

A unique case of spontaneous intestinal volvulus in a pet rabbit

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Abstract

A ten-month-old male pet rabbit was referred to the Surgery Clinic of the University of Sarajevo Faculty of Veterinary Medicine with the history of several days gradual loss of appetite, decreased defecation frequency and the weight loss. Physical examination revealed low body condition score, tachypnea, tachycardia and distended abdomen painful on palpation. Abdominal radiographs were unremarkable displaying abdominal distention with gas accumulation in the intestines. Urgent explorative celiotomy was performed, and definitive diagnosis of intestinal volvulus was made. Manual reposition of the intestines secured reestablishment of the intestinal blood flow, and after the observation of intestinal peristalsis the abdomen was closed in a routine fashion. Analgesics, antibiotics and supportive therapy were administered over the next seven days, and the case was finally concluded 14 days post-surgery without any complications detected. To the best of our knowledge, this is the first report of spontaneous intestinal volvulus in a pet rabbit diagnosed by exploratory laparotomy and successfully surgically resolved.

Keywords: gastrointestinal stasis, distended abdomen, gas accumulation, surgical therapy

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Introduction

Similar to horses, rabbits are hindgut-fermenting herbivores that are very popular exotic pets (Harcourt-Brown, 2002b; DeCubellis, 2016). In these animals, weight loss and anorexia can be caused by many different pathological conditions such as: dental diseases, gastrointestinal disturbance, inappropriate diet, antibiotics, painful conditions, stress, gastrointestinal stasis, obstruction and volvulus (DeCubellis, 2016). The lack of appetite is an emergency in these animals because it leads to electrolyte and fluid imbalance and hepatic lipidosis (Harcourt-Brown, 2002a). Furthermore, inappropriate diet allows infection with opportunistic pathogens or dysbiosis resulting in gastrointestinal stasis and increase in gas production. The gas accumulates in the stomach and intestines due to a rabbit's inability to vomit or eructate (DeCubellis, 2016). The most important part of a rabbit digestive system is the ileocaecocolic complex. This complex occupies about half of the abdomen, and it is formed by the caecum, appendix, proximal colon, ileum, distal colon and descending duodenum (Harcourt-Brown, 2002b). Large part of this complex motility is under the autonomic nervous system and aldosterone regulation, and any kind of stress (surgery, diet change, etc.) with the increase of adrenalin level can inhibit its motility. Therefore, most alimentary tract problems in pet rabbits are the result of a reduced intestinal motility (O'Malley, 2005). Intestinal volvulus represents the condition defined as a rotation of the intestines around mesenteric attachment with a consequential vascular compromise (Cairo et al., 1999; Javanbakht et al., 2013). It can be further classified based on the affected part of the intestines into the volvulus of the

small or large intestines, partial or complete (Valsdottir and Marks, 2008; Knell et al., 2010). It poses a life threatening condition, and immediate reestablishment of the intestinal blood flow by an urgent surgical correction represents a definitive therapeutic goal. Prognosis differ significantly considering an animal species affected. Intestinal volvulus was previously described as experimentally induced in New Zealand white rabbits (Akgür et al., 1996), and as a postmortem finding in a domestic rabbit (Gleeson et al., 2019). This is the first report of successfully surgically resolved spontaneous intestinal volvulus in a pet rabbit.

Material and methods

A ten-month-old male mixed breed pet rabbit was referred to the Surgery Clinic of the University of Sarajevo Faculty of Veterinary Medicine.. The rabbit was kept indoors and fed with adequate commercial food, vegetables, fruits and hay. The owner has noticed a gradual loss of appetite, decreased defecation frequency and weight loss over several days. Approximately twenty-four hours prior to the admission an absolute absence of appetite and defecation was observed. Body weight of the rabbit was 900 grams, with low body condition score 2 by Reusch (2010) recommended scoring system. Pelvis and ribs were sharp and palpable with a flat rump area. Oral cavity was in good condition with no inflammatory signs or dental problems. Tachypnea, tachycardia, and the distended abdomen painful on palpation were detected. Gut meteorism was suspected by percussion. Right and left lateral and ventrodorsal view abdominal radiographs were obtained. In both views, gas accumulation in the intestines and gastric content were visible (Figures 1 and 2).



