

Fine Needle Aspiration Cytology saves Lives in Bone Malignancies

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Abstract: Fine Needle Aspiration Cytology of bone lesions is a prompt, cheap and least invasive diagnostic tool for bone malignancies. However its importance and benefits are not fully realized and as a result considerable delays occur in initial diagnosis undermining the optimal care and management of the patients with disastrous results at times. We here report a case of a 19 year old boy who presented with a swelling in his right arm. Unfortunately the diagnosis was delayed for over a year as a result when finally patient came for diagnostic work up he had evidence of metastases. At this time Fine Needle Aspiration Cytology was performed and diagnosis of osteosarcoma was rendered within one hour. We stress that if this test would have been performed one year back the outcome of the disease would have been pleasantly different.

Keywords: Fine Needle Aspiration Cytology, FNAC of bone, Osteosarcoma, Primary bone tumor, malignant bone tumor

Introduction

There are several diagnostic tools available for bone malignancies but none compares with Fine Needle Aspiration Cytology (FNAC) In terms of rapidity, cost effectiveness, and lack of invasiveness. Many factors contribute to the delayed diagnosis including fear of procedure, cost of procedure, non-availability of operating theater and surgeon due to excessive load of the patients. FNAC on the other hand is routine pathology procedure which can be performed and reported within a day. Its cost is minimal and it's least discomforting to the patient.

Osteosarcoma is the second most common bone malignancy after multiple myeloma. It is an aggressive malignant tumor of mesenchymal origin that exhibits osteoblastic differentiation. In addition the tumor is known to produce other components such as malignant chondrocytes and fibroblasts.^(1,2) Primary osteosarcoma classically occurs in the young age group; 75% of the time before the age of 20 years. Whereas secondary osteosarcoma occurs in the elderly secondary to the malignant transformation of Paget Disease, extensive bone infarcts or post radiotherapy.

Radiography plays an important role in the diagnosis of osteosarcoma of bone, its presentation ranges from an ill defined cloudy mass to the typical findings such as, medullary and cortical bone destruction, codlins triangle, aggressive periosteal reaction or a laminated onion skin appearance. Most latent and active benign bone tumors are treated by intralesional curettage; however osteogenic sarcoma is treated by neoadjuvant chemotherapy followed by surgical resection with or without limb salvage surgery. The prognosis is directly related to the grade of the lesion.

Currently the 5 year survival rate for patients with pulmonary metastatic osteosarcoma is 65 % compared with the earlier 15% during the 60s. Even though there have been surgical advances and diagnostic accuracy is more sensitive, yet osteosarcoma remains generally with poor prognosis.⁽³⁾ When limb salvage surgery is used alone as treatment there can be local recurrences.

A good amount of evidence exists for a number of molecular markers in osteosarcoma in particular, P-glycoprotein, Her-2, CXCR4, uPA/uPAR, and survivin which can prove useful both in predicting response to chemotherapy, overall prognosis, the likelihood of metastasis at diagnosis, and at the same time can provide targets for developing new therapeutic agents.^(4,5) The clinical presentation is generally insidious; most patients don't feel too sick, however the pain can be associated with the growth of the tumor compressing surrounding structures. It can also present as a pathological fracture.

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Case Presentations

A 19 year boy was referred to the Azad Jammu & Kashmir Medical College for FNAC as-assessment of a swelling in his right arm. This swelling was present for the last 12 months; but he had feeling of regression of the lesion due to local quakes' treatment! The tumor however progressed rapidly in the past month. He also complained of shortness of breath, fever and weight loss over last 3 months.

He belongs to a very poor family and is currently studying at a local madrasa. On examination; a hard, fixed non tender 4x3x1cm lump was felt in his right arm at the shoulder region. The overlying skin was intact with no signs of inflammation. A recent chest x-ray revealed a possible metastatic deposits in his right middle lobe.

After giving local 1% 10cc lignocaine local infiltration a FNAC was performed using 5 cc syringes with attached 23 gauge needle; 2 passes were made and 6 slides prepared and stained with hemacolour.

Figure 1.0 Radiograph showing an ill defined mass invading the medullary as well as the cortical bone.



Figure-1.0

Microscopic Examination

FNAC smear were quite cellular and contain highly dysplastic osteoblasts with high N/C ratio. The cytoplasm was hardly visible. These groups of osteoblasts at places were enmeshed in faint amphophilic matrix. The cells were polygonal to spindle shaped.

