

# OBSTETRICS AND GYNECOLOGY

## ( 25 ) Rh Isoimmunization

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# Objectives:

Not given!

# Rh Isoimmunization

## Rh Isoimmunization:

- Is an immunological disorder occurs in a pregnant **Rh-ve mother** carrying **Rh+ve fetus**.
- It affects 1 in 250 live births in Europe and North America, it is much less frequent in other parts of the world such as Asia, where the Rh-negative blood group is uncommon.
- Pathophysiology: The Rh antigen is limited to the red cell surface (Rh complex, C,**D**,E,c,e). \*Rh negativity is referring to the big D.

## Fetomaternal Haemorrhage (FMH):

Rh isoimmunization can only take place if fetal red cells **cross the placental barrier** into the maternal circulation.

When does it happen?

- The placenta is subjected to maximal **trauma** during delivery.
- After **abortion** with a gestational age above 14 weeks.
- APH/trauma.
- External version. \*A delivery procedure for the breech position.
- Amniocentesis.
- Complicated and difficult deliveries.
- Caesarean section.

## The Natural History Of Rh Isoimmunization:

Rhesus antibodies are humoral antibodies or free antibody:

- IgM – large, unable to cross the placenta.
- IgG – small, able to **cross** the placenta and attach itself to Rh positive red cells leading to haemolytic anaemia.

## Immune Responses Are:

- A. Primary – first response to an antigen appears after several weeks and is **IgM**.
- B. Secondary – when exposed for the **2nd** time a primed, antibody will appear within a few days and its **IgG**.

Generally, the quantity of antigen required to produce a secondary immune response is **very much smaller** than that required to initiate the primary immune response.

## Pathophysiology:

- The first pregnancy is usually **unaffected** by RHD because FMH's of sufficient magnitude to induce primary immunization do not usually take place until delivery.
- Only about 5% of all Rh-negative mothers form antibodies.
- Vast majority of FMH's after delivery are small but about 0.2% of mothers have larger bleeds of 30 ml or more. The risk of Rh immunization is proportional to the size of the FMH.

## ABO Incompatibility:

When the mother and the baby are ABO incompatible such as an O mother and an A baby any fetal red cell (Group A) entering the maternal circulation (Group O) is destroyed, in an exactly similar way to that occurring in an ABO incompatible blood transfusion.

## Pregnancy:

FMH does occur during pregnancy but is much less common than following delivery. Most of the bleeds occur in the last trimester when the placenta is degenerating and the barrier may become a little more pervious.

## The Prevention of RHD:

D-positive FMH's can be neutralized by passively administered anti-D antibody (Rh immunoglobulin).

**When to give it? (During every pregnancy):**

- At 28 weeks.
- Post delivery.
- After abortion.
- APH/trauma.
- External version.
- Amniocentesis.

## Failure Rate:

About 1% of Rh-ve women become immunized after D-positive pregnancies despite treatment with Rh immunoglobulin.

- Those **already primed**, even though overt antibody is undetectable by present techniques.
- **Large FMH's** before delivery e.g. epileptic or eclamptic patients.
- **Extreme sensitivity** to the D-antigen: thus small bleeds will produce primary response.
- **Large FMHs** after delivery **more than the amount that can be taken care of** by standard dose of immunoglobulin.
- **Failure to give** the immunoglobulin – patients who slip through the net.

## Management of Isoimmunization:

Pregnancies complicated by clinically relevant isoimmunization are managed in centers with fetal medicine units and regional blood transfusion.

- a) Maternal blood group and antibody quantification.
- b) Paternal blood group genotyping.
- c) Fetal blood group genotyping.

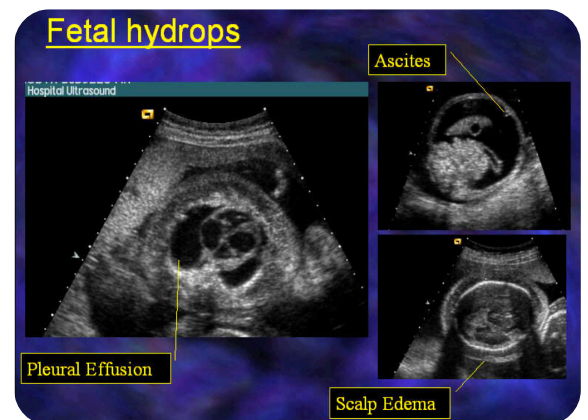
- d) Ultrasound assessment.
- e) Amniotic fluid spectrophotometry.
- f) Fetal blood sampling.
- g) Fetal blood transfusion.

