CHAPTER IV

RESULTS

Group 1 : Saline control.

1.1 : Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on general circulation and renal hemodynamic.

As shown in Figure 2 and 3, the results are expressed as mean ± SEM by comparison between before and after vanadate bolus injection. After vanadate injection, the mean arterial blood pressure, heart rate and hematocrit were not altered significantly from the mean control values (Figure 2). As shown in Figure 3, the effective renal plasma flow and glomerular filtration rate were slightly decreased and urine flow rate was slightly increased but not significance.

1.2 : Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on urinary electrolyte excretion and plasma concentration of electrolytes.

As shown in Figure 4, 5, 6 and 7, the significant increase in fractional excretion of sodium and potassium were seen from 2.49 ± 0.31 to 4.47 ± 0.99 ($p < 0.05$) and from 40.48 ± 2.59 to 58.77 ± 6.26 ($p < 0.025$), respectively. The fractional excretion of chloride and bicarbonate increased slightly without statistically significance. However, without statistically significance the change of urinary excretion rate of sodium, potassium, chloride and bicarbonate were similar to change of plasma concentration of sodium, potassium, chloride and bicarbonate.

1.3 : Effects of an intrarenal arterial injection of vanadate 1.43 μmol/mg on urinary acid excretion.

As shown in Figure 8 and 9, the urinary excretion rate of ammonium ion and titratable acid and net acid excretion were slightly reduced from the mean control values but not significance. The urine pH and plasma concentration of creatinine were not changes.

Group 2 : Acute metabolic acidosis.

2.1 : Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on general circulation and renal hemodynamic.

Effects of an intrarenal arterial injection of vanadate on general circulation and renal hemodynamic are shown in Figure 2 and 3. After vanadate injection, a significant increase in mean arterial blood pressure was seen from 121.83 $\pm$ 5.90 to 128.33 $\pm$ 6.15 mmHg ($p < 0.025$). The slight decrease in heart rate and a little increase in hematocrit were shown without statistically significance. The significant decrease in effective renal plasma flow and glomerular filtration rate from 0.8 $\pm$ 0.17 to 0.48 $\pm$ 0.16 ml/min/gm-kw ($p < 0.025$) and from 0.32 $\pm$ 0.05 to 0.15 $\pm$ 0.04 ml/min/gm-kw ($p < 0.01$), respectively.

The urine flow rate was slightly reduced but not significant.

2.2 : Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on urinary electrolyte excretion and plasma concentration of electrolytes.

As shown in Figure 4, 5, 6 and 7, the significant increase in fractional excretion of sodium, potassium and chloride from 3.94 ± 1.55 to 12.61 ± 4.53 ($p < 0.025$), from 55.69 ± 21.10 to 91.74 ± 37.90 ($p < 0.05$) and from 4.14 ± 1.64 to 13.73 ± 4.38 ($p < 0.01$) was shown, respectively, while the fractional excretion of bicarbonate was a little increase. However, the urinary excretion rate of sodium and chloride rose slightly with a small reduction in urinary excretion rate of potassium and bicarbonate. The plasma concentration of bicarbonate fell significantly from 7.16 ± 1.10 to 3.36 ± 0.91 mEq/L ($p < 0.01$), whereas potassium and chloride increased from 3.76 ± 0.13 to 4.33 ± 0.19 mEq/L ($p < 0.01$) and from 122.30 ± 1.18 to 129.45 ± 1.69 mEq/L ($p < 0.01$), respectively with a little fall in sodium.

2.3 : Effects of an intrarenal arterial injection of vanadate 1.43 umol/kg on urinary acid excretion.

As shown in Figure 8, the significant decrease in urinary excretion rate of ammonium ion and titratable acid and net acid excretion were demonstrated from 0.13 $\pm$ 0.02 to 0.08 $\pm$ 0.01 μEq/min/gm-kw ($p < 0.01$), from 0.14 $\pm$ 0.02 to 0.08 $\pm$ 0.02 μEq/min/gm-kw ($p < 0.01$) and from 0.23 $\pm$ 0.04 to 0.12 $\pm$ 0.03 μEq/min/gm-kw ($p < 0.01$), respectively. No significant changes were seen in urine pH and plasma concentration of creatinine as shown in Figure 9.

