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A CASE OF INTESTINAL OBSTRUCTION AND PERFORATION-INDUCED SEPTIC PERITONITIS IN A 4-YEAR-OLD CANECORSOR DOG FED LOCALLY FORMULATED FOOD

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ABSTRACT

Polythene materials that are sometimes used to package food/foodstuff in Nigeria greatly litter the environment and predispose scavenging animals, especially dogs, to gastrointestinal obstruction and its associated complications. A Canecorsor dog, which was fed with locally formulated food along two other dogs, reportedly vomited and progressively became anorexic and weak with lack of defecation until shortly before death four days later. Necropsy revealed pallour of visible mucous membranes, sunken eye balls in addition to considerable amount of blood-tinged mucopurulent peritoneal fluid. The liver, kidneys, and spleen were congested. Other lesions included swollen and firm stomach containing a plastic pipe wrapped in layers of polythene that continued into the plicated intestinal loops to cause occlusions at two different points with button-like intestinal perforations and multiple mucosal ulcerations. Microscopically, the lung, liver, spleen, kidneys, and intestinal lesions suggested vascular compromise secondary to multi-organ dysfunction. The authors believe that septic hypovolemic shock secondary to inadequate and poor-quality feeding might have contributed to the death of the dog. The inadequate feeding of the highly valued dog might have predisposed it to scavenging for food in unusual materials that resulted in intestinal obstruction and perforation-induced septic peritonitis responsible for its death. Prompt clinical intervention could have improved the prognosis of the case.

Keywords: Dog, Polythene foreign body, intestinal obstruction, Perforation, Septic peritonitis

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INTRODUCTION

Abnormal cravings and the ingestion of inedible foreign materials by animals may result in pica. The actual cause of the condition in dogs and cats is unknown [1]. However, the condition is more common in young dogs and puppies than in adult dogs and in the castrated than in intact dogs [2], as well as more in furious rabid dogs than in apparently normal dogs [3]. Susceptibility is associated with scavenging by these animals under poor management and where kitchen materials/refuge are not properly disposed. Ingested non-

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digestible foreign materials usually pass through the gastrointestinal tract without difficulty. Nevertheless, they may cause the obstruction and perforation of the gastrointestinal tract, and, in some cases, peritonitis, depending upon whether they are large, non-pliable, or sharp objects with irregular edges [4].

Gastrointestinal tract (GIT) obstruction and its complications are reportedly one of the most commonly encountered surgical emergencies in small animal medicine [5]. However, cases of acute gastritis are rarely evaluated with complete diagnostic tools in veterinary practice [6]. Similarly, cases of chronic gastritis seldom occur alone but are usually part of other GIT disorders [6]. Although "Garbage gut" usually results from ingested actual garbage, moulds, fungi, spoiled or raw food, leftovers, or cat litter [6], the role of inadequate and poor-quality feeding in linear polythene gastrointestinal obstruction and its complications in dogs need further elucidation, especially in highly valued dogs with established nutritional requirements. This case reports post-mortem findings of linear polythene intestinal obstruction with associated intestinal perforations and peritonitis in a male Canecorsor dog fed locally formulated food. The report further highlights the role of predisposing factors such as inadequate/poor feeding, early clinical diagnosis, and appropriate treatment in the pathophysiology and prognosis of intestinal obstruction in dogs.

CASE HISTORY

A four-year-old male Canecorsor dog weighing about 45 kg reportedly started vomiting and progressively became anorexic, weak, and withdrawn with lack of defecation for about four days until shortly before death, when it voided little watery stool. The dog resided with two other bitches (a Canecorsor and a Mastiff) all of which are used as guard dogs in a large compound. The dogs had up-to-date annual anti-rabies, canine distemper, hepatitis, leptospirosia, parainfluenza and parvovirus vaccination (DHLPP) vaccination records and were usually fed together twice daily with a locally formulated food. They were previously fed on commercial dog food (Binggo®, Grand Cereals Ltd., Jos, Nigeria. (*www.grandcerals.com*) but later switched to the locally formulated feed. Further clinical examination revealed pyrexia, tachypnoea, tachycardia with signs of abdominal discomfort but the dog died shortly before an X-ray examination and evaluation could be conducted.

