Continuing Professional Development | Business Success | Clinical Skills

vet 360

Vol 09 | Issue 02 | MAY 2022

CPD Article
Ocular neoplasia in dogs

Business
Budgeting within a Veterinary Practice

Oncology
Alimentary Lymphoma in Cats

Also in the issue

Electrochemotherapy, A systematic approach to pelvic limb lameness

Have you heard?

There's an easier way to treat otitis externa.

Elanco™

Convenience & compliance in one dose – administered by you.

Anti-bacterial (Florfenicol)

Anti-inflammatory (Mometasone furoate)

Anti-fungal (Terbinafine hydrochloride)

NEPTRA™

Neptra™ ear drops for dogs. Each 1 ml contains: Florfenicol 16,6 mg/ml, terbinafine hydrochloride 16,6 mg/ml and mometasone furoate 2,2 mg/ml. **Excipients:** Ethanol, purified water, propylene carbonate, propylene glycol, macrogol 8000. **Indications for use:** For the treatment of otitis externa in dogs associated with susceptible strains of yeast *(Malassezia pachydermatis) and bacteria (Staphylococcus pseudintermedius).* **Contraindications:** Do not use in dogs with known tympanic membrane perforation. Do not administer orally. Do not use in dogs with known or suspected hypersensitivity to florfenicol, terbinafine hydrochloride or mometasone furoate, other corticosteroids or any excipients. **Special warnings:** Read the package leaflet before use.

To be supplied only on veterinary prescription. Administration by a veterinarian surgeon or under their close supervision.

Registration Holder:
S4 Neptra™: Reg. No. 20/14.3/06 (Act 101 of 1965). Each 1 ml contains florfenicol 16,6 mg/ml, terbinafine hydrochloride 16,6 mg/ml and mometasone furoate 2,2 mg/ml.

Elanco Animal Health (Pty) Ltd. Co. Reg. No.: 2019/163893/07. N1 Business Park, Old Pretoria Road, Kosmosdal Ext 7, Gauteng, 0157. Tel: +27 12 657 6200.

Elanco™ Helpline: 0861 777 735

Editor's Note

This will be the last edition of VET 360 of which I am editor. I started this journey in September 2014 and have learned much along the way. I would also like to thank mrs Madaleen Schultheiss of Vetlink for offering me this opportunity. If only you could have been a fly on the wall at some of our late night layout sessions; worth a story on its own. However all things come to an end and I wish to apply the time I have available pursuing other challenges.

Dr Marianne Lombard will be continuing as editor from the next edition, and I wish her all the best.

This edition is focused mainly on Oncology. There are some new treatment methodologies becoming available. Dr Celliers from Companion Animal Clinical Studies at Onderstepoort has written an introductory article on electrochemotherapy, also called electroporation. An oncology unit is being built up at the Faculty and further information will follow in the VET360 on when and where else this modality is available to the private veterinarian. Our reliable ophthalmologist, Izak Venter has also contributed an article on ocular neoplasia in dogs, the artice on cats will follow in another edition as there are many species differences.

I hope you enjoy the read . Liesel

vet360

Advisory Board

VET360 aims to be a leader in the field of continuing veterinary development in Southern Africa by providing veterinary professionals from diverse disciplines with tools to help them meet the challenges of private practice. The magazine aims to make information accessible, both paper and electronic, and provide clinical, business and other veterinary information in a concise form to enable the practitioner to rapidly acquire nuggets of essential knowledge

Editor

Dr. Liesel van der Merwe BVSc MMedVet (Med) Small Animals
BVSc (Hons), MMedVet (Med)
Small Animal Internal Medicine Specialist, Small Animal Internal Medicine,
Department of Companion Animal Clinical Studies, University of Pretoria, South Africa

You have a small animal problem. We have an answer...
Vets are invited to send in questions or problems that they have regarding small animal medicine or surgery. The editor will get an expert opinion from colleagues at the Veterinary Faculty. This forum is not designed to assist with specific case management but with concepts. Please keep them short and to the point. If the question is not answered in the magazine we will try to get some advice to you personally or direct you to information sources.
We do not guarantee all questions will be answered as they will be screened.
Please send an email to the Editor at support@vetlink.co.za

SAVA South African Veterinary Association Suid-Afrikaanse Veterinêre Vereniging

Index:

Vet360 is a source of current, relevant educational material for practising veterinary professionals in Southern Africa. Published Bi-monthly in hard copy and electronically on www.vet360.vetlink.co.za.

Distribution: Southern Africa, 3 500 copies.

Editor: Dr Liesel van der Merwe BVSc (Hons) MMedVet (Med) Small Animals.
Layout andLayout and design: Annalize de Klerk
Publisher and Owner: Vetlink Publications
Other Publications by Vetlink: Vet360 Mobile App, Livestock Health and Production Review, Hooo-Hooo, Equine Health Update
Publisher: Madaleen Schultheiss: madaleen@vetlink.co.za

We welcome any comments, contributions, topic suggestions and letters for publication. Send them to:
The Editor, PO Box 232, GROENKLOOF, 0027
Tel: (012) 346 1590, 082 575 6479. Fax: 086 671 9907
Email: marianne@mariannelomberg.com
(Dr Marianne Lomberg)

Advertising Enquiries: AgriConnect
Ilse Liveris
Senior commercial consultant
072-708-4401 / ilsel@agriconnect.co.za

Soekie du Toit
Commercial consultant
078-947-6916 / soekie@agriconnect.co.za

We are currently distributing to SAVA members. A win-win situation for SAVA, Vetlink and the reader. Please to subscribe to ensure access to the CPD MCQ.
Subscription: www.vet360.vetlink.co.za

vetlink

Budgeting within a Veterinary Practice

Andrew Christie
BComm (Business Management)

By saying that budgeting is the process by which provision is made for anticipated expenses, it even sounds boring! And sitting hunched over the computer examining numbers just reinforces that idea. And the reward for setting a budget? Looking at a profit that seems lower than it should be...

Nevertheless,most businesses pay at least a token attention to some form of a budget. Vet practices in particular are aware of the importance of budgeting but it often seems that they are intimidated by how to create and monitor a budget with the result that the budgeting process fails to move past an acknowledgement of its importance.

This series of 3 articles aims to assist the owners and managers of veterinary practices in setting and managing budgets. The first article will explore the purpose and process of budgeting while the second and third will provide practical guidelines in preparing an operational budget and a cash flow forecast respectively.

What is a budget?

A budget is a plan of future activity, expressed in financial terms

Budgeting is about people

As much as one tries to make a budget about values and percentages, it is really about people. It makes forecasts about future costs based on our feelings – we tend to be more conservative with the forecast when we are being bombarded with news about a poor economy and more optimistic when there has been a particularly successful month in the practice.

Equally commonplace with entrepreneurial businesses is allowing expenses to sneak through – "Oh well, another R3,000 to increase our stock of collars and beds won't break us".

But it is looking at the purpose of budgeting that shows just how much it is about people–a meaningful budget should:

i. **Plan the allocation of resources to achieve objectives** – for example, if turnover is going to be increased significantly, an additional vet might have to be employed thus increasing the amount budgeted for monthly salaries.
ii. **Communicate plans and targets to the responsible staff** – for example, if the number of consults per day are to be increased, all vets need to be told what the goal is.
iii. **Motivate staff to achieve targets**– for example, if profitability is going to be increased, each staff member will need to have their Key Performance Indicators (KPI's) adjusted and the incentive for achieving the KPI's changed.
iv. **Report actual activity against targets**– for example, if number of active clients is going to be increased by 10%, why did it only reach 8%? What can be done to support staff to ensure that the goal is achieved? Was the goal unrealistic?

The Budgeting Process

One of the weak points of the typical budgeting process is that the "process" part is ignored – every practice requires a different budget, and this should evolve over a period of time.

i. **Decide on the purpose of the budget**– this may seem obvious, but I find that many practices set a budget because it will assist, but they're not entirely sure how. For example, if a practice is focusing on improving

profitability, an operating budget would be more suitable, where as a cash flow forecast will be better for making sure that expenses are paid on time.

ii. **Allocate the variables that will achieve the purpose** – this includes what will be measured (all expenses, or only the main ones?) as well as how they are measured (Rand values for cash budgeting, but percentages for tracking gross profit).

iii. **Create the budget "vehicle"** – some practices are able to use their practice management system to create and manage the budget, while other practices prefer to use handwritten notes. I like to create Excel spreadsheets for my clients because I can tailor the budget to their need, as well as allowing more sophisticated analysis. It really doesn't matter, as long as the budget can be monitored easily and produces the information required.

iv. **Forecast the figures** - The key to overall business activity in the budget is the sales target. Given a sales target, we can forecast the other figures in the operating budget by percentage analysis, or by estimates. Alternatively, we can use the sales figure as the foundation for cash inflows in the cash flow forecast.Having said this, it is often easier to forecast expenses as they are either related to inflation (consumables, etc) or are agreed at the beginning of along-term contract (rent, leases, etc).

v. **Measure variance on a regular basis (but not too much!)**–The difference between 'budgeted' and 'actual' can become a counter-productive mind-draining focal point. The balance between avoiding the budget and obsessing over it can be tricky but generally once a month should be sufficient. This provides enough time that any outliers such as an extremely quiet day should be balanced out, while still providing sufficient time for problems to be addressed. However, when using the budget as part of your team's performance management, three months might be better. And when preparing a cash flow forecast for the first time, a weekly review might be advisable.

vi. **Adjust the budgeted figures if necessary**–The budget should be seen as a fluid structure rather than one which should be abandoned when the actual figures are very different. When South Africa was affected by the first wave of Covid, everyone's budget had to be quickly adjusted – and then again once things returned to normal. The practices that manged their finances the best did not merely discard their budget, even though it was tempting as the pandemic turned our lives upside down.

In addition to the above, it is important that the budget should be seen as part of the greater practice business strategy. The business strategy for the planning period sets out in words and figures exactly how practices will achieve the objectives that are aligned to the strategy. Planning on growing your turnover? Make sure that provision has been made in the budget for additional stock purchases. Planning on expanding your practice? Make sure that the forecasted increase in turnover will offset the increased expenditure.

Some Final Considerations

As has been discussed, budgeting is a people process. However, it should not be used asa stick that is waved around at either under-performing staff - or yourself!'The Budget' is a term that is already intimidating and should rather be seen as the valuable business tool that it is.

Where possible, as many of the practice staff should be involved in the setting of the budget. Often the receptionists and back-office staff are aware of factors that may affect the practice, factors that should be included in the budget.

Sometimes just asking a staff member if a budgeted figure is attainable will help with'buy in' to the budget. Of course, you may not want all items in the budget to be disclosed to everyone, but those relating to each staff member's KPI should certainly be discussed.

In the follow-up article next month, I will be discussing how to prepare and manage an operating statement. This will take the principles discussed here and show how they are integrated into a practical budget.

Andrew Christie

BComm (Business Management)

Overview:

Andrew consults extensively on business issues to vet practices and other stakeholders within the veterinary industry, as well as conducting lectures on various aspects of business at Onderstepoort. His expertise with practice management in general and financial management in particular has made him a sought-afteradvisor on veterinary business issues, including practice valuations.

Email: andrewc@acahr.com

Cell: 082 799 1153

Content submitted by Mount Laurel Animal Hospital, a dvm360® Strategic Alliance Partner.
March 18, 2022, dvm360, dvm360 March 2022, Volume 53, Issue 3

Alimentary Lymphoma in Cats

An experienced clinician discusses the road to success when the diagnostic path is unclear.

