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ORIGINAL ARTICLE

Effectiveness of Intravenous Iron Sucrose in Management of Iron-Deficient Anemia of Pregnancy at Rural Hospital Set Up

Shrivastava Deepti · Inamdar Sunetra · Bhute Sindhu · Singh Amreen

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Abstract

Objectives Critical evaluation of iron sucrose (Malhotra, FOGSI Focus 9–11, 2009) in terms of efficacy, safety, and feasibility at rural setup for the treatment of anemia of pregnancy (Raja et al., Rawal Med J 28: 40–3, 2003) along with any reduction in blood transfusion rate at peripartum period of 37 weeks to 48 h within delivery.

Methods In a prospective cohort study conducted in Department of Obstetrics and Gynaecology, during the year 2008 AVBRH-Wardha, 256 consecutive women of iron-deficient anemia (IDA) treated with intravenous iron sucrose were studied for feasibility, safety, and efficacy of drug. Blood transfusion rates were compared for the years 2007 and 2008 in cases of antenatal women from 37 weeks onward up to 48 h post delivery. Results were analyzed by Z-test.

Results Mean rises in Hb g% were 1.1 ± 0.2, 2.3 ± 0.8, and 3.0 ± 0.4 after 1, 2, and 3 weeks, respectively. Decline in rate of blood transfusion among total anemic women at peripartum period was 9.36 %.

Conclusion Iron sucrose therapy is very much relevant in rural scenario.

Keywords Anemia · Iron sucrose · Rural hospital · Pregnancy

Shrivastava D. (✉), Associate Professor
M-4, Meghdoot Apt, JNMC Campus, Sawangi, Meghe, Wardha 420001, India
e-mail: deepti_shrivastava69@yahoo.com

Shrivastava D., Associate Professor · Inamdar S., Professor and HOD · Bhute S., Professor · Singh A., Resident
Jawaharlal Nehru Medical College, AVBRH, DMIMS Sawangi, Meghe, Wardha, Maharashtra 420001, India

Introduction

Anemia is the most common indirect cause of maternal mortality in India. Prevalence of anemia among pregnant women in India is 57 % [1]. Iron-deficient anemia (IDA) is responsible for 95 % of anemia during pregnancy [2]. During pregnancy, there is a great demand for iron to meet the requirement of red blood cell mass expansion in the mother, fetal and placental blood, and blood loss at delivery. There are various modalities for the treatment of IDA as oral, intramuscular, and intravenous preparations of iron, but they have some or other associated drawbacks like noncompliance and uncertain absorption rate, or unexpected life-threatening side effects. Hence, to achieve the target rise in hemoglobin (Hb) level in a limited time-period when patient is approaching the term, main modality that remained was the blood transfusion. Iron sucrose complex is a more recent drug which is used intravenously for correction of IDA with less side effects and cost effectiveness. Clinical trials and the long history of the use of iron sucrose injection worldwide have established the efficacy and safety of this drug in patients with IDA; it is metabolically available very quickly after

administration besides being safe, convenient, and more effective than intramuscular iron therapy in the treatment of IDA during pregnancy [3]. The intravenous iron therapy can replace blood transfusion in antenatal period for moderate IDA, as there are numerous hazards of blood transfusion including transfusion of wrong blood, infection, anaphylaxis, and lung injury any of which would be devastating for mother [4].

The aim of this study was to evaluate the Intravenous Iron Sucrose therapy as an effective, feasible, and safe mode of treatment which can reduce anemia in pregnancy and peripartum blood transfusion rate by single hospitalization/without blood transfusion.

Methods and Materials

In a prospective and retrospective study carried out from Jan 2008 to Dec 2008 in a rural medical hospital, women of any parity with Hb 6–8 g% at gestation of 20–36 weeks and 37–48 h after delivery with no underlying disease such as gestational diabetes mellitus, heart disease, liver disorders, renal disorders, peptic ulcer, having no history or other allergic conditions or asthma, having no thalassemia disease, sickle cell anemia other hemolytic anemia, having no history of bleeding tendency were chosen. IDA was confirmed by clinical features and lab investigations. IDA is the easiest to get but difficult to confirm in pregnancy, as the standard test for IDA is the measurement of serum Iron, TIBC, and serum ferritin level, which is physiologically low in pregnancy, and cost of these investigations are higher than the treatment itself, and hence, these tests were not feasible in rural hospital.

