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Kwashiorkor with Hepatic Steatosis: A Case Report of Edematous Malnutrition in an Infant

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ABSTRACT

Kwashiorkor is a form of severe acute malnutrition that predominantly impacts infants and young children in settings characterized by nutritional imbalance. It is marked by swelling, low levels of albumin (Hypoalbuminemia) in the blood, and metabolic derangements. Unlike Marasmus, it is often associated with relatively stable caloric intake but inadequate protein consumption, leading to complex systemic symptoms. The illness remains clinically significant due to its association with immunological dysfunction, increased susceptibility to infections, and the involvement of multiple organ systems, including the liver.

This case study illustrates a conventional yet clinically relevant manifestation of edematous malnutrition in a one-year-old male infant exhibiting progressive bilateral edema and developmental regression. Imaging results showed that the liver was affected by fatty changes, and laboratory tests showed signs of nutritional deficiency, such as mild anemia and low serum protein levels. This kind of engagement across multiple systems shows how a long-term lack of protein affects metabolism and physiology. Micronutrient supplements and structured nutritional therapy were employed to manage the child, leading to gradual clinical improvement and resolution of edema. This case underscores the importance of promptly recognizing subtle clinical indicators, particularly in vulnerable juvenile populations where a delayed diagnosis could lead to significant complications. It also stresses how important it is to use supporting tests like imaging and biochemical measurements to confirm the diagnosis and find other diseases that are related, like hepatic steatosis.

This study affirms that kwashiorkor is a complex clinical condition requiring a comprehensive and interdisciplinary treatment approach, rather than merely a nutritional deficiency disorder. To improve outcomes and mitigate the impact of severe malnutrition in children, healthcare professionals must acquire greater knowledge regarding its diverse manifestations and timely intervention strategies.

Keywords: Kwashiorkor, Hepatic Steatosis ,Malnutrition ,Hypoalbuminemia ,Metabolic complications.

1. Introduction

Kwashiorkor is a serious type of protein-energy malnutrition that commonly affects infants and young children in low-resource settings. It is characterized by bilateral edema, low albumin levels, and metabolic disturbances [7] . It often develops in children who receive adequate caloric intake but insufficient dietary protein, leading to impaired growth and systemic dysfunction [6]. The condition remains a significant contributor to pediatric morbidity due to its association with infections, delayed development, and increased mortality risk [5].

The underlying pathophysiology of kwashiorkor is multifactorial and extends beyond simple protein deficiency, involving oxidative stress, inflammatory responses, and alterations in gut microbiota [4]. Hypoalbuminemia plays a central role in the development of edema by reducing plasma oncotic pressure, although additional mechanisms such as endothelial dysfunction and sodium retention are also implicated [4]. These combined factors contribute to the characteristic fluid accumulation observed clinically.

Hepatic involvement is a well-recognized feature of kwashiorkor, resulting from impaired synthesis of apolipoproteins necessary for lipid transport [3] . This leads to accumulation of fat within hepatocytes, manifesting as hepatic steatosis that can be detected through imaging modalities such as ultrasonography [3]. Such findings provide important supportive evidence in clinically suspected cases.

Diagnosis is mainly clinical, relying on bilateral pitting edema, growth retardation, and corroborative biochemical anomalies such as diminished serum protein and albumin concentrations [7] . Also, laboratory tests may indicate leukocytosis and anemia, which are signs of a weak immune system and nutritional deficiency [6] . This report describes a case of Grade II kwashiorkor in a one-year-old child with concomitant hepatic alterations, emphasizing the necessity of a comprehensive clinical and biochemical evaluation for early detection and intervention [1].

2. Case Presentation

A pediatric infant of 1-year-old male was presented with the complaints of progressive edema on the bilateral upper and lower limbs since 10days, extending upto wrist and ankle along with the facial edema. Family history indicates the young mother with three closely spaced children suggesting a potential role of maternal nutritional depletion as predisposing factors. There were no significant past medical history, normal oral intake and regular bowel and bladder movements. Birth history revealed that the child was born full-term by normal vaginal delivery with the birth weight of 3kgs and no perinatal complications. Anthropometric analysis suggests a weight of 6.5kgs and height of 70cm, indicating growth faltering for age.

