Journal of Equine Veterinary Science 31 (2011) 361-364

Journal of Equine Veterinary Science

journal homepage: www.j-evs.com

Case Report

Enteritis and Septicemia in a Horse Associated With Infection by *Escherichia fergusonii*

Alexander Th. A. Weiss DVM, PhD [a], Antina Lübke-Becker DMV [b], Marcel Krenz DVM [c], Elisabeth van der Grinten DMV [a]

[a] *Department of Veterinary Pathology, Freie Universitaet Berlin, Berlin, Germany*
[b] *Institute of Microbiology and Epizootics, Freie Universitaet Berlin, Berlin, Germany*
[c] *Tieraerztliche Praxis für Pferde Marcel Krenz, Friesack, Germany*

Keywords:
Escherichia fergusonii
Septicemia
Endocarditis
Enteritis
Horse

A B S T R A C T

This report presents a clinical case of enteritis and septicemia with subsequent death of an adult horse associated with *Escherichia fergusonii,* in Germany. The patient died within 24 hours after onset of clinical signs, including fever and erosive stomatitis. Major pathologic findings were severe, acute, fibrinous, and necrotizing enteritis; severe, acute, fibrinous endocarditis; as well as multiple, hyaline thrombi in blood vessels. *E fergusonii* and *Escherichia coli* were isolated in moderate to high amounts from the intestine, the tricuspid valve, and the liver. This article represents the first case report of lethal enteritis and septicemia associated with *E fergusonii* infection in a horse.

1. Introduction

Escherichia fergusonii is a Gram-negative bacterium described in 1985 as a new member of the genus *Escherichia* within the *Enterobacteriaceae* family. Within the genus, *E fergusonii* represents the closest relative to the well-known *Escherichia coli* [1,2]. At the time of discovery, the clinical significance of *E fergusonii* was uncertain; however, its isolation from blood and spinal fluid of human patients pointed toward a possible involvement in human disease [1]. Meanwhile, its potential enteropathogenicity has been experimentally demonstrated and *it* has been isolated from several cases of septicemia in immunocompromised people [3-5]. More recently, 24 cases of bacteremia because of *E fergusonii* were reported from Great Britain (Anon, 2009).

In the veterinary field, systemic infection by *E fergusonii* was documented in a small number of cases in ruminants and ostriches [6-8]. In adult cattle and one calf, massive enteritis with diarrhea, accompanied by weight loss over a short period, were the main clinical symptoms that resembled the symptoms of acute salmonellosis [7].

In ostriches, the clinical course was enhanced as compared with cattle and pathologic findings included fibrinonecrotic typhlitis as well as acute septicemia, characterized by serofibrinous peritonitis and generalized serosal petechiation. *E fergusonii* has been isolated in pure culture from intestinal lesions, blood, liver, and spleen [8].

In addition, it has been reported that *E fergusonii* induces abortion and mastitis in cattle and sheep [7]. Furthermore, the isolation of *E fergusonii* from pigs and sheep with diarrhea, respiratory disease, or septicemia, as well as from reindeer carcasses has been reported [9,10]. Very recently, *E fergusonii* was suspected to be potentially linked to gastric glandular lesions of horses [11]. Moreover, *E fergusonii* has been isolated from beef during routine screening procedures [12].

Although many studies have reported *E fergusonii* as an emerging potentially zoonotic organism, its importance and role as a secondary or primary pathogen in infections in both human beings and animals, as well as the possible source of infection still requires further investigation

Corresponding author at: Alexander Th. A. Weiss, DVM, PhD, Department of Veterinary Pathology, Freie Universitaet Berlin, Robert-von-Ostertag-Street 15, 14163 Berlin, Germany.
E-mail address: weiss.alexander@vetmed.fu-berlin.de (A.Th.A. Weiss).

0737-0806/$ - see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.jevs.2011.01.005

[13,14]. A recent study identified three genes encoding virulence determinants which are common features of known *E coli* pathotypes in different *E fergusonii* strains [9]. One report discussed animal or environmental exposure to *E fergusonii* as a source of infection [3].

This report describes a rare case of enteritis and septicemia in a horse associated with *E fergusonii* and *E coli.*

2. Case Description

2.1. Clinical History

In the late summer of 2007, an 11-year-old Hanoverian mare suddenly developed pyrexia, nasal discharge, and had problems with swallowing. Multifocal, acute erosions measuring up to 1 cm in diameter were visible in the oral mucosa. Laboratory findings included a severe leucopoenia. Despite treatment with novalgin and gentamicin, the animal died within a day after onset of symptoms. Tentative diagnosis was septicemia, and the carcass was immediately transferred to the Department of Veterinary Pathology for postmortem examination.

