Hepatic encephalopathy in the course of alcoholic liver disease — treatment options in the intensive care unit

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Abstract

Hepatic encephalopathy occurs as a complication of alcoholic liver disease may require methods of dialysis available in intensive care units. There is described the case of a 27-year-old patient with jaundice and hepatic encephalopathy with long history of alcohol dependence and substance abuse. The patient was successfully treated using liver dialysis method (Prometheus® system). Basing on this case it is possible to conclude that use of dialysis liver with Prometheus® may be beneficial in patients with severe course of alcoholic liver disease.

Key words: intensive care; alcoholic liver disease, liver insufficiency; liver insufficiency, encephalopathy; liver dialysis

Hepatic encephalopathy (HE) is a severe complication of alcoholic liver disease (ALD) characterised by various abnormalities, including cognitive impairment. In patients with HE, the damaged liver cannot remove neurotoxic substances, which accumulate and enter the brain where they can impair normal activity of neurotransmitters.

Treatment of patients with HE in the course of alcoholic liver disease mostly involves measures to reduce blood ammonia concentrations; in some cases, liver dialyses or liver transplantations are performed. The management to lower ammonia levels involves the supply of osmotically active drugs (e.g. lactulose) and antibiotics (e.g. neomycin) to decrease the production of ammonia in the gastrointestinal tract. Another measure is to convert ammonia into the substances harmless for the brain by administration of L-ornithine L-aspartate.

Liver dialyses can be performed using special systems available only in a few intensive care units. The techniques applied include fractionated plasma separation and adsorption (FPSA) using the Prometheus® system [1–3], molecular adsorbent recirculating system (MARS) [4, 5] or less complicated single pass albumin dialysis (SPAD) [6–9] accessible in each anaesthesiology and intensive therapy department in Poland.

Only 10% of patients with alcoholic liver cirrhosis undergo liver transplants despite the fact the alcoholic liver diseases is one of the commonest indications for such procedures due to end-stage liver cirrhosis [10].

Patients with hepatic encephalopathy associated with ALD are rarely seen in Polish anaesthesiology and intensive therapy departments. They are usually treated in non-surgical departments (of internal medicine, infectious diseases, hepatic diseases, etc.) that are not prepared to perform FPSA, MARS or even SPAD which is less demanding in terms of equipment.

The available treatment options for this group of patients seem not to be used to their full potential, especially in severe clinical cases manifesting as a second- or higher-grade hepatic encephalopathy and/or total bilirubin concentration exceeding 15 mg/dl⁻¹. Transfer of such patients to anaesthesiology and intensive therapy departments for liver dialyses may be a life-saving therapeutic option.

CASE REPORT

A 27-year-old patient with long-term history of alcohol dependency and abuse of psychoactive substances was admitted to the Department of Internal Medicine due to severe abdominal pain and yellowish discolouration of the skin. On admission, the patient was under the influence of alcohol; his blood ethanol concentration was 330 mg dL⁻¹. The additional tests revealed total bilirubin of 12.6 mg dL⁻¹, INR 1.62, AST 323.6 U L⁻¹, ALT 59.7 U L⁻¹, GGTP 1406.5 U L⁻¹, and serum ammonia 196.8 µg dL⁻¹. The abdominal CT scan disclosed "the
liver — markedly enlarged with features of steatosis, no focal lesions, intra- and extrahepatic bile ducts — undilated, the thin-walled gallbladder without calcifications. The patient was diagnosed with toxic liver damage, second-degree hepatic coma, alcohol dependence syndrome, chronic atrophic pancreatitis, cortico-subcortical atrophy of CNS, epilepsy, and secondary anaemia. During the 15-day stay in the department, the patient was initially agitated and subsequently excessively sleepy. The drugs administered (dexamethasone, lactulose, neomycin, spironolactone, propranolol, diazepam) failed to improve his clinical condition despite the reduction in concentrations of AST, ALT, GGTP and ammonia. Since the patient’s general condition and liver function deteriorated (total bilirubin 32.4 mg dL⁻¹; INR 4.62), he was transferred to the Department of Anaesthesiology and Intensive Therapy at the Biegański District Specialist Hospital in Łódź to undergo further treatment (liver dialyses, in particular).