Dose calculation was done according to following formula:

$$\text{Total elemental iron dosage for iron sucrose in mg} = \text{weight (kg)} \times [\text{desired hemoglobin (10)} - \text{actual hemoglobin in g\%}] \times 2.4$$

Investigations were repeated on the 7th, 14th, and 21st day, i.e., Hb g%, Hct, MCV, MCHC, total RBC count, reticulocyte count, peripheral smear, and side effects and adverse reactions were documented.

The aim of our study was to bring Hb level to 10 g% at term with iron sucrose while assessing its safety and efficacy and to find out any decline in blood transfusion rates for the year 2008 in comparison with 2007 among the study population, i.e., 37 weeks of gestation to 48 h after delivery.

Results

The total number of selected patients was 256. The average gestational age was 32.5 weeks. Mean values for Hb on day 1 was 6.9 ± 0.9 g%, Hct was 29.2 % ± 1.3, and MCV was 81.8 fL ± 3.1. Mean rises in Hb percentage were 1.1 ± 0.2, 2.3 ± 0.8, and 3.0 ± 0.4 after 1, 2, and 3 weeks, respectively (Table 1).

Most common side effects found were muscle cramps, arthralgia, uneasiness, and headache tightness of chest and pain. Side effects were related with rate of infusion, and they used to subside with slow rate of infusion. No severe anaphylactic reactions were found in this study (Table 2).

While comparing the blood transfusion rates of 2007 and 2008, there was gross decrease in blood transfusion rate among total anemic antenatal and postnatal patients within 48 h, which was 9.36 %, i.e., down from 29.36 % in 2007 to 20 % in 2008. Z-test was used for comparison: $z = 4.5$; since $z > 2.58$ at 1 % level, there is significant difference in the proportion of the number of transfusions between the 2 years (Table 3).

Discussion

Iron sucrose has revolutionized anemia management in pregnancy. Our study has shown that it is a highly and rapidly effective therapy without major side effects. There are also other modalities for the treatment of IDA like oral iron, iron dextran, and iron gluconate, but all of them have some or other drawbacks. Oral iron has poor absorption, frequent gastrointestinal side effects, and poor compliance. Both iron dextran and iron gluconate cause unpredictable

Table 1 Hematological parameters before and after iron sucrose complex infusion

Parameter	Day 1	Day 7	Day 14	Day 21
Hb g%	6.9 ± 0.9	8.0 ± 1.1	9.2 ± 0.7	9.9 ± 0.5
Hct	29.2 % ± 1.3	29.3 % ± 1	29.5 % ± 0.5	31.0 ± 0.3
MCV	81.8 fL ± 3.1	83.0 fL ± 2.2	83.6 fL ± 2.7	84.2 ± 1.8
MCHC	27.8 % ± 0.9	28.1 ± 0.3	28.3 ± 0.6	28.9 ± 0.3
Total RBCs count	3.35 × 106	3.51 × 106	4.1 × 106	3.9 × 106
Reticulocyte count	1–2 % [avg]	2–5 % [avg]	3–5 % [avg]	3–5 % [avg]
Peripheral smear	Microcytic hypochromic	Microcytic hypochromic	Slight-improvement	Slight-improvement

Table 2 Percentage of adverse effects

Type of reaction	(n = 256)	
	No	%
Muscle cramps	39	15.2
Arthralgia and other pains	31	12.1
Headache/uneasiness	28	10.9
Breathlessness and chest pain	19	7.4
Fever	17	6.64
Flushing	7	2.7
Hypotension	3	1.1
Anaphylaxis	Nil	
Venous thrombosis	Nil	

Table 3 Comparison between blood transfusions in 2007 and 2008

	2007	2008
Total patient (ANC + PNC 48 h)	2,466	2,336
Total anemic patients	797	880
Patients received BT	234	176
	(29.36 % of anemic)	(20 % of anemic)
	(9.48 % of total)	(7.53 % of total)
Total patients received		256
Iron sucrose		(29.09 % of anemic)
		(10.95 % of total)

