

## **Diagnostic Utility of Various Techniques In Bone Tumors**

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### **Abstract**

**Background :** Bone tumours are relatively uncommon. The precise incidence of specific bone tumours is not known, because many bone lesions are asymptomatic and are not biopsied. The initial work up and staging evaluation of a patient with a suspected bone tumour, particularly biopsy is a critical component of successful management.

**Aim :** To assess the diagnostic accuracy of Fine needle aspirates and core needle biopsy of bone. The analysis compared with the accuracy according to anatomical location, size, type of lesion and histology.

**Materials and methods :** 110 patients with bone tumours were referred to pathology department GMKMCH, Salem for diagnosis during the period from 2016 Nov to 2017 Nov. All had been examined by X-ray, CT, and (or) MRI, FNAB, CNB and excision biopsy with suspected local recurrence of primary malignant bone tumour (or) a metastatic lesion of a previously diagnosed malignancy were also included in this study.

**Results :** Cytological diagnosis of 67/110 cases were compared with HPE after needle biopsy. Cytological diagnosis was correct for 76% of benign and 80% of malignant tumours. CNB was adequate in 96.7%. Sample for FNAC was obtained is 87.2%. The accuracy rate of open biopsy is almost 100%.

**Conclusion :** The diagnostic accuracy of FNAC can be improved by the use of ancillary studies such as IHC, DNA cytometry, Karyotyping and medicular genetics in order to reduce the need for open biopsy of bone tumors.

**Keyword :** Core needle biopsy (CNB), Fine needle aspiration cytology (FNAC)

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### **I. Introduction**

Tumours of the skeletal system are relatively constant in their presentation. The pathologist should be fully aware of the five basic parameters like age, bone involved site, radiographic and microscopic appearance. FNAC is a powerful tool in the multi disciplinary approach to diagnose & managing bone tumours. But it has certain limitations like poor aspirate in densely osteoblastic tumours and osteoid can't be identified confidently on cytological smear. The biopsy should be regarded as a final diagnostic procedure.

### **II. Materials And Methods**

110 patients of bone tumours were referred to pathology department for diagnosis during the period from 2016 Nov to 2017 Nov We performed FNAC as an outpatient procedure after studying the X-Ray, CT (or) MRI of the patient. Needle biopsy was performed by a radiologist / orthopedicians under CT / USG guidance. For resected Specimens of bone neoplasm with soft tissue we usually dissect away all the soft material and bony parts were decalcified using 5% Nitric acid in 10% formalin. Amputated specimens were handled in the same way as resected specimens. FNAC, CNB and resected specimens were stained by Hematoxylin and Eosin stain. Histo pathological features of bone lesions were studied, analysed and placed in appropriate category.

### **III. Results**

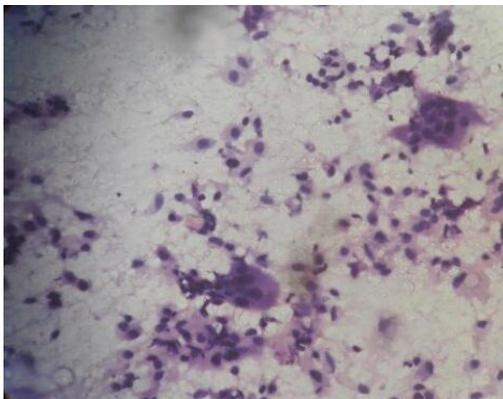
Out of 110 patients with bone tumours FNAC was done for 67 patients. Cytological diagnosis was compared with HPE after needle biopsy and open biopsy in 47 cases. A total of 25 lesions were cytologically assessed as benign. This was correct in 17 (76%) cases. One GCT was diagnosed as osteosarcoma. 30 cases were diagnosed as malignant and this was correlated in 24 cases (80%). Of the 30 malignant cases, the cellular yield was insufficient (0.5%), inconclusive in 2 cases. It required open biopsy to give the final diagnosis. These 2 cases were diagnosed as Periosteal osteosarcoma by open biopsy and one as osteosarcoma telangiectatic variant. The overall rate of correct cytological diagnosis was 76.2%. Falsely benign diagnosis was 4.8% one osteosarcoma was diagnosed as GCT Falsely malignant diagnosis was 4.8%. one Aneurysmal bony cyst with Focal GCT transformation was diagnosed as

