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Histopathological examination of bone lesions

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Abstract:
Background*: Bone tumors are relatively uncommon and poses difficulty byclinicoradiological diagnosis alone, when added by histopathology makes the diagnosis towards accuracy.*
Aims and objective*: Assessment of the histopathological features of bone lesions and to correlate the bony lesions with age, sex and site of presentation.*
Materials and methods*: AtNalanda Medical College, Patna, total of 64 scraped,incisional, and excisional biopsy specimen which were clinicoradiologically diagnosed as bone lesion were taken for study over a period of one year from august 2018 to July 2019. All clinical data was collected such as age, sex, site of involvement on a proforma after informed consent to patient. Bony tissues were put for decalcification (10% nitric acid) and soft tissue was immediately fixed into 10 % formalin, thenprocessed and embedded in paraffin blocks. Sections were stained by haematoxylin and eosin stain. Detailed microscopic study was done and findings and diagnosis were noted and compared to other studies.*
Results*: Out of the 64 cases studied over the period of 1 year, 30 lesions were non-neoplastic (46.87%), and 34 lesions were neoplastic (53.17%), out of which 27 cases are benign (42.21%) and 7 cases are malignant (10.93%). Males (59.37%) were affected more commonly than females (40.13%), with a male: female ratio of 1.46:1. Bone lesions were more common in between the age group of 10 to 30years (67.18%). Amongst non-neoplastic lesions, Chronic osteomyelitis were the most common (16 cases, 25%), followed by Tuberculous osteomyelitis (7 cases, 10.93%).Amongst the benign neoplastic lesions, Osteochondroma was the most common (14 cases, 21.87%), Giant cell tumour was the second most common (8 cases, 12.5%).The most common malignant lesion was Osteosarcoma (3 cases, 4.68%), followed by Ewing sarcoma (2 cases, 3.12%). Most of the lesions were found in the femur (18 cases, 28.12%).*
Conclusion*: Histopathological study enables us to understand the spectrum of bone lesion and give an idea of different bone tumors in population and different age groups and sex.*

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I. Introduction

Bone is made of cartilage, osteoid, fibrous tissue and bone marrow element, with each tissue having a potential to develop either benign or malignant. Bone lesions can present in any form varying from inflammatory, metabolic, degenerative and neoplastic tumors [(1)].The nomenclature and classification of primary bone tumours is based mainly on the pathway of tumour cell differentiation [2]. . Primary bone tumours are uncommon malignancy, but they are important causes of cancer morbidity and mortality, especially among young people [3]. Primary bone tumours account for 0.2% of all tumors in humans. Bone is the third most common site of metastatic disease. Various etiological agents including chemotherapy, radiation, trauma, infections and pre-existing bone lesions have been implicated. Common presentations are progressive pain, swelling, tenderness and in some cases, acute pathological fracture [4, 5].

It is important to remember that some inflammatory lesions such as osteomyelitis can mimic malignant lesions and some malignant lesions such as metastasis or myeloma can mimic benign. It is difficult to determine radiologically whether a bone lesion is benign or malignant [6].

Tumors of the skeletal system are relatively constant in their pattern of presentation. The five basic parameters of importance in this regard are the age of the patients, bone involved, specific area within the bone, radiographic appearance and microscopic appearance. The pathologist should be fully aware of the first four before trying to evaluate the fifth. [(4)]

For the correct diagnosis of bone lesions, charting out treatment plan and estimating prognosis, interpretation of biopsy material proves to be absolutely necessary.

AIM:

This present histopathological study helps us to understand the variety of bone lesions and gives an idea of their relative frequencies, age, sex distributions and site of occurrence.

II. Material and Methods

The study was done in department of pathology,NMCH, Patna over a period of 1 year from August 2018 to July 2019. A total of 76 biopsy cases received in histopathology taken for detailed study.

Inclusion criteria: Scraping, incisional, and excisional biopsy with clinico-radiologically apparent bone lesions.
Exclusion criteria: Inadequate specimen.

The data were collected on proforma after informed consent to all patients. Brief essential clinical history such as the age, sex, anatomical site and radiological findings were taken. Biopsy was taken mainly by scrapping method, incision and excision method. In laboratory soft tissue were fixed in 10 % formalin while for bone 3 to 5 mm thick sections were made and adequately fixed in 10% buffered formalin and then decalcification was achieved by placing the specimens in nitric acid. After that all tissue were processed by increasing concentrations of alcohol and 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 lesions accordingly.

