

# PYOTHORAX

(PUS IN THE PLEURAL SPACE, THE SPACE BETWEEN THE CHEST WALL AND THE LUNGS)

## BASICS

### OVERVIEW

- Accumulation of pus within the pleural space (the space between the chest wall and lungs, which is lined by the pleura), usually associated with infection

### SIGNALMENT/DESCRIPTION of ANIMAL

#### Species

- Dogs and cats

#### Breed Predisposition

- Dogs—hunting and sporting breeds
- Cats—domestic shorthair

#### Mean Age and Range

- Dogs and cats—median age approximately 4 years

### SIGNS/OBSERVED CHANGES in the ANIMAL

- History of fights or puncture wounds
- Often subtle signs in onset, with few clinical signs until late in the course of disease
- Breathing problems—often not severe, unless the disease is advanced
- Vomiting/diarrhea may be initial sign for which animal is presented to the veterinarian in 25% of canine cases
- Diminished activity
- Collapse after exercising and slow recovery
- Weight loss and partial lack of appetite (anorexia) may be the only clinical signs
- Temporary improvement with antibiotic therapy
- Rapid breathing (known as “tachypnea”)—usually apparent; may be mild and not associated with difficulty breathing (known as “dyspnea”)
- Extreme weight loss with muscle wasting (known as “cachexia”)—often observed
- Cough—may be observed
- Fever (known as “pyrexia”)—usually low-grade, may be observed
- Muffled heart sounds, decreased lung sounds in the lower part of the chest, and increased lung sounds in the upper part of the chest (along the back) may be detected when listening to the heart and lungs with a stethoscope (known as “thoracic auscultation”)
- Cats—may show few clinical signs before onset of apparently sudden (acute) severe breathing difficulties (known as “respiratory distress”), collapse, and shock associated with generalized bacterial infection (sepsis; condition known as “septic shock”)
- Injury to the chest wall—may not be apparent or may be healed at the time of examination

### CAUSES

- Infectious—dogs: bacteria including *Actinomyces*, *Nocardia*, anaerobes (bacteria that can live and grow in the absence of oxygen, such as *Bacteroides*, *Peptostreptococcus*, *Fusobacterium*), *Corynebacterium*, *Escherichia coli*, *Pasteurella*, and *Streptococcus*; fungal agents
- Infectious—cats: bacteria normally found in the mouth (such as *Pasteurella multocida* and *Bacteroides*) most common; obligate anaerobes (bacteria that must live and grow in the absence of oxygen, such as *Peptostreptococcus*, *Fusobacterium*) common
- Parasitic—dogs: esophageal rupture of *Spirocerca lupi* granuloma; *Spirocerca lupi* is a parasitic worm that lives in nodules in the esophagus; the nodules are known as “granulomas”
- Tumors or cancer—rarely with tumors in the chest, secondary to death of tumor tissue (known as “tumor necrosis”)
- Twisting of a lung lobe (known as “lung-lobe torsion”)—occasionally associated with accumulation of pus in the pleural space (pyothorax)
- Foreign bodies are found rarely, even with surgical exploration

### RISK FACTORS

- Dogs—hunting, field trials, and other strenuous outdoor sporting activities
- Dogs—*Spirocerca lupi* should be considered in areas where the parasite is common (known as “endemic areas”)
- Cats—multi-cat household, outdoor cats, pneumonia, upper-respiratory infection

## TREATMENT

### HEALTH CARE

- Inpatient—often for several days to weeks
- Treat like any abscess; drainage is critical, without which resolution is highly unlikely
- Continuous removal or evacuation of pus from the pleural space (the space between the chest wall and lungs) via a tube inserted into an opening into the chest (known as “tube thoracostomy”) with low-pressure suction
- Cats—usually require general anesthesia for chest-tube placement
- Dogs with severe breathing problems—may use local anesthesia and regional nerve blocks to prevent pain (analgesia), rather than general anesthesia, for chest-tube placement
- Flushing the pleural space (the space between the chest wall and lungs) with fluid (known as “thoracic lavage”)—every 6 to 8 hours with warm, sterile saline; may help break down consolidated debris and accumulated pus
- Rapid, repeated blows or taps to the chest (known as “coupage” or “rapid thoracic percussion”)—may help remove consolidated debris

### ACTIVITY

- Inpatient—encourage the patient to exercise lightly (10 minutes every 6 to 8 hours); promotes breathing efforts and helps break down developing scar tissue in the pleural space (the space between the chest wall and the lungs; scar tissue is known as a “pleural adhesion”)
- After discharge, gradually increase exercise over 2 to 4 months

