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To study the effectiveness of core needle biopsy in diagnosing bone lesions in patients attending tertiary care centre, Telangana State, South India

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Abstract
Introduction: Preoperative histopathological diagnosis is corner stone, which are most definitive methods of preoperative diagnosis. So the aim of the study is to determine the effectiveness of core needle biopsy in establishing the diagnosis.
Methodology: Hospital based Prospective study which was conducted in department of pathology, RVM Institute of medical Sciences and Research Centre, Siddipet district, Telangana state. A total of 33 cases were studied from March 2019 to December 2019.
Results: In the present study the female participants are more than the males with an observed gender ratio (M: F) 0.8:1.2.The diagnostic results from the samples of core needle biopsy are classified into 4 types and 2 samples (6%) were not adequate to diagnose. The major type of tumors are Primary Malignant type of tumors that is 49%, followed by metastatic type 24%,benign type are 18% and Chronic osteomyelitis was 1 case (3%).
Conclusion: The diagnostic accuracy, sensitivity, specificity, and positive and negative predictive values was 100% which was presented in table 6, were determined on the basis of 31cases, our core needle biopsy diagnosis was matching with definitive diagnosis after surgery.

Keywords: Core needle biopsy, bone tumors, histopathology

Introduction

Bone tumours are one of the commonest complaints encountered in surgery department. It is very important to differentiate between benign and malignant conditions before treating it. Diagnosis and treatment involves team of specialists involving pathologists, radiologists, surgeons in managing the bone tumours [1-4]. Preoperative histopathological diagnosis is corner stone, which are most definitive methods of preoperative diagnosis [4-6]. Diagnostic biopsies of bone lesions are generally done in two forms i.e. percutaneous core needle biopsy or open surgical biopsy [7-9]. Core needle biopsy is standard method of tissue diagnosis in bone tumours [2]. It is minimally invasive, inexpensive and relatively easy and can be performed on an outpatient basis. It also avoids unnecessary excision biopsy. Hence most widely used compared to open biopsy [1, 2, 5, 6]. The aim and objectives of this study is to access accuracy of core needle biopsy in diagnosing bone lesions and to establish definitive pathological diagnosis by using core needle bone biopsy.

Methodology

Hospital based Prospective study which was conducted in department of pathology, RVM Institute of medical Sciences and Research Centre, Siddipet district, Telangana state. A total of 33 cases were studied from March 2019 to December 2019.
Inclusion Criteria: Patients with clinical and/or radiological suspicion of bone lesions who were referred to department of pathology.
Exclusion criteria: Other Vascular tumours like Haemangiomas, Angiosarcoma, and Lymphangiomas Core needle biopsy specimens of bone lesions of different anatomical sites from 33 patients were collected, in which the radiological findings could not differentiate between benign and malignant tumours. The patients were informed about the procedure and consent was taken prior to the sample collection and Ethical clearance was obtained before the start of the study from RVM Institute Ethics Committee. Accuracy of core needle biopsy of bone lesions were analysed based on histo-morphological findings and comparing with

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post-operative excision biopsy. The needle biopsy results were correlated with the clinical outcome for patients who underwent clinical treatment and with histopathologic diagnosis of surgical specimens for patients who underwent definitive resection. Diagnostic accuracy, sensitivity, specificity, and predictive values were determined differentiation between malignant and benign tumors.
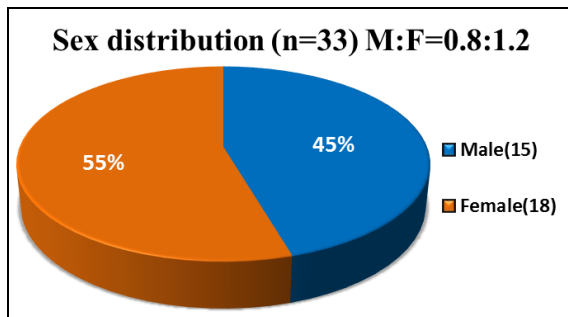
Results

Fig 1: Showing Gender Ratio among the study participants

In the present study the female participants are more than the males with an observed gender ratio (M: F) 0.8:1.2.

