First Italian case of mycobacteriosis in a pet rabbit

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Mycobacteriosis are important zoonoses and clinicians should be aware of their potential risks. A rescued 3-year-old rabbit was presented for acute rhinitis. After 10 days of antibiotic therapy, no improvement was noted and intermittent diarrhoea, dysorexia and weight loss arose. The patient was hospitalized and haematological and faecal examinations were performed. A later ultrasound examination showed intestinal subocclusion. After stabilization, an explorative laparotomy was performed and several caseous nodules were found on the small intestine walls. The rabbit was euthanized and necropsy showed other nodules in the lungs, along with swelling of mesenteric lymph nodes. Cytological and histological examination revealed the presence of acid-fast-resistant bacteria, which were identified as Mycobacterium avium. Mycobacterial infections are uncommon in pet rabbits but their potential impact on human health and the unspecific clinical signs should suggest to include them in the differential diagnoses for respiratory and gastrointestinal disorders.Mycobacteriosis are important zoonoses and clinicians should be aware of their potential risks. A rescued 3-year-old rabbit was presented for acute rhinitis. After 10 days of antibiotic therapy, no improvement was noted and intermittent diarrhoea, dysorexia and weight loss arose. The patient was hospitalized and haematological and faecal examinations were performed. A later ultrasound examination showed intestinal subocclusion. After stabilization, an explorative laparotomy was performed and several caseous nodules were found on the small intestine walls. The rabbit was euthanized and necropsy showed other nodules in the lungs, along with swelling of mesenteric lymph nodes. Cytological and histological examination revealed the presence of acid-fast-resistant bacteria, which were identified as *Mycobacterium avium*. Mycobacterial infections are uncommon in pet rabbits but their potential impact on human health and the unspecific clinical signs should suggest to include them in the differential diagnoses for respiratory and gastrointestinal disorders.

Keywords - Mycobacterium, rabbit, mycobacteriosis, zoonosis.

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CASE REPORT
INTRODUCTION

Mycobacteriosis are major zoonotic diseases and veterinarians should be aware of their potential consequential risks. Bacteria belonging to the genus *Mycobacterium* are aerobic, acid-resistant, immobile, non-spore forming Gram-positive pleomorphic bacilli that are highly resistant to environmental conditions.[1]

Tubercular mycobacteria (in particular *M. tuberculosis*) are still today a serious global health threat:[2] it is estimated that approximately one third of the world's population is infected and in 2010 the World Health Organization (WHO) reported 8.8 million new cases worldwide.[3,4] In human medicine, *M. tuberculosis* is normally associated with pulmonary, spinal and musculoskeletal disorders.[5,6]

With regard to mycobacteriosis in the rabbit, most of our knowledge derives from the fact that this species has been widely used as an experimental model for therapeutic protocols and to study immune responses, immune biomarkers as well as vaccine immunity.[2,5,7]

Mycobacteriosis are major zoonotic diseases and veterinarians should be aware of their consequential risks. Tubercular mycobacteria (in particular *M. tuberculosis*) are still today a serious global health threat. Mycobacteriosis caused by non-tubercular mycobacteria are a cause of increasing concern for immunocompetent human patients.

Mycobacteriosis caused by non-tubercular mycobacteria are the cause of increasing concern in immunocompetent and non-immunocompetent human patients, as well as in many animal species where they cause focal dermal lesions or systemic infections.[8] The various subspecies of *M. avium* are extremely widespread in the environment and can come into contact with human and animal hosts; the infection can be transmitted from animals to humans through contaminated food or via direct contact.[9]

Reports of mycobacteriosis in pet rabbits are few and only refer to non-tubercular mycobacteria (in particular the *M. avium* complex); the clinical signs reported in such cases are heterogeneous and consist of chronic rhinitis, emaciation and joint swelling.[10,11] The anatomopathological lesions described include nodular inflammatory lesions of the lungs, liver, kidneys, intestine, lymph nodes and joints.[10-11]

Mycobacterium avium has been isolated as a pathogen in both adult and young animals; contact with avian droppings is the suspected source of infection.[11,12] The diagnosis can be made by culture, histology or polymerase chain reaction (PCR).[1]

