中文題目:再餵食症候群-病例報告

英文題目: Refeeding syndrome in a patient with suspected MEN-I syndrome: a case report

作　　者: 楊光祖[1], 沈曉津[2], 廖麗瑛[3], 吳文傑[3*]

服務單位: 臺北市立聯合醫院仁愛院區內科部[1]臺北市立聯合醫院仁愛院區教學研究部[2]臺北市立聯合醫院仁愛院區消化內科[3]

Introduction

Refeeding syndrome (RFS) is a well described but often forgotten condition, and associated with risk factors including depression, electrolytes imbalance, cachexia, body weight loss or low BMI.[1]

In 2010, NICE guidelines established risk factors table and management of RFS. The clinical presentation is vague. Anorexia nervosa, muscle weakness, electrolytes imbalance were often seemed in these patients. Computer tomography/magnetic resonance image would be considered to exclude other underlying endocrine related problems. Intensive electrolytes monitoring would also be needed to exclude other diseases(hypokalemia/hypophosphatemia/hypomagenesemia/hyperglycemia). The final diagnosis is made by clinical presentation, progression and complete biochemistry studies. The prognosis of refeeding syndrome was not so serious but could be mortal if there was not enough attention to the disease. Here we present a rare case and finally diagnosed as refeeding syndrome.[2]

To our knowledge, there had been no randomized studies about RFS until now. This was hard to discover due to the difficult diagnostic course itself.

Case report

This 65-year-old female patient had the past history of Parkinson's disease in use of madopar, chronic kidney disease stage 3, and subclinical hyperthyroidism

without medications. She also had chronic constipation, long term poor intake, dysphagia and lost body weight up to 6 kg for half of year. Therefore, she visited our outpatient clinic. The upper gastrointestinal endoscopy was arranged and showed acute gastritis and reflux esophagitis. Recently, she complained diarrhea for two weeks and general weakness. Hypotension was noted during colonoscopy examination with poor bowel preparation and then she was admitted to treat dehydration status.

Physical examination disclosed clear conscious, dry skin turgor and mild pale conjunctiva. The BMI when she arrived at our hospital is 20.2 kg/m 2 (height 1.50 m, weight 46 kg).Laboratory studies one week before admission showed BUN 17.7 mg/dL, serum creatinine 1.8 mg/dL, serum potassium 3.2 mEq/L, serum sodium 134 mEq/L, serum white blood cell 8720/ul, neutrophil 71.4%, and hemoglobin g/dL.

After hospitalization, she received peripheral parenteral fluid supplement. However, two days later, hypotension and muscle weakness occurred. Vital signs were BT 37’C, PR 60 beat/min, RR 18 /min, BP 87/46 mmHg. Laboratory studies showed BUN 45.4 mg/dL, serum creatinine 2.5 mg/dL, serum potassium 1.5 mEq/L, serum sodium 139 mEq/L, serum Albumin 3.6 g/dL, serum magnesium 1.0 mEq/L, serum calcium 6.2 mg/dL, serum phosphate 1.6 mg/dL, serum glucose 117 mg/dL, white blood cell 7370/ul, neutrophil 69.6%, and hemoglobin 8.8 g/dL. Due to shock and electrolyte imbalance, she was transferred to ICU. Refeeding syndrome was highly suspected because hypokalemia, hypophosphatemia and hypomagnesemia after refeeding in a malnourished patient.

After appropriate adjustment of electrolytes and fluid status, clinical conditions improved and she was transferred back to general ward. The abdominal computer tomography revealed pancreatic body nodular lesion in size of 1.1cm and left adrenal nodule. Drowsiness and hypertension occurred at general ward. Lab data showed hypercalcemia and hyperparathyroidism (serum calcium 13.3 mg/dL; Albumin

3.3g/dL, PTH 287.1 pg/mL). Thyroid sonography showed a mass over right thyroid bed; parathyroid SPECT scans revealed an extrathyroidal hot focus posterior to the upper portion of the right thyroid lobe. After fluid hydration, furosemide , calcitonin and bisphosphonates using, her hypercalcemia resolved and consciousness backed to baseline. She was arranged surgical resection for the parathyroid lesion soon. Besides, MEN-I syndrome was suspected and further examinations including gene tests, chromogranin A, IGF-1 and CT guide biopsy for pancreatic lesion were arranged. The survey for this patient is still on going.

