8.
21. Abdulkarem FB, Eyesan SU, Akinde OR, Ezembakwe ME, Nnodu OE. Pathological study of Bone Tumours at the National Orthopaedic Hospital, Lagos, Nigeria. *West African J Medicine* 2007; 26 (4):306-11.
22. Karun Ji, Sunila, Ravishankar R, Mruthyunjaya, Rupakumar CS. Gadiyar, HB. Manjunath GV. Bone tumours in a tertiary care hospital of south asia: A review of 117 cases. *Indian J Med Paediatr Oncol* 2011; 32: 82-85.
23. Vinholes J., *et al.* Effects of Bone Metastases on Bone Metabolism: Implications for Diagnosis, Imaging and Assessment of Response to Cancer Treatment. *Cancer Treatment Reviews*, 1996; 22: 289-331.

How to cite this article:

George Mathew and Shwetha Jose (2017) 'Histopathological Study of Bone Lesions', *International Journal of Current Advanced Research*, 06(09), pp. 6330-6333. DOI: <http://dx.doi.org/10.24327/ijcar.2017.6333.0920>
