

EFFECTS OF MOFETTE THERAPY ON PERIPHERAL HAEMODYNAMICS. STUDY BY DOPPLER ULTRASOUND TECHNIQUE

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The effectiveness of mofette therapy in the long-term management of chronic peripheral arteriopathies is a fact confirmed by several clinical and haemodynamic studies (2, 3, 9, 10). However, the haemodynamic changes secondary to natural carbon dioxide exposure, and the mofette — vasoactive drug interactions as well (4, 5, 6, 10) are less known.

In the present study the Doppler ultrasound technique was applied, which permits the non-invasive determination of perfusion pressure (PP) at various vascular segments and the calculation of differentiated blood pressure, i. e. the Doppler index (DI) (7, 8, 11, 12, 14, 15, 17).

The aims of the present study were as follows:

1. To evaluate the changes of PP and DI secondary to mofette exposure at various arterial segments, which permits the study of the redistribution phenomenon.
2. To study the effect of mofette exposure on the haemodynamic changes during standardized physical exercise.
3. To observe the mofette-vasoactive drug interactions.

Patients and Methods

The haemodynamic investigations were performed in 12 patients aged between 26—59 years, eight of them suffering of chronic occlusive arterial disease of the lower extremities with or without arterial hypertension, and four healthy controls. Any previous treatment with vaso-

active drugs or tranquillizers was withdrawn before the beginning of the study.

In the first part of the study the changes of perfusion pressure (PP) were followed at the level of the four extremities (A. radialis and A. dorsalis pedis), and the Doppler index (DI) was calculated according to the formula: $DI = \frac{PP \text{ A. dorsalis pedis}}{PP \text{ A. radialis}}$, at rest in supine position before mofette exposure, and in the first and the 30th minute after mofette exposure.

In the second part of the study the PP and the DI were determined at rest, and after completing a standardised physical exercise (genuflexions with a frequency of 30 min. for two minutes). After a rest period of 60 minutes the patients completed the mofette therapy, and the haemodynamic measurements — before and after the standardized physical exercise — were repeated.

In the third part of the study the mofette therapy was preceded by the administration of several vasoactive drugs- Kallikrein^R 40 U.I. im. in six patients and Halidor^R 0.100 g per os in six patients. The Doppler ultrasound measurements were performed before and after the mofette exposure.

The mofette therapy was standardised, having a temperature of 20°C and a duration of 20 minutes.

The ultrasound haemodynamic measurements were performed with the aid of a device constructed for vascular explorations type „Gefäß-Doppler Kranzbühler P 280 B.R.D.“.

Results

The results of the first part of study are given in Table I. It appears that the PP increases at the superior extremities in hypotensive subjects, it remains unchanged in normotensives, whereas decreases in hypertensives, phenomenon which can be described as a tendency toward normalisation of the systemic blood pressure. The PP at the lower extremities increases uniformly and independently from the initial value, phenomenon which accompanied by the increase of the DI reflects a favourable haemodynamic effect.

The results of the second part of study are given in the Table II. The PP increases significantly and uniformly at the superior extremities but decreases at the lower extremities in the patients with occlusive arterial disease (group B). DI decreased in the both groups, this being more expressed in the patients with occlusive arterial disease (group B). The haemodynamic response to the exercise test was modified by the mofette therapy as follows: — the PP inregistered uniformly a less expressed increase at the superior extremities; — the PP remained essentially unchanged in the healthy controls (group A) at the lower extremities, but increased in the patients with occlusive arterial disease (group B). The DI remained unchanged in the group A, and increased in the group B. This means that the unfavourable haemodynamic effects of the physical exercise upon the perfusion of the affected lower extremity were annihilated by the mofette therapy.

