Spontaneous Tumor Lysis Syndrome as a Complication of Metastatic Breast Cancer: A Rare Case Report

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Tumor lysis syndrome (TLS) is a well-established potentially fatal condition which is considered an oncologic emergency. TLS typically develops from the rapid lysis of neoplastic cells after the commencement of cytotoxic treatment in patients with some kinds of lymphomas, especially the Burkitt variant, and acute lymphoblastic leukemia. Spontaneous TLS (STLS), a variant of TLS occurring in the absence of chemotherapy or radiation therapy, has been observed in non-Hodgkin lymphoma and acute leukemia, and rarely in solid neoplasms. In this paper, we present a 62-year-old woman with STLS, secondary to metastatic breast cancer. Unfortunately, she died because of complications of acute kidney injury, especially severe metabolic acidosis that was refractory to hemodialysis. Although it is infrequent, healthcare professionals should consider STLS as a probable consequence of breast cancer characterized by a high tumor burden and distant metastases.

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Case Report

INTRODUCTION

Tumor lysis syndrome (TLS) is a well-established potentially fatal condition which is regarded as an emergent condition in the field of oncology.[1,2] TLS usually occurs because of rapid lysis of tumoral cells following cytotoxic therapy and results in metabolic disturbances, especially hyperkalemia, hyperuricemia, hyperphosphatemia, and hypocalcemia.[1-3] This condition may lead to acute kidney injury, seizure, dysrhythmia, or even death.[4] Although TLS is frequently seen during cytotoxic treatments of non-solid malignancies, it is infrequently detected in solid neoplasms.[2,5,6] Spontaneous tumor lysis syndrome (STLS) is referred to the development of TLS without any kind of cytotoxic therapy. STLS also occurs more commonly in hematologic malignancies, and rarely in solid neoplasms.[2,5]

To the best of our knowledge, only eight cases of STLS in breast cancer have been detected worldwide, so far. In this study, we present an STLS in a middle-aged woman who suffered from a metastatic breast cancer.

CASE PRESENTATION

A 62-year-old lady who was a known case of breast cancer with metastasis since 7 years ago, was referred to Aria Hospital in Mashhad, northeast of Iran, due to progressive weight loss over the past five months. A left mastectomy and chemotherapy were performed at the time of diagnosis of breast cancer. Since then, she had been in complete remission and underwent routine follow-ups until two years ago, when hepatic metastases were identified and a partial hepatectomy was performed. She did not show any signs or symptoms related to her prior cancer or its metastases thereafter. She experienced progressive abdominal pain about two weeks before the hospital admission, accompanied by abdominal distension, yellowish discoloration of skin, nausea, and vomiting. On admission, her vital signs were stable, and evidence

Table 1. Laboratory findings of the patient during hospitalization

Laboratory tests	On admission	After dialysis (the last hospital day)
Uric Acid (mg/dL)	13	11
Creatinine (mg/dl)	5.4	4.8
Lactate dehydrogenase (LDH) (IU/L)	1055	N/A
Creatine Phosphokinase (CPK) (IU/L)	3100	N/A
Calcium (mg/dL)	6.8	7.1
Phosphorus (mg/dL)	14	12.1
Potassium (mmol/L)	7.6	7.4
Lactate (mmol /L)	129	N/A
pH	6.85	7.09
Serum Bicarbonate (HCO_3^-) (mmol/L)	6.9	12.4
$PaCO_2$ (mmHg)	40.9	42.3
Base Excess (ecf) (mmol/L)	-26.8	-17.3

N/A: Not Available; ecf: extra cellular fluid

of ascites and hepatomegaly were detected in physical examination, subsequently confirmed by ultrasound, which displayed several hypoechoic lesions in the liver, each measuring between 1 and 2 cm, consistent with hepatic metastases.

Her laboratory tests are depicted in Table 1. The diagnosis of TLS was considered on the basis of the laboratory data according to Cairo-Bishop Criteria Laboratory Cairo-Bishop criteria is confirmed when two of these four parameters are fulfilled (uric acid levels ≥8 mg/dL or 25% increase from baseline, Potassium levels ≥ 6 mmol/L or 25% increase from baseline, Phosphorus levels ≥ 4.5 mg/dL or 25% increase from baseline, Calcium < 7 mg/dL or 25% decrease from baseline). Instead, clinical Cairo- Bishop criteria is fulfilled with confirmed laboratory criteria plus at least one of these clinical findings: Creatinine > 1.5 times the upper limit of normal, Cardiac dysrhythmia/ sudden death, and Seizure.[7] She was treated with intravenous fluid, hypouricemic agent (allopurinol), and hemodialysis via an intravenous temporary catheter.

However, she died to severe metabolic acidosis and hyperkalemia that were unresponsive to all treatments, including intravenous insulin and glucose, sodium bicarbonate, and hemodialysis. (Table 1).

DISCUSSION

TLS usually occurs as a consequence of hematologic malignancies, especially highly aggressive lymphomas (especially Burkitt's lymphoma) and Acute Lymphoblastic Leukemia (ALL).[1-3,5,6] Rarely, TLS occurs without any kind of cytotoxic therapy that is called STLS. Similar to the classic form of TLS, this kind of TLS is seen more commonly in leukemia / lymphomas, but reports in solid neoplasms are scarce.[2,5,8]

The first report of STLS due to a solid tumor backs to 1977, when Crittenden *et al.* described an STLS in a patient with gastrointestinal adenocarcinoma.[9] In contrast to the typical form of TLS, STLS is infrequent, and STLS resulting from solid tumors is much more uncommon. The most common primary solid tumor sites in STLS patients are the lung, colon, and liver, respectively.[2]

To the best of our knowledge, only eight cases of STLS due to breast cancer have been reported in the literature to date,[10-16] and it seems that our patient is the ninth case of breast cancer leading to STLS.

In the largest systematic review concerning patients with solid tumors who developed STLS, Papapanou *et al.* demonstrated that the majority of these patients had been diagnosed with metastatic diseases, primarily in the liver or lungs.[2] This finding is in line with our patient who had hepatic metastasis.

Similar to other cases of STLS secondary to solid tumors, our patient had a poor prognosis with massive liver metastasis.

Some experts believe that although STLS is associated with hyperuricemia, but hyperphosphatemia is infrequently seen in these patients.[17] It is suggested that both uric acid and phosphorus are secreted by the tumoral cells, but the released phosphorus is used again for synthesis of new tumoral cells.[17] This assumption may not always be true as some STLS cases had hyperphosphatemia.[10,11] This may be

related to the large tumor burden or preexisting hyperphosphatemia or different classes of medications used for treatment of STLS.

We conclude that, although infrequent, all clinicians should consider the possibility of STLS due to solid tumors when they face such tumors, particularly in patients with liver metastasis.

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