Case Report

A Rare Case of CDA Type 2 in a Young Female Child

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Abstract

Background: Congenital dyserythropoietic anemia (CDA) type II is a rare inherited disorder caused by mutations in the SEC23B gene and characterized by ineffective erythropoiesis and chronic hemolytic anemia. A 13-year-old female born of a second-degree consanguineous marriage presented with recurrent jaundice, abdominal pain, and transfusion-dependent anemia since infancy. She had a history of neonatal jaundice and was previously treated as a case of nutritional anemia without definitive evaluation. Examination revealed pallor, icterus, hepatosplenomegaly, and facies suggestive of chronic hemolysis. Laboratory findings showed severe anemia, indirect hyperbilirubinemia, hemolysis, and iron overload, while hemoglobin electrophoresis excluded hemoglobinopathies. Clinical exome sequencing identified a homozygous missense mutation in the SEC23B gene (c.880G>T; p.Gly294Cys), confirming CDA type II. The patient was managed with antibiotics, vitamin B12 supplementation, and PRBC transfusions, followed by regular transfusion support with symptomatic improvement. This case emphasizes the importance of early genetic testing in chronic hemolytic anemia for timely diagnosis and appropriate management.

Keywords: Anemia, blood transfusion, hemolysis, hepatosplenomegaly, iron overload.

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Introduction

Congenital dyserythropoietic anemia (CDA) is a rare inherited disorder of red blood cells. They are hyperproliferative anemias characterized by dyserythropoiesis, ineffective erythropoiesis, and hemolysis.[1]

There are a total of 6 subtypes, where CDA type 1, 2 and 3 are the classical types, with CDA type 2 being the commonest. The classification of CDA rests on the genetic mutation. CDAN1 is responsible for 90% of cases of CDA type I; SEC23B are responsible for CDA type 2, and KIF23 gene mutations are responsible for CDA type 3, along with GATA1 mutations.[2]

CDA usually presents in early childhood, adolescence or adulthood.[1] The classical clinical features are related to anemia with subsequent development of hepatosplenomegaly or jaundice. Diagnosis remains a concern since the classical clinical features are mild, and with close diagnostic differential with other types of nutritional anemia and anemia of chronic disease.[1,2]

The importance of reporting this case rests on the rarity of CDA, where the overall prevalence of CDA type 2 is less than 1 case per million.[2] Literature reports limited case reports and case series on CDA type 2 with varied presentations and age groups.[3-9]

We present a case of a 13-year-old female who was diagnosed with CDA type 2 on genetic studies.

Clinical description

A 13-year-old female child, first born to parents of a second-degree consanguineous marriage, with a documented history of neonatal jaundice, presented with complaints of jaundice, left upper quadrant abdominal pain, and headache for one week prior to admission. There was no preceding history of fever, rash, or drug intake.

Past history suggested that the child had neonatal jaundice at birth and signs of hemolysis. Given the strong family history, a hemolytic etiology was later suspected, particularly enzyme deficiencies or red cell membrane defects – but a confirmation was not done. From 2 months of age until 8 years, she required two blood transfusions per year. Over time, the transfusion requirement gradually increased to 3–4 per year and subsequently to 5–6 per year. At present, she required 6–7 transfusions annually, indicating progressive transfusion dependence.

Presently, the child had recurrent episodes of jaundice and abdominal pain since 5 months of age. On examination, the child appeared chronically ill with grade 3 pallor and visible icterus. Facial features were suggestive of hemolytic anemia, including frontal bossing, maxillary hypertrophy, and a depressed nasal bridge. Scleral icterus was present.

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Per abdominal examination revealed hepatomegaly (liver span ~14–15 cm, [Figure 1]) with a firm, nodular surface and marked splenomegaly, along with tenderness in the left upper quadrant.