## MGT:

- Maternal blood group and antibody quantification at booking and 28 weeks if initial is –ve.
- Paternal blood group genotyping.
- Anti-D titer is not serious **if below 1:16** and should be repeated every 2-4 weeks.
- If titer is **above 1:16** invasive testing:
  - Ultrasound assessment.
  - Amniotic fluid spectrophotometry.
  - Fetal blood sampling.
  - Fetal blood transfusion.

## Ultrasound Assessment:

- The severely anemic fetus on scan will have: skin edema, ascites, pleural or pericardial effusions, cardiomegaly and an edematous placenta (Hydrops).
- Middle cerebral artery blood flow is increased.



## Amniocentesis and Amniotic Fluid Analysis:

- When fetal hemolysis occurs the amniotic fluid becomes bright yellow from the **bilirubin**.
- Amniotic fluid bilirubin concentration can be quantified by spectrophotometry by assessing the change in optical density at 450nm ( $\Delta OD 450$ ).
- **Amniocentesis is started after 24 weeks** under ultrasound guidance.

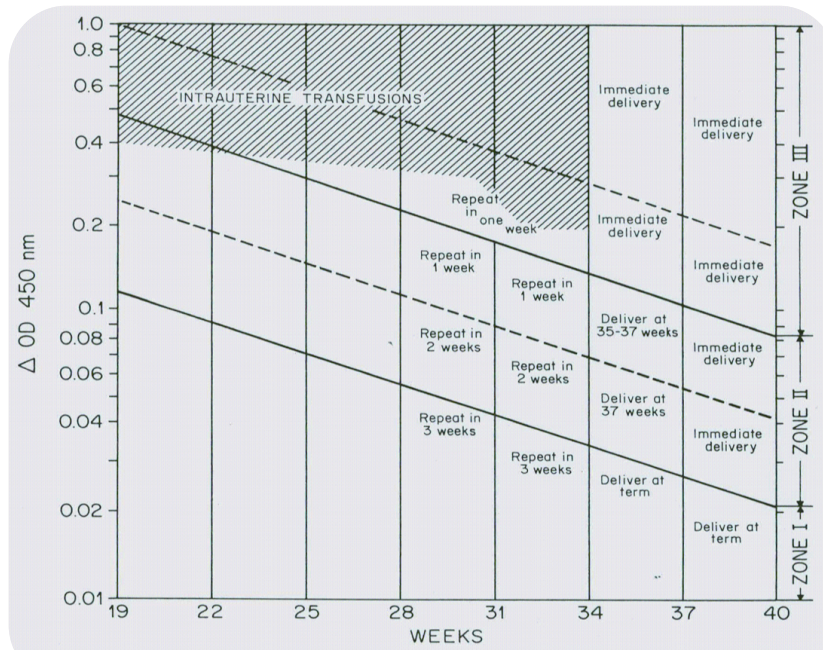


Figure 30-2. Modified Liley chart used to determine the appropriate management of the patient with isoimmunization.

## Complications Following Intrauterine Transfusion:

1. Premature labour.
2. Pre-labour ruptured membrane.
3. Fetal haemorrhage.
4. Fetal bradycardia.
5. Failure to obtain a sample.
6. Increase in maternal Isoimmunization by inducing feto-maternal haemorrhage.

## CTG:

Fetal heart rate changes have been noted with severe anemia. A sinusoidal pattern with the loss of normal baseline variability of the CTG is highly suggestive of severe anaemia.

