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Medicine

High Time We Talk About Cannabis in Veterinary Medicine

Cardiorespiratory

Understanding Cardiorespiratory Causes of Collapse in Dogs

Surgery

Approaching Forelimb Lameness in Dogs: A Practical Guide to the Shoulder and Elbow for General Practitioners

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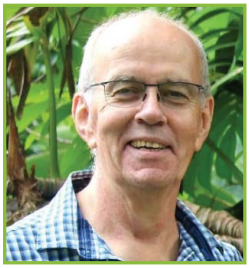

Hi everyone!

Hi everyone! Time flies! After late rains in the summer rainfall area, with flooding in many parts of the country, winter is now upon us. The second issue of 2025 is filled with interesting and informative articles and I am sure that everyone will find something worth reading!

Erika van Zyl-Venter tackles a long-overdue topic – the use of cannabis in veterinary practice. If you are like me – with little knowledge on the topic – her series of articles will serve as an excellent introduction and provide you with information to discuss with clients. The clinical articles – the approach to a collapsed dog, forelimb lameness, diagnostics in renal disease and the responsible use of antibiotics in ophthalmology – are all relevant to daily small animal practice, as is the article on concerns about prolotherapy.

Also included is another article on the role veterinary physiotherapists can (and should) play in the holistic approach to cases and information on some interesting journal articles.

Please let me have your comments on the content – suggestions on how we can add more value are always welcome! Till next time

Paul van Dam

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

Editor : **Paul van Dam** BVSc

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High Time We Talk About Cannabis in Veterinary Medicine

Medicinal Cannabis and How to Talk to Clients

Dr Erika van Zyl-Venter
BVSc

Introduction

The movement towards cannabis as a medicinal solution was given impetus by the South African Constitutional Court ruling in September 2018 decriminalising the private use of cannabis. The growth of non-traditional medicinal solutions in general, and cannabis in particular, is a rapidly growing feature of modern medicine. In veterinary medicine, it has been embraced by pet owners with a zeal that correlates to their own uptake and usage, with recent studies across several countries revealing that many pet owners are increasingly using cannabis-derived products. Particularly cannabidiol (CBD) – this is often viewed as a natural, effective, and safer alternative to conventional medications, especially when managing chronic conditions or when conventional options fall short. However, this is largely anecdotal and emphasises the urgent need for more veterinary-focused cannabis research and clear clinical guidelines. Join me in this three-part series on cannabis in veterinary medicine.

International studies show that pet owners used cannabis to treat pain, inflammation, anxiety and allergies in their pets and observed some positive effect.[1,2,3,4] The same perceived benefits and experience with using particularly CBD products can be expected in South African pet owners.

Clients are increasingly looking to their veterinarians, for empathetically sound scientific advice on the use of cannabis as an alternative form of treatment. Currently, cannabinoids are mostly self-administrated by our clients and the product market is very unregulated. Therefore, it is important for veterinarians to take back the leadership when it comes to potential veterinary therapeutic use of cannabis.

Regulation and Legislation

Another concern is the lack of product regulation and testing,[5] causing a wide gap in quality control of CBD products, which could potentially contain harmful contaminants. These challenges put the pet owner at risk to be defrauded, and in extreme cases, where the amount of phytocannabinoids or source of the product are unknown, could cause harm to the pet. In my experience, this is a particularly concerning problem in South Africa.

Medicinal cannabis should be seen and used as any conventional medication and according to all the relevant regulations governing veterinary medicine. Cannabis regulations in South Africa are currently a mire of confusion and contradictions – even police officers cannot keep up!

Cannabis is still illegal, in a broad sense. Exception is made by SAHPRA for medicinal use only after the acquisition of a Section 21 script for extra-label use of tetrahydrocannabidiol (THC, schedule 6) and CBD (schedule 4) substances. There is currently no SAHPRA-registered cannabis product available in South Africa.

Legislation Governing Cannabis in South Africa:

- The Cannabis for Private Purposes Act, Act 7 of 2024
- The Medicines and Related Substances Act, Act 101 of 1965
- The Foodstuffs, Cosmetics and Disinfectants Act, Act 54 of 1972
- The South African Veterinary and Para-Veterinary Professions Act, Act 19 of 1982
- The Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947

Medicinal Cannabis in Practice

Cannabis, as a single plant, has potential as a medicinal therapeutic for a multitude of physiological and pathophysiological conditions, as the phytocannabinoids produced (THC and CBD are but two of over 140 phytocannabinoids) by the plant interact directly and indirectly with the endogenous endocannabinoid system (ECS) present in all mammals. The ECS is a homeostatic, retrograde lipid-based feedback system and has mainly neuromodulatory and immunomodulatory effects.[6,7]

There is no bodily system that is not influenced by the ECS. Its homeostatic role modulates and regulates physiological and pathological conditions, encompassing analgesia, immune functioning, stress response, sleep, appetite and

memory – a role that has been described as: "relax, eat, sleep, forget and protect."[8] In spite of the positive influences on the **ECS, CANNABIS IS NOT A SILVER BULLET TREATMENT.**

"Currently, the scientific literature is dominated by reports on the efficacy of CBD primarily in the treatment of osteoarthritis, epilepsy, anxiety/ aggression and pruritus in skin atopy" – primarily in dogs[9] – with the possibility to also treat various cancers and tumours.

It is the veterinarian's responsibility to guide clients on product selection and dosing. Medical cannabis is not just about CBD and THC; choosing a product for a condition needs an understanding of medicine, physiology, pharmacology and the chemistry of the plant molecules. Phytocannabinoids and terpenes contained in the plant contribute to an entourage effect and a biphasic, therapeutic effect. Veterinarians should also advise on dosing amounts. While no formal dosing recommendations exist, the rule "start low and go slow" should always be followed. Clients also need to know what the possible side effects could be and how to mitigate these.

Drug Interactions

McGrath et al. did not find drug interactions nor serum blood level changes of either potassium bromide (KBr) or phenobarbital.[10] Elevation of alkaline phosphatase (ALP) may be seen but may not indicate hepatic insult in dogs, though it remains a concern in cats. Possible drug interactions have been demonstrated (mostly in humans) with: zonisamide, clobazam, ketoconazole, topiramate, rifampicin and benzodiazepines.

Cannabis Toxicity or Intoxication

Ironically, most pets I have treated in practice have not been for therapy, but for intoxication. This is likely to continue into the near future. Dogs are sensitive to the side effects of THC-high products. THC is 4–20x more potent than endocannabinoids and has a longer duration of action.

It is exceptional if death occurs, as THC does not cause acute respiratory depression. Deaths recorded could not rule out the presence of confounders such as toxins and underlying conditions – e.g. xylitol in edibles. In a study in dogs and monkeys, a single oral dose of Δ9-THC and Δ8-THC between 3000 and 9000 mg/kg was non-lethal.

> People often ask me about the impact of training police dogs to sniff out Marijuana: Interestingly, this is done by using terpenes of the plant , creating a pseudo marijuana scent, the recipe is: 2.2 g β-caryophyllene, 3.65 g myrcene, and 20 g microcrystalline

Intoxication is not often seen in cats, mostly because accidental ingestion is rare and they may be put off by the strong scent of terpenes. Mildly affected patients can be monitored at home by the owner. Tell them to make some tea for themselves, pull curtains closed, light a fragrant candle, and play some Bob Marley – or late '70s folk music – and take a nap with the patient.

Discussing Cannabis with Clients

In consultation, I inform the client that *CANNABIS IS NOT A SILVER BULLET TREATMENT*, and that cannabis is still illegal, in a sense, though we hope this will change in the future.

I spend time to make sure they understand the realistic expected results, as people often expect cannabis to be a miracle natural product, and to ensure clarity on the treatment objective or outcome.

They need to know what the possible side effects could be, and how to mitigate these. Most importantly, medicinal, pharmaceutical-grade cannabis is expensive. Street value of a 1g greenhouse-grown hydroponic bud/nug sells for R600+.

Abbreviations used in this series of articles:	
CB	Cannabinoid
CBD	Cannabidiol
CBr	Cannabinoid Receptors
CNS	Central Nervous System
ECS	Endocannabinoid System
eCB	Endocannabinoid
PNS	Peripheral Nervous System
SAHPRA	South African Health Product Regulatory Authority
THC	Tetrahydrocannabidiol

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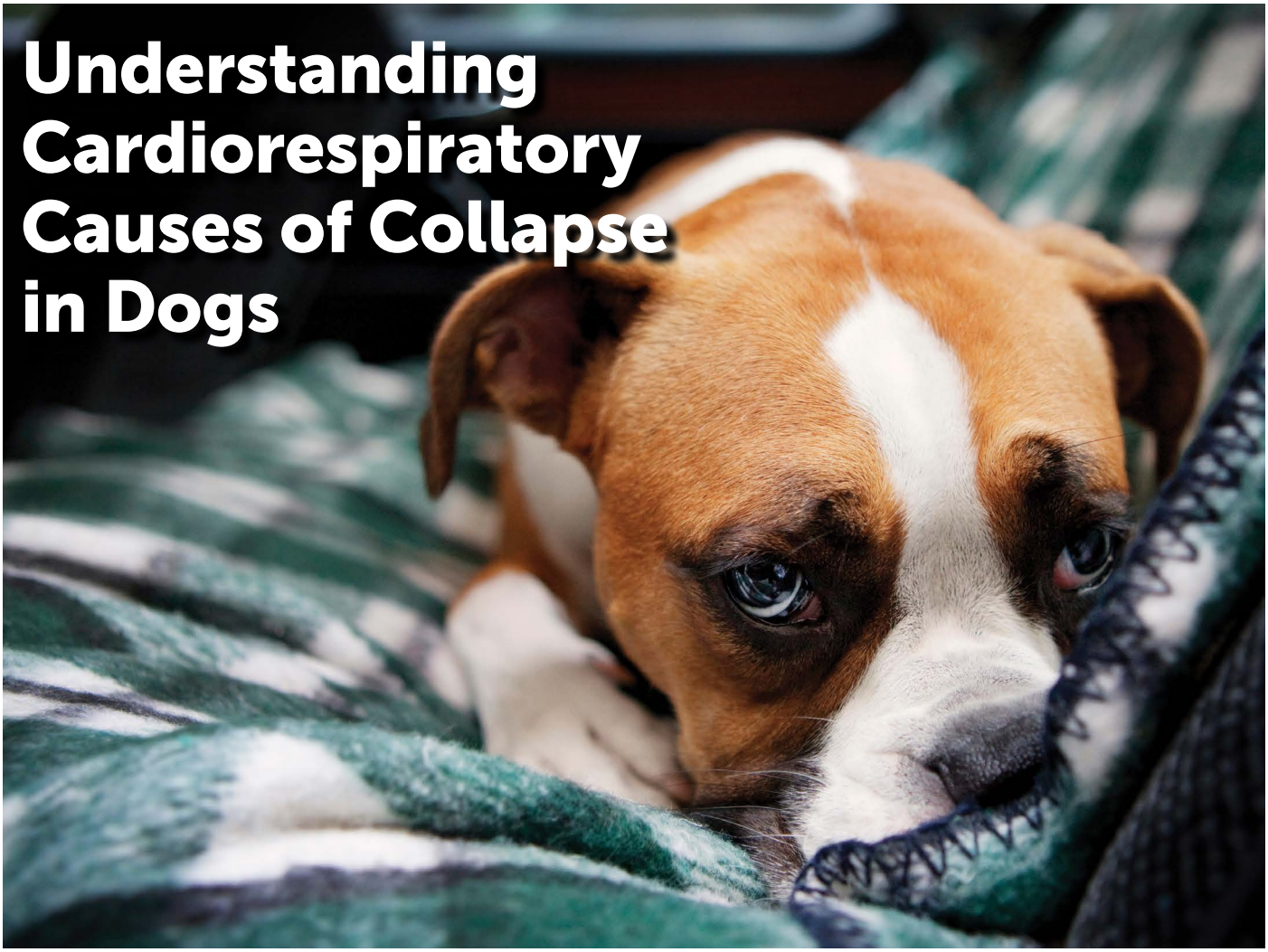
Understanding Cardiorespiratory Causes of Collapse in Dogs



Prof Johan P. Schoeman
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Collapse in a dog, characterised by a sudden loss of strength and postural control, can be a terrifying experience for owners. While seemingly abrupt, these episodes are often the culmination of underlying physiological disturbances. Understanding the potential causes is crucial for prompt diagnosis and appropriate management.

