The post-run vancomycin level was 26 mg/l demonstrating a 73% intravascular vancomycin removal (calculated vancomycin $t_{1/2} = 2.0$ h), BUN was 13 mmol/l and serum creatinine $205 \mu$mol/l. A second haemodialysis session was initiated 24 h later resulting in a vancomycin plasma level of 12 mg/l after 2 h ($t_{1/2} = 1.8$ h). The skin lesions disappeared progressively.

Renal function recovered rapidly 3 days after admission and the patient left the hospital in a good general condition 7 days after discontinuation of haemodialysis with a serum creatinine of $80 \mu$mol/l. One month later serum creatinine was $40 \mu$mol/l, proteinuria was negative and blood pressure was normal.

This case demonstrates efficient removal of vancomycin using a high-flux, large pore size haemodialysis membrane (cut off 70 000 Da). Despite the relatively high extracorporeal volume (150 ml), no blood priming was necessary and haemodialysis was well tolerated.

Once renal function decreased, vancomycin plasma $t_{1/2}$ increases and resulted in an asymptotic kinetic of drug plasma levels (Figure 1).

Earlier reports discuss the benefits of charcoal haemoperfusion or haemodialysis with high efficiency membranes in the treatment of vancomycin overdose. Both methods have been shown to remove vancomycin efficiently. However, charcoal haemoperfusion exposes to the potential risk of excessive calcium and phosphate removal, hypothermia or thrombocytopenia. In order to avoid such electrolyte disturbances, a haemodialysis filter is placed in line after the charcoal circuit. In order to obtain an efficient toxin clearance, charcoal haemoperfusion requires high blood flow rates. This may cause difficulties concerning the prevention of the above-mentioned potential risks, which are aggravated by higher blood flow. Direct comparison of continuous haemofiltration, charcoal haemoperfusion and haemodialysis with either high efficiency or high flux membranes is not possible because the efficiency of each technique depends on multiple variables such as blood/dialysate flow rates, age of patients and the exact type of haemodialysis filter. The choice of technique should take into consideration the availability and experience in the medical centre as well as the patient’s age. In conclusion, haemodialysis with high-flux, large pore size membranes should be considered rapidly in patients with toxic vancomycin serum levels and concomitant multiple variables such as blood/dialysate flow rates, age of patients and the exact type of haemodialysis filter.

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Renal failure following bowel cleansing with a sodium phosphate purgative

Sir,

Visicol® Tablets (InKine Pharmaceutical Co., Inc.) have been used in >1.2 million patients as a bowel preparation for colonoscopy. To date, InKine Pharmaceuticals has received one report of nephrocalcinosis following use of Visicol®. This case was described by Markowitz et al. in the April 2005 issue of the journal along with 15 cases associated with the use of oral sodium phosphate solution (OSPS, Fleet® Phospho®-Soda, C.B. Fleet). Data reported to InKine indicate that this patient had at least three important risk factors for the development of acute renal failure (ARF) and nephrocalcinosis.

First, the patient had a history of renal insufficiency with a rising creatinine (1.7 mg/dl) and had been on meloxicam (Mobic®, Boehringer Ingelheim) for years. This was discontinued just prior to colonoscopy, but was restarted within 1 month for shoulder pain. Visicol® should be used with caution in patients with impaired renal function since they may have difficulty excreting large phosphate loads. It should be noted that the post-colonoscopy creatinine level was much smaller in this patient (2.6 mg/dl 2 months post-colonoscopy) than in the patients receiving OSPS (mean of 4.9 mg/dl 3 days to 2 months post-colonoscopy). It is unknown how much the meloxicam may have contributed to the rising creatinine. In January 2005, the patient’s creatinine was 2.2 mg/dl.

Secondly, since 2002, the patient was taking 10 mg of ramipril (Altace®, Monarch Pharmaceutical), an angiotensin-converting enzyme inhibitor (ACEI), which is twice the recommended daily dose for patients with renal insufficiency. Because ACEIs limit the kidneys’ normal capacity to compensate for the stress of volume depletion, patients on these drugs can experience a decrease in glomerular filtration rate and possible renal failure when in a volume-depleted state, e.g. following the use of a purgative.

Thirdly, this 44-year-old patient presented with a 1 week history of abdominal pain, bloody stools and no relevant family history. The patient underwent colonoscopy within 2 days of presentation. A diagnosis of acute and chronic colitis was made. Patients with acute colitis are at risk for excess phosphate absorption [1].

Since patients who take a purgative experience diarrhoea and in some cases vomiting, every patient is at risk for developing dehydration and hypovolaemia, which can result in renal failure. Physicians should assess patients’ hydration status prior to beginning any bowel purgative. In this case, there was no information provided on the hydration status of the patient although the patient was prescribed a 3 day bowel preparation regimen consisting

References


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of bisacodyl tablets and clear liquids the day prior to starting Visicol® Tablets. The recommended Visicol® bowel preparation is taken over 2 days without other laxatives. A 3-day bowel preparation may predispose a patient to dehydration.

