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Inside This Issue

Histopathologic Characteristics of Biopsies from Dogs Undergoing Surgery with Concurrent Gross Splenic and Hepatic Masses: A Summary

Fernando Leyva, DVM
Department of Surgery

A retrospective study conducted at our hospital titled "Histopathologic characteristics of biopsies from dogs undergoing surgery with concurrent gross splenic and hepatic masses: 125 cases (2012-2016)" was recently published in BMC Research Notes (FJ Leyva, et al.). The purpose of this retrospective study was to describe the prevalence of benign versus malignant masses in dogs with splenic mass(es) and hepatic mass(es) undergoing surgery. It also aimed to report patient signalment (age, sex, breed), weight, and histopathological diagnosis of both organs.

While many studies have looked at splenic pathology and splenic pathology in association with non-traumatic hemoabdomens, very few studies have looked at the association of splenic malignancy and associated hepatic lesions. Our study is the first to report the prevalence of benign versus malignant masses in dogs with concurrent splenic mass(es) and hepatic mass(es) undergoing splenectomy.

Study Design—Inclusion Criteria and Statistical Analysis

In this retrospective study we reviewed medical records of 125 client-owned dogs found to have splenic mass(es) and a liver mass(es) during surgery. Data obtained from the medical records included histopathological diagnosis of both splenic and hepatic tissue, signalment (age, sex, breed), and body weight. Each of the dogs included in the study had a splenectomy performed in conjunction with a liver biopsy (via liver lobectomy or incisional biopsy).

Descriptive statistics (mean, SD, median, minimum, and maximum values for age and weight; frequency and percentage for categorical variables such as sex, breed, benign or malignant lesions, type of lesion) were calculated for the study sample. A cross-tabulation of spleen and liver status (benign or malignant) was constructed to determine the percent of dogs with benign splenic lesions and benign

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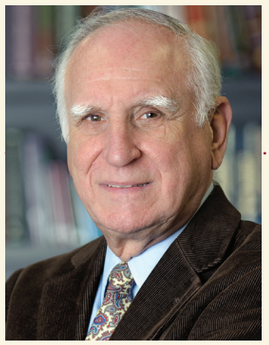
A Note from the Editor



The eleventh month of this year was one of elections, the results of some which were in doubt as many were closer than expected, frenetic black Friday buying which exceeded all previous years spending and finally the preparations for the holiday season, so much anticipated by many enterprises which survive with the spending in November to early January. The elections again shook the incumbent party into a realization that the status quo won't always be, exemplified by business giants like100 year old GE nearing impossibly low numbers and GM deciding to close out many sedan models as consumers shift to SUVs, CUVs and pickup trucks; even minivans losing market share. No doubt, sedans don't facilitate transporting pets, or even people and the AWD function makes winter travel easier in the "tall wagon" vehicles now so popular.

Snow tires will be needed for our vehicles and our pets will feel the freezing ground on their paws when out for their walks. Owners need be aware that pavement deicers contain chemicals that need to be washed off on returning home after an outside adventure; other debris too. Those kept outside should have a heated dog house with a soft mattress to lie on and an electrified/heated bucket of water that is kept a few degrees above freezing.

Drs. Joshua W. Tumulty and Jacqueline Gest have been joined by Dr. Kimberly Golden last month helping to expand the availability of Internal Medicine consultations and ultrasounds. The addition of a Sound (GE) Logiq E9 ultrasound, the most advanced color flow ultrasound available will add the capabilities of the Internal Medicine Department. Feel free to reach out to any member of our Internal Medicine team to receive referrals.

