



IMPRINT CYTOLOGY IN BONE TUMORS – A COMPREHENSIVE 3 YEAR ANALYSIS IN A TERTIARY CARE CENTRE

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ABSTRACT

Primary neoplasms of bone are rare, accounting to only 0.2% of overall tumor burden in humans. Imprint cytology is a simple and rapid technique for cytological diagnosis which can even be used intraoperatively. The rapid staining procedure permits a preliminary diagnosis within 30 minutes.

We analyzed all the imprint smears of bone tumors that we received in our department from January 2014 to December 2016. All cases that had associated biopsy were included in the study. Out of the total of 94 cases 50 were primary bone tumors and 44 were metastatic bone tumors. Among the primary bone tumors, giant cell tumour was common in females (16 cases out of 26 total) osteogenic sarcoma was common in males (8 out of 12). Among the total 94 cases 18 cases could not be diagnosed correctly by cytology. Of these, 11 cases showed blood only in cytology. Among the other 7 cases, we could suggest the lesion as benign or malignant. The correlation coefficient was found to be 0.659 and a p value of 0.0001 was obtained, which is statistically significant, showing a good correlation between cytological and histopathological diagnosis.

KEYWORDS : Imprint cytology, bone tumors, trucut biopsy

INTRODUCTION

Primary neoplasms of bone are rare, accounting to only 0.2% of overall tumor burden in humans(1). Correlation with clinical and radiological findings is crucial in the diagnosis of bone tumors. Imprint cytology is done by touching the representative area of a surgically removed tissue on to a clean glass slide. This then leaves an imprint in the form of cells, on the slide which is stained and studied. In our hospital imprint cytology is routinely done along with trucut biopsies in the diagnosis of bone lesions. Imprint cytology is a simple and rapid technique for cytological diagnosis which can even be used intraoperatively. The rapid staining procedure permits a preliminary diagnosis within 30 minutes. Thus it forms an important diagnostic tool in the armamentarium of clinicians.

AIMS

1. To assess the usefulness of imprint cytology in diagnosis of bone tumors.
2. To study the prevalence of various microscopic types of bone tumors.

MATERIALS AND METHODS

Imprint smears were prepared as per the method described by Tribe CR(2).

- (a) Slides were properly labeled with glass marking pencil.
- (b) After removing the piece of representative tissue, it is gently touched on a gauze piece to remove blood.
- (c) The labeled glass slide is then pressed slightly on to the specimen so that the cells on the surface of the tissue stick on to the glass surface. The pressure applied varies with the consistency of the specimen.
- (d) The slide is then rapidly immersed on to Coplins jar with 95 % isopropyl alcohol as fixative, avoiding air drying artifact.
- (e) The slide is then fixed for 20 minutes and stained by Papanicolaou method.
- (f) The accuracy of cytological diagnosis was verified by comparison with corresponding permanent paraffin embedded tissue sections which is considered as the gold standard.

The technique of imprint cytology plays an important role in deciding the cellularity of the smears obtained and thus the ability to offer an accurate diagnosis. A few techniques were suggested by Singh A et.al (3), for this.

1. To avoid fat overhanging the edges of the tissue for imprint cytology so that the lesional cells get imprinted on the slides.
2. To take multiple imprints of the same section, as the initial ones will have more blood and tissue fluids on the surface, the third one being the best.
3. The pressure to be applied for imprint varies with the nature of the lesion, with more pressure being needed for benign lesions and less for malignant ones, as the cells exfoliate easily in malignant lesions.

We analyzed all the imprint smears of bone tumors that we received in our department from January 2014 to December 2016. All cases that had associated biopsy were included in the study. Total of 94 cases were studied. Imprint smears with blood only were also included so that accuracy of the technique could be assessed. We excluded all cases in which the biopsy was not representative of the lesion.

RESULTS

Out of the total of 94 cases 50 were primary bone tumors and 44 were metastatic bone tumors.(Table -1)

Table - 1 showing the incidence of various bone lesions.

Type of bone lesion	Primary	Metastatic lesions
Number of cases	50	44

GENDER PREVALENCE

Among the primary bone tumors, giant cell tumour was common in females (16 cases out of 26 total) osteogenic sarcoma was common in males (8 out of 12 cases), chondrosarcoma had an equal incidence in both males and females(3 each). Ewings sarcoma was common in males.(3 out of a total of 5). Metastatic tumors were also common in males (30 in males out of a total of 44).

