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vet 360

Vol 06 | Issue 04 | September 2019

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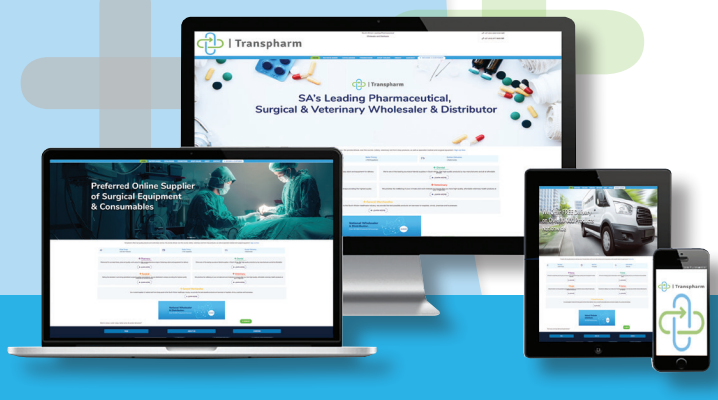


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# Editor's Note

This edition has ended up focussing on cats. Vet practices are seeing more and more cats and the approach to both cat owners and cats is not the same as that to dogs and dog owners.

Included in this edition is an article by Dr Margie Scherck, a cats only vet, who has been invited by Royal Canin to do a road show in Johannesburg, Cape Town and Durban 1-3 October, focusing on feline health and happiness. This is a good opportunity for vets seeking to expand their feline knowledge. Prof Andrew Leisewitz has also contributed to this edition with a summary of feline eosinophilic granuloma complex and very uncomfortable but treatable condition in cats. This is our CPD article.

I hope you enjoy this edition

Regards

Liesel





# Index:



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## PREVIOUS EDITION: July 2019

- Optimising an Indoor Lifestyle for Cats
- Feline Allergic Dermatitis
- The Brachycephalic Problem

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

**Distribution**: Southern Africa, 3 500 copies. 

**Editor:** Dr Liesel van der Merwe BVSc (Hons) MMedVet (Med) Small Animals.
**Layout and design:** Heinrich van Rijn
**Publisher and Owner:** Vetlink Publications
**Other Publications by Vetlink:** Vet360 Mobile App, Livestock Health and Production Review, Hooo-Hooo, Equine Health Update

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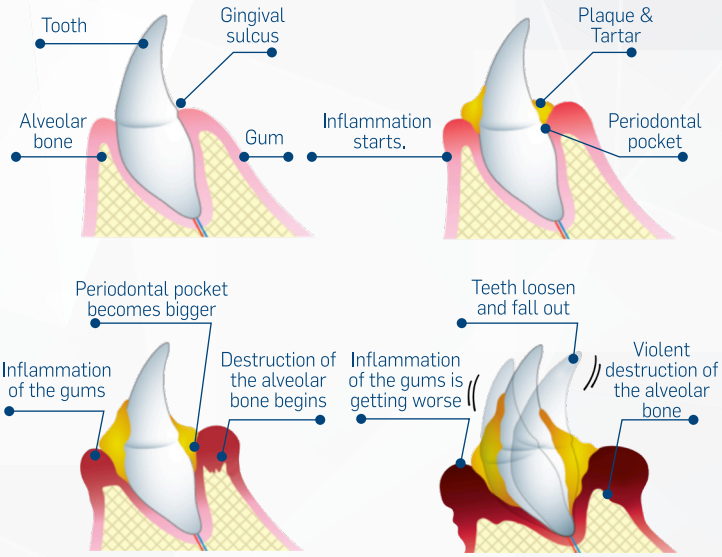



Reg. No. V29070 Act 36/1947
N-FF 4031


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# Safeguarding Your Online Reputation

Eric Garcia
IT Expert. Digital Marketer. Industry Thought Leader.

We all remember that fateful day when we passed through the doors of our high school for the very first time. Brow sweaty and backpack brimming, we knew that our reputation from years past would follow our footsteps down the hallway, but that we'd also have an entirely different arena in which to create anew.

The scenario itself may have changed, but many of the principles remain the same. Our reputation still precedes us when we enter a new environment, though now the World Wide Web is usually the messenger, for better or worse. Whether it's a new job, a meeting, a fundraiser, a date, or something in-between, there are more ways than ever for those around us to do their homework, on us, before meeting face to face.

That's right, a simple Google keyword search can bring up anything from your veterinary practice's website, to your Facebook page, and hopefully not those Instagram pictures from your best friend's wedding. While it may seem like you have no control over what people find out about you online, the truth is that you have more of a say in the matter than you think.

Google has a remarkably comprehensive system in place for coordinating user search results and delivering them in a timely, deliberate and meaningful fashion. What might seem like random results at first glance is actually a highly methodical process unfolding in real-time. "Crawlers" (known singularly as Googlebot) continuously sort through billions of web pages from each corner of the globe, algorithmically analysing, assessing, ranking, and indexing web pages and sorting through each applicable result.

So what does this mean for you? It means that when a pet owner is looking for the best care online and

nonchalantly typing in "pet hospital in your city"; your results aren't random. In fact, they're far from it. Google, which accounts for approximately 70% of search engine market share, is calculating your keywords and weighing-out millions of results before delivering them to you, all in about 0.5 seconds flat. The key takeaway here is this: practice owners can, and frankly need to, monitor and enhance their practice's search results in order to maintain and leverage their Online Reputation.

For example, when searching online for a local veterinary practice, customer reviews will gravitate toward the top of the screen, and instantly display the name, website, address, phone number, and here's the kicker, one to five star average rating, of nearby practices. In a Google Search (by far the most common kind of online perusal) this one to five score is the combined average rating of the "Google Reviews" that have been left for your practice. These scores can dramatically influence the amount of new clients that find, and ultimately choose your practice. This is why practice owners must safeguard and even encourage the establishment of a positive Online Reputation in order to fully optimise their practice.

Ok, so Keyword Searches and Google Reviews are all important factors to consider when managing my Online Reputation. But what can I do about it and how can I use these tools to enhance my practice? Well, I'm happy you asked!

### Quick Tips: Improve Your Online Reputation

1. First, you've got to search for your veterinary practice online. If you've never looked, you might be a bit intimidated at what you might find. But you can do it, dive right in. I recommend that you search on Google, Bing, and Yelp, and then "Claim Your Listing" once you've found the right result. Verify that this truly is your practice, and presto, you've claimed your online listing.
2. Next, setup your online alerts. By using a free service called Perch (perchapp.com) where you'll have a powerhouse service monitoring the Internet for results about your practice. Now you'll be notified by email or push notification whenever a new result or review is available. Convenient? I think so.
3. Now, bookmark your top online listings in a folder within your browser. This will save you time when you wish to check back on your results, and lets you easily review your listings at least several times a month.
4. Here's the fun part; engage with positive reviews! The average veterinary practice receives one review per month. You can reply to a positive review online, call and thank the client, or get creative and send a personalised Thank You card. Engage how you see fit, but definitely reach back to those who've been impressed with your practice. This little bit of effort can most definitely go a long way when it comes to encouraging positive reviews and ensuring client retention.
5. Finally, go the extra mile. You can engage directly with happy clients at checkout by encouraging them to leave a positive review for your practice. If they're onboard, send them a friendly reminder email at the end of the week, with a direct link to help them leave a Google Review.

It's really that simple to enhance your online presence and manage your online reputation. Doing so could mean the difference between countless new customers, and a haphazard web-presence. By pro-actively managing your Online Reputation, you'll stay ahead of the curb, reach more clients and ensure your veterinary practice maximises its resources. In the digital age, you may not be able to control everything that's published online, but you can certainly nudge it in the right direction.

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# The Hidden Power of Google Reviews

Whether your practice has been around for just a few days or a few decades, I can promise you that one thing is consistent between both:

**Your online reputation is either driving people toward, or away from, your veterinary practice.**

Unfortunately, if you haven't started to secure positive reviews online to both maintain and enhance your reputation, you run the risk of the many pitfalls that may follow. Something as simple as a Google Review can actually have profound implications on your business and whether or not you're securing the volume of pet owners that your practice is capable of.

While I once wrote specifically addressing the impact of Google on your online reputation as a whole (at simplydonetechsolutions.com/safeguarding-reputation), I will focus more on the power of Google Reviews and how to leverage this resource to enhance your business, maintain a stellar reputation and increase engagement from pet owners in the process.

When pet owners have a positive experience with your veterinary practice but don't leave a review, this encounter doesn't have the long-term impact it's capable of having.

Yes, the client was satisfied by their experience. But there's nothing over the long haul to prove it, enhance your reputation or otherwise garner a testimonial for future marketing. This can harm your overall visibility and consequently decrease the number of referrals you're receiving from Google. This is far from marginal, because Internet referrals from sites such as Google (or competitors like Bing and Yahoo!) now account for one of the top three sources veterinary practices receive clients from.

That's right, these online resources account for one-third of new business, which of course equates to vast amounts of annual revenue. While traditional word of mouth is still a powerful tool necessary for securing new clients, your online reputation is something like a digital word of mouth, which reverberates far and wide to pet owners who are searching for reliable care. There's no ignoring this reality, which leaves a more permanent footprint than traditional word of mouth and can't be underemphasised in the modern digital age. It's more important now than ever to begin securing new reviews as soon as possible.

This is partially because practices that have no reviews online are the most vulnerable. If this practice, who has not previously established their online reputation, receives a single negative review, this is the only thing that prospective clients will see online.

This can be detrimental for both new and existing business, as a negative review can cause doubt for new prospective client owners and even serve as a red flag to current clients of your veterinary practice.

That's why when veterinary practices approach me to ask where to start when it comes to their marketing efforts, I always tell them the same thing:

**Start by looking at your online reviews!**

Your online reputation is the cornerstone of your success and will likely dictate future success as well. Even clients who ask me for a marketing strategy but haven't worked extensively on their online reputation receive the same reply. We may be able to create a fantastic brand with clear, beautiful messaging and a sleek, modern website, but it won't do anything if your practice doesn't have a great reputation online.

Practices must get involved with online reputation management, paying very close attention to Google Reviews, if they want to thrive both now and into the future.

**The difference between a practice with a 3-star ranking and a 4-star ranking can make a major impact in your ability to market yourself and secure new business.**

This is especially true when a single-star can impact your ability to appear in the map section of the first page of a Google search. A huge amount of traffic and attention goes toward the results that appear first, and practices with lower scores will get buried in online search results. This is because Google selectively filters the results of veterinary practices based off the reviews that they secure online.

It's actually in Google's best interest to do this, because providing results of higher-rated veterinary practices tends to enhance the search experience for pet owners, who are typically looking for the best resource available in their local area. If a pet owner searches (let's say, in the Tampa, Florida region for example) and only finds veterinary practices with 2 and 3 star reviews, they'll likely keep searching. Instead, Google wants to streamline search results and deliver the best results possible to the user on the very first try.

**That's why practices with 4 and 5 star ratings often overwhelmingly appear first in search results!**

This may not occur if a rural area doesn't have a wide-selection of veterinary practices to choose from, but it will always be the case if there is competition in the marketplace.

Ok, let's try a little pop-quiz to see how it works. Let's say I find three veterinary practices during a Google search, and they have the following reviews:

*Practice A.) 3-star rating with 10 reviews.*
*Practice B.) 4-star rating with 12 reviews.*
*Practice C.) No reviews.*

*In this common scenario, where would you go?*

Statistically speaking, almost all those surveyed will choose Practice B. Practice B may not have the best veterinarians, the best service or even the best equipment. Still, their online reputation will land them countless new clients, as it's simply our nature to gravitate toward the most secure solution. Practice B has the highest rating overall, and this lets us feel secure in our decision when taking our pet there.