Vomiting contributes to dehydration and has been shown to contribute to the non-osmotic release of anti-diuretic hormone [2], which after a purgative has produced non-hyponatraemic encephalopathy with sodium phosphate [3] and fatal hyponatraemic encephalopathy with PEG solution [4]. Two phase III trials comparing Visicol® with 4L PEG solution (Cherry NuLYTELY, Braintree Laboratories) for bowel cleansing in 845 patients showed a 50% reduction in the incidence of vomiting in patients taking Visicol® ($P = 0.0001$) [5]. In one trial comparing OPS with 4L PEG, OPS was associated with a higher incidence of vomiting and an increase in reported thirst and dryness ($P = 0.00001$) [6]. If a patient experiences vomiting or is unable to take fluids prior to or after colonoscopy, the patient should be told to contact their physician.

Nephrocalcinosis is a very rare event following the administration of sodium phosphate for bowel preparation. In a recent publication, Markowitz and Perazella state: ‘Prevention of this form of ARF requires maintenance of adequate volume repletion prior to and during phosphate administration’ [7]. Physicians should continue to instruct patients to ingest 8 oz of fluid with each dose of Visicol® tablets every 15 min to maintain adequate hydration. In addition, careful management of gastrointestinal fluid losses, including vomiting, should be emphasized with all purgatives.

Conflict of interest statement. M.R. and R.G.K are employees of InKine Pharmaceutical and have an equity interest in the company. K.W. is a contract employee of InKine Pharmaceutical.

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Timing of first cannulation of arteriovenous fistula: time matters, but there is also something else

Sir,

In the April 2005 issue of Nephrol Dialysis Transplantation, Brunori et al. [1] and Saran et al. [2] expressed ‘personal opinions’ about the proper timing of first cannulation of haemodialysis arteriovenous fistulae (AVFs): the former stressed once more the importance of waiting for a given time period between the creation of the AVF and its first cannulation [1]; the latter were more flexible about this issue, underlining the need for a proper assessment prior to first cannulation, e.g. by objective techniques, such as Doppler ultrasound [2]. The cause of the discrepancy in these ‘personal opinions’ certainly lies in the unsatisfactory NKF-K/DOQI guidelines on this issue: if, on the other hand, they recommend the monthly surveillance of blood flow rate (Qb) of the vascular access by means of saline ultrasound dilution, conductance dilution, thermal dilution, Doppler ultrasonography and other techniques, paradoxically, on the other hand, the maturation of an AVF is still committed to a clinical assessment [3]. Clinically, there are some AVFs that are obviously mature. These clinically mature AVFs usually have an easily palpable, relatively straight and >10 cm long superficial vein, which is of adequate diameter and with a uniform thrill to palpation [4]. The real problem in clinical evaluation is in predicting the ultimate outcome of those AVFs that are not clearly mature. Thus, the ability to predict whether an AVF is going to mature eventually is important.

Therefore, we conducted a feasibility study aimed at developing objective quantitative criteria in order to evaluate AVF maturity prior to first cannulation [5]. Our choice fell on duplex Doppler ultrasonography of the brachial artery feeding the radio-cephalic wrist AVF, because the brachial artery has been suggested to be the best site for the evaluation of Qb of an AVF [6]. Brachial artery Qb was measured just before AVF construction and uniformly 1, 7 and 28 days afterwards in 18 incident uraemic patients [5]. Brachial artery Qb was 56.1±19.2 ml/min at baseline. A new AVF was constructed in that patient whose brachial artery Qb was 80.0 ml/min at day 28. When excluding this AVF, the mean brachial artery Qb of the 17 AVFs was 72.4±132.8 ml/min (median 750, range 480–890) at day 28. When analysing the percentage increase in brachial artery Qb of the 17 AVFs at the different time points, the most dramatic increase occurred at day 1 compared with baseline (549.0%; mean Qb at day 1 = 365.0±129.3 ml/min). Thus, the Qb at day 1 represents already more than half (50.7%) of the Qb which will be measured at day 28. The first cannulation occurred 56.2±12.1 days after the creation of the AVFs; the mean brachial artery Qb of the 17 AVFs was 99.7±259.7 ml/min 258.0±63.0 days after AVF creation [5].

There are at least two other reports that drew conclusions quite similar to ours: Robbin et al. measured Qb at the level of the draining vein within 4 months after AVF placement [4]. AVF adequacy for dialysis was nearly doubled if Qb was ≥500 ml/min (84%) vs <500 ml/min (43%) [4]. Interestingly enough, no significant difference in Qb was found during 2–4 post-operative months, thus allowing the authors to suggest that measurements obtained at 4–8 weeks can be used to predict AVF outcome [4]. Furthermore, Wong