EVALUATION OF ORAL AND PARENTERAL IRON THERAPY IN IRON DEFICIENCY ANAEMIAS OF PREGNANCY

by

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Introduction

The problems of overpopulated and underdeveloped countries are alike. In the east, the problem of large families, meagre incomes, poor hygienic conditions and unbalanced diet, influenced by dietetic prejudices and superstition in pregnancy, leads to bizarre nutritional deficiencies. Iron deficiency is extremely common and widespread, so that mild iron deficiency anaemias in the east cease to be afflictions and may be considered a usual occurrence. However, the severer forms of iron deficiencies may lead to considerable clinical anaemia which increases the risks to both the mother and the child, necessitating treatment.

In the present times, with a wide availability of differing iron preparations, both organic and inorganic, in the form of tablets and syrups, the obstetrician is confronted with a wide variety of medicaments to suit individual requirements and preferences.

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The introduction of saccharated iron oxide for intravenous therapy, in 1947, and iron dextran complex for intramuscular use, in 1944, marked the fulfilment of a long cherished desire for parenteral iron therapy and opened up new therapeutic approaches to this common problem.

With the proved safety of intramuscular iron over intravenous iron therapy, parenteral iron therapy is today restricted to intramuscular therapy.

A comparison of the therapeutic efficacy of the different oral iron preparations and parenteral iron treatment seemed imparative and offered promise to help the obstetrician to decide the best course of therapy to embark upon in the management of the anaemic pregnant woman under his care.

Material and Methods

The present study is a comparison of the response to treatment with oral preparations and parenteral iron therapy.

All those included in the study were patients with iron deficiency anaemia in the second trimester of pregnancy with an initial haemoglobin level of less than 7.5 gms%. All other haematinics were scrupulously

avoided during the period of study.

In all 136 patients were included in the present study. But, because of various reasons including incomplete therapy, premature onset of labour administration of any additional haematinic by private physician without consent, 56 cases were eliminated. For the final analysis only 80 cases were included. Sixty of these had received oral iron therapy and 20 had been administered parenteral iron therapy as shown below:

Group 1 — 20 cases — Tab. ferrous sulfate 2 tabs. b.i.d. x 30 days.

Group 2 — 20 cases — Tab. Rarical (ferrous calcium citrate) 2 tabs. b.d. x 30 days.

Group 3 — 20 cases — Syrup of chealated iron 2 teasp. b.i.d. x 30 days.

Group 4 — 20 cases — Inj. Jectofer (100 mg. elemental iron) i.m. daily x 10 days.

In all cases a haemoglobin estimation, red cell count, colour index, packed cell volume, M.C.H.C., serum iron estimation and serum proteins, were performed at the commencement and at the end of one and two months of therapy.

Discussion and Analysis of Results

Haemoglobin estimation is a simple and reliable method to judge the response of the patient to iron therapy. It is also an effective base line investigation for comparing the clinical response to the various types of drugs used. To evaluate the results, the patients were classified into two groups.

(i) *Moderately severe anaemia* when the initial haemoglobin was between 5.6 to 7.5 gms%, 49 cases.

(ii) *Severe clinical anaemia* when the initial haemoglobin was less than 5.5 gms%, 31 cases.

The response to treatment by the oral and parenteral routes, and the changes in haemoglobin at the end of one and two months of therapy are tabulated below:

TABLE 1

Moderately severe anaemia group
(Haemoglobin between 5.5 gms.%-7.5 gms.%)

Drug used	No. of cases	Average initial Hb.%	Average Hb. after 30 days treatment		Average Hb. after 60 days treatment	
			Average value	% increase	Average value	% increase
1. Fersolate ..	12	7.0	7.7	10.0	8.8	25.7
2. Rarical	14	7.0	8.4	20.0	9.4	34.3
3. Oral iron syrup ..	13	6.8	7.6	12.0	8.6	26.5
Average values for oral iron preparations	39	7.0	7.9	13.0	8.9	27.1
Injections of Jectofer	10	7.2	8.4	16.0	9.7	35.0

TABLE 2

Severe anaemia (haemoglobin less than 5.5 gms.%)

