CASE REPORT

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Spontaneous Tumor Lysis Syndrome in a Patient with Neuroendocrine Lung Carcinoma

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ABSTRACT Tumor lysis syndrome is one of the most important oncological emergencies and may develop after chemotherapy or sometimes spontaneously. Various biochemical abnormalities may occur in the body due to excessive tumor cell destruction in tumor lysis syndrome. In this case report, we aimed to describe a male patient who developed tumor lysis syndrome due to high tumor burden. Laboratory testing on admission revealed acute renal failure, high anion gap metabolic acidosis, hyperuricemia, hyperkalemia, hyperphosphatemia, and hypocalcemia. The patient was diagnosed with spontaneous tumor lysis syndrome as a result of clinical and laboratory evaluations and he was hospitalized. This case report aimed to explain that tumor lysis syndrome may rarely develop spontaneously in solid organ tumors with high tumor burden.

Keywords: Tumor lysis syndrome; carcinoma; small cell; acute kidney injury

Tumor lysis syndrome is one of the most important oncological emergencies and may develop usually after cytotoxic chemotherapy. It is a clinical condition that occurs with the release of intracellular components from the malignant cell into the systemic circulation following chemotherapy.[1] This clinical condition is manifested by metabolic abnormalities that may occur during diagnosis, treatment, remission, or relapse periods of various malignancies. Rapid destruction and metabolism of tumor cells cause ions, proteins, and metabolic products from the cell to enter the circulation, which manifests with hyperuricemia, hyperkalemia, hyperphosphatemia, and hypocalcemia. In some cases, acute renal failure may occur. It should not be forgotten that hydration and diuresis should be provided, allopurinol/rasburicase drugs should be done, hyperuricemia should be controlled and dialysis treatment should be started when necessary.[2]

CASE REPORT

A 67-year-old male patient applied to the emergency department with complaints of fatigue and weakness. The duration of these symptoms was 5 days. It was learned that he had coronary artery disease and Stage 4 neuroendocrine lung carcinoma. He received his last topotecan chemotherapy 21 days ago, for the treatment of lung cancer and liver metastasis. There was no history of iodinated contrast imaging and nephrotoxic drug use before admission. On his physical examination, he was conscious, oriented, and cooperative. The skin was pale and icteric, the heart was rhythmic, the respiratory sounds were normal. There was tenderness in the right upper quadrant in the abdominal examination, the liver was palpable and there were no signs of dehydration. Urine output was decreased. Consent was obtained from the patient and he was hospitalized with a diagnosis of acute renal failure and tumor lysis syndrome.

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Intravenous hydration with 0.9% NaCl was started rapidly. Dextrose and insulin infusion was administered to correct the hyperpotasemia. Allopurinol 300 mg/day was started to reduce uric acid formation. A urinary catheter was inserted and close follow-up was started. He was evaluated daily for possible hemodialysis needs. Oral and intravenous hydration treatments were arranged according to his close follow-up. Urine output was supported with intravenous furosemide when urine output was unstable and the patient showed signs of volume overload. Venous blood gas analysis, urea, creatine, and electrolyte measurements were done daily. On the sixth day of his hospitalization, clinical and laboratory evaluations of the patient showed that acute renal failure improved. Hyperuricemia, hyperpotasemia, and hyperphosphatemia were all resolved. The patient did not need hemodialysis during his hospitalization. He was discharged on the seventh day of his hospitalization. The last laboratory values are summarized (Table 1). Positron emission tomography images of our patients are shared (Figure 1). As can be seen here, the tumor burden is quite high.

TABLE 1: Laboratory results.

	First visit	Last visit	Range	Units
pH	7.297	7.36	(7.35-7.45)	
$PaCO_2$	39.4	32	(35-45)	Mmol/L
HCO_3	19.2	18.3	(22-24)	Mmol/L
K	5.61	3.69	(3.5-5.1)	mEq/L
Ca	9.65	8.79	(8.6-10.2)	mg/dL
P	5.05	3.59	(2.8-4.5)	mg/dL
Uric asid	19.76	6.67	(3.4-7)	g/dL
Creatine	2.94	1.11	(0.6-1.2)	mg/dL

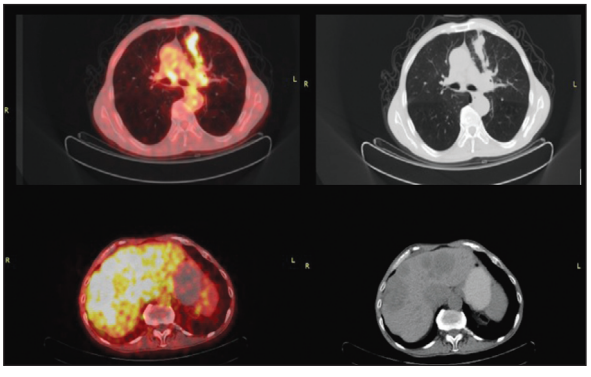

FIGURE 1: Maximum standardized uptake (SUV_{max}): 3.3 fluorodeoxyglucose (FDG) uptake is present in the left lung upper lobe anterior, nodular lesions in the area extending anteriorly from the hilar region, and reticulonodular density areas close to the paramediastinum. **There is SUV_{max}:** 4.6 FDG uptake in peripheral and heterogeneous hypodense lesions observed in multiple areas in the liver.

