International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Rajmane SH et al. Int J Reprod Contracept Obstet Gynecol. 2024 Jul;13(7):1845-1847
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20241786

Case Report

A rare case of congenital methemoglobinemia in pregnancy

Shantanu H. Rajmane*, Mamta Neelesh Anand, J. B. Senapati

Department of Obstetrics and Gynecology, Rajiv Gandhi Medical College, Thane, Maharashtra, India

Received: 26 April 2024
Accepted: 30 May 2024

***Correspondence:**
Dr. Shantanu H. Rajmane,
E-mail: rajmaneshantanu@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

When iron in haemoglobin is replaced from Fe+2 (ferrous) to Fe+3 (ferric), it leads to formation of methemoglobin. Normal levels of methemoglobin are <1%. This is maintained by redox balance between activity of NADH methemoglobin reductase enzyme and amount of oxidised hemoglobin. When levels of methemoglobin are increased, it leads to methemoglobinemia. Methemoglobin has less affinity to bind to oxygen & results in left shift of oxygen–hemoglobin dissociation curve. As most of the cases of congenital methemoglobinemia are asymptomatic, it is often diagnosed first time during pregnancy. Here we report a case, Primigravida with 38 weeks of gestation posted for emergency LSCS i/v/o meconium-stained liquor, who had SPO2 of 84%, was clinically asymptomatic, vitally stable and with ABG, CXR, ECG and 2DECHO normal. Efforts to find out the cause of reduced oxygen saturation led to diagnosis of rare hemoglobinopathy, methemoglobinemia.

Keywords: Methemoglobinemia, Pregnancy, Outcome, Congenital, Acquired

INTRODUCTION

Methemoglobin, is a dyshemoglobin which has decreased affinity to bind to oxygen. The literature related to methemoglobinemia is sparse.[1] Orphanet has put it in the list of rare diseases.[2] Oxidative stress in patients with methemoglobinemia leads to excess production of free radicals that causes damage to cellular membranes and DNA.[3] It is of two types- congenital and acquired.[3]

Congenital type is rare as compared to acquired. Congenital methemoglobinemia occurs due to deficiency of NADH methemoglobin reductase enzyme.[3] It is inherited as autosomal recessive.[4] It has two clinical subtypes, Type 1 - in which, there is only cyanosis and Type 2 - which has severe neurological manifestations with cyanosis.[5] Acquired methemoglobinemia occurs due to exposure to oxidizing drugs like acetaminophen, anti-convulsant, nitrofurantoin, nitrites, anti-malarial drugs and nitrates from contaminated water.[6]

CASE REPORT

A 23-year-old Primigravida with 38 weeks of gestation registered and immunised at private hospital, was admitted in RGMC with complaints of pain in abdomen. She was prepared for emergency LSCS i/v/o meconium-stained labour. On OT table, her SPO2 was 84% on multipara monitor. After removing all artifacts and administration of oxygen, saturation did not improve. Patient was vitally stable and clinically asymptomatic, despite low oxygen saturation. So, after obtaining a high-risk consent, patient underwent emergency LSCS.

LSCS was done under general anaesthesia with help of fentanyl, thiopentone, succinyl choline. General anaesthesia was maintained by using sevoflurane and succinyl choline. LSCS was uneventful, but due to reduced oxygen saturation it became a high-risk case and was shifted to ICU post-operatively and kept on ventilatory support.

Figure 1: Dark coloured blood.

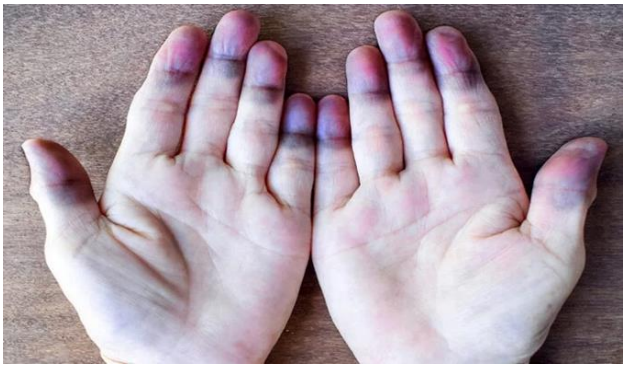

Figure 2: Peripheral cyanosis.

Urgent physician opinion was taken. ABG showed PaO2 of 94% mmHg, PaCO2 of 32% mmHg, HCO3- of 24 mEq/l and pH of 7.42. CXR was done, it was normal. ECG showed sinus rhythm. 2DECHO showed LVEF of 60% and rest normal. All investigations turned out to be normal, which led to suspicion of hemoglobinopathy. The only significant finding during LSCS was, blood was darker coloured than normal and patient had peripheral cyanosis.

Haematologist opinion was sought and serum methemoglobin levels were sent, it came out to be 9% (Normal <1%). So, diagnosis of congenital methemoglobinemia was made. This was treated with tablet Vitamin C BD for 2-3 months. Ventilatory support was gradually weaned off and patient was extubated on day 3.

Being genetic, newborn was also screened, result came out to be negative. Patient had good post-operative recovery; saturation was in the range of 82-85% on room air. Patient was vitally stable, clinically asymptomatic and was discharged on D10. On follow-up, Sr. methemoglobin levels were 8%.

