

PIGEON FEVER: DIAGNOSIS, TREATMENT, AND PREVENTION

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Many equine veterinarians in Texas are seeing an increasing number of cases of Pigeon Fever, an infectious disease caused by the bacteria *Corynebacterium pseudotuberculosis*. The bacteria lives in soil and survives best in drought conditions. The organism enters skin through fly bites, abrasions or lacerations where it then spreads via lymphatics to local lymph nodes. External abscess formation with or without lameness is the most common clinical presentation (91% of cases), with cases of internal abscesses (8%), and ulcerative lymphangitis (1%) seen less frequently.

The disease is not new to Texas; however, its incidence appears to fluctuate in our state rather than being a commonplace diagnosis in states such as California, Nevada, and Utah. According to Dr. Sharon Spier, a medicine faculty researching pigeon fever at the University of California, Davis, recent increases in the diagnosis in Texas may be associated with a fresh population of horses that don't have immunity to the organism combined with a decrease in average rainfall. Equine veterinarians are challenged with providing the best care while also easing the minds of worried owners. The many presentations of *Corynebacterium pseudotuberculosis* infection, methods of diagnosis, treatment, and prevention of outbreaks are reviewed in this article.

ETIOLOGY AND PATHOGENESIS

Corynebacterium pseudotuberculosis infection occurs world wide as caseous lymphadenitis in small ruminants and granulomatous or visceral infection in cattle. Strains appear to be species-specific based upon biotyping, with nitrate positive isolates identified in equine infections, nitrate negative isolated involved in small ruminant infections, and both positive and negative isolates identified in cattle. As such, cross transmission from small ruminants to horses does not appear to occur and transmission between cattle and horses is theoretically possible but not confirmed.

The organism seems to enter the horse through the skin via biting insects, mucous membranes, or abrasions although the exact mechanism is unknown. Direct transmission horse to horse does not appear to occur as consistently as with strangles, and horses kept in stalls appear to be at a decreased risk of disease.

The organism produces a variety of exotoxins, the most clinically significant of which is phospholipase D and sphingomyelinase. These toxins degrade the endothelial cell wall, increasing vascular permeability resulting in the significant edema observed with external abscesses. Phospholipase D and corynomycolic acid activity contribute to the inflammation, pain and edema observed during abscess formation. The synergistic hemolysis action of sphingomyelinase with *R. equi* exotoxin is the basis for diagnostic serology using the synergistic hemolysis inhibition test (SHIT).

Incidence of disease can vary year to year on a single property, but once a single case is observed, the property is considered to be at risk for years as the organism survives in the soil. In California, where cases are frequently seen, horses present at any time of the year with external abscesses but are most often diagnosed in the 3-4 weeks after a heavy rainfall during dry times of the year. This is likely associated with an increase in biting insects following these environmental conditions. Diagnosis of internal infection in California peaks during the fall and early winter; however, in south central Texas, the author has observed a lag in diagnosis compared to California, with cases of both external abscesses and internal abscesses peaking in late winter (January and February) at our hospital. This may indicate a different vector at play in this region or be related to milder winters with less rainfall compared to northern California.

EXTERNAL ABSCESSSES

The vast majority of horses infected (91%) will present with abscesses involving the peripheral lymph nodes, with the cervical and ventral chains being the most commonly affected. Infection of the lymph nodes deep to the pectoral muscles or at the thoracic inlet will lead to significant swelling of the soft tissues in the pectoral region and proximal forelimb. Some horses may present for lameness in the case of abscesses of the pectorals and especially with abscesses deep to the triceps muscles. Others may present for suspected trauma, as initial symptoms may go unobserved and the ruptured abscess is the first sign noticed. Abscesses along the ventral abdomen may resemble *Culicoides* hypersensitivity and abscesses of the inguinal lymph nodes may present with swelling of the sheath or around the mammary gland.

Diagnosis

Diagnosis of pigeon fever abscesses is often made based upon swellings in specific areas of the body and the presence of characteristic thick green-tan purulent exudate. Culture of the discharge will confirm nitrate positive *Corynebacterium pseudotuberculosis*. Use of serology for the diagnosis of external abscesses is unreliable, as some horses do not mount an antibody response to external infection. The typical progression of an external abscess will involve soft tissue inflammation and edema surrounding the lymph node. This stage may be accompanied by a significant amount of discomfort as the swelling becomes firm as it enlarges. About a quarter of infected horses will develop fevers up to 104°F. The abscess generally matures, resulting in hair loss and rupture of the skin allowing the abscess to drain; however, many times veterinarians will be asked to intervene and open the abscess prior to full maturation.

Treatment

As with Strangles, lancing and drainage is often the only treatment required for external abscesses. Many Pigeon Fever abscesses are deep to muscles (pectoral and triceps) and use of ultrasound to guide lancing is beneficial. Daily flushing of the wound with saline or water for a period of 3-5 days will often result in resolution of the infection. Care should be taken to prevent excessive contamination of the environment during lancing and flushing of the wound, and owners should attempt fly control to prevent both further infection of the wound and transmission of the organism to other horses.