By taking ownership over your online reputation, you can leverage Google Reviews to garner new business and make sure your visibility is maximised online

## Get involved by following these simple steps:

1. Claim your business with Google and list your hours, phone number, location and photos. This is your chance to ensure your listing is accurate and

displays vivid imagery to attract new pet owners.

2. Reply to positive reviews as they come in! Engage with pet owners who have taken the time to submit a review and show appreciation for those brand advocates for supporting you.

3. Make sure to solicit new reviews, especially from pet owners who are delighted after their appointment. You can simply ask clients to leave a review, and send a follow-up email clearly explaining how to leave a review for your practice.

It's important to make leaving a review as easy as possible for your client, so feel free to print a step-by-step guide that ensures all types of pet owners know how to leave a review. There are also services available, such as AllyDVM, Vetstreet, ePetHealth, Rapport, Banyan, or Testimonial Tree, which can help you to secure reviews by integrating directly within your practice management software and sending surveys.

By enlisting the help of one of these recommended services, you'll gain the peace of mind that comes from knowing that only clients who leave great survey results, will be asked to go a step further by leaving you a review online. Those who had a less glowing experience will be asked if they're open to discussing their experience, allowing you an opportunity to address their concerns and enhance your veterinary practice accordingly.

No matter the route you choose, understanding and leveraging the impact of Google Reviews will allow you to increase customer satisfaction, enhance your practice and engage with new clients; contributing to a level of future success you may have once never imagined possible.



# Unpacking Feline Dementia

**Early detection and regular follow-up are important components for managing this slowly progressive condition in cats—and helping cat owners understand the difference between feline cognitive dysfunction and ordinary aging.**

Natalie Stilwell, DVM, MS, PhD

Cognitive impairment in cats is tricky—there's just not much information on the topic for veterinary teams. At the 2018 American Association of Feline Practitioners conference, held in Charlotte, North Carolina, Margaret Gruen, DVM, MVPH, PhD, provided clarity on the complex etiology of feline cognitive dysfunction syndrome (fCDS). She also offered tips for veterinarians on diagnosis and management.

## What is feline cognitive dysfunction syndrome?

Cognitive changes are common in cats aged 10 years and older. However, many of these signs, including decreased activity and social interaction, are subtle and may be mistaken by owners as a normal part of aging. In fact, according to one study, cat owners reported at least one behaviour problem in 28% of cats aged 11 to 14 years and in more than 50% of cats aged 15 and older.[1] Many of the reported issues in that study, such as excessive nighttime vocalisation and house soiling, were consistent with fCDS, also called "feline dementia."

### Pathophysiology of fCDS

Although our understanding of cognitive dysfunction in animals frequently is extracted from human medicine, the exact aetiology of neurobehavioural syndromes remains poorly understood. Cognitive dysfunction likely has genetic, nutritional and environmental components.

Dr. Gruen explained that high oxygen demand and lipid content make the brain particularly susceptible to the "cascade of damage" resulting in cognitive dysfunction. Known neuropathologic changes in the brain that lead to cognitive dysfunction include compromised blood flow, chronic inflammation, oxidative damage, and inefficient free radical scavenging. Across species, these processes cause plaques of beta-amyloid protein to surround neurons, ultimately resulting in neuronal dysfunction and death.

Tau protein hyperphosphorylation, another pathologic change, is also documented in humans with Alzheimer disease and in cats, although its role in fCDS remains unknown.

Cognitively impaired patients may have reduced which are responsible for maintaining normal movement, posture, mood, memory, appetite and sleep. Serotonin, gamma-aminobutyric acid (GABA), norepinephrine, dopamine and acetylcholine are most commonly affected.

### The role of chronic pain in cognitive impairment

Dr. Gruen explained that chronic pain plays a significant role in many fCDS cases. Common geriatric issues in cats include degenerative joint disease, arthritis, dental pain, interstitial cystitis and neuropathy. These tend to have "multidimensional effects" on all aspects of the patient's life, including behaviour, sensation, cognition, social interaction and physiology.

## Diagnosing fCDS

### Physical and behavioural signs

Dr. Gruen recommended using the acronym "DISHA-AL," adapted from Gary Landsberg, DVM, to remember the main signs of fCDS[2]:

- **D**isorientation
- **I**nteraction changes
- **S**leep–wake cycle alterations
- **H**ouse soiling
- **A**ctivity changes
- **A**nxiety
- **L**earning/memory

Relatively obvious signs of fCDS tend to be those noticed first by the owner, while subtle or early changes may only be revealed through detailed questioning by the veterinarian. These include mild changes in mood, grooming behaviour and appetite. Because owners often mistake subtle signs for normal aging processes, Dr. Gruen explained it is the veterinarian's responsibility to learn more. "When we don't ask about these behaviours," she stated, "we don't find out about them."

Cats with fCDS often display learning, memory, motor function and spatial-awareness deficits similar to those seen in humans with Alzheimer disease. Overall, the cat owner may notice these slowly progressive changes as a decreased ability to cope with stress and adapt to changes.

### Serial evaluation is key

Dr. Gruen admitted that evaluating cognitive function in feline patients isn't easy. She advised veterinarians to "look at changes in the individual cat over time." Begin screening early to establish patient-specific physical and behavioural baselines. Then, reference baseline information as clinical signs develop. She also emphasised that many signs associated with cognitive dysfunction, such as house soiling, may have medical causes, which is why fCDS should be a diagnosis of exclusion after ruling out other diseases.

## Multimodal management of fCDS

The main goal of fCDS management, Dr. Gruen noted, is to delay progression of the condition and improve patient quality of life. Multimodal treatment should include environmental enrichment, dietary modification, pharmaceutical pain management and cognitive function support.

### Get clients involved

Management of fCDS, Dr. Gruen explained, is most effective when the veterinarian and owner work together. Owners should be encouraged to make a list of activities they perceive as important to their pet's quality of life. These may include perching, playing and grooming. The veterinarian can then maintain the list in the patient's record and discuss changes with the owner on a regular basis. Because many cats are more comfortable in the home than in a hospital environment, Dr. Gruen often asks owners to take pictures and video of behaviour at home. She then uses these images to determine management strategies.

### Environmental management

Social interaction, mental stimulation and physical exercise are all vital components for cognitive support in aging cats. Dr. Gruen recommended use of heated beds to draw cats toward certain areas of the home, including elevated perches and window ledges. Also, many enrichment tools created for dogs, such as puzzle toys, effectively stimulate mental and physical activity in cats. The team should focus on maintaining adequate nutrition, hydration, grooming and elimination habits.

### Dietary supplements and pharmaceutical support

No FDA-approved options exist for treating behavioural disorders in cats, so use is all off label. Several options are available for symptomatic relief, but Dr. Gruen reminded the audience that all should be considered supportive rather than "miracle drugs" for treatment of fCDS. Options include monoamine oxidase inhibitors (MAOIs), omega-3 fatty acids, free radical scavengers and antioxidants, S-adenosyl-L-methionine (SAM-e) and L-theanine. Some commercial therapeutic diets contain one or more of these ingredients.

Among available pharmaceutical options, selegiline (also known as L-deprenyl and marketed by Zoetis as Anipryl) is currently the only FDA-approved drug for treatment of canine cognitive dysfunction syndrome. This MAOI has several documented neuroprotective effects, including improved astrocyte function, increased dopamine production and enhanced free radical scavenging. Clinical improvement is typically observed within 4 to 8 weeks of initiating treatment. A documented treatment for house soiling and reduced activity, selegiline is also particularly useful for regulating sleep patterns when administered in the morning. One study also demonstrated improved spatial memory

in dogs after selegiline administration.[3] Potential side effects include vomiting, diarrhea, restlessness and anorexia, as well as increased stereotypic behaviour if administered at high doses.

SAM-e (marketed by Virbac as Novifit) has free radical scavenging effects and improves cell membrane function. Feline studies demonstrated optimal benefits in patients with mild to moderate cognitive dysfunction, suggesting that SAM-e is best utilised in the early stages of disease. Other pharmaceutical options include Senilife (CEVA Animal Health), which contains the antioxidants phosphatidylserine, ginkgo biloba, vitamin E and vitamin B6; and L-theanine (marketed by Virbac as Anxitane), a green tea extract designed to enhance GABA, serotonin and dopamine levels.Keep in mind precautions associated with administration of certain drugs. For example, selegiline, as an MAOI, should not be used concurrently with selective serotonin reuptake inhibitors, tricyclic antidepressants or opioids due to the risk of serotonin syndrome. Tricyclic antidepressants may have anticholinergic effects, particularly in older pets, and benzodiazepines have been blamed for exacerbating cognitive decline in human patients with existing cognitive dysfunction, particularly when used after anaesthesia.

### Targeted treatment for specific signs

Dr. Gruen closed by demonstrating how multimodal treatment can be tailored for treatment of specific signs, such as nighttime vocalisation. First, she advised identifying and managing any underlying medical causes. Then, incorporate various components of treatment. For example, environmental management of nighttime vocalisation may include blocking noises that awaken the cat and owner, use of a heated bed for improved comfort, and adjunctive use of music, aromatherapy and body wraps. To retrain the patient's circadian rhythm, Dr. Gruen advised owners to keep affected cats awake during the day, especially during the morning and evening periods. Finally, anxiolytic pharmaceutical drugs and supplements may provide additional support for particularly severe cases.

## The bottom line

Many veterinarians and cat owners find that cognitive impairment issues are relatively complex, which is why it's important to remember the progressive nature of fCDS and set realistic management goals. As veterinarians, the "goal should be to keep patients as healthy and comfortable as possible during their golden years," said Dr. Gruen. By establishing patient-specific baselines for behaviour and physiology, the practitioner and owner can work together to manage clinical signs and prioritise feline patients' quality of life.

References available online: www.vetlink.co.za

# Where are we with Cruciate Surgery in Dogs?

Dr Malcolm Ness
BVetMed, CertSOA, DipECVS, MRCVS, RCVS
European Specialist in Surgery

Functional failure of the cranial cruciate ligament (CCL) in dogs, whether by traumatic rupture or following a slower degenerative metaplasia of the ligament remains a very common cause of chronic lameness and secondary osteoarthritis (OA) in dogs. Indeed, a survey conducted by the British Veterinary Orthopaedic Association revealed CCL failure to be the single most common cause of chronic pelvic limb lameness in the dog. (BVOA, 1996). It is likely that a further substantial cohort of dogs evades specific diagnosis because the same survey recorded many cases of unspecified stifle OA – most likely caused by previously undiagnosed CCL failure.

While lameness attributable to CCL failure is considered by most experienced clinicians to be a surgical diagnosis, it is impossible to be dogmatic because any diligent review of the published, peer-reviewed veterinary literature provides scant support for that position. Sadly, the veterinary surgical evidence base is remarkably poor and the overwhelming majority of cruciate literature comprises simple case series reports. Crucially, there is a dearth of comparative data and neither is there a single, properly controlled review. In short, we simply do not know what might have happened to the dogs recruited into our surgical series had they been managed conservatively or medically: there is a supposition, even a consensus, that lameness would progress to the point of disability but that remains supposition.

Although early veterinary textbooks contain accounts of a chronic lameness condition that might well be CCL failure, for example, Dollar (1902) it was not until the detailed investigations made by Saki Paatsaama during the nineteen forties and fifties that the veterinary world gained any real insight into this condition. (Paatsaama, 1952) Paatsaama went on to describe a surgical technique for 'replacing' the failed CCL and though most now consider the 'Paatsaama Technique' obsolete, it was the first of an eye-wateringly large range of surgical "solutions" offered in response to this most frustrating of orthopaedic conditions.

