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CPD Article
Warmblood Fragile Foal Syndrome

Business
Budgeting Within a Veterinary Practice

Physiotherapy
The Acute Neurological Patient

Also in this issue

Ocular Neoplasia in Cats | Surgical Versus Medical Management of CDD

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Editor's Note

Dear colleagues,

2022 is halfway through, and between the cold nights of Winter and Eskom helping make them darker, I'm sure I'm not alone in looking forward to Spring!

Of course, lengthening days also mean foaling season is around the corner. Our CPD article in this edition deals with a genetic condition affecting foals which has only recently come to light in South Africa, thanks to the development of a local PCR test.

Fragile Foal Syndrome is still such a new term that horse owners may not know about it, so even non-equine vets can play a role in raising awareness and helping reduce the chances of it affecting our foals. The article was first presented as a paper at the recent SAEVA congress and we're grateful to Mareli Smalberger for letting us share her work with the wider veterinary community.

We'd love to do more of this at Vet360 - we have such great minds in the local veterinary community. So if you've attended a congress where you heard a great talk and think people who couldn't attend would benefit from reading about it, please let us know! On the note of feedback, we got several questions last month following the article about electrochemotherapy, asking what we should tell our clients to expect if we refer their pets for this treatment.

We're grateful to be able to bring you answers from one of the specialists performing this modality, so that you can refer with confidence. Of course, this issue is also packed with our regular features about neurology, opthalmology, business and much more. Finally, I'd like to thank Liesel van der Merwe for the wonderful work she did as editor of Vet360. She leaves big shoes to fill! It's a good thing the Wintry nights allow me to wear thick socks.

Enjoy this edition, keep warm and see you again in the Spring.

vet360

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

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Index

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Budgeting within a Veterinary Practice - The Operational Budget

Andrew Christie
BComm (Business Management)

The first article in this series of three, looked at the purpose and process of budgeting. This, the second article, will examine the process of preparing an operational budget.

Introduction

A colleague commented after the last article that budgeting is really easy – it can be summarised as "don't spend too much". In fact, the budgeting process should look at increasing spending, as much as it examines maintaining costs. What do I mean by this? Let's consider the operating budget, which is a forecast income statement.

Below is the Income Statement for A Vet Practice for the 2022 Financial Year:

	R' 000
Turnover	7 600
Less: Cost of Sales	4 500
Gross Profit	3 100
Less: Overheads	2 270
Advertising	20
Bookkeeping fees	110
Consulting costs	10
Insurance	140
Rent	700
Repairs	70
Salaries	1 040
Telephone	180
Operating Profit	830

What is an operating budget?

An operating budget is the forecast of the income statement of a business for a future accounting period of (usually) one year.

When preparing the budget, I like to start with the overheads, with the figures that we know – for example, the Insurance and Rent should have been agreed in advance by contract. We can also get an accurate amount from the bookkeeper and consultants for those expenses.

Next are the figures that we can estimate – the amount spent on telephone expenses can usually be forecast based on the previous year, adding a percentage to reflect the changes in charges. This is also the first point where vets typically start saying things like "This year we need to try and spend less". In my experience, reducing this type of expense can be achieved, but at a high indirect expense. For example, a fancy new system saves 5%, but the practice has to sign a contract. Or staff are monitored more closely and develop resentment. Unless these kinds of expenses are ridiculously out of control, allow them to grow in line with inflation – you can increase profit elsewhere.

Advertising and repairs can be estimated in terms of the strategy of the practice - for example, is the practice going to increase the amount spent on advertising because it is moving premises? Or are you planning on replacing an ageing piece of equipment only in two years and so higher repair expenses may be expected in the coming year?

Finally, salaries. And this is where things get tricky in a veterinary practice because salaries are the highest overhead, andalso involves the core of the practice – the staff - and so the vet has to balance managing the cost with keeping staff motivated. While there is no easy answer, my suggestions are:

a. Keep each individual's Key Performance Indicators in mind – there's no point in someone working hard to produce a spectacular performance only to discover that the practice hasn't made provision for the incentive payment in the budget.
b. Try and keep the financial year end roughly in line with increases in salary – this allows the past year's performance to guide you in the salary increases.
c. Don't try and save costs here – your staff could be a strong drive for an increase in turnover.

After budgeting for the overheads, the operating budget could look like this:

	2022 R' 000	Budget R' 000
Turnover	7 600	
Less: Cost of Sales	4 500	
Gross Profit	3 100	
Less: Overheads	2 270	2 450
Advertising	20	15
Bookkeeping fees	110	120
Consulting costs	10	15
Insurance	140	155
Rent	700	750
Repairs	70	70
Salaries	1 040	1 145
Telephone	180	195
Operating Profit	830	

Breakeven Point

The breakeven point is the point at which sales equal overheads AND variable expenses (cost of sales). In other words, it is the level of turnover at which neither a profit nor a loss is made.

To calculate it, first the Gross Profit % (GP%) must be worked out from 2022:

GP% = GP ÷ Turnover
GP% = R4,500 ÷R7,600
GP% = 40.79%

The breakeven can then be calculated using the overheads from the budget:

Breakeven = Overheads ÷ GP%
Breakeven = R2,450 ÷ 0.4079
Breakeven = R6,006

The breakeven point above may seem complex, but it needs to factor in that the cost of sales are variable - that they vary according to the turnover. It must be remembered that the GP% is stable and does not change significantly with changes in turnover, even from year to year. The rule of thumb is that if the turnover doubles, the COS doubles.

Knowing the breakeven point and the GP% means that the operational budget at the breakeven point can be calculated:

	2022 R' 000	Breakeven R' 000
Turnover	7 600	6 006
Less: Cost of Sales	4 500	3 556
Gross Profit	3 100	2 450
Less: Overheads	2 270	2 450
Advertising	20	15
Bookkeeping fees	110	120
Consulting costs	10	15
Insurance	140	155
Rent	700	750
Repairs	70	70
Salaries	1 040	1 145
Telephone	180	195
Operating Profit	830	0

Now, obviously, we want the practice to make some sort of profit, so why calculate the breakeven?

a. It is useful to compare the breakeven point to the sales of the previous year – in this case, it is much lower than 2022's turnover indicating that making a profit in the coming year should be straightforward.
b. It provides a foundation for forecasting sales in the coming year

Sales

	2022	Budget		
		Breakeven	10% Increase on 2022	20% Increase on 2022
	R' 000	R' 000	R' 000	R' 000
Turnover	7 600	6 006	8 360	9 120
Less: Cost of Sales	4 500	3 556	4 950	5 400
Gross Profit	3 100	2 450	3 410	3 720
Less: Overheads	2 270	2 450	2 450	2 450
Advertising	20	15	15	15
Bookkeeping fees	110	120	120	120
Consulting costs	10	15	15	15
Insurance	140	155	155	155
Rent	700	750	750	750
Repairs	70	70	70	70
Salaries	1 040	1 145	1 145	1 145
Telephone	180	195	195	195
Operating Profit	830	0	960	1 270

Above are two budgets that the owner of the practice could choose from, in addition to the 2022 income statement and the breakeven budget. Again, choosing a reasonable increase in turnover is complicated – here are some important factors to bear in mind:

a. As sales increase, the variable expenses will increase – make sure that the practice can keep a portion of the increase in turnover to fund this.
b. Make sure that the forecast of sales is in line with the practice's strategy. For example, if the strategy is to open another practice to increase customer reach, perhaps a lower increase in sales of the primary practice is in order to allow resources to grow the new practice.
c. An increase in sales will have a quicker, stronger effect of the profitability than a decrease in expenses. It is because of this that the old adage of "it takes money to make money" should apply to the budgeting process. This shouldn't be seen as a reason to increase the "entertainment expenses", butemploying new staff or investing in a new system or even getting to grips with Google Ads could be considerations for a practice running at a loss.

Finally...

The peaks and troughs of a practice's finances mean that, ideally, the annual operational budget should be broken up into the months of the financial year. This will enable:

a. Busier months to have a higher budgeted sales figure than quieter months.
b. This in turn allows stock planning.
c. Increases in expenses to be accommodated as they occur – for example, insurance premiums increasing in January etc.
d. Tighter control of the budget as it can be reviewed each month.

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A Practical Guideline to Implementing an

Antibiotic (Antimicrobial)

Stewardship Program in South Africa

Antibiotics are incredibly important in veterinary medicine including companion animal practice. We need to be able to balance the use of antibiotics without creating unnecessary resistance which threaten their effectiveness. Antibiotic stewardship programs help to improve effective antibiotic use whilst overcoming barriers to poor use such as veterinary perceptions and gaps in knowledge. Companion animal veterinarians are a part of the ABR problem even if ourimpact seems small in comparison to human health and production animals. We also need to be part of the solution.

Having started researching the topic of Antimicrobial Stewardship Programs (ASP) in Veterinary companion animal practices, I realised that my prescribing was similar to many of the vets in the studies I read. My knowledge was accumulated from colleagues, practice norms, formularies and some CPD events. Decisions to treat were generally empirical and often influenced by a "just in case" mind set. Drug choices were being made on availability, cost, owner compliance and sometimes, most importantly, animal compliance [1,2].

The impact of antibiotic resistance:

The cost of antibiotic resistance (ABR)for both humans and animals ismortality and morbidity with associated loss of production and welfare as well as increased cost of treatment. Deaths in humans from drug resistant organisms were estimated to be about 700 000 in 2016 and are estimated to rise to 10 million by 2050 if no changes are made in antibiotic use, the main driver of ABR. Costs of the loss inproductivity and cost of treatment would be in the region of $100 trillion if this occurs [3].

As new antibiotics are not being developed as fast as pathogens are becoming resistant, there is a need to

preserve the usefulness of the drugs we have available. New antibiotics are also likely to be restricted to use in human medicine and not be available for veterinary use [4].

Companion animal veterinarians often don't consider that they are contributing to antimicrobial resistance[5]. However,evidence of multidrug resistant bacteria transferring between companion animals and their owners is published. These include Methicillin resistant *Staphylococcus aureus* (MRSA), methicillin resistant *Staphylococcus pseudintermedius* (MRSP) and extended spectrum β-lactamase (ESβL) gram negative species such as *Escherichia coli and Klebsiella pneumonia*[6–9].

There is also evidence of transfer of multidrug resistant isolates between hospital cases and to hospital surfaces [9] and prior hospitalisation increasesthe chance of a veterinary patient carrying multidrug resistant *E.coli*[10,11].

