PATHOPHYSIOLOGICAL ASPECT OF THE LIVER IN ACUTE OBSTRUCTIVE SUPPURATIVE CHOLANGITIS

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Summary

This study is prompted in order to clarify the pathophysiological aspect of the liver in acute obstructive suppurative cholangitis (AOSC). An experimental model of AOSC, was prepared by intracholedochal infusion of endotoxin in dogs with and without obstructive jaundice. In the patients with AOSC, liver function was aggravated remarkably compared with that in the stage of non suppurative cholangitis. A rapid fall of platelet count occurred.

Experimentally, after intracholedochal infusion of endotoxin, liver function revealed significant hepatic cellular damage. A considerable increase in the S-OCT level was accompanied by a marked rise in blood ammonia concentration. Liver damage due to obstructive jaundice was further aggravated by endotoxin infusion.

The level of serotonin in the liver tissue increased markedly after endotoxin infusion. This was accompanied by a rapid fall of platelet counts. Serotonin is considered to be a factor which may cause an impairment of hepatic microcirculation and then hepatic cellular damages.

It may be concluded that AOSC is induced by cholangio-venous reflux of endotoxin. Liver function is impaired remarkably due to increased bile canicular pressure, to the direct affect of endotoxin on liver cells during the process of cholangio-venous reflux, and to impairment of hepatic microcirculation in endotoxin shock.

Liver dysfunction contributes to develop this clinical entity and play an important role to make its outcome fatal.

Key Words: acute obstructive suppurative cholangitis, obstructive jaundice, cholangio-venous reflux of endotoxin, aggravation of liver function, serotonin.

Acute obstructive suppurative cholangitis is one of the most serious complications of obstructive jaundice. In this clinical entity, which is characterized by right upper abdominal pain, jaundice, fever with chills, altered mental status, and shock. Mortality is nearly 100 per cent, unless biliary decompression is immediately instituted.

Although cholangio-venous reflux of endotoxin is considered the main cause of this entity, the pathophysiological aspect still remains unclear. It is suggested that dysfunction of the liver may play a significant role for development of this syndrome. However, a few investigations of pathophysiological changes of the liver with respect to AOSC have been re-

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ported.

In this study, biochemical changes of the liver following the experimental infusion of endotoxin into the common bile duct are investigated, and liver function of patients with acute obstructive suppurative cholangitis is analyzed.

Material and Methods

Clinically, liver function in the stage of non suppurative cholangitis before development of acute suppurative cholangitis was compared to that just after the development of this syndrome in the patients with benign disease, which consisted of choledocholithiasis in five patients and empyema vesicae felleae in one patient; and with malignant disease, which consisted of pancreas head cancer in four patients, gallbladder cancer in three patients, and choledochal cancer in one patient. Changes in W.B.C. and platelet counts were also observed.

As experimental animals, mongrel dogs weighing 10 to 15 kg, were used and divided into three groups.

Endotoxin (E. coli 055:B5) 3 mg/kg, diluted with 10 ml saline solution was infused and followed by further infusion of approximately 60 ml saline solution into the common bile duct (C.B.D.) of both the dogs with acute obstruction of C.B.D. (Group II) and those with ligation of C.B.D., performed two weeks previously (Group III). As control, just 60 ml of saline solution was infused into the C.B.D. of normal dogs (Group I). The drip infusion of solution was carried out under a pressure of 100 to 150 mmH2O higher than intracholedochal pressure for 15 minutes. Blood sample and liver specimens were taken before and after two hours of endotoxin or saline infusion. Changes in peripheral blood cell counts, changes in liver function such as S-GOT, S-GPT, S-OCT (according to Takeda's method), and blood ammonia (according to Fujii & Okuda's method), changes in total and free tryptophan (former: according to Bloxam & Warren's method, latter: Curzon's method), and serotonin (according to modified Udenfreind's method) in blood and liver tissue, were observed.

Results

In the patients with AOSC, remarkable leucocytosis could be observed. On the other hand, the control value (value in the stage of non suppurative cholangitis) was within normal limits. Platelet counts decreased considerably in AOSC (Table 1).

In liver function tests, levels of S-GOT, S-GPT, ALP (Alkaline phosphatase), LAP (Leucine aminopeptidase), LDH (Lactic dehydrogenase), bilirubin, BUN, increased remarkably after development of AOSC (Table 2). In malignant disease, impaired liver function due to obstructive jaundice was further aggravated in AOSC. S-GOT level increased to 322 ± 65 from control value of 134 ± 62. LDH level increased to 841 ± 190 from control value of 336 ± 22.

Experimentally, WBC (white blood cell counts), and Platelet counts decreased marked-

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<th>Benign disease (n=6)</th>
<th>Malignant disease (n=8)</th>
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<tr>
<td></td>
<td>Before</td>
<td>After</td>
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<tr>
<td>WBC (×10⁹/mm³)</td>
<td>59.6±12.2</td>
<td>168.2±21.6⁺</td>
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<tr>
<td>Platelet (×10⁹/mm³)</td>
<td>18.0±3.1</td>
<td>4.8±2.1⁺</td>
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Values are expressed as means ± SEM. Before: before development of AOSC. After: after development of AOSC. *⁺p<0.01