That there are so very many different ways of surgically attacking the CCL deficient stifle indicates that not one is ideal – if it were, then we would all be using that technique with confidence and satisfaction! Broadly speaking, CCL surgery can be divided into three types:

1. Attempts to replace the failed ligament using a biological or a synthetic prosthesis. These are hindered first by the need to replicate exactly the 'lie' of the CCL within the stifle and further by the impossibility of finding a prosthesis that replicates the material properties, including stiffness and strength, of the original ligament.

2. Attempts to 'stabilise' the stifle using a prosthesis placed outside the joint. These are hindered first by the impossibility of placing a single, simple prosthesis to replicate the function of the original ligament and further by the inadequate material properties of available prostheses.

3. Attempts to alter the mechanics of the CCL deficient stifle such that it can function adequately without an intact CCL – the tibial osteotomies. These are hindered by cost, complexity and an

incomplete understanding of normal, let alone altered stifle biomechanics.

There is a dearth of good quality evidence to indicate the superiority of any of these approaches although there is a very strong consensus amongst experienced veterinary orthopaedic surgeons that the tibial osteotomy techniques offer the best chance of good clinical outcome.

Although a considerable amount of argument, (and even a little evidence) can be brought to bear in support of tibial osteotomies as the "Gold Standard" it is necessary to remain circumspect and critical - there is considerable potential for bias related to vested interest and one must beware the influence of PBVM (Profit Based Veterinary Medicine!). It is not surprising that the use of very complex and costly, referral-only, procedures find their strongest support amongst the very specialists who perform them.

Whilst the efficacy of tibial plateau levelling osteotomy (TPLO) (Slocum and Slocum, 1993) (Fig.1) or conventional tibial tuberosity advancement (TTA) (Montavon and Tepic, 2002 is now beyond reasonable doubt, the fact that the cost and complexity of these procedures puts them beyond most dogs cannot be reasonably ignored. While the veterinary orthopaedic literature is dominated by accounts of tibial osteotomy,

*FIgure 1. Immediate post-surgical lateral radiograph showing a tibial plateau levelling osteotomy (TPLO) fixed with a bone plate and screws.*

*Figure 2. Intra-operative view of fabello-tibial suture stabilisation of a cruciate-deficient stifle. A stout nylon 'suture' has been passed around the lateral fabella and through a tunnel drilled in the cranio-proximal tibia. The nylon prosthesis is tightened in a controlled fashion using the instrument while the surgeon confirms adequate stability prior to fixation within the tubular stainless-steel crimp.*

in practice most dogs with a cruciate lameness will be treated differently – more often than not, with some variation of the fabello-tibial suture technique (Fig.2). Although the results with such techniques can be pleasing, disappointment is not unusual.

The Modified Maquet Technique (MMP) (Fig.3) was developed in response to the need for a cruciate surgery that offered clinical outcomes similar to those seen with conventional TPLO or TTA but which avoided the complexity and prohibitive cost of those operations. Simplicity and affordability were key requirements and the procedure had to be achievable in primary care veterinary practice.

*Figure 3. Lateral radiograph of a dog immediately after MMP surgeryThe wedge-shaped implant of titanium foam maintains the tibial tuberosity advancement. A titanium alloy staple is used to fix the tibial tuberosity.*

MMP evolved from from a tibial tuberosity advancement procedure described for humans by Phillipe Maquet in 1963 (Rappaport and colleagues, 1992) and was further influenced by the work of Montavon and Tepic (2002) in dogs. MMP uses a wedge-shaped implant of a novel bio-material – a pure titanium micro-foam initially developed for human orthopaedic and dental applications – which maintains the tibial tuberosity advancement and facilitates early and sustained ingrowth of bone. (Fig. 03).

The surgery employs a series of carefully designed saw and drill guides which make the procedure relatively simple, safe and predictable even for surgeons without specialist orthopaedic training or certification. In the author's practice, the MMP technique effectively replaced the TPLO technique which had been used for more than 3,000 cases over more than a decade previously. Our appraisal was that MMP was neither better nor worse than TPLO in terms of clinical outcomes, risk of complication, consequence of complication etc but the simplicity and the reduced operating time offered a reduced cost to owners that made MMP available to a greater number of patients.

This clinical impression has found some independent evidential support in work underway at the Veterinary Referral Hospital of the University of Munich, Germany and which was presented, in part, recently. Eberle and colleagues, (2017) concluded that, "Clinical orthopaedic examination revealed no significant difference between the TPLO and MMP groups for any of the long-term control parameters except for one exception, joint capsular fibrosis [MMP showed less fibrosis than TPLO]. An average low arthritis progression was detectable in all knee joints and that was not significantly different between MMP and TPLO groups.

Overall, MMP as a recent surgical technique represents an interesting alternative to established TPLO due to its nearly comparable long-term results." (Translated by Sven Hempel)

The question, "2019: Where are we with cruciate surgery in dogs?" does not yet have a certain answer. There is still a plethora of surgical options, some obsolete and many others finding continuing popularity. Much controversy remains and the veterinary surgical evidence base, despite CCL failure being very common and commonly written about, is woefully weak. MMP marks a milestone on the road towards a predictably effective and widely affordable cruciate surgery, achievable in non-specialist practice and which can be offered, it seems, with the expectation of a clinical outcome that stands comparison with TPLO.

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# The ABCs of Veterinary Dentistry

## *'S' is for Supernumerary Teeth*

**Extra! Extra! Read all about how when it comes to excess teeth, more isn't always merrier for your veterinary patients.**

Jan Bellows, DVM, DAVDC, DABVP, FAVD

I had no idea what "supernumerary" meant (much less how to spell it) when I first heard the term some 30 years ago. But time and experience have taught me the importance of paying attention to this dental condition that often needs immediate care.

Both extra and supernumerary teeth refer to the same medical condition — hyperdontia — which describes when teeth or odontogenic structures develop from tooth germs in excess of the usual number for any given region of the dental arch. It's thought that these teeth develop from either a cleaved tooth bud caused by hyperactivity of dental lamina near the regular tooth bud or from splitting the regular tooth bud itself. Heredity may also play a role in this anomaly, as supernumeraries often occur in littermates of affected dogs and cats.

Supernumerary teeth may be single or multiple, unilateral or bilateral, and erupted or impacted. The condition is less common in deciduous (baby) teeth than in permanent teeth.

### Why more isn't always merrier

Not all dogs and cats with supernumerary teeth are in trouble. Some are able to accommodate extra teeth in the arch without adverse effects. In such cases, pay close attention to these teeth during follow-up clinical and intraoral radiograph examinations for the life of the patient (Figures 1A and 1B).

However, supernumerary teeth can cause several problems, as described below:

**Eruption failure**. The presence of a supernumerary tooth may cause a mechanical blockage of the eruption pathway that prevents a permanent tooth from erupting normally, leading to either partial or complete eruption failure (Figures 2A-2D). The resulting unerupted tooth is predisposed to dentigerous cyst formation, with an enlarged follicular sac often noted clinically and on radiographic examination (Figures 3A-3D).

*Figure 1A. A feline patient with two left maxillary second premolars. No treatment was necessary at the time the photo was taken. (All photos courtesy of Dr. Jan Bellows).*

*Figure 1B. A canine patient's rostral maxilla accommodating seven incisors without excessive crowding.*

*Figure 2A. A patient with supernumerary left maxillary first, second and third incisor.*

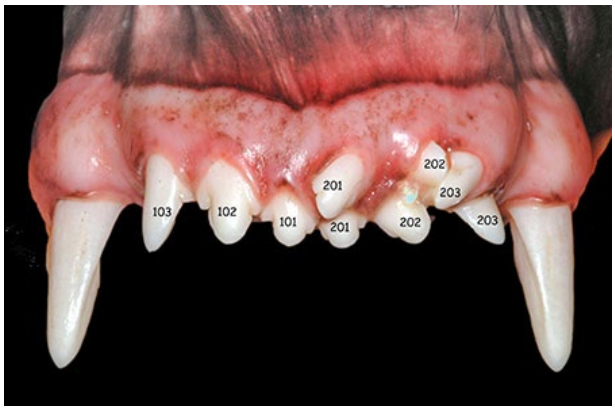


*Figure 2B. A side view of the patient from Figure 2A with supernumerary left maxillary first, second and third incisors.*

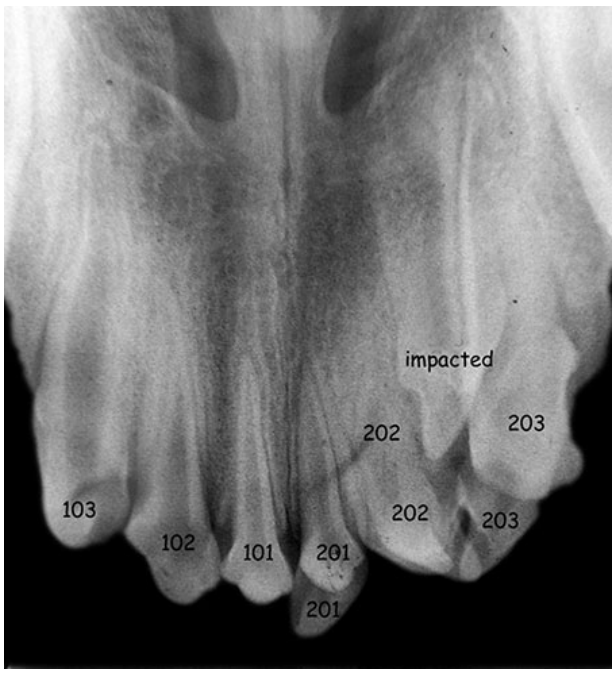


*Figure 2C. A radiograph of the patient from Figure 2A revealing an impacted incisor due to mechanical obstruction in addition to the supernumerary teeth.*

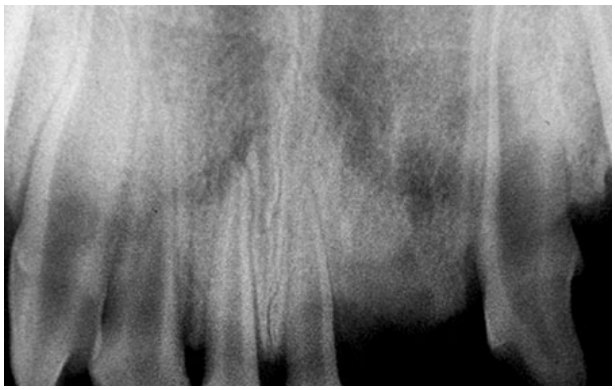

*Figure 2D. A postoperative radiograph of the patient from Figure 2A after the extraction of the supernumerary and impacted teeth.*

*Figure 3A. Large swelling is present near the left maxillary canine tooth.*

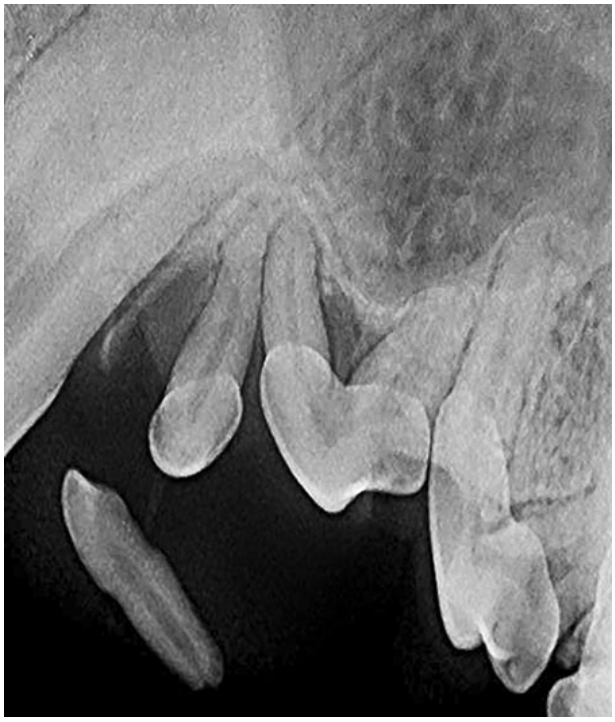

*Figure 3B. An intraoral radiograph of the patient from Figure 3A revealing a large cyst and an unerupted first premolar.*

