continue to use whatever treatment we see fit. I am grateful to the General Medical Council for opposing the attempt to unseat me. Their "inaction" was not a failure but a positive step towards defending that freedom.

- 1 Kay AB. Alternative allergy and the GMC. *BMJ* 1993;306:122-4.
- 2 Rusznak C, Devalia JL, Herdman MJ, Davies RJ. The effect of six hours exposure to 400 PPB nitrogen dioxide and/or 200 PPB sulphur dioxide on inhaled allergen response in mild of asthmatic subjects. *Clin Exp Allergy* (in press).
- 3 Hardin JA, Hinoshita F, Short DH. Mechanism by which benzopyrene, an environmental carcinogen, suppresses B cell lymphocytes. *Toxicol Appl Pharmacol* 1992;117:155-64.
- 4 Calman KC. *Chief Medical Officer's letter*. London: Department of Health, 1992; 26 Oct.
- 5 Littlewood J, Glover V, Sandler M, Petty R, Peatfield R, Clifford Rose F. Platelet phenolsulphotransferase deficiency in dietary migraine. *Lancet* 1982;ii:983.
- 6 Smith CAD, Gough AC, Leigh PN, Summers BA, Harding AE, Maraganore DM, et al. Debrisoquine hydroxylase gene pleomorphism and susceptibility to Parkinson's disease. *Lancet* 1992;339:1375-7.
- 7 Waring RH, Stusman SG, Smith MCG, Steventon GB, Heathfield MTE, Williams AC. S-methylation in motor neurone disease and Parkinson's disease. *Lancet* 1989;iii:356-7.
- 8 Barbeau A, Cloutier T, Roy M, Plasse L, Paris S, Poirier J. Ecogenetics of Parkinson's disease: 4 hydroxylation of debrisoquine. *Lancet* 1985;ii:1213.
- 9 Royal College of Physicians Committee on Clinical Immunology and Allergy. *Allergy: conventional and alternative concepts*. London: RCP, 1992.

- 10 King WP. Provocation-neutralisation: a two part study: 1 the intracutaneous provocation food test. *Otolaryngol Head Neck Surg* 1988;99:263-71.
- 11 King WP. Provocation-neutralisation: a two part study: 2 subcutaneous neutralisation therapy. *Otolaryngol Head Neck Surg* 1988;99:272-7.
- 12 Rea WJ, Podell RN, Williams ML, Fenyves E, Sprague DE, Johnson AR. Elimination of oral food challenge reaction by injection of food extracts. *Arch Otolaryngol* 1984;110:248-52.
- 13 Scadding GK, Brostoff J. Low dose sublingual therapy in patients with allergic rhinitis due to house dust mite. *Clinical Allergy* 1986;16:483-91.
- 14 Jewett DL, Fein G, Greenberg MH. A double-blind study of symptoms provocation to determine food sensitivity. *N Engl J Med* 1990;323:429-33.
- 15 American Academy of Allergy and Immunology. Position statements—clinical ecology. *J Allergy Clin Immunol* 1986;78:269-70.
- 16 Crawford LV. A double blind study of sublingual provocative food testing. *J Allergy Clin Immunol* 1976;57:236.
- 17 Kailin E, Collier R. "Relieving" therapy for antigen exposure. *JAMA* 1971;217:78.
- 18 Bronsky EA, Burkley DP, Ellis EF. Evaluation of the provocative food skin test technique. *J Allergy* 1971;47:104.
- 19 Caplin I, Bronsky EA, Crozier W, Dickstein B, Exline L, Hale R, et al. Report of the committee on provocative food testing. *Ann Allergy* 1973;31:375-81.
- 20 Breneman JC, Crook WC, Denver W, Exline L, Gerrard JW, Heiner D, et al. Report of the Food Allergy Committee on the sublingual method of provocative testing for food allergy. *Ann Allergy* 1973;31:382-5.
- 21 Breneman JC, Hurst A, Heiner D, Leney FL, Morris D, Josephson BM. Final report of the Food Allergy Committee on the sublingual method of provocative testing for food allergy. *Ann Allergy* 1974;33:164.
- 22 Rowan RJ. Alaska legislature miracle—freedom of choice. *Health Care Rights Advocate* 1990;5:4.

