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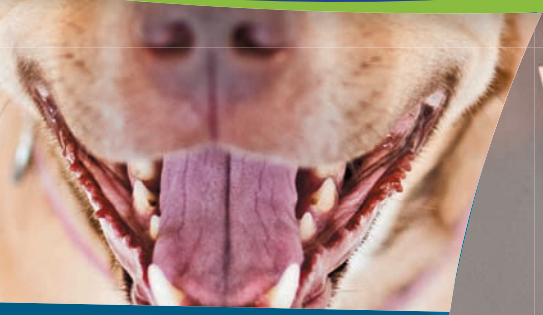

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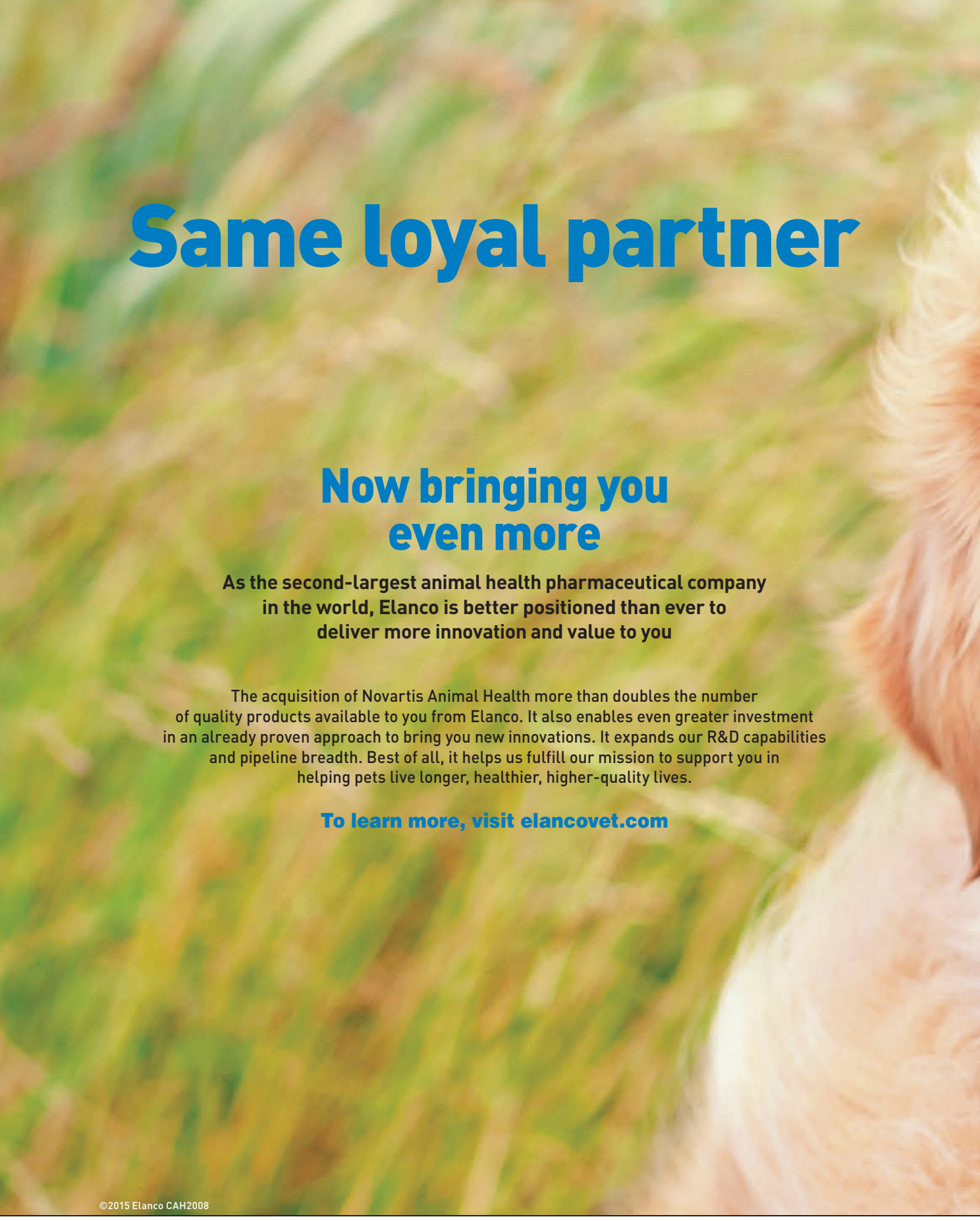

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Why you need high-quality digital dental radiographs—**and how to get them**

Looking to make an investment for your practice this year? Put a digital dental radiography unit on your wish list, and you and your patients will all have happy and healthy smiles. *By Sandra Manfra Marretta, DVM, DACVS, DAVDC*

Dental radiography is an essential component in the daily delivery of high-quality dental care for dogs and cats. The diagnostic yield of full-mouth radiographs in feline and canine patients is extremely high, and routine full-mouth radiography is justified. Two studies found that dental radiographs were clinically useful in most canine and feline dental patients (*Tables 1 & 2*).[1,2]

Recently, many state-of-the-art veterinary practices have switched over to digital dental radiography because of the speed and ease in which these images can be produced and evaluated. The real value in taking digital dental radiographs is improved patient care while at the same time providing a profit center for the hospital. The advantages of digital dental radiography far outweigh the disadvantages of this new technology (*see sidebar "Advantages and disadvantages of digital dental radiography" on page 36*).

With proper orientation and training in the use of digital dental radiographic units, this new technology can become an integral part of small-animal practices. After an appropriate training period, veterinarians and veterinary technicians will be able to obtain high-quality dental images, which will result in the recognition of more lesions that can then be appropriately treated.