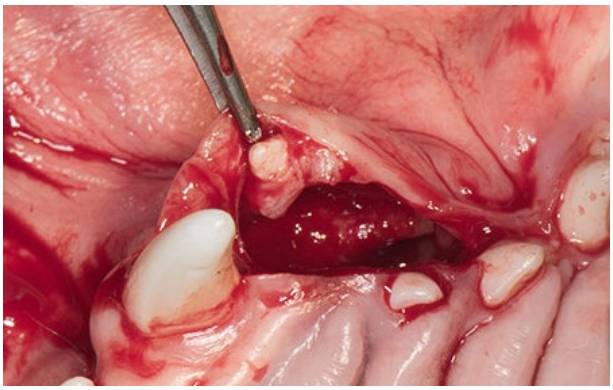

*Figure 3C. Surgical exploration in the patient from Figure 3A revealing the unerupted supernumerary canine and dentigerous cyst.*

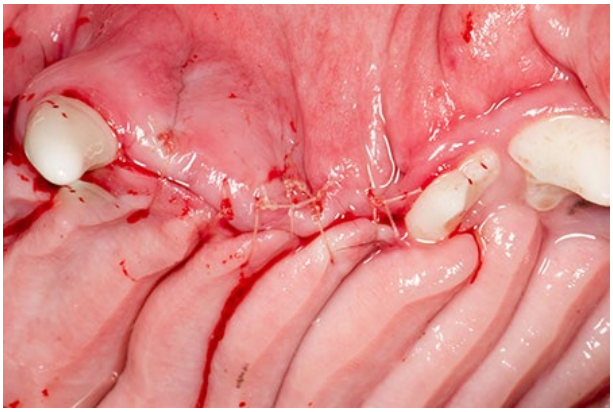

*Figure 3D. Closure of the cyst in the patient from Figure 3A.*

*Figure 4A. A right mandibular first premolar displaced caudally due to an impacted supernumerary first premolar.*

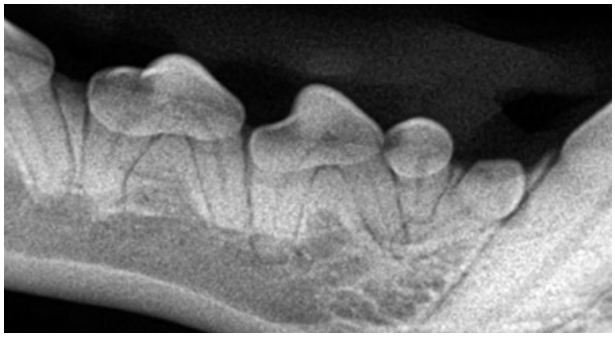

*Figure 4B. A radiograph of the patient from Figure 4A with a right mandibular first premolar displaced caudally due to an impacted supernumerary first premolar tooth.*

**Displacement.** The presence of a supernumerary tooth may cause one or more permanent teeth to become displaced (Figures 4A-4C). The degree of shift can range from a mild rotation to complete displacement, resulting in interference with adjacent or opposing teeth (Figure 5).

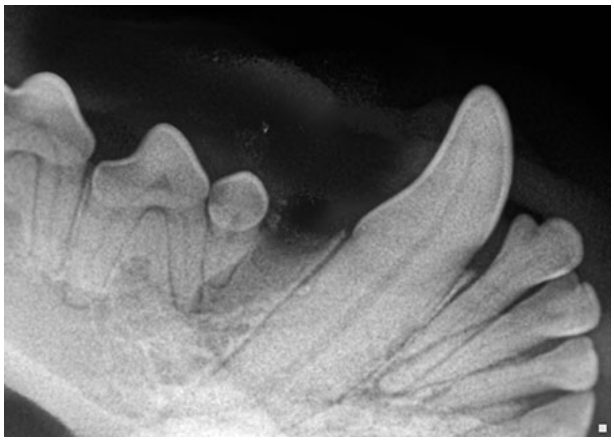

*Figure 4C. A postoperative radiograph of the patient from Figure 4A confirming the extraction of the first premolar.*

*Figure 5. Bilateral supernumerary maxillary third premolars in a cat that are displacing the adjacent third premolars.*

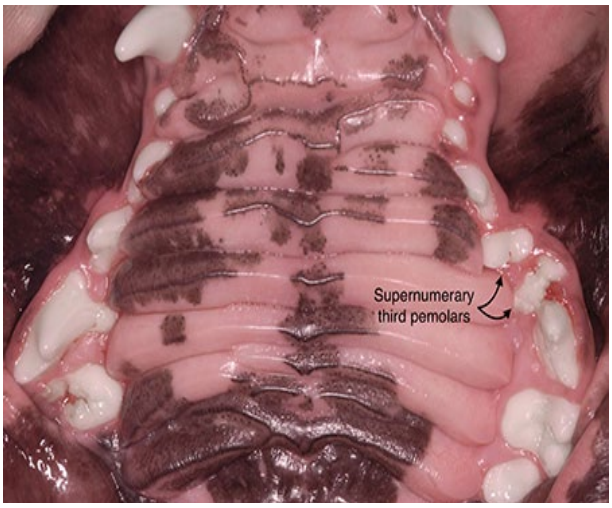


*Figure 6. Two left maxillary supernumerary third premolars in an English bulldog.*

**Crowding**. Erupted supernumerary teeth most often cause crowding (Figure 6). The decreased space between the affected teeth may result in advanced periodontal disease. Crowding may be resolved by extracting the most displaced or deformed tooth to stop food from becoming entrapped.

In cats predisposed to plaque-induced inflammation (gingivostomatitis), supernumerary teeth create plaque-retentive surfaces for stomatitis to proliferate (Figures 7A-7C). Extraction of the supernumerary teeth and teeth affected by periodontal disease is usually curative (Figure 7D).

## What to do when there are too many teeth

The management of a supernumerary tooth should form part of a comprehensive treatment plan and should not be considered in isolation. Treatment depends on the type and position of the supernumerary tooth (Is it erupted or nonerupted? What is the stage of the crown and root development?), as well as its effect or potential effect on adjacent teeth (What is the distance between the supernumerary tooth and the roots of adjacent teeth? What is the condition of the dentition? Is there malocclusion or crowding?).

## When to extract the extras

Supernumerary tooth extraction is recommended when there is:

- associated pathology(dentigerous cyst) or tooth support loss (periodontal disease)
- crowding that compromises the normal self-cleaning process (Figures 8A, 8B and 9).

However, if a patient's supernumerary teeth don't appear to cause adverse effects on adjacent soft tissues or teeth (e.g. adjacent teeth are able to erupt satisfactorily and there is no associated pathology), it's reasonable to decline or delay surgical intervention and regularly monitor them instead.

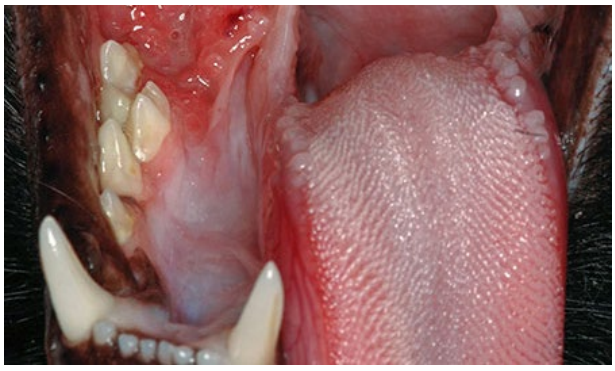

*Figure 7A. An inflamed caudal oral cavity on the right side of the patient's mouth.*

*Figure 7B. A close-up image of the patient from Figure 7A revealing inflammation surrounding the right mandibular fourth premolar.*

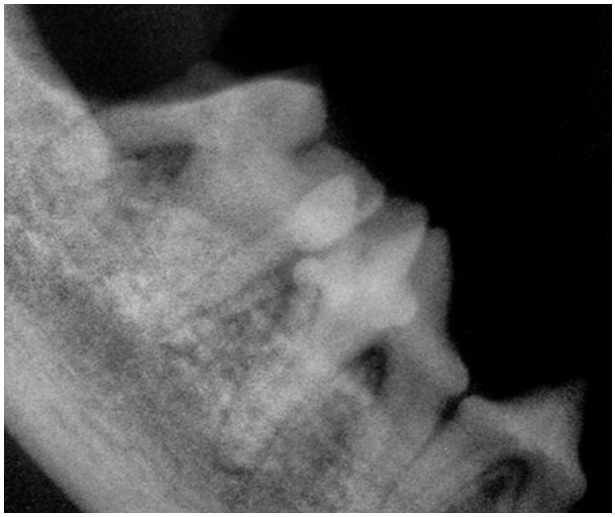

*Figure 7C. A radiograph of the patient from Figure 7A confirming a supernumerary third premolar.*

*Figure 7D. Resolution of inflammation in the patient from Figure 7A three weeks after extracting the right mandibular cheek teeth.*

*Figure 8A. A patient with supernumerary maxillary third incisors.*

*Figure 8B. The supernumerary teeth in the patient from Figure 8A were preemptively extracted before pathology could occur.*

## Looks aren't everything

As with many veterinary dental conditions, it's important for your clients to understand that your concern is for the patient's health—not cosmetics. Educate yourself on the complications that can arise from supernumerary teeth so you're ready to pass on the knowledge to your clients if and when the time comes to benefit your patients.

*Figure 9. A right mandibular supernumerary fourth premolar in a cat. This created an environment for advanced periodontal disease to develop, thereby necessitating the extraction of all the right mandibular cheek teeth.*

Shaping the future of animal health

# Feline Eosinophilic Granuloma Complex

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Faculty of Veterinary Science

## Lesions associated with Eosinophiic Granuloma Complex (EGC)

This condition is in fact not a single disease but rather the manifestation of an underlying cause that presents with a variable complex of skin lesions. It is not a specific diagnosis but rather representative of a cutaneous reaction pattern. The most common underlying condition is a hypersensitivity and the most common presenting lesions include indolent (rodent) ulcers; eosinophilic plaques and eosinophilic granulomas. (Fig 1-4)

## Pathogenesis

Most authors recognise that this presentation is most likely a manifestation of feline allergic skin disease. Some alternative aetiologies have been suggested.

These include:

- Insect bites (especially mosquito bites) – although most clinicians would see this as a separate disease entity. (Fig 5)
- Various infectious agents have been suggested based on the frequent presence of bacteria seen on cytology and histology. It should however be remembered that the ulcerated lesions are predisposed to secondary bacterial infection. In one study cytological evidence of infection was found in all cats examined and treatment with amoxicillin/clavulanate resulted in significant improvement in most cats after 21 days of use.
- Clinical and histological similarities between EGC and various feline viral dermatoses have generated the suspicion that there may be an underlying viral aetiology. This theory has however failed to gain traction in other studies.
- One study demonstrated that 68% of 19 cats with EGC had circulating antibodies to normal feline epithelium suggesting an underlying autoimmune pathogenesis. This could however simply be due to exposure of normal epithelium to the cat's immune system due to chronic trauma and may in fact have nothing to do with triggering the lesions.
- A colony of 17 related Norwegian Forest cats all developed EGC and hence a genetic link is also possible.
- EGC occurs most commonly in association with allergic skin diseases. These include flea bite hypersensitivity, cutaneous adverse food reaction and atopic dermatitis. In a study of experimentally induce flea bite hypersensitivity in a colony of cats, 5/8 developed EGC (indolent ulcers). Other allergens that have been associated with EGC are food proteins and environmental allergens. Interestingly even self-antigens have been proposed as a trigger.
- One study suggested that Felis domesticus allergen 1 (the major feline saliva allergen in human cat allergy) was an autoantigen in EGC. It is possible that this allergen is planted in the deep dermis through chronic licking.

