Successful treatment of digoxin intoxication by haemoperfusion with specific columns for β2-microglobulin-adsorption (Lixelle®) in a maintenance haemodialysis patient

Sir,

Although intensive caution is exercised in the usage of drugs that are excreted into urine, intoxication with these drugs is still reported, especially in patients with renal failure. In case of intoxication, haemoperfusion can be used for treatment. However, efficacy is limited because of the relatively low capacity and several adverse effects. We report the first case of a successful treatment of serious digoxin (Dx) intoxication with a β2-MG adsorption column, together with haemodialysis in a patient with renal failure. This therapy selectively removes Dx from blood without major complications and may provide one of the new options for the treatment of this condition.

Case. An 88-year-old woman was referred to our division on 2 August, 1999 because of vomiting and anorexia. She had been on a maintenance haemodialysis programme three times a week since 1997 and she received Dx (0.25 mg per day, three times a week) for 3 years because she also suffered from chronic heart failure. On referral, the patient was slightly drowsy. Electrocardiogram showed ventricular premature contractions (VPC). The serum Dx concentration at the start of the haemodialysis session was extremely elevated (6.38 ng/ml, Figure 1). Administration of Dx was stopped and continuous drip infusion of lignocaine was started with maintenance dialysis, which led to a slight reduction of serum Dx (5.30 ng/ml). However, serum Dx concentration remained increased the next day and the patient became confused and disoriented. Frequent VPCs were again recorded. With the informed consent of her family, direct haemoperfusion by a β2-microglobulin adsorption column (Lixelle®; Kaneka Co, Ltd, Japan) was performed, together with regular haemodialysis. The column was connected to the arterial end of a haemodialyser. Dialysis time, dialysate membrane, and blood flow rate were identical to those of the last haemodialysis session. Serum Dx concentration decreased from 6.00 to 2.31 ng/ml and gastrointestinal symptoms improved markedly (Figure 1). Serum lignocaine was not influenced by the procedure (4.82 and 5.12 μg/ml, before and after the treatment respectively). No major adverse reactions such as haemolysis, thrombocytopenia, or hypotension were observed during this treatment. The same therapy was again performed on 9 August when serum Dx concentration was further reduced from 3.59 to 1.70 ng/ml. There after, serum Dx concentration gradually decreased with regular maintenance haemodialysis alone, and the patient’s general condition improved.
Comment. Various methods to treat Dx intoxication have been attempted, including the recent use of anti-digoxin antibody [1]. However, each therapy has disadvantages. For example, termination of the antibody treatment is followed by a rapid rise of serum Dx concentration [2]. It has also been reported that removal of administered antibody (MW = 50 000) is difficult, especially for renal failure patients, and additional plasmapheresis or plasma exchange is sometimes needed to overcome this problem. On the other hand, blood purification methods also have some disadvantages for the treatment of Dx intoxication. Usual haemo- or peritoneal dialysis methods have a low efficacy in terms of Dx removal. Direct haemoperfusion by charcoal also has several side-effects such as the reduction of serum protein, and of red blood cell and platelet counts. Thus, there is no well-accepted therapy of Dx intoxication, especially in patients with renal failure.

The β2-MG adsorption column (Lixelle®) has been developed to remove this endogenous β2-M from the circulation. It is now commercially available in Japan for the treatment of dialysis-related amyloidosis [3]. Lipophilic substances with molecular weights from 4000 to 20 000 mainly enter into the filter covered with this adsorbent. It is possible that other solutes with similar chemical characters as β2-MG might be removed, although most hormones are not removed by this manoeuvre [4]. We have made the preliminary observation that the serum concentration of Dx, a lipophilic drug, decreased under the concomitant use of this column in chronic renal failure patients under long-term Dx therapy. We have also found that this column adsorbed Dx as well as β2-MG in vitro and that the capacity for drug removal was much higher than with the usual charcoal column [5]. This finding encouraged us to use the β2-MG column for the treatment in the present severe Dx intoxication, after having obtained informed consent from the family.

Thus, with the concomitant use of Lixelle, the reduction rate of blood Dx concentration was greater than with HD alone, in the absence of any major complications, which have been often seen by haemoperfusion. Subsequently, intoxication symptoms were markedly improved. Rebound of serum Dx after the combined treatment was less prominent than with haemodialysis alone. This finding indicates that the capacity of Lixelle to remove Dx is greater than that of haemodialysis alone. Furthermore, there were no changes in serum lignocaine concentration during the procedure, suggesting that adsorption was specific for some solutes. In our opinion, this experience provides a new option for the treatment of Dx intoxication, especially in patients with renal failure.

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