Foal Septicemia

Classic case: Neonatal foal, lethargic, nursing poorly, reluctant to rise, +/- colostrum.

Presentation:

Clinical Signs:
- Lethargic, sleeping a lot
- Nurses poorly
- Tachycardia, tachypnea
- Hyperemic mm + coronary bands
- Fever or hypothermia
- +/--Petechiae
- +/--Hypoglycemia

Risk factors:
- Failure of passive transfer (FPT)
  - Poor quality colostrum
  - No colostrum or milk
  - Foal nurses poorly or doesn’t nurse
- Unsanitary environment, poor hygiene
- Prematurity/Dysmaturity
- Agalactia – fescue, poor nutrition, maiden mare
- Placentitis – leakage of colostrum
- Premature placental separation
- Prolonged gestation

More advanced case:
- Obtunded, recumbent
- Hypoglycemia or hyperglycemia
- Hypertension
- Hypoxemia
- Hypothermia usually
- +/- infection of joints, umbilicus
- Hyperemic mm + coronary bands
- Diarrhea, pneumonia

Most severe cases: all of the above, and
- Multiple joint infections
- SHOCK, Renal failure
- CNS infection, seizures
- MULTI organ dysfunction (MOD)

How it starts: Infection occurs:
- In utero via ascending infection of placenta – foal is sick at birth or first 24 hr
- Soon after birth – foal sick, usu. after 1-3 days – dep on dose, immunity, organism(s)
  - Ingestion or inhalation during birth/udder seeking
  - Bacteria may enter via GIT prior to gut closure
  - Via wounds
- Septicemia seen anytime in first few weeks –
  - May localize early,
  - Systemically ill later

DDX:
- Hypoxic ischemic encephalopathy (HIE, sometimes called Neonatal maladjustment syndrome (NMS) and periparturient asphyxia syndrome (PAS))
- Meconium impaction (not always colicky, esp at first)
- Prematurity/Dismaturity
- Neonatal pneumonia
- Neonatal isoerythrolysis
- Uroperitoneum
- Congenital cardiac disease
- White Muscle Disease
- Other myopathy

Note: Infection may be local and systemic:
- Local: Involves the placenta, amniotic fluid, umbilical cord, or placenta-foal interface
- Systemic: Involves the bloodstream, spreading to other body parts

Note: Sepsis often accompanies many other conditions in foals and vice versa
**Suspect Sepsis?**

Look for localized 2° infection(s):
- Pneumonia
- Umbilical abscess
- Joints/physes
- Enteritis/diarrhea
- Uveitis
- Endocarditis
- Liver, Kidney, Skin/muscle

**Test(s) of choice:**
- **History**
- **Physical examination** – can be misleading in early cases
- **Sepsis score** – combines PE findings and lab data

- **Clinical pathology**
  - WBC and neutrophil counts variable
    - Usually leukopenic, due to neutropenia, +/- left shift
    - Toxic PMNs - sepsis
  - **Hypoglycemia,** often
    - If persistent, poorer Px
  - Fibrinogen ↑ed at birth = in utero infection
  - **IgG level**
    - Foal side tests
      - ELISA - SNAP® - IDEXX
      - Gamma-check E® - Plasvacc
    - Radial immunodiffusion (RID) = gold standard; req. 24 hrs
  - Azotemia - ↑ creatinine may be from placental dysfunction
  - Liver enzymes ↑ - hypoxia, hypotension, endotoxin
  - Electrolytes – esp if diarrheic, uroperitoneum suspect

**Blood cultures** – aerobic and anaerobic
- **Gram negatives in most** - *E. coli* most often
- Gram positives in many - *S. zooepidemicus* common
- Regional differences exist – know your area
- Some farms have problems with specific organisms
- Anaerobes not common but do occur – *Clostridium*, esp w/enteritis
- Osteomyelitis – look for *Salmonella* spp
- Infection with more than one microbe “not uncommon”