Figure 1. Ventrodorsal abdominal radiograph of the rabbit showing gastric contents and gas accumulation in the intestines



Figure 2. Lateral radiograph of the rabbit showing gastric contents and gas accumulation in the intestines

Based on the findings, urgent abdominal exploratory celiotomy was recommended. Anesthetic used for induction was ketamine (25mg/kg, IM) in a bolus combination with xylazine (5mg/kg, IM) (Vennen and Mitchell, 2009). Anesthesia maintenance was performed with a volatile agent isoflurane in oxygen over the face mask. Intraoperatively, sterile saline solution (10mL/kg/h) was applied over the 24-gauged catheter positioned and secured in the marginal auricular vein (*Vena arucularis caudalis*) (Vennen and Mitchell, 2009). Access to abdominal organs was provided by the ventral midline incision. Meteorism and abnormal position of the caecum with the base (*Ampulla coli*) dislocated cranially and appendix caudally (Figure 3), were immediately visible. The 180° clockwise rotation of the ileocaecal valve and mesenteric root were noted. Peristalsis was absent and there were no signs of the intestinal rupture. Through the needle the decompression of the caecum was performed, and the volvulus was corrected by counterclockwise derotation. Continuous irrigation of the intestines with sterile water was performed until peristalsis was observed.

Abdominal incision was closed in a routine fashion. Atipamezole was administered (1 mg/kg, IM) in order to antagonize potentially still effective xylazine (Vennen and Mitchell, 2009). The client was instructed to continue antibiotic therapy with enrofloxacin (5mg/kg PO, q12h) and metronidazole (40mg/kg PO, q24h), gastrointestinal prokinetic agent metoclopramide HCl (0.5mg/kg PO, q8h) and meloxicam (0.3mg/kg PO, q24h) over the next seven days (Vennen and Mitchell, 2009; Plumb, 2011). The case was definitely concluded 14 days post-surgery without any complications detected.



Figure 3. Intraoperative view of the abnormal position of the caecum, with the base (*Ampulla coli*) dislocated cranially and appendix caudally

CR-Cranial, CD-Caudal, LI-large intestine, PC-Proximal colon, AC-Ampulla coli, BSC-Base of caecum, BDC-Body of caecum

Results

After the celiotomy with ventral midline approach the intestinal abnormal position with gas accumulation was highly visible. Abnormal position of the intestines was manifested by the base of the caecum (*Ampulla coli*) being more cranially and appendix more caudally (Figure 3). The needle decompression of the caecum removed the accumulated gases, which facilitated the repositioning process itself by counterclockwise derotation. Restoration of the bowel to normal position resulted in noticeable gradual return of intestinal peristalsis. According to the owner, the rabbit started to eat hay on the very same night. Next morning, the owner offered commercial food and the rabbit showed great interest to eat. On the same day, the patient started to defecate. Gain of weight was recorded seven days after the surgery.

