Case Report

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Successful management of Acute respiratory tract infection and severe anemia in a case of severe acute malnutrition: A Case Report.

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Abstract

Introduction: Severe acute malnutrition (SAM) is a critical health issue in children, defined by significant wasting, low mid-upper arm circumference (MUAC), or nutritional edema. This report presents a case of a 2-year-old boy with SAM, severe anemia, pneumonia, and pleural effusion, highlighting the challenges and successful management strategies.

Case Report: A 2-year-old boy presented with cough, fever, and severe respiratory distress. Examination revealed severe malnutrition (weight-for-height Z-score of -3.1, MUAC of 11.4 cm), pedal edema, and severe pallor. On chext xray pleural effusion was also present. Nutritional rehabilitation commenced with therapeutic feeds, and supportive care, including nebulizations and chest physiotherapy, was provided. Over time, the patient's respiratory distress resolved, fever subsided, and pedal edema improved.

Discussion: SAM significantly impairs immune function, predisposing children to severe infections like pneumonia. The coexistence of severe anemia further complicates the clinical course, reducing the oxygen-carrying capacity and exacerbating the body's response to infections.

Conclusion: Early diagnosis and a comprehensive treatment approach are essential for managing children with SAM, severe anemia, and pneumonia. The successful outcome in this case emphasizes the need for standardized protocols to improve the overall outcomes for such complex cases.

Keywords:- Severe Acute Malnutrition, Acute Respiratory Infection, Pleural Effusion, Nutritional Rehabilitation.

INTRODUCTION

Severe acute malnutrition (SAM) is defined as a weight-for-height/length Z-score below -3 standard deviations of the WHO Child Growth Standards, or a mid-upper arm circumference (MUAC) less than 115 mm, or the presence of nutritional edema. Risk factors for SAM include inadequate dietary intake, repeated infections, and socio-economic factors such as poverty and lack of access to healthcare.

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Clinically, SAM presents with severe wasting, edema, and loss of subcutaneous fat. Complications of SAM are numerous and include infections, hypoglycemia, hypothermia, and severe anemia. Anemia in SAM is often due to multiple factors such as micronutrient deficiencies (especially iron), chronic infections, and inflammation. Age is a critical factor, with younger children being at higher risk due to their rapid growth and higher nutritional requirements.[1]

Acute respiratory infections (ARI) are common in children with SAM due to their weakened immune systems and poor nutritional status. Anemia further exacerbates the clinical course of ARI by reducing the oxygen-carrying capacity of the blood, leading to increased susceptibility to infections and poorer outcomes. In children with SAM, the prevalence of ARI and anemia is significantly higher, and these conditions often coexist, creating a vicious cycle of deteriorating health and nutritional status. [2]

Respiratory complications in severe acute malnutrition (SAM) are a significant concern due to the profound impact of malnutrition on the immune system and respiratory function. Children with SAM have weakened immune defenses, leading to an increased susceptibility to infections, including pneumonia. The pathophysiology of respiratory complications in SAM involves multiple factors: impaired immune response, decreased production of antibodies, and reduced function of immune cells. Malnutrition also affects the integrity of the respiratory epithelium, making it easier for pathogens to invade and establish infections. Additionally, SAM can cause muscle wasting, including the respiratory muscles, leading to reduced respiratory effort and capacity. Edema, commonly seen in SAM, can further complicate respiratory function by accumulating fluid in the lungs, exacerbating breathing difficulties. These combined factors create a high risk for severe respiratory infections and complications in children with SAM, necessitating prompt and comprehensive medical intervention.[3]

Anemia is a prevalent complication in severe acute malnutrition (SAM), arising from a combination of nutritional deficiencies, chronic inflammation, and infections. The pathophysiology of anemia in SAM involves several interconnected mechanisms.

