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Halothane Hepatitis with Renal Failure Treated with Hemodialysis and Exchange Transfusion

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ABSTRACT: A 38-year-old white female, hepatitis B antigen negative, developed fluminating hepatic failure associated with oliguria and severe azotemia after two halothane anesthesia and without exposure to other hepatotoxic drugs or blood transfusions. She was treated with multiple hemodialysis and exchange blood transfusion. The combined treatment corrected the uremic abnormalities and improved her level of consciousness. The liver and kidney function gradually improved, and she made a complete recovery, the first recorded with hepatic and renal failure under these post-anesthetic conditions. Further evaluation of this combined treatment used for this patient is warranted.

KEY WORDS: halothane hepatitis, renal failure, hemodialysis, exchange transfusion.

Introduction

Halothane induced liver injury with coma almost invariably leads to death. The occurrence of oliguria in the presence of severe hepatic insufficiency is a further poor prognostic sign[2,5,8]. No survival has been reported in patients with halothane induced hepatic necrosis with oliguria. We have recently treated a 38-year-old Caucasian female with severe halothane hepatitis with coma and oliguria, who recovered from the two abnormalities following hemodialysis and exchange transfusion. It is the purpose of the present communication to describe the management of this patient, which may be of potential benefit for the treatment of patients with similar diseases.

Case Report

A 38-year-old obese Caucasian female underwent two laparotomies without blood transfusion on November 9, 1972 and January 3, 1973 because of a malignant lesion of the left ovary. Anesthesia was with halothane and nitrous oxide on both occasions. By palpation, the liver and the gallbladder were described as normal both times. The post-operative course was uneventful after the first operation. After the second laparotomy,

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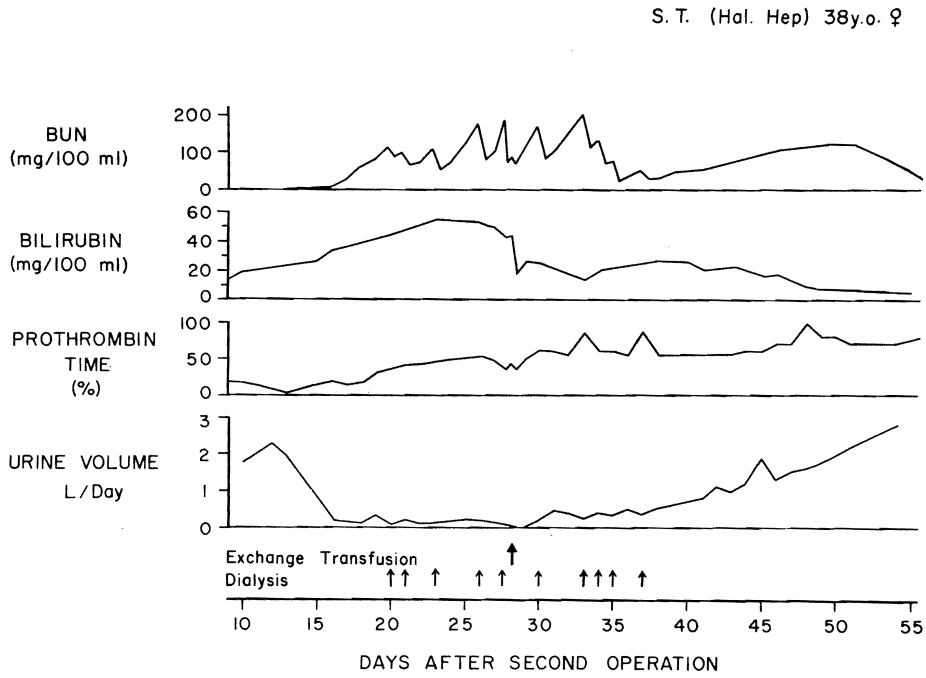

Fig. 1. The change in serum concentration of BUN. Bilirubin, prothrombin time and daily urine volume in patient S.T. during the hospital course.