We may thus conclude most evidence points towards an underlying allergic trigger.

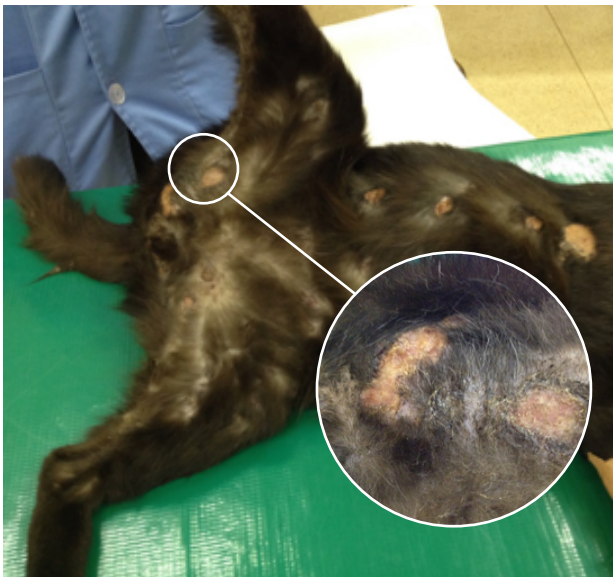

*Figure 1: A cat with allergic skin disease and multifocal eosinophilic granulomas on its skin.*


*Figure 3. A cat with a typical indolent ulcer on the upper lip and an ulcerative lesion inside the mouth that was part of the eosinophilc granuloma complex.*


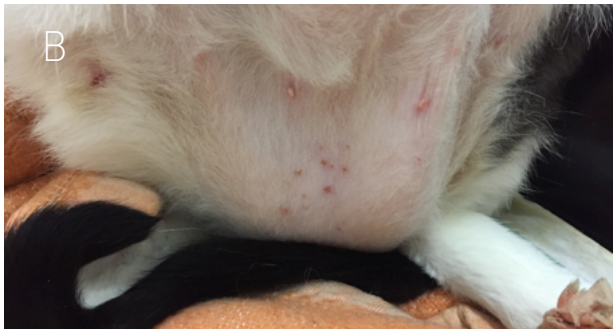


*Figure 2. A cat with a classical indolent ulcer (A) and a papular rash on the ventral abdomen (B) due to self-trauma due to pruritus as a result of underlying allergic sin disease.*

*Figure 4. An typical wet, ulcerated, well circumscribed, obviously sensitive eosinophilic plaque lesion*

*Figure 5a. Early lesions in a cat with suspected mosquito bite hypersensitivity*

*Photo courtesy of Niven Pillay*

*Figure 5. Cats with more advanced lesions due to suspected mosquito bite hypersensitivity*

## Diagnosis

The investigation should confirm the presence of an EGC lesion and then be aimed at determining the underlying cause.

**Confirming the presence of an EGC lesion:**
Clinical presentation is typical. Cytological examination demonstrates large numbers of eosinophils. It is helpful to remember that ulcers, plaques, nodules and tumors may need to be biopsied to rule out non-allergic differentials. Here it is especially important to be sure that there is no neoplasia or primary viral, fungal or bacterial aetiology. Microbial culture may be indicated in some cases. Histology is usually quite typical for EGC and can easily rule out other differentials.

**Searching for the primary disease**
A thorough dermatological history and physical examination is mandatory. General health in cats with EGC is almost always good. Vaccination history should exclude FHV-1 and also FeLV. A history of flea infestation, seasonal exacerbations and gastrointestinal signs should increase a suspicion for flea bite allergy, atopy or food allergy. Other clinical signs consistent with allergic dermatitis including miliary dermatitis, symmetrical alopecia and head and neck pruritus provide clues to associated allergy.

Coat brushings with fungal culture, trichography, cello-tape impressions and Wood's lamp examination should be performed to help rule out dermatophytosis and other ectoparasites. It must be remembered however, that the absence of ectoparasites on clinical examination does not rule them out as cats are fastidious groomers and may remove all signs of ectoparasitosis.

Cytology (usually impression or brush collected) or cello-tape impressions from the lesions can yield findings that are consistent with the diagnosis of EGC and may also give evidence of secondary infections. To be significant, bacteria should be found phagocytosed. If rod bacteria are found, culture is recommended.

To rule out ectoparasitosis a strict 6-8 week long anti-parasite treatment trial should be conducted. This should include the use of a topical adulticide. All in contact animals should be included in the treatment trial. If mosquito exposure is suspected, removing the cat from the insect will confirm this. Topical repellants are not usually safe in cats.

**Testing for cutaneous adverse food reactions:**
The only way to rule food out as a source of allergen is to conduct an eight week long hydrolyzed diet trial. During the trial, depending on the severity of the disease, it may be necessary to provide symptomatic treatment for the EGC and as such it may be necessary to extend the food trial beyond the eight week mark to evaluate for recurrence of the disease once treatment effects have abated. Food trials are often impossible in cats because of their hunting behavior. Confining a cat to the house may also be difficult and may exacerbate behavior abnormalities in some.

**Testing for environmental allergens:**
Atopy is a diagnosis of rule out. Once ectoparasites, microbial infections and food allergy have been excluded, a presumptive diagnosis of atopy is usually made. Serum allergen specific IgE titers may be measured if allergen specific immunotherapy is a consideration.

**Testing for other systemic disease:**
Because cats with EGC are almost always healthy, a full medical investigation for underlying disease is rarely indicated. But, should the cat show any signs of systemic disease, a more complete investigation should be pursued. This should include a haemogram, basic blood chemistry profile and testing for retroviral infections. Lymph node enlargement may be seen in some cases and is usually just reactive but fine needle aspiration will help in excluding lymphoid neoplasia.

## Management

**Glucocorticoids**
EGC usually show a good response to corticosteroid use. Some lesions may require high doses and some may be refractory to corticosteroid use alone. Where possible, depot corticosteroid injections should be avoided. These injections cannot be withdrawn if there is treatment failure and there is also no immediate ability to control the dosing regimen. Oral prednisolone (NOT prednisone) is the treatment of choice. *(EDITOR NOTE: Note that prednisone needs to converted to prednisilone in the liver. Only about 25% of this happens in cats due to a lack of spesific enzymes. Thus the use of prednisone is not indicated in cats or dogs with liver disease)* Starting doses are usually around 1 – 2 mg/kg per day. In some cases up to 4mg per day me be needed. Lesions should regress within 7-14 days and once this occurs the dose of oral

corticosteroid should be tapered to alternate day use. If response to corticosteroid is poor, additional or a different treatment should be considered.

Although cats are more resistant than dogs to the side effects of corticosteroid, they are by no means immune to them. These would include, pu/pd and polyphagia, weight gain, diabetes mellitus, urinary tract infections, iatrogenic Cushing's syndrome, congestive heart failure, demodicosis and gastric ulceration.

### Cyclosporine

This calcineurin inhibitor inhibits T-cell function. The dose in cats is higher than in dogs and usually starts at 7mg/kg once daily. This normally translates to a single 25mg capsule daily in South Africa as we do not have the syrup formulation available here. The drug is usually very effective in treating EGC. Once daily treatment is typically maintained for 4 weeks and if response is good, treatment can be tapered to alternate day use and then even lower if possible. Remember response is slow and doses should not be decreased more frequently than monthly. The drug is well tolerated by most cats but as with dogs, a small proportion of cats will show signs of gastro-intestinal intolerance over the first 3 weeks of use. Persisting with use through this induction phase may see some cats accommodate to the drug and the side effects pass. There are some reports of a link between toxoplasmosis and neoplasia cyclosporine use. This is however very rare and usually seen when cyclosporine is used together with prednisolone (in what is a very potent immunosuppressive treatment combination). Remember that concurrent treatments with doxycycline, erythromycin, fluconazole and ketoconazole inhibit cyclosporine biotransformation and increase plasma levels and may exacerbate side effects.

### Hydrocortisone aceponate

This is a topical spray formulation (Cortavance, Virbac). The corticosteroid is metabolised in the skin and not absorbed systemically allowing it to maintain local potency without inducing systemic side effects. A recent study evaluated the efficacy of daily or alternate-day application of the commercially available 0.0584% HCA spray in 10 cats with presumed allergic disease. Seven of these cats presented with eosinophilic plaques, and the remainder with combinations of miliary dermatitis and symmetrical alopecia. There were highly significant improvements in both clinical lesion and pruritus scores over the 56-day study period. Ease of application of the spray, as scored by owners in the study, increased significantly with time and most owners rated the drug's efficacy as good or excellent. During study, two sprays of HCA were applied to a 10 x 10 cm area of lesional skin daily for 28 days and reduced to alternate-day therapy if there was a greater than 50% improvement in clinical lesion and pruritus scores. However, the response to treatment was rapid and most of the clinical improvement was seen within 14 days. One cat was withdrawn from the study due to poor treatment efficacy and no adverse effects were reported in any of the cats. The study suggests that HCA is effective and safe for the treatment of EGC lesions.

### Chlorambucil

This is an alkylating agent and may be considered for the treatment of EGC cases that are refractory to steroid use. It may be given concurrently with steroids 0.1 – 0.2 mg/kg daily or every other day (thus one 2mg tablet 2 – 3 times a week in most cats). The tablets must not be crushed or broken. Treatment should continue for 4 – 8 weeks before full benefit will be seen. Once response is observed, the corticosteroid dose should be dropped and/or tapered first followed by the chlorambucil dose. Side effects are infrequent but when seen usually relate to gastro-intestinal intolerance or bone marrow suppression. A complete blood count should be done every 2 weeks for the first few months of use to ensure that the treatment is not causing myelotoxitity.

### Progestagens

Megoesterol acetate used to be recommended for the treatment of EGC. There is no place for the use of this drug with this disease. The side effects can be severe and there are far better and safer alternatives.

Suggested reading

Buckley L, Nuttall T. 2012. Feline eosinophilic granuloma complex(ities): some clinical clarification. J Feline Med Surg 14:471-81

Wildermuth B E, Griggin C E, Rozenkrantz W S. 2011. Response of felin eosinophilic plaques and lip ulcers to amoxicillin trihydrate-clavulanate potassium therapy: a randomized, double blind placebo-controlled prospective study. Vet Derm 23: 110-e25

Bloom P B. 2006. Canine and Feline eosinophilic skin diseases. Vet Clin Small Anim 36: 141-160

# CPD Questions

AC/2240/19

## Eosinophilic Granuloma Complex in Cats

Web-based: www.cpdsolutions.co.za - choose Onlinevets/VET360. SMS number available through website.
*CPD reserved for Vet360 subscribers (R360 per annum) Call 012 346 1590 for assistance SMS code a20721

**1. Which one of the following presentations is NOT typical of the feline eosinophilic granuloma complex (ECG)?**

a. Indolent ulcer
b. Eosinophilic plaques
c. Eosinophilic granulomas
d. Pruritis and trauma
e. Peri-ocular inflammation and Conjunctivitis

**2. Which one of the statements below regarding EGC is correct?**

a. Secondary bacterial may play a role in the progression of the lesions.
b. The lesions are due to an underlying autoimmune response.
c. Feline viral dermatoses are implicated
d. Feline EGC is likely to have strong heritable component
e. Insect bite hypersensitivity doesn't play a role in this condition

**3. Which one of the allergens listed is least likely to be identified in ECG?**

a. Food hypersensitivity
b. Flea bite hypersensitivity
c. Normal feline epithelium self antigens
d. House dust mite
e. Feline saliva antigens

**4. Which one of the diagnostic methods for EGC listed below is least likely to provide important information?**

a. Cytological smear
b. Blood smear
c. Elimination Diet trial
d. Lesion biopsy
e. Microbial culture

**5. Which one of the statements below regarding treatment of ECG is correct?**

a. Chlorambucil may be used and full response will occur within 2 weeks.
b. Cyclosporin is indicated in combination with depo-formulations of corticosteroids
c. The doses of cyclosporine can be decreased every 2 weeks if there is a good response to treatment
d. Topical treatment with cortisone can be used as a sole therapy
e. Megestrol acetate, an old remedy, is still considered effective.

