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Hypersensitive reaction due to ferric carboxymaltose in a post-partum mother experienced in a tertiary care hospital in West Bengal, India: A case report

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Abstract

Iron deficiency anaemia (IDA) is highly associated with insufficient nutrition, chronic renal failure and congestive heart failure. Post-partum anaemia is also very common with a high mortality rate. Ferric carboxymaltose (FCM) is a non-dextran third-generation intravenous (IV)-iron preparation. FCM is an effective means of correcting IDA and improving haemoglobin (Hb) concentration in IDA. Incidence of IDA is common in low socio-economic groups. Clinical research has shown that the risk of hypersensitivity reaction (HSR) with FCM is low. An 18-year-old female has faced post-partum anaemia. IDA is most common due to low socio-economic status. Day 1 of post-partam period, Hb was 6.5 g/dl. One unit of packed red blood cell has been transfused. The next day, the Hb was 7.1, so, IV FCM was advised. The patient had faced a serious HSR. Sudden respiratory distress occurred and chest congestion was present. SpO_2 had dropped to 85%. The case was primarily managed with Injection (Inj) Adrenaline, Inj Hydrocortisone, Inj Promethazine, oxygen and nebulization. In this case report, we are reporting a case of severe HSR due to administration of IV FCM in a post-partum mother. It should be kept in mind that severe HSR can be seen due to IV FCM infusion. During the infusion, proper monitoring is important. FCM should be advised in a well-equipped setup where proper infrastructure and protocols are present to combat the HSR.

Keywords

Hypersensitive reaction, ferric carboxymaltose, iron deficiency anaemia, post-partum mother

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Introduction

Iron plays a key role in oxygen delivery, electron transport and enzymatic actions.[1] Iron deficiency anaemia (IDA) is highly associated with insufficient nutrition, chronic renal failure and congestive heart failure. Anaemia during pregnancy is a key factor in maternal mortality.[2] Post-partum anaemia is also very common with a high mortality rate. The definition of post-partum anaemia is haemoglobin (Hb) level <11 g/dl at 1 week of post-partum and <12 g/dl in 8 weeks of post-partum.[3] Anaemia during pregnancy is defined by the World Health Organization as Hb level <11 g/dl (any gestational age).[4] In pregnant women, mild anaemia is defined as Hb level 10–10.9 g/dl, moderate anaemia is defined as 7–9.9 g/dl and severe anaemia is defined as below 7 g/dl.[4] The definition of anaemia during pregnancy, according to the Centers for Disease Control and Prevention (CDC), is Hb level <11 g/dl (first to third trimester) or <10.5 g/dl (second trimester).[5] As per Kanu et al., 'The prevalence of anemia was calculated overall and by race and ethnicity, agency, and trimester'.[6]

In India, the major cause of IDA in pregnant women is insufficient nutrition due to low socio-economic background. As per, the National Family Health Survey, the incidence rate of anaemia (Hb < 11g/dl) in West Bengal is 54.3% in

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urban and 53.3% in rural areas and the incidence rate in all women is 58.3% in urban and 64.4% in rural areas.[7] So, the incidence rate is very high, more than 50% of women.

Ferric carboxymaltose (FCM) is a non-dextran third-generation intravenous (IV)-iron preparation. It increases the Hb level and restores iron towards a normal limit over a short period of time.[8] As per literature, FCM is a safe drug. A West Bengal-based study has mentioned that during the 10 months period of the trial, no case of hypersensitivity reaction (HSR) or anaphylactic reaction had been noted.[9] Arici et al. have noted that clinical research has shown that the risk of HSR with FCM is low.[10] Death rate due to HSR is also very low. We are here presenting a case of an 18-year-old post-partum female who faced a serious hypersensitive reaction after administering IV FCM in diluted state.

Case report

An 18 years old female who had no history of diabetes, hypertension, chronic renal failure or chronic heart disease. She has no history of thalassemia. The female had delivered a baby girl through normal vaginal delivery at 10.51 am on 28 May 2024. The patient has no history of Pregnancy Induced Hypertension and the blood pressure (BP) was within normal limits. On 27 May 2024 her white blood cell (WBC) count was 15.64×10^3/µl and her Hb was 8.4 g/dl. Day 1 of post-partum (29 May 2024), WBC count was 20.25×10^3/µl and Hb was 6.5 g/dl. Piperacillin-Tazobactam and Linezolid had been advised due to high WBC count and C-reactive protein (134). One-unit packed red blood cell was transfused. On 30 May 2024, patient got a fever of 101°F. Fever management was done and after that patient had no fever. The next day, Hb came as 7.1 g/dl, so Injection (Inj) IV FCM was advised in diluted state (diluted in normal saline (NS)). A 500 ml NS had been given to the patient at 122 drops/min. After infusion of 250 ml, 1000 mg of FCM is diluted in remaining 250 ml and infused for 30 min. First 10 min was slow and no HSR was recorded at that time. After infusion, 50 ml NS had been infused for 6 min. After infusion, the patient was observed for 30 min and no HSR was recorded at that time. The infusion had been given as per the Govt of West Bengal Guidelines.[11]

