Lesson of the Week

Potassium citrate mixture: soothing but not harmless?

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Potassium citrate mixture *BP* is widely used to relieve frequent painful micturition and is regarded as safe. We report two cases of severe hyperkalaemia after ingestion of this mixture. One of the patients was receiving therapeutic doses under supervision in hospital.

Case reports

Case 1—A 71 year old man developed a urinary tract infection secondary to an indwelling catheter four days after a planned resection of an abdominal aortic aneurysm. He complained of dysuria. After removal of the catheter he was prescribed oral trimethoprim and potassium citrate mixture *BP* 10 ml four times a day. Sodium concentration was 135 mmol/l, potassium 4.4 mmol/l, chloride 103 mmol/l, urea 7.0 mmol/l, creatinine 103 µmol/l, and bicarbonate 24 mmol/l. Five days later he became generally unwell with nausea and vomiting. Serum sodium concentration was 133 mmol/l, potassium 8.6 mmol/l, chloride 91 mmol/l, urea 9.9 mmol/l, creatinine 110 µmol/l, and bicarbonate 15.4 mmol/l. An electrocardiogram showed a right bundle branch block and peaked T waves. The potassium citrate mixture was stopped; he was given intravenous calcium gluconate, and a dextrose-insulin infusion was started. Within 36 hours his serum sodium concentration was 132 mmol/l, potassium 5.0 mmol/l, chloride 120 mmol/l, urea 6.5 mmol/l, creatinine 115 µmol/l, and bicarbonate 22 mmol/l; an electrocardiogram was within normal limits. Serum electrolyte concentrations thereafter remained within the normal range until his discharge home.

Case 2—A 55 year old woman presented at the casualty department after a fainting attack. She was unable to give a history and on examination was feverish (37.8°C) and tremulous and had suprapubic abdominal tenderness. Blood pressure, pulse, heart sounds, and results of a neurological examination were normal. Her husband said that she had recently had dysuria and urinary frequency, for which she was being treated with cephalexin by her general practitioner. For one week she had also taken about 400 ml potassium citrate mixture *BP*, which she had bought without prescription from a pharmacist. She was not taking any other drugs. Her sodium concentration was 140 mmol/l, potassium 8.8 mmol/l, urea 5.9 mmol/l, and glucose 6.9 mmol/l. Electrocardiography showed a nodal rhythm and peaked T waves. A midstream specimen of urine showed over 0.1×10^9 leucocytes/l and a profuse growth of *Escherichia coli*, which was resistant to cephalexin. Within 24 hours after treatment with calcium

Potassium citrate mixture may cause severe hyperkalaemia even when renal function is normal

gluconate and a dextrose-insulin infusion her serum potassium concentration was normal. The *E coli* infection responded to a course of ampicillin. Blood cultures done on admission and results of serial cardiac enzyme studies were normal. Subsequent investigations including intravenous urography, ultrasonography of the abdomen and kidneys, and measurement of creatinine clearance all yielded normal results.

Discussion

Potassium citrate mixture *BP* by its alkalinising action may relieve the discomfort of cystitis caused by infections of the lower urinary tract. The recommended dosage is 10 ml three or four times a day. Each 10 ml dose contains 28 mmol potassium. The *British National Formulary* warns against its use in patients with glomerular filtration rates of less than 20 ml/minute because of the risk of hyperkalaemia.¹ Despite previous reports that it causes hyperkalaemia^{2,3} it is still commonly used to relieve dysuria. In 1986 in 10 hospitals in the central Liverpool area 1000 bottles of 200 ml of the mixture were prescribed to inpatients (hospital pharmacy department, unpublished data). In 1985 (the most recent year for which data are available) general practitioners issued about 140 000 prescriptions for the mixture (Department of Health and Social Security Statistics and Research Division; unpublished estimate derived from sample of about one in 200 prescriptions dispensed by pharmacists in England). The mixture can also be bought without a prescription, but the amount bought in this way from retail pharmacists is not known.

These two cases show that there may be danger in using potassium citrate mixture *BP*, both in hospitals and in the community, even when renal function is normal. We suggest that when the mixture is used in hospital serum electrolyte concentrations should be monitored. It is worrying that the mixture can be bought without prescription from any retail pharmacist.

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References

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