SHORT REPORTS

Plasma exchange v peritoneal dialysis for removing Bence Jones protein

A major cause of renal failure in multiple myeloma is damage by light chains or Bence Jones protein (BJP). Serum BJP concentrations may rise in renal failure¹⁻³ to levels comparable to or above those in the urine. It is therefore rational to attempt their removal to prevent further damage, but the value of doing so in practice remains uncertain.¹ Because BJP molecules are relatively small it seemed possible that appreciable quantities could be removed by peritoneal dialysis. We have recently treated a patient with both plasma exchange and peritoneal dialysis and have been able to compare the amounts of BJP removed by the two methods.

Case report

A 64-year-old man was admitted to hospital on 4 October 1977 with a short history of increasing confusion and oliguria. On examination he was dehydrated with scattered petechiae. He was apyrexial, pulse rate was 100 beats/min, and blood pressure was 95/60 mm Hg. There was no clinical evidence of cardiac failure but a chest radiograph suggested bronchopneumonia. The abdomen was soft and the spleen palpable 2 cm below the costal margin. He was confused but there were no localising neurological signs. Laboratory results were as follows: erythrocyte sedimentation rate 140 mm in 1 hour, haemoglobin 7.9 g/dl, white cell count $2.4 \times 10^9/l$, platelets $18 \times 10^9/l$, calcium 3.4 mmol/l (13.6 mg/100 ml), phosphate 2.4 mmol/l (7.4 mg/100 ml), urate 0.7 mmol/l (11.8 mg/100 ml), sodium 129 mmol(mEq)/l, potassium 4.0 mmol(mEq)/l, chloride 90 mmol(mEq)/l, bicarbonate 21 mmol(mEq)/l, urea 30.1 mmol/l (181 mg/100 ml), total protein 114 g/l, albumin 22 g/l, creatinine 1130 μ mol/l (12.8 mg/100 ml). An IgA paraprotein accounted for 48% of the total protein, and IgG and IgM concentrations were subnormal. Bone marrow findings were consistent with multiple myeloma.

He was rehydrated overnight and antibiotics were given. Next morning (5 October; see table) haemoglobin was 6.5 g/dl, total protein 90 g/l, calcium 2.86 mmol/l (11.4 mg/100 ml), and urea 34.7 mmol/l (209 mg/100 ml). The jugular venous pressure was raised 2 cm and there was clinical and radiological pulmonary oedema. He remained anuric with no response to frusemide, ethacrynic acid, and bumetanide. A Haemonetics Model 30 cell separator was used to remove 1.25 l of plasma without replacement, and the signs of congestion improved. The next day 5.33 l plasma was exchanged for blood and plasma. Despite some improvement in pulmonary oedema and urine output the blood urea continued to rise, so peritoneal dialysis was started on 7 October. His clinical condition deteriorated despite improvement of uraemia and he died on 10 October with massive haemorrhage from the upper respiratory tract.

BJP concentrations were measured by immunodiffusion⁴ on samples of dialysate, urine, and serum. The table shows the amounts removed in these fluids. Serum concentrations of BJP were about a hundredfold higher than those in the dialysate and double the urine values.

Comment

One would expect to find BJP in peritoneal dialysate; indeed appreciable quantities of complete immunoglobulin molecules may also be present.⁵ In our patient, however, the concentrations of BJP were such that about ten times as much could be removed by a 5 l plasma exchange as by peritoneal dialysis using 50 l of fluid. Because of oliguria quantities excreted in the urine were relatively small. It

therefore seems that plasma exchange remains the most rational way of removing BJP in these circumstances if a satisfactory diuresis cannot be obtained.

We thank Dr A T Otaki for referring this patient.

¹ Russell, J A, Toy, J L, and Powles, R L, *Experimental Hematology*, 1977, 5, suppl No 1, p 105.

² Solomon, A, and Fahey, J L, *American Journal of Medicine*, 1964, 37, 206.

³ De Fronzo, R A, *et al*, *Medicine*, 1978, 57, 151.

⁴ Darcy, D, in *Methods in Immunology and Immunochemistry*, vol 3, p 200. New York, London, Academic Press, 1971.

⁵ Kaiser, D, and Norwig, P, *Medizinische Welt*, 1976, 27, 468.

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Insulinoma (apud cell carcinoma) in a diabetic

Insulinomas are uncommon and in diabetics they are exceedingly rare. Only five well-documented cases of this association exist.¹ We describe a case of insulinoma (apud (amine precursor uptake decarboxylation) cell carcinoma; apudoma) in a diabetic with evidence of proinsulin, gastrin, and pancreatic polypeptide hypersecretion.

Case report

A 43-year-old man developed diabetes mellitus in 1970 (plasma glucose 14.8 mmol/l (266 mg/100 ml)). Over the next three years he was treated with glibenclamide and phenformin at the Roe Valley Hospital, Limavady (Dr J E Gibbon). Insulin treatment was begun in June 1973 but was discontinued in February 1976 because of recurrent hypoglycaemia. In March 1976 he lost weight and began to vomit frequently. A pancreatic tumour was found at laparotomy. On admission to our care in June 1976 his plasma glucose was 1.2 mmol/l (24 mg/100 ml) with plasma insulin by radioimmunoassay (RIA) 116 mU/l (usual range 1-15 mU/l). Insulin antibodies were absent and no insulin had been given for three months. Plasma fractionation showed that the 6000 molecular weight immunoreactive insulin fraction represented only 14% of the total. A 50-g oral glucose tolerance test (0, 30, 60, and 120 min) showed plasma glucose concentrations of 3.1, 6.0, 7.9, and 8.2 mmol/l (56, 110, 124, and 130 mg/100 ml) with corresponding plasma insulins of 165, 195, 160, and 120 μ U/ml (figure). Plasma gastrin (RIA) was 290-500 ng/l (usual range 0-150 ng/l). There was considerable acid hypersecretion (residual acid 38.3 mmol (mEq)/l, one-hour basal level 32.4 mmol (mEq)/l, and one-hour pentagastrin-stimulated acid 42.2 mmol (mEq)/l). Plasma glucagon, secretin, and vasoactive intestinal peptide (RIA) were within normal limits.

Quantities of BJP removed in plasma, dialysate, and urine

Date (October)	Serum BJP (g/l)	Blood urea (mmol/l)	Plasma		Dialysate		Urine	
			Volume removed (l)	BJP removed (g)	Total volume (l)	BJP removed (g)	Volume (l)	BJP excreted (g)
5	4.0	34.7	1.25	5.0			0	0
6	4.0	46.4	5.33	17.5			0.53	ND
7	3.8	48.2			28.5	1.0	0.37	ND
8	4.0	41.2			48.9	2.0	0.20	0.37
9	4.8	37.0			52.1	1.8	0.02	0.04
10	4.0	27.1			31.0	1.4	0	0

ND = Estimation not done.

Conversion: SI to traditional units—Urea: 1 mmol/l $\approx$ 6 mg/100 ml.