

DIAGNOSTIC UTILITY/ROLE OF FINE NEEDLE ASPIRATION IN (DIAGNOSIS) GIANT CELL (LYTIC) LESIONS OF BONE AND ITS CORRELATION WITH HISTOPATHOLOGY

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Abstract

Introduction and Aim : Aim of this study was to assess the accuracy of Fine Needle aspiration cytology(FNAC) in the diagnosis of giant cell lesions (Lytic Lesions) of bone .Accurate diagnosis of these lesions is of utmost importance as the treatment modalities are different for various bone lesions .FNAC is accurate, safe, cost-effective .The Literature on this topic are limited in India. So we wanted to study and assess the technique. We also focused on limitations and advantages of FNAC in these lesions. Lastly we compared our results of FNAC with the gold standard Histopathological samples.

Material and Methods: We took Clinical and Radiological findings into consideration first then we proceeded for FNAC. FNAC was done using 22 -23 Gauge needles along with 10 ml disposable syringe and 20 Gauge needle for deep lesions. Cytology smears were stained by PAP and H&E.

Result: We studied 105 cases, during period of February, 2015 to September, 2021. Out of 105 cases of lytic (giant cell) lesions of bone we studied, 35 cases were of Inflammatory, 25 cases of Benign tumors, 20 cases of primary malignant bone tumors. Most of the patients belonged to the 11-20 years age group with the age incidence varying with the type of lesion. Out of these 105 Cases 56 were males and 49 were females. The lytic lesions were more common amongst males within the age group of 11-20 years. Diagnostic accuracy in this study was 51 to 100%. Positive and negative predictive value was 99% and 91% respectively.

Conclusion: Taking the clinical and radiological findings into consideration, benign tumors are more common amongst all lytic lesions with Giant cell tumor taking first place. Tuberculosis Osteomyelitis is commoner than pyogenic osteomyelitis. Secondaries in the bone are more commonly found than primary malignant tumors.

Keywords- fnac; fine needle aspiration; cytology; giant cell lesion; bone histopathology

Introduction

Accurate diagnosis of bone lesions is the outcome of correct correlation of Clinical, Radiological and Pathological findings. As the treatment is different so it's important to arrive at a correct diagnosis. We considered histopathology as the gold standard to arrive at our conclusions. Lytic lesions of the bone are the most common radiological finding in various bone diseases including inflammatory and neoplastic lesions. A osteolytic lesion is found when the destructive process takes upper hand than laying down of new bone. A lytic lesion is supposed to be seen when the destruction of bone is about 30-50 % of usual bone density and more than 1 cm in size. It is interesting however that some benign conditions such as Osteomyelitis can mimic malignant tumors and some malignant lesions like metastases and myeloma can mimic benign. It's often a dilemma to differentiate these conditions radiologically. Osteomyelitis both pyogenic and Tuberculous, Neoplastic lesions, both the benign and malignant (Primary and secondary) all produce lytic lesions. Patients present with either increasing pain, swelling, may have tenderness and in few cases even a fracture at the site. Differential diagnosis of benign lytic lesions include simple bone cyst, Aneurysmal bone cyst,

Osteochondroma (Exostosis), Enchondroma, Giant cell tumor, Fibrous dysplasia, Osteoblastoma, Chondroblastoma, Non ossifying Fibroma and Brown tumor of bone. Malignant bone tumors list includes Ewings Sarcoma, Osteosarcoma, Multiple myeloma, Adamantinoma as Primary malignant tumor lesions. Primary bone tumors are less in number than metastases. Bone being the commonest site found for metastases from Lung, Kidney, Thyroid, Breast, gastrointestinal and melanomas. Carcinomas are found to metastasize more commonly than sarcomas. Axial skeleton is affected more than the appendicular skeleton. Biopsy is often difficult to perform than FNAC .From the earlier periods of skepticism we have now entered the phase of enthusiastically doing FNACS of bone. FNAC is simple, less painful, and safe does not require anesthesia, can be done in OPD (day care), quick. A multidisciplinary approach helps to arrive at an accurate diagnosis earlier. Due to the limited studies in the literature available and to assess the diagnostic utility of FNAC in lytic lesions (Cystic) of bone, we carried out this study in our Institute.

