Solitary metastasis to spleen from breast cancer origin in a patient with hairy cell leukemia; a case report

Pedram Fadavi[1], Nastaran Khodakarim[2], Pegah Babaheidarian[3], Masoumeh Sajadi Rad[4], Sepideh Soltani[4], and Maryam Garousi[1]

[1]Iran University of Medical Sciences
[2]Department of medical oncology and hematology, Iran university of Tehran, Iran
[3]Assistant professor of pathology, Iran University of Medical science, Tehran, Iran
[4]Radiation Oncology Department, Iran University of Medical science, Tehran, Iran.

April 1, 2022

Abstract

Introduction: Metastasis to the spleen is rare. Case presentation: The patient was a 62-year-old woman with diagnosis of invasive ductal carcinoma of breast and hairy cell leukemia with huge splenomegaly. Discussion: This case has been reported considering the uncommonness of solitary metastasis to the spleen and synchronous hairy cell leukemia.

Introduction:

Metastasis to the spleen from different neoplasms is rare, though in autopsy about 1.6-30% of patients with cancer have metastasis to the spleen (1)The most common tumors that metastasized to the spleen have been lung cancers, breast cancers, and melanoma (2). The spleen plays an important role in hematopoiesis and immunosurveillance. The main functions of spleen include clearance of abnormal erythrocytes, removal of microorganisms, and IgG synthesis (3). Splenomegaly can rarely be the main sign of metastasis to the spleen (1). Generally, the pathophysiological mechanism of splenomegaly is categorized into congestive, infiltrative such as metastasis, immune, and neoplasm such as lymphoma (3).

Considering the rare prevalence of metastasis to the spleen various theories have been propounded: I) presence of a humoral substance in the spleen which causes degradation of tumor cells; II) presence of contractions in the spleen causing blood ejection from sinusoids into the splenic vein (1). In this study, one case of hairy cell leukemia and breast cancer with isolated metastasis to the spleen synchronously is reported considering its rarity.

Case presentation:

The patient was a 62-year-old woman who presented with a right breast mass. The diagnosis was invasive ductal carcinoma in the biopsy of the mass with a positive lymph node in the ipsilateral axilla (figure1). The initial laboratory tests revealed pancytopenia, and in the abdominal sonography, she showed massive splenomegaly with 200 mm diameter and normal echo. BMB and flow cytometry was positive for CD103, CD30, and CD11 in favor of hairy cell leukemia (figure3). Given the severe symptoms of pancytopenia, the patient underwent splenectomy with the diagnosis of hairy cell leukemia; in the pathophysiology, metastatic carcinoma in favor of breast origin was seen. IHC was positive for PanCK, CK7, GATA3, and negative for CK20, TTF1, and CDX2(figure2). Pancytopenia was recovered after splenectomy.

In PET scan, after splenectomy, multiple FDJ avid metastases in the right axillary and subpectoral lymph nodes were reported without the involvement of other regions of the body. The patient underwent eight

courses of chemotherapy (doxorubicin, cyclophosphamide, taxane, and trastuzumab) and then lumpectomy surgery. In the pathology, residual ductal carcinoma was reported with 4.5 mm size and grade 2 without positive lymph node findings. The patient underwent breast and right axilla radiotherapy.

At the end of radiotherapy, pancytopenia occurred. cladribine was administrated for a patient. Unfortunately, the Patient passed away because of severe pancytopenia and sepsis.

Discussion:

In the autopsy of patients with breast cancer, the risk of spleen involvement has been 11-17%, which is uncommon compared to metastasis to other organs. In contrast, the most common organ of metastasis is the lung with a risk of 57-77% (4).

In the study by Corinna in the autopsy of patients with cancer, metastasis to the spleen has been more common among younger patients and in those with more sites of metastasis (2), while in our case, the spleen has been the only site of metastasis.

Metastasis to the spleen occurs in a delayed way and rarely becomes symptomatic; thus it is seldom diagnosed by the physician (5). However, in our case, metastasis to the spleen was early and synchronous with the primary breast cancer as well as symptomatic with splenomegaly presentation. Various etiologies have been propounded for splenomegaly, including hepatic diseases, malignancies including lymphoma and leukemia, splenic vein thrombosis, cytopenia (which causes functional splenomegaly), infections, splenic sequestration, connective tissues disease, and focal lesions such as hemangioma, abscesses, cysts, and metastasis (3).

For diagnosis of splenomegaly, a CT scan and sonography can be used. MRI, PET scan, biopsy, splenectomy, and liver-spleen colloid scanning are recommended in special cases (3).

In two cases reported by Cummings et al., the primary symptoms of patients who had metastasis to the spleen were ITP (due to diffuse splenic metastases), and the absence of any specific tumors in the imaging complicates the diagnosis. In these two cases, the patients had also metastases to the bone, and the spleen metastasis was delayed (6).

In the literature review, there are sparse studies on metastasis to the spleen with breast origin, and most metastases are multiple as well as multiorgan. In the study by Bartolotti, one case of breast cancer who had metastasis to the lymph node, lungs, and vertebrates at the time of diagnosis experienced a relapse in the spleen after four years; in the CT scan, it was in the form of two focal lesions and was diagnosed with FNA. The patient underwent chemotherapy (7).

