PREVENTION OF Rhesus Allo-immunisation

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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.
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 2
  nd 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\textsuperscript{st} trimester, 15.9% in 2\textsuperscript{nd} trimester, 28.9% in 3\textsuperscript{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.
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 1\textsuperscript{st} 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, 300\textmu g 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 1\textsuperscript{st} dose.

• Fetomaternal hemorrhage; in 0.4\% of cases, 300µg will not be enough. \textit{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.
• 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

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GRACIAS