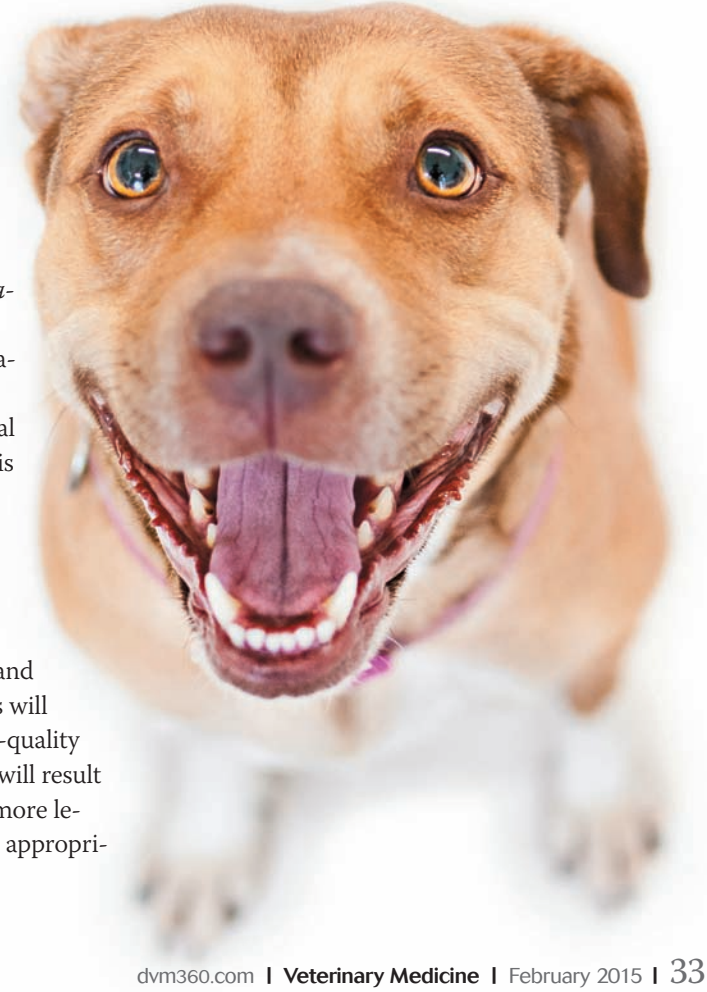

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Table 1
Value of radiographs when no clinical findings are present

	Dogs	Cats
Incidental radiographic findings	41.7%	4.8%
Clinically important findings	27.8%	41.7%
Radiographs of no value	30.5%	53.6%

Table 2
Value of radiographs when clinical findings are present

	Dogs	Cats
Confirmational only	24.3%	13.9%
Additional findings	50%	53.9%
Clinically essential findings	22.6%	32.2%
Radiographs of no value	3.1%	0%

How to take digital dental radiographs

There are two methods of acquiring digital dental radiographs, either digital radiography (DR) or computed radiography (CR). DR images are acquired by placing a sensor into the mouth in the same position as a film and exposing the sensor with a greatly reduced dose of radiation compared with traditional dental film. The image is transferred within seconds for viewing on a computer. These images are then electronically stored and manipulated as needed for radiographic evaluation of a wide variety of dental lesions.

CR images are an indirect way of acquiring digital dental radiographs. With this technology, a reusable phosphor storage plate (PSP) is exposed to X-rays, and the PSP is then processed and converted to a digital image on a computer. CR systems produce a digital image by scanning PSPs of various sizes (0, 2, 3, and 4) that have been exposed to X-rays. These systems allow computer storage, processing, retrieval, and display of the computed radiographic images by using a user-supplied software package. These systems also have an in-line plate eraser function that removes the latest image from the plate immediately after scanning, providing an efficient one-step scanning and erasing process, leaving the PSP ready for collecting the next radiographic image.

Digital dental radiographs can be manipulated for better visualization. The mouse can be used to adjust the contrast and brightness; a particular area of a tooth can be highlighted, magnified, labeled, flipped, rotated, or measured; or explanatory notes can be added.

Indications for taking dental radiographs

Full-mouth radiographs are recommended in every patient, but this may not be possible because of cost constraints or concerns for time under anesthesia in critically ill patients. Digital radiographs can help alleviate these concerns because of the decrease in time needed to acquire digital radiographs.

If full-mouth radiographs are not taken, there are several indications in which teeth should be radiographed. Dental radiography is recommended in the evaluation of:

- Tooth resorption
- Periodontal disease
- Endodontic disease, including discolored or fractured teeth and facial swelling
- Retained roots
- Missing teeth
- Abnormally located teeth
- Malformed teeth
- Osteomyelitis
- Boney lysis secondary to neoplasia
- Metabolic bone disease
- Dentigerous cysts (localization)
- Traumatic injuries

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Dental radiography is indispensable in the development of an appropriate treatment plan.

Positioning for optimal radiographs

Numerous publications describe appropriate positioning for optimal dental radiographs.[3-8] There are two specific intraoral radiographic dental techniques: the parallel technique and the bisecting angle technique.

Parallel technique. The ideal dental radiograph is produced by using the parallel technique. When using this technique, the plane of the radiographic film is parallel to the long axis of the tooth and perpendicular to the plane of the radiographic beam. The parallel technique in dogs and cats can only be achieved with the mandibular premolars and

Advantages and disadvantages of digital dental radiography*

Advantages

- There is a 50% to 90% reduction in radiation needed to expose an image.
- DR images are displayed on the computer within seconds, eliminating processing chemicals and reducing anesthetic time.
- CR images are displayed after being inserted in the scanner within about 30 seconds, and the images come in various sizes (#0, 2, 3, and 4), providing flexibility in imaging.
- PSPs are very thin and flexible, providing easy placement in confined spaces.
- Errors in positioning and exposure can be corrected immediately without waiting for film processing.
- Computer storage makes retrieval and storage of the image easier than for conventional film and allows easy electronic transfer of radiographs to the patient file, consultant, or referring veterinarian.
- An image can be adjusted for better visualization—the image can be enlarged, the contrast and brightness can be changed, and the image can be inverted or rotated.
- Digital dental radiography provides extremely efficient progress evaluation during endodontic and oral surgery procedures.

Disadvantages

- Sensors are initially expensive, but over time they are less expensive than film-based radiology.
- At this time sensors are supplied only in periapical film size (#2). Since occlusal size (#4) sensors are not currently available, multiple exposures with smaller sensors are required, and sensors are rigid and thicker than standard dental film or PSPs and make acquisition of images in confined spaces more difficult.
- The sensors can become damaged, necessitating costly replacement.
- Digital dental radiography requires a computer in the dental operatory and extra time for computer patient input.

*Source: Holmstrom SE, Frost Fitch P, Eisner ER. Dental radiology. In: *Veterinary dental techniques for the small animal practitioner*. 3rd ed. Philadelphia: Saunders, 2004;131-174; Bellows J. Dental radiography. In: *Small animal dental equipment, materials and techniques: A primer*. Oxford, UK: Blackwell Publishing, 2004;63-103.