synovial sarcoma. One Ewings sarcoma was diagnosed as fibroblastic osteosarcoma. Role of Core needle biopsy in diagnosis of bone tumours :A definitive diagnosis was made on the basis of the tumour histology, clinical and radiographic confirmation. Out of 110 cases we resected 30 CNB of which resected specimens for 17 cases were received. Diagnostic Accuracy of CNB of Bone Lesions :One osteosarcoma was diagnosed as Chondromyxoid fibroma one chondrosarcoma as benign chondroma. One GCT as Chondromyxoid fibroma and one Osteitis Fibrosa cystica as Aneurysmal bony cyst. CNB was adequate in 29/30 cases (96.7) and inadequate in only one case (3%)

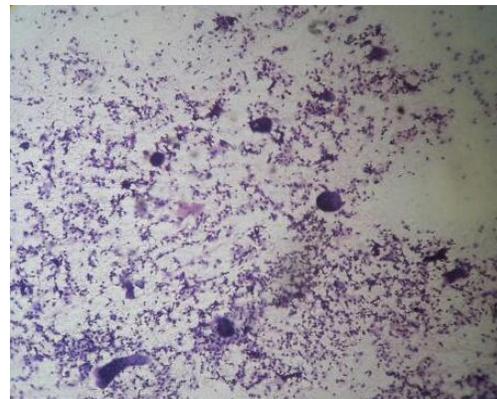
**Table 1** : Comparison of results with previously published data<sup>(15)</sup>.

Study	Years	No of Biopsies	Adequate Tissue %	Accuracy %
Washington Cancer Institute	1992-1997	185	90.1	72.7-92
Prior Data	1979-1997	472	83-100	64-100
Current Study	2004-2006	30	96.7	76.5

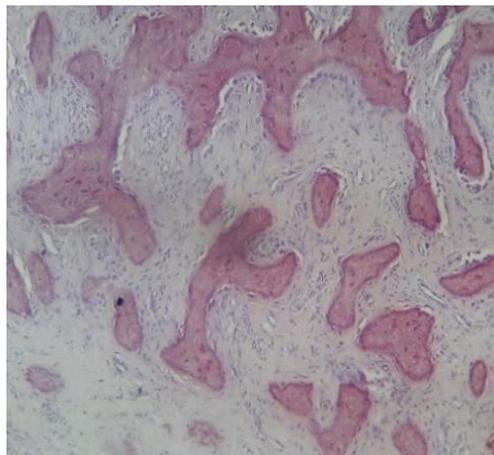
Barth et al in a direct comparison of FNAC and CNB reported the CNB to be more accurate<sup>(15)</sup>. The distinct advantage of a CNB is that it provides a chunk of tissue that allows the pathologist to examine the tumour architecture. This is not possible with FNAC. Resected specimens were available for 3 open biopsies, diagnosis was correlated in 3 cases which are GCT, pleomorphic spindle cell sarcoma and chondroma.