**6. Which one of the following tests is not necessary in the initial clinical evaluation of the cat with EGC?**

a. FeLV status
b. Serum allergen specific IgE
c. A flea comb
d. A coat brushing for fungal culture
e. Lesion cytology

**7. Which one of the following statements regarding bacterial infection in EGC is correct**

a. All bacteria are deemed significant
b. Culture is recommended if cocci are found
c. Culture is recommended is rods are found
d. Culture is recommended if any bacteria are found
e. Culture is not required - a course of skin-effective antibiotics is sufficient

**8. Which one of the following treatments/ procedures for EGC is NOT correct?**

a. A 6-8 week anti-parasite treatment
b. An 8 week duration hydrolysed diet trial
c. No systemic cortisone treatment to be used until the diet and anti-parasitic trials have been completed
d. A 21 day antibiotic course
e. Using topical cortisone treatment on affected areas

**9. Which one of the following statements regarding treatment of EGC in cats is incorrect?**

a. Oral prednisolone is an effective treatment
b. Prednisolone is equivalent to prednisone and can be used in cats
c. Depo-cortisone formulations should be used with caution in cats
d. Topical cortisone is an effective treatment
e. Once a response is seen the corticosteroid dose can usually be tapered within 7-14 days

**10. Which one of the statements regarding alternative treatments for EGC is correct?**

a. Cyclosporin treatment is effective in cats and needs to be maintained at daily doses.
b. The dose of cyclosporin is higher in cats than in dogs
c. The response to cyclosporine for feline EGC is rapid
d. Cats do not show the gastrointestinal side effect to the drug which are exhibited by dogs
e. Cyclosporin, used alone, can cause potent immunosuppression

# The Proper Use of Topical and Oral Corticosteroids

By Carlo Vitale, DVM, DACVD

Corticosteroids are among the most used and misused medications in veterinary medicine. They exert a powerful, reliable, and rapid effect, and there is no viable, more effective therapeutic alternative in animals with certain skin conditions. Topical and oral corticosteroid therapies are considered the first choice for treatment of acute and chronic inflammatory skin diseases, particularly allergic dermatitis. In addition, they aid in the inflammation associated with some types of infections, primarily Malassezia dermatitis and otitis.

## Using oral corticosteroids

As a review, the oral corticosteroids available for dogs are listed in Table 1 along with their relative potencies, half-life, and relative mineralocorticoid effects. As you can see from the table, these drugs' half-life becomes much longer as the potency increases. This is important from a clinical standpoint because many patients which are treated for more than two to three weeks with oral corticosteroids experience side effects.[1] To minimise these effects, clinicians should use an alternate-day protocol when administering oral corticosteroids longer than two weeks.

The incidence of side effects—either annoying or more serious—increases as the potency of the corticosteroid increases. Some controversy surrounds the use of oral triamcinolone in regard to its potency and half-life. To be conservative, it is best to assume that oral triamcinolone has a greater potency than

*Table 1 Oral Corticosteroids Used in Dogs*

| Glucocorticoid | Relative anti-inflammatory potency | Biological half-life | Relative mineralocorticoid effect |
|---|---|---|---|
| Cortisol/hydrocortisone | 1 | 8-12 hrs | 1 |
| Prednisone/prednisolone | 4 | 12-36 hrs | 0,8 |
| Methylprednisolone (not injectable) | 5 | 12-36 hrs | 0,5 |
| Triamcinolone (not injectable) | 3-5 | 24-48 hrs | 0 |
| Dexamethasone | 29 | 35-54 hrs | 0 |

*Source: Boothe DW. Small Animal Pharmacology and Therapeutics. Philidelphia, Pa: WB Saunders Co, 2011: 313-329*

prednisone or prednisolone and has a longer biologic half-life—closer to 36 hours. Therefore, practitioners should reserve the use of oral triamcinolone in dogs for treatment of serious refractory skin diseases. Oral dexamethasone should be used in canine cases only if no other treatment has been successful and the owners have been warned about the potential serious side effects, or the owners are debating the pet's quality of life (i.e., they are considering euthanasia). The mineralocorticoid effects of corticosteroids are responsible for increased water consumption, subsequent increased urine output, and potential urinary incontinence. Prednisone and prednisolone exert a slightly stronger mineralocorticoid effect than methylprednisolone. Therefore, methylprednisolone may be used instead of prednisone or prednisolone in cases of undesirable increases in water consumption and urine output.

The most commonly administered oral corticosteroids are prednisone and prednisolone, the latter being more effective in cats. In dogs, a short regimen of prednisone or prednisolone usually results in mild to no side effects.

Most clinicians in private practice are regularly faced with challenging dermatologic cases, and a common question arises: How much prednisone is too much? No one can definitively answer this question, as different dogs respond in different ways. Some patients are unaffected by long-term prednisone administration, while others immediately demonstrate polyphagia, polydipsia and polyuria, or incontinence. Still others show signs of iatrogenic Cushing's disease—muscle wasting, a pot-bellied appearance, and muscle weakness—early on in therapy. The best approach is to try the safest treatment first, monitor the patient's response carefully, and adjust the therapeutic protocol if side effects become problematic or the condition does not respond.

Many dogs receiving corticosteroids will experience alterations in blood work, including variable increases in alkaline phosphatase activity; stress leukograms characterised by neutrophilia, lymphopenia, and eosinopenia; hyperglycemia; hypercholesterolemia; and occasionally a blunted cortisol response to adrenocorticotropic hormone (ACTH) administration.[2] These changes are generally acceptable as they are rarely of clinical importance.

Other side effects commonly seen with long-term therapy include weight gain, a pot-bellied appearance associated with fat redistribution, alopecia (some hairs fractures, but most are arrested in the telogen phase), thin and poorly elastic skin, comedones, pustules, and secondary bacterial infections primarily involving the skin and the urinary tract. In one study, more than one-third of dogs experienced a urinary tract infection when treated with corticosteroids for longer than six months.[3]

More serious side effects associated with long-term corticosteroid administration include muscle weakness, severe muscle wasting primarily affecting the muscles of mastication, *(especially in large breed dogs - Ed)* gastroduodenal ulceration, severe and often haemorrhagic colitis (particularly with oral dexamethasone), induction of sometimes irreversible diabetes mellitus, severe liver disease, and renal disease as evidenced by proteinuria.

## Using topical corticosteroids

In light of these many possible side effects, I suggest that in some cases topical corticosteroids be used in place of systemically administered corticosteroids. Most of the side effects discussed above can be avoided or reduced when topical corticosteroids are prescribed in a responsible way. However, with uncontrolled use, some side effects at the site of application are common with topical corticosteroids, including cutaneous changes such as thin skin, loss of elasticity, and comedones. Side effects can also include ecchymoses resulting from vascular fragility and ulceration with pyoderma. This pyoderma is termed bullous (blister-like) impetigo and results in large, irregularly shaped pustules. It can also be accompanied by the small pustules typically associated with allergy and can be somewhat refractory to antibiotic therapies.

The disease involving bullous impetigo and other cutaneous changes seen from the repeated use of potent topical corticosteroids is termed topical iatrogenic Cushing's disease. This response is localised to the site of corticosteroid application, can result in a blunted cortisol response to ACTH, and is reversible. Patients are less likely to experience these adverse cutaneous changes with low- or intermediate-potency topical corticosteroids such as hydrocortisone and triamcinolone.

Although topical corticosteroids are generally less likely to cause side effects than oral formulations, there are some contraindications to their use in dogs. Topical corticosteroids are contraindicated any time pyoderma is present. It is recommended that pyoderma be treated and resolved with appropriate antibiotic therapy before the application of topical corticosteroids. In some cases (particularly in small dogs), more corticosteroid will be systemically absorbed into the bloodstream per unit of body weight and thus can affect the ACTH stimulation test and elevate alkaline phosphatase activities. This is a well-recognised phenomenon with otic and ophthalmic preparations of triamcinolone, prednisone, prednisolone, and dexamethasone.

Overall, however, topical corticosteroids are far less likely to produce systemic side effects.

## Indications for corticosteroid therapy

### Flea allergy dermatitis

Before the advent of imidacloprid, fipronil, and selamectin, fleas and flea allergy dermatitis were the most common dermatologic cases seen in both general and referral practice. With more pet owners using the new adulticides, the number of flea allergy patients I see in my busy San Francisco referral practice has declined somewhat. However, the cases I do see are much more challenging—in many instances adult fleas are not observed on the dog upon presentation. This can be a result of the partial success of the new adulticides or inconsistent application of these products in the presence of environmental infestations.

When fleas aren't seen on presentation, practitioners must rely on other clinical signs to diagnose flea allergy dermatitis. Canine flea allergy dermatitis is one of few skin diseases that presents with acute pruritus. The pruritus is generally distributed over the caudal half of the body, particularly the dorsal lumbosacral area, tail base, and inguina. On occasion, some dogs develop more generalised skin disease. Scabies is another skin disease that presents with acute pruritus. In the absence of adult fleas or positive skin scrapings for sarcoptic mites, the clinical distribution of the dermatitis is the key to differentiating these two diseases—canine Sarcoptes infestation commonly presents with pinnal, elbow, and ventral pruritus.

Flea allergy dermatitis patients experience a systemic response to antigen in the flea's saliva through increased production of IgE. This promotes an influx of inflammatory cells into the skin, resulting in local and sometimes diffuse pruritus. My preferred method of treating these intensely pruritic dogs is to prescribe a short duration (two to three weeks maximum) of orally administered prednisone or methylprednisolone and institute strict flea control on the patient and in the environment. The antipruritic and anti-inflammatory dosage of prednisone and prednisolone in dogs is generally 0.5 to 1 mg/kg orally once daily and tapered over two to three weeks. Since methylprednisolone is 20% more potent than prednisone and prednisolone, 4 mg methylprednisolone is equivalent to 5 mg prednisone.

In some cases of flea allergy dermatitis, I prefer to use intermediate-potency topical spray. This approach provides many advantages over oral corticosteroids. First, some dogs are difficult for owners to medicate orally, so a topical treatment can be a welcome alternative. Secondly, the owner can apply the treatment to the specific problem areas. Thirdly, flea allergy dermatitis cases have a therapeutic endpoint. Flea control will eliminate the need for corticosteroids at some point, so it seems reasonable to consider topical treatment in order to avoid systemic side effects. In addition, systemic corticosteroids are contraindicated in animals with preexisting underlying disease such as diabetes mellitus.

### Food allergy

Another common allergic dermatologic disease is food allergy. The only consistent clinical sign is pruritus that is typically nonseasonal. The pruritus associated with food allergy can be managed similarly to flea allergy pruritus, as the proper diet should eventually eliminate the need for corticosteroids. In my opinion, it is not sound medicine to allow a patient to remain in discomfort during the initial phase of a dietary trial.

