



ORIGINAL RESEARCH PAPER

Pathology

ROLE OF FNAC (FINE NEEDLE ASPIRATION CYTOLOGY) AS DIAGNOSTIC TOOL IN BONE TUMOR IN RURAL POPULATION.

KEY WORDS: Bone tumors, FNAC, Radiology, Smear cytology, Sensitivity , Specificity.

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ABSTRACT	Background: –Primary bone tumor are rare neoplasms that often present with nonspecific clinical symptoms.
	Aims And Objective :- To study fine needle aspiration cytology in diagnosis of various tumor of bone at tertiary health care centre in rural population.
	Material & Method :- A retrospective and prospective study was carried out in the department of pathology (VIMS Pawapuri ,NALANDA) of a tertiary health care centre during the two year period is March 2019 to Feb 2021 in the patients suspected of bony neoplasm .FNAC was done after taking the written consent .Sterile 21-22 gauge needle with 10-20 cc syringes were use. Aspirate were air dried, stained by the MGG method and examined under microscopically.
	Result :- A total 50 FNAC were analyzed in the study. Majority of the patients were in the age groups (years) of 30-40 . The majority of the patients were male 36 (72%) and female 14 (28%).
	Conclusion :- On FNAC the chondroblastoma was found the most common tumor and the sensitivity of FNAC was high for bone tumors so this comparatively easy and safer method should be the first line investigations in the bone tumors.

INTRODUCTION

The neoplasm of bone accounts for only 0.2% to 0.5% of the overall human tumor[1].

Primary bone tumors are rare neoplasm that often present with non specific clinical & symptoms[3,4,6]. For bone tumors, clinical evaluation, radiologic studies and demographic characteristics are the most important pieces of information physicians use in generating a pertinent differential diagnosis [2,5]. A correct diagnosis is essential to guide an appropriate and definitive treatment. Fine needle aspiration cytology (FNAC) is a highly effective procedure in diagnosis the bony lesion. Cytologic assessment with clinical and radiographic findings, together with the experience of cytopathologist can yeild almost the same diagnostic accuracy as histopathology of subsequent open biopsies in majority of lesion [7].

Also FNAC material can be sent for other studies ie immunohistochemistry, electron microscopy, cytogenetic microbiological analysis etc as and when required. Easy retrieval of diagnostic material for successful cytomorp hologic and microbiologic assessment makes FNAC the procedure of choice in diagnosis of bony lesion [8]. Aspiration cytology has proven in recent years to be a very convenient and reliable method for the rapid diagnosis of bone lesion[9].

In developing countries like India, where high resolution bone scanning and CT-guided biopsy facilities are a minimal and large proportion of patients belong to rural area, aspiration cytology provides a simple, quick and easy method of diagnosis[10]. However, for the definitive diagnosis, tissue study i.e. histopathological evaluation of biopsy specimen is important [11].

AIMS AND OBJECTIVE :-

To study fine needle aspiration cytology in diagnosis of various tumor of bone at tertiary health care centre in rural population.

MATERIALS AND METHODS :-

A retrospective and prospective study was carried out in the department of pathology (VIMS Pawapuri, Nalanda) of a tertiary health care centre during the two year period i.e. march 2019 to Feb. 2021 in the patients suspected of bony

neoplasm. All the patients were clinically examined for symptoms, durations, onset, past illness, personal and occupational history and course of treatment. 18-22 gauge sized needle were selected based on the radiographic appearance of the bones involved by bone lesion. Tumor was localized by careful palpation and the puncture site was selected . The skin over the site was cleaned with surgical spirit. FNAC done under standard protocol Smears obtained by FNAC was air:dried and were stained by May-Grunwald Giemsa staining. Re-aspiration was done whenever aspirate obtained was inadequate.

RESULT

Total 50 cases were included in the study among them 36 (72%) were males and 14(28%) were females. A maximum number of cases were in the age groups of 30 to 40 years (14 cases , 28 %) followed by 50 to 60 years (12 cases, 24 %)

The inadequate smears were found in 2 cases which constitute 4 % of total cases leading to inconclusive diagnosis on cytology.

The most frequent clinical presentation was mixed that included both pain and swelling that is in 30 (60%) patients.

Table 1 : Distribution of the patients as per the age.