How does Resistance develop:

Antibiotic use isunfortunatelyone of the major drivers of antibiotic resistance. Antibiotics select for resistant individual bacterium in a population similar to the laws of natural selection seen in eukaryotes (cells containing an enclosed nucleus). However, the resistant individual can then pass on their favourable genetic material either vertically (reproduction or multiplication) or horizontally known as horizontal gene transfer (HGT). HGT can occur within or between species, for example between commensal bacteria and pathogenic bacteria. This makes the time period for the development of resistant populations shorter than in eukaryotes and allows resistance genes to spread globally and between humans, animals and the environment[12].

Commonly used antibiotics in companion animal veterinary practice such as cephalexin, amoxycillin-clavulanic acid, 3rd generation cephalosporins and fluoroquinolones promote the development of multidrug resistant organisms[7,13–16]. These drugs are also important in human medicine and therefore these drugs, 3rd generation (and higher) cephalosporins and fluoroquinolones are on the WHO's highest priority critically important antibiotic list and amoxycillin-clavulanic acid is on the high priority critically important antibiotic list[17]. This is the reason for restriction of their use in companion animals in some European countries [18,19].

Setting up an ASP:

Antimicrobial stewardship programs (ASP) are aimed at improving responsible use of antimicrobials not just in hospital settings but also the community and veterinary settings. ASP's have been shown to improve antibiotic drug use (choice of drug, dosage and duration), to minimise the emergence of ABR and still optimise clinical outcomes in human hospitals [20]. Implementation of guideline tools, education programs and benchmarking of prescribing practices in veterinary companion animal hospitals showed reduction of highest priority critically important antibiotics and reduced use of antibiotics overall[21,22].

Guidelines on their own have been shown to be ineffective in changing prescribing habits [1,23]so other enablers such as education, feedback on prescribing and discussions on clinical casesneed to be implemented. It is also important that barriers to use of guidelines, such as owners perceptions, consultation time to educate owners and practice norms,be addressed to make implementation easier [23].

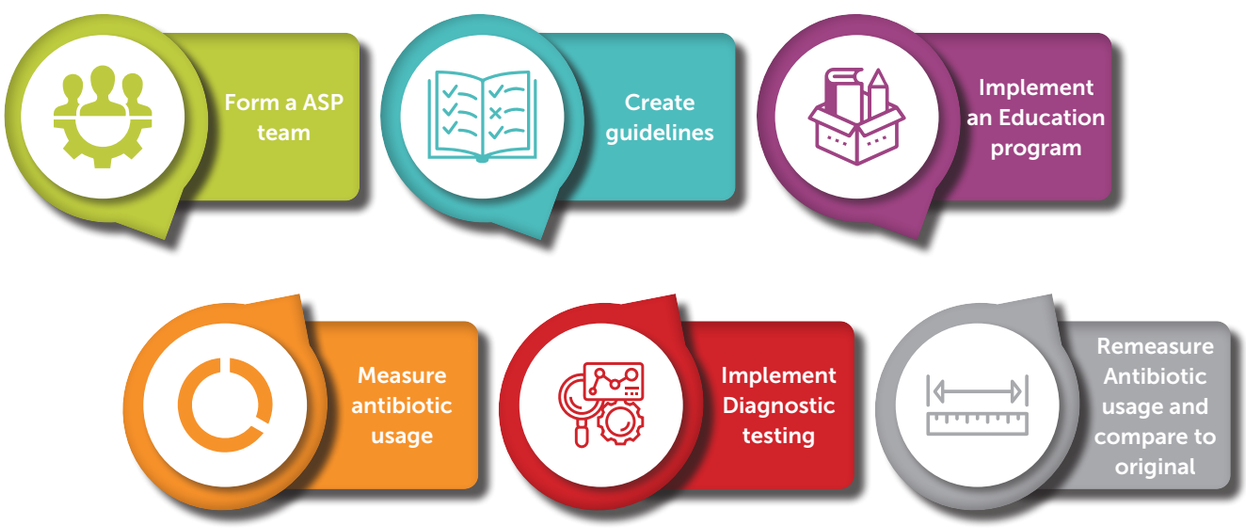

Diagram 1: Steps involved in setting up an ASP

Form a team:

One of the most important aspects of implementing an ASP is that it is a team effort. In smaller practices this may involve all staff members, while in larger practices representatives from different divisions should be involved. This includes administrators, veterinarians, nurses as well as support staff[24].

One of the main factors in noncompliance by veterinarians is pressure is from more senior veterinarians[23,25]. There are costs and logistics such as inventory when introducing ASP's so administrators need to be involved. Ideally a staff member with good understanding of ABR and therapy should lead the team[24].

Work out how much and how you are using antibiotics:

The second step is trying to find out where a practice is in terms of antibiotic usage patternsand overall drug usage. These are not always easy to extract from computer systems. Depending on what computer system is in place program IT support may be able to extract necessary data or advise on ways to improve extraction of data going forward.

It is important to be able to periodically measure certain metrics in order to evaluate how an ASP is working in a practice[24].

Useful metrics:

1. Antibiotic usage: If possible, measure how much of each drug is used over a period of time.
2. Amounts of first second and reserve antibiotics being used according to guidelines below.
3. Consultations where antibiotics are prescribed compared to being not prescribed.
4. Consultations where antibiotics were used empirically compared to a confirmed bacterial infection.
5. Records of drug side effects and antibiotic treatment failures are also useful to record.

In the UK, SAVSNET (Small Animal Veterinary Surveillance Network) has been developed to monitor disease occurrence, prescribing habits of veterinarians and give feedback to practices about how well they are performing[21], something similar in SA would be very useful to reduce the cost of monitoring antibiotic use and provide feedback to vets.

Create a set of Guidelines:

A set of Guidelines for veterinarians to follow in a practice needs to be decided on: whether this is setting up from scratch or using existing guidelines that are available.

Guidelines would include commonly encountered diseases or conditions with recommendations on when treatment is necessary and a list of first, second and reserve choice antibiotics. Ideally local resistance patterns should be included in drug choices[24].

Generally,prescribing should be based on the following:

1. Is a bacterial infection present or highly likely to be present?Are symptoms being demonstrated due to a bacterial or viral infection? Can diagnostic tests be used to differentiate between the two?If an infection is present, is it likely to be self-limiting, if not is topical treatment an option or will systemic antibiotics be needed? For example, uncomplicated Canine Infectious Respiratory Disease Complex (Kennel Cough) and superficial canine pyoderma where topical disinfectants may be sufficient(table 2).
2. What is the most likely organism present in an infection given the organ system involved?
3. If systemic antibiotics are needed, what is the narrowest spectrum antibiotic which has a low impact on potential development of ABR available, and with the lowest importance in human medicine?Narrow spectrum antibiotics will only affecta small number of bacterial species compared to broad spectrum antibiotics so have less effect on ABR development.
4. Use of reserve antibiotics may need permission to prescribe, either at a practice level where the ASP lead is consulted or a national level in some countries. Some antibiotics are reserved for use only when they are the only antibiotics to which a pathogen is sensitive. In some European countries use of 3rd generation cephalosporins or fluoroquinolones is only allowed if sensitivity results indicate it is the only choice [19,22].

Some international guidelines mentioned below from several governing bodies, have worked out optimal treatments for each organ system given likely organisms, antibiotic spectrums, use in human medicine and potential to promote ABR.

The South African guidelines cover background best practice but not recommendations for conditions seen in companion animal practice.

Computer guidance programs are also becoming available, and it may be feasible to incorporate guidelines into some in house computer programs, otherwise there are online websites such as Antibiotic Scout which is easy to use.

You may need to use Google translate from German into English; https://www.vetpharm.uzh.ch/cpthome.htm.

Table 1: *Country of origin, link to guidelines and relevant notes on each guideline.*

Origin	Website	Notes
BSAVA (United Kingdom)	https://www.bsava.com/Resources/Veterinary-resources/PROTECT-ME	Poster is easy to print out
Danish Veterinary Association	https://www.ddd.dk/media/2175/assembled_final.pdf	Comprehensive review of organ systems including likely pathogens
Swedish Veterinary Association	https://www.wormsandgermsblog.com/files/2008/03/Policy-ab-english-10b2.pdf	Comprehensive review of organ systems including likely pathogens
Federation of European Companion Animal Veterinary Associations (FEAVA)	https://www.fecava.org/	Posters on infection control, responsible antibiotic use and use in organ systems as well as information on AMR for owners
GRAM book	https://www.ava.com.au/siteassets/advocacy/gram-book---guidance-for-the-rational-use-of-antimicrobials.pdf	Very comprehensive
South African Veterinary Association	https://www.worldvet.org/uploads/docs/technical_guidelines_for_the_prudent_use_of_antimicrobials.pdf	Only includes background good prescribing practices no specific recommendations for each organ system

Table 2: *Procedures or symptoms where antibiotics can be withheld, notes regarding when these are applicable* [19,26].

Routine clean surgeries	If no hollow viscus is entered and sterile techniques are adhered to	Ovariohysterectomies and castrations
Acute vomiting and Diarrhoea	Even if caused by an infectious agent are generally self-limiting. Exceptions are if the animal is showing systemic signs such as sepsis.	Supportive treatment with antinausea medication, probiotics and in some cases fluid therapy
Canine Infectious Respiratory Disease Complex (Kennel Cough)	Generally self-limiting and antibiotics are only indicated if there is fever, lower airway involvement present or if symptoms have continued for longer than 10 days	First choice if antibiotics are needed are Doxycycline or Amoxycillin
Upper Respiratory Infections or rhinitis in cats	These are generally caused by viral infections which require no antibiotics but if clinical signs persist for longer than 7 to 10 days, a nasal discharge develops, or systemic signs are present antibiotics may be indicated	For infections without secondary bacterial infection antivirals. If bacterial infection is present doxycycline if first choice
Canine Conjunctivitis	Generally, not bacterial in origin and more likely due to irritation, allergies, Keratoconjunctivitis sicca	Further testing needed to determine underlying disease

Some problems with implementing the guidelines are that the first line antibioticsare not always available as a registered veterinary medicine, or even as a human registered medication, leaving compounded medications which are only registered for use if no other registered medication is available.

However, prescribing guidelines by the SAVA and the medicines board recommend use of veterinary registered products first, followed by extra label use and lastly compounded medications. This makes it difficult to comply with both ABR and SAVA guidelines in some situations. Examples are Convenia and Baytril which are both highest priority critically important antibiotics (HPCIAs) and should be reserved for human use (WHO guidelines for antibiotic use) but are registered and easy to use in cats.

There does need to be some guidance from councils on these factors and development of more veterinary specific narrow spectrum antibiotics would help to make following guidelines easier.

Use Diagnostic testing:

Treating based on diagnostic testing is important to improve antibiotic usage. Many veterinarians however prescribe empirically on clinical signs [1,2].

