**DELVING AUTOIMMUNE HEMOLYTIC ANEMIA IN TODDLER AND ASSOCIATED COMPLICATIONS: A RARE CASE REPORT**

**ABSTRACT**

Autoimmune hemolytic anemia (AIHA) refers to a rapid breakdown of red blood cells, leading to a decrease in hemoglobin and hematocrit levels. In pediatric patients, it is less a rare condition. A 03 year old male patient was admitted in a tertiary care hospital with complaints of fever since the last day morning, vomiting since previous day of 5 episodes, containing mostly mucus material, abdominal pain, decreased appetite for 2 days, yellowish discoloration of eyes and dark colored urine noted, and decreased urine output. History of travel to Dubai, ate cheese for the first time. The serology showed positive in Direct Coombs Test (DCT) with decrease in Hemoglobin, Hematocrit, MCH, MCHC with Blood Picture showed as features of Hemolytic Anemia. CRP, Bilirubin, AST, ALP, Serum LDH levels were increased. This confirmed Autoimmune Hemolyic Anemia associated with liver enzyme elevation potentially due to severe hemolysis, a rare condition with an estimated incidence of 0.2 per one million individuals younger than 20 years. Plan of care was primarily with IV corticosteroids, blood transfusion, folate supplements. Other supportive medications were also given. The condition improved during the course of time in hospital and was discharged with oral medications.

**KEYWORDS:** Direct Coombs Test (DCT), Autoimmune Hemolytic Anemia (AIHA), Liver Enzyme, hemolysis, corticosteroids

**INTRODUCTION**

Autoimmune Hemolytic Anemia (AIHA) is a rare but clinically significant disorder in which the immune system produces antibodies that target and destroy the body’s own red blood cells, leading to hemolysis and anemia. This condition is more common in adults but remains relatively rare in pediatric populations. AIHA can be classified into two main types: warm autoimmune hemolytic anemia (WAIHA), where antibodies react at body temperature, and cold agglutinin disease (CAD), where antibodies are active at colder temperatures. In children, AIHA can be primary (idiopathic) or secondary, often associated with infections, autoimmune diseases (such as systemic lupus erythematosus), or hematologic malignancies (e.g., lymphoma or leukemia) [1][2].

Pediatric AIHA often presents with clinical features such as pallor, jaundice, fatigue, and splenomegaly, and it can be triggered by viral infections like Epstein-Barr virus or Mycoplasma pneumoniae, or as part of an underlying autoimmune condition. Diagnosis is confirmed through laboratory tests, including a direct Coombs test, reticulocyte count, and peripheral blood smear, which show evidence of hemolysis and antibody-coated red blood cells [3][4].

The management of AIHA in children depends on the severity of the disease and may include corticosteroids, intravenous immunoglobulin (IVIg), or, in more refractory cases, rituximab, azathioprine, or splenectomy. Early diagnosis and treatment are essential to prevent severe anemia, hemolytic crises, and potential organ damage [5][6].

Although AIHA in children is uncommon, it remains an important condition to consider in the differential diagnosis of unexplained anemia. Further research into the pathophysiology and optimal management strategies for pediatric AIHA is needed to improve patient outcomes [7][8].

Autoimmune Hemolytic Anemia (AIHA) is considered a rare condition, particularly in pediatric populations. While the overall incidence of AIHA in children is not precisely established, it is generally estimated to account for less than 1% of all cases of anemia in children. The incidence rate for AIHA in children is thought to be around 0.1 to 0.2 cases per 100,000 children per year. This rarity is reflected in the overall low frequency of autoimmune-related hematologic disorders in pediatric populations compared to adults. Despite its rarity, AIHA is important to recognize because, in some cases, it can lead to significant morbidity or mortality if not promptly diagnosed and treated. The condition may be idiopathic or secondary to infections, malignancies, or autoimmune disorders, but its exact incidence is difficult to pinpoint because of its heterogeneous nature and the overlap with other causes of anemia in children

Here we are reporting a case of wrong dosage form and monitoring of DMARDs induced Abdominal Uterine Bleeding with endometrial polyp followed by severe anemia[9][10].