DISCUSSION

Normally small amount of hemoglobin is oxidised continuously, which leads to formation of methemoglobin. It is converted back to hemoglobin via NADH methemoglobin reductase enzyme. Deficiency of this enzyme leads to congenital methemoglobinemia.[7] In acquired methemoglobinemia, patient develops methemoglobinemia after exposure to oxidant drugs like acetaminophen, anti-malarial drugs, nitrites, dapsone etc. in which, rate of oxidation of hemoglobin is exceeds rate of reduction by NADH methemoglobin reductase.[8]

Methemoglobinemia leads to hypoxia which leads to uteroplacental insufficiency. This leads to increased risk of anemia, threatened abortion, oligohydramnios, intra-uterine growth retardation (IUGR), preterm labour, preeclampsia and abruption.[9]

Clinical features of methemoglobinemia depends upon percentage of methemoglobin in blood.10 Concentration <3% produces no symptoms, 3-5% concentration is associated with greyish skin colour, 5-15% concentration causes cyanosis and dark coloured blood, concentration of 15-30% is associated with headache, fatigue, dyspnoea, dizziness and syncope.[10] Higher concentration of 30-50% results in tachypnoea, metabolic acidosis, cardiac arrythmias, seizure and coma.[10,11]

Mild cases are treated with tablet Vitamin C, two times a day for 2-3 months. It is a reducing agent which causes decrease in amount of methemoglobin.[10] Moderate to severe cases are treated with injection methylene blue 1 mg/kg in 500 ml NS transfused over 30 mins.[10] It acts by activating NADH methemoglobin reductase enzyme, which causes reduction of methylene blue to methylene leucoblue, which results in non-enzymatic transformation of methemoglobin to normal hemoglobin.[10] Cases with Glucose 6 phosphate deficiency where methylene blue is contra-indicated and in resistant cases, treatment options include hyperbaric oxygen and exchange transfusion.[10]

A case report by Kelkar VP illustrated primigravida with congenital methemoglobinemia (Methemoglobin -19.5%) was managed with vitamin C and oxygen therapy, underwent LSCS, had good post-operative recovery.[7]

A case report by Verma S illustrated that a gravida 2 patient posted for LSCS had decreased oxygen saturation (66-70%) on OT table, later diagnosed as methemoglobinemia, required no treatment was required as she was totally asymptomatic.[3] Patient underwent LSCS, had post-operative recovery.

A case report by Dudhe M illustrated primigravida with k/c/o of methemoglobinemia underwent LSCS i/v/o early signs of abruption and fetal distress, after administration of injection methylene blue as methemoglobin levels were 44%. She had good post-operative recovery.[10]

Pregnancy is a stressful event, due to which levels of methemoglobin rises during pregnancy. It is often diagnosed first time during pregnancy, because most of the cases are asymptomatic and patient becomes symptomatic

when methemoglobin levels becomes more than 30% in blood.

CONCLUSION

Any patient with decreased oxygen saturation and cyanosis who is vitally stable and clinically asymptomatic, if cardiac workup is normal, suspicion of methemoglobinemia should be always kept in mind. For optimum management, clinical features, Sr. methemoglobin levels, maternal wellbeing, foetal wellbeing and mode of delivery should be taken into account.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the faculties and other staff members of the Department of OBGY, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj hospital, Thane in their respective assistance in preparing this manuscript.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Palaniappan S, Goon JA, Choor CK, Congenital Methemoglobinemia in Pregnancy. Research Updates in Medical Sciences. 2013;1(2):30-2.
2. Orphanet Report Series list of rare diseases and synonyms listed in alphabetical order, ORPHA number: 621, Hereditary methemoglobinemia, May 2015. Available at: http://www.orpha.net/. Accessed on 17 December 2023.
3. Verma S, Sachdeva P, Gandhi G. 'Rare Case of Methemoglobinemia Complicating Pregnancy. Case Reports in Obstetrics and Gynaecology. 2016;2016:Article ID 9740403.
4. Warang PP, Kedar PS, Shanmukaiah C, Ghosh K, Colah RB. Clinical spectrum and molecular basis of recessive congenital methemoglobinemia in India," Clinical Genetics. 2014;87(1):62-7.
5. Ewenczyk C, Leroux A, Roubergue A. Recessive hereditary methaemoglobinaemia, type II: delineation of the clinical spectrum. Brain. 2008;131(3):760-71.
6. Londhey V, Khadilkar K, Gad J, Chawla B, Asgaonkar D. Congenital methemoglobinemia: a rare cause of cyanosis in an adult patient, The Journal of the Association of Physicians of India. 2014;62(3):269-71.
7. Kelkar VP, Nayak PP. Peri operative Management of a Patient with Methaemoglobinaemia Posted for Caesarean Section. Obs Rev: J Obstet Gynecol. 2015;1(1):27-9.
8. Paczek A, Wawrzynska L, Mendek-Czaikowska E, Kober J, Torbicki A. Acquired Methemoglobinemia – Case report. Pneumonol Alergol Pol. 2010;78(2):153-8.
9. Mohorovic L. The role of methemoglobinemia in early and late complicated pregnancy. Medical Hypothesis. 2007;68(5):1114-9.
10. Dudhe M, Khadkikar R, Saxena N, Chauhan AR. Pregnancy In A Case Of Methemoglobinemia -A Rarity. JPGO. 2015;2:1.
11. Nascimento TS, Pereira ROL and Mello HLD, Costa J. Methemoglobinemia: from Diagnosis to Treatment. The Internet Journal of Obstetrics and Gynecology. 2008;58(6):651-64.

Cite this article as: Rajmane SH, Anand MN, Senapati JB. A rare case of congenital methemoglobinemia in pregnancy. Int J Reprod Contracept Obstet Gynecol 2024;13:1845-7.