Systemic administration of antimicrobials is generally not recommended as it does not shorten the course of the disease and in some cases may actually prolong the clinical course; however, persistence of active drainage beyond two weeks or repeated occurrence of infection may indicate a need for antibiotics. The organism is sensitive to most antimicrobials, and duration of administration will vary depending on the severity of the infection; however a period of 10 to 28 days is generally effective for the treatment of complicated cases of external abscessation.

INTERNAL ABSCESSSES/INFECTION

Internal infection and abscess formation can be significant and should be included in the differential list for any horse presenting to equine veterinarians for weight loss and general malaise, with or without fever. Many cases of internal infection will be identified in horses that have either had external abscesses (63% of cases) in the preceding months or reside on premises where external abscesses have been diagnosed in other horses; however, there will be some horses that present without this history. The organism appears to have a predilection for the spleen, liver, and kidney; however, reports of pneumonia, pericarditis, pleuritis, peritonitis, osteitis, otitis and meningitis are also available. As with bastard Strangles, solitary abscesses of mesenteric lymph nodes may also occur.

Diagnosis

The diagnosis of internal infection with *Corynebacterium pseduotuberculosis* is best determined by use of serology by synergistic hemolysis inhibition. Titers $\geq 1:512$ combined with appropriate clinical signs, leukocytosis and hyperfibrinogenemia is considered diagnostic for the presence of internal abscesses. Serial monitoring of titers is not useful in evaluating response to therapy as titers can remain elevated for months to years following resolution of infection. Other abnormalities on biochemical profiles may be present depending on the site of infection, with elevations in hepatic enzymes frequently observed with liver involvement.

Imaging of the infected tissue by ultrasound in organ involvement or radiography in bone involvement is very useful in the diagnosis and monitoring of response to therapy. Resolution of abnormalities in architecture based on ultrasound combined with improvement in blood cell counts and biochemistry values is useful in determining when to stop treatment.

Treatment

Therapy for internal infection requires long term antimicrobial therapy using site of infection and penetration requirements to guide antimicrobial selection, as the organism is susceptible to most antibiotics. A combination of broad-spectrum antimicrobial with rifampin appears to be effective in the vast majority of cases. Duration of antibiotic administration should be a minimum of 28 days and in the author's experience averages approximately 2-4 months. In one retrospective study, median duration of antimicrobial administration was 34-42 days (range 28-97 days).

Mortality is reported to be high in cases of internal infections (40% with treatment); however, this number is based upon an older study in which cases evaluated had advanced disease at the time of

diagnosis. Clinical experience is that most cases will respond to appropriate antimicrobial and supportive therapy; however, this comes with a large financial and time commitment on the part of the owners. Left untreated, cases of infection within the abdominal cavity are 100% fatal.

ULCERATIVE LYMPHANGITIS

Horses with ulcerative lymphangitis usually have a concurrent external abscess, and present with significant swelling of the distal limbs with multiple areas of drainage along lymphatics. Differentials include cellulitis of other causes and purpura hemorrhagica. This is the rarest presentation of *C. pseudotuberculosis* infection in horses, observed in less than 1% of cases.

Diagnosis

Diagnosis is based upon concurrent external abscessation, compatible clinical signs, and identification of the organism by culture of exudative material. Biopsy of the skin and subcutaneous tissues may be performed as well and Strep M titers performed to rule out purpura hemorrhagica resulting from *Streptococcus equi* var *equi*.

Treatment

Therapy for ulcerative lymphangitis is similar to that of any other bacterial cellulitis and includes supportive care, bandaging, cleaning of draining abscesses, and antibiotic administration.

PREVENTION

Currently there is no vaccine available for the control and prevention of *C. pseudotuberculosis* infection. As such, the best method of prevention is good sanitation, removal of waste, and fly control. Use of a feed-through insect regulator seems to be effective in reducing the number of biting insects on individual properties and it's important that all horses on the property receive the feed through.

While treating pigeon fever abscesses, it is recommended that environmental contamination be reduced by either treating in areas easily disinfected with concrete or rubber flooring or collected purulent material from the initial lancing in a waste container, rather than letting it hit the ground. Further, some large boarding facilities may consider requiring that infected horses be kept in individual stalls until the drainage has ceased. As with other infectious diseases, practicing some light biosecurity may be beneficial in terms of cleaning infected stalls last, sanitizing grooming equipment, and thoroughly disinfecting stalls where infected horses are kept.

SUMMARY

An increasing number of Pigeon Fever abscesses have been diagnosed in Texas over the last two years. Conditions associated with *Corynebacterium pseudotuberculosis* infection include painful swellings in the chest with or without lameness, along the ventral abdomen, and internal infection associated with significant weight loss. Diagnosis is based upon culture of exudates or use of serology. The best course of treatment is the establishment of drainage of the abscesses and antibiotics for the treatment

of internal infection. Fly control and good sanitation is key to controlling outbreaks on individual ranches.