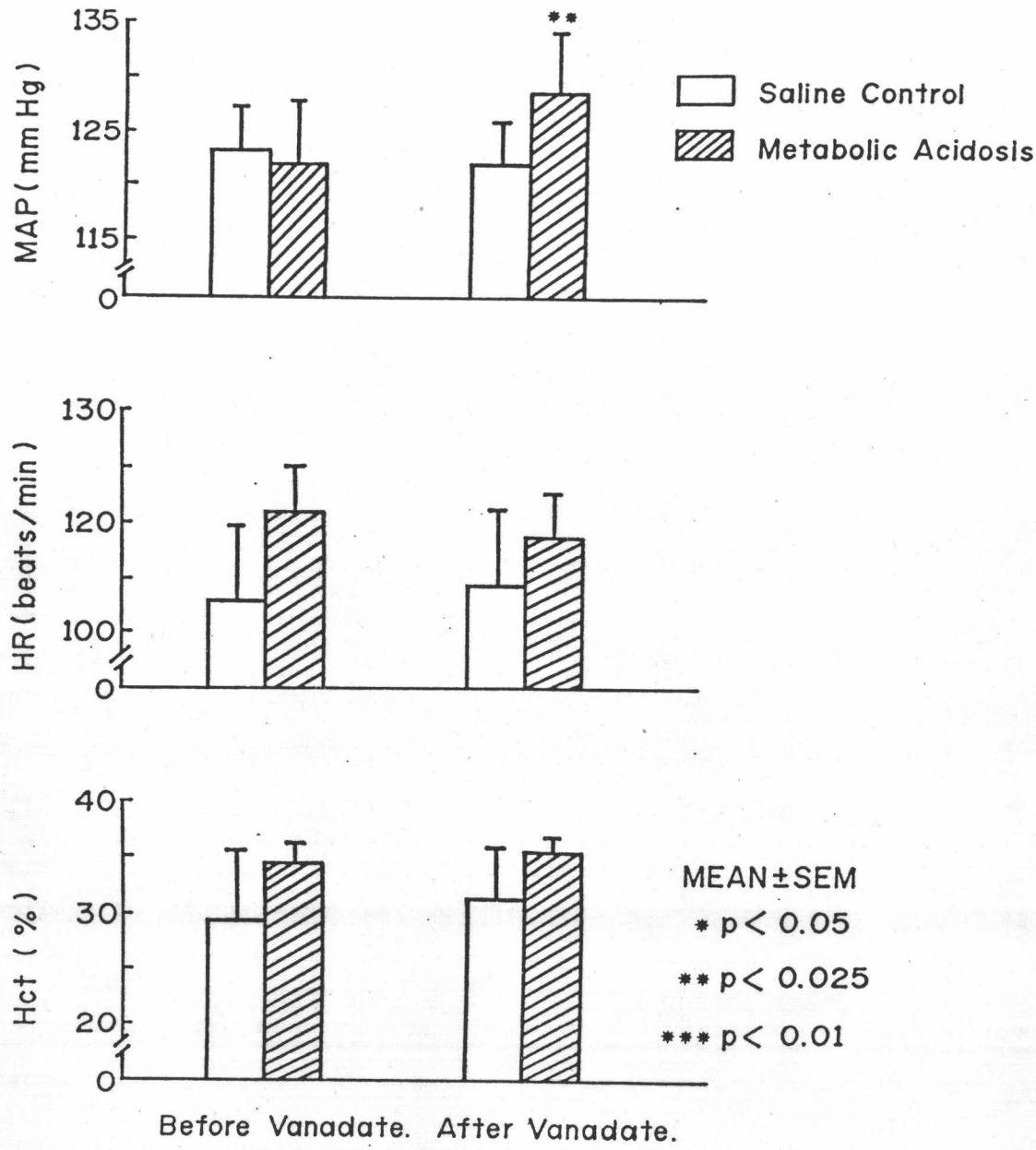

Fig. 2 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on mean arterial blood pressure (MAP), heart rate (HR) and hematocrit (Hct) in saline control and metabolic acidosis compared in the same group.

