CLINICAL RESEARCH

Absorption of 1.5% glycine after percutaneous ultrasonic lithotripsy for renal stone disease

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Abstract

An elderly normotensive man underwent percutaneous ultrasonic lithotripsy for renal stone disease, the procedure lasting three hours and the fragments being washed out with 20 l 1.5% glycine. After two hours the inflation pressure had risen to 25 cm H₂O and his blood pressure to 150 mm Hg. Inflation pressure continued to rise until drainage tubes were inserted into the retroperitoneal space, releasing a large volume of fluid, some of which appeared to be from the peritoneal cavity. Shortly after transfer to the recovery area the patient showed signs of the transurethral resection syndrome, with hyponatraemia, hyperkalaemia, and hypertension. He was treated appropriately and survived.

Low infusion pressures should be used for irrigation during lithotripsy and 0.9% saline instead of 1.5% glycine. In patients given a general anaesthetic any rise in inflation pressure suggests extravasation of fluid and warrants emergency estimation of the plasma sodium concentration.

Introduction

A case of extravasation of 1.5% glycine irrigant into the retroperitoneal space during percutaneous ultrasonic lithotripsy is reported. The patient developed the transurethral resection syndrome¹ of hyponatraemia, hyperkalaemia, and hypertension. Similar cases have recently been described.^{2,3} We report our experience with this syndrome.

Case history

A 68 year old man presented with haematuria, proteinuria, back pain, and frequency of micturition. An intravenous pyelogram showed a right renal calculus. His medical history contained nothing else of note and he was normotensive (130/80 mm Hg).

Ultrasonic lithotripsy entails inserting a percutaneous guide wire into the renal collecting system under x ray control. The track is then dilated and an endoscope passed along it. An ultrasonic probe is inserted to disintegrate the stone.

After insertion of the percutaneous guide wire anaesthesia was induced and intermittent positive pressure ventilation begun. The initial inflation pressure was 18 cm H₂O with the patient in the prone position. The procedure lasted three hours, during which 20 l 1.5% glycine was used as irrigation fluid. After two hours the inflation pressure had risen to 25 cm H₂O and the systolic blood pressure to 150 mm Hg despite increments of muscle relaxant and analgesia. The inflation pressure continued to rise to 35 cm H₂O by the end of the procedure. On turning the patient supine the abdomen was noted to be grossly distended and tense. Drainage tubes were inserted into the retroperitoneal space and a large volume of fluid released, some of which appeared to be from the peritoneal cavity.

The inflation pressure fell to 20 cm H₂O and the patient was transferred to the recovery area. A few minutes later the blood pressure rose to 250/140 mm Hg before being controlled by an infusion of sodium nitroprusside. In view of the possibility of the transurethral resection syndrome 100 ml sodium bicarbonate 8.4% (100 mmol(mEq)sodium) was given. The table shows the initial blood gas and serum electrolyte values. An infusion of 1.8% saline was then begun and 50 ml dextrose 50% with 20 units neutral insulin administered. Mannitol 20% 100 ml and initially frusemide 10 mg were also given. Two hours later, after 1000 ml 1.8% saline, the serum electrolyte concentrations had improved considerably (table). The patient was ventilated overnight. Serial glycine concentrations confirmed the absorption of large amounts of glycine (5779 µmol/l (434.0 µg/ml) postoperatively; in a subsequent patient concentrations measured during an uneventful percutaneous ultrasonic lithotripsy did not rise above 412 µmol/l (31.0 µg/ml)). One month later the patient was well and pain free.

Comment

Acute water overload with severe hyponatraemia is a potentially fatal complication of percutaneous ultrasonic lithotripsy. Glycine 1.5% is hypotonic (osmolality 200 mmol(mosmol)/kg) and will cause intravascular haemolysis if large quantities are absorbed. In percutaneous ultrasonic lithotripsy its non-electrolytic nature

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Initial serum electrolyte and blood gas values