(Accepted 23 July 1993)

Lesson of the Week

Severe lactic acidosis in patient receiving continuous ambulatory peritoneal dialysis

Izhar H Khan, Graeme R D Catto, Alison M MacLeod

Ensure that diabetic patients who develop impaired renal function are not taking metformin

The use of metformin in non-insulin diabetic patients with renal failure is contraindicated because of the risk of developing lactic acidosis. The condition is fatal in up to 80% of these patients. We report a case of acidosis in a woman started on metformin when her renal function was normal but whose treatment was not stopped when renal failure developed.

Case report

A 76 year old woman with non-insulin dependent diabetes was started on continuous ambulatory peritoneal dialysis in 1991 for end stage renal failure. In 1987 she had been started on metformin in the diabetic clinic. Her serum creatinine concentration at that time was normal ($<110 \mu\text{mol/l}$). In October 1990 she developed complete heart block after a myocardial infarction and a permanent pacemaker was implanted.

She was admitted on 1 January 1993 with a 24 hour history of general debility and drowsiness. She was taking nifedipine 40 mg, metformin 1000 mg, thyroxine 0.05 mg, and calcium carbonate 1500 mg daily in divided doses. Her dialysis regimen comprised four 2 litre exchanges ($2 \times 3.86\%$ and $2 \times 1.36\%$) daily. She had not taken aspirin or alcohol. On examination her breath was acidotic and she had hypotension (90/50 mm Hg), hypothermia with a rectal temperature of 34.5°C , and a paced cardiac rhythm. Arterial blood gas concentrations on 24% oxygen were oxygen 22.3 kPa, carbon dioxide 1.6 kPa. Results of other relevant investigations were pH 6.94, standard bicarbonate 5.0 mmol/l, base excess -29 mmol/l , carbon dioxide 4 mmol/l, chloride 98 mmol/l, and creatinine 773 $\mu\text{mol/l}$. Her calculated anion gap was 41 mmol and blood glucose concentration 15.6 mmol/l.

Severe lactic acidosis was confirmed by a serum venous lactate concentration of 28 mmol/l (normal 1-2 mmol/l). Investigations excluded peritonitis, liver dysfunction, and myocardial infarction. Her dialysate was drained and she was started on intravenous sodium

bicarbonate. She was given two exchanges with 2 litres of peritoneal dialysate prepared with bicarbonate buffer, according to the method described by Ing *et al*.¹ In view of severe hypotension and myocardial depression she was not given haemodialysis. Despite these measures she became comatose, her acidosis remained refractory, and she died 20 hours after admission.

Discussion

Prompted by this case we examined the use of metformin in patients with renal impairment. We found that in Grampian metformin had been used in 13 out of 28 patients with non-insulin dependent diabetes who had a serum creatinine concentration above 300 (range 301-1062) $\mu\text{mol/l}$ during 1 July 1989 to 30 June 1990 and which did not return to normal over the subsequent two years (or till death, whichever occurred first). During this period metformin was stopped in five patients. One further patient continued to be given metformin as he refused treatment with insulin.

This case and our survey highlight two important considerations in managing diabetic patients with renal impairment. Firstly, it is essential to consider stopping metformin if the patient develops renal failure or myocardial ischaemia. Our patient was started on metformin when her renal function was normal but unfortunately this was overlooked when renal failure developed. Our survey of renal failure showed that metformin is often given to patients with renal failure. We may have underestimated the use of metformin in renal impairment as we examined only patients with a serum creatinine concentration of 300 $\mu\text{mol/l}$ or above.

