

# Bordetella Bronchiseptica in a Kidney-pancreas Transplant Recipient after Dog Vaccination

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## Abstract

*Bordetella bronchiseptica* is a gram negative coccobacillus that causes infections in animals including dogs, rabbits, and guinea pigs. It's the causative agent in kennel cough, producing a dry, 'honking' cough. We report a case of *Bordetella bronchiseptica* in a kidney and pancreas transplant patient. A 55-year-old gentleman with a history of a living related kidney transplant, pancreas transplant, diabetes, hypertension, hyperlipidemia, and smoking history who presented to the hospital with fever/chills. He underwent pancreas transplantation 3 weeks prior to his current hospitalization. He was immunosuppressed on Prograf, Cellcept. Patient recently had a PICC line in place due to dehydration requiring IV fluids as an outpatient. He had adopted a puppy recently after his wife went back to work for companionship. The puppy had been given live vaccines around the time of transplant. Puppy noted to have been licking the PICC line. Patient denied cough, sore throat, nausea or vomiting. Physical exam revealed blood pressure 117/84 mm/Hg, heart rate 70 beats per minute, respiratory rate 14, temperature 38.3°C, 98% on room air. Auscultation of lungs revealed clear lungs bilaterally. No leukocytosis, normal renal function. CXR revealed no infiltrate, no lymphadenopathy. Blood cultures revealed *Bordetella bronchiseptica* sensitive to quinolones and trimethoprim-sulfamethoxazole. Patient started on piperacillin/tazobactam. His PICC line was removed. All symptoms gradually resolved with antibiotics over a two week course of Ciprofloxacin. Household dogs and some cats are routinely vaccinated against *Bordetella bronchiseptica*. Transmission occurs via respiratory droplets or by direct contact. Diagnosis is based on positive cultures or polymerase chain reaction from a patient with a history of exposure to infected animals. Treatment includes aminoglycosides, antipseudomonal penicillins, quinolones, tetracyclines, third-generation cephalosporins, and trimethoprim-sulfamethoxazole. Duration of therapy is based on immune status of patient, however ranges from 2-6 weeks. Immunosuppressed patients should avoid contact with unvaccinated or newly vaccinated especially those with young animals who have received live vaccines.

**Keywords:** *Bordetella bronchiseptica*; Immunosuppressed; Transplant

## Introduction

*Bordetella bronchiseptica* is a gram negative coccobacillus that causes infections in animals including dogs, rabbits, guinea pigs, rats, mice, horses, chicken, and koala bears. It is the causative agent in kennel cough, which is described as a dry 'honking' cough. Most infections with *Bordetella bronchiseptica* affect immunocompromised patients exposed to farm or companion animals. Immunocompetent patients may produce only pertussis-like symptoms, whereas immunosuppressed patient illnesses can range from respiratory symptoms to severe pneumonia [1]. We report a case of *Bordetella bronchiseptica* in a kidney and pancreas transplant patient, acquired by an infected puppy who licked an IV access site.

## Case History

A 55-year-old gentleman with a history of living related kidney transplant, pancreas transplant, diabetes, hypertension, hyperlipidemia, and smoking history presented to the hospital with fever/chills. The patient had a living related kidney transplant 4 years prior and a pancreas transplant 3 weeks prior to current hospitalization. Patient immunosuppressed on Prograf, Cellcept. Patient recently had PICC line in place due to dehydration requiring IV fluids as outpatient. He also had adopted a puppy recently after his wife went back to work. The puppy had been given live vaccines around the time of transplant. Puppy noted to have been licking the PICC line. Patient denied cough, sore throat, nausea, vomiting. Physical exam revealed blood pressure 117/84 mm/Hg, heart rate 70 beats per minute, respiratory rate 14, temperature 38.3°C, 98% on room air. The cardiac exam revealed holosystolic murmur loudest at the apex, regular rate. Auscultation of lungs revealed clear lungs bilaterally. His extremities revealed no edema. There was no

leukocytosis and he maintained normal renal function. CXR revealed no infiltrate, no lymphadenopathy. Blood cultures from a peripheral venipuncture line and PICC cath tip revealed *Bordetella bronchiseptica* sensitive to quinolones and trimethoprim-sulfamethoxazole. Transthoracic echocardiogram revealed no vegetations. The patient was started on piperacillin/tazobactam and later converted to ciprofloxacin after sensitivity results 72 hours later. The PICC line was removed. His symptoms gradually resolved and patient was discharged home with antibiotics after 4 days of hospitalization. Patient completed a two week course of Ciprofloxacin and was clinically normal at 4 weeks post-diagnosis.

## Discussion

Household dogs and some cats are regularly vaccinated against *Bordetella bronchiseptica*. There are two types of vaccines available: a live-attenuated intranasal administered vaccine and an injectable inactivated vaccine. The live-attenuated vaccine can be transmitted for weeks after immunization. *Bordetella bronchiseptica* are very closely related to *B. pertussis* and *parapertussis* [2] *B. bronchiseptica* and *B.*

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*pertussis* both possess the gene for the pertussis toxin but the toxin is only expressed in *B. pertussis*. Typically, *Bordetella bronchiseptica* affect the cilia of respiratory epithelial cells resulting in stasis and thickening of the mucous. Adenylate cyclase toxin also affects the host immune response by disrupting chemotaxis, superoxide production, and killing [3]. Transmission occurs via respiratory droplets or by direct contact. Nosocomial transmission of *B. bronchiseptica* has also been reported.

Diagnosis is based on positive cultures or polymerase chain reaction from a patient with a history of exposure to infected animals. Treatment includes aminoglycosides, antipseudomonal penicillins, quinolones, tetracyclines, third-generation cephalosporins, and trimethoprim-sulfamethoxazole. Duration of therapy is based on immune status of patient, however ranges from 2-6 weeks. Effective therapy is often hard due to the ability of *Bordetella bronchiseptica* to invade and persist in epithelial cells [4]. Immunosuppressed patients should avoid contact with recently vaccinated animal contacts, especially with young animals who have received live vaccines [5]. Solid organ transplant recipients should avoid live vaccines due to the risk of active infection. In the case of the shingles vaccine, transplant patients should be isolated from family members receiving the vaccine who develop a rash. Whenever possible, the varicella-zoster vaccine should be given to household contacts of varicella-zoster virus and seronegative solid organ transplant candidates prior to transplantation in order to reduce the risk of transmission of the vaccine strain of the virus following transplantation.

In summary, we report a case of *Bordetella bronchiseptica* in a kidney and pancreas transplant patient transmitted by the patient's puppy. The patient developed *Bordetella bronchiseptica* bacteremia after exposure to a recently vaccinated dog and the dog licking the patient's IV access. It is important for physicians to be aware of the risks for *Bordetella bronchiseptica* in immunosuppressed patients who have contact with pets as the health risk is indeed real.

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