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BRIEF REPORT

Clinical study on external counterpulsation in treatment of viral hepatitis

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INTRODUCTION

External counterpulsation (ECP) is an artificial blood circulation apparatus, and has been widely used for treatment of some ischemic diseases. Since June 1988, we have been observing the therapeutic effects of ECP in treatment of viral hepatitis; in general, this therapy has attained excellent results, which are presented here.

MATERIALS AND METHODS

Patients

All the patients in our study were admitted to our hospital in 1990. All the cases were diagnosed with viral hepatitis according to the criteria formulated by the National Virus Hepatic Conference in Shanghai, China (1990). There were 1004 patients in the ECP group and 783 patients in the control group; the groups were comparable in sex, age and etiological diagnosis (Table 1). The methods of ELISA and PCR were used to detect hepatitis B virus serological markers, including HBsAg, anti-HBs, anti-HBc, HBeAg, anti-HBe, anti-HBcIgM, anti-HAVIgM, *etc*, in all the hospitalized patients.

Methods

The ECP group and the control group were treated with similar general therapy, which included administration of vitamins C and B orally; for all, when serum bilirubin was > 85.6 μmol/L, potassium magnesium aspartate was administered (40 mL in 10% glucose 500 mL, once a day at the same time each day). The ECP group received the addition of ECP (SKB-Ⅱ), delivered for 45 min, one time every day for 14 d until the end of one therapeutic course. The pressure of the air pocket wrapped around the patient's limbs ranged from 0 kg/cm to 5 kg/cm (fat: 0.55 kg/cm). Complaints accompanying the ECP treatment included nausea, anorexia, sleeplessness, and acratia. Levels of SB, ALT, TTT, *etc*. were detected in all patients and compared for the ECP group and the control group.

Criteria used to determine therapeutic effect were as follows. 'Notable efficacy' was indicated by extinction of symptoms and normalized levels of SB and ALT within 2 wk or normalized levels of SB, ALT and TTT within 4 wk. 'Effectiveness' was indicated by disappearance of symptoms and levels of SB at < 34.2 μmol/L and ALT at < 1000.2 nmol/s within 2-4 wk. 'Improvement' was indicated by patients general improvement within 6 wk, with levels of SB at < 34.2 μmol/L and ALT at 1016.87-1667 nmol/s. 'No efficacy' was indicated by persistence of symptoms after 6 wk, with SB at > 34.2 μmol/L and ALT at > 1667 nmol/s, and/or further deteriorated liver function.

RESULTS

The therapeutic effects, *i.e.* disappearance of four major symptoms (nausea, sleeplessness, acratia, anorexia), are shown in Table 2 ($P < 0.05$). After 4 wk of treatment, the effective rates in the ECP group are much higher than those of the control group, which are shown in Table 3 ($P < 0.01$).

DISCUSSION

ECP is a non-traumatic therapy and has been used in treatment of ischemic diseases (heart, brain, kidney) for about 10 years[1]. In 1988, we began to apply ECP as treatment for viral hepatitis. Clinical observations indicated that ECP can accelerate elimination of jaundice and relieve clinical symptoms as well as promote recovery of liver function[2]. The underlying mechanism of its therapeutic efficacy may involve the following features. First, it may increase hepatic artery perfusion. It is known that hepatic cell trauma induced by viral hepatitis is caused by a series of immunoreactive responses. Each type of viral hepatitis produces a varying degree of microcirculatory disturbance[3], and ECP may prompt blood flow from the four limbs to the visceral artery system in the ventricular diastole period, which is advantageous to cell regeneration. Second, when ECP is used, more nutrients, such as oxygen, can be carried to the hepatic tissues and the noxious substances in cells can be taken away, more so by the increased hepatic blood flow. ECP may raise PaO2, reduce platelet aggregation in circulation, improve the quantity and quality of blood that flows into the liver, abate the microcirculatory disturbance and stimulate cell regeneration[4]. Third, it has been reported that the patients with hepatitis show a positive correlation between the digestive tract symptoms and concentration of cortisol in the body; the higher the cortisol concentration,

