

Management of maternal anemia with intravenous Iron Sucrose

Introduction:

Intravenous iron sucrose has a very high potential for reducing the burden of iron deficiency anemia because it overcomes the problems of compliance and absorption, compared to oral iron supplementation and has an excellent safety record. Through a single total dose infusion of iron sucrose it is possible to handle the commonest medical disorder of pregnancy there by dramatically reducing maternal morbidity and mortality, while improving the quality of life of women in the developing world.

Anemia:

As one of the important factors influencing maternal morbidity and mortality and also the health of the newborn, Anemia has defied over 3 decades of public health intervention and continues to affect a majority of pregnant women in the state. Anemia in pregnancy is associated with high maternal morbidity and mortality.

Anemia in antenatal women has been classified as followed by Government of India :

Hb level	Classification
Less than 7 g/dl	Severe
7-10.9 g/dl	Moderate
11 and above	No anemia

Indications for Intravenous Iron Sucrose Therapy:

- ▶ Intolerance to oral iron
- ▶ Poor compliance to oral iron
- ▶ Inadequate absorption due to gastrointestinal disorders – malabsorption achlorhydria
- ▶ Lack of response to oral iron
- ▶ Pregnant women with severe IDA, presenting late in pregnancy
- ▶ As the first line therapy in cases of moderate and severe Iron deficiency anemia in second and third trimester of pregnancy.
- ▶ Post-partum anemia

Intravenous Iron sucrose:

A. Chemistry

a. Iron sucrose injection, USP is a sterile, aqueous, complex of polynuclear iron (III)-hydroxide in sucrose for intravenous use. Its molecular weight (MW) is approximately $\sim < 60,000$ Daltons.

B. Availability

IV iron sucrose is available as 2.5 ml & 5ml single dose ampoules. One ampoule of 2.5 ml contains 50 mg and one ampoule of 5 ml contains 100 mg of elemental iron.

C. Safety Profile:

- ▶ Rarely, minor adverse effects¹
- ▶ Lower dose of Iron sucrose (100mg Fe/kg) produced less or almost no adverse effects.
- ▶ Allergic reactions : 3.3 cases/million/year

D. Dosage Calculation:

Administration of IV Iron sucrose is based on total Iron deficit.

Total dose in mg = Body Wt. X (Target Hb - Actual Hb) X 2.4
This is followed by 10 mg/ Kg body weight to replenish the Iron stores.

Dose is based on the following method:²

The body weight here is pre pregnancy body weight, the target Hb is measured in gm/litre, and 0.24 is a correction factor that takes into account the patient's blood volume, estimated at 7% of body weight and Haemoglobin iron content; Since we are measuring Hb in g/dl or gm % in routine measurements, the correction factor is adjusted to $0.24 \times 10 = 2.4$.

E. Administration:

IV Iron sucrose is administered by **intravenous Infusion:**

- The infusion is administered as every 2.5 ml Iron Sucrose diluted exclusively in a maximum of 100 ml of 0.9% NaCl, immediately prior to infusion. The rate should be of 100 ml/30 minutes.
- Example: To give 100 mg of elemental iron, two ampoules of 2.5 ml or one ampoule of 5 ml should be diluted in 100 ml NS and this should be infused over the period of 30 minutes.
- Unused diluted solution must be discarded.
- **Maximum dose:** A maximum of 200mg of elemental iron can be given in one dose (in 100 ml NS). This should be infused over 30 minutes, can be given 1-3 times per week or on alternate days.
- ***A total dose of 1.0 gm can be given in 4-10 sittings (over a period of 1 month).***

F. Patient Selection:

IV iron sucrose should be considered only when Hb levels are above 7 gm %. In case of 7 gm % and below, blood transfusion should be considered.

Hb level (gm%)	Gestation Period			
	14-16 wks	20-24 wks	26-30 wks	30-34 wks
< 7	Blood Transfusion at CEmOC	Blood Transfusion at CEmOC	Blood Transfusion at CEmOC	Blood Transfusion at CEmOC
7.1 - 8.9	IFA therapeutic/ supplemental dose	Consider IV iron sucrose	First time IV iron sucrose and top up doses if given earlier	First time IV iron sucrose and top up doses if given earlier / Blood transfusion
9 to 10.9	IFA therapeutic/ supplemental dose	IFA therapeutic/ supplemental dose	IFA therapeutic/ supplemental dose	IV iron sucrose first time or top up doses if given earlier
11 and above	IFA therapeutic/ supplemental dose	IFA preventive dose	IFA preventive dose	IFA preventive dose

G. Refractory cases:

If Hb levels do not improve after 3-4 weeks of therapy, the cause of anemia should be re-evaluated. For a non-iron deficiency anemia, the cause should be treated and blood transfusion should be considered. Also, for a refractory iron deficiency anemia blood transfusion should be considered.

H. Post partum IV iron sucrose

I. Pre-requisites for IV Iron sucrose therapy

- It should be given under proper supervision. At least a doctor should be available while giving it. This is required to handle anaphylactic shock.
- Close monitoring is required to observe the rate of infusion and patient vitals, especially the pulse rate and blood pressure.
- An emergency tray containing Inj. Adrenaline, inj. Hydrocortisone and Oxygen should be available for management of anaphylactic reactions.
- Cardiopulmonary resuscitation facility should be available, in case a patient collapses because of anaphylactic shock.

J. Contraindications to Iron sucrose:

General contraindications are iron overload, non-iron deficiency anemia and known hypersensitivity to iron sucrose.

K. Side effects of Iron sucrose:

There can be hypotension, headache, vomiting, nausea, dizziness, joint ache, paresthesia, abdominal & muscle pain, edema, and cardiovascular collapse. Side effects are rare in a dose of 100mg/day. They appear if it is infused in a higher dose or the rate of infusion is very slow and very fast (the norm of 100ml/30 minutes should be followed).

Reference:

1. Intravenous iron sucrose therapy for moderate to severe anaemia in pregnancy:
*Alka Kriplani, Reeta Mahey, Biswa Bhusan Dash, Vidushi Kulshreshta, Nutan Agarwal
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2. Iron therapy in iron deficiency anemia in pregnancy: Intravenous route versus oral route
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Henryse Legagneur, MD,b Patricia Monnier-Barbarino, MD,c and Marie Claire Laxenaire,
MDa Nancy, France*

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3. Fatal anaphylactic reaction to iron sucrose in pregnancy
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