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Case Report

CASE REPORT

Steroid-induced tumour lysis syndrome in small-cell lung cancer

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Abstract

A 64-year-old male presented to hospital with breathlessness and weight loss. Ultrasound-guided biopsy of supraclavicular lymph node confirmed a diagnosis of small-cell lung cancer. The patient was started on Dexamethasone 8 mg twice daily for symptom control while awaiting urgent oncology assessment. Three days later he was admitted with acute kidney injury and worsening breathlessness. Biochemical changes confirmed tumour lysis syndrome (TLS) that had occurred following steroid therapy. He was given allopurinol followed by rasburicase. His clinical condition continued to worsen and he died of multi-organ failure. To our knowledge, TLS in small-cell lung cancer solely attributed to steroid therapy has not been described before. Due to its rarity, physicians have a very low index of suspicion of TLS in lung cancer when prescribing corticosteroids for palliation of symptoms. Patients with risk factors should be identified and baseline blood tests performed and appropriate prophylaxis commenced.

CASE REPORT

A 64-year-old male was admitted to hospital with a 1-month history of increasing breathlessness, chest pain and weight loss. He was a current smoker of 30-pack years and alcohol intake was 20–30 units per week. He had a previous history of myocardial infarction. Regular medications included Atorvastatin, Ramipril, Amitriptyline, Clopidogrel, Thiamine and Vitamin B co-strong.

On examination positive findings included an enlarged right supraclavicular lymph node and stony dull percussion at the right lung base with reduced air entry.

Baseline blood tests showed normal full blood count, glucose, renal and liver function with a raised CRP of 85. Chest radiograph showed right moderate-sized pleural effusion. Pleural fluid aspiration confirmed an exudate with protein of 46 g/L (serum protein—65 g/L). CT scan demonstrated a 50 mm × 40 mm right hilar mass with mediastinal lymph nodes, a moderate right pleural effusion and patchy left lower lobe consolidation. Staging CT scan confirmed multiple liver metastases, left adrenal nodule and abdominal lymphadenopathy. Radiological appearances were consistent with metastatic lung cancer with a provisional staging of T4N3M1b.

An ultrasound-guided core biopsy of the supraclavicular lymph node was performed and the patient was discharged on Dexamethasone 8 mg twice daily to alleviate chest pain and breathlessness symptoms. Lymph node biopsy and pleural fluid cytology showed numerous groups of malignant cells consistent with metastatic small cell carcinoma with immunohistochemistry positive for CD56 and TTF1.

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He was re-admitted 3 days later with worsening breathlessness. Blood tests showed acute kidney injury (AKI) with a creatinine of 136 μmol/L (normal: 60–120 μmol/L) and deranged liver function (raised transaminase, alkaline phosphatase and g-GT). He was treated with intravenous fluids with monitoring of urine output, empirical antibiotics until sepsis excluded, whilst continuing on dexamethasone.

Urine output and renal function continued to decline with rising serum creatinine of 581 μmol/L accompanied with metabolic acidosis. Non-contrast renal CT showed multiple small renal calculi with mild bilateral hydronephrosis. He received right ureteric stent as an emergency procedure. Further blood tests showed uric acid level of 1520 mmol/L (normal: 200–430), potassium 4.4 mmol/L, phosphate 1.86 mmol/L (normal: 0.80–1.50), calcium 2.08 mmol (normal: 2.20–2.60). Biochemical abnormalities confirmed tumour lysis syndrome (TLS). Treatment continued with intravenous rehydration, and addition of allopurinol followed by rasburicase and.

The clinical condition continued to deteriorate, palliative care was instituted based on discussion with patient and family, and the patient died of multi-organ failure 8 days after hospital admission.

DISCUSSION

TLS, well recognized in leukaemia and lymphoma, is relatively rare in lung cancer. Lung cancer is the most common cause of cancer death in UK (around 36 000 deaths in 2014). A recent literature review [1] of published reports of TLS in solid tumours between 1950 and 2014 reported a total of 21 cases of TLS in lung cancer; 13 were of small cell and 8 cases were of non-small cell lung cancer. In another recently published observational retrospective study [2] of all patients with solid tumours diagnosed with TLS over a period of 16 years, a total of 19 patients were identified and only eight had lung cancer.

TLS predominantly occurs in bulky, rapidly proliferating and chemotherapy sensitive malignancies [3]. TLS is often seen following initial chemotherapy, but can also occur following therapies including surgery, radiotherapy and immunotherapy. Spontaneous cases have also been described [4]. Lysis of tumour cells result in the rapid release and accumulation of intracellular ions and metabolites [5]. These exhaust the body's homeostatic mechanisms resulting in the characteristic findings of hyperuricaemia, hyperkalaemia, hyperphosphataemia and hypocalcaemia [6]. These intracellular substances alongside released cytokines have potentially toxic effects leading to AKI, cardiac arrhythmias, seizures, multi-organ failure and eventually death [7].

