PLACENTITIS AND DYSTOCIA ATTRIBUTED TO *STREPTOBACILLUS MONILIFORMIS* IN A DOMESTIC DUMBO RAT (*RATTUS NORVEGICUS*)

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Abstract

A 12-week-old sexually intact female domestic Dumbo rat (*Rattus norvegicus*) was presented for dystocia. The animal had malocclusion incisors, mucohemorrhagic vulvar discharge, and no evidence of obstruction of the pelvic canal. The animal was treated parenterally with calcium and oxytocin and provided supportive care. Controlled vaginal delivery under general anesthesia was unsuccessful. The animal was humanely euthanized and was diagnosed with bacterial placentitis on necropsy. Histopathologic examination revealed abundant filamentous, Gram-negative, Giemsa-positive bacteria associated with the placenta, endometrial surface, and uterine vessels of the dam, and alveolar spaces of multiple fetuses. Aerobic bacterial culture of placental tissues revealed small pure gray colonies of Gram-negative, rod-shaped, and filamentous bacteria. Polymerase chain reaction targeting the 16S ribosomal RNA gene followed by sequencing identified the etiologic agent as *Streptobacillus moniliformis*, the causative agent of rat bite fever and a zoonotic disease that historically has been considered a nonpathogenic commensal organism of the rat. The current report documents placentitis attributed to *S. moniliformis* infection in a rat and is consistent with reports in mice and humans that this organism may be an opportunistic pathogen of the female reproductive tract; it also suggests that *S. moniliformis* can cause primary disease in a rat.

Key words: rat bite fever; *Streptobacillus moniliformis*; zoonosis; reproductive tract

A 12-week-old sexually intact female domestic Dumbo rat (*Rattus norvegicus*) was acquired from a pet shop 2 weeks before the presentation. The rat had been exposed to a male before purchase and exhibited progressive abdominal distention. The dam began showing signs of labor including stretching, rolling, licking her abdomen and perivulvar region, and hemorrhagic vulvar discharge for approximately 3 hours before presentation to the Louisiana State University Veterinary Teaching Hospital.

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On presentation, the animal was bright, alert, and responsive with normal respiratory rate and effort, pink and tacky mucous membranes, and capillary refill time <2 seconds. The rat weighed 206 g and was in good body condition despite severe malocclusion of the incisor teeth. Multiple fetuses were detected on abdominal palpation, but none within the pelvic or vaginal canals. History, presentation, and clinical examination findings were consistent with dystocia. Medical treatment at presentation included fluid therapy (50 mL/kg, 0.9% NaCl SC; Abbott Laboratories, North Chicago, IL USA), parenteral calcium (100 mg/kg IM, calcium gluconate injection USP; APP Pharmaceuticals, LLC, Schaumburg, IL USA), oxytocin (1 to 3 U/kg IM, 3 doses given 2 and 5 hours apart; Oxytocin injection, Bimeda-MTC Animal Health Inc., Cambridge, Ontario, Canada), and warm sterile saline and sterile lubricant flushed per vulva. Approximately 8 hours following presentation, the owners elected controlled vaginal delivery under general anesthesia, declining cesarean section. Before sedation, a single full-term stillborn pup had been delivered. The animal was administered buprenorphine (0.1 mg/kg IM; Buprenex injectable, Reckitt Benckiser Pharmaceuticals Inc., Waltham, MA USA) and midazolam (0.5 mg/kg IM; Midazolam injection USP, Akorn, Inc., Lake Forest, IL USA) and anesthesia was induced and maintained with isoflurane by mask. A total of 3 additional dead pups were removed vaginally. More were palpated, but could not be extracted. At this time, the patient had become pale with prolonged capillary refill time and weak pulses and was cold to the touch. The rat was euthanized with pentobarbital sodium solution (1 mL intravenous; Fatal-Plus, Vortech Pharmaceuticals, Ltd., Dearborn, MI USA) and the body was submitted to the Louisiana Animal Disease Diagnostic Laboratory for necropsy.

At postmortem examination, the abdominal cavity contained 1.5 mL of serosanguineous fluid and an intact gravid uterus containing 5 fetuses. The lungs of the dam failed to collapse and the visceral pleura and pulmonary parenchyma appeared mottled. The maxillary and mandibular incisors were maloccluded and overgrown, but there was no evidence of infection or trauma. No other significant gross findings were observed.

Histologically, sections of the uterus, including placental attachment sites, contained neutrophils with fewer numbers of lymphocytes and plasma cells and with multifocal hemorrhage among decidual cells. Vessels within the myometrium contained fibrin aggregates with neutrophilic inflammation in the myometrial stroma. Gram-negative and Giemsa-positive filamentous bacteria were observed lining the endometrial surface of the uterus and within the lumina of uterine vessels (Fig. 1). The endometrium of the uterine body and lamina propria of the vagina contained similar inflammatory infiltrates. The alveolar spaces contained homogenous eosinophilic fluid consistent with acute edema. Alveolar septa were expanded by mononuclear cells. Histologic examination of the liver revealed acute coagulative necrosis with infiltrative neutrophils. There was mild-to-moderate lymphocytolysis in the spleen and macrophages in affected lymphoid follicles. No significant abnormalities were observed in the gastrointestinal tract, kidneys, adrenal gland, pancreas, heart, sciatic nerve, or brain. The 2 fetuses representative of the litter were examined histologically. The discoid placenta associated with each fetus contained neutrophils, hemorrhage, and fibrin, with abundant intralesional bacteria similar to those previously described in the uterus of the dam (Figs. 2 and 3). Placental blood vessels were diffusely congested and several were surrounded by reactive histiocytes and neutrophils. The alveolar spaces contained histiocytes, neutrophils, and bacteria similar to those observed in the placenta and uterus (Fig. 4). No abnormalities were observed in the gastrointestinal tract, liver, kidneys, heart, skeletal muscle, bone marrow, skin, brain, or spinal cord of the examined fetuses. Morphological diagnoses of the dam were severe, acute necrosuppurative placentitis with intralesional bacteria, moderate suppurative metritis with intralesional bacteria, and mild acute

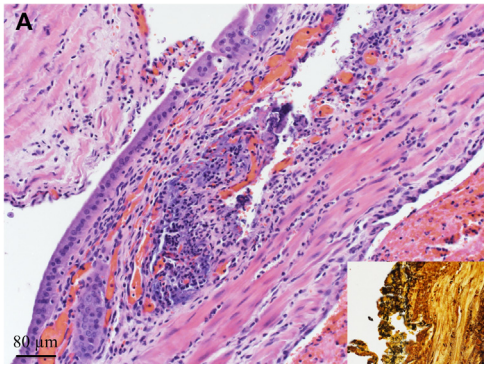

FIGURE 1. Dumbo rat (*Rattus norvegicus*), uterus of the dam. The endometrium and stroma of the myometrium are infiltrated by moderate numbers of neutrophils (hematoxylin/eosin [H/E]). Inset shows similar filamentous bacteria are highlighted in black lining the epithelial surface of the uterus. Steiner special stain. Bar, 80 µm.