症 例

Improved Hepatic Blood Flow after Olprinone Administration Confirmed by Pulse Doppler Echography

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Introduction

We encountered a patient with a marked improvement in hepatic blood flow after olprinone administration, which was confirmed by abdominal pulse Doppler echography.

Key word : Olprinone, Hepatic blood flow, Pulse Doppler echography

Case report

The patient was a 69-year-old man who was 156 cm tall and weighed 54 kg.

His past history included variant form of angina at the age of 44, and cholecystitis at the age of 67. Previously, the patient had been treated for diabetes mellitus and hypertension by a physician. Due to the appearance of gray stool since September 21, 1998, further examination was performed, which indicated stenosis of the common bile duct. Therefore, an internal fistular tube for biliary drainage was inserted on September 30 1998. On October 3 1998, because the diagnosis of cholangio carcinoma was established by angiography, the patient was admitted to our hospital for surgical treatment.

Physical findings on admission : His nutritional status of the patient was good, however, the bulbar conjunctiva was slightly jaundiced. Examination findings on admission : The following results of biochemical examinations demonstrated damaged liver functions and increased biliary tract enzyme : AST 81 IU/l, ALT 142 IU/l, γ -GTP 1213 IU/l and total bilirubin 2.5 mg/dl. Hematological examinations did not apparently demonstrate either anemia or thrombocytopenia.

On November 13, surgical treatment was performed, the tumor was not a cholangio carcinoma, but rather a bile duct infiltration of a gallbladder carcinoma that had developed at the gallbladder neck. Therefore, cholangiojejunostomy and subsequent portal vein reconstruction were performed after partial resection of the right hepatic lobe and the duodenum.

The first postoperative course was favorable. Serial abdominal ultrasonography demonstrated that the peak portal vein blood flow velocity -12 - 14 cm/sec on the 2nd postoperative day (POD) and 15 cm/sec on the 10th POD - was satisfactory. Also, hepatic arterial and venous blood flow were sufficiently visualized by pulse Doppler echography. When an abdominal CT was performed on the 18th POD, the superior mesenteric vein was visualized at the anterior surface of the pancreas. However, the superior mesenteric vein at the head of the pancreas was not visualized at all, demonstrating insufficient portal blood flow due to portal vein thrombosis. Pulse Doppler echography simultaneously performed on the 18th POD could not visualize portal blood flow either, supporting the findings of the abdominal CT. Although i.v. administration of urokinase 6,000 units/day was initiated,

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portal vein blood flow was not improved. Therefore, second surgery was performed on December 1 (19 th POD). Findings on second surgery : Although the color of the liver was dark and, hepatic arterial blood flow was wellpreserved, and ischemic changes were not observed. However, portal blood flow was not preserved due to complete occlusion of the graft used for portalvein reconstruction. The portal vein was reconstructed again by end-to-end anastomosis using the graft newly obtained from the right external iliac vein.

The second postoperative course of the patient after the second surgery : The following results of biochemical examinations, which were performed immediately after the second operation, demonstrated exacerbated liver functions : total bilirubin 14.7 mg/dl, AST 2535 IU/l and ALT 927 IU/l. Therefore, plasma exchange was performed. However, portal blood flow was not visualized by pulse Doppler echography.

On December 3, abdominal angiography was performed, and stenting was attempted at the narrow region of the inferior mesenteric vein running at the posterior surface of the pancreas, but it was unsuccessful. However, a catheter for urokinase administration was left in the portal vein. Because portal blood flow was not improved after the second surgery, 2 mg of olprinone was initially administered intravenously, then 0.1 μg/kg/min (hereinafter referred to as " γ -") of olprinone was continuously administered. However, the patient died on December 15 due to further exacerbation of liver functions and advanced abdominal infection.

Table shows the results of hepatic blood flow measurement after olprinone administration.

Using an SSD2000 equipped with a 3.5 MHz convex type probe (Aloka), hepatic blood flow was measured before and 10 minutes after bolus injection of olprinone (2 mg) and 24 hours after continuous administration of 0.1 γ olprinone. Although tachycardia and decreased blood pressure were observed immediately after i.v. administration of olprinone, portal vein blood flow, which was not visualized before olprinone administration, was confirmed. Moreover, hepatic arterial and venous blood flows were also increased after i.v. administration of olprinone. Portal vein pressure, which was measured simultaneously, was decreased, while portal oxygen saturation was increased after administering olprinone.

Table The results of hepatic blood flow measured by pulse Doppler echography pre-and post--administration of olprinone.

		olprinone		
		Pre injection	10min. after 2mg i.v.	24hour after continuous i.v.(0.1 γ)
AP (mmHg)		164/93	111/71	136/73
HR (bpm)		111	138	98
CVP (mmHg)		11	8	9
PV (cm/sec)		ND	10	13
PVP (mmHg)		28	21	19
$S_{PV}O_2$ (%)		83	94	93
HA	(cm/sec)	27	32	42
	PI	0.3	0.6	0.5
HV(cm/sec)		9.1	15	10

AP : arterial pressure
HR : heart rate
CVP: central venous pressure
PV : portal vein
PVP: portal vein pressure
$S_{PV}O_2$: saturation O_2 in portal vein
HA : hepatic artery
HV : hepatic vein
PI : pulsatile index
ND : no detection
γ : μ g/kg/min

Discussion

Olprinone is a phosphodiesterase (PDE) III inhibitor that inhibits PDE III without intervention of α or β adrenergic receptors, and increases intracellular concentration of cAMP, thus inducing cardiotonic and vasodilative actions. Although various studies regarding the original influence of olprinone on the cardiovascular system have been previously reported, there are only a few reports describing the influence of olprinone on abdominal blood flow[1~5]. Iribe, et al.[6] reported that continuous administration of olprinone (0.3 γ) had increased blood flow of abdominal organs after open heart surgery. Since these increases in blood flow of abdominal organs were significantly higher than increases in cardiac output, they considered that

blood flow of abdominal organs was selectively increased. In the present case, 2 mg of olprinone was administered i.v., and hepatic blood flow was measured by pulse Doppler echography 10 minutes after olprinone administration. As a result, hepatic arterial and venous blood flows were increased, and portal vein blood flow, which was not visualized before olprinone administration, was also increased. Furthermore, oxygen saturation of portal vein was increased, while portal pressure was decreased. Therefore, it was speculated that administration of olprinone induced portal vein and hepatic arterial and venous dilations, resulting in increased hepatic blood flow. In their basic experiment, Fujimoto, et al[7]. demonstrated that olprinone relaxes vascular smooth muscles of the mesenteric artery and vein. Mizutani, et al[8]. measured renal blood flow as we did, using pulse Doppler echography in patients who underwent coronary arterial bypass grafting surgery after olprinone administration, then confirmed significantly decreased renal vascular resistance and increased renal blood flow.

Using pulse doppler echography, we confirmed that olprinone administration apparently increased portal vein, and hepatic arterial and venous blood flows. Therefore, it was considered that olprinone was useful for improving or maintaining hepatic blood flow in patients with decreased liver functions caused by hepatic ischemia.

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(Circ Cont 21 : 88～90, 2000)