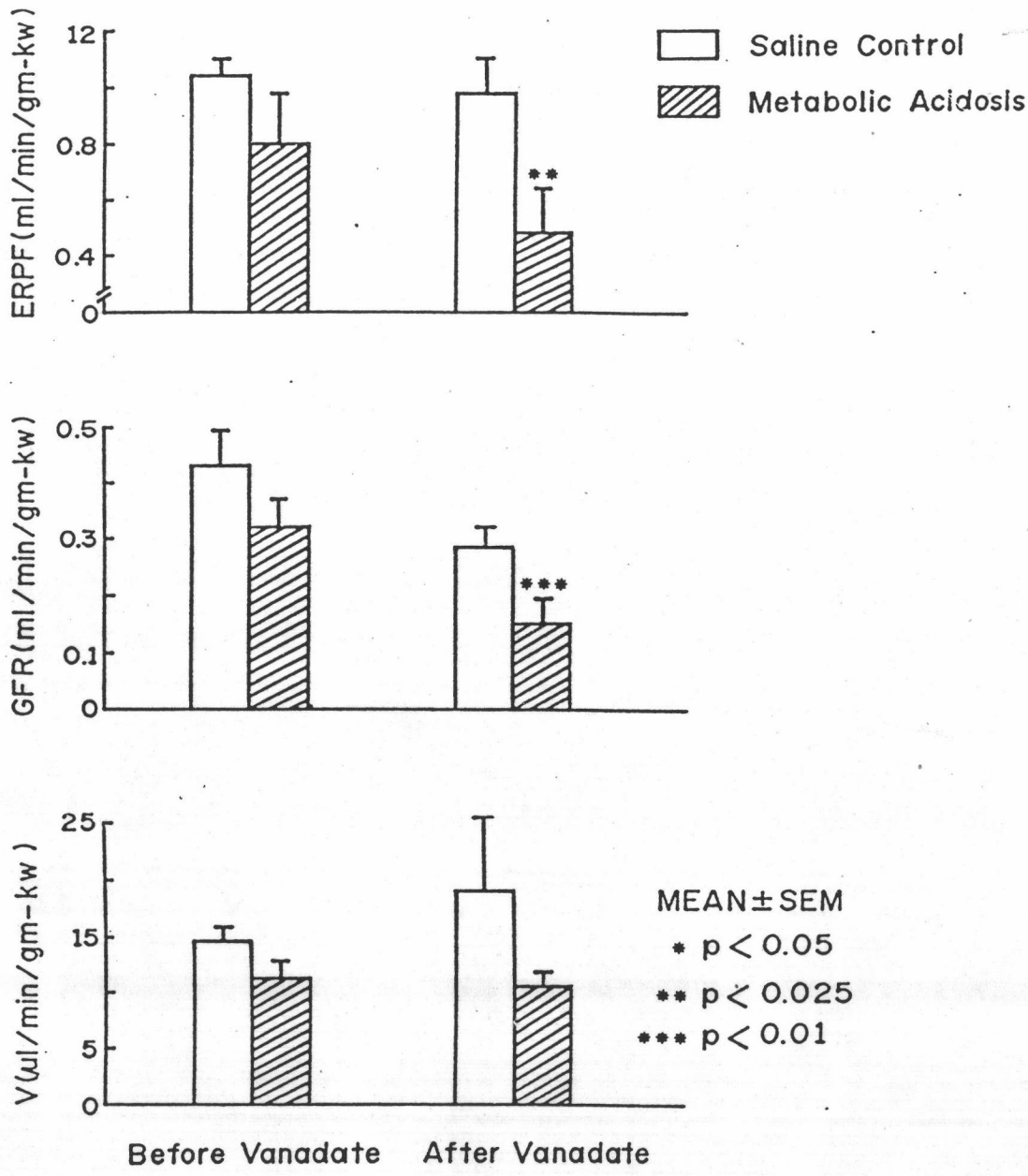

Fig. 3 Effects of an intrarenal arterial injection of vanadate 1.43 µmol/kg on effective renal plasma flow (ERPF), glomerular filtration rate (GFR) and urine flow rate (V) in saline control and metabolic acidosis compared in the same group.

