Diagnostic Challenge

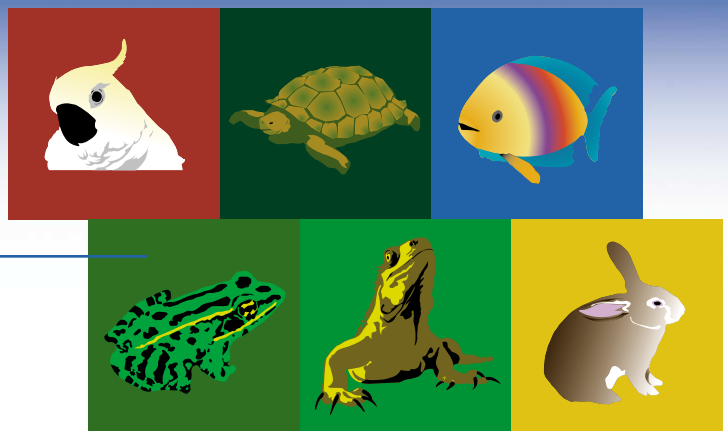

Figure 1. Rabbit on presentation, showing the severe hyperkeratosis affecting the head area.

Figure 2. Ocular presentation with discharge and lid closure.

Figure 3. Severe inflammation associated with bilateral otitis externa

History

Cadbury, a 1-year-old domestic rabbit (*Oryctolagus cuniculus*) weighing 2.3 kg, was presented with a 1-month history of facial alopecia and "skin sloughing." The rabbit was maintained in a greenhouse located behind the owner's residence and was allowed free roam of the facility.

While in the green house, the rabbit had access to a bowl filled with tap water and was fed a commercial rabbit pellet mix (Hartz Nutrition Original Recipe; The Hartz Mountain Corp, Secaucus, NJ) and free choice alfalfa hay. The rabbit was placed in the greenhouse for the winter months but had been housed in a wire rabbit cage since the "skin sloughing" was first noticed 1 month before presentation. The owner applied a triple antibiotic ointment (Neosporin; Pfizer Inc, New York, NY) to the affected areas, with no discernable improvement.

On physical examination, the patient was emaciated and depressed. There was severe alopecia and hyperkeratosis of the cranial body, including the face (Fig 1). Cadbury had periocular crusting and alopecia, and the superior lids were immobile secondary to dermatologic changes, with upper medial intropion (Fig 2). Severe otitis externa was evident with extreme crusting and scaling (Fig 3). The rabbit was considered 5% dehydrated based on its pale, tacky mucous membranes and skin elasticity. No other abnormalities were noted on the external physical examination.

At this time, evaluate Figures 1, 2, and 3, the history, and external physical examination results, and develop a treatment plan based on your top differential diagnoses.

Treatment and Diagnosis

With the severe dermatologic presentation, a complete evaluation of the affected area was initiated. Skin scrapings of the face and ear lesions revealed a *Psoroptes cuniculi* mite infestation (Fig 4) with a secondary bacterial infection. The secondary bacterial infection was probably aggravated by the pruritis and subsequent scratching by the rabbit. Lesions from the infestation were noted on the face, eyes, ears, lips, nose, dewlap, and all 4 paws. The areas on the face were sloughing. A complete blood count and plasma biochemistry analysis were performed. Abnormal results from the complete blood count[1] included a mild anemia (packed cell volume: 32%; reference range: 34%-50%) and a monocytosis (5%; reference range: 0-2%). The abnormal findings from the plasma biochemical analysis[1] included elevated creatine kinase (2,772 U/L; reference range: 140-372 U/L), total protein (7.6 g/dL; reference range: 4.9-7.1 g/dL), and globulin levels (4.9 g/dL; reference range: 2.4-3.3 g/dL).

Cadbury was hospitalized for treatment. At the time of hospitalization he was eating, drinking, and producing normal feces. To rehydrate the patient, fluids were administered (76 mL subcutaneously every 8 hours; lactated Ringer's solution; Abbot Laboratories, North Chicago, IL) over 4 days. Other treatments included enrofloxacin (5 mg/kg one intramuscular dose, followed by administration by mouth every 12 hours; Baytril; Bayer, Shawnee Mission, KS), butorphanol tartrate (10 mg/kg subcutaneously as needed; Torbugesic; Fort Dodge Animal Health, Fort Dodge, IA), ivermectin (0.4 mg/kg subcutaneously every 14 days for 3 treatments; Ivomec; Merial Limited, Iselin, NJ), and triple antibiotic ophthalmic ointment (applied topically to both eyes every 8 hours, neomycin and polymyxin B sulfates, and bacitracin zinc ophthalmic ointment). Wound manipulation was delayed to allow for treatment response, prevent iatrogenic trauma, and reduce stress and pain to the patient. Within 4 days of treatment, the rabbit exfoliated the majority of the crust associated with the mite infestation (Fig 5). Treatment continued, along with a general improvement of Cadbury's condition. The rabbit was released 14 days after presentation with husbandry and nutritional instructions given to the owner on the discharge summary. A recommendation regarding cleaning of the rabbit's environment and contaminated areas was made to prevent reinfestation. Cadbury's condition returned to normal with no lasting effects from the mite infestation or associated wounds.

