ORIGINAL ARTICLE

Bone Marrow Aspiration Biopsy: Work-up of Metastatic Malignant Disorders

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ABSTRACT

Aims and objectives: This study has been conducted to find out bone marrow infiltration in different malignant disorders. Metastases to bone marrow is a hallmark of human malignancies. Metastatic tumors to bones are more common as compared to primary bone tumors and likelihood of bone metastases depends upon the type of primary tumor. Tumors that commonly metastasize to the skeleton include those originating from lymph node, breast, lung, prostate, kidney and gastrointestinal tract. Bone marrow aspiration and trephine biopsy is a useful tool for staging of patients with various malignant disorders.

Material and methods: This cross-sectional study included 100 patients with different malignancies. These patients were taken from Oncology Departments of Shaikh Zayed and Mayo Hospitals, Lahore. Bone marrow aspiration and trephine biopsy were performed on these patients.

Results: Fifty six patients were male while forty four were female. In our study maximum number of patients with bone marrow infiltration were of carcinoma breast. Other cases in the study included non-Hodgkin's lymphoma, carcinoma prostate, carcinoma of the lung and carcinoma ovary.

Key words: Bone marrow aspiration/trephine biopsy, Metastases.

INTRODUCTION

Bone marrow metastasis is spread of neoplasm arising in other organs to the marrow of skeletal system[1]. After lymphoma, the primary tumours that most frequently involve the bone marrow are malignancies of the prostate, breast, lungs, thyroid, kidney, and stomach[2]. The bone marrow aspirate and biopsy is an important medical procedure for the diagnosis of hematologic and non haematological malignancies, and for follow-up evaluation of patients undergoing chemotherapy, bone marrow transplantation, and other forms of medical therapy.[3] Marrow aspiration and trephine biopsy are often included as part of the staging procedures in solid tumors[4]. Metastatic tumour in bone marrow may influence the response to treatment and the survival of the patient. The resulting decreased haemopoiesis may force the clinician to scale down the dosage of drugs used in treatment.[5] Bone marrow examination is necessary not only diagnostically for metastases but also for assessment of iron stores and cellularity and to differentiate marrow hypoplasia from tumor progression[6].

MATERIAL AND METHODS

This cross-sectional study included 100 patients with different malignancies. These patients were taken from Oncology Departments of Shaikh Zayed and Mayo Hospitals, Lahore. Fifty six patients were male while forty four were female. The primary diagnosis was made on the basis of biopsy (Histopathology). A complete history was taken and physical examination conducted in every case. Routine investigations (Haemoglobin, TLC, DLC, Platelet count and ESR) were performed. Bone marrow aspiration and trephine biopsy were performed on these patients from the posterior iliac crest or sternum and stained by the Wright-Giemsa or other techniques for microscopic examination. The bone marrow core biopsy was obtained from the posterior iliac crest with a Jamshidi or similar needle and processed in the same manner as other surgical specimens. The bone marrow films were assessed and reported in a systematic manner. An interpretation of the findings, in the light of the clinical and haematological features were given.

RESULTS

In this study a total of 100 cases with various established malignancies were taken. Fifty six patients were male while forty four were female. Sixteen patients were less than 20 years of age. Thirty two patients were between 21-40 years of age. Forty six patients belonged to 41-60 year age group and six patients were above 60 years of age.

Out of 28 cases of non-Hodgkin's Lymphoma, 6 patients (21.4%) showed positive bone marrow infiltration and 22 (78.67%) were negative for infiltration. Among 18 patients with CA. breast, 6

