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Percutaneous J-Needle Biopsy as an Outpatient Procedure in Diagnosis of Bone Tumors - A Hospital Based Study (Pathology)

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Abstract: ***Introduction: Bone lesions are diverse and range in their natural history from the innocuous to rapidly fatal. This diversity makes tumor diagnosis and staging a critical process. The study has been designed to evaluate Jamshidi needle (J-needle) biopsy as a minimally invasive tool for rapid diagnosis of bone lesions which is aimed at initiating therapy that ensures survival while maintaining function of affected body parts. Method: Present study is a prospective study where 56 patients with clinically and radiologically suspected bone tumors (from June 2017 to March 2018) were recruited. Biopsy specimens received in the Department of Pathology, Gauhati Medical College and Hospital constituted the study material. Results: Out of 56 cases, 38 cases showed presence of tumor in biopsy material which included 11 cases of Giant Cell tumor of Bone, 7 cases of Osteosarcoma, 4 cases of Osteochondroma, 3 cases of Aneurysmal Bone Cyst, 2 cases each of Chondroblastoma, Chondrosarcoma and Metastases and 1 case each of Chondromyxofibroma and Fibrous Dysplasia. Most of the biopsy material in the present study was sampled from the long bones, particularly the femur and tibia. Conclusion: In the present study, most of the bone tumors were found to be amenable to being diagnosed by a simple J-needle biopsy procedure in the outpatient department. Among the non-neoplastic lesions, most cases were of Granulomatous Inflammation.***

Keywords: Jamshidi needle biopsy, Bone biopsy, Bone tumor

1. Introduction

Bone tumors remain a daunting challenge to the Orthopedician and Pathologist alike. The challenge is heightened in developing countries due to limited diagnostic and therapeutic facilities.

The Jamshidi needle is a trephine biopsy needle can be used for performing a bone biopsy, whereby a cylindrical sample of tissue known as Core biopsy specimen, can be obtained. It is a cylindrical needle with a tapered cutting edge on one end and a handle with a stilette on the other.

The main advantage of trephine biopsy over Fine Needle Aspiration (FNA) is the ability to preserve tissue architecture, facilitating Histopathological diagnosis.

Reports using a trephine bone biopsy system such as the Craig, Michelle[1] or Jamshidi needles[2] have obtained 66% to 90% accuracy respectively.

The key to accurate recognition of Bone tumors is utilization of an integrated approach involving Clinical, Radiological and Pathological findings. Radiological evaluation of a bone lesion must be performed before any invasive procedure is undertaken, such as FNAC or needle biopsy.

2. Materials and Method

The study was conducted in the Department of Pathology, Gauhati Medical College and Hospital from June 2017 to March 2018. A Total of 56 cases with clinically and radiologically suspected bone tumors were evaluated by a Jamshidi needle biopsy on an outpatient basis after taking detailed clinical history. Results of relevant investigations were collected/abstracted from the patients. Biopsy specimens were received in the Department of Pathology in 10% Formalin. Whole specimen was processed in all cases. Decalcification of bone tissue was carried out by using Nitric Acid (5% or 10%). After conventional processing, paraffin sections were stained by Hematoxylin and Eosin (H&E) for Histopathological Examination.

3. Results and Analysis

Out of 56 cases in our study, 38 cases showed presence of tumor (67.85%) in biopsy material which included 11 cases of Giant Cell tumor of Bone (28.9%), 7 cases of Osteosarcoma (18.4%), 4 cases of Osteochondroma (10.5%), 3 cases of Aneurysmal Bone Cyst (7.8%), 2 cases each of Chondroblastoma (5.2%), Chondrosarcoma and Metastases and 1 case each of Chondromyxofibroma and Fibrous Dysplasia. Most of the biopsy material in the present study was sampled from the long bones, particularly the femur and tibia.

