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CASE REPORT

Study on Cauliflower-Like Mass in Rectum Mucosa Induced by *Strongyloides stercoralis* in Beagle Dogs

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A B S T R A C T

A five-month-old, female beagle dog was sent to veterinary teaching hospital of Yangzhou University with cauliflower-like mass germinating from rectum mucosa. Clinical signs included weight loss, abdominal pain, and defecating posture frequently. When the beagle dog defecated, no feces but cauliflower-like mass in rectum mucosa were found obviously. Digital radiographic and fecal detection were applied and then the cauliflower-like mass was incised. Histopathologic examination revealed that nematode larvae infiltrated in the tissue. Based on the morphological characteristics, the nematode larvae were identified as *Strongyloides stercoralis.*

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INTRODUCTION

Strongyloides stercoralis (*S. stercoralis*) is a soil-transmitted nematode. It happens commonly in tropical and subtropical areas, even also in temperate areas (Mircean *et al*., 2012; Dantas-Torres and Otranto, 2014). *S. stercoralis* infection occurs in many species of livestock and wild animals, including dogs and humans. It is estimated that tens of millions of people are suffering from infection with *S. stercoralis* (Keiser and Nutman, 2004). This report supplies further evidence that *S. stercoralis* may infiltrate different tissues, possess worldwide geographical distribution and also induce cauliflower-like mass in rectum mucosa of dogs in China.

History: A five-month-old, female beagle dog was presented to veterinary teaching hospital of Yangzhou University with cauliflower-like mass germinating from rectum mucosa. The dog developed emaciation from 3 month old and frequently scratched anus position. After one month, little knots were found in the rectum mucosa and grew up quickly. The dog often had diarrhea with mucoid and blood-flecked feces. But in recent days, no feces were discharged and the dog frequently showed tenesmus and dyschezia. Some beagle dogs raised together also had similar clinical signs, which were not taken here.

Clinical examination: Physical detection revealed dehydration, stunting, focal dermatitis, and anemia. In the meanwhile, cauliflower-like mass was observed in rectum mucosa with lots of knots on it, which could not recovered by itself (Fig. 1 A, B). When palpation, rigid pipe-like block located in the abdominal cavity. The dog showed nervous when put pressure on the abdominal walls. According to the owner's description, the local veterinarian have administrated medicine to the dog for continuous one week, including ceftriaxone sodium (20mg/kg, bid, im) and dexamethasone (2mg/kg, qd, im). In the beginning, the dog showed clinical improvement, but condition worsened later. Temperature (39.1°C), heart rate (65 beats/min), and respiratory rate (23 breaths/min) were normal. So complete blood counts, abdominal radiographic examination, and fecal parasite detection were applied to diagnosis the disease.

Diagnosis and treatment: Blood sample was collected from cephalic vein and abnormal hematological findings included anemia and increased neutrophil granulocyte (Table 1). Abdominal radiographic examination was performed in left-right lateral position. Lateral plain film of abdomen showed solid "inspissated" or "scybalous" feces in the descending colon, and gas alone aside (Fig. 2A). The findings manifested as severe constipation with gross fecal overload. So enema was performed and

Fig. 1: Posterior and lateral view of cauliflower-like mass in anus mucosa. A, posterior view. B, lateral view.

Fig. 2: L-R lateral abdominal radiograph before and after enema. A, colon impacted with feces before enema. B, no high density substance in colon after enema.

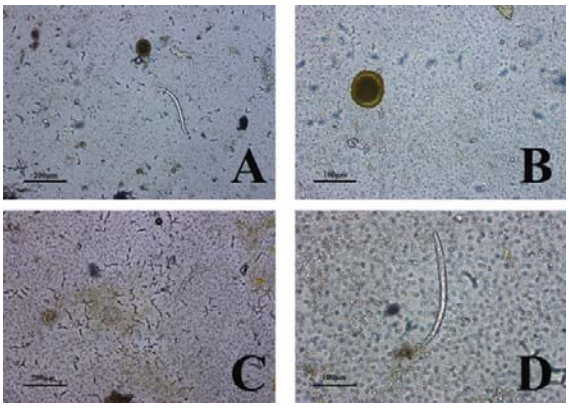

Fig. 3: View of fecal parasitic examination. A, *Strongyloides stercoralis* larvae and roundworm eggs. B, magnification of the roundworm eggs (*Toxocara canis*) with dark brown centre and a thick, light-colored (orange) wall in appearance. C, three *Strongyloides stercoralis*. D, magnification of *Strongyloides stercoralis* filariform larvae with a slit in the tail. A, C, bar=200μm; B, D, bar=100μm.