Discussion

First reports of the syndrome appeared in the 1950s after observations of malnourished prisoners of war who developed cardiac and neurological symptoms soon after the recommencement of feeding.[5][6]

Symptoms of RFS are unpredictable, and it may occur anytime. Symptoms occur because of serum electrolytes imbalance. Then it affects the cell membrane potential impairing function in nerve, cardiac and skeletal muscle cells. However, it may be asymptomatic due to mild abnormality of these electrolytes. The spectrum of presentation ranges from muscle weakness, nausea, vomiting, and lethargy to respiratory insufficiency, cardiac failure, hypotension, arrhythmias, delirium, coma, and death. Clinical conditions may worsen rapidly if there was no adequate caution, no intensive lab data monitoring, or no emergent management. Low serum albumin may be an significant predictor for hypophosphatemia although albumin is not a nutritional marker.[4]

When refeeding, glucose intake leads to insulin release and glucagon decrease. Insulin stimulates glycogen, fat, and protein synthesis, a process requiring minerals such as phosphate and magnesium, and cofactors such as thiamine. Therefore, there would be a significant plunge in phosphate, magnesium and potassium level. There

was a flow chart we drew to describe RFS mechanism as Figure 1.[7]

Patients had high risks of RFS if they had t underlying diseases such as anorexia nervosa, chronic alcoholism, postoperation, uncontrolled diabtes mellitus, chronic malnutrition, high stress patient unfed for >7 days, inflammatory bowel disease, chronic pancreatitis, cystic fibrosis, short bowel syndrome, long term users of antacids or diuretics. The NICE guideline also published criteria for identifying patients at high risk of refeeding problems. If the patient has body mass index (kg/m^2) <16, unintentional weight loss >15% in the past three to six months, little or no nutritional intake for >10 days, low levels of potassium, phosphate, or magnesium before feeding.[3]

About diagnostic criteria, there was no consensus. As clinical experience, if hypophosphatemia, hypokalemia, hypomagnesemia and hyperglycemia were simultaneously found, the patient was highly suspected and almost diagnosed refeeding syndrome. Of course, other electrolytes imbalance problems and other hyperglycemia underlying conditions must be excluded to confirm refeeding syndrome.

There was no definite medicine or procedure for refeeding syndrome. Only supportive care and high intensity monitoring of clinical conditions were the best strategy. [1,2,7] To prevent refeeding syndrome, there was a recommended regimen as table 1.[1] It is important that if RFS is suspected in the patient who develops intolerance to artificial nutritional support, the energetic intake should be reduced or stopped. As above, feeding rate should be increased to meet full requirements for fluid, electrolytes, vitamins, and minerals if the patient is clinically and biochemically stable.

The pearl of this case report is that clinical physicians should keep high alert of RFS during refeeding the malnourished patients, especially in patients with high risk. It does not represent a single problem or syndrome rather it describes an illness

spectrum that occurs under particular circumstances within high-risk people. Nearly, RFS will affect almost every system in our body. Improved understanding of energetic requirements in healthy and sick patients would help improve understanding and allow for developing novel strategies to minimize risk of RFS to patients.[3]

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Table 1

Day	Calorie intake (All feeding routes)	Supplements
1	10 kcal/kg/day For extreme cases (BMI < 14 kg/m^2 or no food >15 days) 5 kcal/kg/day Carbohydrate: 50–60% Fat: 30–40% Protein: 15–20%	Prophylactic supplement PO_4^{3-}: 0.5–0.8 mmol/kg/day K^+: 1–3 mmol/kg/day Mg^{2+}: 0.3-0.4 mmmol/kg/day Na^+: <1 mmol/kg/day (restricted) IV fluids-Restricted, maintain "zero" balance IV Thiamine + vitamin B complex 30 minutes prior to feeding
2-4	Increase by 5 kcal/kg/day If low or no tolerance stop or keep minimal feeding regime	Check all biochemistry and correct any abnormality Thiamine + vitamin B complex orally or IV till day 3 Monitoring as required
5-7	20–30 kcal/kg/day	Check electrolytes, renal and liver functions and minerals Fluid: maintain zero balance Consider iron supplement from day 7
8-10	30 kcal/kg/day or increase to full requirement	Monitor as required

Figure Legion

Figure 1 Mechanism of refeeding syndrome