CLINICAL CASE

A rescued, 3-year-old, 2.5 kg castrated male rabbit was presented for acute rhinitis. The patient could roam freely in a flat with access to the balcony; the owner also had two clinically healthy guinea pigs and a hamster, which had no direct contact with the rabbit. The clinical examination only showed the presence of bilateral mucosal rhinitis. An oral therapy with enrofloxacin 10 mg/kg q24h [Baytril tablets

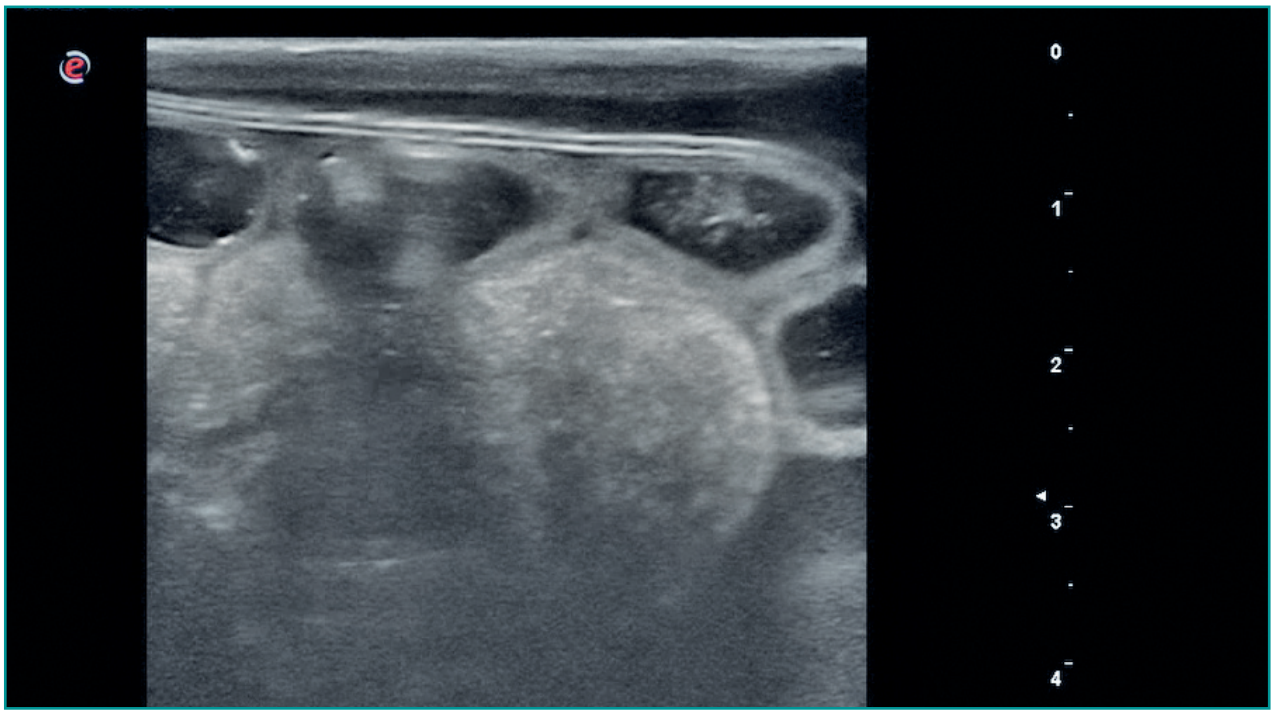

Figure 1 - Numerous segments of the small intestine are thickened, filled with liquid material and present an altered wall echostructure.

A rescued, 3-year-old, 2.5 kg castrated male rabbit was presented for acute rhinitis. The subject subsequently presented intermittent diarrhoea, dysorexia and weight loss. Ultrasonography detected an intestinal subocclusion.