she developed low grade fever on the first and second postoperative days and became jaundiced and somewhat lethargic on the fifth day. The laboratory findings around this time revealed total bilirubin 13.7 mg/100 ml, SGOT 4020 IU/L, prothrombin time 25 seconds (not improved with Vitamin K). On the 11th day, the patient had an episode of hypotension lasting less than one hour. However, the urinary output did not decrease during the next three days. By the 13th day, she became more lethargic with asterixis and slurring of speech. An abrupt decrease of serum hepatic enzymes (SGOT 562, SGPT 712) with the presence of very low BUN (Figure 1) and increasing bilirubin and prothrombin time were consistent with fulminating hepatic necrosis. The patient was, therefore, transferred on the 16th day to Colorado General Hospital for further evaluation and possible liver transplantation. On arrival, the patient was lethargic and had pronounced asterixis plus nausea and vomiting. Urinalysis on admission revealed pH 5, specific gravity 1.027. Urinary Na was 12 mEq/L. The sediment showed 1–5 granular cast and rare WBC, occasional RBC per high power field. Additional laboratory data showed: BUN 14 mg per cent, creatinine 4.1 mg/100 ml, normal serum electrolytes and glucose, prothrombin time 15.5 per cent, bilirubin 30 mg/100 ml, SGOT 52, SGPT 99, alkaline phosphatase 99 IU. The size of the liver was decreased, both on percussion and on radiotechnetium scan. Rose Bengal retention was 92 per cent (normal=5~11 per cent). The patient's urine volume decreased markedly following admission. On the 19th day, the BUN was 92 and serum creatinine 10.0 mg/100 ml. A Schribner type arteriovenous shunt was inserted in the patient's right forearm. Hemodialysis was performed with regional heparinization with DOW-4 hollow fiber dialyzer (see Figure 1). However, the patient's level of consciousness continued to deteriorate. On the 28th day, the patient lapsed into the fourth stage of hepatic coma.

Exchange transfusions were performed through the A-V shunt with heparinized whole blood (10 units). After this procedure, the bilirubin decreased and the urine output began to increase. The patient showed an improvement in the level of consciousness about 24 hours after the procedure. On the 31st day, the liver scan revealed definitive increase in size. Urinary output also showed a further increase. The hemodialysis was, therefore, discontinued. The prothrombin time and the bilirubin continued to improve gradually. The kidney function as estimated by creatinine clearances also showed gradual improvement, reaching 10 ml/min on the 49th day after the second laparotomy. The patient was discharged the same day in good general condition. In October, 1973, the patient was asymptomatic with a creatinine clearance of 60 ml/min. Hepatic enzymes and bilirubin were normal. Rose Bengal retention was 50 per cent.

Discussion

Although halothane hepatitis is a well established clinical entity, arriving at a definitive diagnosis may be difficult[1]. The exclusion of other etiological factors is necessary before the role of the halothane as the pathogenetic agent may be assumed. In our patient, the following findings supported the diagnosis of halothane hepatitis. First, normal consistency of the liver on palpation during the two laparotomies made pre-existing chronic liver disease unlikely. Second, the tests for Australia antigen were always negative, and the patient never received blood transfusions before the hepatic failure appeared. Third, this patient was exposed to halothane on two occasions, in less than two months' interval. She was obese and middle-aged, factors considered favorable for the development of halothane hepatitis[1].

The etiology of renal failure in this patient was not clear. Two major alternative possibilities were considered. The first was that functional renal failure was secondary to hepatic failure (hepatorenal syndrome). The second was that tubular necrosis either resulted from toxic insult to the kidney (possibly due to fluoride in the anesthetic agent) or was due to hypotension. However, there was no decrease in urinary output during the subsequent 3 postanesthetic days. This observation, plus a high urinary specific gravity (1.027) and a low urinary Na (12 mEq/L) on admission, militated against the diagnosis of acute tubular necrosis. Thus, the diagnosis of functional renal failure was held most likely.

The reports on success with hemodialysis alone in hepatic failure are conflicting[3,4,7,10]. Although ammonia may be effectively removed with hemodialysis, the role of ammonia in hepatic coma is not clearly defined[7]. In our patient, hemodialysis produced an improvement in the biochemical abnormalities of uremia, but it failed to alter the severity of the hepatic coma. The improvement in the state of consciousness as well as the increase in urine volume seemed to follow the exchange transfusion with 5 liters of blood. There have been some reports that exchange transfusion was effective for hepatic coma[9]. However, the efficacy of this procedure in acute hepatic failure has been seriously questioned in a recent report[1]. Thus, we cannot exclude a spontaneous and coincidental improvement in our case.

In chronic hepatic failure, supportive treatment yields only temporary improvement and the prognosis is invariably poor. By contrast, in acute hepatic failure with potential reversal of liver damage, especially when complicated by renal failure, hemodialysis combined with exchange transfusion is worth trying. The presence of external arteriovenous shunt in our patient made the exchange transfusion a very easy and safe procedure, which could be repeated if necessary. A single case does not allow the drawing of definitive con-

clusions, but the experience suggests that further evaluation of the combined treatment may be warranted.

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