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Case Report

Kwashiorkor Following Roux-En-Y Gastric Bypass (Rygb) Managed Conservative by A Multidisciplinary Team

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Background

Kwashiorkor also known as oedematous malnutrition is poorly recognised and seldom encountered in the developed world [1,2]. Although still extremely rare, more cases have appeared in literature recently detailing patients with iatrogenic Kwashiorkor following bariatric surgery [2-6].

Case Report

A 55-year-old female presented with a 2-month history of increased lethargy, peripheral oedema and hair thinning. She had a Roux-en-Y gastric bypass (RYGB) with an alimentary limb of 170cm 4 years prior to her presentation. She also reported steatorrhea and vague abdominal discomfort. Her past medical history included hypertension, asthma and resolved type 2 diabetes mellitus (T2DM). When initially referred to the bariatric services, her BMI was 50kgm [2].

One year postoperatively her BMI dropped to 36.1kgm [2] (weight 201.0kg) and her T2DM was in remission. Her weight loss plateaued at two years postoperatively with a BMI in the mid- thirties.

Physical examination revealed pallor of the conjunctiva, a mildly distended soft non-tender abdomen with pitting oedema up to the knees bilaterally. No demonstrable ascites and no other peripheral stigmata of chronic liver disease present. Laboratory studies results detailed in Table 1.

Investigations

Endoscopy revealed a normal upper gastrointestinal tract with small bowel histological appearances within normal limits. A colonoscopy showed several diverticula A barium swallow showed prompt drainage of contrast from the oesophagus into the pouch and then small bowel with no evidence of stricture or obstruction. A CT with oral contrast confirmed positive drainage into the Roux loop with no evidence of significant obstruction at present.

Differential diagnoses:

• Surgical mechanical adverse events – such as Fistulae, anastomotic stricture and stenosis
• Chronic inflammatory process – Such as Crohn's, Colitis, Coeliac disease
• Noncompliance with postoperative nutrient replacement

Treatment

Her management involved a multidisciplinary team of bariatric surgeons, endocrinologist, dieticians and nurse specialist. Pharmacist, nutritionist, and General practitioners also played a vital role in long term follow up.

The first steps involved nutritional assessment and planning. She was placed on Total Parental Nutrition (TPN) (NuTRIflex® 8.6g N) for four weeks whilst correcting micronutrients and electrolyte deficiencies. Part of her rehabilitation involved high protein drinks, diuretics and thyroid hormone replacement. TPN was converted to approximately 2200Kcals plus 150g protein daily oral intake.

Outcome and follow up:

She was discharged after five weeks following a resolution of her symptoms. Outpatient clinic reviews by the bariatric nurse specialist and dietician confirmed a satisfactory and maintained nutritional status. At 6 months post-discharge, she is currently well established on an oral diet her nutritional markers are all within normal ranges. Strict long-term macro- and micronutrient replacement is expected to continue.

Discussion

The aetiology of Kwashiorkor is still poorly understood [1]. Over the last century, it has been hypothesised that protein deficiency, hypoalbuminaemia, and excessive oxidant stress play a vital causative role [1,2].

Following bariatric surgery, an incidence of 4.7% has been quoted in one small series following RYGB with a mortality of 5.5% in identified cases [6]. It has been noted to occur even at more than 5 years post RYGB with a fatal case was reported by Alisha N et al. in 2010 [5].

We propose a flow chart in figure 1 highlighting how a RYGB can lead to a clinical manifestation of Kwashiorkor.

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Table 1: Blood results.

