

Anaphylaxis to rabbit: a case report

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Background: While rabbits are common as pets, severe allergic reactions to domestic rabbits in homes are unusual. Typically, allergic manifestations are mild to moderate allergic rhinitis, conjunctivitis, pruritus and/or asthma in laboratory animal caretakers with frequent exposure.

Methods: We report an atopic child with a severe allergic reaction following inhalant exposure to a rabbit. We performed percutaneous skin tests and determined serum-specific IgE to commercial preparation of rabbit epithelium and extracts of rabbit fur and serum.

Results: Percutaneous skin test was positive to rabbit epithelium. The patient had elevated serum-specific IgE to rabbit epithelium and fur but not to rabbit serum.

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INTRODUCTION

Rabbits are popular house pets for adults and children but few reports on allergic reactions exist. While rabbit and rodent allergies are common in laboratory animal caretakers,¹ severe allergic reactions to rabbits are rarely reported.² We report a case of anaphylaxis resulting from rabbit exposure in a household.

CASE REPORT

A 10-year-old female with mild seasonal allergic rhinitis and eczema, developed a dry cough shortly after entering a basement where a live rabbit was kept in a cage. She did not handle the rabbit. After leaving the basement, her symptoms resolved spontaneously.

Several weeks later she entered the same basement and within minutes experienced coughing, wheezing, nasal and ocular pruritis, rhinorrhea, shortness of breath, sneezing paroxysms, and a sensation of throat swelling. Although she left the basement her symptoms progressed with the onset of severe hoarseness with difficulty breathing and a croup-like cough. In

the emergency department she was afebrile, tachycardiac (pulse 118), stridorous, and exhibited a barking cough. Her lungs were clear to auscultation. Angioedema and urticaria were not seen. Pulse oximeter monitoring was 97% on room air. A lateral neck radiograph was normal. She was treated with oral prednisone, oxygen, racemic epinephrine, and albuterol by nebulization. Her symptoms gradually resolved. She was discharged home with instructions to take prednisone and antihistamines.

She denied frequent rabbit exposure, with only minimal indirect and intermittent contact at school. Several years ago she had a lucky rabbit foot. She denied symptoms on exposure to her pet hamster and cat. She also denied symptoms in any other basement. Both parents smoke and have seasonal rhinitis.

METHODS

We performed prick skin testing using the Multi-Test device (Lincoln Diagnostics, Inc, Decatur, IL) with commercial extract of rabbit, guinea pig, mouse, and hamster epithelia, common inhalants (tree, grass, and ragweed pollen, mold, and mite), (Greer Laboratories, Inc, Lenoir, NC), and standardized cat hair (Allergologisk Laboratorium A/S, Horsholm, Denmark). Histamine and albumin-saline controls were performed.

Her serum was assayed for specific IgE by in-house enzyme-linked immunosorbent assay (ELISA) to rabbit, mouse, and cat using the above listed commercial allergens as well as rat dander extract, rabbit serum, freshly prepared extract from the fur of the suspected pet rabbit, another pet rabbit (Miniature lop), and guinea pig. The antigens from rabbit and guinea pig were prepared by extracting 1 g of fur with 10 mL of sterile saline overnight at 4°C. Immulon II polystyrene microtiter plates (Fisher Scientific, Itasca, IL) were coated with the antigen by incubating overnight at 4°C with a 1:40 dilution of the extract with phosphate buffered saline. The patient's serum and two control sera were added to the wells and incubated for 3 hours at room temperature followed by washing and the addition of 1:500 dilution of anti-human IgE biotinylated mouse antibody for 1 hour. Following a 1-hour incubation with streptavidin peroxidase the color reaction from o-phenylenediamine was developed then stopped with 6N sulfuric acid. The optical density (OD) was read by spectrophotometry at 490 nm. The reactivity of the blank wells was subtracted and mean OD values calculated.

RESULTS

Skin prick test with commercial rabbit extract was positive (wheal 8 × 10 mm and flare 25 × 30 mm) at 5 minutes. Skin tests were positive to ragweed and tree pollen, and molds, while hamster epithelium and cat hair were negative.

