

A CASE REPORT OF STOMACH RUPTURE SUSPECTED DUE TO GASTROINTESTINAL DILATION IN A FEMALE NEW ZEALAND WHITE RABBIT, *Oryctolagus cuniculus*

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ABSTRACT

New Zealand White (NZW) rabbit is a monogastric herbivore with special anatomy and physiology of digestion system that allows efficient nutrient extraction from a high-fiber diet. However, the lacking of fiber may cause gastrointestinal disturbance in the rabbit. Gastrointestinal dilation or obstruction also known as bloat is an acute, life threatening and the most common problem to occur in the rabbit. It is usually caused by complete or partial obstruction of the intestine or obstruction with the presence of abscesses or tumors in the gastrointestinal lumen. This paper reviews a case report of sudden death and gastric dilation of a ten-months-old female NZW rabbit without any abnormalities observed prior to death. Post mortem finding revealed complete stomach ruptured with digested contents dispersed into the thoracic cavity via ruptured diaphragm and haemothorax in the thoracic cavity. Complete history and clinical findings and evaluation with radiography are the best way to diagnose if gastrointestinal dilation can be noticed early, leading to appropriate treatment and therefore pose higher chances for the rabbit to survive.

KEYWORDS: New Zealand White (NZW) rabbit, gastrointestinal dilation, stomach rupture

INTRODUCTION

Rabbit is a monogastric herbivore, which has an evolved digestive physiology, a highly complex structure that processes and digests food vitally with the aid of a huge population of bacteria (Mereditih, 2010). The digestive system of a rabbit allows it to consume high energy and protein in feed. It can also separate the digestible and easily fermentable components of the diet as well as rapidly eliminates the slowly fermentable fibrous waste (Davies and Davies 2003). Hence, lack of fiber in the ration may cause gastrointestinal disturbance in the rabbit.

Inadequate fibre intake will inhibit normal peristalsis thus when gastrointestinal motility is impaired, fluid may absorb from accumulated ingesta in the stomach and further compacting the contents (Oglesbee and Jenkins 2012). Feeds high in fibre can also protect rabbits from infectious bacterial enteritis in which an acidic environment in the stomach destroys most ingested bacterial pathogens. However, feeding high pelleted foods formed a compacted stomach and the ingesta protects ingested bacteria from degradation by gastric acid, thus allowing potentially pathogenic bacteria to enter the small intestine (Oglesbee and Jenkins 2012). In addition, rabbits cannot vomit due to a well-developed cardiac sphincter, and when the stomach is obstructed, gastric fluid and swallowed saliva quickly accumulate eventually the fluid undergo fermentation to produce large volumes of gas, resulting a rise in intragastric pressure and a severely dilated stomach (Bahador et al. 2014).

Gastrointestinal dilation also known as gastrointestinal obstruction or bloat is one of sudden, life-threatening syndromes commonly reported in rabbits with unexpected death occurred. In most cases, complete obstruction of the intestine with hair or other swallowed foreign objects reported such as carpet fibres, cloth fibres, locust beans and plastic will lodge at proximal duodenum, approximately 2 to 5 cm from the pylorus where the lumen narrows causing gastrointestinal dilation (Harcourt-Brown 2007; Oglesbee and Brigitte 2020). Occasionally, complete intestinal obstruction due to abscesses and tumors may occur but it is uncommon (Oglesbee 2011). This paper reviews a case of the sudden death of a female New Zealand White (NZW) rabbit due to its gastric rupture.

Case descriptions

This case involved a ten-months-old female NZW Rabbit.