Post-mortem Evaluation

A post-mortem examination was immediately conducted on the carcass with prompt fixing of harvested lung, liver, kidney and spleen tissues in 10% neutral buffered formalin prior to processing for histopathological evaluation, according to standard procedures. The carcass showed pale ocular and oral mucous membranes with sunken eyes, mild bilateral ocular discharges, and soiled perineum. There was about 250 ml of blood-tinged mucopurulent fluid within the abdominal cavity with congested mesentery (Fig. 1), as well as dark red liver and kidneys with a bi-coloured spleen. The swollen and firm stomach contained an occluding folded plastic pipe wrapped in several layers of polythene that continued into the plicated intestinal loops (Fig. 2) as a central core. The plicated intestine was bulgy and occluded at two different points down the line (jejunum and ileum) containing bones wrapped in polythene coupled with the presence of button-like intestinal perforations (Fig. 3) and multiple swollen and indented Peyer's patches. However, the part of the intestine distal to the last point of occlusion to the anus contained some blood-tinged mucopurulent fluid.

The lung showed pulmonary haemorrhage, thickened inter-alveoli septa with marked mononuclear cellular infiltration, and melano-macrophage centers (MMCs) (Fig. 4). Marked diffuse portal and peri-portal sinusoidal congestion occurred in the liver (Fig. 5) while the darker part of the grossly bi-coloured spleen showed diffuse lymphocytic cellular depletion with the presence of MMCs (Fig. 6). Multifocal interstitial fibrinous exudation with tubular necrosis occurred in the kidney (Fig. 7) with diffuse goblet cell hyperplasia, congestion, and focal mononuclear cellular infiltration within the thickened intestinal mucosa. These post-mortem observations led to a diagnosis of gastrointestinal obstruction with intestinal perforations and septic peritonitis in the affected dog.

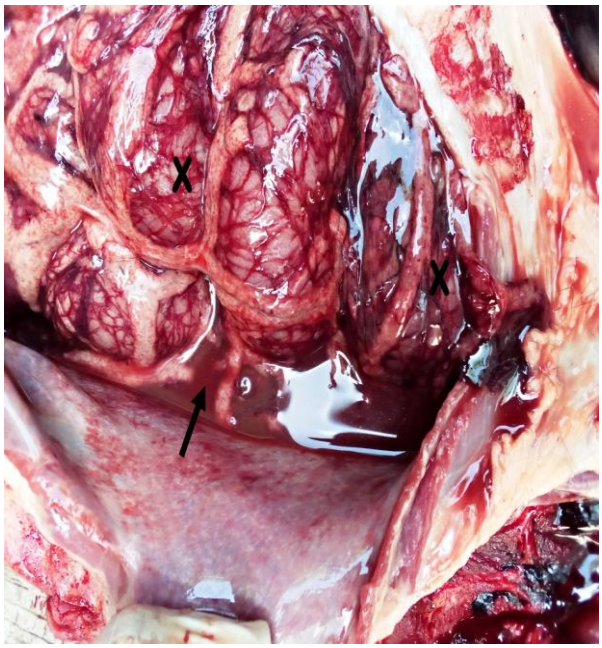

Fig. 1: Photograph of the peritoneal cavity of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the blood-tinged mucopurulent peritoneal fluid (arrow) and the congested mesentery (X).

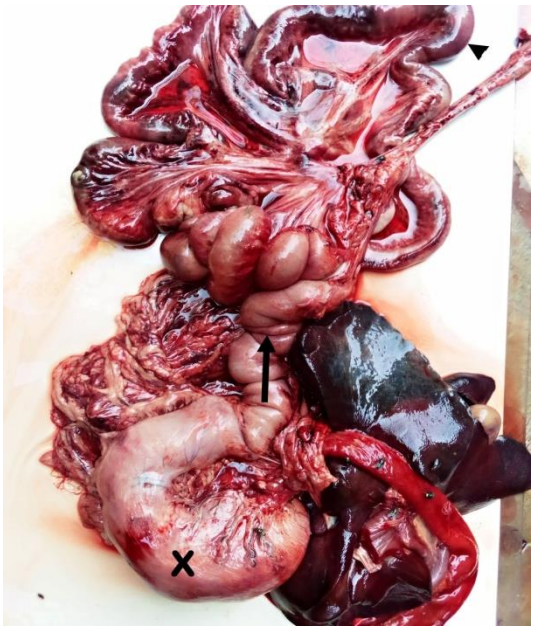

Fig. 2: Photograph of the gastrointestinal tract of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the swollen rigid-looking stomach (X) with the plicated upper part of the intestine (arrow) and the ballooned distal part of the intestine (arrowhead).

Proximate Analysis of the Locally Formulated Food

The proximate analysis of the locally formulated food samples according to AOAC [7] showed results of its crude protein, crude fat, crude fibre, ash, moisture, and energy content as presented in Table 1.