Ideally all infections should be treated based on culture and sensitivity, but due to cost and time implications this is not always feasible. Indications of infection being present can be achieved in other ways in practice at lower cost. Smears can be used to visualise bacteria and neutrophils present in ears, urine, skin or abscesses . Bacteria found in the cytoplasm of neutrophils or macrophages with the presence of degenerative neutrophils are indicative of a pathogenic bacterial infection[27]. Culture and sensitivity is however recommended for recurrent infections, failure of treatment, if resistance is suspected or in post-operative infections [19].

Cost of culture and sensitivity and time till results can be reduced with in house tests such as Speed Biogram by Virbac and V-tech. These test for several likely pathogens from skin, urinary and ear samples with a sensitivity profile. However, if more than oneorganism is present you will not know which sensitivity is relevant to which organism. The other drawback is that if results show resistance to all antibiotics, you will still need to send a sample for an extended panel for testing. More can be found on https://bvt.virbac.com/en/home/diagnostic-solutions/pour-le-veterinaire-praticien/infectious-diseases/main/gamme-speed/speed-biogram-1.html.

C reactive protein (CRP) is a positive acute phase protein which increases during inflammation, especially the first 24 hours. Levels of CRP greater than 100mg/L have been found to be specific for bacterial pneumonia in dogs while levels below 20mg/L could rule out infection[28]. This doesn't seem to apply to bronchopneumonia caused by *Bordetella bronchiseptica* however[29]. It has also not been found to translate to other organ systems[30]. However, it is useful in determining when to stop antibiotic therapy in bacterial pneumonia cases. Instead of a standard 3 to 6 weeks, antibiotics can be stopped 7 days post CRP returning to normal, reducing unnecessary use[31].

Education Programs:

Guidelines on their own are usually ineffective at changing prescribing guidelines, soeducation programs should be implemented to facilitate changes. This includes all staff and if possible, owners but this requires time in consultation or information on social media, poster in waiting rooms etc. There are several online courses on antimicrobial resistance and prescribing;these are included in the table below. Some of these also include posters for owners.

University of Minnesota	https://amrls.umn.edu/
Veterinary Schools of Australia and New Zealand, Australian Government	https://www.vetams.org/
FECAVA	https://www.fecava.org/
Heath department of South Africa: ANTIMICROBIAL RESISTANCE ELECTRONIC BASIC MODULE ON AWARENESS	https://www.knowledgehub.org.za/form/antimicrobial-resistance-awarene
The Fleming Fund:	https://www.open.edu/openlearncreate/course/index.php?categoryid=415

In-house discussions of cases and prescribing practices have been shown to greatly increase adherence to guidelines and can be done periodically.They also help to evaluate how well an ASP is doing in achieving its objectives [24].

Re-evaluate usage metrics:

Once your ASP is running regularly evaluating prescribing metrics will allow you to assess whether it is working and allow certain areas which are not yet improving to be targeted for change[24].

Concluding remarks:

Antibiotic resistance is a One Health problem and as such affects humans, animals and the environment. It follows that we are all important in the solution, including veterinarians. Although there are costs involved in setting up an ASP, the risk of losing some of our most valuable/effective drugs outweighs this.

There are still external barriers outside of our control to implementing ASPs, such as availability of veterinary registered narrow spectrum medications in formulations that are easy to give to companion animals. Government regulations on antibiotic use and public education programs will also help overcome external barriers to reducing antibiotic usage.

References available on request

Ocular Neoplasia in Cats

Dr Izak Venter
BVSc, MMedVet (Ophthal)
Digital Veterinary Ophthalmology Services
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Facebook DVOS VETS

Ocular neoplasia in cats is a potentially serious condition often leading to blindness, discomfort, tissue destruction, and metastasis.

As is the case in dogs primary ocular neoplasia is more common than secondary neoplasia, with secondary neoplasia most likely affecting intraocular structures. Ophthalmic neoplasms account for approximately 2% of all feline neoplasms.

Eyelid neoplasia

Eyelid neoplasms are infrequent in cats compared with dogs.The prevalence of eyelid neoplasia increases with advancing age, but no sex or breed correlations have been found. Squamous cell carcinoma [SCC] is the most common encountered eyelid neoplasm in cats, but fibrosarcoma, mast cell tumor, haemangioma, hemangiosarcoma, adenocarcinoma, peripheral nerve sheath tumour, lymphoma and apocrinehidrocystoma have been reported.

- **Squamous cell carcinoma [SCC].**

  Chronic exposure to ultraviolet light is a major predisposing factor and white cats are predisposed. Lesions often begin as actinic keratoses which are premalignant lesions that are capable of becoming invasive squamous cell carcinomas. Clinically, SCC has a very characteristic appearance as a slightly raised or depressed ulcerative lesion, often with a crusted surface, either on or adjacent to the eyelid margin. [Figure 1].

  Metastasis does not occur until late in the disease, but local invasion can be extensive with regional lymph nodes eventually involved.

  Imiquimod is an immune system modulator and possesses both potent antiviral and antitumor activity.

Figure 1: *Typical ulcerative appearance of advanced squamous cell carcinoma affecting the medial canthal area.*

Current theories suggest that imiquimod acts both directly by inducing apoptosis and by inducing secretion of pro-inflammatory cytokines.Topical 5% imiquimod are applied three times per week for up to 12 weeks. This may lead to resolution of early cases. Another treatment option for early cases is cryosurgery.

Wide surgical excision is often curative, but due to limited eyelid skin available grafting procedures are usually necessary to fill the lid defect. Early detection and treatment aretherefore of paramount importance. Because the lower lid is most often affected, lip-to-lid subdermal plexus flaps are in most cases the best surgical option.

Orbital exenteration with wide skin margins and a

grafting procedure should be considered in cats with extensive periocular SCC.

- **Apocrine hidrocystomas** or apocrine cystadenomas may occur as single or multiple, well-circumscribed, tense to fluctuant, smooth nodular structures of 2–10 mm in diameter located in the upper and lower eyelids. They usually have a slight bluish appearance. [Figure 2]. Definitive diagnosis requires excisional biopsy and histopathological examination. In cats with multiple tumours cryosurgical removal is indicated compared to surgical excision in order to preserve eyelid function.

Third eyelid

Neoplasia of the third eyelid is uncommon in cats. Reported neoplasms affecting the third eyelid include mast cell tumor, hemangiosarcoma, adenocarcinoma, and melanoma. Any mass of the third eyelid warrants a biopsy. Depending on the nature and extent of the neoplasia, excision of the mass alone or excision of the entire third eyelid should be performed. In cases where the entire third eyelid is removed post operative prophylactic treatment with good quality tear replacement product for example chondroitin sulphate is indicated.

Conjunctiva

- **Conjunctival melanoma.** The vast majority of feline ocular melanomas arise diffusely from the anterior uvea. Conjunctival melanoma has been reported in cats, though it does not appear to be common.Feline conjunctival melanoma is most frequently found on the bulbar conjunctiva and extends deeply into the orbital tissues adjacent to the globe.

  A study published in 2010 suggest that cats with conjunctival melanoma has a slightly higher metastatic risk than affected dogs (14% vs.10%) and a higher mortality rate (61% vs. 5%). Surgical resection of the mass if localized is indicated, but in cases with infiltration into the orbit, exenteration is justified.

Cornea and sclera

Neoplasms affecting the feline cornea and sclera are rare. SCCs can potentially invade the fibrous tunic of the eye but most often invade the orbit. Limbal melanomas appear to be the most common primary tumors affecting the sclera and cornea. Both SCCs and melanomas can be treated conservatively with surgical resection and cryosurgery.

Anterior Uveal Neoplasia

Both primary and secondary uveal neoplasms occur in cats. Feline intraocular neoplasms tend to involve the anterior uvea, whereas posterior uveal involvement is less common.

Figure 2: *Multiple small apocrine hidrocystomas in a Persian cat.*

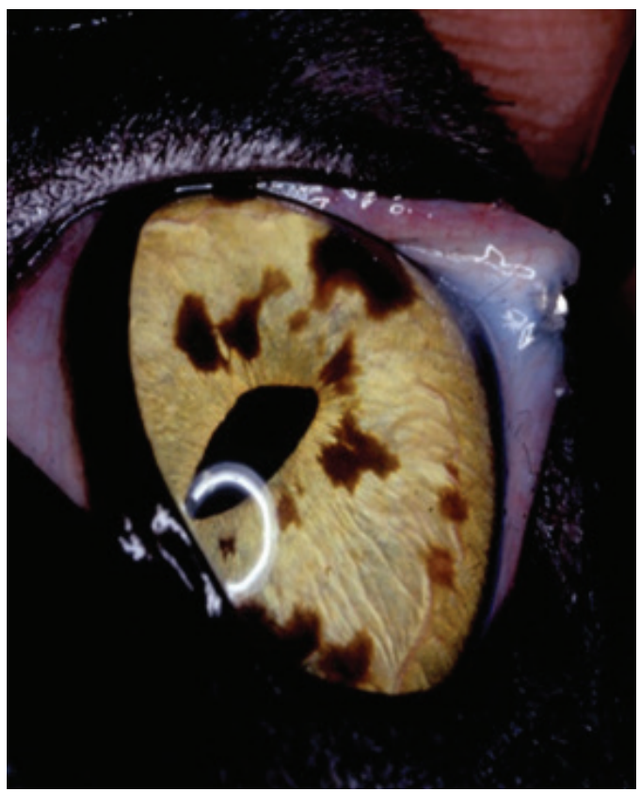

Figure 3: *Multifocal flat brown spots on the iris surface.*

- **Diffuse Iridal Melanoma** [FDIM] FDIM begins as hyperpigmented foci consisting of a proliferation of dysplastic melanocytes, which appear as flat, brown spots on the iris surface. [Figure 3].

  These precursor lesions are considered benign and are known as iris melanosis, where the melanocytes are confined to the anterior iris. The behaviour of these lesions is unpredictable. Some remain static or grow slowly over months to years, resulting in only a cosmetic change to the iris. Others may progress rapidly. The transition of iris melanosis to early FDIM is only recognisable histologically, where invasion of the dysplastic melanocytes into the iris stroma occurs.

  The diffuse iridal melanoma of the cat appears as progressive pigmentation of the iris, which occurs over months to several years. The pigmentation may develop simultaneously in several areas on the anterior iridal surface. Generally, both the extent and amount of pigmentation increase with time. Clinical signs highly suggestive of FDIM include dyscoria, thickening of the iris, infiltration of the iridocorneal angle visible on gonioscopy and secondary glaucoma. [Figure 4]

  There are wide variations of observed metastatic rates between studies, ranging from 19% to 63%. The tumour may exfoliate into the anterior chamber, and dissemination of neoplastic cells via the aqueous humour is a suggested route of metastasis. Extraocular metastasis is most likely through haematogenous spread via the scleral venous plexus. The sclera must be penetrated by neoplastic cells for lymphatic spread to occur, as the eye is devoid of lymphatics. Metastatic disease most commonly occurs in the liver but also the lungs, kidneys, spleen, lymph nodes, brain and bone. A latent period of several years between diagnosis of FDIM and death from metastatic disease has been reported.