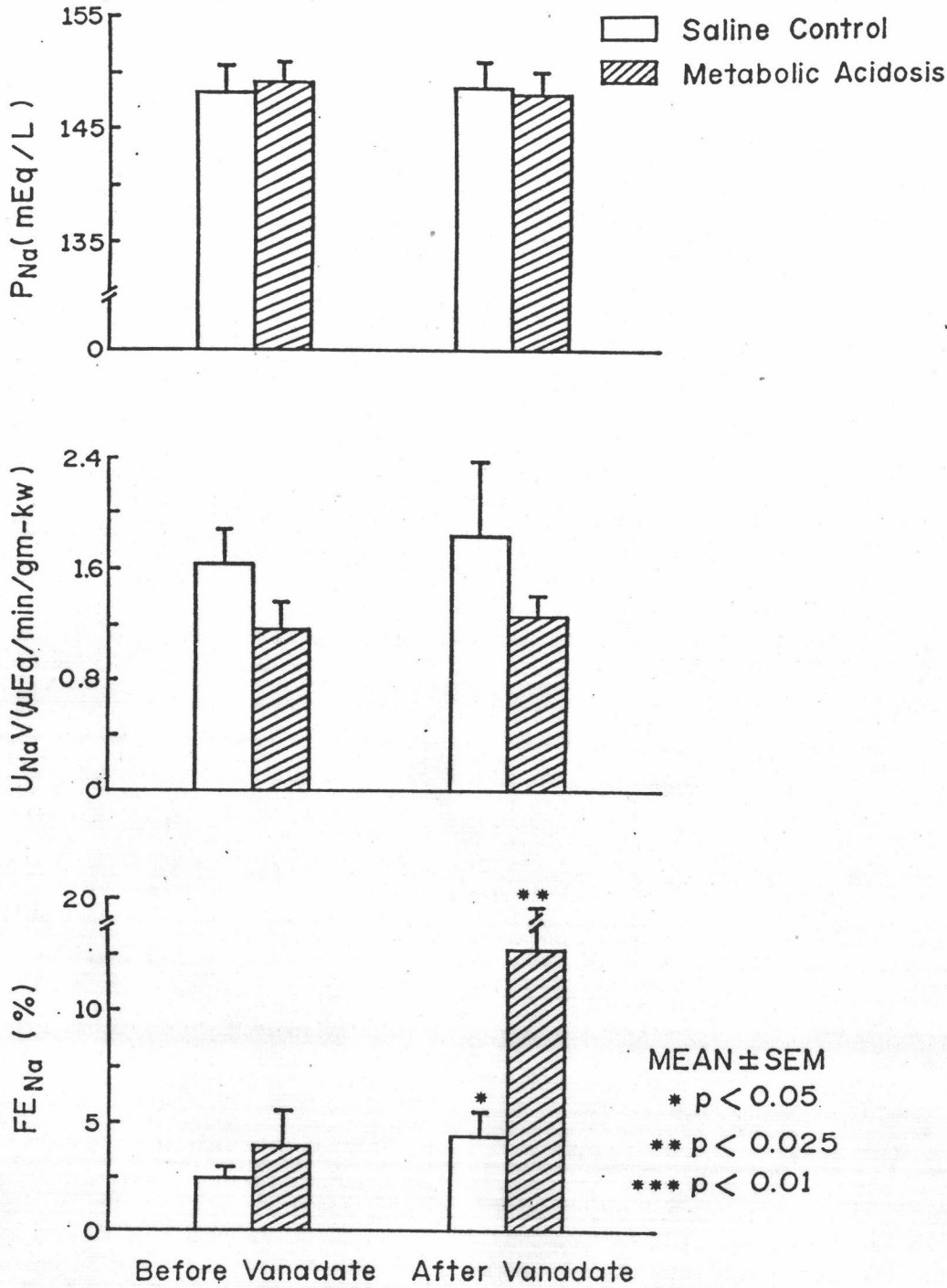

Fig. 4 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on plasma concentration of sodium (P_{Na}), urinary excretion rate of sodium ($U_{Na}V$) and fractional excretion of sodium (FE_{Na}) in saline control and metabolic acidosis compared in the same group.

