***Lecture 12 Blood transfusion***

**Compatibility testing:**

Compatibility testing may be very difficult especially in warm AIHA.

If the autoantibody has specificity, the red cells lacking the corresponding antigen should be selected for transfusion. For example, a patient with warm reacting anti-e antibody should be transfused with compatible group ABO red cells of R2 R2(Cde/Cde) phenotype. In most instances, the antibody has no specificity and reacts equally strongly with the patient's own red cells and donor's red cells. Such blood is called (least incompatible blood).

In addition a strong warm reacting antibody may mask the presence of alloantibody such as anti K, and anti JK or others.

When a anti of (least incompatible) is selected for transfusion, it must transfuse over a period of four to eight hours, to minimize the untoward reaction, and it should transfused under the supervision of the physician.

**Drug induced immune hemolytic anemia:**

In this condition a drug (methyldopa, pencillines, sulphonamides) induced immune haemalysis is responsible for the destruction of red cells. Blood grouping and compatibility testing usually do not present a problem.

**Haemolytic disease of the newborn (HDN):**

HDN is caused by blood group difference between the fetus and the mother.

Most blood groups can be involved, but the most common and sever cases are caused by differences in the rhesus blood group system, the mother being rhesus negative (dd) while the fetus is rhesus positive carrying the D-antigen (Dd or DD).

**Mechanism:**

In most normal pregnancies, small numbers of fetal red cells enter the maternal circulation late in pregnancy or at delivery.

During delivery, sufficient fetal red cells cross the placenta and enter the maternal circulation and lead to immunization the mother, and production of antibodies to any blood group differences between the fetus and the mother. Any IgG antibodies produced will pass across the placenta in a subsequent pregnancy, coating the red cells of the fetus. Later such coated cells will be haemlysed in the fetus causing anemia.

 Fetus RBCs

D

D

D

Mother immunization

D

D

D

Anti-D antibodies (IgG)

 Coating red cells

 Extra vascular haemolysis

 Anemia

**Formation of maternal antibodies:**

The formation of antibodies in the mother depends on the dose of the fetal cells.

When one pint of blood (Rh+ve) is given by transfusion to Rh-ve individual, 70% will produce anti-D (responder) while 30% will not produce anti-D (non-responder).

There is some variation in the antigenicity of D according to the genotype of the fetus, and D**U**is a less potent antigen. A significant factor which affects the number of fetuses sensitized is the ABO compatibility of the fetal blood and that of the mother.

**Clinical effects:**

In utero, the only effect of antibody coating is haemolysis. The earlier this starts, the more severely affected the fetus becomes.

When the degree of anemia gets more severe, the fetus suffer from cardiac failure and becomes edematous with ascites, namely hydropsfetalis, and most severely affected fetuses die in utero.

Before birth the placenta clears any bilirubin from the fetal blood and jaundice at birth usually only mild.

After birth, the hemolysis of the babyʼs cells continues until any material antibody has been used up, and the anemia often becomes severe. More importantly, the unconjucated bilirubin level can rise to levels that can cause kernicterus (brain damage).

**Management of the sensitized pregnancy:**

1. Blood grouping for all pregnant.
2. Indirect Coomb's test (antibody screen).

All pregnant women are screened for the presence of antibodies and this would not only detect anti-D, but also any other atypical antibodies indicating the possibility of hemolytic disease of the newborn due to other antibodies.

Once an antibody has been discovered, it must be identified.

All mothers test at 12 weeks

-ve Coomb's retest at 28 and 34 weeks

+ve Coombʼs retest at 16, 20, 24, 28 weeks then 2 weekly.

1. Antibody titer: the level of antibody found in the mother correlate badly with the severity of the disease in the fetus.
2. The genotype of the father is also important because if, for example, he is Dd then the fetus has 50% chance of being rhesus negative (dd) and will be unaffected.

**Severity of the disease in the fetus:**

Before birth, the severity of the disease is assessed by the amount or titer of antibody in the maternal blood, the history of previous pregnancies, the bile pigment (bilirubin) level in the amniotic fluid, and findings on ultrasound examination.