

Foal Septicemia

Extended Version

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

More advanced case:

- Obtunded, recumbent
- Hypoglycemia or hyperglycemia
- Hypotension
- Hypoxemia
- Hypothermia usually
- +/- infection of joints, umbilicus diarrhea, pneumonia

Most severe cases: all of the above, and

- Multiple joint infections
- **SHOCK**, Renal failure
- CNS infection, seizures
- MULTI organ dysfunction (MOD)

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
- Malnourishment, poor health of mare
- **Dystocia**, Twinning
- Other immune deficiency

Any condition that makes it harder to nurse:

- Pneumonia (hard to breathe and eat simultaneously!)
- Injury - rib fracture, lameness
- Limb deformities - difficulty rising

**ANY NEWBORN FOAL THAT IS NOT NURSING
NORMALLY IS SEPTIC TILL PROVEN OTHERWISE!!**

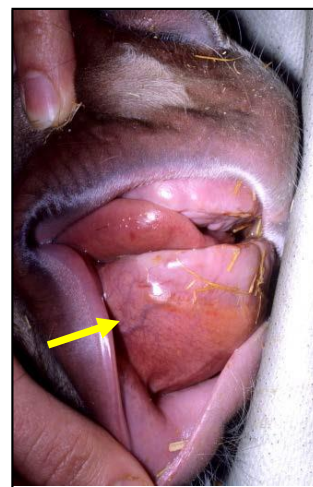
How it starts: Infection occurs:

- **In utero** via ascending infection of placenta – foal is sick at birth or first 24 hr
-or-
- **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/Dysmaturity
- Neonatal pneumonia
- Neonatal isoerythrolysis
- Uroperitoneum
- Congenital cardiac disease
- White Muscle Disease
- Other myopathy



Hyperemic mucous membranes in a septic foal (left)
Premature foal on nasal O₂ (right)
Note floppy ears, domed head, silky haircoat

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

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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 asphyxia
- Joint taps, abdominocentesis
- If diarrhea – culture, toxin analysis, fecal smear – Clostridial dz



Udder-seeking in the first hours of life is when many infections begin.



Suspect Sepsis? LOOK FOR **Localized 2° infection(s):**

Pneumonia
Umbilical abscess
Joints/physes
Enteritis/diarrhea
Uveitis
Endocarditis
Liver, Kidney, Skin/muscle



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

These two did really well and both survived.

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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 $paO_2 < 80$ mmHg; $SaO_2 < 95\%$
 - Some recommend even if oxygen levels are normal
 - Ventilation if 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.



Foal recovering from anes/surgery for removal of infected umbilicus

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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 on to have successful performance careers.
 - Many more foals are treated at home and do very well also.

Refs: Merck Veterinary Manual 10th ed, Perinatal care, mares and foals, Foal septicemia, Large Animal Internal Medicine, B. Smith pp. 303-318, Blackwell's 5 Minute Consult: Equine 2nd ed., pp. 698-9, Vet Clinics of NA, Equine, August 2005, pp 273-93. Images courtesy Dr. JG Adams.

