Feline Gastrointestinal Adenocarcinoma: A Review and Retrospective Study

Alastair E. Cribb

Abstract

Feline gastrointestinal adenocarcinomas are the most common nonhematopoietic gastrointestinal tumors in cats. They are highly malignant tumors causing intestinal obstruction due to the annular, stenosing nature to their growth. Current literature is largely based on surveys of pathology records. Therefore, a retrospective study was conducted to evaluate clinical course and prognosis with surgical excision of the tumor. In published reports feline gastrointestinal adenocarcinoma represented 20–35% of gastrointestinal neoplasia in the cat; the average age was greater than ten years; and there was a greater incidence in Siamese. The small intestine accounted for 70% of cases. In this retrospective study, cats usually had a long history of nonspecific gastrointestinal disease; weight loss and vomiting were the most common signs. Abdominal radiographs demonstrate intestinal obstruction, and an abdominal mass is often palpable. With intestinal resection and anastomosis, median survival time was 2.5 months (range: 0–24 months). Tubular adenocarcinomas may have a better prognosis than other histological types, especially if metastasis is not present at the time of surgery. A significant disease-free interval is possible in some cases.

Résumé

L'épithélioma gastro-intestinal chez le chat: revue de la littérature et édude rétrospective

Chez le chat, l'épithélioma de l'intestin est la tumeur gastro-intestinale la plus fréquemment rencontrée. La sténose annulaire engendrée par la croissance de cette tumeur hautement maligne produit une obstruction intestinale. On a effectué une étude rétrospective afin d'évaluer l'évolution clinique ainsi que le pronostic de cette condition après l'excision chirurgicale de la tumeur. Le petit intestin était impliqué dans 70% des cas. Les chats présentaient en général une histoire assez longue de problèmes gastro-intestinaux non-spécifiques: la perte de poids et les vomissements étaient les signes les plus fréquemment observés. On a observé des signes d'obstruction intestinale à la radiographie et une masse abdominale était fréquemment détectée à la palpation. La survie moyenne après résection intestinale et anastomose était de 2,5 mois (écart 0–24 mois). Les épithéliomas tubulaires ont peut-être un meilleur pronostic que les autres types histologiques surtout s'il n'y a aucune évidence de métastases au moment de la chirurgie. La survie sans évidence de néoplasie est parfois prolongée.

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Department of Small Animal Clinical Sciences, Veterinary Clinical Center, Michigan State University, East Lansing, Michigan 48824.

Reprint requests to Dr. A.E. Cribb, Division of Clinical Pharmacology, Hospital for Sick Children, 555 University Avenue, Toronto, Ontario M5G 1X8.

Introduction

Gastrointestinal adenocarcinoma is the most common nonhematopoietic gastrointestinal tumor in cats (1). Adenocarcinomas are malignant tumors of the glandular epithelium (2); they originate in the crypts of Lieberkuhn and spread via the intramural or submucosal lymphatics (2). The result if often an annular constriction of the intestine, causing partial or complete obstruction. The tumors are usually firm and white on cut surface (3). The macroscopic appearance of the lesion is often more suggestive of a chronic inflammatory change than of a glandular neoplasm (4). Although the tumor is considered highly malignant with frequent metastasis to the regional lymph nodes (5), the presenting signs are usually those of small bowel disease or obstruction. Chronic, intermittent vomiting, inappetance, weight loss, and diarrhea or constipation are common signs (1,3). For this reason, it is frequently undetected in the early stages.

Although several surveys of pathology records have been reported, information on the clinical course and prognosis with surgical treatment is lacking. It is unlikely that any single practitioner will see a series of cases, making recommendations based on experience difficult. The intent of this paper is to review the epidemiology of feline gastrointestinal adenocarcinoma based on the current literature and to discuss the clinical course and prognosis in eleven cases.

Review of Literature

The majority of the over 100 reported cases of feline gastrointestinal adenocarcinoma (FGA) have been in retrospective studies of pathology records. Incidences of 0.7 to 1.2% of feline necropsies (1), 0.4 to 8.3% of all feline neoplasias (1,5,6,7,8), and 20 to 35% (6,7,9) of gastrointestinal neoplasias have been reported.

