Neonatology—then and now (CHM Walker)

Anaemia of prematurity (1962)

The prevention of anaemia of prematurity

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It was most unfortunate that, because of the minimal risk of producing a tumour at the site of injection, the use of intramuscular iron-dextran 'complex, used for some time as an effective prophylactic against late anaemia of prematurity, had to be discontinued. A single injection had a long term effect and avoided the need for daily oral iron. Thus it became necessary to determine if oral treatment could substitute adequately and the conclusions of the work reported in this paper were:

'A comparison of mean haemoglobin levels at four week intervals between 57 premature babies who received intramuscular injections of an iron-dextran complex in the newborn period, 75 who received oral iron during the first six months of life and 70 who did not receive any prophylactic iron indicates that the intramuscular preparation was the most effective in preventing the anaemia of prematurity, especially in babies of lowest birth weight. It is suggested that oral iron might be satisfactory if its regular administration could be assured'.

It is also suggested that the introduction of mixed feeding in the fourth month of life is required to maintain a satisfactory haemoglobin level once this has been achieved by the administration of additional iron, but will do no more than check the rate of fall of haemoglobin if additional iron is not given.

Today. While officially recommended doses of oral iron have now been established absorption and utilisation rates vary and compliance is always a problem after the baby goes home. So an awareness that anaemia can 'creep up on one' must be maintained at all times.

There have been several important innovations in treatment since this paper was published. These include the early use of folic acid, vitamin E, and possibly other trace elements but still late anaemia occurs and top up transfusions are required. The part played by iatrogenic loss has been well documented and the answer to the problem would seem to lie in not only minimising blood loss and supplying the substrates but in stimulating the marrow to use them. The role of erythropoietin in this respect is of obvious importance. It is not surprising that the erythropoietin concentration in preterm babies falls in the first few weeks as the premature kidney is unlikely to

be able to produce sufficient to maintain adequate concentrations of haemoglobin. As with folic acid, maternal 'donations' are exhausted before the babies can produce enough of their own. One is reminded of work done in the early 1960s by Dr Sandy Spiers of Stirling who stored the plasma taken from blood removed during exchange transfusion which, when given later to the same baby, produced a good red blood cell response. Whether this was due to the erythropoietin, to folic acid content, to both (or to something else) is uncertain but it seems more effective in marrow stimulation than adult donor blood, which seems to have the effect of reducing marrow response to anaemia.

The latest news on erythropoietin is encouraging however. It is now produced by recombinant DNA technology and is available in good quantities.¹ This is not only effective in various forms of anaemia but it has the added bonus, which could be most valuable in preterm babies, in that it also stimulates the production of platelets. Perhaps this at least in part is the long awaited answer to the early marrow inadequacy of the preterm infant.

The principal innovation in assessing the need for and volume of blood transfusion has been the measurement of oxygen carrying power (red cell mass) rather than merely measuring haemoglobin or haematocrit.² While not denying its value this technology is not always available and many parts of the world will still have to rely on haemoglobin, and perhaps reticulocytes, to know how the bone marrow is performing and how much blood to transfuse.

References

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- ² Phillips HM, Holland BM, Abdel-Moiz A, *et al.* Determination of red cell mass in assessment and management of anaemia in babies needing blood transfusion. *Lancet* 1986;i:882-4.

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