Drug used	No. of cases	Average initial Hb.%	Average Hb. after 30 days treatment		Average Hb. after 60 days treatment	
			Average value	% increase	Average value	% increase
1. Fersolate ..	8	4.4	5.4	22.7	6.7	50.0
2. Rarical	6	4.8	6.2	28.0	7.9	60.0
3. Oral iron syrup ..	7	4.7	5.6	20.0	6.7	44.0
Average values for oral iron preparations	21	4.6	5.7	24.0	7.1	52.0
Injections of Jectofer	10	4.5	6.3	40.0	8.4	86.0

Tables 1 and 2 show the response of haemoglobin to oral and parenteral iron therapy. It is clear from the above tables that there is a definite response to oral iron therapy at the end of the first month which improves and is much enhanced by the end of the second month. The response to therapy with oral fersolate and oral iron syrup are alike. Rarical or iron calcium citrate with vitamins gives better results which are almost comparable to those of parenteral iron therapy. A comparison of the average results following oral iron therapy with those of parenteral iron therapy reveal the superiority of the parenteral route. However, the difference in the results is not as marked as in the severely anaemic group. Rarical therapy, in our opinion, is the treatment of choice in patients with moderate anaemia.

The response to treatment, as evidenced by the rise of haemoglobin following oral and parenteral iron therapy, reveals that the percentage increase of haemoglobin over initial values is much higher in patients with severe anaemia as compared to those with moderate anaemia. This response is further enhanced with passage of time showing greater rise in haemoglobin towards the end of the second month.

A comparison of the results with the different oral iron preparations once again confirms the identical response to fersolate and oral iron syrup. Rarical gives much better results but in the severely anaemic patients its response cannot be compared to that of Jectofer which should be the treatment of choice.

A graphical representation of the haemoglobin response in the anaemic patients shows the best response to Jectofer and identical responses to oral fersolate and oral iron syrup. The response to rarical lies somewhere in between.

A comparison of the indices at the commencement of therapy and at the end of the first and second months following the administration of the various oral iron preparations is shown in Tables 3 and 4.

TABLE 3

Moderate anaemia—oral iron

	Initial values	After one month	After two months
Hb. %	7.0	7.9	8.9
R.B.C.	3.1	3.5	3.5
C.I.	0.8	0.85	0.9
P.C.V. %	27.0	32.0	32.0
M.C.H.C. % ..	24.0	26.0	28.0

TABLE 4

Severe anaemia—oral iron

	Initial values	After one month	After two months
Hb. %	4.6	5.7	7.1
R.B.C.	2.0	2.32	2.71
C.I.	0.8	0.86	0.91
P.C.V. %	20.0	24.0	28.0
M.C.H.C. % ..	24.4	27.0	30.0

These values reveal that the rise in red blood cells does not keep pace with the rise in haemoglobin per cent and hence the colour index gradually rises. This is also reflected in the rise in values of the M.C.H.C. The increase in packed cell volume (P.C.V.) is the result of the improved haemopoietic response, and the release of red blood cells in circulation. The new cells show increasing iron saturation leading to corresponding rises in M.C.H.C. The improvements in values of all indices are seen in both the groups of mild and severe anaemias, the response being relatively better in the severer groups.

Lastly, to bring out the improved response of iron deficiency anaemias in pregnancy following parenteral iron therapy as compared to oral iron therapy, a percentage improvement over the initial values of all the indices of a haemogram were calculated as shown in Table 5.

TABLE 5

Percentage increase in indices at end of 30 and 60 days' treatment

Laboratory index	Oral iron		Parenteral iron	
	30 days treatment	60 days treatment	30 days treatment	60 days treatment
1. Haemoglobin ..	20.0%	50.0%	40.0%	80.0%
2. R.B.C. count ..	10.7%	18.0%	28.0%	35.5%
3. C.I.	6.2%	12.4%	13.3%	33.0%
4. P.C.V.	18.5%	30.0%	22.4%	40.4%
5. M.C.H.C. ..	9.0%	20.0%	24.0%	32.0%

Table 5 very clearly brings out the undoubted superiority of parenteral iron therapy over oral iron showing marked improvement in values of all indices in the parenteral iron therapy group. The disproportionate rises in haemoglobin values over the red cell values explain the colour index changes, the P.C.V. increases, and improved cellular saturation is reflected in percentage increase in M.C.H.C. values.