Nutritional markers			Full blood count		
Albumin	15	30 - 50 g/L	Haemoglobin	88	122 – 165g/L
Total Protein	34	60 – 80 g/L	WCC	10.5	3.9–11.1 109/L
INR (Vit K)	1.2		Platelets	404	150–400 109/L
Vit D (25 – OH)	37	nmmol/L	MCV	95	82 – 98fl
Vit B12	1993	211 – 900 ng/L	MCH	30.9	27.3-32.6pg
HBA1c	4.0		Lymphocytes	3	1.1 – 5 109/L
Adjusted calcium	2.36	2.2 – 2.6mmol/L	Liver Function		
Zinc	7.8	10 – 18umol/L	Bilirubin	5	3 – 21 umol/L
Plasma Selenium	0.30	0.75-1.50umol/L	ALP	97	30 – 130 U/L
Magnesium	0.73	0.7-1pmol/L	AST	17	10 – 45 U/L
Copper	23.8	11.0 – 25umol/L	ALT	25	5 – 55 U/L
Phosphate	0.94	0.8 –1.5 mmol/L	Lipid Profile		
Iron Studies			Cholesterol	2.1	3.1–6.5 mmol/L
Serum Iron	13.7	14-39umol/L	HDL	1.41	1 – 1.8mol/L
TIBC	31.5	45-80umol/L	Triglycerides	0.94	0.84 – 1.9mmol/L
% Saturation	43.5	%	LDL	0.26	mmol/L
Serum Folate	20.5	2 – 20ug/L	HDL:LDL ratio	1.49	
Ferritin	256	12 – 300ug/L	Thyroid markers		
Inflammatory markers			TSH	10.6	0.3 – 6mU/L
Anti-tissue transglutaminase (iTG-IgA)	0.2	0 – 7.0u/ml	Free T4	14.7	9 – 24pmol/L
CRP	<5		parathyroid hormone	12.8	1.6 – 6.9pmol/L
Renal Function			Miscellaneous		
Urea	7.5	2.5 – 7.5 mmol/L	Urine protein	0.16	0.0-05g/L
Creatinine	66	50 – 100umol/L	Urine Creatinine	6.28	g/L
Sodium	136	133 – 146 mmol/L	Urine PCR	0.025	0.00-0.014
Potassium	3.8	3.5 – 5.3 mmol/L	Urine protein	0.16	0.0-05g/L

Severe malnutrition in the context of a RYGB can be due to surgical mechanical adverse events such as fistulae and anastomotic strictures [7]. It can also be caused by a superimposed inflammatory process such as coeliac and inflammatory bowel disease.

In most cases, noncompliance with nutritional supplements postoperatively plays a significant role [7]. Macro- and micronutrients levels are known to be impaired following a RYGB [8] as seen in figure 1. This may be explained by the reduction in the bioavailability of these nutrients which is dependent on stomach acid and digestive juices in the duodenum. The malabsorptive and restrictive component of a RYGB therefore leads to an aberration in this relationship. Expert recommendations are for patients to go on a lifelong regimen of daily micro and macronutrient replacements following malabsorptive surgery [8]. In this case, this was achieved by daily Forceval, Adcal D, Ferrous sulphate and 3 monthly IM Vitamin B12 hydroxocobalamin.

Calcium an important macroelement plays a vital role in cell signalling. Its absorption in the small intestines is regulated by vitamin D [8]. Vitamin D has also been shown to play an important role in cell proliferation, insulin function and immune function. For the absorption of calcium and other divalent metals such as Zinc, the transporters which are most prevalent in the bypassed segment require acidic conditions for solubilisation. This acidic environment is also reduced by a small stomach pouch (Figure 1).

In most cases of Kwashiorkor, there is moderate anaemia (80 – 100 g/L) with normal or raised free iron [1] and this was evident in the above case.

The exact cause of protein malnutrition following surgery remains poorly defined. Faintuch J, et al. 2004 also reported that patients with a Roux limb of greater than 150cm are at a higher risk of severe protein malnutrition with an incidence of 13% at 2 years post-RYGB which might have been a contributing factor in this case [6].

So when these patients present, It is important to rule out any mechanical causes for the patient's clinical picture. This can be done by a series of endoscopic and radiological investigations with biopsies were indicated. Blood test may help identify any underlining inflammatory process.