Some food allergy patients may take up to 12 weeks to respond to the diet change. During this time they may continue to exhibit pruritus and develop secondary pyoderma. Therefore, it seems prudent to consider using corticosteroids during the first two to four weeks of the diet trial. Again, oral prednisone, prednisolone, or methylprednisolone, or topical triamcinolone is preferred. Some cases of food allergy have a limited clinical distribution, involving only the feet, perianal area, axillae, trunk, or inguina. These cases are excellent candidates for treatment with topical triamcinolone alone.

### Atopy

Canine atopic dermatitis is my most commonly referred case and the most frustrating. This disease is genetically based (although the exact mode of inheritance is unknown) and is thus not curable. Clinical signs can be seasonal or nonseasonal and include many potential pruritic patterns. Since atopic disease is chronic, I usually prescribe oral corticosteroids because they constitute the most reliable and relatively safe therapy.

In some situations (cases that are refractory to oral corticosteroids or involving severe side effects to oral corticosteroids, lifelong disease, or owners who object to corticosteroid use), I prescribe cyclosporine. Because cyclosporine can have a delayed onset of action, I recommend use of topical corticosteriods for the first two to three weeks. Topical corticosteroids can also be sprayed onto a cotton ball or medical gauze and applied to difficult-to-spray areas, such as the pinnae and areas around the face. Topical triamcinolone can also be successfully used for immediate and short-term relief of pruritus pending the desired response to allergen-specific immunotherapy.

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# Feline Constipation, Relieving a Hard Problem

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Straining in the litter box, possibly even crying out... or leaving unwelcome hard pellets around the home. Who wants any of it? Constipation is unpleasant at all levels. It is uncomfortable, can interfere with appetite and, in cats, can even result in vomiting. Traditional approaches to this hard problem include administration of enemas, laxatives to soften the stool or increase contractions, dietary fiber, and promotility agents. Might we be missing something really basic? And when should we be concerned about long-term effects of constipation?

## Aetiologies for constipation

Constipation is a clinical sign that is not pathognomonic for any particular cause. Constipation increases with increasing age, so that older cats in a UK shelter study were found to be at greater risk. This study also showed a role of season: more constipation was seen during the winter. Most commonly, constipation is a result (and sign) of dehydration. The body is 65-75% water, depending on age and % body fat. Homeostasis attempts to maintain a consistent cellular and extracellular environment; when cells become dehydrated, the body takes steps to correct the fluid deficit. Drinking more and concentrating urine are helpful, but once those capabilities have been maximised, water is reabsorbed in the colon resulting in drier stool that is harder to pass. Bearing this in mind, medical therapy might not be the best initial therapeutic approach.

As well, other causes for constipation include problems that result in obstruction, (either mechanical or functional), painful defecation, stress within with the home environment (social or a dirty toilet) and possibly metabolic disease. (See Table 1)

## Evaluating the patient: history, physical examination and diagnostic testing

Given the myriad of possible causes as well as concurrent problems, getting an appropriate history is very important. Clients may misinterpret stranguria for

Table 1

| Mechanism | Examples |
|---|---|
| Increased water loss | Diuretic drugs<br>Polyuria from chronic kidney diseases, diabetes mellitus, hyperthyroidism,<br>Vomiting |
| Inadequate water intake | Inadequate water available or lack of access to water (social stress or limited mobility)<br>Painful drinking from orodental disease or difficulties swallowing |
| Painful defecation | Degenerative joint disease, diseases of anal glands, prostate, rectum |
| Reluctance to defecate | Social competition or fear of being ambushed<br>Unpleasant litter box (e.g., dirty, negative association with painful urination/defecation, inadequate size, covered box, dislike of litter type, etc.)<br>Hospitalisation |
| Obstruction - mechanical | Intraluminal foreign body, neoplasia, stricture, polyp<br>Mural thickening (neoplasia, inflammation), intussusception, diverticulum or hernia<br>Extra-intestinal compression by neoplastic or other mass, pelvic fracture, prostatic disease |
| Obstruction - functional | Drugs resulting in decreased motility (e.g., opioids, barium, atropine, etc.)<br>Idiopathic megacolon<br>Ileus due to inflammatory disease<br>Spinal neoplasia<br>Electrolyte imbalance (hypercalcaemia, hypokalaemia, hypomagnesaemia) |
| Metabolic disease | Obesity<br>Hypothyroidism |

Table 2. Getting the history. What questions should be asked?

| Question | In order to elicit information regarding |
|---|---|
| How old was your cat when you adopted him/her? Does he/she go outside at all? Has your cat's appetite increased or decreased? Have you noticed him/her having any difficulties eating/drinking or swallowing? What food does your cat eat? Have you changed the diet in the last few weeks/months? Does he/she get any treats or supplements? Are you aware of any weight loss or gain? | General background |
| How long has your cat been constipated? Is this the first time he/she has been constipated? Do you ever see blood on or in the faeces? Mucus on the faeces? If no, how often has this occurred in the past and how long has it lasted previously? What medications/treatments have been given before? | Onset and chronicity |
| Have you noticed an increase in the amount of urine your cat is producing? Is your cat vomiting (more than usual)? | Increased water loss |
| How many water stations does ___ have access to? Does he/she appear to drink comfortably? Have you noticed a change in the amount of water your cat is drinking? | Inadequate water intake |
| Do you ever find faeces outside of the litter box? If so, where is it located (another room, immediately beside the box)? When he/she is in the box, does he/she round his/her back and squat almost to the ground? Does he/she cry out when defecating? Does he/she ever vomit while or after defecating? Is there ever diarrhoea associated with straining? Is he/she moving around your home less or jumping up/down less readily? Do you notice any weakness? Is your cat declawed? | Painful defecation |
| Are there any other pets living with you? # cats ___ # dogs ___ # other ___. Do you have young children? How many litter boxes do you have in your home? Are any of them covered/hooded? How large are the boxes? Where are the litter boxes located? (If a multi-level home) Are they boxes on every level? Does __ appear to like the litter and bury his/her faeces? Are there any other cats/dogs that he/she might feel threatened by making him/her reluctant to use the box? How often do you scoop the litter box/week? Per day? Does he/she seem to have any problem getting to the litter box? | Reluctance to defecate |
| Has he/she had any traumatic accidents? Does your cat have any medical problems that you know of? Is your cat on any medications? (If yes,) Which medications is he/she getting? | Metabolic or obstructive disease, medication induced problems |

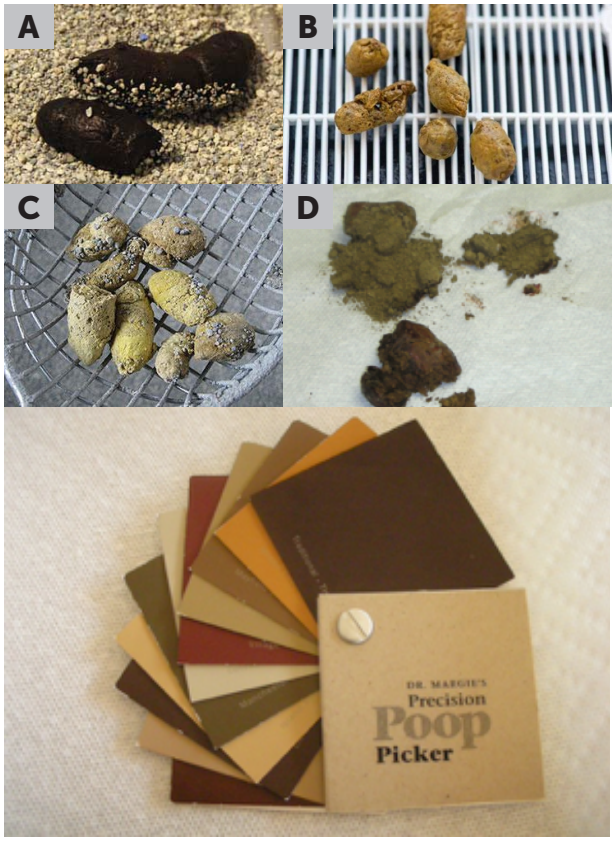


*Figure 1. Examples of faecal samples with varying consistencies. A - Normal, B - Dry, C - Hard, D - Very Dry,*
*The colour as well as the consistency of the cat's stool can be indicated using charts.*
*(The above images are not those of the author due to image quality, similar examples have been placed by the Editor)*

tenesmus. Not only is current diet (type, frequency, appetite) important, but also questions to determine whether the patient might be dehydrated (due to decreased intake or increased water loss), may have orthopaedic pain or may be disinclined to use the litter box due to social or toileting factors (fear, unpleasant box). Table 2 addresses these possible concerns at length.

Mild constipation does not require a great deal of work-up or treatment, however identifying the causes is relevant for management in order to reduce the chance for progression. Chronic, recurrent constipation results in dilation of the colon and obstipation, in some cats becoming irreversible, "idiopathic megacolon", that is refractory to cure due to loss of neuromuscular function.

**Dehydration +/- other problem => Constipation => Ongoing/recurrent constipation => Obstipation or megacolon**

On examination, hydration is assessed using skin elasticity plus coat luster, mucous membrane moisture and eye position (see Table 3). Skin elasticity can be misleading in older patients (as well as young kittens) due to age-related changes

Table 3

| Degree of deficit relative to euhydrated state | Physical examination findings |
|---|---|
| Mild: ~5% | Slightly tacky mucous membranes or saliva, minimal loss of skin turgor, normal eye position |
| Moderate: ~8% | Dry mucous membranes, moderate loss of skin turgor, mildly sunken eyes |
| Severe: >= 10% | Extremely dry mucous membranes, skin does not return to original position when tented, severely sunken eyes, weak thready pulses, tachycardia, hypotension, altered level of consciousness |

*From Davis H, Jensen T, Johnson A, et al. 2013 AAHA/AAFP Fluid therapy guidelines for dogs and cats. J Am Anim Hosp Assoc 2013; 49:149–159*

in elastin and collagen. Body weight, weight change relative to previous evaluation, body condition score (indicating percentage body fat) and muscle condition score (indicating protein adequacy) help determine progression as well as rehydration amounts.

On the first episode of uncomplicated constipation, further testing is not needed and treatment via rehydration is likely adequate. For recurrent constipation or when complications such as trauma or degenerative joint disease (DJD) or neurologic signs are present, additional steps are recommended. A minimum database consisting of a complete blood count (CBC), serum biochemistries, total T4, and urinalysis should be performed to assess overall metabolic status and to get a more information regarding degree of dehydration.

Abdominal palpation reveals the presence of firm faeces in the colon unless the faeces is hidden in the rectum. Radiographs are required to confirm that the firm mass is in fact intraluminal as well as to identify possible extraluminal problems such as obstructive masses or orthopaedic/skeletal problems. Spondylosis deformans of the lumbosacral vertebral column as well as pain from degenerative changes in the shoulders, elbows, hips, stifles or hocks may limit mobility making it harder to get to the litter box or to squat comfortably. Evidence of pelvic fracture or other poorly aligned fractures may be observed.

Sedation may be helpful, allowing gentle manipulation of joints to assess if range of motion is restricted or if pain is present. All cats with recurrent constipation should have a digital rectal exam. This helps to assess abnormalities of the anal glands, prostate, pelvic inlet, the presence of rectal diverticulum, polyps or other obstructive masses. Chronic tenesmus can result in perineal herniation.

