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A Case Study and Clinical Implications of Antenatal Allergic Reaction to Parenteral Iron During Pregnancy

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ABSTRACT

Iron deficiency anemia (IDA) is the most widespread food deficiency prostration in the world, particularly, associated with deficiency among girls of procreative age. IDA is another important source of morbidity and fatalities connected with pregnancy, especially in underdeveloped countries such as India. In patients with poorly tolerated oral iron, intravenous iron formulations, including iron sucrose, is an effective treatment of moderate-to-severe anemia. Nevertheless, sometimes they might also lead to development of hypersensitivity reactions, resulting in the need of immediate medical assistance.

In this case, a 26-year-old female patient (G2P1L1) who was admitted for an elective repeat cesarean procedure at 38 weeks of gestation is described. Her vitals were stable, and she had palpitations. In preoperative tests, mild microcytic anemia, leukocytosis, hypokalemia, and elevated CRP and serum IgE values were detected, which may indicate a possible allergic propensity.

On the first postoperative day after intravenous iron sucrose, she developed a type I hypersensitivity reaction that was facilitated by urticaria, flushing, itching, dyspnea, and hypotension. Using hydrocortisone and IV pheniramine maleate (Inj. Avil), the response was well controlled. Oral iron supplementation was started and parenteral iron was stopped.

The present case emphasizes how crucial it is to monitor the allergic reactions when receiving parenteral iron therapy, particularly in individuals who have high inflammatory signs.

Keywords: Iron deficiency anemia (IDA), G2P1L1, hypersensitivity reactions, urticaria, parenteral iron, Inj. Avil (pheniramine maleate), Oral iron supplements

1. INTRODUCTION

Iron deficiency anemia (IDA) is the most widespread global nutritional deficiency that benefits mostly reproductively-age women. The overwhelming percent of pregnant women experience anemia during pregnancy creating a health problem with significant worldwide implications. It features in 20 % direct maternal deaths and 50 % indirect maternal deaths in India. The Indian Council of Medical Research (ICMR) has given pregnancy-related anemia classification into mild (Hb 10-10.9 g/dL), moderate (Hb 7-9.9 g/dL), severe (Hb 4-6.9 g/dL) and extremely severe (Hb <4 g/dL) [1].

Anemia increases the risk of pregnancy problems that include infections, premature labour, intrauterine growth restriction (IUGR), post-partum hemorrhage (PPH), improper uterine involution and elevated rates of cesarian section [2][3].

Diagnosis of IDA is made using low hemoglobin levels; a strong indication of deficiency [4]. The World Health Organization (WHO) defines anemia in pregnancy as Hb <11 g/dL, in consideration of physiologically caused reductions due to increasing plasma volume during the second trimester [5].

The management includes parenteral and oral iron supplements and blood transfusion in extreme cases. Oral iron is preferred because it is easily accessible and safe but this form is associated with common gastrointestinal side effects (nausea, vomiting, and metallic taste) that reduce compliance [6].

Intra-venous (IV) iron therapy is more effective, more rapid, and useful when oral drug therapy is improperly absorbed or does not work. The intravenous formulations include iron sucrose, ferric carboxymaltose and iron dextran. Hypersensitivity reactions can happen even with test doses, particularly with the initial dose [7][8].

Hypotension and abdominal pain, among others, are its side effects, although adverse drug reactions (ADRs), which are adverse effects that occur when a patient is admitted in hospital, are severe. ADRs still have a considerable prevalence in pregnant women, and special attention should be paid to them when observation and pharmacovigilance are performed. [10] [11].

Avil injection is a first-generation H1 systemic antihistamine with an active component of Pheniramine Maleate that is routinely used in clinical practice to rapidly reverse severe allergic conditions. It decreases urticaria, pruritus, flushing, rhinorrhea, and moderate bronchospasm symptoms related to allergic reactions, competing in the binding of the histamine H1 receptor.