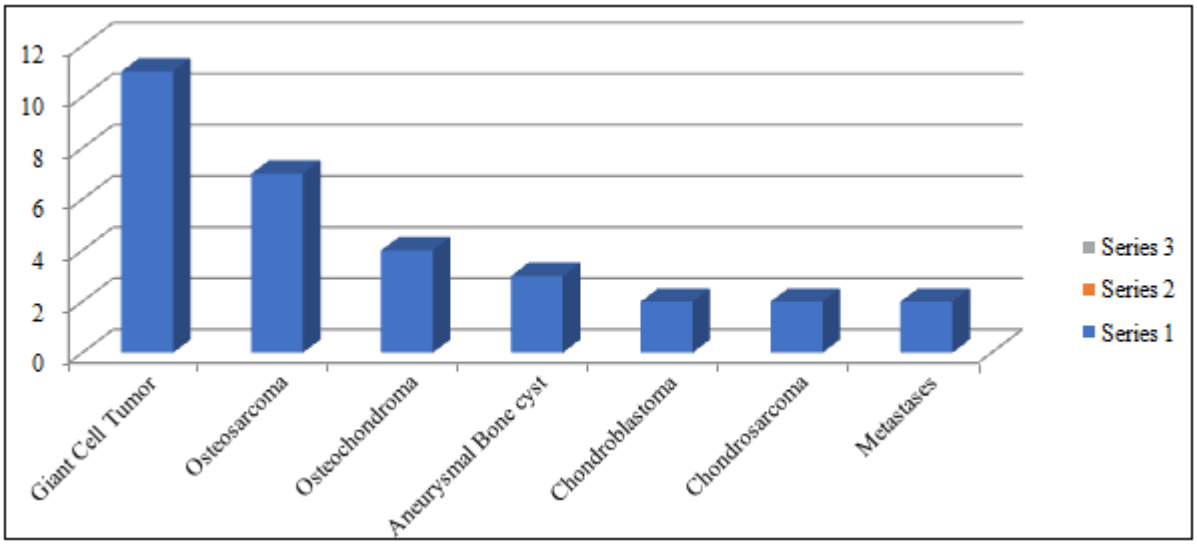

Table 1: Relative frequencies of benign and malignant bone lesions as found in the study. Giant Cell Tumor is the most frequently encountered bone lesion in the population under study followed by Osteosarcoma, Osteochondroma, Aneurysmal Bone Cyst, Chondroblastoma and Chondrosarcoma in that order.

Table 2: Showing incidence of Bone lesions (both benign and malignant) in males and females as found during our study. Females show a higher incidence than males

Table 3: Showing Age-wise distribution of Bone lesions. In our study, patients were mostly in the age group of 11-70 years.

Age (yr)	GCT of bone	Osteosarcoma	Small round cel tumour	Osteochondroma	Aneurysmal bone cyst	Chondroblastoma	Chondrosarcoma	Chondromyxofibroma	Osteoid Osteoma	Fibrous Dysplasia	Metastases	Others
11-20	3	7	1	3	1	3			1	1		5
21-30	3	2			1		1	2				4
31-40	3											5
41-50	3										1	
51-60	1										1	
61-70												4

Maximum number of cases were found in the second and third decades. Most cases of Giant cell tumor were seen in the second and third decades whereas maximum number of cases of Osteosarcoma was seen in the second decade. Metastatic deposits of the bone were seen in middle aged patients in the age groups of 40-60 years. The category-others refers to those cases which were suspected to be bone tumors radiologically and clinically but J-needle biopsy either showed inflammatory changes (most commonly Granulomatous inflammation), or normal bone tissue only. Cases in which J-needle biopsy failed to obtain adequate biopsy material for diagnosis have also been included in this category.

4. Discussion

In our study, most of the tumors were sampled from the long bones, particularly Femur and Tibia which is in concordance with the studies undertaken by Deka MK et al[3] and Sunita A. Bamanikar et al[4]. Also, in our study, there is female preponderance (ratio=1.54), but studies by Rhutso Y, Laishram RS et al[5] and Shubhi Sharma[6] et al show male preponderance. This variation may be attributed to geographic and environmental factors. The predominantly affected age groups in our study is the second and third decade (73.6%) with a peak incidence around age 15 which is in conformation with data obtained in other worldwide studies undertaken by Philip Lanzkowsky et al[7], Michael J. Ramdass et al[8], Y Pillai et al[9] and Rani Gereige et al[10].

