SEVERE ANEMIA AND ADVANCED PREGNANCY

by

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Introduction

It is known that in Britian the maternal mortality fell from 4.4 per 1000 total births in 1928 to 0.8 in 1956, and in Scotland the maternal mortality was 0.19 per thousand total births in 1970. (Public Health Laboratory report service, 1972) Corresponding figures for the developing countries are not available. In such countries the antenatal attendance also is poor. Otherwise the two prime leaders of maternal mortality in these countries, namely, severe anemia and toxemia of pregnancy could have been better controlled. Mudaliar from Madras was the earliest to call attention to the high mortality rate in this country and to point out that severe anemia caused 35% of this high incidence.

Since then this appalling picture has changed. The subject received much attention, and in 1969 at the International Seminar on Maternal Mortality held at Bombay, the problem was viewed from many angles. These mothers are on the verge of circulatory failure, the more severe the anemia the worse the oxygenation of the tissues including the uterus and the more liable they are to go into premature labour making a potentially dangerous situation really explosive.

In Ibadan, Nigeria, another developing country, ninety-three women died in the University College Hospital during 1968, though the best known treatment for anemia was given to them. Studies show that anemia is the prime factor in Ibadan that swells the maternal mortality rate (Harrison, 1968). For the treatment of this condition there were only two accepted lines of approach. One method was to supply the deficiency factors and improve the haemoglobin content of the red blood cells and thus reduce the anoxia in the vital tissues. The alternative line of treatment was to transfuse red cells from a donor to the patient. Yet though blood transfusion was an established line of treatment in many conditions in these women transfusion of all kinds proved difficult and often lethal. This study therefore was undertaken to make blood transfusion possible in such patients who have a precarious state of cardiovascular function and improve their prognosis. It was also intended to be a method of treatment that could be safely carried out to produce quick results in the hospitals of developing countries where most of these patients attend.

Present Trial

This trial was conducted in Unit Three of the Lady Curzon and Bowring Hospitals of the Institute of Post Graduate Studies and Research, Bangalore, during the period of January to July 1972. For the present study the patients were selected from the antenatal and labour wards

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of the hospital when they fulfilled the following conditions:

(1) They should be over 34 weeks' pregnant.

(2) They should have a haemoglobin of less than 50% and they should show cardiac strain as manifest by tachycardia and dyspnoea at rest or at slight exertion.

(3) The patient should be willing to participate in the programme.

Presentation of the Cases

In the group there were two primiparas 19-22 years of age, and the rest were in the age group from 24-43 years, of these 16 were grand multiparas. One was a widow and 23 were married; mostly they were from the lower income groups. Quantitywise and qualitywise their diet was lacking according to any nutritional standards. Only two of them had primary education and the rest had never gone to school. Seventy-eight per cent of them were from villages near the city staying within four to sixteen kilometers from the nearby hospitals. Including those staying in the city proper, none of them attended the antenatal clinic, except one who was treated for a threatened abortion at the fourth month in this hospital.

Two of them had mitral stenosis complicating the picture. The rest had only uncomplicated severe anemia. They had the common appearance of puffy face, muddy complexion, lustreless hair with anasarca; 6 of them had marked swelling of the lower extremities. Mucous membrane pallor was striking not only due to lowered haemoglobin but also due to capillary peripheral spasm which made them look even paler than what they were. Though the characteristic haemic murmur of the heart was present in some of the cases, most of them showed no signs of cardiac failure. The pulse rate varied from 90-130 per minute while at rest. Their main complaints were dyspnoea on exertion and feeling of extreme weakness. A few complained of a persistent headache.

On investigation, haemoglobin ranged from 25-35% and there were two cases with haemoglobin below 20%. Packed cell volume ranged from 26-32%. The blood picture was suggestive of dyphasic normocytic cells in 6 of them, the rest had a blood picture of microcytic hypochromic anemia with poikilocytosis and anisocytosis. Serum protein ranged between 5.8—7.2 gms/ccs and possible anoxic changes were taking place in the liver (Upadhyay, 1970) though no liver function tests were conducted. Urine showed traces of albumin in a few of the cases and stools showed roundworm infestation in 4 cases and only in 1 case was hookworm ova detected. X-ray pictures of the chest showed an enlarged heart with basal congestion of the lungs in a few, but the majority showed a clear lung field. The 2 cases with mitral stenosis showed the heart shadow occupying almost half the total chest shadow. Because of shortage of time electrocardiograms were done in only 5 cases excluding the mitral stenosis cases and in 2 of them the report was no abnormality seen and in 3 cases the findings were suggestive of myocardial vascular deficiency.