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[1] Best medicine is a veterinarian's desire to provide effective and safe medical interventions that maximize the pet's quality of life.

molars. The flat shallow palate and the shallow caudally extending mandibular symphysis in dogs and cats prevent use of this technique when radiographing the maxillary premolars and molars and the incisor and canine teeth.

Bisecting angle technique. For teeth that cannot be captured with the parallel technique, the bisecting angle technique can be used. The film is placed as parallel as possible to the teeth being radiographed. An imaginary line that bisects the angle between the long axis of the tooth and the film is the bisecting angle line. The X-ray beam should be directed perpendicular to the bisecting angle line. Improper utilization of the bisecting angle technique will result in an elongated, a foreshortened, or an overlapped dental image.

How many views? A basic dental radiographic survey consists of six views: the rostral maxillary and mandibular projections, the right and left maxillary projections, and the right and left mandibular projections. Additional radiographs may be necessary depending on the size of the patient and tooth being evaluated. The upper fourth premolar requires additional radiographs to permit adequate visualization of all three roots. A 30-degree rostral oblique projection needs to be added to the bisecting angle technique to permit adequate visualization of the mesiobuccal and palatal roots.

Critiquing dental radiographs

Guidelines have been established to critically evaluate dental radiographs.[3] Striving to follow these established guidelines will produce diagnostic films. The following requirements can be used as a guide to assist in self-evaluation of radiographs.

- All teeth to be evaluated are clearly visible.
- The radiographs are well-positioned.
- The maxillary cheek teeth should have the roots facing upward and the crowns downward.
- The mandibular cheek teeth should have the crowns facing upward and the roots facing downward.
- Maxillary incisors should have the roots facing upward and the crowns downward.
- Mandibular incisors should have the roots facing downward and crowns upward.
- When viewing the right side of the mouth, the anterior teeth are on the right side.
- When viewing the left side of the mouth, the anterior teeth are on the left side of the radiograph.
- Proper angulation has been used.
- No foreshortening or elongation is present.
- Visualization of all roots and apices is adequate.
- Exposure and developing technique are adequate.
- No artifacts appear on the radiograph.
- Contrast and density of the radiograph are correct. VM

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Urinary obstruction *secondary to* bladder lymphoma in a dog

By Carolyn V. Clarke, DVM; Michele Cohen, DVM, DACVIM, DACVR; and Derek P. Burney, DVM, PhD, DACVIM

A 14-year-old 54 lb (24.6 kg) neutered male Vizsla was presented for evaluation of progressive worsening stranguria, which had caused complete urinary obstruction of five days' duration.

HISTORY

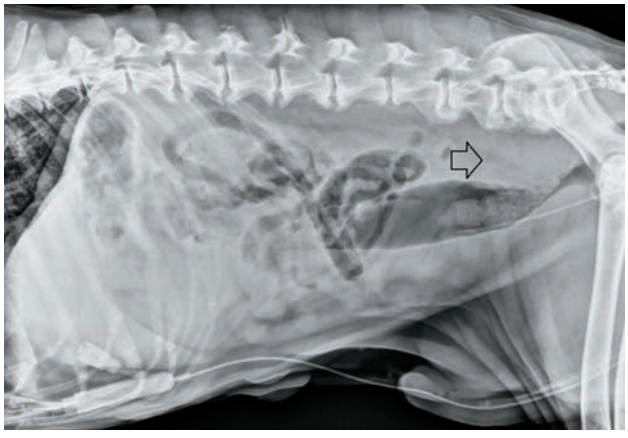
Three months before presentation, the patient had been diagnosed by its primary care veterinarian with stage IIIb, multicentric lymphoblastic lymphoma. The diagnosis was based on the results of a fine-needle aspiration of the left prescapular lymph node. At the time of diagnosis, thoracic and abdominal radiography revealed enlarged sternal, inguinal, and sublumbar lymph nodes and hepatosplenomegaly. Abdominal ultrasonography was not performed. A modified University of Wisconsin-Madison chemotherapy protocol was instituted.

Five days before referral, the patient started to show signs of stranguria and was reevaluated by its primary care veterinarian. Hematologic analysis and a serum chemistry profile performed at that time revealed mild anemia (packed cell volume = 33.6%; reference range = 37% to 55%), mild lymphopenia (0.48 x 10^3/µl; reference range = 0.5 to 4.9 x 10^3/µl), and a moderately elevated alkaline phosphatase activity (970 U/L; reference range = 23 to 212 U/L). A urinalysis revealed a urine specific gravity of 1.030, large numbers of red blood cells per high-power field (too numerous to count), five to seven white blood cells per high-power field, and 3+ rod-shaped bacteria.

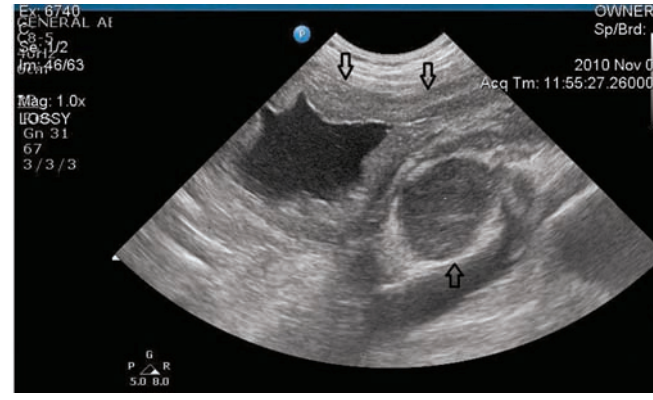
Therapy initiated at this time included ciprofloxacin (10 mg/kg orally b.i.d.) to treat the urinary tract infection and repeated daily urinary catheterization to relieve the urinary obstruction. The patient was referred to the Veterinary Emergency and Referral Group South for further evaluation of the urinary obstruction and diagnostic testing.

PHYSICAL EXAMINATION

At presentation, physical examination abnormalities included a firm, painful caudal abdominal mass—suspected to be the urinary bladder—and sublumbar lymphadenopathy palpable by rectal examination. An in-house renal profile revealed mild anemia (packed cell volume = 27%; reference range = 35% to 50%) and normal renal values.