### DIET

- High-calorie food
- Protein replacement usually is unnecessary

### SURGERY

- Surgical exploration, surgical removal of dead tissue and any foreign material (known as “débridement”) and potential surgical removal of a lung lobe (known as “lobectomy”) may be required in some cases and can ensure a better outcome than with medical treatment alone
- Surgery—likely to be associated with higher cure rate if lung abscesses are present, if scar tissue has developed in the pleural space (pleural fibrosis), if a lung lobe has twisted (lung-lobe torsion), if extensive development of pockets of pus is present, or if the mediastinum (the center portion of the chest that contains the heart and other organs [except for the lungs]) is involved
- Identified foreign body via chest imaging (such as X-rays, ultrasound, computed tomography or CAT scan [CT], or magnetic resonance imaging [MRI])—surgical incision into the chest (known as “thoracotomy”) and retrieval of the foreign body is indicated; grass awns are found rarely, even during surgery; attempted surgical retrieval is not recommended unless foreign body is visualized via imaging

## 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**

- Ultimately, choice determined by bacterial culture and sensitivity testing
- Suspected specific pathogen—initiate treatment before bacterial culture and sensitivity results are available; choose on the basis of common antibiotic sensitivities of particular organisms; *Actinomyces* and *Bacteroides* (but not *Bacteroides fragilis*) often are susceptible to amoxicillin; *Nocardia* often are susceptible to potentiated sulfonamides; obligate anaerobic bacteria (bacteria that must live and grow in the absence of oxygen including, *Bacteroides fragilis*) are susceptible to amoxicillin–clavulanic acid, chloramphenicol, and usually metronidazole; *Pasteurella* often are susceptible to potentiated penicillins
- **Ampicillin** or **amoxicillin** with a  $\beta$ -lactamase inhibitor—good initial choice for most patients; ampicillin and sulbactam followed by **amoxicillin–clavulanic acid**, when medications can be given by mouth
- **Trimethoprim-sulfa**, **aminoglycosides**, and **quinolones**—generally ineffective
- Multiple antibiotics occasionally necessary
- Dosages are generally high, to allow adequate distribution into the pleural space (the space between the chest wall and the lungs); may need to continue drug for several months and occasionally indefinitely

### **Pain Relievers (Analgesics)**

- May be required following surgical incision into the chest (thoracotomy) or during procedure to tap the chest and to remove fluid from the pleural space (the space between the chest wall and lungs; procedure known as “pleurocentesis”)
- With severe discomfort—may use fentanyl patch or intravenous/intramuscular agents

- Effectiveness of drugs to decrease pain and/or anesthetize the surfaces of the lining of the chest (known as “intrapleural anesthesia,” such as bupivacaine [a local anesthetic] mixed with the fluid to flush the pleural space [lavage fluid]) may be limited by the presence of pus in the pleural space (the space between the chest wall and lungs)

## **FOLLOW-UP CARE**

### **PATIENT MONITORING**

- Measure net chest-fluid production—determine when chest tubes may be removed
- Periodic chest X-rays—to ensure proper chest-tube placement, and lack of pocketing of pus in localized areas; to determine whether an additional chest tube should be placed on the opposite side of the chest; to determine if primary lung disease exists, that may not have been apparent on initial examination
- Evaluate chest X-rays—ensure adequate removal of fluid from the pleural space (the space between the chest wall and lungs)
- Assess complete blood count (CBC) and chest X-rays monthly—residual changes seen on X-rays may be permanent, but fluid should be absent
- Repeat bacterial culture and sensitivity testing, if the patient fails to improve
- Antibiotics—continue for 1 month after the patient is clinically normal, the complete blood count (CBC) is normal, and no evidence of fluid re-accumulation is seen on X-rays; average duration of therapy is 3 to 4 months, but may continue for 6 to 12 months or longer

### **PREVENTIONS AND AVOIDANCE**

- Avoid activity that increases the likelihood that the animal will develop pyothorax (“pus in the chest”)—often not practical

### **POSSIBLE COMPLICATIONS**

- Problems with the chest tube—may prevent adequate drainage or produce pneumothorax (accumulation of free air in the pleural space, the space between the chest wall and lungs); the chest tube may put pressure on the arteries and veins to the front leg, resulting in fluid build-up (known as “limb edema”) or lameness; injury to the lung itself during placement of the chest tube
- Persistent, recurrent accumulation of pus in the pleural space (pyothorax)—compartmentalization of pus; premature discontinuation of treatment; lung lesions
- Long-term (chronic) inflammation of the pleura (the lining of the pleural space), characterized by scar tissue (known as “fibrosing pleuritis”) and poor performance after apparent recovery—may occasionally respond to surgery
- Persistent inflammation of the mediastinum (the center portion of the chest that contains the heart and other organs [except for the lungs]); inflammation is known as “mediastinitis”)

### **EXPECTED COURSE AND PROGNOSIS**

- With aggressive management—prognosis fair to excellent (60% to 90% survival)
- With repeated intermittent antibiotic therapy only or with inadequate drainage—prognosis poor
- Return to performance—depends on long-term duration of disease and level of management

## **KEY POINTS**

- Duration of treatment (inpatient and outpatient) is long and expensive; average duration of therapy is 3 to 4 months, but may continue for 6 to 12 months or longer
- With aggressive management—prognosis fair to excellent (60% to 90% survival)