

Thomas M. Donnelly, DVM, Column Editor

## Acute abdominal distension in a spinally transected rat

Chris E. Suckow, DVM, Joanne Zahorsky-Reeves, DVM, PhD, Greg W. Lawson, DVM, PhD, Nicole E. Nemetz, DVM & Marcelo A. Couto, DVM, PhD, DACLAM

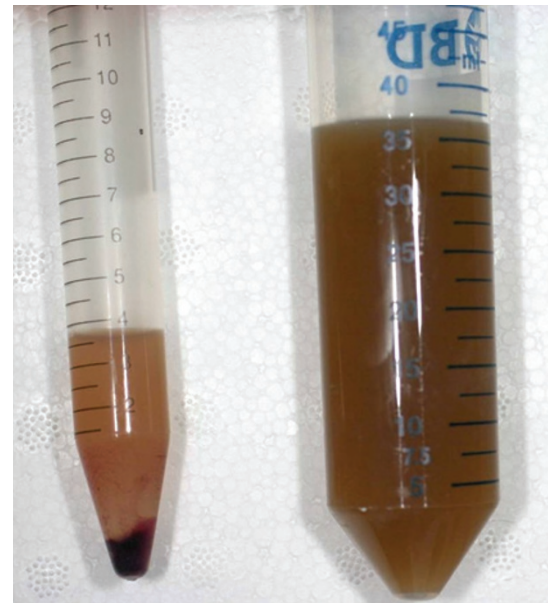
More than 11,000 Americans sustain spinal cord injuries (SCIs) every year<sup>1</sup>. SCIs are a major source of morbidity worldwide, with the loss of ambulation being a major consequence of these injuries<sup>2</sup>. Studying how to restore basic life functions is one of the goals of spinal cord research. Research laboratories currently use spinally transected rats as a model to study strategies for restoring spinal cord function after injury. Rats are often used as the model of choice in the study of SCI because their neuromuscular system is similar to humans<sup>3</sup>. Also they are small; relatively easy to acquire, maintain, and care for; and attract less attention from animal rights groups than phylogenetically higher species, such as cats, previously used in similar studies. This makes the rat the primary model for the study of spinal cord injury and regeneration<sup>3</sup>. This case report describes a rat that was in a study involving spinal cord transection (SCT) to study spinal column regeneration.

A 9-month-old adult female Sprague-Dawley rat from a colony of spinally transected rats presented 10 days after spinal cord transection surgery with a 2-day history of abdominal distention. The surgery involved transecting the spinal cord at the mid-thoracic level<sup>4</sup>. After surgery, the rats were housed on a paper-based bedding (CareFRESH, International Absorbents, Inc., Ferndale, WA) as we found it minimized trauma compared with wood-based bedding. We filled the cage three-quarters of the way to the top with bedding to allow for the expression of natural burrowing behavior and to allow the rats easy access to water and feed in the microisolator wire

lids. For environmental enrichment we put Nylabones (Nylabone Products, Neptune City, NJ) in the cage for gnawing, and provided a few pieces of Froot Loops cereal (Kellogg Company, Battle Creek, MI) as daily treats. To facilitate urinary and fecal evacuation, the research staff manually expressed the bladder and rectum twice a day. They also flexed the rear legs daily through their full range of motion to maintain muscle and tendon tone and elasticity.

Upon presentation the rat had a severely distended abdomen. History and physical examination revealed decreased appetite, moderate dehydration, lethargy, and ocular-nasal porphyrin discharge. On palpation and percussion, the abdomen felt distended with gas. An abdominal tap yielded gas and 0.5 ml of brownish fluid. Cytologic examination of this fluid using a Wright-Giemsa stain revealed large numbers of bacteria, and a moderate number of mononuclear white blood cells, macrophages, and neutrophils containing intracellular bacteria. A complete blood count (CBC) showed severe leukocytopenia and anemia. A urinalysis yielded a specific gravity of 1.030 and a pH of 6.5, both within our in-house diagnostic laboratory's normal reference range<sup>5</sup>.

While the blood and urine samples were being processed, we initiated supportive care consisting of intravenous fluids and intravenous antibiotics. On the second day the rat was more active, although it exhibited pica, as evidenced by consumption of the shredded paper bedding. The abdominal bloating had returned and we did a second abdominal tap. This time it produced ~40 ml of brownish fluid (Fig. 1). Due to



**FIGURE 1** | Conical tubes containing abdominocentesis recovered fluid from a nine-month-old, spinal cord transected, female Sprague-Dawley rat, 10 days after surgery. The volume (40 ml total) and color of fluid in the tube on the right is abnormal. Sedimentation of red blood cells in standing fluid is seen in the tube on the left.

the grave prognosis, we euthanized the rat and submitted it for necropsy.

Based on the clinical findings presented, what are your differential diagnoses? What is the cause of the brown abdominal fluid? Is it related to the spinal cord surgery?

### What's your diagnosis?