I noticed a few grasshopper like critters in my house in the last few weeks as the temperature dropped and it seems that these arrivals are Camel crickets. Their actual family is Rhaphidophoridae. They are omnivores and will eat fungus, plant matter, insects, and even fabric or cloth. Crickets aren't particularly harmful, they can bite, but they aren't inclined to bite humans and it is rare for their mouthparts to be able to break the skin. They love dampness and moisture. Outdoors these crickets hide in cluttered garages, near leaky gutters, underneath decks and in piles of leaves, but when the temperature drops, they seek shelter indoors, mainly in dark basements and crawl spaces. Clearing away leaves under a deck, cleaning out the garage, ventilating crawl spaces, cutting back

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A Note from the Editor

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bushes, fixing leaky gutters can deter camel crickets from nesting nearby, and ultimately invading the home. I bought some home exterminating liquid and using the battery supplied wand, liberally applied the material on baseboard areas and doorways and crawlspace openings. Sticky traps, sprays and insecticides can be used too to get rid of them.

In upstate Hilton, near Rochester, a feral cat tested positive for rabies recently.

The cat was captured by a well-meaning person and the cat bit the person multiple times. Although uncommon, we must be vigilant with feral animals and keep our pets' immunizations up to date.

As usual, Dr. Curtis Dewey, a LIVS staff neurologist and associate professor and section head of Neurology/Neurosurgery at College of Veterinary Medicine, Cornell University, is at LIVS every other week for consultations. Appointments can be made also at 516-501-1700.

LIVS remains open 24 hours daily as always and our clinicians have extended their hours to better accommodate your needs.

Again, we welcome your observations e-mailed to lmarino@livs.org.

Leonard J. Marino, MD, FAAP, LVT

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LIVS is proud to welcome:

Dr. Kimberly Golden - Internal Medicine

Dr. Golden is a native New Englander and is very excited to be back in the northeast. She developed a love for animals at a young age. Dr. Golden enjoys forming long-standing relationships with clients while working together to determine the best treatment plan tailored to each individual patient.

She obtained her Doctorate of Veterinary Medicine from Ross University, School of Veterinary Medicine in St. Kitts, West Indies. It was during her clinical year of veterinary school at the University of Florida where she discover a keen interest in internal medicine. She continued her education with a 1-year small animal rotating internship at Bay Area Veterinary Specialists in California and then an internal medicine specialty internship at Memphis Veterinary Specialists. She then completed a 3-year internal medicine residency at BluePearl Veterinary Partners in Michigan. After completing her residency, she worked in San Antonio, Texas before moving back up north.

Dr. Golden has clinical interests in all aspects of small animal veterinary internal medicine with special interests in feline medicine, infectious diseases, immune-mediated disease, and gastroenterology.

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Histopathologic Characteristics of Biopsies from Dogs Undergoing Surgery with Concurrent Gross Splenic and Hepatic Masses: A Summary

➤ *Continued from Front Cover*

Table 1 Number of dogs per type of splenic mass(es) (SM) and hepatic mass(es) (HM)

	Malignant HM	Benign HM	Sum total of dogs
Malignant SM	60	23	83[a]
Benign SM	8	34	42
Sum total of dogs	68	57	125

[a] One dog had two malignant splenic lesions

liver lesions, the percent of dogs with benign splenic lesions and malignant liver lesions, the percent of dogs with malignant splenic lesions and malignant liver lesions, and the percent of dogs with malignant splenic lesions and benign liver lesions.

Inferential statistics were also conducted for the study sample. After testing for equality of variance by Levene's test, a series of independent-samples t tests were conducted for age and weight. A series of Chi squared analyses for patient sex was also conducted. Values of $P \leq 0.05$ were considered significant for all analyses. All analyses were performed using SAS version 9.4.

Results

There were 125 dogs included in this study. Mean age was 10.1 years (range 4–15 years). There were one female intact, 59 female spayed, 11 male intact, and 54 male neutered. Mean weight was 27.8 kg (range 4–58.3 kg). There were 42 mixed breed dogs; 24 Golden Retrievers; 7 Labrador Retrievers; 6 German Shepherd Dogs; 4 Beagles; 3 each Cocker Spaniels, Rottweilers, and Yorkshire Terriers; 2 each Australian Shepherd, Cane Corso, English Springer Spaniel, and Pekingese; and 1 each of 25 other breeds. There were no significant differences in age, weight, or sex between dogs with malignant lesions versus those with concurrent benign lesions.