Lymphoma is the most common cancer in cats, and it is most frequently located in the gastrointestinal tract.[1] Its clinical signs can be vague and include vomiting, diarrhea, weight loss, and inappetence. If an abdominal mass is palpable, it may guide subsequent diagnostic tests. However, not every case is straightforward. Distinguishing high-grade from low-grade lymphoma—and low-grade lymphoma from lymphocytic-plasmocytic enteritis (inflammatory bowel disease [IBD])—can be a challenge. Nonetheless, understanding the disease process can minimise both time to diagnosis and cost.

LOW-GRADE LYMPHOMA

Likely underdiagnosed in cats, low-grade alimentary lymphoma (LGAL), also known as small cell lymphoma, has an indolent course and a slow progression. Owners typically report chronic clinical signs (at a median of six months) that may intermittently respond to supportive medications. Results of the physical exam may be normal, or abdominal palpation may reveal either diffuse intestinal thickening (a "ropey" sensation) or an abdominal mass. Initial recommendations are routine blood work, including evaluation for hypocobalaminaemia, which in one study was present in 78% of cats.[2] Cobalamin is absorbed by the ileum and is decreased in cats affected by diffuse disease, and the half-life of cobalamin is reduced in cats with gastrointestinal disease. If blood work is normal or palpable abnormalities are present, an abdominal ultrasound is indicated.

Sonographic findings typically reveal mild to moderate diffuse circumferential thickening of the small intestinal muscularispropria layer and/or mesenteric lymphadenopathy.[3] Notably, intestinal wall layering is nearly always preserved. However, the appearance of the intestinal tract may be normal. Hepatomegaly or hypoechoicechotexture of the liver may also be present. In one study, liver involvement was found in 53% of cats with LGAL.[1]

If lymphadenopathy is present, fine-needle aspiration cytology can be performed. LGAL is characterised by a predominant population of small lymphocytes. The challenge then is to distinguish it from IBD. Because ultrasound features, clinical signs, and cytology results are often identical in both conditions, an owner who desires a definitive diagnosis should be encouraged to pursue histopathologic testing, although polymerase chain reaction for antigen receptor rearrangement (PARR) on the cytology samples can be useful to reach a diagnosis.

The gold standard for LGAL detection is a full thickness surgical biopsy. However, an endoscopic biopsy, which requires only partial thickness samples and is both less invasive and expensive, can often yield a diagnosis. If results are equivocal, PARR clonality testing can be performed. Although mature T cells form IBD and most LGAL lesions, a neoplastic population undergoes clonal rearrangement, whereas an IBD cell population remains polyclonal. PARR detects lymphoma in 68% to 90% of cases, so a negative PARR result does not rule out lymphoma.[4-5] PARR can be run on cytologic or histopathologic specimens.

When it comes to treatment, differentiating between the diseases is of less importance. Initial recommendations for IBD are faecal testing (or deworming), reducing allergen exposure with a novel protein diet, and B12 supplementation if required. Given that B12 functions intracellularly, cats with low-to-normal levels should also receive supplements because they are likely to be deficient in intracellular B12. Some cats respond well to these treatments, but others may require subsequent immunosuppression with prednisolone and, if signs persist, with chlorambucil as well.

The treatment for LGAL is prednisolone and chlorambucil plus B12 supplementation as needed. Clinical improvement may be delayed if hypocobalaminemia is not corrected. Typically, an initial dose of 250 µg SC once a week is recommended. I favour 250 µg SC weekly for six weeks, then every other week for three months, and once a month thereafter. If clinical remission and normal cobalamin levels are confirmed at this time, the regimen may be discontinued.

Chlorambucil—at 20 mg/m^2 once every two weeks or 2 mg every other or every third day—has been associated with similar outcomes. I prefer the former for improved client compliance. Prednisolone is typically prescribed at 2 mg/kg daily to start and then tapered according to clinical response. More than 80% of cats will respond to treatment, although the response is expected to be slow, and median survival times range from 18 - 36 months. Regular blood work and monitoring for weight loss and clinical signs is necessary, and ultrasound exams should be performed every three to four months if financially feasible. To reduce the risk of chronic impact on the bone marrow, chlorambucil and prednisolone are typically discontinued at one year if remission is clinically and sonographically achieved.

If an acute decline occurs or a new abdominal mass is suspected, an ultrasound and ultrasound-guided fine needle aspiration of lesions(s) are indicated. Transition to high-grade intestinal lymphoma can occur; a recent study found an incidence of 10% in cats with a history of LGAL.[6] If relapsed LGAL is diagnosed, rescue drugs with positive results include cyclophosphamide and lomustine.

HIGH-GRADE LYMPHOMA

High-grade alimentary lymphoma (HGAL), also called lymphoblastic lymphoma, is characterised by acute onset and progression of clinical signs. Cats with HGAL often present unwell. Physical exam typically reveals an abdominal mass, and sometimes peritoneal effusion. As is the case with LGAL, blood work and an ultrasound scan are indicated. In contrast to the LGAL form, gastric, colonic, and ileal involvement is common.

Sonographically, abdominal lymphadenopathy and/or a gastrointestinal mass may be seen, typically with loss of wall layering. If peritoneal effusion is confirmed, it should be sampled. A septic abdomen will require emergency surgery. Perforated or obstructed masses have historically been the only indications for surgery as part of HGAL management. Nevertheless, the diagnosis of lymphoma can sometimes be reached by evaluating any peritoneal effusion. Fine-needle aspiration cytology of an enlarged lymph node or mass can confirm HGAL, which consists of a largely monomorphic population of lymphoblasts (intermediate to large cells).

Although uncommon, large granular lymphoma is associated with a poorer prognosis.[7] In HGAL, the B-cell form predominates, but PARR is not usually necessary, unless the diagnosis is unclear. Immunophenotyping is less helpful in cats than in dogs with high-grade lymphoma, as it is not known whether type-based treatment adjustments would affect prognosis. Lymphomatous lesions tend to exfoliate well; repeated nondiagnostic cytology samples should raise suspicions that another disease process is occurring.

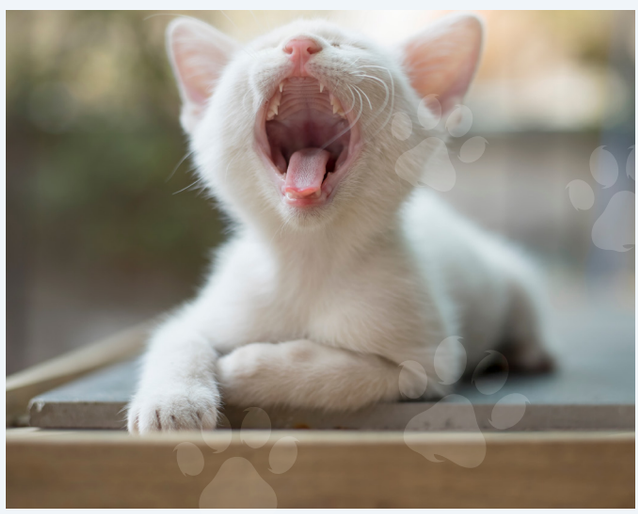
The recommended treatment for HGAL is a multi-agent chemotherapy protocol: CHOP or COP.[8] Approximately 50% to 65% of cats will respond, with 30% having a complete response. Single-agent lomustine can be used in cats that do not tolerate frequent injections or whose owners wish to keep costs down. Finally, prednisolone alone is a reasonable option when owners are not interested in chemotherapy.
Response to chemotherapy, indicated by cats that achieve a complete response to treatment, is the most reliable prognostic factor. Cats that achieve complete remission have median survival times of seven to 10 months, with some surviving more than a year. Cats that do not respond or have only partial remission live significantly less time. Rescue drugs include lomustine, mechlorethamine, cytarabine, and actinomycin-D.

There are preliminary data on surgery and radiation for HGAL. In a small study in which cats underwent surgical debulking of a discrete mass prior to a course of chemotherapy, the median survival time was nearly 14 months.[9] Two small studies evaluated abdominal radiation in cats with HGAL, one concurrent with CHOP and another at relapse. Some cats experienced durable remissions.[10-11] Further investigations are warranted to evaluate the roles of these modalities for this disease.

Feline patients with lymphoma can have variable clinical presentations, but the history, physical exam, and ultrasound findings can be predictive of type (LGAL or HGAL) and help guide further tests. Given that the treatment recommendations for IBD and LGAL are similar, extended diagnostic testing can be minimised if owners do not wish to pursue costly or invasive procedures in lieu of treatment. Although LGAL is a responsive cancer with a good long-term prognosis, further studies are needed to improve HGAL outcomes.

References

1. Vail D, Thamm D, Liptak J, eds. Withrow and MacEwen's Small Animal Clinical Oncology. 6th ed. Elsevier Health Sciences; 2019.
2. Kiselow MA, Rassnick KM, McDonough SP, et al. Outcome of cats with low-grade lymphocytic lymphoma: 41 cases (1995–2005). J Am Vet Med Assoc. 2008;232(3):405-410. doi:10.2460/javma.232.3.405
3. Paulin MV, Couronné L, Beguin J, et al. Feline low-grade alimentary lymphoma: an emerging entity and a potential animal model for human disease. BMC Vet Res. 2018;14(1):306-324. doi:10.1186/s12917-018-1635-5
4. Weiss AT, Klopfleisch R, Gruber AD. T-cell receptor γ chain variable and joining region genes of subgroup 1 are clonally rearranged in feline B- and T-cell lymphoma. J Comp Pathol. 2011;144(2-3):123-134. doi:10.1016/j.jcpa.2010.08.001
5. Hammer SE, Groiss S, Fuchs-Baumgartinger A, et al. Characterization of a PCR-based lymphocyte clonality assay as a complementary tool for the diagnosis of feline lymphoma. Vet Comp Oncol. 2017;15(4):1354-1369. doi:10.1111/vco.12277
6. Wright KZ, Hohenhaus AE, Verrilli AM, et al. Feline large-cell lymphoma following previous treatment for small-cell gastrointestinal lymphoma: incidence, clinical signs, clinicopathologic data, treatment of a secondary malignancy, response and survival. J Feline M Surg. 2019; 29(4): 353-362. doi:10.1177/1098612X18779870
7. Finotello R, Vasconi ME, Sabattini S, et al. Feline large granular lymphocyte lymphoma: An Italian Society of Veterinary Oncology (SIONCOV) retrospective study. Vet Comp Oncol. 2018;16(1):159-166. doi:10.1111/vco.12325
8. Collette SA, Allstadt SD, Chon EM, et al. Treatment of feline intermediate- to high-grade lymphoma with a modified university of Wisconsin–Madison protocol: 119 cases (2004–2012). Vet Comp Oncol. 2016;14(suppl 1):136-146. doi:10.1111/vco.12158
9. Gouldin ED, Mullin C, Morges M, et al. Feline discrete high-grade gastrointestinal lymphoma treated with surgical resection and adjuvant CHOP-based chemotherapy: retrospective study of 20 cases. Vet Comp Oncol. 2017;15(2):328-335. doi:10.1111/vco.12166
10. Williams LE, Pruitt AF, Thrall DE. Chemotherapy followed by abdominal cavity irradiation for feline lymphoblastic lymphoma. Vet Radiol Ultrasound. 2010;51(6):681-687. doi:10.1111/j.1740-8261.2010.01723.x
11. Gieger TL, Seiler GS, Nolan MW. Treatment of feline gastrointestinal intermediate- or large-cell lymphoma with lomustine chemotherapy and 8 Gy abdominal cavity radiation therapy. J Feline Med Surg. 2021;23(6):469-476. doi:10.1177/1098612X20959602



NEW

70% OF THE IMMUNE SYSTEM IS ACTIVE IN THE GASTROINTESTINAL TRACT (GIT)[5]

REINFORCING INTESTINAL HEALTH

- Inhibits intestinal growth of *E.coli, Salmonella* spp. and clostridia;[2]
- Increases beneficial bacteria within GIT;[1]
- And enhances mucosal immunity.[3,4]

PROBIVET

For more information, speak to your Sales Representative.