The age range of cats with FGA was 2–17 yr (1,3,4, 6,7,9,11–14). Most cats were older than 10 yr and few were less than 5 yr. Average ages of 10.6 (1) and 11.3 yr (6) have been reported. The sex distribution was approximately 60% male and 40% female. Feline gastrointestinal adenocarcinoma has been reported in 42 Siamese, 30 domestic shorthair (DSH), one Russian blue (1), and one Persian (7). Relative frequency rates of 3:1 (6) and 8:1 (1) Siamese:DSH based on known population bases have been found.

The distribution of adenocarcinomas in the gastrointestinal tract based on reported cases (1,3–15) was:

TABLE 1
Presenting Complaints, Physical Examination, Histological Findings, and Survival Times In 11 Cases of Feline Gastrointestinal Adenocarcinoma

Case Number	1	2	3	4	5	6	7	8	9	10	11	Total
Presenting Complaints												
Weight loss	x	x		x	x	x	x		x		x	8
Vomiting	x		x	x	x			x	x	x		7
Anorexia/Inappetance	x		x	x	x	x						5
Abnormal Stool												
Hematochezia									x	x	x	3
Constipation			x								x	2
Diarrhea									x			1
Physical Examination												
Cachexia	x	x	x	x	x		x	x	x		x	9
Abdominal mass	x	x	x	x	x		x		x			7
Dehydration			x	x	x						x	4
Location	St	Du	Jj	Jj	Il	Il	IC	IC	Co	Re	Re	
Tumor type	U	T	M	U	T	T	U	T	U	T	U	
Survival time (weeks)	1	E	8	45	56	0	4	104	14	12	8	

U = Undifferentiated adenocarcinoma; T = Tubular adenocarcinoma; M = Mucinous adenocarcinoma
St = Stomach; Du = Duodenum; Jj = Jejunum; Il = Ileum; IC = Ileocecal junction; Co = Colon; Re = Rectum; E = Euthanized at time of surgery

1% stomach; 68% small intestine (11% exact location not specified; 6% duodenum; 20% jejunum; 31% ileum); 9% ileocolic junction; 2% cecum; 13% colon; 3% rectum; and 5% unknown.

Twenty-five percent of cats did not have local or distant metastasis at the time of necropsy. In 45%, metastasis to the regional lymph nodes had occurred; in 50%, to the peritoneum or omentum; in 8%, to the lung; and in 9%, to other abdominal organs including the liver and spleen.

In one study (1) where FGA was classified histologically according to the World Health Organization (WHO) classification guidelines (16), 45% were tubular adenocarcinomas, 33% were undifferentiated carcinomas, and 22% were mucinous adenocarcinomas. Eleven of 22 adenocarcinomas in one report (6) were ulcerated.

Accurate survival times with surgical treatment and clinical courses were reported for only four cases (8,12,13,14). Survival times were 8 d, 3 mo, 18 mo, and 28 mo. One report had survival times ranging from 2 d to 2 yr (1) but gave no details. They also reported no relation between location or histological pattern of tumor and prognosis. Based on the literature, it is not possible to confirm or refute this finding.

Materials and Methods

The case records of the Veterinary Clinical Center, Michigan State University from January 1970 to January 1985 were used as source material. Cases of FGA confirmed histologically were identified and the clinical course of the disease and success of treatment reviewed.

Results

Eleven cases of FGA were identified. Six cats were Siamese and five were DSH. There were seven males and four females. They ranged in age from 6 to 14 yr with an average of 10.7 yr.

The most common presenting complaints (Table 1) were weight loss, vomiting, and anorexia. Hematochezia was evident only with colonic or rectal involvement. There were no reports of melena. The duration of signs prior to presentation or diagnosis varied from 1 mo to 2 yr. The median duration was 2 mo. Several cats were treated for nonspecific gastrointestinal disease for varying periods of time before a diagnosis was made.

On physical examination (Table 1), the most consistent finding was cachexia. An abdominal mass was palpable in 7 of 11 cats. This varied from a small 1 cm mass to a large doughy mass resulting from accumulation of intestinal contents anterior to the stricture. Dehydration was present in four cats.

The most common hematological abnormalities were neutrophilia and lymphopenia (seven cats), consistent with stress and/or local inflammation at the tumor site. One cat had a nonregenerative anemia (PCV 0.165 L/L) sufficient to require a blood transfusion prior to surgery. Increases in alanine aminotransferase (76 U/L, 98 U/L; N[a]:20–45 U/L) and alkaline phosphatase activities (53 U/L, 63 U/L; N: 10–50 U/L) were documented in four cats. Unfortunately, hepatic biopsies were not obtained, so a retrospective assessment of hepatic disease was not possible. The cats had colonic or rectal adenocarcinomas and died within 3.5 mo. Mild azotemia and urine specific gravities consistent with dehydration were present in three cats. Two cats had mild hypokalemia, consistent with chronic vomiting and/or diarrhea and decreased food intake. Tests (ELISA or immunofluorescent) for the feline leukemia virus were negative in seven cats tested.