Small-cell lung cancer (SCLC) is a prevalent tumour with ~7000 cases in the UK annually [8]. It is characterized by rapid tumour growth with two-third of patients presenting with extensive disease. Of the 13 cases of SCLC with TLS reported in literature review, 12 had metastatic disease and 11 were attributed to chemotherapy but none to steroid therapy alone. Steroids are often used in SCLC patients for the management of associated symptoms as well as brain metastases, spinal cord compression, lymphangitis and for palliating symptoms of advanced malignancy. To our knowledge, TLS in SCLC solely attributed to steroid therapy has not previously been described.

Due to its rarity, physicians have a very low index of suspicion of TLS during management of patients with lung cancer and may not consider the possibility at all when prescribing oral corticosteroids for palliation of symptoms. As a consequence screening is not performed, prophylaxis not given and the diagnosis is delayed or missed with detrimental outcome. TLS is an oncological emergency with mortality of around 15% [9] but in solid tumours including lung cancer where the index of suspicion is low mortality is significantly higher (30–60%) [2].

Diagnosis of laboratory TLS in adults requires at least two of the following abnormalities in a patient with cancer or undergoing treatment for cancer within three days prior to and up to seven days after initiation of treatment (uric acid ≥476 μmol/l or 25% increase from baseline, potassium ≥6.0 mmol/l or 25% increase from baseline, phosphate ≥1.45 mmol/l or 25% increase from baseline, calcium ≤1.75 mmol/l or 25% decrease from baseline). Clinical TLS requires the presence of laboratory TLS plus at least one of AKI (creatinine ≥1.5 upper limit of normal), seizures, cardiac arrhythmias or death. Our patient fulfilled the criteria for clinical TLS.

This report aims to increase the awareness of clinicians that TLS can result from the use of oral corticosteroid therapy in SCLC leading to potentially life-threatening complications. Large tumour burden, renal insufficiency, advanced age and concomitant use of drugs that increase uric acid levels are recognized risk factors. Patients with risk factors should be identified and baseline blood tests performed (serum lactate dehydrogenase, uric acid, phosphate, potassium and renal function). Prophylaxis should thereafter be considered in intermediate and high-risk patients [10] in the form of intravenous fluids, allopurinol (oral xanthine oxidase inhibitor) or rasburicase (exogenous recombinant urate oxidase).

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None to declare.

CONFLICT OF INTEREST STATEMENT

No conflicts of interest.

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ETHICS APPROVAL

Not required.

CONSENT

The patient provided consent for the work to be published before he deteriorated and passed away.

GUARANTOR

Dr Fasihul Khan.

REFERENCES

1. Mirrakhimov AE, Ali AM, Khan M, Barbaryan A. Tumor lysis syndrome in solid tumors: an up to date review of the literature. *Rare Tumors* 2014;**6**:5389.
2. Caravaca-Fontan F, Martinez-Saez O, Pampa-Saico S, Olmedo ME, Gomis A, Garrido P. Tumour lysis syndrome in solid tumours: clinical characteristics and prognosis. *Med Clin (Barc)* 2017;**148**:121–4.
3. Gemici C. Tumour lysis syndrome in solid tumours. *Clin Oncol (R Coll Radiol)* 2006;**18**:773–80.
4. Feld J, Mehta H, Burkes RL. Acute spontaneous tumour lysis syndrome in adenocarcinoma of the lung: a case report. *Am J Clin Oncol* 2000;**23**:491–3.

5. Soares M, Feres GA, Salluh JIF. Systemic inflammatory response syndrome and multiple organ dysfunction in patients with acute tumor lysis syndrome. *Clinics (Sao Paulo)* 2009;**64**:479–81.
6. Howard SC, Jones DP, Pui CH. The tumor lysis syndrome. *N Engl J Med* 2011;**364**:1844–54.
7. Kim JO, Jun DW, Tae HY, Lee KN, Lee OY, Choi HS, *et al*. Low-dose steroid-induced tumor lysis syndrome in a hepatocellular carcinoma patient. *Clin Mol Hepatol* 2015;**21**:85–8.
8. Cancer Research UK. www.cancerresearchuk.org
9. Pathak R, Giri S, Aryal MR, Karmacharya P, Thapaliya P, Donato AA. Predictors of in-hospital mortality in tumour lysis syndrome. *Blood* 2014;**124**:4862.
10. Cairo MS, Coiffier B, Reiter A, Younes A. Recommendations for the evaluation of risk and prophylaxis of tumour lysis syndrome (TLS) in adults and children with malignant diseases: an expert TLS panel consensus. *Br J Haematol*. 2010; **149**:578–86.