Materials and Methods

This prospective study was carried out with 105 patients at ABCDEF during the period of 2 years. Along with our pathology, orthopedic and Radiology worked together. The criteria for selection of cases were patient having a radiologically apparent lytic bone lesion. Total 105 cases were selected and in all patients lytic lesion of bone was diagnosed radiologically. In orthopedic OPD patients clinically presented with pain, swelling, non-healing fracture. Patient's detail clinical examination included recording the age, sex, address, occupation, H/O fever, evidence of weight loss, cough, hemoptysis, All patients were thoroughly examined. Both systemic and physical examination was done. All patients after examination were sent for X Ray of the bone lesion area, better tests like CT scan and MRI were done if needed. Pathological basic workup done included Haemogram, urine, sputum, body fluids, calcium, phosphorous and

alkaline phosphatase tests were done.

Once the lesion was localised radiologically, then FNAC was done after taking consent and properly explaining all details of the procedure to the patient. Under all aseptic precautions aspiration of the lesion was done. We used 22-23 Gauge needles for superficial lesions along with 10 ml disposable syringe. For deep lesions 20 gauge needles were used. The Sites chosen for FNAC were preferably 1) Soft tissue extension of the lesion 2) Breached or thinned ut cortex, 3) Lytic component 4) Least dense area of the tumour 5) No rule of thumb was applied for cystic lesions. Needles entering into the thinned out cortex gave a peculiar sensation We even used osseous blood for making smears .Whenever tissue fragments were aspirated, smears were prepared by placing a second slide over the first one and pulled apart with gentle pressure. Sites of aspiration were posterior iliac crest, anterior iliac crest, sternum, lower limb inferior to knee joint.

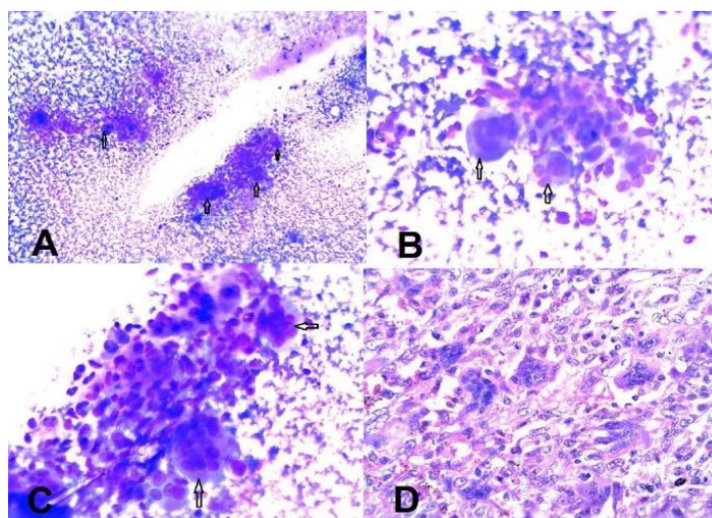


Figure 1: Giant cell tumor-(A, B, C) Cytology: smears show typical presence of giant cells (arrow) at the periphery of stromal cells. (A, Giemsa x100, B & C, Giemsa x400). Histopathology (D): Section shows mononuclear stromal cells and osteoclastic giant cells (H&E ×400)

