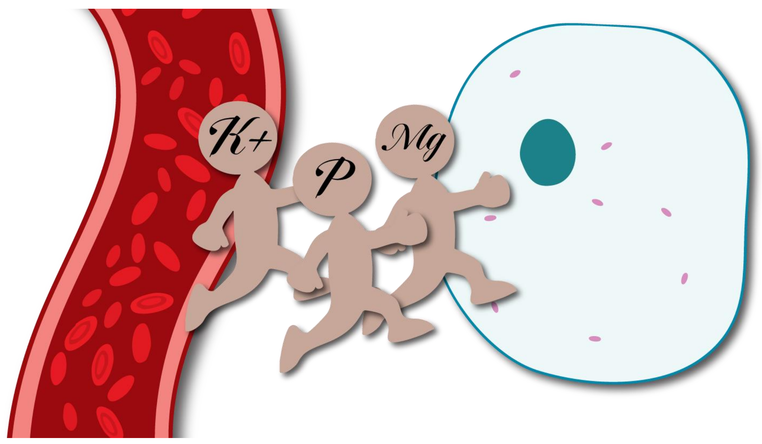
Refeeding Syndrome in Acute Kidney Injury: A Case Report

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Introduction

- Refeeding syndrome (RFS) can cause electrolyte and clinical disturbances after reintroducing dextrose/carbohydrates following marked undernourishment, including oral, enteral, or parenteral nutrition and/or dextrose-containing IV fluids. [1]
- Electrolyte disturbances include decreased potassium (K^+), phosphorus (P), and/or magnesium (Mg) due to insulin-mediated shifts from the bloodstream into cells.[1]
- Clinical manifestations of RFS may include cardiac arrhythmias and neurological and respiratory compromise.
- RFS risk increases with alcohol use disorder, major stressors (e.g., critical illness), and/or surgery following prolonged undernourishment. [1]
- The kidneys regulate electrolyte concentrations; AKI can cause hyperkalemia, hypermagnesemia, and/or hyperphosphatemia. Historically, AKI has not been considered a risk factor for RFS.[1]
- We present a case suggesting the patient developed RFS despite having AKI.



Case Presentation

- A patient is his early 60s presented with altered mental status, abdominal pain, and hypoxia. No documented weight loss. PMH included hypertension, hyperlipidemia, and alcohol use disorder; no surgical history.
- Work up: ileus, AKI, and alcohol withdrawal. Intubated on admission. Thiamine was started. Hemodialysis started on hospital day (HD) #1. Ileus resolved on HD #4.
- On HD #5, a protein modular and tube feed started at 50 mL/hrs but were discontinued ~43 hrs later due to abdominal distention. CT scan suggested a small bowel obstruction. Parenteral nutrition (PN) started on HD #11.
- PN contained no , Mg, P, or insulin (nor exogenously), and no dextrose-containing solutions were given before or during the Table 1 timeframe.
- Hemodialysis was provided every other day with decreasing volume removal; dialysate was 2 mEq/L pre-PN and 3 mEq/L during PN.
- During PN days, NG output consistently decreased, while urine and stool output remained essentially unchanged (320 and 340 mL average/day, respectively).
- An electrocardiogram was not done. There was no noted decline in respiratory status or neurological changes.
- On HD #13, worsening abdominal distention and concern for GI bleed prompted surgery, revealing ischemic/perforated bowel; small bowel resection and tracheostomy were performed.
- Underwent multiple GI surgeries, the last being small bowel/ileocolonic anastomoses and gastrojejunostomy (G-J) tube placement on HD #17.
- Renal function recovered, and the tracheostomy was decannulated before discharge; the G-J tube remained in place.
- PN discontinued on HD #48 after transition to enteric nutrition (tube feeds and oral diet). Discharged to rehab on HD #62 tolerating a regular diet with oral supplements.

Table 1: Dextrose received, PN day, electrolyte lab values, electrolyte repletion

Dextrose received	(mEq repletion)	Mg (mEq repletion)	P (mmol repletion)
Prior to PN start (03:45)	**5.1**	**2.4**	**9.9**
PN day 1 (start 20:00)			
47 g (within 9 hrs)	**3** (30)	2 (n/a)	**3.5** (n/a)
126 g (within 24 hrs)	3.9 (n/a)	2 (n/a)	
PN day 2 (start 20:00)			
95 g (within 9 hrs)	3.4 (20)	2 (2)	3.2 (n/a)
252 g (within ~18 hrs)	**3.5** (33)	**1.7** (2)	**1.9** (15)
PN held subsequent 2 days	3.8 (33)	1.8 (2)	**2.3** (15)
Day 1 held	4.9 (n/a)	1.7 (2)	4 (n/a)
Day 2 held			
Restart day 1 (20:00)			
40 g (within 7.5 hrs)		1.7 (n/a)	4.8 (n/a)
75 g (within 14.5 hrs)	3.3 (n/a)	1.7 (2)	7.9 (n/a)
108 g (within 20 hrs)	3.9 (n/a)		

dL = deciliter; g = grams; hrs = hours; L = liter; mEq = milliequivalents; Mg = magnesium; mg = milligrams; mmol = millimole; n/a = not applicable. Normal range: (3.5-5.1 mmol/L); Mg (1.7-2.8 mg/dL); P (2.5-4.5 mg/dL).

Discussion

- No published case reports were found describing RFS in patients with AKI.
- Two recent studies linked impaired kidney function to RFS: elevated creatinine (Cr) predicted refeeding hypophosphatemia in Choi et al.[4] and was a risk factor for RFS in Adika et al.[5]
- In AKI, K+, P and Mg are often high which can disguise intracellular depletion. A clinician may be falsely reassured that elevated K^+, P, and/or Mg will not precipitously decrease after dextrose reintroduction, despite RFS risk factors.
- The American Society of Parenteral and Enteral Nutrition (ASPEN) Consensus Recommendations for Refeeding Syndrome suggest providing 100–150 g of dextrose for the first 24 hours; advancing by 33% of goal dextrose every 1 to 2 days.
- Surprisingly, K^+ and P fell markedly after dextrose reintroduction following just 47 g on PN day 1; both decreased ~35%.
- After receiving 252 g on day 2—higher grams than ASPEN recommends—P fell ~54% that day and ~81% within 48 hours of PN day 1. predominantly stayed low to low normal (table 1).

Conclusion

- This patient appears to have experienced RFS based on the precipitous declines in and P.
- Clinicians should be mindful that RFS could occur for those with known risk factors despite having AKI.

Citations

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Image by Lily K. Lange

Conflict of interest: none declared

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