Age (Yrs)	No.	Percentage (%)
<10	1	2
10-20	5	10
20-30	9	18
30-40	14	28
40-50	6	12
50-60	12	24
60-70	2	4
>70	1	2

The majority of the patients were in the age group (yrs) of 30-40-14,(28%), 50-60 -12(24%), 20-30- 9(18%), 40-50 – 6 (12%), 10-20 – 5 (10%), 60-70 – 2 (4%) and <10 and >70-1 (2%).

Table 2 : Distribution of the patients as per the sex

Sex	No	Percentage(%)
Male	36	72
Female	14	28
Total	50	100

The patterns were variable and ranged from scattered discohesive cells to clusters sheets, papillae, cords, glands and even mixed patterns.

Table 3 : Patterns of smears

	Frequency	Percentage(%)
Discohesive / Scattered	16	32.0
Clusters / Sheets	14	28.0
Mixed	15	30.0
Other	5	10.0
Total	50	100.0

The cells were typed as mesenchymal, epithelial, inflammatory, fibrohistiocytic, neuroectodermal and others.

On the basis of cytomorphology, the various bone lesions were divided into 7 groups.

- I. Inflammatory (mainly osteomyelitis)
- II. Fibrohistiocytic and synovial
- III. Primary benign tumor of bone.
- IV. Primary malignant tumor of bone
- V. Plasma cell dyscrasia
- VI. Metastatic and
- VII. Miscellaneous

Table : 4 Distribution of the patients, as per the various bone tumor on FNAC .

	Number	Percentage(%)
Inflammatory Lesion	13	26
Fibrohistiocytic & Synovial Lesion	7	14
Primary Benign tumor of Bone	9	18
Primary Malignant tumor of Bone	11	22
Plasma cell Dyscrasia	2	4
Metastasis	6	12
Miscellaneous	2	4

Group I included 13 (26%) cases, group II-7 (14%) cases group III-9(18%) cases, group IV-11(22%) cases, group V-2 (4%) cases, group VI- 6 (12%) cases and group VII 2 (4%) cases.

Table 5 : Distribution of the patients as per the various bone tumors on FNAC.

Osteoid osteoma	4
Chondroblastoma	8
Aneurysmal cyst	4
Osteochondroma	4
Enchondroma	2
Giant cell tumor	6
Osteosarcoma	2
Fibrous Dysplasia	1
Neuron Fibromo	2
Simple Bone cyst	3
Ewings's sarcoma	3
Myeloma	4
Leukemia	1
Metastasis	6

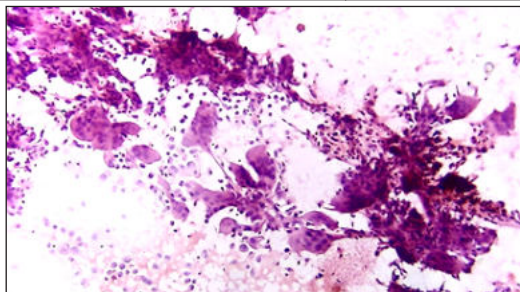


Fig. 1: FNAC; Giant Cell tumor, cytological smear showing mixture of mononuclear cells with multinucleated giant cells, (MGG stain, 40X)

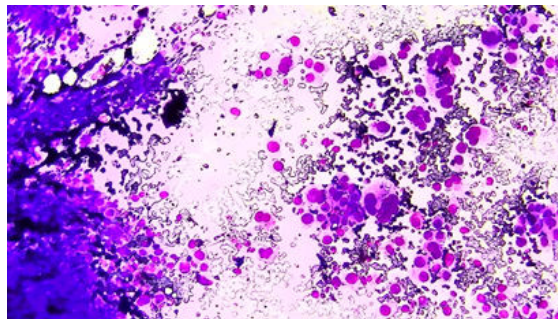


Fig. 2: FNAC; Osteosarcoa; cytological smear showing Osteoid surrounded by pleomorphic tumor cells, (MGG stain, 40X)

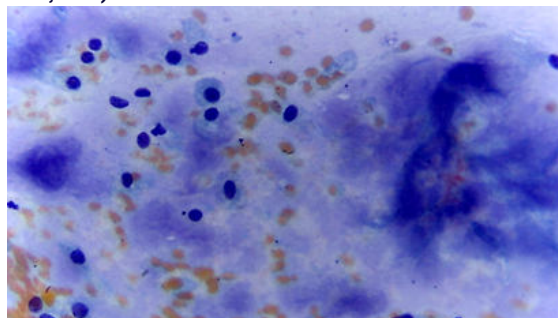


Fig. 3: FNAC; Chondroma; cytological smear showing chondromyxoid stroma and dispersed chondrocytes, (MGG stain, 40X)

