Portal Reform: Old, But New Concept on Portal Circulation

**Key words:** portal hypertension, portal decompression, portal-systemic shunt

Portal-systemic shunt achieved by surgical procedure was the origin of the treatment for portal hypertension suggested by Eck (1). Connection of the portal trunk with inferior vena cava achieves a dramatic decrease in portal pressure and stops bleeding from esophageal varices immediately. In a few countries, portocaval shunting is one of the choices of the treatment for bleeding esophageal varices even now. In Japan, in about 1950, cardiovascular surgeons successfully performed many portocaval shunt-operations on patients with liver cirrhosis (2). But, following the operation, hepatic encephalopathy occurred repeatedly, therefore, mid-term prognosis was poor due to encephalopathy and malnutrition. Naturally occurring hepatic encephalopathy has been studied in detail by the neuropathologist, Inose (3). Identical pathologic changes were observed in the patients who received the portocaval shunt-operation. A practical consensus was proposed as follows: ‘Mesocaval’ shunt is harmful due to the induction of hepatic encephalopathy.

To avoid this shunt-encephalopathy maintaining the portal decompression, numerous methods have been designed by scientists studying portal circulation. For example, Warren et al proposed distal selective shunting (4), i.e. connection of the splenic vein with left renal vein. Inokuchi also proposed shunting left gastric vein to inferior vena cava (5). These selective shunt-operations have achieved better prognosis than the simple portocaval shunting.

After the development of medical imaging technologies, naturally-produced or congenital portosystemic shunts without portal hypertension were discovered (6). Patients with intrahepatic portovenous shunts reported at first by Raskin et al (7), and with an extrahepatic portal-systemic shunt (8), recovered from unconsciousness by surgical obliteration (9, 10).

To improve portal circulation, there are two competitive methods. One is to make a portal-systemic shunt, and the other is to occlude the same shunt. Does the difference depend on only the basic liver disease?

After that, balloon-occluded retrograde transvenous obliteration (B-RTO) was proposed by Kanagawa et al (14). B-RTO was the method to treat gastric varices in patients with cirrhosis. Because gastric varix is usually composed of portal-systemic shunt, B-RTO also occludes the major portal-systemic shunt. Even in cases of liver cirrhosis, some authors reported that the liver function became better due to B-RTO (15, 16).

This ‘portal reform’ on meso-portal systems was successful in patients without and also with cirrhosis. As to the method of the ‘portal reform’, laparotomic, laparoscopic, endoscopic, and interventional procedures are all effective for regulating portal circulation in the short or middle term. Recently, interventional ‘differentiation’ of mesenterohepatic flow from splenorenal flow was attempted by obstructing the proximal portion of splenic vein. In the future, the reliability of the ‘portal reform’ will need to be confirmed by multicenter-prospective controlled trials.

From the historical viewpoint as mentioned above, ‘portal reform’ is the key-concept in the improvement of portal circulation. Nevertheless, a physiological principle is lacking in this concept.

1: What is the ‘adequate’ portal pressure?
2: What are the hormonal factors regulating portal circulation such as the renin-angiotensin system? (endothelin or nitric oxide or others?)
3: Is the suitable portal circulation different between the cirrhosis patient and a normal person?

By resolving these basic problems, the concept of ‘portal reform’ will open a new era of gastroenterology and hepatology.

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