>>>1. A lateral abdominal radiograph obtained after urinary catheter placement. Sublumbar lymphadenopathy is present (*arrow*), causing ventral displacement of the colon and compression of the rectum at the level of the pelvic canal.



>>>2. An ultrasonographic image showing enlarged sublumbar lymph nodes and irregular and markedly thickened bladder and urethral walls.

An indwelling urinary catheter with a closed collection system was placed with difficulty to assist in bladder emptying. The patient was given buprenorphine (0.01 mg/kg intravenously t.i.d.) for pain, and the patient's urine output was monitored.

IMAGING

Thoracic and abdominal radiography revealed mediastinal, intra-abdominal, and sublumbar lymphadenopathy, the latter causing ventral displacement of the colon and compression of the rectum at the level of the pelvic canal (*Figure 1*). Despite this finding, the patient did not demonstrate any difficulty defecating.

Because the patient was resistant to dorsal recumbency for abdominal ultrasonography despite sedation, general anesthesia was required. Ultrasonographic findings included severe lymphadenopathy of the sublumbar lymph nodes, irregular and markedly thickened bladder and urethral walls, and hypoechoic fat surrounding the neck of the urinary bladder and in the perirectal region (*Figure 2*). Additional findings included severe lymphadenopathy of the mesenteric lymph nodes, bilaterally hyperechoic renal cortices with reduced corticomedullary definition, two hypoechoic splenic nodules (measuring 18 mm and 13 mm), and a diffusely hypoechoic liver with course echotexture.

The ultrasonographic findings were suggestive of disseminated neoplasia. The differential diagnosis for the urethral obstruction in this patient was compression of the urethra from either sublumbar or subsacral lymphadenopathy or through direct neoplastic infiltration of the urethra, leading to the narrowing and occlusion of the lumen.

RECOMMENDATIONS TO OWNER

Recommendations to the patient's owner included fine-needle aspiration of abnormal abdominal organs and lymph nodes as well as a urine culture. The placement of a permanent urethral stent to help with urination was also offered. However, at the owner's request, the patient was euthanized.

POSTMORTEM CYTOLOGIC RESULTS

After euthanasia, ultrasound-guided fine-needle aspiration of the thickened bladder wall and the sublumbar lymph nodes was performed for cytologic evaluation. A population of monomorphic lymphoblasts was the predominant cell type

in both samples, consistent with lymphoma. Additional testing (flow cytometry, polymerase chain reaction for antigen receptor rearrangement [PARR], immunohistochemistry) to distinguish B or T cell lymphoma was not performed.

DISCUSSION

Lymphoma is the most common hematopoietic neoplasm in dogs and generally presents in multicentric, gastrointestinal, mediastinal, and cutaneous forms. Less commonly, primary extranodal forms of the disease have been reported, including ocular, nasal, central nervous system, and cardiac.[1] Lymphoma affecting the urinary bladder of dogs is rare, and only a few cases have been reported.[2-6] More commonly, they are part of a multisystemic disease process, but primary extranodal urinary bladder lymphoma has also been documented. In two case reports of dogs with primary bladder lymphoma, one was B cell in origin and the other was T cell in origin.[3,4]

The ultrasonographic appearance of canine urinary bladder lymphoma can be similar to other bladder neoplasms.

Urethral obstruction secondary to lymphoma affecting the lower urinary tract has been previously reported in two dogs, one with urethral lymphoma and the other with prostatic lymphoma. In the dog with urethral lymphoma, a well-marginated, midurethral tubular mass was the cause of the urinary obstruction. The patient also had a small intestinal mass, and T cell lymphoma was diagnosed on postmortem examination.[7] The cause of the urinary obstruction in the dog with prostatic lymphoma was presumed to be infiltrative disease of the prostate, causing compression of the prostatic urethra. Suction biopsy of the dog's urethra did not reveal neoplastic cells.[8] Since a postmortem examination was not performed, it is difficult to determine whether this patient's urethral obstruction was due to neoplastic cells infiltrating the urethra causing intraluminal narrowing or was secondary to urethral compression by enlarged regional lymph nodes or the surrounding inflamed or neoplastic tissues.

View the references for this article at **dvm360.com/Lymphoma Obstruction**.

Ultrasonography

The ultrasonographic appearance of canine urinary bladder lymphoma can be similar to findings reported with other bladder neoplasms and, thus, cannot solely be used to differentiate between them. Its appearance has been documented either as a heterogeneous mural mass that can affect all sites of the urinary bladder wall and potentially invade the serosa or as focal thickening of the urinary bladder wall.[3,5] In addition to the regional changes within the urinary bladder, hydronephrosis and hydroureter have also commonly been reported.[3,5] In this case, the ultrasonographic appearance of the dog's bladder was consistent with a diffusely thickened and irregular wall and was not mass-like in appearance.

Clinical signs

Clinical signs that have been reported in dogs with lymphoma of the bladder include hematuria, stranguria, pollakiuria, dysuria, polydipsia, vomiting, diarrhea, weight loss, anorexia, and lethargy, in addition to no clinical signs at all.[3-5]

Treatment options

Treatment of dogs with urinary bladder lymphoma may depend on whether the patient has multicentric lymphoma that has spread to the bladder or has primary malignant lymphoma that is limited to the urinary bladder. For patients with systemic disease, multiagent chemotherapy appears to be a logical treatment modality.

As primary urinary bladder lymphoma is relatively rare,

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there is little documentation of preferred modalities for treating it. In one case, hypofractionated external beam radiation and cytotoxic chemotherapy was used to treat a 3-year-old spayed mixed-breed dog with a large infiltrative lymphomatous mass encompassing two-thirds of the bladder lumen. The patient achieved complete remission and had been in remission for 52 months when that case report was published.[3]

Limitations with this case

A limitation of this case report is that the patient was euthanized before reinstituting therapy. Also, the owner did not consent to a full necropsy examination to assess the full extent of disease. It is unfortunate that neither histology nor specific testing to distinguish B cell from T cell lymphoma was performed either before or after referral.

Had the client opted to pursue additional treatment, restaging the patient, placing a urethral stent, and starting a rescue chemotherapy protocol in addition to radiation therapy would have been considered.