2.2. Pathologic Findings

The gross examination of the well-nurtured horse revealed severe, diffuse, fibrinous, necrotizing; and hemorrhagic enteritis of the distal part of the jejunum and the ileum. The tricuspid valve of the heart had severe, diffuse, acute, fibrinous endocarditis (Fig. 1). The mucous membranes of the oral cavity, especially of the lips and the tongue, showed severe, multifocal, acute, erosive to ulcerative inflammation.

Multifocal petechiae and ecchymoses were visible in the mucosa of the colon, all serous membranes, and partially in skeletal muscles of the trunk, indicating hemorrhagic diathesis. The spleen and the meninges were mildly congested, whereas the liver was severely congested. The lungs showed severe, acute, diffuse alveolar edema in addition to moderate congestion. The right lateral ventricle of the brain contained a plexus cholesteatoma measuring approximately $1.5 \times 0.7 \times 0.5$ cm^3.

Samples of all organs were fixed in 4% neutral-buffered formaldehyde, embedded in paraffin wax, 5-μm sections were made, and stained with hematoxylin-eosin. Gross lesions described previously were confirmed by pathohistologic evaluation (Figs. 2 and 3). Additionally, the mucosa of the small intestine revealed multiple, hyaline thrombi within small arteries and arterioles. Furthermore, vascular thrombi were found in arterioles and capillaries of mucous membranes of the oral cavity, in pulmonary vessels, in mediastinal and mesenteric lymph nodes, in the cerebral cortex, as well as in renal glomeruli.

Spleen, lung, and mesenterial lymph nodes also displayed severe, acute hyperemia and moderate, acute hemorrhages. In the liver, moderate, multifocal, acute, centrilobular coagulation necrosis was present.

In the cerebrum, moderate, multifocal, acute, suppurative plexus choroiditis and moderate, acute, diffuse, meningeal and submeningeal edemas were observed.

2.3. Bacteriological Findings

All specimens were transferred to blood agar (5% defibrinated sheep blood), Gassner agar (Oxoid, Wesel, Germany), and CHROMagar (CHROMagar, Paris, France). Plates were incubated for 24 to 48 hours under aerobic conditions at 36°C. Species determination was performed according to standard procedures using Gram stain and cytochrome oxidase test [15]. The identification of *E fergusonii* and *E coli* was confirmed using the rapid ID32E system (bioMérieux, Marcy l'Etoile, France). Microbiological examination revealed moderate to high amounts of *E fergusonii* from the tricuspid valve, the small intestine, and the colon. The liver yielded low to moderate amounts of *E fergusonii*. Additionally, *E coli* was isolated in moderate to high amounts from the tricuspid valve, the ileum, and the colon, and in low to moderate amounts from the liver (results are also summarized in Table 1). Bacterial culture did not detect *Salmonella spp.* or *Clostridium perfringens*.

3. Discussion

Pathogenetic and morphological characteristics of septicemia are vascular leakage and disseminated intravascular coagulation causing hemorrhagic diathesis and

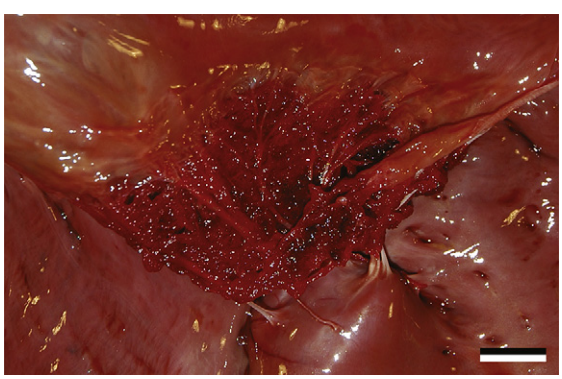

Fig. 1. Heart, tricuspid valve: acute, fibrinous endocarditis. The trabeculae are covered by fibrinous exudate and coagulated blood. Bar approximately 0.8 cm.

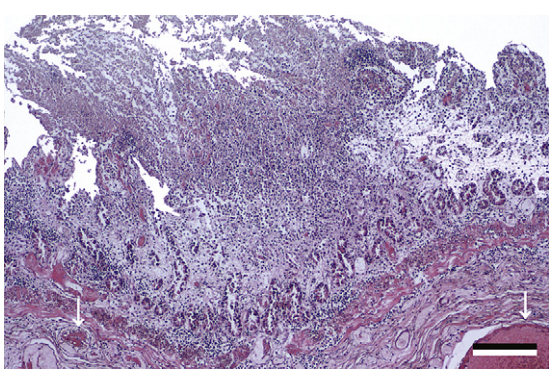

Fig. 2. Ileum (HE): acute, fibrinous, and necrotizing enteritis. Epithelium is replaced by fibrinous exudate that is intermingled with inflammatory cells. Some arterioles contain hyaline thrombi (arrows). Bar: 200 μm.