Sepsis in Foals

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Sepsis in the foal is a common disorder that typically affects foals during the neonatal period (<10-14 days of age). Predisposing factors that contribute to sepsis include failure of passive transfer of maternal antibodies, placentitis, adverse events at the time of birth, endemic pathogenic bacteria at breeding or foaling facilities, and maternal illness. An overwhelming amount of information is available in regard to the topic of sepsis due to its prevalence in people. This PowerPage review will highlight the common bacteria associated with neonatal sepsis in the foal, the clinical signs, and therapeutic options.

Key Points

- Routes of introduction of pathogenic bacteria to the neonatal foal include **inhalation, ingestion, wounds or the umbilicus**
- **Passive transfer** of maternal antibodies is an important factor in the prevention of sepsis. IgG concentrations greater than **800 mg/dL** are considered adequate
- Multiple complications can occur with sepsis, but prompt and aggressive therapy may produce positive results in equine neonatal sepsis

Definition of Sepsis

Sepsis: Systemic disease caused by circulating microorganisms and their products

- Consensus statements in human medicine more specifically define sepsis as the systemic inflammatory response (SIRs) to infection manifested by ≥ 2 of the following:
  - **Hyperthermia or hypothermia**
  - **Tachycardia**
  - **Tachypnea**
  - **Leukopenia or leukocytosis**
  - **> 10% immature (band) neutrophils**

- Infection typically defined as positive bacterial culture (e.g. blood culture). Blood cultures are performed by collecting blood and placing in blood culture bottles (image above). One bottle is for aerobic growth while the other is for anaerobic growth. Samples can be collected 2-3 times over a period of time to increase diagnostic yield.

- Circulating bacteria and their products (i.e. endotoxin) causes the host's immune response to produce numerous cytokines and mediators in efforts to combat the infection. Such mediators include tumor necrosis factor-α (TNF-α), interleukin-1 (IL-1), and IL-6 that subsequently produce a strong inflammatory response. When this inflammatory response is exuberant and uncontrolled, a malignant and widespread inflammatory response syndrome (SIRS) occurs which may lead to systemic disease, shock and potentially death. When SIRS is caused by infection, the consequent clinical condition is referred to as sepsis.

Common Bacterial Isolates Associated with Equine Sepsis

Common Isolates: Various bacteria are associated with equine neonatal sepsis and may involve one or more species of bacteria. Some common isolates include:

- **E. coli***
- **Klebsiella**
- **Enterobacter**
- Actinobacillus
- Pseudomonas
- Salmonella
- Streptococcus
- **Enterococcus**
- **Staphylococcus**

*** E. coli is the most common isolate cultured from foals with neonatal sepsis[1,2]**

Clinical Signs & Clinicopathologic Abnormalities

- Weakness, lethargy, anorexia
- Diarrhea
- Tachycardia
- Hypovolemia
- Swollen joints
- Jaundice
- Hypothermia
- Tachypnea
- Petechia

- Leukopenia, neutropenia, left shift, toxic neutrophils
- Hypoglycemia
- Electrolyte abnormalities
- Acidemia
- High serum lactate

Diagnosis

Diagnosis can be based on a combination of the following:

- Based on history (FPT, prematurity, maternal illness)
- Physical examination findings and clinicopathologic abnormalities (as above)
- Sepsis Score – a flow chart that assigns points to specific abnormalities (e.g. hypoglycemia, FPT, prematurity, CBC results, toxic neutrophils); if the point total exceeds a specific value, there is a high likelihood of sepsis.[3]
- **Positive blood culture**
  - Allows exact identification of bacteria and provides a antimicrobial susceptibility pattern for treatment

Treatment & Complications

Treatment may be intensive and include one or more of the following:

- Fluid therapy
- Antimicrobial therapy
- Nutritional support
- Plasma transfusions
- Ventilator support
- Diligent nursing and supportive care

Complications can occur relatively frequently in cases of sepsis and include:

- Septic arthritis (image)
- Septic physitis
- Omphalophlebitis
- Thrombophlebitis
- Pneumonia
- Diarrhea

14-day old thoroughbred colt with sepsis and septic arthritis. Note the lysis of the distal tarsal bones.

Prognosis

- Septic foals can surprise the clinician in their ability to recover from severe illness
- Complications may occur, but diligent care typically lends itself to a guarded to good prognosis
- Costs incurred by the client can be substantial

References & Reading

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