  Enucleation of a visual and non-painful eye is a challenging decision for any pet owner. Patients showing signs of iridocorneal angel infiltration, raised lesions [thickened iris] dyscoria and secondary glaucoma enucleation is in the patient's best interest. Iris biopsies may also assist in obtaining a histopathological diagnosis before enucleation.

  Feline Ocular Sarcomas[FOPTS] Feline ocular sarcomas are the second most common primary intraocular tumour, after diffuse iridal melanomas.Ocular post-traumatic sarcomas were first recognized as a separate disease entity in cats in 1983. Among reported cases of FOPTS, there is a common association with ocular trauma and subsequent lens capsule rupture, with chronic intraocular inflammation preceding the development of the tumour.

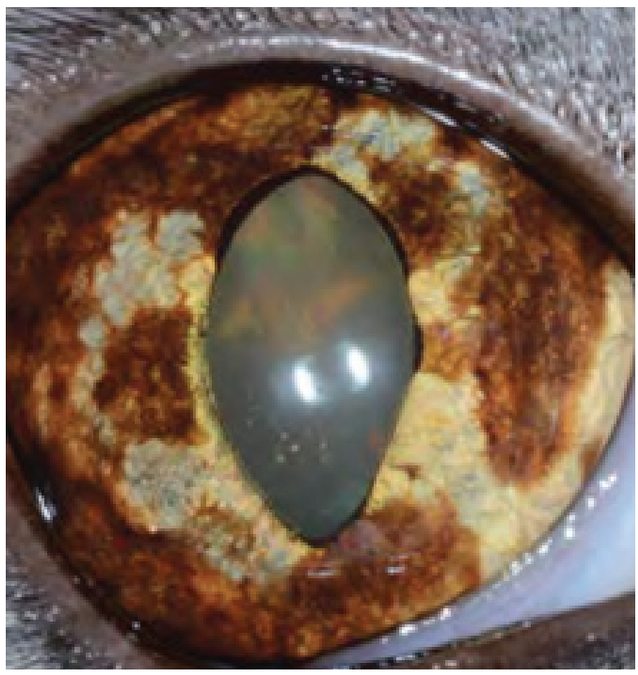

Figure 4: *Multifocal brown areas on the iris surface. The ventral aspect of the iris is thickened. Dyscoria is also visible.*

This disease has also been diagnosed in cats with chronic uveitis, phthisis bulbi or the appearance of an abnormal eye since adoption despite no known history of trauma. Other risk factors for the development of ocular sarcomas in cats are a history of intra ocular surgery involving the lens, such as cataract surgery, or globe-sparing chemical cycloablation procedures for glaucoma using intravitreal injections of drugs such as gentamicin. The average time to presentation from the inciting event is approximately 6.2 years, but this can range from several months to more than 10 years.

Cats with ocular post-traumatic sarcoma tend to be older adults at presentation, with an average age of 11 and range of 7–15 years, 67% of affected cats are intact or neutered males. Rather than reflecting a direct gender predisposition, this over-representation may be due to the behavioural tendency of intact males to fight and thus be at increased risk of ocular trauma.

Presenting clinical signs include chronic uveitis, glaucoma, intraocular haemorrhage, and possible single or multiple, white-to-pink masses.

Often, intraocular evaluations are impossible because of corneal edema and the anterior chamber mass. Because cartilage and bone formation may occur within this tumour, ultrasonography and radiography may be helpful.FOPTS have a characteristic appearance on gross examination of hemisected enucleated eyes. Neoplastic tissue circumferentially carpets the intraocular structures such as the anterior uvea and

retina. With progression, the globe becomes filled with a solid white, pink or tan coloured mass.

Tumours often extend into the sclera and optic nerve. Local invasion along the optic nerve to the chiasma and brain is most commonly reported and may occur early in the neoplastic development process.

FOPTS are subdivided into three morphologic variants: (1) spindle cell sarcomas, (2) round cell tumours and (3) osteosarcomas/ chondrosarcomas. These subtypes cannot be differentiated clinically or grossly and require histologic evaluation. While morphologically different, all three variants have similar biologic behaviour.

Enucleation is the gold standard of therapy for FOPTS. It is important that owners are educated about the increased risk of neoplasia development in cats with eyes that have been traumatized, and those globes that are blind and painfulshould be removed. Given the propensity for local invasion with this form of neoplasia, as much of the optic nerve as possible should be removed during enucleation.

The general prognosis for cats with FOPTS is poor, with an average survival time of 7–11 months. The prognosis is considerably better for those patients where enucleation is performed before the tumour invades the optic nerve or extends beyond the sclera.

- **Primary ciliary body adenomas and adenocarcinomas.** These are uncommon tumours in cats. They appear as nonpigmented masses within the pupil or at the iris root that originate from the ciliary pars plicata, and they often produce secondary glaucoma. They are usually slow growing and seldom penetrate the sclera.

- **Lymphosarcoma.** Lymphosarcoma is the most frequent metastatic intraocular tumor in cats. Clinical signs include a possible pink-to-white mass in the anterior chamber or within the anterior uvea. Signs of inflammation include miosis, reduced IOP, aqueous flare, keratic precipitates, and hypopyon. Secondary glaucoma may result from neoplastic obstruction of the aqueous humor outflow pathways.

Lymphosarcoma in cats may be associated with FeLV or FIV; however, the disease also occurs in uninfected cats. Intraocular biopsy of the anterior uvea is not usually indicated due to possible complications, but aqueous humor cytology is frequently diagnostic. Lymphosarcoma affecting ophthalmic tissues is considered to be a manifestation of multicentric disease.

Therefore, systemic chemotherapy is recommended. Topical corticosteroids may reduce the size of an intraocular mass and improve signs of uveitis.

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Warmblood Fragile Foal Syndrome: the Significance to South African Veterinarians

Dr Mareli Smalberger
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Fragile Foal Syndrome Type 1 (FFS1) was previously known as Warmblood Fragile Foal Syndrome or WFFS, but since the mutation causing it has been discovered in several other breeds besides warmbloods (most notably the Thoroughbred), the new name was proposed at the end of 2021(1). FFS1 is caused by a lethal autosomal recessive mutation that disrupts collagen synthesis. Affected foals are non-viable due to severe skin abnormalities, often accompanied by musculoskeletal deformities. FFS1 may have a range of clinical presentations, from late term abortions and stillbirths, to dystocia and weak, deformed foals who require euthanasia.

The severity of symptoms can also vary between foals, with some only showing thinning of the dermis or alopecia in a few areas of the body and a tendency towards frequent haematoma formation, and others showing severe malformations such as hyperextensible joints which make it impossible for them to stand, incomplete skin closure, incomplete closure of the abdominal wall, intracranial bleeding and spinal malformation (2,3). As expected, histological examination of the skin of affected foals shows a thin dermis with degeneration of collagen fibres and irregular collagen bundles. (2)

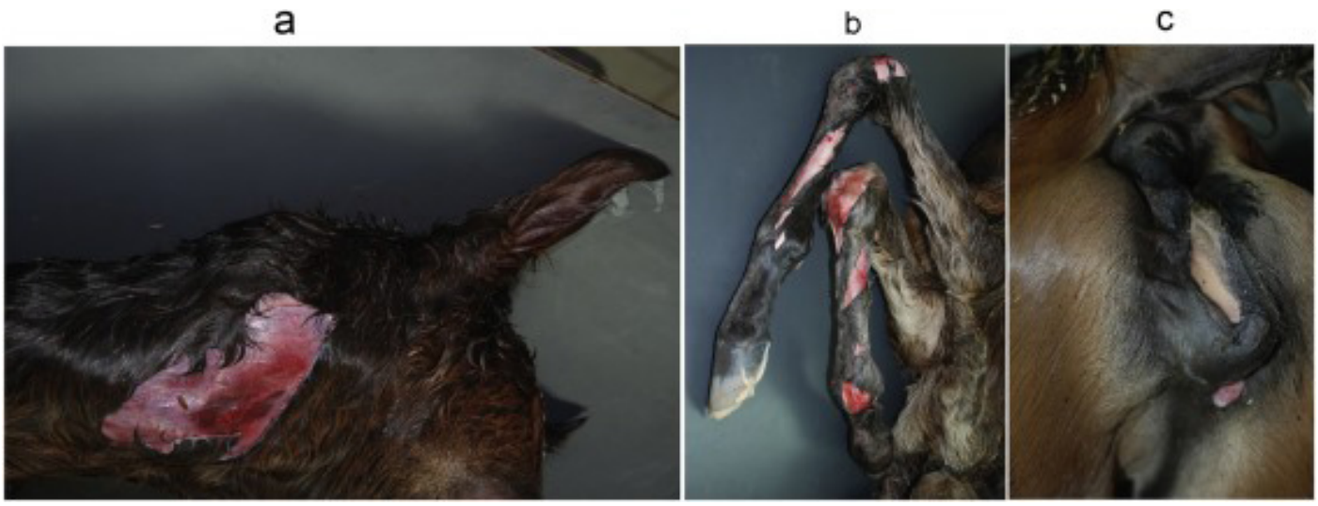

Figure 1: *Defects of the head, front legs and ventral to the vulva of an affected foal. Photo credit: Aurich et al (3)*

Aetiology

The disruption in collagen synthesis in FFS1 is caused by a single nucleotide polymorphism in the procollagen-lysine, 2-oxoglutarate 5-dioxegenase 1 (PLOD1) gene, a point mutation from G to A which causes affected animals to express Arginine instead of Glycine at this locus (4). This leads to incorrect folding of the collagen molecule, which causes the macroscopic abnormalities associated with the syndrome.

Similar hereditary conditions occur in several other horse breeds, both in neonates and in older animals and can also vary in severity, for example Junctional Epidermolysis Bullosa in Belgian and other draft horses and Hereditary Equine Regional Dermal Asthaenia (HERDA) in Quarter horses and related breeds.

However, even though the lesions may be phenotypically similar, the conditions in these breeds have not been linked to the PLOD1 mutation and without genetic testing it would be unlikely that historically reported cases could be linked to FFS1. (5, 3). For example, in humans, Ehlers-Danlos syndrome, which is morphologically similar to FFS1, can develop as a result of ten different mutations, only one (type VI) being similar in aetiology to FFS1.