CONCLUSION

This report documents an unusual presentation of urinary bladder lymphoma in a dog with a urinary obstruction. While cases of urinary bladder lymphoma have been previously described in the literature, this case is the first report of confirmed multicentric lymphoma with bladder involvement being associated with a urinary obstruction. Urinary bladder lymphoma should be included as a differential diagnosis for urinary obstructions in dogs, especially in dogs with multicentric lymphoma. VM

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Lamotrigine toxicosis in dogs and cats

By Laura A. Stern, DVM

Lamotrigine (Lamictal—GlaxoSmithKline) is a phenyltriazine anticonvulsant. It is available as a 2-, 5-, 25-, 50-, 100-, or 200-mg tablet. Available formulations include regular, chewable, orally disintegrating, and extended-release tablets. In people, lamotrigine is given to treat bipolar disorder and partial or generalized seizures.[1] Lamotrigine is not given to companion animals because of toxicity concerns.

Pharmacokinetics and metabolism

Information regarding lamotrigine's pharmacokinetics in companion animals is largely unknown because this medication is not used in veterinary medicine.

In people, lamotrigine is rapidly and completely absorbed after oral administration with negligible first-pass effect and bioavailability of 98%. The peak plasma concentration occurs at one or one-and-a-half hours with the immediate-release formulations and four to 11 hours with the extended-release formulations.[2] Lamotrigine is about 55% protein-bound.[3] It is extensively metabolized in the liver by glucuronic acid conjugation. Elimination is primarily renal, with 94% of the drug excreted through the urine and 2% excreted in the feces.[4]

Mechanism of action

Lamotrigine's exact mechanism of action is unknown, but it is theorized that it may prevent seizures by inhibiting voltage-gated sodium channels, thus stabilizing neuronal membranes. The mechanism of action for the treatment of bipolar disorder is not fully understood.[4]

Toxicity

Lamotrigine appears to have a narrow margin of safety in companion and laboratory animals. The oral LD_{50} is 245 mg/kg in mice and 205 mg/kg in rats.[5] Life-threatening signs can be seen at much lower doses in dogs and cats, however.

Lamotrigine is primarily metabolized by glucuronide conjugation, so medications that affect glucuronidation will affect the clearance of lamotrigine. Carbamazepine, phenytoin, phenobarbital, and primidone all induce glucuronidation and increase the clearance of the medication. Animals receiving these medications will be more tolerant of lamotrigine overdoses. Conversely, valproate decreases glucuronidation, which almost doubles lamotrigine's half-life. That decreases the clearance of lamotrigine and increases lamotrigine's toxicity.[5] Cats may be more sensitive to lamotrigine than dogs are

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because of their limited capacity to glucuronidate.

Lamotrigine in dogs is extensively metabolized to a 2-N-methyl metabolite. This metabolite causes dose-dependent prolongation of the P-R interval, widening of the QRS complexes, and, at higher doses, complete atrioventricular (AV) conduction block. Similar cardiovascular effects are not anticipated in people because only trace amounts of the 2-N-methyl metabolite have been found in human urine.

Clinical signs most commonly occur within four hours after exposure and typically last 24 to 48 hours.

Cases

A review of the ASPCA Animal Poison Control Center's (APCC) toxicology database from 2003 to 2011 identified 138 lamotrigine cases involving 128 dogs and 10 cats.[6] These cases were single agent (lamotrigine only) and were assessed as medium- or high-suspect cases based on the animal's history of exposure and clinical signs. Follow-up was not available in 95 of the 128 dogs (74%), full recovery was noted in 23 (18%) of the dogs, and nine (7%) dogs died. One dog continued to show arrhythmias at follow-up. Of the 10 cat cases, one cat (10%) fully recovered, one cat (10%) continued to show clinical signs, and follow-up information was not available on the remaining eight cats (80%).

Of the nine dogs that died, two were found dead at home, one was seizing at home and died before medical attention could be sought, and the other six dogs died at veterinary facilities. One dog was presented to the veterinary facility in status epilepticus and was euthanized because the seizures were thought to be caused by underlying preexisting health conditions. The euthanasia occurred before the dog's exposure to lamotrigine was recognized.

The other five dogs arrested suddenly. The cause of the cardiac arrest was likely due to cardiac arrhythmias, as one dog was experiencing significant arrhythmias before arresting. The dog in that case was a 1.5-year-old Labrador retriever in previously good health that ingested 67.8 mg/kg of lamotrigine and was experiencing ventricular tachycardia, ventricular premature contractions (VPCs), and a bundle branch block before arresting. Resuscitation efforts were not successful. In three of the other cases, the dogs became rigid and vocalized before arresting.

Clinical signs of toxicosis most commonly occur within four hours after exposure, though they are sometimes delayed up to 12 hours with the extended-release products.[6] Clinical signs typically last 24 to 48 hours. Signs in dogs, such as lethargy and somnolence, have been observed at exposure doses as low as 3.4 mg/kg. Cardiac signs such as tachycardia are generally not seen until the exposure dose is more than 20 mg/kg. Life-threatening cardiovascular signs such as arrhythmias and seizures are generally seen in dogs exposed to more than 40 mg/kg of lamotrigine.[6]

There are not enough feline exposures to lamotrigine to establish doses of concern for cats. However, a cat with underlying renal insufficiency did develop bradycardia and VPCs after ingesting a 5-mg/kg dose.[6]

The most commonly reported clinical signs in dogs and cats included vomiting (64/138 [46%]), ataxia (35/138 [25%]), lethargy (34/138 [25%]), tachycardia (20/138 [14%]), seizures (20/138 [14%]), tremors (15/138 [11%]), arrhythmias (not including sinus tachycardia or bradycardia; 15/138 [11%]), hypersalivation (11/138 [8%]), bradycardia (8/138 [6%]), and hypokalemia (5/138 [4%]). Eight

