PREVENTION OF RHESUS ALLO-IMMUNISATION

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BACKGROUND

- Some blood groups act as antigens in individuals not possessing those blood groups.
- If enough fetal cells leak into maternal blood, a maternal antibody response may be provoked.
- Some blood types produce antibodies capable of crossing the placenta.

BACKGROUND 2

- Ab react with subsequent fetal erythrocytes causing hemolytic anemia.
- Erythroblastosis foetalis results/death.
- Rh is the most complex human blood group.
- Ag grouped in 3 pairs: Dd, Cc, Ee.
- Rh factor D is of particular concern.
- 45% of rhesus-positive are homozygous.

INCIDENCE

- Basque population highest incidence 30-35%.
- Caucasians: 15-16%
- Finland: 10-12%
- Blacks in the USA: 8%
- African blacks: 4%
- North American Indians: 1%
- Mongoloid races: nil

INCIDENCE 2

- Overall risk for Rh+ ABO compatible with Rh-ve mother is 16%; 1.2-2% antepartum, 7% within 6 months of delivery and *7% early in the 2nd pregnancy*
- ABO incompatibility is *protective* 1.5-2%.
- Other *protective mechanisms*: 30% are nonresponders

PATHOGENESIS

- Rh Ag are lipoproteins.
- Isoimmunisation during incompatible blood transfusion or fetomaternal hemorrhage in pregnancy or at delivery.
- Fetal red cells found in mother's blood in 6.7% women in 1^{st} trimester, 15.9% in 2^{nd} trimester, 28.9% in 3^{rd} trimester.

PATHOGENESIS 2

- Predispositions: abortion, amniocentesis, abdominal trauma, PP, abruptio, IUD, multiple pregnancy, manual placenta removal, cesarean section.
- As little as 0.1ml Rh+ve cells will sensitize
- Initial low level of IgM, then IgG within 6 weeks to 6 months become detectable.

PATHOGENESIS 3

- Other blood group isoimmunization are: Kell, Duffy, Kidd, MNS, Diego, P, lutheran and Xg groups.
- Fetal anemia stimulates extramedullary erythropoiesis.
- Immature erythrocytes present in fetal blood.
- Hemolysis produces neurotoxic *heme* and *bilirubin* (Placental removal).

PATHOGENESIS 4

- If destruction > production, then severe anemia with erythroblastosis foetalis; extramedullary hematopoiesis, heart failure, edema, ascitis, pericardial effusion.
- Tissue hypoxia and acidosis.
- Modified liver architecture and function causing decreased protein production, portal hypertension and ascitis.

PATHOGENESIS 5

- Neonatal effects: anemia and sequelae.
- Hyperbilirubinemia in a context of an immature liver and low levels of glucuronyl transferase; kernicterus ensures.

PREVENTION IN Rh-negative UNSENSITIZED PREGNANCY

- At 1st ANC or prepregnancy: screening for ABO and Rh blood group, including Du in the couple.
- Antibody screening (indirect Coombs' test).
- At 28 weeks; Ab –ve, 300µg RhIgG given.
- At 35 weeks; Ab –ve, then observation; if +ve, the patient managed as Rh-sensitized.

PREVENTION IN Rh-negative UNSENSITIZED PREGNANCY 2

- Postpartum; if infant Rh+ve or Du+ve, 300µg of RhIgG given to the mother provided she is antibody negative. If she is Ab positive then she is managed as Rh-sensitized during the next pregnancy.
- Special fetomaternal risk states exist:
  - Abs; 2% and 4-5%, 50µg of RhIgG.
  - Amniocentesis; 11%, 300µg of RhIgG.

PREVENTION IN Rh-negative UNSENSITIZED PREGNANCY 3

- APH; PP or abruptio, 300µg of RhIgG, repeated if pregnancy carried on 12 weeks after the 1st dose.
- Fetomaternal hemorrhage; in 0.4% of cases, 300µg will not be enough. *Verify with Kleihauer-Betke acid elution test*. Indications; precipitous delivery, anemic neonate, abruptio, PP, tetanic labour, manual removal of placenta.

MANAGEMENT OF PREGNANCY WITH ISOIMMUNIZATION

- More than 1 in 8 pregnancies.
- Ultrasound at 14-16 weeks to look for ascitis and edema.
- Amniocentesis?? at 18-22 weeks, analyzed by spectrophotometry.

MANAGEMENT OF PREGNANCY WITH ISOIMMUNIZATION 2

- *Mildly affected*, repeat 2-3 weekly until delivery near term.
- *Moderately affected*, repeat 1-2 weekly and enhance lung maturity with betamethasone.
- *Severely affected*, repeat weekly and interventions needed to carry pregnancy to an acceptable age when neonatal risk is lower than in utero risk.

MANAGEMENT OF PREGNANCY WITH ISOIMMUNIZATION 3

- In the severely affected, ultrasound often indicated to look for ascitis or edema.
- Intrauterine transfusion of O-negative, low titer, glycerolized or irrigated packed red cells.
- Sites: abdominal, placenta, abdominal cord insertion, placenta cord insertion.

ABO - Rh INCOMPATIBILITIES

- ABO hemolytic disease is milder??
- About 20-25% pregnancies at risk but recognizable process only in 10% of the cases.
- Infants of groups A and B, of group O mothers.
- Neonatal Coomb's test +ve or –ve and maternal Abs are variable.

ABO - Rh INCOMPATIBILITIES 2

- Rh isoimmunization, 1-2% in the first-born infant.
- ABO, 40-50% in the 1st born infant. Severe sequelae (stillbirth, hydrops) almost never occur and severe fetal anemia is rare.
- Neonatal jaundice at <24 hours, HSPM.

ABO - Rh INCOMPATIBILITIES 3

- Neonatal jaundice at <24 hours:
  - Phototherapy in 10% of cases
  - Exchange transfusion in 1% of cases
  - Late anemia rare
  - Kernicterus almost never occurs

MATERNAL-FETAL MEDICINE

- *What can maternal-fetal medicine in Yaounde-Cameroon offer in such situations?*

  - Routine preventive measures
  - Precautions before invasive procedures
  - *Amniocentesis for bilirubin testing??*

MATERNAL-FETAL MEDICINE 2

- Ultrasound in pregnancy, main tool!!
- Diagnosis of *fetal anemia* by ultrasound
- Doppler studies of MCA; peak systolic velocity expressed as the mean of the median (MoM) for gestational age.
- Values of MoM <1.5, 1.5 - 1.9, >2.0 etc.
- Perinatalogy index from PUBMED!!

CONCLUSION

- The low incidence in black Africans should not be a misleading factor.
- Preventive measures remain the main arm especially in our economically weak population.
- *‘A knot on time saves nine’.*
- New techniques in the diagnosis of fetal anemia and in the monitoring of fetal wellbeing are a reality in our milieu.

THANK YOU

MERCI

GRACIAS