



Case Report

# Leukemoid reaction as a “prognostic marker” in breast cancer and review of literature

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## Abstract

Neutrophilic leukocytosis above  $50 \times 10^9/l$  not involving the bone marrow, defines a leukemoid reaction (LR). Although it simulates leukemia, most of the causes are inflammatory and benign. LR has been found to be associated with malignancy which is postulated to be caused by granulocyte colony-stimulating factor (G-CSF) secreted by the tumor cells. A 50 years old woman, presented with high grade infiltrating ductal carcinoma of breast and leukocytosis ( $60 \times 10^3/ cumm$ ). After completion of MRM, the condition of neutrophilic leukocytosis subsided. After three months, total leukocyte count rose and local relapse of tumor was found. Following that wide excision was done, and the condition of leukocytosis subsided again. In this case the leukemoid reaction was a paraneoplastic reaction which can be view as a potential for prognostic marker.

## Key words

Leukemoid reaction, Neutrophilic leukocytosis, Prognostic marker, Breast cancer.

## Introduction

The leukemoid reaction (LR) is associate with poor prognosis in advanced high grade tumors is

a potential as a prognostic marker in malignant tumors. It is a kind of paraneoplastic syndrome and appears only during the later stages of malignancy but sometimes may be seen as an

early sign of malignancy. However, it has been rarely associated with breast cancer patient. Herein, we reported a case of high grade infiltrating ductal carcinoma of breast related to Leukemoid Reaction which disappeared after the disease was controlled.

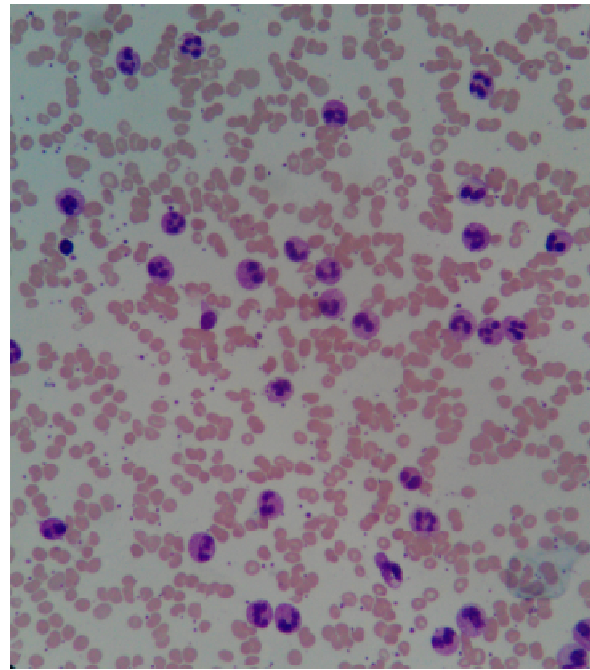
### Case report

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A 50 years old woman, presented with lump in right upper outer quadrant of breast since 3 months duration. Clinically, the lump measured 5x4 cm, firm to hard, with Peu de'orange of skin. Laboratory test results showed neutrophilic leukocytosis ( $60 \times 10^3/\text{cumm}$ ) with shift to left. **(Photo – 1)** Ultrasonography of the breast was done which was suggestive of malignant breast tumor (BIRADS grade IV). Fine needle aspiration (FNA) from the lump breast was done and showed high grade infiltrating ductal carcinoma (Robinson grade 3). Chest X-ray, abdominal ultrasonography and whole body bone scan showed no evident of metastasis. She received four courses of pre-operative chemotherapy following which she underwent modified radical mastectomy (MRM). After completion of chemotherapy and MRM, total leukocyte count reduced to within normal range. Follow-up leukocyte counts were within normal limits till three months, after which the counts suddenly started to rise rapidly up to  $55 \times 10^3/\text{cumm}$ . Based on this sudden rise of leukocyte count a suspicion of recurrence of tumor was conveyed to the clinicians who did a thorough clinical examination of the patient and found an irregular mass at the site of operation. A repeat ultrasonography and FNA were done which showed local relapse of the tumor. Wide excision of the tumor was done following which the leukocyte count slowly reduced to within normal range. Series of white blood cell (WBC) change during the treatment course was as per **Chart - 1**. Subsequent follow-up of the patient

showed no relapse of the tumor and raise in WBC counts.

**Photo – 1:** Blood smear showing raised leukocyte counts.



### Discussion

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Leukemoid reaction (LR) is a condition where leukocyte count exceeds  $50 \times 10^9/\text{l}$  and the cause is outside the bone marrow [1]. Various causes of LR are severe infection, intoxications, malignancies, severe hemorrhage, or acute hemolysis [2]. LR has been mentioned to be associated with many malignancy most commonly in lung [2, 3], urinary bladder, uterine cervix and pancreas [4, 5, 6]. In a case series reported by Kasuga I., et al. out of 227 patients with carcinoma lung, leukocytosis was seen in 14.5% of cases and LR was found to be associated in 2.6% of cases [7]. In the literature, very few cases of breast cancer associated with LR were reported. The mechanism by which leukocytosis occurs is poorly understood but it is probably due to secretion of granulocyte colony-stimulating factor (G-CSF) by the tumor cells



which leads to increased production and function of late myeloid progenitor cells. Before a diagnosis of LR is made all the other causes of leukocytosis, like malignant hematological disorder, chronic myelogenous leukemia and chronic neutrophilic leukemia have to be excluded.

Our patient which was a case of carcinoma breast was found to be associated with leukocytosis. The leukocyte count progressively reduced with every cycle of chemotherapy and came to normal range after mastectomy only to rise again which raised a suspicion of recurrence, which subsequently was proved right. The WBC count again came to normal with the excision of recurrent lesion. Similar response was reported by Nimieri HS, et al. who found patient diagnosed with cervical cancer had a good response of LR to chemotherapy and local radiotherapy [1].

### Conclusion

We conclude by suggesting that the theory of G-CSF production by the tumor cells which leads to marked leukocytosis may be perhaps correct but it needs to be further evaluated and also that the LR can be used as an additive finding in patients suspected of having malignancy, which may also hint at tumor relapse.

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**Chart – 1:** Changes of leukocyte count with the clinical course and treatment of the patient.

