

Title : RENAL BLOOD FLOW AUTOREGULATION DURING ANESTHESIA

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**Introduction.** Several years ago we described falls in renal blood flow when sodium nitroprusside (SNP) was administered to patients receiving anesthesia and surgery.<sup>1</sup> During this study we found little evidence of renal autoregulation even when the systolic pressures were above 80 torr. The present study was designed to look closely at renal autogulation when SNP and nitroglycerine (NTG) were used as the hypotensive agents.

**Methods.** The study was carried out in 27 adult patients undergoing nephrolithotomy. The patients gave informed consent to the protocol previously approved by the Medical Center's Committee on Clinical Research Practices. All patients were anesthetized with fentanyl; N<sub>2</sub>O, O<sub>2</sub> and relaxed with pancuronium during the studies. They were then randomly divided into two groups. Group I consisted of 15 patients in whom the mean arterial pressure (MAP) was reduced from an average of 100 torr to 80 torr utilizing an infusion of SNP (100µg/ml). Eleven of the patients received 5cc/Kg/hr of 5% dextrose and Ringers lactate while 4 were given 10cc/Kg/hr.

Group II included 12 patients whose MAP was lowered to comparable levels with an infusion of NTG (32µg/ml). Eight patients received the fluids at 5cc/Kg/hr and 4 received 10cc/Kg/hr. All renal blood flows were measured with previously calibrated electromagnetic flow probes.

**Results.** Differences of the decrease in MAP in the two groups were not statistically significant. Renal blood flow (RBF) decreased from control significantly only in the SNP group that received 5cc/Kg/hr fluid loading ( $p < .01$ ). In patients given the higher fluid load (10cc/Kg/hr), RBF of patients receiving NTG did not differ significantly from those receiving SNP. Urine output was not statistically different between the Groups.

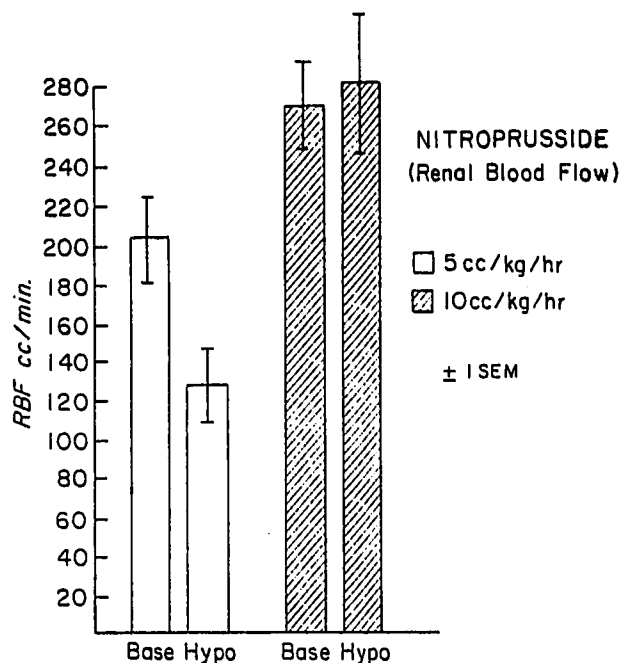
**Autoregulation,** as defined by maintenance of renal blood flow in spite of a decrease in MAP to 80 torr<sup>2</sup>, was seen in only 3 of 11 patients (27%) with the 5cc/Kg/hr fluid load in Group I. It was present in 3 out of 4 patients (75%) with the 10cc/Kg/hr fluid load in Group I. Six of 8 Group II patients (75%) receiving fluids at 5cc/Kg/hr showed autoregulation. All Group II patients with the 10cc/Kg/hr fluid load showed autoregulation.

**Discussion.** In this study several points should be made. First, that with the fluid loads given, there was no replacement of

insensible losses during the night. Second, that as best we could, we tried to maintain the MAP above the lower threshold for autoregulation but with SNP infusion this was precisely difficult. The last point is that although the urine output was not greatly different between Group I and II, there was a trend to greater falls in urine flow during the hypotension with SNP with slower recovery than with NTG. We conclude that RBF can be better maintained during periods of relative hypotension if the patients are aggressively hydrated. At fluid loads of 5cc/Kg/hr, nitroglycerine is preferable to SNP as it apparently causes fewer alterations in factors affecting renal blood flow.

#### References.

1. Birch A. A., Boyce W. H.: Changing renal blood flow following sodium nitroprusside in patients undergoing nephrolithotomy. *Anesth. Anal.* 56:102-109, Jan., Feb., 1977
2. Bastion R. D., Deutsch S., Anesthesia and the Kidney. Grune and Stratton, p. 32-34., 1976



Change in renal blood flow in Group I during nitroprusside infusion. The decreased RBF was significant in the 5cc/Kg/hr fluid loaded group. ( $p < .01$ )