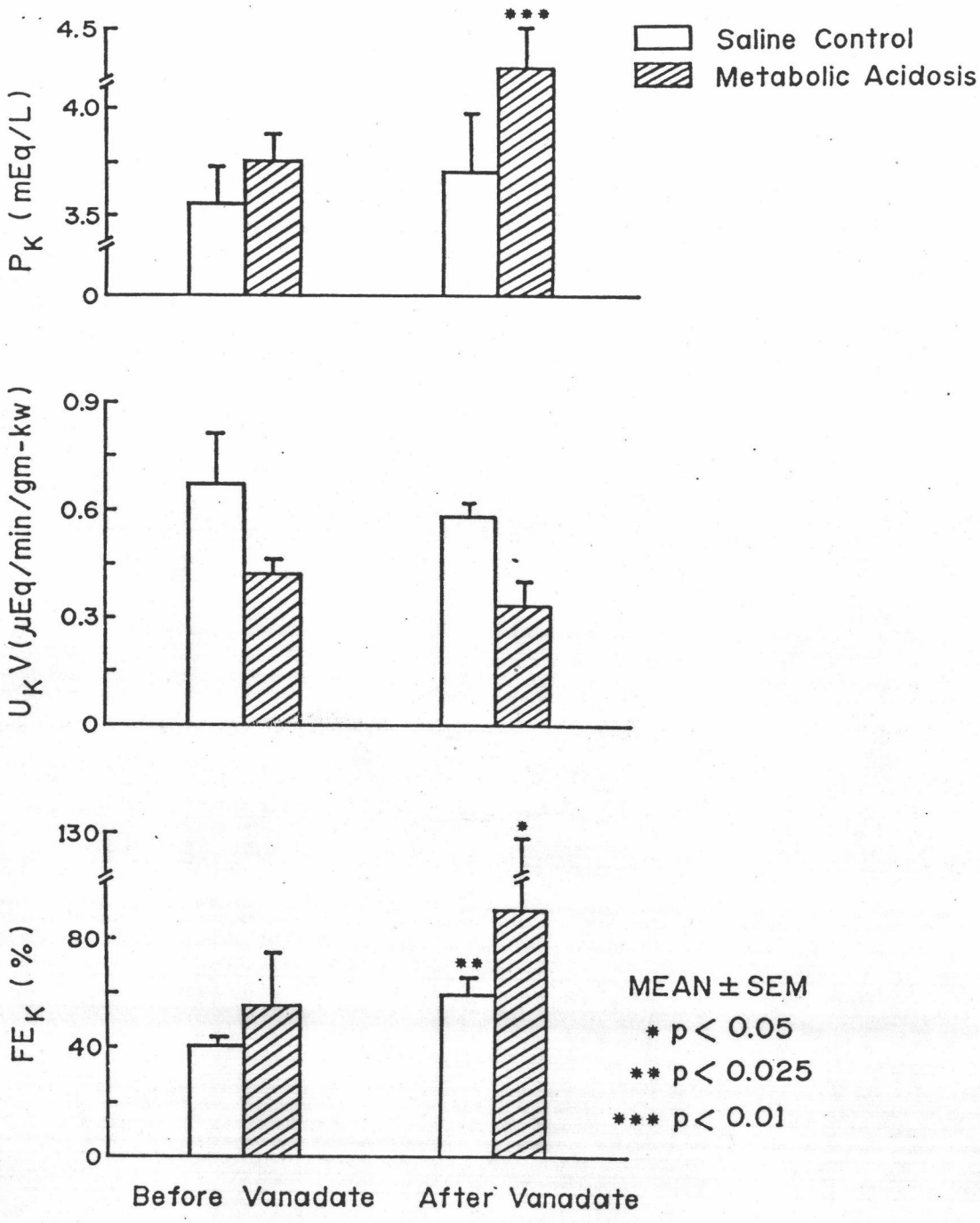

Fig. 5 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on plasma concentration of potassium (P_K), urinary excretion rate of potassium ($U_K V$) and fractional excretion of potassium (FE_K) in saline control and metabolic acidosis compared in the same group.

