Imaging Findings In Human Bordetella Bronchiseptica Pneumonia

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1. Background

- Bordetella bronchiseptica is a gram-negative coccobacillus that causes respiratory infection in dogs, rabbits, and pigs, and is rarely a human pulmonary pathogen.
- We present two immunocompromised patients diagnosed with B. bronchiseptica pneumonia. To our knowledge, these are the first reports of this disease in patients with B-cell lymphoma and an orthotopic cardiac transplant.
- We will briefly discuss the epidemiology, microbiology, and challenges in laboratory identification of B. bronchiseptica, describe the protein imaging manifestations of this rare pulmonary infection, and address issues related to treatment.

2. Methods

- Performed a literature search, dating back to 1985, through PubMed, Medline, and Google Scholar to investigate both veterinary and human cases.
- Contacted veterinary pharmaceutical companies and the Zalk Veterinary Medical Library at the University of Missouri-Columbia, Columbia, MO.

3. Discussion

- Bordetella bronchiseptica is a pleomorphic, gram-negative coccobacillus which commonly causes tracheobronchitis, or "kennel cough". In dogs, it also causes atrophic rhinitis in pigs and upper respiratory tract infections in rabbits.
- Because of its high prevalence in dogs, a B. bronchiseptica vaccine is routinely administered & is currently available in four preparations which differ with species and age of the dog (i.e., dog kennels).
- Although not required or "core" vaccine, its administration is recommended if dog is going to be in close contact with large numbers of dogs (i.e., dog kennels).
- Does not cure or prevent disease against the specific strain in the vaccine; only decreases the intensity of the infection in an already exposed dog.
- Since its discovery in 1910, B. bronchiseptica was thought to infect humans, but was not actually cultured from a human host until 1973. Only 88 cases of culture-positive and presumed human infection have been reported worldwide.
- The majority of cases occur in severely immunocompromised individuals.
- Among these patients, who has been most commonly exhibited in Acquired Immunodeficiency Syndrome (AIDS) patients with a CD4 count of 100 cells/mm\textsuperscript{3} or less.
- Cases have also been reported in patients with a history of hematopoietic stem cell transplant, Hodgkin’s lymphoma, chronic lymphocytic leukemia, Crohn’s Disease, meningitis, endocarditis, and chronic lung parenchymal abnormalities such as cystic fibrosis and bronchiectasis. Two cases have also been reported in immunocompetent infants.
- Typically manifests as pneumonia
- Can also induce milder respiratory tract infections such as acute sinusitis and bronchitis

4. Conclusions

- Imaging Findings
  - Thus far, case reports have described only vague imaging findings (most frequently reported: "interstitial pneumonia").
  - Our two patients presented with significant differences in imaging findings: B-cell lymphoma patient with cavitary pneumonia and multiple nodules and orthotopic cardiac patient with mass-like consolidation and interstitial lymphadenopathy.
- Diagnosis
  - Routine human disease (i.e., sputum culture) challenges in making the diagnosis:
    - Must be included in the database of microorganisms contained within human hospital automated microbiology identification systems that are utilized in identifying the cause of infection in patients.
    - Because B. bronchiseptica is a fastidious organism, requires a longer duration of time than most organisms (up to 6 days) to grow on simple nutritive media.
- Treatment
  - Currently, no definitive guidelines for treatment. Antibiotic therapy is based on the sensitivity results specific to the patient.
- Duration of therapy: ranges from 2-4 weeks and as long as several months.
- These are the first reported cases of Bordetella bronchiseptica pneumonia in immunocompetent patients, demonstrating a case of bacterial disease as a well as a patient on chronic immunosuppressive therapy secondary to orthotopic heart transplantation.
- A broad range of imaging findings have been previously reported, including cavitary pneumonia, cavitary nodules, microcavities, ground glass opacities, and rarely, pleural effusions. To our knowledge, we report the first case to mimic a tumor.
- Although it is a rare human pathogen, B. bronchiseptica infection should be considered in immunocompromised patients who have an appropriate anatomic exposure history and present with respiratory tract infection.

5. References