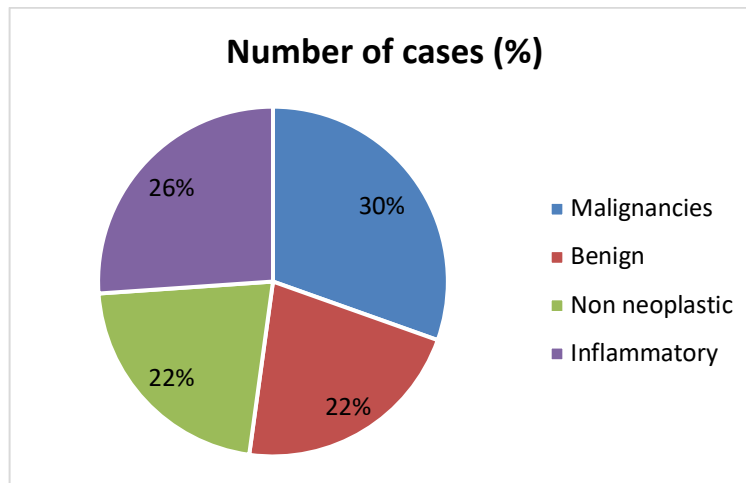
Air dried smears after transporting to lab were stained by May Grunwald Giemsa (MGG)/ Papanicolaou (PAP stain). Haematoxylin and Eosin (H &E) stain was done after fixation in 95 % alcohol. Samples that went to histopathology had to be decalcified before paraffin sections were prepared. Tissue blocks were prepared after processing the tissue by fixation in 10 % formalin, dehydrating, clearing, impregnating and then embedding in paraffin. Sections were cut 3 to 4micron thick on rotary microtome's and lastly stained by H &E stain. After the procedure patients were followed up for any complaints, complications and advised accordingly.

Result:

In the present study of FNAC of lytic lesions of bone, out of 105 cases, 35 cases were malignant (33.33%), 25 cases were benign (23.80%) and 25 cases were non neoplastic (23.80%), 35 were inflammatory (33.33%) with ___ cases we had unsatisfactory material. Out of the 20 malignant cases 23 were primary (21.90% of the total cases) and 12 were metastatic bone malignancies (11.42%). Amongst 25 benign bone tumors, 12 were Giant cell tumors and 7 of rest of the 6 were metastatic bone tumor. The most common Lytic lesion of bone was fibrous dysplasia (42%). Table 1 and 2 below are showing the broad result of FNAC in our study and the proportion of different lytic lesions, respectively.

Table 1: Broad result of FNAC in our study

Results of FNAC	Number of cases (%)
Malignancies	20 (33.33%)
Benign	25 (23.80%)
Non neoplastic	25 (23.80%)
Inflammatory	35 (28.57%)
Total	105

**Figure 2: Number of cases****Table 2: The proportion of different lytic lesions**

Lytic Lesion found	Percent
fibrous dysplasia	23.80
Bone Cyst	11.42
Chondroblastoma	3.80
Inflammations (infection, trauma, etc)	28.57

Out of 105 cases, 55 (52.38%) were males, 50 cases (47.61%) were females. In male patients 16 cases were of benign neoplastic lesion, 9 cases were inflammatory lesion and 12 were of malignant lesion. Whereas in Females, 9 cases were benign lesion, 22 cases were inflammatory lesion and 8 cases were malignant lesion. So, Benign neoplastic lesions were the most common among both the sexes. [Table3].

Table 3: Result of FNAC, total number of cases, number of cases in each group like male, female and according to the age groups

Results of FNAC	Number of cases (%)	Male	Female	Age Group			
				< 10	11-20	21-40	>40
Malignancies	20 (33.33%)	12	8	3	14	9	6
Benign	25 (14.28%)	16	9	0	15	10	2
Non neoplastic	25 (23.80%)	15	10	0	9	8	2
Inflammatory	35 (28.57%)	13	22	4	14	8	1
Total	105	56	49	7	52 (49.52%)	35	11

