Utilization of an Intake Diversion Program to Prevent Surrender Due to Cost of Veterinary Care for a Mammary Mass

(Shelter Medicine Practice Category: Programs and Services for Community Animals)

Introduction

The decision to surrender a pet often stems from a combination of animal and owner-related factors.[1,2] While animal-related concerns like behavior, health, and age contribute, more commonly cited concerns include financial strain, housing changes, and life transitions.[2] In particular, the high cost of veterinary care is often a significant factor that can lead pet owners to make the difficult decision to surrender their pets.[1,2]

A 2015 study by Dolan et al. showed that cost was the most common reason for pet surrender, with 76.9% of owners citing it as a factor.[1] Additionally, 80.7% of owners were unaware of available community services.[1] Interestingly, most owners relinquishing their pets reported emotional attachment to the animal.[1] This study suggests that many surrenders could be prevented by addressing financial barriers and providing information about available resources.[1] A similar study by Ly et al. (2021) demonstrated the need for targeted interventions to address financial barriers and disseminate information about affordable pet care options to prevent unnecessary relinquishment.[2]

The organization described here is a private, urban, non-profit shelter system that annually intakes approximately 14,000 animals across its three shelter facilities. Of these animals, 55% are cats, 40% are dogs, and 5% are rabbits, small companion

mammals, or birds. This organization also operates 2 low-cost clinics and has had a robust surrender prevention program in place since 2019.

This shelter employs a managed admissions program with a "surrender by appointment" policy. This approach allows staff opportunities to discuss surrender prevention options and connect pet owners with community resources. Managed admission also helps to regulate the flow of animals through the system. Ultimately, this shelter aims to proactively address the causes of pet relinquishment, among whichis the high cost of veterinary care, to keep animals with their owners.

This report describes a case where a pet surrender was scheduled due to the cost of veterinary care. The owner also perceived a declining quality of life resulting from a mammary tumor and assumed euthanasia would be thelikely outcome of surrender. The shelter's surrender prevention program successfully intervened, providing affordable, high-quality, veterinary care, which allowed the pet to remain in its home. The author (a staff veterinarian and the manager of clinical veterinary education) was the primary clinician responsible for this case.

Treatment/Management/Prognosis

Mammary cancer represents the most prevalent malignancy in female dogs.[3] However, canine mammary tumors are historically thought to be histologically benign in 50% of cases.[3] Unfortunately, a recent trend toward increasing malignancy has been observed, paralleling similar trends in human medicine.[3] Surgical intervention remains the primary treatment modality, and adjuvant therapies such as chemotherapy and radiation therapy are not routinely recommended or employed.[3] Over 40% of dogs with mammary cancer die within a year of diagnosis.[3]

The extent of recommended surgical approaches varies based on factors like tumor size, tumor number (at least 50% of cases present with multiple tumors), suspicion of malignancy, location, and the dog's overall health.[3] Procedures ranging from simple lumpectomy to bilateral chain mastectomy may be recommended. Local mastectomy is generally advised for larger solitary tumors like the one described in this report.[3] In most cases, spaying is performed simultaneously to reduce the risk of future tumor development due to hormone exposure.[3] Pre-operative staging (thoracic radiographs, abdominal ultrasound, and lymph node assessment) to determine the presence and extent of metastatic spread is recommended.[3]

Tumor diameter is a significant predictor of local recurrence and distant metastasis, with larger tumors posing a higher risk.[4] It follows that tumor size can be used to guide treatment decisions and predict patient outcomes.[4] However, it is important to note that while tumor size is a crucial factor, it is not the sole determinant of prognosis.[4] Other considerations like histologic grade, lymphatic invasion, and the presence of specific molecular markers may also play a role in predicting the clinical course of canine mammary tumors.[4] As expected, dogs with benign mammary tumors have the best prognoses and complete surgical removal of these tumors often leads to excellent long-term outcomes with a low risk of recurrence or metastasis.[4]

Case History and Presentation

A 9-year-old, female, intact, mixed breed dog presented for a surrender appointment at this shelter. Again, the stated reason for the surrender appointment was the owner's inability to afford veterinary care for a mammary tumor. Surrender prevention was discussed at the initial point of contact with the phone hotline, but it is

unclear if the owner understood the program at that time. On intake, the surrender prevention program was again discussed with the owner, in accordance with organizational protocol. This owner was thrilled to learn more about the program, expressed interest in intake diversion, and received information on how to proceed with scheduling an appointment at the low-cost veterinary clinic.

