

<Case Report>

Primary intestinal mast cell tumor in a Russian Blue cat: ultrasonographic and histopathological findings

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Abstract: A 11-year-old, female Russian Blue cat was presented with anorexia, vomiting, and diarrhea lasting for 3 days. Abdominal ultrasonography revealed a hypoechoic, non-circumferential, and eccentrically formed intestinal loop with altered wall layering and thickening of the tunica muscularis. After surgical resection, histopathologic examination confirmed an infiltrative, round-cell neoplasm composed of sheets and cords of neoplastic mast cells within a fibrotic, edematous stroma. The cat was alive and healthy 6 months after surgery. To the best of our knowledge, this is the first reported case of an intestinal mast cell tumor in a Russian Blue cat in South Korea.

Keywords: feline, histopathology, intestinal mast cell tumor, ultrasonography

Intestinal tumors are not common in cats and dogs. Nonetheless, feline intestinal mast cell tumors (MCTs) are the third most frequent intestinal tumor in cats, followed by lymphomas and adenocarcinomas [10]. Mast cell neoplasms in cats can be categorized into three anatomic forms: cutaneous, visceral (spleen, liver, lymph nodes, and bone marrow), and gastrointestinal [5]. MCTs can usually be diagnosed on the bases of: cytological evaluation of a fine-needle aspirate of the mass and the ultrasonographic appearance of the affected organ [5]. Giemsa staining reveals metachromasia of intracytoplasmic granules within neoplastic mast cells [4]. Intestinal MCT in the cat may present as either a single solitary lesion or a multifocal lesion, and it most commonly affects the small intestine [7]. In contrast with the cutaneous form, metastasis to the regional lymph nodes and liver is common with intestinal MCT, and prognosis is poor [8]. This case report describes the clinical and diagnostic features of feline intestinal MCT. To the best of our knowledge, this is the first case report of intestinal MCT in a cat in South Korea.

A 11-year-old, intact, female Russian Blue cat, weighing 3 kg, was presented with anorexia, vomiting, and diarrhea that had been persistent for 3 days. On presentation, there was marked loss of elasticity of the skin. A complete blood cell count and serum chemistry profile indicated polycythemia (hematocrit 55.7%; reference range, 24.0–45.0), hyperproteinemia (total protein 11 g/dL; reference range, 5.7–7.8), increased levels of liver enzymes (alanine transaminase [ALT]

315 U/L; reference range, 22–84; aspartate transaminase [AST] 168 U/L; reference range; 18–51; alkaline phosphatase [ALP] 459 U/L; reference range, 48–165; total bilirubin 2.9 mg/dL; reference range, 0.1–0.4). Thoracic and abdominal radiography showed no remarkable findings. Abdominal ultrasonography revealed a regionally thickened intestinal loop in the central abdomen, as well as a corrugated segment of the small intestine. The thickened intestinal loop was hypoechoic, non-circumferential, and eccentric in form, with altered wall layering and thickening of the tunica muscularis (Fig. 1). The following treatment was provided: ampicillin sodium (10 mg/kg, intravenous [IV]; Penbrex, Yungjin Pharm, Korea), metronidazole (15 mg/kg, IV, Metrynal; Daihan Pharm, Korea), famotidine (0.5 mg/kg, IV, Gaster; Dong-A ST, Korea) and metoclopramide (0.5 mg/kg, IV, Meckool; Jeil Pharmaceutical, Korea). Fluid therapy using 0.9% normal saline was conducted at a rate of 5 mL/kg/h for the first 24 h to correct the patient's dehydration. After achieving euhydration, it was maintained by administering 5% dextrose in 0.9% normal saline at a rate of 2.5 mL/kg/h. The cat's general condition improved slightly after the medication; however, anorexia relapsed 4 days later. A tentative diagnosis of intestinal tumor was made, based on all the clinical features, and a diagnostic laparotomy was scheduled. Computed tomography (CT; Hispeed DX/i; GE Healthcare, Japan) was conducted before surgery to evaluate whether any metastasis had occurred; no evidence of metastases in the liver, spleen, regional lymph

