Original Article

Intravenous iron sucrose complex therapy in iron deficiency anemia in the pregnant women

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ABSTRACT:

Objective: We aimed to improve the hematological parameters in pregnant women with iron deficiency anemia (IDA) with the use of iron sucrose complex.

Methods: We used iron sucrose complex intravenously and assessed its effects on hematological parameters in pregnant anemic women. Fifty pregnant women with hemoglobin level of 8gm/dl or lower were given calculated dose of iron sucrose complex intravenously in several sessions. Any allergic reactions were noted. Hemoglobin (Hb) levels, mean corpuscular volume (MCV) and ferritin levels were monitored.

Results: Mean Hb level increased from 7.5 to 11 gm/dl, (P <0.5) MCV increased from 65 to 75 (P <0.5) and ferritin level increased from 9.6 to 16.4 ug/l (P <0.5). Two minor allergic reactions were noted.

Conclusions: Iron sucrose complex, when given to pregnant women with IDA, significantly improved the hematological parameters. (Rawal Medical Journal 2003;28:40-43).

KEY WORDS: Pregnancy, iron deficiency anemia, iron sucrose complex.
INTRODUCTION:

Anemia is estimated to affect nearly two thirds of the pregnant women in developing countries [1]. Iron deficiency anemia is responsible for 95% of the anemias during pregnancy [1-3]. The responsible constellation of factors producing IDA generally precedes the pregnancy, including diet poor in iron content coupled with menstrual losses and a rapid succession of pregnancies in which supplemental iron was not provided. Most women begin their pregnancy with partially or completely depleted iron reserves. Thus, the severity of the anemia is inversely related to the amount of iron reserves [3]. 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 [1,2]. In pregnancy, iron deficiency is exaggerated because of the ability of fetus to extract its requirement in obligatory one way direction even from iron deficient mothers [2]. This is aggravated by poor absorption of iron due to adverse effects of pregnancy on the gastrointestinal tract, which include nausea and vomiting, motility disorder with reflux esophagitis and indigestion [1-2].

In underdeveloped countries, anemia is a major contributory factor to maternal morbidity and mortality [4]. Inadequate antenatal care along with poor knowledge of dietary needs of pregnant woman, and overall poor socio-economic conditions are all responsible for this in our country [5-7]. Other countries of the Asian region like Indonesia [8] and India [9] also report high prevalence of IDA in pregnancy and associated maternal and fetal loss. It is also associated with high perinatal mortality rate in our region [6-9]. A recent study reported a fetal mortality rate of 50% at 7 month, 28% at 7 months and 24% at 9 months of gestation [10].

Over the past years, various oral, intramuscular and intravenous preparations of iron have been used for correction of IDA in the pregnant patients [11-13]. However, they are associated with significant side effects and it is not possible to achieve the target rise in Hb level in a limited time-period when patient is approaching the term. Iron sucrose
complex (ISC) is a relatively new drug, which is used intravenously for the correction of IDA [12,13]. The drug has been able to raise the Hb to satisfactory level when used in severely anemic iron deficient pregnant women [14,15]. The aim of this study was to assess the efficacy and tolerability of ISC in pregnant patients with IDA seen at our institution.

MATERIALS AND METHODS:

Fifty consecutive pregnant women between 16-32 weeks of gestation, diagnosed as cases of iron deficiency anemia, who were seen from May 2000 to April 2002 at the antenatal clinic of Shifa International Hospital, Islamabad were included in the study. For the purpose of this study, iron deficiency anemia was defined as Hb level of <8 gm/dl. Absolute indices and serum ferritin level were also determined. Patients with other causes of anemia e.g. thalassemia, hemolytic anemia, hypersplenism, infection, inflammation, liver or renal disease were excluded.

All the patients received ISC in infusion form with the aim to correct the iron deficiency as well as to replenish the iron stores. The aim was to bring has been Hb level to 11 gm/dl. Iron sucrose complex was administered as 200 mg elemental iron in 100 ml 0.9% normal saline infusion over 1 hour every 3-7 days up to the total calculated dose. A test dose of one ml of ISC infusion was given and followed by a 15 minutes window period, during which no infusion was given and patient was observed for any allergic reactions. If no reactions occurred, the rest of the infusion was given. The initial dose was given in the emergency department but rest of the calculated dose was given in the day-care set up.