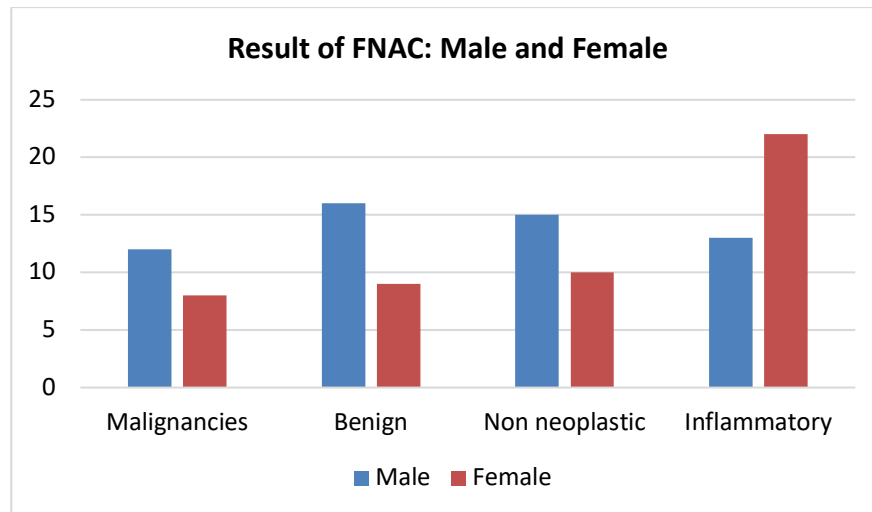


Figure 3: Distribution of FNAC result among Males and Females

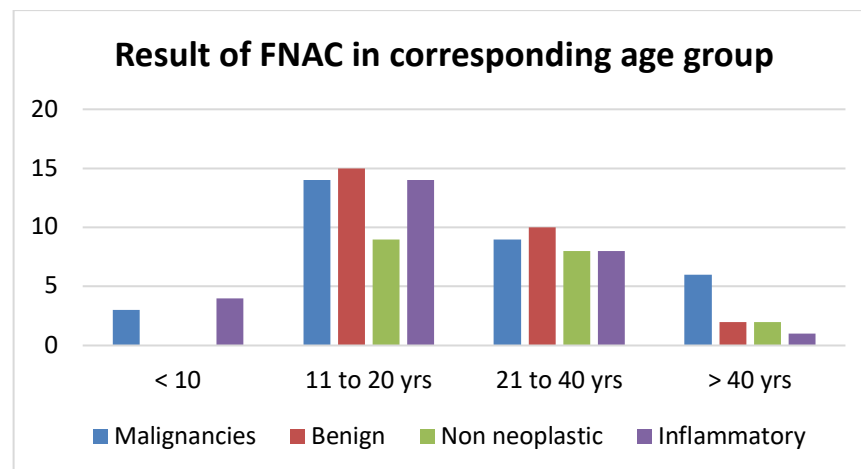


Figure 4: Distribution of FNAC result among various age groups

From different age group, the most common age group was 11-20 years, in which total 52 cases of lytic lesion (49.52%) were found, in which benign neoplastic lesions 15 cases were most common. In age group of 21-40 years, in which total 35 cases of lytic lesion were found, in which benign lesion 10 cases was most common. In age group of 40 years, total 11 cases of lytic lesion were found, in which 6 malignant lesions were found. In below 10 year group only 3 cases were found which was of Malignant type [Table 3]. Out of total 4 cases inflammatory lytic lesions, 1 case was of pyogenic, 1 case was of Osteomyelitis and 2 were of Tuberculous osteomyelitis. So Tubercular Osteomyelitis was slightly more common than pyogenic malignant lesion Osteomyelitis in Inflammatory lytic lesions. Out of 15 cases of benign neoplastic lytic lesions, 9 cases were of giant cell tumor, 6 cases of fibrous dysplasia. Giant cell tumors show a higher incidence than other benign lytic lesion. Out of 20 malignant lesions, 8 were Primary and 12 cases were secondary malignant lesions. So secondary malignant lesions were more common than Primary in malignant lytic lesions.

Discussion

Ever since Martin and Ellis first applied this technique to diagnose bone lesions in 1930, several series of works in this field show diagnostic accuracy ranging from 51 to 100%. The initial period of skepticism later turned into enthusiastically applying this diagnostic tool. These days medical imaging has become an integral part of assessment of lytic bone lesions and also helps in localizing the site of FNAC of lytic lesions of bone. Lately several new techniques such as salvage limb procedures and neoadjuvant chemotherapy for treatment of primary malignant bone neoplasms are being introduced in orthopedics. This has increased the role of FNAC not only for detecting metastatic malignancies but also in detecting primary malignant lesions of bone. We aimed at studying the diagnostic accuracy of FNAC in diagnosing the lytic lesions (Giant cell tumors) of bone and also focused on and evaluated the limitations of the procedure and concentrated on getting adequate aspirates.