Discussion and conclusions

Common gastrointestinal life-threatening conditions reported in pet rabbits are: ileus, gastric dilatation and intestinal obstruction (Harcourt-Brown, 2007; DeCubellis and Graham, 2013). Intestinal volvulus represents a condition defined as a rotation of the intestines around the mesenteric attachment with a consequential vascular compromise (Cairo et al., 1999; Javanbakht et al., 2013). Considering the part of the intestines that is affected, it is primarily divided into volvulus of the small and large intestines. Considering the degree of the rotation itself, it can be partial or complete (Knell et al., 2010). It is a life-threatening medical emergency recognized in many animal species (Shealy and Henderson, 1992; Cairo et al., 1999; Stephen et al., 2004; Knell et al., 2010; Javanbakht et al., 2013) and humans (Valsdottir and Marks, 2008). It is of an unknown etiology (Westermarck and Rimaila-Parmanen, 1989; Shealy and Henderson, 1992; Cairo et al., 1999). In dogs, the occurrence of this condition is associated with chronic intestinal disorders such as bacterial overgrowth, increased intestinal motility, exocrine pancreatic insufficiency and lymphoplasmacytic enteritis (Cairo et al., 1999). In the recent report (Gleeson et al., 2019) of postmortem diagnosed spontaneous mesenteric and caecal volvulus in a rabbit, the authors proposed that chronic caecal disorders causing gas accumulation could create an environment where mesenteric and intestinal torsion were more easily achieved. During the presence of volvulus, blood flow is compromised resulting in tissue hypoperfusion, which leads to intestinal deterioration. In the blood flow reestablishment and correction of volvulus it is urgently needed to prevent permanent damage by prolonged ischemia (Akgür et al., 1996). Depending on the severity and duration of ischemia, reperfusion can result in intestinal ischemia/reperfusion (I/R) injury. I/R cause significant intestinal tissue damage, but also induce systemic circulation of intestinal bacteria or endogenous endotoxins, which can lead to systemic multiorgan dysfunction syndrome (Yang et al., 2016). In our case, due to incomplete occlusion of the intestinal vasculature, and therefore less severe intestinal vascular compromise, signs of I/R were not observed. Complete process, diagnosis and treatment of intestinal volvulus must be performed with extreme caution because the initial clinical signs are not specific and prognosis is grave (Cairo et al., 1999). Detailed anamnesis and complete physical and radiographic examination of the patient are the most important facts in reaching a diagnosis. Nevertheless, in most cases a definitive diagnosis can be obtained only by exploratory celiotomy (Cairo et al., 1999). The risk of the postoperative gastrointestinal stasis can be reduced by administration of gastrointestinal prokinetic agents, analgesics, fluid therapy, antibiotics and dietary corrections (DeCubellis and Graham, 2013). In rabbits, small intestine volvulus is described as artificially induced with the purpose of experimental investigation (Akgür et al., 1996) and as a spontaneous mesenteric and caecal volvulus diagnosed

postmortem (Gleeson et al., 2019). Successfully surgically treated intestinal volvulus has not yet been reported to the best of the authors' knowledge.

The present case demonstrated that intestinal volvulus should be considered in differential diagnosis for rabbits presented with anorexia and abdominal distension. In such cases, consideration should be given to performing exploratory laparotomy.

References

1. Akgür, F.M., Olguner, M., Yenici, O., Gökden, M., Aktuğ, T., Yılmaz, M., Ataç G., 1996. The effect of allopurinol pre-treatment on intestinal hypoperfusion encountered after correction of intestinal volvulus. *J. Pediatr. Surg.* 9, 1205-1207.
2. Cairo, J., Font, J., Gorraiz, J., Martin, N., Pons, C., 1999. Intestinal volvulus in dogs: a study of four clinical cases. *J. Small Anim. Pract.* 40, 136-140.
3. DeCubellis, J., 2016. Common emergencies in rabbits, guinea pigs, and chinchillas. *Vet. Clin. North Am. Exot. Anim. Pract.* 19, 411-429.
4. DeCubellis, J., Graham, J., 2013. Gastrointestinal disease in guinea pigs and rabbits. *Vet. Clin. North Am. Exot. Anim. Pract.* 16, 421-435.
5. Gleeson, M., Chen, S., Fabiani, M., Marcino, A., Antinoff, N., 2019. Mesenteric Root and Cecal Torsion in a Domestic Rabbit (*Oryctolagus cuniculus*). *J. Exot. Pet Med.* 28, 76-81.
6. Harcourt-Brown, F., 2002a. Anorexia in rabbits. Causes and effects. *Practice*, 24, 358-367.
7. Harcourt-Brown, F., 2002b. Biological characteristics of the domestic rabbit (*Oryctolagus cuniculi*). In: Harcourt-Brown, F. (Ed.), *Textbook of Rabbit Medicine*. Elsevier, pp. 3-18.
8. Harcourt-Brown, F.M., 2007. Gastric dilation and intestinal obstruction in 76 rabbits. *Vet. Rec.* 161, 409-414.
9. Javanbakht, J., Daraei, H., Jani, M., 2013. Evaluation of small intestinal volvulus caused by pathogenic microorganisms in a thoroughbred mare. *Int. J. Enteric Pathog.* 1, 49-53.
10. Knell, S.C., Andreoni, A.A., Dennler, M., Venzin, C.M., 2010. Successful treatment of small intestinal volvulus in two cats. *J. Feline Med. Surg.* 12, 874-877.
11. O'Malley, B., 2005. Rabbits. In: O'Malley, B. (Ed.), *Clinical Anatomy and Physiology of Exotic Species*. Elsevier Saunders, pp. 172-195.
12. Plumb, D.C., 2011. Enrofloxacin. In: Plumb, D.C. (Ed.), *Plumb's Veterinary Drug Handbook*, 7th ed. PharmaVetInc, pp. 3372-3404.
13. Plumb, D.C., 2011. Metoclopramide. In: Plumb, D.C. (Ed.), *Plumb's Veterinary Drug Handbook*, 7th ed. PharmaVetInc, pp. 6032-6053.
14. Plumb, D.C., 2011. Metronidazole. In: Plumb, D.C. (Ed.), *Plumb's Veterinary Drug Handbook*, 7th ed. PharmaVetInc, pp. 6074-6105.
15. Reusch, B., 2010. Why do I need to body condition score my rabbit? www.rabbitwelfare.co.uk/pdfs/ROSpring10-Body-conditionscore.pdf. Retrieved February 8, 2019.
16. Shealy, P.M., Henderson, R.A., 1992. Canine intestinal volvulus. A report of nine new cases. *Vet. Surg.* 21, 15-19.
17. Stephen, J.O., Corley, K.T.T., Johnston, J.K., Pfeiffer, D., 2004. Small intestinal volvulus in 115 horses: 1988-2000. *Vet. Surg.* 33, 333-339.

