REFEEDING SYNDROME IN A 5 YEARS OLD CHILD: A RARE COMPLICATION OF MALNUTRITION MANAGEMENT

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ABSTRACT

Refeeding syndrome is a rare but preventable complication of malnutrition management. This is the second case of refeeding syndrome being reported from Pakistan. Although many cases have been reported worldwide. It is a clear indication of lack of knowledge of the entity (Refeeding syndrome) in our doctor's community. Refeeding syndrome presents with a mix picture of clinical manifestations and thus it is necessary to keep a regular check and balance of electrolyte disturbance especially serum phosphate levels before and after initiating nutrition irrespective of the route nutrition are given through. We are reporting a case of refeeding syndrome in a severely malnourished 5-year-old child which unfortunately died despite taking strict lifesaving actions.

KEY WORDS

Refeeding syndrome, Complication, Malnutrition

INTRODUCTION

According to M.A crook et al "this potentially lethal condition can be defined as severe electrolyte and fluid shifts associated with metabolic abnormalities in malnourished patients undergoing refeeding orally, enterally, or parenterally"[1]. It was first described in Japanese prisoners who were captured and starved in concentration camps in World War 2 and refed but still 21 % of the prisoners died [2]. Refeeding syndrome may be manifested as hormonal changes leading to hypophosphatemia, hypokalemia, hypomagnesemia, hypocalcemia with or without hyperglycemia, fluid retention, hypoalbuminemia, and thiamine deficiency .The condition is potentially lethal and early detection and prompt management is required [3]. In prolong starvation fat and protein stores are catabolized to produce energy as insulin levels decline and glucagon levels increase .When feed is started a sudden shift from fat to carbohydrate metabolism occurs and secretion of insulin increases which stimulates cellular uptake of phosphate and potassium due to stimulation of Na-k ATP asetransporter on cells and induces glycogen formation and storage which can lead to profound hypophosphatemia and fluid shift from extracellular compartment into intracellular compartment[4]. We are reporting a case of refeeding syndrome in a 5 years old child which ultimately led to death of the child.

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Clinical manifestations of refeeding syndrome [1]

deficiencies	Clinical features
hypophosphatemia	Phosphate levels (4.0-7.4mg/dl) Below normal levels may cause Cardiovascular:heartfailure,arrhythmias,hypotension,cardiomyopathy Renal: acute tubular necrosis, metabolic acidosis Skeleton: rhabadomyolosis, myalgia, diaphragm weakness Neurolpgy: delirium, coma, seizures, tetany Hematology :hemolysis, thrombocytopenia ,leukocyte dysfunction
hypomagnesemia	Magnesium levels(1.7-2.4mg/dl) Below normal levels may cause Cardiovascular: paroxysmal atrial or ventricular arrhythmias Respiratory: hypoventilation ,respiratory distress, respiratory failure Neuromuscular :muscle cramps ,weakness, paresthesia, depression, GIT: abdominal pain vomiting diarrhea constipation
hypokalemia	Potassium levels(3.5-5.5mg/dl) Below normal levels may cause Cardiovascular: hypotension ,ventricular arrhythmias cardiac arrest Respiratory :hypoventilation, respiratory distress, respiratory failure Skeleton: weakness ,fatigue, muscle weakness Metabolic: metabolic alkalosis
Vitamin deficiencies	Deficiency of thiamine may present as Neurology: Wernicke-korsakoff syndrome, korsakoffs psychosis Cardiovascular :congestive heart failure and lactic acidosis, beriberi disease

METHODOLOGY

A 5 years old child was admitted to the hospital with chronic diarrhea .Stool was watery and foul smelling in nature and child was reluctant to feed .He belonged to a poor family. On examining the child was severely malnourished weighing only 7.5 kg height was 100 cm (bmi :7.5) he was lethargic had weak regular pulses and a heart rate of 110 beats per minute. A bolus of N/saline of 250 ml initially, 1/2st D/saline 20ml/hr with 10 ml kcl added was started, the patient condition improved . The child had mile stone delay as he was unable to sit and walk and there was severe muscle wasting. Investigation showed HB 6.9G/dl, TLC 16400/cmm, blood sugar 88mg/dl, serum calcium 8.7 mg/dl, urea 12mg/dl, alkaline phosphatase 943 u/L,serum anti transglutaminase Iga negative ≤1 . Nasogastric tube was passed and small feeds of formula milk was started equal to 350 kcal/day food supplements which included vitamin A 200000 i.u initially, calcium phosphate 210mg/day, folic acid 2.5mg/day, zinc sulphate 20mg/day and B complex and ciftrixone 750mg/day were given .After a few days the patient condition improved he started taking feed by himself the calorie intake was increased up to 500kcal/day.