The author was the staff veterinarian working at the time of the surrender appointment. The patient was assessed for surrender prevention eligibility and was noted to have a large (approximately 5 x 7 cm diameter), semi-firm mass on the ventral abdomen associated with the left caudal-most mammary gland. The patient's body condition score was assessed at 6 out of 9. Additionally, heavy dental tartar accumulation with moderate recession of the gingiva and multiple obviously mobile upper incisors were noted. No enlarged peripheral lymph nodes were palpated and the remainder of the physical examination was within normal limits.

The owner reported that the mass had been present for longer than 6 months although he was unsure of the exact duration. During that time, the mass had stayed relatively small but had rapidly increased in size over the past 2-3 months. He was concerned for malignancy based on this change. The mass had also started to bother the patient and the owner had noted her licking and chewing at the area. No change in the patient's activity level, appetite, or general condition had been noted.

The owner was again informed that the next step in the surrender prevention process was to schedule an appointment with the public-facing veterinary center.

Case Management and Outcome

The patient was re-evaluated at the public-facing veterinary clinic by another staff veterinarian. Physical examination was repeated which showed no new findings. Baseline screening lab work (complete blood count, serum chemistry, total T4, and 4Dx[a] testing) was performed, which showed only a very mild elevation in alkaline phosphatase (Table 1). No other abnormalities were noted. An in-house urinalysis showed no abnormalities (Table 2). The labwork results were discussed with the owner and a recheck of the alkaline phosphatase was recommended in 3-4 months with further diagnostics to be suggested if indicated at that time. Screening thoracic radiographs were recommended to evaluate for evidence of metastasis prior to surgery. Screening radiographs (Figure 1a,b,c) showed no evidence of metastatic spread and the surgery was scheduled for 10 days later. Ultimately, the cost of care was negotiated with this owner. In this case, the owner was given the opportunity to "pay-what-you-can" and was able to offer $300 in support of this dog's procedure.

On the day of surgery (performed by the author), this 53-lb patient was pre-medicated for anesthesia with hydromorphone[b] (1.2 mL, 0.1 mg/kg) and acepromazine[c] (0.07 mL, 0.03 mg/kg) administered intramuscularly in the left lumbar epaxial muscles. An IV catheter was placed in the right cephalic vein and the patient was induced with ketamine[d] (1.3 mL, 0.3 mg/kg) and midazolam[e] (1.3 mL, 0.275 mg/kg) intravenously. An endotracheal tube was placed after adequate sedation was achieved. The patient was maintained under anesthesia on isoflurane[f] inhalant gas and was given intraoperative intravenous fluids at a rate of 120 mL/hour. A standard 24-hour subcutaneous dose (1.9 mL, 4 mg/kg) of injectable carprofen[g] was administered for additional pain relief. A standard ovariohysterectomy was performed followed by excision of the large mammary

mass. While the abdomen was open for spay, a brief survey of the abdomen was performed to evaluate for evidence of obvious metastasis. None was noted. Care was taken to include wide and deep margins beyond the visible mammary gland. The surgical site was closed with Monomend®[h] suture with simple interrupted skin sutures placed. A local block of bupivacaine 0.5%[i] (2 mL total infiltrated subcutaneously around the surgical sites) was administered in recovery. The mass was submitted for histopathology to IDEXX laboratories[j] in 10% neutral buffered formalin. Carprofen[k] (50 mg twice daily by mouth for 7 days) and gabapentin[l] (200 mg twice daily by mouth for 7 days) were sent home with this patient for post-operative pain control.

The histopathology results from this mass are included at the end of this report (Figure 2). The mass was benign and characterized as ductal ectasia and lobular mammary hyperplasia with locally extensive, moderate to marked neutrophilic and lymphohistiocytic mastitis. The patient recovered well at home with no further complications.

A recheck and suture removal was performed 10 days after the procedure. Again, follow-up for the mild alkaline phosphatase elevation was recommended in 3-4 months. Additionally, a future dental procedure with likely extractions was advised and an estimate was prepared at the lowest pricing tier available at this clinic. The client was offered a continued relationship at the facility's low-cost veterinary center for this recommended care and annual wellness visits.