Table 1: The proximate analysis of the locally formulated dog food

Proximate analysis	Locally formulated dog food	Minimum requirement for adult dog maintenance
Crude protein (%)	13.0	18.0*
Crude fat (%)	6.1	5.0*
Crude fibre (%)	2.7	2.5 - 4.5**
Ash (%)	6.2	5.0 – 8.0***
Moisture (%)	8.3	6.0 – 10.0**
Energy (kcal ME/kg)	3206.3	4000.0*

*AAFCO [8]; **NRC [9]; ***Mohrman [10]

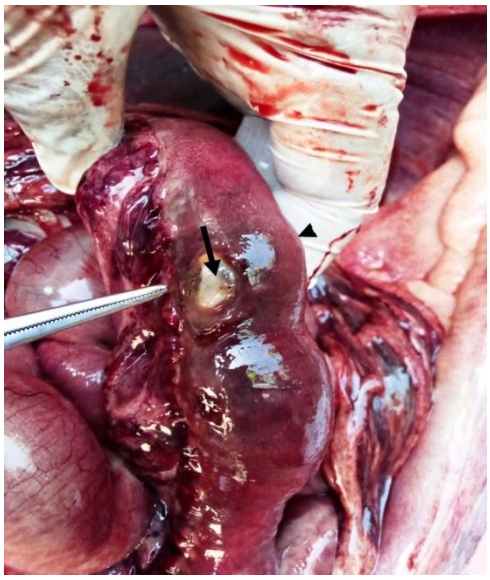

Fig. 3: Photograph of the intestine of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the occluded part of the intestine (tip of the scissors and arrowhead) with a button-like intestinal perforation (arrow).

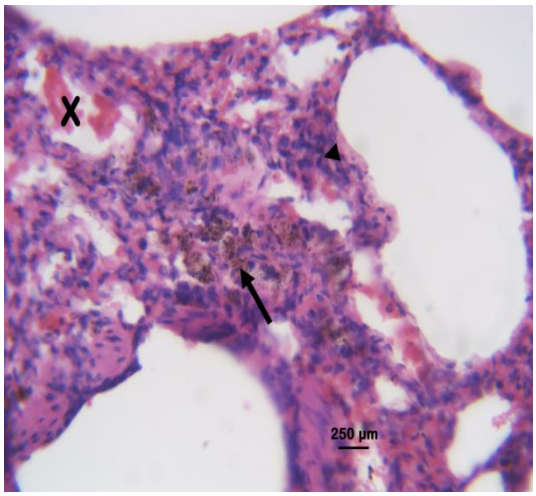

Fig. 4: Photomicrograph of the lung of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the pulmonary congestion (X) and thickened inter-alveoli septa due to marked mononuclear cellular infiltration (arrowhead) with the presence of melano-macrophage centers (arrow). H and E.

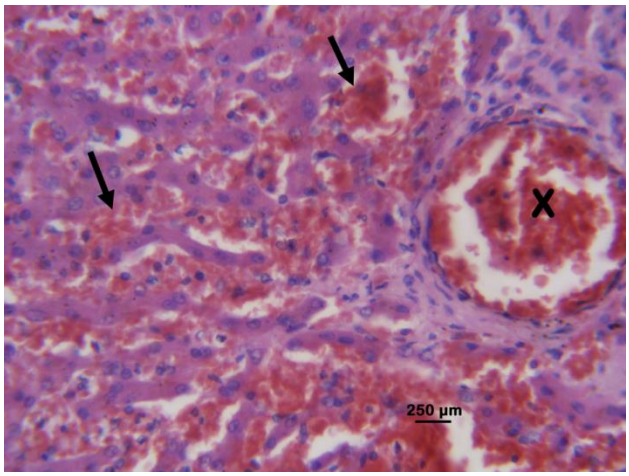

Fig. 5: Photomicrograph of the liver of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the portal congestion (X) with peri-portal sinusoidal congestion (arrows). H and E.

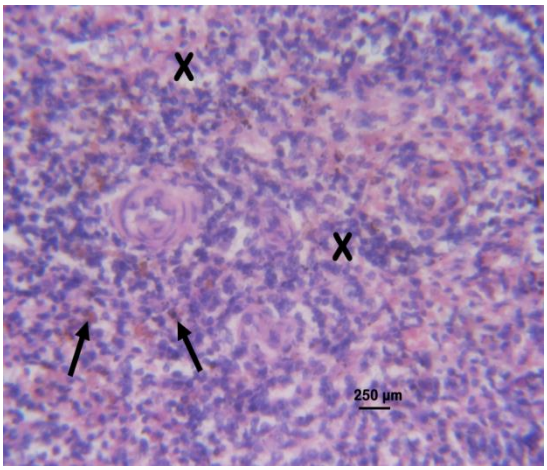

Fig. 6: Photomicrograph of the spleen of a 4-year-old Canecorsor dog following poor nutrition-induced gastrointestinal obstruction, perforations, and peritonitis. Note the lymphocytic cellular depletion (X) with melano-macrophages centers (arrows). H and E.