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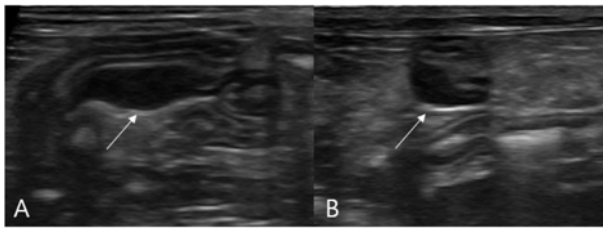


Fig. 1. Ultrasonography of a cat with an intestinal mast cell tumor: sagittal (A) and transverse (B) ultrasound images showing a hypoechoic, non-circumferential, eccentric intestinal loop (arrows).

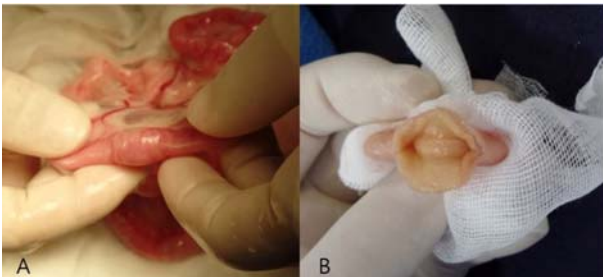


Fig. 2. Gross images obtained from a cat with an intestinal mast cell tumor. There was marked focal jejunal wall thickening (A), especially in the muscular layer (B; after mass resection).

nodes, or lung was noted. The diagnostic laparotomy revealed a mass surrounding the jejunal lumen (Fig. 2A). The thickened jejunal segment ($1.52 \times 1.03 \text{ cm}^2$) was resected (Fig. 2B), and the intestinal ends were joined by end-to-end intestinal anastomosis.

Histopathologic examination (IDEXX Laboratories, USA) revealed a densely cellular, unencapsulated, poorly circumscribed mass that spanned the tunica submucosa and infiltrated into the tunica muscularis (Fig. 3A). The infiltrative, round-cell neoplasm was composed of sheets and cords of neoplastic mast cells within a fibrotic and edematous stroma (Fig. 3B). The neoplastic cells were well differentiated, and mitotic cells were infrequent (0–1 per $40\times$ microscopic field). A significant number of infiltrating eosinophils were detected throughout the neoplastic population. On the basis of Patnaik grading, the cat was diagnosed as having a grade 2 MCT [9]. The Giemsa histochemical stain was performed to allow accurate histopathological diagnosis of the MCT. The Giemsa stain revealed many metachromatic cytoplasmic granules within numerous mast cells (Fig. 3C). A definite diagnosis of feline intestinal MCT was made histopathologically. The cat was hospitalized and treated using ampicillin sodium, metronidazole, famotidine, ornipural (0.2 ml/kg, IV, Ornipural, twice a day; Vetoquinol, Korea) and S-adenosyl-methionine (80 mg tablet, per oral, Samylin, once a day; Vet-Plus, Korea). The patient began to eat food on the third day after surgery, and her condition improved gradually. Hepatic enzyme levels were normalized 11 days after surgery, and the patient was discharged from the hospital at this time. The