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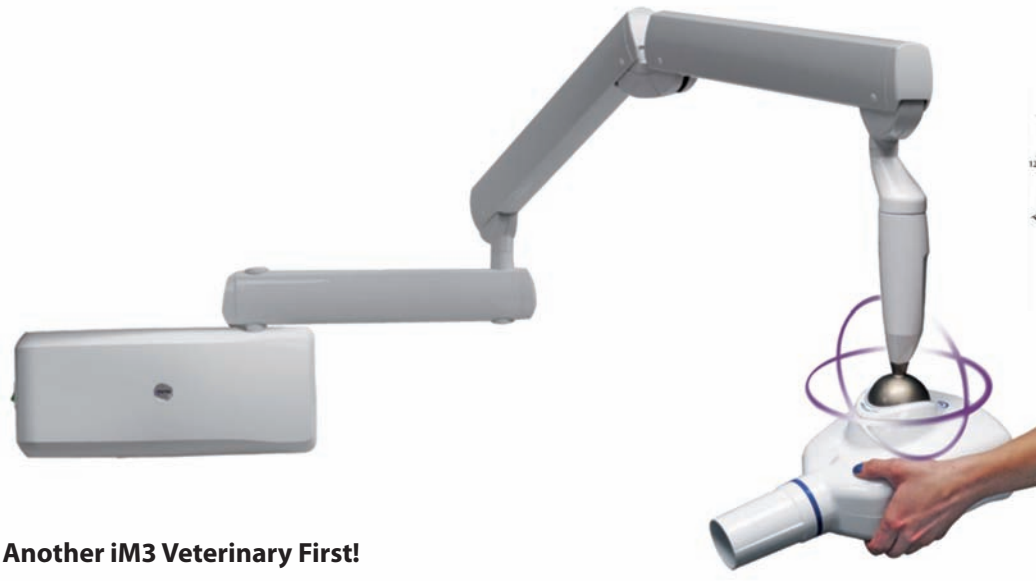

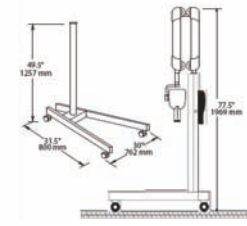

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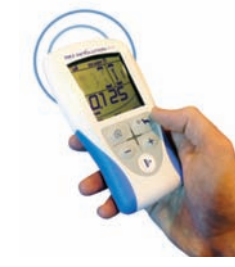

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of 138 animals (6%) died due to the exposure. Somnolence, recumbency, collapse, disorientation, and extensor rigidity are also sometimes seen.[6]

Monitoring

Diagnostic tests should be performed in all patients exposed to lamotrigine to check for underlying kidney or liver problems, as these conditions can significantly affect blood concentrations and can lower the doses at which clinical signs may be seen.[1] Monitor for hypokalemia and acidosis. The patient's cardiovascular status (heart rate and rhythm, blood pressure, perfusion parameters) should also be closely monitored. A continuous electrocardiogram (ECG) should be considered, especially in animals exposed to high doses.

Lamotrigine intoxication in dogs and cats can cause central nervous system depression and, at higher doses, life-threatening cardiac arrhythmias, seizures, and death.

Treatment

Decontamination can be performed if the patient is asymptomatic. Emesis can be induced within one hour of exposure to the immediate-release product and within two or three hours of exposure to the extended-release product. Administering activated charcoal (0.7 to 1 g/kg) with a cathartic, such as sorbitol, will help in the adsorption of the lamotrigine and help reduce the systemic absorption. If activated charcoal is given, monitor the patient for hypernatremia.

Intravenous (IV) fluids are required for symptomatic pets. The rate of IV fluids should be based on the patient's cardiovascular status, with patients showing marked signs receiving fluid diuresis for cardiovascular support. Ventricular tachycardia and VPCs can be controlled with lidocaine. Lidocaine can be given as an IV bolus of 2 to 8 mg/kg to effect while monitoring the patient's ECG and then as a constant rate infusion of 25 to 75 µg/kg/min, tapering to the lowest effective dose.[7] Treat bradyarrhythmias, such as AV blocks, with either atropine (0.02 mg/kg intravenously) or an isoproterenol infusion (0.04 to 0.08 µg/kg/min intravenously).[7]

Vomiting should be controlled with antiemetics. Methocarbamol should be given to tremoring pets at a dosage of 55 to 220 mg/kg intravenously. Give half the calculated dose rapidly (not exceeding 2 ml/min), allow the animal to relax, and then give to effect.[7] Diazepam (0.5 to 1 mg/kg intravenously to effect) may be given to control seizures, but refractory seizures may require a phenobarbital bolus (2 to 5 mg/kg intravenously) or gas anesthesia.[7] Patients with potassium concentrations < 2.5 mEq/L should be supplemented with potassium chloride.

There have been reports of giving intralipids to treat cardiac conduction impairment in people, but intralipid administration has not been adequately evaluated in veterinary medicine to determine its efficacy.[8]

Summary

Lamotrigine appears to have a narrow margin of safety in companion and laboratory animals. Pets currently receiving valproic acid or with preexisting liver or renal disease are more susceptible to toxicosis. Lamotrigine intoxication in dogs and cats can cause central nervous system depression and, at higher doses, life-threatening cardiac arrhythmias, seizures, and death. Treatment may

include gastrointestinal decontamination, intravenous fluid support, and drug administration based on clinical findings. The prognosis is good for animals showing mild signs but guarded for animals with severe cardiac arrhythmias. VM

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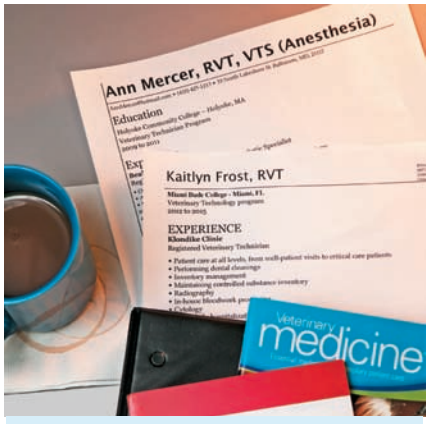

What **specialized technicians** *bring* to the table

Specialization is one way the technicians in your practice might be able to earn more because their increased expertise can save veterinarians' time and bring in more revenue. *By Matthew Kenwright, Assistant Content Specialist*

Wages are one of the top issues confronting team members today. There are large outside forces facing veterinary medicine that can't be easily resolved, but there are options available. Becoming a specialized veterinary technician is one example. The time-consuming process—it can range from two to five years—improves technicians' skills and can foster a sense of professional accomplishment, but the question is whether it influences pay.

The 2014 *Firstline* Career Path Study detailed the differences between the various types of technicians. On average, veterinary assistants made $14.08 an hour, credentialed technicians made $17.02, and credentialed technicians with a specialty made $21.34.

Specialized veterinary technicians might be poised for more success if they work in an environment suited for them. They can be valuable assets in specialized practices that tout their expertise to clients. But even in general practices, more services can equate to more patients, more visits can lead to increased revenue, and more money can translate to higher wages.