Table I

No.	Patient	Age	Diagnosis	PPAr mmHg	PPAr _l mmHg	PPAr _r mmHg	PPAp _l mmHg	DI	
1.	C.M.	41	S.m.	b	115	115	150	150	1,30
				1'	130	130	150	150	
				30'	138	138	160	160	1,16
2.	V.P.	26	S.M.	b	95	95	130	130	1,37
				1'	110	110	140	140	
				30'	115	115	140	140	1,21
3.	B.Z.	46	S.m.	b	130	130	150	150	1,15
				1'	130	130	170	170	
				30'	130	130	170	170	1,30
4.	B.A.	45	HT	b	150	150	170	170	1,13
				1'	145	145	172	172	
				30'	102	102	175	175	1,71
5.	B.G.	58	HT OAD	b	160	160	115	80	0,50
				1'	140	140	120	98	
				30'	140	140	130	105	0,75
6.	G.S.	57	HT OAD	b	170	170	102	100	0,59
				1'	155	155	120	120	
				30'	160	160	120	120	0,75
7.	S.L.	53	OAD	b	160	160	170	160	1,03
				1'	152	152	170	170	
				30'	150	150	210	180	1,20
8.	Sz.M.	52	OAD	b	115	115	115	35	0,30
				1'	124	124	130	65	
				30'	125	125	140	65	0,52
9.	V.G.	56	OAD	b	110	110	100	30	0,27
				1'	125	125	150	100	
				30'	130	130	170	130	1,00
10.	N.C.	59	OAD	b	130	130	15	20	0,12
				1'	130	130	25	35	
				30'	130	130	40	50	0,30
11.	T.D.	42	OAD	b	110	110	115	95	0,86
				1'	120	120	130	100	
				30'	120	120	135	105	0,87
12.	D.I.	59	OAD	b	90	90	100	60	0,66
				1'	140	140	150	100	
				30'	140	140	170	130	0,92
Mean values				b					0,54
				30'					0,79

Legend: PP = perfusion pressure
 DI = Doppler index
 Ar = A. radialis
 Ap = A. dorsalis pedis
 r = right

l = left
 b = before
 OAD = occlusive arterial disease
 HT = hypertension
 S.M. = sine morbo

Table II

		Before mofette		After mofette	
		BE	AE	BE	AE
A.	PPAr (mmHg)	126,2	147,5	130,0	131,2
	PPAp (mmHg)	145,0	141,2	160,0	155,0
	DI	1,14	0,97	1,22	1,18
B.	PPAr (mmHg)	141,8	168,1	137,5	123,8
	PPAp (mmHg)	81,2	65,0	84,4	110,6
	DI	0,57	0,42	0,61	0,81

Legend : A = without occlusive arterial disease (cases 1—4)
 B = with occlusive arterial disease (cases 5—12)
 BE = before exercise (mean values)
 AE = after exercise (mean values)
 PP = perfusion pressure
 Ar = A. radialis
 Ap = A. dorsalis pedis
 DI = Doppler index

Table III

		Before mofette	After mofette
Halidor (100 mg)	PP Ar (Hgmm)	123,3	131,0
	PP Ap (Hgmm)	108,6	114,0
	DI	0,86	0,89
Kallikrein (40 U.I.)	PP Ar (Hgmm)	135,5	144,2
	PP Ap (Hgmm)	118,0	128,3
	DI	0,87	0,89

Legend : PP = perfusion pressure (mean values)
 Ar = A. radialis
 Ap = A. dorsalis pedis
 DI = Doppler index (mean values)

The results of the third part of the study are given in the Table III. The results show that the PP and the DI had a less expressed increase at the lower extremities after the association Halidor—mofette than after mofette only, the Kallikrein influencing even to a lesser degree the changes of PP at the lower extremities.

Conclusions

1. The natural carbon dioxide therapy determines an increase of the perfusion pressure of the lower extremities, especially in patients with peripheral arterial occlusive disease, improving also the Doppler index.
2. The unwanted haemodynamic effects of physical exercise, i.e. the decrease of the PP and of DI of the affected lower extremity are annihilated at least partially by the mofette therapy.

3. The concomitant administration of several vasoactive drugs as Halidor and Kallikrein does not enhance the changes of PP at the level of affected lower extremities.

Reference

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