**KEY POINT: Stretching or irritation of the colon may result in vomiting. A cuffed endotracheal tube should be in place when administering enemas, manipulating faeces or examining the rectum under anaesthesia.**

Abdominal ultrasound is useful to assess motility, to further examine abdominal structures and to collect fine needle biopsies or suspicious lesions. Colonoscopy may be required to biopsy mural or intraluminal masses. Computed tomography (CT) or magnetic resonance imaging (MRI) may be used if an intrapelvic lesion is present or if neurologic deficits are present. Cats with evidence of neurologic problems such as paraparesis, hyporeflexia, urinary retention, regurgitation, etc., should have a complete neurologic examination to rule out sacrocaudal dysgenesis (e.g., Manx breed), spinal neoplasia or dysautonomia.

Kittens with congenital hypothyroidism present with a shorter, rounder body, enlarged head with a short neck compared to their littermates. Along with dental and skeletal growth problems, they are mentally dull and commonly have difficulty passing faeces. The diagnosis is readily confirmed by finding an elevated TSH (canine TSH assay) and a low T4. Life-long treatment with thyroid supplementation (levothyroxine sodium) corrects abnormalities.

## Treatment: Hydration first

**1.** The cornerstone of therapy for constipation is rehydration and maintenance of a hydrated state. Fluid therapy for rehydration may consist of intravenous fluids but subcutaneous therapy is generally adequate. The volume of fluid needed to correct the fluid deficit is based on the patient's previous hydrated weight. If not known, the total solids/total protein in conjunction with packed cell volume or hematocrit may helpful. An isotonic polyionic fluid (e.g., lactated ringer's solution. LRS) is appropriate for rehydration.

A maintenance solution is preferable for ongoing maintenance therapy in order to prevent hypernatremia and hypokalemia, however if this results in discomfort, then LRS may be considered. The volume required for maintaining hydration is 60 ml/kg normal, hydrated weight/day*. Box 1 shows an example. Table 4 shows an alternate method to calculate rehydration requirements or use Table 4

After rehydration, for maintenance: This rehydrated 6.0 kg cat needs 360 ml/day. If the cat eats canned food 156 g with 80% water = 124 ml water, only an additional 236 ml of fluids are needed

**2**. Removal of the faeces using enemas or manual extraction may be done while the patient is being rehydrated. Use of dietary therapy, prokinetic agents and laxatives, however, should not be initiated until the patient has been rehydrated. Dietary fiber and medical therapy increase faecal water or interfere with the colon's attempts to resorb water needed for cellular hydration.

Administering smaller volumes (e.g. 35ml) of warm water (or saline) mixed with 5 ml of mineral oil, glycerin, polyethylene glycol (PEG/PEG 33350), lactulose or docusate sodium into the colon several times throughout a 24 h period is safer and more effective than administering the entire volume as a bolus. Because docusate sodium increases absorption, it should not be administered concurrently with mineral oil. Paediatric rectal suppositories can also be used (e.g., bisacodyl, docusate sodium). If the patient is anaesthetised or sedated for rectal manipulation (digital exam, manual faecal extraction or enema administration), a cuffed endotracheal tube should be in place in order to prevent aspiration from vomiting.

**3.** Dietary therapy is the third step in treatment of a constipated cat. Soluble fibers (e.g., pectin, oligosaccharides) are capable of adsorbing (binding) water and forming a gel. Insoluble fibers increase faecal bulk resulting in distention and reflex contraction. Both interfere with water reabsorption into the body and should only be considered when a patient is well hydrated. Different fiber sources have different soluble:insoluble proportions.

Fiber can also be characterised by differences in fermentability, which refers to the ability of intestinal bacteria to produce short chain fatty acids (SCFA) and gas from the fiber. Moderately fermentable fibers (such as beet pulp) are preferable to a highly fermentable, high-gas-forming fiber source. SCFAs are vital as an energy source for colonocytes and are key in motility.

While a psyllium-enhanced dry diet has been shown to be effective in treating constipation, increasing water intake, through including wet foods and increasing desirable water stations in the home is beneficial. As with all things in cats, individualisation is critical. Regardless of diet chosen, the patient should be reassessed to ensure that the diet is having the desired effect.

**4.** Cathartics are agents that increase colonic motility. They include hyperosmotic laxatives such as polysaccharides (e.g., lactulose) and polyethylene glycols (PEG) or those that irritate and stimulate the mucosa (e.g., vegetable oils, sennoside, glycerin).

True laxatives act by other mechanisms. Lubricating laxatives (e.g., mineral oil, hairball remedies) impair water absorption; emollient laxatives (e.g., anionic detergent such as docusate sodium) enhance absorption of lipid, but impede water absorption; bulk-forming laxatives (e.g., cellulose or poorly digestible polysaccharides such as cereal grain) increase faecal bulk, fermentation and viscosity.

**5**. Promotility drugs should be considered after other therapies have been instituted and been shown to be insufficient. Cholinergic agents (e.g., bethanechol) have undesirable side-effects and cannot be recommended. Drugs affecting serotonin 5-HT4

**Box 1: Fluid volume for deficit correction and hydration maintenance**

Example: A 5.4 kg dehydrated cat, with ~5% deficit whose normal, hydrated weight was 6.0 kg

Deficit = 5% × 6.0 kg hydrated weight = 300 ml*

+ Maintenance = 60 ml/kg/day* × 6.0 kg = 360 ml

Total: 660 ml in first 24 hours

*From Davis H, Jensen T, Johnson A, et al. 2013 AAHA/AAFP Fluid therapy guidelines for dogs and cats. J Am Anim Hosp Assoc 2013; 49:149–159*

Table 4
110 ml/kg/day X 6.0 kg = 660 ml

| **Maintenance (60 ml/kg/day) + % dehydration** | **Ml/kg/day** |
|---|---|
| Maintenance + 1% | 70 |
| Maintenance + 2% | 80 |
| Maintenance + 3% | 90 |
| Maintenance + 4% | 100 |
| Maintenance + 5% | 110 |
| Maintenance + 6% | 120 |
| Maintenance + 7% | 130 |
| Maintenance + 8% | 140 |
| Maintenance + 9% | 150 |
| Maintenance + 10% | 160 |

*Adapted from DiBartola 4th ed Fluid, electrolyte acid-base disorders p347*

**Treatment flow algorithm**

Rehydrate and maintain hydration

↓

Remove faeces by enema or manual extraction

↓

Modify diet (canned low residue diet, psyllium-enhanced dry diet)

↓

Laxative therapy

↓

Promotility drugs

receptors (e.g., cisapride, mosapride, prucalopride, tegaserod) have been used to effect. These should be given *per os* as the transdermal route fails to deliver therapeutic levels. Experimentally, nizatidine and ranitidine inhibit anticholinesterase activity acting synergistically with cisapride.

**6.** A recent paper (Rossi) evaluated the clinical and histologic effects of a probiotic (SLAB51) in cats with chronic constipation with or without megacolon. Faecal consistency improved during treatment. Tissue samples harvested at time zero were compared with those taken 90 days after starting treatment as well as to biopsies archived from unaffected cats. Results showed an increase in interstitial cells (CD17+) which the authors suggested might reflect a decrease in inflammation. Additionally, there was an alteration in the microbiome, with an increase in Lactobacillus *spp.* and Bacteroidetes.

If the patient has concurrent medical problems, he/she may be on other medications which might exacerbate constipation. These include those that increase dehydration (i.e., diuretics) and those that interfere with intestinal motility, such as anticholinesterase and sympathomimetic agents, barium, opioids, tricyclic antidepressants and some H1-antihistamines.

## What role does the environment play?

A basic environmental need (Ellis, 2013) is to have multiple but separated resources. These include duplicates each of water, food, litter boxes/outside latrines, perches, resting areas and toy stations. By having multiple sites, separate from each other, the chance of inter cat or threat (perceived or real) from other individuals is minimised. So too, having unhooded litter boxes is important to eliminate the risk of ambush. Litter boxes need to be large (at least 1.5X length of cat) and very clean. They (and all resource stations) need to be easy to access, especially for a cat that is mobility restricted (e.g., due to DJD).

Water stations must be kept clean and freshened regularly. Feeding small amounts of food, frequently, results in cats drinking a greater volume of water (Kirschvink, 2005). Wet food increases water intake significantly, favouring a positive hydration status.

## To cut is to cure?

Colectomy is a "last resort" for the cat with megacolon who is refractory to medical management and has been struggling with obstipation for more than six months. If pelvic trauma resulting in malunion occurred more than six months earlier, colectomy is likewise justified. Should pelvic trauma have occurred less than six months ago, however, pelvic osteotomy may be all that is required to prevent megacolon from developing. Colectomy is a procedure with significant potential complications and should be referred to a surgeon with advanced soft tissue and anastomosis skills whenever possible.

## Summary

Early correction and management of constipation will help prevent irreversible problems from developing. The effects of all drugs and dietary manipulations depend on the patient being adequately hydrated. Behavioural and environmental aspects should not be overlooked. Clean, attractive litter boxes that are safe and easy to access not only enhance a positive quality of life but also prevent retention of faeces or inappropriate elimination. Regular follow-up is very important. By assessing the effect of the recommendations on the individual and making adjustments as warranted will provide the best individual health care outcome.

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# CLIENT INFO SHEET

## How to give Subcutaneous Fluids to Cats

### To warm the fluids to body temperature:

**1. Using an unopened bag:**

a. Remove the outside protective bag
b. Microwave the bag for 2-3 minutes (depending on microwave)
c. Massage the warmed bag to distribute the heat evenly.
d. Test the bag on your wrist. It should feel comfortably warm, just about body temperature.

**2. If the bag has already been used and has the line attached, do not microwave it as the line will melt and seal shut.**

a. Boil water in a kettle or pot
b. Put the bag into a vase or tall upright container with the bulb portion up so it will remain above the water
c. Pour the hot water into the vase taking care to not reach the bulb
d. Set the timer for about 5 minutes (depends on how much is remaining in used bag)
e. Massage the warmed bag to distribute the heat evenly.
f. Test the bag on your wrist. It should feel comfortably warm, just about body temperature

### To connect a new line to a bag:

1. Prepare the line by rolling the wheel to a closed position
2. Take the cap off the line being careful not to touch the end of the line
3. Remove the end from the port on the bag
4. Insert the pointed end of the IV line into the port
5. Squeeze the bulb of the IV line to fill the bulb half full
6. Open the line by rolling the wheel to the open position and fill the line with fluids

### To give your kitty fluids

1. Hang the bag of fluids on a curtain rod or shower rod with the still capped line hanging down
2. Place an unused, covered needle on the line and place the sterile cap (from the end of the line) close by
3. Sit somewhere comfortable. I prefer the floor so that kitty feels secure.
4. If you want, you can wrap your kitty in a towel leaving head and shoulders exposed and cradle him/her
5. Remove the cover on the needle
6. With kitty facing away from you, holding the needle rest your dominant hand on your kitty's back with the needle facing toward his head
7. Lift and make a tent with the skin between kitty's shoulders using your non-dominant hand
8. Exhale and firmly pull that skin tent over the needle
9. Open the IV line wheel and administer the volume of fluids as directed by your doctor
10. Once the needle is in place, because the fluids are warmed, kitty should be comfortable. Giving treats and praise doesn't hurt either!
11. Close the IV line, remove and discard the needle safely recapping the line with the sterile cap
12. Pinch the skin together with your non-dominant hand when you remove the needle

CONGRATULATIONS! YOU'VE DONE IT!

**Notes:**

1. While you are getting used to this procedure, it may help to have the fur shaved over two places at the back of the neck. That way you can be sure the needle is getting under the skin. The fur will grow back.
2. Your kitty will look like she/he is wearing shoulder pads. The fluids will droop to one side down a leg, even to the paw. These will be absorbed over 12-24 hours.
3. If some of the fluids or even a bit of blood leak from the injection site, there is no need to worry.

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