On admission, the patient was conscious, drowsy, in logical contact; disturbances of consciousness were observed periodically. The respiration and circulation were efficient. His GCS, SOFA, APACHE II, and SAPS II scores were found to be 14, 6, 13 and 17, respectively. Six FPSA procedures were performed (Prometheus® 4008H, Fresenius Medical Care, Germany) — on day 2, 3, 4, 5, 8 and 11 — which resulted in temporary improvement of clinical condition and values of biochemical parameters. During the first 4 days, the patient experienced hallucinations, agitation and incoherence. Each liver dialysis provoked temporarily increased tremor of the hands and sleep disorders, which was associated with mild withdrawal syndrome.

Once the desired clinical condition was achieved (grade 0 hepatic encephalopathy, decrease in total bilirubin below 15 mg dL⁻¹, prothrombin index above 50%), the patient was transported to the Department of Infectious and Hepatic Diseases.

**DISCUSSION**

Severity of alcoholic liver disease is a derivative of time and amount of alcohol consumed. The subsequent stages of ALD include hepatic steatosis, hepatitis and cirrhosis. The available data demonstrate a linear correlation between per capita alcohol consumption and mortality attributable to alcoholic liver disease.

Hepatic steatosis is entirely reversible provided the alcohol consumption is reduced or discontinued. The disease may develop even after short-term heavy alcohol consumption.

Alcoholic hepatitis may be acute, subacute or chronic. It is caused not only by direct toxic effects of alcohol but also by toxins from the intestinal bacteria that infiltrate the portal system in excessive volumes. Acute alcoholic hepatitis most commonly develops during the period of increased alcohol consumption and may periodically manifest itself as liver failure with full metabolic decompensation. Severe cases of alcoholic hepatitis are characterized by poor general health condition, jaundice, fever, high leucocytosis, tachycardia, abdominal pain and confusion [11].

Cirrhosis occurs in less than 10% of alcohol abusers. The risk of this form of ALD concerns individuals abusing alcohol for at least 3–5 years. The majority of patients with alcoholic cirrhosis do not survive the period of 10 years following the diagnosis. In patients with decompensated cirrhosis, a 5-year survival reaches 60% in those who stopped drinking and drops below 30% in those continuing drinking [12].

Hepatic encephalopathy in alcoholic liver disease occurs mainly in the most advanced stage of disease, i.e. in cirrhosis. However, it can also develop in earlier stages. Such cases are usually a consequence of excessive alcohol consumption before the onset of encephalopathy.

The use of dialyses to treat encephalopathy in the course of alcoholic liver disease seems an interesting option. It enables to reduce substantially the blood levels of various toxic substances, including neurotoxins.

The most expensive yet the most effective method of dialysis is fractionated plasma separation and adsorption (FPSA) using the Prometheus® system [13].

FPSA ensures higher clearance of the majority of liver toxins, especially those strongly bound to serum albumins. The Prometheus system supplements the 4008H haemodialysis apparatus. In addition to haemodialysis procedures, it enables extracorporeal removal of toxins from blood in acute and chronic liver failure. Following the serum fractionation, toxins that were originally bound to albumins are removed thanks to the application of capillary filters with albumin-permeable membranes and special adsorption capsules. The procedure diagram is presented in Figure 1.

In severe clinical alcoholic liver disease, as the case described, a series of liver dialyses ensuring time for regeneration of the hepatic parenchyma is optimal. Dialyses are available in some intensive care units equipped with the Prometheus® system. However, in line with the Polish provisions of law, each anaesthesiology and intensive therapy department should have at least one renal replacement therapy device, which means that every patient from this group can be treated with SPAD.

Liver transplants are performed in patients with alcoholic cirrhosis in the end-stage chronic liver failure. Considering average patient and graft survival rates as well as quality of life of patients, the outcomes of transplantations for alcoholic cirrhosis are comparable to or even better than those after transplants due to other diseases [14].

In Poland, patients with alcoholic hepatitis are not qualified for liver transplants. This is associated with the shortage of organ donors and multiple organ complications of alcoholic
disease that disqualify such patients (e.g. cardiomyopathy, oesophageal cancer, pancreas failure, alcoholic characteropathy). Moreover, in the majority of centres the inclusion criterion is a 6-month alcohol abstinence prior to transplantation.

**CONCLUSION**

The use of the Prometheus’ FPSA system is likely to beneficially affect the course of exacerbations of alcoholic liver disease.

**References:**


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