This article will delve into the intricate interplay between the cardiovascular and respiratory systems, exploring how malfunctions within either or both can lead to this alarming clinical sign in dogs.

Cardiorespiratory Physiology

The cardiovascular and respiratory systems work in concert to ensure the delivery of oxygen to and removal of carbon dioxide from every cell in the body.

The lungs facilitate gas exchange, drawing oxygen from the air into the bloodstream and expelling carbon dioxide. The heart, through its rhythmic contractions, propels this oxygenated blood throughout the systemic circulation. Any disruption to this finely tuned balance can have far-reaching consequences, particularly affecting oxygen-sensitive organs like the brain, and ultimately leading to collapse.

Cardiovascular Causes of Collapse

A primary failure of the cardiovascular system to adequately perfuse the brain is a significant cause of collapse, often manifested as **syncope**, a transient loss of consciousness due to cerebral hypoperfusion.

Forward Heart Failure

When the heart is unable to pump enough blood forward to meet the body's metabolic demands, it results in forward

heart failure. This can occur in various cardiac diseases, such as end-stage chronic valvular heart disease, dilated cardiomyopathy, and severe congenital defects like aortic- or pulmonic stenosis.

In these conditions, the reduced **cardiac output** directly leads to insufficient oxygen delivery to the brain, triggering a syncopal episode. The clinical signs preceding or accompanying this collapse may include **exercise intolerance**, **lethargy**, and potentially a **cardiac murmur** auscultated on physical examination.

Cardiac Arrhythmias

Disturbances in the heart's electrical rhythm can profoundly impact its ability to pump blood effectively. Both excessively slow **(bradyarrhythmias)** and excessively fast **(tachyarrhythmias)** rhythms can lead to collapse.

Severe **sinus bradycardia**, a heart rate significantly below the normal range, can result in inadequate blood flow. In contrast, extreme sinus tachycardia, while initially compensatory, can become so rapid that the ventricles do not have enough time to fill properly (impaired diastolic filling), leading to a decrease in stroke volume and potential collapse.

More serious arrhythmias like **atrial fibrillation** with a very rapid ventricular response, **ventricular premature contractions** occurring frequently (paroxysms) or in runs, and **ventricular tachycardia** can all drastically reduce effective cardiac output, precipitating syncope. An **electrocardiogram (ECG)** is essential for diagnosing the specific type of arrhythmia.

Third-degree atrioventricular (AV) block represents a complete dissociation between the atrial and ventricular electrical activity, often resulting in a very slow and unreliable ventricular rhythm, which can lead to collapse.

Congenital Heart Defects

Several congenital cardiac abnormalities can predispose dogs to collapse, often manifesting in younger animals.

As mentioned before, severe **aortic stenosis**, a narrowing of the left ventricular outflow tract, obstructs blood flow to the systemic circulation, causing reduced cardiac output and increasing the risk of sudden death or exercise-induced collapse.

Severe **pulmonic stenosis**, on the other hand, while primarily affecting the right side of the heart, can in later stages lead to right heart failure and ultimately, to reduced preload to the left ventricle, potentially causing weakness or collapse.

A **patent ductus arteriosus (PDA)** with a reversed shunt (right-to-left) can lead to differential **cyanosis** (bluish discolouration of the mucus membranes of the hindquarters and genitals, yet normal coloured buccal mucosa) and exercise intolerance, potentially culminating in intermittent weakness or collapse.

Acquired Heart Diseases:

Various acquired cardiac conditions can progress to a stage where collapse becomes a risk.

Dilated cardiomyopathy (DCM), a disease characterised by enlarged and weakened heart chambers, leads to poor contractility and reduced ejection fraction, ultimately resulting in congestive heart failure and the potential for syncopal episodes due to inadequate forward flow.

Hypertrophic cardiomyopathy (HCM), more common in cats but occasionally seen in dogs, involves thickening of the heart muscle, which can impair ventricular filling and reduce stroke volume, particularly under stress, potentially leading to collapse.

Severe **chronic valvular heart disease (CVHD)**, particularly mitral valve disease, can progress to significant mitral regurgitation, leading to left atrial enlargement, pulmonary oedema, and ultimately reduced forward cardiac output capable of causing collapse.

Pericardial effusion, the accumulation of fluid within the sac surrounding the heart, can lead to **cardiac tamponade,** where the increased pressure restricts ventricular filling, drastically reducing stroke volume and potentially causing weakness or collapse.

Bacterial Endocarditis, infection of the heart valves, can cause significant valvular dysfunction, leading to congestive heart failure and potentially embolic events that could affect cerebral blood flow, contributing to collapse.

Respiratory Causes of Collapse

While the heart is the pump, the lungs are the oxygenators. Severe compromise of the respiratory system can lead to critical **hypoxia**, a severe deficiency in tissue oxygenation, which can also manifest as collapse.

Severe Upper Airway Obstruction:

Conditions causing significant narrowing of the upper airways, such as acute exacerbations of **brachycephalic airway syndrome** (stenotic nares, elongated soft palate, laryngeal collapse), severe **laryngeal paralysis**, or critical episodes of **tracheal collapse**, can lead to a drastic reduction in airflow and life-threatening hypoxia, resulting in collapse. Owners may report **inspiratory stridor** (a high-pitched sound on inhalation) or **stertor** (a snoring or gurgling sound).

Severe Lower Airway Obstruction:

Conditions affecting the lower airways, such as severe asthma (in cats) or chronic bronchitis (in dogs), or the aspiration of a large **foreign body** into the trachea or major bronchi, can critically impede airflow and gas exchange, leading to hypoxia and collapse. In such cases, **expiratory dyspnoea** may be noted.

Parenchymal Lung Disease Causing Severe Hypoxaemia:

Severe inflammatory or infectious conditions of the lung tissue **(parenchymal disease)**, such as severe pneumonia (bacterial, aspiration), acute respiratory distress syndrome (ARDS), or extensive pulmonary contusion following trauma, can severely impair oxygen diffusion into the bloodstream, leading to critical hypoxaemia and collapse. Increased

respiratory rate and **effort** are often prominent signs in these cases.

Pleural Space Disease Severely Compromising Ventilation:

The accumulation of air **(pneumothorax)** or fluid **(pleural effusion)** in the pleural space can compress the lungs, restricting their ability to expand fully and impairing ventilation. A **tension pneumothorax**, where air enters the pleural space but cannot escape, can cause a rapid and life-threatening collapse due to severe lung compression. **Muffled lung** sounds on auscultation are a characteristic finding, especially in cases with pleural effusion. In fact, the percussion of a bilateral fluid line (hypo-resonant on the ventral aspect of the thorax and hyper-resonant dorsally) is pathognomonic for pleural effusion.

Pulmonary Thromboembolism (PTE):

The sudden obstruction of pulmonary arteries by blood clots can severely disrupt blood flow through the lungs, leading to acute and severe respiratory distress and potentially collapse due to hypoxaemia and excessive strain on the right heart. The clinician should have a high index of suspicion for this condition in dogs with hyperadrenocorticism, immune-mediated haemolytic anaemia and protein-losing nephropathy/enteropathy and in others that are predisposed to coagulopathies.

The Vicious Cycle: Cardiorespiratory Interactions in Collapse

It is crucial to recognise that cardiac and respiratory conditions often interact and can exacerbate each other, increasing the likelihood of collapse. For instance, a dog with underlying heart disease experiencing respiratory distress will have an increased cardiac workload due to the hypoxia, potentially leading to decompensation. Conversely, pulmonary oedema secondary to heart failure significantly reduces lung compliance and oxygen exchange, further stressing the cardiovascular system. Ultimately, severe hypoxaemia, regardless of the primary origin (cardiac or respiratory), can lead to brain dysfunction and collapse.

Unravelling the Mystery: Diagnostic Considerations

Determining the underlying cause of collapse requires a systematic problem-based diagnostic approach:

A thorough **history**, including the breed of the dog (certain breeds are predisposed to specific cardiac and respiratory conditions), the circumstances surrounding the collapse, and any prior medical history, is essential. The main differentials for a dog presenting with coughing AND dyspnoea are prioritised differently than for a dog presented solely with dyspnoea, for example.

A comprehensive **physical examination** should include careful **auscultation** of the heart and lungs to identify murmurs, arrhythmias, or abnormal lung sounds. Assessment of **pulse quality, mucous membrane colour** (for cyanosis or pallor), and **respiratory pattern** (rate, effort, and any abnormal sounds) can provide crucial clues. **Thoracic radiography** is invaluable for evaluating **cardiac size (vertebral heart score and vertebral left atrial score) and shape**, as well as assessing the **lung parenchyma** for signs of oedema, pneumonia, or other infiltrates, and for identifying abnormalities in the **pleural space.**

In this regard, the recent introduction of **lung ultrasound** into veterinary practice has potentially revolutionised our approach. All the various abnormalities that can be found on lung ultrasound is beyond the scope of this article. Suffice to mention that wet lung (excessive extra-vascular lung water - EVLW) can be reliably distinguished from dry lung. In addition, the distribution pattern of the EVLW can provide aetiological clues. For example, a peri-hilar distribution of EVLW, can indicate left heart failure in dogs, whereas a ventral pattern can be suggestive of aspiration pneumonia. In essence, the clinician must learn how to distinguish A lines (reverberation artefacts representing dry lung) from B lines (vertical, laser-like projections indicating EVLW) and, *inter alia*, be able to tell the tissue-sign (hepatisation of lung) apart from the nodule sign (metastatic tumours). Moreover, an **electrocardiogram (ECG)** is critical for identifying and characterising **cardiac arrhythmias.**

Echocardiography provides detailed imaging of the heart's size, structure and function, allowing for the diagnosis of **structural heart disease**, assessment of **contractility**, and identification of conditions like pericardial effusion. Moreover, focussed cardiac ultrasound is a very efficient way of ruling out pericardial effusion, low contractility and severe left atrial enlargement through the assessment of the **left atrial to aortic ratio.**

In cases of suspected respiratory compromise, **blood gas analysis** can quantify the level of oxygenation and carbon dioxide in the blood, providing objective evidence of respiratory dysfunction.

Conclusion

Collapse in dogs is a serious clinical sign that can stem from a variety of underlying cardiorespiratory disorders. Understanding the intricate relationship between the heart and lungs, and how dysfunction in either can lead to cerebral hypoperfusion or critical hypoxaemia, is paramount for veterinary practitioners. A thorough and systematic diagnostic approach, incorporating detailed history, careful physical examination, and appropriate ancillary tests, is essential to accurately identify the cause of the collapse and implement timely and effective treatment, ultimately improving the prognosis and quality of life for our canine patients.

CPD Questions

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1. Collapse in dogs is characterised by a sudden loss of:
a) Appetite and energy levels
b) Strength and postural control
c) Consciousness and vocalisation
d) Gait stability and smell
e) Vision and hearing

2. The primary function of the cardiorespiratory system is to:
a) Regulate body temperature and blood pressure
b) Filter waste products and produce hormones
c) Deliver oxygen to and remove carbon dioxide from every cell
d) Protect against infection
e) Digest food and absorb nutrients

3. A transient loss of consciousness due to cerebral hypoperfusion is known as:
a) Seizure
b) Vertigo
c) Stroke
d) Syncope
e) Ataxia

4. Forward heart failure occurs when the heart is unable to:
a) Maintain a regular rhythm
b) Remove carbon dioxide from blood
c) Properly fill with blood
d) Pump enough blood forward to meet the body's metabolic demands
e) Efficiently oxygenate blood

5. Which one of the following can lead to collapse due to a severely reduced cardiac output?
a) Mild sinus tachycardia
b) Occasional ventricular premature contractions
c) Mild and passing bradycardia
d) First-degree atrioventricular block
e) Ventricular tachycardia

6. Severe aortic stenosis can cause collapse by:
a) Causing excessive backflow of blood into the left atrium
b) Obstructing blood flow to the systemic circulation
c) Leading to an excessively rapid heart rate.
d) Increasing blood pressure
e) Weakening the heart muscle over time

7. Conditions causing significant narrowing of the upper airways can lead to collapse primarily due to:
a) Life-threatening hypoxia
b) Excessive build-up of carbon dioxide in the bloodstream
c) A sudden increase in blood pressure
d) Impaired cardiac contractions
e) Stimulation of the vagal nerve leading to bradycardia

8. Muffled lung sounds on auscultation are a characteristic finding in cases of:
a) Severe pneumonia
b) Chronic bronchitis
c) Pleural effusion
d) Pulmonary fibrosis
e) Pulmonary thromboembolism

9. Pulmonary oedema secondary to heart failure can increase the likelihood of collapse by:
a) Increasing the heart's contractility
b) Significantly reducing lung compliance and oxygen exchange
c) Dilating the pulmonary arteries
d) Decreasing the cardiac workload
e) Vasovagal syncopy

10. Which diagnostic tool is critical for identifying and characterising cardiac arrhythmias in a dog that has collapsed?
a) Thoracic radiography
b) Lung ultrasound
c) Echocardiography
d) Electrocardiogram
e) Blood gas analysis

Continued from PAGE 5 - References

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Integrative Management of Obesity in Companion Animals: The Role of Veterinary Physiotherapy

Tasmyn Gouws, Veterinary Physiotherapist
Equine-Librium Clinics

Introduction

Obesity in companion animals, particularly dogs and cats has reached epidemic levels. Over one-third of adult dogs and a significant proportion of cats are now classified as overweight or obese, facing increased risks of chronic disease and decreased quality of life. While nutrition and exercise are critical components of any weight loss plan, one often underutilised resource in the battle against pet obesity is the veterinary physiotherapist.