Rarity of tumors, different treatment modalities, and many cases still requiring histopathological evidence prompted us

to seek FNAC of lytic lesions of bone lesions and finding out the diagnostic utility/role of FNAC in the diagnosis of lytic lesions of bone. Histopathology will always remain the gold standard in Pathology. Initial use of FNAC only for diagnosing malignant lesions is now getting widely acceptable and being applied as a diagnostic tool in detecting the lytic lesions of bone. We get references of cytopathological findings in earlier studies. Three to four drops of the aspirate are enough to diagnose a lesion. We even found osseous blood smears quite useful for diagnosis. The combination of PAP, H and E and Leishman stain increased our accuracy further. Osteoid was better judged by H & E stain. In this prospective study of FNAC of lytic lesions of bone we found 93% diagnostic accuracy for malignant and 94% for benign lesions. Rate above 95% was reported earlier by Bommer *et al.*, Mehrotra *et al.*, Jorda *et al.* Our result was comparable to earlier studies in literature. No complications nor was any trauma observed. No premedication was required to be given to patients nor was any anesthesia used. We are reporting 2% as false negatives. There were no false positive reports. Our using 22 and even smaller gauge a needle was associated with low risk of tumor seeding as compared with open biopsy. FNAC of lytic lesions carries low morbidity rate and is safer than open biopsy. Moreover it is simple, safe, quick, cost effective and can be performed in OPD setting. Complications are few and one can always go for a repeat aspirate, if the initial one is inadequate. This has been the impediment in still accepting it openly and widely. A presence of an expert cytopathologist increases the acceptance though.

The most common age group for lytic lesions we found was 11-20 years, in which total 52 cases of lytic lesions were found composed of 15 cases of benign neoplastic lesions. In the age group of 21-40 years total 35 lytic lesions were found, in which benign 10 cases were the commonest. In the age group of 40 years and above a total of cases were found, in which malignant lesions was the most common diagnosis. In below 10 years group, only 3 cases were found of Ewing's Sarcoma. The osteolytic lesions of multiple sites needed to be differentiated from multiple myeloma, secondary metastasis and bacterial osteomyelitis. Problematic group of cases are those having inadequate sample for diagnosis. Adequacy here can be defined as presence of at least 5 clusters of 10 unobscured cells in majority of slides. Layfield *et al.* reported 0% and Dollahite reported 33% as rate of inadequate samples. But this rate goes parallel with rate for open or cutting biopsies.

Giant cell tumor of bone is of unknown histogenesis having distinct morphology. GCTs are graded as Grade one, two and three. They are basically low grade malignant lesions. Locally aggressive. Few just say benign and malignant GCTs of bone. Even times benign looking GCTs have shown metastasis. It's a riddle. In our study of 20 cases of GCT we correctly diagnosed, thus giving sensitivity as 82% and Specificity as 75%. In the past studies have reported 51% to 91% diagnostic accuracies for GCT of bone. In our study we found 3.80% cases of chondroblastoma, 11.42%

cases of Aneurysmal bone cyst (ABC), 23.80% of fibrous dysplasia and 28.57% of inflammatory reactions. All these cases needed to be excluded before one makes diagnosis of GCT of bone for sure.

To summarize, this study amply demonstrates the utility of preoperative FNAC diagnosis of lytic lesions of bone in expert hands with Radiology and clinical data working together. This is simple and less traumatic to the patient over open biopsy and needle core biopsy.

Conclusion

We found that FNAC of lytic (Giant cell Tumors) Lesions of bone is a very useful tool when used in correlation with clinical and Radiological findings. Provided we get adequate aspirate then we can diagnose inflammatory, non-fibrous bony lesions, benign as well as malignant primary as well as metastatic lesions correctly. The procedure was successfully assessed and established at our Institute. So we recommend FNAC can be used as an initial screening method in diagnosing lytic lesions of bone. It was found to be simple, safe, Quick, inexpensive and a good example of a team approach in the field of medicine.

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