**CASE REPORT**

A03-year -old male patient was admitted to the Pediatrics department with complaints of fever, 5 episodes of vomiting with mucus content, yellowish discoloration of eyes and dark coloured urine noted on the day before admission.. Abdominal pain, decreased appetite for last 2 days.

The patient was conscious, and oriented with icterus, heart sounds were heard, the chest was clear, was able to move all limbs and was having abdominal distension. He was immunized upto age, well nourished and attained all milestones upto age. The weaning was at 1.5 years age. He was taken SYP. CEFIXIME 2 doses were taken on the last day from an outside clinic. History of travel to Dubai and eating cheese for the first time. The provisional diagnosis was food poison or cheese allergy. During admission, he had a Pulse Rate of 72 beats/min, Respiratory Rate of 20 breaths/min, and Blood Pressure of 120/80mmHg. His laboratory investigation showed an elevation in CRP (71.0, 71.0, 45.0 mg/L), Bilirubin (4.96 mgldL), AST (97 U/L), ALP (146 U/L), Serum LDH (1843 U/L) and the declined parameters were Hemoglobin (4.9, 7.0 g/dL), Hematocrit (50.1%), MCH (23.9 pg), MCHC (28.7 fL). Direct Coombs Test was positive. The blood picture showed features of hemolytic anemia. USG Abdomen showed borderline hepatomegaly. Based on these investigations, he was diagnosed as Autoimmune Hemolytic Anemia (AIHA).

Initially 20 PRBC were given to manage the severe anemia. To manage the autoimmune condition, IV Corticosteroids were given (INJ. METHYL PREDNISOLONE 40 mg IV OD ), then converted to oral form (T. PREDNISOLONE 10 mg P/O 1-1-1. To prevent the infection condition IV antibiotics were given (INJ. CEFOTAXIME SODIUM 100 mg, IV Q8H) and later converted to oral form (SYP. CEFIXIME 5 ml P/O BD). To prevent the gastric irritations H2 blockers were given (INJ. RANITIDINE 50 mg IV BD) and then converted to oral form (SYP. RANITIDINE 5 ml P/O BD). To improve the GI motility ( SYP. SUCRALFATE 5 ml P/O BD) was added. To manage the iron deficiency, (T. FOLIC ACID 5 mg P/O 0-1/2-0) was given. To prevent the thrombophlebitis condition, (THROMBOTAS OINTMENT L/A 1-0-1) were given. On the 9th day of admission, the patient was symptomatically stable and was discharged with T. PREDNISOLONE 10 mg P/O 1/2-1/2-1/2, T. FOLIC ACID 5 mg P/O 1/2-0-0, SYP. RANITIDINE 5 ml P/O 1-0-1.

**DISCUSSION**

Autoimmune Hemolytic Anemia (AIHA) is a rare but potentially serious hematologic condition in pediatric patients, characterized by the immune system producing antibodies that attack the body's red blood cells, leading to their premature destruction and resulting in anemia. The prevalence in individuals under 20 years is approximately 0.2 per million, making it a rare clinical finding in this age group. AIHA may present acutely or insidiously, with symptoms including pallor, fatigue, jaundice, dark urine, hepatosplenomegaly, and in severe cases, cardiovascular compromise. In this rare case, the child presented with complications such as severe anemia, hyperbilirubinemia, borderline hepatomegaly, and thrombophlebitis, highlighting the aggressive nature of the disease. Diagnosis is primarily based on clinical features, and laboratory findings including a positive direct antiglobulin (Coombs) test, and supportive markers of hemolysis such as elevated LDH, indirect bilirubin, and reticulocytosis. Management typically involves corticosteroids as first-line therapy, with immunosuppressants or IVIg used in refractory cases; blood transfusions may be required for acute anemia, though cross-matching can be challenging due to autoantibodies. Prognosis depends largely on the underlying cause and the patient’s response to therapy, with early diagnosis and intervention being crucial to avoid long-term complications like chronic anemia, iron overload, organ damage, or thromboembolic events. Regular follow-up is essential for monitoring disease activity, therapy response, and early detection of relapses or complications, ensuring optimal long-term outcomes for affected children. [11, 12]

