

General Lectures—(B-1)~(B-85)

B-1. A STUDY ON MECHANISM OF INTRAHEPATIC SHUNT FLOW FORMATION IN LIVER DISEASES

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This study was undertaken to clear the mechanism of intrahepatic shunt formation during the course of chronic hepatitis by means of determination of ratio of parenchyma to connective tissue of the liver, portal venous pressure, hepatic accumulation rate of radiogold colloid and plasma disappearance rate of Indocyanine green (ICG) respectively. Intrahepatic shunt flow was obtained from galactose excretion rate which was calculated by continuous injection method of galactose reported by Nakamura. The ratio of parenchyma to connective tissue of the liver was measured by the calculation with the use of microscopic photograph ($\times 80$) of liver specimens taken by liver needle biopsy.

1) Most of the cases with chronic hepatitis showed normal patterns of galactose excretion rate and ratio of the connective tissue to the parenchyma. On the other hand, a few cases of chronic hepatitis and all of the cases with precirrhosis and cirrhosis showed a decrease in galactose excretion rate and ratio of the connective tissue to the parenchyma.

2) Some of the cases of non cirrhotic stage showed a marked decrease in galactose excretion rate when the portal venous pressure in these cases were elevated over 250 mmH₂O. The reduction of galactose excretion rate was estimated as the functional shunt flow concerned to the increase of portal pressure, because the existence of portal vein-hepatic vein anastomosis could not be considerable with these cases from their morphological findings.

3) Effective hepatic blood flow measured by galactose clearance method, plasma disappearance rate I.C.G. and hepatic accumulation rate of radiogold colloid were compared respectively. Similar results were obtained with galactose method and I.C.G., but the result of radiogold colloid differed to some extent. It was noted that the ratio of I.C.G. with radiogold colloid (ICG/Au¹⁹⁸ colloid) was closely related to galactose excretion rate.

B-2. CLINICAL AND EXPERIMENTAL STUDIES ON INTRAHEPATIC SHUNTED BLOOD FLOW

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In 62 patients, the intrahepatic shunted blood flow was measured by galactose-1-C¹⁴ method which was previously reported by us. The calculated values in controls were 4~20%, averaging 12%. Patients with acute icteric viral hepatitis showing high transaminase values and marked hepatic cell necrosis in needle biopsy had almost the same values as the controls. The intrahepatic shunted blood flow of 12 patients with hepatic cirrhosis was mostly more than 40%, averaging 53%. Though about half of the patients with chronic hepatitis or alcoholic fibrosis had higher per cent intrahepatic shunt than the controls, it was mostly less than 40%. There was statistically significant correlation between the per cent intrahepatic shunt and per cent of interstitial tissue in hepatic biopsy specimens.

The above-mentioned results were confirmed also by animal experiments. Rats were given carbon tetrachloride for 1~3 months. One month after discontinuation of carbon tetrachloride administration, heat-denatured radioactive iodinated human serum albumin was injected into the mesenteric vein. Ten seconds after the injection, the hepatic artery and the portal vein were ligated, and the liver was resected. Per cent intrahepatic shunt was calculated from the radioactivity of the injected albumin solution (R₁) and that of the resected liver (R_L) as

$(1 - R_L/R_I) \times 100$.

Per cent intrahepatic shunt averaged 6% in normal rats, 20% in hepatic fibrosis, and 49% in hepatic cirrhosis. The correlation between the per cent intrahepatic shunt and the per cent of interstitial tissue was highly significant. These results are similar to those in clinical studies. Thus, appropriateness of galactose-1-C¹⁴ method was confirmed in the animal experiments.

B-3. STUDIES ON PORTAL CIRCULATION (6)

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The effects of Phenylalanine³-lysine⁸-vasopressin (PLV₂) on portal circulation was observed clinically and experimentally.

(1) Experimental studies in dogs, divided into the following two groups:

A group: with normal level of portal pressure, as in normal dogs and prolonged portal stenosed dogs.

B group: with portal hypertension, as in CCl₄ injured dogs and CCl₄ treated portal stenosed dogs.

The administration of 10 units of PLV₂ caused a transient, marked decrease of the portal pressure and hepatic vein pressure, and the increase of the arterial blood pressure. A slight diminution in the hepatic blood flow, measured by radiogold Au¹⁹⁸ was also observed at the same time in both groups.

The decrease of portal pressure was, however, less remarkable in B group than in A group.

(2) Clinical observations:

The effects of PLV₂ were studied on two patients with hepatic cirrhosis. 20 units of the hormone were diluted in 200 ml. of 5% dextrose solution and injected intravenously for the period of 15 minutes.

A rise of systemic pressure and reduction of hepatic blood flow were observed, similar to rise and fall found in those experimental studies.

An extensive depletion of the rectal capillary pressure (RCP), measured at the same time, was also observed. 30 minutes after administration of PLV₂, the blood pressure resumed to the normal level, however, the tone of the visible mucosa was remained in pale and RCP was kept in lower level.

Neither significant side reaction in physical signs, nor changes in ECG was found after the administration of this hormone.

On three patients with repeated bleeding from esophageal varices, PLV₂ showed transient effect on stanching.

The mechanism of these changes, caused by this hormone, will be also discussed.

B-4. THE RELATION BETWEEN NODULAR PARENCHYMAL REGENERATION AND VASCULAR CHANGES IN THE CIRRHOTIC LIVER

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Studies of the hepatic vascular changes which accompany cirrhosis have been undertaken by many investigators. Despite the extensiveness of this research, much remains in the unknown fields. The present investigation deals with the relation between hepatic vascular changes and nodular parenchymal regeneration which is known one of the anatomic definition