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Acute Suppurative Otitis in a Rabbit Infected with Multidrug-Resistant *Staphylococcus aureus*

Ionela POPA, Vlad IORGONI, Ionica IANCU, Timea BOCHIS, Călin POP, Alexandru GLIGOR, Bogdan SICOE, Viorel HERMAN, Ileana NICHITA Department of Semiology, Faculty of Veterinary Medicine, University of Life Sciences "King Mihai I" from Timişoara, Romania



This case report describes a two-month-old female German Giant Spotted rabbit (Oryctolagus cuniculus) diagnosed with acute suppurative otitis affecting the external and middle ear. The

etiological agent, Staphylococcus aureus, exhibited multidrug resistance, complicating therapeutic management. The rabbit presented with clinical signs including head tilt, ataxia, and purulent otic discharge. Microbiological analysis confirmed S. aureus as the causative pathogen, with antimicrobial susceptibility testing revealing resistance to multiple antibiotic classes. Given the pathogen's resistance profile, treatment involved a combination of supportive care and targeted antimicrobial therapy. Despite intervention, the infection progressed, highlighting the challenges posed by multidrug-resistant bacterial infections in rabbits. This report emphasizes the importance of early microbiological diagnosis and antimicrobial susceptibility testing in guiding effective treatment strategies. Additionally, it underscores the emerging concern of antibiotic resistance in bacterial otitis in lagomorphs and the need for judicious antimicrobial use in veterinary practice.

Introduction

Staphylococcus aureus is a major zoonotic pathogen with global distribution, capable of causing a broad spectrum of diseases in both humans and animals. In human medicine, S. aureus is associated with a wide range of clinical conditions, including skin and soft tissue infections, pneumonia, endocarditis, osteomyelitis, septic arthritis, and bloodstream infections. Its pathogenic potential is largely attributed to an extensive array of virulence factors and its remarkable capacity to develop resistance to multiple antimicrobial agents, particularly β-lactams. The emergence and global dissemination of methicillin-resistant *S. aureus* (MRSA) since its first report in 1961 has significantly complicated the clinical management of staphylococcal infections, both in community and healthcare settings [Agnoletti et al, 2014, Badillo et al, 2022, Holmes et al 2016].

In veterinary medicine, S. aureus has long been recognized as an important pathogen, affecting numerous animal species, including poultry, dairy cattle, small ruminants, and companion animals. Among livestock, S. aureus is responsible for economically significant conditions such as bovine mastitis, lameness in broiler chickens, and a variety of infections in farmed rabbits, including mastitis, pododermatitis, dermatitis, metritis, and septicemia. Rabbits (Oryctolagus cuniculus), particularly those raised in intensive farming systems, represent a susceptible host for *S. aureus* infections, which may lead to severe clinical outcomes and production losses [Agnoletti et al, 2014, Idicula et al, 2016, Goni et al 2004, Munoz-Silvestre et al 2020].

In this study is presented the case of a two-month-old female German Giant Spotted rabbit from a breeding facility in western Romania presented with head tilt, ataxia, and purulent ear discharge, suggestive of otitis externa and media. It was the only affected animal out of 64. Staphylococcus aureus was isolated from otic secretions and identified by MALDI-TOF mass spectrometry. Antimicrobial testing revealed a multidrug-resistant profile, complicating treatment.

• Case study

A two-month-old female German Giant Spotted rabbit (Oryctolagus cuniculus) was presented to the University Veterinary Clinic of the Faculty of Veterinary Medicine in Timișoara, Romania, with acute neurological and otic

• **Discussions**

Staphylococcus aureus is a major pathogen in rabbitries, causing abscesses, mastitis, otitis, pododermatitis, and septicaemia. Infections can be sporadic, due to low-virulence strains, or epidemic, caused by highly virulent strains leading to infertility, production loss, and death. Typing methods help identify virulent strains, but treatment and disinfection are often ineffective. In such cases, culling the entire flock and repopulating after thorough sanitation is the only effective solution. Strict biosecurity measures are essential to prevent introduction and spread [Hermans et al, 2003].

Otitis media in rabbits is frequently asymptomatic and may be detected incidentally during diagnostic imaging performed for unrelated concerns. When clinical signs are present, they commonly include lethargy, reduced appetite, discomfort, pruritus at the base of the ear, or the presence of a painful swelling indicative of localized inflammation or abscess formation. Neurological manifestations such as head tilt, facial asymmetry, or muscle spasticity may occur in more advanced stages due to the extension of infection to neural structures surrounding the bulla. The accumulation of inflammatory exudate within the middle ear cavity is typically initiated by bacterial, fungal, or parasitic pathogens. Tympanic membrane rupture may allow purulent material to drain into the external ear canal or enable further progression toward otitis interna, frequently marked by balance disturbances and ataxia [Vecere et al, 2022, Eatwell 2013].

In a study from 2022, next-generation sequencing was employed to investigate the microbial composition of the external ear canal in both clinically healthy rabbits and those diagnosed with otitis externa. The results revealed substantial differences between the two groups, with a significantly higher bacterial and fungal diversity observed in healthy individuals (P = 0.00 for both). This microbial richness may play a protective role in maintaining ear canal homeostasis. In contrast, rabbits with otitis externa exhibited a predominance of potential pathogenic bacteria such as Staphylococcus aureus, Corynebacterium lactis, and Corynebacterium mastitidis, alongside fungal taxa such as *Malassezia restricta* and a species of *Cladosporium*. Interestingly, the healthy group showed the highest relative abundances of an uncharacterized *Phytoplasma* species and *Staphylococcus* epidermidis, as well as a different Cladosporium species, suggesting that certain taxa may be associated with a stable, non-pathogenic microbiome [Vecere et al, 2022].



symptoms. The rabbit originated from a small-scale extensive breeding facility located in western Romania, where animals are reared both for exhibition purposes and for meat production. At the time of presentation, the breeding operation housed a total of 64 rabbits. According to the breeder, the affected rabbit was the only animal in the group exhibiting clinical signs of illness.

The owner reported the sudden onset of symptoms including persistent head tilt to the left, ataxia, and a copious, purulent discharge from the left ear. Upon clinical examination, the rabbit was alert but demonstrated notable vestibular dysfunction. Physical inspection revealed inflammation and swelling localized to the external ear canal, along with increased local temperature and a thick, malodorous purulent exudate. The animal displayed moderate pain upon palpation of the left ear and surrounding region.

To further evaluate the extent of the infection, a lateral and dorsoventral radiographic examination of the skull was performed. Radiographs indicated opacification of the tympanic bulla on the left side, consistent with otitis media (Figure 1). No signs of bone lysis or advanced osteomyelitis were observed, although soft tissue involvement was evident. Based on these findings, a presumptive diagnosis of otitis externa and media was made.

Conclusions

This case highlights the challenges of diagnosing and treating otitis in rabbits, especially when caused by multidrug-resistant Staphylococcus aureus. Though an opportunistic pathogen, S. aureus is rarely reported in severe otitis in young rabbits from large-scale breeding facilities. Neurological signs alongside purulent ear discharge warrant thorough diagnostics, including imaging and microbiological testing. MALDI-TOF MS enabled rapid identification, and susceptibility testing guided targeted therapy. The isolate's extensive resistance complicated treatment and worsened the prognosis. This underscores the need for prudent antibiotic use, routine surveillance, and individualized treatment in exotic animal practice.



Figure 1. Radiographic image of the left medium otitis.

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