In the present study, non-neoplastic lesions constituted 55.26% of the cases while malignant lesions accounted for the rest which is in concordance with the studies of Kunjal Mukesh Karia et al[11] and Karun Jain et al[12]. Giant cell tumor is the commonest bone tumor in our study population which was also seen in studies undertaken by Sung HW et al[13] and Settakorn J et al[14], both of which reported a higher incidence of Giant Cell Tumor in the Oriental and Asian population than in the Caucasian Counterparts. Study conducted by DelaGarza-Montano P et al[15] (53%) also supports the same. However, Statistical data released by American Cancer society and Cancer.NetEditorialBoard state that Chondrosarcomas (40%) are the most common primary bone tumors in adults, followed by Osteosarcomas (28%). This variation may be due to variable clinical presentation of the tumors along with severity of symptoms that prompted the patients to attend outpatient clinic.

In our study, skeletal metastases account for a mere 5.26% of all tumors which clearly contradicts a vast number of studies undertaken worldwide that state metastases from carcinomas are the most common malignant tumors involving bone. To name a few of these studies, Mandeep S Virk et al[17], Filipa Macedo et al[18], Deka MK et al[3] and Yvonne M Schrage et al[19]. This could possibly be explained by the fact that patients with metastatic bone tumors are rarely biopsied since primary cancer is already detected in most cases (Carcinomas of Breast, Prostate, kidney, Lung, Thyroid and Colon) and therefore bone metastases in such cases are taken as part of the disease spectrum. Also, patients already detected with a cancer are sometimes referred to higher centres for therapy and as a result, they are lost to follow up. Alternatively, another explanation for the low detection rate of metastatic bone tumor is that most patients are terminally ill at this stage and therefore avoid an invasive diagnostic procedure.

A subset of the cases studied is negative for bone tumors. While a majority of these lesions are of Granulomatous lymphadenitis, some of these also showed normal bone and in a few other cases, the biopsy material was insufficient for arriving at a discussion.

5. Conclusion

Out of 56 cases in our study, 38 cases showed presence of tumor (67.85%) in biopsy material of which 55.26% are benign tumors and the rest are either primary malignant bone tumors or metastases from another primary tumor. The most common bone tumor encountered is Giant Cell tumor followed by Osteosarcoma whereas the least common ones are Osteoid Osteoma and Chondromyxofibroma.

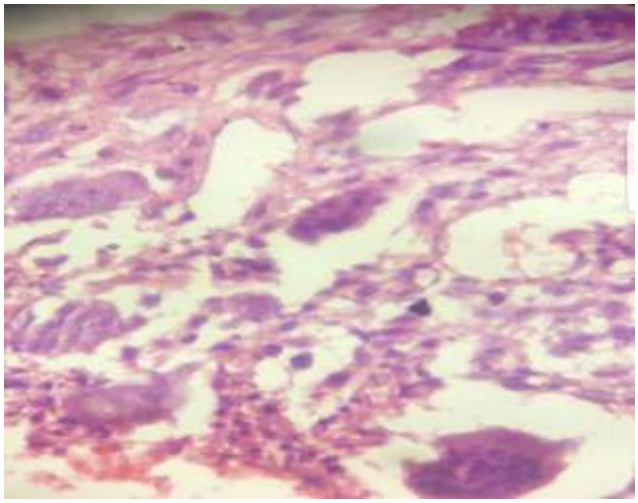

Figure 4: Giant Cell tumor of bone showing Multinucleate Osteoclast-like Giant cells surrounded by spindle to round mononuclear cells.

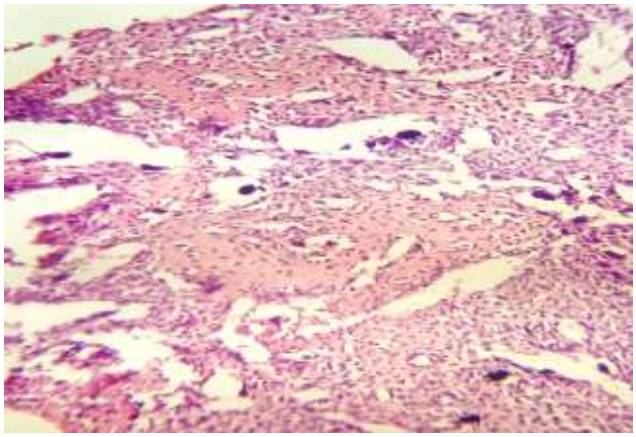

Figure 5: Osteosarcoma showing plump osteoblasts embedded in a fibrous stroma along with immature new bone and Osteoid.