The animal was used to be bright, alert and responsive prior to its death. The rabbit was found dead in the morning during a routine inspection. In the same group, there were two male and three female rabbits (aged 10 months) weighed between 4.5 to 5.5 kg, and had been put in an individual standard cage in the breeding room. All these cages were then kept in Laboratory Animal Resource Unit (LARU) at the Institute for Medical Research, Kuala Lumpur since August 2019. Excluding this one rabbit, the others kept in the same facility were normal. The conventional standard individual stainless-steel cage was used to keep each rabbit. Tray beneath the cage was filled with corncob bedding and was cleaned every 5 days. The cages were also changed and cleaned every 5 days. The animals were fed with rabbit pellet daily and a variety of vegetables such as broccoli, cabbage, carrot, cauliflower, mustard leaf of 10% of body weight, with ad libitum drinking water. Basically, types of vegetable were given alternately. Prior to death, animal was provided with 150 g carrot, 100 g spinach, 100 g lettuce and 150 g of pellet.

Upon post mortem examination, physical findings revealed the presence of serosanguineous discharge within the nasal and oral cavity (Figure 1). There is no evidence of diarrhea before death. The external body of the carcass was clean and also without any lesions. Diaphragmatic ruptured on the left side with rounded shape tear estimated 3 cm in diameters, and stomach contents were observed in the thoracic cavity where the digested stomach contents flew into the thoracic cavity (Figure 2A). The stomach was complete ruptured, with all the digested contents dispersed into its thoracic cavity (Figure 2B). Upon closer inspection in the pleural space, the digested stomach contents were found within the space mixed up with hemothorax. There was an accumulation of bloody fluid in the thoracic cavity, which suggested hemothorax into the pleural space (Figure 2C). The trachea was filled with frothy fluid and congested mucosa posterior to the trachea wall (Figure 2D). Generalized hemorrhages and congestion were observed in all lung lobes. The small and large intestines were examined; however, there was no intestinal obstruction observed and the intestine was empty. The other internal organs were found partially autolysis.

DISCUSSION

In this case, gastric dilation or bloat is suspected as the cause of death due to gastrointestinal tract obstruction leading to rupture of stomach wall, though no evidence of



Figure 1. Serosanguineous discharge on the nasal and oral cavity of the NZW rabbit carcass (black circle)

obstruction found during post mortem. Gastrointestinal obstruction frequently presented in a more acute presentation, as compared to stasis. The same condition was also observed in this case where the animal did not show any abnormality a day before death. Furthermore, the progression of disease depends on the location of obstruction, where death of animal may happen around 6-8 hours (Oglesbee and Brigitte 2020). Hence, this is probably the reason where the caretakers were not able to notice the symptoms in animal prior to death as the symptoms might have risen overnight. Stomach of the rabbit continues to distend due to the obstruction as saliva continues to be secreted and stomach will continue to make fluid too and leading to excessive accumulation of fluid in the stomach.

Accumulation of fluid in the stomach causing overgrowth of bacteria and due to the trapped they produce more gases since most of these bacteria are gas forming (Bardshiri, Tavana, and Peighambarzadeh 2014). Since rabbit anatomical structure does not allow it to vomit, this condition causes the rapid distension of stomach to rupture due to the thin-walled anatomical structure in rabbit. Due to the high impact of stomach ruptured, this resulted in the diaphragmatic tearing as seen in the post mortem finding. As a result, rabbit might die due to sudden respiratory failure that can be associated to the finding of generalized hemorrhages and congestion in all lung lobes.

In certain conditions, bloat can be related to overeating, low fibre intake, sudden change of diet, excessive drinking or stress, or result from a pyloric blockage, gastric ulcers or other digestive problems (Oglesbee and Jenkins 2012). Other than that, neoplasia,

tapeworm cysts, intussusception and post-surgical adhesion may also lead to gastrointestinal obstruction (Harcourt-Brown 2007). However, in this case, the causes of bloat remain unknown. The feeding regime remains the same and there are no sudden changes in its diet or reducing the amount of feed given. As this is the first case to be recorded in this laboratory, the observations of animal behavior should be done more frequently by the animal caretaker to prevent further sudden death in other animals in the future. Any abnormality observed, should be reported immediately to the veterinarian for further action. Early detection will lead to successful treatment; however, the caretaker needs to be aware of any signs and symptoms of gastrointestinal dilation (Oglesbee 2011).