Successful weight-loss strategies involve coordination between the primary care veterinarian and the veterinary physiotherapist. The veterinarian typically conducts diagnostic assessments, identifies underlying health

issues, and prescribes a dietary plan. The veterinary physiotherapists compliment the veterinary treatment by offering a unique skill set that supports both the prevention and treatment of obesity, especially in cases complicated by musculoskeletal disorders like osteoarthritis (OA).

Through tailored interventions ranging from hydrotherapy to manual therapy they help pets regain mobility, reduce pain, preserve lean muscle mass, and improve long-term health outcomes. Their role becomes even more crucial when addressing the specific needs of cats, who often present different behavioural and mobility challenges.

The Obesity Crisis: A Multispecies Problem

Obesity in pets is defined as body weight exceeding the ideal weight by 15% or more. It is a multifactorial disease influenced by genetics, activity levels, neuter status, feeding habits, and owner behaviours. Dogs and cats alike are at risk of developing comorbidities such as:

- Osteoarthritis
- Diabetes mellitus
- Cardiovascular disease
- Hepatic lipidosis (particularly in cats)
- Lower urinary tract disorders
- Decreased immune function

Perhaps most alarmingly, obesity is associated with a reduced lifespan of up to two years shorter in some studies and measurable declines in activity, enthusiasm, and overall comfort.

Caloric Restriction: Essential, But Not Enough

Nutritional management remains the cornerstone of weight loss. Caloric restriction, guided by target weight and resting energy requirement (RER), enables gradual fat reduction at a safe rate (typically 1–2% per week).

However, diet alone does not address functional limitations caused by excess weight. For obese pets, especially those with OA or reduced mobility, movement may be painful or avoided altogether. The triad of pain, obesity, and reduced movement forms a vicious cycle.

In cats, this may manifest as reluctance to jump, decreased grooming, or behavioural changes. Without movement, weight loss plateaus and quality of life may remain poor despite dietary success.

The Veterinary Physiotherapist assessment

Initial Consultation and Case History

The assessment begins with a comprehensive review of the pet's medical history, provided in collaboration with the referring veterinarian. Key components include:

- Weight trends and previous body condition scores
- Existing diagnoses (e.g., osteoarthritis, endocrine disorders)
- Medications and dietary plans
- History of physical activity and behavioural patterns
- The veterinary physiotherapist will also obtain a detailed account from the pet owner regarding lifestyle, mobility concerns, and activity levels at home.

Observational Assessment

Observation is critical to understanding the impact of obesity on function. The veterinary physiotherapist will examine:

- Gait and posture while walking, turning, sitting, and rising
- Stance symmetry and weight distribution
- Signs of discomfort, fatigue, or reluctance to move
- Respiratory effort and tolerance during mild activity
- These observations guide further functional and hands-on assessments.

Palpation and Physical Examination

The hands-on portion of the assessment includes:

- Muscle mass evaluation: Detecting atrophy, asymmetry, or compensatory hypertrophy
- Joint palpation: Assessing for swelling, crepitus, or restricted range of motion
- Spinal assessment: Checking for tension, pain responses or any abnormalities
- Soft tissue examination: Identifying areas of muscular pain or discomfort
- Neurological assessment: If required, neurological status will be assessed.

This examination helps determine the physical limitations that could affect exercise tolerance and mobility.

Measurement and Scoring Tools

Objective data is recorded to benchmark progress and support clinical reasoning:

- Body Condition Score (BCS): Typically using a 9-point scale
- Weight and girth measurements: To monitor trends and fat distribution
- Muscle Condition Score (MCS): To identify sarcopenia or muscle imbalance
- Functional mobility tests: e.g., sit-to-stand, timed walking distance

These data points are essential for designing safe, measurable goals.

Therapeutic Interventions:

- Hydrotherapy (underwater treadmill, swimming)
- Targeted exercise plans
- Manual therapy (soft tissue release, massage)
- Electrotherapy (TENS, PEMF)
- Laser therapy
- Shockwave therapy

Hydrotherapy: Movement Without Impact

Hydrotherapy, particularly underwater treadmill (UWT) and swimming, provides a controlled environment where pets can exercise without overloading their joints. The benefits include:

- Buoyancy, which reduces weight-bearing stress
- Resistance, which increases energy expenditure
- Improved joint range of motion
- Enhanced cardiovascular engagement
- Increased comfort during activity

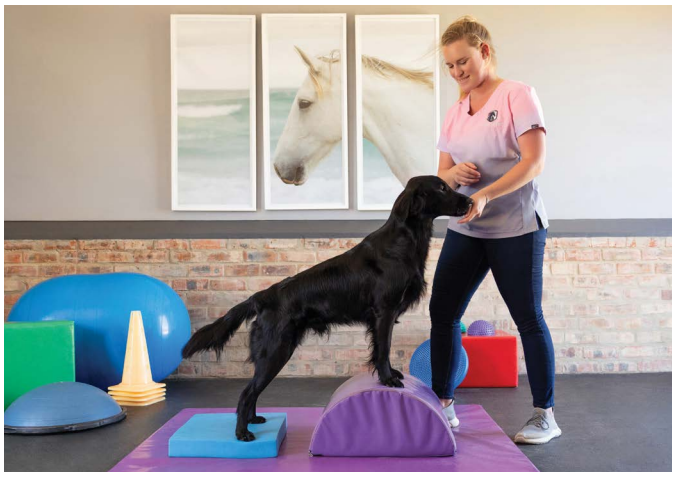
For cats, hydrotherapy is used less frequently but can still be beneficial when tolerated, especially with early desensitisation or in calm, water-adapted individuals.

Land-Based and Home Exercises

Land-based exercises are vital, particularly for pets that cannot access hydrotherapy. These may include:

- Static postural exercises
- Dynamic core strengthening
- Hill walking (for dogs)
- Interactive play (for cats)
- Low-impact endurance sessions
- Owner-guided home routines

Importantly, physiotherapists ensure that any treat-based rewards are accounted for in the animal's calorie budget.



How Exercise Increases Metabolism in Companion Animals

Metabolism refers to the sum of all biochemical processes involved in maintaining life, including the conversion of nutrients into energy. In the context of obesity management, **increasing metabolic rate** is a critical goal, as it allows for more efficient calorie expenditure and supports sustainable weight loss. Veterinary physiotherapists play a key role in using exercise as a tool to modulate metabolic function in dogs and cats. Here's how:

1. Increased Resting Energy Expenditure (REE)

One of the primary metabolic effects of regular exercise is an **increase in resting energy expenditure (REE)**—the amount of energy the body uses at rest. This occurs due to:

- **Mitochondrial biogenesis** in skeletal muscle, enhancing oxidative capacity
- **Upregulation of enzymatic pathways** involved in aerobic metabolism
- **Muscle hypertrophy,** which raises baseline caloric needs because lean tissue is more metabolically active than adipose tissue

Increased REE supports ongoing fat oxidation and helps prevent weight regain once a target weight is achieved.

2. Preservation and Growth of Lean Body Mass (LBM)

Exercise, particularly **resistance training and controlled endurance activity**, helps preserve and grow **lean body mass**, especially muscle. Muscle accounts for a significant portion of daily energy expenditure due to its high mitochondrial density and metabolic demand. Veterinary studies show that pets undergoing weight loss programs that include structured physiotherapy preserve more LBM than those on caloric restriction alone. Preserved muscle mass ensures a **higher basal metabolic rate (BMR),** preventing the metabolic decline often seen with diet-only weight loss.

3. Hormonal Modulation and Appetite Regulation

Exercise influences metabolic hormones, contributing to improved energy balance:

- **Increased sensitivity to insulin** improves glucose uptake and reduces fat storage

- **Modulation of leptin and ghrelin** helps regulate appetite and satiety
- **Enhanced secretion of catecholamines (e.g., epinephrine, norepinephrine)** stimulates lipolysis, increasing fat mobilisation from adipose tissue

In pets, this hormonal shift supports more effective use of stored energy and reduces hyperphagic behaviour, which can hinder compliance in weight loss programs.

4. Post-Exercise Oxygen Consumption (EPOC)

After vigorous exercise, pets experience **excess post-exercise oxygen consumption (EPOC)**—a period during which oxygen consumption remains elevated as the body restores homeostasis. This includes:

- Replenishing oxygen stores in blood and muscle
- Clearing lactate
- Re-synthesising ATP and creatine phosphate
- Restoring normal thermoregulation

This post-exercise phase contributes to **continued calorie burn** even after the activity session has ended. In practical terms, this means that regular exercise increases total daily energy expenditure, even with short or moderate-duration sessions.

5. Fat Oxidation and Metabolic Flexibility

Routine exercise enhances the pet's **metabolic flexibility**—the ability to switch efficiently between fuel sources (fat and carbohydrates). Through adaptations like increased mitochondrial density and enzyme activity (e.g., citrate synthase, β-hydroxyacyl-CoA dehydrogenase), trained animals become better at:

- **Utilising fat stores for energy**, especially at lower intensities
- **Improving insulin sensitivity**, which promotes more effective energy partitioning

This results in greater long-term fat loss and improved body composition.

6. Neuromuscular Activation and Thermogenesis

Therapeutic exercise, including weight-bearing, balance, and proprioceptive tasks, engages multiple muscle groups and stimulates **non-shivering thermogenesis.** This refers to increased heat production by muscle activity, especially in brown adipose tissue (in younger animals and some breeds). The **thermic effect of activity (TEA)** becomes a substantial component of daily energy use in active animals.

Exercise is a metabolic activator. It boosts resting and total energy expenditure, improves fuel utilisation, preserves lean mass, and modulates key hormonal regulators of appetite and fat storage. For both dogs and cats, these mechanisms make physiotherapy-driven exercise not only a support for weight loss, but a cornerstone of metabolic rehabilitation and preventive care.

Collaborative Care and Owner Engagement

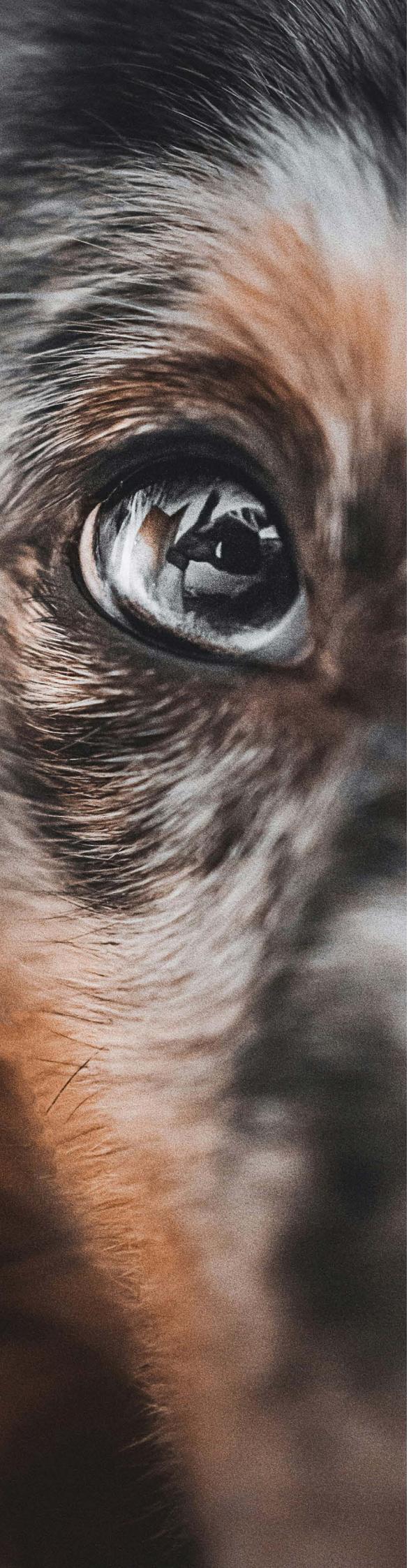
One of the biggest barriers to successful weight loss is inconsistent owner compliance. Veterinary physiotherapists help overcome this by:

- Creating structured, goal-oriented programs
- Offering regular follow-ups and rechecks
- Educating owners on exercise, behaviour, and feeding
- Providing visual tracking tools (diaries, weight charts)

This approach increases compliance and motivation—especially as pets show visible improvements in mobility and mood.