Formulae were used to calculate the iron requirement of the patient to fulfill the deficit as well as to replenish the iron stores and were calculated as follows:
A. Amount of iron deficit (mg) = Body wt. (Kg) × Hb deficit × 0.3

[ Hb deficit = Hb target – Hb initial ]

B. Amount of iron to replenish (mg) = Body wt.(Kg) × 10

C. Total iron deficit (mg) = Amount of iron deficit + amount of iron to replenish stores

Hemoglobin level, MCV and serum ferritin level were done fortnightly. Allergic reactions were graded as grade I and grade II and they are described as following. A grade I reaction was mild to moderate in nature, settled with an anti-allergic drug but not requiring discontinuation of the infusion. A grade-II reaction was severe in nature, threatening the patient’s life and requiring discontinuing of infusion. Coulter hematology analyzer was used for Hb and MCV determinations. Serum ferritin levels were measured using standard laboratory techniques. Mean values of Hb, MCV and ferritin were used to compare pre and post treatment parameters. A p value of less than 0.5 was considered to be significant.

RESULTS:

The total number of selected patients during the study period was 50. The age of subjects ranged from 21 to 35 years. The mean age was 30 years. Most of the patients were multigravida. The average gestational age was 30 weeks. After the test dose of ISC infusion, only two patients had grade I allergic reaction. One had pain in the epigastrium and the other had restlessness. No patient had grade II allergic reaction. The mean duration to achieve the target Hb level of 11 gm/dl was five weeks.

Before ISC infusion, the mean Hb level was 7.5 gm/dl, mean MCV was 65 fl and mean serum ferritin level was 9.6 ug/l. After ISC infusion, the mean Hb level rose to 11 gm/dl,
mean MCV became 75 fl and mean serum ferritin level was 16.4 ug/l. (see table). The differences in values were statistically significant as shown by p values.

### TABLE

**HEMATOLOGICAL PARAMETERS BEFORE AND AFTER IRON SUCROSE COMPLEX INFUSION**

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Before ISC Infusion</th>
<th>After ISC Infusion</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb Level</td>
<td>7.5 gm/dl</td>
<td>11 gm/dl</td>
<td>&lt;.0.5</td>
</tr>
<tr>
<td>MCV</td>
<td>65 fl</td>
<td>75 fl</td>
<td>&lt;.0.5</td>
</tr>
<tr>
<td>Ferritin Level</td>
<td>9.6 μg/l</td>
<td>16.4 μg/l</td>
<td>&lt;.0.5</td>
</tr>
</tbody>
</table>

**DISCUSSION:**

The fetus and placenta require about 500 mg of iron and a similar amount is needed for red cell increment. An average postpartum blood loss and lactation for six months each accounts for about 180 mg. From total of 1360 mg, 350 mg may be subtracted (saved as a result of amenorrhea) to give an actual extra demand for about 1000 mg. This is unlikely to be provided by dietary iron but may be mobilized from full iron stores (about
It is the state of stores that largely determine whether or not a pregnant woman becomes anemic. The smaller her stores, the earlier the anemia occurs [1,2].

Our study showed that iron sucrose complex can be used in the pregnant patients with iron deficiency anemia not only for correction of deficit in the hemoglobin but also for restitution of iron stores as seen by significant improvement of ferritin level. The mean duration of the period to achieve the target Hb in the present study was five weeks as compared to 6.9 ± 1.85 weeks in a previous study [13].

We used Hb, MCV and ferritin levels to monitor response of hemopoietic system to iron sucrose complex because of their relative importance in the haemodynamics of the pregnant lady. Due to dilutional effect of pregnancy on plasma volume, there is a decrease in Hb, hematocrit and red blood cell count but MCV remains unaffected [2]. Thus, serial evaluation is useful in differentiating dilutional anemia from progressive IDA during pregnancy. Except for bone marrow biopsy, serum ferritin is best indicator for assessment of iron stores in the non-pregnant women [1,2,16]. In pregnancy, it falls dramatically in second and third trimester, presumably because of hemodilution effect [1].

Treatment of IDA has included oral iron, intramuscular iron, iron dextran, ISC, recombinant erythropoietin and blood transfusion [2]. However, most of these have their disadvantages. Even patients who respond well to oral iron therapy require a long time (months) to reach target Hb compared with weeks required in case of treatment with ISC. The compliance is always a problem and to improve this, even iron-rich natural mineral water has been tried to treat IDA in pregnant women [17]. The use of intramuscular iron preparations in IDA is discouraged because of pain, irregular absorption and staining. Up to 30% of patients who were given iron dextran suffer from adverse effects, which include arthritis, fever, urticaria and anaphylaxis [2]. In present study, only two of the 50 patients had mild side effects and none had anaphylaxis, thus showing the safety of the drug in the pregnant women. Side effects were limited in the present study because the
total dose of ISC was administered at intervals and it was given in diluted form and slowly.

CONCLUSION:
This study showed significant improvement of Hb and iron stores in pregnant women given calculated dose of ISC infusion. It was safe and well tolerated. In our country with frequent IDA found in pregnancy, this type of treatment may be helpful in management of these patients.

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