Of the total 94 cases, 55 (58.5%) were males and 39 (41.5) were females (Table 2; Figure 1).

Table – 2 Showing the gender prevalence

Gender	Frequency	Percent
Females	39	41.5
Males	55	58.5
Total	94	100.0

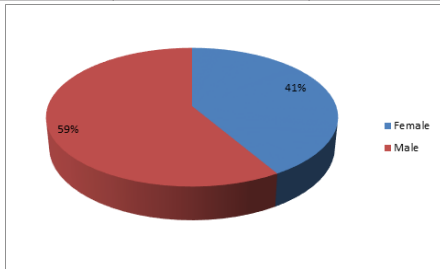


Figure – 1 showing gender distribution of bone tumors.

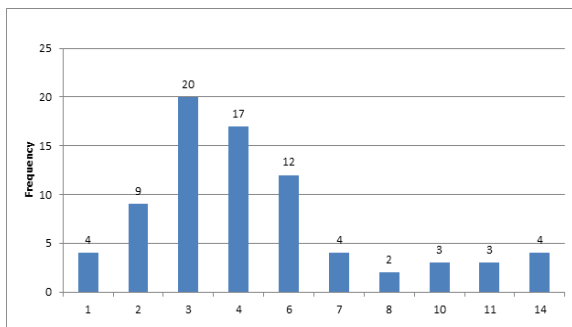


Figure -2 showing the frequency of bone involvement.

ANALYSIS OF PREVALENCE OF BONETUMORS.

Commonest primary bone tumor was giant cell tumor (26 cases; 27.7%).Femur was involved in a total of 10 cases by giant cell tumor.(Figure – 3)

Second common primary bone tumor was osteogenic sarcoma.(12 Cases;12.8%).

AGE PREVALENCE

Among the primary bone tumors giant cell tumour had the maximum incidence in the 4th decade of life, with the mean age being 30 years. Osteogenic sarcoma and Ewings sarcoma were common in 2nd decade with mean age being 14and 18 years respectively. Chondrosarcoma was common in 6th decade with the mean age of 54 years. Metastatic bone lesions were common in 7th decade with a mean age of 60 years.

Considering all the lesions, maximum lesions were in the 6th decade of life(26 cases, 27.7%) followed by second decade (17 cases, 18%).

BONE INVOLVEMENT

Commonest bone involved was femur(20 cases; 25.6%), followed by vertebra(17 cases;21.8%) (Figure– 2).

The commonest secondary bone tumor was metastatic adeno carcinoma (26 cases; 27.7%) and the commonest bone involved was vertebrae (8 cases;30%).

Other neoplasms according to incidence was chondrosarcoma (6cases;),poorly differentiated carcinoma metastasis(6 cases), Ewing’s sarcoma (5 cases)multiple myeloma and metastatic small cell carcinoma(2 cases each)one each of NonHodgkins lymphoma, metastatic squamous cell carcinoma and a poorly differentiated neoplasm.(Figure-3).

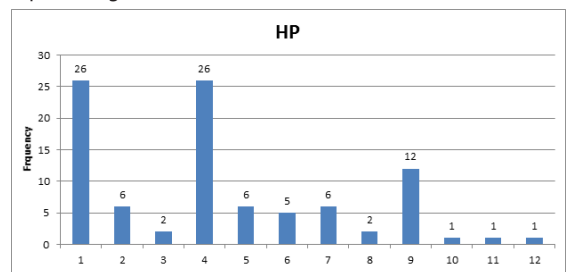


Figure -3 showing relative incidence of various bone tumors by histopathology.

ANALYSIS OF CORRELATION BETWEEN CYTOLOGICAL AND HISTOLOGICAL DIAGNOSIS.