[a]*Normal values, Veterinary Clinical Pathology, Michigan State University*

Thoracic radiographs were taken in seven cats. One cat had cardiomegaly which was subsequently diagnosed as hypertrophic cardiomyopathy. No evidence of metastasis was present in any cases. Abdominal survey radiographs were suggestive of obstruction in five of ten cats. Impacted bowel was visible in two cats and abnormally dilated small intestinal loops were seen in three cats. Ascites was present in two cases. Upper gastrointestinal contrast studies performed in two cats identified obstruction and barium enemas identified rectal strictures in two cats.

Exploratory laparotomy and histological examination were required for final diagnosis of cause of obstruction in all cases. The distribution of adenocarcinomas was: one gastric; one duodenal; two jejunal; two ileal; two ileocecal; one colonic; and two rectal.

Impression smears of the intestinal stricture/mass were prepared at the time of surgery in seven cats. Cytology was interpreted as septic inflammation in five cats; one as a possible epithelial tumor; and two as lymphosarcoma. On histological examination, five were tubular adenocarcinomas, five were undifferentiated carcinomas, and one was a mucinous adenocarcinoma. Biopsies of the regional lymph nodes revealed metastasis in 5 of 11 cats. Peritoneal involvement was present in two cats, while metastasis to the liver and pancreas was seen in one cat with diffuse abdominal metastases. The liver was not consistently biopsied. Lung metastases were not identified histologically or radiographically, either at the time of surgery or at necropsy.

Surgical resection of the annular tumor and any severely dilated intestine was performed in ten cases. The amount of intestine resected varied. One cat was euthanized intraoperatively because of carcinomatosis.

Survival of cats treated surgically ranged from 0 d to 24 mo. Median survival time was 2.5 mo. Two cats died within 5 d from surgical-related causes (surgical stress/shock; peritonitis). According to clinical information (referring veterinarian), one cat died of renal disease (2 mo survival) and one of cardiomyopathy (2 mo survival) (necropsies were not obtained). Three cats were euthanized at 1, 3, and 24 mo postoperatively because they were not doing well, presumably the result of metastasis. Necropsies were not performed. One cat was euthanized 3.5 mo postoperatively with recurrence of a colonic adenocarcinoma; one cat was euthanized 11 mo postoperatively with recurrence at a distant site and stricture at the surgical site; and one was euthanized 13 mo postoperatively with diffuse implantation metastases. The perceived quality of life varied from poor to excellent and tended to correspond to survival time.

Discussion

The epidemiology of the 11 cases presented here is similar to that previously reported. Feline gastrointestinal adenocarcinoma is a disease of older cats, with a higher frequency in males and Siamese. The presenting signs were those of chronic partial intestinal obstruction. Weight loss was the predominant sign and was related to the intestinal obstruction. Long-term symptomatic therapy was the rule rather than the exception. The duration of clinical signs corresponded to the location: gastric, duodenal, and jejunal tumors had clinical signs for an average of 1 mo; ileal and ileocecal, 3.5 mo; and colorectal, 4.5 mo. Early diagnosis is important because debilitated cats are more susceptible to the stresses of surgery, and metastasis is more likely to have occurred. Due to the advanced age of these cats, a complete work-up is recommended. Specific laboratory findings associated with FGA were not identified, however, they are essential to identify concurrent medical problems.

Abdominal palpation and radiography were helpful in making a diagnosis of intestinal obstruction. Single or sequential plain abdominal radiographs were sufficient to justify exploratory laparotomy in 65% of cases, avoiding the stress of contrast studies. Thoracic radiographs should always be taken to screen for metastasis and/or concurrent cardiopulmonary disease.

Definitive diagnosis was dependent on laparotomy and histological examination of involved tissues. The recommended surgical procedure for intestinal adenocarcinoma is wide segmental resection of the intestine with its associated mesentery, and biopsy or, if possible, removal of regional lymph nodes. Preliminary ligation of the vascular trunks to avoid tumor emboli and minimal manipulation of the neoplasm are desired (3). The tumor can resemble scar tissue, so histological examination of all removed tumors must be performed for accurate diagnosis and prognosis. Cytology of the mass was unreliable in diagnosing adenocarcinoma. Enlarged mesenteric lymph nodes do not necessarily mean metastasis and they too should be biopsied.