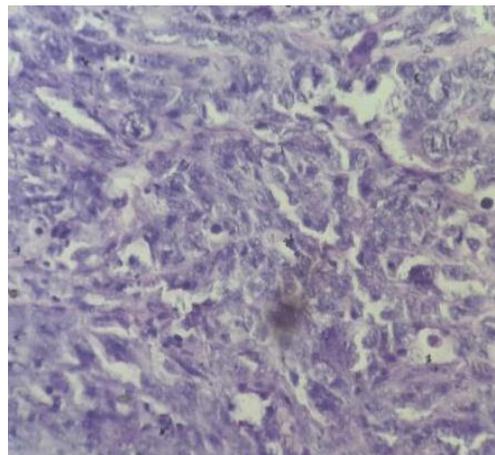
**Fig1** : Giant cell tumor



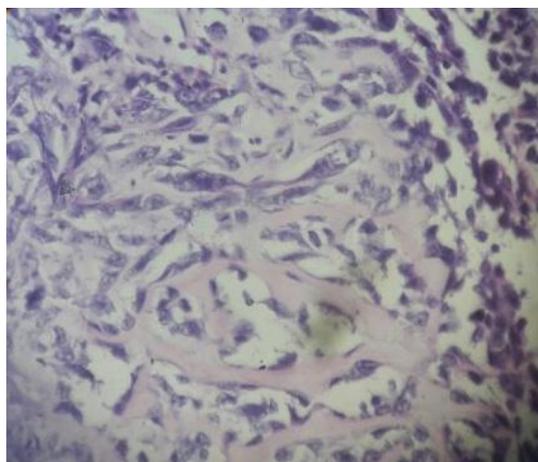
**Fig2** : Giant cell tumor



**Fig3** : Fibrous dysplasia



**Fig4** : Osteosarcoma



**Fig5** : Malignant osteiod

#### IV. Discussion

Our study suggest that FNAC is a valid option in the diagnosis of bone tumours but FNAC can't completely replace open biopsy. Dollahite et al in 1989 who reported a diagnostic accuracy of 83 % of GCT, but a significantly lower rate for bone lesions thought to be benign<sup>(8)</sup>. In our study diagnostic accuracy for GCT is 90%. The main reason for failure was inadequate sampling rather than diagnostic difficulties. Efforts should be made to improve the technique of obtaining adequate material. In a comparative study of 67 bone tumours Agarwal and Wahel (1983) showed diagnostic agreement between cytology and histopathology is 83%. The distinction between benign & malignant tumours lymphomas, myelomas and metastatic tumours is sufficient for correct management. The greatest diagnostic difficulties were found with chondro sarcoma and periosteal osteosarcoma seems to be more cystodiagnostic difficulties than Ewings sarcoma but less so than chondrosarcoma<sup>(8)</sup>. Of 5/9 cases of cytologically diagnosed osteosarcoma 5 cases are correct (55%), 3 are incorrect, inadequate in one case of telangiectatic variant of osteosarcoma. The distinction between chondroblastic osteosarcoma, high grade osteosarcoma and malignant fibrous histiocytoma proved to be difficult on smears. Biopsy accuracy for malignant, benign and metastatic bone tumors were 91% , 80% and 75% respectively

**Table 2** : Diagnostic accuracy of fnac comparative analysis

S.No	Authors Name	Diagnostic Accuracy
1.	Texas M.D Anderson Hospital <sup>(6)</sup> (1978-1986)	80.4%
2.	Arti Bhatia 1989 <sup>(9)</sup>	89%
3.	Andris Breicbergs <sup>(8)</sup>	95%
4.	Current Study	76.2%

The most common benign and malignant tumors are GCT and osteosarcoma. 32/47 cases are correctly diagnosed with adequate material. A satisfactory sample for FNAC was obtained in 42 cases (87.2%) and in 5 cases (12.4%) the material was unsatisfactory. The accuracy rate of open biopsy is almost 100%. The one case of chondroma and subsequent report of chondro sarcoma can be explained by differentiation of cartilaginous bone tumors which is very common.

#### V. Conclusion

The diagnostic accuracy of FNAC and CNB were evaluated and compared with the final diagnosis assessed by HPE, clinical and radiologic features. Our study suggest that FNAC is the most useful and effective technique in screening of various bone lesion, is a simple procedure, give sufficient cytological materials for correct diagnosis, Ancillary methods can be applied and minimal tumor dissemination. The main reasons for failure in this study is

inadequate sampling rather than diagnostic difficulties which can be corrected by repeating the aspirate. Though open biopsy has 100% accuracy FNAC is the best method of pre operative procedure to evaluate and to arrive at a definitive diagnosis because open biopsy involves dissemination In future efforts should be focused on an improved technique to obtain a higher rate of conclusive cytological material, which can be done by improved instrument design to facilitate multiple aspirates through cortical bone. Diagnostic accuracy can be improved by the use of IHC, DNA cytometry, proliferative rate assessments, karyotyping and molecular genetics. These methods combined with clinical experience should reduce the need for open biopsy of bone tumors

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