Studies on Cirrhosis of the Liver

VII Hepatic Venography in Clinical Cases

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For diagnosing liver diseases, various function tests and biopsy of the liver are routinely carried out besides the examinations of clinical signs and symptoms. Recently, in addition, the measurements of hepatic blood flow and of wedged hepatic venous pressure and hepatic venography by means of liver catheterization have come into importance.

The present authors subjected normal subjects and patients with various liver diseases to hepatic venography and studied the morphological changes and anastomoses in their hepatic veins, as reported in the following study.

EXPERIMENTAL

Subjects and Method

Hepatic venography was performed to 11 cases with no known liver disorder (in 3 cases of which the catheter was driven in deeply to introduce the contrast medium into the sinusoids), 4 hepatitis cases, 6 liver fibrosis cases, 11 liver cirrhosis cases comprising 4 mild, 6 severe and one biliary cases, and 3 metastatic liver cancer cases, 35 cases in total.

In these cases, a catheter was inserted through the ulnar or radial vein into the right hepatic vein under X-ray control after the method adopted in 1953 by Ueda¹⁾ and Tori²⁾. The tip of the catheter was led as near as possible to the orifice of the right hepatic vein into the inferior caval vein, and about 15 cc of 70% Pyraceton or 60% Urographin was introduced as quickly as possible and a venogram was taken. For taking the venogram of the sinusoids the catheter was driven in more deeply. For testing supersensitivity to iodine, 1-2 cc of contrast medium was

slowly injected intravenously before the venography. Only one case vomited during the test, while the other cases merely complained of a temporary feeling of fever.

Results

1) Changes in the hepatic veins

In the normal liver, the hepatic veins sent out many branches at regular intervals, tapered off gradually and did not run crooked or serpentine courses. Their walls were even and smooth (Figs. 1 and 2). In the cases with hepatitis and liver fibrosis, no change was observed; in only one of the cases with mild liver cirrhosis, a crooking was found in the course of the veins (Fig. 3). In the severe cirrhosis cases, however, the branches were very few and the veins ran zig-zag courses, giving the impression of a dead tree, as shown in Figs. 4, 5 and 6, while the venous walls were found uneven due to the pressure of the regenerating nodules. The case of biliary cirrhosis, though severe, showed little change (Fig. 7). In

Fig. 1

Fig. 2

Fig. 1. The hepatic veins in the normal liver. A: Anastomoses between the hepatic veins.

Fig. 2. The hepatic veins in the normal liver. A: Anastomoses between the hepatic veins.

the mild liver cancer cases, the branches were somewhat decreased and the courses of the veins were winding. In the severe liver cancer case, the picture of venous stenosis and circuitous courses was apparent, and a round

Fig. 3

Fig. 4

Fig. 3. The hepatic veins in hepatitis. A: Anastomoses between the hepatic veins.

Fig. 4. The hepatic veins in liver cirrhosis.

shadow as shown in Fig. 8 was observed. Upon autopsy of this case, it was ascertained by venography and casting, that the venous walls were infiltrated by the cancerous tissue, probably forming a venous cyst.

In the normal cases with the catheter driven far into the sinusoids, a uniformly dense localized shadow was seen, and the contrast medium running out of it delineated the branches of the portal vein (Fig. 9).

2) Venous Anastomoses

Figs. 10 and 11 illustrating the liver of a hepatitis case showed a picture of anastomoses between the hepatic veins. The anastomoses were clearly demonstrated, as the contrast medium, alternately introduced into the V. hepatica dextra ventralis and the V. hepatica dextra caudalis, as nominated by Toyoshima³⁾, obviously ran through the anastomoses to the other vein branch.

Anastomoses between the hepatic veins were frequently met with in 7 of 8 normal cases, in 2 of 4 hepatitis cases, in 3 of 6 liver fibrosis cases and in 3 of the 4 mild liver cirrhosis cases, but only in one of the 6 severe cirrhosis cases and in one biliary cirrhosis case. In the cases of severe liver cancer, besides the anastomoses usually observed in normal cases, complicated anastomoses between hepatic venous branches resembling of meshes of a

Fig. 5. The hepatic veins in liver cirrhosis.