Reg. No. V30518 Act 36/1947
Registraton Holder: Ascendis Vet (Pty) Ltd. Reg. No. 2001/017471/07
31 Georgian Crescent East, Bryanston, Johannesburg, 2191. **Tel:** 0108800778 E -mail: vet-info@ascendishealth.com PRO.20.04/1

PROBIVET | Ascendis ANIMAL HEALTH

REFERENCES:
1. Pinna, C. & Biagi, G. (2012) The utilisation of prebiotics and synbiotics in dogs. *Italian Journal of Animal Science*, 13:1, 3107, pp. 169-178. doi: 10.4081/ijas.2014.3107
2. Benyacoub, J. Czarnecki-Maulden, G.L. Cavadini, C. Sauthier, T. Anderson, R.E. Schiffrin, E.J. & von der Weid, T. (2003) Supplementation of food with Enterococcus faecium (SF68) stimulates immune functions in young dogs. *The Journal of Nutrition*, 133:4, pp. 1158-1162. https://doi.org/10.1093/jn/133.4.1158
3. Raa, J. (2015) Immune modulation by non-digestible and non-absorbable beta-1,3/1,6-glucan. *Microbial Ecology in Health and Disease*, 26:1, 27824. doi: 10.3402/mehd.v26.27824
4. Stier, H. Ebbeskotte, V. Gruenwald, J. (2014) Immune-modulatory effects of dietry Yeast Beta-1,3/1,6-D-glucan. *Nutrition Journal*, 13:38. doi: 10.1186/1475-2891-13-38
5. Wortinger, A. (2010) Nutrition know-how: prebiotics and probiotics: what they can do for dogs and cats. Retrieved from *Yardley, USA, Veterinary Learning Systems Inc.* website: https://www.vetlearn.com/veterinary-technician

Ocular Neoplasia in Dogs

Dr Izak Venter
BVSc, MMedVet (Ophthal)
Digital Veterinary Ophthalmology Services
www.dvos.co.za
Facebook DVOS VETS

Ocular neoplasia is a serious condition and may lead to blindness, discomfort, tissue destruction, and metastasis. Primary ocular neoplasia is more common than secondary neoplasia. Secondary neoplasia most likely affecting intraocular structures.

Periocular skin and eyelid margin neoplasia

In contrast to cats, horses, and cattle, the canine eyelids exhibit many different neoplasms that are fortunately, for the most part, locally minimally invasive and respond to well to conservative surgical procedures. Distinct metastasis from eyelid neoplasms in dogs has not been reported. Periocular skin and lid margin tumors must be distinguished from conjunctival neoplasms, which tend to be locally invasive and often recur after attempts of surgical excision and may metastasize.

Neoplasia more likely to affect the periocular skin include canine cutaneous histiocytoma, melanocytoma, adenoma and viral papilloma. While some neoplasms, for example histiocytoma or viral papilloma may regress spontaneously, others may require surgical intervention. Most eyelid tumours occur primarily in dogs over 10 years old, and no gender predisposition has been reported. The upper lid is affected slightly more often than the lower lid.

The meibomian glands of the eyelid margin are the adnexal structure most frequently affected by neoplasia, representing 44–70% of eyelid neoplasms. Histologically, meibomian gland neoplasms can be categorised as adenomas, epitheliomas and carcinomas. Clinically these tumours have the same appearance. They are first noticed erupting though the eyelid margin or the palpebral conjunctiva just behind the eyelid margin. They may be pink or have varying degrees of pigmentation and may appear as multiple lobes. They can cause local irritation resulting in blepharospasm, epiphora, conjunctival hyperaemia, corneal vascularization, pigmentation and possible corneal ulceration. [Figure 1]

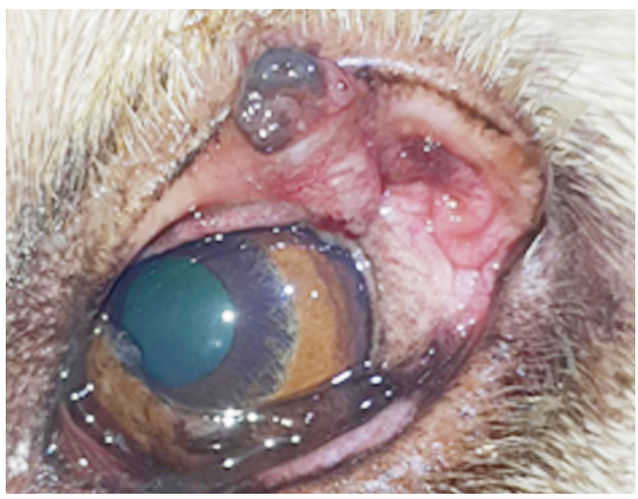


Figure 1: *Tarsal adenoma of the upper eyelid. The neoplasm is visible protruding through the palpebral conjunctiva.*

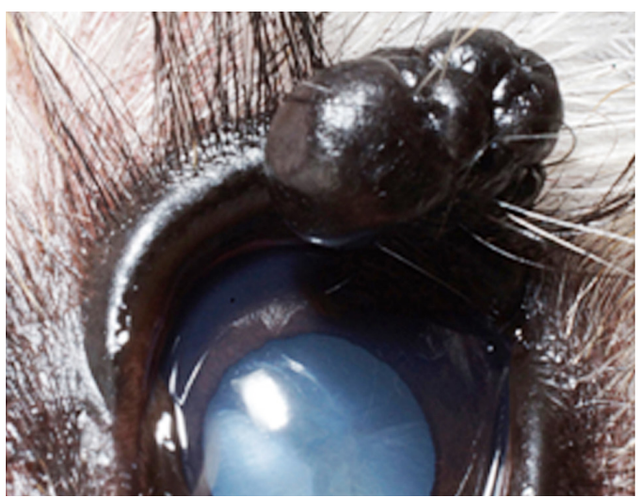


Figure 2: *Large eyelid melanoma in upper eyelid arising form the pigmented eyelid margin.*

Eyelid melanomas are the second-largest group of tumours affecting the eyelid and appear as two distinct types. One type arises from the eyelid skin and is usually a single or multiple pigmented mass, figure 2. The second type arises from the pigmented eyelid margin and tends to expand to both directions. These melanomas behave more benignly than melanomas in the mouth or other sites.

Most eyelid tumours are typically surgically removed, sometimes adjunctive therapy such as cryotherapy, radiation therapy, chemotherapy, or immunotherapy may be required. In general, eyelid neoplasms should be removed early, when the resultant surgical defect is small. For smaller tumours involving less than a quarter of the length of the eyelid margin, a full-thickness wedge resection with closure using a figure of 8 suture pattern should be used. Larger masses require more complicated procedures involving some form of blepharoplasty.

Squamous cell carcinomas may involve the eyelids of all species but is especially common in poorly pigmented areas of the eyelids in horses, cattle, and cats. Squamous cell carcinoma of the eyelids is not that common in dogs but are seen in patients with unpigmented eyelids after long standing solar blepharitis. SCC is very infiltrative and may metastasize to regional lymph nodes, but rarely to more distant sites.

Due to the infiltrative nature these tumours need to be surgically removed with wide margins which makes it very difficult in eyelids. The best approach is prevention rather than cure. Solar radiation may lead to blepharitis in animals that lack pigment in the eyelids. These animals are predisposed to the development of squamous cell carcinomas.

Clinical signs of solar blepharitis include erythema, ulcerations of the eyelid margin and epiphora. To prevent SCC from developing early treatment of solar blepharitis is justified. This includes applying regular application of sunscreen, topical corticosteroids or eyelid tattooing.

Most eyelid tumours are typically surgically removed, sometimes adjunctive therapy such as cryotherapy, radiation therapy, chemotherapy, or immunotherapy may be required. In general, eyelid neoplasms should be removed early, when the resultant surgical defect is small.

For smaller tumours involving less than a quarter of the length of the eyelid margin, a full-thickness wedge resection with closure using a figure - of - 8 suture pattern should be used. Larger masses require more complicated procedures involving some form of blepharoplasty.

Conjunctival neoplasia

Melanomas, squamous cell carcinomas, mast cell tumours, haemangiomas, hemangiosarcomas papillomas, lymphosarcomas, histiocytomas and transmissible venereal tumours all may affect the canine conjunctiva.

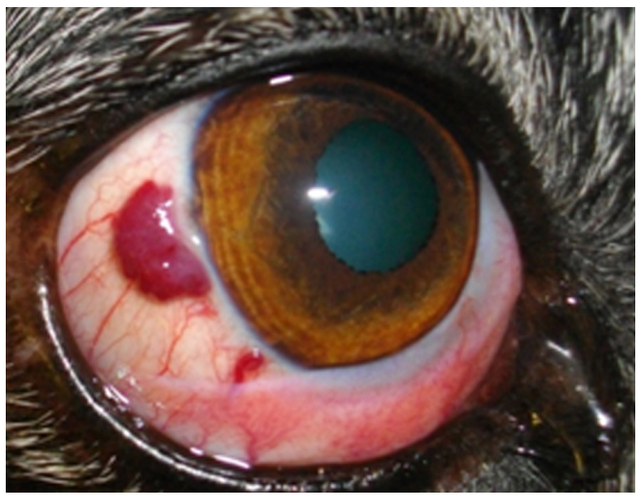


Figure 3: *Conjunctival haemangioma present in the temporal bulbar conjunctiva.*

Figure 4: *Large conjunctival hemangiosarcoma infiltrating the cornea.*

- Conjunctival melanomas most commonly involve the third eyelid, but they may also originate from the upper palpebral conjunctiva. These tumours tend to be malignant with recurrences and metastasis common. Wide surgical excision followed by cryotherapy is recommended. In extensive cases exenteration may be indicated. The prognosis for life and for the globe in conjunctival melanoma is guarded. The confirmed metastasis rate has been reported as 17%, even after aggressive surgical intervention.
- Conjunctival mast cell tumours present clinically as smooth, firm subconjunctival masses. Mast cell tumours can arise from the bulbar or palpebral conjunctiva or the third eyelid. There may be a history of intermittent swelling and redness of the conjunctiva. These tumours are easily diagnosed via fine needle aspirate. Surgical excision is usually curative and conjunctival mast cell

tumours have a low risk of recurrence and are unlikely to metastasize.

- Conjunctival haemangiomas and hemangiosarcoma tend to occur at the nonpigmented, leading edge of the third eyelid as well as the temporal bulbar conjunctiva. Haemangiomas stays confined to the conjunctiva but hemangiosarcoma of the conjunctiva can infiltrate the cornea. The conjunctival masses are bright red fluctuant well circumscribed massed. Corneal infiltration is characterised by corneal oedema, vascularization and a raised dark red corneal mass. [Figure 3 & 4]. There is a breed predisposition in collie breeds and there is also an increased risk of tumour development with increased UV exposure. Surgical resection is usually curative. According to unpublished reports corneal haemangiomas and conjunctival haemangiomas and hemangiosarcomas cases have been treated successfully with subconjunctival bevacizumab [Avastin] a drug routinely used to treat age-related macular degeneration in humans.

Third eyelid neoplasia

Neoplasia of the third eyelid is uncommon in the dog. Melanomas, adenomas, adenocarcinomas, squamous cell carcinomas, haemangiomas, hemangiosarcomas and lymphosarcoma have all been reported.

Adenocarcinoma of the third eyelid is the most common of the possible third eyelid neoplasms. They are localized, firm, smooth, pink swellings that appear to involve the gland. A possible differential diagnosis would be a prolapse of the gland of the third eyelid. Adenomas and adenocarcinomas are typically seen in older dogs compared to prolapsed glands which occur in young dogs. Removal of the entire third eyelid is currently the recommended treatment. Post operative treatment with hyaluronic acid eyedrops is indicated to treat possible quantitative as well as qualitative keratoconjunctivitis sicca that may result from the removal of the tear gland of the third eyelid.