Of the 125 dogs, 42 (33.6%) had benign splenic mass(es) and 83 (66.4%) had malignant splenic mass(es). One of the dogs had two malignant splenic masses. The most common malignant splenic lesion was hemangiosarcoma (69/84, 82.1%). The most common benign splenic lesion was nodular hyperplasia (27/62, 43.5%). Sixty-seven dogs (53.6%) had malignant hepatic mass(es). The most common malignant hepatic lesion was hemangiosarcoma (51/68, 75%). The most common benign hepatic lesion was nodular hyperplasia (26/69, 37.7%). The number of dogs per type (benign versus malignant) are summarized in **Table 1**.

Thirty-four of the dogs (27%) had benign splenic mass(es) and hepatic mass(es). Of the 60 dogs with malignant splenic and liver lesions, 56 (93.3%) had the same malignancy in both organs. Forty-six dogs (76.7%) had hemangiosarcoma in the spleen and the liver, 3 (5%) dogs had leiomyosarcoma in both organs, 3 (5%) dogs had histiocytic sarcoma in both organs (one of these dogs additionally had splenic hemangiosarcoma), 1 (1.7%) dog had liposarcoma in both organs, one dog had anaplastic sarcoma in both organs, one dog had undifferentiated sarcoma in both organs, and 1 dog had lymphosarcoma in both organs. In the four dogs with exclusively different malignancies, one dog had liposarcoma in the spleen and lymphosarcoma in the liver, one dog had osteosarcoma in the spleen and undifferentiated sarcoma in the liver, one dog had leiomyosarcoma in the spleen and stromal sarcoma in the liver, and the last dog had mast cell tumor in the spleen and hemangiosarcoma in the liver. Seven of the dogs (5.6%) with benign splenic mass or masses had malignant hepatic mass or masses, 23 of the dogs (18.4%) with malignant splenic mass(es) had benign hepatic mass(es). The more salient numbers and percentages of dogs with benign and malignant lesions are summarized in **Fig. 1**.

Conclusion

The data gathered in this study suggests that nearly 30% of dogs undergoing surgery with both gross hepatic and splenic lesions have a favorable prognosis. While malignant neoplasia is most likely in cases with both splenic mass(es) and hepatic mass(es) undergoing splenectomy, benign or treatable causes must be considered possible in each dog. This information should be provided to owners to facilitate making an informed decision of whether or not to pursue surgery after imaging. ❑

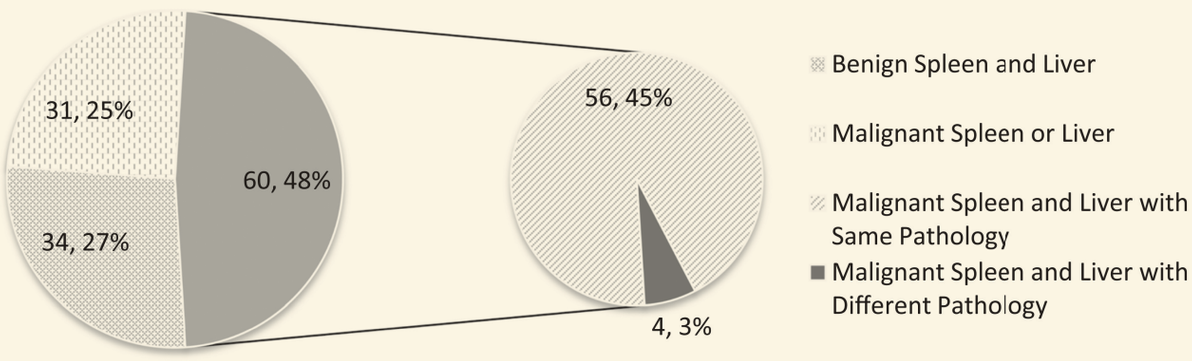

Fig. 1 Numbers and percentages of benign and malignant SM and HM (n = 125)