Primarily, deficiencies in essential nutrients such as iron, folate, and vitamin B12, which are crucial for erythropoiesis, lead to reduced production of red blood cells. Chronic infections, common in malnourished children, can induce anemia of inflammation, where cytokines impair iron metabolism and erythropoiesis. Additionally, the bone marrow's capacity to produce red blood cells is often compromised in SAM due to overall nutritional deficiencies and the direct impact of malnutrition on marrow function. Hemolysis, or the premature destruction of red blood cells, may also occur, further exacerbating anemia. This multifactorial etiology makes anemia in SAM particularly severe, contributing to symptoms like fatigue, pallor, and increased susceptibility to infections, thereby complicating the clinical management of these children. [4]

Management of children with SAM and pneumonia requires a multidisciplinary approach. Initial stabilization is critical and includes treating hypoglycemia, hypothermia, and dehydration. Antibiotic therapy is essential for managing infections such as pneumonia. Nutritional rehabilitation should commence as soon as the child is stabilized, with therapeutic feeds that provide adequate calories and micronutrients to promote recovery and catch-up growth. Continuous monitoring and supportive care are vital to address any complications promptly.Iron supplementation and nutritional rehabilitation are pivotal in managing children with SAM, pneumonia, and anemia. Iron supplementation should be administered cautiously to avoid exacerbating infections and should be part of a broader nutritional strategy that includes therapeutic foods rich in protein, energy, and essential micronutrients. Nutritional rehabilitation aims to restore the child's growth and immune function, ultimately improving their overall health and reducing the risk of future episodes of malnutrition and infection.[5]

We hereby report a case of 2 year old boy with severe acute malnutrition and severe anemia with pneumonia and plueral effusion. He was treated by appropriate antibiotics, blood transfusion and nutritional rehabilitation. Our case emphasises the need for early diagnd appropriate interventions in cases of SAM presenting with acute respiratory tract infections.

CASE REPORT

A 2-year-old boy presented with a history of cough for 7-8 days, fever for 2-3 days, and fast breathing for one day. On examination, he was found to have severe respiratory distress. Auscultation revealed decreased breath sounds on the right side. Initial chest radiograph (CXR) showed evidence of pneumonia. Additionally, the patient exhibited pedal edema and was noted to have features consistent with severe acute malnutrition (SAM).

A detailed anthropometric examination was done. His weight was 7.0 kg, resulting in a weight-for-height Z-score of -3.1, confirming severe wasting but on the higher end of the SAM range. The mid-upper arm circumference (MUAC) was 11.1 cm, just below the 11.5 cm threshold for SAM. Additionally, the presence of bilateral pitting edema, a clinical sign of SAM, was noted. His height-for-age and weight-for-age Z-scores were also significantly low, further indicating chronic malnutrition.

Parameter	Measurement	Criteria for SAM
Height (cm)	85	-
Weight (kg)	7.0	Weight-for-height Z-score < -3 SD
Mid-Upper Arm Circumference (MUAC) (cm)	11.1	< 11.5 cm
Weight-for-Height Z-score	-3.1	< -3 SD
Height-for-Age Z-score	-3.2	-
Weight-for-Age Z-score	-3.5	-
Bilateral Pitting Edema	Present	Presence of bilateral pitting edema indicates SAM

Table 1:- Anthropometric measurement of the case.

Upon admission, the patient's laboratory investigations revealed a hemoglobin level of 3.5 g/dL and a positive C-reactive protein (CRP). Given the severe pallor and confirmed anemia, the patient received two blood transfusions. A chest X-Ray was done on the day of admission which showed presence of right parahilar pneumonitis changes. Despite initial antibiotic therapy, the patient's respiratory distress persisted, and a follow-up CXR was done on Day 3 of admission which showed inhomogenous opacities in right midzone and minimal blunting of right costophrenic angle s/o right sided pneumonitis and right minimal pleural effusion.

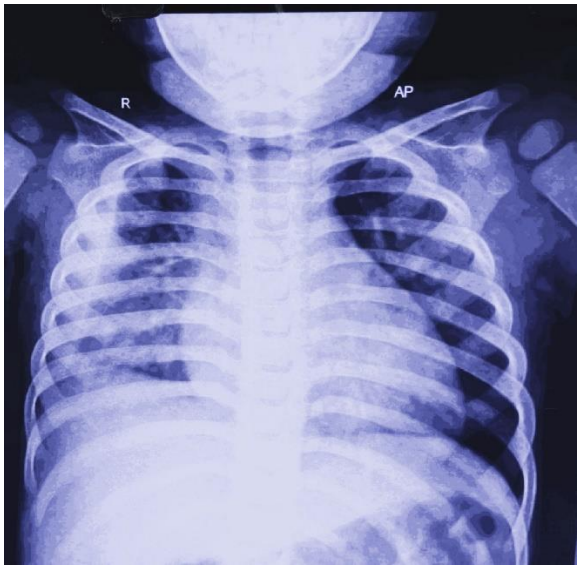

Figure 1: Chest X-Ray on admission showing inhomogenous opacities in right midzone and minimal blunting of right costophrenic angle s/o right sided pneumonitis and right effusion.

