it could trigger severe arrhythmias which would limit the potential benefit as regards the survival of haemodialysis patients. In fact, there are some studies that describe hypocalcaemia as a risk factor for increased mortality in patients on haemodialysis.[11]

We believe that our observation of a potential QT prolongation in patients on haemodialysis treated for secondary hyperparathyroidism with cinacalcet means that special vigilance is required in patients with high calcium or when there is significant hypocalcaemia. It would be advisable to carry out an ECG and check if there is a prolongation of QT beyond the limits that are considered dangerous due to the appearance of severe ventricular arrhythmias. This should be taken into account especially in patients receiving antiarrhythmic medication that may prolong QT or in patients with ischaemic heart disease or previous dilated cardiomyopathy. We also recommend reviewing data from prospective studies carried out with cincalcet or proposing that future prospective studies be accompanied by the implementation of an ECG to check the clinical significance of the data presented herein.

Conflicts of interest

The authors declare that they have no conflicts of interest related to the contents of this article.

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B) BRIEF CASE REPORTS

Effectiveness of early haemodialysis in cefepime-induced neurotoxicity

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To the Editor:

Cefepime is a fourth-generation cephalosporin, active against gram-positive organisms such as *Staphylococcus aureus*, and gram-negative organisms such as *Pseudomonas aeruginosa*.[1,2]

The kidney is the primary elimination route, with over 80% of cefepime being recovered with no change in the urine of patients with normal renal function.

The elimination half-life is 2-2.5 hours. It has low plasma protein binding, ap-

proximately 16%-19%, meaning that extra-renal clearance techniques such as haemodialysis and peritoneal dialysis may be useful in patients with toxicity related to this antibiotic.[1]

We report the case of an elderly man who presented with neurotoxicity related to inadequate dose of cefepime with good clinical evolution after establishing early haemodialysis.

CLINICAL CASE

78-year-old male with a history of allergy to sulfonamides and thiazides, a former smoker and former drinker, chronic bronchitis with home oxygen, chronic atrial fibrillation, peripheral arterial disease and chronic venous insufficiency. His usual treatment was furosemide, pentoxifylline, acenocoumarol, omeprazole, oral iron and paracetamol. He was admitted to our hospital for antibiotic treatment and cure of mixed ulcers with slow evolution.

Physical examination on admission: blood pressure 100/61mmHg, mixed ulcers with exudate in both lower extremities; the rest of the examination unremarkable.

The blood test on admission showed: creatinine 1.5mg/dl (previous 1.4-1.6mg/dl) (Cockcroft-Gault 28ml/min), uric acid 9.4mg/dl, albumin 3.2g/dl, haematocrit 27.8%, haemoglobin 8.9g/dl, the rest of the test normal. The ulcer exudate culture was positive for non-group A and non-group B cefepime-sensitive *Streptococcus beta* and *Pseudomonas aeruginosa*.

Antibiotic treatment with cefepime was started with an intravenous dose of 2 grams every 8 hours for 10 days. On the fourth day of antibiotic treatment renal function remained stable with serum creatinine of 1.4mg/day. On the tenth day of treatment with cefepime (when the antibiotic was suspended) it was found that there was a deterioration in prior renal function, with serum creatinine of 2.8mg/dl. A day after cefepime was suspended, this deterioration in renal function persisted and the patient developed delirium and restlessness, and consequently the Nephrology and Neurology Services were consulted.

Anamnesis was impossible to perform due to the excitability and restlessness of the patient. Fluid therapy with isotonic saline was begun. Renal ultrasound showed a diminished kidney size (8cm).

We performed an electroencephalogram (EEG), which was pathological, with the presence of bilateral electrical status (constant bilateral slow, acute and triphasic wave discharges). A head CT was carried out with the sole finding being cortico-subcortical atrophy.

With the suspicion of neurotoxicity provoked by cefepime, phenytoin was prescribed with a loading dose of 1000mg intravenously and subsequently 100mg/8 hours intravenously; haemodialysis was carried out urgently via catheter through left femoral vein for 3 hours. Quantification was made of predialysis cefepime plasma levels (24 hours after suspension of the antibiotic), which were of 50.087μg/ml. After the first session of dialysis, the patient was more settled and brighter.

Given the clinical improvement after the first dialysis session and considering the high mortality rate associated with neurotoxicity linked to cefepime, three further haemodialysis sessions were carried out, with undetectable levels of predialysis cefepime in the fourth session.

The new EEG after 4 sessions of dialysis, showed a dramatic improvement with respect to the previous recording. After three days without dialysis, serum creatinine remained at 2.7mg/dl.

One week after discharge, in the outpatient clinic, the recovery of renal function was observed (creatinine 1.6mg/dl), which was at these levels two months after discharge.

DISCUSSION

We report another case of cefepime-induced neurotoxicity; an elderly man with advanced renal failure, treated with cefepime at a normal renal function dose (2g/8h intravenously), which showed favourable resolution with the early introduction of antiepileptic drugs and urgent haemodialysis.