However, two things make FFS1 particularly significant. First, it is due to a single point mutation which can now be tested for in South Africa. This means that carriers can be identified and conscientious breeding can help reduce the pain and financial loss caused by the condition. If a carrier is mated with a carrier, there is a 25% chance of breeding an affected foal, so not mating carriers will eliminate the chance of breeding an affected foal.

Secondly, the fact that Warmbloods can be bred by artificial insemination and that semen from confirmed carriers is available in South Africa has led to a significant carrier population in our country.

Why has FFS1 only been discovered now?

The PLOD1 gene mutation was only discovered in 2011, and a commercial test became available in 2013, in Europe and America, where several countries have since introduced mandatory testing for stallionas and several breeders have voluntarily tested their breeding stock. No testing had been done on local horses, partly due to the mutation being unknown to local breeders and partly due to logistic issues with sending samples overseas.

A South African test using an allele-specific PCR was developed and validated during a final-year BVSc research project by the author in 2019, under the supervision of Professor Alan Guthrie at the Equine Research Centre at Onderstepoort.

Until the local test was developed and validated, many of the dystocias, stillbirths and non-viable foals which could have been due to FFS1 went undiagnosed.

How prevalent is it in the South African warmblood population?

So far only the results of the pilot study are available, so the results may not be fully representative of the wider warmblood population in South Africa, but it does give a starting comparison to the international community. The study consisted of 110 Warmbloods divided into two study populations, namely 82 breeding stallions without suspicion of carriers in their direct parentage , as well as 28 mares, stallions and geldings with known or suspected carriers as sires or grandsires.

19% of the horses tested were carriers of FFS1, but the results skewed towards dressage horses, with 24% of the dressage sub-population being carriers vs 15% of jumping horses and 22% of dual-purpose horses. The total allele frequency was 9.5%, which is not dissimilar to that in other countries where voluntary or mandatory testing schemes are in place: Brazil (5.5%), the USA (11.1%) and Germany (9.5% with 14% in the Hanoverian population) (6, 3).

The higher prevalence in dressage horses is also an echo of international findings. This is thought to be due to the fact that dressage breeding has tended towards selecting horses with greater limb joint flexibility, especially in the forelimbs, because this is an early indicator of dressage success later in life.

Although the genes coding for limb flexibility are unrelated to the PLOD1 gene, they are closely associated on the chromosome, so selecting for one is more likely to select for the other. (7). This is perpetuated by the "popular sire phenomenon", where a large number of breeders use semen from a few highly-regarded stallions. Unfortunately, imported semen from carriers has circulated in South Africa, and untested offspring from confirmed carriers are also standing at stud in South Africa.

How can a non-equine vet make a difference?

The single mutation and simple autosomal recessive inheritance of FFS1 presents the South African community with a valuable opportunity to reduce the spread of the condition in our local population through encouraging testing of all suspected cases, especially in warmbloods but also in breeds which may be crossed with warmbloods in South Africa as "Sport horses": Thoroughbred, Andalusian, Appaloosa, Friesian, Boerperd, Lusitano etc. The condition has also been found at a 2% frequency in the Thoroughbred population (8, 9).

EDTA blood samples from suspected affected foals, as well as suspected carrier dams and sires can be submitted to the Equine Research Centre at Onderstepoort for testing. A test costs around R400, considerably less if the horse being tested has already had a DNA sample submitted to the Veterinary Genetics Lab. Skin samples from late-term abortions, non-viable foals and stillbirths may also be sent for histopathology.

Due to the relative novelty of the condition's identification, horse breeders and especially owners may not know about the genetic test. All vets, even non-equine vets, therefore have a role to play in educating our friends and clients about proactive testing and conscientious breeding, especially with the 2022 foaling season just around the corner.

Any questions about FFS1 or about the test can be sent to smalbergermareli@gmail.com

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1. What is FFS1?
a. The name for Warmblood Fragile Foal Syndrome when it appears in another breed
b. A neurological condition of foals which causes them to look fragile
c. The new name for the condition previously known as Warmblood Fragile Foal Syndrome
d. A tick-borne disease of foals which causes alopecia

2. What signs could lead to a suspicion of FFS1?
a. Late-term abortion
b. Stillbirth
c. Incomplete skin closure in the foal
d. Weak, deformed foals unable to stand
e. All of the above

3. What is the underlying mechanism causing defects in affected foals?
a. A disorder of collagen synthesis
b. A disorder of nerve development
c. A toxic buildup of B-vitamins
d. An iron deficiency

4. FFS1 is caused by a single point mutation on the PLOD1 gene. What is the mode of inheritance?
a. Sex-linked recessive
b. Autosomal recessive
c. Autosomal dominant
d. Unknown

5. FFS1 has only recently been identified in South Africa. This is because:
a. The condition did not exist before 2020
b. A test for the genetic mutation that causes FFS1 was not available in South Africa until 2019
c. The condition only recently jumped from the wild zebra population to horses
d. South Africa has had wide-spread compulsory testing in place and could exclude carrier semen until recently

6. Within the South African Warmblood population tested for FFS1, carrier status was found to be higher in dressage horses than those bred for jumping or dual-purpose use. This is thought to be because:
a. The gene coding for flexible forelimbs, which is desirable in dressage horses, is located near the defective locus on the PLOD1 gene
b. Dressage horses are not as hardy as jumping horses
c. Dressage horses eat a diet which predisposes them to showing symptoms of FFS1
d. None of the above

7. True or false: FFS1 is a condition that can only occur in Warmblood horses.
a. True
b. False

8. When two carriers of the mutated PLOD1 gene linked to FFS1 are mated, what chance will their offspring have of being affected?
a. 10%
b. 25%
c. 50%
d. 100%

9. True or false: Other conditions can cause similar skin lesions to FFS1, therefore genetic testing is recommended to establish the cause.
a. True
b. False

10. Why is it important for even non-equine veterinarians to be aware of FFS1, its mode of inheritance and the genetic test which can identify carriers?
a. The condition has only recently been identified, so horse breeders and horse owners may not yet know about it
b. Many stillbirths, late-term abortions or non-viable foals are not investigated, so carrier status in their dams and sires may go undetected and the condition be perpetuated
c. Voluntary genetic testing and responsible breeding practices (not breeding carriers to carriers) can reduce the number of affected foalsand all the associated losses.
d. All of the above

Electrochemotherapy:

Perspective From a Medicine Specialist

Every practice in South Africa may not be able to provide the specialist services covered in Vet360, but by referring our patients, we are able to give them access to these cutting edge interventions.

This month, Vet360 interviews Dr Ryan Friedlein (BVSc Hons MmedVet Medicine), an internal medicine specialist with a special interest in oncology, who treats dogs, cats and horses with electrochemotherapy in Gauteng about what to expect when you refer a patient for this modality.

Vet360	Can you tell us why you chose to start doing electrochemotherapy?
Dr Friedlein	Cancer is a common and devastating disease, and until now, most vets have limited treatment options of surgery and chemotherapy. Other modalities are technically available, but often practically difficult: • Radiotherapy is only available to patients able to travel repeatedly to the handful of human hospitals who allow vets to use their facilities after hours. • DNA vaccines for malignant melanomas and small molecule inhibitor therapies for mast cell and other tumours are gaining traction in South Africa but difficult to obtain and only available in certain referral hospitals. And then there is a vet-specific system of electrochemotherapy which can treat many cutaneous tumours, especially those which are surgically difficult due to obtaining clear margins or location (for example on the eyelids, lips, digits and orally), and which uses a far lower dose of the chemotherapeutic agent, thus lowering the side effects typically associated with chemotherapy. It makes so much sense to add this tool to our arsenal of cancer therapeutics

Vet360	You say it can be used in many tumours. Which ones in particular?
Dr Friedlein	I've used it successfully in dogs, cats and horses. Electrochemotherapy can be used as a sole agent in poorly resectible tumours, but I often use it in conjunction with surgery to treat the margins after the bulk of the neoplasia has been removed, or even to shrink the tumour to a point where surgical resection is feasible. The most common neoplasias are squamous cell carcinoma, melanoma, fibrosarcomas and mast cell tumours. I personally find that a multimodal approach of working in conjunction with surgery offers the best outcomes.
Vet360	So if a general practitioner wants to refer a patient to you for electrochemotherapy, what can they tell their clients to expect?
Dr Friedlein	Well, depending on the size and type of tumour, we typically need between one to four treatments, three to five weeks apart. Each treatment happens under general anaesthesia because the current passed through the electrodes into the tumour causes a significant focal muscle contraction that is too high for an awake animal to tolerate. The treatment itself however only takes a few minutes. The chemo agent is infused intraveneously or intra-lesionally then the electrodes are placed along the tumour margins and circumferentially worked from outside in. The current causes the neoplasia cell membranes to become permeable, the chemotherapy agent enters the cells then remains inside allowing high chemotherapy concentrations within the tumour tissue. So far I have just treated pets in Gauteng, but they can fly up to get treated and go home inbetween.
Vet360	That sounds really simple! Is there something referring vets need to alert owners to expect after treatment?
Dr Friedlein	Yes, even though the procedure itself causes very few side effects compared to traditional chemotherapy, the tumour cells die off after treatment, causing focal tissue necrosis, scab formation and subsequent healing via second intention. Typically, the referring vet or their nursing team can clean and manage the healing wound appropriately, but owners need to be warned to expect this.
Vet360	This sounds like a wonderful additional tool for vets to be able to offer their clients! What is the typical cost?
Dr Friedlein	Of course, the cost varies depending on the size of animal, tumour, the complexity of anaesthesia and the chemotherapeutic agent used, but most treatments are in the region of R3,000 to R5,000. A more precise cost estimate can be given according to individual case requirements. It really is great being able to add this to the range of treatment options South African vets have access to.
Vet360	How can veterinarians contact you about potential referrals?
Dr Friedlein	They can email reception@valleyfarmvet.co.za , or if they want to find out more before recommending electrochemotherapy to their clients, they are welcome to contact me personally on 082 379 9056.

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Veterinary physiotherapy is gaining traction within the veterinary world. At the outset, animal physical rehabilitation relied on techniques and practices that were proven in the field of human physiotherapy. The practice was extrapolated from positive results gained in human medicine. In the past decade more research is being performed in the field of veterinary physiotherapy and encompasses all animal species. Aside from the research, a large body of anecdotal evidence is available. Physical rehabilitation improves both medical and surgical outcomes in several conditions. In this article the focus is on the use of physiotherapy to improve the functional result in dogs diagnosed with an acute neurological condition.

Veterinarians and vet nurses are familiar with the treatments administered in dogs diagnosed with a neurological disorder. These include cage rest/confinement, pain management, excellent nursing care, and supervision of urination and defaecation. A physical therapist can assist with all these aspects.