III. Results

A histopathological study of various bone lesions was carried out from September 2018 to Aug 2019. A total 64 cases were studied. (Table 1) Non-neoplastic lesions comprised 30 cases (46.87%), 27 cases (42.21%) were benign lesions and malignant lesions accounted for 7 cases (10.93%)(Table 1).Bone lesions were more common in 11 to 30 years age group (43 cases out of 64). Males (38 out of 64 cases, 59.37%) were affected more commonly than females (26 out of 64cases, 40.62%) with male to female ratio as 1.46:1 (table 2). Amongst non-neoplastic lesions, chronic osteomyelitis (16 cases, 25%) were commonest followed by tuberculous Osteomyelitis (7 cases, 10.93%) while osteochondroma (14 cases, 21.87%) was more common in the category of benign neoplastic lesions followed byGiant cell tumor (8 cases, 12.5%). Osteoid osteoma and enchondroma (2 cases each, 3.12%) each were other benign neoplastic bone lesions. Among malignant tumours, osteosarcoma accounts for 3 cases, Ewing's sarcoma 2 cases,Chondrosarcoma 1 case and metastasis 1 case (table 3). Both neoplastic and non-neoplastic lesions were more prevalent in < 40 years age group. Overall most common bone involved was femur (table 4).

Table 1: Proportion and distribution of the bone lesions

	Non neoplastic	Neoplastic	
		Benign	Malignant
	1. Chronic Osteomyelitis-16	1. Osteochondroma-14	1. Osteosarcoma-3
	2. Tuberculous Osteomyelitis-7	2. Giant Cell Tumor-8	2. Ewing's sarcoma-2
	3. Aneurysmal bone cyst-3	3. Chondroblastoma-1	3. Chondrosarcoma-1
	4. Fibrous dysplasia-2	4. Osteoid Osteoma-2	4.Metastasis-1
	5. Simple bone cyst-2	5. Enchondroma-2	
Total	30	27	7
%	46.87%	42.21%	10.93%

Table 2: Sex distribution of primary bone tumours

Histological type	Male	Female	Total (%)
Non-neoplastic			
Chronic Osteomyelitis	9	7	16(25%)

Tuberculous Osteomyelitis	3	4	7 (10.93%)
Aneurysmal bone cyst	2	1	3 (4.68%)
Fibrous dysplasia	1	1	2 (3.12%)
Simple bone cyst	2	0	2 (3.12%)
SUBTOTAL	17	13	30 (46.87%)
Benign Tumours			
Osteochondroma	9	5	14 (21.87%)
Giant Cell Tumor	5	3	8 (12.5%)
Chondroblastoma	1	-	1 (1.56%)
Osteoid Osteoma	1	1	2 (3.12%)
Enchondroma	-	2	2 (3.12%)
SUBTOTAL	16	11	27 (42.21%)
Malignant Tumours			
Osteosarcoma-	2	1	3 (4.68%)
Ewing's sarcoma-1	1	1	2 (3.12%)
Chondrosarcoma-3	1	-	1 (1.56%)
Metastasis	1	-	1 (1.56%)
SUBTOTAL	5	2	7 (10.93%)
TOTAL (%)	38 (59.37%)	26 (40.62%)	64 (100%)

Table 3: Age distribution of primary bone tumours

Histological type	0-10	11-20	21-30	31-40	41-50	51-60	>61		Total
Non-neoplastic and tumour like lesion									
Chronic osteomyelitis	2	5	5	2	1	1	-		16
Tuberculous osteomyelitis	1	3	2	1	-	-	-		7
Aneurysmal bone cyst		1	1	1					3
Fibrous Dysplasia	-	-	1	-	1	-	-		2
Solitary bone cyst		1	-	1					2
Benign Tumours									
Osteochondroma	1	6	4	1	1	1	-		14
Giant Cell Tumor	-	1	4	3	-	-	-		8
Chondroblastoma	-	1	-	-	-	-	-		1