Transfusion Dosage

After grouping and cross matching, 300 ccs to 350 ccs of packed cells were given in 22 cases and twice that amount in 2 cases. In the 3 cases where whole blood was used to save time, the results were still good. The blood

bank in the hospital found it difficult to pack small doses in different containers and so all doses were given from a single container. The 300-350 ccs were divided into six doses. Three doses of 35 ccs each were given at eight hourly intervals followed by two doses of 50 ccs at twelve hourly intervals. The remaining quantity which usually ranged from 75-120 ccs was given after another twelve hours as one dose which all of them took well. Even when the blood containing bottle was graduated a label with different quantities of the doses marked was affixed to the bottle to make the dosage accurate. Thus, the total transfusion, including the intervals between them, took about 60 hours. After each transfusion the remaining blood in the bottle was immediately put back in cold storage without further shaking and it was observed that the supernatant fluid remained the same colour throughout the transfusion period. The first and often the first three transfusions were the most difficult ones to give. These were administered under the supervision of a senior member of the hospital staff. Though intravenous injection of blood was thought of for the first three small doses at the beginning it was not found satisfactory when tried in the first case. This was because pushing in the blood was difficult and the rate of flow was not controllable, therefore even the small doses were given only as a drip. A histamin preparation like Synopen or Avil was given before each dose of transfusion and oxygen and other aids to support the patients were made available especially for the first two or three transfusions. The prefixed dosage was completed to avoid alterations in the programme. Often oxygen administration with sedation helped to make the patient more comfortable. When blood was given the usual manifestation of strain were tachycardia and tachypnoea, with perspiration in a few cases, also a few of them complained of substernal pain. The patients who gave the maximum anxiety were the ones who had more cardiac symptoms and not the lowest haemoglobin percentage. Age was also a factor contributing to difficulties. The two mitral stenosis cases were managed under the supervision of a physician as well. The later doses were taken better, and the last long one gave no trouble in any of the cases.

The Phases of Treatment

All 24 cases selected for the trial had a three phase treatment. The first phase was a preparatory one, which lasted for 24 to 36 hours. During this time a case study was made and investigations carried out. The patient meanwhile had rest, oxygen being given when indicated and Digoxin was given in proper doses when the pulse rate was found high, specially in the cardiac cases. All patients had one or two parentral doses of diuretics like Frusemide.

The second phase was the transfusion proper. After grouping and cross matching the blood was made available by two p.m. the next day of admission. The starting time suited every one well including the staff members of the hospital. The patient slept after the second transfusion at ten p.m. without any disturbance till six a.m. the next day when she got her third transfusion, and later the twelve hourly transfusion posed no problems.

During the third phase, which followed if the condition of the patient was not improving satisfactorily, repeat multidose transfusions were given. Only two patients in the series had repeat multidose transfusion. The rest did well on the

parentral iron therapy supplemented with folic acid and vitamins after the first multidose transfusion of about 300 ccs of blood.

Results

Mental outlook improved in many of the patients and a feeling of well being cheered them up. Colour improved with better oxygenation but haemoglobin as such increased only from 5-7% with the first series of transfusions and when repeated it varied from 15-16%. Pulse rate gradually settled and dysponea subsided. Diuresis increased and with the oedema getting less she became more comfortable. Further treatment with iron, folic acid and vitamins sustained the improvement. All patients had delivered vaginally and in the two mitral stenosis cases and four other patients low forceps was applied under pudendal block to reduce the length of the second stage. But, on the whole it was noticed that the first and second stages were shorter in these patients. The third stage of labour was managed with care and the controversial I.V. Methergin was given to all patients with the anterior shoulder of the baby presenting, except to the two mitral stenosis cases. Placenta was delivered with controlled cord traction. Postpartum haemorrhage had to be watched for and carefully avoided especially in these cases because it was found that the placenta was heavier, the average baby to placental weight was 1:4.5. Repeat fundal massage with an ensured empty bladder reduced bleeding.