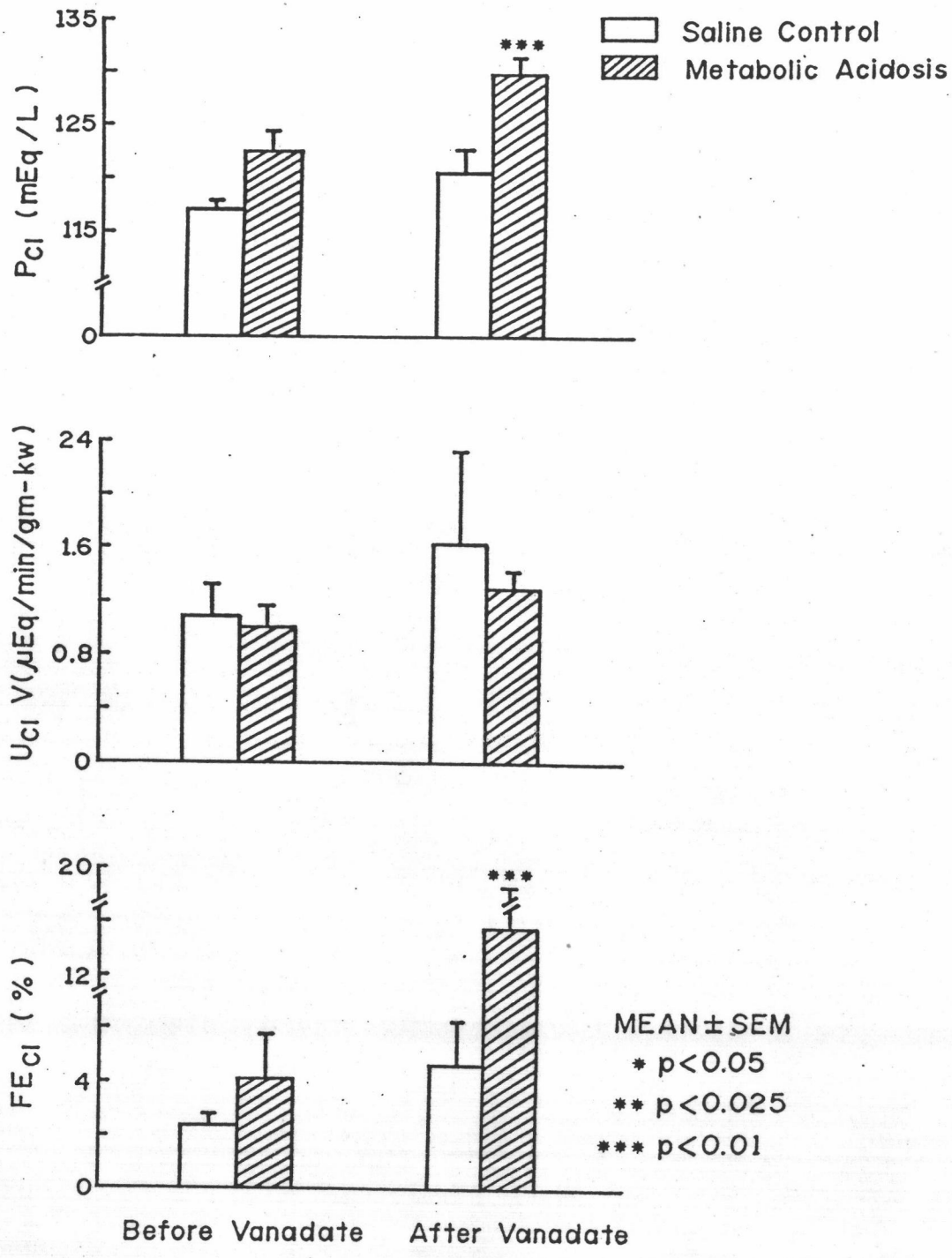

Fig. 6 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on plasma concentration of chloride (P_{Cl}), urinary excretion rate of chloride ($U_{Cl}V$) and fractional excretion of chloride FE_{Cl}) in saline control and metabolic acidosis compared in the same group.