In view of progressive pneumonitis changes intravenous antibiotics were escalated to ceftriaxone (MONOCEF) and vancomycin. A diagnostic pleural tap performed on the 20th of May revealed a sterile effusion with AFB negative for TB NAAT, thus excluding tuberculosis. Consequently, the patient was continued on antibiotic therapy, received supportive care, and nutritional rehabilitation was initiated.

Over the following days, the patient's respiratory distress gradually improved with back-to-back nebulisations. His fever subsided, and his pedal edema resolved. SAM supplements were introduced to address his nutritional deficiencies, and his oral intake progressively improved.

Serial CXR assessments confirmed the resolution of the pleural effusion, and the patient's clinical condition stabilized. Chest physiotherapy was taught to the parents to support ongoing respiratory improvement. The patient was discharged in a stable condition, afebrile, with no respiratory distress, and demonstrating good oral intake. He was discharged with dietary advice and follow-up recommendations for continued nutritional rehabilitation and monitoring.

DISCUSSION

Severe acute malnutrition (SAM) coupled with severe anemia and pneumonia, as observed in this 2-year-old boy, presents a complex clinical challenge that needs a comprehensive management strategy. The coexistence of these conditions exacerbates the vulnerability of the affected child, leading to increased morbidity and potential mortality if not promptly addressed.

The pathophysiology of SAM and its impact on respiratory function is multifactorial. Malnutrition impairs immune function, leading to a diminished ability to mount an effective response to infections. This weakened immune state predisposes children to recurrent and severe infections, including pneumonia. Furthermore, the muscle wasting seen in SAM, including the respiratory muscles, contributes to decreased respiratory effort and capacity, further complicating the clinical course of pneumonia in these patients.[6]

In our case, the presence of severe anemia with a hemoglobin level of 3.5 g/dL further complicated the clinical picture. Anemia in SAM is often due to a combination of nutritional deficiencies, chronic infections, and inflammation, which together lead to impaired erythropoiesis and hemolysis. This condition not only diminishes the oxygen-carrying capacity of the blood but also exacerbates the body's response to infections, creating a vicious cycle of deteriorating health.[7]

Management of such cases requires a multidisciplinary approach. Initial stabilization with blood transfusions to address severe anemia was critical in this case. This step was essential in improving the oxygen-carrying capacity and overall physiological stability of the child, allowing for better management of the respiratory infection. The use of broad-spectrum antibiotics such as ceftriaxone and vancomycin due to persistent respiratory distress and radiological evidence of pneumonitis and pleural effusion, underscores the importance of aggressive infection control in these patients.[8]

Nutritional rehabilitation is a cornerstone in the management of SAM. In our patient, the introduction of therapeutic feeds and SAM supplements was crucial in addressing the nutritional deficiencies, promoting catch-up growth, and enhancing immune function. Nutritional rehabilitation not only supports recovery from the acute illness but also plays a pivotal role in preventing future episodes of malnutrition and associated infections.[9]

The resolution of the pleural effusion and improvement in respiratory status observed in our patient highlights the effectiveness of this integrated management approach. Continuous monitoring and supportive care, including chest physiotherapy and dietary advice, are vital components in the comprehensive care of children with SAM and severe respiratory infections.[10]

This case underscores the need for early diagnosis and appropriate interventions in children with SAM presenting with acute respiratory infections. The successful outcome in our patient emphasizes the importance of an early and aggressive treatment strategy that includes stabilization, aggressive infection control, and nutritional rehabilitation. Further studies and case reports are needed to establish standardized protocols for the management of similar cases and to improve the overall outcomes for children with SAM and severe complications.

CONCLUSION

Respiratory tract infections and anemia is fairly common in children with SAM. This case highlights the critical importance of early diagnosis and comprehensive management in children with severe acute malnutrition (SAM) presenting with severe anemia and pneumonia. The integrated approach, including initial stabilization with blood transfusions, aggressive infection control with broad-spectrum antibiotics, and nutritional rehabilitation, led to a successful outcome. The improvement in respiratory status and resolution of pleural effusion underscore the effectiveness of this strategy. Continuous monitoring and supportive care are vital in managing such complex cases.

Conflict of interest

None

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