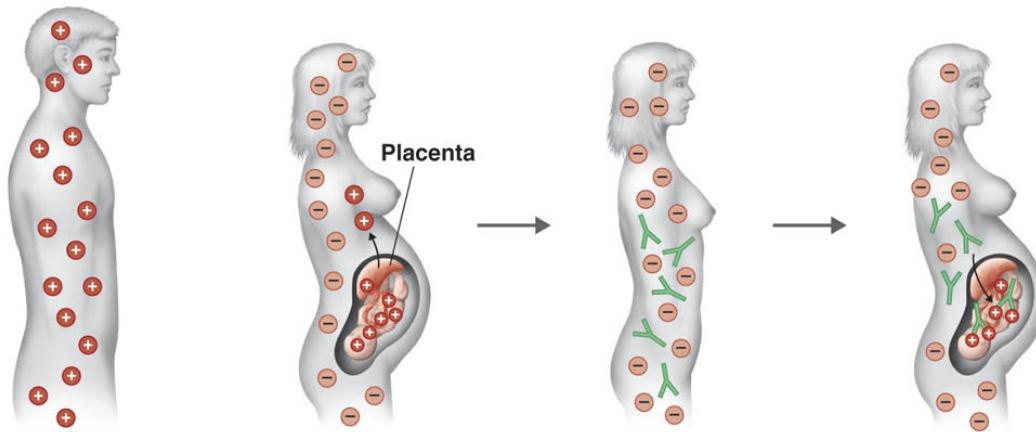
## Irregular Antibodies:

- 2% \*Other than Rh D.
- Kell, Duffy, Kidd...etc.

# Summery

- ✓ Rh Isoimmunization is an immunological disorder occurs in a pregnant Rh-ve mother carrying Rh+ve fetus.
- ✓ Rh isoimmunization can only take place if fetal red cells cross the placental barrier into the maternal circulation.
- ✓ Rhesus antibodies are humoral antibodies or free antibody:
  - IgM – large, unable to cross the placenta.
  - IgG – small, able to cross the placenta and attach itself to Rh positive red cells leading to haemolytic anaemia.
- ✓ Immune Responses Are:
  - Primary – first response to an antigen appears after several weeks and is IgM.
  - Secondary – when exposed for the 2nd time a primed, antibody will appear within a few days and its IgG.
- ✓ D-positive FMH's can be neutralized by passively administered anti-D antibody (Rh immunoglobulin).  
When to give it?
  - At 28 weeks.
  - Post delivery.
  - After abortion.
  - APH/trauma.
  - External version.
  - Amniocentesis.
- ✓ Management Of Isoimmunization:
  - Maternal blood group and antibody quantification.
  - Paternal blood group genotyping.
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  - Fetal blood sampling.
  - Fetal blood transfusion.
- ✓ Ultrasound Assessment:
  - The severely anemic fetus on scan will have: skin edema, ascites, pleural or pericardial effusions, cardiomegaly and an edematous placenta (Hydrops).
  - Middle cerebral artery blood flow is increased
- ✓ CTG: Fetal heart rate changes have been noted with severe anemia. A sinusoidal pattern with the loss of normal baseline variability of the CTG is highly suggestive of severe anaemia.





- 1 Rh<sup>+</sup> father.
- 2 Rh<sup>-</sup> mother carrying her first Rh<sup>+</sup> fetus. Rh antigens from the developing fetus can enter the mother's blood during delivery.
- 3 In response to the fetal Rh antigens, the mother will produce anti-Rh antibodies.
- 4 If the woman becomes pregnant with another Rh<sup>+</sup> fetus, her anti-Rh antibodies will cross the placenta and damage fetal red blood cells.

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## MCQ's :

1. The blood group of a 28-weeks pregnant lady is ARH negative. Her husband's group is O Rh negative. What is your next step regarding her blood group?
  - a. Check Rh-antibody every 4 weeks.
  - b. Give anti-D prophylaxis at 34 weeks.
  - c. Give anti-D within 72 hours after delivery.
  - d. Reassure her that there is no risk of Rh immunization.
  
2. Anti-D prophylaxis:
  - a. Should be given to all sensitized Rhesus negative women after delivery.
  - b. Should be given to all Rhesus negative women after amniocentesis.
  - c. Should be given to all Rhesus positive women who give birth to Rhesus.
  - d. Is contra-indicated during pregnancy if the women is Rhesus negative.

Ans: 1:d. 2:b.

For mistakes or feedback

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