Ed Durham, CVT, LATG, VTS (cardiology), says, "As always, the salary range for technician specialists varies around the country, but in general a VTS (veterinary technician specialist) does receive a salary increase upon achieving his or her VTS designation. Also, if changing jobs, they can command a higher salary due to their specialty certification. On average, I would estimate that a VTS makes 5% to 10% more than a credentialed technician with the same years of experience without the VTS."

However, Susan Burns, BS, RVT, VTS (anesthesia), says becoming a specialized technician does not usually mean an increase in pay. "This is something I warn potential candidates of when they inquire about obtaining a specialty. I hope this will change in the future. Veterinary medicine can offer a lot of specialized treatments to our patients that 10 years ago were unheard of in the field. This increase in knowledge will require more specialized training for

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See brief summary on page 52

RP141006

both veterinarians and technicians. My hope would be that this will translate into pay increases for both specialized and nonspecialized technicians."

Besides money, specializing offers intangible benefits. The additional capabilities offer veterinarians more resources and can help alleviate some of veterinarians' responsibilities and make operations more efficient.

Liza Rudolph, BAS, CVT, VTS (clinical practice, small animal internal medicine), says, "In my opinion the most common reasons veterinary technicians seek specialty recognition include increasing their knowledge, job satisfaction, and professional opportunities. Veterinary technicians learn so much during the VTS process. This directly affects the quality of patient care, helps raise the bar for co-workers, and increases confidence in their daily practice. Veterinary technician specialists report an increase in recognition and respect from veterinarians and technicians."

For example, Durham recently helped place a challenging urinary catheter in a dog with a transitional cell carcinoma through the use of a cardiac catheter guide wire. "The application of my advanced knowledge and skill in guide wire manipulation proved useful in providing a positive outcome for the patient, even though it was not a cardiology case. ICU was happy, my doctors were happy because they did not have to stop what they were doing to help ICU, and the dog can empty his bladder now," Durham says.

Each technician specialty brings its own set of advances to a practice. "Veterinary technicians are at the forefront of the nutrition conversation with pet parents," says Kara Burns, MS, MEd, LVT, VTS (nutrition), president of the Academy of Veterinary Nutrition Technicians. "Pet parents are becoming more aware of the importance of nutrition in their own health and subsequently will expect a higher standard of nutritional care for their pets."

Susan Burns explains specialized anesthesia technicians can also help fill in gaps. "There are very few board-certified anesthesiologists in private practice, so in many ways we are the go-betweens. Most veterinarians and technicians shy away from anesthesia because it scares and intimidates them. We can be that cushion for many practices."

There are ambitious technicians who will become specialized for their own sake, but the impetus can begin with a

hospital's leadership team. Offering incentives for training, explaining the benefits of professional development, and just encouraging continuing education are among the traits of managers and owners that can elevate practices. Below is an overview of the 11 current NAVTA-approved technician specialties and what these credentialed technicians can bring to your practice.

1. The Academy of Equine Veterinary Nursing Technicians (AEVNT)

Mission statement: To advance the education and professional recognition of credentialed equine veterinary technicians who display excellence in, and dedication to, providing superior nursing care to the equine patient.
Year established: Formed in 2009; first exam in 2011
Number currently credentialed: 21
How this specialty can help veterinarians: "Our goal is to make veterinarians' jobs easier, leverage their time, and give them assurance that they have given the care of the patients over to the 'nurses' who are dedicated professionals in this industry."—Deborah B. Reeder, RVT, VTS (equine veterinary nursing)

2. The Academy of Internal Medicine for Veterinary Technicians (AIMVT)

Mission statement: The AIMVT will promote the interest in and advance the skills of veterinary technicians within the disciplines of veterinary internal medicine by providing cutting-edge continuing education, working with veterinarians to advocate superior patient care, client education, and consumer protection. The AIMVT will further the recognition of credentialed specialty technicians as leaders in the profession of veterinary internal medicine nursing.
Year established: Achieved specialty academy status from NAVTA in 2008
Number currently credentialed: 124
How this specialty can help veterinarians: These specialists' expertise can increase the veterinarian's productivity by performing certain advanced procedures and providing client education on a wide range of topics. In addition, specialists can assist and supervise team members not yet suited for an elevated level of care.

3. The Academy of Veterinary Behavior Technicians (AVBT)

Mission statement: To promote excellence in the discipline of veterinary behavior medicine. The veterinary technician who becomes certified as a VTS (behavior) will demonstrate superior knowledge in scientifically—and humanely—based techniques of behavior health, problem prevention, training, management, and behavior modification. The AVBT will advance the skills of veterinary technicians within the discipline of animal behavior and further their recognition as critical components of the veterinary behavior team in creating, maintaining, and strengthening the human-animal bond.
Year established: Recognized by NAVTA in 2008; first exam in 2010
Number currently credentialed: 13
How this specialty can help veterinarians: "Behavioral medicine is an excellent consideration as every animal that receives veterinary care is displaying behaviors. Because they are uniquely different from humans, interpreting these behaviors requires advanced knowledge and skill. A VTS (behavior) is better poised to understand patients, provide for their unique needs, support the veterinarian's role, and aid the client as they provide optimal physical and behavioral health."— Sherrie Yuschak, RVT, VTS (behavior), KPA-CTP, CPDT-KA

4. The Academy of Veterinary Clinical Pathology Technicians (AVCPT)

Mission statement: To advance the area of and promote excellence in the discipline of veterinary clinical pathology.
Year established: 2012 (first technicians credentialed in 2014)
Number currently credentialed: 7
How this specialty can help veterinarians: "The specialty will greatly benefit the veterinary community by serving the niche of those involved in laboratory testing, whether in a clinic, diagnostic or reference laboratory, research or government facility, private industry, or academia. By establishing educational and clinical requirements and credentialing veterinary technician clinical pathology specialists, the AVCPT will benefit the veterinarian, the veterinary technician, the animal owner, and the patient." — Executive Board of the AVCPT