Fig. 6. The hepatic veins in liver cirrhosis.

Fig. 7. The hepatic veins in biliary liver cirrhosis. A : Anastomoses between the hepatic veins.

Fig. 8. The hepatic veins in metastatic liver cancer. A: Abnormal anastomoses between the hepatic veins. B: Anastomoses between the hepatic veins. C: Round shadow.

Fig. 9. The contrast medium is injected into sinusoids in the normal liver. A: Portal veins.

Fig. 10. The contrast medium flows from the V. hepatica dextra ventralis into the V. hepatica dextra caudalis through the anastomosis. A: Anastomosis.

net were observed.

As described in the succeeding paper, in the autopsied cases of liver

Fig. 11. The same liver as shown in Fig. 10. The contrast medium flows from the V. hepatica dextra caudalis into the V. hepatica dextra ventralis through the anastomosis. A : Anastomosis.

Fig. 12. The hepatic veins in liver cirrhosis. A : Anastomosis between the hepatic veins. B : Portal vein. C : Anastomosis between the hepatic and portal veins.

cirrhosis, it was confirmed by venography and casting that relatively large anastomoses were found between the hepatic and the portal veins. In our clinical cases, too, we found a picture suggesting a similar anastomosis, shown in Fig. 12. The branch indicated by the mark "c" in the

figure can hardly be a branch of the right hepatic vein, judging from its course, but seems to be a branch of the portal vein.

DISCUSSION

Since Rappaport⁴⁾ employed hepatic venography to dogs, there have been several reports on the subject. In the normal liver, Tori²⁾ reported the satisfactory visualization of the right hepatic veins as far as their terminal branches, and Takahashi⁵⁾ and Ney⁶⁾ asserted that the course of the hepatic veins was never rugged, and the branches of the veins tapered off slowly and were large in number. In the cases in which contrast medium was introduced through the sinusoids, Celis⁷⁾ reported a homogenous shadow corresponding to the opacified vascular territory. In 4 cases with liver cirrhosis, to which venography was applied by Takahashi⁵⁾, venous branches were reduced in number and as knotty as plum tree branches. In liver tumor, Tori²⁾ found the number of branches reduced and Mikami⁸⁾ observed absence of the shadows and a stricture due to pressure and displacement of the hepatic veins. All the above observations have been confirmed in our studies.

In hepatitis, liver fibrosis, and mild liver cirrhosis cases little change in the venous picture has been found in the present studies, in close agreement with the remarks of Wakim⁵⁶⁾ that little change was found in the autopsied cases of early liver cirrhosis.

Anastomoses between the hepatic veins were observed in most of the autopsied cases of normal livers and in most of our clinical cases. Although Ney⁶⁾ considered that the same anastomoses as shown in Figs. 11 and 12, were the anastomoses between portal and hepatic veins, it is clear from the two photographs that they represent the anastomoses between the hepatic veins.

The existence of anastomoses between the hepatic and the portal veins in liver cirrhosis cases is proved by what we report on autopsied cases in the succeeding paper, but no such anastomosis observed venographically in clinical cases has previously been reported. The present authors have experienced a picture suggesting the anastomosis between the hepatic and the portal veins in one of our clinical cases of liver cirrhosis.

SUMMARY

Using liver catheters, we employed hepatic venography to study normal subjects and clinical patients with liver diseases and arrived at the following results in summary:

1. Little change from the normal was observed in the hepatic veins in

hepatitis, liver fibrosis and mild liver cirrhosis, but in severe liver cirrhosis, the branches were fewer, as if it were a dead trees, showing marked changes in the general picture. In the case of severe but biliary cirrhosis, however, no change was observed. In the cases of liver cancer, circuitous courses of the hepatic veins and a round shadow were observed.

2. When the contrast medium was introduced as far as possible into the sinusoids, the sinusoids as well as the portal vein branches also came out in the venograms.

3. Anastomoses between the hepatic veins were observed in most of the normal livers and we could observe similar anastomoses in hepatitis, but they were found rarely in liver cirrhosis.

4. A finding suggesting anastomosis between the hepatic and the portal veins was observed in a liver cirrhosis case.

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