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A case of carcinocythemia following breast carcinoma mimicking acute leukemia: a case report and review of literature

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ABSTRACT

Carcinocythemia, the presence of circulating cancer cells in the peripheral blood is a rare event which occurs as a late manifestation of solid malignancies and can be confused as acute leukemia. A 50-year-old male with breast carcinoma presented to the hospital with complaints of breathlessness and weakness. His routine hemogram showed leucocytosis along with marked anemia and thrombocytopenia. The peripheral blood smear showed presence of blast like cells and a diagnosis of acute leukemia/metastatic carcinoma breast was considered. The blasts like cells were negative for myeloperoxidase stain. The bone marrow revealed presence of metastatic adenocarcinoma. Carcinocythemia was diagnosed and the patient has been planned for docetaxol and carboplatin based chemotherapy. The differential diagnosis for carcinocythemia is acute leukemia which is common following chemotherapy and radiotherapy for solid tumors. These patients generally have a poor prognosis and survival.

Key words: *Acute leukemia, breast carcinoma, carcinocythemia, circulating tumor cells*

INTRODUCTION

The spread of solid tumor cells through the circulatory system, and seen on routine stain of peripheral blood smears, is an infrequent phenomenon and is known as carcinocythemia or carcinoma cell leukemia which mimics acute leukemia. Here, we describe a case of advanced breast carcinoma in a male patient who developed carcinocythemia.

CASE REPORT

The patient, a 50-year-old male presented to our hospital with complaints of a lump over right chest wall for past 14-15 months, breathlessness for 2 months, backache and pain radiating to both lower limbs for 20 days. On examination a 8 × 4 cm hard lump fixed to the underlying chest wall muscles and over lying skin along with two discrete axillary lymph nodes was found. There was bony tenderness over the mid-dorsal spine and the right pelvic bone. Fine-needle aspiration cytology from the breast lump and axillary lymph nodes was suggestive of infiltrating ductal carcinoma. The skeletal survey showed multiple large areas of lytic lesions involving the skull and pelvic bones along with lytic, expansile lesions involving multiple dorsal, lumbar vertebrae and right 6th, 7th, and the 9th ribs along with collapse of the D4 vertebra. A diagnosis of carcinoma right breast with bone metastases was made. The clinical stage was T4cN1M1. The blood analysis revealed hemoglobin (Hb): 11.1 g/dL; total leukocyte count (TLC): 7500/µl; platelet (PLT) count: 613 × 10^3/µl; differential leukocyte count: Polymorphs - 75%; lymphocytes - 20%; eosinophils - 03%; monocytes - 02%; Alanine transaminase (ALT) - 16 U/L; Aspartate aminotransferase (AST) - 36 U/L; urea - 29 mg%; creatinine - 0.9 mg%; calcium - 8.9 mmol/L; random blood sugar - 101 mg%; CA15-3-60 U/mL. The patient was put on injection zoledronic acid (4 mg every once in 4 weeks) and radiation (30 Gy in 10 fractions) was delivered to the dorsal spine from D2 to D5 vertebrae. The patient was then started on cyclophosphamide, adriamycin, and 5-flurouracil based chemotherapy along with 20 mg of daily tamoxifen.

A good response was achieved after 6 cycles of the planned chemotherapy and the patient was taken up for local radiation to the chest wall (50 Gy in 25 fractions), following completion of which he was given 2 more cycles of the same chemotherapy. The patient was on follow up with a static disease for 18 months. He then presented with complaints of breathlessness and marked weakness. His X-ray chest and ultrasound whole abdomen were found to be unremarkable. However, his complete blood count showed a Hb: 6.6 g/dL; TLC: 12.5 × 10^3/µl; PLT: 17 × 10^3/µl, %, ALT - 38 U/L, AST - 108.4 U/L, urea - 18 mg/dL, creatinine - 1.13 mg/dL, calcium - 8.4 mmol/L, CA15-3-130 U/mL. The peripheral smear showed a leucoerythroblastic picture with 05% atypical cells with high nuclear/cytoplasmic ratio [Figure 1]. The nuclei showed relatively clumped chromatin with moderate amount of lightly basophilic cytoplasm. No Auer rods or cytoplasmic granules were noted. The first diagnosis considered was acute leukemia and the second possibility was metastasis from breast carcinoma. Leucocytochemistry done on peripheral smear was negative for myeloperoxidase. A bone marrow aspiration showed a hypocellular marrow with scant marrow elements and malignant cells singly placed as well as in clusters forming acini [Figure 2]. Myeloperoxidase stain done on the bone marrow smear was negative. A diagnosis of metastatic adenocarcinoma was made and hence presence of carcinocythemia was confirmed.

DISCUSSION

Carcinocythemia is considered the end-stage disease. It is probably caused by widespread infiltration of many bone marrow sites. Virtually any tumor can metastasize to the bone marrow. According to the literature, the most common neoplasms associated with circulating cancer cells in the peripheral blood were breast adenocarcinoma, small-cell lung carcinoma, and rhabdomyosarcoma.[1-3]

The presence of atypical cells on peripheral smear in a case of solid malignancy post-chemotherapy raises a possibility of acute

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leukemia. In one study,[4] the mean length of time between the initial diagnosis of breast cancer and the development of leukemia was 5 years (range 1.7-12.5). Patients receiving both systemic drug therapy and radiation were at greatest risk. Melphalan is a more potent leukemogen than cyclophosphamide or radiotherapy. Low risks were associated with the levels of cyclophosphamide which is commonly used nowadays.