Yet another change observed during the progress of the present study was the change in values of serum proteins and serum iron levels during therapy. These values are given in Table 6.

TABLE 6

	Initial	Oral iron		Parenteral iron	
		% increase 30 days	60 days	30 days	60 days
	Gms.%				
1. Serum proteins (mean) ..	5.4	11% (6 gms.%)	14% (6.2)	11%	15%
2. Serum iron (mean)	98	10%	12%	18%	20%

The values of serum iron and serum proteins indicate that the improvement in picture of anaemia is a result not only of the improved therapy but also a reflection of the improvement in the nutritional standards of the patient. For all cellular activity, proteins are required for protoplasm formation. If the proteins are not available in adequate amounts then the response to iron therapy is slow and apparently refractory. The rise in serum proteins precedes the rise in haemoglobin by many days. Once the serum proteins return to normal, these values persist as long as the dietetic needs are adequately maintained. The serum protein values are independant of the type of iron therapy employed.

Serum iron values show a sustained rise towards the end of the first month of treatment. This rise is much higher under parenteral iron therapy as compared to oral iron. The rise which commences after about a week of therapy reaches an increase of about 10% under oral iron and 18% under parenteral iron at the end of 30 days. The rise thereafter plateaus down showing a minimal further rise of only 2% in the next month.

Complications during therapy

Oral iron:	Total number of cases	60
	No. of patients with complications	7
	Gastrointestinal hurry	3
	Anorexia	2
	Vomiting	2
Parenteral iron:	Total number of cases	20
	No. of patients with complications	Nil

The above table shows that about 12% of patients on oral iron therapy had transient complications which are

not seen in the parenteral iron therapy.

C. G. Barnes is of the opinion that prophylactic therapy with 9 grains of ferrous sulphate or 20 grains of ferrous gluconate per day should be adequate. He says that large doses will not lead to corresponding gain in the absorption of iron and will increase the incidence of gastrointestinal disturbance.

Fisher and Biggs (1960) in their series obtained a rise of haemoglobin to 90 per cent or more in 75 per cent of their patients with oral iron therapy.

Many physicians perhaps do not appreciate how rapidly the iron deficient individual will respond to her specific need, that is, iron administered orally or parenterally. Many have documented this fact. Pritchard, studying a group of menorrhagic women, found a rise of haemoglobin of 5.0 gm. per 100 ml. in 19 days with intramuscular iron and 4.9 gm. per 100 ml. in 24 days with oral iron. But Ellis Vanslyck is of the opinion that oral iron will replenish body iron stores quite slowly after the haemoglobin concentration has been corrected and here parenteral iron has advantages.

Summary and Conclusions

(1) A controlled comparative study of oral iron preparations, using ferrous sulphate, syrup of chelated iron, Rarical tablets, and Jectofer injections, administered to groups of twenty patients has been presented.

(2) The response to therapy, as seen in the rise of haemoglobin values after 30 and 60 days of treatment, reveals that in the moderately severe anaemia group, the average percentage rise in haemoglobin was 13% after one month and 27% after two months. The corresponding rise of haemoglobin under parenteral iron therapy was 16% and 35%.

In severely anaemic patients the percentage rise of haemoglobin at the end of one and two months of therapy was 24% and 52% respectively as compared to 42% and 86% respectively, showing clearly the improved results following parenteral therapy.

(3) Of all iron preparations Rarical which is a combination of iron, calcium and vitamins, gives better results as compared to syrup iron and fersolate.

(4) The haemoglobin, red blood cells, colour index, P.C.V. and M.C.H.C. all show improvement following therapy which is more marked in the severely anaemic patients and under parenteral iron therapy.

(5) The serum protein values and the serum iron values show a rise which precedes the rise of haemoglobin and the haemogram indices. The maximum rise of serum proteins and serum iron occur towards the end of the first month. Very little further rise is noticed thereafter.

(6) The rise in serum iron values is almost double under parenteral iron therapy as compared to oral iron.

(7) Seven patients out of the 60 treated with oral iron had complained of transient gastrointestinal discomforts, giddiness, and anorexia. None of the patients in the parenteral iron therapy had suffered from untoward symptoms.

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