Cornea/sclera

Limbal melanomas appear clinically as darkly pigmented masses arising from the limbus and expanding into the adjacent cornea and sclera. Limbal melanomas are presumed to arise from the melanocytes that demarcate the limbus at the junction of the corneal stroma and sclera. They are typically benign neoplasms, but they may invade the cornea or intraocular structures. These tumours are usually smooth and pigmented lesions. [Figure 5]. Limbal melanomas in dogs occur in two age groups.

In the younger group, 2–4 years of age, the tumours tend to be invasive, with a history of rapid growth. In the older group, 8–11 years of age, the tumours are more likely to be static and found incidentally on physical examination.

Primary limbal melanomas must be differentiated from external extension of intraocular uveal melanomas. Complete intraocular examination and gonioscopy should be performed to differentiate between primary intraocular tumours and those originating from the sclera. In older dogs with nonprogressive limbal masses, periodic surveillance appears to be adequate. Treatment of limbal melanomas should be considered for dogs in which the mass is enlarging and includes lamellar or full-thickness excision and replacement with grafting procedures.

Primary corneal squamous cell carcinoma [SCC] occurs in the dog when the neoplastic mass arises directly from the cornea. Primary corneal squamous cell carcinoma appears as a raised, multilobulated, pink to white mass. [Figure 6] SCC occur more often in corneas with chronic keratitis. The prognosis for life with corneal squamous cell carcinoma is

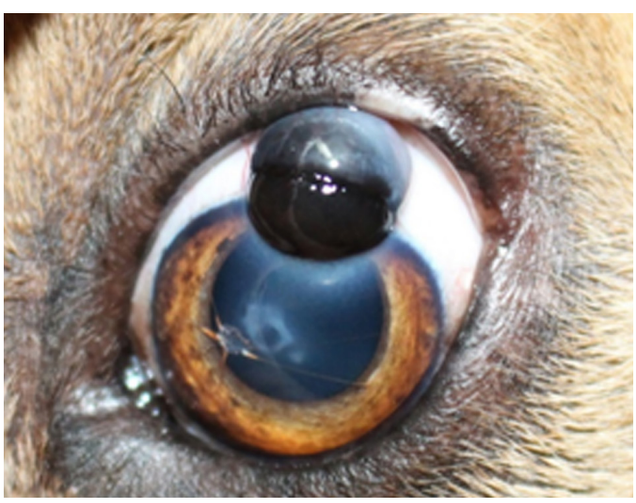


Figure 5: *Limbal melanoma infiltrating both the cornea and sclera.*

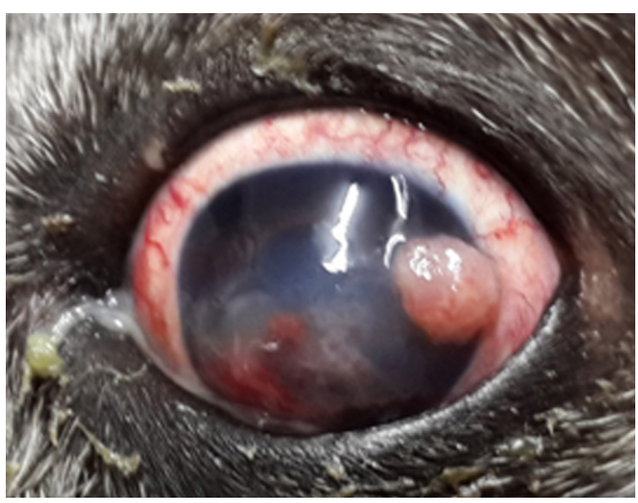


Figure 6: *Corneal SCC in the temporal cornea. This patient also has concurrent superficial keratitis of especially the ventromedial aspect of the cornea.*

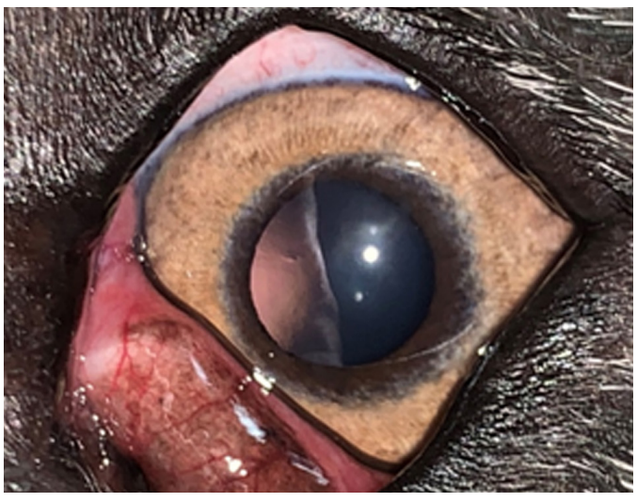


Figure 7: *Ciliary body adenoma visible in the pupil. Based on clinical findings alone this may also be an amelanotic melanoma.*

good. The prognosis for the globe is dependent on early detection and surgical intervention. Early surgical excision by keratectomy is recommended.

Anterior uveal tumours

Intraocular tumours are relatively uncommon in the dog. The tumours may be primary or secondary from metastatic disease or local invasion. The great majority of primary intraocular tumours have their origin in the anterior uvea. Tumours must be differentiated from other intraocular masses, including iris cysts and granulomatous lesions. Diagnosis is based on findings from complete ophthalmic and physical examinations and whether the masses are unilateral or bilateral, singular, or multiple, raised or flat, and stationary or changing in appearance. Tumours are typically solid, raised and change in appearance.

Primary anterior uveal neoplasia

Intraocular melanocytic tumours are most common in older dogs with a mean age of around 9 years. A colour change or mass effect in the dog's eye may be the first abnormality observed, or changes may go unnoticed until secondary uveitis or glaucoma develops. Another possible first presenting sign is thinning of the sclera with a pigmented mass visible expanding into the sclera.

Neoplastic melanocytes or melanophages are often free-floating in the anterior chamber, and their obstruction of the filtration angle may contribute to secondary glaucoma. Anterior uveal melanocytic neoplasms may appear as a mass in the iris and extending into the anterior chamber or as a mass posterior to the iris that anteriorly displaces the iris face leading to a shallow anterior chamber. Melanomas in dogs tend to produce nodular growth rather than diffuse infiltration, as is seen in cats. Masses are typically heavily pigmented but may be nonpigmented.

Anterior uveal melanomas may be locally invasive, and they may extend to involve the choroid, sclera, filtration angle, cornea, and orbit. Lens sub luxation may also occur because of displacement by the mass.

Severity of intraocular destruction has been used as a sole indicator of malignancy; however, most canine anterior uveal melanomas, though frequently invasive, do not conform with the strictest definition of malignancy, which includes metastasis.

Most tumours arising from the anterior uvea grow expansively rather than invasively and occupy the filtration angle and deep stroma of the peripheral cornea and sclera. Malignant melanomas tend to be less pigmented and comprise 20% of intraocular melanocytic tumours.

Metastasis occurs hematogenously and typically involves the thoracic and abdominal viscera. Metastasis may be more likely when extraocular extension or glaucoma is present. The metastatic rate for uveal melanomas in dogs has been reported to be between 4% and 10%. The overall low risk of metastasis of canine uveal melanomas and unproven efficacy of enucleation at preventing metastasis makes the decision to remove normotensive non-inflamed visual eyes difficult. In general enucleation is recommended as the treatment of choice once secondary glaucoma is present.

Iridociliary epithelial tumours are the second-most common primary intraocular tumour in the dog. These tumours arise from either the epithelial cells of the iris or ciliary body. They appear clinically as segmental or non-segmental and invasive or non-invasive. The incidences of adenoma (benign) and adenocarcinoma (potentially malignant) are approximately equal.

The clinical presentation may appear similar to that of melanoma. The tumours may extend through the pupil or invade the iris, but adenomas are more often limited to the ciliary body. Adenocarcinomas, on the other hand, are typically more invasive, may extend through the iris base or pupil, and may metastasize. [Figure 7]. The prognosis for life with ciliary body adenomas and adenocarcinomas is good, although the prognosis for the globe is poor as enucleation is required in most cases due to the development of secondary glaucoma.

Secondary ocular neoplasia

The hematogenous route is essential for neoplastic metastasis to the eyes, therefore the uveal tract is the most common location of ocular metastasis. To metastasize to the eyes, extraocular systemic neoplasms must reach the general circulation first. The main secondary neoplasms affecting the eyes of the dogs were lymphoma and mammary gland carcinoma. Neoplasms may also invade the eye by local extension

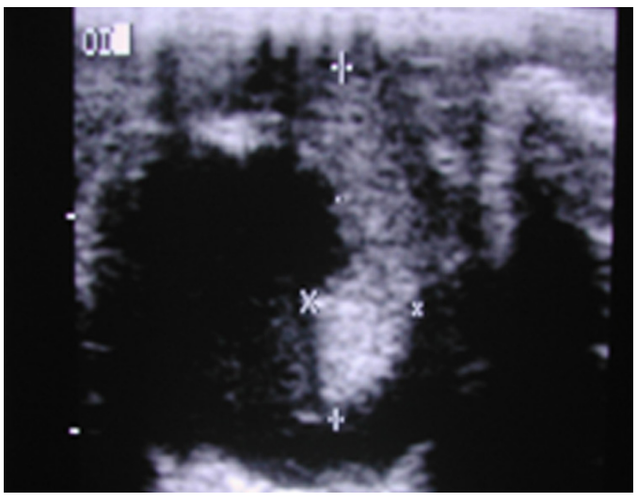


Figure 8: *Ciliary body neoplasm visible on ultrasound in patient presenting with hyphema.*

from the ocular adnexa, cornea, orbit, paranasal sinuses, or nasal cavity.

Secondary neoplasms often have similar clinical presentations, regardless of the histopathologic type. Secondary neoplasms may be more likely to occur bilaterally than primary ocular neoplasms. Dogs with secondary ocular neoplasms may have obvious concurrent systemic disease or signs may be limited to the eyes. Ocular signs include anterior uveitis, hyphema, and glaucoma. Neoplasia should always be considered in patients with hyphema of undetermined etiology. Ocular ultrasound is the diagnostic modality of choice in these patients. [Figure 8]

Mammary gland carcinoma is the most common secondary neoplasm among bitches. In one study 17.2% of bitches had eye involvement. from a systemic metastatic disease, with a multifocal, obliterating distribution within blood. The clinical signs and approach are similar to ocular lymphosarcoma.

Ocular Lymphosarcoma

Ocular signs are seen commonly with lymphosarcoma. The reported incidence of ocular involvement with lymphosarcoma has been reported as 37%. The high incidence of ocular signs makes ocular disease the second-most common clinical sign of lymphoma second to lymphadenopathy.

With the high incidence of ocular signs and because ocular lymphoma can mimic inflammation, lymphoma should be considered as a differential for anterior uveitis even in the absence of lymphadenopathy. Additional ocular signs include conjunctival infiltrates, corneal infiltrates, hyphema, hypopyon, intraretinal and subretinal haemorrhages, and glaucoma. Corneal lesions typically start with corneal oedema and vascularisation, followed 2–3 weeks later by peri-limbal corneal infiltrates of neoplastic lymphocytes. It has been reported that the cornea may be affected in up to 20% of cases.

Diffuse large B-cell lymphoma is considered the most frequent histological subtype in dogs, followed by T-lymphoblastic and peripheral T-cell lymphoma.

Histopathologic examination is necessary to confirm the diagnosis. Histopathology should be performed on all enucleated eyes. Fine needle aspiration of intraocular masses has not been routinely used in veterinary ophthalmology. The reason being the vascularity of the canine iris possibly leading to severe hyphema.