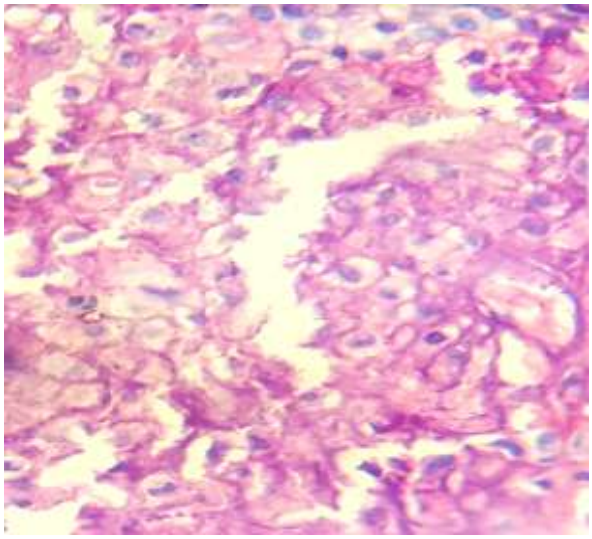

Figure 6: Chicken Wire Calcification between individual tumor cells- seen in Chondroblastoma.

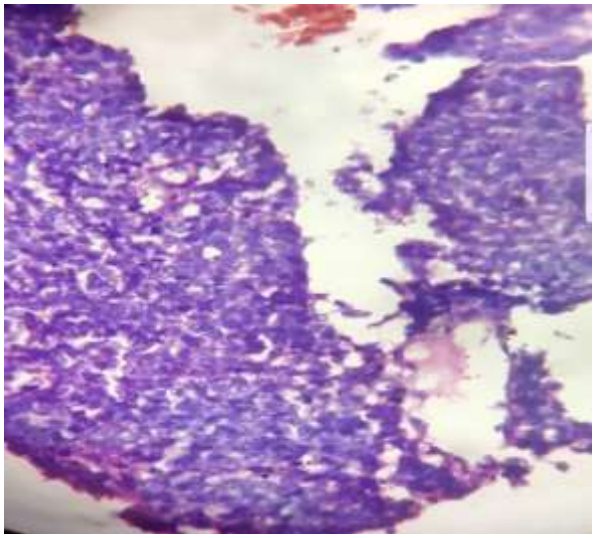

Figure 7: Small Round Cell Tumor of bone showing homogenous and densely packed undifferentiated small round blue cells with regular nuclei, scanty clear cytoplasm and infrequent mitoses.

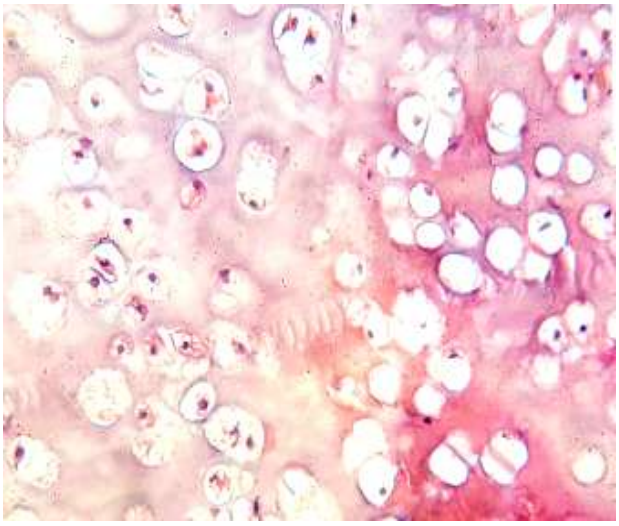

Figure 8: Chondrosarcoma showing clear cells with vacuolated cytoplasm. Matrix shows calcified trabeculae.

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