Puerperium was uneventful in most cases. All of them were maintained under antibiotic coverage and infection was avoided as far as possible by careful nursing. Perineal sutures healed well and except for the incidence of one or two urinary infections, one mild puerperal infection and one instance of cracked nipples there was very little manifestation of infection. Thus, the most often found complication of severe anemia in puerperium was negligible.

The babies that survived gave very little trouble. All of them were on breast milk except the baby whose mother developed cracked nipples. All these babies had a haemoglobin percentage of 100%-110% when their mothers had only less than 50% haemoglobin. But none of them were available for a check up of the haemoglobin six to twelve months after birth. Whether these babies are more liable to a rapid fall in haemoglobin due to insufficient iron storage in their body could not be proved in this study. All mothers left the hospital by the seventh day to the tenth day.

Discussion

For the patient with severe anemia facing a major strain like labour and puerperium the best remedy is transfusion of the donor's healthy cells. The red blood cells supplied by the donor start to function the minute they reach the circulation of the patient, improving the functioning of all her tissues by the resulting enhanced oxygenation. (Scott, 1962).

Blood transfusion service traces its history to the year 1667 when Professor James in Paris transfused blood from an animal to man. This was a few years after the establishment of the circulation of blood by William Harvey in 1654. Blood group studies by Landsteiner of 1900 were improved by Jansky and Moss in 1910 and to prevent clotting Haustin added citrate to the blood. Thus step by step the hurdles and risks of transfusion were overcome. It was found that in these

chronic anaemia cases the degenerative fatty changes in the myocardium made it difficult for it to function normally and deal with the expansion of volume due to the transfusion even when given slowly and the bulk reduced in a concentrated form. When transfusion is given to such patients the venous pressure rises with a decreased cardiac output and delayed volume adjustment causes pulmonary oedema which often proves fatal. (Plummer 1963; Dasgupta 1964).

To escape these complications of transfusion several improvements have been tried over the years. Intraperitoneal infusions of blood as performed by Fowler in 1968 with red cell absorption through the net work of the lymphatics in the peritoneal cavity is not applicable in these cases of advanced pregnancy. Alternatively packed cell transfusion was tried to reduce the volume to the minimum possible by discarding the supernatant plasma but was found not sufficiently small to reduce the risk of volume increase, and the risk of cardiac strain remained especially in the more severely anaemic patients. The safety produced with the concurrent administration of diuretics like Frusemide or Ethacrynic acid administered parenterally was not sufficient to make it a dependable measure to safeguard the heart at all times. However, as an ancillary aid to reduce circulating volume it can be used and in this series of multiple dose transfusion it was used (Ledingham, 1965).

An alternative approach was to give transfusion on an exchange basis with better quality cells used to replace a slightly larger volume of the recepient's blood which was removed and which had only poorer quality cells. By this procedure total blood volume is not increased and central venous pressure is reduced. Excellent results with exchange transfusion were reported by many, Daniel (1965) being one of them. But even partial exchange transfusion has several drawbacks to make it an acceptable procedure for the treatment of these cases in many hospitals. For supplying the large volume of blood to be transfused many donors are required and this increased the risk of incompatibility between different donor bloods. Air embolism, clot embolism, citrate toxicity and cardiac arrest are some of the major risks involved in this procedure. The sophisticated set-up required to arrange the transfusion with facilities to deal with emergencies like those mentioned above are lacking in many hospitals, especially the trained team of workers.

Conclusions

In the management of cases of severe anaemia with a high mortality individual evaluation and choice of treatment are welcome and in this study an attempt is made to make the treatment of blood transfusion possible to such patients. Each mini transfusion of the dosage schedule improved the heart muscle function sufficiently to make it receive the next dose with toleration and benefit. On this dose schedule the time interval between doses is not too long and this enables the maximum effect of the therapy in a short time. Not only is it safe but this streamlined procedure is easy to carry out, and is quite practicable in any institution where a transfusion can be arranged. The few repeated needle pricks are well accepted by the patients when the objective of the treatment is explained to them. After the multiple dose transfusion and, if time is available before delivery, a course of deficiency factors like iron, folic acid, vitamins to-

gether with a protein rich diet can be given to her to improve her condition still further. Thus, for the patient suffering from severe anaemia in advanced pregnancy, management with Multiple Dose Transfusion is an effective treatment.

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