References

1. Amber L. Labelle, Philippe Labelle. Canine ocular neoplasia: a review. Veterinary Ophthalmology (2013) 16, Supplement 1, 3–14
2. Kirk N. Gelatt, Brian C. Gilger, Thomas J. Kern. Veterinary Ophthalmology 5th Edition. A John Wiley & Sons, Inc., Publication.
3. Marcele Bettim Bandinelli, Matheus Viezzer Bianchi, Júlia Gabriela Wronski, et al. Ophthalmopathologic characterization of multicentric or metastatic neoplasms with an extraocular origin in dogs and cats. Veterinary Ophthalmology. 2020; 23: 814–827.
4. Susette M. Aquino. Management of Eyelid Neoplasms in the Dog and Cat. Clin Tech Small Anim Pract 2007; 22: 46-54

CPD Questions

CPD Questions and AC number available
https://bit.ly/CPDvet360

Go to www.vet360.vetlink.co.za or download the new Vet360 App to answer the questions
CPD reserved for Vet360 subscribers (R360 per annum) Call 012 346 1590 or visit www.vet360.vetink.co.za to sign up

1. **Which one characteristic regarding canine peri-ocular and eyelid tumours listed below is INCORRECT?**
a. Most canine eyelid tumours are minimally invasive.
b. Canine eyelid tumours are easily distinguished from conjunctival tumours.
c. Metastasis from canine eyelid tumours is unlikely.
d. Most eyelid tumours occur in dogs over 10 years old.
e. Some eyelid tumours may regress spontaneously .

2. **Which one of the statements regarding canine eyelid tumours is INCORRECT?**
a. The meibomian glands of the eyelid margin are the adnexal structure most frequently affected by neoplasia.
b. Histologically these neoplasms can be categorised as adenomas, epitheliomas and carcinomas.
c. Carcinomas are be more likely to be ulcerated in clinical appearance.
d. Meibomian gland tunours can cause local irritation.
e. For smaller tumours involving less than 25% of the eyelid margin, a full-thickness wedge resection should be used.

3. **Which one of the statements regarding squamous cell carcinoma (SCC) in the eyelids of dogs is INCORRECT?**
a. Squamous cell carcinoma of the eyelids is not that common in dogs.
b. SCC is seen in patients with unpigmented eyelids after long standing solar blepharitis.
c. SCC is very infiltrative and may metastasize to regional lymph nodes and distant sites.
d. Clinical signs of solar blepharitis include erythema and ulcerations of the eyelid margin.
e. Prevention of solar blepharitis includes topical corticosteroids eyedrops or eyelid tattooing.

4. **Ultraviolet radiation to the eyelids and eye structures can cause disease. Which one of the conditions listed below is NOT linked to UV exposure.**
a. Haemangioma
b. Haemangiosarcoma
c. Solar blepharitis
d. Melanoma
e. Squamous cell carcinoma

5. **Which one of the statements below regarding tumours of the third eyelid is INCORRECT?**
a. Neoplasia of the third eyelid is uncommon in the dog.
b. Conjunctival melanomas most commonly involve the third eyelid.
c. Melanomas, adenomas, adenocarcinomas, squamous cell carcinomas and haemangiomas, have all been reported.
d. Adenocarcinoma of the third eyelid is the most common of the possible third eyelid neoplasms.
e. Prolapse of the gland of the third eyelid (cherry eye) is an important differential for an adenoma of the third eyelid.

6. **Melanoma is a tumour which frequent affects the eye and related structures. Which one of the following statements is CORRECT?**
a. Melanomas affecting the eyelid structure are uncommon.
b. Conjunctival melanomas are malignant.
c. Limbal melanomas in older dogs are typically invasive and metastatic.
d. Uveal melanomas have a high metastatic rate.
e. Melanomas affecting the eye are typically non-pigmented.

7. **Conjunctival haemangiomas and hemangiosarcoma occur in the dog. Which one of the statements listed below is INCORRECT?**
a. Conjunctival haemangiomas and hemangiosarcoma tend to occur at the nonpigmented, leading edge of the third eyelid as well as the temporal bulbar conjunctiva.
b. Collie breeds are predisposed.
c. Haemangiomas stay confined to the conjunctiva but hemangiosarcoma can infiltrate.
d. The conjunctival masses are bright red fluctuant well circumscribed massed.
e. Enucleation is required for cure.

8. **Which one of the following statements regarding limbal melanomas in dogs is INCORRECT?**
a. Limbal melanomas appear clinically as darkly pigmented masses.
b. They may invade the cornea or intra-ocular structures.
c. They are typically benign neoplasms.
d. In younger dogs the growth is more benign than in older dogs.
e. Enucleation is the method of choice for cure.

9. **Which one of the following statements regarding ciliary tumours in the dog is INCORRECT?**
a. Iridociliary epithelial tumours occour commonly in dogs
b. The incidences of adenoma (benign) and adenocarcinoma (potentially malignant) are approximately equal.
c. Iridociliary adenocarcinoma has a high incidence of metastasis
d. The clinical presentation may appear similar to that of melanoma.
e. The tumours may extend through the pupil or invade the iris.

10. **Which one of the following statements regarding ocular lymphoma in dogs is INCORRECT?**
a. Systemic lymphoma should be considered as a differential for anterior uveitis even in the absence of lymphadenopathy.
b. A solid uveal mass seen through the pupil is typical with ocular lymphoma
c. Ocular signs are seen commonly with lymphosarcoma.
d. Ocular lymphoma can mimic inflammation
e. B cell lymphoma is most commonly implicated in ocular lymphoma.

Turning the world of Metronidazole

upside down

Pharmapack Awards 2018

METRONIDAZOLE LIQUID SUSPENSION
Flexible dose

EASILY ADMINISTERED
Pharmapack Awards Winner

2 SIZES FOR ALL DOGS
30 ml and 100 ml

WELL ACCEPTED[6] BY DOGS
Flavoured

NEW

Flavoured Liquid Suspension Metronidazole for Dogs!

With the award-winning smart cap for accurate dosing and protected administration!

Eradia®

FOCUS ON METRONIDAZOLE

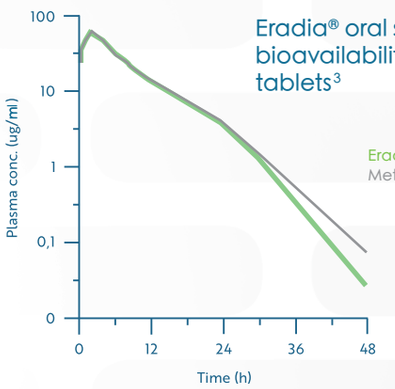
Chronic diarrhoea can have different origins and may respond to antibiotics like metronidazole [1]

136 dogs with chronic or persistent diarrhoea

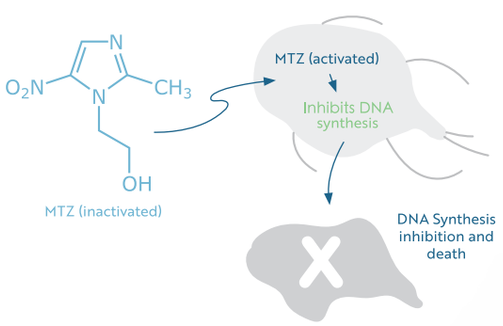
PRIMARY ENTEROPATHY **90 %**

- Other e.g. Neoplastic
- Chronic Inflammatory Enteropathy **71 %**
  - Dietary responsive
  - Antibiotic responsive
  - Inflammatory Bowel Disease
- Infectious **13 %**
  - E.g. Giardia, Clostridia, Mixed Infection

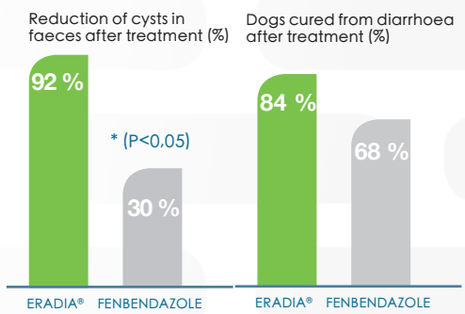
ERADIA® : A METRONIDAZOLE-BASED ORAL SUSPENSION



Metronidazole is active specifically against micro-organisms: Giardia, obligate anaerobic bacteria [2]



Eradia® oral suspension is efficient in decreasing cyst excretion and curing diarrhoea in Giardia infected dogs [4]



Metronidazole & fenbendazole: 50 mg/kg/day as recommended.

73 dogs treated with Eradia®

58 dogs treated with fenbendazole

VERY SATISFYING ACCEPTABILITY [5] **100 %** intake **80 %** total consumption

REFERENCES

(1) Volkmann M, Steiner JM, Fosgate GT, Zentek J, Hartmann S, Kohn B. Chronic Diarrhea in Dogs – Retrospective Study in 136 Cases. Journal of Veterinary Internal Medicine. 2017;31(4):1043-1055. (2) Samuelson J. Why Metronidazole Is Active against both Bacteria and Parasites. Antimicrobial Agents and Chemotherapy. 1999;43(7):1533-1541. (3) Pellet T, Toutin C, Fournel S, Gruet P. Bioequivalence study between an oral suspension and a tablet formulation of metronidazole following a single oral administration in dogs. EAVPT congress 2018. (4) Faure L, Fournel S, Nicolas C, Rigaut D. A Field Clinical Study to Confirm the Efficacy & Safety of a Metronidazole-based Oral Suspension in Dogs Naturally Iinfested byGiardiasis: Comparison to Fenbendazole. IJARVM 2018. (5) Nicolas CS, Martins F, Pujol C. Evaluation of palatability of a metronidazole-based oral suspension in dogs when poured on the food and at different stages of shelf-life. In: Proceeding of the 5th World Congress on Advanced Clinical Trials and Clinical Research. J Clin Trials. 2018;8:45.
(7) Nicolas CS, Martins F, Pujol C. Evaluation of palatability of a metronidazole-based oral suspension in dogs when poured on the food and at different stages of shelf-life.

Virbac (Pty) Ltd (Reg. No: 1990/003743/07) Private Bag X115, Halfway House 1685. T (012) 657-6000 | F (012) 657-6067. za.virbac.com

Shaping the future of animal health

Virbac

Electrochemotherapy
in Veterinary Oncology

Dr Anri Celliers
BSc, BVSc (Hons), MMedVet (Med)
Small Animal Internal Medicine Specialist
Tel +27 (0)12 529 8302
Email: anri.celliers@up.ac.za

What is electrochemotherapy?

Electrochemotherapy (ECT) is themethod of using electric pulses to increase the permeability of cancer cells to specific chemotherapy agents. It has been shown to be a safe and effective technique that is easy to administer and cost-effective. ECT is mainly recommended for the treatment of solid tumours for which surgery or radiotherapy is either not an option or is declined by pet owners.

How does it work?

The cell membrane functions as a barrier to the influx of hydrophilic drugs, peptides and macromolecules which can make tumour cells resistant to the effects of certain chemotherapy agents. Through a technique called electroporation,this barrier can be overcome by the local application of a short intensive electric field which creates aqueous pores (electropores) within the cell membrane. This allows cells to become temporarily permeable to substances that would ordinarily not be able to cross the cell membrane into the cytoplasm. Poorly or non-permeant hydrophilic chemotherapeutic drugs such as bleomycin and cisplatincan achieve high intracellular concentrations leading to enhanced cytotoxic effects with potent antitumour effects.

In combination with electric pulse delivery, only low doses of these drugs are required while still resulting in good local tumour control with minimal systemic cytotoxicity.

