

## Uterine torsion in a Sprague Dawley rat (*Rattus norvegicus*)

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### ABSTRACT

Uterine torsion is a twisting of the uterus or uterine horn perpendicular to its long axis. We report a case of uterine torsion in an adult breeding Sprague Dawley rat. The rat died a month after her last recorded delivery. *Post mortem* examination of the rat revealed 270° torsion of the right uterine horn. The uterus contained a single foetus. The liver was pale and enlarged. The rest of the viscera appeared normal. Histopathological examination showed acute hepatic necrosis and pulmonary congestion with mild lymphocytic infiltrates peribronchially. The acute hepatic necrosis may have been associated with septicaemia due to compromised blood vessels following the uterine torsion. The presence of a single foetus could have resulted in foeto-maternal disproportion with resultant uterine torsion. Torsion of the uterus can be accompanied by haemostatic and metabolic complications, which could have caused the death of the rat. Although uterine torsion is a rare condition in rats, it should be considered as a potential complication of gestation in animal breeding units.

**Keywords:** *post mortem*, rat, *Rattus norvegicus*, uterine torsion.

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Complications of gestation include pyometra, dystocia, uterine/vaginal prolapse and uterine torsion<sup>1</sup>. Uterine torsion is rarely reported except in association with pregnancy<sup>5</sup>. Cattle reportedly have a higher incidence of uterine torsion than other domestic animals<sup>3</sup>. The condition is well documented in cats<sup>3,10</sup>, dogs<sup>9</sup>, horses<sup>7</sup> and women<sup>6</sup>. Apart from a report of uterine torsion in a captive colony of maras (*Dolichotis patagonum*)<sup>11</sup> there is a dearth of literature on the occurrence of the condition in rodents in laboratory animal breeding units. We report a case of uterine torsion in a Sprague Dawley rat (*Rattus norvegicus*).

During routine cage changing, a Sprague Dawley adult breeding female was found dead in her cage by the animal attendant. The animal attendant indicated that he had not noticed any untoward behaviour or sickness in the rat during the previous cage change 48 hours earlier. However, about 12 hours before death the rat was

less active than usual. On examination, other than showing signs of slight discomfort on handling, no overt signs of ill health were observed. The rat's distended abdomen was in line with breeding and delivery dates for advanced pregnancy. The rat was provided with supplemental heating and left for a follow-up examination the next morning, by which time she had died.

The rat died a month after her last recorded delivery. In this facility, breeders are housed in pairs throughout the breed-

ing cycle. She was therefore with a male rat until 12 hours before the 1st clinical examination. The rats had been housed in a cage with wood shavings for bedding and shredded paper for environmental enrichment. The bedding was changed twice a week. The rat had been on a 12-hour light:dark cycle (lights on at 07:00) and had access *ad libitum* to drinking water and a diet of commercially available cubes for mice (Epol, South Africa).

On *post mortem* examination of the rat, her abdomen was visibly distended and her extremities were pale. Examination of the internal organs revealed 270° torsion of the right horn of the uterus (Fig. 1). The uterus contained a single foetus and was filled with blood-tinged fluid. The length of the foetus was 67 mm from tip of the external nares to the base of the tail. The dam's liver was pale, yellowish and enlarged while the lungs appeared congested. The rest of the viscera appeared normal. Samples of the dam's liver, spleen, kidney and lung were collected in 10 % buffered formalin and submitted to a commercial laboratory (Idexx Laboratories Inc., Johannesburg) where they were processed for routine histopathological examination.

The pathologist reported multifocal to coalescing areas of moderate to severe acute hepatic necrosis with a mild infiltrate of neutrophils and on 1 focal area of the capsular surface a large number

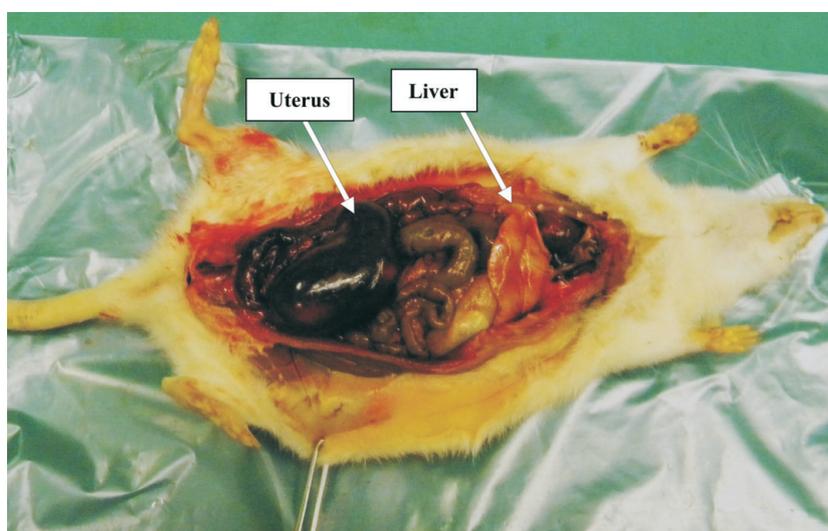


Fig. 1: Photograph of the abdominal and thoracic viscera of the rat *in situ*. The prominent discoloured and distended uterus and the enlarged, pale liver are indicated by arrows.