anaphylactic reactions and require a test dose before the first administration. However, iron sucrose is safe and can be administered without a test dose [5]. Iron sucrose injection is an aqueous complex of polynuclear iron(III)–hydroxide in sucrose. It has a molecular weight of 34,000–60,000 Da [6]. It is convenient and cost effective in pregnant iron-deficient women who are unable to obtain an adequate amount of iron rapidly by oral route. The only contraindication to the use of iron sucrose is that all types of anemia are not associated with iron deficiency, hypersensitivity to iron sucrose, or any of its inactive components. Iron sucrose complex infusion overcomes the problem of compliance and absorption, and has excellent safety record. By single hospitalization and total dose infusion of iron sucrose, it is possible to eradicate the commonest medical disorder of pregnancy, thereby dramatically reducing maternal mortality and morbidity. Iron sucrose is safe as it is a dextran-free complex. The risk of allergic reactions is extremely low, it is also cost effective as it is an alternative to blood transfusion except for acute hemorrhagic emergencies, and it enables to shorten hospitalization time, as there is faster clinical recovery than with oral iron therapy in IDA. Recent evidence suggests that iron sucrose can be detected in high levels in the liver circulation and marrow within 5 min after intravenous administration [3].

Iron sucrose complex can be used in the pregnant women with IDA not only for correction of deficit in Hb but also for restitution of iron store, which can be measured by serum ferritin; however, as our study has been done at rural hospital, it was not affordable and feasible. Transfusion is a reliable method with excellent results in the treatment of not only anemia but also with high risk for transmission of viral infections (HIV, HCV, HBs, and CMV) and serious transfusion cross reactions [7]. Therapy with iron sucrose gives a good opportunity to avoid the risk of hemotransfusional infections, incompatible hemotransfusions, and immunocompromising effect of hemotransfusion, and it is economically more attractive. The WHO has stated that transfusion should be considered only for conditions for which there is no other treatment, Blood transfusion gives a temporary elevation in Hb concentration, and thus acts as symptomatic management of anemia. It cannot address the fundamental issue and restore balance, it does not rebalance the production and destruction of RBCs, and it is simply a transient and often ineffective in Hb "fix"; hence, it is not part of a rational approach to the IDA and should be reserved for acute emergency cases of anemia.

Iron sucrose injection is contraindicated in patients with known hypersensitivity to iron sucrose or any of its inactive components, and in patients with anemia not caused by iron deficiency like sickle cell anemia. Potentially fatal hypersensitivity reactions (characterized by anaphylactic shock, loss of consciousness, collapse, hypotension, dyspnea, or convulsion) have been reported rarely in patients receiving iron sucrose. Intravenous iron sucrose complex is safe and effective in the treatment of IDA during pregnancy. Obvious side effects like arthralgia and uneasiness were seen, when the rate of infusion was fast and subsided by slowing down the rate. This absence of side effects is partly due to the lower allergenic effect of the sucrose complex caused by the very slow release of elementary iron from the complex. Also, the accumulation of iron sucrose in organic parenchyma is much lower compared with iron-dextrans and iron-gluconate. [8].

Through this study, it has been proved that parenterally administered iron sucrose elevates Hb and restores iron stores earlier and also that intravenous iron administration has led to reduction in the rate of blood transfusion rate at peripartum period of 37 weeks—48 h within delivery.

References

1. Malhotra J. Iron deficiency anemia in India. FOGSI Focus 2009; 9–11.
2. Raja KS, Janjua NB, Khokhar N. Intravenous iron sucrose complex therapy in iron deficiency anemia in the pregnant women. Rawal Med J. 2003;28: 40–3.

3. Wali A, Mushtaq A, Nilofer. Comparative study: efficacy, safety and compliance of intravenous iron sucrose and intramuscular iron sorbitol in iron deficiency anemia of pregnancy. J Pak Med Assoc. 2002;52:392–5.
4. Bhandal N, Russell R. Intravenous versus oral iron therapy for postpartum anemia. BJOG. 2006; 113:1248–52. doi:10.1111/j.1471-0528.2006.01062.x.
5. Al RA Md, Unlubilgin E Md, Kandemir O, et al. Intravenous versus oral iron for treatment of anemia in pregnancy Obstet Gynecol. 2005;106:1335–40.
6. Cada JD, Levien T, Baker DE (Editors). Facts and comparisons iron sucrose injection. Hosp Pharm. 2001;36(4):404–12.
7. Brochea D-E, Gaya C, Armand-Brangerb S, et al. Severe anaemia in the immediate post-partum period. Clinical practice and value of intravenous iron. EJOG. 2005; S21–S27.
8. Giannoulis C, Daniilidis A, Tantanasis T, et al. Intravenous administration of iron sucrose for treating anemia in postpartum women. Hippokratia. 2009;13:38–40.