The electrical pulses also induce a transient decrease in local blood flowafter its application by causing vasoconstriction, thereby "trapping" the chemotherapy drug that has already been absorbed by the tumour tissue in the treatment area.

The resultant vasoconstriction also limits bleeding from the treatment area which is particularly important in tumours that are prone

Figure 1: *OnkoDisruptor® pulse generator*

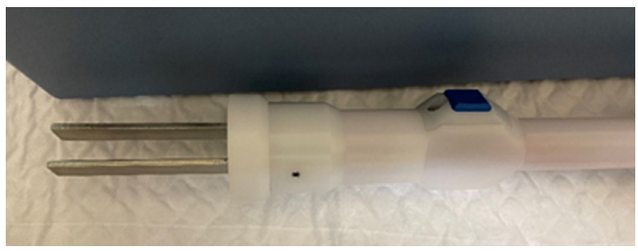


Figure 2: *Plate electrodes*

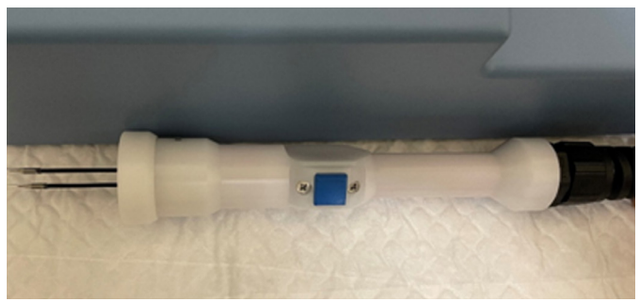


Figure 3: *Penetrating electrodes*

to bleeding. Necrosis and apoptosis of tumour cells caused by ECT further upregulates the cytotoxic immune response against surviving tumour cells.

Bleomycin, cisplatin, doxorubicin and mitoxantrone are chemotherapeutic agents that have shown increased efficacy when used together with electroporation techniques. These drugs are administered intravenously or intratumourally before electric pulses are applied directly to the tumour.

Several pulse generators such as the OnkoDisruptor®, Cliniporator® and the ELECTROvet EZ® are commercially available. The pulses that are generated can differ in electrical shape, amperage, voltage, interpulse duration and frequencyand is programmed into the pulse generator.The permeabilising protocol used, depends on the tumour histiotype, tumour size and previous treatmentsgiven. Two typicaltypes of electrodes are used for electroporation: non-penetrating plate electrodes and penetrating needle row electrodes. The type of electrode chosen depends on each individual tumour. Plate electrodes work well for superficial tumours while penetrating electrodes are used for deeper tumours which allows an electric field to be distributed evenly – throughout theentire tumour.

Applications of ECT in veterinary oncology

In veterinary oncology, ECT can be used as first-line treatment of solid and certain visceral tumours. It can be used in a palliative, adjuvant or neoadjuvant treatment setting. ECT can also be performed intraoperatively with concurrent surgery or using ultrasound guidance for treatment of deep-seated tumours. In dogs and cats, ECT is mainly used for treatment of cutaneous, subcutaneous and oral tumours. It has also been used successfully in horses for treatment of sarcoid and in a bearded dragon for an oral fibrosarcoma.

In general, the response rate is better for smaller tumours (less than 2 cm^3) than larger tumours. In humans it was found that patients previously treated with radiotherapy or chemotherapy had a lower response rate to ECT.

Adverse effects are rarely encountered and often mild in nature. Initial local inflammation and necrosis can be expected after treatment. Tumour lysis syndrome is a risk when large tumours are treated due to rapid cell death.

Canine tumours

Soft tissue sarcoma

Several studies have made use of ECT with intralesional bleomycin or a combination of intralesional cisplatin with intravenous bleomycin for the treatment of incompletely excised soft tissue sarcomas. It has also been used as neoadjuvant treatment to shrink the tumour mass to enable surgical excision. Median time to recurrence in these studies ranged between 703 –857 days. Treatment appeared to be well tolerated and highly effective.

Perianal and anal sac tumours

Perianal tumours are often challenging to treat surgicallydue to the need of preservation of healthy anatomical structures in that area and the often-infiltrative nature of these tumours. Intralesional bleomycin in combination with ECT was used in one study for the treatment of hepatoid gland adenomas and carcinomasand resulted 91% overall response ratewith

83% of dogs attaining a complete response. Another study using intralesional cisplatin and ECT in dogs with perianal adenomas and adenocarcinomas resulted in a 92% overall response rate with 65% of dogs achieving complete remission. Intravenous mitoxantrone-based ECT have also been used in a dog with apocrine gland carcinoma, resulting in tumour control for longer than six months. The use of ECT in an adjuvant setting and combination with surgical excisionhas been suggested to promote tumour control while preserving sensitive tissues in the perianal area.

Melanoma

In one study, the use of intralesional bleomycin-based ECT in the treatment of oral melanoma resulted in an 80% response rate with 40% of the patients that did respond showing tumour control for more than one year.

Mast cell tumour

ECT can be used as primary therapy or adjuvant therapy after surgical excision of mast cell tumours. A study using cisplatin-based intralesional ECT to treat incompletely excised grade II and grade III mast cell tumours, resulted in a 78% response rate with minimal local or systemic side-effects. Another study using intralesional bleomycin with ECT as an adjuvant treatment for incompletely excised mast cell tumours, showed a response rate of 85% and a mean survival time of 52.76 months.

Lymphoma

Bleomycin-based ECT has been used in a single study for the treatment of local lymphoma. Treatment was well-tolerated with clinical responses ranging from 1 week to 3 years. At this stage ECT is mainly used as palliative treatment for chemoresistant oral tumours.

Transmissible venereal tumour

Intralesional bleomycin-based ECT has successfully been used in cases of transmissible venereal tumour (TVT) that have been resistant to chemotherapy with first-line vincristine and second-line doxorubicintreatments.

Feline tumours

Soft tissue sarcoma

Several studies using intralesional or intravenous bleomycin-based ECT have resulted in stable disease or a median time to recurrence of 12 – 19 months. Another study using intralesional cisplatin resulted in local control with a mean time to recurrence of 666 days compared to 180 days in control cases. The most common side-effects noted were local inflammation and wound dehiscence.

Lymphoma

ECT has mainly been used in the treatment of local nasal and retrobulbar lymphoma. In one study, complete response rates of up to a 100% was achieved, with treatment being well tolerated despite it being used on sensitive tissues.

Squamous cell carcinoma

ECT is especially helpful in treating carcinomatous lesions in anatomically challenging areas such as the eyelid, periocular areaor oral cavity. In one study, intravenous bleomycin with ECT resulted in a median time to progression of 30.5 months compared to 3.9 months in control cases that received bleomycin alone. In another study using intralesional bleomycin and ECT, 77.7% of cases showed a complete response.

Additional uses of ECT

Ultrasound-guided ECT can be used for deeper-seated tumours such as thymoma, liver tumours or nasal tumours, using a single-needle electrode . In one study, 91% of dogs with various intranasal tumours, responded to ECT-based treatment. Endoscopic ECT has also successfully been performed in two dogs with rectal neoplasia.

ECT can also be used to transport genetic material into cells. Gene electrotransfer (GET)allows plasmid DNA encoding for a therapeutic gene to be transferred into cells via reversible electroporation. GET of plasmid DNA encoding interleukin-12(IL-12) has effectively been used in the treatment of canine cutaneous, subcutaneous and maxillofacial tumours and superficial cell carcinoma in cats. IL-12 has antitumour effects through activation of the acquired and innate immune systems, thereby promoting tumour cell death.

Take-home messages

ECT allows hydrophilic drugs with a narrow therapeutic index to obtain high intracellular cytotoxicity in tumour cells, while sparing healthy cells in the body from toxicity. Due to its efficacy, affordability, ease of use and low toxicity, ECT is becoming aviable adjunct or alternative to traditional cancer therapy.

References

1. Spugnini EP, Bladi A. Electrochemotherapy in veterinary oncology: State-of-the-art and perspectives. Veterinary clinics of North America 2019; 49: 967 – 979.
2. Impellizeri J, Aurisicchio L, Forde P, Soden DM. Electroporation in veterinary oncology. The veterinary journal 2016; 217: 18 – 26.
3. Cemazar M, Tamzali Y, Sersa G, Tozon N, Mir LM, Miklavcic D, Lowe R, Teissie J. Electrochemotherapy in veterinary oncology. Journal of veterinary internal medicine 2008; 22: 826 –831.
4. Spugnini EP, Vincenzi B, Citro G, Dotsinsky I, Mudrov T, Baldi A. Evaluation of cisplatin as an electrochemotherapy agent for the treatment of incompletely excised mast cell tumors in dogs. Journal of veterinary internal medicine 2011;25: 407 - 411.
5. Nemec A, Milevoj N, Tratar UL, Sersa G, Cemazar M, Tozon N. Electroporation-based treatments in small animal veterinary oral and maxillofacial oncology. Frontiers in veterinary science 2020; 7: article 575911.
6. Sersa G, Ursic K, Cemazar M, Heller R, Bosnjak M, Campana LG. Biological factors of the tumour response to electrochemotherapy: Review of the evidence and a research roadmap. European journal of surgical oncology 2021; 47: 1836 – 1846.

MALASEB™
MEDICATED SHAMPOO

Reg. No. G4202 Act 36/1947

MALASEB™ **is a medicated shampoo for cats and dogs. It contains chlorhexidine and miconazole in a shampoo base. It is registered to treat hot spots, dry itchy and symptoms associated with ringworm.**

Use ***MALASEB™*** twice a week when infection is active, then once every 1-2 weeks when infection is under control.

SEBORRHOEIC DERMATITIS

Seborrhoeic dermatitisis the scientific name for a skin infection involving both a combination of bacterial (Staphylococcus) and yeast (Malassezia). It is normal in dogs to have low numbers of resident bacteria and yeasts on the skin surface. When there is a disruption to the skin's natural ecosystem these bacteria and yeasts can overgrow causing disease.

Reasons for disruption to the natural balance:

- Allergy to pollens, grasses, foods (meats) and fleas.
- Parasites, such as fleas, mites and lice.
- Hormonal problems.
- Conformational problems such as deep skin folds, making sweaty crevices.

HOW DOES *MALASEB™* HELP?

- Kills the micro-organisms, helping to keep the numbers of yeasts and bacteria at manageable levels.
- Removes excess scale and oils, commonly produces when the skin is infected.
- Removes allergens such as pollens which can be caught in fur or on skin causing irritation.

DERMATOPHYTOSIS OR 'RINGWORM'

Dermatophytosis is the scientific name for ringworm, a condition which is not due to worms (like the name suggests) but is in fact a fungal infection.

Ringworm is the most common fungal condition in cats, however it is also a well recognised problem in dogs and horses. ***MALASEB™*** will help to sterilise the coat of ringworm spores, helping to speed recovery and prevent spread of the disease. Ringworm in cats is a systemic disease which means that although you may only see a few spots the cat is actually covered in ringworm infection and thus all over treatment is needed. ***MALASEB™*** can be used alone or in combination with systemic medication (usually anti-fungal tablets) to treat ringworm. Combination therapy results in a faster cure than either alone. It is important if you have young children or immune-compromised adults in the same household as an infected pet that you discuss this with your veterinarian or doctor. Ringworm can have serious consequences for those without a good immune system.