Secondly, it is important to recognise that lactate is used as buffer in almost all currently available peritoneal dialysate solutions. Lactate is absorbed at a rate of 25 mEq/hour throughout 24 hours of peritoneal dialysis,² so dialysis with lactate buffer must be stopped whenever lactic acidosis is suspected. Lactate dehydrogenase catalyses the conversion of lactate to

Renal Unit, Aberdeen
Royal Infirmary, Aberdeen
AB9 2ZD
Izhar H Khan, research fellow
Graeme R D Catto, professor
Alison M MacLeod, senior lecturer

Correspondence to:
Dr I H Khan, Department of
Medicine and Therapeutics,
Polwarth Building,
Foresterhill, Aberdeen
AB9 2ZD

BMJ 1993;307:1056-7

pyruvate, which is converted to carbon dioxide and water in the citric acid cycle. Peritoneal dialysate contains a racemic mixture of both D and L isomers of lactate and mammals lack D-lactic dehydrogenase and are slower in metabolising D-lactate.³

There is only one previously reported case of lactic acidosis in a patient receiving peritoneal dialysis, which like our case was related to metformin.⁴ Severe lactic acidosis has a mortality of about 80% despite treatment. Acetate and bicarbonate are alternatives to lactate as buffers for peritoneal dialysate. The use of acetate, however, has largely been abandoned because of its association with loss of ultrafiltration and sclerosing encapsulated peritonitis.⁵ Bicarbonate would be the ideal buffer but solutions containing bicarbonate are difficult to prepare and sterilise because of precipitation of insoluble calcium salts. It is, however, possible to prepare bicarbonate based dialysate for use in patients with lactic acidosis.^{6,7}

We thank Dr I Broom for reviewing the manuscript and for the lactate assay. The study was supported by a grant from the clinical resource and audit group of the Scottish Home and Health Department.

- 1 Ing TS, Quon MJ, Daugirdas JT, Lui P, Gandhi VC, Reid RR. On-line preparation of bicarbonate-containing dialysate for use in peritoneal dialysis. *Int J Artif Organs* 1981;4:308.
- 2 Dixon SR, McKean WL, Pryor JE, Irvine ROH. Changes in acid-base balance during peritoneal dialysis with fluid containing lactate ions. *Clin Sci* 1970;39:51-60.
- 3 Oh MS, Uribarri J, Alveranga D, Lazar I, Basilinski N, Carroll HJ. Metabolic utilisation and renal handling of D-lactate in men. *Metabolism* 1985;34:621-5.
- 4 Lin PS, Huang CC, Wei JS. Metformin-induced lactic acidosis: report of a case. *Taiwan I Hsueh Hua Tsa Chih [Journal of the Formosan Medical Association]* 1992;91:374-6.
- 5 Faller B, Marichal JF. Loss of ultrafiltration in CAPD: a role for acetate. *Peritoneal Dialysis Bulletin* 1984;4:10-3.
- 6 Varizi ND, Ness R, Wellikson L, Barton C, Greep N. Bicarbonate-buffered peritoneal dialysis. *Am J Med* 1979;67:392-6.
- 7 Naparstek Y, Freidlaender MM, Rubinger D, Popovtzer MM. Lactic acidosis and peritoneal dialysis. *Israel J Med Sci* 1982;18:513-4.

(Accepted 26 May 1993)

"Postretirement polydipsia" mimicking prostatism

T S O'Brien, D C Hanbury, D Cranston

Exclude excessive drinking as a cause of urinary frequency before considering prostatic disease

Frequency of micturition is a common symptom of bladder outflow obstruction, but it may merely reflect polyuria. We describe two patients referred for consideration of prostatic surgery in whom the frequency developed shortly after retirement from full time work. In each case the frequency was caused by excessive drinking and responded to a reduction in fluid intake.