Date and time	Sodium (mmol/l)	Potassium (mmol/l)	Chloride (mmol/l)	Carbon dioxide (mmol/l)	Urea (mmol/l)	Creatinine (μmol/l)	Fractional inspired oxygen	Hydrogen (nmol/l)	Arterial partial pressure of carbon dioxide (kPa)	Base excess (mmol/l)	Arterial partial pressure of oxygen (kPa)	Glycine (μmol/l) (normal 176-332)
Before operation	141	4.3	100	31	6.3	100						
17 Sept 1745	108*	6.8*	81*	18*	5.7*	90*	0.4†	50†	5.6†	-5†	15.2†	5779
2000	132	3.3	94	22	6.5	130	0.4†	50†	5.3†	-6†	10.8†	3471
2400	134	3.9	100	23	8.8	110						1813
18 Sept 0800	136	3.7	102	26	8.9	100	0.21	38	5.5	+2	8.8	415
2000												

*Haemolysed.

†Ventilated.

Conversion: SI to traditional units—Sodium, potassium, chloride: 1 mmol/l=1 mEq/l. Carbon dioxide: 1 mmol/l=4.4 mg/100 ml. Urea 1 mmol/l=6 mg/100 ml. Creatinine: 1 μmol/l=0.01 mg/100 ml. Hydrogen: 1 nmol/l=1 pg/ml. Pressure of carbon dioxide: 1 kPa=7.5 mm Hg. Base excess: 1 mmol/l=1 mEq/l. Pressure of oxygen: 1 kPa=7.5 mm Hg. Glycine: 1 μmol/l=0.08 μg/ml.

(which avoids dissipation of diathermy currents in prostatic surgery) is unnecessary. An isosmotic electrolytic solution such as 0.9% saline may be substituted.² In the event of extravasation of this solution hyponatraemia and haemolysis would not occur and the slower rate of expansion of the intravascular space would be less of a challenge to the cardiovascular system.

In this case the infusion into the retroperitoneal space of a large volume of 1.5% glycine led to an increase in inflation pressure, an increase in intravascular volume with hypertension, and hyponatraemia and hyperkalaemia secondary to intravascular haemolysis. The signs and symptoms of acute hyponatraemia with water overload in the central nervous system (apprehension, restlessness, headache, nausea, vomiting, confusion, coma, convulsions, paralysis) are masked by general anaesthesia. Thus cardio-respiratory signs become important (severe hypertension, bradycardia, dyspnoea, cyanosis, increased amplitude of QRS complex, T wave inversion).^{3,4}

To avoid extravasation of large quantities of irrigant solution we suggest the use of low infusion pressures (60-70 cm H₂O) and measurement of the volume of irrigant going into and returning

from the patient. To reduce the effects of extravasation should it occur the use of 0.9% saline as irrigant solution is suggested and regional anaesthesia will allow detection of early changes in the central nervous system. With general anaesthesia raised inflation pressure suggests extravasation and, if suspected, emergency estimation of the plasma sodium concentration should be carried out.

We thank Mr R Scott for his permission to report this case.

References

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Prolonged use of nitrazepam for epilepsy in children with tuberous sclerosis

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Abstract

A case note study of 90 children with tuberous sclerosis showed that 56 had taken nitrazepam for seizures for from one month to 13 years. In 38 children nitrazepam was withdrawn but only two had immediate major seizures. Given that sleepiness, deterioration in motor skills, or ataxia seems to be associated in some children with treatment with nitrazepam, doctors may wish to review their long term prescriptions of this drug in children with tuberous sclerosis.

Introduction

Nitrazepam has been used since the 1960s to treat those myoclonic epilepsies of infancy and childhood that do not respond to general anticonvulsants.¹ Tolerance may develop within months, leading to increased doses over time.² No controlled study of this use of nitrazepam exists, and little attention has been paid to its possible side effects in small children.

Method and results

We made a case note study of 90 children with tuberous sclerosis attending hospital paediatric departments in Great Britain. The children were aged 5 or more at the time of the study.

Out of 86 children with seizures, 73 had had infantile spasms or childhood myoclonic epilepsy, or both. Fifty six had been given nitrazepam for from one month to 13 years. In 26 children seizures were moderated or stopped for at least a few months after nitrazepam was administered. No change in pattern or number of seizures was recorded for the 30 other children. The obvious consequence should therefore have been to stop giving the drug to these children. This was not necessarily the case.

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