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Case Report

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Re-Feeding Syndrome as a Rare Sequelae Post Resolution of DKA

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ABSTRACT

Refeeding Syndrome (RS) refers to electrolyte imbalances that occur in malnourished and abruptly refed patients. Though there is scarce evidence in pediatric literature, it is a potential life-threatening condition that can lead to organ dysfunction. It occurs when the body's metabolism suddenly shifts from a catabolic state to an anabolic state which leads to rise in insulin secretion and electrolyte imbalances. Though is no clear definition of Refeeding syndrome, hypophosphatemia is considered as the hallmark of refeeding syndrome. We report the case of a 12 yr old male child, who recovered from diabetes ketoacidosis and as soon as enteral nutrition was initiated the child landed up in refeeding syndrome. Physicians should be aware about the risk factors leading to refeeding syndrome as prompt identification and initiation of treatment is the key to its management.

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Introduction

Refeeding syndrome (RS) is a potentially life-threatening condition that can occur in malnourished adults and children who resume feeding suddenly and rapidly. The rapid shift in fluid and electrolytes, predisposes the patient to life-threatening complications like cardiac arrhythmia, shortness of breath, seizures, organ damage and even death. RS in adolescents and young adults is generally associated with marked malnutrition, mainly anorexia [1-3]. However, several clinical conditions at different life stages pose a risk for RS.

According to the American Society for Parenteral and Enteral Nutrition (ASPEN), criteria for diagnosing RS include a 10%–20% drop in serum phos- phate, potassium, and/or magnesium levels in mild RS and 20%– 30% in moderate RS or greater than 30% and/or the presence of organ dysfunction due to a decrease in either of these electrolytes and/or thiamine deficiency in severe RS [4].

The symptoms of refeeding syndrome are nonspecific hence, many times the condition remains underdiagnosed and undertreated [5]. We aim to increase awareness about refeeding syndrome in all physicians, provide suggestions for prevention of refeeding syndrome and outline treatment strategies, according to the evidence in literature. We believe local guidelines should be established and nutritional team, where available, should be involved as early as possible in-patient care.

Case Report

A 12-year-old male child, presented to the emergency department with typical features of severe Diabetes ketoacidosis. He was a newly diagnosed case of diabetes mellitus type1 that was managed as per ISPAD protocol. Parents had noticed weight loss of 5kg (20% weight loss) over the last 15 days. DKA resolved gradually over the next 3 days. No other significant history. Post resolution of DKA, he was found to have electrolyte imbalances showing hypophosphatemia, hypomagnesemia and hypokalaemia. Over the next 24-48hrs, he developed puffiness of the face, mild ascitis, scrotal edema and pedal edema. Possibility of re-feeding syndrome was thought of. The child was started on supplementation of thiamine at a dose of 2mg/kg for the next 5 days. Gradually his edema reduced and electrolytes stabilised without any evidence of organ dysfunction.

Na -135	pH-7.27
K-2.86	Bicarbonate-14.2
Cl-111	pCO2-31
Inorganic Phosphorus-1.3	Creatinine-0.99
Albumin 3.6	Mg-1.8
Total protein -5.5	Lactate-1.3

Discussion

During prolonged fasting periods, the body adjusts to a catabolic state relying on the stored glycogen and lipid stores for the energy requirments. Sudden introduction of carbohydrates, shifts the body's metabolism to an anabolic state, that demands cellular uptake and utilization of energy, vitamins and minerals. This effect is mediated by the raised insulin levels which promotes glucose uptake and utilisation by the cells, eventually resulting in intercellular shift of potassium, magnesium, phosphate and thiamine contributing to the development of edema [6,7].

During starvation serum phosphate levels decrease due to increased renal excretion and decreased intestinal absorption. Even a small drop in serum phosphate levels after reintroduction of feeds can lead to significant dysfunction of cellular processes affecting virtually every physiological system. Magnesium is used as a cofactor in many enzymatic reactions. Hypomagnesemia is typically associated with hypocalcemia and hypokalemia because

it activates the Na+/K+-ATPase pump and alters parathyroid hormone release .Potassium is needed for normal cell function and is an important electrolyte involved in muscle and nerve function. Thiamine is also an essential cofactor in many enzymatic reactions . Its deficiency is typically known in Wernicke encephalopathy (ataxia, ophthalmoplegia, confusion, hypothermia, coma) and Korsakoff syndrome (amnesia, confabulation).

Children with chronic illnesses causing malnutrition (z score BMI <−2 SD), like anorexia nervous, cancer, cystic fibrosis are at increased risk. In acute cases, weight loss of >10% in less than 3 months and/or 10–14 days of malnutrition (eg, in children receiving intravenous fluids without supplemental proteins/lipids or appropriately dosed electrolytes) result in increased risk.

Lack of a clear definition of of RS results in less published data on the frequency of RS. In addition to this, slight symptoms are often not recognized, and low levels of electrolytes can be secondary to other diseases. Therefore, the true prevalence of RS in children remains unknown.

Early identification of at-risk patients is the mainstay of treatment. Slow and progressive introduction of feeds is vital in the management of refeeding syndrome. Feeds can be started at 10-20kcal/kg (or lesser) in the first 24hrs and can be gradually increased to full requirement over the next 7 days. Close monitoring of serum electrolytes is also essential to pick up any signs of refeeding syndrome. Electrolytes can be monitored atleast 12th hourly for the first three days. Diuretics can be used if needed. Vitamin and mineral supplementation should also be considered. Ideally, Magnesium, potassium & phosphate levels should be checked before nutritional replenishment. ASPEN recommends to delay nutritional replenishment if the electrolytes are deranged. However, NICE Guidelines advices, electrolytes can be replaced parallel to the reintroduction of feeds.

Aspen Recommends

- A thiamine dose of 2 mg/kg to a maximum of 100–200 mg/day prior to feeding or before beginning intravenous administration of dextrose-containing fluids in high-risk pediatric patients.
- Continue thiamine supplementation for at least 5–7 days, or even longer, in patients at high-risk of RS.
- In this case of DKA, the introduction of insulin as per sugar level along with increased oral intake predisposed the child to Refeeding syndrome. In case of electrolyte disturbances post introduction of feeds, though rare in pediatrics but the possibility of re-feeding syndrome should be kept in mind.

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