CLINICAL APPLICATION OF THE HAEMOPERFUSION DEVICES BULSORB 160 COMBINED WITH HAEMODIALYSIS

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Routine haemodialysis use is not capable of eliminating all toxic substances from uraemic patient's organism because of restricted pore size of dialysis membranes and of binding of certain toxins with plasma proteins. That is why some authors (2, 3, 4) use systemically the combination of haemodialysis (HD) and haemoperfusion (HP) in order to eliminate toxic substances with a higher molecular weight as the sorbent absorbs a part of the toxins bound up with plasma proteins.

The application of this method is confined because of the high price of haemoperfusers which are used only once.

The aim of the present study is the clinical assessment of the haemoperfusers Bulsorb 160 as created by ourselves.

Material and methods

Simultaneous haemoperfusion/haemodialysis (HP/HD) procedures were carried out in patients with chronic renal failure (CRF) on HD. The dialysis was performed by using of the dialisators Haemoflow, Nephross and ND-14. The haemoperfuser was started prior to the haemodialysis device. The dialysis was performed 4 hours long at blood flow speed of over 200 ml/min. An increased heparinization — with 1 ml heparin more than the routine dosis with dialysis — was applied in our cases. Haemoperfusion devices (columns) constructed by ourselves from plastics with filters and volume of 160 ml called Bulsorb 160 were used, too. The columns were filled up with sorbent — spherical activated uncoated charcoal from the firm Mitsubishi. Sterilization was done by means of ethylene oxide.

A series of clinical and laboratory indexes were assessed and demonstrated in tables below. Independently performed HDs without combination with HP were used as controls.

Results and discussion

Combined HP/HD implement did not cause any significant changes in the blood pressure, pulse frequency and temperature of the patients (table 1).

No febril reactions and chills could be established in our patients. Thrombocyte count and fibrinogen did not show any significant changes, too, although the literature data about the reduction of these parameters with HP (table 2).

Plasma concentrations of creatinine, urea and uric acid were examined before and after HP/HD to determine the absorption properties towards these substances. Creatinine, uric acid and urea levels were determined after the column

Table 1

Patient	Age	Body temperature		Arterial blood pressure kPa		Pulse frequency	
		before	after	before	after	before	after
M. K.	27	37,0	37,0	19,95/7,98	15,96/6,65	124	124
D. N.	32	37,3	36,8	21,28/11,97	19,95/9,31	64	92
M. K.	27	36,4	36,8	18,62/13,30	17,29/6,65	124	120
J. K.	37	36,5	37,1	11,97/8,65	10,64/7,98	82	82

Table 2

Patient	Date	Thrombocytes—giga/l		Fibrinogen g/l	
		before HP/HD	after HP/HD	before HP/HD	after HP/HD
M. K.	May 7, 1983	218	**302**	**3,40**	3,28
D. N.	May 9, 1983	133	—	**3,26**	—
M. K.	May 10, 1983	225	**227**	**2,46**	2,32
J. K.	June 6, 1983	77	**47**	**0,92**	0,70

Table 3

Patient	Creatinine mkmol/l				Uric aric mkmol/l			
	start		final		start		final	
	input	output	input	output	input	output	input	output
M. K.	724	127	339	161	667	155	262	137
D. N.	1009	159	479	202	571	83	232	119
M. K.	897	126	504	239	833	113	**464**	**209**
J. K.	796	204	354	186	512	321	321	**244**

Table 4

Index	Start HP/HD			Final HP/HD		
	HP input	HP output	HD output	HP input	HP output	HD output
Creatinine mkmol/l	770	271	202	354	310	189
Uric acid mkmol/l	511	400	323	**323**	261	243
Urea mmol/l	**38**	**31**	**15**	**20**	18	8

in one patient in order to define more precisely the absorption capacity of the column Bulsorb 160 (table 3 and table 4).

It can be seen that the absorption capacity of Bulsorb 160 is considerable towards creatinine, less expressed towards uric acid and insignificant towards urea at the beginning of HP. This corresponds to the literature data available concerning other absorption devices filled up with an activated charcoal. At the end of HP/HD procedure after 4 hours absorption capacity is considerably reduced, i. e. the sorbent is saturated.

On the basis of our investigation it can be concluded that haemoperfusion module Bulsorb 160 possesses good absorption properties, it is biologically compatible, it does not cause any side effects and can, therefore, be systemically applied as an addition to haemodialysis.

REFERENCES

1. Димов, А., Д. Ненов, М. Никова, Х. Димитров. Свидетелство за промишлен образец Булсорб 160 и Булсорб 600. София, 1983. — 2. Дмитриев, А. А., Е. П. Левицкий, Н. Н. Сахарова. *Науч. тр. II. МОЛГМИ*, т. 80, *Сер. Хирургия, Гемосорбция*, № 17, 1977, 69—73. — 3. Bonomini, V., L. Baldrati, L. Coli, et al. *Internat. J. Artif. Organs*, 1980, 3, 348, *Proc. ESAO*, 7, 147. — 4. Stefoni, S., G. Feliciangeli, L. Coli, M. P. Scolari, V. Bonomini. *Internat. J. Artif. Organs*, 4, 1981, No 4, 189.

КЛИНИЧЕСКОЕ ПРИМЕНЕНИЕ ГЕМОПЕРФУЗИОННЫХ УСТРОЙСТВ BULSORB 160 В КОМБИНАЦИИ С ГЕМОДИАЛИЗОМ

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РЕЗЮМЕ

При лечении больных с хронической почечной недостаточностью методом периодического гемодиализа происходит удаление только части уремических ядов, что связано с ограниченным размером пор диализной мембраны. В результате этого ряд авторов применяет комбинацию гемоперфузии с гемодиализом (ГП/ГД). Этим способом достигается извлечение токсических субстанций, имеющих большую молекулярную массу.

Авторы применяют комбинированный метод ГП/ГД с использованием собственного устройства для проведения гемоперфузии. Это устройство заполнено сферическим, непокрытым активированным углем фирмы «Mitsubishi». Первые клинические испытания не дали побочных реакций и осложнений. Достигается хороший результат в очистке плазмы от мочевины, креатинина и мочевой кислоты.