Our case a patient of carcinoma breast presented with a high TLC, low hemoglobin and low platelets after 3 years 3 months of initial appearance of the lump and 1 year 3 months after receiving chemotherapy and radiotherapy. The peripheral smear showed 5% atypical cells along with a leucoerythroblastic picture. The patient also had a normocytic normochromic anemia (Hb = 8.3 g/dL) along with low platelets ($40 \times 10^3/\mu L$). The first possibility considered was acute leukemia followed by a possibility of metastasis from carcinoma breast. A bone marrow aspirate and biopsy was done in view of atypical cells and bicytopenia on routine blood analysis, which showed a hypocellular marrow with few clusters of malignant cells forming acini. Myeloperoxidase staining done on the bone marrow smears were negative. Hence, the diagnosis of metastasis from breast carcinoma was made and the atypical cells on the peripheral smear were attributed to the same. The bone marrow in a case of acute leukemia usually is associated with a hypercellular marrow packed with blasts.

The most widely-used serum markers in breast cancer are CA15.3 and carcinoembryonic antigen (CEA). Although of little use for early diagnosis, CA15-3 may be the first independent circulating prognostic marker described for breast cancer. Currently, one of the most widely used applications of tumor markers in breast cancer is in the follow-up of patients with diagnosed disease. Finally, markers are potentially useful in monitoring therapy in advanced disease, particularly in patients who cannot be assessed by standard modalities.[5] However, it is unclear whether the introduction of early treatment based on this lead time improves disease-free survival, overall survival, or quality of life for patients.

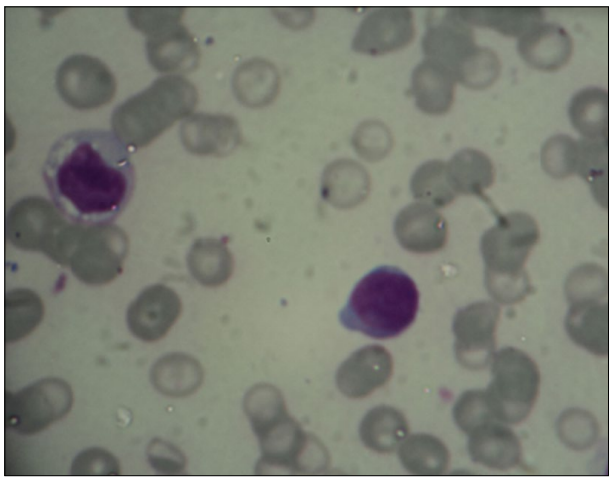

Figure 1: Peripheral smear showing blast like cell (Giemsa, ×40)

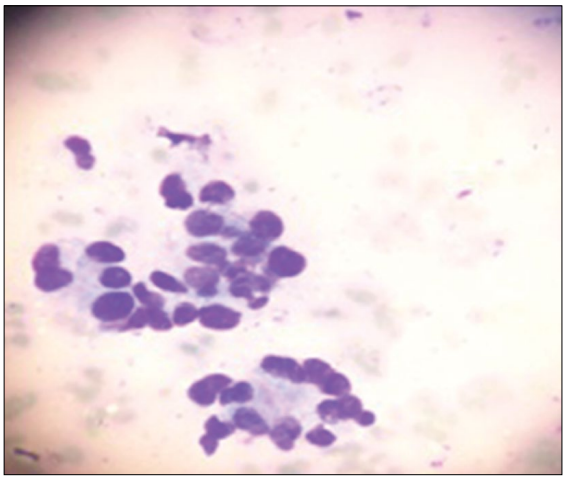

Figure 2: Bone marrow aspirate smear showing tumor cells in acini (Giemsa, ×40)

Our patient when presented for the second time had a serum CA15.3-130U/dL (normal range 0-25 U/mL), which also provided a clue that there was recurrence of the disease. The serum CEA level was also mildly increased - 4.88 ng/mL (normal range 0-4.7 ng/mL).

The documentation of circulating cancer cells on a routinely prepared peripheral blood smear provides an unusual example of the hematogenous spread of solid tumors.

As early as 1865, Theirsch[6] observed invasion of cancerous cells into veins. Brown and Waren[7] believed that hematogenous spread of tumors depend on the grade of differentiation. Various techniques have been utilized in the past to isolate circulating cancer cells using Millipore filters and nucleopore membrane filters. Song *et al*.[8] postulated that certain patients possessed some type of intrinsic host resistance which destroys the detached cancer cells.

