

Low-Dose Dopamine in Patients with Renal Dysfunction: No Benefit

Low-dose dopamine in patients with early renal dysfunction: a placebo-controlled randomised trial. Australian and New Zealand Intensive Care Society (ANZICS) Clinical Trials Group. Lancet 2000;356:2139–43.

Study Overview

Objective. To determine whether low-dose dopamine has beneficial effects for critically ill patients with evidence of declining renal function.

Design. Double-blind, randomized, placebo-controlled trial.

Setting and participants. All patients admitted to 23 intensive care units (ICUs) in Australia and New Zealand were screened for admission to the study. Inclusion criteria were presence of a central venous catheter, at least 2 pathophysiologic changes meeting criteria for systemic inflammatory syndrome (SIRS) [1] over a 24-hour period, and at least 1 indicator of early renal dysfunction (urine output averaging 0.5 mL/kg/hr for 4 hours or longer, serum creatinine concentration more than 150 $\mu\text{mol/L}$ without premorbid renal dysfunction, or an increase in creatinine concentration of more than 80 $\mu\text{mol/L}$ in less than 24 hours without a creatine kinase level more than 5000 IU/L or myoglobin in the urine). Patients were excluded who were younger than 18 years, had experienced an episode of acute renal failure in the previous 3 months, had undergone renal transplantation, had received dopamine at any dose during the current hospitalization, had a baseline serum creatinine concentration more than 300 $\mu\text{mol/L}$, were unsuitable for renal replacement therapy, or if the attending physician believed that the drug could not be administered for 8 hours or longer.

Intervention. Patients received either dopamine infused at a rate of 2 $\mu\text{g/kg/minute}$ or an identical amount of placebo (vehicle without active drug), administered through a central venous catheter.

Main outcome measures. The primary outcome was peak serum creatinine level during the study infusion. Secondary outcomes included reason for cessation of trial infusion, development of cardiac arrhythmias, duration of mechanical ventilation, length of ICU stay and hospital stay, peak plasma urea concentration during study infusion, change in serum creatinine and urea concentrations from baseline to

peak value, hourly urine output at predetermined times, number of patients requiring renal replacement therapy, number of patients whose serum creatinine concentrations exceeded 300 $\mu\text{mol/L}$, and survival to ICU and to hospital discharge.

Main results. Of 467 patients screened, 328 were randomized. Their average age was 62 years, and 60% were men. Patients were admitted for a variety of medical and surgical conditions, including cardiac surgery, respiratory events, and multiple trauma.

No significant differences were found between dopamine and placebo in any primary or secondary outcome measures. At baseline, volume status and hemodynamics appeared to be well managed in both study groups, with an average mean arterial pressure of 80 mm Hg and a mean central venous pressure of 14 mm Hg. During trial infusion, serum creatinine and urea concentrations increased similarly in both groups ($62 \pm 107 \mu\text{mol/L}$ and $6 \pm 8 \text{ mmol/L}$ in the dopamine group versus $66 \pm 108 \mu\text{mol/L}$ and $7 \pm 9 \text{ mmol/L}$ in the placebo group, respectively). In addition, both groups showed a similar increase in urine output, which may have been influenced by simultaneous administration of loop diuretics to 90 patients in each group. Of all patients, 22% required renal replacement therapy, 66% survived to ICU discharge and 58% survived to hospital discharge.

Conclusion

“Renal-dose” dopamine (2 $\mu\text{g/kg/minute}$) does not appear to confer any benefit to critically ill patients at risk for renal failure.

Commentary

This is the first relatively large (for a critically ill population), well-designed and executed study assessing the effectiveness of renal-dose dopamine. The findings clearly show that in high-risk patients only minimal (if any) benefits are gained from this agent, and thus its use is probably not cost-effective. Both the authors and an editorialist [2] further conclude that low-dose dopamine may confer some risk to these patients. The study does not

support such a conclusion; however, even with a slight risk, dopamine therapy would not be worthwhile given the lack of evidence to support the agent's use solely for its putative nephroprotective effects.

Applications for Clinical Practice

Dopamine should not be used solely for its nephroprotective effects in critically ill patients.

References

1. Bone RC, Balk RA, Cerra FB, et al. Definition for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committee. American College of Chest Physicians/Society of Critical Care Medicine. *Chest* 1992;101:1644-55.
2. Galley HF. Renal-dose dopamine: will the message now get through? *Lancet* 2000;356:2112-3.

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