**CONCLUSION**

This rare case of autoimmune hemolytic anemia (AIHA) in a pediatric patient highlights the importance of a comprehensive approach to diagnosis and management, particularly when secondary causes are suspected. First-line treatment with corticosteroids was initiated, with close monitoring for any signs of hemolytic crises or complications. Given the patient’s response to therapy, the prognosis remains favorable, though ongoing follow-up is necessary to ensure complete recovery. This case emphasizes that while AIHA is rare in children, it should be considered in the differential diagnosis of unexplained anemia, especially when accompanied by jaundice, splenomegaly, or a recent viral infection. Early diagnosis and appropriate management are crucial for preventing complications and improving outcomes.

Ethical Approval:

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

**Consent**

**As per international standards, parental written consent has been collected and preserved by the author(s).**

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Details of the AI usage are given below:

1.

2.

3.

**REFERNCE**

1. Sankaran, J., Rodriguez, V., Jacob, E. K., Kreuter, J. D., & Go, R. S. (2016). Autoimmune hemolytic anemia in children: Mayo Clinic experience. Journal of pediatric hematology/oncology, 38(3), e120-e124.
2. Motta, I., Giannotta, J., Ferraresi, M., Barbullushi, K., Revelli, N., Graziadei, G., ... & Fattizzo, B. (2021). Autoimmune hemolytic anemia as a complication of congenital anemias. a case series and review of the literature. Journal of Clinical Medicine, 10(15), 3439.
3. Voulgaridou, A., & Kalfa, T. A. (2021). Autoimmune hemolytic anemia in the pediatric setting. Journal of clinical medicine, 10(2), 216.
4. Zuelzer, W. W., Mastrangelo, R., Stulberg, C. S., Poulik, M. D., Page, R. H., & Thompson, R. I. (1970). Autoimmune hemolytic anemia: Natural history and viral-immunologic interactions in childhood. The American journal of medicine, 49(1), 80-93.
5. Habibi, B., Homberg, J. C., Schaison, G., & Salmon, C. (1974). Autoimmune hemolytic anemia in children: a review of 80 cases. The American journal of medicine, 56(1), 61-69.
6. Fattizzo, B., & Barcellini, W. (2022). Autoimmune hemolytic anemia: causes and consequences. Expert review of clinical immunology, 18(7), 731-745.
7. Fattizzo, B., & Barcellini, W. (2022). Autoimmune hemolytic anemia: causes and consequences. Expert review of clinical immunology, 18(7), 731-745.
8. Shah, S., & Padrnos, L. (2022). Complications of autoimmune hemolytic anemia. Hematology/Oncology Clinics, 36(2), 353-363.
9. Aladjidi, N., Leverger, G., Leblanc, T., Picat, M. Q., Michel, G., Bertrand, Y., ... & Perel, Y. (2011). New insights into childhood autoimmune hemolytic anemia: a French national observational study of 265 children. haematologica, 96(5), 655.
10. Liebman, H. A., & Weitz, I. C. (2017). Autoimmune hemolytic anemia. Medical Clinics, 101(2), 351-359.
11. Michalak, S. S., Olewicz-Gawlik, A., Rupa-Matysek, J., Wolny-Rokicka, E., Nowakowska, E., & Gil, L. (2020). Autoimmune hemolytic anemia: current knowledge and perspectives. Immunity & Ageing, 17, 1-16.
12. Zecca, M., Nobili, B., Ramenghi, U., Perrotta, S., Amendola, G., Rosito, P., ... & Locatelli, F. (2003). Rituximab for the treatment of refractory autoimmune hemolytic anemia in children. Blood, The Journal of the American Society of Hematology, 101(10), 3857-3861.