1.31×10^9 /l after she was discharged. Results of liver function tests and lumbar puncture were normal. The titre of influenza A antibody was 256.

During the first week she remained febrile and semi-conscious. She was treated with oxygen, parenteral nutrition, physiotherapy, and tracheal aspiration of tenacious green sputum. Erythromycin was stopped after 72 hours, when antibodies to *Legionella* were shown to be absent. Five days after admission invasive pulmonary aspergillosis was diagnosed on the basis of persistent fever, diffuse radiographic changes, and densely branched septate hyphae in the tracheal aspirate, from which numerous colonies of *Aspergillus fumigatus* (sensitive to flucytosine and amphotericin) were cultured. Precipitins to *A. fumigatus* were absent on gel diffusion.

Amphotericin B (initially 15 mg daily but increasing over four days to 60 mg daily) and flucytosine (2.5 g four times daily) were given intravenously. After a week the flucytosine was given by nasogastric tube. There was a striking clinical improvement (figure): her temperature fell, the tracheal aspirate became mucoid, the colony count decreased, and hyphal fragments became smaller and less abundant. A recurrence of fever and green sputum owing to infection with *Staphylococcus aureus* responded to flucloxacillin. Blood urea concentration rose to 18.6 mmol/l (112 mg/100 ml), however, necessitating withdrawal of amphotericin after 460 mg had been given. Four days later flucytosine was stopped. Meanwhile, fever had recurred and the sputum had again become green and contained abundant large viable fragments of *A. fumigatus*, so econazole 200 mg thrice daily intravenously was started. Thereafter the temperature dropped and the sputum, although still containing hyphae, became sterile. The profusion and apparent viability of hyphae in sputum were assessed daily as a guide to treatment. Subsequently the sputum smears were arranged in random order and assessed on two occasions on an arbitrary 10-point scale, with five as a maximum each for profusion and fragment size. These readings are recorded in the figure as sputum score.

Clinical course of disease, showing temperature, drug regimen, sputum hyphae score (measured on two occasions (see text)), and sputum *A. fumigatus* colony count.

Econazole was stopped after 18 days, when she had been afebrile and free of sputum for a week. Renal function had returned to normal. The chest film was finally clear nine weeks after admission. Neurological recovery, apart from some amnesia, was complete within two months.

Comment

While invasive pulmonary aspergillosis usually occurs in immunosuppressed hosts, it has occasionally been described after influenza,¹⁻³ which may, as in our patient, depress T lymphocytes. In all such published reports the disease has proved fatal; nevertheless, our patient shows that it may respond to treatment if diagnosed promptly. The key to such diagnosis lies in the demonstration of characteristic densely branching hyphae in sputum, tracheal aspirate, or a lung biopsy specimen in a patient with signs of systemic infection and diffuse pulmonary infiltrates. Culture will produce typical colonies of *Aspergillus*, though serum precipitins are usually absent.

In the treatment of aspergillosis amphotericin is the drug of choice either alone or in combination with flucytosine when the isolate is sensitive. Emergence of resistance to flucytosine is prevented by adding amphotericin,⁴ whose dose, and hence toxicity, may be reduced. Econazole has been used successfully in the treatment of aspergillosis,⁵ and our results suggest that it merits further evaluation.

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Administration of potassium by subcutaneous infusion in elderly patients

Fluid administration by the subcutaneous route or hypodermoclysis was once a common procedure; the development of the intravenous drip infusion, however, led to its virtual abandonment. Recently, hypodermoclysis has been shown to be an excellent method for giving fluid supplements to elderly patients where their need is not urgent and has few side effects when modern equipment is used.^{1 2 3}

Although the possibility of giving potassium by hypodermoclysis has been reported,^{4 5} we could not find a detailed description of the technique or of its practical applications. We describe our experience of giving potassium by the subcutaneous route.

Patients, methods, and results

Isotonic solutions of glucose or of saline were made up containing potassium chloride in amounts of up to 34 mmol/l. To each 500-ml pack, 750 IU of hyaluronidase were added. The injection sites, on the anterolateral aspect of the middle third of each thigh, were cleansed with alcohol and povidone-iodine. Two standard intravenous infusion sets were used with No 20 needles. The needles were inserted deep into the subcutaneous tissues in the direction of the patient's head. The rate of infusion was adjusted so that the patient received 1 litre in three to four hours.

A total of 350 infusions were given to 67 patients (average age 82) with no side effects whatsoever. In those few cases where the patient complained of discomfort, relief was obtained by slowing the drip rate. The main indication for giving potassium was mild deficiency (with serum concentrations of 3.0 to 3.5 mmol(mEq)/l) or conditions liable to cause hypokalemia such as gastrointestinal disturbances or difficulty in ingesting food. The serum potassium concentration was monitored during and after the infusion and never rose by more than 1.0 mmol/l. Patients with severe electrolyte imbalance were given intravenous infusions.

Most infusions (30) were given over two months to an 84-year-old woman who had undergone surgery for a fractured neck of the femur and had Parkinsonism and dysphagia; she received 18 mmol potassium a day. The largest amount of potassium in an infusion was given to a hemiplegic patient whose serum potassium concentration fell to 3.2 mmol/l because of vomiting; he received 60 mmol of potassium in 2 litres of glucose and saline solutions every day for a week, the potassium concentration returning to normal within three days.