50 mg - Bayer S.p.A.] was started.[13,14] A second clinical examination was performed 10 days later; no improvement was detected and in addition signs of occasional diarrhoea, dysorexia and weight loss were now present. The patient was hospitalized and the ongoing therapy was integrated with metoclopramide 2 mg/kg SC q12h [Vomend injectable 5mg/ml - Eurovet Animal Health B.V.],[15] meloxicam 0.5 mg/kg SC q24h [Metacam injectable 5 mg/ml - Boehringer Ingelheim S.p.A.],[16] subcutaneous fluid therapy with saline solution [Sodium chloride 0.9% - B. Braun Milano S.p.A.] corresponding to 2% of the body weight q24h and a diet change (higher amount of fibre - increasing the quantity of hay - and lower amount of carbohydrates). During hospitalization, haematological, haematobiochemical and parasitological faecal tests were performed. The blood count and parasitology test did not show any alterations; the blood and biochemistry examination showed hypophosphatemia (1 mmol/L) and hypotriglyceridaemia (109 mg/dL).[17] After an initial recovery, and despite the good appetite, after a few days the rabbit started again to lose weight. An abdominal ultrasound examination was then performed, revealing the presence of abdominal effusion, abundant meteorism of the cecum and colon, thickening of the wall of the small intestine with loss of the normal echostructure and presence of a suspected subocclusion; the liver, gallbladder and kidneys did not present any alterations [Fig. 1]. To confirm the diagnostic suspicion an exploratory laparotomy was performed: the patient was premedicated with dexmedetomidine (0.05 mg/kg) [Sedastart 1mg/ml injectable solution - Esteve SpA], butorphanol (0.1 mg/kg) [Dolorex 10mg/ml injectable solution - MSD Animal Health S.R.L.] and ketamine IM (5mg/kg) [Imalgene 100 mg/ml injectable solution - Merial Italia SpA];[13] mask induction was achieved with isoflurane [Vetfluorane vial 100 mg/g - Virbac S.R.L.]; the rabbit was then intubated with a 2.5 mm orotracheal catheter and the anaesthesia was maintained by inhalation with 1.5% isoflurane in 100% oxygen. Upon opening of the abdominal cavity numerous caseous nodular lesions (diameter from 1 to 10 mm) were immediately detected in the serosa and intestinal wall [Fig. 2]. Being these lesions responsible for the intestinal subocclusion, intraoperative euthanasia was performed by intravenous administration of a commercial formulation [Tanax injectable solution - MSD Animal Health S.R.L.], followed by necropsy. The *post mortem* examination showed the presence of numerous intestinal nodules (some occupying the entire space and responsible for the subocclusion) and pulmonary nodules [Fig. 3], in addition to mesenteric lymph node enlargement (5-8 mm in diameter). Cytological examination of the lesions and lymph

Presence of numerous intestinal nodules. Necropsy diagnosed mycobacteriosis caused by *Mycobacterium avium*. The case is important as the patient was initially brought in and treated for symptoms common to several diseases that are epidemiologically more frequent in this species.

Figure 2 - Nodular caseous lesions scattered on the external intestinal surface.

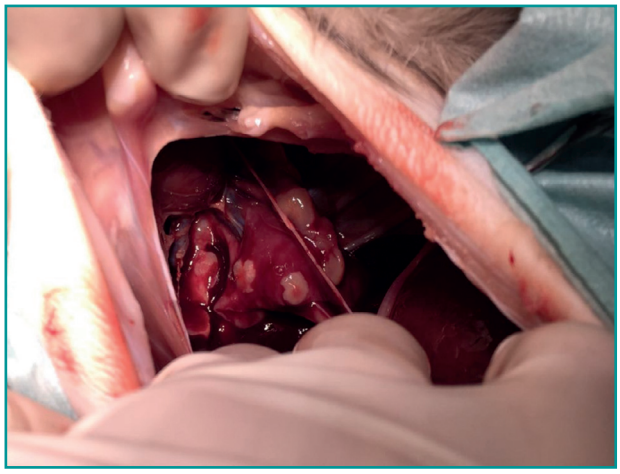

Figure 3 - Numerous lung nodular lesions.

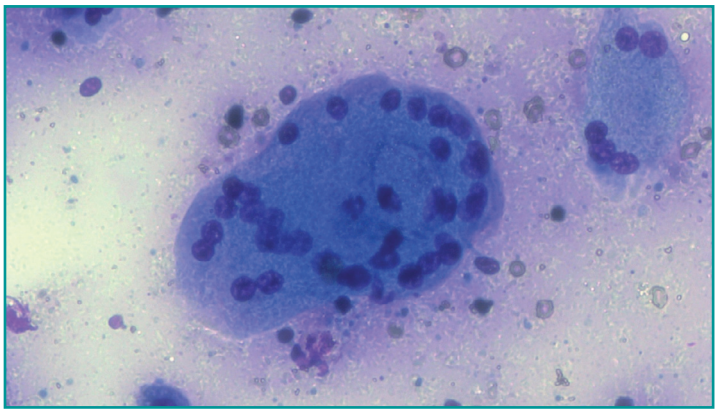

Figure 4 - Multi-nucleated cell containing optically clear, rod-shaped cell profiles compatible with bacteria; the bacteria are also extracellular. 40X

