TITLE: THE EFFECTS ON RENAL FUNCTION OF LOW DOSE DOPAMINE INFUSIONS IN LIVER TRANSPLANT RECIPIENTS

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INTRODUCTION. Liver transplant recipients may present with or develop perioperative renal dysfunction. This prospective study was undertaken to evaluate the effects of perioperative dopamine on renal function in liver transplant recipients.

METHOD. Following approval by the institutional review board, informed consent was obtained from 55 patients requiring liver transplantation. Eight patients were eliminated from the study secondary to simultaneous kidney transplant in three, intraoperative nephrectomy in one, and preoperative institution of dopamine in four for clinical reasons. The remaining were randomized in double blind fashion into two groups: group D (n=22) received an infusion of dopamine, $3\mu g \cdot kg^{-1} \cdot min^{-1}$, during surgery and the first 48 postoperative hours, group ND (n=25) received a placebo. A standard anesthesia technique was utilized. Intraoperative monitoring included arterial line, pulmonary artery catheter, urine and serum osmolalities, and laboratory analysis of electrolytes. The surgical technique included veno-veno bypass in 45 of 47 patients (one patient in each group without bypass). All patients received mannitol $0.5gm \cdot kg^{-1}$ during the procedure. Attempts to maintain a urine output of greater than $0.5ml \cdot kg^{-1} \cdot hr^{-1}$ were by optimization of hemodynamics through volume infusion and diuretics when appropriate. During the vascular anastamosis, the donor liver was flushed with 700-1000mls of cold normal saline; in seven patients this flush contained an additional 50 gms mannitol per liter (as a potential free radical scavenger). Data included daily creatinines and BUNs; intraoperative hemodynamics, blood loss, and fluid utilization; intraoperative urine outputs and free water clearances; preoperative and one-month postoperative glomerular filtration rates; and the use and dosages of cyclosporin, diuretics, and aminoglycosides in the immediate perioperative period. Results were analyzed using Student's *t* tests.

RESULTS. Table 1 summarizes important results. Patients that received dopamine (D) had an increase in heart rate in the preanhepatic (HR1) and anhepatic phases (HR2) and an increase in intraoperative urine output in the postanhepatic phase (UO3). There were no other significant differences, notably, no difference in serial creatinines, BUNs, or postoperative glomerular filtration rates. The increase in UO3 was associated with the inclusion of 50 grams of mannitol in the liver flush of 5 patients receiving dopamine (UO3 of dopamine only group (n=17) was $2.93 \pm 1.84 ml \cdot kg^{-1} \cdot hr^{-1}$, UO3 of dopamine + mannitol containing flush group (n=5) was $7.76 \pm 5.41 ml \cdot kg^{-1} \cdot hr^{-1}$, $p<0.01$). After excluding patients who received mannitol containing flush, the heart rate remained elevated in the dopamine group;however, there was no longer any significant difference in the intraoperative urine output.

DISCUSSION. These results do not confirm the conclusions of a retrospective study by Polson et al[1] which showed a decrease in renal impairment and morbidity in liver transplant patients who received dopamine. This may be due to the slightly different dose ($2\mu g \cdot kg^{-1} \cdot min^{-1}$ vs. $3\mu g \cdot kg^{-1} \cdot min^{-1}$), the difference in patient selection, and possible differences in the selected use of veno-veno bypass in the Polson study. Furthermore, in Polson's study, creatinine clearances were significantly different at 24-48 hours post-surgery; the continued dopamine infusion at that time may have influenced their result. This is in contrast to our study that shows similar glomerular filtration at one month, perhaps due to the continued exposure to the nephrotoxic effects of cyclosporine. There was no difference in our use of cyclosporine between groups and the one month glomerular filtration rates in both are comparable to that reported by Wheatley et al[2] in examining the long-term effects of cyclosporine on renal function.

There was a dramatic increase in urine output during the postanhepatic phase in patients who received mannitol containing flush. Although this study was not designed to examine potential interactions between dopamine and mannitol, the concurrent administration of dopamine may have acted in synergism with the mannitol.

This study demonstrates that the routine perioperative use of dopamine does not alter the incidence of long term renal impairment, does not (at least alone) lead to an increased diuresis, and does not influence the postoperative use of dialysis in liver transplant patients.

Table 1

	D	ND
PREOP GLOFIL($ml \cdot min^{-1}$)	97.8±31	84.9±33
POSTOP GLOFIL($ml \cdot min^{-1}$)	59.4±24	57.6±45
POSTOP DIALYSIS	1/22	2/25
UO3($ml \cdot kg^{-1} \cdot hr^{-1}$)	3.1±4.3*	1.8±1.6*
HR1($beats \cdot min^{-1}$)	104±13*	92±9*
HR2($beats \cdot min^{-1}$)	102±13*	91±10*
DEATH WITHIN 1 MONTH	3/22	2/25

*$p<0.05$

REFERENCES.

1 Polson RJ, Park GR, Lindop MJ, Farman JV, Calne RY, Williams R. The prevention of renal impairment in patients undergoing orthotopic liver grafting by infusion of low dose dopamine. Anaesthesia 42:15-19, 1987.

2 Wheatley HC, Datzman M, Williams JW, Miles DE, Hatch FE. Long-term effects of cyclosporine on renal function in liver transplant recipients. Transplantation 43:641-647, 1987.