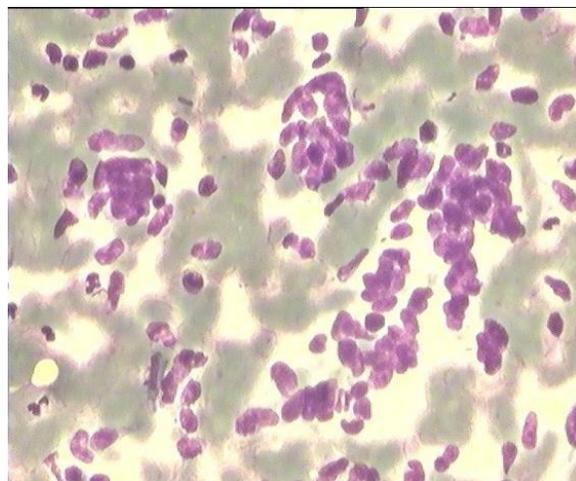


Figure-2.0: Highly Dysplastic Malignant Osteoblast with Scant Cytoplasm (Hx1000)

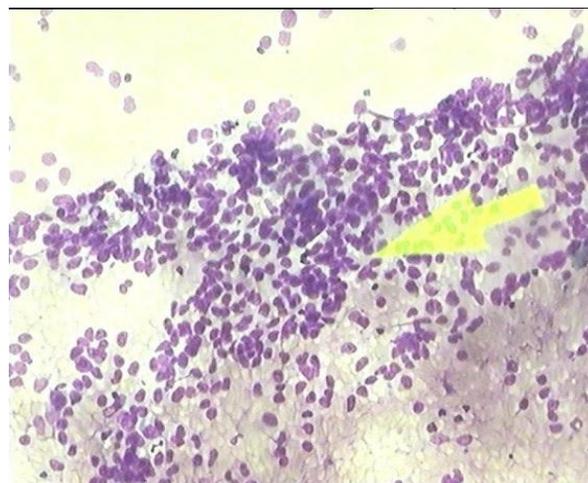


Fig-3.0: Dysplastic Osteoblasts enmeshed in osteoid matrix (Hx400)

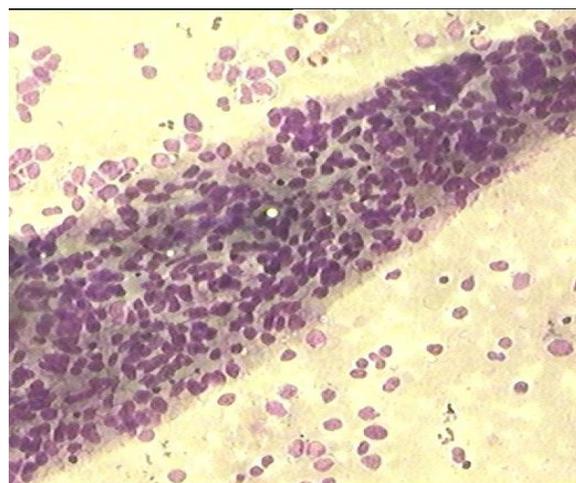


Fig-4.0: Dense Core of Malignant Osteoblast surrounded by faint Matrix (Hx400)

Discussion

Fine needle aspiration cytology (FNAC) is a safe, cost effective and virtually noninvasive procedure which can be routinely used to diagnose tumors of the bone. Not only palpable but also deeply seated lesions can be easily targeted with the help of imaging modalities. It has a high sensitivity, specificity and accuracy. Its fast and almost painless procedure with very little complications. It has eliminated a great number of invasive procedures along with their expense, discomfort and complications.^[5,6] However FNAC has its own limitations and pitfalls. As generally on FNAC smears tissue architecture is not observed the pathologist has to pay much more attention to the cellular details. Magnification of 1000 is quite useful in closely observing the finest cytological details. We routinely use this magnification on almost all cytological smears and sometimes tissue pathology. Needless to say that FNAC requires a lot of training, experience and meticulous focused detailed microscopic observations and clinical correlation. Frequent revisiting the cases and holding unknown conferences are quite helpful in refining one's cytological observation.

Detailed clinical history and physical findings are extremely important Accurate positioning of needle in the lesion and standard technique are essential. The interpretation is based on individual cells, small groups of cells and stromal reactions around these cell groups. Seldom we get sufficiently large fragments giving detailed tissue architecture.⁽⁶⁾

In addition there can be mental block factors for tumors pertaining to the bone, the fear of FNAC, deal seated bone lesions. The lack of knowledge about FNAC as a initial tool among physicians also has a role in the procedure not being undertaken.

Conclusion

While FNAC is widely used in most lesions of different organs, but bone tumors and lesions are seldom subjected to FNAC for diagnosis. This may be

due to the general concept that bone is a hard tissue and a Fine Needle may not be able to penetrate. This is not true, almost all bone lesions except sclerotic osteoid Osteoma and Osteoma are amenable to FNAC. Malignant and inflammatory lesions render the bone soft and it is easily done. Hence bone lesions was not be deprived from the advantages of FNAC. If FNAC is not employed, we may deprived patients quick, early and economical diagnosis that might make a difference of life and death. Fine needle aspiration cytology should be an initial tool for the evaluation of bone tumors. It is safe, cheap, easy to do and effective in differentiating benign and malignant tumors of bone. In our case the delay in the management of such a case where FNAC was done the outcome for the patient may have been different. Fine needle aspiration cytology should be more popular among physicians and surgeons.

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