First report of listeriosis in hamster (*Mesocricetus auratus*)

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**ABSTRACT**

A six month old male hamster living in a colony of Hamster in the animal house of Urmia University, Urmia, Iran, was found with restlessness and circling signs. The clinical examination revealed symptoms and signs of encephalitis. Therefore microbiological and histopathologic studies were conducted after euthanizing the animal. Finally, the results of laboratory tests demonstrated *Listeria monocytogenes* infection in the Hamster.

**Keywords:** Listeriosis, encephalitis, Hamster.

**INTRODUCTION**

Listeriosis is a bacterial zoonotic disease caused by *Listeria monocytogenes*. *Listeria monocytogenes* is a gram- positive, microaerophilic, motile, non-spore forming and non-acid fast rod. It grows well on ordinary media and often forms aggregates resembling Chinese letters, in tissue [1, 3]. This bacterium is widespread in nature and is responsible for a variety of infections in animals and humans [2].

Listeriosis occurs as three distinct syndromes, which ordinarily do not occur together: encephalitis, systemic infection (septicemia) and abortion [4]. Laboratory animals such as guinea pigs, mice and rats can be infected experimentally and are occasionally the victim of small epizootics [5, 6]. The most characteristic form of the disease is encephalitis that can be diagnosed based upon animal’s abnormal posturing of the head and neck, walking aimlessly in a circle (“circling disease”), nystagmus, blindness and paralysis [4]. Diagnosis of listeriosis is based on the isolation of *L. monocytogenes* from different clinical materials, depending upon the syndrome [7, 8, 9].

The aim of this case report was to detect the cause of infectious encephalitis in a hamster and describe the histopathologic modifications caused by *L. monocytogenes*.

**MATERIALS AND METHODS**

**Bacteriological analysis.** Animal was euthanized by CO₂ and the whole body surface disinfected with 70% alcohol. After dissection of the abdominal wall, samples from liver, kidney, spleen, heart, blood, brain and spinal cord were collected for bacteriological and histopathologic study. The common technique for isolation of *Listeria* from brain and spinal cord is the cold enrichment method. Therefore, the samples of brain and spinal cord were homogenized in nutrient broth (10%) and stored at 4°C for one month. Every four days bacterial subcultures from the suspension were performed on blood agar and MacConkey’s medium (Merck, Germany). The inoculated media were incubated at 37°C for up to seven days. The samples from liver,
kidney, spleen and heart were cultured on blood agar and MacConkey and incubated as mentioned above. The plates were analyzed daily for any bacterial growth. Gram staining and biochemical tests were carried out for identification of the isolates. Biochemical tests used for identification were: catalase, cytochrome oxidase, aesculin hydrolysis, motility, nitrate reduction and carbohydrate fermentation. Furthermore modified CAMP test with *Staphylococcus aureus* (PTCC 1113) and with *Rhodococcus equi* (ATCC 33701) were used for confirmation. Finally, serotyping was carried out by the agglutination method using the rapid slide test for serotypes 1, 4 and polyvalent types 1, 4 according to the manufacturers instructions (Difco, USA).

**Histopathologic analysis.** The liver, kidney, spleen, heart, brain and spinal cord samples were fixed in 10% formalin solution and embedded in paraffin wax. Sections were cut at 5 to 7 µm and stained with Ehrlich’s haematoxylin and Eosin (H & E).

**RESULTS**

*Listeria monocytogenes* was isolated in blood, liver, kidney, brain and spinal cord samples. Positive samples contained *L. monocytogenes* at >20 CFU per plate. On the basis of their physiological and biochemical characteristics, the isolates were identified as *L. monocytogenes* (Table 1). The strains isolated from all the samples belonged to serovar 1/2a.

Histopathologic analyses demonstrated the presence of congestion and bleeding in the brain parenchyma with purulent meningitis and penetration of neutrophils into the brain (Fig. 1). It should be noted that the formation of micro-abscesses in brain and brain stem is pathognomonic of lesions in listeriosis. Furthermore, microscopic study of heart sections revealed the presence of focal necrosis, congestion and bleeding in muscle fibers (Fig. 2). Swelling, congestion, fatty degeneration, necrosis and micro-abscesses were observed in the liver (Fig. 3). Histopathologic study of kidney sections demonstrated the presence of congestion, bleeding and hyaline casts in the glomerules and kidney tubules, respectively (Fig. 4). Furthermore, bleeding and severe congestion were seen in spleen sections.

**CONCLUSION**

*Listeria monocytogenes* has a world wide distribution and has been found in over 50 species of animals including mammals, birds and fish. In most animal cases, the mode of infection is unknown, though it probably involves ingestion of infected soil or foodstuffs or contact with infected animals. In this case, based the bacteriologic and histopathologic studies listeriosis with systemic and meningoencephalic involvement was confirmed in the hamster under investigation. With referring to literature, we found no reports of listeriosis in hamster so this is the first report of listeriosis by *L. monocytogenes* in a hamster.

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<thead>
<tr>
<th>Shape</th>
<th>Gram</th>
<th>Catalase</th>
<th>Oxidase</th>
<th>Motility (umbrella-shaped)</th>
<th>Nitrate</th>
<th>Aesculin hydrolysis</th>
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<tr>
<th>Glucose fermentation</th>
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<th>Mannitole fermentation</th>
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Fig. 1. Sections of the brain: a) penetration of neutrophils into the brain, b) Congestion and the presence of polymorphonuclear cells in a blood vessel of the brain, c) meningoencephalitis and d) purulent meningitis (H & E, ×400).

Fig. 2. Histopathologic sections of the kidney revealed congestion (a, H & E, ×100) with glomerular congestion and dilation (b, H & E, ×400).
REFERENCES


