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Metastatic Lesions Involving Bone Marrow: 16-Year Analytical Study at a Tertiary Care Centre

Nuzhat S[1], Aiman A[2], Gull S[3], Bhat IH[4], Hamid P[5]

[1]Senior Resident, Department of Pathology, SKIMS Soura, Jammu and Kashmir, India; [2]Assistant Professor, Department of Pathology, SKIMS Soura, Jammu and Kashmir, India; [3]Resident, Department of Pathology, SKIMS Soura, Jammu and Kashmir, India; [4]Senior Resident, Department of Neurosurgery, SKIMS, Soura, Jammu and Kashmir, India; [5]Medical Officer NCD, Department of Medicine, DH Ganderbal, Jammu and Kashmir, India.

ABSTRACT

Introduction: The bone marrow is one of the common organs to be involved by tumours that metastasize via the bloodstream. Screening of the bone marrow is considered one of the most valuable diagnostic tools to evaluate hematologic disorders- diagnosis, staging and therapeutic monitoring. Intracranial tumours rarely metastasize outside the cranial vault. Differences between bone marrow biopsy and aspirate findings usually result from a desmoplastic stromal reaction to the tumour cells that renders neoplastic cells more difficult to aspirate than residual haemopoietic cells.

Objective: To know the diagnostic utility of bone marrow aspiration and biopsies in non-haematological lesions which can have a direct impact on treatment and prognosis of the patient.

Methods: Bone marrow aspiration and bone marrow biopsy specimens received were dealt with according to the standard procedure for cytological and histological examination. In case of bone marrow biopsies, 5-6 µm thick sections were cut and stained with routine hematoxylin and eosin stain.

Results: In the paediatric age group, the most common metastatic tumour is small round cell tumour among which neuroblastoma is the most common followed by ewings and rhabdomyosarcoma. In adults, most common metastasis was from lung followed by prostate and breast. Lung and prostate were more common in males and breast in females. There was a slight male preponderance in our study with male to female ratio of 1.9:1.

Conclusion: The bone marrow examination is a useful, minimally invasive and important investigation in diagnosing metastatic tumours. Further trephine biopsy and bone marrow aspiration are complementary to each other as if one procedure fails to pick up the tumour cells other may diagnose it successfully.

Key Words: Bone marrow aspiration, Bone marrow biopsy, Metastasis

INTRODUCTION

The bone marrow is one of the more common organs to be involved by tumours that metastasize via the bloodstream. In adults the tumours most often seen are carcinomas of the prostate gland, breast and lung, although any tumour that gives rise to bloodborne metastases may infiltrate the marrow.[1,2] In children, neuroblastoma, rhabdomyosarcoma, Ewing's sarcoma, other primitive neuroectodermal tumours (PNET) and retinoblastoma account for the majority of metastases.[3,4] Intracranial tumours rarely metastasize outside the cranial vault. Of those cases reported with bone marrow involvement, glioblastoma multiforme has been the most frequent.[5] Examples of metastatic medulloblastoma[6] and oligodendroglioma[7] have also been recorded. If bone marrow aspiration is found to be impossible, imprints from the biopsy specimen are obtained, before putting it into fixative which permits a differential count similar to that performed on aspirate films.[8] Further sampling allows for material to be directed towards other ancillary tests such as cytogenetic, molecular studies, microbiologic cultures, immunohistochemistry, and flow cytometry. Malignancy is on an increase globally and bone marrow examination has gained a lot of importance in the management of such patients. The present study has been undertaken to know the diagnostic utility of bone marrow aspiration and biopsies in non-haematological lesions which can have a direct impact on treatment and prognosis of the patient.

Corresponding Author:

Samoon Nuzhat, Senior resident, Department of Pathology, SKIMS Soura, Jammu and Kashmir, India.
Phone: 917006151848; Email: samoon.nuzhat@gmail.com

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MATERIAL AND METHODS

The present study was conducted in the department of pathology and the department of clinical Hematology, 8-year retrospective extending from June 2002 to May 2010 and 8-year prospective extending from June 2010 to December 2018 in a tertiary care hospital Sheri-i-Kashmir institute of medical science (SKIMS), Srinagar, Kashmir. Clinical information as per the Performa was gathered, which included information on age, sex, hemogram, and most common symptoms. Bone marrow aspiration and bone marrow biopsy specimens received were dealt with according to the standard procedure for cytological and histological examination. In case of bone marrow biopsies, 5-6 µm thick sections were cut and stained with routine hematoxylin and eosin stain. The positive ones were subjected to special stains and immunohistochemistry where ever necessary.