5. The Academy of Veterinary Dental Technicians (AVDT)

Mission statement: To promote an expansion of knowledge and education of veterinary dentistry among credentialed veterinary technicians and to expand the role of the veterinary dental technician in the workplace. The academy strives to advance the education of the whole dental community through continuing education, mentor programs, journal articles, and textbooks.
Year established: Recognized by NAVTA in 2002
Number currently credentialed: 54 active members
How this specialty can help veterinarians: "I believe one huge benefit of our specialty is having someone in the veterinary clinic who knows anatomy, pathology, instrumentation, and marketing and can provide surgical assistance and patient care. Veterinarians, technicians, and clients all have high expectations when it comes to preventive care, and this is one area where a specialist can excel."— Pat March, RVT, VTS (dentistry)

6. The Academy of Veterinary Emergency and Critical Care Technicians (AVECCT)

Mission statement: To ensure the veterinary profession and the public that AVECCT-certified technicians possess the knowledge and experience needed to work effectively in a well-equipped and staffed emergency or critical care facility.
Year established: 1996 (first technicians certified in 1997)
Number currently credentialed: More than 360
How this specialty can help veterinarians: "When a technician becomes a VTS, they are at the

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Also see two technicians' takes on how specialization can truly help technicians grow in their career at **dvm360.com/SpecialtyChat**.

forefront of their field, similarly to a veterinarian diplomate. Often people wonder why the exam is that tough. It is because that technician truly understands that area of medicine. They understand why the doctor is prescribing that medication and they are there to remind the doctor that the two drugs they ordered cannot be given together. They are there to offer excellent nursing care and have forward-thinking skills."—Amy Breton, CVT, VTS (emergency and critical care)

7. The Academy of Veterinary Nutrition Technicians (AVNT)

Mission statement: To advance the area of and promote excellence in the discipline of veterinary nutrition. The AVNT provides a process by which veterinary technicians may become certified as a veterinary technician specialist in the field of nutrition, increasing the competence of those practicing in the field of veterinary nutrition. The AVNT mission is to enhance the skills and knowledge of veterinary nutrition technicians and promote technicians as integral members of the veterinary nutrition team.
Year established: 2010
Number currently credentialed: 14
How this specialty can help veterinarians: More and more pet owners are learning to recognize the role nutrition plays in their pets' lives. As more clients take initiative and request nutrition services, technicians will be expected to offer a higher level of care for patients.

8. The Academy of Veterinary Surgical Technicians (AVST)

Mission statement: To increase the competence of those who perform specialty duties in the field of veterinary surgery. The academy will strive to ensure that the veterinary surgical technician possesses superior knowledge and skill in the care and management of surgical cases, surgical instruments, and the surgical suite.
Year established: First certifying examination in January 2013
Number currently credentialed: 20
How this specialty can help veterinarians: "Practicing veterinary surgical care at an advanced skill level helps ensure that veterinary surgical patients receive a level of care commensurate to the advanced surgical procedure provided."—Heidi Reuss-Lamky, LVT, VTS (anesthesia, surgery)

9. The Academy of Veterinary Technician Anesthetists (AVTA)

Mission statement: To promote interest in the discipline of veterinary anesthesia. The academy provides the opportunity for members to enhance their knowledge and skills in the field of veterinary anesthesia.
Year established: 1999
Number currently credentialed: 190
How this specialty can help veterinarians: Anesthesia is among the top specialties needed in almost every veterinary hospital. With the small number of board-certified anesthesiologist in private practices, these specialties can fill an important niche.

10. The Academy of Veterinary Technicians in Clinical Practice (AVTCP)

Mission statement: To promote excellence in veterinary technology in clinical practice. The veterinary technician who becomes recognized as a VTS (clinical practice) demonstrates superior knowledge in the care and management of a broad range of clinical cases.
Year established: Recognized by NAVTA in 2010
Number currently credentialed: 31
How this specialty can help veterinarians: "The AVTCP was specifically developed to produce highly skilled, knowledgeable, and educated veterinary technicians who currently practice their advanced skills and understanding on a daily basis in clinical practice. These individuals are dedicated and invaluable to multidisciplinary contemporary veterinary medicine. They are truly considered experts in their field." —Liza Rudolph, BAS, CVT, VTS (clinical practice, small animal internal medicine)

11. The Academy of Veterinary Zoological Medicine Technicians (AVZMT)

Mission statement: To promote excellence in the discipline of zoo medicine.
Year established: Approval in 2009; first exam 2012
Number currently credentialed: 11
How this specialty can help veterinarians: "A more knowledgeable technician is desirable. First and foremost, this specialty was created to benefit zoo technicians. To give them something to strive for."—Bonnie Soule, BS, CVT, VTS (zoo) VM

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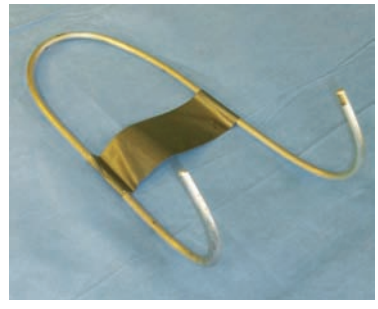

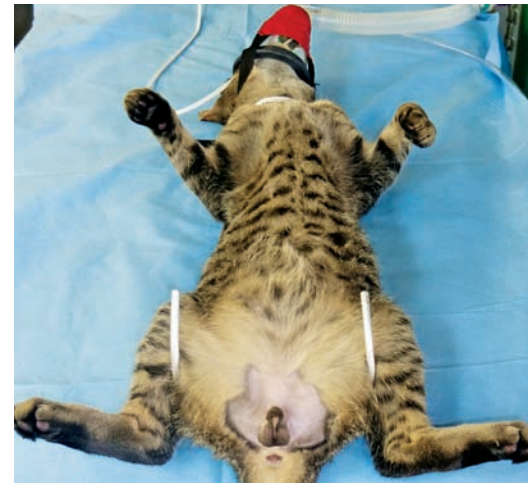

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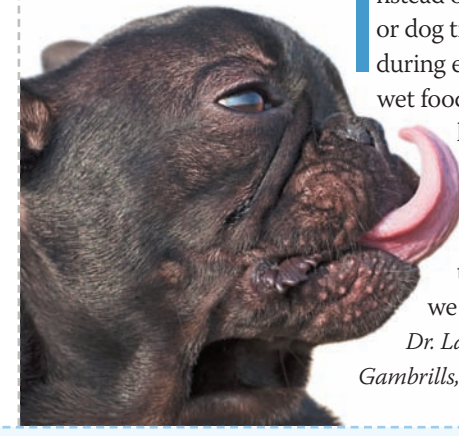

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