Conclusion

Veterinary physiotherapists play a vital role in the multimodal management of obesity in companion animals. Their expertise in therapeutic exercise, pain management, and functional assessment enables safe, targeted interventions particularly for patients with comorbidities such as osteoarthritis. When integrated with dietary restriction, veterinary physiotherapy improves outcomes by preserving lean body mass, enhancing mobility, and reducing pain. Evidence supports that combined approaches lead to greater fat loss and improved functional capacity compared to nutritional management alone. Incorporating veterinary physiotherapy into obesity treatment protocols not only accelerates weight reduction but also supports long-term health and quality of life, positioning it as an essential component of evidence-based veterinary care.



The Responsible Use of Topical Antibiotics in Veterinary Ophthalmology

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Introduction

Antibiotic resistance (ABR) is a major global health threat, affecting both human and veterinary medicine. Globally, bacterial resistance to antibiotics is currently considered one of the 7 major threats to the human race, along with terrorism, nuclear proliferation and air pollution.

Antibiotics are among the most cost-effective, life-saving medicines, significantly extending lifespans in animals and humans. However, their effectiveness is increasingly compromised by the rapid rise of antibiotic-resistant bacteria, driven primarily by overuse and misuse. The World Health Organization (WHO) emphasises that rational antibiotic use requires appropriate prescribing based on patient needs, with the correct dosage and duration, at the lowest societal cost. Any deviation accelerates resistance development.

Bacteria are simple yet highly adaptable organisms capable of altering themselves when environmental conditions, such as antibiotic exposure, become unfavourable. Antimicrobial resistance (AMR) is a natural phenomenon, as bacteria develop resistance through *de novo* mutations or by acquiring resistance genes from other bacteria.

The widespread use of antibiotics creates selective pressure, favouring the survival and spread of resistant strains. Some multi-resistant bacteria now lack effective treatments, posing a serious challenge in both human and veterinary medicine.

The consequences of AMR are alarming. Resistant pathogens are responsible for approximately 4.95 million deaths annually worldwide. Transmission of resistant bacteria occurs through various pathways, including animal-to-human spread, but resistance can also originate from humans.

The risks of AMR were foreseen long ago. Sir Alexander Fleming, who discovered penicillin in 1928, warned about the dangers of antibiotic misuse in his Nobel Prize lecture on December 11, 1945:

"There is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant."

His warning remains critically relevant today. As veterinarians, we play a key role in preserving antibiotic efficacy by ensuring responsible prescribing and judicious use of antibiotics – especially in specialised fields like veterinary ophthalmology, where topical antibiotics are frequently used. This article will explore best practices for responsible topical antibiotic use to mitigate the growing threat of resistance.

Rethinking the Routine Use of Topical Antibiotics

The rapid emergence of fluoroquinolone resistance in ophthalmology has raised concerns about the routine use of these antibiotics. Eugene Milder *et al.* reported a significant increase in fluoroquinolone resistance following repeated exposure in humans.

Fluoroquinolones are widely used in both human and veterinary ophthalmology, particularly for endophthalmitis prevention after intraocular surgery. In human ophthalmology, they are commonly prescribed post-intravitreal injections for exudative age-related macular degeneration (AMD), as well as for patients undergoing cataract surgery – a practice mirrored in veterinary medicine.

However, the repeated short-term use of fluoroquinolones, such as 4-day regimens every 4–6 weeks, may contribute to bacterial resistance without effectively eradicating pathogens. This selection pressure could explain the increasing fluoroquinolone resistance observed in ocular microbiology.

A study found baseline fluoroquinolone resistance in 32.1% of control eyes. After an average of seven intravitreal injections, resistance rose to 63.6% in treated eyes and 87.5% in those receiving fluoroquinolones post-injection. These findings highlight the need to reconsider routine antibiotic use, especially when the benefits in infection prevention remain unproven, while the risk of resistance escalation is clear.

When to prescribe / not prescribe topical antibiotics.

Conjunctivitis

Conjunctivitis is a common ocular condition in animals, yet antibiotics are frequently prescribed without scientific justification. While bacterial infections can occur, many cases result from non-bacterial causes, making antibiotics unnecessary (refer Figure 1 & 2).

The conjunctiva often becomes secondarily inflamed due to underlying ocular or periocular conditions, such as keratitis, orbital disease, blepharitis, keratoconjunctivitis sicca, and dacryocystitis.

Conjunctivitis in Cats

The most common causes of conjunctivitis in cats are Feline Herpesvirus (FHV) and *Chlamydia*, emphasising the need for targeted treatment rather than routine antibiotic use:

- Feline Herpesvirus (FHV): Antibiotics are generally not required unless a secondary bacterial infection is present, which can be confirmed through conjunctival cytology.
- Chlamydial conjunctivitis: Requires treatment with topical fluoroquinolones and systemic doxycycline. To help preserve the efficacy of advanced antibiotics, second- or third-generation fluoroquinolones should be used instead of fourth-generation products like moxifloxacin.

Conjunctivitis in Dogs

Primary bacterial conjunctivitis is rare in dogs but can occasionally occur, especially in outdoor dogs that swim in contaminated water. More commonly, dogs develop secondary bacterial conjunctivitis, often involving staphylococci and streptococci (Table 1).

Conjunctivitis	
Dogs	**Cats**
Allergy	Infectious: Feline Herpes Virus, *Chlamydia, Mycoplasma*
Immune mediated	Allergy
Mechanical irritation: Entropion, ectropion, distichiasis, ectopic cilia, trichiasis, foreign bodies, eyelid neoplasia.	
Keratoconjunctivitis sicca	
Infectious	

Table 1 Common causes of conjunctivitis in dogs and cats.

Figure 1. Follicular conjunctivitis in a dog, typically caused by chronic low-grade irritation (e.g., mechanical irritation) rather than bacterial infection.

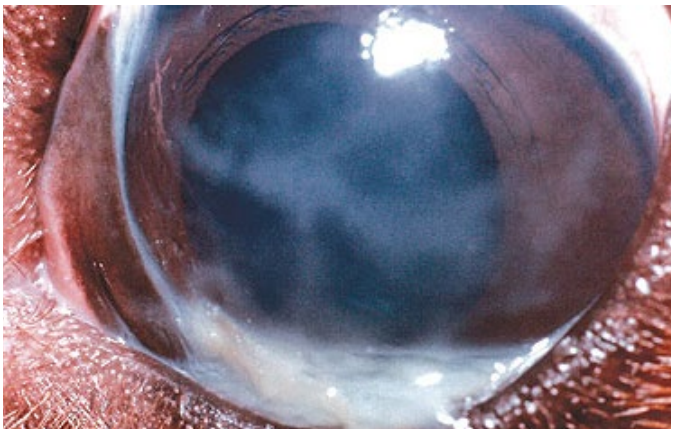

Figure 2. Mucoid ocular discharge and conjunctival hyperaemia of the third eyelid in a dog, most likely due to decreased tear production (keratoconjunctivitis sicca). Routine treatment does not require antibiotics.

Keratitis

Keratitis, or inflammation of the cornea, has various causes in dogs and cats. It can be classified based on the underlying cause:

Infectious Causes
- Viral: Feline Herpesvirus-1 (FHV-1) – common in cats, leading to dendritic ulcers
- Bacterial: Secondary bacterial infections (often opportunistic following trauma or ulceration)
- Fungal: Rare but possible, especially in immunocompromised animals

Immune-Mediated Causes
- Chronic superficial keratitis (pannus) – common in German shepherds
- Keratoconjunctivitis sicca (KCS, dry eye) – reduced tear production leading to corneal inflammation

Traumatic Causes
- Corneal ulcers from scratches, foreign bodies, or blunt trauma
- Post-surgical inflammation

Metabolic Causes
- Lipid keratopathy – lipid deposits in the cornea, often linked to hyperlipidaemia
- Calcium keratopathy – mineral deposits associated with systemic diseases like Cushing's

Allergic and Environmental Causes
- Exposure to irritants (smoke, dust, chemicals)
- Allergic conjunctivitis leading to secondary keratitis

Neurogenic Causes
- Neurotrophic keratitis – due to trigeminal nerve dysfunction, reducing corneal sensation
- Facial nerve paralysis – leading to incomplete blinking and corneal drying

Structural and Congenital Causes
- Entropion
- Ectopic cilia or distichiasis
- Corneal dystrophy

Topical antibiotic treatment is only required in cases of ulcerative keratitis to prevent or manage infection. The most common bacterial isolates cultured from corneal stromal ulcers include:

- Dogs: *Staphylococcus, Streptococcus*, and *Pseudomonas species*.
- Cats: *Staphylococcus* and *Streptococcus species*.

Uncomplicated corneal ulcers should heal within 7–10 days. The most critical aspect of ulcer treatment is identifying and addressing the underlying cause to prevent recurrence. Although uncomplicated ulcers are not inherently infected, the absence of the corneal epithelial layer makes the exposed corneal stroma more susceptible to bacterial adhesion. Therefore, topical antibiotics are routinely included in treatment to prevent secondary infection and support healing.

Keratomalacia, also known as acute stromal collagenolysis, melting corneal ulcer, or liquefactive stromal necrosis, is not a primary corneal disease but rather a complication of pre-existing corneal ulceration. It arises due to an imbalance between proteinases and proteinase inhibitors, which are essential for normal corneal tissue maintenance and wound healing. These enzymes and inhibitors are naturally present in the cornea and precorneal tear film but can also be released by neutrophils, macrophages, keratocytes, and certain bacterial and fungal species. When proteinase inhibitors fail to counteract the excessive activity of proteolytic enzymes, rapid liquefaction of the corneal stroma occurs.

The most common pure isolate cultured from melting corneal ulcers in dogs is *Pseudomonas aeruginosa* followed by β-hemolytic *Streptococcus. Pseudomonas aeruginosa* is known to secrete various proteases, including well-characterised alkaline protease (AP), elastase A (LasA), and elastase B (LasB). Additionally, fungi such as *Aspergillus* and *Fusarium* species produce serine proteinases that facilitate corneal invasion and contribute to corneal melting.

Because the ulcer can progress to corneal perforation within hours, it is considered an ophthalmic emergency. Initial management of melting keratitis typically involves intensive medical treatment aimed at halting collagenolysis using anti-collagenase agents such as serum, EDTA, N-acetylcysteine, and tetracycline, alongside antimicrobial therapy and pain management.

Antibiotic corticosteroids combination products

Several combination products are available, with one of the most commonly used being a formulation containing polymyxin, neomycin, and dexamethasone. While these products have a well-defined role in veterinary

ophthalmology, they are frequently misused. A common example of inappropriate use includes conditions such as uveitis and hyphema (Figure 3). These conditions are rarely associated with bacterial infections but do require topical corticosteroid treatment. In such cases, the most effective options are prednisolone acetate 1% or dexamethasone 0.1%, rather than antibiotic-corticosteroid combinations.

Figure 3: Hyphema in a Dog. Corticosteroids are an integral part of the treatment for hyphema; however, the inclusion of topical antibiotics in an antibiotic-corticosteroid combination is not justified, as hyphema is not typically associated with bacterial infection.

Selecting the Right Antibiotic

The problem of choosing the correct antibiotic is further complicated by the limited amount of antibiotics suitable for topical use. When considering antibiotic eye drops for corneal infections, the key factor is whether they achieve therapeutic intracorneal levels. Several factors affect corneal penetration:

- Epithelium integrity – An intact epithelium acts as a barrier; damaged epithelium increases penetration.
- Lipophilicity – Lipophilic antibiotics (e.g., fluoroquinolones) penetrate better than hydrophilic ones.
- Molecular size – Smaller molecules diffuse more easily.
- Formulation – Fortified or preservative-containing drops may enhance penetration.