- Ultrasound – umbilicus, thorax
- Radiographs – thorax, joints, physes
  - Prematurity – lack of ossification carpus, tarsus
  - Infection – physes
- CSF tap if neuro signs, not due to axphyxia
- Joint taps, abdominocentesis
- If diarrhea – culture, toxin analysis, fecal smear – Clostridial dz

**Twins are more likely to develop sepsis, if they survive to birth.**

These two did really well and both survived.
Rx(s) of choice:

- **Broad-spectrum antibiotics ASAP = TREATMENT OF CHOICE**
  - Penicillin and amikacin
  - Ceftiofur
  - Regional differences in antibiotic sensitivity!

- **NSAIDS** – Banamine®, ketoprofen, meloxicam, firocoxib

- **IgG supplementation**
  - Colostrum – PO or via NG tube if ≤ 12 hrs age
  - IgG replacement oral preparations
    - give via NG tube if ≤ 12 hrs age
  - Plasma IV – commercial products, plasma from mare

- **Fluid therapy** – Balanced electrolyte solution
  - Correct dehydration; some foals require fluid resuscitation
  - Maintenance as needed
  - Dextrose if hypoglycemic

- **Endotoxin Rx** – NSAIDS, hyperimmune plasma/serum

- Blood pressure – Dobutamine, colloids if needed

- **Oxygen** therapy – if $\text{paO}_2 < 80$ mmHg; $\text{SaO}_2 < 95$
  - Some recommend even if oxygen levels are normal
  - Ventilation if $\text{CO}_2$ persistently $> 60-65$ mmHg

- Ophthalmic problems – correct entropion, Tx corneal ulceration, uveitis

- Nutrition – enteral only if foal can stand or sit sternal; otherwise, parenteral administration

- Supportive care – **NURSING care very important**
  - **Keep sternal or turn often:** get up as much as possible
  - **Monitor corneas – ulceration common,** Tx entropion
  - Good bedding, bandage to prevent pressure sores
  - **May need constant attention** by owners/caretakers for successful outcome

- +/- Surgery/anesthesia to remove umbilicus, lavage joints

- **Don’t forget the mare**
  - Check for uterine tears, anemia
  - Be sure all of placenta is gone, treat uterine/vaginal problems
  - Domperidone if milk supply is inadequate, etc.
Prognosis:
- **Good to excellent** if caught very early and foal is strong, nursing well, and owners are diligent
- **Guarded to poor** if foal is very weak, requires a lot of attention, and resources are slim.
- **Grave** if multi-organ dysfunction (MOD), seizures (NOT due to HIE), meningitis present
- With multiple joints infected – athletic future not likely.

Prevention:
- Good prenatal nutrition, booster vaccines 30 days prior to foaling
- **Be present at foaling**
- Clean udder, legs, belly of mare prior to nursing;
  - Monitor size of udder before and after foaling
    - if foal is not nursing, it will stay too full,
    - if the foal is constantly trying to nurse and udder seems small – suspect agalactia.
- **Dip foal’s navel** with dilute chlorhexidine or povidone-iodine solution q 8 hrs or so first 36 – 48 hrs.
- Ensure adequate colostrum intake / passive transfer

**Pearls:**  
**Septicemia is the most common cause of death in neonatal foals.**
- In its most severe form = systemic inflammatory response syndrome (SIRS)
  - Keys to success are *early identification* of the problem and diligent treatment.
  - Treatment of illness in neonatal foals is **VERY labor intensive and costly.**
  - Refer foals *earlier rather than later* if owners can afford costs.
  - Advise owners of financial & time investment
  - Warn owners they *may still lose foal.*  
    (but…….)
- Outcomes for sick foals are improving
  - Survival for referred foals is 70 - 80%;
  - Many of these foals go onto have successful performance careers.
  - Many more foals are treated at home and do very well also.


*What everyone hopes will happen….*