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Ergotamine and Cerebral Blood Flow

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SUMMARY **We measured the cerebral blood flow (CBF) of 16 patients by the xenon-133 intracarotid method before and after the intramuscular injection of ergotamine tartrate. The regional and hemispheric CBF was unaltered, even in 3 migraneurs in whom ergotamine relieved the headache. Ergotamine tartrate in therapeutic doses has no effect on the cerebral circulation.**

EVIDENCE for an ergotamine effect on the cerebral circulation is indirect and contradictory; therefore, we measured cerebral blood flow (CBF) directly, before and after the administration of therapeutic doses of ergotamine tartrate.

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Methods

Regional cerebral blood flow (rCBF) studies[1] were carried out prior to clinically indicated carotid arteriography in 16 patients. Their age, sex and diagnosis are listed in the table. Although cases 5, 6, 8, 10 and 11 were investigated because of suspected brain disease, no brain lesions were demonstrated; hence these patients were, in effect, non-migranous controls. Informed consent was obtained in all cases. Three millicuries of xenon-133 were injected through an indwelling catheter into the internal carotid artery. The intracarotid catheter was also used for mean arterial blood pressure (MABP) measurements and arterial blood gases analysis. The clearance rate of the isotope, and hence the rCBF, was measured by 16 extra-

TABLE 1 *Cerebral Blood Flow Before and After Ergotamine Tartrate*

Patient	Age	Sex	Diagnosis	$Paco_2$ (mm Hg) B	$Paco_2$ (mm Hg) E	MABP (mm Hg) B	MABP (mm Hg) E	CBF (ml/100g/min) B	CBF (ml/100g/min) E	CBF corrected to $Paco_2$ of 40 (mm Hg) B	CBF corrected to $Paco_2$ of 40 (mm Hg) E
1	52	M	Normal pressure hydrocephalus	46	47	75	85	38	38	29	28
2	49	F	Dementia	40	41	80	100	40	40	40	39
3	53	M	Parasagittal meningioma	42	41	90	90	58	61	53	59
4	62	M	L. temporal glioma	36	29	55	75	35	27	42	43
5	28	M	Temporal lobe epilepsy	43	44	85	100	54	55	47	46
6	46	M	Temporal lobe epilepsy	43	44	85	85	58	61	51	52
7	57	M	L. cerebral infarct	40	41	110	115	57	60	57	58
8	61	M	TIA (R. hemiparesis)	43	47	130	140	41	46	36	34
9	55	M	R. hemisphere infarct (minimal)	43	47	135	135	47	51	42	38
10	68	F	R. arm weakness	54	50	75	75	47	45	26	29
11	43	M	Suspected brain tumor	42	43	115	115	84	89	77	78
12	59	F	L. parietal angioma	34	33	140	140	41	47	53	63
13	65	F	Progressive supranuclear palsy	40	39	125	130	42	37	42	39
14	18	F	Migraine	34	31	115	120	63	64	81	91
15	38	M	Migraine	37	35	110	110	48	46	54	56
16	24	M	Migraine	38	36	80	80	48	43	52	51
Mean				41	41	100	106	50	51	49	50
Standard Deviation				5	6	25	23	12	15	15	17

$Paco_2$ = partial arterial pressure of carbon dioxide; MABP = mean arterial blood pressure; CBF = mean hemispheric cerebral blood flow; CBF corrected = equivalent mean hemispheric cerebral blood flow at a $Paco_2$ at 40 mmHF according to the formula of Olesen, et al.[2]; B = baseline; E = post-ergotamine.
There was no statistically significant difference between any of the baseline and post-ergotamine variables (*t*-test for paired observations).

cranial probes, and expressed as $CBF_{initial}$[2] (milliliters of blood per 100 grams of brain per minute). rCBF studies were carried out before and 15–20 minutes after an intramuscular injection of 0.2–1.0 mg of ergotamine tartrate. Thus each patient served as his own control.

Results

Ergotamine tartrate did not change the focal cerebral blood flow in any of the patients. Three migraneurs received the drug during the headache phase with relief of pain, but no change in rCBF.[3] The mean hemispheric CBF value showed a slight rise after ergotamine tartrate injection, but this rise was not statistically significant (table).

Discussion

Observations of the effect of ergotamine on cerebrospinal fluid pulsatility,[4] retinal vessels,[5, 6] and carotid angiograms,[7] as reflections of CBF, have been equivocal. Lennox et al.[8] reported that ergotamine increased CBF; however, their data were obtained from thermoelectric flowmeter studies of the internal jugular vein, an indirect and unreliable way of estimating CBF. Shenkin,[9] by using the nitrous oxide method, found reduced CBF after ergotamine; but his high control values for CBF and his failure to note $Paco_2$ suggest that these data, too, may be unreliable. Using the more reliable intracarotid xenon-133 method, Simard and Paulson[10] demonstrated that 1 mg of ergotamine, given intravenously, had no effect on rCBF during a prolonged migranous aura, nor 3 months later, when the patient was asymptomatic. The present study suggests, further, that ergotamine tartrate in therapeutic doses has no effect on CBF during the symptomatic headache phase of migraneurs, nor on the cerebral circulation of non-migraneurs.

Since we did not measure rCBF in the vertebrobasilar circuit, we cannot rule out an effect of ergotamine on this area of blood flow.

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