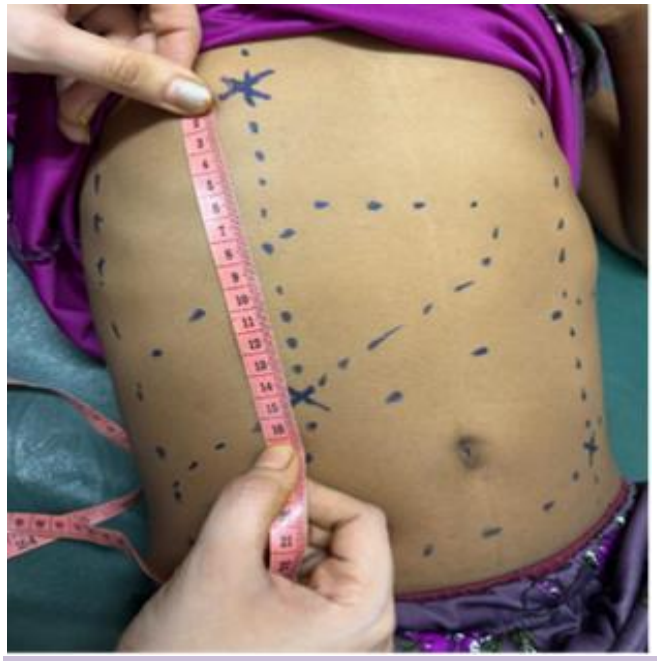

Figure 1: Increased Liver span

Cardiovascular examination showed normal S1 and S2 with an ejection systolic murmur at the lower left sternal border. Respiratory and central nervous system examinations were unremarkable.

Laboratory evaluation revealed severe anemia with features suggestive of ineffective erythropoiesis and hemolysis. Peripheral smear showed anisopoikilocytosis with occasional spherocytes. Liver function tests demonstrated indirect hyperbilirubinemia with near-normal transaminases. Serum ferritin was elevated, consistent with iron overload secondary to repeated transfusions.

Hemoglobin electrophoresis showed no elevation of hemoglobin F or other abnormal hemoglobin patterns, and did not reveal a primary hemoglobinopathy. Direct and indirect coombs test were negative. Genetic testing by clinical exome sequencing identified an autosomal recessive homozygous missense mutation in the SEC23B gene. The identified homozygous missense variant (c.880G>T; p.Gly294Cys) was classified as a Variant of Uncertain Significance (VUS). The investigative findings are shown in [Table 1].

Bone marrow aspirate was done which showed erythroid hyperplasia with multinucleate erythroblasts [Figure 2].

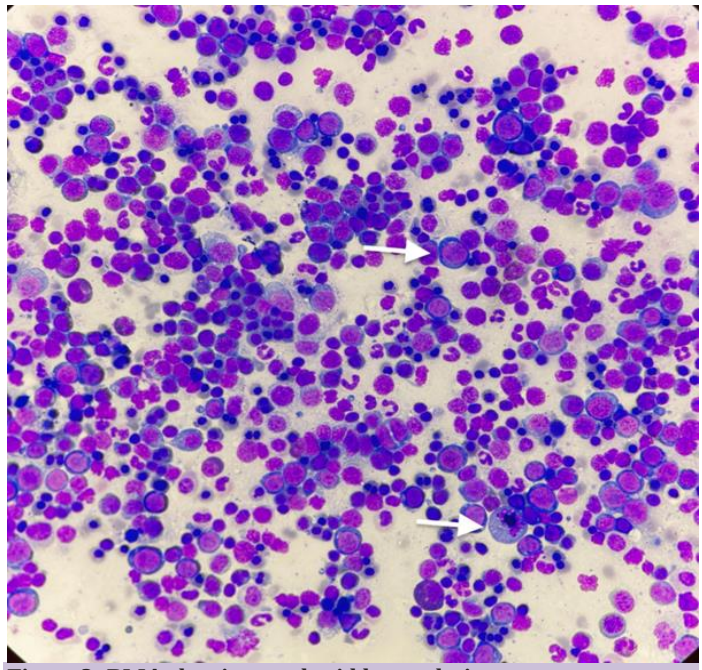

Figure 2: BMA showing erythroid hyperplasia.

Table 1: Summary of Investigations

Investigation	Result
Hemoglobin	3.9 g/dL
RBC count	2.55 million/mm³
PCV	33.32%
MCV	72 fL
MCH	24 pg
RDW	20.16%
Peripheral smear	Microcytic hypochromic RBCs with spherocytes
Reticulocyte count	2.3%
Total bilirubin	5.6 mg/dL
Direct bilirubin	1.1 mg/dL
SGOT / SGPT	42 / 32 U/L
Serum ferritin	364 ng/mL
Hb electrophoresis	Hb A 95.3%, Hb F 1.9%, Hb A2 2.8%
BMA	Erythroid hyperplasia
Genetic testing	SEC23B homozygous c.880G>T (p.Gly294Cys)