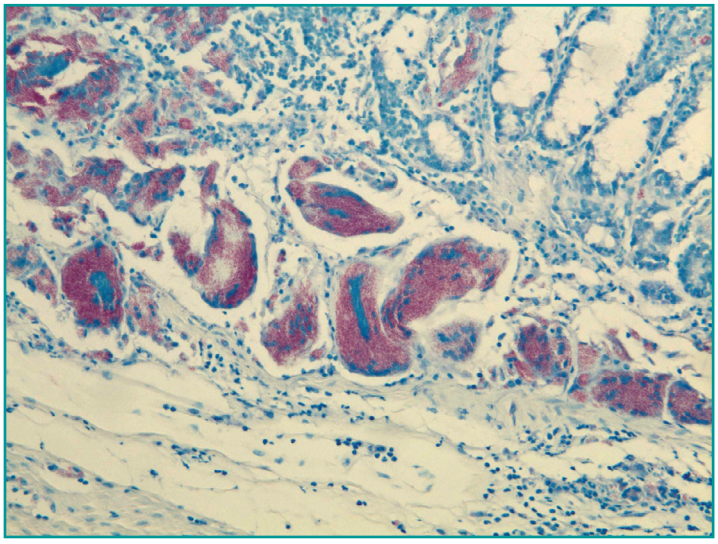

Figure 5 - Intestine; several acid-alcohol-resistant bacilli in the cytoplasm of macrophages and multinucleated giant cells. Ziehl-Neelsen, 40X

nodes revealed the presence of numerous macrophages and multinucleated giant cells with abundant basophilic cytoplasm and containing several optically clear, rod-shaped vacuolizations compatible with the presence of *Mycobacterium sp*. Given the suspicion of mycobacteriosis, the entire corpse was sent to the Istituto Zooprofilattico Sperimentale (IZS) in Brescia to perform a necropsy, which revealed the presence of granulomatous enteritis, lymphadenitis and pneumonia characterized by the presence of numerous multinucleated cells. Ziehl-Neelsen staining revealed a myriad of intracellular acid-alcohol-resistant bacilli in the cytoplasm of multinucleated giant cells. PCR confirmed the definitive diagnosis of mycobacteriosis caused by *M. avium* [Fig. 4, Fig. 5].

DISCUSSION

Mycobacteriosis is still a poorly described disease in the domestic rabbit and, to the knowledge of the authors, this work represents the first report of the disease in a rabbit in Italy.[1]

In most animals, mycobacteriosis appears as a slow and progressive disease. The *Mycobacterium avium* complex has been isolated in birds, humans, bovids, dogs, cats, rodents and rabbits. In these species the main clinical signs reported are similar to the ones of the clinical case presented, i.e. lethargy and weight loss. The symptoms, which can be intermittent, are: vomiting, anorexia, diarrhoea, haematochezia, fever; more rarely, also: lameness, paresis, hyperesthesia, subcutaneous swelling, anterior uveitis, dyspnoea. As for the clinical conditions of the patient in question, the symptoms were already known to be potentially compatible with mycobacteriosis.[18]

The case is important as the patient was initially brought in and treated for symptoms common in several diseases that are epidemiologically more frequent in this species, and the final diagnosis was reached only *post mortem*, relying on a reference centre.

Pathogens that spread through the environment, wildlife, livestock and human movements are a major challenge for the safeguard of human health, for the protection of pets, for agricultural management and for the preservation of wildlife. In wild rabbits only few reports on mycobacteriosis are available and hence the epidemiological role of this species has not yet been clarified.[1]

Since mycobacteria infections are important zoonotic infections and a real threat to public health, it is the duty of the clinical veterinarian to include them in differential diagnoses in the case of wild, rescued or unknown subjects.

KEY POINTS

- Mycobacteriosis is an important zoonotic disease
- Mycobacteriosis caused by non-tubercular mycobacteria is the cause of increasing concern in human medicine.
- A rabbit was examined for rhinitis, intermittent diarrhoea, dysorexia and weight loss and treated for an intestinal subocclusion.
- Mycobacteriosis is still a poorly described disease in the domestic rabbit and, to the knowledge of the authors, this work is the first report of the disease in a rabbit in Italy.

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