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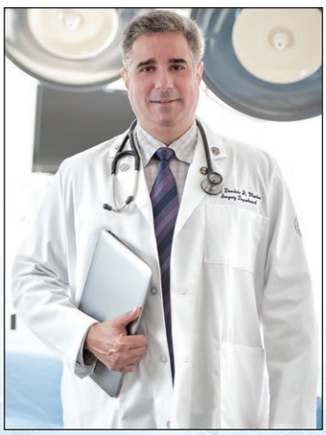

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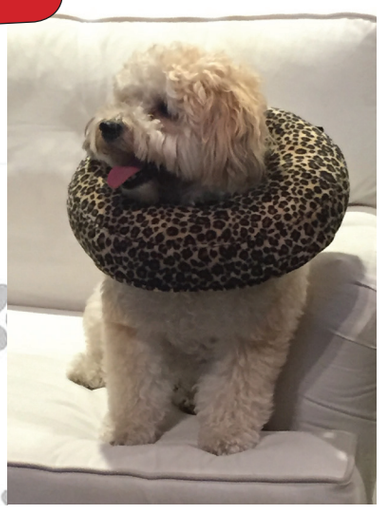

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Feline Cranial Cruciate Ligament Rupture

Jed Sung, DVM, Department of Surgery

Introduction:
One of the most common canine orthopedic problems is a ruptured cranial cruciate ligament (CCL), however, in feline patients, this is an uncommon condition. There are several reasons for this species difference. Cats have relatively thicker CCL's compared to their caudal cruciate ligaments (CdCL), whereas dogs have relatively thicker CdCL. The lighter weight of the cat also places less stress on the stifle and its associated ligaments. Finally, due to spontaneous resolution shortly after its onset, many owners may simply overlook the problem, resulting in many underreported cases.

Etiology:
A ruptured cranial cruciate ligament means that the integrity of the CCL is compromised; either a partial or complete tear, resulting in decreased stifle stability. The most common etiology of ruptured CCL in felines is trauma but it can also be the result of ligament degeneration.

Clinical anatomy:
The femur is the long bone that contributes to the proximal end of the stifle joint while the tibia contributes to the distal end. The distal end of the femur contains the medial and lateral condyles and the intercondylar fossa. The patella is a sesamoid bone that lies on the cranial aspect of this part of the bone. The fabellae are two sesamoid bones found caudal to the femur, within the origin of the gastrocnemius muscle. The proximal end of the tibia contains medial and lateral condyles, tibial tuberosity, and the intercondylar eminence, which separates the cranial and caudal intercondylar area. The popliteal sesamoid bone (cyamella) is located between the proximal tibia and fibula.

The CCL attaches proximally within the caudal intercondylar fossa of the femur and distally to the cranial intercondylar area of the tibia. The CdCL attaches proximally within the cranial intercondylar fossa of the femur and distally to the popliteal notch, caudal to the caudal intercondylar area. The MCL (medial collateral ligament) and LCL (lateral collateral ligament) attach proximally from the medial and lateral epicondyle of the femur, respectively, and distally to the medial and lateral condyle of the tibia, respectively. The medial and lateral menisci are C-shaped disks found medially and laterally, respectively, within the stifle joint between the femur and tibia.

Pathogenesis:
The pathogenesis of a cranial cruciate rupture can be traumatic, atraumatic, or a combination.

Trauma usually involves a cat falling off an elevated platform. These incidents can result in multiligamentous damage (deranged stifle) involving the CdCL, MCL, LCL, medial meniscus (MM), and/or the patellar ligament.

