

DOPAMINE TREATMENT FOR PREVENTION OF RENAL FAILURE IN PATIENTS WITH SEVERE ECLAMPSIA

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SUMMARY

Nine cases with severe convulsive eclampsia, undergoing intensive care, are reported.

The main problem besides sedation and antihypertensive therapy was to bring about diuresis. Dopamin was administered in all cases, as in particularly severe cases the application of Furosemid and osmotic diuretics does not succeed in the reestablishment of diuresis. The diluted drug was administered by means of a central venous catheter in a dosage of 3 µg/kg body weight/min.

Diuresis was achieved in all patients after few hours and the values of creatinin, rest-nitrogen and creatinin-clearance restored to normal. Also the consumption coagulopathy, due to the primarily restricted function of the kidneys, which was accompanied in the most cases by low platelet and high fibrinogen values, was controlled by the mentioned therapeutic procedure.

The positive therapeutic effect of Dopamin is explained by the stimulation of the postulated specific renal dopamin receptors. The discussed antagonism between Dopamin and Angiotensin could be the cause of the vascular dilatation. Thus, Dopamin has a possibly causal significance in the treatment of oligoanuric eclamptic patients.

INTRODUCTION

EPH gestosis, in particular its aggravated form, the convulsive eclampsia, requires a maximum of personnel, diagnosis and therapy. The common forms of this pathology may be treated in the general wards with sedatives, antihypertensives and diuretics. Severe convulsive eclampsia however, can only be treated successfully in the intensive care unit in close cooperation with anesthesiologists, gynecologists and neurologists (3, 4, 6). This paper does not discuss complications during birth and the specific therapy thereof, but the effect of Dopamin on a limited renal function. At the same time, the influence of Dopamin on an accompanying consumption coagulopathy should be presented (5).

MATERIAL AND METHODS

Intensive medical treatment for an average of 9.7 (6-19) days was necessary in nine patients aged between 18 and 29 years (table 1), who suffered from the symptoms of severe convulsive eclampsia and were admitted to the First Department of Obstetrics and Gynecology in Vienna. All patients were volumed cycled ventilated with PEEP, because of severe hypoxic conditions (2). To treat cerebrally initiated convulsions Diazepam, "cocktail lytique" and Thiopental in particularly severe cases were used. Anticoagulant therapy followed by applying 10 I.U. Heparin/kg bodyweight/h. Hypotensive therapy was carried out with Dihydralazin (Nepresol®), Clonidin (Catapresan®) and in some cases Sodiumnitroprussid (Nipride®). In order to improve diuresis, which was decreased in each of the nine cases, therapy was initiated with 2 mg/kg bodyweight Furosemid (Lasix®), or with osmotic diuretic agents, f.i. Mannitol or Sorbitol. This treatment was followed by a continuous dose of Dopamin of 3 µg/kg bodyweight/minute. Dopamin, also called the "Third Endogenous Catecholamine" is an endogenous substance, biologically the precursor of Norepinephrin, with different hemodynamic properties (1, 8).

Rest-Nitrogen and Creatinin were used to determine the renal function. Furthermore, the platelets and fibrinogen were under constant surveillance, as were arterial pressure, pulse, temperature and ECG. Bloodgas analyses were done at regular intervals.

Table 1. — *Material.*

Patient	Age (years)	Parity	First convulsion (week of pregnancy)	Duration first convulsion-delivery (hours)	Delivery mode *
N.H. ☒	18	0	34	96	BE
H.G.	18	0	32	4	SD
W.H.	29	1	34	10	F
G.E.	26	0	29	6	CS
S.W.	19	0	35	2	CS
S.B. ☒	27	0	33	29	CS
I.N.	18	0	37	6	CS
K.M.	26	1	34	2	CS
M.H.	18	0	31	85	SD

* BE=breach extraction; SD=spontaneous delivery; F=forceps; CS=cesarian section.

RESULTS

As seen in table 1, 5 of the 9 infants were delivered by Cesarean section. Induction of labor with Oxytocin (Syntocinon®) or Prostaglandin (Prostin-F_{2α}® or Prostin E-2®) resulted in a vaginal delivery in 4 cases (twice spontaneously, one breach extraction, one forceps delivery).

The mean systemic blood pressure of initially $\bar{x}=207/112$ mm/Hg was lowered to $\bar{x}=143/88$ mm/Hg by the above mentioned antihypertensive therapy.

Applying the above mentioned therapy in 7 of the 9 patients a continuous signi-

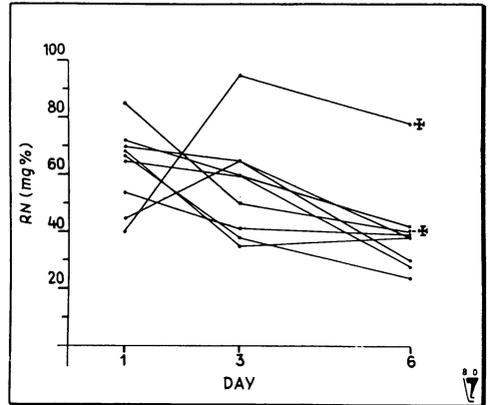


Fig. 1. — Alteration of rest nitrogen in 9 eclamptic patients during administration of dopamin ($3 \mu\text{g kg}^{-1} \text{min}^{-1}$).

ficant improvement of the renal function was obtained (table 2) (figs. 1, 2).