Differential diagnosis: The differential diagnosis encompasses a variety of inherited and acquired disorders, including megaloblastic and sideroblastic anemias, β-thalassemia, myelodysplastic syndromes, hemoglobinopathies, Diamond–Blackfan anemia, Fanconi anemia, hereditary spherocytosis, and pyruvate kinase deficiency. Other hemolytic conditions to be considered are paroxysmal nocturnal hemoglobinuria, glucose-6-phosphate dehydrogenase deficiency–associated non-spherocytic hemolytic anemia, and autoimmune hemolytic anemia, as well as disorders

characterised by ineffective erythropoiesis such as thalassemia syndromes.[7]

Final diagnosis: Given the autosomal recessive inheritance pattern, consanguinity, chronic hemolytic anemia, hepatosplenomegaly, transfusion dependence, and laboratory findings of ineffective erythropoiesis, with bone marrow aspirate showing erythroid hyperplasia and multinucleate erythroblasts, a final diagnosis of Congenital Dyserythropoietic Anemia type II was made.

Management and Outcomes: The patient was managed with antibiotics (Ceftriaxone 1g i.v. bd and vitamin B12 100 mg i.v. od followed with Packed RBC transfusions, and was discharged. The patient was frequently managed with regular blood transfusions and progressed well.

Discussion

CDA remains a rare hematological disorder seen in young children with a close differential diagnosis with other hemolytic disorders. We examined and report here a case of 13-year-old female who was finally diagnosed with CDA type II. Barring few case reports, CDA has not been much reported before and holds a complex list of differentials with ongoing blood transfusions. The rarity of the case, the misdiagnosis and management in the initial years as nutritional anemia and the choice of the non-invasive genetic testing by the patient (rather than bone marrow aspirate diagnosis) makes the case interesting.

The age group among previous case reports of CDA type II has varied from 2 years to 38 years, depending on the age of diagnosis.[2-8] The gender distribution has shown an equivalent distribution between male and female patients.[2-8] Genetic disorders hold a strong association with consanguineous marriages as was seen in our case. Consanguineous marriage increases the likelihood that both parents carry identical recessive mutations, raising the risk of autosomal recessive disorders. Reduced genetic diversity in such populations also promotes expression of deleterious genes, with broader health implications beyond single-gene diseases.[10]

CDA type II remains a mild disorder as compared to CDA type I and type III. Many affected individuals experience only minimal symptoms, with approximately one in ten remaining asymptomatic, while around one fifth require regular transfusion support.[11]

The clinical features are generalized (hemolysis and anemia): mild to severe symptoms ranging from anemia, jaundice, and sometimes iron overload and hydrops fetalis in severe cases. It remains of diagnostic concern since the severity of hemolysis goes on increasing with age and so does the requirement of blood transfusion, which carries its own side effects of iron overload. The severity of iron accumulation is primarily driven by expanded erythropoiesis and tends to worsen progressively over time. While some individuals experience only nonspecific symptoms such as fatigue, others may develop serious complications, including hepatic cirrhosis and portal hypertension, as a consequence of secondary iron excess. In addition, iron deposition within the hypothalamic region can disrupt endocrine function, leading to hypogonadism.[6,12]

The present case showed symptoms from birth, that is, neonatal jaundice with progressive need for transfusions. Similar findings were reported by Sharma T et al,[3] who described a 2-year-old male with CDA type II and a history of physiological jaundice at 16 hours of life, supporting the concept of early hemolysis in affected neonates. In contrast, Korubo et al,[9] reported 6-year-old girl with CDA type II who had persistent jaundice but no history of neonatal jaundice. This discrepancy may be due to variation in disease severity, differences in erythropoietic stress at birth, delayed clinical recognition, or underreporting of neonatal symptoms, as mild early jaundice may have gone unnoticed or resolved spontaneously without medical evaluation.

Diagnosis and management remains the key to a better outcome. In our case, a wide array of diagnostic investigations was performed, and the patient was managed as having nutritional anemia for a prolonged period. The definitive diagnosis was eventually established only after bone marrow aspirate analysia, and gold-standard genetic analysis, which revealed a homozygous missense mutation in the SEC23B gene. BMA was consistent with CDA as it showed erythroid hyperplasia and multinucleate erythroblasts.

These findings are consistent with previously published literature emphasizing the pivotal role of molecular diagnostics. Shemawat S et al,[5] reported a 30-year-old female with CDA type II in whom hereditary hemolytic anemia gene analysis revealed a homozygous missense mutation in the SEC23B gene on chromosome 20, closely mirroring our results. Similarly, Sharma T et al,[3] described a 2-year-old male in whom whole exome sequencing detected a SEC23B (NM_006363.6) gene mutation in exon 10, confirming the diagnosis. Christoforidou A et al[7] also demonstrated a homozygous missense mutation in exon 4 of the SEC23B gene through direct sequencing in a 26-year-old female.

