LETTER TO THE EDITOR

## Intraoperative tumor lysis-induced fatal hyperkalemia

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Received: 7 May 2012/Accepted: 28 May 2012/Published online: 9 June 2012 © Japanese Society of Anesthesiologists 2012

**Keywords** Surgery · Tumor lysis syndrome · Hyperkalemia

## To the Editor:

A 40-year-old man, highly suspected as having lymphoma, without having undergone any chemotherapy or radiation therapy, was scheduled to undergo exploratory laparotomy for a definite diagnosis. Laboratory examination revealed hyperuricemia (1,115  $\mu$ mol/l) and high lactate dehydrogenase (1,792 U/l) with normal serum potassium (3.9 mmol/l) upon admission to our hospital. Thus, oral allopurinol 200 mg three times a day was applied for 2 weeks to reduce the level of serum uric acid, which decreased to 303  $\mu$ mol/l; lactate dehydrogenase was reduced to 1,326 U/l, with a normal serum potassium (4.7 mmol/l) the day before operation.

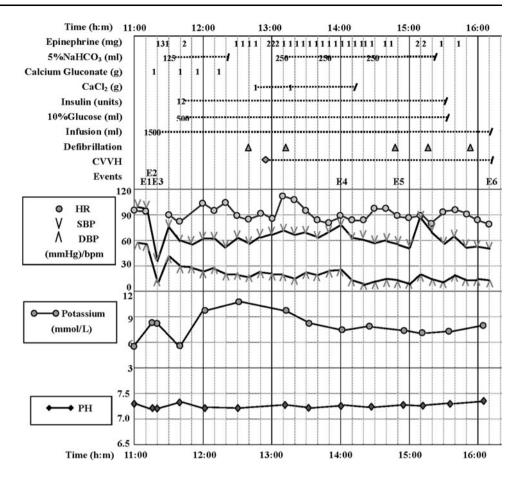
During the surgery with general anesthesia, the patient's blood pressure (BP) gradually decreased from the baseline of 112/65 to 72/38 mmHg when 1,000 ml ascites was suctioned and the tumor had been partially excised. Three consecutive doses of 10 mg ephedrine were administered intravenously without significant increase of BP. Phenyl-ephrine 0.3 mg was therefore given, which only elevated

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Y. G. Peng Department of Anesthesiology, University of Florida College of Medicine, Gainesville, FL, USA his BP to 98/56 mmHg. Furthermore, BP could not be maintained stably until phenylephrine infusion was initiated. The surgery was completed within 1 h. Unfortunately, 10 min after the patient arrived in the post-anesthetic care unit, his BP suddenly fell to 30/13 mmHg and cardiac arrest ensued. Cardiopulmonary resuscitation (CPR) was immediately performed. After intravenous injection of a total dosage of 5 mg epinephrine within 10 min, BP increased to 79/38 mmHg with cardiac massage. A synchronous arterial blood gas (ABG) revealed serum potassium 8.5 mmol/l, pH 7.21, PaO<sub>2</sub> 75 mmHg, PaCO<sub>2</sub> 37 mmHg, and base excess -13.7 mmol/l. Hyperkalemia-induced cardiac arrest was thus confirmed. Sinus rhythm did not recover despite repeated uses of epinephrine, calcium, sodium bicarbonate, insulin/glucose, and defibrillation with sustained CPR. ABG showed a progressive increase in serum potassium over 60 min (from 8.5 to 10.9 mmol/l). Thus, high-flow (6 l/h) continuous venovenous hemofiltration (CVVH) was instituted, and serum potassium slowly decreased to the range of 7 and 8 mmol/l (Fig. 1). The patient's pathological report at that time revealed the diagnosis of diffuse large B-cell lymphoma, and subsequent laboratory investigation showed hyperuricemia (967 µmol/l), hyperphosphatemia (1.87 mmol/l), and hypocalcemia (0.88 mmol/l), suggesting tumor lysis syndrome (TLS) as the cause of hyperkalemia. Regular cardiac rhythm and spontaneous circulation were not restored, and the resuscitation process was abandoned 5 h after the occurrence of cardiac arrest.

TLS often manifests as hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia, and renal failure in tumor patients, especially in those with lymphoma or leukemia after chemotherapy and radiotherapy [1, 2]. Clinicians should be vigilant for TLS in those tumor patients with preexisting high-risk factors of TLS and monitor perioperative serum potassium in series and in timely fashion

Fig. 1 Treatments, events, and changes in heart rate (HR), blood pressure (BP) [systolic blood pressure, SBP; diastolic blood pressure, DBP], and serum potassium following the end of the operation. CVVH continuous venovenous hemofiltration, El end of operation, E2 admission to ICU, E3 cardiac arrest, E4 pathological report, E5 laboratory investigations of uric acid, phosphorus, and calcium, E6 resuscitation abandoned



for the diagnosis and treatment of intraoperative TLS. However, tumor resection may be more harmful than beneficial to patients with this type of tumor in an active phase such as the patient presented here. Laparoscopic biopsy to make the necessary diagnosis and guide for chemotherapy or radiation therapy could be a better approach. Then, the tumor resection procedure may be delayed until tumor size and vasculature are minimized.

## References

- Davidson MB, Thakkar S, Hix JK, Bhandarkar ND, Wong A, Schreiber MJ. Pathophysiology, clinical consequences, and treatment of tumor lysis syndrome. Am J Med. 2004;116:546–54.
- 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.