

HAEMODYNAMICS AND RENAL FUNCTION DURING ADMINISTRATION OF LOW DOSE DOPAMINE IN CRITICALLY ILL PATIENTS

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INTRODUCTION

The kidneys possess a dopaminergic system that seems to be independent from neural dopamine systems. Due to the actions of dopamine on the dopaminergic system and interactions with other systems (mainly adrenergic), dopamine represents a key drug in the regulation of blood pressure levels in patients with hemodynamic instability and hypotension. Stimulation of dopamine in D1-like and D2-like receptors induces natriuresis, diuresis, and improvement of renal blood flow through vasodilation (preferably of the afferent renal arteriole). For this reason, dopamine is used at low levels to promote diuresis and at high levels to increase blood pressure.

Aim of the work

To evaluate the effects of dopamine (2 mg/kg/min) on systemic hemodynamics (heart rate, HR, central venous pressure, CVP), creatinine clearance (CLcr), diuresis and fractional sodium excretion (FENa⁺) in comparison with Fursoemide.

PATIENTS

This multi-centered study will be carried out over a period of four months at critical care units in Alexandria university hospitals.
Approval of the Medical Ethics Committee of Alexandria Faculty of Medicine. An informed consent will be taken from the patients’ next of kin before their enrollment in the study.
Exclusion criteria: Patients aged below 18 years, Patient with severe pulmonary hypertension, ESRD patients on Haemodialysis, AKI due to obstructive uropathy, Toxin induced AKI, Chronic AF patients and Patients with contraindications for bladder catheterization

METHODS

Patients were evaluated over a 24-hour period divided into two groups. In the First group (G1), 2 g/kg/min of dopamine were administered. In the second group (G2), Furosemide infusion at a rate of 20 mg/hr were administered. At the end of each period, diuresis (UV) was established and the following were measured, Urinary sodium (UNa⁺-mmol/l), Urinary creatinine (UCr, mmol/l), Plasma sodium (PNa⁺, mmol/l) and Plasma creatinine (PCr, mol/l). From the data obtained above, the creatinine clearance (CLcr = UCr/PCr x UV) and the fractional sodium urinary excretion (FENa⁺ = UNa⁺ x PCr/PNa⁺ x UCr) were calculated.

RESULTS

We have shown that the infusion of 2 mg/kg/min of dopamine for 24 hours increased the diuresis significantly but still Furosemide achieved slightly better UOP . Also ,our study showed that LDD has a notable impact on CLcr ,even better then furosemide especially in sepsis patients, where it was demonstrated that UV clearance before administration of dopamine ranged from 40.0 – 94.0 with a mean of 78.15 ± 16.79 ml/min while after administration of dopamine ranged from 50.0 – 117.0 with a mean of 87.80 ± 19.16 ml/min and Percent change of UV clearance in dopamine group ranged from -12.82 – 100.0 in sepsis group with median of 22.22, while ranged from -8.33 – 25.81 in other causes of AKI with median of -3.80 . This is in agreement with many other studies on humans.

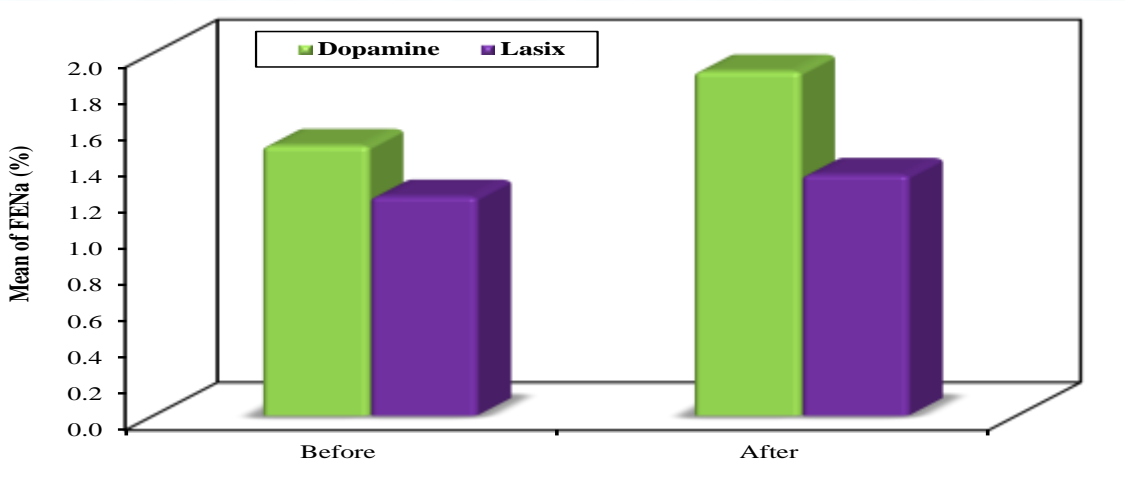


Figure (1): Comparison between the two studied groups according to UV CL

Table (1): Comparison between the two studied groups according to UV CL

UV CL	Dopamine (n = 40)	Lasix (n = 40)	p
Before			
Min. – Max.	40.0 – 94.0	60.0 – 96.0	0.530
Mean ± SD.	78.15 ± 16.79	80.13 ± 10.47	
After			
Min. – Max.	50.0 – 117.0	50.0 – 118.0	0.196
Mean ± SD.	87.80 ± 19.16	82.63 ± 16.23	
P_t	<0.001*	<0.001*	
Improvement			
Min. – Max.	-10.0 – 40.0	-20.0 – 25.0	0.144
Median (IQR)	0.0 (0.0 – 20.0)	0.0 (0.0 – 16.0)	
% of improvement			
Min. – Max.	-12.82 – 100.0	-25.0 – 39.68	0.160
Median (IQR)	0.0 (0.0 – 24.73)	0.0 (0.0 – 19.35)	

Conclusion

Infusion of 2 mg/kg/min of dopamine for 24 hours in critically ill patients with AKI has a notable impact on increasing their UOP although not as potent Furosemide,
No significant cardiovascular effects occurred during the administration of LDD
The use of dopamine for its systemic effects in Sepsis should not be precluded,
LDD infusion has a strong natriuretic effect in comparison to furosemide infusion