Carey *et al*.[9] were the first to use the term carcinocythemia. They noted a unique population of cells on a Wright's-stained blood smear of a patient with metastatic breast cancer. The patient had an atrophic spleen at autopsy. The authors speculated that damage to the reticuloendothelial organ may have impaired normal mechanisms for the removal of circulating cancer cells. In an another case report by Myerowitz *et al*.,[10] a patient with carcinocythemia due to widespread metastatic adenocarcinoma of the breast who survived 20 years after the initial diagnosis and 17 years after the initial detection of metastatic disease. The patient developed carcinocythemia 10 months after splenectomy which supported the hypothesis put forward by Carey *et al*., however, in two case reports autopsy studies failed to demonstrate overt splenic disease.[11,12]

Ejeckam *et al*.[13] reported a case of carcinocythemia in a patient with primary oat cell carcinoma of the lung with widespread metastasis. Although the spleen was not atrophic, its sinuses and red pulp, as well as the sinusoids of liver, were replaced by tumor cells. The possible saturation of the reticuloendothelial system was believed to have prevented the elimination of tumor cells from the peripheral blood.

Patients at the time of carcinocythemia have been reported to be in the terminal stage of the disease and survived for an average of a few days or weeks.[14-16]

Gallivan and Lokich[1] concluded that finding of <10% cells circulating tumor cells among nucleated cells is not prognostically important but that a level of >10% indicates a poor prognosis.

Funaki *et al*.[17] showed that reverse transcription-polymerase chain reaction (RT-PCR) based assay of circulating hepatocellular carcinoma cell level can be utilized to predict the recurrence of the

tumor. Similarly multi-marker real-time RT-PCR and microarray measurement of circulating melanoma cells in peripheral blood have been used to assess disease severity, progression, and survival.[18]

According to the literature, carcinocythemia is a terminal event and is associated with poor prognosis; however, advanced treatment may prolong survival in these patients.

Our patient has been planned for injection docetaxol 120 mg i.v. and injection carboplatin 450 mg i.v. once in 3 weeks.

In conclusion, circulating tumor cells in a case of solid malignancy is a rare and terminal event which can mimic leukemic blast cells on peripheral blood smear and require a clinical suspicion.

REFERENCES

1. Gallivan MV, Lokich JJ. Carcinocythemia (carcinoma cell leukemia). Report of two cases with english literature review. Cancer 1984;53:1100-2.
2. Sile CC, Perry DJ, Nam L. Small cell carcinocythemia. Arch Pathol Lab Med 1999;123:426-8.
3. Rodríguez-Salas N, Jiménez-Gordo AM, González E, de las Heras B, Zamora P, Espinosa E, *et al*. Circulating cancer cells in peripheral blood. A case report. Acta Cytol 2000;44:237-41.
4. Curtis RE, Boice JD Jr, Stovall M, Bernstein L, Greenberg RS, Flannery JT, *et al*. Risk of leukemia after chemotherapy and radiation treatment for breast cancer. N Engl J Med 1992;326:1745-51.
5. Duffy MJ. Serum tumor markers in breast cancer: Are they of clinical value? Clin Chem 2006;52:345-51.
6. Engell HC. Cancer cells in the blood; a five to nine year follow up study. Ann Surg 1959;149:457-61.
7. Brown CE, Warren S. Visceral metastasis from rectal carcinoma. Surg Gynec Obstet 1938;66:611.
8. Song J, From P, Morrissey WJ, Sams J. Circulating cancer cells: Pre- and post-chemotherapy observations. Cancer 1971;28:553-61.
9. Carey RW, Taft PD, Bennett JM, Kaufman S. Carcinocythemia (carcinoma cell leukemia). An acute leukemia-like picture due to metastatic carcinoma cells. Am J Med 1976;60:273-8.
10. Myerowitz RL, Edwards PA, Sartiano GP. Carcinocythemia (carcinoma cell leukemia) due to metastatic carcinoma of the breast: Report of a case. Cancer 1977;40:3107-11.
11. Beverley PC, Linch D, Delia D. Isolation of human haematopoietic progenitor cells using monoclonal antibodies. Nature 1980;287:332-3.
12. Krause JR. Carcinocythemia. Arch Pathol Lab Med 1979;103:98.
13. Ejeckam GC, Sogbein SK, McLeish WA. Carcinocythemia due to metastatic oat-cell carcinoma of the lung. Can Med Assoc J 1979;120:336-8.
14. Aboulafia DM. Carcinocythemia. A terminal manifestation of metastatic breast cancer. West J Med 1992;157:672-4.
15. Sile CC, Perry DJ, Nam L. Small cell carcinocythemia. Arch Pathol Lab Med 1999;123:426-8.
16. Misawa R, Kobayashi M, Ito M, Kato M, Uchikawa Y, Takagi S. Primary colonic signet ring cell carcinoma presenting carcinocythemia: An autopsy case. Case Rep Gastroenterol 2008;2:301-7.
17. Funaki NO, Tanaka J, Seto SI, Kasamatsu T, Kaido T, Imamura M. Hematogenous spreading of hepatocellular carcinoma cells: Possible participation in recurrence in the liver. Hepatology 1997;25:564-8.
18. Glumac N, Snoj M, Hocevar M, Novakovic S. Prognostic significance of tyrosinase mRNA detected by nested RT-PCR in patients with malignant melanoma. Neoplasma 2006;53:9-14.

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