

Hyperphosphatemia

Definition

- Serum Phosphate $>4.5\text{mg/dL}$.

Etiology/Risk Factors

- Increased intake (external/internal):
 - Excessive vitamin D (increases GI absorption of PO_4) or vitamin A.
 - Phosphate-containing enema, particularly in patients with kidney insufficiency.
 - PO_4 replacement.
 - TPN (through administration of excess phosphate).
- Excessive dietary phosphate in patients with advanced CKD (usually Stage >4).
- Shifts from cells into serum:
 - Acidosis (lactic acidosis, DKA).
 - Hypoinsulinemia.
 - Rhabdomyolysis.
 - Tumor lysis.
- Decreased excretion/increased reabsorption:
 - Bisphosphonates.
 - Decreased PTH secretion or renal resistance to PTH (hyper- or hypomagnesemia).
 - Kidney disease ($\text{GFR} < 30$).
 - Often accompanied by hypocalcemia due to calcium-phosphorus complex formation.

Evaluation

Laboratory tests to order:

- CMP.
- Calculate a calcium-phosphate product ($[\text{Calcium}] \times [\text{Phosphate}]$).
- At risk for calciphylaxis, renal osteodystrophy, and ectopic calcification if product > 55 .
- LDH, uric acid if clinical concern for tumor lysis syndrome.
- CK if clinical concern for rhabdomyolysis.

Management

Determine urgency of intervention.

- ACUTE: rhabdomyolysis, tumor lysis, exogenous phosphate load.
- If acute process and developing renal failure or symptomatic (with severe hypocalcemia), may require hemodialysis.
- If kidney function is preserved, most causes of hyperphosphatemia will resolve by addressing the underlying cause (stopping vitamin D, resolution of tumor lysis, etc.). IV fluids may be given to facilitate phosphate excretion.
- CHRONIC: chronic kidney disease and secondary hyperparathyroidism.
- Low phosphate diet and phosphate binders as necessary (sevelamer, calcium acetate, lanthanum carbonate, etc.). Dialysis removes phosphorus, but given that only a small fraction of phosphorus is in plasma, there is significant rebound post-HD, hence the need for adjunctive therapies.

Key Points

- If kidney function is preserved, most other causes of hyperphosphatemia will resolve by addressing the underlying cause.
- Consider hemodialysis for acute, severe hyperphosphatemia complicated by symptomatic hypocalcemia and AKI/CKD.
- Hemodialysis (3x/week) is not typically effective for chronic hyperphosphatemia, and most patients with ESRD will require low phosphate diet and phosphate binder therapy.
- Calculate calcium-phosphate product to determine risk for complications.

Revision #6

Created 25 February 2022 06:20:07 by Katarina Soewono

Updated 21 March 2022 17:14:04 by Tarnpreet Kaur