Case 1—A 67 year old man presented with a two year history of frequency and nocturia. He passed urine seven times a day and twice by night. There was no hesitancy or dribbling but he described the stream as poor. He had retired two years earlier. Rectal examination showed a large smooth prostate gland. Maximum urinary flow rate was 15 ml/s. There was no glycosuria and the serum creatinine concentration was normal. The urine was sterile. A daily fluid intake-output record kept for one week showed an average fluid intake of 4 litres a day, mostly of tea. After reducing his fluid intake to 2 litres a day the frequency improved to four times a day and once at night. He was satisfied and was discharged.

Case 2—A 63 year old man presented with an 18 month history of frequency and nocturia. He passed urine eight times a day and three times at night. He complained of hesitancy and described the stream as moderate. Two years earlier he had retired. Rectal examination showed a moderately enlarged prostate. Maximum urinary flow rate was 11 ml/s. There was no glycosuria and the serum creatinine concentration was normal. The urine was sterile. A daily fluid intake-output record kept for one week showed an average fluid intake of 4.5 litres a day, mostly of tea. After he halved his consumption of tea the frequency improved to five times a day and once at night. He was delighted and was discharged.

Comment

Fifteen to 20 per cent of elderly men will at some time undergo prostatic surgery,¹ and in 70% frequency will be a presenting symptom.² In the presence of hesitancy and low urinary flow rates frequency is usually explained by bladder outflow obstruction, and medical or surgical treatment will usually be effective.²

Frequency may, however, be caused by polyuria, detrusor instability, or urinary tract infection. In these conditions surgery is helpful only if there is evidence of

bladder outflow obstruction. Polyuria may reflect underlying organic disease such as uraemia, diabetes, or hypercalcaemia, or it may be secondary to excessive drinking. Polydipsia is readily identified from daily fluid intake-output measurements recorded for one week by the patient. Both these patients had fluid intakes exceeding 4 litres a day. Neither had evidence of severe bladder outflow obstruction on urinary flow rate testing (normal maximum flow rate is about 18-30 ml/s), although both had complained of a poor urinary stream and had moderately enlarged prostates on rectal examination. Both were surprised by the evidence of the fluid charts but admitted that since retirement they had had more opportunity to "relax with a cup of tea."

Attention has recently focused on the delays that patients may face before a urological outpatient consultation.^{3,4} One solution is to investigate and treat patients in the community. As retirement and benign prostatic hypertrophy often occur simultaneously in a man's life and may produce similar symptoms, we recommend that "postretirement polydipsia" is excluded as a cause of frequency before referral to a urology service. The diagnosis is easily made on the basis of a frequency-volume chart. If the true cause of the frequency turns out to be a large fluid intake then even severe symptoms may be relieved promptly by reducing intake—at no cost and without resort to drugs or surgery.

- 1 McKelvie GB, Collins GN, Hehir M, Rogers ACN. A study of benign prostatic hyperplasia—a challenge to British urology. *Br J Urol* 1993;71:38-42.
- 2 Doll HA, Black NA, McPherson K, Flood AB, Williams GB, Smith JC. Mortality, morbidity and complications following TURP. *J Urol* 1992;147:1566-73.
- 3 German K, Nuwahid F, Matthews P, Stephenson T. Dangers of long waiting for outpatient appointments at a urology clinic. *BMJ* 1993;306:429.
- 4 Pope C. Waiting times for outpatient appointments. *BMJ* 1993;306:408-9.

(Accepted 9 June 1993)

Department of Urology,
Churchill Hospital, Oxford
OX3 7LJ
T S O'Brien, registrar
D C Hanbury, senior registrar
D Cranston, consultant

Correspondence to:
Mr O'Brien.

BMJ 1993;307:1057

Correction

Assessment of thyroid status in elderly people

This fortnightly review by Peter Rae *et al* (17 July, pp 177-80) was commissioned by the Association of Clinical Biochemists, although this fact was omitted from the published review.