The next day the child become comatosed (GCS 6/15), developed pedal edema,and 3rd nerve palsy ,weak regular pulse, cold peripheries, heart rate of 100bpm respiratory rate of 40/min

blood pressure of 60/40mmHg and oxygen concentration of 90 % . Investigation showed HB 5.9mg/dl, TLC 32900/cmm, neutrophils 80%, CT-Brain was normal, Na 127mmol/l(normal range 135 -138), potassium 3.44 (normal range 3.5-5.5), chloride 103mmol/l(normal range 98-107), serum creatine phosphokinase was 44units/l (normal range upto 195 u/l), blood sugar 137mg/dl (upto 150mg/dl), serum phosphorous 3.3 mg/dl (normal range 4-7.4mg/dl).A diagnoses of Refeeding syndrome was made, oxygen supplementation was given,blood was transfused as 10ml/kg/day, n/saline 20 drops/min with added kcl 10ml in 500ml infusion drip ,2.7 ml (200mg/5ml)of dopamine was added in 100ml infusion chamber of 5% D/saline and transfused at rate of 10µg/kg/mint , injectable B-complex were added on the supposition of thiamine deficiency related to refeeding syndrome ,phosphorus was given in the form of calcium phosphate 410mg,magnesium glycerophosphate 6.6mg, calcium glycerphosphate 16mg and potassium guaiacolsulphonate 82mg p/o through N/G tube (although it is adviced to give calcium 2hrs after phosphorus but because of unavailability of phosphate sandoz or i.v potassium dihydrogen phosphate, calcium phosphate was given) and vital monitoring was done hourly. The patient's condition still deteriorated after vigorous supportive treatment the patient ultimately expired after continues efforts of cardio pulmonary resuscitation.

DISCUSSION

Diagnosing Refeeding syndrome in a malnourished patient can be some time challenging for doctors as it may present with different clinical manifestation for different patients and thus its always necessary to keep a high level of certainty and low threshold in diagnosing Refeeding syndrome. According to Robert M.kliegman "Refeeding syndrome is the development of severe hypophosphatemia after the cellular uptake of phosphate during the 1st week of starting to refeed. Serum phosphate levels of ≤0.5mmol/L can produce weakness, rhabdomyolysis, neutrophil dysfunction, cardio respiratory failure, arrhythmias, seizures, altered level of consciousness or sudden death"[5]. The published refeeding syndrome policy 2010 by royal prince alfared hospital states that[6],

"The following patients can be classified at extreme risk: -
Patients with BMI<14 or who appear extremely emaciated
Patients known or suspected to have anorexia nervosa
Patients known or suspected to have chronic alcoholism
Patients with severe recent weight loss (>5% of usual weight in one month, or >10% in six months)
Patients presenting with low levels of K+, PO42-, Mg2+

The following patients can be classified at high risk: -
Frail elderly patients assessed by dietitian as being at nutritional risk
Patients not coping with difficult economic circumstances, e.g. homeless
Morbidly obese patients with rapid weight loss (e.g. after gastric ballooning or banding)
Patients who have not been fed for 7 – 10 days with evidence of stress and depletion
Patients who have been fasted and/or given only IV fluids for a prolonged period
Risk is increased in patients who are given TPN or IV dextrose".

Identifying the risk patients and managing as such may prevent deaths in undernourished patients[6].The current guidelines for commencing feed in malnourished children is that the child

should be started on 40cal/kg/day but it should be kept in mind that the calories given should not be less than which he was previously consuming, the meal should consist of 10-15% protein, 30-35% fat, 50-60% carbohydrates increase the total calories given to 200kcal/day until 2000kcal/day is achieved. Serum phosphate levels should be checked daily, well detailed oral meal plan should be made and implemented consisting of a devised plan to what should be given at what time with the addition of food supplements. If not possible feed should be given through N.G tube which is a more preferable way to give feeds in children .If weight gain is less than 0.6kg/week it is advised to shift the patient on estimated average requirement of calories per day regimen[7]. Our case was diagnosed refeeding syndrome on the basis of deterioration of child's health after commencing increase oral feeds and also by clinical feature related to electrolyte imbalance which was confirmed by investigations specifically by low levels of serum phosphorus. The patients electrolyte balance was corrected but he progressively become vitally unstable and a undaunted effort was made to bring the child back which was of no use and the child unfortunately expired after much attempts of CPR .

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