18. Valsdottir, E., Marks, J.H., 2008. Volvulus: small bowel and colon. Clin. Colon Rectal Surg. 21, 91-93.
19. Vennen, K.M., Mitchell, M.A., 2009. Rabbits, In: Mitchell, M.A., Tully, T.N., (Eds.), Manual of Exotic Pet Practice. Saunders Elsevier, pp.375-405.
20. Westermarck, E., Rimaila-Parnanen, E., 1989. Mesenteric torsion in dogs with exocrine pancreatic insufficiency: 21 cases (1978-1987). J. Am. Vet. Med. Assoc. 195, 1404-1406.
21. Yang, M., Dong, J.X., Li, L.B., Che, H.J., Yong, J., Song, F.B., Wang, T., Zhang, J.W., 2016. Local and Remote Post-conditioning Decrease Intestinal Injury in a Rabbit Ischemia/Reperfusion Model. Gastroenterology Research and Practice. Volume 2016, Article ID 2604032, 7 pages

Jedinstven slučaj spontanog intestinalnog volvulusa kunića

SAŽETAK

Kunić, mužjak, starosti deset mjeseci, upućen je na Kliniku za hirurgiju Veterinarskog fakulteta u Sarajevu s anamnezom višednevnog postupnog gubitka apetita, smanjenjem učestalosti defekacije i gubitkom tjelesne mase. Opštim pregledom ustanovljena je niska vrijednost bodovne procjene tjelesnog statusa, tahipneja, tahikardija i nadut abdomen, bolan pri palpaciji. Radiografija abdomena bila je nespecifična sa opservacijom dilatacije abdomena i akumulacijom gasova u crijevima. Urgentnom eksplorativnom celiotomijom postavljena je konačna dijagnoza intestinalnog volvulusa. Manualnom repozicijom izvršena je korekcija nepravilnog položaja crijeva sa ponovnom uspostavom crijeвне vaskularizacije. Nakon vizualizacije povratka crijevne peristaltike artifičijelna celiotomijska rana je rutinski zatvorena. Postoperativni tretman zasnivao se na aplikaciji analgetika, antibiotika i potporne terapije tokom sedam dana. Slučaj je konačno zaključen 14 dana nakon operacije bez ustanovljenih komplikacija. Navedeni prikaz slučaja predstavlja prvi opis spontanog intestinalnog volvulusa kunića dijagnosticiranog eksplorativnom laparatomijom i uspješno terapijanog hirurškom intervencijom.

Ključne riječi: gastrointestinalna staza, dilatacija abdomena, akumulacija gasova, hirurška terapija