Table 1 General data

Type	ECP Group				Control Group			
	n	Age	m	f	*n*	Age	m	f
IHA	309	30.4 ± 8.5	200	109	205	30.9 ± 8.7	129	76
IHB	270	30.0 ± 6.6	164	106	187	31.2 ± 8.1	104	83
NIHA	97	31.8 ± 8.9	59	38	102	29.9 ± 9.1	57	45
NIHB	98	29.5 ± 6.2	62	36	104	30.9 ± 7.0	64	40
CPH	190	30.6 ± 6.2	135	55	147	33.4 ± 10.1	103	40
CHA	40	32.1 ± 5.7	30	10	38	37.4 ± 12.4	27	11
TOTAL	1004	30.7 ± 7.0	650	354	783	32.3 ± 9.2	484	299

I: Ictero, NI: No ictero, n: Number, m: Male, f: Female.

Table 2 Extinction of symptoms after 2 weeks of external counterpulsation treatment

Type	Acratia	Anorexia	Nausea	Sleeplessness
ECP group	82.93 (%)[a]	86.04 (%)[a]	82.58 (%)[a]	94.50 (%)[a]
Control group	53.12 (%)	67.43 (%)	62.25 (%)	25.78 (%)

[a]$P < 0.05$ *vs* control group. ECP: External counterpulsation.

Table 3 Effective rate comparison among group

	ECP Group									Control Group								
	N	Notably		Effective		Improved		Ineffective		N	Notably		Effective		Improved		Ineffective	
		n	%	*n*	%	*n*	%	*n*	%		*n*	%	*n*	%	*n*	%	*n*	%
IHA	300	182	58.8	96	31.1	25	8.1	6	1.9	205	30	14.6	73	35.7	65	31.7	37	18.0
IHB	270	129	47.8	103	38.1	23	8.5	15	5.6	137	24	12.8	75	40.1	57	30.5	31	16.6
NIHA	96	51	52.6	34	35.1	8	8.2	4	4.1	102	26	25.5	32	31.4	31	30.1	13	12.7
NIHB	98	37	37.8	39	39.8	12	12.2	10	10.2	104	25	24.0	35	33.7	28	26.9	16	15.4
CPH	190	76	40.0	70	36.8	36	18.9	8	4.3	147	36	24.5	43	29.3	49	33.3	19	12.9
CAH	40	4	10.0	19	47.5	10	25.0	7	17.5	38	6	15.8	8	21.1	15	39.5	9	26.7
TPTAL	1004	479	47.7	361	35.9	14	11.4	5	5.1	783	147	18.8	266	34.0	245	31.3	125	16.0

[b]$P < 0.01$ *vs* control group. I: Ictero; NI: No ictero; ECP: External counterpulsation.

the more serious the symptoms serious. Approximately 75.5% of patients with acute hepatitis reportedly have higher cortisol concentration[5]. ECP may improve perfusion of the digestive tract mucosa and accelerate the inactivation of cortisol. Fourth, the patients in the ECP in this study had better curative effect than that of the control group, in regard to disappearance of jaundice. This finding could be due to improvement in the liver microcirculation and enhancement in the enzymatic activity (Na^+-K^+ ATPase), both of which are advantageous to bile excretion; moreover, it is possible that hepatic cell protein intake, and bilirubin, may be improved as the renal blood flow is increased during the course of ECP and that the amount of urine becomes increased also. Fifth, the liver cells repair and regenerate in response to ECP, as a result of the therapy improving tissue perfusion, ameliorating microcirculation, decreasing blood viscosity, increasing the scavenging of free radicals, and abating endothelial cell injury[6]. For the reasons outlined above, ECP may be a useful accessory treatment of viral hepatitis.

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