Optimising these patients nutritionally helps in the resolution of Kwashiorkor. Anaemia can be corrected by blood transfusion and macro- and microelements adequately replaced. Diuretics can help improve oedema whilst addressing severe hypoproteinaemia. Some cases of post- RYGB malnutrition have been managed by reversal. However, this has mainly been in

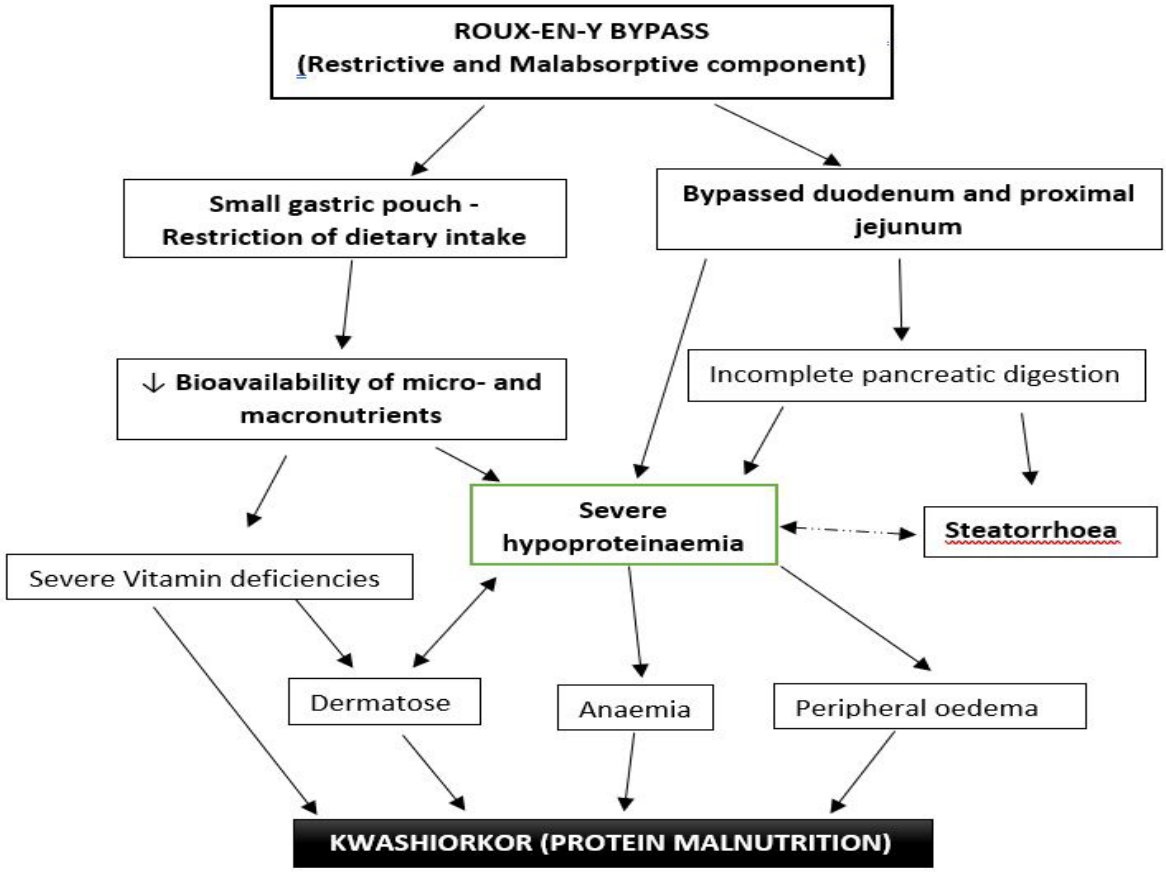

Figure 1: Flow chart illustrating clinical manifestation of protein malnutrition following RYGB.
Proposed flow chart illustrating the physiological implications of incomplete pancreatic digestion and the restrictive component of a Roux-en-Y gastric bypass.

refractory cases [9].

Notably, not every patient with a RYGB has this clinical outcome. More work, therefore, needs to be done to identify at-risk patients.

Learning points

Kwashiorkor is rare in the developed world but can occur following RYGB

Adequate assessment and nutrition rehabilitation carried by a multidisciplinary team is an effective management option.

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