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Published In/Presented At

Kumar, A., Dhakarwal, P., Agrawal, V., & Ali, T. (2013). *Pseudo hyperphosphatemia in multiple myeloma*. Poster presentation.

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Pseudo Hyperphosphatemia in Multiple Myeloma

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BACKGROUND:

Hyperphosphatemia is a common condition found in patients with decreased kidney function. Without treatment, it can lead to a variety of clinical consequences. The presence of hyperphosphatemia in patients with normal kidney function may be true or spurious. We present a case of pseudo hyperphosphatemia in a patient with multiple myeloma.

CASE REPORT:

60 year female with a history of Multiple myeloma in remission was admitted with back pain. She was noted to have sodium of 128mmol/l, phosphorus of 12.6mg/dl, calcium 9mg/dl and creatinine of 1mg/dl by labs done with Siemens Advia through spectrophotometry. She had no clinical manifestations of hyperphosphatemia and her serum osmolality was found to be normal. With normal creatinine, calcium, low sodium and normal osmolality we had suspicion of spurious results from paraproteinemia. So, same sample was rechecked on dry chemistry analyzer (Vitros). Barium sulfate spreading layer in the Vitros dry chemistry slide filters the protein in serum and assays phosphate in a protein free filtrate negating interference of paraproteins. Patients repeat sodium and phosphorus on the same blood sample was 137mmol/l and 4.8mg/dl.

DISCUSSION:

Spurious elevation of the serum phosphorus level may occur in with prolonged refrigeration, prolonged exposure to room temperature, hemolysis, hyperlipidemia, hyperbilirubinemia or paraproteinemia. Our patient's initial sample was tested using a clinical analyzer in which inorganic phosphorus reacts with ammonium molybdate in the presence of sulfuric acid to form an unreduced phosphomolybdate complex. This phosphomolybdate complex absorbs light and is quantified photometrically in the UV range at a wavelength of 340 nm. Light absorbance is directly proportional to the inorganic phosphorus concentration. Two mechanisms have been hypothesized to explain pseudohyperphosphatemia. First, paraproteins bind to

molybdate, resulting in turbidity. The turbid reaction mixture scatters and absorbs light while reducing its transmittance. This then can be interpreted as a falsely high phosphorus level. The second proposed mechanism for spurious hyperphosphatemia is the direct binding of paraprotein to phosphorus. This interference is seen with the liquid colorimetric assay on the Advia is not seen with the slide-based, solid-state colorimetric assays on the Vitros. In our case, spurious hyperphosphatemia caused by hemolysis, hyperlipidemia and hyperbilirubinemia was excluded.

RESULT:

Pseudohyperphosphatemia in the presence of serum paraproteins has been documented but the paucity of case reports reflect the scant attention clinicians routinely pay to phosphate measurements. Clinicians taking care of patients with myeloma need to be aware of the potential interference in phosphate-measuring assays that can result in spurious values to prevent unnecessary tests and starting the patient on a phosphate binder which can lead to dangerously low levels of phosphorus with spurious normal readings.

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Siemens Advia 1800 Analyser



Vitros - 350 Analyser

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