DISCUSSION

Although some dogs are deliberately underfed to make them more aggressive [11], others are underfed either due to ignorance of their feeding requirements or apparently, to cut down rising feeding costs. The feeding together of the three dogs at the same time and place as in the present case might have induced competitive food aggression between them [12], at the very expense of this particular dog with probably little food at each feeding time. The low protein and energy content of the left over from the locally formulated food suggested poor quality feed. Although the Ash content of the locally formulated food was within the minimum recommended level for adult dog maintenance ration, the possibility of individual components not being in the right proportions could have predispose the dog to the pica. This is because food aggression by dominant dogs normally leads to inadequate nutrition on the part of the aggressed. The proximate composition of the locally formulated food suggested poor-quality feeding due to its low crude protein and energy contents [9]. Inadequate and poor-quality feeding might have predisposed this particular dog to look for food in unusual places, which in the present case, was in food or food spices-laden polythene responsible for the recorded condition.

The reported depression, loss of appetite, vomiting, and constipation are consistent with GIT obstruction [13]. The presence of polythene foreign bodies in the dog's GIT indicated an underlying primary GIT issue [14], which in the present case may be attributed to poor nutrition. The sunken eyeballs indicated dehydration, which could have arisen from the protracted vomiting with inadequate food and water/fluid intake. The observed pallor suggested a hypovolemic state that usually characterizes fluid shift and volume depletion [15]. Vomission often leads to dehydration and subsequently, hypovolemia [16]. The presence of the occluding mass that continued into the intestine as a stringy central core suggested linear GIT foreign body obstruction [17], which was responsible for the observed intestinal plication [18]. The intestinal perforations probably arose from either the linear material-induced cutting pressure of the plicated intestine or the jagged-edged occluding materials during peristalsis.

The presence of congested mesentery with button-like intestinal perforations at both sites of complete intestinal occlusions and blood-tinged mucopurulent fluid within the peritoneum suggested secondary septic peritonitis due to intestinal content leakage into the peritoneum [19]. The mucopurulent nature of the peritoneal fluid could probably due to protein, neutrophils, and macrophages influx to curtail the prevailing condition [20]. The significant fluid effusion into the peritoneum and fluid sequestration into the lumen of the distal bowel, coupled with the reported vomiting and lack of food and water/fluid intake, may have predisposed the dog to hypovolemic shock that contributed to its death [21]. Although there was no microbial evaluation of the peritoneal fluid content, the microbial translocation from the leaked intestinal content might have also contributed to septic and haemovolemic shock [22]. The observed congestion, haemorrhage, fibrinous exudation, and mononuclear cellular infiltration in some of the evaluated organs further suggested cardiovascular compromise secondary to multi-organ dysfunction. Prompt veterinary attention could have improved the prognosis of the case, which lasted for about four days before veterinary attention was sought. This is because of the propensity of complete obstruction to cause the observed dramatic clinical presentations with the rapid deterioration of the condition, especially in association with septic peritonitis [23]. There was a similar report of gastric anchored gastrointestinal linear foreign bodies with associated intestinal necrosis, perforation, and peritonitis in dogs that required intestinal resection and anastomosis [24]. Besides the physical examination, the diagnosis of GIT obstruction and its associated complications in dogs is usually via endoscopic, radiographic, microbial, cytological, haematological, and blood chemistry evaluations to reveal the need for either prompt medical or surgical intervention for favourable prognosis of the condition.

In conclusion, inadequate and poor-quality feeding coupled with the resulting malnutrition might have predisposed the dog to scavenging. The ingestion of food in polythene-wrapped edible and inedible

materials may have resulted to intestinal obstruction with its associated intestinal perforations, septic peritonitis, and multi-organ dysfunction responsible for the death of the animal. Adequate feeding and prompt diagnosis followed by appropriate clinical intervention usually improves the prognosis of such condition in affected dogs. In addition, facilities like fencing to prevent straying should complement adequate feeding of dogs with the right amount and quality of food in preventing foreign body gastrointestinal obstruction and its associated perforation-induced septic peritonitis in dogs.

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