The following antibiotics have good penetration into the cornea, especially when the epithelium is compromised:

Fluoroquinolones (e.g., ciprofloxacin, ofloxacin, moxifloxacin, levofloxacin)
- Excellent penetration due to their lipophilicity.
- Active against Gram-negative bacteria and some Gram-positive bacteria.

Aminoglycosides (e.g., tobramycin, gentamicin)
- Good penetration when the corneal epithelium is damaged.
- Strong Gram-negative coverage, especially against *Pseudomonas.*

Chloramphenicol
- Penetrates well into the corneal stroma.
- Broad-spectrum but weak against *Pseudomonas.*

The following antibiotics do not achieve therapeutic levels in the cornea, often due to their molecular properties.

- Beta-lactams (penicillins, cephalosporins)
- Poor penetration due to their hydrophilic nature.

Glycopeptides (e.g., vancomycin)
- Limited penetration unless used in high concentrations.

Tetracyclines (e.g., doxycycline, tetracycline)
- More commonly used systemically for anti-inflammatory / immune modulating effects in conditions like chalazions or in corneal melting due their anti-metalloprotease effect.
- Used for bacterial and especially chlamydial conjunctivitis.

Polymyxins (e.g., polymyxin B, colistin)
- Poor penetration due to large molecular size.
- Often combined with other antibiotics for surface-level infections.

Prophylactic use of antibiotics after ocular surgery

The prophylactic use of antibiotics after ocular surgery in dogs and cats is generally acceptable and commonly practiced. However, it should be done with careful consideration of the risks and benefits.

Advantages of the prophylactic use of antibiotics include the prevention of postoperative infections. Ocular surgeries, especially those involving the cornea (e.g., cataract surgery, keratectomy), create entry points for bacteria. Prophylactic antibiotics help reduce the risk of postoperative infections like bacterial keratitis or endophthalmitis.

It also helps with the protection against opportunistic bacteria. The conjunctiva and eyelids harbour bacteria (e.g., *Staphylococcus, Pseudomonas*) that can invade the surgical site.

Antibiotics minimize this risk. Lastly prophylactic use may support the healing process. A clean surgical site with minimal bacterial load reduces postoperative inflammation and complications.

The biggest disadvantage of prophylactic antibiotic use is the contribution to bacterial resistance. Some antibiotics may further disrupt the balance of normal eye flora, potentially leading to overgrowth of resistant or opportunistic pathogens including mycotic infections.

Conclusion

With the rising concern of antibiotic resistance, the decision to use a topical antibiotic should be carefully considered. If an antibiotic is indicated, selecting the most appropriate product is essential.

Table 2 provides a summary of recommended antibiotics for specific ocular conditions.

Condition	Antibiotic
Bacterial conjunctivitis [Confirmed with cytology]	Chloramphenicol Doxycycline Polymyxin B
Chlamydial conjunctivitis	Ofloxacin, Levofloxacin Systemic Doxycycline
Uncomplicated corneal ulcer	Chloramphenicol, Triple antibiotic [Polymyxin, Neomycin, Gramicidin] Ofloxacin, Levofloxacin
Melting corneal ulcer	Tobramycin, Gentamycin Moxifloxacin
Prophylactic	Chloramphenicol Triple antibiotic [Polymyxin, Neomycin, Gramicidin]

Table 2: Recommended antibiotics for specific conditions

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Prolotherapy for Canine Cranial Cruciate Ligament Disease: A Call for Caution

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Veterinary professionals are compelled to provide evidence-based care for our patients. The increased number of cases where prolotherapy is used to treat cranial cruciate ligament (CCL) disease in dogs is a matter for concern.

This technique involves the injection of irritant solutions (dextrose or hypertonic saline) into or around joints to trigger inflammation, aimed at promoting tissue repair. Although explored in human and veterinary medicine, its use in canine CCL disease remains largely unproven.

Lack of Scientific Evidence

Safe and effective treatments in veterinary medicine require scientific evidence. The literature supporting prolotherapy for CCL disease is scarce, mostly anecdotal, and lacks peer-reviewed validation, with no high-quality studies demonstrating its safety or effectiveness in dogs currently available.

The 2017 study by Sherwood et al found no significant benefits of intra-articular dextrose prolotherapy for CCL injuries over a placebo.

In addition, subjective observations (rather than objective measurements, such as peak vertical impulse, radiographic evidence of joint changes and muscle atrophy measurements) are often used in support of prolotherapy.

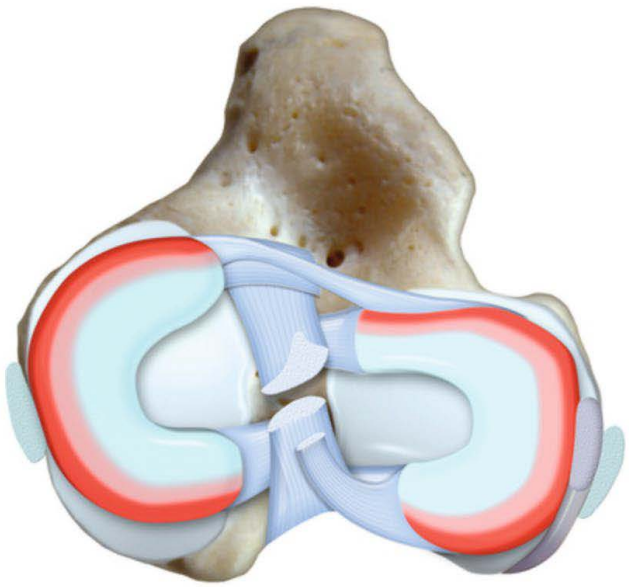
Cruciate-deficient stifles can improve over time without intervention. A study by BL O'Connor[2] showed that, following experimental CCL transection, peak vertical force decreased to 35% of normal but gradually improved to 53% at 12 weeks and 71% over the long term.

In contrast, dogs that underwent tibial plateau levelling osteotomy (TPLO) regained normal peak vertical impulse by 18 weeks post-surgery. This raises the question whether the improvement seen after prolotherapy is the result of the treatment or would they have improved on their own?

Ethical Concerns

As the hypertonic solutions used for are injected to irritate tissues and stimulate an inflammatory response, they are likely to be painful. Without scientific evidence in support of this approach, it raises serious ethical concerns. .

Scientific evidence does support the need to surgically explore the stifle in CCL cases to identify concurrent issues, such as meniscal tears, which are present in 30-73% of cases.



(Figure from Johnston SA and Tobias KM (Eds) Veterinary Small Animal Surgery)

Considering the meniscus's limited blood supply – primarily in the outer 15-25% – these meniscal injuries are unlikely to heal after the injection of irritant substances and require surgical intervention.

Without proper diagnosis and treatment, these dogs may continue to experience pain and progressive joint damage. We need to ask ourselves: Is this ethically justifiable when our fundamental oath is to do no harm?

Risks of Accelerated Osteoarthritis

Emerging evidence suggests that injecting hypertonic solutions into canine joints may exacerbate joint damage rather than promote healing.

Dogs with CCL disease are already at risk for osteoarthritis, and prolotherapy may accelerate this process. Without clear benefits, the potential harm far outweighs any theoretical advantages.

CPD Accreditation

CPD should focus on evidence-based, ethical veterinary medicine. Including treatments that lack scientific evidence in CPD courses dilutes the value of veterinary education and misleads practitioners seeking high-quality learning opportunities.

Types of Treatments to Heal Chronic Conditions

It is important to distinguish between prolotherapy and platelet-rich plasma injections:

- **Dextrose Prolotherapy** is used to stimulate tissue repair in certain chronic conditions but lacks evidence for use in CCL disease.
- **Platelet-Rich Plasma (PRP)** therapy shows promise in soft tissue healing but is a fundamentally different treatment.

Despite these distinctions, the injection of irritant solutions into canine joints has not been demonstrated to have any clinical benefits as a treatment for CCL disease.

Call to Action

Veterinary ethics require that we must we must prioritise patient welfare, and we should therefore:

1. **Clinicians:** Avoid offering or endorsing prolotherapy for CCL disease unless robust, peer-reviewed evidence emerges.
2. **Professional Organisations:** Ensure that all CPD activities are aligned with evidence-based medicine.
3. **Pet Insurance Companies:** Exclude cover for prolotherapy techniques using hypertonic solutions until scientific evidence supports the benefits.
4. **Veterinary Community:** Critically evaluate unproven methods and educate pet owners on scientifically validated options.
5. **Research:** If prolotherapy is to be considered, it must be rigorously tested in well-designed and peer-reviewed studies. If new findings emerge must be documented and shared with the entire veterinary community.

Conclusion

Prolotherapy (using hypertonic solutions) for the treatment of canine CCL disease lacks scientific support and carries significant risks. It may mislead pet owners and could potentially harm the patient.

Until supporting evidence for this approach becomes available, we should focus on proven surgical interventions and maintain a commitment to high-quality, proven and ethical patient care.

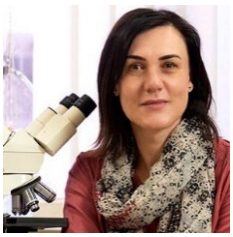
Science is based on testing hypotheses through objective data, obtained through well-designed and peer-reviewed studies, and is not , science is not based on conviction, opinion, subjective case-based observations or outdated references.

The South African Veterinary Council registers veterinary professionals on successfully completing a Bachelor of Veterinary **Science**, grounded in evidence.

Until credible scientific data supports the use of prolotherapy in the treatment of CCL disease, promoting this treatment contradicts our professional obligations and must be discouraged.

References available on request

Optimal Diagnostic use of Laboratory Tests in Dogs and Cats with Renal Disease



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Introduction

The primary objective of evaluating the urinary system is to detect dysfunction. Nevertheless, laboratory abnormalities do not manifest until a substantial proportion of nephrons is impaired and the remaining nephrons are unable to compensate for the damaged ones. Dilute urine or isosthenuria is observed when approximately 66% of nephrons do not function adequately. Azotaemia becomes evident only when approximately 75% of nephrons are compromised. Upon identification, renal failure is classified as acute or chronic.

This classification is subsequently refined to a specific disease diagnosis or to the renal structure affected by the disease. For instance, the disease may be localised to the glomeruli (as in glomerulonephritis or amyloidosis), tubules (nephrosis), interstitium (interstitial nephritis), renal pelvis (pyelonephritis), or excretory system (cystitis, obstruction, or rupture). Serum biochemistry tests and urinalysis are the primary diagnostic approaches for the initial detection and assessment of kidney disease severity in dogs and cats.

An understanding of the glomerular filtration rate (GFR) and the role of nephrons in the conservation or excretion of various metabolites is crucial because renal damage leads to the abnormal retention of substances that should be excreted and the loss of metabolites that should be conserved. Variations in these metabolites in the serum and urine are used to detect and categorise renal diseases. Renal function tests can be classified into those that (a) assess the GFR and (b) evaluate tubular function.

The diagnostic characteristics and interpretative considerations of a selected number of renal function tests and renal injury biomarkers are briefly examined below.

Estimation of glomerular filtration rate

GFR is the most reliable indicator of renal function as it is directly correlated with the number of functioning nephrons. However, it is crucial to acknowledge that GFR is also contingent on sufficient renal blood flow. Consequently, any condition that leads to reduced renal perfusion, such as dehydration or shock, will result in diminished GFR. In veterinary medicine, direct measurement of the GFR is infrequently performed. Instead, indirect assessment is typically derived from the serum concentrations of urea, creatinine, and symmetric dimethylarginine (SDMA).

Serum creatinine

Serum creatinine has been the standard diagnostic tool for evaluating renal function and disease for approximately a century. As a by-product of muscle metabolism, serum creatinine concentrations correlate with muscle mass. Consequently, renal function may be overestimated in cachectic animals with low muscle mass, and may lead to false diagnosis of renal dysfunction in heavily muscled animals. The analytical method predominantly used to measure serum creatinine concentration is susceptible to interference from sample haemolysis, which can result in overestimation of creatinine levels, as well as from lipemic and icteric samples, which can falsely lower the measured creatinine concentration. Additionally, it is recommended that blood samples be collected from fasting animals, as serum creatinine concentrations can increase following the ingestion of cooked meat products in dogs. This increase is attributed to the conversion of approximately 20-65% of muscle creatine to creatinine during the cooking process.