The hematological report demonstrates reduced hemoglobin levels with 10.2gm/dl and RBC count of 3.5million/cmm indicating mild anemia likely secondary to nutritional deficiency along with an elevated WBC count of 16,900cells/cmm suggesting an association with possible infection or inflammatory response, which is usually observed in malnutrition children due to immunocompromised status. Liver function tests revealed Hypoproteinemia and hypoalbuminemia with reduced total protein (5.7g/dl) and albumin levels (3.3g/dl) contributing to decreased plasma oncotic pressure which correlates to the clinical

presentation of progressive edema. Increased spot urine protein (21.4mg/dl) in urine analysis implies the mild proteinuria while other parameters remain normal. Ultrasonography of abdomen and pelvis has shown altered liver echotexture resulting from impaired apolipoprotein synthesis due to hypoproteinemia supporting the fatty infiltration.

Based on the clinical presentation of bilateral edema involving the upper and lower limbs and face, along with anthropometric evidence of growth faltering (6.5 kgs weight at 1 year) and biochemical findings of Hypoproteinemia, the child was diagnosed with Grade-II Kwashiorkor, an edematous Severe Acute Malnutrition (SAM). The diagnosis was further supported by associated features including ultrasonographic evidence of altered hepatic echotexture suggestive of fatty liver changes and mild anemia typically seen in kwashiorkor.

The patient was initiated on nutritional and supportive management with oral vitamin D3 drops (1ml/OD), Syrup Multivitamin (1ml/OD), Zinc and Vitamin D_3 drops (1ml/OD), and Vitamin A supplementation. Tab. Folic acid (5mg/OD) was administered to address mild anemia, and Magnesium supplementation (2ml/IM) was given to correct electrolyte imbalance. Following initial stabilization, the patient was started on an F-100 therapeutic diet to promote growth, with regular weight monitoring. On the third day of hospitalization, syrup potassium chloride (7.5ml/BD) was added for further electrolyte correction. With ongoing treatment, the patient demonstrated gradual clinical improvement, including a significant reduction in edema. At discharge, the patient was advised to continue iron supplementation for six months along with supportive nutritional therapy for two weeks and recommended for follow-up after six months.

3. Discussion:

The current case presents a classic manifestation of edematous severe acute malnutrition, characterized by bilateral edema, hypoalbuminemia, and growth retardation typical for kwashiorkor [7]. Historically, edema was attributed mainly to diminished plasma oncotic pressure resulting from hypoalbuminemia; however, recent studies suggest that additional mechanisms significantly contribute to its pathogenesis [4]. Oxidative stress, systemic inflammation, and endothelial dysfunction are some of the things that can change vascular permeability and fluid distribution in a broad way [4].

This patient's hepatic steatosis corresponds with the acknowledged metabolic consequences of protein deficiency, including reduced apolipoprotein synthesis essential for lipid transport. This makes the liver store fat, which is often seen on ultrasound as a change in echotexture. Such hepatic involvement underscores the importance of early dietary intervention to halt the disease's progression and illustrates its systemic nature [3].

Malnourished children often have leukocytosis because their immune systems are weak. This could mean that they have an inflammatory or infectious condition [5]. Protein-energy malnutrition heightens susceptibility to infections and exacerbates clinical outcomes by compromising humoral and cellular immunity [5]. This underscores the imperative of meticulous monitoring and supportive care during the treatment process.

Due to the mild proteinuria, differential diagnoses such as nephrotic syndrome, which may present with edema-like symptoms, needed to be considered [1]. The diagnosis of kwashiorkor, as opposed to a primary renal disorder, was substantiated by the absence of severe hypoalbuminemia and significant protein loss [1]. The major part of treatment is still therapeutic management, which focuses on nutritional rehabilitation. This includes giving patients energy-dense therapeutic meals and vitamin supplements [6]. This case favourable clinical outcome further supports the idea that quick and appropriate treatment can help with kwashiorkor symptoms [2].

4. Conclusion:

This case implies that Grade II kwashiorkor usually exhibits as an edematous form of severe acute malnutrition, along with biochemical problems and liver involvement that suggest systemic metabolic failure. To make an accurate diagnosis, it reinforces the importance of finding bilateral edema and stopping development early on, with the help of specific laboratory and imaging results. Prompt, protocol-based care can successfully reverse illness symptoms and prevent complications, as evidenced by the favorable response to timely nutritional rehabilitation and micronutrient supplementation. It is also important to carefully mention the difference between pediatric edema and other causes, like kidney problems, to make sure the right treatment is given. Raising awareness and using early intervention techniques are still important for improving the health of affected children.

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