Using the WHO classification and disregarding surgical-related deaths, cats with tubular adenocarcinomas had an average survival time of 11 mo (range: 3–24); whereas cats with mucinous and undifferentiated adenocarcinomas had an average survival of 4 mo (range: 1–11). The one previously reported case given a histological classification and survival time was a tubular adenocarcinoma with no evidence of metastasis; it survived 28 mo postoperatively. The mean survival time when no metastasis was evident at the time of surgery was 10 mo, and 5 mo if metastasis was present. Due to the small sample size, none of these differences were statistically significant. However, the above findings do agree with findings in man: the shortest survivals have been recorded in individuals whose carcinomas were least differentiated or produced excess mucin (11).

The highly malignant nature of FGA was evident in this series of cases. Six cats had metastasis at the time of surgery and metastasis or recurrence was documented in the five cats that were necropsied. It has been suggested that failure of penetration of the tumor through the serosa is a good prognostic sign (14). This was not supported by this series of cases.

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References

1. Turk MAM, Gallina AM, Russell TS. Nonhematopoietic gastrointestinal neoplasia in cats: a retrospective study of 44 cases. Vet Pathol 1981; 18: 614–620.

2. Theilen GH, Madewell BR. Tumors of the digestive tract. In: Veterinary Cancer Medicine. Philadelphia: Lea & Febiger, 1979: 307-331.
3. Head KW, Else RW. Neoplasia and allied conditions of the canine and felne intestine. Vet Annual 1981; 21: 190-208.
4. Taylor PF, Kater JC. Adenocarcinoma of the intestine of the dog and cat. Aust Vet J 1954; 30: 377-379.
5. Twedt DC. Intestinal neoplasia. In: Withrow SJ, ed. Oncology Notes. Colorado State University, 1981: 399-404.
6. Patnaik AK, Liu S-K, Johnson GF. Feline intestinal adenocarcinoma: a clinicopathologic study of 22 cases. Vet Pathol 1976; 13: 1-10.
7. Brodey RS. Alimentary tract neoplasms in the cat: a clinicopathologic survey of 46 cases. Am J Vet Res 1966; 27: 74-80.
8. Palumbone NE, Perri SF. Adenocarcinoma of the ileum in a cat. J Am Vet Med Assoc 1974; 164: 607-608.
9. Cotchin E. Neoplasia in the cat. Vet Rec 1957; 69: 425-434.
10. Gerosa RM, De Estrada MMM. Colorectal resection in a cat with adenocarcinoma. Feline Pract 1982; 12: 6-15.
11. Lingeman CH, Garner FM. Comparative study of intestinal adenocarcinomas of animals and man. J Natl Cancer Inst 1972; 48: 325-346.
12. Stowater JL. Intestinal adenocarcinoma in a cat. Vet Med Small Anim Clin 1978; 73: 475-477.
13. Feeney DA, Klausner JS, Johnston GR. Chronic bowel obstruction caused by primary intestinal neoplasia: a report of five cases. J Am Anim Hosp Assoc 1982; 18: 67-77.
14. Patnaik AK, Johnson GF, Greene RW, Hayes AA, MacEwan EG. Surgical resection of intestinal adenocarcinoma in a cat, with survival of 28 months. J Am Vet Med Assoc 1981; 178: 479-481.
15. Okin R. Intestinal carcinoma causing obstruction in a cat. Feline Pract 1984; 14: 8-17.
16. Head KW. Tumors of the lower alimentary tract. Bull WHO 1976; 53: 167-186.

Abstract

Cardiopulmonary Effects of a Halothane/ Oxygen Combination in Healthy Cats

Walter Ingwersen, Dana G. Allen, Doris H. Dyson, Peter J. Pascoe and Michael R. O'Grady

This experiment defined the remarkable depressant effects of halothane on the feline cardiopulmonary system. As stated in the Introduction, the cardiovascular depression may in fact have a "sparing" effect on myocardial oxygen demand with the apparent degree of cardiovascular depression being overstated. However, since coronary blood lactate levels were not studied this would only be speculative. Nonetheless, cardiopulmonary depression may be insignificant during short routine procedures performed on healthy cats, but may have significant effects in animals that have compromised cardiopulmonary function, especially if cardiopulmonary support is not instituted.

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