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 protean 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.
  - -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 contain various strains of *B. bronchiseptica* and other organisms(viral Parainfluenza and Adenovirus)
  - -although not a 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 strains 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, has been most commonly exhibited in Acquired Immunodeficiency Syndrome (AIDS) patients with a CD4 count of 100/mm^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

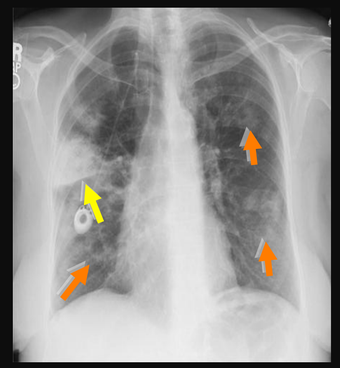

Figure 1. Posteroanterior (PA) chest radiograph of B-cell lymphoma patient shortly following admission shows consolidation within the anterior segment of the right upper lobe (yellow arrow) and multifocal cavitary nodules bilaterally (orange arrows).

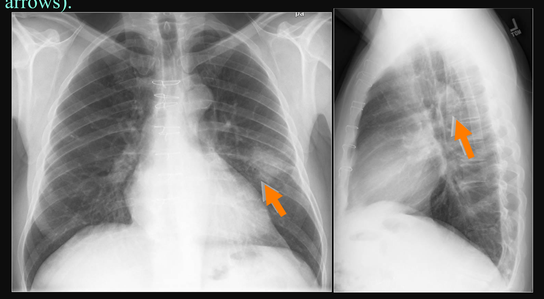

Figure 3. PA and lateral chest radiographs upon admission of orthotopic cardiac transplant patient exhibited focal consolidation within the lingula (orange arrows).

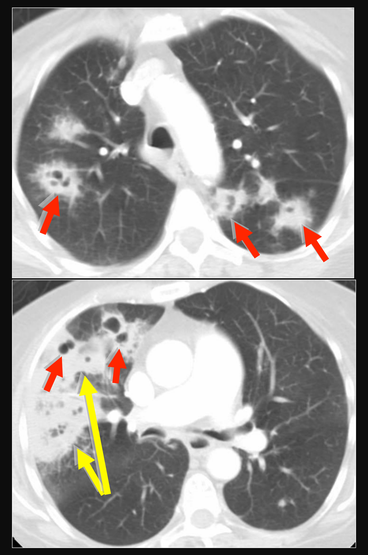

Figure 2. CT of the chest of B-cell lymphoma patient one day following the PA chest radiograph demonstrates cavitation within the right upper lobe consolidation (yellow arrows). The multifocal nodules exhibited varying degrees of cavitation (red arrows).

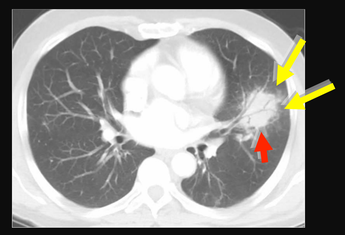

Figure 4. CT on lung window of orthotopic cardiac transplant patient shows lingular consolidation with intrinsic air bronchograms (red arrow) and a surrounding halo of ground glass attenuation (yellow arrows).

3. Discussion

- 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 cavitary nodules, and orthotopic cardiac patient with mass-like consolidation and intrathoracic lymphadenopathy

- Diagnosis
  - -routine human diagnosis (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
  - -length of therapy is typically determined by the amount of time it takes for radiographic resolution

4. Conclusions

❖ These are the first reported cases of *Bordetella bronchiseptica* pneumonia in a patient with risk factors including B-cell lymphoma and dog breeding as 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, micronodules, 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 zoonotic exposure history and present with respiratory tract infection

5. References

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