Nitrogen and Creatinine increased initially, but decreased again. A primary anuric-oliguric phase was overcome in all cases. The alteration of the platelets can be seen in table 3. In all 9 patients a significant increase was achieved in comparison with the initial values ($\bar{x} = +158.9\%$). The initially slightly increased fibrinogen figures settled in the course of the treatment within the normal range.

Table 2. — *Rest-nitrogen and creatinin levels, prior and during intensive care.*

Patient	Rest Nitrogen (mg %)				Creatinin (mg %)			
	1st day	3rd day	6th day	Alteration 1st to 6th day (\pm %)	1st day	3rd day	6th day	Alteration 1st to 6th day (\pm %)
N.H. ☒	40	95 ↑	78	+95%	1.62	2.43 ↑	1.83	+13%
H.G.	70	65	30	-57%	2.31	1.25	0.92	-65%
W.H.	72	60	42	-42%	1.69	1.28	1.00	-41%
G.E.	69	35	38	-45%	1.64	1.26	0.76	-54%
S.W.	44	65 ↑	38	-14%	1.30	1.72 ↑	1.12	-14%
S.B. ☒	85	50	40	-53%	2.89	1.67	1.66	-43%
I.N.	65	50	28	-57%	1.64	1.33	0.73	-55%
K.M.	54	41	39	-28%	2.32	0.97	0.70	-70%
M.H.	67	38	24	-64%	1.35	0.92	0.74	-45%

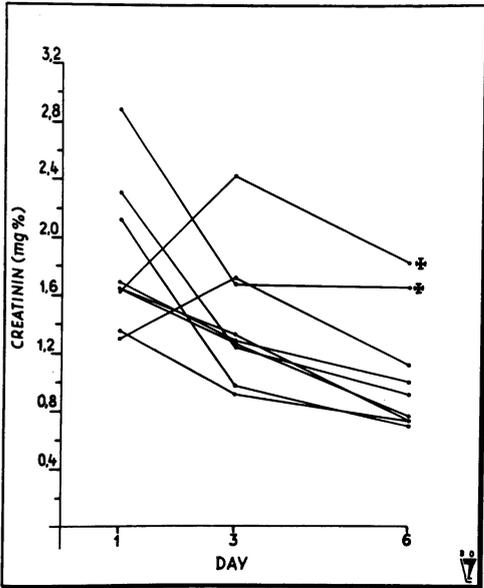


Fig. 2. — Alteration of creatinin in 9 eclamptic patients during administration of dopamin ($3 \mu\text{g kg}^{-1} \text{min}^{-1}$).

In 7 patients our procedure was successful, so that they could be admitted into home care. 2 of the patients died.

DISCUSSION

Convulsive eclampsia is one of the most severe conditions during pregnancy. It always requires intensive care due to various life endangering reasons.

Besides the respiratory problem and cerebral convulsions the dysfunction of the kidneys is the main symptom in cases of severe convulsive eclampsia. Apart from primary causes the involvement of the cardiovascular system is also due to the restricted renal function. This could be due to mechanisms of the compensatory hypertension which should be able to compensate the cortical renal perfusion for some time. Eclamptic oligo-anuria resistant to diuretic therapy, as so often described in literature, should be the cause for

further investigation of primary therapeutic approaches (^{3,7}).

Our results suggest, that the administration of Dopamin considerably improves the renal function. Thus, we agree with other authors, who were able to show an increase of the cortical renal flow with the dosage also administered by us (^{1,2,8}). Furthermore it is also possible to break through a possible feed-back mechanism by favourably influencing the renal function, thus activating endogenous catecholamines. By activating the postulated Dopamin-receptors (⁹), the pathological substrate, which subsequently causes severe, often lethal organic damage can be avoided.

There is evidence, that an early induction of labor has a positive effect on the course of eclamptic symptoms (^{6,7}). The 2 patients, who died due to eclampsia despite immediate intensive care, only delivered after 19 hours respectively 4 days after the first eclamptic convulsion. Successful treatment of eclampsia is assumed to be related to an improvement of renal function. However, the treatment can only be successful if the renal parenchyma has not been damaged irreversibly. In all of our surviving patients the administration of Dopamin in time resulted in a full recovery.

Table 3. — Platelets prior and during intensive care (Dopamin $3 \mu\text{g kg}^{-1} \text{min}^{-1}$).

Patient	Platelets ($\times 10^3/\text{mm}^3$)		
	1st day	6th day	Alteration (% \pm)
N.H. ✕	40	70	+ 75%
H.G.	98	167	+ 70%
W.H.	50	202	+ 304%
G.E.	60	120	+ 100%
S.W.	69	85	+ 23%
S.B. ✕	41	62	+ 51%
I.N.	52	124	+ 138%
K.M.	99	144	+ 45%
M.H.	45	327	+ 627%
			$\bar{x} = + 158.9\%$

Thus, we believe to have shown, that apart from intensive care and therapy of severe eclampsia the administration of Dopamine is recommendable.

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