Most rabbits that experienced gastrointestinal dilation may show various clinical signs such as pain of abdomen by stretching out, fidgety, apparent discomfort and sitting hunched, bruxism, sudden and severe depression, not moving, lethargy, dull, depress and not responsive, decrease inappetence and complete lack of faecal production. Direct damage to the stomach wall caused by stretching of the stomach and lack of blood flow, will lead to the stomach wall to dies off. The dilated stomach can also stop blood flow to vital organs such as the kidneys. These changes account for the sudden clinical signs, which include severe abdominal pain, shock, and heart failure (Bardshiri, Tavana, and Peighambarzadeh 2014). Without treatment, the affected rabbit will die with no obvious signs of illness and unexpected death will occur within 4 to 24 hours (Bardshiri, Tavana, and Peighambarzadeh 2014).

To assist and stimulate the movement of obstruction in the gastrointestinal tract, treatment with gastrointestinal motility stimulant must be given to the rabbit. Either that, to soften the mass in the intestines, fluid therapy such as Lactated Ringer's and Dextrose can be administered intravenously (Bardshiri, Tavana, and Peighambarzadeh 2014). The recommended maintenance fluid rate for a rabbit is 4 mL/kg/hr and it can be approximated to 100 mL/kg/day (Varga 2013, 137-77; Grint 2013). The formation of gas in the stomach causing to discomfort to the rabbit, and many of them will not regain their appetite and not eating until this discomfort is treated. To reduce this pain, by giving pain killer such as buprenorphine (0.01 – 0.05 mg/kg SC IV q6-12hr), meloxicam (0.2 – 1.5 mg/kg SC PO q24hr), or carprofen (2 - 4 mg/kg SC Po q24hr) can alleviate discomfort due to gas formation (Varga 2013, 137-77; Oglesbee and Jenkins 2012).