Transcutaneous electrical nerve stimulation (TENS), photobiomodulation and passive range of motion exercises contribute to decreasing pain levels. Physical therapy maintains muscle mass and joint range of motion[1]. Low level laser therapy, therapeutic ultrasound, TENS and cryotherapy can all be used frequently in the initial stage of injury[2,3] and can indirectly improve oedema by virtue of their effects on blood flow.[2]

Appropriate neurological rehabilitation techniques are performed by the rehabilitation practitioner, based on well-established principles. The first concept to appreciate is that of neuroplasticity. This is the ability of the nervous system to reorganise itself by forming new neural connections. To form beneficial connections, the neurons must be correctly stimulated[4]. The second concept is Proprioceptive Neuromuscular Facilitation.

PNF is relaxation, re-education, stabilisation, strengthening and co-ordination training of the body following a

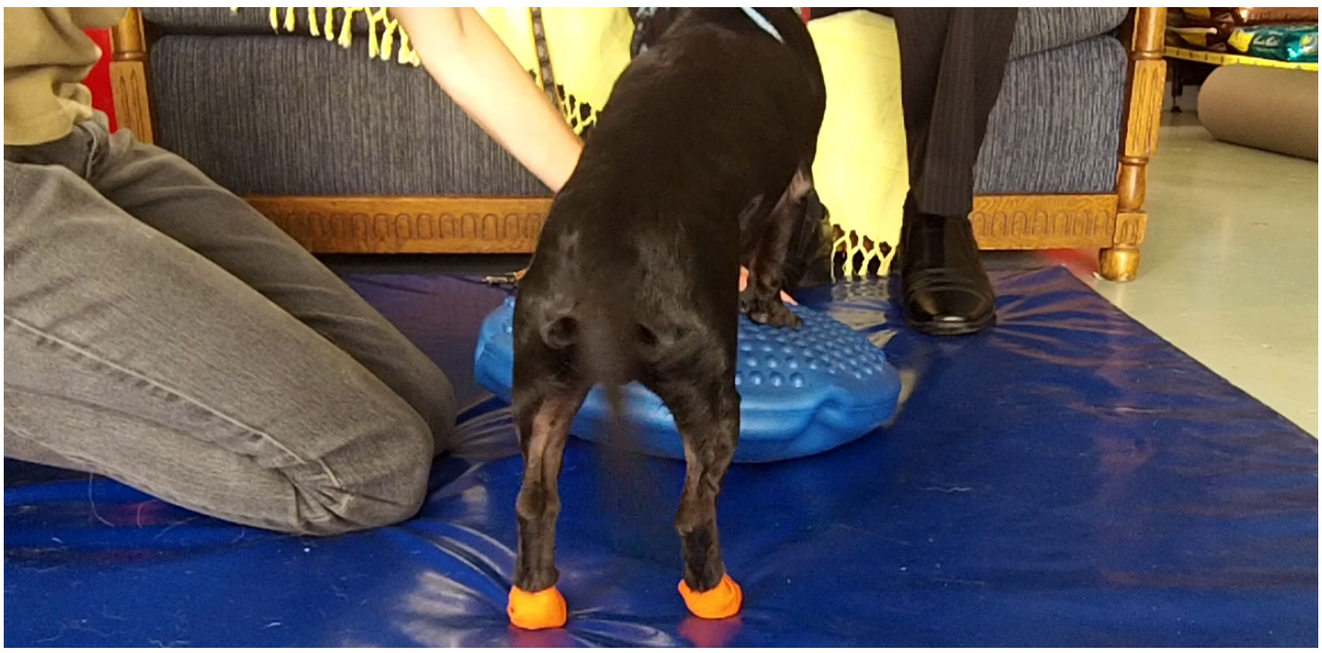

Figure 1: *Balance and Proprioception*

neurological insult.[5] Exercises are repeated several hundred times to promote motor skill learning and relearning. The repeated exercise must be performed properly otherwise an undesired pattern will be established. Physiotherapists are trained in this regard.

In non-ambulatory/recumbent patients the sooner rehabilitation begins (in conjunction with adequate pain control) the more likely it is that the patient will walk. This requires the use of Neurodevelopmental Techniques (NDT). NDT develop normal postures and movements. The dog is taught to move from lateral to sternal recumbency.

From sternal recumbency to a sit and from a sit to a stand. Once the dog can stand then walking can begin. Now the Central Pattern Generators (CPGs) need to be activated. CPGs are neuronal circuits that, when activated, can produce rhythmic motor patterns such as walking, breathing, and swimming. Physical rehabilitation is not just about teaching a dog to walk, it is about returning the dog to full functionality, or as close to that as possible.

INTERVERTEBRAL DISC DISEASE (IVDD)

Whether treated medically or surgically, there is a place for physical rehabilitation in the management of IVDD.

Benefits

- Adjunctive analgesia
- Management of swelling and oedema
- Appropriate and directed therapy (depending on the stage of healing)
- Enhanced recovery
- More rapid return to function
- Assist with management of the patient and act as a facilitator with regards to home care of the patient
- Able to help the clients with queries and difficulties encountered, especially in the home environment or with patient cooperation

When to Refer

As soon as possible after the incident or surgery. Physical rehabilitation is as appropriate for dogs walking 24 hours after surgery as it is for those that take longer. Physical rehabilitation is beneficial at any stage of recovery for all the reasons explained above. In the early stages analgesia is enhanced. Once the pain is controlled, and the sooner neurological rehabilitation begins, the better for the patient.

Physical rehabilitation of the surgical patient helps with pain management, relaxation, core stability, and building and maintaining muscle mass. It prevents joint contracture, increases flexibility and improves the dog's mental status,[6,3,7] and enhances the neuroregenerative process.

What to Expect

Sessions are to be conducted twice a week for two weeks in the acute phase of recovery. The pain usually diminishes at this point and sessions can be reduced to once a week for a further 4 weeks. The patient is evaluated at every session with a more in-depth evaluation every fortnight to establish of the progress is occurring as expected. Physiotherapy is dynamic and adjustments are made according to the patient's response to therapy.

Most patients require at least 6 weeks of therapy but this quote from Millis and Levinesays it all, *"The degree of*

success in rehabilitation of thoracolumbar intervertebral disc disease varies greatly and may take several months of dedicated treatment by therapist and owner." [8]Rehabilitation protocols are individually tailored to meet the patient's needs during the recovery process.

FIBROCARTILAGINOUS EMBOLISM (FCE)

FCE is defined as an acute infarction of the spinal cord caused by a vascular embolus of fibrocartilage probably originating from the nucleus pulposus.

Benefits

The choice of treatments and modalities to employ will depend on the extent and severity of the clinical signs and are similar to those used in the rehabilitation of IVDD patients.

- Appropriate and directed therapy (depending on the extent of the symptoms)
- Enhanced recovery
- Advise and facilitate with home care and management. How to move the patient and the use of assistive devices (slings and body support).
- Supportive role for the pet owner

When to Refer

Nursing care and physical rehabilitation play an essential role in promoting recovery and preventing complications. These should begin immediately after the diagnostic work-up.[1,7,9,10]

Figure 2: *Stretching exercises being done*
Dr Megan Esterhuizen, Bakenkop Animal Clinic 012 653 4474/2 or follow her facebook page Pins & Paws

What to Expect

Goals of therapy are to:

- Regain ambulation
- Prevent muscle atrophy
- Improve limb function
- Alleviate secondary pain caused by tension

Millis et al[8] have a standard three-week rehabilitation protocol but the program may be lengthened in those patients experiencing a slower recovery. Analysis of the progress made is crucial to all rehabilitation programs. Improvement is related to resolution of haemorrhage and oedema, recovery of the neural tissue from sublethal injury and the presence or development of collateral circulation.

Outcome is dependent on the severity and extent of injury as well as lesion localisation. Intact deep pain perception and signs of motor recovery within 2 weeks of onset are good prognostic indicators.[1,11,12] About 85% of patients recover but can be left with a permanent dysfunction.Most patients undergo physical therapy sessions once a week for 6 to 10 weeks.

POLYRADICULONEURITIS

Polyradiculoneuritis is also called Coonhound disease and is characterised by sudden inflammation of multiple nerve roots and peripheral nerves. It manifests as acute progressive flaccid tetraparesis to tetraplegia, with normal bladder and tail function and normal pain sensation.

Benefits

Intensive physical therapy is advisedto lessen or slow the inevitable loss of muscle mass.Voluntary movements are encouraged to facilitate a more rapid recovery. Physiotherapy interventions assist with recovery and all the principles of neurological rehabilitation are applicable thus the benefits are similar.

When to refer

Refer for physiotherapy as soon as possible. If physical therapy is not available in hospital, then refer as soon as the patient is discharged. The longer the dog remains in a state of flaccid paralysis, the more difficult this state is to overcome. No medications are proven effective for reversing this disorder. Dogs with polyradiculoneuritis are treated at home once their diagnosis is confirmed.

What to expect

Therapy sessions can take place daily or every alternate day in the acute stage of the disease. Care of a patient with flaccid paralysis is intense. The client will need support and advice on how often to move/turn the dog, appropriate soft bedding, feeding, how to manage elimination behaviour, as well as to be taught basic techniques that can be done at home.

Most patients will begin to recover after 7 to 10 days. The therapy sessions can become less frequent as the dog regains function.

DISCOSPONDYLITIS

Discospondylitis is a bacterial or fungal infection of the intervertebral discs and adjacent vertebral end plates.[6,13,14]Infection can be focal or at multiple sites along the spine.

Benefits

Physiotherapy plays a vital role in recovery following spinal injury[15] and is increasingly becoming an invaluable component in the treatment of discospondylitis. In severe cases confine the dog and apply physical therapy appropriate to the level of dysfunction. Physiotherapy can assist to:

- Maintain joint health
- Decrease pain and swelling
- Limit the muscular atrophy with appropriate therapeutic exercise

Employ neurological rehabilitation techniques applicable to the level of neurological dysfunction with the aim of returning the dog to function. Use similar protocols to those used for IVDD, so benefits are similar.

When to Refer

As soon as the diagnosis is made and the dog is responding to the chosen pain protocol and antibiotic/antifungal the dog should embark on a physical rehabilitation program.

What to Expect

This is dependent on:

- The ability to eliminate the causative organism
- Degree of neurologic dysfunction

Severe neurologic deficits and fungal infections carry a more guarded prognosis.Be aware and careful because discospondylitis patients may have significant weakness of affected bones of the vertebral column.In the early stages of the disease rehabilitation sessions may focus solely on adjunctive pain management. These may occur twice a week for 2 weeks. As the pain subsides and the medicine becomes effective then neurological rehabilitation and strengthening become the focus. Most patients can then be treated weekly. This recovery can be protracted and is dependent on the level of neurological dysfunction that is present. Rehab may continue for as long as 3 months.