Discussion

A more rigorous approach to lymph node assessment would have been prudent in this case. Specifically, removal of the superficial inguinal lymph node should have been considered during preoperative planning. At minimum, a fine needle aspiration of this node could have been performed to evaluate for potential metastatic spread at the time of surgery.

Post-operative pain management may have been inadequate for this patient. Gabapentin is thought to have limited efficacy for post-surgical pain control. Use of an oral opioid medication (codeine, for example) or a long-acting local anesthetic like Nocita®™ would have been more appropriate for this patient.

At this shelter's point of contact, a centralized phone "hotline," eligible individuals scheduling surrender appointments are given information about the organization's outreach programs providing free pet food/supplies and vaccination clinics. The low-cost, full-service veterinary services available at the organization are also discussed. In surveys, some owners have reported feeling judged or coerced into keeping their pets. A more thoughtful approach may include asking owners if they are open to discussing options for surrender prevention prior to sharing this information.

Fortunately, this patient's mass was ultimately found to be benign and she was able to be discharged with recommendations for only routine follow-up care. If the mass were found to be malignant, palliative care and euthanasia services (when indicated) would have been offered to this patient.

To be eligible for the surrender prevention program, the pet's health issue must be resolvable without hospitalization, the owner must be capable of caring for the pet

post-treatment, and the owner should be able to afford ongoing care for the animal beyond the health concern in question. If these conditions are met and staffing and resources allow, surrender prevention will be offered. Unfortunately, these requirements are vague and difficult to discern, leaving staff confused about when the program can be offered. Staff education regarding the program and more simply defined eligibility criteria ("can we resolve this problem long-term in a few visits?") would help to clarify.

In summary, the surrender prevention program was effective in preventing this dog's intake into the shelter. Beyond the obvious advantage of keeping people and pets together, intake diversion strategies are also essential for the sustainable management of shelter populations. Reducing the number of animals entering shelters can mitigate stress, disease transmission, and overcrowding, all of which ultimately contribute to improved animal welfare in the shelter environment.

Endnotes

[a]Snap 4Dx Plus Test, Idexx Laboratories, Inc., Westbrook, ME.

[b]Hydromorphone HCL Injection, USP 2 mg/mL, West-Ward Pharmaceuticals Corp., Eatontown, NJ.

[c]Acepromazine Maleate Injection 10 mg/mL, Covetrus, Dublin, OH.

[d]Ketamine Hydrochloride 10 mg/mL, Auromedics, East Windsor, NJ.

[e]Midazolam Injection, USP 5 mg/mL, Avet Pharma, East Brunswick, NJ.

[f]Isoflurane USP, Covetrus, Dublin, OH.

[g]Carprofen Injection 50 mg/mL, Covetrus, Dublin, OH.

[h]Monomend® MT 3/0, Veterinary Products Laboratories, Phoenix, AZ.

[i]Bupivacaine HCL 0.5% Injection, Hospira, Inc., Lake Forest, IL.

[j]Idexx Laboratories, Inc, Westbrook, ME.

[k]Carprofen Tablets 100 mg, Covetrus, Dublin, OH.

[l]Gabapentin Capsules 100 mg, Laurus Labs, Berkeley Heights, NJ.

[m]Nocita® (bupivacaine liposome injectable suspension), Elanco Animal Health, Greenfield, IN.

References

1. Dolan ED, Scotto J, Slater M, et al. Risk Factors for Dog Relinquishment to a Los Angeles Municipal Animal Shelter. *Animals* 2015;5: 1311-28.
2. Ly LH, Gordon E, Protopopova A. Inequitable Flow of Animals in and Out of Shelters: Comparison of Community-Level Vulnerability for Owner-Surrendered and Subsequently Adopted Animals. *Front Vet Sci* 2021;8: 784389.
3. Valdivia G, Alonso-Diez Á, Pérez-Alenza D, et al. From Conventional to Precision Therapy in Canine Mammary Cancer: A Comprehensive Review. *Front Vet Sci* 2021;8: 623800.
4. Rasotto R, Berlato D, Goldschmidt MH, et al. Prognostic Significance of Canine Mammary Tumor Histologic Subtypes: An Observational Cohort Study of 229 Cases. *Vet Pathol* 2017;54: 571-578.

