Insulin analogue usage in a haemodialysis patient with type 2 diabetes mellitus

Sir,

Diabetes mellitus has been increasingly recognized as a cause of end-stage renal disease, world-wide as in our country. Tight glycaemic control leads to decreased long-term micro and macrovascular complication rates. In advanced stages of renal insufficiency, there are various and somewhat contrasting abnormalities affecting glucose and insulin metabolism. With decreased clearance and catabolism of insulin, the metabolic effects of both rapid and longer-acting traditional insulin preparations persist longer and the potential for symptomatic hypoglycaemia increases [1].

A 62-year-old woman, suffering from type 2 diabetes mellitus for 25 years, was included in the haemodialysis programme in November 1998. She had recurring diabetic foot, retinopathy operated on three times for vitreous haemorrhagia and neuropathy. Her left big toe was amputated in 2003. Throughout this period, she received traditional intensive insulin therapy consisting of preprandial regular and bedtime NPH insulin at four doses. Her blood glucose control was poor with hypoglycaemic and hyperglycaemic episodes. She was admitted to the emergency service because of fever and impaired general status in August 2004. She had cellulitis in the right anterior cruris region and a purulent-necrotic lesion on the amputated stump. Her initial laboratory tests revealed a leucocyte count of 23 000/mm³, serum glucose 620 mg/dl, pH 7.33 and CRP 28 mg/dl. She suffered from hypotension. Klebsiella pneumoniae and methicillin-resistant Staphylococcus haemolyticus were present in the blood cultures. Sepsis was treated with appropriate antibiotic therapies. Her blood glucose was regulated with adequate amounts of insulin infusion. Her treatment was changed to insulin analogues (three doses of insulin lispro preprandially and one dose of insulin glargine at bedtime) for better glycaemic control. She remained well for 1 year after her discharge. Figures 1 and 2 show the changes in blood glucose and HbA1c levels during her follow-up. She had her right small toe amputated in May 2005 during which time her glycaemic control worsened.

Traditional insulin absorption profiles are erratic, creating day-to-day fluctuations in glycaemic control and their delayed onset of action and peak activity requires coordination of injection and meals [2]. Uraemic patients are threatened by hyperinsulinaemia and severe hypoglycaemic episodes when receiving traditional insulin treatment [3]. Insulin analogues characterized by action profiles afford more flexible treatment regimens with a lower risk of the development of hypoglycaemia [4]. Rapidly acting analogues, lispro and aspart, are active within minutes and peak in about 1 h, mimicking normal mealtime insulin release. Long-acting analogues, glargine, provides a peakless, continuous release over 24 h that approximates a normal basal pattern [2]. There are limited data in the literature concerning insulin analogue usage in diabetic haemodialysis patients. Aisenpreis et al. showed that the pulsatile pharmacokinetic profile of insulin lispro may not only facilitate the correction of hypoglycaemia, but may also decrease the risk of late hypoglycaemic episodes, which are of particular clinical relevance in haemodialysed type 1 and type 2 diabetic patients [5].

We observed that intensive insulin analogue treatment provided better glycaemic control in our patient without long-term hypoglycaemia risk. Although the cost is a disadvantage, insulin analogues can be preferred in selected haemodialysis patients with diabetes mellitus.

Effects of CAPD on hepatosteatosis and lipid profile

Sir,

Non-infectious complications that may occur in patients on continuous peritoneal dialysis (CAPD) include hernia formation, leaks (including hydrothorax or pleuroperitoneal leaks), local oedema, back pain and gastrointestinal problems, such as gastro-oesophageal reflux and delayed gastric emptying. CAPD is associated with a number of metabolic abnormalities. These include lipid abnormalities, most commonly hypertriglyceridaemia, increased very low-density lipoprotein (VLDL) cholesterol and decreased high-density lipoprotein (HDL)-cholesterol levels; carbohydrate abnormalities, a result of the absorption of large quantities of glucose; protein losses, consisting of albumin and amino acid losses; and a propensity to obesity. In our study, we investigated whether patients on CAPD had increased tendency to fatty liver and changes of lipid profile.

We studied 22 patients with end-stage renal disease (ESRD) on chronic peritoneal dialysis: 14 females and eight males with a mean age of 38.8 ± 15.5 (16–71) years. We measured the height and dry weight of all patients. Body mass index (BMI) was calculated by dividing the weight (kg) by height squared (m²). At the time of sampling, no patients had diabetes mellitus. No patient was hepatitis B virus (HBV) and anti-hepatitis C virus (HCV) positive. The patients had no history of significant alcohol consumption. In all patients, serum fasting glucose, urea, creatinine, albumin, ALT, AST, cholesterol, triglyceride, HDL-cholesterol, low-density lipoprotein (LDL)-cholesterol and VLDL-cholesterol were measured, and liver ultrasonography was performed by the same radiologist.

Grade I fatty liver was revealed in nine patients (40.9%). Patients with hepatosteatosis detected by ultrasound were compared with patients without hepatosteatosis. No differences were observed in terms of blood glucose, total cholesterol, triglyceride, HDL, LDL, VLDL, ALT, AST and albumin levels (respectively \( P = 0.23, 0.53, 0.74, 0.86, 0.91, 0.57, 0.27, 0.20 \) and 0.85) (Table 1). Oreopoulos et al. reported alterations in the morphology of the superficial liver lobuli of dialysed rats [1]. In several studies, it was described that hepatic subcapsular steatosis was specific to diabetic CAPD patients on intraperitoneal insulin treatment [2–4]. In our study, the follow-up time is relatively shorter (mean 22.4 ± 14.3, 3–72 months). Further long-term studies are needed in larger series in order to elucidate better the relationship of hepatosteatosis and lipid profile in CAPD patients. As far as we know, there is no similar study in the literature on the effects of CAPD on hepatosteatosis.

Conflict of interest statement. None declared.

Table 1. The relationship of hepatosteatosis and demographic and laboratory parameters in CAPD patients