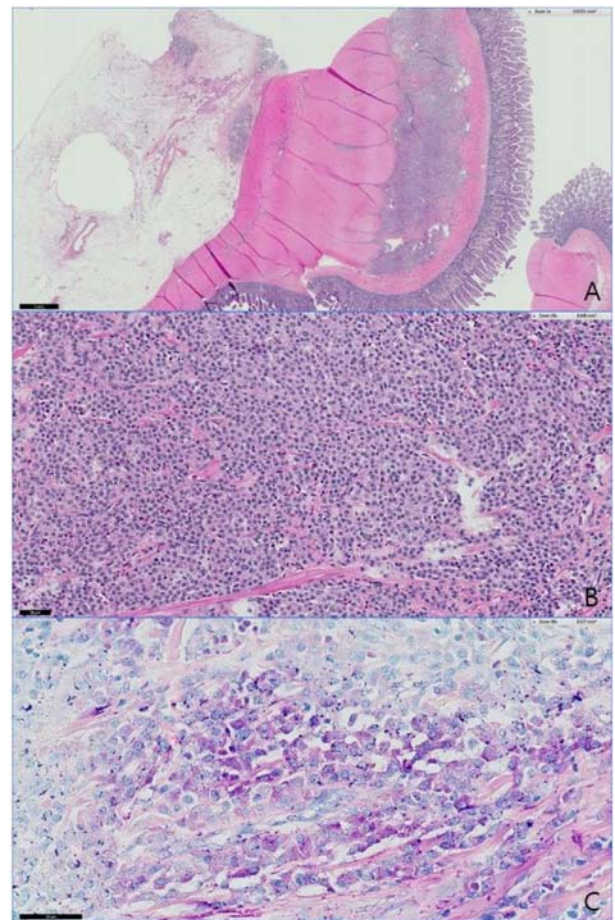


Fig. 3. Photomicrographs of an intestinal mast cell tumor in a cat. (A) The tumor spanning the submucosa of jejunum. (B) Dense sheets of granular round cells within a fibrotic stroma. (C) Numerous neoplastic mast cells with metachromatic cytoplasmic granules. H&E (A and B), Giemsa stain. (C). Scale bar = 1 mm (A), 50 μm (B and C).

owner refused adjuvant therapy (chemotherapy and antihistamines). Neither recurrence nor metastasis was detected on the basis of clinical signs, or by ultrasonography, during the 6 months following surgery.

Feline intestinal MCTs are malignant neoplasms that represent about 4% of all feline intestinal tumors [5]. The majority (65%) of intestinal MCTs are diagnosed between the ages of 11 and 15 years in cats [10]. In this case report, the cat was 11 years old at the time of diagnosis. The clinical signs of intestinal MCT are non-specific; most commonly, patients are presented with vomiting (64%), anorexia (50%), diarrhea (36%), and weight loss (21%) [6]. In the present study, the cat had symptoms of anorexia, vomiting, and diarrhea, none of which responded to medical treatment. According to a previous report [6], intestinal MCTs are most commonly located in the small bowel (9/14 cats; 64%) and ileoceocolic junction (4/14 cats; 29%) in cats. In the same study, a non-circumferential, eccentric wall thickening was noted in over half of the cases (9/16 tumors; 56%) [6]. In the present study,

the cat had a single mass in the small intestine (jejunum). The mass was hypoechoic, non-circumferential, and eccentric in form, with altered wall layering. Metastasis to the lung, lymph nodes, liver, and spleen is common at the time of diagnosis in cases of feline intestinal MCTs [6, 8]. In the present study, metastasis was not detected by ultrasonography or CT scanning. This finding was different to those of previous studies [6, 8] and indicated that the MCT was diagnosed early in our case.

MCTs should be considered if any cat is presented with an intestinal mass, especially if the lesions consist of round-shaped, neoplastic cells and an eosinophilic infiltrate. Mast cells promote eosinophilic inflammation by producing eosinophil-directed cytokines, such as interleukin (IL)-4 and IL-5. In turn, these cytokines induce chemokines that specifically attract eosinophils, such as eotaxin-1 and -2 [12]. Furthermore, the fibrogenic cytokines (fibroblast growth factor and transforming growth factor [TGF] β 1) are among the numerous substances released by MCTs [11, 12]. These cytokines promote the activation, proliferation, and migration of fibroblasts, with subsequent collagen production and contraction [1, 11, 12]. In addition to mast cells, eosinophils play a role in fibrosis. They also influence tissue remodeling and fibrosis in allergic reactions by releasing fibrogenic cytokines such as TGF- β and IL-1 β [2, 3].

The intestinal form of feline MCT has a poor prognosis [5]. If surgery is possible, wide surgical margins are recommended [8]. However, most cats die or are euthanized soon after, and the survival time after surgery is only 4 to 6 months [5, 6]. Thus, it was surprising that this cat was healthy and metastasis-free 6 months after the surgery.

In conclusion, the ultrasonographic and histopathological findings in the present study were similar to those of previous cases of feline intestinal MCT. However, our patient had better outcome after surgical excision of a single intestinal MCT. To the best of our knowledge, this was the first case of rare feline intestinal MCT in a Russian Blue cat in South Korea.

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