

Pyloric Stenosis Metabolic Derangement

The first abnormal finding to develop in patients with IHPS is usually tachycardia. Laboratory studies may show a hypochloremic, hypokalemic metabolic alkalosis, depending on severity and duration of symptoms. Several mechanisms contribute to this metabolic alkalosis. Persistent vomiting leads to a significant loss of gastric fluid, which contains hydrochloric acid (HCl) as well as potassium (K⁺) and sodium (Na⁺). The bicarbonate (HCO₃) generated during the production of HCl is retained in the plasma. The loss of K⁺ and Na⁺ results in renal K⁺ and Na⁺ resorption and hydrogen ion (H⁺) excretion. Hypokalemia also causes H⁺ to shift into cells, raising extracellular pH. The dehydration caused by excessive vomiting also leads to a contraction alkalosis, due to release of aldosterone and subsequent resorption of HCO₃.

Causes of Metabolic Alkalosis in Persistent Vomiting

Change	Effect
Loss of HCl	Overall loss of H ⁺ with retention of HCO ₃
Loss of K ⁺	Renal resorption of K ⁺ leads to excretion of H ⁺
Loss of Na ⁺	Renal resorption of Na ⁺ leads to excretion of H ⁺
Loss of H ₂ O	Release of aldosterone leads to resorption of HCO ₃