Avil is an adjuvant in anaphylaxis and acute hypersensitivity reactions such as drug-induced allergies, insect bites because of the rapid onset of action upon parenteral administration. In obstetric and perioperative settings, it has been commonly used as an adjuvant to corticosteroids (hydrocortisone) to stabilize patients in the event of Type I hypersensitivity reactions.[12]

2. CASE REPORT:

The patient was a 26-year-old woman with (G2P1L1) who had had a previously a lower-segment cesarean section and was admitted to the Department of Obstetrics and Gynecology (O&G) with elective cesarean delivery during the 38th week of pregnancy. When she came, she was in a clinically stable condition despite palpitations. At the moment of the first evaluation, she did not describe any significant additional symptoms, her vital signs remained within a normal level. 2025She did, however, experience an acute hypersensitivity reaction after receiving parenteral iron sucrose for antenatal iron-deficiency anemia. On the same day, routine parenatal investigations and diagnostic samples were completed, and prompt medical management was started.

Admission date: June 9, 2025

Discharge date: June 13, 2025

Stable vital signs were found at the initial clinical examination:

Pulse: 102 beats per minute;

Blood pressure: 100/60 mmHg

Normal temperature

SpO_2 and respiratory rate were both within normal limits.

The uterus was of term size, and the fetus had a singleton pregnancy with a cephalic presentation and normal fetal heart sounds. During the evaluation, she was unable to voice any serious grievances. On the same day, diagnostic samples were gathered and one of the common clinical screening techniques was analyzed.

Laboratory Examinations:

Hematology Results on June 9, 2025:

Hemoglobin level of 11.5 g/dL.

Leukocytosis: Count of WBC: 15.9 x 10 10^3/µL

Neutrophils (80.8%) higher neutrophil count

Microcytic anemia is indicated by an MCV of 71.5 µm^3.

Test of Renal Function:

Hypokalemia is 3.0 mmol/L of serum potassium.

Serology and Immunology

An inflammatory marker that is positive is 15.2 mg/dL of CRP.

Laboratory Investigations:

Notable Abnormal Results in Hematology from 9th June 2025:

A hemoglobin level of 11.5 g/dL.

Leukocytosis: WBC Count: 15.9 × 10^3/µL

80.8% neutrophils → High neutrophil count

Microcytic anemia is suggested by an MCV of 71.5 µm^3.

Renal function test:

3.0 mmol/L of serum potassium = hypokalemia

Immunology and Serology:

15.2 mg/dL of CRP indicates a positive inflammatory marker.

Serum IgE: 355.2 IU/mL c High (which suggests that allergies may be present)

Microscopy of urine:

Cells of pus: 10–12/hpf

6-epithelial cells/hpf It is a sign of a slight level of pollution or inflammation.

Diagnostic Evaluation:

The patient's hemoglobin level of 11.5 g/dL suggested mild anemia, which was most likely brought on by stress or dietary deficits. There were no known causes for the transient, reversible hypokalemia (3.0 mmol/L). a minor elimination problem, perhaps an allergy or stress response.

Diagnosis G2P1L1, elective lower segment Caesarean section (LSCS) of a girl with no morbidity, full term pregnancy (38 weeks).

Pre-Anesthetic Assessment:

Suitable for spinal anesthetic surgery, Mallampati grade I ASA grade I

Medications given were:

Inj. Taxim (Cefotaxime), an IV antibiotic

Metrogyl (Metronidazole) injection: Antibiotics

Emeset (Ondansetron) injection: Antiemetic

Intervenous fluids were started to rehydrate and get her ready for surgery.

Caesarean Section Surgery

On June 10, 2025, a lower segment caesarean section was carried out while under spinal anesthesia. The baby girl child was born safely and in good health. There was very little loss, and the uterus and adnexa were unharmed. The abdomen was layered shut after the hemostasis was accomplished. Prior to being moved to the postnatal ward, the patient was monitored during her post-operative recuperation. The regimen of tramadol for pain management and ceftriaxone and metronidazole for infection prevention was continued. Despite receiving intravenous fluids, she stabilized.

Medications after the Operation:

Inj. Tramadol

Inj. Emeset

Inj. Pantoprazole

Inj. Taxim

Monitoring of vitals was done closely. There were no problems in the production of urine, bleeding, and well-being.