Comments

P. cuniculi infections are a relatively common presentation in pet rabbits. Although the possibility of a generalized *P. cuniculi* infection outside of the external ear canal has been described, these presentations are less frequent than the typical localized otitis externa infestations.[2] This case was interesting because of the magnitude of the infestation and obvious secondary disease associated with the tissue reaction to the mites. On presentation, the original owner's complaint was that "the face fell off." Proper assessment of the patient, a thorough history, and physical examination are necessary to keep a clinician focused on the potential differential diagnoses, essential diagnostic tests, and treatment plan. In this case, performing a skin scraping, despite the severe generalized condition of the dermis, led to a diagnosis. Clinicians treating rabbits should always consider that *P. cuniculi* infestations may not be localized to the ears, because the authors have also diagnosed a *P. cuniculi* infestation from a skin scraping of the dorsal rear surface of a rabbit.

P. cuniculi is described as a large, obligate, non-burrowing parasite.[2] It has a 3-week life cycle and can survive in the host's surrounding environment for up to 21 days.[2,3] It is the ability of the parasite to survive off the host for 21 days that requires long-term environmental treatment to prevent reinfestation.[3] The most common presentation of *P. cuniculi* infection in rabbits is reddish-brown

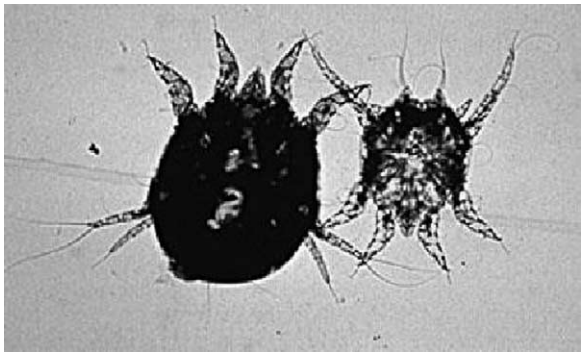

Figure 4. *Psoroptes cuniculi* was identified in skin scrapings from the affected areas.

Figure 5. Cadbury 1 week after treatment for *Psorptes cuniculi* infection was initiated.

crusting of the external ear canal, which may range from a mild to severe reaction.[2] As with this case, the inflammation and crusting can extend to the face, dewlap, neck, trunk, legs, feet, and perineum.[2] Although there are anecdotal reports of the mite causing neurologic signs by breaching the tympanic membrane, this would be a rare occurrence.[2] In the authors' experience, even with this severe case of *P. cuniculi*, the tympanic membrane has always remained intact. It is more likely rabbits exhibiting neurologic signs (for example, torticollis), and in whom ear mites have been identified, have a concurrent *Pasteurella multocida* infection.

The mites can be best identified by using an otoscope or viewing slides of otic debris or a by skin scraping (Fig 4). When examining otic debris under the microscope, one can identify mites, mite eggs, and mite feces along with exfoliated desquamated cellular material.[2] The mites are best treated with ivermectin (0.4 mg/kg subcutaneously every 14 days for 3 treatments).[4] Secondary disease conditions should be treated accordingly, and additional supportive care (for example, fluids and nutrition) provided. As with this case, ivermectin is an effective drug when used at an appropriate dose and duration. Historically, ivermectin dosing for *P. cuniculi* infestations were 0.2 mg/kg. The authors have observed resistance to ivermectin by *P. cuniculi* in some of the rabbit ear mite infestations we have treated. Currently, supported by published dosages, the authors have found 0.4 mg/kg to be both safe and effective. It is also important to treat the patient a minimum of 21 days to ensure that any immature stages of the parasite are eliminated. Environmental cleanup before placing the rabbit back into its enclosure will prevent reinfection.

This case was submitted by **Thomas N. Tully, Jr, DVM, MS, Carol S. Foil, MS, DVM**, and **Mark A. Mitchell, DVM, MS, PhD,** from the Department of Veterinary Clinical Sciences, Louisiana State University School of Veterinary Medicine, Skip Bertman Drive, Baton Rouge, LA 70803.

1055-937X/05/1404-$30.00
doi:10.1053/j.sacp.2005.09.009

References

1. Fudge AM: Laboratory reference range for selected avian, mammalian and reptilian species, in: Fudge AM (ed). Laboratory Medicine: Avian and Exotic Pets. Philadelphia, PA, WB Saunders, pp 377-381, 2000
2. Hess L: Dermatologic diseases, in: Quesenberry KE, Carpenter JW (eds): Ferrets, Rabbits and Rodents Clinical Medicine and Surgery (ed 2). St. Louis, MO, WB Saunders, pp 197-198, 2004
3. Arlian LG, Kaiser S, Estes SA, et al: Infestivity of *Psoroptes cuniculi* in rabbits. Am J Vet Res 42:1782-1784, 1981
4. Hernandez-Divers SJ: Rabbits, in: Carpenter JW (ed): Exotic Animal Formulary (ed 3). St. Louis, MO, Elsevier/Saunders, pp 416, 2005