

GENERALIZED BACTERIAL INFECTION (SEPSIS) AND THE PRESENCE OF BACTERIA IN THE BLOOD (BACTEREMIA)

BASICS

OVERVIEW

- “Sepsis”—generalized (systemic) response to bacterial infection (such as fever or low blood pressure [known as “hypotension”])
- “Bacteremia”—the presence of bacteria in the blood

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Predominant Sex

- Large-breed male dogs—more susceptible to developing bacterial infection/inflammation of the lining of the heart (known as “bacterial endocarditis”) and bacterial or fungal infection of the intervertebral disks and adjacent bone of the spine (vertebral bodies; condition known as “diskospondylitis”)

SIGNS/OBSERVED CHANGES in the ANIMAL

- Signs may be sudden (acute) or may occur in a vague or episodic fashion
- Variable and may involve multiple organ systems
- More severe when gram-negative bacteria are involved
- Dogs that develop an overt generalized (systemic) response to bacterial infection (sepsis)—earliest signs usually involve the gastrointestinal tract (including the stomach and intestines)
- Cats—usually involves the respiratory system (including the lungs)
- Intermittent or persistent fever
- Lameness
- Depression
- Rapid heart rate (known as “tachycardia”)
- Heart murmur
- Low blood pressure (hypotension)
- Weakness

CAUSES

- Dogs—bacteria; gram-negative bacteria (especially *E. coli*) most common; gram-positive cocci and obligate anaerobes also are important; infection with more than one type of bacteria (known as “polymicrobial infection”) reported in about 20% of dogs with positive blood cultures (that is, bacteria are grown in the laboratory from samples of blood); “obligate anaerobes” are bacteria that must live and grow in the absence of oxygen
- Cats—bacteria; disease-causing agents usually are gram-negative bacteria or obligate anaerobes; *Salmonella* is the most common gram-negative bacteria cultured
- *Pseudomonas aeruginosa*—uncommon isolate from animal blood cultures

RISK FACTORS

- Very sudden (known as “peracute”) disease—most often associated with infection/inflammation of the uterus with accumulation of pus (known as “pyometra”) and disruption of the gastrointestinal tract
- More prolonged onset of disease—associated with infections of the skin, upper urinary tract (kidneys and ureters), mouth, or prostate
- Excessive levels of steroids produced by the adrenal glands (known as “hyperadrenocorticism” or “Cushing’s disease”); diabetes mellitus (“sugar diabetes”); liver or kidney failure; surgical removal of the spleen (known as “splenectomy”); cancer; and burns
- Inability to develop a normal immune response (known as “immunodeficiency”)—chemotherapy; feline immunodeficiency virus (FIV); surgical removal of the spleen (splenectomy)
- Administration of steroids—considered an important risk factor for the presence of bacteria in the blood (bacteremia); allows greater multiplication of bacteria in body tissues
- Intravenous catheter—provides rapid access for bacteria to enter the bloodstream
- Indwelling urinary catheters

TREATMENT

HEALTH CARE

- Successful treatment requires early identification of the problem and aggressive intervention; careful monitoring is essential—patient status may change rapidly
- Low blood pressure (hypotension)—intravenous fluids (such as lactated Ringer’s solution)
- Colloids (fluids that contain larger molecules that stay within the circulating blood to help maintain circulating blood volume and expand blood volume), such as hydroxyethyl starch (hetastarch)
- Low blood glucose or sugar (hypoglycemia)—may add dextrose to intravenous fluids
- Electrolytes and acid–base balance—correct abnormalities
- Abscesses—locate and drain
- External sources of infection—give appropriate attention to wound care and bandage changes
- Internal sources of infection (such as infection/inflammation with accumulation of pus in the uterus [pyometra] or disruption of the bowel)—surgical intervention is essential

DIET

- Nutritional support—provide by assisted feeding or placement of a feeding tube

SURGERY

- Surgery may be required for treatment of certain disorders (such as infection/inflammation with accumulation of pus in the uterus [pyometra] or disruption of the bowel) and to establish drainage for abscesses

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Antibiotics—usually selected before bacterial culture and sensitivity test results are available; do not delay treatment while waiting for test results; direct therapy to cover all possible types of bacteria (gram-positive and negative bacteria; aerobic and anaerobic bacteria); “aerobic bacteria” are bacteria that can live and grow in the presence of oxygen; “anaerobic bacteria” are bacteria that can live and grow in the absence of oxygen
- Antibiotics—administered intravenously
- If patient is not in shock—a good choice of antibiotics is a first-generation cephalosporin, such as cefazolin
- Aminoglycosides—(class of antibiotics) may be added to the treatment protocol, if more aggressive therapy is warranted; example is gentamicin

FOLLOW-UP CARE

PATIENT MONITORING

- Aminoglycoside therapy—monitor kidney function
- Blood pressure and electrocardiogram to monitor circulation and the heart

POSSIBLE COMPLICATIONS

- Gram-negative generalized disease caused by the spread of bacteria in the blood (known as “septicemia” or “blood poisoning”)—high death rate; death owing to low blood pressure (hypotension), electrolyte and acid–base disturbances, and shock due to the presence of bacterial toxins in the blood (known as “endotoxic shock”)

EXPECTED COURSE AND PROGNOSIS

- Depend on underlying cause
- Generalized (systemic) response to bacterial infection (sepsis) and the presence of bacteria in the blood (bacteremia) are serious conditions, which may be fatal

KEY POINTS

- Generalized (systemic) response to bacterial infection (sepsis) and the presence of bacteria in the blood (bacteremia) are serious conditions, which may be fatal
- Successful treatment requires early identification of the problem and aggressive intervention; careful monitoring is essential—patient status may change rapidly
- Do not delay treatment while waiting for bacterial culture and sensitivity test results
- Direct therapy to cover all possible types of bacteria (gram-positive and negative bacteria; aerobic and anaerobic bacteria); “aerobic bacteria” are bacteria that can live and grow in the presence of oxygen; “anaerobic bacteria” are bacteria that can live and grow in the absence of oxygen

