



Life-Threatening Mannitol-Induced Hyperkalemia in Neurosurgical Patients

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Introduction

Mannitol is the most commonly-used intraoperative hypertonic solution in patients undergoing craniotomy surgery. However, the use of mannitol has been reportedly associated with hyperkalemia that can be occasionally life-threatening.

Case Report

A 43 year-old male with history of adenocarcinoma of the colon underwent a right frontal craniotomy for resection of a metastatic lesion. At the time of skin incision, 0.7 g/kg of mannitol were infused over 20 minutes. One hour after completion of the mannitol infusion, the patient’s EKG began to exhibit peaked T-waves. Shortly thereafter, the patient developed ventricular tachycardia, followed by ventricular fibrillation and ultimately asystole. The Advanced Cardiac Life Support (ACLS) protocol was initiated immediately, and continued for about 40 minutes. Serum electrolytes showed significant hyperkalemia (K+ = 6.5 mEq/L).

After about 40 minutes, the patient spontaneously regained normal sinus rhythm. The tumor resection was completed in order to achieve hemostasis, and closure was performed with no further incidents. Postoperative cardiac evaluation revealed no cardiovascular abnormalities. The patient had an unremarkable postoperative course and was discharged home with no clinical sequelae.

Discussion

A handful of cases of mannitol-induced hyperkalemia have been reported in the literature. A comprehensive review of these cases suggests that patients prone to this phenomenon are young and healthy individuals with normal preoperative and postoperative cardiopulmonary and renal functions. Review of the literature also suggests that the total dose of mannitol, as well as its rate of infusion, may play a role in the development of this condition.

Conclusions

Mannitol-induced hyperkalemia is a rare and poorly understood phenomenon. However, when it occurs, it can be a severe and life-threatening complication for patients undergoing craniotomy. Knowledge of the existence of this condition is paramount for the neurosurgeon and the anesthesiologist, since early treatment with insulin and calcium can quickly restore the patient’s normal cardiac rhythm and prevent intraoperative death.

Learning Objectives

- Recognize mannitol as a potential cause of life-threatening intraoperative hyperkalemia.
- Patients undergoing mannitol infusions must undergo continuous EKG monitoring.
- Intraoperative mannitol-induced hyperkalemia is reversible with the use of calcium and insulin.

Selected References

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