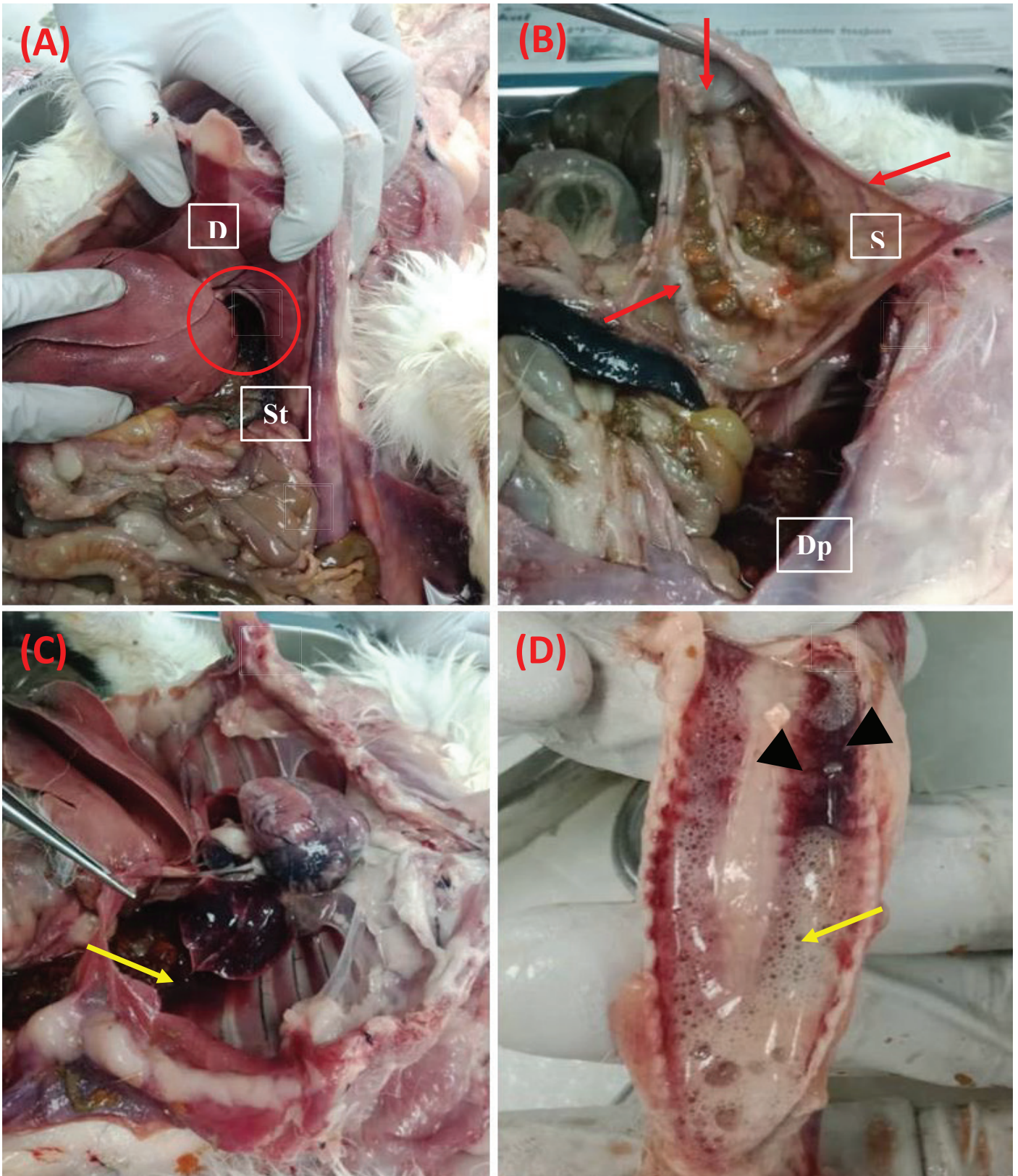


Figure 2. (A) Diaphragmatic [Dp] ruptured (red circle) on the left side with rounded shape tear estimated 3 cm in diameter. (B) The stomach [St] appeared completely ruptured (red arrow). (C) The digested stomach contents were found within the space (yellow arrow) mixed up with hemothorax (red arrow). (D) The trachea filled with frothy fluid (yellow arrow) and congested mucosa posterior to the trachea wall (arrowhead).

If there is evidence of dysbiosis such as diarrhea, some antibiotic therapy should be given to kill the overgrowth of harmful bacteria. Metronidazole 20 mg/kg can be given PO q12hr to treat *Clostridium* spp. if suspected (Oglesbee and Jenkins 2012). Furthermore, treatment with enrofloxacin 15 – 20 mg/kg PO q12hr and trimethoprim-sulfamethoxazole 30 mg/kg PO q12hr can also be used to treat against other pathogenic bacterial species (Oglesbee and Jenkins 2012). As for prevention, the animal should be provided with high fibre food (such as fresh hay and vegetables) and also clean water at all times to create a gastrointestinal environment conducive to gut motility. An adjunctive therapy such as housing the rabbit in a calm and quiet environment with dim light can also reduce their stress level. A gentle abdominal massage can be applied only if the rabbit is calm and receptive to handle, and do not persist the massage therapy if it is too stressful for the rabbit (Ager 2017). Complete history and clinical findings and evaluation with radiographs are the best to diagnose as it is a useful diagnostic tool because from radiographs image, the gas and/ or fluid in the outlined the dilated stomach and intestines (Schuhmann and Cope 2014). Therefore, early treatment can be done and chances for the animal to survive is higher.

CONCLUSION

Gastrointestinal dilation is one of the sudden, life-threatening syndromes and unexpected death occurs if an affected rabbit is not treated immediately. Failure to treat could lead to fatal consequences. The cause of bloat remains unknown, however early recognition of GI dilation signs and symptoms, and an immediate treatment, and management with pain relief, high quality of nutrition and fluid therapy can make the difference between a good and poor prognosis.

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