Comment

The serious side effects of intravenous infusions, such as thrombophlebitis, systemic infection, and embolism, are not seen in hypodermoclysis.² Moreover, hypodermoclysis has further advantages in the elderly: not only does it obviate the pain and distress caused by searching for fragile and elusive veins but, since the infusion is over in a few hours, the patient is not immobilised for long periods as so often happens when the intravenous route is used.

We found hypodermoclysis to be a safe and acceptable method for

giving potassium supplements to elderly patients where their need is not urgent. Since the absorption of fluid from the infusion site is slow, we do not recommend this method for giving potassium when large amounts are needed urgently. There seems to be no danger of hyperkalemia with the method used here.

Although hypodermoclysis is suitable for use in nursing homes, we feel that subcutaneous potassium infusions should be given only in hospitals until more experience is gained.

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Estimation of urine specific gravity and osmolality using a simple reagent strip

A recently developed reagent strip, now incorporated into an existing multiple test strip, provides a guide to urine specific gravity and osmolality and is quicker and simpler to use than the traditional methods of assessing urinary concentration. This method requires only a small volume of urine and is therefore an improvement on hydrometry, which is not always practical in patients with reduced urine volumes, from whom results are often of most interest.¹ The new strip was evaluated against traditional methods.

Methods and results

The strip test now incorporated on N-Multistix SG (Ames), is based on the pKa change of pretreated polyelectrolytes in relation to the concentration of cations in urine. Fresh urine was obtained from healthy controls, medical inpatients, diabetic patients with glycosuria, and patients with serious renal disorders. The urine was tested by the strip method; specific gravity was also measured by hydrometry and refractometry and osmolality by freezing-point depression.

There were satisfactory correlations between specific gravity as measured by hydrometer and by the strip in all groups except diabetics with 2% glycosuria (specific gravity measured traditionally does not reflect osmolality in patients with glycosuria) (correlation coefficients: controls 0.93, all patients 0.83, individual patient groups 0.80-0.86, diabetics 0.78). Osmolality as measured by traditional methods and by the strip correlated well in diabetics, with 85% strip agreement to within 0.005 with osmolality classification; there were reasonable correlations in other groups (coefficients: controls 0.90, diabetics 0.82, all patients 0.78). Measurements of refractometry correlated well with results of the strip test in all groups.

Results of strip test compared with hydrometer reading and osmolality

Strip	Hydrometer reading							Osmolality (mOsm/kg)							
	1.000-1.002	1.003-1.007	1.008-1.012	1.013-1.017	1.018-1.022	1.023-1.027	1.028-1.032	0-75	75-225	226-375	376-525	526-675	676-825	826-975	976+
1.000	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1.005	8	0	2	0	0	0	0	1	3	12	3	1	0	0	0
1.010	0	19	12	3	2	2	0	0	0	16	12	8	2	0	0
1.015	0	2	11	5	3	1	0	0	0	2	7	8	4	1	0
1.020	0	0	3	6	4	2	1	0	0	1	2	7	3	1	2
1.025	0	0	0	3	3	1	0	0	0	0	0	2	2	3	0
1.030	0	0	0	0	4	3	0	0	0	0	0	0	4	1	2

The table shows results of strip tests compared with those of traditional methods.

Comment

The correlations between results of traditional methods and those of the new strip test suggest that the strip test provides similar information more quickly and more easily. In most of the few patients with a discrepancy between results of hydrometry, refractometry, tests of osmolality, and strip testing this was unlikely to be misleading, as in clinical practice urines are classified as "concentrated," "isotonic," or "dilute."

An unexplained overestimate of strip specific gravity in three patients with rejecting kidney transplants merits further investigation. Clinical experience may show other examples of non-correlation; these are no more likely to be clinically confusing than any other traditional tests when used in isolation from other information to make major decisions.

The "specific gravity" estimated by N-Multistix SG appears a satisfactory alternative to ward testing by hydrometry. It will save nursing time—and perhaps money, as hydrometers break. In patients with diabetes and heavy glycosuria the strip is an improvement on hydrometry and refractometry, and with other patients it is more convenient. The new test allows assessment of urine concentration when only small volumes of urine are available. In textbooks describing hydrometry,^{2,3} corrections are suggested for temperature, protein, and glucose; a pH correction is recommended by the manufacturers of the strip. In our opinion these correction factors provide a precision not usually needed in clinical practice. Infected urine (often detectable by the nitrite test on these strips) or urine with a high pH may be stale, and results should be interpreted with caution.

Measurement of specific gravity by hydrometry is a task often "routinely" performed by nursing staff, but with results rarely used and sometimes not understood by medical staff. It is also, by tradition, part of many examinations for insurance, employment, and other purposes. Osmolality should be measured in problem patients, but few laboratories are prepared to process large numbers of specimens, and there is limited enthusiasm for out-of-hours requests: measurement of urine osmolality should not be a "routine" investigation. Information on urine concentration, however, may be useful and patients might receive inappropriate fluid regimens less often if doctors used the information on urine concentration collected for them by the nursing staff. The introduction of strip testing may stimulate doctors to consider more carefully how to use measurements of urine concentration and make it much easier to measure at the bedside.

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