

## Severe Hypokalemia Precipitated Under Anesthesia Due to Conventional Amphotericin B in a Patient with Invasive Aspergillosis

To the Editor,

Amphotericin B is often used in the therapeutics of potentially fatal fungal infections. Traditional amphotericin B (and less often the liposomal preparation) increases the permeability of macula densa thereby inappropriately activating tubuloglomerular feedback leading to excessive afferent arteriolar vasoconstriction, which can reduce the glomerular filtration rate (GFR) by more than one-half.<sup>[1]</sup> Other renal presentations, comprising of urinary potassium dissipation and hypokalemia, urinary magnesium drainage and hypomagnesemia, metabolic acidosis due to type 1 (or distal) renal tubular acidosis, and polyuria due to nephrogenic diabetes insipidus could also be provoked.<sup>[1,2]</sup> We report a case of invasive aspergillosis (with patient consent) on amphotericin B treatment who manifested severe hypokalemia under anesthesia.

A 40-year-old man, with poorly controlled diabetes mellitus, on high-dose insulin therapy, was posted for a left upper lobectomy for invasive pulmonary aspergillosis. He was started on liposomal amphotericin B. About 5 days prior to proposed surgery, his medication was changed over to conventional amphotericin B (1 mg/kg/day) since he could not afford the liposomal preparation any more. Serum electrolytes and renal function tests were closely monitored. On the morning of surgery, his serum K<sup>+</sup> level was 3.3 mEq/L, Mg<sup>++</sup> 1.2 mg/dL, and creatinine 1.24 mg/dL. Intraoperatively, the arterial blood gas (ABG) demonstrated a pH of 7.45, pCO<sub>2</sub> 34 mmHg, pO<sub>2</sub> 273 mmHg, and K<sup>+</sup> 1.54

mEq/L. The ECG was normal. Suspecting a fictitious value, a repeat ABG was done in another machine, by which time the patient had been initiated on one-lung ventilation. The new ABG showed a pH 7.47, pCO<sub>2</sub> 26 mmHg, pO<sub>2</sub> of 145 mmHg, and K<sup>+</sup> 1.19 mEq/L. Based on these results, intravenous K<sup>+</sup> correction was started at the rate of 5 mEq/hr. Mg<sup>++</sup> correction was also instituted alongside, with 5 g of Mg<sup>++</sup> at the rate of 1 g/hr. The surgical procedure was uneventful. Total input was 1700 ml of lactated Ringer's, and one unit of packed red cells. Urine output over a 3 & ½ hour procedure was 1,100 ml. The patient was ventilated postoperatively after changing the double-lumen tube to a single lumen endotracheal tube, and K<sup>+</sup> correction was continued. Serial K<sup>+</sup> estimations remained below 3 mEq/L for the entire day, despite nearly 180 mEq/L of K<sup>+</sup> being administered over the next 24 hours. The serum K<sup>+</sup> and Mg<sup>++</sup> values had normalized by the first postoperative day. The patient was extubated and put on oral K<sup>+</sup> supplementation 40 mEq/day in divided doses, with close monitoring of serum K<sup>+</sup> and Mg<sup>++</sup> levels, while amphotericin B therapy was continued into the postoperative period. On the second postoperative day, the serum K<sup>+</sup> had again declined to 2.3 mEq/L. The oral K<sup>+</sup> supplementation was increased to 80 mEq/day in divided doses. He demonstrated no further episodes of significant hypokalemia while on this dose of oral K<sup>+</sup> supplementation.

Risk constituents of amphotericin B nephrotoxicity involve male gender, high daily dose of amphotericin B

( $\geq 35$  mg/day), diuretic use, body weight  $\geq 90$  kg, use of nephrotoxic drugs, and poor renal function. Presentation of amphotericin B nephrotoxicity involves deficits in renal function, hypokalemia, hypomagnesemia, metabolic acidemia, and polyuria due to nephrogenic diabetes insipidus. Volume expansion with saline is believed to reduce nephrotoxicity. The communicated case demonstrated severe hypokalemia intraoperatively, in spite of mild hypokalemia (serum  $K^+$  3.3 mEq/l) on the morning of surgery. Constituent causes, apart from amphotericin B, could be high dose insulin therapy and intraoperative hyperventilation. Reports show that renal function is affected in more than 80% of patients on amphotericin B, with 15% of patients needing hemodialysis.<sup>[3]</sup> Naranjo's probability scale scored the adverse drug reaction as probable association with amphotericin B.<sup>[4]</sup>

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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### REFERENCES

1. Branch RA. Prevention of amphotericin B-induced renal impairment. A review on the use of sodium supplementation. *Arch Intern Med* 1988;148:2389-94.
2. Barton CH, Pahl M, Vaziri ND, Cesario T. Renal magnesium wasting associated with amphotericin B therapy. *Am J Med* 1984;77:471-4.
3. Wong KC, Schafer PG, Schultz JR. Hypokalemia and anesthetic implications. *Anesth Analg* 1993;77:1238-60.
4. Naranjo CA, Busto U, Sellers EM, Sandor P, Ruiz I, Roberts EA, *et al.* A method for estimating the probability of adverse drug reaction. *Clin Pharmacol Ther* 1981;8:239-45.

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