Table -3 Spearman's rank correlation between cytological and histopathological diagnosis

Cytological diagnosis	Histopathological diagnosis												Total
	GCT	STsa	MM	Met adeno Ca	csa	Esa	Met PD ca	Met sm cell ca	OS	NHL	Met sq cell ca	PD malignancy	
Blood only	2	2	-	1	1	-	1	-	3	-	-	-	10
Giant cell tumor	24	-	-	-	-	-	-	-	-	-	-	-	24
Soft tissue sarcoma	-	3	-	-	-	-	-	-	1	-	-	-	4
Multiple myeloma	-	-	2	-	-	-	-	-	-	-	-	-	2
Mets adeno carcinoma	-	-	-	23	-	-	-	-	-	-	-	-	23
chondrosarcoma	-	-	-	-	3	-	-	-	-	-	-	-	3
Ewings sarcoma	-	-	-	-	-	4	-	-	-	-	-	-	4
Mets poorly differentiated carcinoma	-	-	-	-	-	-	4	-	-	-	-	-	4
Mets small cell carcinoma	-	-	-	-	-	-	-	2	-	-	-	-	2
Osteogenic sarcoma	-	-	-	-	-	-	-	-	8	-	-	-	8
NHL	-	-	-	-	-	-	-	-	-	1	-	-	1
Mets squamous cell carcinoma	-	-	-	-	-	-	-	-	-	-	1	-	1
Poorly differentiated neoplasm	-	1	-	2	2	1	1	-	-	-	-	1	8
Total	26	6	2	26	6	5	6	2	12	1	1	1	94

Among the 94 cases 18 cases could not be diagnosed correctly by cytology. 11 cases showed blood only in cytology (Table-3).Among

the other 7 cases we could suggest the lesion as benign or malignant.

Table - 4

The correlation coefficient was found to be 0.659 and a p value of 0.0001 was obtained (Table 2), which is statistically significant, showing a good correlation between cytological and histopathological diagnosis (Table -4).

	correlation coefficient (r)	p value
Cytological and HP diagnosis	0.659	0.0001

DISCUSSION

Bone tumors form a wide spectrum of lesions ranging from benign to malignant including tumour like lesions. Correct diagnosis of the lesion is important in choosing the treatment modality. Imprint cytology provides excellent cellular details of the lesions if done from the representative area, which in fact can be superior to biopsy due to the reason that cells suffer morphological alterations during the process of decalcification in biopsy samples(4).

Xiaohui Niu M.D et al (5) compared the epidemiologic features of primary bone tumors in Chinese and American population. Among the malignant tumors osteogenic sarcoma was the most common in both Chinese and American population similar to our study. Among the benign tumors, giant cell tumour was the most common in Chinese and that too in females which is comparable to our study. In Americans the most common benign tumor was cartilagenous tumours. The most common bone involved by primary bone tumors was femur similar to our study. Also the most common decade involved by GCT was third decade in Chinese and fourth in American population. Similar to our study, Kumar et al (6) also got a higher incidence of primary malignant tumors in the age group of 10 – 20 yrs. Comparing with study by Gulia A et al (7) bone tumors as a whole were common in males similar to our study. Most common primary bone tumor was malignant bone tumor (70%, primary bone sarcoma) and 30% was metastatic bone lesions. Primary bone sarcoma was common in second decade. Among the benign bone tumors, GCT was the most common. This is comparable to our study. The commonest bone involved was tibia for benign tumors and femur for malignant tumors in this study. According to this study, Western literature and Asian literature says osteochondroma as the most common benign tumor. But GCT became commonest in the study due to referral bias ie, being locally aggressive it would have been referred to a tertiary care centre for surgery.

In our study of the total 94 cases, 18 cases could not be diagnosed as such by imprint. 11 cases showed blood only and the rest 7 could be said only as either benign or malignant by cytology. Study by Bokun et al(8) on imprint cytology of bone tumors also showed results comparable with that of our study. Of the 19 primary malignant bone tumors 18 cases could be diagnosed as malignancy and the correct final diagnosis could be given in 10 cases. In the study, all 14 cases of metastatic carcinoma could be well diagnosed by cytology. Among 21 benign cases, 19 could be diagnosed correctly in the study.

CONCLUSION

Giant cell tumor was the commonest benign tumour involving the bone and osteogenic sarcoma was the commonest malignant bone tumor. Commonest bone involved by primary bone tumors was femur and vertebrae for metastatic bone lesions. Imprint cytology is an excellent rapid diagnostic tool in diagnosis of bone lesions provided there is adequate material for diagnosis.

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