Appearance of Acute Myelogenous Leukemia (AML) in a Patient with Breast Cancer after Adjuvant Chemotherapy: Case Report and Review of the Literature

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Abstract

Acute Myelogenous Leukemia (AML) is an aggressive hematologic malignancy that cause by abnormal proliferation and accumulation of hematopoietic progenitor cells. A 37-year-old woman referred to oncologic clinic with a self-detected mass and pain in her left breast. The stage of tumor was IIIA. She was treated with the combination of anthracycline and cyclophosphamide for four courses, followed by four courses of paclitaxel with trastuzumab for one year. After 18 months of the first treatment for breast cancer, her bone marrow biopsy was compatible with AML-M2.

Here, we are reporting a young woman case with breast cancer that developed AML malignancy during short interval of therapy.

Keywords: Acute myelogenous leukemia; Cyclophosphamide; Paclitaxel

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Introduction

Breast cancer is the most frequent malignancy among women that can be a leading cause of death through middle-aged women [1]. Adjuvant chemotherapy, commonly Include alkylating agents and anthracyclines [1], improves survival rate in operable breast cancer but treatment-induced Acute Myelogenous Leukemia (AML) is now widely regarded as an important concern of survivors [2]. Numerous studies have reported an increased risk of AML after treatment of breast cancer (Table 1). The aim of this study is to evaluate the treatment agents for breast cancer and their effect on risk of AML Expression.

Case Report

In April 2009, a 37-Year-old woman referred to oncologic clinic in Kermanshah, Iran with a self-detected mass and pain in her left breast. The pathology report of biopsy confirmed invasive ductal carcinoma, with Immunohistochemical (IHC)-based Estrogen Receptor (ER) and Progesterone Receptor (PR) positive results. P53 was also negative, and Ki67 was positive in 50% of tumor cells. Furthermore, Human Epidermal Growth Factor Receptor 2 (Her-2) was Three positive. The stage of tumor was IIIA. The status of patient in sentinel lymph node biopsy, bone scan and Computerized Tomography (CT) scan of abdomen and pelvis were normal. She was consulted about radical modified left breast mastectomy axillary dissection, and then her therapy was started with the combination of anthracycline and cyclophosphamide for four courses, followed by four courses of paclitaxel with trastuzumab for one year (17 courses of trastuzumab). Due to node-positive, she was treated in follow up with irradiation on site of surgery and left axillary area. After 18 months of the first treatment for breast cancer, she referred again to our clinic with gingival hyperplasia complaints. Peripheral blood analyses indicated WBC count more than 40000/µL with immature (blasts) cells. Her bone marrow biopsy according to FAB (French-American-British) classification was compatible with AML-M2. She was treated with diagnosis of Leukemia as a secondary cancer with 7+3 regiment that lead to complete remission and continued by

Table 1. Case reports about acute myelogenous leukemia (AML) and its subtypes after breast cancer

Reference	subtypes	Age	Interval (month)	Treatment between two malignancies
8	M2	56	~53	cyclophosphamide, methothrexate, fluorouracil, radiation, tamoxifene
The present study	M2	37	18	anthracycline , cyclophosphamide, paclitaxel, trastuzumab, irradiation
9	M2	42	36	mitoxanthrone. cyclophosphamide, 5-fluorouracil, vincristine, radiotherapy
9	M2	39	48	mitoxanthrone, cyclophosphamide, 5-fluorouracil, vincristine, tamoxifen, radiotherapy
9	M2	62	108	cyclophosphamide, methothrexate, 5-fluorouracil, mitomycin, mitoxanthrone, etoposide, cisplatin, radiotherapy
10	M2	39	31	*5- fluorouracil, epirubicin, cyclophosphamide, radiotherapy*
10	M2	44	28	*docetaxel, doxorubicin, cyclophosphamide, lapatinib, radiotherapy, herceptin, tamoxifen*
11	M2	42	48	epirubicin, paclitaxel, cyclophosphamide, 5-fluorouracil, radiation therapy, tamoxifene
12	M3	51	71	doxorubicin, cyclophosphamide, docetaxel, leuprorelin, tamoxifen, radiation therapy with (89) Sr injection
13	M3	36	24	medroxyprogesterone acetate, tamoxifen, radiotherapy
14	M3	43	9	-
15	M3	69	10	cyclophosphamide, doxorubicin, paclitaxel
16	M5	56	36	radical mastectomy, radiotherapy, adriamycin, cyclophosphamide, oral anti-estrogen therapy
17	M5	37	36	adriamycin, cyclophosphamide, radiotherapy
18	M5	59	168	oral cyclophosphamide, methotrexate, 5-fluorouracil, radiation, Tamoxifen
19	M4	54	36	paclitaxel, radiotherapy
20	-	50	48	alkylating agents, antitumor antibiotics, vincristine, etoposide, teniposide, Paclitaxel, gemcitabine

two extra courses of high dose Ara-C. She had a full match sibling donor for allogeneic transplant, but unfortunately she rejected procedure of bone morrow transplantation. She died with relapse of AML after six months of last consolidation.

Discussion

AML is an aggressive hematologic cancer that is characterized by accumulation of immature myelogenous cells in the blood and bone marrow [3] that cause by abnormal proliferation and accumulation of hematopoietic progenitor cells, and is one of the most common malignancies in adults [4]. According to FAB classification, subtypes of AML are M0 to M7 [5]. Many studies (listed in table 1) as well as other reports [6, 7] have reported the incidence of leukemia as a complication of adjuvant chemotherapy or radiotherapy for breast cancer. In these studies, increased risk of AML has been especially reported for treated cases with

cyclophosphamide and anthracyclines and paclitaxel. In majority of these cases, AML was developed after two or more years of starting chemotherapy for breast cancer and also the age of patients was between 36 to 69 years. Table 1 also shows that majority of patients with breast cancer develop AML-M2. In this study, the young aged patient diagnoses with AML-M2 in a short period of interval. She was a case of Her-2 positive breast cancer and so treated with trastuzumab for one year + irradiation on site of surgery and left axillary area and also treated with cyclophosphamide and anthracyclines and paclitaxel. Adjuvant chemotherapy for breast cancer has been shown to make an increase in the risk of secondary malignancies such as AML. As indicated in table 1, irradiation and cyclophosphamide appear to be suspects of secondary AML incidence. Since paclitaxel is by itself leukemogenic, its effect may be augmented by carboplatin (REF). The interval between the alkylating agent exposure and the development of AML is usually 5 to 7 years (60-84 months).

Conclusion

There is a strongly possibility that addition of paclitaxel-therapy to irradiation and cyclophosphamide will reduce interval period between two malignancies (breast cancer and AML).

Acknowledgment

There is no acknowledgment.

Conflict of Interest

The authors had no conflict of interest.

Authors' Contribution

Mehrdad Payandeh: Analysis of study
Reza Khodarahmi: Edition
Masoud Sadeghi: Corresponding author
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