Normal serum creatinine concentrations suggest the retention of at least 25% of the functional renal mass. An increase in serum creatinine concentration, indicating a loss of 75% of the functional renal mass, implies that each subsequent doubling of creatinine concentration corresponds to a 50% reduction in the remaining functional mass. Conversely, a 50% reduction in serum creatinine concentration is assumed to reflect a 50% restoration of renal function.

Owing to the greater inter-individual biological variation (BV) of serum creatinine compared to intra-individual BV in dogs and cats, the population-based reference intervals (RI) for creatinine are broad and lack sensitivity. Consequently, a

patient may experience a significant increase in creatinine concentration due to declining renal function, yet the concentration may still fall within the RI, potentially leading to a misdiagnosis of normalcy. Therefore, serial measurements should be used to detect significant changes in creatinine concentration. These measurements should consistently use the same method, and only a change exceeding 30% is deemed clinically significant, irrespective of whether the result falls within the RI.

Serum symmetric dimethylarginine

In 1970, SDMA was first isolated from human urine. In 1997, research demonstrated that elevated serum and urine concentrations of SDMA were associated with the severity of renal insufficiency in human patients with renal dysfunction. SDMA is an amino acid generated during cellular metabolism that is exclusively eliminated by the kidneys through renal filtration and excretion. Consequently, circulating concentrations of SDMA are predominantly influenced by alterations in the GFR, thereby serving as an indicator of kidney function.

Previous studies involving dogs and cats have demonstrated that SDMA concentration increases significantly earlier than creatinine concentration when there is a 25-40% reduction in GFR, with increases observed 17 months prior in cats and 9 months prior in dogs. Nonetheless, more recent investigations suggest that SDMA and creatinine exhibit comparable diagnostic accuracy.

Employing a threshold of >18 mg/dL, as opposed to 14 mg/dL, enhances the specificity of SDMA, resulting in fewer false positives and greater reliability of positive results without diminishing sensitivity, thereby reducing the likelihood of overlooking a genuinely diseased animal.

However, false-positive results have been documented in non-azotaemic dogs with psychogenic polydipsia and dermatopathies. Additionally, elevated serum SDMA concentrations have been observed in dogs and cats with lymphoma, attributed to the overexpression of protein methyltransferase 5, which does not correlate with increased serum creatinine levels.

The impact of hyperthyroidism and hypothyroidism on serum SDMA concentration remains unclear, necessitating cautious interpretation in these animals. Measurement of serum SDMA concentration may be beneficial in cases where early renal disease is suspected, particularly when creatinine concentrations remain within the RI or have not increased by >30% across subsequent assessments.

An elevated serum SDMA concentration is indicative of a decreased GFR, suggesting a potential renal disease. Given that SDMA is not influenced by muscle mass or wasting, it is more useful than creatinine in animals with low muscle mass. However, SDMA does not offer substantial additional information in animals with elevated creatinine concentrations.

It is crucial to acknowledge that increases in SDMA, akin to increases in creatinine, can result from pre-renal, renal, or post-renal factors, and that elevated serum SDMA serves as an indicator of decreased GFR, though not necessarily of renal dysfunction.

Test of renal tubular function

Urine specific gravity, fractional clearance of electrolytes, and urinary enzymes can be used to estimate the renal tubular function.

Urine specific gravity

Urine specific gravity (USG) is a measure of urine density relative to pure water. For routine clinical applications, USG is assessed using a refractometer, as the refractive index generally correlates well with USG. Interpretation of USG must always consider an individual's hydration status and drug therapy, including fluids, glucocorticoids, and diuretics. It is essential to measure USG in all animals that exhibit increased SDMA concentrations, azotaemia, polyuria, oliguria, or anuria. USG serves as a primary laboratory criterion for differentiating between azotaemia types.

In cases of primary renal azotaemia, the kidney is unable to concentrate or dilute urine, resulting in a consistent isosthenuric USG, typically ranging from 1.008 to 1.012. In the context of renal disease, the complete loss of renal tubular function occurs progressively.

Consequently, USG values that fall between the isosthenuric and "adequate" ranges in animals experiencing dehydration and/or azotaemia are highly indicative of primary renal failure. It is important to note that urine concentration is not solely dependent on the health of the renal tubule; it is also influenced by factors such as hormone concentrations, urine osmolality, responsiveness of water channels (aquaporins) in the collecting duct to anti-diuretic hormone (ADH), and hypertonicity of the renal medulla.

Urinary enzymes

The enzymes present in urine originate from two primary sources: filtration at the glomeruli or release from the renal tubular epithelium. The presence of enzymuria can serve as an early indicator of renal tubular damage, preceding increases in fractional excretion and the onset of azotaemia. Gamma-glutamyltransferase (GGT) is expressed in various tissues, notably on the apical surface of proximal convoluted tubular epithelial cells, which secrete small quantities of GGT into the urine.

In canines, the urine GGT to creatinine ratio is a sensitive early marker of tubular injury, often increasing before elevations in serum creatinine concentration, reductions in GFR or USG, or the appearance of casts in urine sediment. In dogs with gentamicin-induced renal failure, urine GGT activity increased within 24 h of the initial dosing, whereas serum creatinine concentration did not exceed the RI until seven days of drug administration. Urine GGT is unstable; therefore, samples should be analysed within 24 h, and they should be refrigerated rather than frozen, as freeze-thaw cycles compromise enzymatic activity.

Urinary biomarkers of renal injury

Biomarkers are physiological molecules, usually proteins, which increase or decrease in association with normal or pathological processes. Serum and plasma biomarkers seem less sensitive and have poorer correlations with

the presence and severity of kidney injury than urinary biomarkers. Two commercially available urinary tests are briefly discussed below.

Urinary cystatin B:

Cystatins constitute a family of protein inhibitors that target cysteine proteases, and are predominantly located within mammalian cells. However, they are not present in significant concentrations in the circulatory system.

The urinary concentration of Cystatin B increases in response to acute or active injury to renal tubular epithelial cells, such as cellular necrosis, and may also increase in cases of subclinical injury that are not indicated by changes in functional biomarkers such as creatinine or SDMA.

It is not recommended for use as a screening test in healthy animals; rather, it should be used in dogs and cats where kidney injury is suspected or possible, including in non-renal conditions that may secondarily affect renal perfusion.

Additionally, it can be used to differentiate between stable and progressive chronic renal disease in animals with previously diagnosed renal disease. Commercial quantitative tests in dogs and cats are available locally, and urinary cystatin B remains stable in canine and feline urine for up to 10 days at temperatures of 2-8°C. Freezing is not advised.

Neutrophil gelatinase-associated lipocalin (NGAL):

NGAL is an intracellular protein found in hepatocytes, neutrophil granules, and epithelial cells, including those of the tubular epithelium in the thick ascending loop of Henle and the collecting ducts. In healthy tissues, NGAL expression is minimal; however, it is significantly upregulated in response to inflammation, thereby contributing to innate immunity against bacterial infections.

Several studies have demonstrated that the urinary NGAL-to-creatinine ratio in dogs with acute kidney injury increases earlier than serum creatinine concentrations. Nonetheless, this ratio also increases in cases of lower urinary tract infection, inflammation, and malignancy.

Additionally, there is a weak positive correlation between NGAL concentrations and age. Currently, a semi-quantitative liquid chromatographic test for NGAL in dogs is available locally.

Conclusion

Early diagnosis of kidney disease provides an opportunity for intervention by investigating the underlying causes and complications associated with the disease. The combination of diagnostic tests that assess kidney function (for example, creatinine and SDMA) and ongoing pathology in patients (active injury markers such as urinary Cystatin B) provides clinicians with a complete toolkit to better manage patients, improve care, and achieve better outcomes.

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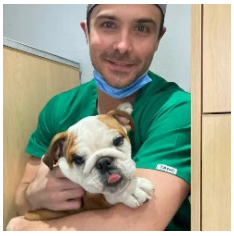
Part 1: Elbow

Approaching Forelimb Lameness in Dogs:

A Practical Guide to the Shoulder and Elbow for General Practitioners



Dr Christiaan Triegaardt
MMedVet(Surg: Small Animal), BVSc, BSc
Specialist Small Animal Surgeon (Cape Specialist Surgical Vet)

Introduction

Forelimb lameness is a common presenting complaint in small animal practice, but localising the source of discomfort - particularly when there's no history of trauma - can be frustrating. As a referral surgeon, I often receive cases that have been investigated for weeks or months without a diagnosis.

This guide offers a structured, efficient approach to forelimb lameness, focusing on the elbow (part 1) and shoulder (part 2), and is designed to help general practitioners improve diagnostic confidence, client communication, and patient outcomes.

Initial Assessment

History Taking

A focused clinical history helps shape your examination and differential list:

- *Onset:* Acute vs chronic
- *Progression:* Intermittent, worsening, or static
- *Activity correlation:* Worse after rest or exercise?
- *Trauma:* Rough play, jumping, slipping?
- *Treatment response:* NSAIDs, physiotherapy, rest

Helps differentiate soft tissue, orthopaedic, or neurological disease.

Signalment

Signalment can significantly narrow your differential list:

Age/Type	Key Differentials
<1 year	Elbow dysplasia (osteochondritis dissecans - OCD, fragmented medial coronoid process - FMCP, ununited anconeal process - UAP, incongruence), carpal laxity, shoulder OCD, HIF (Humeral intercondylar fissure)
Young–middle-aged	FMCP, biceps tendinopathy, medial shoulder instability - MSI
Older dogs	Osteoarthritis, neoplasia
Working/sporting	Shoulder (~45%), distal carpus (~30%)
Trauma (any age)	Fracture, carpal hyperextension
Very young large breeds	Panosteitis

Note: OA is not "wear and tear" – it is secondary to joint development abnormalities, normal joints do not just develop OA.

OCD presents early in life

Physical Examination

Step 1 Gait Analysis (Hands off)

Observe gait on a non-slip surface.

- *"Down on sound"* – the head drops when the *sound* limb bears weight
- Owners often misidentify the affected limb.
- Look for asymmetry, shortened stride, or external rotation
- Elbow disease often presents with *abducted elbows* and *externally rotated antebrachium*

Step 2 Palpation

Start with the *unaffected* limb to establish a baseline and maintain comfort.

Use a *systematic digit-to-neck* approach:
- Palpate all joints (Do not miss the thorn in the digit)
- Check *range of motion - ROM*
- *Always* include cervical spine

Elbow-specific tests:

- *Flex and extend* the joint
- *Supinate the paw with elbow flexed.* This stresses the medial compartment and highlights medial coronoid pain.
- Direct pressure on the *medial elbow* can elicit pain
- Feel for *effusion (often lateral)*

Diagnostic Work-Up

Arthrocentesis (Joint Tap)

Joint tap, joint tap, joint tap!

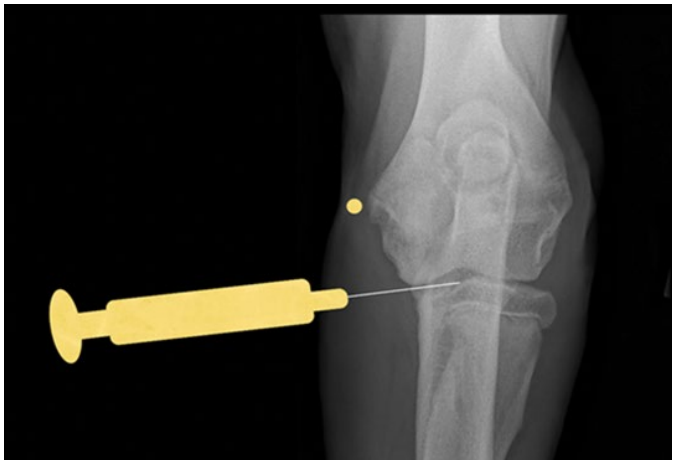
This is often overlooked but *should always* be part of your work-up.

