

Title: IT IS UNNECESSARY TO PUSH FLUIDS FOR THE SAKE OF URINE OUTPUT DURING ANESTHESIA

Authors: L Priano, MD, PhD, EE Everts, MD and JD Smith, MD

Affiliation: Departments of Anesthesiology and Otolaryngology,
The Oregon Health Sciences University, Portland, OR 97201

Introduction. IV fluid administration during anesthesia is directed at maintaining urine output and systemic hemodynamics in the face of blood loss and anesthetic induced vasodilation. Generous administration of physiologic salt solutions has greatly diminished the incidence of perioperative renal failure. However, perhaps the pendulum has swung too far (1). Retrospectively, intraoperative oliguria does not predict postoperative renal failure (2). We prospectively studied patients with normal renal function undergoing prolonged surgical procedures and examined the hypothesis that urine output (UO) is not important, irregardless of the severity of oliguria, as long as systemic hemodynamics are maintained.

Methods. Approval was obtained from the human research committee and informed consent given to all subjects. Patients who were to undergo radical surgery of the neck structures for resection of carcinoma were randomly assigned to either a generous fluid group (wet) or a conservative fluid group (dry). They were maintained NPO past midnight and given oral sedation the morning of with 4 mg of lorazepam. With local anesthesia an IV, 20 gauge radial artery catheter and pulmonary artery catheter were positioned. Baseline data were obtained in the sedated but otherwise conscious state for all cardiovascular and respiratory variables. Anesthesia was induced with a standard dose of thiopental and maintained with a mixture of halothane and 60/40 N₂O/O₂. Normothermia and normocarbida were maintained throughout. Fluid replacement was as follows: wet group, full NPO deficit plus maintenance fluids plus blood loss 3:1 and third space 6 ml·kg⁻¹·h⁻¹ with 200 ml boluses for oliguria less than 0.5 ml·kg⁻¹·h⁻¹; dry group, half of the NPO deficit, plus maintenance fluids plus blood loss 1:1 and third space 2 ml·kg⁻¹·h⁻¹ with 200 ml boluses for mean arterial pressure below 50 mmHg.

Results. The 2 groups were comparably matched for preop hematocrit, age, serum creatinine (Cr), body weight and there were also no statistically significant differences between them in the awake cardiovascular variables. Intraoperatively there were no statistically significant differences between the 2 groups in any of the hemodynamic variables. The wet group received 1018±58 ml·h⁻¹ of fluid vs. the dry group which got 426±23 ml·h⁻¹ (p<0.05). The hourly UO's in the wet group were 1.33±0.27 ml·kg⁻¹·h⁻¹ vs. 0.39±0.1 ml·kg⁻¹·h⁻¹ in

the dry group (p<0.05). The protocol ended when surgery did after which the primary physicians handled the fluid management. Hemodynamics, however, were followed every 6 hrs until 24 hrs after the start. The average amount of fluids administered postoperatively to the wet group was 113±10 ml·h⁻¹ vs. 121±7 ml·h⁻¹ in the dry group (NS). The average urine output in the wet group was 1.9±0.3 ml·kg⁻¹·h⁻¹ vs. 1.1±0.1 ml·kg⁻¹·h⁻¹ in the dry group (p<0.05). Postoperatively there were no statistically significant differences between the arterial pressure, cardiac output, CVP, or FWP's of the two groups and the the Cr's were also similar.

Discussion. On the basis of these data we would accept the null hypothesis that "oliguria is not important as long as systemic hemodynamics are not compromised". We have prospectively demonstrated that administration of fluid for the sake of forcing urine output is not necessary in patients under anesthesia as long as hypotension does not ensue. Despite being kept dry with resultant oliguria intraoperatively we found no impairment of renal function postoperatively in the dry group. The data fit with hypotheses stated in previous work (3); namely, renal of blood flow is maintained during anesthesia and the oliguria often seen results from anesthetic effects of decreasing glomerular filtration. An unexpected but gratifying result from this study is that systemic hemodynamics in the dry group did not suffer. These conclusions apply to patients with normal preexisting renal function. If significant renal impairment is present preoperatively, this may not apply. These data may be particularly applicable not only to normal patients but those who have normal renal function but are tenuous in terms of their myocardial pump function. They could realistically be kept on the dry side with less risk of fluid overload but yet preservation of renal function.

References.

1. Keats AS: The Rovenstein lecture 1983 - cardiovascular anesthesia - perceptions and prospectives. *Anesthesiology* 60:467-474, 1984.
2. Alpert RA, Roizen MF, Hamilton WK, et al: Intraoperative urinary output does not predict postoperative renal failure. *Anesthesiology* 59:A157, 1983.
3. Priano L: Effects of anesthesia on renal blood flow and function. *ASA Refresher Courses in Anesthesiology* 13:143-156, 1985.