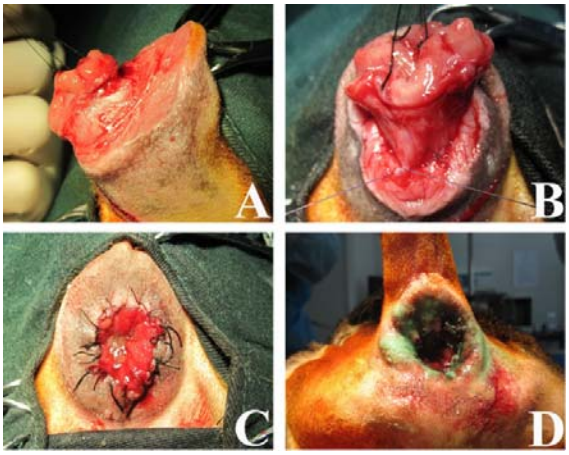

Fig. 4: Surgical procedure of cauliflower-like mass resection. A, blunt separation at the healthy baseline of mass. B, Interrupted sutures of serosal muscularis and anus sphincter. C, Interrupted sutures of rectum mucosa and the anal skin section. D, rectum and anus recovered at post-operation with antibacterial ointment at the incision.

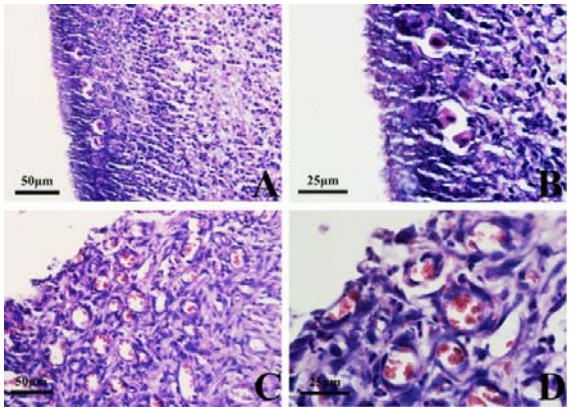

Fig. 5: Photomicrograph of cauliflower-like mass of the beagle dog. A, transversal sections of *Strongyloides stercoralis* larvae located in mucosa. B, magnification of *Strongyloides stercoralis* larvae in mucosa. C, elongated larvae of *Strongyloides stercoralis* in hyperplasia fibrous connective tissue. D, magnification of elongated larvae of *Strongyloides stercoralis*. Hematoxylin and eosin. A, C, bar=50μm; B, D, bar=25μm.

Table 1: CBC detection results of the beagle dog

Variable	Result	Normal range
White Blood Count ($\times10^9$/L)	16	6.0-17.0
Neutrophil Count ($\times10^9$/L)	14 ↑	4.0-12.6
Red Blood Count ($\times10^{12}$/L)	4.6 ↓	5.5-8.5
Hemoglobin (g/L)	98 ↓	110-190
Platelets ($\times10^9$L)	213	117-460

Note: "↑", increase; "↓", decrease.

cleaned the feces in the descending colon. After enema, the left-right lateral radiographic film was taken again. Radiograph was observed and no feces densities were found (Fig. 2 B). In the meanwhile, fresh fecal samples were collected and detected. *S. stercoralis* larvaes and roundworm eggs (*Toxocara canis*) were found in the fecal smears (Fig. 3A to 3D).

After enema, the dog was administrated with routine general anesthesia of isoflurane. Surgical procedure was performed. Along the joint position of the anus rectum mucosa and skin, mass was separated bluntly from the healthy base line (Fig. 4 A). Attention to protect the anus sphincter and reserve more healthy rectum mucosa and muscle layer. Suture the serosal muscularis of rectum to anus sphincter intermittently around the rectum with absorbed thread (Fig. 4B). Then incise mass and suture the second layer between the rectum mucosa and the skin section of anal edge. Interrupted sutures were employed at the second layer (Fig. 4C). When complete the surgery, apply antibacterial ointment at the incision (Fig. 4D) and bandage the tail.