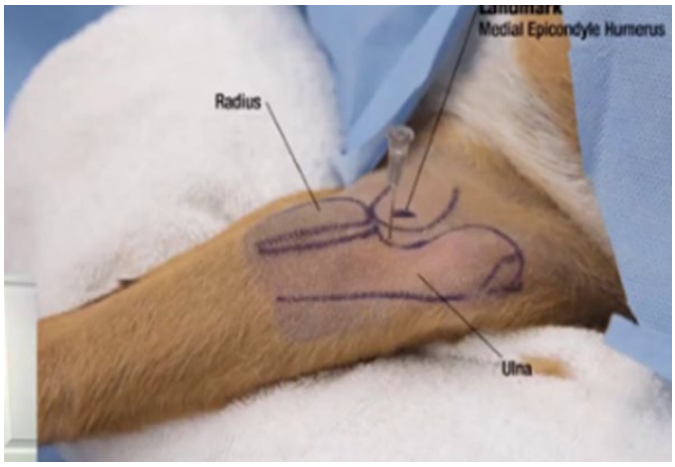
Technique:

- Use alcohol/chlorhex spray (no clipping required)
- 3 mL syringe + 22G needle
- Collect into EDTA tube + direct smear
- *Sedation* is advised

Elbow Tap Site:

Medial—just distal to medial epicondyle. Use a sandbag under elbow as a fulcrum to open medial joint space.





(Smith, M.M. (2018). Arthrocentesis in Dogs. Clinician's Brief. Available at: https://www.cliniciansbrief.com/article/arthrocentesis-dogs)

Cytology Interpretation

Appearance	Likely Cause
Clear, viscous	Normal
Clear-orange, ↓viscosity	Degenerative joint disease – DJD, or trauma
Turbid, watery	Septic arthritis or Immune-mediated poly-arthritis – IMPA

Key findings:

- *Normal:* High viscosity, low nucleated cells, windrowing
- *Septic:* Degenerative neutrophils ± bacteria (rare to see)
- *IMPA:* Neutrophilic inflammation (multiple joints)
- *DJD:* Mononuclear cells, macrophages ± vacuoles

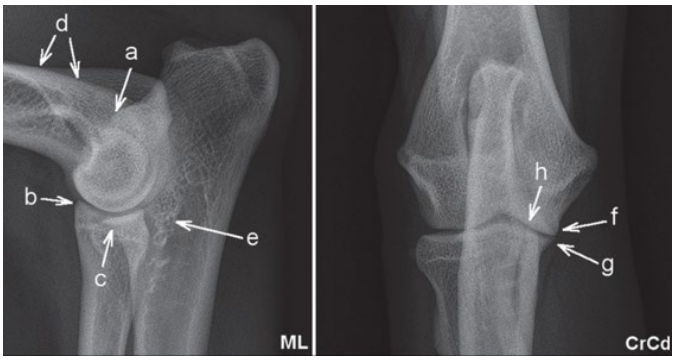
Pro Tip: 60% of joint cultures are false negatives—*treat based on cytology + clinical signs.*

My approach:

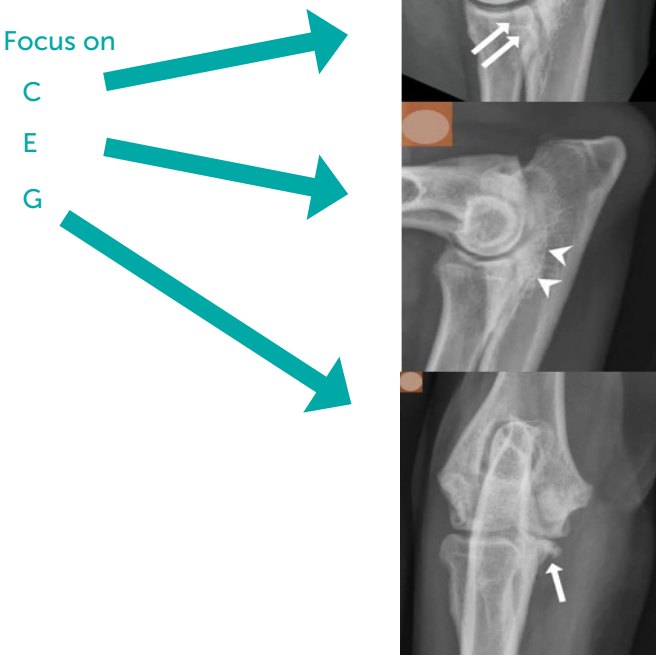
1. Joint aspirate turbid and watery and neutrophils everywhere
2. Send for culture and antibiogram in blood culture bottle
3. Start with broad spectrum antibiotics in interim
   - Negative culture but responding to antibiotics (1 joint) – septic
   - Negative and not responding to antibiotics (>1joint) – Immune mediated

Radiography

Take *mediolateral and craniocaudal views ± cranio-lateral caudo-medial obliques* for medial coronoid process disease – MCPD.



(Normal mediolateral and craniocaudal views. C – cranial tip of medial coronoid process; e – trochlear notch at the base of the coronoid process; g – medial contour of the medial coronoid process. Lau, S.F., Theyse, L.F., Voorhout, G. and Hazewinkel, H.A., 2015. Radiographic, computed tomographic, and arthroscopic findings in labrador retrievers with medial coronoid disease. Veterinary Surgery, 44(4), pp.511-520.)



Radiographic changes:

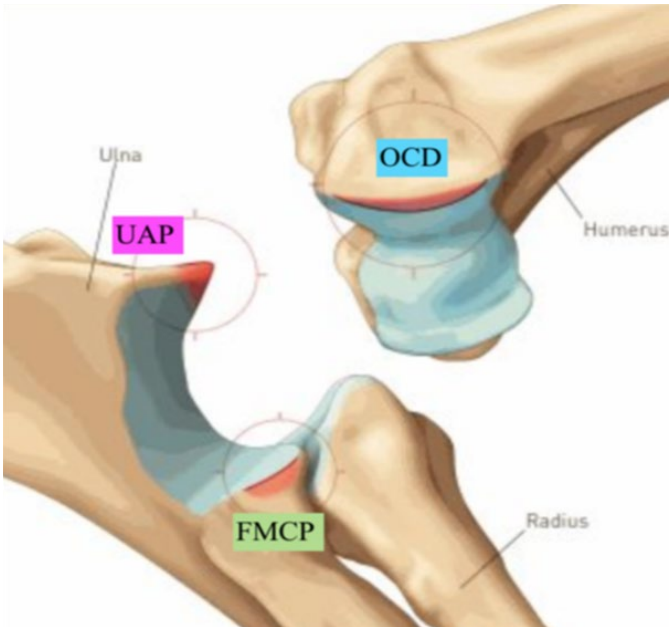
- *C - Loss of cranial contour of medial coronoid*
- *E - Subtrochlear sclerosis (increased bone density seen just below the trochlear notch of the ulna- early radiographic sign of elbow dysplasia)*
- *G - Osteophytes on the medial contour of medial coronoid process ("lipping")*

(Lau, S.F., Theyse, L.F., Voorhout, G. and Hazewinkel, H.A., 2015. Radiographic, computed tomographic, and arthroscopic findings in labrador retrievers with medial coronoid disease. Veterinary Surgery, 44(4), pp.511-520.)

Arthroscopy

Gold standard for both diagnosis and treatment.

Elbow Dysplasia: A Closer Look

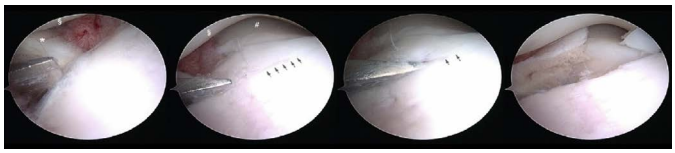


(Burton, N. (n.d.). Elbow: medial coronoid process disease (MCPD). Vetlexicon Canis. Available at: https://www.vetlexicon.com/canis/musculoskeletal/articles/elbow-medial-coronoid-process-disease-mcpd/)

Overview

Polygenic, heritable disease in *large–giant breeds*, often bilateral. 5-10months of age

Component	Features	Treatment
FMCP	Most common (~96%), often bilateral	Arthroscopic subtotal coronoidectomy ± PAUL (proximal abducting ulna osteotomy)
UAP	Presents 5–12 mo, 30% have FMCP Can only diagnose after 5mo of age	Early: Lag screw + Bi-oblique osteotomy Late: Removal
OCD	Less common, worse prognosis with FMCP	Curettage or SynACART plug
Incongruence	Due to premature distal ulna growth plate closure > 6-7 months the interosseous ligament is too strong and therefore you must do a proximal osteotomy *Early intervention in these cases can make a massive difference in the longevity of these joints	<6 mo: Distal ulna ostectomy >6 mo: Dynamic Proximal Bi-oblique ulna osteotomy



(Step formation in the elbow. Lappalainen, A.K., Hyvärinen, T., Junnila, J. and Laitinen-Vapaavuori, O., 2016. Radiographic evaluation of elbow incongruity in Skye terriers. Journal of Small Animal Practice, 57(2), pp.96-99.)

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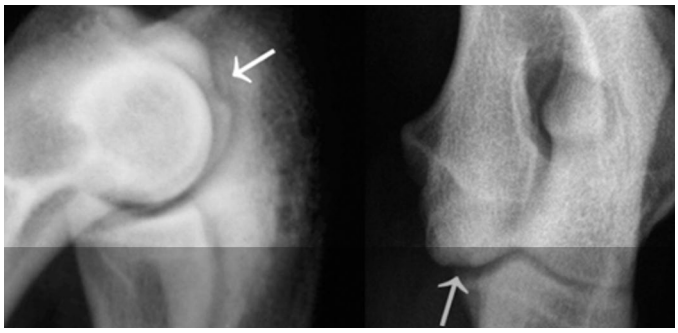
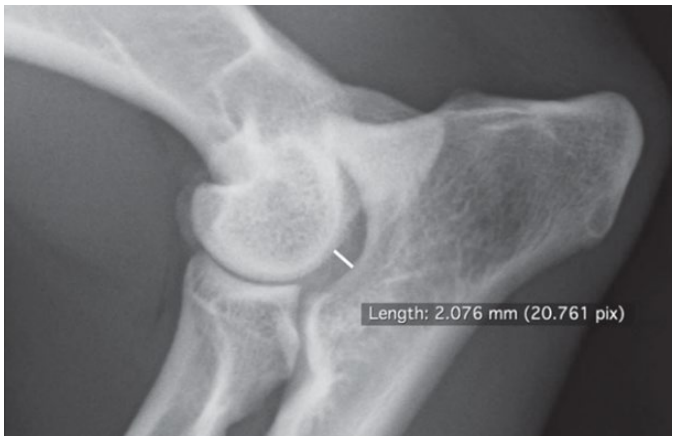


(OCD lesion visible on hyperflexed Md-Lat view of the elbow. Vezzoni A, Benjamino K. Canine elbow dysplasia: ununited anconeal process, osteochondritis dissecans, and medial coronoid process disease. Vet Clin North Am Small Anim Pract. 2021;51(2):439-474. doi:10.1016/j.cvsm.2020.12.007)



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Summary

A systematic, *recipe-based approach* increases diagnostic accuracy and speeds up intervention or referral.

Remember:

Most referral cases could have been diagnosed earlier with:

- Joint taps
- Signalment-focused differentials
- Structured physical exam

Key Take-Home Tips

- Always examine *both forelimbs*, start with the unaffected side
- *Don't skip* the joint tap
- *Supinate the paw* to stress the medial elbow
- In any elbow case: *"It's FMCP until proven otherwise"*
- *Early arthroscopy* improves outcomes

Look for subtrochlear sclerosis on radiographs - easy to identifiy and guides you in the right direction(place both elbows next to each other on your viewer and compare)

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Journal Scan / Abstracts

Editor's note: This month I used VetLit.org as the source for our journal scan. VetLit.org is a free resource to help keep up to date with veterinary literature. VetLit brings together recent literature from over 60 journals, grouped into specialties, topics and conditions. It is designed to make veterinary literature more accessible for all included specialties – at any one time it displays the last month's worth of articles for each field.

VetLit not only lists articles, but also sends out five regular newsletters, covering Emergency and Critical Care (compiled by Simon Cook BSc BVSc MVetMed DipACVECC DipECVECC FHEA MRCVS), Internal Medicine (Chris Scudder BVSc MVetMed DACVIM PhD MRCVS), Neurology (Abbe Crawford BVM&S BSc MVetMed PhD DipECVN FHEA MRCVS), Surgery (Matteo Rossanese DVM SPSA CertAVP MSc DipECVS FHEA MRCVS) and Cardiology (Kieran Borgeat BSc BVSc CertVC MVetMed FHEA DipACVIM DipECVIM-CA (Cardiology) MRCVS).

Comments (the first section following the topic) on the articles are from these newsletters (identified by the initials of the specialist involved). The full abstract follows on the comments.