Enzyme-linked immunosorbent assay revealed elevated levels of serum-specific IgE to crude extracts of rabbit fur and commercial extract of rabbit epithelia. Net optical density was 0.332 and 0.293 for the offending rabbit and another pet rabbit, respectively. Commercial rabbit skin testing extract was 0.218. Specific IgE to guinea pig

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epithelia was 0.031; while cat, rat, mouse, and rabbit serum were less than 0.018. The ELISA to rabbit fur was less than 0.043 for two control subjects. Control subjects were adults without pet rabbits. One control subject was atopic.

DISCUSSION

Although rabbits are common household pets, severe allergic reactions to domestic rabbits at home are rare. We described a child with a severe allergic reaction manifesting as rhinitis, conjunctivitis, and laryngeal edema from the inhalation of dust contaminated with rabbit allergen. Her history is unusual as she had limited exposure to rabbits and her only recollection of symptoms was one episode of self-limited cough weeks prior to her severe reaction. Interestingly she had no symptoms or sensitization to cat hair or hamster to which she had daily exposure.

Domestic rabbits (*Oryctolagus cuniculus*) belong to the Leporidae family and are divided into 11 genera. Although originally classified as rodents they are now placed in a separate order, the lagamorphs (includes pikas, hares, and cottontail rabbits), primarily because of the presence of a second set of incisor teeth.³

Animal production facilities supply rabbits for wool (Angora), meat, pelts to be used in making fur coats, toys, and for research. Breeding rabbits for show is becoming popular with over 35,000 member breeders housing 50 animals on average.

Over 600,000 rabbits are used yearly in research facilities in hospitals, medical schools, pharmaceutical manufacturing, universities, and veterinary colleges.⁴ Typical symptoms of allergic rhinitis, conjunctivitis, and asthma with rabbit exposure are com-

mon in scientists, technicians, and laboratory animal handlers as an occupational allergy. In a survey of over 1200 persons exposed daily to laboratory animals in the US nearly 15% of these workers reported rhinitis with conjunctivitis, asthma, cough, palatal itch, or hives on exposure to the animals.⁵ Fifty-six percent of responders reported symptoms with rats while 37% with rabbits. Fifty-five percent of workers reported symptoms on exposure to two or more species. Only 30% of workers had a personal history or were aware of a family history of atopy. Even in laboratory animal handlers, severe reactions are unusual. A research physician with prior symptoms of allergic rhinitis and conjunctivitis on exposure to rabbits, had an anaphylactic reaction after he sustained an accidental superficial needle puncture contaminated with fresh rabbit tissue. Serum IgE antibodies to rabbit were elevated.²

The major allergen from rabbit (*Oryctolagus cuniculus*) has been identified as a glycoprotein with a molecular weight of 17,000 kD and named *Ory c I* or *Ag RI*.⁶ It may be found in higher molecular weight forms suggesting dimer formation or polymerization. The major source of *Ag RI* is saliva. Fur extracts also contain high levels of *Ag RI*. The antigen in the saliva probably becomes deposited on the fur during grooming, then becomes airborne as it dries. This accounts for the high amounts of *Ag RI* detected in dust samples taken near rabbit cages. *Ag RI* was found in small quantities in rabbit urine and dander but was notably absent from rabbit serum.⁶ This is in contrast to cat, dog, and horse serum where serum albumin is thought to be an important allergen. Our patient had no detectable specific IgE to rabbit serum. This is similar to a previous study where skin testing with rabbit serum

was uniformly negative in seven subjects with a strong history of asthma or rhinitis on rabbit exposure.⁷

Treatment for our patient included specific avoidance recommendations for rabbits, self-injectable epinephrine and a bracelet identifying her as allergic to rabbits. We recommend subcutaneous injections of epinephrine for treatment of acute allergic reactions rather than inhaled racemic epinephrine preparations.

As the pet and hobbyist markets for rabbits grow, it is necessary to consider rabbit allergies in the home as well as the workplace. Physicians should be aware that rabbit exposure can cause severe upper airway allergic reactions.

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