Resected tissue samples were collected. Several sections of tissues were trimmed and dipped in 10% neutral buffered formalin. Tissues were processed routinely and stained with hematoxylin and eosin. Histopathologic examination showed that lots of transversal sections of *S. stercoralis* larvae were located in the mucosa, which appeared to be round or polygon shapes. There were abundant neutrophils, chronic inflammatory cells and lymphocyte at underlying mucosa (Fig. 5A & 5B). Tissues of nodular position were characterized by abundantly vascularized granulation

tissue rich in fibrous connective tissue and lots of elongated larvae. Polymorphonuclear cells infiltrated the tissue and mild inflammation developed (Fig. 5 C, D).

Based on the fecal and histopathologic detection, the dog was diagnosed as *Strongyloides stercoralis* infection. So levamisole hydrochloride and albendazole were administrated to all the dogs simultaneously for one week continuously. Considering some dogs with complicated infection, dogs with clinical signs were also injected with ceftriaxone sodium (20 mg/kg, bid). Following investigation revealed that beagle dogs recovered.

DISCUSSION

Strongyloides spp. infection is often asymptomatic or mild. It happens commonly in tropical and subtropical areas, even also in temperate areas. Literature searches reveal that some studies on the infection of *Strongyloides spp.* in dogs have been introduced. *S. stercoralis* have been reported to migrate to the spinal cord (Snook *et al.*, 2009) and intestine tissue (Dillard *et al.*, 2007). In this case, the larvae appeared to be *Strongyloides stercoralis* based on histomorphology. Migration of *S. stercoralis* to the rectum mucosa inducing cauliflower-like of mass in dogs has not been reported to our knowledge. While some canine and feline parasites are highly host-specific, others may easily switch to other hosts, including humans. So it can threaten public health security. Dantas-Torres *et al* (Dantas-Torres and Otranto, 2014) reviewed dogs, cats, parasites, and humans in Brazil and focused on several canine and feline parasites (e.g. *Toxoplasma gondii*, *Dipylidium caninum*, *Ancylostoma caninum*, *Strongyloides stercoralis*, and *Toxocara canis*) which are important not only from a veterinary perspective but also from a medical standpoint.

Prevalence of *S. stercoralis* was surveyed in different countries and areas. In a cross-sectional study of humans and dogs, the prevalence of *S. stercoralis* was 8.9% in Laos (Conlan *et al.*, 2012). In Pinhais, Brazil, the prevalence of *S. stercoralis* was 26.3% and 3.4% respectively in 2009 and 2010(Martins *et al.*, 2012). In the east of Japan, prevalence of ascarids, *Strongyloides spp*. and hookworms were recorded 1.8%, 1.1% and 0.1%, respectively in pet shop puppies (Itoh *et al.*, 2011). In China, it is the first time to report natural incidence of *Strongyloides spp.* in dogs. But in human medicine, these diseases have been reported in recent years and often induced severe inflammation, even death (Chen *et al.*, 2013). Probably *Strongyloides spp* were not paid more attention to by veterinarians in China. Animals transmission function should be taken into account in making control measures. The beagle dog in the report was raised in a beagle farm and during the following examination, 12% beagle dogs were diagnosed as mixed infection with *S. stercoralis* and *Toxocara canis*. Some researchers found that ivermectin was 100% effective in removing adult *S. stercoralis*, but it was not effective in removing third-stage larvae from parenteral sites (Mansfield and Schad, 1992). Maybe this is another cause that ivermectin which was applied to prevent parasites in the beagle farm was not effective. In addition, spread of *S. stercoralis* is typically secondary to immune compromise. The beagle dog was injected with dexamethasone at first for one week, which probably suppressed the immunity and promoted the development of disease.

In conclusion, it is the first time to report that *S. stercoralis* infected dogs in China. So it is necessary to survey the prevalent of *S. stercoralis* in animals in China. In the meanwhile, control programs are recommended for *S. stercoralis* in humans and animals

Authors' contributions: HW and JJL diagnosed, treated and wrote the case. JSD and YL made the histological section and fecal detection. XZL, GF, WL and XM took part in the surgery and nursed the dogs. All authors interpreted the results, revised the manuscript for important intellectual contents and approved the final version.

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