Nevertheless, regarding solitary metastasis to the spleen with breast origin, we found only five case reports in the literature, which were as follows:

The first case was found in 2001; a breast cancer who experienced solitary metastasis to the spleen after 9 years (8).

S IYPE Case in 2002; she was a 54-year-old woman who found solitary metastasis to the spleen after 2 years, and underwent splenectomy (9).

Kari Sufficool et al. in 2012 reported synchronous metastasis to the spleen with breast origin diagnosed through FNA (10).

In 2013, a woman with breast cancer was reported; after the treatment and in the follow-up was examined due to abdominal pain and fever, for whom metastasis to the spleen was diagnosed. She passed away 3 months after due to unknown reasons (11).

In 2019, Sohaila Fatima et al. reported a 62-year-old breast cancer case (ILC) with synchronous solitary metastasis to the spleen, who underwent chemotherapy (12).

A case of hairy cell leukemia and breast cancer have been reported in 2013. The patient was a 65-year-old woman with the diagnosis of breast cancer who was treated with surgery and chemotherapy. About 20 years

later, hairy cell leukemia was confirmed by cytopenia in the complete blood count and BMB(13).

This case has been reported considering the uncommonness of solitary metastasis to the spleen from breast cancer origin as well as synchronous hairy cell leukemia.

Figure's legend:

Figure 1a.H&E staining show infiltrating ductal carcinoma with desmoplastic reaction

Figure 1b.H& E staining show breast carcinoma forming ducts and tubules

Figure2. H&E staining show spleen tissue infiltrated by nests of cells forming cohesive sheets with high n/c ratio, and eosinophilic nuclei with tubular structures

Figure3.H&E staining show hypocellular marrow with foci of lymphoid aggregates with round hyperchromatic nuclei and clear cytoplasm in Para trabecular region

Author Contributions: drafting of the manuscript: P.F, M. G.; critical revision of the manuscript for important intellectual content: N.K., M.S., and S.S.; Pathologist: P.B.

References:

1. Klein B, Stein M, Kuten A, Steiner M, Barshalom D, Robinson E, et al. Splenomegaly and solitary spleen metastasis in solid tumors. Cancer. 1987;60(1):100-2.

2. Schön CA, Görg C, Ramaswamy A, Barth PJ. Splenic metastases in a large unselected autopsy series. Pathology-Research and Practice. 2006;202(5):351-6.

3. Chapman J, Bansal P, Goyal A, Azevedo AM. Splenomegaly. StatPearls [Internet]. 2020.

4. Lee YTN. Breast carcinoma: pattern of metastasis at autopsy. Journal of surgical oncology. 1983;23(3):175-80.

5. El Fadli M, Kerrou K, Alaoui Mhamdi H, Richard S, Khalil A, Lotz J-p, et al. Breast cancer metastasis to the spleen: a case report and literature review. Oxford medical case reports. 2017;2017(12):omx069.

6. Cummings O, Mazur MT. Breast carcinoma diffusely metastatic to the spleen: a report of two cases presenting as idiopathic thrombocytopenic purpura. American journal of clinical pathology. 1992;97(4):484-9.

7. Bartolotti M, Franceschi E, Battista MD, Esposti RD, Castaldini L, Baccarini P, et al. Cytologically confirmed splenic metastases in breast cancer. Future Oncology. 2012;8(11):1495-500.

8. Barreca M, Angelini D, Gallo A, Puntillo F, Amodio P, Fernandes E. Single asymptomatic splenic metastasis of breast carcinoma: report of a clinical case. Il Giornale di chirurgia. 2001;22(6-7):227-8.

9. Iype S, Akbar MA, Krishna G. Isolated splenic metastasis from carcinoma of the breast. Postgrad Med J. 2002;78(917):173-4.

10. Sufficool K, Wang J, Doherty S. Isolated splenic metastasis from carcinoma of the breast: a case report. Diagnostic cytopathology. 2013;41(10):914-6.

11. Chaiyasit K, Wiwanitki V. Isolated Splenic Metastasis Presenting with Continuous Fever and Abdominal Pain. Iranian Journal of Pathology. 2013;8(1):71-.

12. Sohaila F. Isolated splenic metastasis from invasive lobular carcinoma breast. International Journal of Allied Medical Sciences and Clinical Research. 2020;7(3):625-30.

13. Petersen B, Mascarenhas J. A Case Report of Hairy Cell Leukemia and Breast Cancer.

Hosted file

Figure 1a.docx available at https://authorea.com/users/473399/articles/563600-solitary-metastasis-to-spleen-from-breast-cancer-origin-in-a-patient-with-hairy-cell-leukemia-a-case-report

Hosted file

Figure 1b.docx available at https://authorea.com/users/473399/articles/563600-solitary-metastasis-to-spleen-from-breast-cancer-origin-in-a-patient-with-hairy-cell-leukemia-a-case-report

Hosted file

Figure2.docx available at https://authorea.com/users/473399/articles/563600-solitary-metastasis-to-spleen-from-breast-cancer-origin-in-a-patient-with-hairy-cell-leukemia-a-case-report

Hosted file

Figure3..docx available at https://authorea.com/users/473399/articles/563600-solitary-metastasis-to-spleen-from-breast-cancer-origin-in-a-patient-with-hairy-cell-leukemia-a-case-report