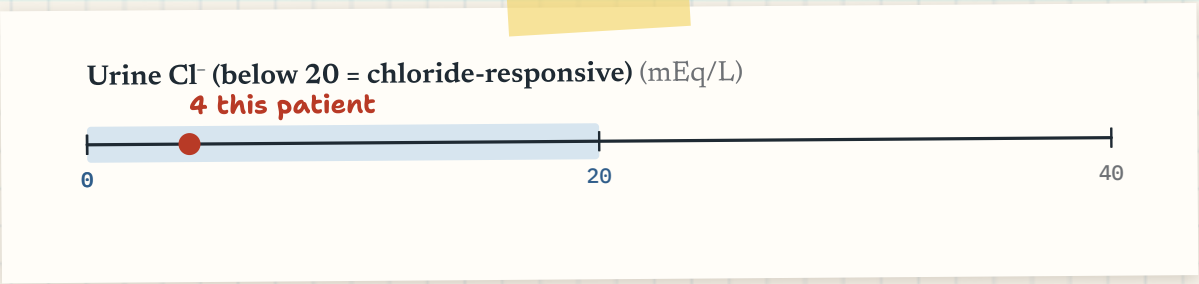
Vomiting and metabolic alkalosis

Why alkaline blood gives acid urine



Step by step

1. Generation: vomiting removes HCl (H^+ and Cl^-)
2. Volume: ECF contracts, RAAS switches on
3. Aldosterone: Na^+ in, K^+ and H^+ out
4. Maintenance: volume, Cl^-, K^+ depletion and lower GFR
5. Treat: saline plus K^+

Finding	Direction	Why
Serum HCO_3^-	High	HCl lost, bicarbonate stays
Serum Cl^-	Low	Lost with H^+
Serum K^+	Low	Aldosterone: K^+ out in urine
Urine pH	Acid	H^+ secreted to save Na^+ and HCO_3^-
Urine Cl^-	< 20 mEq/L	Chloride-responsive

Vomiting alkalosis at a glance

Rule of thumb

Low chloride, low volume, low potassium: a loop that locks the alkalosis in

Alkaline blood + acid urine = paradoxical aciduria

Exam traps

- Excess bicarbonate in the urine would make it alkaline; here the kidney reabsorbs bicarbonate hard.
- Distal H^+ secretion defects give alkaline urine with low HCO_3^-, the opposite picture.
- Some sources use urine Cl^- < 10 rather than < 20 mEq/L.

Vomiting metabolic alkalosis: why the urine turns acid

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/renal-acid-base/vomiting-metabolic-alkalosis-paradoxical-aciduria

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