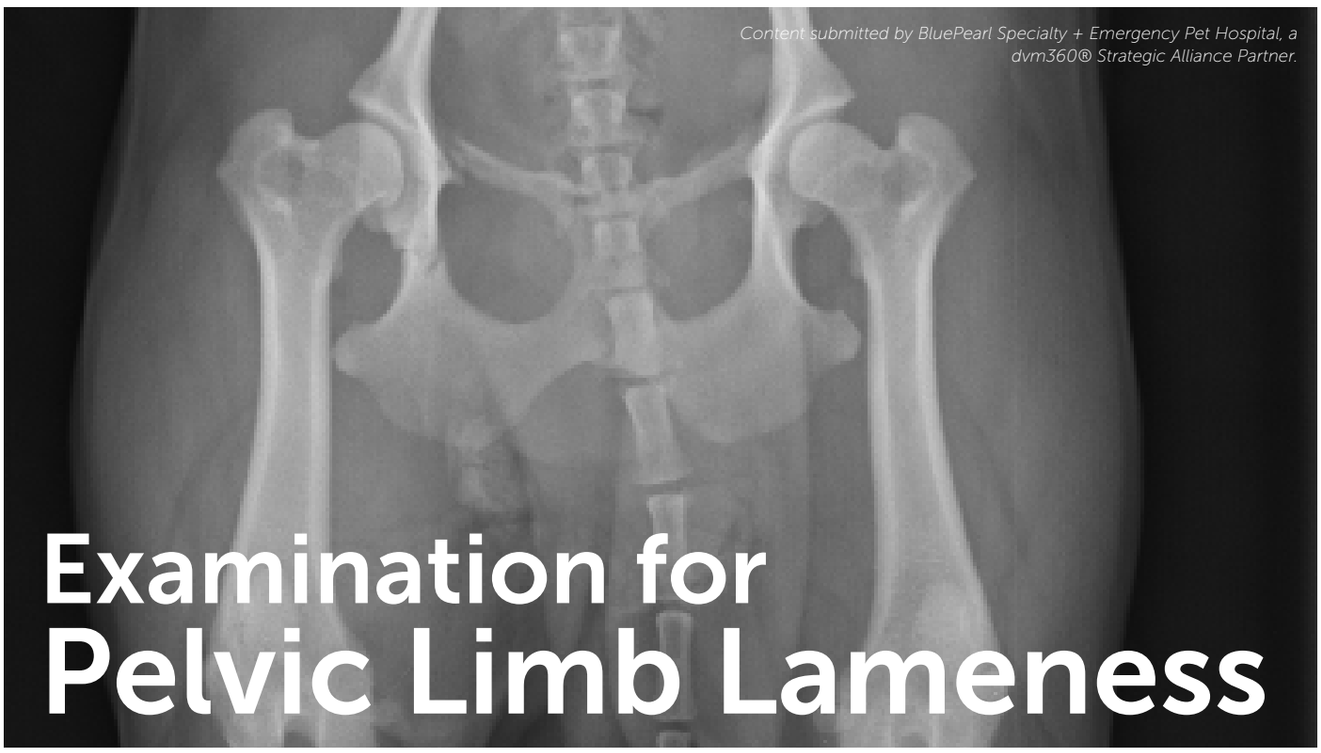
BATHING TIPS

- Leave the shampoo on for the full 10 minutes where ever possible.
- Always make sure the coat is thoroughly wet before applying ***MALASEB™***, as this will make lathering and spreading easier.
- Using a wet sponge can help to spread the shampoo well. The sponge also holds water which again helps to ensure the coat is adequately wet during application.
- A damp cloth, with a little diluted foam can be used to clean the face of both cats and dogs.
- Whilst bathing cats is never easy, many will tolerate water better if it is not running. Using a 3 bucket technique, where all buckets are filled with warm water can help. The cat is dunked (not including head) into the first bucket and shampoo applied, then wrapped in a towel for the 10 minutes to stay warm and prevent licking foam. Once the 10 minutes is up the cat is sequentially dunked into the foamy water then remaining buckets to rinse the coat.

MALASEB™ should be used twice a week during ringworm treatment. Treatment may be required for 8-12 weeks.

AECI ANIMAL HEALTH
dermcare VET THE SPECIALISTS IN SKIN CARE

DISTRIBUTED BY: AECI Animal Health
Chem Park, 200 Bergrivier Drive, Chloorkop Ext. 24, Gauteng
Telephone: +27 11 922 1973 | E-mail: Tshipane.nkwe@aeciworld.com
Website: www.aeciworld.com/animal-health



Content submitted by BluePearl Specialty + Emergency Pet Hospital, a dvm360® Strategic Alliance Partner.

Examination for Pelvic Limb Lameness

Sarah Round DVM, DACVS

The limping dog is one of the most common complaints I see as a veterinary surgeon. The goal of this article is to describe my approach to diagnosing the inciting cause for pelvic limb lameness in dogs.

Pre-exam preparations

I like to be prepared and have a differential list prior to putting my hands on the patient. The first thing I do is to review the patient's signalment and create four categories: small breed young, small breed old, large breed young, large breed old.

This helps narrow down differentials. For example, a juvenile, large-breed dog would more likely have hypertrophic osteodystrophy (HOD) over their small-breed counterpart or mature patients. On the other hand, an older, large-breed dog is more likely to have osteosarcoma than a juvenile patient.

These are obviously not hard and fast rules as I did recently diagnose proximal tibia osteosarcoma in a 2-year-old Rottweiler. I also make note of the breed of dog when evaluating signalment, as there are certain breeds that follow the textbook.
For example, German shepherd dogs are predisposed to panosteitits and gracilis contracture, and a Labrador retriever or a boxer with a pelvic limb lameness is more likely to have a cruciate tear than a greyhound with a pelvic limb lameness.

A thorough history

The next step before touching the patient is to review a thorough history. For instance, if the patient was hit by a car, then fractures would be high on the differential list regardless of age or breed. Aside from a major trauma, major questions are acute vs chronic onset and whether the issue is progressive, responsive to medications, or worse after rest or activity; this is especially important for older patients to weed out osteoarthritis vs other causes. It is also imperative in older patients to distinguish orthopaedic from neurologic causes for pelvic limb lameness. Asking targeted questions regarding subtle signs—a reluctance to go on furniture or upstairs, scuffing or dragging of legs, or any urinary or faecal incontinence—can be very telling.

Gait analysis

At this point, the clinician should have a decent differential list. Now for gait analysis, I think it is very important to watch a patient walk and trot before manipulating them.(*Ed - on a non-slip surface*) I love when owners have videos at home as often dogs behave differently at the clinic than in a home environment. I watch them several times at slow and fast paces, and then I perform my examination and watch after, as well. Is the lameness continually non-weight bearing, or is it normal and then a skip is noted?

Often intermittent lameness with a skip can be indicative of a patella luxation or in a Collie dog may be a superficial

digital flexor tendon luxation. There are also distinctive gaits for cranio-dorsal vs caudo-ventral hip luxation. These gait changes can be subtle and can take time and experience to recognize. However, searching for online videos can also be a good tool to familiarise yourself with these gaits.

Gracilis contracture has a pathognomonic gait. Bilateral cruciate ligament rupture can sometimes be confused with a polyarthropathy gait, as the dogs are painful in both stifles, they are often shifting weight to thoracic limbs and dancing/stutter-stepping on the pelvic limbs. However, polyarthropathy dogs are often very painful in both thoracic and pelvic limbs and appear to be "walking on eggshells" and have other clinical signs.

The physical examination

The next step is the orthopaedic examination itself. By this point, the clinician should have a good idea of what they will find, but it's important to be methodical and not just go to problem area, as that is when things get missed. I start with general examination to get a sense of dog's overall demeanor. Then I begin with the leg not in question to test reactivity. I watch for subtle shifting of weight/offloading. If one is having trouble determining which leg is more clinical, try picking up each leg. Dogs sore in one leg will be hesitant to lift the opposite off the ground, as it forces them to bear weight on the painful leg. I always start with toes and go up.

If I'm worried about neurologic disease, I inspect the nails to see if there is abnormal wear on the dorsal surface that would indicate scuffing/knuckling. In juvenile patients with pelvic limb lameness, I palpate for pain and swelling at proximal tibia, as tibial tuberosity avulsion fractures are relatively common. I palpate for long bone pain in juvenile patients in which panosteitis may be a concern. I make sure to palpate for cranial drawer in both flexed and extended positions in lieu of the 2 bands and the craniomedial band most likely torn with partial tears, and therefore, instability only noted in flexion.

I try to elicit pain on stifle hyperextension when I cannot elicit cranial drawer or tibial thrust, as pain on hyperextension can be an early indication of cruciate disease. I make note of medial buttress, as this may indicate chronic cruciate disease, and often a lot of instability may not be appreciated when the tear is chronic and/or partial. In addition, I listen closely for a click or pop sound during flexion as this will likely indicate a meniscal injury.

When evaluating for hip disease, I make sure to palpate for iliopsoas pain by extending the leg and internally rotating it and palpating for pain at location of iliopsoas insertion. In any dog with hip pain, and especially older dogs, I always perform a rectal exam. A lordosis test is useful to determine if there is lumbosacral pain. In dogs with shifting leg lameness or multiple limbs affected, I make sure to get a rectal temperature prior to examination and pay close attention for any joint effusion.

After the physical examination

After a thorough orthopaedic examination, I circle back to history, gait and signalment to put the pieces together and determine the next diagnostic step (i.e. radiographs, joint taps, etc). Often radiographs are the next diagnostic step, and my advice for radiographs is to get well-positioned, sedated radiographs; use the sedation to enable more thorough examination.

For example, if the clinician is concerned about hip dysplasia, look for an Ortolani sign when sedated. More stifle instability is often noted under sedation in patients with cruciate disease.

For dogs that clinicians suspect tarsal instability, sedation is key to palpate instability and to enable getting appropriate stressed views of the tarsus. I strongly recommend radiographing the contralateral limb in puppies, as growth plate injury can be challenging to diagnose. Remember, serial radiographs can be just as important. Often avascular necrosis of the femoral head is not seen on radiographs from a month earlier, or subtle lytic lesions of the proximal tibial may be missed, which on later radiographs are obvious for a lytic neoplastic lesion. After reviewing radiographs, I then review all the aforementioned information and determine a diagnosis.

Reviewing all the steps and diagnostics needed to determine every potential inciting cause for pelvic limb lameness in canines is well beyond the scope of this article. I hope that this systematic approach will aid in narrowing the differential list and enabling clinicians to make a diagnosis the next time limping dogs walks through the clinic's doors.

Sarah Round, DVM, DACVS, currently heads the surgery department at the BluePearl Specialty and Emergency Pet Hospital in Philadelphia. Round graduated from Michigan State University of Veterinary Medicine and completed a rotating and surgical specialty internship at Garden State Veterinary Specialists. She then joined VSEC/ BluePearl team and completed her surgical residency. In September 2019, she returned to BluePearl as staff surgeon. Round enjoys all aspects of both orthopedic and soft tissue surgery.

February 28, 2019
Hilal Dogan, BVSc, CCTP
dvm360, dvm360 May 2019, Volume 50, Issue 5
Dr. Kim Johnson shares tips on diagnosing and treating canine transitional cell carcinoma.

Transitional Cell Carcinoma ... A Serious Urge Incontinence

Dr. Kim Johnson

Transitional cell carcinoma (TCC) of the urinary bladder, the most common malignancy of the urinary tract in dogs, is challenging to both diagnose and treat effectively. In her talk at Fetch dvm360, Kim Johnson, DVM, DACVIM, laid out some tips that may help you with this challenging cancer.

What causes TCCs?

Dr. Johnson says we don't really know. It's possible that environmental pollution, chemicals and obesity all have a role to play. Dogs that are obese, female and older than 9-years of age are most likely to get TCCs, although males can get them as well. Scottish terriers are 21 times more likely to get TCCs than any other breed.[1-6] Signs of the cancer include haematuria, pollakiuria, stranguria and tenesmus.

Presenting complaints are not just limited to the urinary tract! Lameness can also be a clinical sign, since the cancer can spread to bone. You may also see some improvement clinically after treating with antibiotics and anti-inflammatories, but signs will return once treatment is stopped, and meanwhile the tumour may be growing during this time.