Ligamentous damage can also be atraumatic, where the disease process involves a de-

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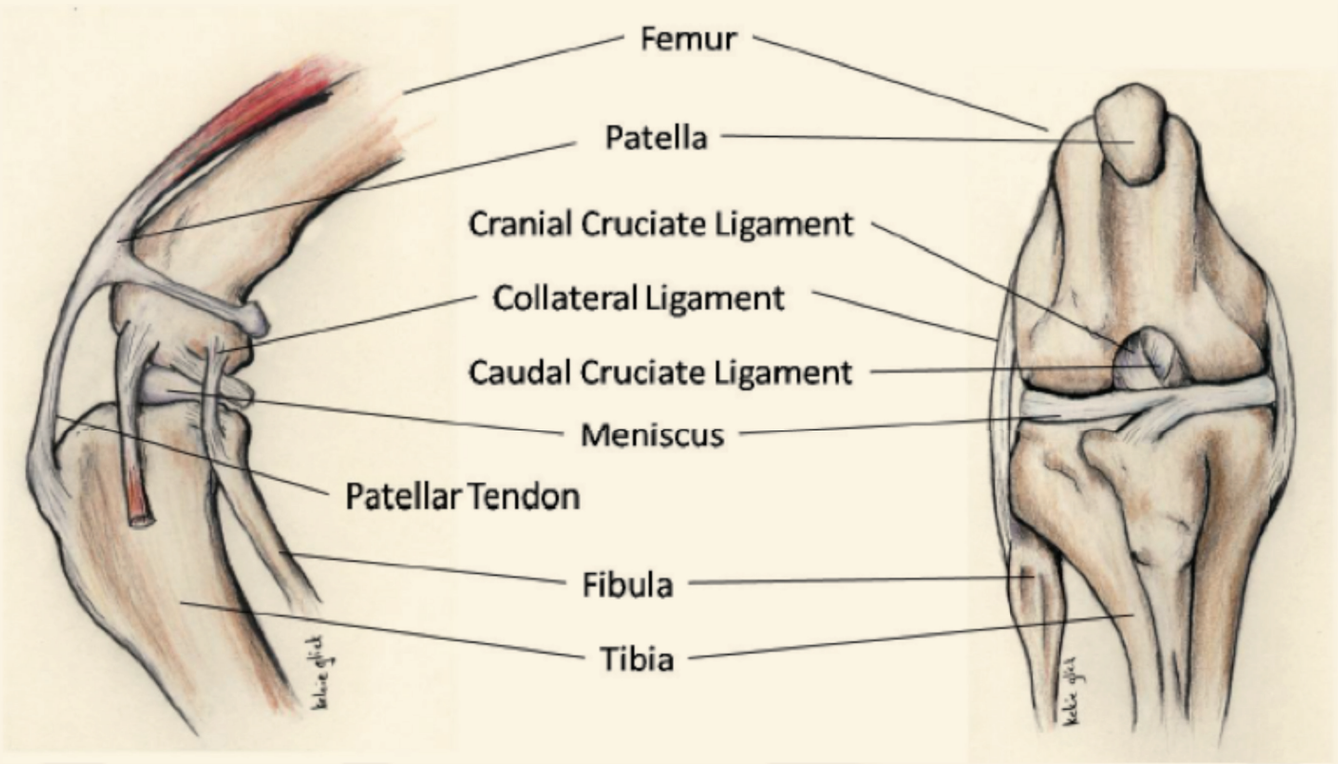

Figure 1: *Stifle joint (Priddy, Edwards, von Pfeil)*

Feline Cranial Cruciate Ligament Rupture

➤ *Continued from Page 9*

generative component. Due to the rarity of this disease in cats, the pathogenesis of this disease is not well known. Histopathologic assessment of ligaments of afflicted cats have shown irregular collagen fiber distribution, acellular or hypocellular areas, chondroid metaplasia and fibrocyte proliferation (indicative of the reparation process). Due to its histological similarity to affected canine CCL, it is thought that atraumatic CCL ruptures may have the same pathogenesis as dogs. A study conducted on Newfoundland dogs suggested that a genetic mutation e ither chemically or physically predisposes them to have ruptured CCL's. Other possible contributors to this disease include autoimmune response to type I collagen, articular damage due to joint instability, and obesity.