RESULTS AND DISCUSSION

Bone marrow examination is a very important investigation for evaluation of the number of disease processes involving bone marrow, primary and secondary, and has an important role in establishing the final diagnosis. A limited number of studies have been conducted to evaluate the diagnostic utility of bone marrow examination in non-haematological disorders. Of the total 217 cases, most of them were from the pediatric age group, and most of the cases of metastasis were from small round cell tumours. This can be because our institute is the only institute in our state having developed pediatric surgery and medical oncology departments. The metastasis in adults mainly affected middle-aged to elderly patients with a mean of (55 years) Most of the adult cases are above 50 years of age accounting for 66.6% and most of the pediatric cases are below 10 years. They found 62.8 % of adult patients above 50 years of age and most of the pediatric patients were below 10 years of age.

Out of 217 patients studied 141 patients were males (65.3%) and 75 patients were females (34.5%), with male to female ratio of 1.9: 1.

Table 1: Age distribution of the studied subjects (n=217)

Age group	Number of patients	Percentage (%)
<20	76	35.3
21-40	38	17.6
41-50	40	18.3
51-60	27	12.2
>60	36	16.3
Total number	217	100

The youngest patient was 5 months old and the eldest patient recorded was 80 years of age. The mean age of presentation was 35.8 with a standard deviation of 23.016.

Table 2: Distribution of Metastatic cases based on Known and Unknown Primary

Primary	Number of patients	Percentage (%)
Known	196	90.3
Unknown	21	9.7
Total number	217	100

Table 3: Distribution of Primary in malignancies diagnosed on bone marrow examination (n=196)

Site of primary	Number of patients	Percentage (%)
Lungs	49	25
Prostate	31	15.8
Breast	27	13.7
Ovarian	13	6.6
Stomach	7	3.5
Bladder	5	2.5
Small round cell tumor	64	32.6
Total number	196	100

Table 4: Differential diagnosis of small round cell tumor in our study (n=64)

Diagnosis	Number of patients	Percentage (%)
Ewing's	21	32.8
Neuroblastoma	25	39
Rhabdomyosarcoma	13	20.3
Wilms tumor	3	4.6
Retinoblastoma	2	3.1
Total number	64	100

In our study, the most common primary location was lung (Figure 1 and 2) and was also comparable to the previous studies.[1,9,10]

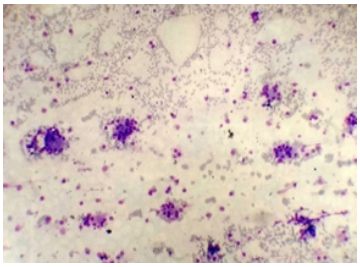

Figure 1: Bone marrow aspirations smear showing metastatic deposits of adenocarcinoma Lung (10x, Leishman stain).

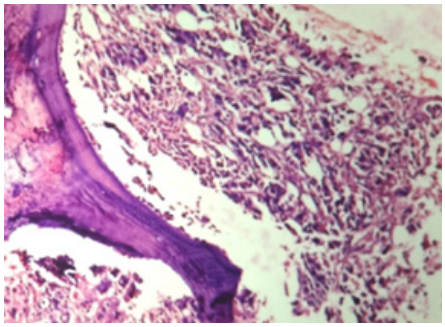

Figure 2: Bone marrow biopsy with metastatic deposits of adenocarcinoma lung, (40X, H & E).

However against the study done by Saadettin kilickap[11] et al which showed breast (Figure 3) and prostrate as the most common primary location respectively.

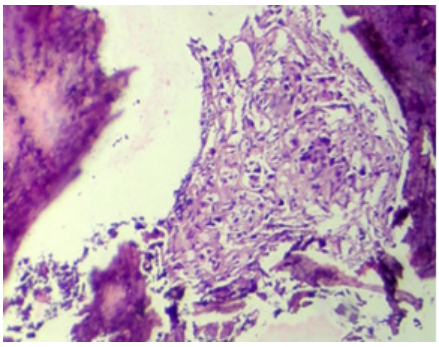

Figure 3: Photomicrograph of bone marrow biopsy showing metastatic deposits of Infiltrating Ductal Carcinoma breast (40 X, H & E).

