



Neonatal Isoerythrolysis

# Neonatal Isoerythrolysis Pathogenesis

- Immune mediated hemolytic anemia
- Mediated by maternal anti-RBC antibodies
  - Colostrum

# Neonatal Isoerythrolysis Pathogenesis

- Foal inherits specific RBC Ag from the sire
- Dam does not have these Ag
- Dam previously sensitized
  - Placental bleeding - previous pregnancies
  - Previous whole blood transfusion
  - Equine biologics
  - Plasma contaminated with RBC Ag

# Neonatal Isoerythrolysis Pathogenesis

- Current pregnancy mare re-exposed
- Mounts antibody response
- Concentrates antibodies in colostrum
- Foal absorb the colostrum Abs
- Hemolytic Anemia

# Neonatal Isoerythrolysis Pathogenesis

- 32 blood group antigens in horses
- Aa and Qa 90% of the reactions
- R and S groups most of the rest
- Based on gene frequencies
  - TB, QH, Saddlebred, - Qa & Aa
  - Standardbred, Morgan - Aa (not Qa)
  - Arabian - Qa

# Neonatal Isoerythrolysis

## Clinical signs

- Onset
  - 8-120 hours old
  - Depends on amount of antibody absorbed
    - Titer in colostrum
    - Amount ingested
  - More antibody absorbed
    - More rapid the onset
    - More severe the disease

# Neonatal Isoerythrolysis

## Peracute disease

- Severe, acute anemia (massive hemolysis)
  - No hypoxemia
  - Tissue hypoxia
  - Metabolic acidosis
  - MODS

# Neonatal Isoerythrolysis

## Peracute disease

- Normal at birth
- Sudden onset
- Weakness
- Tachycardia
- Tachypnea
- Collapse



# Neonatal Isoerythrolysis

## Peracute disease

- Neurologic derangement
- Fever or hypothermia
- Cardiovascular collapse
- Shock
- Death - often before icteric

# Neonatal Isoerythrolysis

## Acute disease

- Normal at birth
- Progressive weakness
- Icterus (may become extreme)
- Exercise intolerance
- Tachycardia
- Tachypnea
- Fever (secondary to hemolysis)
- Hemoglobinuria

# Neonatal Isoerythrolysis

## Subacute disease

- Normal at birth
- Only sign may be icterus
- Can be febrile
- Can have brief hemoglobinuria
- Mild tachycardia/tachypnea
- May go undetected

# Neonatal Isoerythrolysis

## Lab data

- Anemia - mild to severe (as low as 4-8%)
- Plasma very icteric
- Plasma may be pink
- Hyperbilirubinemia - primarily unconjugated

# Neonatal Isoerythrolysis Test before foal nurses

- Hemolytic test
  - Dam's serum
  - + foal's RBC
  - + complement
  - Not easily done on farm
- Jaundice Foal Agglutination Test
  - Does not test hemolysis
  - But good correlation with it
  - Easy procedure
- Whole blood cross match

# Neonatal Isoerythrolysis Treatment

- If signs during first 24 hours
  - for first 36 hrs
    - Strip colostrum from mare
      - Discard - do not feed to other foals
    - Don't allow nursing
      - Separate foal from mare
      - Muzzle foal and cover udder
    - Find foal alternate source of colostrum

# Neonatal Isoerythrolysis Treatment

- Most important - minimize stress
  - Difficult since otherwise normal
  - Need to be confined - blood samples
- Monitor PCV (serial samples needed)
- Watch for hemolytic episodes
  - Fever
  - Hemoglobinuria
  - Tachypnea, Tachycardia
  - Muscle fasciculations

# Neonatal Isoerythrolysis Treatment

- Particularly susceptible to infections
  - Insure adequate IgG
  - Antimicrobial therapy in severe cases
- Maintain adequate nutrition, hydration
- Monitor renal function



# Neonatal Isoerythrolysis

## Blood transfusion

- PCV in low teens
- PCV is dropping rapidly
- When signs of severe anemia are present
  - Even if PCV is not extremely low
  - Monitor lactate
  - Monitor HR

# Neonatal Isoerythrolysis

## Blood transfusion

- Whole or packed cells
- Mare's washed RBC
- Aa and Qa Ag negative donor
- Cross-matched blood

# Neonatal Isoerythrolysis

## Blood transfusion

- Cross-match
  - Major side compatibility
  - Minor will not be compatible
    - Foal's RBC's already coated with Ab
    - Autoagglutinate or autohemolize
- Transfused RBC (if well matched)
  - Nearly normal life span
  - Unlike older horses

# Neonatal Isoerythrolysis

## Prevention - Identify mares at risk

- If mare has had an NI foal
- Can blood type mare and stallion
  - Breed based on blood groups
  - Predict likelihood of problem
- Test mare's sera
  - In late pregnancy
  - Run the JFA test before foal nurses

# Neonatal Isoerythrolysis

## Prevention - Take measures at birth

- Cover udder in late pregnancy
- Attend birth
  - Before foal nurses & for first 36 hrs
    - Separate foal/mare
    - Muzzle foal and cover udder
    - Strip colostrum from mare
- Alternate source colostrum/nutrition

# Neonatal Isoerythrolysis Sequela

- Kernicterus
- Iron Toxicity
  - Liver failure