1 Radiographic features of cardiogenic pulmonary oedema in dogs with dilated cardiomyopathy

JSAP
https://onlinelibrary.wiley.com/doi/10.1111/jsap.13851

A diffuse, unstructured interstitial pulmonary pattern was the most common radiographic finding in this retrospective evaluation of dogs with DCM and left sided congestive heart failure, and it was often predominantly ventrally distributed. (This might be contrasted with the hilar and caudodorsal distribution of an unstructured interstitial to alveolar pattern in dogs with mitral valve disease) (SC)

ABSTRACT

Objectives
Dilated cardiomyopathy (DCM) is a common cause of acquired cardiac disorder in dogs, second only to myxomatous mitral valve disease (MMVD). This study aimed to describe the thoracic radiographic features of cardiogenic pulmonary oedema in dogs with DCM.

Materials and Methods
Thoracic radiographs of dogs in left-sided congestive heart failure with an echocardiographically confirmed diagnosis of DCM were included in this retrospective study. Radiographs were retrospectively reviewed by two radiologists to assess the distribution, severity and characteristics of the pulmonary pattern, as well as to identify the presence of pleural effusion and degree of cardiomegaly.

Results
A total of 97 dogs with L-CHF due to DCM met the inclusion criteria. Results of the study suggest that the predominant pulmonary pattern differs from myxomatous mitral valve disease and is characterised by a mild to moderate (62/97 or 63.9% and 30/97 or 30.9%, respectively), unstructured interstitial (72 or 74.2%), diffuse (90 or 92.8%) and predominantly ventrally distributed (52 or 53.6%) pulmonary pattern.

A subset of dogs (49 or 50.5%) had diffusely distributed linear soft tissue opacities throughout all lung lobes considered to represent pulmonary vascular congestion, bronchial cuffing and/or thickening of the bronchi.

Clinical Significance
The pulmonary pattern of L-CHF with DCM differs from what has been previously reported for dogs with MMVD. The predominant pulmonary pattern with L-CHF in dogs with DCM was a diffuse, marked, more severely ventrally distributed, mild to moderate, unstructured interstitial pulmonary pattern.

2 Transient atrial fibrillation in dogs with degenerative mitral valve disease: eight cases (2020-2024)

JSAP
https://onlinelibrary.wiley.com/doi/10.1111/jsap.13855

This describes the trajectory of dogs with paroxysmal atrial fibrillation and mitral valve disease. They presented acutely (eg. with tachypnoea, cough, syncope), were often diagnosed as being in congestion, and under antiarrhythmic treatment (which was eventually discontinued in 6/7) the AF was documented to resolve in hospital in 4/8 cases, or by the time of follow up in the other 4. AF recurrence was described several months later (SC)

ABSTRACT

Objective
To report the occurrence of transient atrial fibrillation in dogs with degenerative mitral valve disease (DMVD) American College of Veterinary Medicine (ACVIM) stage C/D, presenting with acute clinical signs.

Materials and Methods
Retrospective multicentric case series of dogs with DMVD ACVIM stage C/D and transient atrial fibrillation (AF) hospitalised in referral centres (2020 to 2024). Signalment, clinical findings, treatments, electrocardiographic and echocardiographic data and outcomes were recorded.

Results
Eight dogs were included. All dogs presented for acute deterioration of clinical signs:tachypnoea with worsening cough (5/8) and syncopal episodes (3/8). Electrocardiographic findings were compatible with AF with a fast ventricular rate in all dogs. Active congestive heart failure (CHF) was identified in 5/8 patients.

Antiarrhythmic treatment with digoxin (4/8), diltiazem (1/8) or digoxin/diltiazem (2/8) was instituted in seven dogs. Treatment for active CHF was also performed. Sinus rhythm was subsequently observed either during hospitalisation (4/8, average 30hours) or at the first recheck after stabilisation (4/8, average 22days).

In 6/7 dogs, antiarrhythmic treatment was discontinued. Three dogs showed a recurrence of AF a few months after the first episode. Five dogs died of cardiac disease, two of which died suddenly.

Clinical Significance
Paroxysmal AF has been previously described in dogs; the pathophysiological mechanism is presumed to be neurally mediated. Transient AF has not been extensively reported in dogs with clinically significant DMVD and is a possible event in dogs presenting with acute clinical signs and AF.

The pathophysiological mechanism in this population may be slightly different from previously reported cases. After cardioversion, variation in clinical outcomes was observed.

3 Radiographic features of cardiogenic pulmonary oedema in dogs with dilated cardiomyopathy

JSAP
https://onlinelibrary.wiley.com/doi/10.1111/jsap.13851

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4 Short-term complications of internal versus external fixation of closed diaphyseal tibial fractures in skeletally immature dogs

Veterinary surgery
https://onlinelibrary.wiley.com/doi/full/10.1111/vsu.14221

When treating closed diaphyseal tibial fractures in skeletally immature dogs, the choice between internal fixation (IF) and external skeletal fixation (ESF) can have a significant impact on short-term outcomes. This study confirmed that ESF carries a higher complication rate (56%), mostly major and primarily due to pin-tract issues, compared to IF (20%). Interestingly, the use of prophylactic antibiotics was associated with more complications, particularly in ESF cases, suggesting they may not always be beneficial. My take home message is that surgeons should carefully balance the risks of complications with healing times, and if ESF is chosen, pin-tract morbidity should be a primary concern (MR).

ABSTRACT

Objective

To determine the influence of fixation method (internal vs. external) on short-term postoperative complications of closed diaphyseal tibial fractures in skeletally immature dogs.

Study design

Retrospective observational multicenter study.

Animal population

Skeletally immature dogs stabilized with internal fixation (IF) via plate osteosynthesis (n=59) and external skeletal fixation (ESF) (n=36).

Methods

Medical records from skeletally immature dogs with closed tibial diaphyseal fractures were reviewed. Data collected included signalment, fracture morphology, etiology, fixation technique, surgeon status, complications, time to discharge and time to final discharge.

Results

The total complication rate for IF was lower at 20.3% ($p<.001$, CI: 11.0–32.8) compared to ESF at 55.6% (CI: 38.1–72.1). A total of 95% of complications were considered major for external fixation versus 75% for internal fixation. Multivariable analysis revealed decreased odds of a postoperative short-term complication when a closed tibial diaphyseal fracture was stabilized with IF compared to ESF ($p=.004$, OR: 0.2, CI: 0.09–0.63). The median time to final discharge for ESF was 4weeks (range: 2–13) and for IF was 6weeks (range: 4–32) ($p=.01$).

Conclusion

ESF had a higher rate of short-term complications than IF, primarily due to pin-tract morbidity. The complication rate was 35.3% higher for ESF than for IF.

Clinical significance

Surgeons should consider the use of IF over ESF for skeletally immature dogs to reduce the risk of major complications.

5 Dehiscence rate and associated risk factors after gastrotomy for removal of foreign material in dogs and cats

JAVMA
https://avmajournals.avma.org/view/journals/javma/aop/javma.24.08.0531/javma.24.08.0531.xml

This study retrospectively reviewed 271 dogs and 31 cats that had undergone a gastrotomy for foreign body retrieval. It reassures us that gastrotomy dehiscence is exceedingly rare. The overall dehiscence rate was reported as 0 to 0.66%, as there were no confirmed episodes of dehiscence reported.

Two dogs that were euthanised having developed post-operative septic peritonitis were presumed to have had gastrotomy dehiscence for statistical analysis (creating a dehiscence rate of 0.66%) but they both also underwent intestinal resection and anastomosis, which is more commonly associated with dehiscence.

No necropsy was performed on those dogs to confirm the source.

What I take from this study is that, while we always need to be vigilant about post-op septic peritonitis, gastrotomy itself is a solid, reliable procedure when closed properly. And you, how do you close your gastrotomy?! (MR).

Abstract

OBJECTIVE
Identify rate and associated risk factors for dehiscence following gastrotomy for foreign material removal.

METHODS
Medical records from 2 private practice emergency and referral hospitals were reviewed, and history, laboratory values, intraoperative findings, and outcomes were collected on 271 dogs and 31 cats (n = 302).

RESULTS
Hospital A performed 222 procedures and Hospital B performed 80 procedures. Three cats (3 of 31 [10%]) and 20 dogs (20 of 271 [7%]) had intraoperative intestinal perforations. Two cats (2 of 31 [6.5%]) and 7 dogs (7 of 271 [2.6%]) were diagnosed with preoperative septic peritonitis. Concurrent surgical procedures in felines included enterotomy (3 of 31 [10%]), multiple enterotomies (3 of 31 [10%]), intestinal resection and anastomosis (IR&A; 2 of 31 [6%]), and other (1 of 31 [3%]). Concurrent surgical procedures in canines included enterotomy (55 of 271 [20%]), multiple enterotomies (11 of 271 [4%]), IR&A (24 of 271 [9%]), IR&A and enterotomy (1 of 271 [0.4%]), splenectomy (11 of 271 [4%]), and other (50 of 271 [18%]).

There was no proven gastrotomy dehiscence. Two patients that did not have follow-up surgery or necropsy before euthanasia developed postoperative septic peritonitis, and gastrotomy dehiscence could not be ruled out as a differential diagnosis. Assuming neither patient, 1 patient, or both patients had gastrotomy dehiscence, the gastrotomy dehiscence rate was 0% to 0.66%. However, these patients also had an IR&A.

CONCLUSIONS
Two cases were presumed to have gastrotomy dehiscence, as the authors would rather overestimate the dehiscence rate. However, it is more likely that the IR&A was the dehiscence site rather than the gastrotomy.

CLINICAL RELEVANCE
Gastrotomy dehiscence rate is low in cats and dogs, and the dehiscence rate reported in this study may be an overestimation.

3 Urinary Cystatin B as a marker of acute kidney injury in cats

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Cystatins are protease inhibitors, and cystatin B is typically found intracellularly but can be detected in urine following kidney cell damage. This study included 38 cats with acute kidney injury (AKI) (as defined using IRIS guidelines), 17 cats with chronic kidney disease (CKD) (2, 6, 8 and 1 cats in stages 1, 2, 3 and 4, respectively), 9 cats with urethral obstruction and 12 control cats.

Cats within AKI and CKD groups had statistically higher median urine cystatin B compared to controls (1052, 112 and 22 ng/mL, respectively), and urine cystatin B was higher in the AKI group than the CKD group.

A urine cystatin B of 180 ng/mL identified the AKI group with a sensitivity of 76% and specificity of 71%. Urine cystatin B concentrations predicted survival in AKI; cats surviving 30 days had a median of 584ng/ml, compared to 1572 ng/mL in non-survivors. Therefore, when the aetiology of azotaemia is uncertain then cystatin B may help determine the likelihood of AKI and likelihood of survival from AKI (CS).

Abstract

Diagnosing acute kidney injury (AKI) might be challenging due to lack of sensitive early markers. The objective of this study was to evaluate the diagnostic and prognostic utility of the urinary biomarker Cystatin B (uCysB) in cats with AKI. Seventy-six client-owned cats were included. Urine samples of healthy cats and cats with various urinary tract disease including urethral obstruction (UO), chronic kidney disease (CKD) and AKI, were collected. uCysB concentration was measured using a research sandwich format ELISA at IDEXX Laboratories, Inc. uCysB was different among groups (P <0.001). uCysB was higher in the AKI (P <0.001) and CKD (P =0.006) groups compared with controls [1052 ng/mL (range, 7–3858) and 112 ng/mL (range, 14–1370) vs. 22 ng/mL (range, 11–154), respectively].

Cats with AKI had higher uCysB compared with cats with CKD (P =0.001) or UO (P =0.004). Receiver operator characteristic curve (ROC) analysis of uCysB as an AKI predictor vs. controls had an area under the curve (AUC) of 0.92 (95 % CI, 0.84–1.0).

An 84 ng/mL cutoff point corresponded to sensitivity and specificity of 90 % and 92 %, respectively. uCysB concentration was higher in AKI non-survivors compared with survivors (1572 ng/mL, range, 140–3858 vs. 584 ng/mL, range, 7–2803 respectively; P =0.004). ROC analysis of uCysB as an AKI outcome predictor had an AUC of 0.84 (95 % CI, 0.56–1.0), with an optimal cut-off point of 469 ng/mL, corresponding to sensitivity and specificity of 100 % and 75 % respectively. In conclusion, uCysB is a useful diagnostic and prognostic marker of AKI in cats.

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