

Sept 2009
QUESTION 09

A six (6) month old child is diagnosed with a gastric outlet obstruction. Investigations reveal a metabolic alkalosis and a urine pH of 5. Describe the physiological basis of these results.

Gastric outlet obstruction

occurs in the first weeks to months of life
characterised by excessive vomiting, eagerness to feed and failure to thrive
due to a hypertrophic pylorus preventing food transit
presentation in a 6 month old is likely an incomplete obstruction, but prolonged symptomatology

Physiological consequences

classic presentation is a hypochloremic metabolic alkalosis with hypovolaemia
vomiting causes excessive acid loss (HCl)
this causes an increase in strong ion difference (simplified to $\text{Na} - \text{Cl}$)
and subsequent metabolic alkalosis
retention of fluid is prioritised over osmolality
RAAS system is activated, characterised by high aldosterone
the kidneys reabsorb sodium and water
usual compensation is via renal bicarbonate excretion, but this is impaired due to the low Cl
this explains the acidic urine
potassium usually decreases due to increased renal loss (H is retained preferentially)

Treatment

volume resuscitation and replacement of electrolytes
usually with normal saline and added potassium