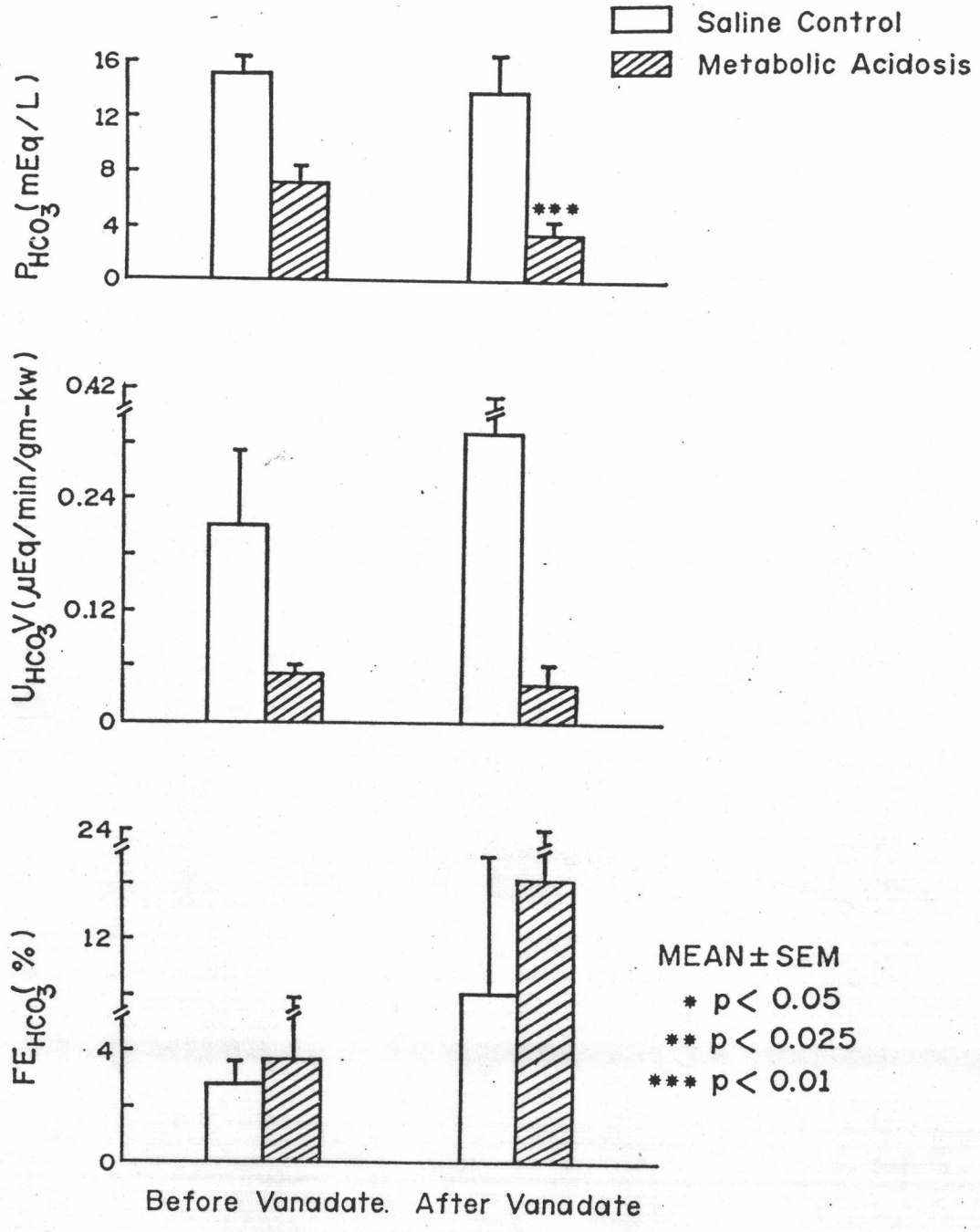

Fig. 7 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on plasma concentration of bicarbonate (P_{HCO_3}), urinary excretion rate of bicarbonate ($U_{HCO_3}V$) and fractional excretion of bicarbonate (FE_{HCO_3}) in saline control and metabolic acidosis compared in the same group.