Table 1: Showing Site of tumors in axial skeleton among the cases in the study

Site of tumor in axial skeleton	Number of cases
Iliac bone	3
Sternum	3
Sacrum	2
Skull	1
Ribs	1
Clavicle	1

Table 2: Showing Site of tumors in appendicular skeleton among the cases in the study

Site of tumor in appendicular skeleton	Number of cases
Distal femur	6
Proximal tibia	4
Proximal femur	2
Shaft of femur	2
Distal tibia	2
Proximal humerus	2
Distal humerus	2
Distal radius	2

The sites of lesions in this study are found to be in the axial and appendicular skeleton, where in the axial skeleton we found 11 tumors and in appendicular skeleton 22 tumors from the 33 study participants.(Table 1 and 2)
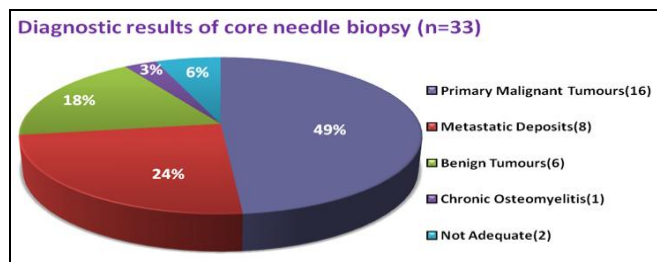

Fig 2: Showing the results from core needle biopsy in the study participants

The diagnostic results from the samples of core needle biopsy are classified into 4 types and 2 samples (6%) were not adequate to diagnose. The major type of tumors are Primary Malignant type of tumors that is 49%,followed by metastatic type 24%,benign type are 18% and Chronic osteomyelitis was 1 case (3%).

Table 3: Diagnostic results of primary malignant bone tumors (n=33)

Diagnostic results of primary malignant bone tumors(n=33)	Number of patients
Osteosarcoma	6
Chondrosarcoma	3
Ewings sarcoma	2
Chordoma	1
Plasma cell neoplasm	1
Non-Hodgkin's lymphoma	1
Germ cell tumor	1
Synovial sarcoma	1
Osteochondroma	1
Giant cell tumour	5
Metastatic deposits	8
Chronic osteomyelitis	1
Not adequate	2

Metastatic deposits are seen in 8 cases followed by Osteosarcoma cases (6), Giant cell tumor (5), Chondrosarcoma (3) and Ewing's sarcoma (2) being commonest tumors in this study.

Table 4: Showing distribution of primary malignant bone tumors

Diagnostic results of primary malignant bone tumors(n=16)	Number of cases	Percentage
Osteo Sarcoma	6	38
Chondro Sarcoma	3	19
Ewings Sarcoma	2	13
Chrodoma	1	6
Synovial Sarcoma	1	6
Gem Cell tumour	1	6
Plasma cell neoplasm	1	6
NHL High-grade	1	6
Total	16	100

The Primary malignant tumors in this study are distributed as 38% of osteosarcoma, 19% as chondrosarcoma, 13% as Ewing's sarcoma as the major type of tumors in this study.

Table 5: Showing diagnostic accuracy, sensitivity, specificity, and positive and Negative predictive values in the present study

Parameter	n	Percentage (%)
Accuracy	31/31	100
Sensitivity	10/10	100
Specificity	6/6	100
Positive predictive value	9/9	100
Negative predictive value	7/7	100

The core needle biopsy yielded 100% accurate and specific results in relation to the bone biopsies in the present study.

Discussion
Definitive pre-operative diagnosis of pathologic bone lesions is of great value and importance when considering the treatment and prognosis of the disease. The most important is histological diagnosis before the management

of bone tumors [1]. Adequacy rate of (93.9%) in our study is observed to be near similar with the study conducted by Amit Joshi *et al.* [1] where adequacy rate was 92%, and Logon *et al.* [8] with adequacy rate of 97.8%.In our study out of 33, in 16 cases (48%) core needle biopsy was done without image guidance as the lesions are found on palpation where the results can be compared with Similar study conducted by Amit Joshi *et al.* who reported that the palpation technique seems to be equally effective as image guided biopsies, and is more feasible [1].

Table 6: Showing the comparison of core needle biopsy results accuracy with other similar studies

Similar studies & Present study	Accuracy rate (%)
Amit joshi *et al.* [1]	95
F. Polhig *et al.* [12]	100
N.A. Jambhekar *et al.* [2]	95
Torraini Martin *et al.* [13]	97
Present study	100

Accuracy rate in present study was 100%. It is similar to the studies conducted by F. Polhig *et al.* [12] (2012) where accuracy rate was 100%, study of Amit Joshi *et al.* [1] (2013) where accuracy rate was 94.5%, N A Jambhekar *et al.* [2] with accuracy rate of 95%, Torraini Martin *et al.* [13] (2002) was 97%.

Table 7: Showing results of core needle biopsy in comparison with previous studies

Study by	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Torraini Martin *et al.* [13]	96	100	100	95
F. Polhig *et al.* [12]	100	100	100	100
Present study	100	100	100	100

The diagnostic accuracy, sensitivity, specificity, and positive and negative predictive values was 100% which was presented in table 7, were determined on the basis of 31cases, our core needle biopsy diagnosis was matching with definitive diagnosis after surgery.

Conclusion
Histological diagnosis before starting definitive management of bone tumors has definitive importance. Hence we conclude, treatment plan is to be decided by multidisciplinary approach involving pathologist, radiologist and orthopedic surgeons.

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