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of neutrophils were visible. Moderate hydropic degeneration of the rest of the hepatocytes was detected. The spleen showed well-developed lymphoid tissue but no specific diagnostic lesions were evident. The pulmonary tissue was mildly congested with mild lymphocytic infiltrates peribronchially in a few focal areas. The pulmonary changes are usually indicative of chronic respiratory disease in older rodents especially in conventional breeding colonies which are not free of pathogenic *Mycoplasma* and *Pasteurella* species<sup>8</sup>. In this colony, which is routinely screened for the presence of disease, exposure of the rats to *Pasteurella pneumotropica* has been detected but not *Mycoplasma*. The pancreas was histologically normal and no specific lesions were evident in the kidney. The histopathologist concluded that the acute hepatic necrosis may have been associated with septicaemia due to compromised blood vessels following the uterine torsion. However, specific organisms were not visible histologically.

Uterine torsion is described as a rotation of the uterus or uterine horn of more than 45° along the long axis of the uterus<sup>6</sup>. Although the aetiology is unclear, factors such as uterine contraction, foetal movement, rough handling during gestation, decreased tone of the gravid uterus, flaccid uterine walls and a long flaccid mesometrium have been proposed as contributing factors in gravid animals<sup>2,4</sup>. In non-gravid cats and dogs it has been associated with endometritis, mucometra, haemometra and pyometra<sup>3,9,10</sup>, all of which are conditions that distend the uterus. Torsion of the uterus can be accompanied by haemostatic and metabolic complications including septicaemia, endotoxaemia, peritonitis and clotting disorders<sup>3,10</sup>.

The rat in this report was in her 3rd parity and had delivered a total of 26 pups, with the individual litter sizes being 15, then 9 and finally 2. It is possible that a small litter size would have resulted in more *in utero* foetal nutrition resulting

in a larger than normal foetus with a consequent foeto-maternal disproportion and dystocia. The foetal length of 67 mm was longer than the average newborn length of 63 mm for some randomly sampled pups in this unit. Foeto-maternal disproportion has been proposed as a cause of uterine torsion in a cat<sup>9</sup>. The presence of a single foetus unilaterally in 1 horn of the rat's uterus could have also predisposed it to torsion. Compromise of uterine vasculature could result in necrosis of uterine tissue and placental detachment, with consequent metabolic and haematological disturbances<sup>10</sup>. The pallor of the rat could be indicative of anaemia secondary to occlusion of the uterine veins, which results in the engorgement and rupture of zonal blood vessels, sequestering and haemorrhaging blood into the uterus<sup>10</sup>. Hyperkalaemia has been reported to occur as a result of massive tissue breakdown and reduced renal function and may result in cardiac arrest<sup>10</sup>. Unfortunately it was not possible to measure the concentration of electrolytes in the rat's body fluids as they would have been altered by *post mortem* degenerative changes. Nevertheless, these metabolic and haematological disturbances, if present in the rat *ante mortem* in combination with septicaemia and possible endotoxaemia, could have resulted in the pathology seen in the other tissues and ultimately the death of the rat.

It is recommended that if uterine torsion is detected soon enough, ovariohysterectomy should be performed without correction of the torsion to avoid the release of inflammatory mediators and endotoxins into the systemic circulation<sup>3,10</sup>. Unfortunately uterine torsion was not suspected in this case before death. Although uterine torsion has been reported in breeding rabbits in laboratory animal units<sup>5</sup>, it has not been reported in rats. The breeding unit maintains 57 breeding pairs annually and in the previous year (2009) a total of 1144 rats were born to the breeders. No cases of uterine torsion in the breeding rats were recorded during that period.

Over the past 7 years the veterinary records revealed 1 previous case of uterine torsion, indicating the rarity of the condition in rats. Therefore, given the rarity and acute nature of this condition, in a general breeding colony in a laboratory animal setting specific clinical diagnosis and treatment may not be feasible, as animals showing signs of an acute abdomen are usually euthanased. However, in a breeding colony where animals are of a specific genetic make up or are of great value to a study, or in a companion rat, exploratory surgery and ovariohysterectomy could be attempted.

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