TRANSPLANT INTERNATIONAL

LETTER TO THE EDITORS

Organ donation following fatal organophosphate poisoning

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Poisoned donors are often overlooked as organ donors because of the perceived risks of toxins transmission or organ dysfunction [1,2]. We describe a case of successful liver and kidneys donation after fatal organophosphate (OP) poisoning.

A 49-year-old man was admitted to the hospital after the suicidal ingestion of an unknown amount of the OP compound parathion (E-605 from Bayer®, Leverkusen, Germany), a pesticide that has been officially banned for many years. He had a medical history of chronic ethanol abuse and grade I chronic obstructive pulmonary disease. He had been found in cardiac arrest with no bystander rescue. After cardiac massage (10 min), intubation for mechanical ventilation, and 10 mg of i.v. atropine, there was a rapid return of spontaneous ventilation before arrival at the hospital.

The patient was hemodynamically stable, but remained comatose with pinpoint pupils and myoclonus. Laboratory results revealed an ethanol blood concentration of 3.39 g/l, with a marked decrease of serum cholinesterase (386 IU/l, normal values 5860–13 060) consistent with the diagnosis of severe OP poisoning. The patient received a total dose of 27 500 mg of pralidoxime and 410 mg of atropine during the first 6 days. The treatment was pursued for persisting miosis, fasciculation, and decreased serum cholinesterase level (240 IU/l on day 7). The neurological condition never improved. The brain computed tomodensitometry (CT) was normal and the electroencephalogram showed diffuse slowing with theta waves. The patient suffered numerous lung complications, with atelectasis and pneumonia.

On day 21, he abruptly developed hypotension and diabetes insipidus. The clinical diagnosis of brain death was confirmed by an isoelectric EEG and by the absence of intracerebral perfusion at brain angio-CT. The cause of brain death was very likely the progression of postanoxic encephalopathy, with a long initial delay between asystole and resuscitation. Organ donation was accepted by the relatives and the kidneys and the liver were recovered. The last laboratory values were: serum creatinine 0.53 mg/dl (nl < 1.69), ASAT 79 IU/l (nl < 30), ALAT 89 IU/l (nl < 35). The electrocardiogram (EKG) showed sinus rhythm with a QTc interval at 459 ms and diffuse repolarization changes.

The renal transplant biopsy revealed a moderate degree of glomerular sclerosis and a mild degree of interstitial fibrosis/tubular atrophy (IF/TA) (<25%), but no signs of cortical necrosis or thrombotic microangiopathy. These lesions were not directly related to parathion toxicity.

The kidney recipients were, respectively, a 46- and 57-year-old man. In the first recipient, delayed graft function was noted, mainly as a consequence of early humoral rejection and hemodialysis is still required at 3 month-follow-up because of cellular rejection. A better renal recovery was observed in the second recipient (serum creatinine 1.67 mg/dl).

After a cold ischemia time of 9 h and 20 min, the liver was transplanted into a 50-year-old man suffering from alcohol induced liver cirrhosis with a labMELD of 13. Intra- and postoperative course was uneventful. Histology immediately after reperfusion showed only low grade ischemia reperfusion injury. The primary function was excellent with a peak of ASAT at 227 IU/l and ALAT 127 IU/l directly after transplantation and complete normalization on the third postoperative day. In addition, INR and serum bilirubin levels were within normal ranges without further treatment. No dialysis was required in the immediate postoperative period. The patient was discharged from ICU on day 3. Currently, the patient is well, but is treated for recurrent ascites.

The three recipients did not experience any sign of OP toxicity. No specific informed consent was obtained regarding the origin of the grafts.

Data regarding organ donation after pesticide poisoning are scant [3,4]. Successful liver, kidney, and even heart donation has been reported after carbamate poisoning [3,4]. Carbamate compounds are reversible cholinesterase inhibitors undergoing rapid urinary excretion. Liver and kidneys were also harvested from a 17-year-old man who developed brain death after malathion suicidal ingestion [5]. The patient underwent prolonged cardiopulmonary resuscitation and heart donation was not considered.

Parathion and methyl parathion have been banned in a large number of countries because of their health effects, but some farmers have still probably some residual stockpiles in Europe, with the risk that these substances may be used for suicidal purpose. Parathion, as other OP, may

cause serious muscarinic and nicotinic effects. Dysrhythmias and conduction defects may occur in the early phase of severe poisoning [6]. The electrocardiographic changes may be impressive, even mimicking acute myocardial ischemia [7]. The possibility of late onset malignant ventricular arrhythmias cannot totally ruled out, but most of the patients then exhibited at least a prolonged QT interval. Recently, a case of asystole was observed 12 days after the ingestion of 100 ml of 50% methyl parathion, when the acute effects of the OP had already subsided [8]. The QT interval was normal and asystole was preceded by wide QRS complexes followed by a short burst of ventricular tachycardia. Although there is some concern about heart donation, there is no evidence that parathion may cause direct hepatotoxicity or nephrotoxicity.

Parathion is converted by liver microsomal enzymes to a more toxic form, paraoxon. Parathion has an apparent volume of distribution of 21.5 ± 3.8 l/kg and paraoxon a 10-fold smaller one [9]. The importance of fat tissue as a deep compartment with parathion is known from experimental animals. The transfer of parathion from fat tissue into blood is probably slow. There is a large variation of parathion elimination kinetics in poisoned patients. Plasma elimination half-life is usually around 28–32 h, but longer half-lives approaching 140 h have been reported [10].

As blood or tissue levels of parathion are not routinely available, the optimal timing for liver and kidney recovery should be mainly based on the absence of any clinical sign of toxicity because of parathion. Although the detoxification and excretion of parathion is rapid, it appears safer to consider a maximal terminal elimination half-life of 140 h. Other organophosphates should be considered according to their toxicological properties and disposition. Treatment with large doses of atropine and oximes is unlikely to influence graft function.

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