In both traumatic and atraumatic cases, damage to the ligament(s) can lead to an inflammatory response that quickly helps to remodel the ligament(s). Swelling may be the result of vascular reorganization or a hematoma. This can potentially compress somatosensory nerves that run to or near the stifle joint, resulting in nociception and reluctance to use the affected limb. The end result of a CCL rupture is cranial transition of the proximal tibia when the patient bears weight on the affected limb.

Clinical signs:

Clinical signs include decrease in physical activity, acute lameness (weight-bearing and non-weight-bearing), inflammation of the joint, and pain around in the stifle joint. In cases where there is mild CCL rupture, clinical sign may spontaneously resolve without treatment.

Diagnosis:

Ruptures of the CCL can be detected in physical examinations by conducting a cranial drawer test. Cranial movement of the proximal tibia relative to the femur is indicative of a CCL rupture. Radiographs can both confirm the diagnosis and exclude other causes of hindlimb lameness. Radiographic signs include stifle joint effusion, degenerative joint disease, and distal displacement of the popliteal sesamoid bone. In chronic cases, mineralization can also be found on the insertion point of the CCL on the cranial portion of the tibia.

Treatment:

In deranged stifles, the ruptured ligaments will need to be surgically reconstructed in order to achieve stifle stability.

In cases of CCLR ruptures, one may use conservative management by enforcing strict cage rest for several weeks. There are also several surgical approaches that can be done. The most commonly used technique to stabilize the stifle is done by placing an extra-capsular monofilament nylon suture around the lateral fabellae and through a hole drilled through the tibial tuberosity. Complications from this procedure can be iatrogenic, such as inappropriate tension of the suture that results in valgus or varus or a breakage of the suture.

Other techniques that have been suggested for feline CCL ruptures include dynamic stabilization of the stifle. Tibial plateau leveling osteotomy (TPLO) and tibial tuberosity advancement (TTA) are typically used in dogs to change the biomechanics of the stifle and eliminate the need for a cranial cruciate ligament when bearing weight, however, due to the experimental nature of this procedure in cats, the general complications of this surgery are well not known.

Prognosis:

A study found that cats with traumatic ruptures that underwent the surgery had function of their affected limb during recheck exams (4 weeks to 6 months postoperatively), however, all of these cats had clinical or radiographic evidence of osteoarthritis.

In 1987, 18 cats with atraumatic damage were kept indoors and restricted to minimal activity. In an average of 5 weeks (ranging from 1-16 weeks), these cats regained function of their affected leg and returned to a normal gait. Although most of these cats retained a cranial drawer laxity, the overall improvement of the animals led veterinarians to recommend conservative management.

A relatively more recent study, done between 1997 and 2004, showed that extra-capsular stabilization led to normal use of the leg within an average of 16 days (ranged from 2- 35 days). Despite its faster results, there are still risks involved with this surgery. Three cats passed away from the surgery with two of them being diagnosed with hypertrophic cardiomyopathy during necropsy. In fact, a link had been suggested between ruptured CCL and cardiomyopathy, meaning that such surgery may not be advisable for a specific subset of patients.

Finally, in one study, two TTAs were performed and resulted in normal gait within four weeks. This longer healing process, compared to the extra-capsular stabilization, may be due to the fact that this was an experimental procedure where there was no written literature about the optimal angle to advance the tibial tuberosity.

Conclusion:

CCL rupture is an uncommon occurrence in cats, which can be a result of either trauma, ligament degeneration or a combination of the two. The degenerative process is not very well understood, but histopathological signs suggest that it is similar to degenerative CCL's in dogs. Cats with this condition will present with lameness, inflammation of the stifle, and pain. Cranial drawer tests and radiographs can confirm the diagnosis. Treatment can range from conservative management, ligament reconstruction, extra-capsular stabilization, or dynamic stabilization. Normal gait should return at an average of 4 to 5 weeks. ❑

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