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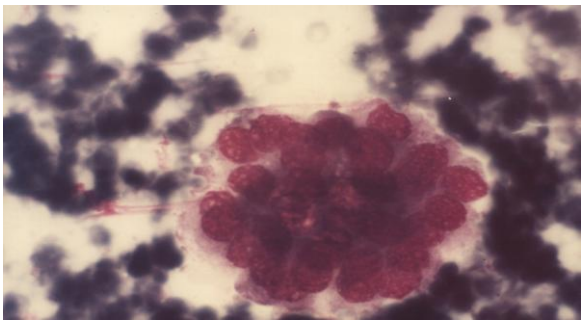
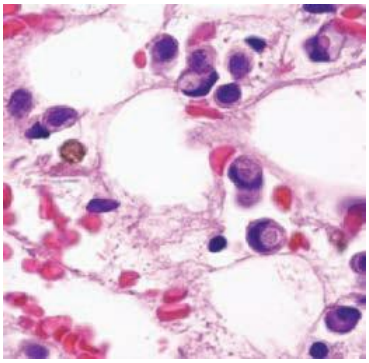
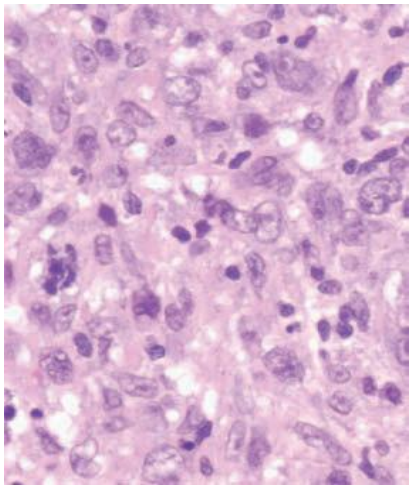
patients (33%) were positive for bone marrow infiltration while 12 cases (67%) were negative. Out of 4 cases of CA. ovary, 2 cases (50%) were positive for infiltration and 2 cases (50%) showed no bone marrow infiltration. In our study, 18 out of 100 cases were positive for bone marrow infiltration. Out of these, 10 cases were positive for bone marrow metastases in positive bone scan patients, whereas 8 patients were positive for bone marrow metastases in negative bone scan patients. Table 1 shows number of cases and frequency with bone marrow infiltration. Figure 1 and 2 show metastatic infiltrating cells (bone marrow aspiration and trephine biopsy; Giemsa stain) in a case of CA breast.





Aspirate showing metastatic cells in CA Breast



Aspirate of Hodgkin Lymphoma

Bone Marrow Aspirate and trephine needles used to detect metastatic clumps

Table 1: Frequency of Cases with Bone Marrow Infiltration (n=100)

Type of tumour	n=	Bone marrow infiltration
CA. Breast	18	6
CA. Brain	2	0
Osteogenic Sarcoma	4	0
CA. Cervix	8	0
CA. Urinary Bladder	4	0
CA. Intestine	2	0
CA. Testis Seminoma	4	0
CA. Ovary	4	2
CA Prostate Adenocarcinoma	2	0
CA. Vulva	2	0
CA. Lung	4	0
Lymphoma	2	2
Hodgkin's Lymphoma	6	2
Undifferentiated Sarcoma (Tibia)	2	0
Ewing's Sarcoma	4	0
NHL	28	6
CA rectum	2	0
Squamous cell CA. (cheek)	2	0

DISCUSSION

The diagnostic importance of bone marrow examination has been recognized since 1868 by Nauman and Bizazera who first discovered and described nucleated cell in the marrow[7]. Most bone metastases arise from carcinomas. Even with different carcinomas, there is considerable variability in the metastatic potential to bone. Incidence of metastases to bone in cancer patients is varied. Autopsy studies by Suprun and Rywlin found that the incidence of metastases to bone marrow is 34.5%[8].

In another study, micro metastases in the bone marrows of 359 patients was 18% with solid cancer [9]. Our study has revealed an 18% infiltration rate.

The bone marrow examination is invaluable in the diagnosis of certain haematological and non haematological conditions[6 10 11]. Histopathological examination of a bone marrow (BM) trephine biopsy is an integral part of the diagnostic work-up of patients with haematological disorders and other diseases which may afflict hematopoiesis[12]. Bone marrow aspiration biopsies are carried out principally to permit cytological assessment but can also be used also for immunophenotypic, cytogenetic, molecular genetic, and other specialised investigations[13]. In recent years many of the technical obstacles preventing application of these techniques to BM biopsies have been surmounted, and immunohistochemistry, fluorescence in situ hybridization and polymerase chain reaction (PCR)-based molecular techniques for examination of DNA and RNA have successfully been applied to conventionally processed BM trephines. However the dramatic increase in modern immunological and molecular techniques which have been added to the diagnostic repertoire of clinical haematology has largely bypassed the BM trephine[12].

CONCLUSION

The failure of local treatment of cancer usually depends on the presence of unknown metastases at the time of diagnosis. Bone marrow biopsy / aspiration are useful tools for staging of patients with malignant disorders. It is recommended that the bone marrow histology should be studied in detail for the diagnostic workup of malignancies since it correlates well with the clinical stage and offers useful prognostic information. The aspirate and trephine biopsy specimens are complementary and when both are obtained, they provide a comprehensive evaluation of the bone marrow. The final interpretation requires integration of peripheral blood, bone marrow aspirate and trephine biopsy findings, together with the results of supplementary tests such as immunophenotyping, cytogenetic analysis and molecular genetic studies as appropriate, in the context of clinical and other diagnostic findings.

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