Post-operative Day-1:

Intravenous iron sucrose on 1st postoperative day [11 th June,2025] provoked an allergic reaction by resulting in Urticaria (hives), itching, flushing and mild breathlessness. Infusion was aborted and she was given a course of IV pheniramine maleate (Avil) and hydrocortisone. Iron was replaced to oral administration together with calcium and folic acid and multivitamins. There was no infection, and oral intake was satisfactory, and recovery was in stable condition and activity normal in baby.

IMPRESSION

Antenatal Allergic Reaction to Iron Injection

Medications:

Initiation of oral treatment: Iron, calcium, multi vitamins

Oral analgesics (Avil, intravenous pheniramine maleate and hydrocortisone) tapering off the IV

One of the Post-Operative Assessment would be Day Two:

This adverse response caused the withdrawal of IV iron supplement and the administration of oral supplementation of multivitamins, calcium, folic acid, and iron. On June 12 the patient remained stable and afebrile. The surgery site did not show evidence of infections. She had normal bowel and urinary ablutions, could mobilize independently and could take oral intake. The infant was feeding well with no issues of neonatal problems.

Medications:

Oral antibiotics and supplements were persisted

Vitals stable so injection was stopped

Discharge and Postnatal Advice:

The patient left the hospital with a healthy baby on June 13 after becoming clinically stable. She was given tips on nutrition, wound healing, hygiene and feeding baby. Some of the oral meds included antibiotics, iron, calcium, and multivitamins; in seven days, a suture could be reviewed.

3. DISSCUSION:

The case describes one of the common but clinically significant side effects of parenteral iron treatment in the prenatal period. Even though it is often prescribed in the treatment of moderate-to-severe iron deficiency anemia during pregnancy, intravenous iron sucrose is associated with a low risk to elicit hypersensitivity reactions. On June 11, 2025, the patient experienced a hypersensitivity reaction of Type I after a start of an iron sucrose infusion.

Such symptoms were:

Facial flushing

urticaria (hives)

itching

dyspnea mild

mild desaturation (SpO_2 dropped down to 94%)

Hypotension

These symptoms are indicative of an IgE-based allergic reaction, which could be augmented by her elevated CRP and elevated serum IgE level (355.2 IU/mL) both signifying that she is predisposed towards inflammation and allergy.

Iron infusion discontinuation:

Pheniramine maleate (Avil), a rapidly acting H1 antihistamine decreasing the symptoms of an allergy, is used intravenously.

IV hydrocortisone is a steroid whose effects decrease inflammation as well as prevent the establishment of delayed hypersensitivity.

This intervention solved the symptoms very soon. The parenteral iron therapy was not advised to be done during the

remaining part of her treatment due to the hypersensitivity. Instead of them, oral supplementation with fat-soluble vitamin iron, calcium, and folic acid and multivitamins were commenced.

In this case, the availability of such medication as Avil (pheniramine) played a very important role since it enabled the prompt alleviation of the patient and prevented the even more dramatic developments as anaphylaxis. This case supports past evidence that pheniramine and prednisone in combination remain an effective first-line agent in management of acute drug-related allergic reactions in pregnancy, where iron hypersensitivity is suspected.

4. CONCLUSION:

The significance of careful monitoring and treatment for pregnant patients undergoing parenteral iron therapy is highlighted by this example. Hypersensitive reaction to intravenous iron in the patient was most probably caused by increased immunological markers such as IgE and CRP. It was imperative in preventing further difficulties since the infusion of iron was terminated immediately, antihistamines and corticosteroids were administered, which included a shot of Avil.The case in point reflects on the need of proper pre-administrative tests, close monitoring during infusion and in case risks of side effects outweigh the advantages, alternatives in the oral form should be discussed.

It also recommends the need to consider paying attention even to minor changes in terms of hematological and biochemical alterations as they are potential signs of the immunological reactivity. When such allergic reactions have been managed effectively there can be positive outcomes of both the mothers and their new-born.

Conflict of Interest:

None declared.

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