The lung is the most common primary site here because here in our part of world people smoke Huka, cigarette and use Bukhari and firepots inside their clothing in the winter season.

Neuroblastoma is the most common tumour among small round cell tumours (Figure 4 and 5) in our study being followed by rhabdomyosarcoma frequency; similar findings were seen in the study done by Lashiram et al where neuroblastoma and rhabdomyosarcoma tumour metastasis was 42.8% and 28.5 % respectively.

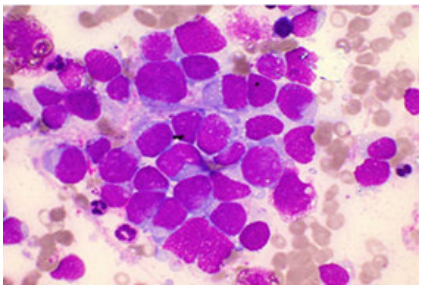

Figure 4: Marrow /aspirations smear showing metastatic deposits of neuroblastoma (100X, Leishman's stain).

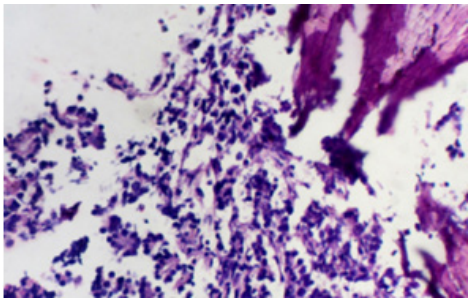

Figure 5: Marrow biopsy from a child showing metastatic neuroblastoma with Homer-Wright rosettes (40X, H & E).

In our study, anaemia was the most frequent finding (79.6%). We also found that bone marrow aspirate detects only 53 % of all the tumours that were diagnosed on bone marrow biopsy. Bone marrow biopsy being more sensitive procedure, as bone marrow tumour cells show a desmoplastic reaction, thus the demonstration of tumour metastasis by bone marrow biopsy was far superior to the bone marrow aspirate in our study.

CONCLUSION

We would like to conclude that bone marrow examination is a useful, minimally invasive and important investigation in diagnosing metastatic tumours. Further trephine biopsy and bone marrow aspiration are complementary to each other as if one procedure fails to pick up the tumour cells other may diagnose it successfully.

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REFERENCES

1. Anner RM, Drewinko B. Frequency and significance of bone marrow involvement by metastatic solid tumours. Cancer 1977;39:1337-1344.
2. Singh G, Krause JR, Breitfeld V. Bone marrow examination for metastatic tumour. Cancer 1977;40: 2317-2321.
3. Finkelstein JZ, Ekert H, Isaacs H and Higgins G, Bone marrow metastases in children with solid tumours. Am J Dis Child 1970;119:49-52.
4. Delta BG, Pinkel D. Bone marrow aspiration in children with malignant tumours. J Paediatr 1964;64:542-546.
5. Kleinschmidt-Demasters BK. Bone marrow metastases from glioblastoma multiforme: the role of dural invasion. Hum Pathol 1997;27:197-201.

6. Hoffmann M, Henrich D, Dingeldein G, Uppenkamp M. Medullo blastoma with osteoblastic metastasis and bone marrow fibrosis. Bone Marrow Transpl 1999;23:631.
7. Dawson TP. Pancytopenia from a disseminated anaplastic oligodendroglioma. Neuropathol Appl Neurobiol 1997; 23:516-520.
8. Aboul-Nasr R, Estey EH, Kantarjian HM, et al. Comparison of touch imprints with aspirate smears for evaluating bone marrow specimens. Am J Clin Pathol 1999;111:753-758.
9. Syed NN, Moiz B, Adil SN, Khurshid M. Diagnostic importance of bone marrow examination in non-haematological disorders. JPMA 2007;57:123.
10. Wong KF, Chan JK, Ma SK. Solid tumour with an initial presentation in the bone marrow--a clinicopathologic study of 25 adult cases. Hematol Oncol 1993;11(1):35-42.
11. Kilickap S, Erman M, Dincer M, Aksoy S. Bone marrow metastasis of solid tumours: Clinicopathological evaluation of 73 cases. Turk J Cancer 2007;37(3):85-88.