After 3 hours, suddenly hypersensitive reaction occurred. Sudden respiratory distress occurred and chest congestion was present. SpO_2 had dropped to 85%. Patient had been put on oxygen with non-rebreather mask (NRBM). Inj Epinephrine (Adrenaline; 0.5 mg of 1 mg/ml; 1:1000) was given in intramuscular in the anterolateral part of thigh. Inj Hydrocortisone (1 vial) and Inj Promethazine (1 ampule) had been administered. Nebulization had been given. After this patient's SpO_2 increased to 99% with O_2. BP raised to 160/90. For hypertensive management, 1 tablet of amlodipine 10 had been given as a stat dose. The patient was sent to critical care unit (CCU) for better monitoring. Next day, the patient was stable. Vitals were normal and SpO_2 was 98% in room air. On 2nd June, WBC came 11.6×10^3/µl and Hb came 8.5 g/dl. Table 1 shows the detailed lab findings. Patient is currently stable and the patient got transferred to post-natal ward from CCU on 3 June 2024. The patient was discharged on 6 June. The patient was completely stable. The patient is under routine post-natal visits.

Table 1. Various lab findings of the patient on 2 June 2024 at CCU (2 days after HSR due to FCM).

Components	Patient values	Normal range
WBC	11.6×10^3/µl	$4.0–12.0 \times 10^3$
Hb	8.5 g/dl	11.0–17.0
Blood urea	27 mg/dl	12–45
Sr. creatinine	0.8 mg/dl	0.5–1.2
Albumin	3.6 g/dl	3.4–5.4
CRP	15 mg/l	<5

CCU, critical care unit; FCM, ferric carboxymaltose; HSR, hypersensitivity reaction; WBC, white blood cell.

Discussion

Need for iron is high in ante-partum and post-partum states. IV FCM is a recommended drug to treat IDA. IV iron is better than oral iron supplements and IV iron in pregnancy improves the haematological parameters.[12] IV iron enables the delivery of a higher dose of iron, thus facilitating a more rapid correction of an iron deficiency compared to oral iron. Das et al.[13] has mentioned in their study that IV iron sucrose is more effective in increasing Hb level than oral iron therapy. FCM is a convenient drug to treat IDA in pregnancy.[14] FCM is a costly drug, but it is available free of cost in government hospitals. With FCM, adverse effects are less commonly reported.[15] A retrospective examination of the Eudra Vigilance drug safety database (2014–2017) showed 121 FCM-related significant HSR, just one of which was fatal.[10] A recent systematic review has concluded that HSR is uncommon in IV iron formulation and incidence of HSR is less in ferric Der isomaltose (FDI) compared to FCM.[16] Another very recent meta-analysis has concluded 'Ferric carboxymaltose demonstrated better efficacy than other intravenous iron in increasing haemoglobin and ferritin levels in treating iron deficiency anaemia in pregnant women'.[17] In this meta-analysis, no serious adverse event has been recorded.

Very few case reports were present in PubMed about the HSR due to FCM. To our knowledge, this is the first case report, which reported HSR due to FCM in post-partum state. Inflammatory state is one predisposing factor of HSR due to FCM[10] High WBC count and CRP could be one reason for HSR in our patient.

Conclusion

It should be kept in mind severe HSR can be seen due to IV FCM infusion. During the infusion, proper monitoring is

important. FCM should only be advised in a hospital where proper oxygen and CCU backup are present. A good infrastructure and following the protocols are important. If WBC and CRP are raised, then FCM should be administered with proper monitoring. FDI can be preferred over FCM but more clinical trials are needed.

Limitations

1. Our lab doesn't have a setup to measure serum ferritin and serum iron levels.
2. The amount of blood loss during the labour was not estimated.

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Author contributions

Conceptualization: B.C.M. and A.H. Writing and drafting: D.M. Critical review and editing: B.C.M., A.H., D.M., A.A. All authors have contributed significantly and all authors have approved this version of the manuscript.

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