Table 1, *Reference laboratory CBC, chemistry, TT4, 4Dx results*

Test	Laboratory Value	Normal reference
Complete Blood Count		
Erythrocytes		
RBC	7.68 M/uL	5.39-8.70 M/uL
Hematocrit	52.5%	38.3-56.5%
Hemoglobin	18.8 g/dL	13.4-20.7 g/dL
MCV	69 fL	59-67 fL
MCH	24.5 pg	21.9-26.1 pg
MCHC	35.8 g/dL	32.6-39.2 g/dL
% Reticulocytes	0.3%	
Reticulocytes	23 K/uL	10-110 K/uL
Reticulocyte Hemoglobin	25.2 pg	24.5-31.8 pg
Leukocytes		
WBC	13.9 K/uL	4.9-17.6 K/uL
% Neutrophils	74.8 %	
% Lymphocytes	14.0%	
% Monocytes	9.9%	
% Eosinophils	1.2%	
% Basophils	0.1%	
Neutrophils	10.397 K/uL	2.94-12.67 K/uL
Lymphocytes	1.946 K/uL	1.06-4.95 K/uL
Monocytes	1.076 K/uL	0.13-1.15 K/uL
Eosinophils	0.167 K/uL	0.07-1.49 K/uL

Basophils	0.014 K/uL	0-0.2 K/uL
Thrombocytes		
Platelets	173 K/uL	143-448 K/uL
Chemistry		
Glucose	90 mg/dL	63-114 mg/dL
IDEXX SDMA	13 ug/dL	0-14 ug/dL
Creatinine	0.8 mg/dL	0.5-1.5 mg/dL
BUN	17 mg/dL	9-31 mg/dL
BUN:Creatinine Ratio	21.3	
Phosphorus	5.1 mg/dL	2.5-6.1 mg/dL
Calcium	9.9 mg/dL	8.4-11.8 mg/dL
Sodium	150 mmol/L	148-152 mmol/L
Potassium	4.1 mmol/L	4.0-5.4 mmol/L
Na:K Ratio	37	28-37
Chloride	111 mmol/L	108-119 mmol/L
TCO2 (Bicarbonate)	20 mmol/L	13-27 mmol/L
Anion Gap	23 mmol/L	11-26 mmol/L
Total Protein	6.7 g/dL	5.5-7.5 g/dL
Albumin	3.5 g/dL	2.7-3.9 g/dL
Globulin	3.2 g/dL	2.4-4.0 g/dL
Albumin:Globulin Ratio	1.1	0.7-1.5
ALT	115 U/L	18-121 U/L
AST	44 U/L	16-55 U/L
ALP	237 U/L	5-160 U/L

GGT	6 U/L	0-13 U/L
Bilirubin-Total	0.3 mg/dL	0.0-0.3 mg/dL
Bilirubin-Unconjugatec	0.2 mg/dL	0.0-0.2 mg/dL
Bilirubin-Conjugatec	0.1 mg/dL	0.0-0.1 mg/dL
Cholesterol	279 mg/dL	131-345 mg/dL
Creatinine Kinase	192 U/L	10-200 U/L
Endocrinology		
Total T4	1.6 ug/dL	1.0-4.0 ug/dL
4Dx		
Heartworm	Negative	
Lyme	Negative	
Anaplasma	Negative	
Ehrlichia	Negative	

Table 2, *Reference laboratory urinalysis results*

Urinalysis	
Collection	Free Catch
Color	Dark Yellow
Clarity	Turbid
Specific Gravity	1.057
pH	6.0
Urine Protein	Negative
Glucose	Negative
Ketones	Negative
Blood/Hemoglobin	Negative
Bilirubin	Negative
Urobilinogen	Normal
White Blood Cells	0-2/HPF
Red Blood Cells	0-2/HPF
Bacteria	None seen
Epithelial Cells	1-2/HPF
Mucus	None seen