DISCUSSION

Tumor lysis syndrome is one of the most important oncological emergencies and may develop after chemotherapy or sometimes spontaneously. It is a condition that may occur after chemotherapy in all tumor types and malignancies, but aggressive hematological malignancies have a higher probability for this condition than solid tumors.[3] It is a condition manifested by metabolic abnormalities that can occur during diagnosis, treatment, remission, or relapse of various malignancies.[3]

In tumor lysis syndrome, various biochemical abnormalities may occur in the body due to excessive tumor cell destruction. The most common of these are hyperkalemia, hyperphosphatemia, hyperuricemia, and hypocalcemia.[4] Uric acid metabolites, which are easily soluble in normal urinary pH, form urate crystals due to the diminished urinary pH in the case of tumor lysis syndrome, causing an increase in the risk of renal failure by accumulating in the renal tubules. Acidosis and hyperkalemia in patients may deteriorate because of renal failure. Hyperkalemia is the most dangerous complication of tumor lysis syndrome that requires urgent intervention. Excessive amounts of phosphorus ions are released due to cell destruction. Hypocalcemia develops when phosphorus ions form calcium crystals together with calcium ions. Due to the low solubility of calcium phosphate crystals, they can accumulate in various parts of the body and cause systemic damage. As a result of hypocalcemia, the patient may develop conditions such as nausea, changes in consciousness, cramps, and carpopedal spasm.[5]

In this case report, we wanted to emphasize that spontaneous tumor lysis syndrome may develop in solid organ tumors depending on the tumor burden, and rapid diagnosis and treatment are life-saving. Spontaneous tumor lysis syndrome has been reported very rarely in solid tumors although more frequently seen in hematological malignancies. In our patient,

chemotherapy-induced tumor lysis syndrome was not considered because 3 weeks had passed since the last chemotherapy and the treatment response of the tumor was not good.

Spontaneous tumor lysis syndrome was mentioned for the first time in 2008 in a small cell lung cancer case. A limited number of case reports are observed in the literature.[2,6-8]

Myint and colleagues reported tumor lysis syndrome secondary to a small cell neuroendocrine carcinoma of unknown origin.[9]

Our case is also valuable in that it shows spontaneous tumor lysis syndrome may develop in patients with solid tumors with a high tumor burden. It is expected to be a guide for clinicians. Supportive treatment is important in patients with acute tumor lysis syndrome. Allopurinol is the treatment of choice to prevent uric acid formation. Rasburicase is one of the treatment options to reduce the urinary alkalinization requirement. Insulin and dextrose fluids, intravenous salbutamol, and calcium gluconate can be used in the treatment of hyperkalemia.[9] Hemodialysis may be needed if there is no improvement in acute renal failure despite effective hydration.[9] Providing hydration, rapid correction of hyperkalemia and other biochemical abnormalities, and reduction of uric acid formation should be aimed. Hydration with iso-osmolar fluids is of great importance to maintain urine output and prevent cardiac complications that may occur due to hyperkalemia.[10]

In our patient, renal functions improved with close follow-up and effective hydration without any need for hemodialysis. Lymphadenopathies, high white blood cell count, high serum lactate dehydrogenase level, hyperuricemia, and presence of renal disease have been stated as risk factors for the development of tumor lysis syndrome. Hydration and 400-600 mg/day allopurinol 2 days before chemotherapy for prophylaxis, in patients with risk factors or high tumor burden is effective.[10]

In conclusion, it is possible to prevent mortality and morbidity with early intervention, aggressive fluid support, close follow-up, and interventions in case of tumor lysis syndrome. However, it should be kept in mind that spontaneous tumor lysis syndrome may rarely develop in solid tumors.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Düriye Sıla Karagöz Özen;* ***Design:*** *Buğra Özel;* ***Control/Supervision:*** *Düriye Sıla Karagöz Özen;* ***Data Collection and/or Processing:*** *Buğra Özel;* ***Analysis and/or Interpretation:*** *Buğra Özel;* ***Literature Review:*** *Buğra Özel;* ***Writing the Article:*** *Buğra Özel;* ***Critical Review:*** *Düriye Sıla Karagöz Özen;* ***References and Fundings:*** *Ahmet Baran;* ***Materials:*** *Buğra Özel, Düriye Sıla Karagöz Özen, Ahmet Baran.*

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