How do you diagnose TCCs?

Diagnostic tip:

To increase your sample size for cytology, traumatic/diagnostic catheterisation can be performed where the catheter is inserted and then pushed around onto the bladder walls to try and get cells to dislodge into the urine. (*ed note: as the TCC is often on the trigone area you can perform this treatment as you wold do a prostatic was, catheterising and doing a rectal at the same time. Sometimes nice samples are obtained which can be sent for histopathology even.*)Dr. Johnson says this is OK to do and not to worry about spreading the cancer, especially when it comes to cystocentesis or fine-needle aspirates (FNA) of the bladder. She says, "It's OK! Do the FNA! Back in the good ole days, we did cystocenteses and other diagnostics without the benefit of ultrasound. I'm confident several of those bladders had TCC and we didn't

know it." (*Ed – however - try to miss the mass when using ultrasound!*)

Always do a rectal exam! You may feel a mass or an enlarged prostate in males, and a cobblestone urethra may be palpated. Diagnostics for the condition include baseline haematology (a complete blood count and a serum chemistry profile), urinalysis and culture, abdominal and chest radiographs, and abdominal ultrasound and advanced imaging when possible.

These methods may help with early detection:

Veterinary bladder tumour antigen (VBTA). This test detects tumour analytes in the urine. It has a high diagnostic sensitivity (about 90%), meaning TCC is unlikely in a dog with a negative result. However, Dr. Johnson doesn't currently recommend this test, because it's only moderately diagnostically sensitive (approx. 78-85%), meaning there may be false positives due to glucosuria, pyuria or haematuria. So Dr. Johnson says that with this test, you will still need further testing to confirm a diagnosis of TCC.

BRAF mutation assay. If you want to perform an early diagnostic test, Dr. Johnson recommends this one. You can use it to detect possible TCC up to four months prior to any clinical signs becoming evident. It can also be used for diagnosis and monitoring effectiveness of treatment.

What are the treatment options?

Treatment options for TCCs include:
> Surgery (including permanent cystotomy)
> Radiation therapy
> Metronomic chemotherapy
> Medical management

Although surgery is an option, the location that we most commonly find TCCs, the trigone, is a location where surgery is often not an option. In these cases, Dr. Johnson will often try a combination therapy of chemo and NSAIDs.[7-16] Here's a look at the efficacy of various chemotherapy protocols:

Table 1: *Chemotherapy protocols*

Drugs	# of dogs	Mean survival time (days)
Cisplatin alone	18	130
Carboplatin alone	14	132
Piroxicam (NSAID) alone	34	181
Carboplatin and piroxicam	13	93
Mitoxantrone and piroxicam	49	350
Cisplatin and piroxicam (12 developed renal toxicity	14	246
Cispatin, then piroxicam	8	309

Dr. Johnson suggests these chemo protocols:

> Mitoxantrone: 5 mg/m^2 IV once every three weeks for six treatments.
> Carboplatin: 250 mg/m^2 IV once every three weeks for six treatments.
> Vinblastine: 2 mg/m^2 every two weeks for six to eight treatments. Dr. Johnson recommends starting with this if the patient already has kidney disease.
> Prioxicam (NSAID): 0.3 mg/kg once a day for one month, then every other day for six months to help preserve kidneys. Monitor the blood urea nitrogen/creatinine ratio and urine specific gravity during treatment. Ed note - some patients will develop GI signs on this dose and require cessation for a while and starting up again using a Prostaglandin E analogue (misoprostil)).

Metronomic chemotherapy is just low doses of chemotherapy, administered frequently and is less toxic. Dr. Johnson typically divides her regular doses by 15 and administers chemo at that dose every other day.

A quick note about cats:

They can get TCCs too but it's rare. In cats it seems to be more common in males instead of females, and it's not as frequent in the trigone of the bladder like we see in dogs. Typical survival time is five to eight months due to progressive disease. Remember, you can't use cisplatin in cats due to renal toxicity.

Frequent Fetch dvm360 speaker Dr. Hilal Dogan practices medicine in Denver, Colorado. She started the Veterinary Confessionals Project as a senior veterinary student at Massey University in New Zealand.

References

1. Mutsaers AJ, Widmer WR, Knapp DW: Canine transitional cell carcinoma, J Vet Intern Med 17:136–144, 2003.
2. Knapp DW, Glickman NW, DeNicola DB, et al: Naturally-occurring canine transitional cell carcinoma of the urinary bladder: a relevant model of human invasive bladder cancer, Urol Oncol 5:47–59, 2000.
3. Glickman LT, Schofer FS, McKee LJ: Epidemiologic study of insecticide exposures, obesity, and risk of bladder cancer in household dogs, J Toxicol Environ Health 28:407–414, 1989.
4. Raghavan M, Knapp DW, Dawson MH, et al: Topical spot-on flea and tick products and the risk of transitional cell carcinoma of the urinary bladder in Scottish terrier dogs, J Am Vet Med Assoc 225:389–394, 2004.
5. Glickman LT, Raghavan M, Knapp DW, et al: Herbicide exposure and the risk of transitional cell carcinoma of the urinary bladder in Scottish terrier dogs, J Am Vet Med Assoc 224:1290–1297, 2004.
6. Raghavan M, Knapp DW, Bonney PL, et al: Evaluation of the effect of dietary vegetable consumption on reducing risk of transitional cell carcinoma of the urinary bladder in Scottish terriers, J Am VetMed Assoc 227:94–100, 2005.
7. Mutsaers AJ, Widmer WR, Knapp DW: Canine transitional cell carcinoma, J Vet Intern Med 17:136–144, 2003.

8. Knapp DW: Animal models: naturally occurring canine urinary bladder cancer. In Lerner SP, Schoenberg MP, Sternberg CN, editors: Textbook of bladder cancer, Oxon, United Kingdom, 2006, Taylor and Francis.
9. Knapp DW, Richardson RC, Chan TCK, et al: Piroxicam therapy in 34 dogs with transitional cell carcinoma of the urinary bladder, J VetIntern Med 8:273–278, 1994.
10. Henry CJ, McCaw DL, Turnquist SE, et al: Clinical evaluation of mitoxantrone and piroxicam in a canine model of human invasive urinary bladder carcinoma, Clin Cancer Res 9:906–911, 2003.
11. Arnold EJ, Childress MO, Fourez LM, et al: Clinical trial of vinblastine in dogs with transitional cell carcinoma of the urinary bladder, J Vet Intern Med 25(6):1385–1390, 2011.
12. Chun R, Knapp DW, Widmer WR, et al: Cisplatin treatment of transitional cell carcinoma of the urinary bladder in dogs: 18 cases (1983-1993), J Am Vet Med Assoc 209:1588–1591, 1996.
13. Moore AS, Cardona A, Shapiro W, et al: Cisplatin (cisdiamminedichloroplatinum) for treatment of transitional cell carcinoma of the urinary bladder or urethra: a retrospective study of 15 dogs, J Vet Intern Med 4:148–152, 1990.
14. Greene SN, Lucroy MD, Greenberg CB, et al: Evaluation of cisplatin administered with piroxicam in dogs with transitional cell carcinoma of the urinary bladder, J Am Vet Med Assoc 231:1056–1060, 2007.
15. Boria PA, Glickman NW, Schmidt BR, et al: Carboplatin and piroxicam in 31 dogs with transitional cell carcinoma of the urinary bladder, Vet Comp Oncol 3:73–78, 2005.
16. Knapp DW, Glickman NW, Widmer WR, et al: Cisplatin versus cisplatin combined with piroxicam in a canine model of human invasive urinary bladder cancer, Cancer Chemother Pharmacol 46:221–226, 2000.

Emerging localized therapies and medications are being investigated as possible treatment options in dogs.

Dr L L van der Merwe, BVSc MMedVet(Med)

The Bacillus Calmette-Guérin (BCG), commonly thought of as the tuberculosis vaccine, has been long used in humans as a treatment for bladder and prostatic cancers. In fact the use of attenuated microorganism such as BCG to treat human urinary bladder cancer was found to be superior compared to standard chemotherapy. The BCG vaccine injected in prostatic tissue of human patients with prostatic cancer, produces an increase of cytotoxic T lymphocytes and natural killer cells, with antitumoral action.

BCG has been tested in dog bladders and a marked and predictable inflammatory reaction, characterisd by an extensive histiocytic infiltration with varying proportions of polymorphonuclear leukocytes, plasma cells, and lymphocytes which was seen in all dogs tested. These findings suggest that in the future non-specific immune-potentiators may play a role in the treatment of cancer of the bladder.

Recent studies have reported that up to 80% of canine urothelial carcinoma has the BRAF V595E mutation, which is homologous to the human V600E mutation.

Activating the BRAF mutation is target for developing effective therapeutic agents Sorafenib, a multiple kinase inhibitor targeting RAF/vascular endothelial growth factor receptor (VEGFR), successfully inhibited the BRAF/MAPK pathway and induced apoptosis. He response to sorafenib was greater than to vemurafenib, which is known as a specific BRAF inhibitor in human cancer.

Vemurafenib medication showed antiproliferative effects when studied in canines with TCC but results were not that promising with less than 50% of the dogs achieving partial remission. The study also showed the development of new tumours and resistance to therapy in some participants.

References

1. Bloomberg SD, Brosman SA, Hausman MS et al . 1975. The effects of BCG on the dog bladder. Investagions in Urology , 12(6):423-7.
2. Nallar S. C. , Xu De-Qi , Kalvakolanu D.V. 2017 Bacteria and genetically modified bacteria as cancer therapeutics: Current advances and challenges. Cytokine. Vol 89:160-172.
3. Rossman P, Zabka TS, Ruple A et al, 2021. Phase I/II Trial of Vemurafenib in Dogs with Naturally Occurring, BRAF-mutated Urothelial Carcinoma. Molecuar Cancer Therapy (11):2177-2188

Hill's
Transforming Lives

FOOD + ENVIRONMENTAL ALLERGIES

Also available in a smaller kibble for mini dogs

LET'S MAKE ITCHING A THING OF THE PAST

Hill's Prescription Diet Derm Complete is the only clinically proven nutrition for both food *and* environmental allergies*.

Derm Complete helps to address two primary causes of itching with:

1. Novel protein that avoids 96% of food allergies[1]
2. A breakthrough formula with bioactives and phytonutrients to reduce the signs associated with environmental alleries

Ask your Hill's Territory Manager about allergy care that's
A STEP AHEAD FOR THEIR BEST LIFE

[1]Mueller RS, Olivry T, Prélaud P. Critically appraised topic on adverse food reactions of companion animals (2): common food allergen sources in dogs and cats. *BMC Vet Res.* 2016;12:9.
*The only dietetic nutritional solution for both food and environmental allergies in dogs supported by 3 clinical studies.

V32802, V32800

Helicopter/DermComplete/V360

KYRON LABS

KYRON PROBIOTICS

& THE TREATMENT OF DIARRHOEA

PROTEXIN

Multi-strain Probiotic

Backed by over 20 years expertise & research

60g | 250g | 1kg

PRO-KOLIN+

Restores gut microflora

Dual source pre-biotic

Optimised levels of medicinal Koalin clay

Protects irritated intestinal walls

15ml | 30ml

PRO-LYTE

Replaces lost electrolytes

Minimises villous atrophy

Replenishes & restores beneficial gut microflora

Restores energy levels

10 x 80g sachet bucket

10 x 20g sachet box

KyronLabs @kyronlabs

www.kyronlabs.co.za

Health and beauty for all animals®

Kyron Laboratories
a division of Kyron Group (Pty) Ltd. | Co.Reg. No. 1997/016380/07
29 Barney Road, Benrose, 2094, South Africa | Tel: +27 11 618 1544 | info@kyronlaboratories.com