In literature, there have been reports of neurotoxicity associated with cefepime with a different prognosis, ranging from full recovery to death of patient.[3] Chatellier et al. reported a series of five cases, all treated with urgent haemodialysis, with full recovery in four cases. Delay in diagnosis in the fifth case could be the reason for the patient's death.[3] Sonck et al. describe another series of eight patients, whose deaths were all related to cefepime-induced neurotoxicity.[4] Martin Herrera and Navarro reported a series of seven cases, all who had some degree of deterioration in renal function when the antibiotic was introduced. Of the seven patients, four died of encephalopathy and the remaining three evolved favourably, and one received haemodialysis.[5]

Recently, a meta-analysis concluded that there is no statistically significant increase in mortality in patients treated with cefepime compared with other beta-lactam antibiotics.[6] In the case described, favourable evolution could perhaps be explained by the early suspicion of encephalopathy (it was found that the dose of cefepime initially prescribed was inadequate and was maintained for ten days), along with the introduction of urgent haemodialysis on the day of diagnosis, extended by a further four days (the fourth dialysis was also performed with undetectable predialysis cefepime levels).

In patients with normal renal function, cefepime is eliminated in more than 80% of cases by urine, with a half-life of 2-2.5h. In patients with renal failure and creatinine clearance <10ml/min, the half-life of cefepime is approxi-

mately five times greater, compared to patients with normal renal function from 2.3h to 13.5h and even 22h.[4] Cefepime is dialyzable; up to 70% of a given dose can be removed during a 3-hour haemodialysis session.[3] In our case, we have pre-dialysis cefepime levels (after 24 hours of drug withdrawal), but we have no post-dialysis cefepime levels, to assess the effectiveness of haemodialysis in its elimination, although the patient showed significant clinical improvement after the first haemodialysis session. With three daily haemodialysis sessions of 3 hours, antibiotic levels were undetectable prior to the fourth session of haemodialysis.

In conclusion, although the prognosis of patients with cefepime-induced neurotoxicity varies in literature, the close monitoring of renal function in patients treated with cefepime, early suspicion of associated neurological symptoms and urgent haemodialysis may be the keys to a more favourable prognosis for patients with cefepime-induced encephalopathy.

Conflicts of interest

The authors declare that they have no conflicts of interest related to the contents of this article.

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Genital leakage associated with patent peritoneovaginal duct and polycystic kidney and liver disease in patients on peritoneal dialysis

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To the Editor:

The genital oedema is a common complication in peritoneal dialysis that occurs due to the passing of dialysis fluid outside the abdominal cavity through inguinal hernias, persistent peritoneovaginal duct, lower abdominal wall defects, etc. Its association with persistent patent peritoneovaginal duct is widely described in literature[1] but its relationship with polycystic kidney disease is not very well known. Below, we describe two cases of patients with chronic kidney disease (CKD) secondary to adult polycystic kidney and liver disease. After initiation of peritoneal dialysis, they developed fluid leakage to genitals, secondary to persistence of said patent duct.

CASE REPORT 1

A 76-year-old male with stage 4 CKD secondary to polycystic kidney and liver disease with a long history of high blood pressure, type 2 diabetes mellitus, hyperuricaemia, dyslipidaemia and chronic obstructive pulmonary disease. Given the situation of advanced CKD and after explaining the different dialysis techniques, a straight, non-self-locating 1 cuff peritoneal catheter was inserted by open surgery without immediate incidents, functioning well during the training period. A month after catheter placement, home continuous ambulatory peritoneal dialysis (CAPD) was started with a prescription of 3 exchanges of 2 litres of 1.5% dextrose, initially with neutral or negative balances of 200-300ml. After 4 days of treatment at home, he came to the Peritoneal Dialysis Unit complaining of genital oedema without other associated symptoms. Having performed a testicular ultrasound, pathology was ruled out at this level. On suspicion of leakage, CT peritoneography was carried out, after the administration of 100ml of hypoosmolar iodinated contrast (Optiray® 300mg/ml) by catheter, confirming the passage of peritoneal contrast material through the spermatic cord to the scrotum due to the presence of a non-dilated patent peritoneovaginal duct (Figure 1). Similarly, we observed the existence of a left ipsilateral indirect inguinal hernia with a sac up to 58mm in diameter (Figure 2). Given these findings, peritoneal rest is decided and surgery is indicated for correction of inguinal hernia and closure of the peritoneovaginal duct. With these measures, and after restarting low-volume peritoneal dialysis, no leakage was observed a month after reintervention.

CASE REPORT 2

A 45-year-old male with stage 5 CKD secondary to polycystic kidney liver disease with a history of high blood pressure and hyperuricaemia. Given the progressive deterioration of renal function requiring renal replacement therapy, and after explaining the different techniques, a straight, non-self-locating, 1 cuff