Osteoid Osteoma	-	1	1	-	-	-	-		2
Enchondroma	-	-	1	1	-	-	-		2
Malignant Tumours									
Osteosarcoma-		1	1	-	1	-	-		3
Ewing's sarcoma-1	-	1	1		-	-	-		2
Chondrosarcoma-3	-	-	1	-	-	-			1
Metastasis	-		-	-	-	-	1		1
Total (%)	4(6.25)	21(32.81)	22(34.37)	10(15.62)	4(6.25)	2(3.12)	1(1.56)		64(100)

Table 4: Anatomical distributions of the bone lesions

Bone	Non neoplastic	Neoplastic		Total (%)
		Benign	Malignant	
Distal end of Femur	7	9	2	18 (28.12)
Proximal end of Tibia	7	4	2	13 (20.31)
Proximal end Humerus and scapula	2	5	1	8 (12.50)
Proximal end of femur	3	3	1	7 (10.93)
Distal end of humerus	3	3	0	6 (9.37)
Radius and ulna	4	1	0	5 (7.81)
Distal end of tibia	2	2	0	4 (6.25)
Small bone of hand	2	0	0	2 (3.12)
Pelvic bone	0	0	1	1 (1.56)
Total	30	27	7	64 (100)

IV. Discussion

This study was carried out precisely to diagnose different lesions of bone. One of the important points to be considered is the age of the patient. Some of the bone lesions are most probably confined to certain age groups. In this study, out of the 64 bone specimens received during the study period neoplastic lesions (34 cases)were found to be more common than non-neoplastic lesions (30 cases)confirming to study done by Settakomet al.[7)Amongst non-neoplastic lesions, Chronic osteomyelitis were the most common similar to Kethireddy S, Raghu K, Chandra Sekhar KPA, et al. 2016 (8).

Benign lesions are more common than malignant lesions [9-12]. In our study, among benign lesions Osteochondroma was the most common followed by giant cell tumor [14-15]. In some other studies Giant cell tumor was the most common benign tumor followed by Osteochondroma like in Modi D, Rathod GB, Delwadia KN, et al 2016 [13]

The peak age incidence for benign and malignant bone tumours was in the second and third decades of life (Table 2). This finding is in agreement with that of Oyemade (Ibadan), Omololu et al (Ibadan), Odetayo (Lagos) and Solomon (South Africa) (16, 17, 18, and 20]. However, the report by Umar in Zaria is slightly different; the peak age incidence in Umar's work was in the first and second decade of life [21].

More males were affected with bone tumours with an overall male to female ratio of 1.46:1. This is very similar to the ratio of 1.25:1 reported by Odetayo in a similar study at Lagos [18]. For malignant primary bone tumours, the male to female ratio was 2.5:1. This is similar to the male to female ratio of 2:1 reported by Oyemade et al in a study of malignant primary bone tumours at Ibadan and Dahlin et al at Mayo clinic, USA.

Most common site of involvement is the femur similar to Kethireddy S, Raghu K, Chandra Sekhar KPA, et al. [8]. The most frequently involved bone in primary malignant bone tumours, in this study was the femur. This finding was consistent with that of Solomon in South Africa and Ahmad et al in Pakistan [20, 19]. They both reported femur as the most frequently involved bone in primary malignant tumours. However, Omololu et al at Ibadan reported that the mandible was the most frequently involved bone in primary bone cancer, followed by the femur, tibia and maxilla in decreasing order (17].

Osteosarcoma was the commonest malignant bone tumour in this study. It accounted for 42.87% of all bone cancers. This figure of relative frequency ratio is very close to 39% reported by Bahebeck et al in Cameroon and Umar in Zaria, 45.7% by Rao el at in India and 36.0% by Oyemade et al at Ibadan (21). The high incidence of this tumour in the second and third decades of life (76.2%) coincides with the pubertal growth spurt.

V. Conclusion

In our study, neoplastic bone lesions were more common (53.13%) than non-neoplastic bone lesions (46.87%). Bone lesions were more common in younger age group 10-30 years. Males were more commonly affected than females. Chronic osteomyelitis was the most common non-neoplastic lesion, followed by tuberculous osteomyelitis. In case of neoplastic lesions, osteochondroma was the commonest benign tumour. Femur was the most frequently affected location. All the lesions were quite consistent in their occurrence with relation to age, sex and site of distribution. Therefore, if diagnosed with clinical, radiological and histopathology, proper diagnosis and treatment can be made.