Casts	None seen
Crystals	None seen
Other	Non-crystalline debris present

Figure 1 a,b,c, *Thoracic radiographs*

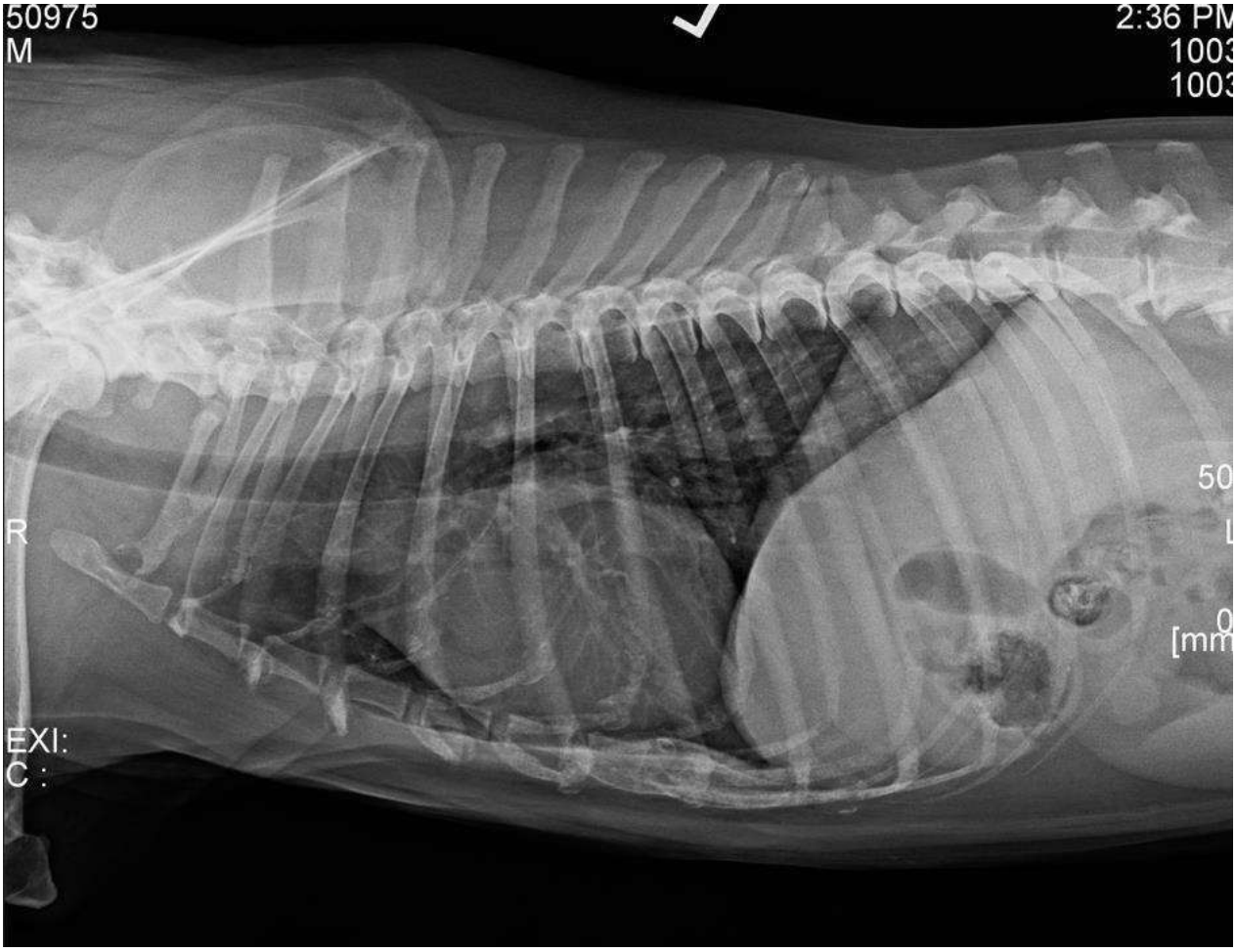

Figure 1a: Left lateral thoracic radiograph

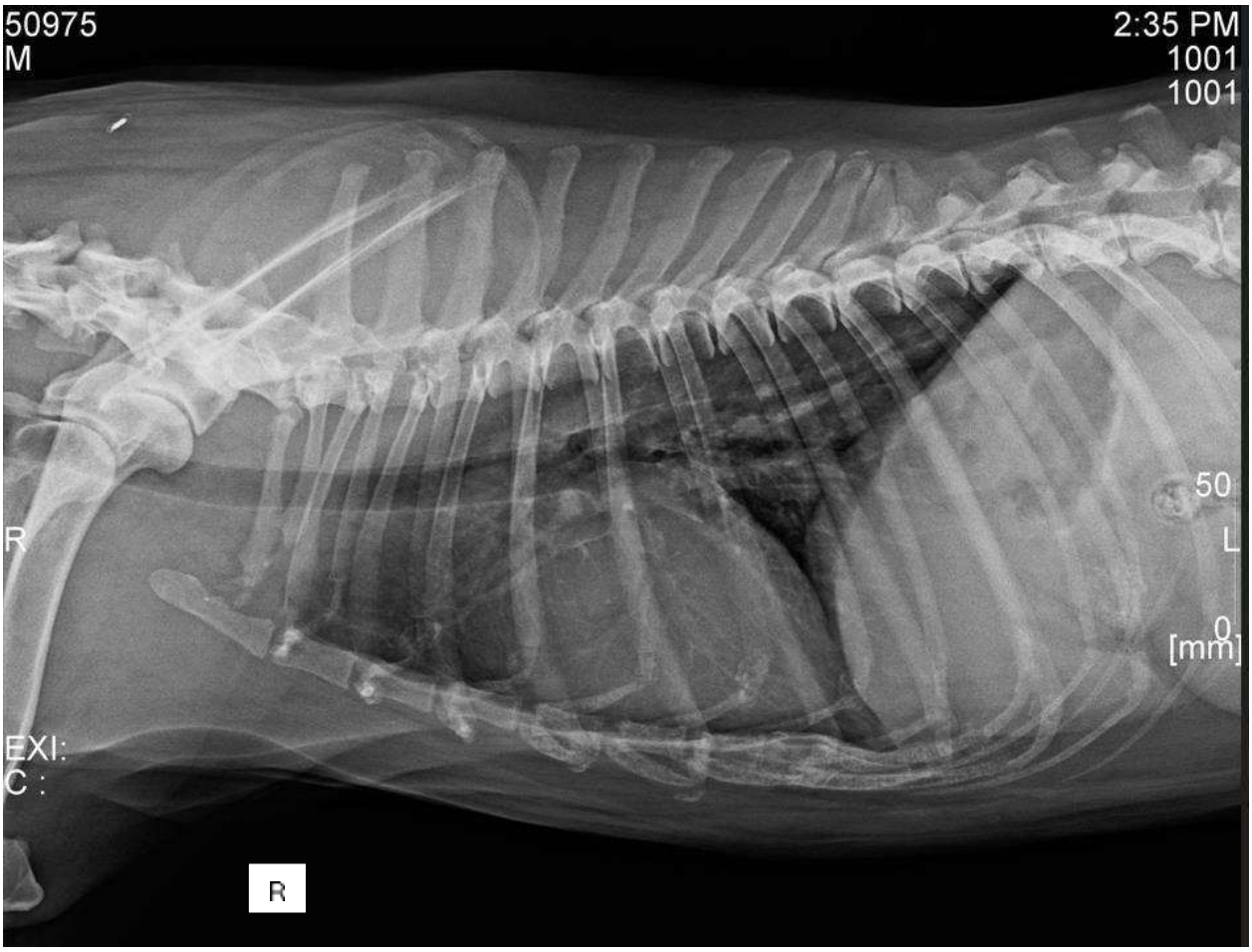

Figure 1b: Right lateral thoracic radiograph

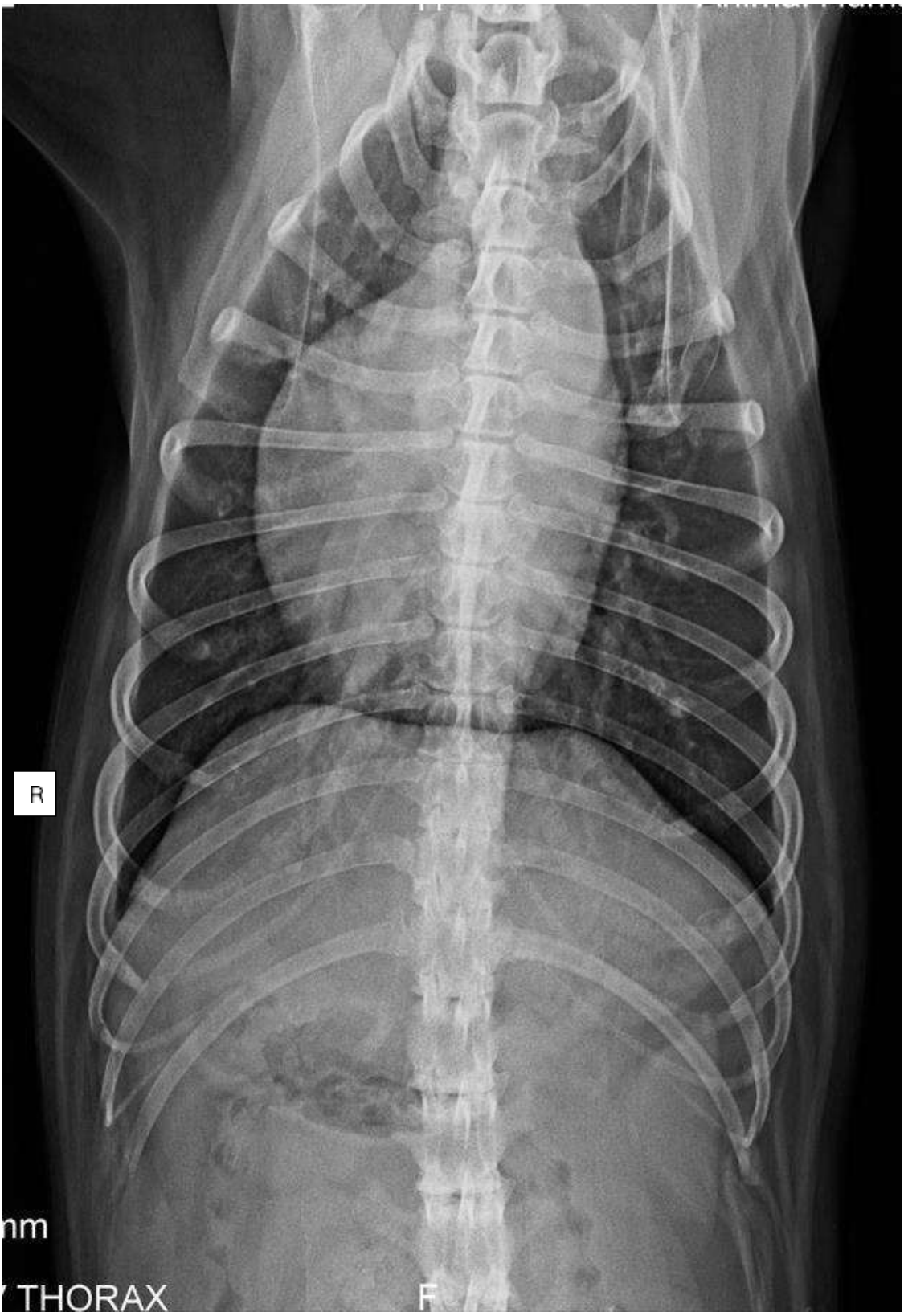

Figure 1c: Ventral/Dorsal thoracic radiograph

Figure 2, *Pathology report*

MICROSCOPIC INTERPRETATION:
Mammary mass (per requisition form): Ductal ectasia and lobular mammary hyperplasia with locally extensive, moderate to marked neutrophilic and lymphohistiocytic mastitis
COMMENTS:
Microscopic features of ____'s mammary mass are morphologically most consistent with a region of ductal ectasia accompanied by surrounding lobular mammary gland hyperplasia. The ectatic mammary ducts are focally obscured by regionally intense inflammation. Mammary duct ectasia is a benign dilation of one or more ductal structures (Goldschmidt, 2011). Lesions can be single or multiple, often forming a mass-like lesion clinically. These lesions can occur in both intact and spayed animals, and are not associated with an increased risk of mammary neoplasia (Miller, 2001). As these cystic ducts enlarge, they can become secondarily inflamed (as suspected in this case).
Mammary lobular hyperplasia is a benign, non-neoplastic proliferation of secretory epithelium and/or myoepithelium Mammary lobular hyperplasia may be accompanied by variable degrees of ductal ectasia and inflammation (as in this specimen). These lesions are most common in intact, nongravid, and nonlactating patients (more commonly in dogs than cats). Hormonal stimulation may play a role in the development of lesions in some, but not all, patients. Complete excision of individual lesions is typically curative.