VESTIBULAR SYNDROME

Old-dog vestibular syndrome, or canine idiopathic vestibular syndrome is a sudden non-progressive, disturbance in balance. The vestibular system is responsible for maintaining balance, posture, and the body's orientation in relation to the horizon.

Benefits

Initial days following diagnosis

- Provide supportive management of postures and transferring from one position to another
- Increase sensation and awareness of body position
- Maintain soft tissue flexibility

Figure 2: *Gait Training*

Following on from this and depending on thedog's progress, the aims might include:

- Improve core stability
- Further raise awareness of body position and posture
- Advance functional transfers of weight
- Facilitate supportive gait patterns

Once good recovery is established further aims are defined:

- Continue to strengthen core muscles
- Further enhance gait patterns including pace
- Enhance exercise tolerance and cardiovascular fitness
- Return to normal function or how to manage any residual disabilities

When to refer

As soon as the diagnosis is suspected or made.

What to Expect

As for most neurological conditions more frequent physiotherapy sessions are expected in the acute phase of the disease. As the patients respond then therapy sessions can move to weekly. Initial therapy may last for 4 to 6 weeks. After function has returned (in the final phases

of rehabilitation) the dog may be moved onto a home exercise program with a check-up every 2 – 4 weeks. The duration of the therapy is dependant on the dog's response to therapy, as well as the desired outcome as determined by the client.

CONCLUSION

Making use of a physical rehabilitation practitioner for patients with acute neurological conditions hastens and improves the dog's recovery. It is essential that the chosen therapist has the necessary training and skills to perform the therapy.

Veterinary physiotherapy is now a recognised veterinary para-profession in South Africa. Registered and Authorised practitioners can be found at www.saapra.co.za

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Common Canine Spinal Disease Simplified

Joan Capuzzi, VMD
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Although the spinal cord choreographs everything a dog does, it is a delicate neural pipeline and vulnerable to common issues that can be mechanical, vascular, infectious, or degenerative.

When managing "spinal" disease, the first step is ruling out an imposter such as a cruciate tear, immune-mediated polyarthritis (IMPA), and metabolic and vascular issues that produce weakness (ie, internal bleeding).

"When something can't walk, we need to first ask whether it is truly neurological and then, number two, if it is like this because of a problem in the brain or in the spine or if it is neuromuscular," explained Michelle Carnes, DVM, MS, DACVIM, medical director at Specialists in Companion Animal Neurology in Naples, Florida.

Localize and characterize the lesion

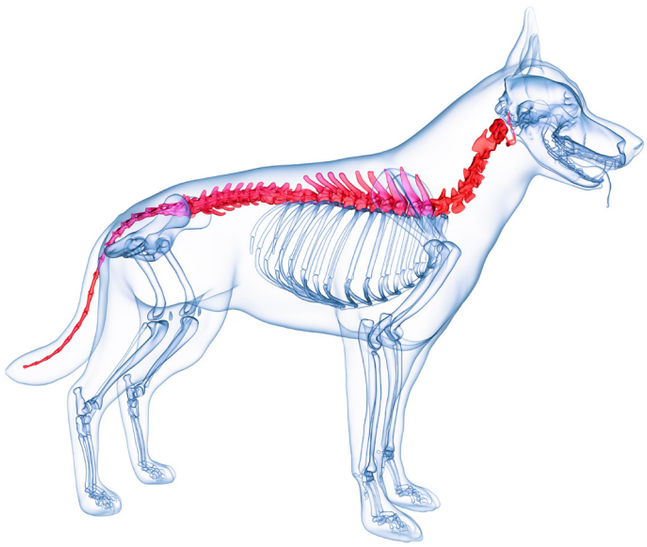
The next step is localizing the lesion into one of the 3 main anatomic districts: cervical; T3-L3; and L4>caudad. This neurologic examination also assesses motor function, proprioception, spinal reflexes, and deep pain perception.

The lesion is likely high cervical if the motor and/or proprioception are abnormal and withdrawal reflex is normal in all 4 limbs. However, if the withdrawal reflex is decreased/absent in the front limbs but normal in the hind limbs, the lesion is likely low cervical. For T3-L3 and lower lumbar lesions, the thoracic limbs are unaffected but the hind limbs have abnormal withdrawal reflexes.

If withdrawal reflexes are decreased or absent in all 4 limbs, the problem is neuromuscular, Carnes explained: "Make sure it's spinal, because neuromuscular takes us on a very different pathway from a spinal cord problem."

The presence of spinal pain leads down a different path than its absence. For example, if pain is present, think spinal fracture, extradural neoplasia, or acute intervertebral disc disease (IVDD).

A nonpainful dog, on the other hand, could be experiencing chronic IVDD, intradural neoplasia, fibrocartilaginous embolism (FCE), or degenerative myelopathy.



Intervertebral disc herniation

IVDD is the most common cause of myelopathy and back pain in dogs. Chondrodystrophic breeds are predisposed, often presenting between 3 and 6 years of age.
Three types of IVDD exist:

- **Hansen Type I** – acute extrusion of the nucleus pulposus from the annulus fibrosus
- **Hansen Type II** – chronic bulging of the annulus fibrosus
- **Hansen Type III** – acute, high-velocity, noncompressive extrusion of the nucleus pulposus secondary to sudden tear in the annulus fibrosus resulting from spinal trauma

The clinical signs — which vary with the spinal level of the lesion — are back pain, proprioceptive deficits, and paresis/paralysis. The absence of deep pain (assessed by compressing the digits) is the primary negative prognostic factor and signals the need to act fast. "The sooner the better," Carnes said. "You're getting secondary injury the longer that compression is there."

To relieve compression and prevent spinal cord necrosis—which, in 10% of patients lacking deep pain, can culminate in the irreversible liquefactive condition known

as myelomalacia—surgery may be necessary. Besides the absence of deep pain, the chief indications for surgery are nonambulatory paraplegia or paresis, recurring paresis, unrelenting spinal pain, or medical treatment failure.

Most IVDD cases can be medically managed. This hinges on at least 2 weeks of strict cage rest, followed by a month or so of restricted activity. Effective drugs include diazepam, gabapentin, and nonsteroidal anti-inflammatory drugs (NSAIDs) or, alternatively, prednisone as short-course therapy.

According to Carnes, a 2007 study of medical management for thoracolumbar/cervical herniations in 200 ambulatory dogs, approximately 54/49% recovered with no recurrence, 30/33% recovered withrecurrence and 14/18% did not recover.

FCE occurrence

An FCE occurs when a fibrocartilaginous fragment breaks from the disc and injects itself into the spinal cord vasculature. The neurologic fallout from this is determined by the extent of circulation occluded. "It's like a stroke in the spinal cord," Carnes said.

Canines with an accelerated risk for FCE are usually either young or adult miniature schnauzers and giant breed dogs. The typical presentation is sudden vocalization amidst vigorous activity, followed by an inability to walk. Deficits are asymmetrical and signs are nonprogressive. Affected dogs are usually anxious with no apparent pain.

FCE improves with supportive care and rehabilitation but not with corticosteroids. Manual bladder expression is usually necessary until function returns. "If they can't move their legs, they can't urinate," said Carnes. Most patients regain function, although some have residual deficits. In one study cited by Carnes, 73% of canine survivors recovered within a few weeks.

The more serious cases are signaled by several negative prognostic indicators, including symmetrical clinical signs, decreased spinal reflexes, absent/reduced deep pain sensation, spinal cord swelling (on MRI), lower cervical/lower lumbar localization (spinal intumescences), and elevated CSF leukocytes.

Diskospondylitis

Infection of intervertebral disc(s) with lytic invasion of adjacent endplates, diskospondylitis produces severe spinal pain, proprioceptive deficits, and fever +/- systemic illness. Large-breed dogs are at increased risk for this aggressive infection, which results most frequently from translocation of skin pathogens like *Staphylococcus* and *Streptococcus* spp., as well as *Escherichia coli*. It can also be caused by hematogenous bacterial spread, migrating foreign bodies, and other penetrating wounds.

Though bacteria are typically implicated in diskospondylitis, *Aspergillus* spp. can also precipitate it, particularly in German shepherds.

Although blood or urine cultures can support treatment choices, most cases are best addressed with broad-spectrum antibiotics like Clavamox or Simplicef, presenting a response within 5 days of treatment. NSAIDs and cage rest are key to a good outcome.

X-rays that track bone healing should be obtained every 2 to 3 months. "Where those lytic lesions were, I want to see smoothing of the bone of the vertebral bodies," said Carnes, adding that antibiotics should be continued for about a month past radiographic resolution.

Degenerative myelopathy

This slowly progressive decay of spinal cord white matter is considered the canine analogue for the human amyotrophic lateral sclerosis (ALS). A mutation in the *SOD1* gene and in most cases, underlies this chronic, nonpainful myelopathy that manifests as gradual weakness in the older (>8 years) dog. Usually seen in large-breed dogs—notably German shepherds, boxers, Bernese mountain dogs, Chesapeake Bay and golden retrievers, standard poodles, and Siberian huskies. Degenerative myelopathy (DM) does not spare smaller breeds, particularly pugs, miniature poodles, and Cardigan Welsh corgis.

The T3-L3 region, which corresponds to the pelvic limbs, is affected first, followed by the thoracic limbs. A diagnosis of rule-out, DM looks like IVDD on clinical presentation—wobbly gait, proprioceptive deficits, and loss of motor function, but for its sparing of the withdrawal reflex and its nonresponse to corticosteroids. MRI can exclude IVDD and neoplasia.

Though there is no established treatment for DM, intense physical therapy has been shown to slow deterioration and lengthen survival times. Further support may come from adjunct treatments, including NSAIDs, thyroid supplementation, and weight loss, in the case of corresponding comorbidities.

Joan Capuzzi, VMD, is a small animal veterinarian and journalist based in the Philadelphia area.

Making the Cut:

Surgical Versus Medical Management of Canine Disk Disease

Joan Capuzzi, VMD
DVM 360, November 13, 2019

Intervertebral disk disease in dogs can be a devastating diagnosis, with treatment decisions often based both on the neurologic status of the patient and the economics of the owner.

"They cushion the blow during activity," explained Simon Platt, BVM&S, FRCVS, DACVIM, DECVN, professor of neurology at the University of Georgia College of Veterinary Medicine, at the 2019 Atlantic Coast Veterinary Conference.

The disk consists of a gelatinous substance (nucleus pulposus) encased and stabilized by a rigid ring (annulus fibrosus).

When disk material herniates and compresses the spinal canal secondary to either degeneration of disk material or traumatic forces, the result is intervertebral disk disease (IVDD).