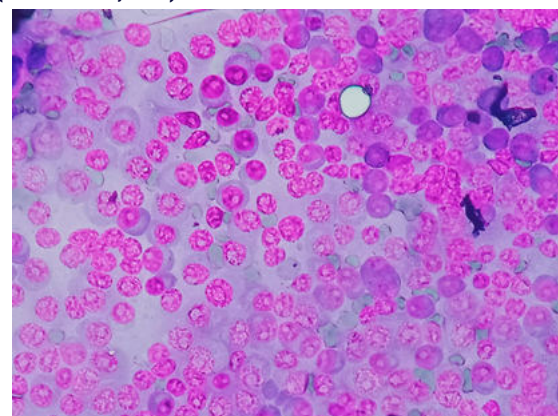


Fig. 4: FNAC; Plasmacytoma; cytological smear showing plasma cells showing eccentrically placed nucleus with cartwheel chromatin pattern and basophilic cytoplasm, (MGG stain, 40X)

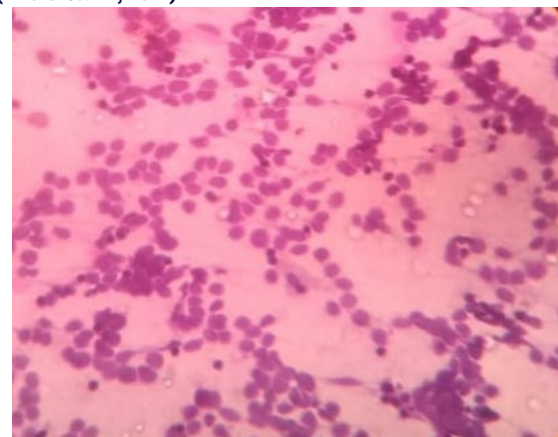


Fig. 5: FNAC; Ewings Sarcoma; cytological smear showing plenty of small round cells with scanty cytoplasm , (MGG stain, 40X)

DISCUSSION

Primary bone tumors, both benign and malignant, are rare. Primary malignant bone tumors are uncommon, constituting only 0.2 % of all neoplasms, however in children, malignant bone tumors account for approximately 5 % of all malignancies[1]. Their incidence is only 0.8 in 1,00,000 people per year [12].

The present study was conducted over a period of 2 years in 50 patients of bone tumors. The mean age of patients was 36.27 years with ranged from 10-70 years which is similar to the study done by *Nnodu et al*[13] and *Jain et al*[14] in which they observed the age ranges of cases from 4 to 76 years and 5 to 75 years respectively. The maximum number of our cases were found in the age group of 30-40 years (14 cases ; 28%) followed by 50-60 years (12 cases ; 24 %) and minimum cases were found in the age groups > 70 years which is comparable to the study of *rajani et al*[15]. Male to female ratio found out to be 2.57 : 1 with 36 males and 14 females which is nearly similar to study by *goyal et al* [16] and *Jorda et al* [17].

Clinical- radio- pathological correlation is essential to the proper evaluation of chondrogenic/ osteogenic lesions. Tumor of bone lesion having the appearance of a neoplasm and clinically behave like non neoplastic lesions. Their significance lies in the fact that they are very common, and their radiological appearance mimics true bone tumors including malignant lesions. Martin and Ellis first applied fine needle aspiration (FNA) technique to the diagnosis of bone lesions in 1930[18]. Fine needle aspiration cytology (FNAC) is a minimally invasive and high effective primary diagnosis method practiced worldwide for accurate diagnosis of various pathological lesions. A review of various studies [15,16,17,19] has shown that osteosarcoma, chondro sarcoma, Ewing's sarcoma, myeloma, and malignant lymphoma are among the most common primary malignant bone tumors. However the relative morbidity of each malignancy varies considerably.

Sensitivity was 95.34% and specificity was 96.23%. These findings are similar with *pratima kujur et al*[20].

CONCLUSION :-

FNAC being rapid, easy cheap and minimum invasive outpatient department procedure, plays a vital role in diagnosing bone tumors. It also helps the surgeons to plan the extent and type of surgery based on cytological diagnosis. Sensitivity and specificity of FNAC is high for bone tumors, so this comparatively easy and safer method should be the first line of investigations in the bone tumors.

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