Our case, after identification, was adequately managed and patient was showing good signs of survival period of time with lesser blood transfusions. Overall, management of the patients is largely supportive and includes treating symptoms, providing appropriate nutritional support, administering blood transfusions when indicated, and ensuring close follow-up with regular assessment of hemoglobin levels and iron burden. In individuals who become transfusion-dependent, more definitive interventions such as hematopoietic stem cell transplantation or splenectomy may be considered.

This outcome aligns with previously reported cases of CDA type II, where early diagnosis and structured follow-up contributed to stable clinical courses. Christoforidou A et al,[7] described a 26-year-old female diagnosed at the 6th week of gestation, with progression without complications. Hassan et al,[1] also managed with a multidisciplinary approach involving regular blood transfusions, genetic counseling, and monitoring for iron overload, with consideration of definitive surgical interventions. Shemawat et al,[5] reported a 30-year-old female with delayed diagnosis of CDA type II who was managed solely with regular blood transfusions and remained well until last follow-up, suggesting that even late-diagnosed cases can achieve stability, however with higher transfusion dependence. Similarly, Sharma T et al,[5] noted a hemodynamically stable patient under regular follow-up with transfusions as required.

Limitations: This single case report has inherent limitations, including limited generalizability due to the small sample size. Long-term follow-up was inadequate to evaluate disease progression, transfusion dependence, iron overload, and survival outcomes. Advanced diagnostic tools such as bone marrow microscopy were not utilized. Parental segregation studies were not done to confirm carrier status.

Conclusion

This case highlights a classical clinical presentation of CDA II with severe transfusion-dependent anemia and secondary iron overload. Although the identified SEC23B variant is currently classified as a VUS, the strong clinicogenetic correlation supports its pathogenic role in this patient.

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Conflicts of interest

There are no conflicts of interest.

References

1. Hassan M, Mirza AA, Zaidi R, Malik M, Javaid M. Congenital dyserythropoietic anemia type II: a case report. Cureus 2022;14(8):e27933.
2. Dass J, Nayak AR, Puri V, Aggarwal M. Congenital dyserythropoietic anemia in children: Case series with review of literature. Pediatr Hematol Oncol J 2024;9:55-61.
3. Sharma T, Vaswani S, Barman D, Didel S, Purohit A. Congenital dyserythropoietic anemia type II-A rare case report. Indian J Pathol Microbiol 2025;68(2):435-7.
4. Rahman S. A case report of rare disease from Bangladesh: congenital dyserythropoietic anemia (CDA) type 2, with thrombocytopenia. J Blood Disord Treat 2023;6(1):1-4.
5. Shemawat S, Bansal S, Mathur A, Mittal A, Sharma M. Congenital dyserythropoietic anemia type II with myelofibrosis in an adult patient: a report of a rare case with a brief review. Cureus 2024;16(4):e58515.
6. Akpan IJ, Bogyo K, Leeman-Neill RJ, Wattacheril J, Francis RO. Congenital dyserythropoietic anemia type II and ineffective erythropoiesis: challenges in diagnosis and management. Front Hematol 2024;3:1389820.
7. Christoforidou A, Fasoulakis Z, Kontomanolis EN. Diagnosis and management of congenital dyserythropoietic anemia type ii in a secundigravida. Cureus 2017;9(10):e1811.
8. Shah VN, Mehta MN, Santwani PM. A rare suspected case of congenital dyserythropoietic anemia type II. JCDR 2008;2(2):757-9.
9. Korubo KI, West BA. Congenital dyserythropoietic anemia: case report of a rare blood disorder in a Nigerian child. Blood 2014;124(21):4879.
10. Khayat AM, Alshareef BG, Alharbi SF, AlZahrani MM, Alshangity BA, Tashkandi NF. Consanguineous marriage and its association with genetic disorders in Saudi Arabia: a review. Cureus 2024;16(2):e53888.
11. Iolascon A, Andolfo I, Russo R. Congenital dyserythropoietic anemias. Blood 2020;136(11):1274-83.
12. Delicou S, Moraki M, Papatheodorou E, Xydaki A. Treatment options for congenital dyserythropoietic anemias (CDAs): advances in bone marrow transplantation, gene therapy, and targeted therapies. J Hematol Clin Res 2024;8:27–33.