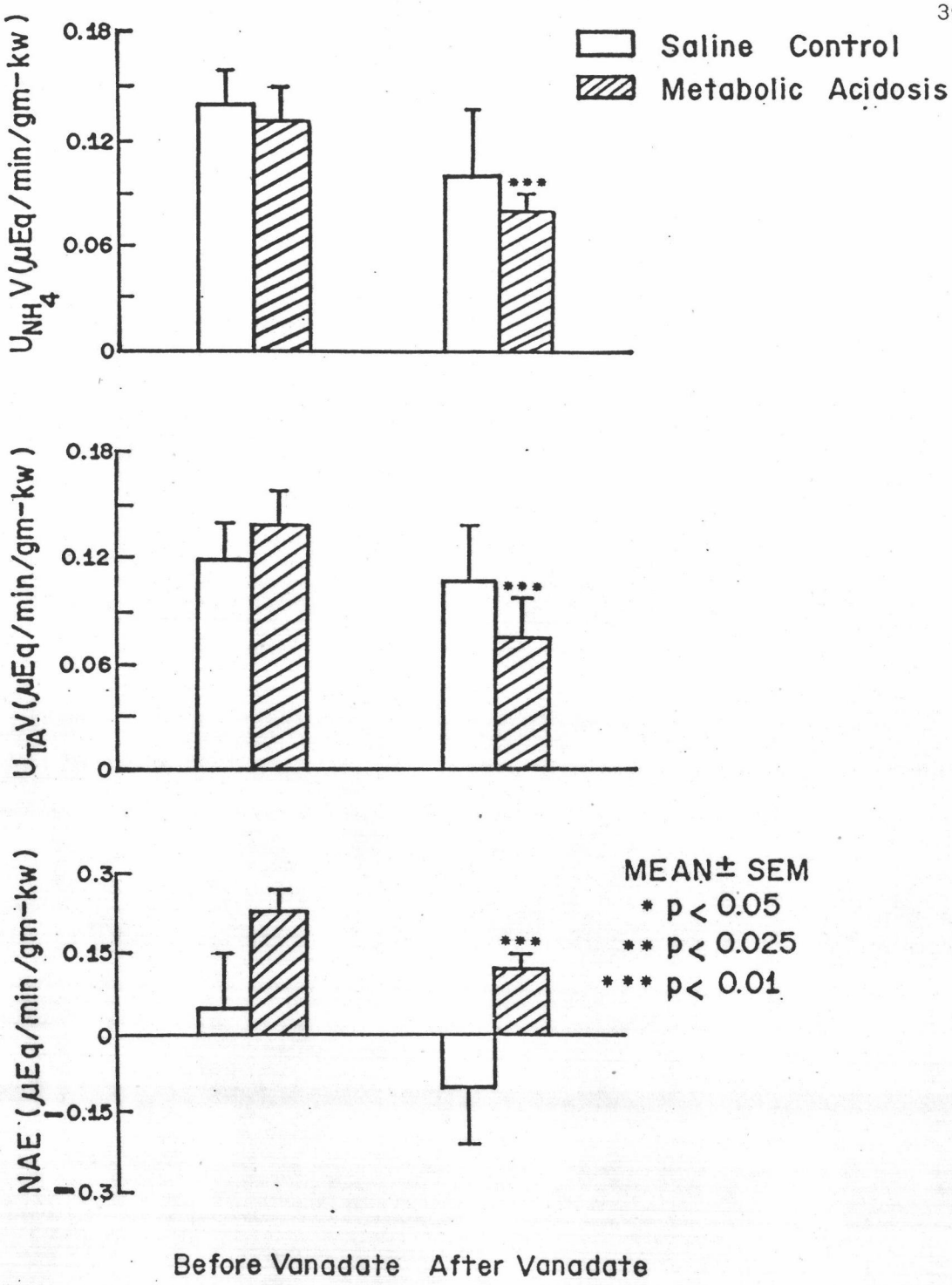

Fig. 8 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on urinary excretion rate of ammonium ($U_{NH_4}V$), titratable acid ($U_{TA}V$) and net acid excretion ($U_{NAE}V$) in saline control and metabolic acidosis compared in the same group.

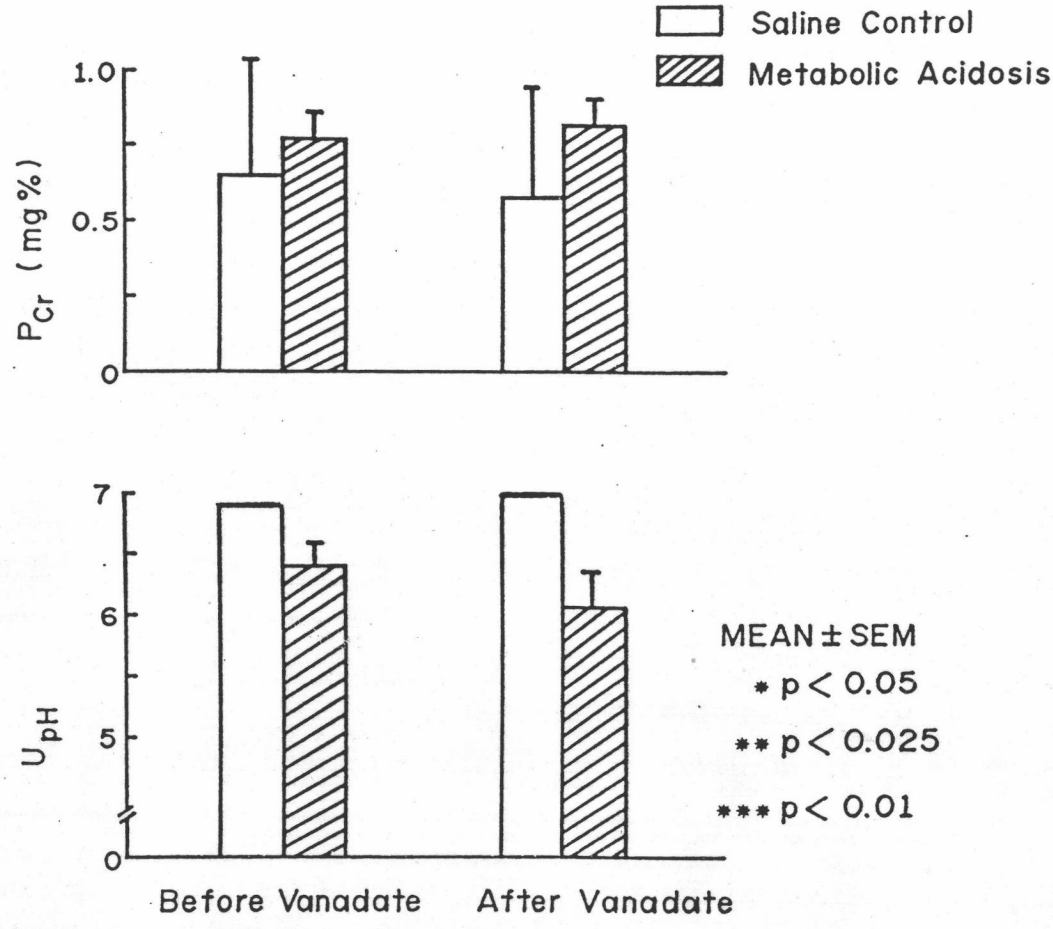

Fig. 9 Effects of an intrarenal arterial injection of vanadate 1.43 μmol/kg on plasma concentration of creatinine (P_{cr}) and urine pH (U_{pH}) in saline control and metabolic acidosis compared in the same group.