Classifying disk disease

The various types of disk disease are linked largely to signalment and patient history. In Hansen type I IVDD, the degeneration of proteoglycans in the central nucleus pulposus results in dehydration, collagenization and mineralization of the gel. The hardened pulposus then extrudes through the annulus fibrosus and compresses the spinal canal.

The resulting spinal contusion causes spinal cord ischemia, electrolyte changes and neurogenic shock, and can even occasionally result in systemic hypotension. This acute condition is an emergency, and the patient should be stabilized rapidly with oxygen and fluids, Dr. Platt said.

Chondrodystrophic breeds, like dachshunds and Welsh corgis, are genetically predisposed to type 1 IVDD. By age 2, said Dr. Platt, nine out of 10 chondrodystrophic dogs have degenerative changes in their disks. These dogs typically present with clinical signs around age 5.

Hansen type II IVDD, by contrast, occurs most commonly in older (mean age 7-8 years), large-breed dogs. Here, natural dehydration and mineralization of both the pulposus and the surrounding fibrosus occur over time. These chronic changes lead to disk bulging and spinal cord compression. Rest and anti-inflammatory medications can often alleviate clinical signs and stall progression.

Acute noncompressive nucleus pulposus extrusion (commonly referred to as Hansen type III IVDD) occurs more frequently in large breeds but can strike any dog. It is not degenerative; rather, it involves trauma that tears the annulus and allows normal nucleus to explode through.

Because the gel disperses, there is typically no ongoing cord compression or pain. These patients usually do not require surgery, and they respond well to anti-inflammatories and rehabilitation.

The worst sequela of traumatic IVDD is progressive myelomalacia. This condition, which afflicts some 10% of dogs with severe IVDD (those that are paralyzed with a loss of nociception), involves ischemic necrosis and liquefaction of the nerve tissue.

This rapid cell death ascends and descends along the spinal cord, away from the original lesion, beginning within 72 hours of injury. Characterized by paraplegia, profound pain, hyperthermia, incontinence, abnormal respiration and eventual loss of reflexes, myelomalacia is usually ultimately fatal.

The IVDD crystal ball

IVDD is graded based on clinical signs. This grading system helps determine course of treatment and prognosis associated with different options:

Grade 1: Back pain without motor impairment
Grade 2: Ambulatory paraparesis
Grade 3: Non-ambulatory paraparesis
Grade 4: Paraplegia with deep pain perception
Grade 5: Paraplegia without deep pain perception.

Chronicity does not factor directly into grading, Dr. Platt explained.

"Acute onset doesn't imply prognosis," he said. "What indicates prognosis is the presence or absence of deep pain perception or nociception."

For a dog that has pain sensation, the overall chances of recovery are 80%. If pain sensation is absent, the chances drop to 50%, and recovery is almost 0% with concurrent spinal fracture.

Dr. Platt questioned the use of radiography for chondrodystrophic breeds, noting that plain radiographs will almost always indicate disk mineralization - even in young Bassets or beagles, for example - but often will fail to confidently identify the pertinent herniated disk(s). Radiographs are more useful for non-chondrodystrophic breeds to rule out other differentials, such as diskospondylitis or neoplasia.

If surgery is planned, he recommended computed tomography (CT) or magnetic resonance imaging (MRI) to confirm and localize the lesion(s); CT, he noted, is faster and more affordable for clients and can be as accurate in many cases.

To cut or not to cut

Factors to consider when developing a management plan include neurologic status, lesion location, concurrent illness and medical treatment, presence or absence of previous episodes, method of diagnosis and economics; ultimately, said Dr. Platt, the decision between medical and surgical treatment comes down to patient neurologic status and dog owner economics.

Successful recovery from IVDD, he continued, means the patient is no longer painful, can ambulate without assistance and has urinary and fecal continence.

For grades 1 and 2 IVDD, both medical and surgical management yield 90% recovery. For grade 3, surgery excels over medical management (90% vs. 70% recovery, respectively). The gap widens for grade 4 IVDD; 80% to 90% of patients recover with surgery, whereas 50% recover with medical treatment. Patients with grade 5 disk disease are less than 5% likely to recover following medical management. Prognosis with surgery in these patients is time dependent: Surgery within 48 hours of clinical onset carries a 60% chance of recovery, but this drops to less than 5% around the one-week mark.

Dr. Platt described the criteria for surgery: paralysis on presentation, worsening neurologic status despite medical treatment, refractory spinal pain despite medical treatment, and recurrent episodes of spinal pain that worsen successively.

For medical management alone, Dr. Platt recommended low-dose (0.5-1 mg/kg/day), short-course prednisone or nonsteroidal anti-inflammatory drugs; he said he prefers prednisone because of its superior effect in spinal analgesia and for chronic and/or severe compression. Adjunctive treatment includes gabapentin, opioids and muscle relaxants such as methocarbamol and diazepam.

Nursing care for these patients should include four to six weeks of cage rest, adequate padding and nonslip mats, sternal recumbency (or lateral recumbency with turning every 4 hours), monitoring for decubital ulcers, feeding assistance, bladder management and such supportive therapies as physical therapy, hydrotherapy, laser therapy and acupuncture.

With medical management, 25% of cases will recover with no recurrence, 25% will recover with recurrence within one year, 25% will recover with recurrence within two years and the remaining 25% will deteriorate without surgery.

For the medical-versus-surgical dilemma in first-presentation cases of grade 1 to 3 IVDD, he said, "We let owners make the decision based on the fact that the majority will get better, but 50% will have a recurrence."

The intervertebral disks, though small and well concealed within the spinal meshwork, are critical to function and life itself. Fortunately, there are good medical and surgical protocols to address the debilitating effects of disk failure.

Dr. Capuzzi, who earned her BS and VMD degrees from the University of Pennsylvania, works in small animal practice in the Philadelphia area and is a published author. She has written for *The Philadelphia Inquirer*, *Time*, *Business Philadelphia*, *Dog Fancy* and *Dog World*, among others. She is especially interested in public health and animal welfare, and is involved with several organizations whose missions are to improve the lives of domesticated and wild animals.

Not letting sleeping dogs lie

Diagnosing and Managing Canine Narcolepsy

Canine narcolepsy is a chronic neurological disorder characterised by a lack of energy, excessive daytime sleepiness (especially after stimulation), and sudden loss of muscle tone without loss of consciousness (cataplexy). Affected animals can show signs as early as one month of age, although symptoms typically appear between four to six months. Fortunately, episodes are generally both short (a few seconds to several minutes) and painless, and the condition is considered to be neither progressive nor life-threatening. Many dogs actually remain conscious during an attack, and are aware of their surroundings, although they may eventually fall asleep if the episode lasts longer than a few minutes. They can, however, be assisted to end the episode early, either through physical or auditory stimulation.

Narcolepsy can have several causes, including the destruction of neurons through an auto-immune response or various nerve disorders, but in dogs it is most often an inherited condition. The heritable form of the disease has thus far been identified in three different dog breeds, namely Doberman Pinschers, Labrador Retrievers and Dachshunds. Although each is caused by a different mutation, all three are located within the canine *HCRTR2* gene, and disrupt the normal functioning of the neurotransmitter hypocretin (also called orexin) which is responsible for regulating alertness, and is also known to have a significant impact on sleep patterns.

The Doberman mutation is a 226bp SINE insertion within the *HCRTR2* gene, while the Labrador and Dachshund mutations are both single base pair changes from a "G" to an "A" within the DNA sequence. However, all three result in the production of a reduced- or non-functional hypocretin receptor protein, which severely impacts the neurons' ability to receive and transduce the neurotransmitter signal. This means that, during an episode, dogs typically have abnormally low levels of hypocretin.

Clinical signs of Narcolepsy include:

- Lack of activity/excessive sleeping during the day
- Sudden buckling of hind limbs, drooping neck and limb paralysis
- Sudden loss of consciousness/unexplained sleep
- Rapid eye movements and muscular twitching (as if dreaming)
- Symptoms appear at predictable times, such as during feeding or play
- The animal recovers from the episode when stimulated by noises or petting

Diagnosis of narcolepsy and cataplexy in dogs is most often based on a thorough veterinary examination (physical and neurological), as well as a detailed description of the symptoms before and during an episode (any video footage of an episode can be particularly helpful). The age of the dog, as well as any family history of symptoms, can also assist in diagnosing the condition. However, as narcoleptic symptoms can arise alongside or mimic other medical conditions, such as diabetes, heart disorders and epilepsy, it is most important to rule these more severe causes out first. This can include examining the dog's blood chemistry and full blood count, an electrolyte panel and urine testing, as well as an X-ray of the brain to eliminate the possibility of tumours or lesions, particularly in older dogs.

While there is currently no cure for narcolepsy in dogs, the condition is not fatal and should not affect the animal's lifespan. However, the situation in which an episode occurs could be dangerous for an unconscious and/or immobile pet. If the animal collapses while crossing the street, on steep terrain, or falls into a body of water, a harmless narcoleptic episode can quickly become a medical emergency.

A narcoleptic dog can also startle a canine companion when they suddenly collapse to the ground, causing an otherwise safe playmate to react aggressively. Pet owners should therefore be vigilant whenever their dog engages in an activity known to trigger episodes near other dogs. Fortunately, it is possible to significantly reduce the occurrence of episodes by identifying potential triggers and avoiding them where possible. For example, if the owner finds that an episode is triggered whenever guests visit due to over-excitement, they might try to keep the dog calm when guests arrive through maintaining physical contact and a soothing tone of voice. They might similarly avoid crowded dog parks, and keep their pet on a leash when walking in high traffic areas. Alternatively, if rigorous exercise becomes a trigger, play times can be monitored to avoid over-stimulation, as well as containing activity within a smaller area, and on more level terrain.

In general, affected dogs will show similar symptoms throughout their lives, and those with milder symptoms rarely need medical treatment. However, in more severe cases, where the episodes are affecting quality of life or becoming too disruptive, tricyclic antidepressants, or human hyperactivity medications can help to reduce the duration and/or frequency of episodes, while stimulant medications can counteract excessive sleepiness during the day. Which medication is chosen depends on what the dog responds best to, and which causes the least side-effects. Neither option is able to rid the pet entirely of the condition, although it is possible for the episodes to become less frequent as the dog ages. Additionally, starting from three weeks of age, puppies that are considered to be at risk of developing the disease can be treated with immune-suppressants, which can both delay the onset of symptoms and lessen their severity.

Overall, narcoleptic pets can still enjoy living a normal life - only a more cautious one. Research into the possibility of artificially introducing hypocretin into the brain is also still on-going, and pet owners of the future may yet have the option of permanently treating their animal companions for the condition.

Editor's note: Unistel offers genetic tests which can provide the definitive diagnosis of both Dachsund- and Labrador narcolepsy. For more information, visit http://www.unistelmedical.co.za/

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