References

[1]. Dorfman HD, Czerniak B. Bone Cancers. Cancer. 1995; 75:203-10
[2]. D Charles M, Nicholas AA. Guidelines for histopathological specimen examination and diagnostic reporting of primary bone tumours. *Clin Sarcoma Res* 2011; 1:6.
[3]. Negash BE, Admasie D, Wamisho BL, Tinsay MW. Bone tumours at Addis Ababa University, Ethiopia: Agreement between radiological and histopathological diagnoses, a-5-year analysis at Black-Lion Teaching Hospital. *Int J Medicine and Medical Science* 2009; 1:119-25.
[4]. Rosai and Ackerman's. Bone and joints. In: Juon Rosai, editor. Surgical pathology, 10th Ed. New Delhi: Elsevier; 2012: 2013-2104.
[5]. Cope JU. A viral etiology for Ewing's sarcoma. *Med Hypotheses* 2000; 55:369‑372.
[6]. Bonetumor.org, (internet), Massachusetts, Henry Degroot, Bone metastasis, Available from, http://www. bonetumor.org/tumors/pages/page67.htm. Accessed on 20-11-2015.
[7]. Settakorn J, Lekawanvijit S, Arpornchayanon O *et al*. Spectrum of bone tumors in Chiang Mai University Hospital, Thailand according to WHO classification 2002: A study of 1001 cases. J Med Assoc Thai. 2006; 89(6):780-7.
[8]. Kethireddy S, Raghu K, Chandra Sekhar KPA *et al*. Histopathological evaluation of neoplastic and non-neoplastic bone tumours in a teaching hospital. J Evolution Med. Dent. Sci. 2016; 5(86):6371-6374. DOI: 10.14260/jemds/2016/1441
[9]. Rao VS, Pai MR, Rao RC *et al*. Incidence of primary bone tumours and tumour like lesions in and around Dakshina Kannada district of Karnataka. J Indian Med Assoc. 1996; 94(3):103-4, 121.
[10]. Solooki S, Vosoughi AR, Masoomi V. Epidemiology of musculoskeletal tumors in Shiraz, south of Iran. Indian J Med Paediatr Oncol. 2011; 32(4):187-91.
[11]. Mohammed A, Isa HA. Pattern of primary tumours and tumour-like lesions of bone in Zaria, northern Nigeria: a review of 127 cases. West Afr J Med. 2007; 26(1):37-41.
[12]. Obalum DC, Giwa SO, Banjo AF *et al*. Primary bone tumours in a tertiary hospital in Nigeria: 25 year review. Niger J Clin Pract. 2009; 12(2):169-72.
[13]. Modi D, Rathod GB, Delwadia KN *et al*. Histopathological study of bone lesions-A review of 102 cases. IAIM. 2016; 3(4):27-36.
[14]. Manoja V, Divya Chevakula, Suresh K. Histopathological evaluation of bone lesions: A retrospective institutional study. Med Pulse International Journal of Pathology. 2019; 12(1):01-04
[15]. Negash BE, Admasie D, Wamisho BL, Tinsay MW. bone Tumors at Addis Abbas University Ethiopia,
[16]. Agreement Between Radiological and Histopathological Diagnosis-A 5 year analysis at Black Lion Teaching Hospital, Malawi Med J. 1:62-5.
[17]. Oyemade GAA, Abioye AA. Primary malignant tumours of bone: Incidence in Ibadan. Nigeria J Natl Medical Assoc. 1982; 74(1): 65-8.
[18]. Omololu AB, Ogunbiyi JO, Ogunlade SO et al. Primary malignant bone tumours in a tropical African UniversityTeaching Hospital. West Afr J Med. 2002; 21(4):291-9
[19]. Odetayo OO. Pattern of bone tumours at the National Orthopaedic Hospital, Lagos. West Afri J Med. 2001; 20(2): 161-4. PubMed | Google Scholar
[20]. Ahmad M, Ghani A, Mansoor A, Khan AH. Pattern of malignant bone tumours in northern areas of Pakistan: armed forces institute of pathology, Rawalpindi. J Pak Med Assoc. 1994; 44(9): 203-5.PubMed | Google Scholar
[21]. Solomon L. The Johannesburg bone tumour registry-first ten years. South Afr J Surgery. 1975; 13(3): 129-135
[22]. Umar T. Tumours and Tumour like conditions of bone in Zaria: a ten year retrospective study, dissertation. National postgraduate medical college of Nigeria. 1995: 1-100.

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